Documentation

Description	Documentation for the Game Creator tools
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Repository	https://gamecreator.link/core
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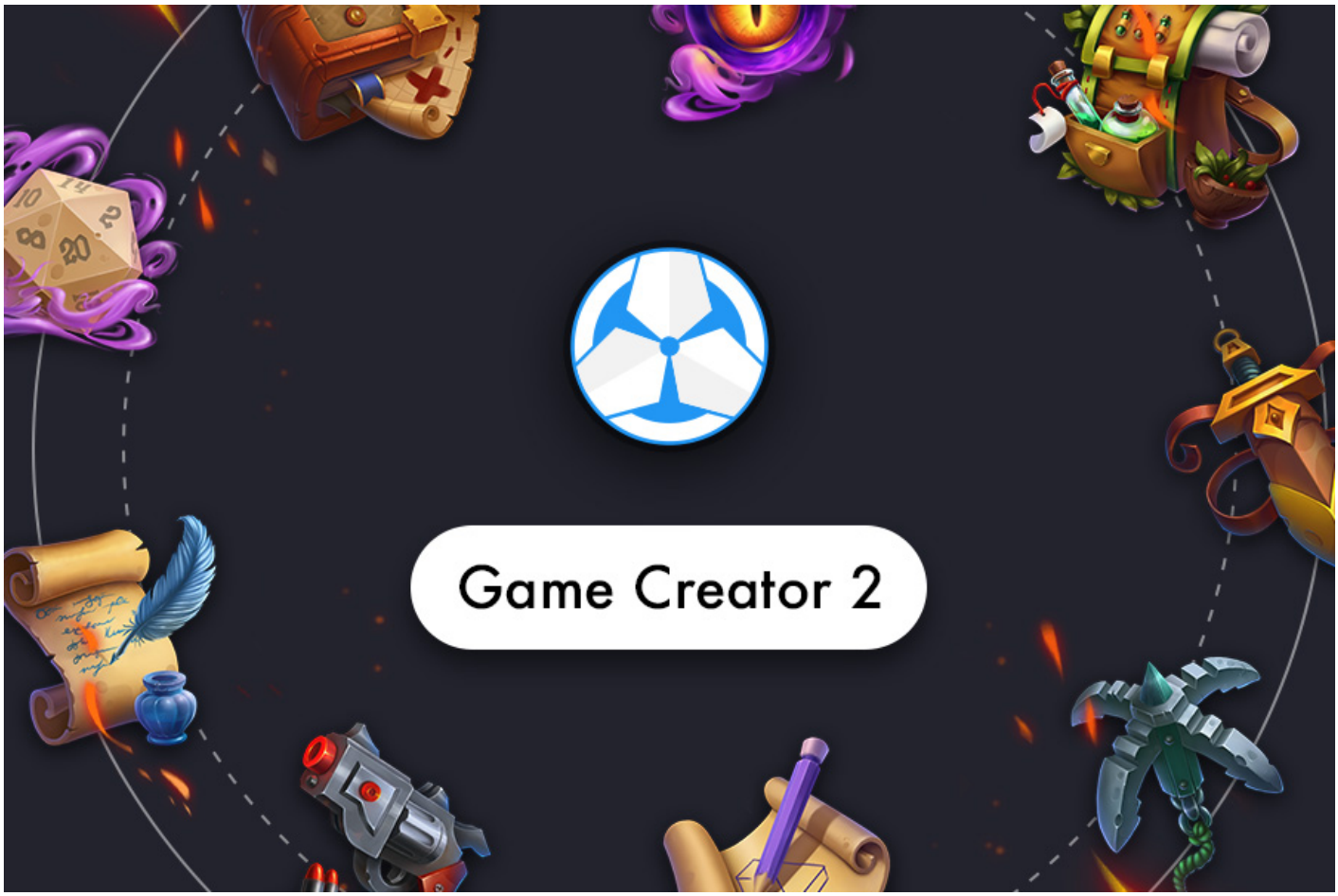
I. Game Creator

1 Welcome to Game Creator

Every game begins with an idea – a world to build, a compelling game mechanic, a feature that players are bound to fall in love with – but it takes a lot of work to bring that idea into fruition. Game Creator is a collection of tools to help make the journey from idea to playable game a lot smoother.



Acronym

Game Creator is sometimes informally abbreviated as **GC**.

1.1 Who is it for?

Game Creator is the perfect tool for both beginners and experienced users.

- Newcomers will find an easy-to-use tool with a very smooth learning curve, thanks to the small amount of concepts one has to learn in order to get started.
- Experienced users will find that these small set of tools have a lot of depth and can be synergically used to create any mechanic with ease, while favoring quick iteration.

Game Creator also has a very straight-forward API for programmers, from which they can extend the tools with new features and seamlessly integrate them with the rest of the ecosystem of tools. Level and art designers can quickly test their environments, creating a playable character and a camera type that fits their game with just a couple of clicks. And game designers will be delighted with a plethora of tools that they can use and exploit to create intrincate game mechanics.

1.2 How to get started

The easiest way to start learning how to use **Game Creator** is to jump to the Getting Started section. It overviews everything you need to know to get up to speed and assumes you have no technical knowledge. It also contains links to other learning resources from where to learn more.

1.3 What is it?

The **Game Creator** package comes with a slew of tools that help you very easily make the game of your dreams. These tools have been carefully crafted to be as flexible and intuitive as possible. Each tool takes care of dealing with the heavy-math under the hood and present it to you in a very human-friendly form, so you can focus on what really matters: Making games.

- **Characters:** Characters are entities living in your scene. These come loaded with common features, such as inverse kinematics, obstacle avoidance navigation, user input, jumps, footstep sound effects and animation systems.
- **Cameras:** Cameras allow to control how your game is framed. From an orbiting third-person perspective with zoom and geometry clipping avoidance to more traditional fixed camera angles, top-down perspectives or first-person views.
- **Visual Scripting:** Visual Scripting in Game Creator is very unique: Instead of using a typical node graph, it borrows the concept of task lists. This makes it really easy to read, organize and keep all interactions under control without the project quickly becoming a spaghetti mess.
- **Variables:** Variables allow to keep track of the game's progress and storing it when the user saves the game.

> ✓ **More tools**
>
> Game Creator comes with more tools than the aforementioned above. However, we recommend beginners focus on understanding these first. Experienced users and programmers can jump to the Advanced section to know more about the rest.

1.4 Modules

Game Creator is built to be extremely flexible and extensible. **Modules** are add-on packages that extend the features provided even further. For example, the **Inventory** module allows to easily define items with different properties, which can later be equipped, consumed, crafted, dropped, sold, bought or stored in chests.

- Inventory: Manage and equip items, craft new ones and trade them with other merchants.
- Dialogue: Create conversations with other characters with branching narratives.
- Stats: Make complex RPG interactions with intertwined stats, attributes and status effects.
- Quests: Keep your game's progress and lore under control with a mission manager.
- Behavior: Easily manage character's AI using Behavior Trees and other mechanisms.
- Perception: Allow entities to use sight, smell or hearing to understand the world.
- Shooter: Create long-ranged shooting mechanics.
- Melee: Define close quarter combat mechanics with parries and combos.
- Traversal: Give characters the ability to climb and other traversing skills.

Modular synergy

Modules do not just extend **Game Creator**'s capabilities, but can also communicate with other **Modules**. This allows to intertwine their features and develop even more complex game mechanics.

Example of use case

A very common case is using the **Dialogue** module along with the **Stats**. The first one allows to easily manage conversations between characters, where the player is prompted with choices and characters react to these. The **Stats** module, on the other hand, allows to define RPG traits to objects.

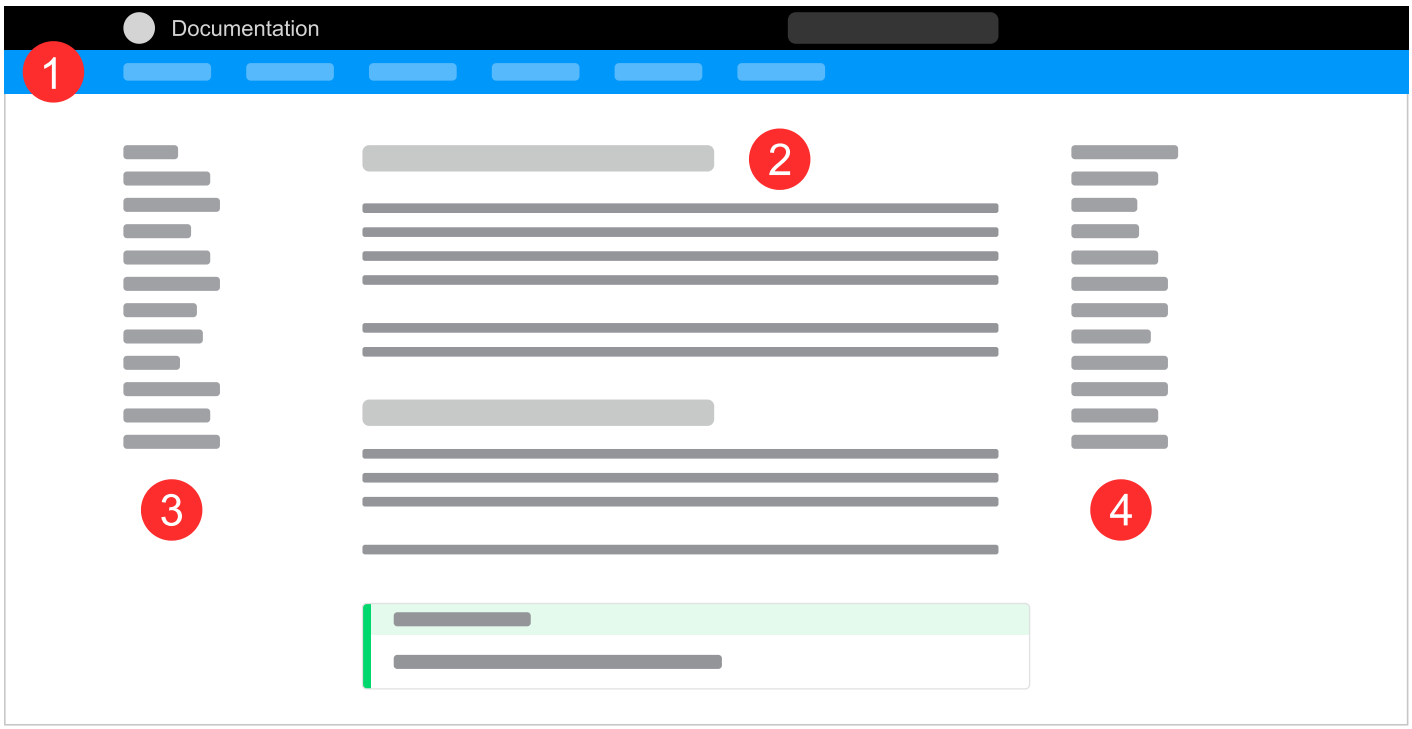
By combining these two modules you can create more interesting mechanics, such as displaying an option during a conversation with a character, where trying to intimidate it will only yield in success if the player has a certain stat (for example `strength`) above a certain value.

1.5 Documentation

If you're reading this from a PDF file, make sure you're reading the latest version of the documentation. Click Download PDF to get the latest version.

However, we recommend you read this documenation from the website itself, which contains GIFs, higher quality images and better navigation options. PDF should only be used as an offline alternative.

The documentation is structured as follows:



1. The top navigation shows a list of all the available **Modules** with their own documentation.
2. The central page is dedicated to the content of the current page.
3. The left side-bar shows the current page you are reading.
4. The right side-bar shows the table of contents of the current page.

Game Creator 1.x Support

Game Creator 2.0 is not compatible with **Game Creator 1.x** because its code base has been re-architectured. However, most concepts are identical or very similar.

Each module has one or multiple pages dedicated to the description of what each sub-system does, with clear examples, tips and tricks. Moreover, for those who want to go one step further, all sub-systems have an *Advanced* chapter with more technical details on how it works and how it can be extended through the exposed scripting API.

1.6 Errata

If you find a mistake or omission in the documentation, please send us an email at docs@gamecreator.io with a link to the relevant entry and an explanation what you think is wrong. We'll take a look and make any necessary updates.

I.I Getting Started

2 Getting Started

Welcome to the Getting Started section. Here you will find all necessary resources to get you started with **Game Creator**.

- **Installation:** Learn how to install Game Creator from the Unity Asset Store.
- **First Steps:** Get to know the basic first steps towards using Game Creator.

Once you are comfortable with the core concepts, we recommend checking the **Examples** that come with Game Creator and the free **Courses** available on the website. If you prefer to learn in non-written format, you can also check our Youtube channel, where we upload new video tutorials.

- **Examples:** Discover examples to learn from and production-ready templates.
- **Video Tutorials:** A collection of courses you can take at your own pace.

We also recommend checking out the **Game Creator Hub**: It's a community-driven platform where anyone can download further free Instructions, Conditions and Events.

- **Game Creator Hub:** Explore how the Hub can help you connect with other developers and expand the tools at your disposal.

3 Installation

This guide explains how to set up your Game Creator project from scratch. It includes information about prerequisites, installing the package, creating an initial workspace and verify your setup.

3.1 Creating a new project

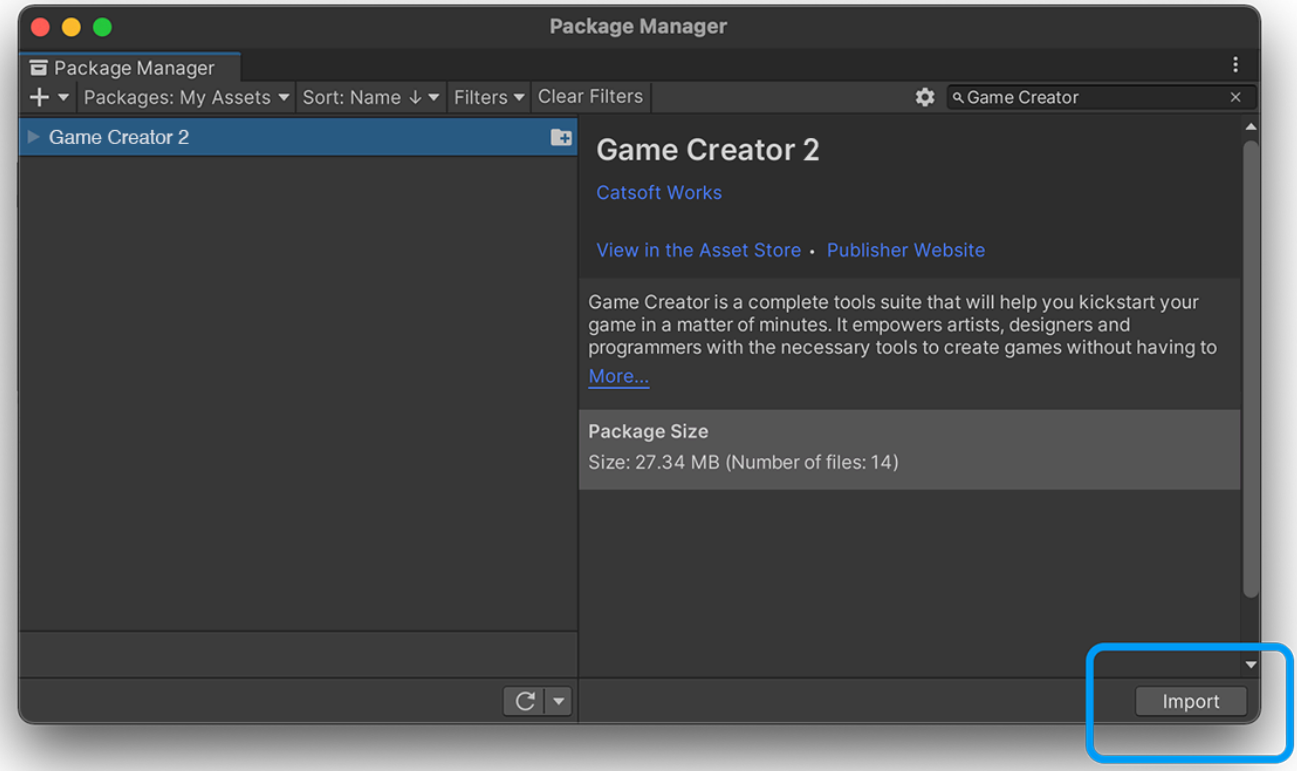
Start by downloading the Unity Hub software and install the latest Unity version. Create a new blank project and choose the rendering pipeline that suits you best.

> **Rendering Pipeline**
>
> We recommend using the **Built-in Rendering Pipeline** (BRP) if it's the first time you're using Unity or you just want to try out Game Creator. If you want to use **URP** or **HDRP**, convert the materials automatically clicking on *Edit* → *Rendering* → *Materials* → *Convert all built-in materials to URP/HDRP*.

Get the **Game Creator** core package from the Unity Asset Store following the link below:

Get Game Creator

Once you have purchased it, click on the "Import" button on the website and the Unity Editor's **Package Manager** window should appear with the **Game Creator** package selected. Click on *Download* and *Import* afterwards.



Let the process complete and if everything went fine, your console shouldn't have any errors. If you do, please feel free to reach out to our support email.

3.2 Verify installation

If you have successfully installed Game Creator you should see a new "Game Creator" menu at the top-toolbar with a set of options. You'll also have access to a new "Game Creator" section right clicking on both the *Hierarchy* panel and the *Project* panel.

3.3 Setting up for Git

We highly recommend using GitHub or GitLab for backing up your projects. If you use Git as your main repository source be sure to add the following snippet at your `.gitignore` file:

```
# Game Creator
/Assets/Plugins/GameCreator/Documentation.pdf
/Assets/Plugins/GameCreator/Packages
```

This willl avoid adding the offline documentation file to your git repository as well as the examples & code from the Game Creator asset. The reason why the code can be ignored is that it can be easily downloaded from the Asset Store. If you prefer to save a local copy of the current version of your Game Creator package, skip the last two lines and only include the following on your `.gitignore` file:

```
# Game Creator
/Assets/Plugins/GameCreator/Documentation.pdf
```

4 First Steps

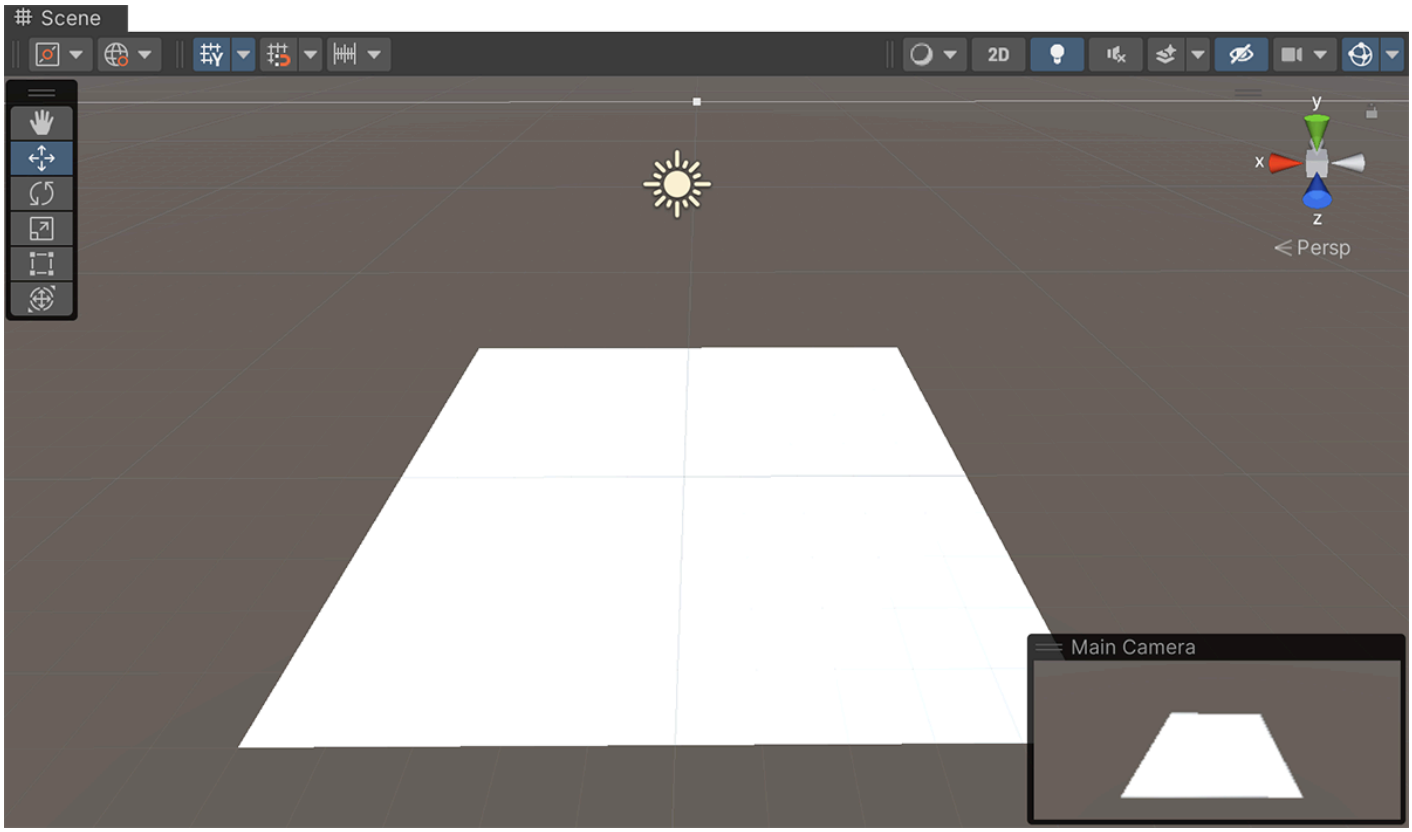
In this section you'll learn to setup a very simple example that uses some of the core features of Game Creator. It shouldn't take you more than 5 minutes to have it up and running.

4.1 Preparing the scene

Let's start creating the geometry that will hold the scene. Right click on the *Hierarchy Panel* and select 3D Object → Plane. This is going to be the floor.

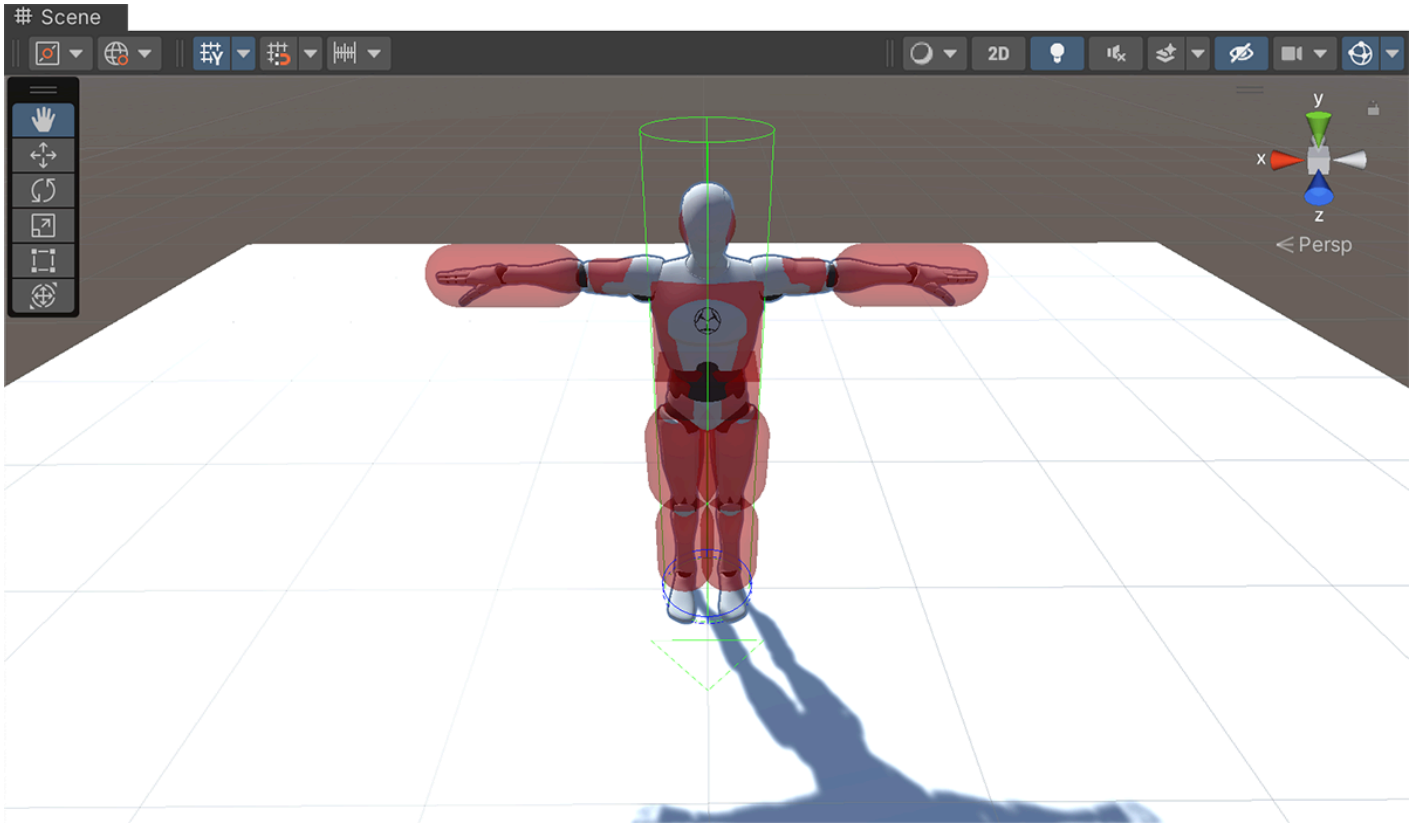
If the scene doesn't have a light, create one right clicking again on the *Hierarchy Panel* and select Light → Directional Light and place it somewhere that shines downwards towards the plane.

Finally, if the scene doesn't have a camera object, create one clicking on the *Hierarchy Panel* and select Create → Camera. Select it and, in the upper-part of the *Inspector* window, change its tag from `Untagged` to `MainCamera`. You should also change the camera's position and rotation so it points towards the center of the plane, in order to visualize what happens in it.



4.2 Creating the Player

To create a player character, open the *Hierarchy Panel* context menu and select Game Creator → Characters → Player. This should have created a character object in the scene in T-pose. If you click play, you should be able to control the default player using the WASD keys or a controller, if you have one plugged in.



4.3 Creating a camera

Game Creator uses Camera Shots to tell the main camera how to behave and which target/s to follow. The easiest way to follow the player character is to use the Third-Person camera shot, which automatically orbits around the player using the mouse's movement and allows to zoom in/out.

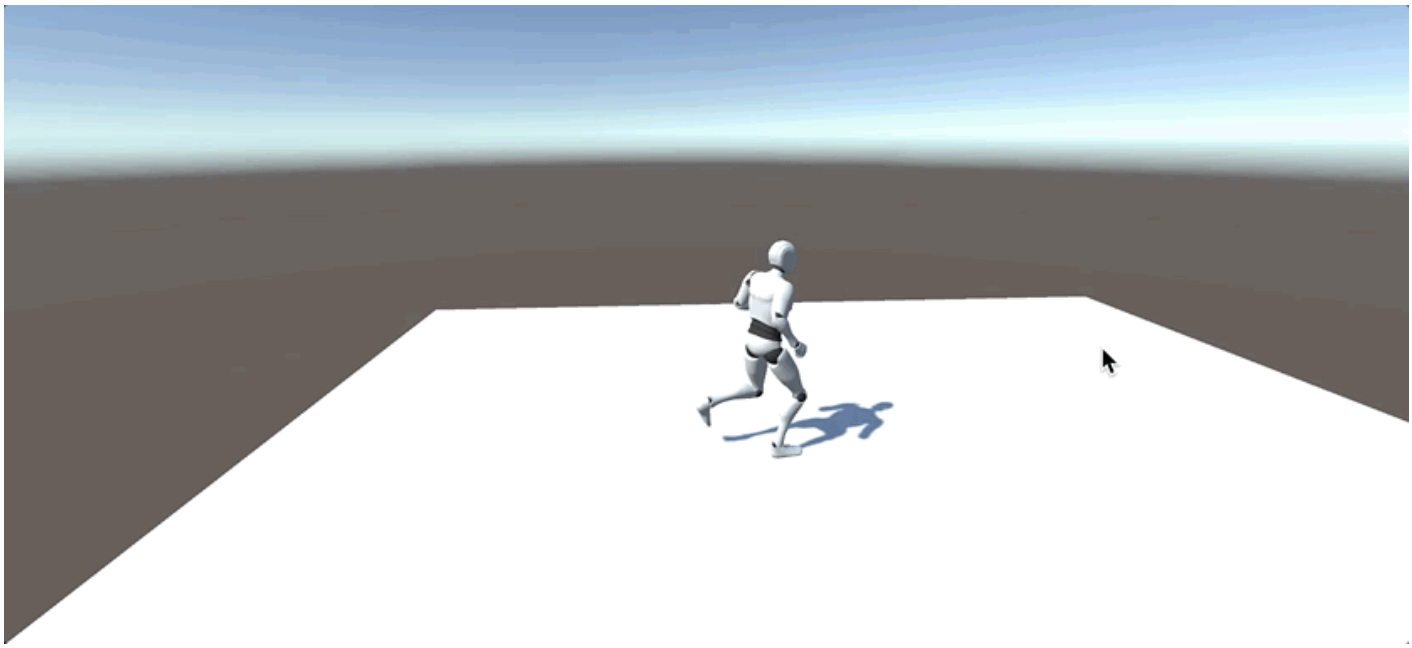
To create a **Camera Shot** open again the **Hierarchy Panel**'s context menu and select Game Creator → Cameras → Camera Shot.

> **Automatic camera detection**
>
> Creating a new Camera Shot will automatically add the Main Camera component on the scene's main camera, if any at all. If the main camera doesn't have any Camera Shot assigned, it will assign this newly created shot.

The default Camera Shot is the Fixed one. However, we want to use the Third-Person Orbit shot. To change the type of camera shot, click on its name and select **Third Person** from the dropdown menu.

New options should appear now. We need to specify the target at which the camera will look at and orbit around. In both cases, this is the Player, so choose the "Player" option from the `Look Target` and `Orbit Target` fields.

Enter Play-Mode and you should be able to move the player like before, but the camera should also track it and orbit around it using the mouse or controller's right stick.

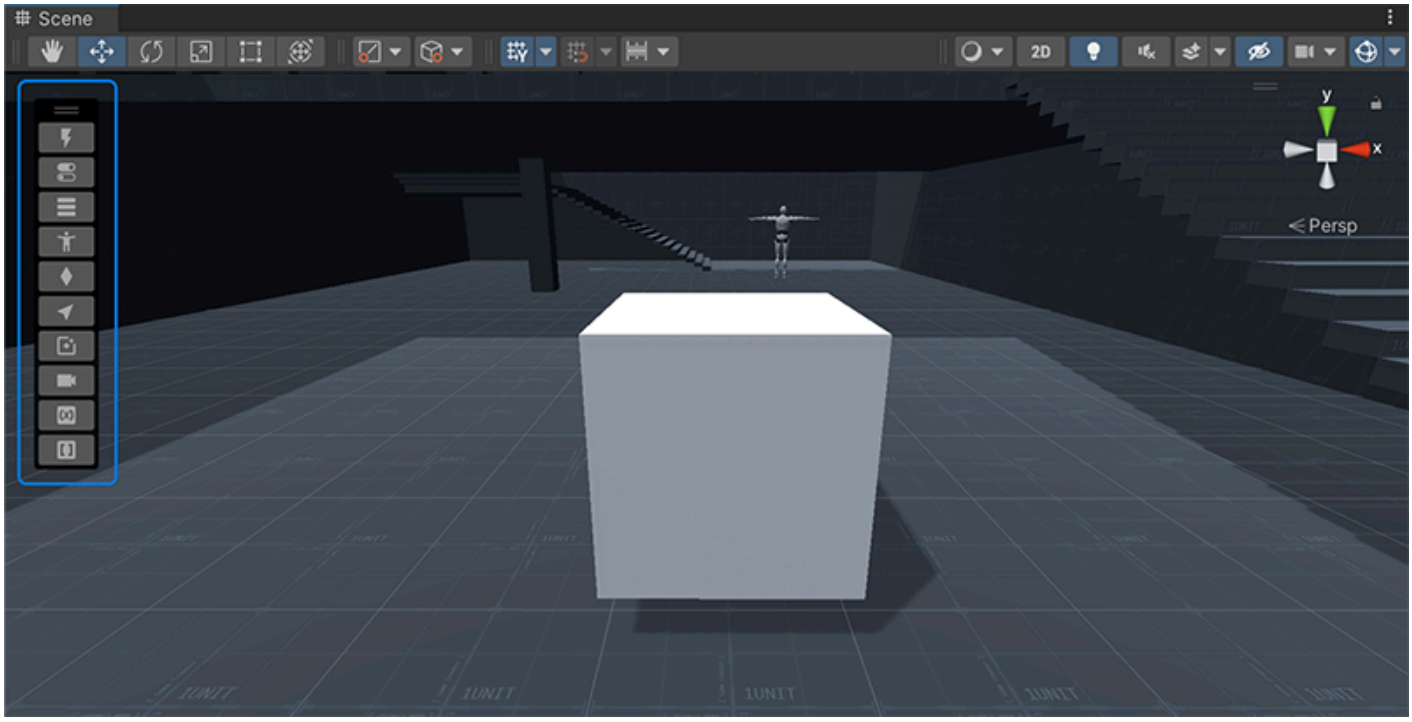


Next Steps

Check out Game Creator's free courses for more step-by-step tutorials

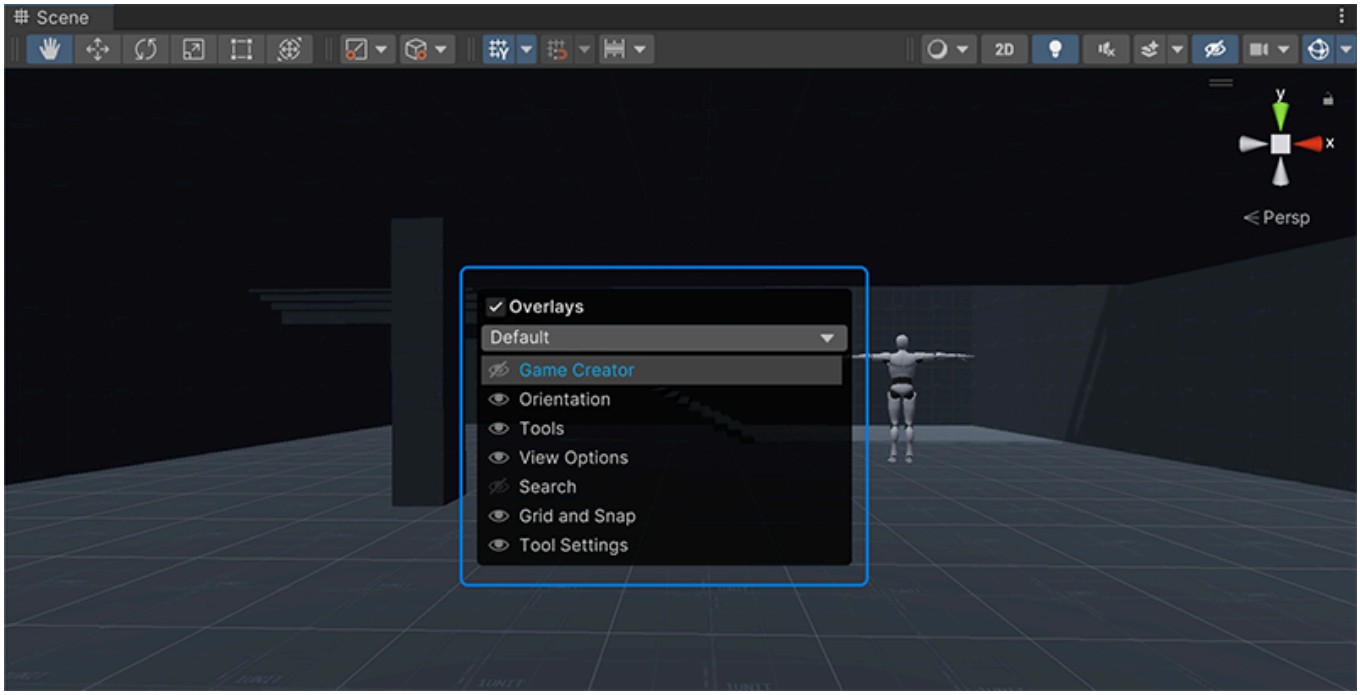
5 Toolbar

Since version 2.3.15, **Game Creator** comes with a dockable **Toolbar** that can be used to create common components in the scene view.



Display Toolbar

If the Toolbar is not displayed by default, focus on the scene view and right click on the top tab and select *Overlay Menu*. This will pop a vertical menu that allows to show/hide different toolbars. Click on **Game Creator** to enable its visibility.



The toolbar can be docked as any other toolbar. Simply drag the handles and drop them on any corner or edge.

The orientation can also be changed to fit the position. To do so, right click the handles and select one of the following options:

- **Panel**: Displays an horizontal stripe with the name and icons for each button
- **Horizontal**: Shows an horizontal stripe with just the icons
- **Vertical**: Similar to Horizontal, but displays each button vertically stacked

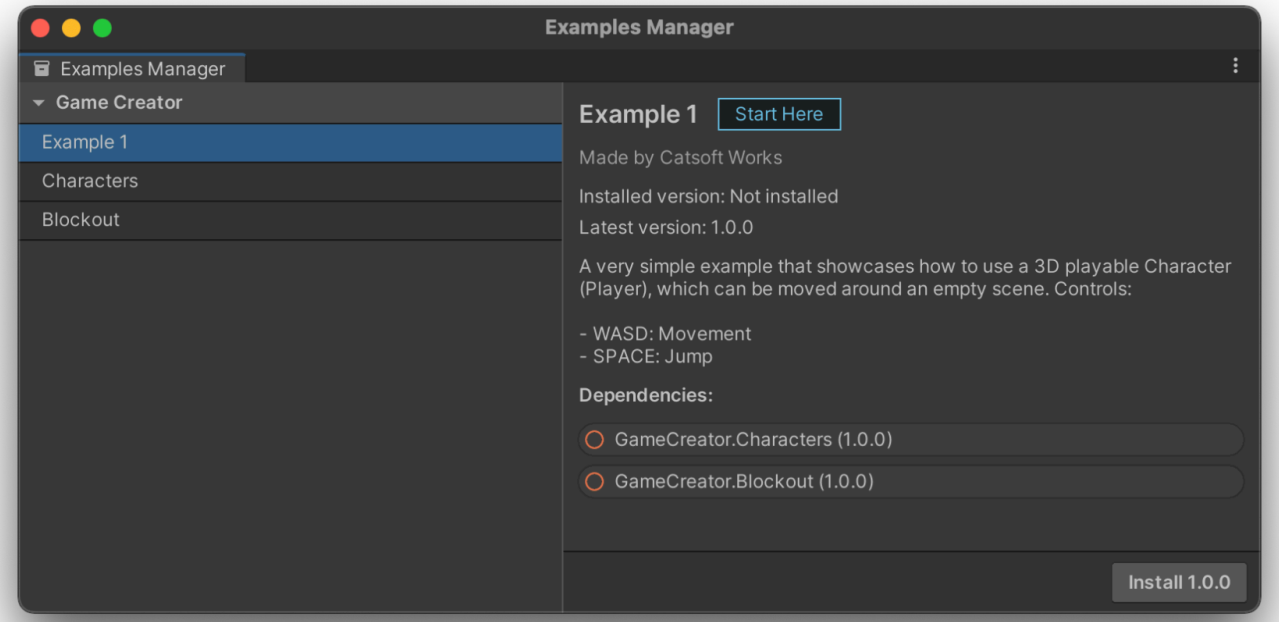
Tooltips

We recommend using either Horizontal or Vertical layouts. Hovering over any of the icons will display a small tooltip with a description of what that button does.

6 Examples

Game Creator comes packed with a collection of examples that have been carefully hand-crafted to speed up your development process even further with common mechanics. You can think of them as *templates* of game mechanics you can use for your projects.

To install an example, head to the top toolbar and click **Game Creator** → **Install...**. A window will appear with a collection of available examples to install. Select one that you want to add and click *Install*.



Dependencies

An example may or may not have a list of dependencies. The **Install** window will display a green icon if the example dependency is installed or a red icon if it is not. Installing a module with dependencies will install and update all dependencies.

Once you do that, the example will appear under `Assets/Plugins/GameCreator/Installs/` or you can simply click the *Select* button to automatically select the example's folder.

Example Path

When installing an example, it is located at the `Plugins/GameCreator/Installs/` directory. The name of the example's folder is the `[name of the module]` followed by a dot, the `[name of the example]` followed by an `@` (at) symbol and the version number. For example, Game Creator's *Example 1* with version 1.2.3 will be located at: `Plugins/GameCreator/Installs/GameCreator.Example1@1.2.3/`.

6.1 Uninstalling an Example

If you want to uninstall an example, simply delete root folder of the example. For instance, if you installed a Game Creator example called "Example 1", you can right click the folder at `Assets/Plugins/GameCreator/Installs/GameCreator.Example1@1.0.0/` and choose *Delete*. This will permanently delete the example from your project. However, you can still reinstall it again from the **Install** window.

I.II Characters

7 Characters

One of **Game Creator**'s main systems is the **Character**. It represents any interactive playable or non-playable entity and comes packed with a collection of flexible and independent features that can be used to enhance and speed up the development process.

7.1 Main Features

A **Character** is defined by a `Character` component that can be attached to any game object. It is organized into multiple collapsable sections, each of which controls a very specific feature of this system.

Some of the most noticeable features are:

- **Player Input:** An input system that allows to change how the Player is controlled at any given moment. Including directional, point & click, tank-controls, and more.
- **Rotation Modes:** Controls how and when the character rotates. For example facing the camera's direction, its movement direction or strafing around a world position.
- **World Navigation:** Manages how the character moves around a scene. It can use a Character Controller, a Navigation Mesh Agent, or plug-in a custom controller.
- **Gestures & States:** An animation system built on top of Unity's Mecanim which simplifies how to play animations on characters.
- **Inverse Kinematics:** An extendable IK system with feet-to-ground alignement or realistic body orientation when looking at points of interest.
- **Footstep Sounds:** A very easy to use foot-step system that mixes different sounds based on the multiple layers of the ground's materials and textures
- **Dynamic Ragdoll:** Without having to configure anything, the Ragdoll system allows a character to seamlessly transition to (and from) a ragdoll state.

7.2 Player Character

The Player character uses the same **Character** component as any other non-playable character but with the difference that it has the `Is Player` checkbox enabled. A **Character** with this option enabled processes the user's input based on its Player section.

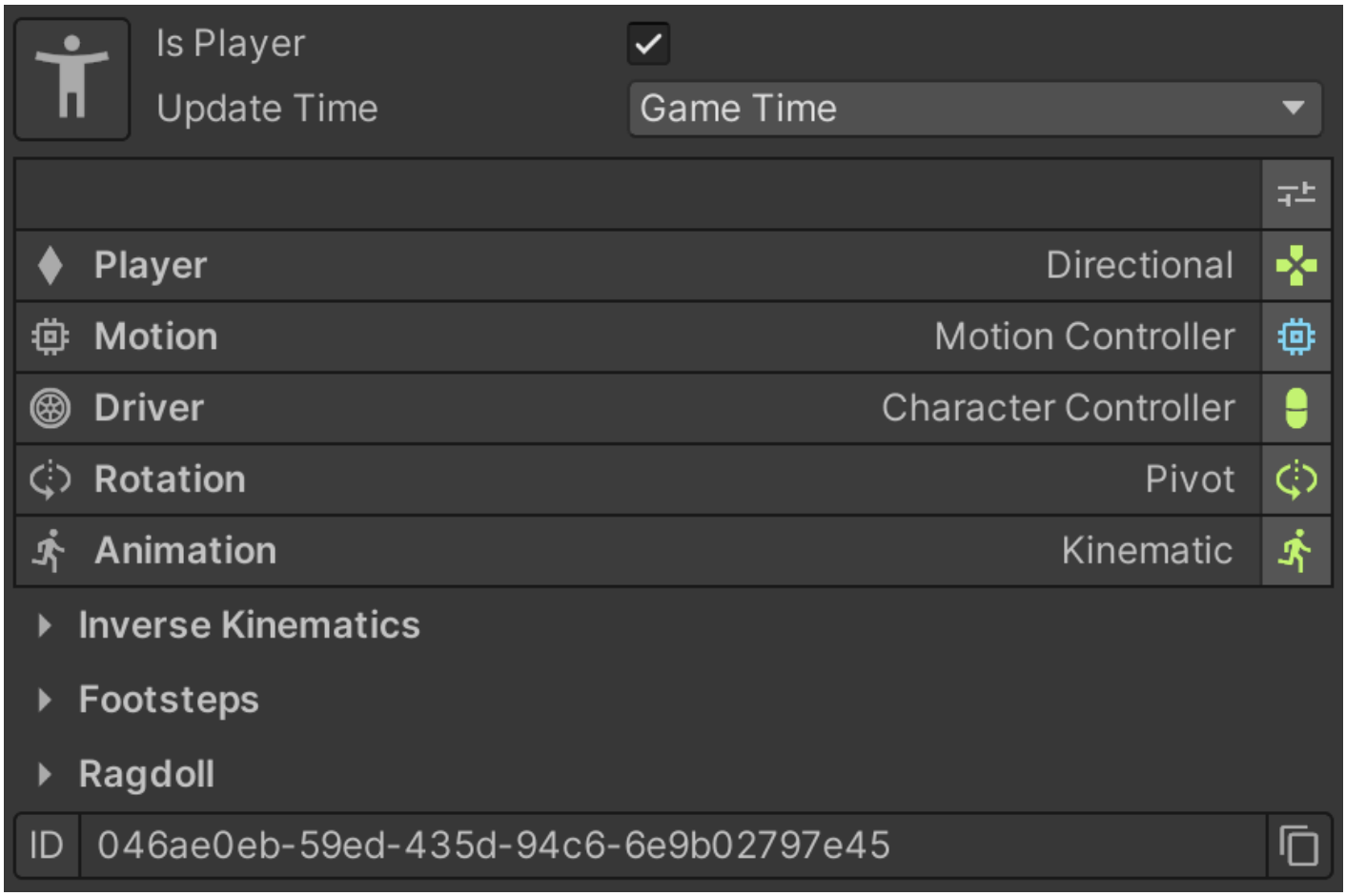
> **One Player per Scene**
>
> There can be only one *Player* character per scene. You can use the **Change Player** instruction to change who the Playable character is, but at any given time, just one Character might have the `Is Player` checkbox ticked.

Shortcut Player

Note that when creating a **Player** game object from the Hierarchy menu or the Game Creator Toolbar, it ticks the **Is Player** checkbox by default.

8 Component

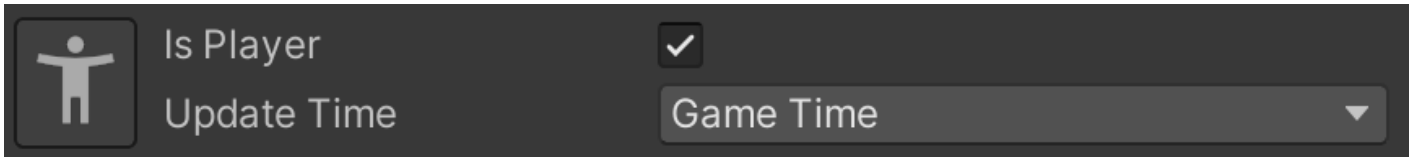
The **Character** system is built using a single component called `Character` component and handles everything a character can do; From playing animations to footstep sounds, modifying animations though inverse kinematics and much more.



8.1 General Settings

This block includes the big *mannequin* icon and two fields:

- **Is Player:** Determines whether this character is a Player character or not. A Player character processes input events and makes the character respond accordingly.
- **Update Time:** Indicates whether the character should work with the internal game's clock the real-life clock.



Game Time vs Unscaled Time

By default all characters should use the game's clock. Setting the game's time scale to zero will freeze the game, which is useful for pausing it. However if your game has a mechanic where a character ignores the time scale, you can use the unscaled real-life clock.

The *mannequin* icon isn't just an aesthetic ico, but a debugging tool. When the game is running, the icon will change into a green colored one and will turneach of its limbs red every time the character performs a blocking action that prevents that limb from doing something else. For example, performing a jump makes the legs be *busy* for a little less than a second, as well as landing.

The *mannequin* icon will change into a red skull when the character is considered dead.

8.2 Kernel Settings

This block is the most important one. A **Character** behavior is divided into 5 main categories (known as **Units**) and each one can be changed individually without affecting the rest.

Names

This settigs block is called the **Kernel** of the character and each individual row is called a **Control Unit** or **Unit** for short.

To change each type of **Unit** click on the right-most icon of each and choose the implementation you want. Clicking on the name of the **Unit** will expand/collapse its available options.

Custom Character Controllers

Game Creator comes with a collection of **Units** so you can customize how you want your characters to work. However, these lists are not fixed and can be extended via code. As **Game Creator** grows, so will the amount of options available. If you are a programmer you can create **Unit** that integrates a third-party character system. To know more about extending the `Character` component see the Character Controller section.

8.2.1 Player

The **Player** unit controls how the character is controlled by the user. It only affects the character if its `Is Player` checkbox is enabled. **Game Creator** comes with a bunch of different **Player** units the user can choose from:

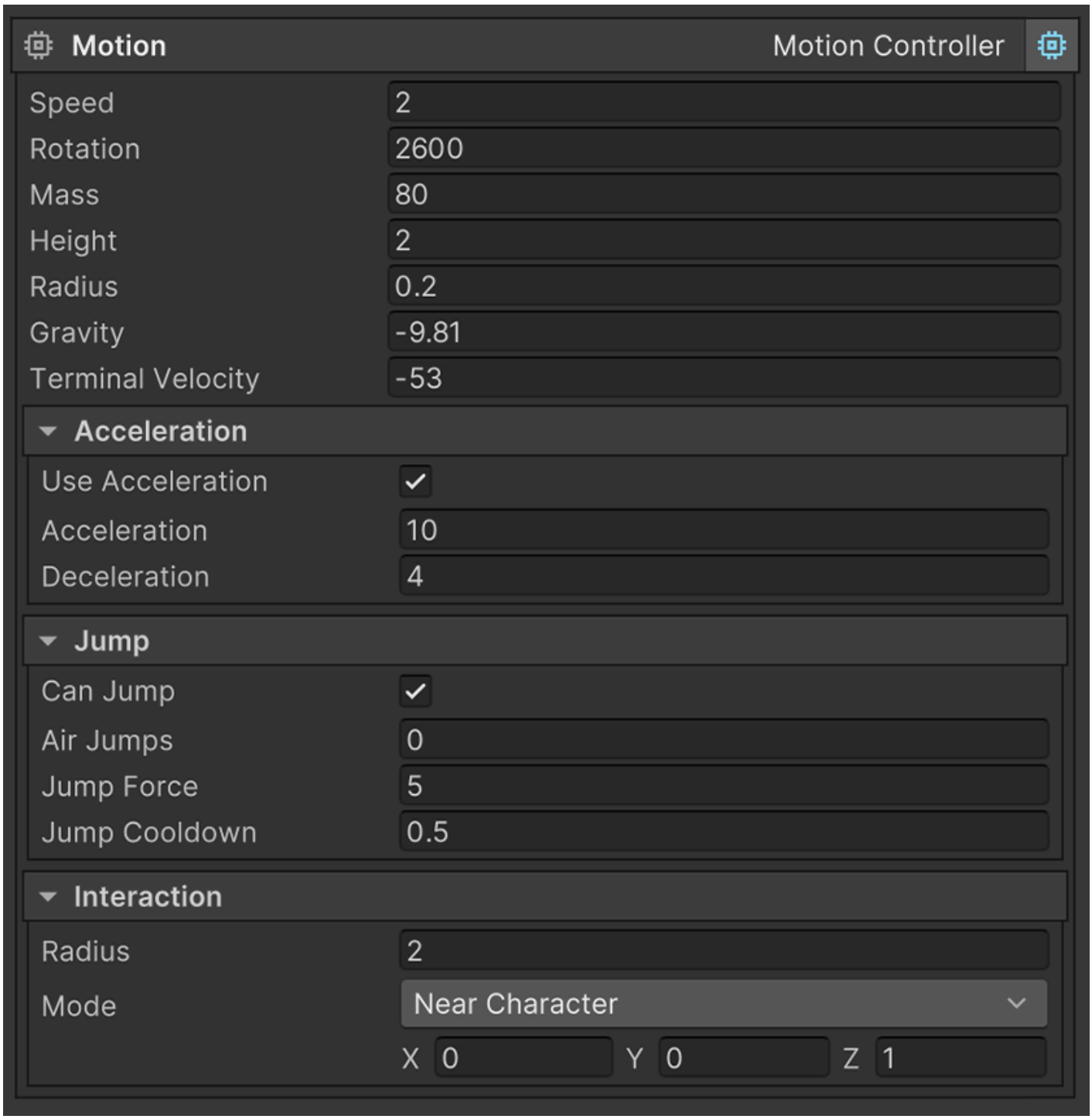
- **Directional:** The character moves relative to the main camera's direction and reacting to the keyboard's WASD keys or any Gamepad's Left Stick. This is the most common control scheme for most games.
- **Point & Click:** The character moves towards the point in space click with the mouse cursor. If the Driver is set to Navigation Agent, the character will try to reach the clicked position avoiding any obstacles along its path.
- **Tank:** Pressing the *advance* key will make the character move forward in their local space, regardless of the main camera orientation. This option requires the *Tank* option as its Rotation unit.

8.2.2 Motion

The **Motion** unit defines a character's properties and what it can or can't do. It comes with a list of options that can be modified both in the editor and at runtime.

Singular Unit

Game Creator comes with just a single **Motion** unit called **Motion Controller**. Unless the character is implementing a custom character controller, the **Motion** unit shouldn't be changed to anything else.



These options are:

- **Speed:** The maximum velocity at which the character can move. In Unity units per second.
- **Rotation:** The maximum angular speed at which the character can rotate. In degrees per second.
- **Mass:** The weight of the character. In kilograms.
- **Height:** How tall the character is. In Unity units.
- **Radius:** The amount of space the character occupies around itself. In Unity units.
- **Gravity:** The pull force applied to the character that keeps it grounded.

- **Terminal Velocity:** The maximum speed reached by a character when falling.
- **Use Acceleration:** Determines if the character accelerates/decelerates when moving. If set to false, the character will start moving at full speed.
  - **Acceleration:** How fast the character increases its velocity until it reaches its maximum speed.
  - **Deceleration:** How fast the character decreases its velocity until it stops.
- **Can Jump:** Determines if the character can execute a jump.
- **Air Jumps:** The number of *double jumps* the character can perform in mid-air. Most games allow zero or up to one air-jump.
- **Jump Force:** The vertical force used when executing a jump.
- **Jump Cooldown:** The minimum amount of time that needs to pass between each successive jump. Useful to prevent the user from spamming jumps.

The **Motion** unit also has the Interaction section at the bottom, which allows to configure how the character can interact with elements from the scene.

8.2.3 Driver

The **Driver** unit is responsible for translating the *math* of the processed motion data into actual movement. Depending on the controller type the character will move slightly different.

- **Character Controller:** The default unit. It uses Unity's default Character Controller which provides a versatile controller which should work fine for most cases.
- **Navmesh Agent:** It uses Unity's Navmesh Agent as the character controller. It allows to avoid obstacles when moving a character to a point in space but has the con that prevents the character from being able to jump.
- **Rigidbody:** It uses Unity's Rigidbody component so the character is affected by external forces using Unity¡s Physics Engine.

> ✓ **Axonometry Settings**
>
> Since version **2.9.36** the **Driver** unit comes with an *Axonometry* field that allows to post-process the character movement and constrain by some rules. These rules can be:
>
> - **Side-Scroll XY**: The character can only move within the X axis and gravity affects the Y axis. Locked on zero in Z axis.
> - **Side-Scroll YZ**: The character can only move within the Z axis and gravity affects the Y axis. Locked on zero in X axis.
> - **Isometric 8 Directions**: The character can only move around the XZ plane in multiples of 45 degrees.
> - **Isometric Cardinal**: The character can move north, south, east and west.
> - **Isometric Ordinal**: The character can move in diagonals from world-space perspective.

8.2.4 Rotation

The **Rotation** handles how the character rotates and its facing direction at any time. There are multiple **Units** available by default although the most common one is the **Pivot**.

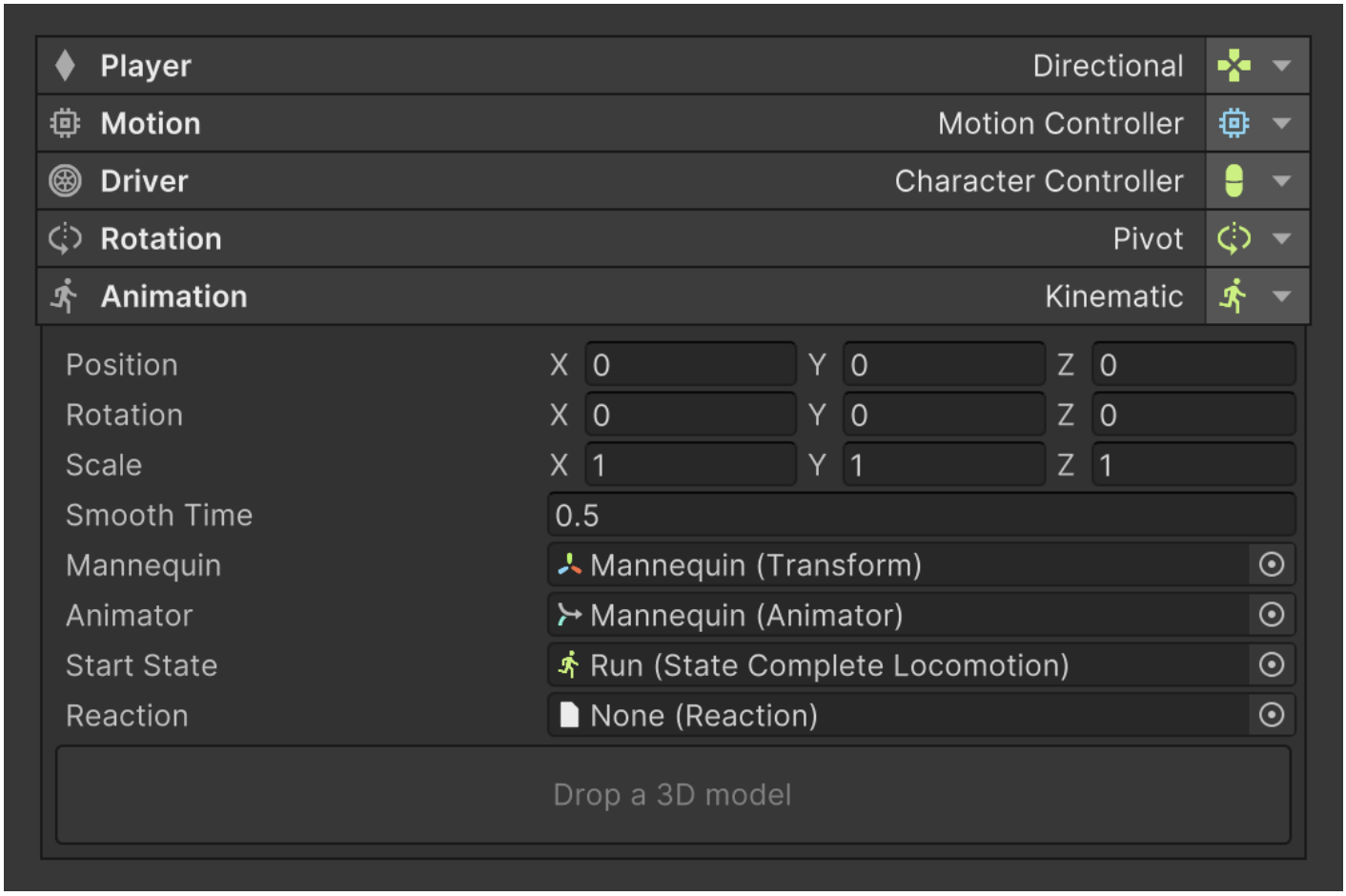
- **Pivot:** The character rotates towards the direction it last moved to.
- **Pivot Delayed:** Very similar to **Pivot** but the character waits a few seconds before it starts rotating towards the direction it's moving. This option looks best for slow-paced movements, like walking slowly, sneaking or crawling.
- **Look at Target:** The character always faces towards an object in the scene and wil strafe when moving sideways relative to the object. This option is most used when locking onto enemies.
- **Object Direction:** The character faces the direction of another object. This is mostly used third and first person shooting games where the character must look straight towards where the camera aims so the weapon's direction is aligned with the camera's point of view.
- **Towards Direction:** The character faces a 3D world-space direction. Mostly used in games *on-rails* or *infinite runners*.
- **Tank:** The character pivots around itself when pressing the specified buttons.

> **Switching at Runtime**
>
> It's important to highlight the fact that these options can be changed at runtime. For example, the player can use the **Pivot** unit when wandering the world but switch to a **Look at Target** unit when encountering an enemy. The character will seamlessly transition between them.

> **Axonometry Settings**
>
> Since version **2.9.36** the **Rotation** unit also comes with an *Axonometry* field that allows to post-process the character rotation and constrain it by some rules. These rules can be:
>
> - **Side-Scroll XY**: The character can only look at right of left.
> - **Side-Scroll YZ**: The character can only look forward or backwards.
> - **Isometric 8 Directions**: The character can only rotate in multiples of 45 degrees.
> - **Isometric Cardinal**: The character can rotate towards north, south, east and west.
> - **Isometric Ordinal**: The character can rotate in diagonals from world-space perspective.
>
> It's worth noting that both **Driver** and **Facing** *Axonometry* values should match for best results.

8.2.5 Animation

The **Animation** unit controls how the character model moves as a reaction of any internal or external stimulus and also manages the representation of the character's 2D or 3D model.



Just like the **Motion** unit, there is one single **Animation** unit option available called **Kinematic** which controls any generic character model's animations. There are different configuration blocks within the **Kinematic** animation unit:

- **Position:** Determines the local position of the mannequin inside the **Character** component. **Rotation** and **Scale** also change the transform of the mannequin in local space.
- **Smooth Time:** Determines how long it takes to transition between most character's animations, in seconds. Higher values make transitions look smoother but also take longer and feel less responsive. Lower values closer to zero make the character feel more responsive but also snappier.
- **Mannequin:** A reference to the intermediate game object between the root **Character** and the 3D model.
- **Animator:** The Animator component of the character's 3D or 2D model.

Runtime Animator Controller

The character's model **Animator** component should use **Game Creator**'s Locomotion *runtime animator controller* or a custom controller that follows the same parameter names. To use a custom *runtime animator controller* it is necessary to implement a custom `IAnimim` unit (see Character Controller for more information).

- **Start State:** Optional field that allows to set an initial character State. The starting state is set to layer number -1.
- **Reaction:** An optional field that determines the default hit reaction for **Shooter** and **Melee** modules.

Still pose animations

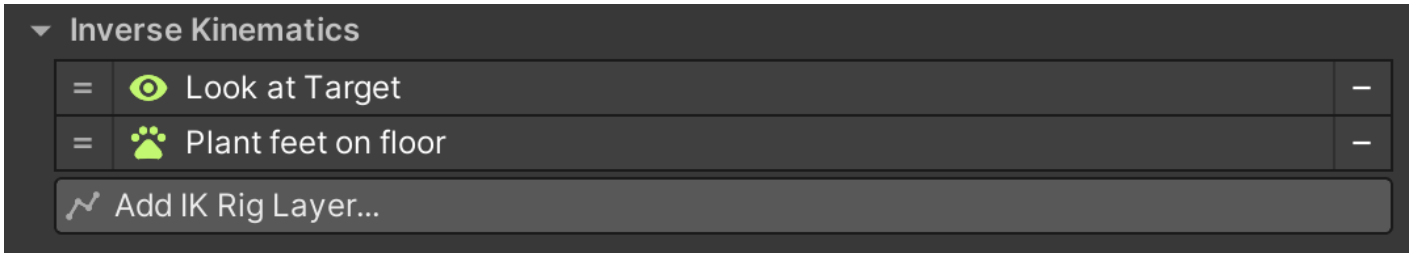
Combining the **breathing** and **twitching** systems allows using single-frame still poses feel like fully-fledged animations, thanks to the additive *breathing* and *twitching* animations. In fact, **Game Creator**'s default idle poses have a duration of a single frame. It's the twitching and breathing animations that make the pose look like it's real.

8.3 Extra Settings

The `Character` component has 3 extra sections at the bottom of the component which allow to control more specific parts of the character.

8.3.1 Inverse Kinematics

Inverse Kinematics (IK for short) allow characters to change their bone rotations in order to transform the overall structure and reach with the tip a targeted position and rotation. A common use of Inverse Kinematics is making sure the character correctly align their feet to the steepness of the terrain.



Game Creator allows to dynamically add or remove new IK systems onto each character individually and are processed from top to bottom. To add a new IK system simply click onto the *"Add IK Rig Layer"* button and select the option you want from the list.

Custom IK Rigs

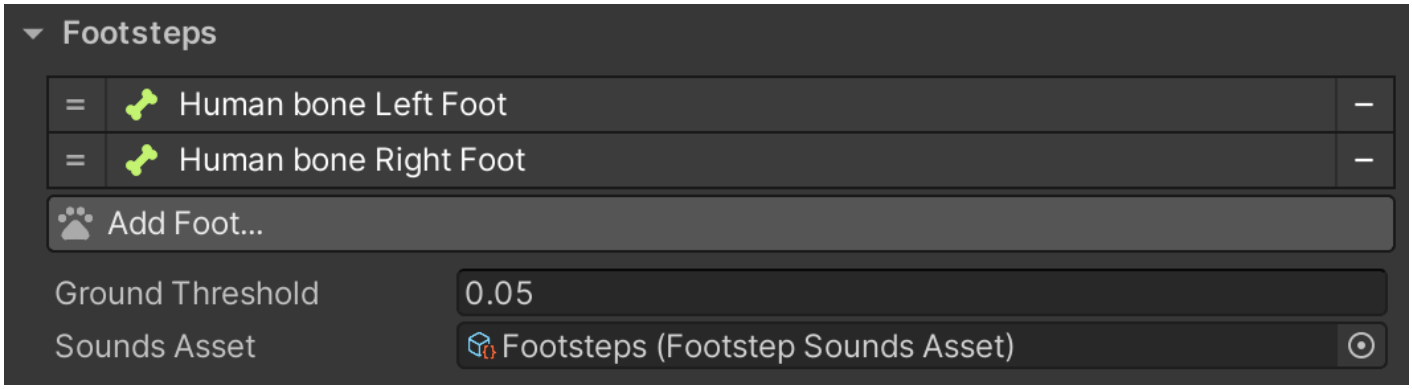
You can also create your own custom IK systems. Check out the Custom IK section for more information.

The `Character` component comes with some common IK systems used on most games:

- **Look at Target:** This IK system allows characters to slightly rotate their head, neck, chest and spine chain in order to look at a specific point of interest. This is specially useful when paired with the Hotspots component. Requires the character model to be *Humanoid*.
- **Align Feet with Ground:** This IK system allows a character to automatically detect when the character is touching the ground and smoothly align their feet with the inclination of the ground. It can also lower the position of the hip so both feet touch the ground, in case the ground is very steep and one foot is higher than the other.

8.3.2 Footsteps

The Footstep system allows the character to signal when it has performed a step. This is useful when you want a character to leave a trail of footprints, play some particle effects simulating the dust of each step or playing a sound effect.



Humanoid and Generic characters

The Footstep system doesn't require the character model to be humanoid. It uses an array of objects that identify the character's feet bones. By default it assumes the character is a human and has two feet, but this can be easily customized clicking on the *"Add Foot"* button.

- The **Sound Asset** field references a *Footstep Sounds* asset that determines which textures play which sound effects. For more information about how to configure this asset see Footstep Sounds section.

Physically accurate sounds

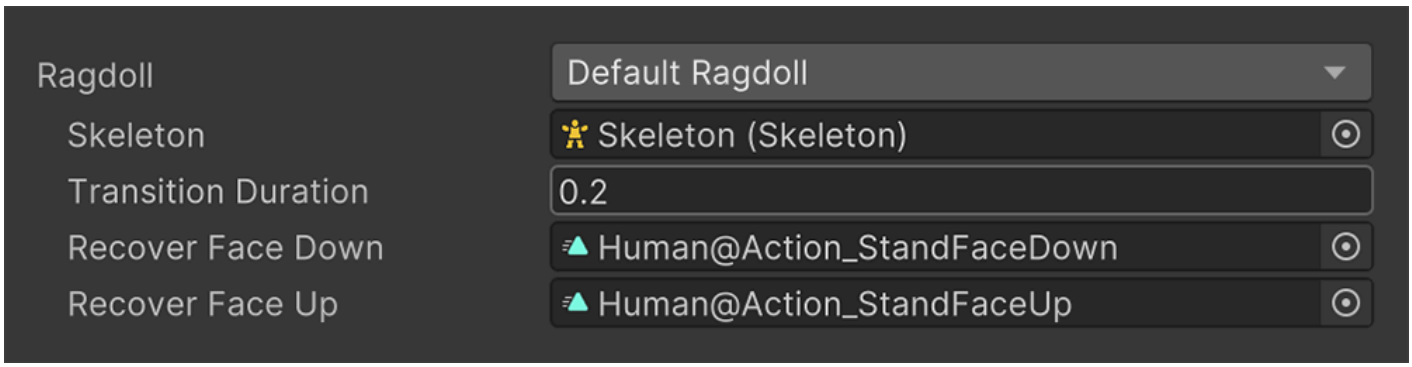
The *Footstep Sounds* does not play the raw step sound effect but automatically distorts it in order for the player to hear different slightly different sounds each time. It also changes the pitch of the sound if there are multiple layers of textures, muffling those that are less prominent.

Custom Feet Phases

A **Character**'s footsteps are determined by the feet phases (when the character touches ground with their feet). These values are driven by animation curves. If you want to use custom animations, you can download and use for free a custom tool for assigning feet phases clicking here.

8.3.3 Ragdoll

The `Character` component comes with a built-in Ragdoll physics system that allows to quickly turn any character into an inanimate object that reacts to physics with a set of constraints on each of its limbs.



Skeleton asset

The **Ragdoll** system uses the Skeleton configuration asset to determine which parts of the model correspond to which bone. It can't work without one.

- **Transition Duration:** When a character recovers from a ragdoll state, it plays an animation based on the direction its body faces. This field determines the time it takes to blend between the ragdoll position to the animation clip being played when recovering.

Give plenty of transition time

It is recommended to use large transition values, above 0.5 seconds. The character's limbs can be in very awkward positions that doesn't match the initial pose of the recovery animation clip; so having small transitions will make the character appear to snap into an animation, instead of smoothly blending into it.

- **Recover Face Down:** The recovery animation played when the root of the character's ragdoll faces downwards.
- **Recover Face Up:** The recovery animation played when the root of the character's ragdoll faces upwards.

For more information check its dedicated Ragdoll section.

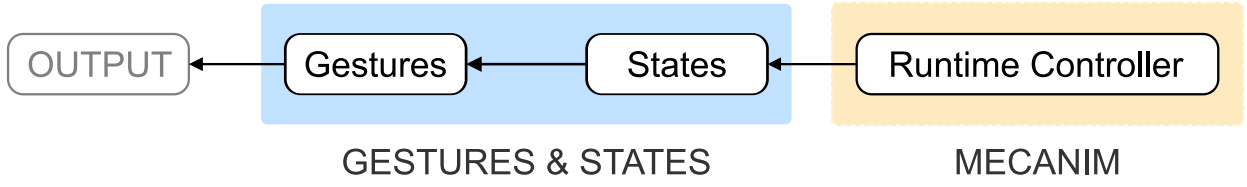
I.II.I Animation

9 Animation

Game Creator has a built-in custom animation system built on top of Unity's Mecanim that makes it easier and faster to manage character animations.

It introduces the concept of **Gestures** and **States**, which are two mechanisms that allow to play different types of animations without having to previously register them inside an Animator Controller graph.

> **Mecanim vs Gestures & States**
>
> It is preferable that users use the **Gestures** and **States** system to manage and play all their animations. However if a user prefers to use a more traditional approach, there's a base Mecanim layer that allows to use Unity's runtime controller workflow. Check the Animator section to know more about this.



Gestures are animations that are played once and are removed from the animation graph when finished. For example, an animation of a character throwing a punch can be played as a *Gesture*; This will make a character play the *punch* animation and smoothly restore its previous animation after the animation finishes.

States are animations that are played on a repeating loop. For example, a character sitting on a chair is an *Animation State* while a character moving crouched is a *Locomotion State*.

- **Animation States** play a single animation clip over and over again, until told to stop.
- **Locomotion States** are more complex states that react to certain parameters such as character speed. Can have multiple clips transitioning and blending with each other.

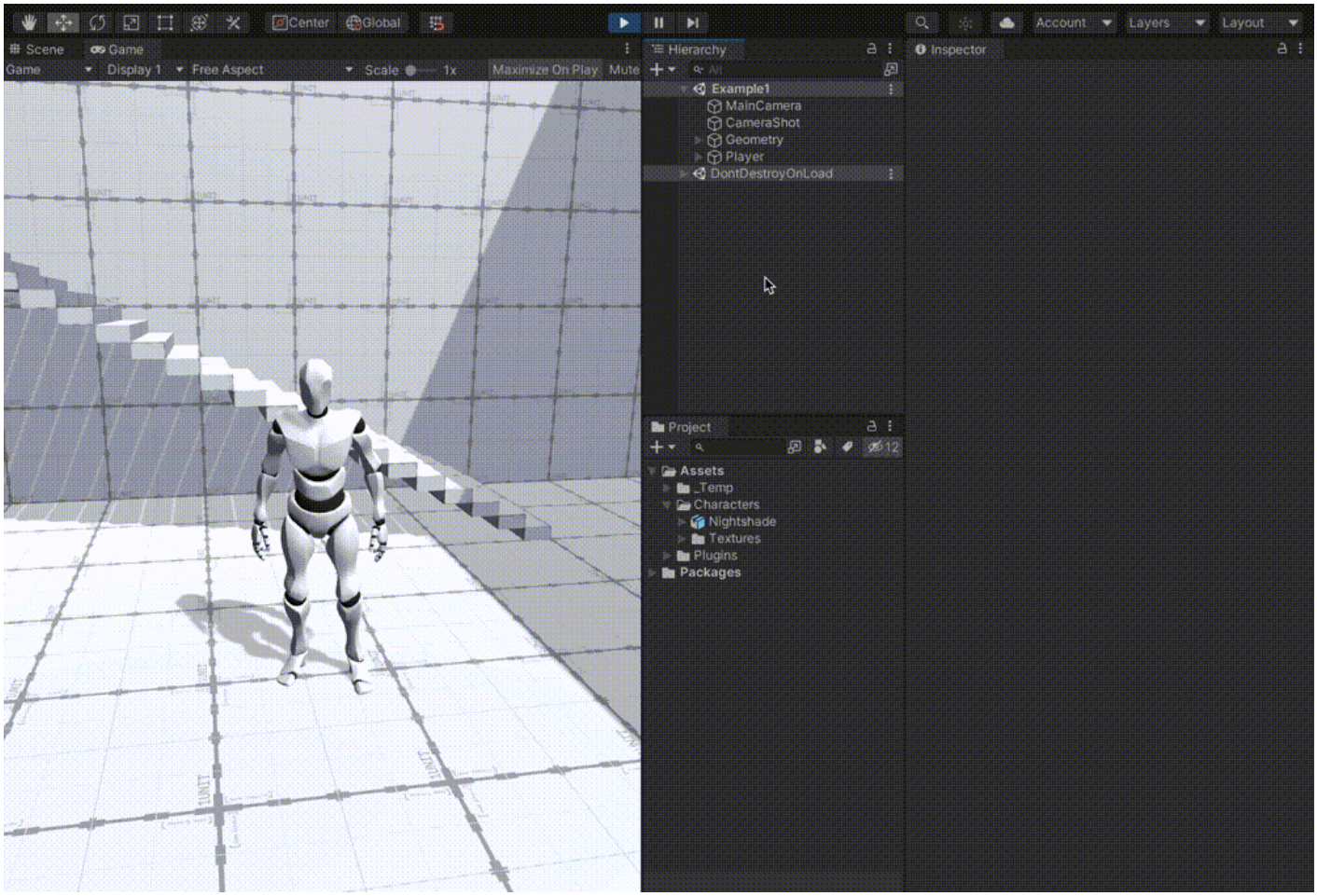
Click on Gestures and States to know more about how to use them in your game.

10 Animator

`Character` components reference a child game object called the *Model* which contains an `Animator` component. This component must referece a Runtime Animator Controller graph, that determines which animations are played when and how these transition between them.

10.1 Custom Model

Game Creator makes it very easy to change the 2D or 3D model from a character. All that needs to be done is to open the **Animation** section of the `Character` component and drag and drop the Character prefab onto the indicated drop zone.



Changing model at runtime

To change the character model at runtime use the **Change Model** instruction.

10.2 Locomotion Runtime Animator

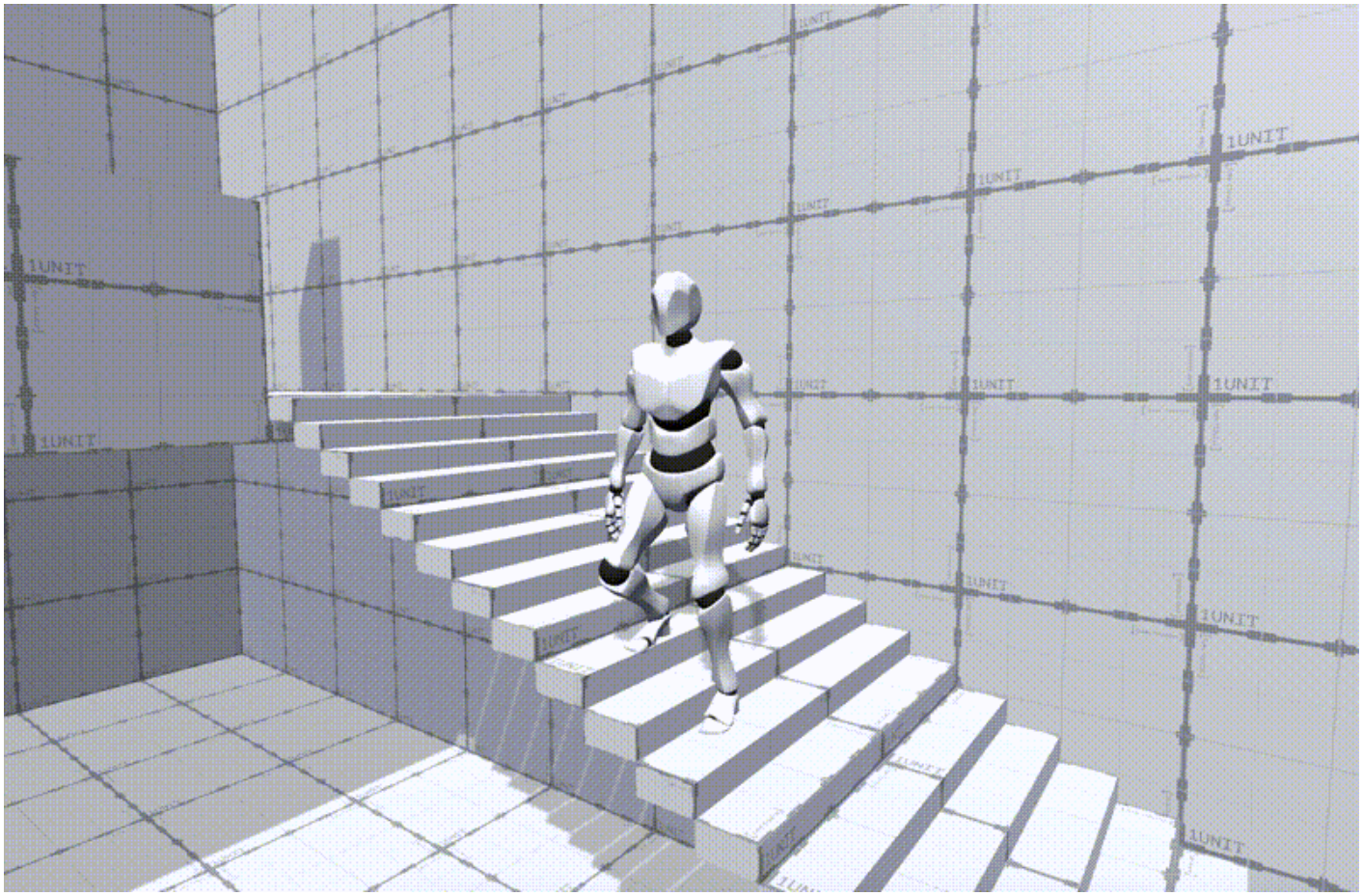
Game Creator comes with a default **Runtime Animator Controller** called the *Locomotion* controller. It comes packed with a collection of animations and features that fit most projects.

> **Changing the Locomotion controller**
>
> It is not recommended modifying the Locomotion controller. In most cases using a custom State is easier and provides enough flexibility to create new simple or complex locomotion animations.
>
> However if you need to use a custom **Runtime Animator Controller** you must also creata new class that implements the `IAnimim` interface to feed the Character's data onto your custom controller. See Character Controller section for more information.

11 Gestures

The **Gesture** system allows characters to play a single animation that stops after it finishes. This is specially useful for animations such as a character throwing a punch, vaulting an obstacle or waving a hand.

These animations are always played on top of any other animations.



11.1 Parameters

The easiest way to play a **Gesture** animation is using the Play Gesture instruction, which has a few configuration parameters.

Too many options?

It may seem a bit overwhelming the amount of parameters available for a single animation. Note that the most important ones are the **Character** and **Animation Clip** fields. The rest can be left with their default values and should work on most cases.

11.1.1 Character

The **Character** field determines the object that the animation clip will be played. The game object referenced must contain a `Character` component in order to work. Otherwise the instruction will be skipped.

11.1.2 Animation Clip

The **Animation Clip** references an animation asset. Without this field the instruction will not work.

11.1.3 Avatar Mask

The **Avatar Mask** is an optional field that determines which parts of a character will play the animation and which won't. If this field is left empty the whole body will play the animation. For more information about masking animations, see the Unity documentation about Avatar Masks.

11.1.4 Blend Mode

The **Blend Mode** field determines whether the animation clip overrides or adds up its movement on top of any other animations being played.

- **Blend:** The default parameter. Blend overrides any animations and plays the animation clip on top of them. This is the most common option for most animations.
- **Additive:** This blend mode allows to play an animation by adding up the motion on top of any other clips being played.

11.1.5 Delay

The **Delay** field allows to start playing the animation after a certain amount of seconds have passed. If the value is set to zero the animation will start to play immediatelly.

11.1.6 Speed

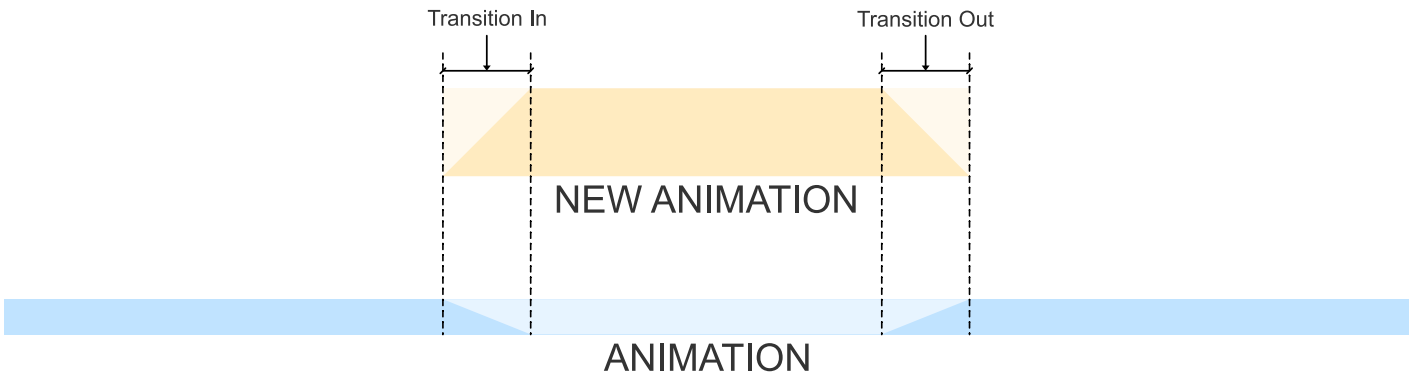
The **Speed** field is a coefficient that determines the speed at which the animation is played. A value of 1 plays the animation at its original speed. Higher values will play the animation faster while lower ones will play the animation slower. For example a value of 2 will play the animation twice as fast.

11.1.7 Root Motion

Determines whether this animation should take control over the character and use its root motion to also move and rotate it. Notice that using *root motion* takes control of the character while the animation plays and the user's input will be ignored.

11.1.8 Transitions

The **Transition In** field determines the amount of seconds the animation will take to blend between the current animation and the new Gesture animation clip.



Similarly, the **Transition Out** field determines how much time, in seconds, it takes to blend out the current gesture animation to the animation being played underneath.

11.1.9 Wait to Complete

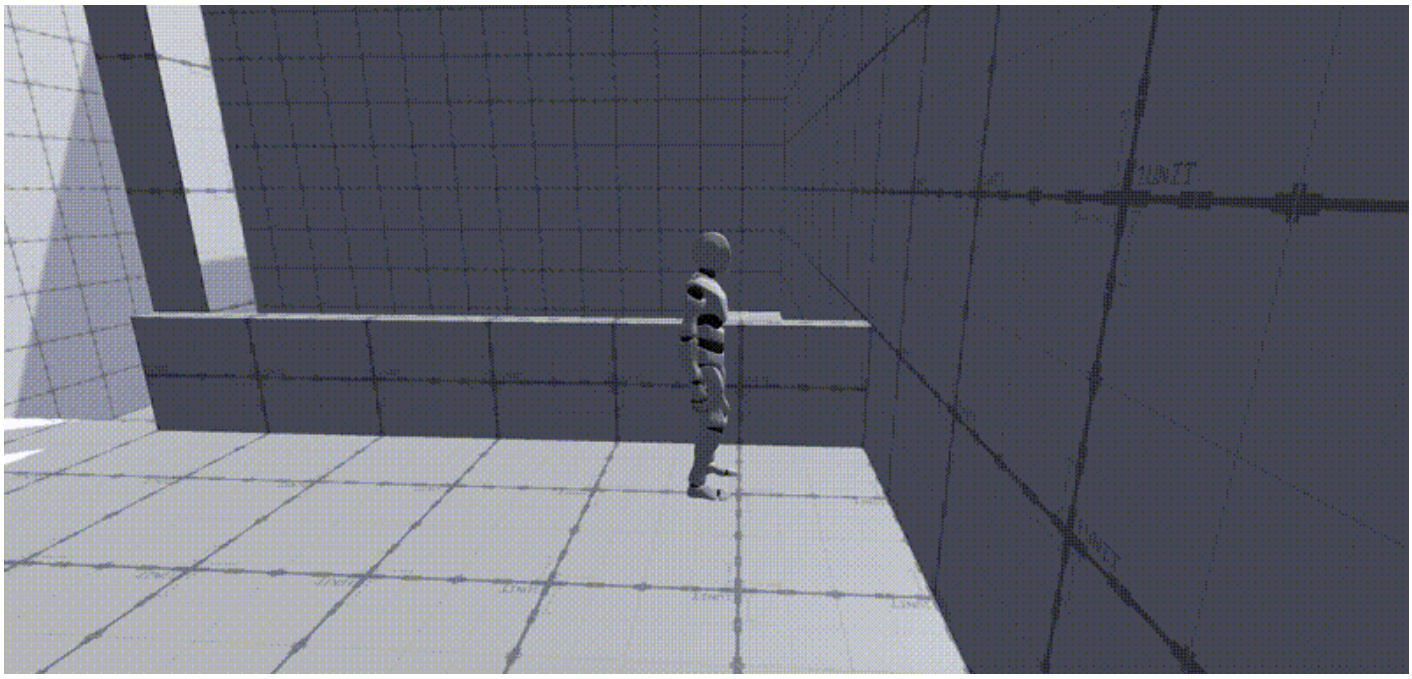
The **Wait to Complete** checkbox allows the instruction to be put on hold and only continue once the animation finishes. This is specially useful when chaining multiple gestures one after another.

About Instructions

For more information about how to use instructions to interact with other systems, see the Visual Scripting section.

12 States

The **States** system allows to dynamically blend in/out arbitrary animations or entire animator controllers at runtime. All that needs to be done is to specify which animation or controller a character should play, and which layer should it be assigned to.



Mecanim vs States

It is important to note that the **States** system is built on top of Unity's Mecanim and it complements it; It does not prevent or restrict from using any of its features. It simply adds a new and more flexible workflow on top of it.

12.1 Types of States

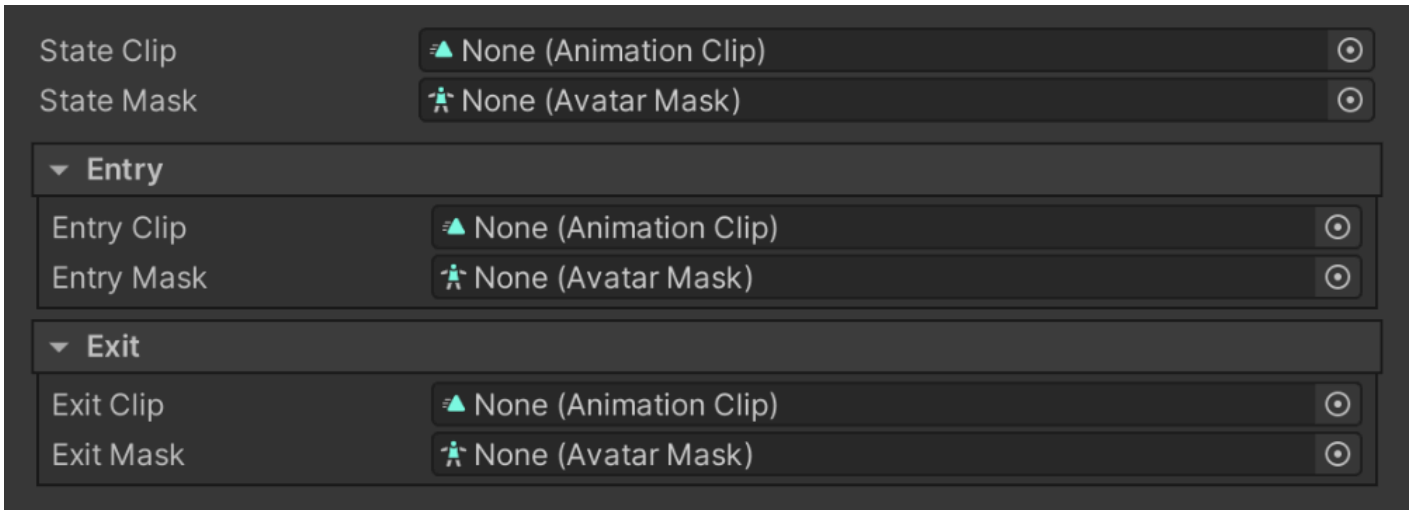
There are primarily two types of States, but both work the same way: An instruction feeds a State to a Character and this one plays the animation/s based on the behavior of the State.

12.1.1 Animation States

Animation States are single animation clips that are played over and over again, until told to stop and blend out.

For example a character playing a single looped animation of sitting on a chair is an *Animation State*. These are the most common and basic forms of **States**, where an Animation Clip must be provided and the Character plays it in a loop.

It is also possible to create an *Animation State* asset that allows to play a looped animation as well as providing a fields for gestures that are played when entering and exiting the State. To do so, right click on the Project Panel and select *Create* → *Game Creator* → *Characters* → ***Animation State*** and drop the Animation Clip file onto the corresponding field.

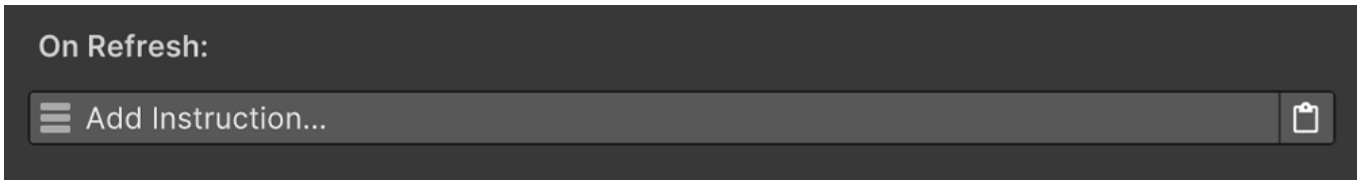


The **State Clip** field determines which animation is played in a loop, while **State Mask** discerns which body parts are affected by the animation. Note that this last field only works with Humanoid characters. See Avatar Mask for for information about masking animations.

The **Entry** and **Exit** sections contain optional fields that allow to play a Gesture right before entering or exiting the current State. For example, you may want a character to play the *unsheathe sword* animation every time it enters a sword combat stance, and play the *sheathe* animation when exiting the combat stance state.

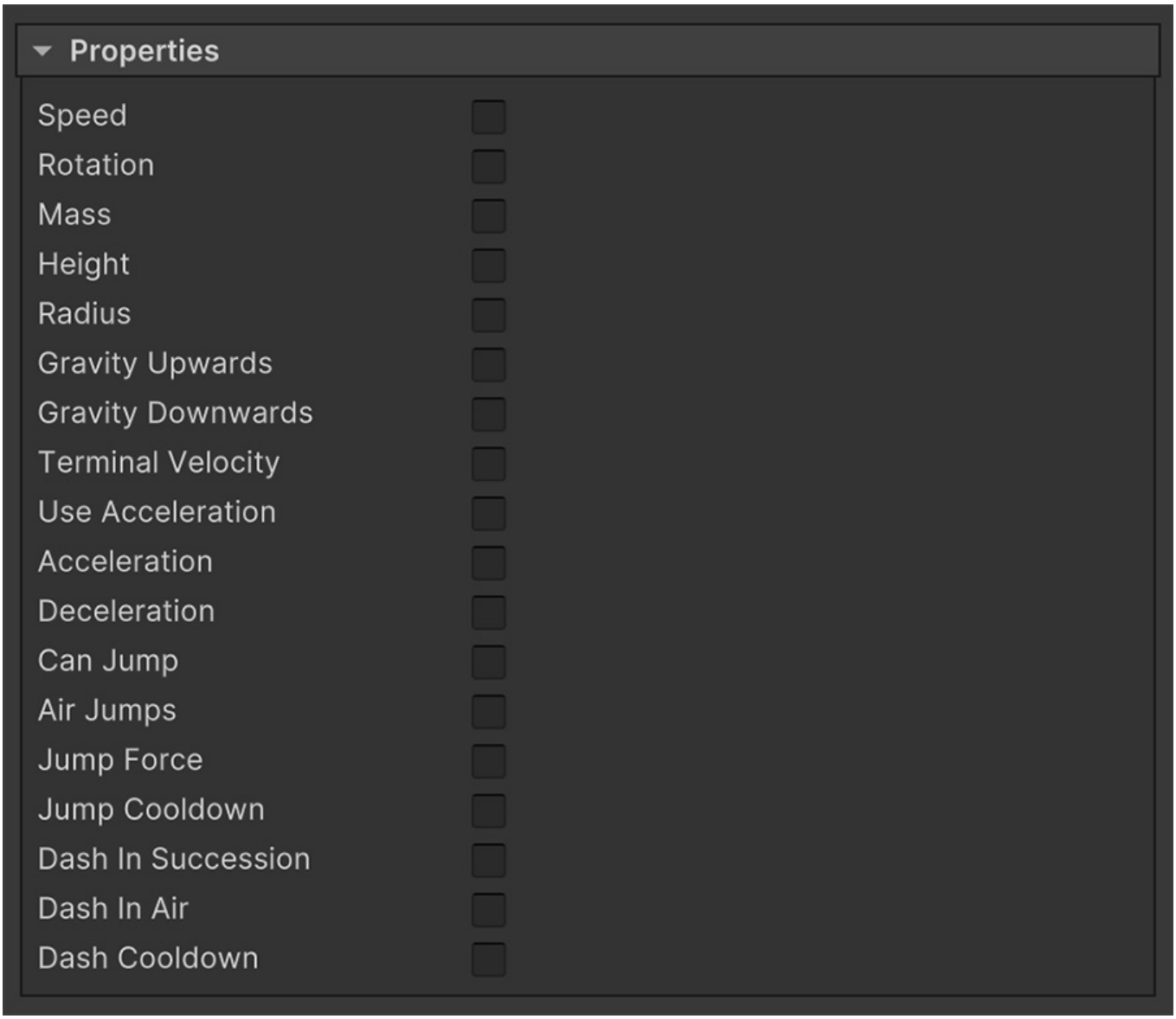
On Refresh Instructions

Since version **2.5.20** there's an **Instruction** list at the bottom of any **State** asset called **On Refresh**. These instructions are called in order, from the lowest *Layer* to the upper-most one, any time a Character adds or removes a **State**.



Properties

Since version **2.9.34** each **State** contains a **Properties** section that allows to modify common values from a Character, such as its linear and angular speed, jump options, gravity, etc...



Changing Movement Speed

This allows to change the move speed from within the **State** itself. For example, let's say we have the following States:

- Running **State** at layer 1 that sets the player's speed to 10
- Walking **State** at layer 2 that sets the player's speed to 5

The "Running" State properties will be called first, and afterwards the "Walking" State, because it's on a greater layer number. The second State will override the player's movement speed and set it to 5.

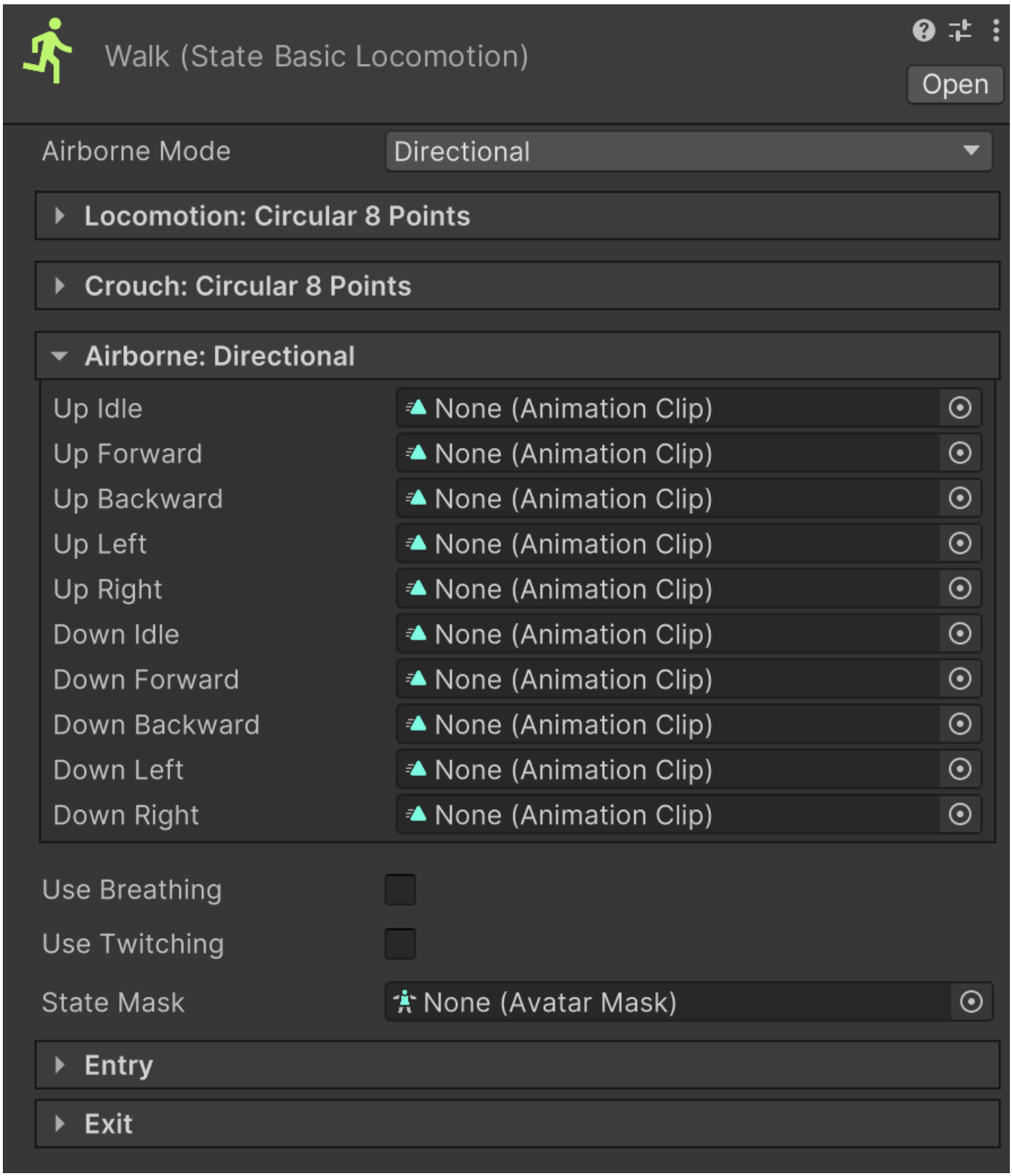
Removing the Walking State will run again the Properties values. However, this time, only the **Running** State properties are called, and thus the player's speed will be set to 10.

12.1.2 Locomotion States

These are more complex States that react to certain parameters such as the speed of a character, its direction and fall velocity. Locomotion States have multiple clips transitioning and blending with each other.

For example a character that idles in a prone position and crawls when the character moves is a *Locomotion State*.

To create a Locomotion State, right click anywhere on the *Project Panel* and select *Create* → *Game Creator* → *Characters* → ***Locomotion Basic State*** or *Create* → *Game Creator* → *Characters* → ***Locomotion Complete State***.



The **Locomotion State** asset may seem a bit daunting at first, but it's fairly straight forward. There are two types of **Locomotion States** and those are:

- **Basic States:** Have an idle and an 8-axis directional animation clip fields for moving

- **Complete States:** Have an idle and a 16-axis directional animation clip fields for moving: 8 for moving at half speed and another 8 for moving at full speed.

The first fields, **Airborne Mode**, controls the amount of animation clips available and can take one of the following values:

- **Single**: Displays a single animation clip for that particular phase.
- **Circular 8 Point**: Displays animation clip fields for the 8 cardinal directions: Forward, Backwards, Right, Left and each of the diagonals.
- **Circular 16 Points**: Displays animation clip fields for the 8 cardinal directions, and another 8 for half-way points between the first and the origin.

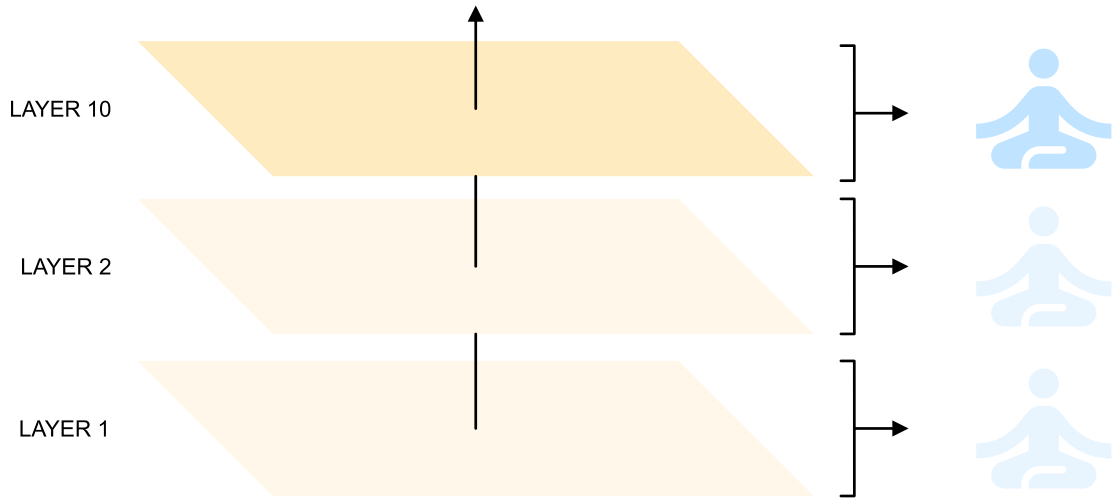
> **8 Points vs 16 Points**
>
> This decision comes down to the type of controller and animations available. If your game is meant to have analogic controls, the user might slightly push the movement joystick forward, making the character move slow. In this case, it is recommended using the **Complete Locomotion State**, as it allows to have both running and walking animations in a single State.

12.2 Layers

The **States** system is built around the concept of *Layers*, which is similar to the concept found in image editing tools, such as *Photoshop*. The idea is that any **State** is assigned a layer number. With higher numbers taking higher priority when playing an animation.

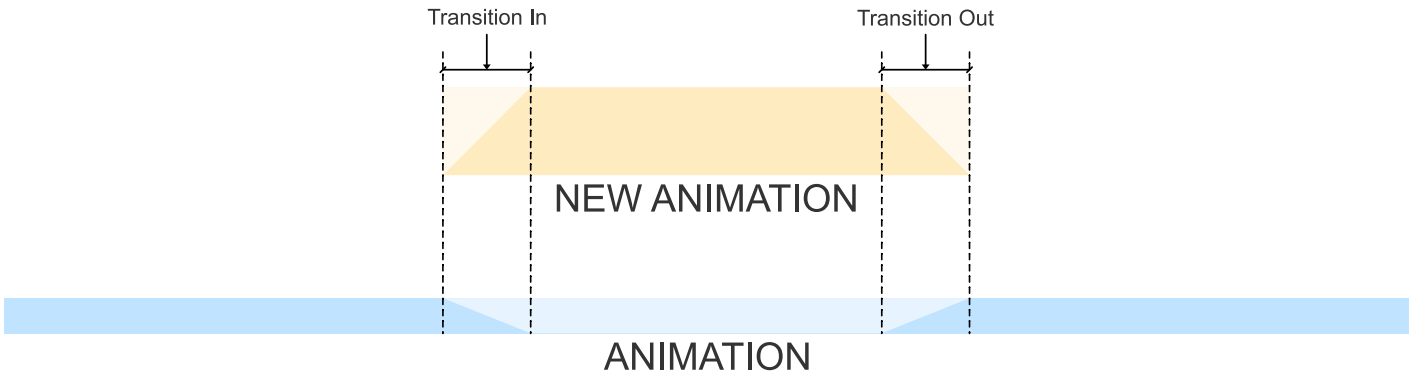
Example

Let's say we have a character with three Layers, each one with a single **State**, numbered **1**, **2** and **10** respectively.



In this case, the animation played would be be the one found at the layer number **10**. However, if this layer was to be removed, the animation at layer **2** would be the next one with highest priority and thus, its **State** would be played.

It is recommended to add a transition time when adding or removing a **State** from a *Layer* in order to smoothly blend between the new animation and the one underneath.



When adding a new **State** onto a *Layer* that already has a **State**, this last one will be smoothly faded out taking into account the new **State**'s transition time, until it is replaced by the new one. After that happens, it will be automatically disposed.

Gestures and States

Note that although **States** can have different priorities, a **Gesture** animation will always have higher priority than any **State** and will play on top of it.

12.3 Weights

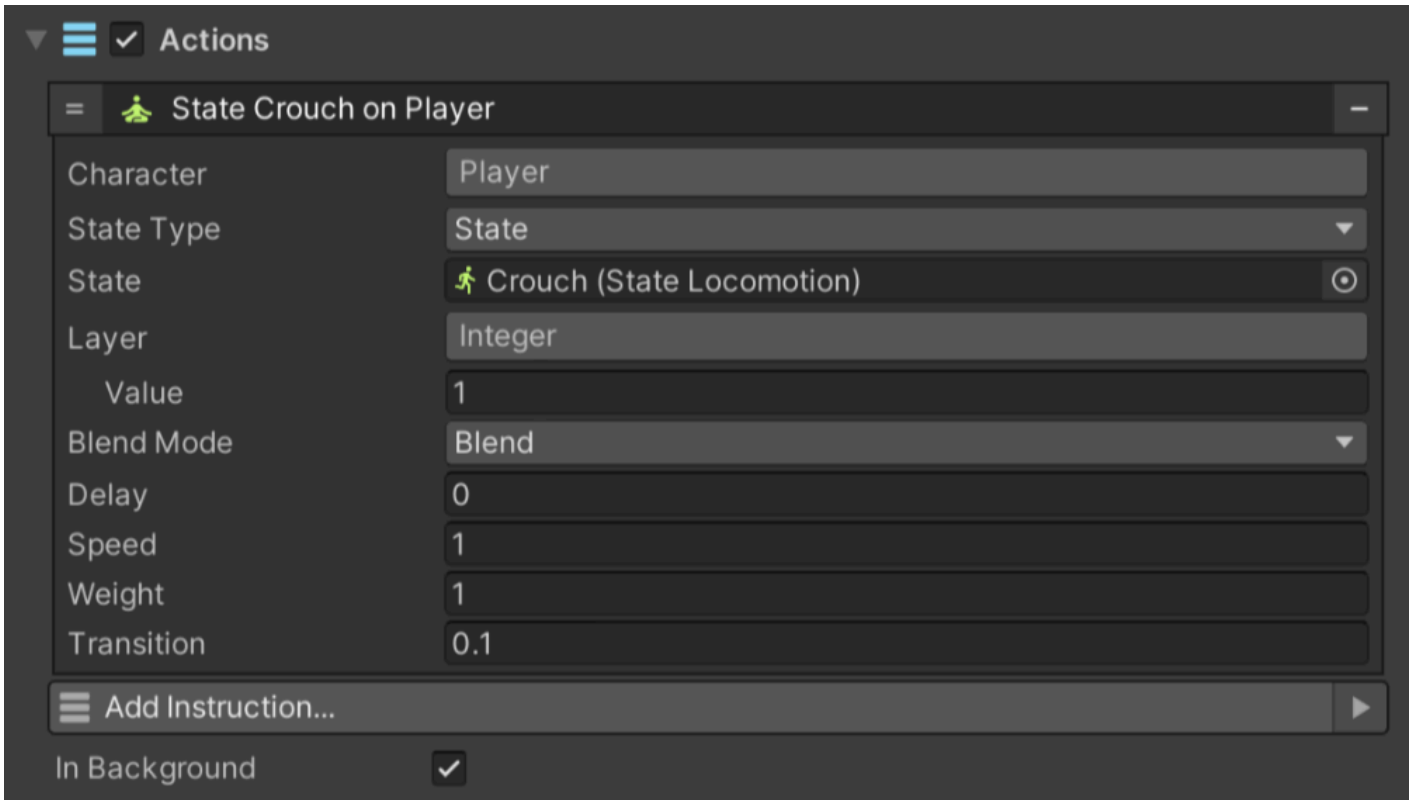
Setting a new State is not an all-or-nothing operation and the new animation can be blended by a percetage with any other animations playing underneath the stack.

For example, if a character is currently playing a *running upstraight* animation, a *running crouched* animation can be blended at 50% to to make the character look like it's running halfway between standing and crouched.

> **Weight at runtime**
>
> The weight can be modified at runtime using the Change State Weight instruction.

12.4 Entering a State

The easiest way to make a character enter an Animation or Locomotion State is using the Enter State Instruction.



The **Character** field references the targeted character game object that enters the state. The **State Type** field determines whether the State is an *Animation Clip*, a *State* asset or a Runtime Animation Controller.

> **Runtime Animation Controller as a State**
>
> Game Creator allows to use a Runtime Animation Controller as a State. However, this is an advanced feature and should only be used if one understands how Gestures & States work under the hood.

The **Layer** field allows to determine which layer this State occupies in the Character's layer stack. **Blend Mode** by default is set to *Blend*, which overrides the underlying animation with the animations provided by the State. If set to *Additive* it adds up the new State's animation as a delta movement on top of any other animation being played.

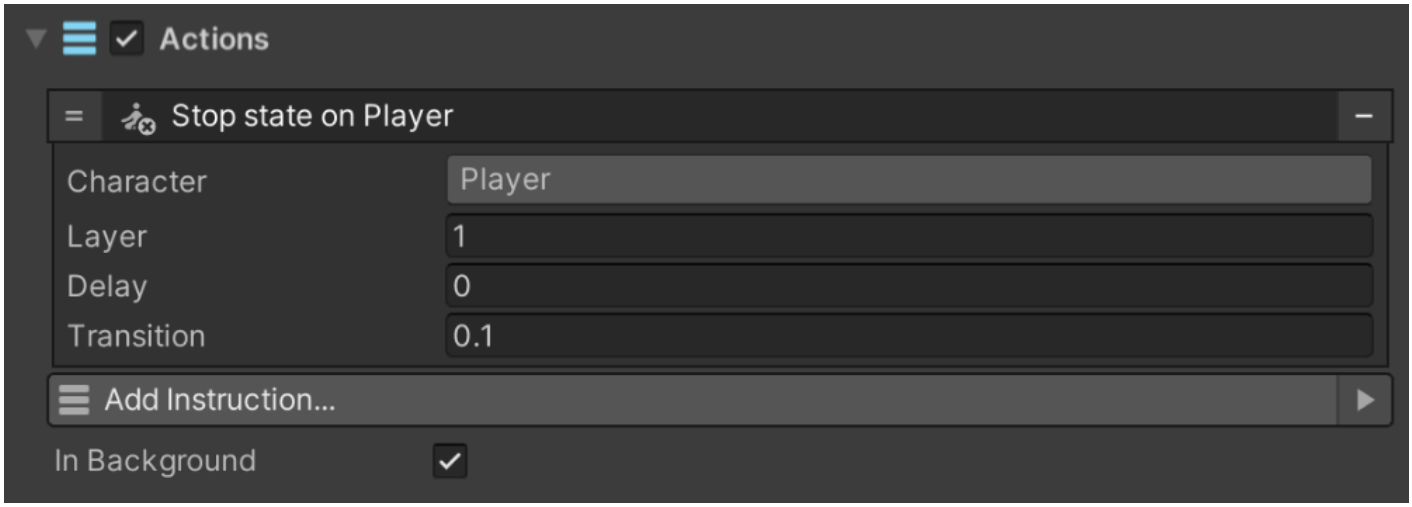
The **Delay** field allows to delay in a few seconds the time to start playing the State. **Speed** is a coefficient value that determines how fast the State plays. For example, a value of 1 makes the State play its animation at its default speed. A value of 0.5 plays the animation at half speed and a value of 2 plays it twice as fast.

The **Weight** field determines the opacity of the State. A value of 1 plays the animation as it is. Lower values allow any previous animations to bleed through and mix the effect between the new State and any other animation being played in lower layers.

The **Transition** field is the time in seconds that the new State takes to fade in.

12.5 Exiting a State

The instruction Stop State can be used to smoothly stop playing a State on a character.



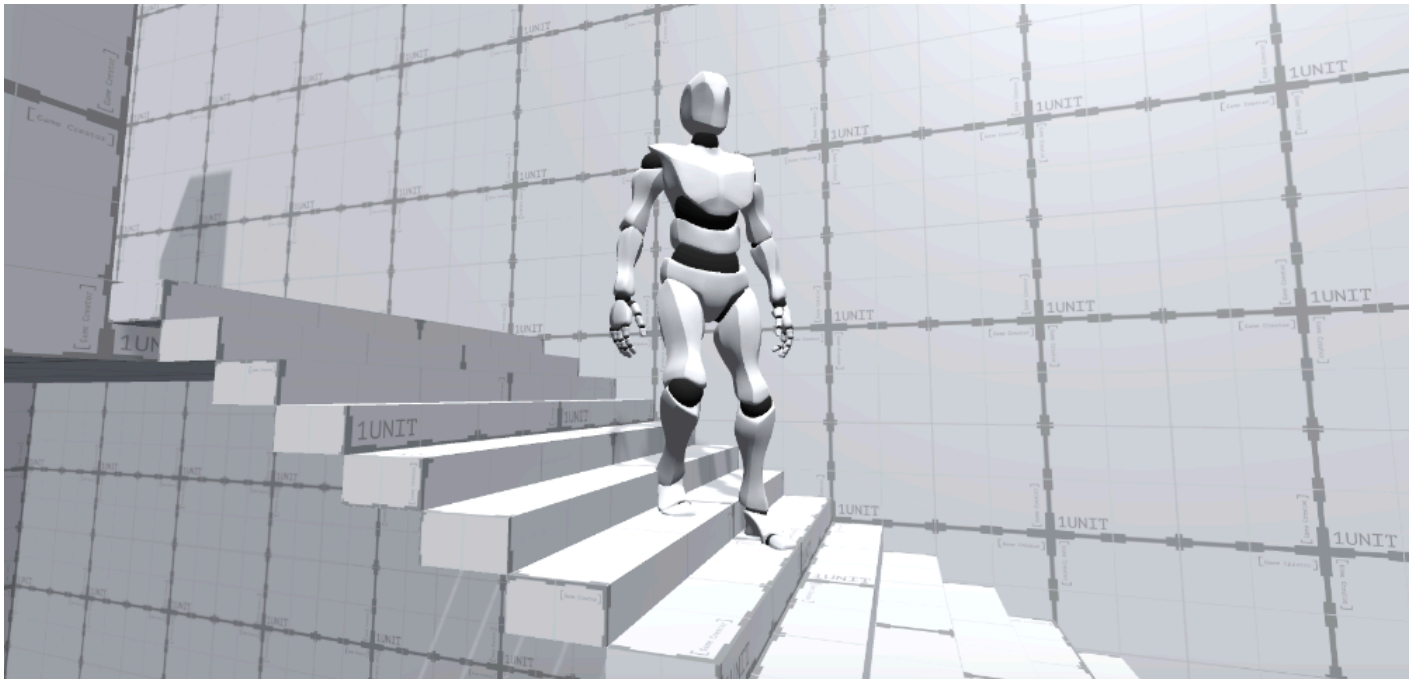
The **Character** field determines the targeted game object that stops playing a State found at the layer identified by the **Layer** number field.

Similarly, the **Delay** and **Transition** fields allow to delay the fading of the State by a certain amount of seconds.

I.II.II Inverse Kinematics

13 Inverse Kinematics

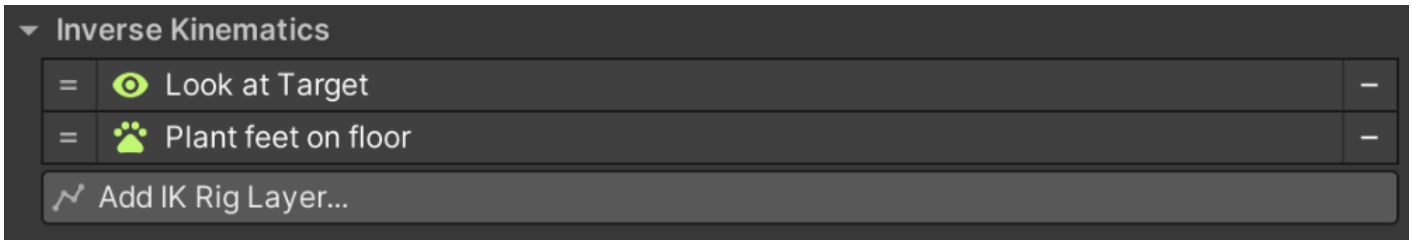
Inverse Kinematics (IK for short) is the process of calculating the rotation of bones from a chain of bones, in order for the leading one to reach a desired position. **Game Creator** makes use of both limbic and full-body IK.



A common case scenario is adjusting the bending of the knees so the character naturally plants its feet on the ground.

13.1 Manage IK Rigs

The `Character` component has a section at the bottom that allows to manage which rigs affect the character and change their properties.



Rig order matters

The IK Rigs are excuted from top to bottom. So if two IK systems affect the same bone chains, the last rig will override any previous ones.

To add a new Rig, click on the *Add IK Rig* button and choose one from the dropdown list.

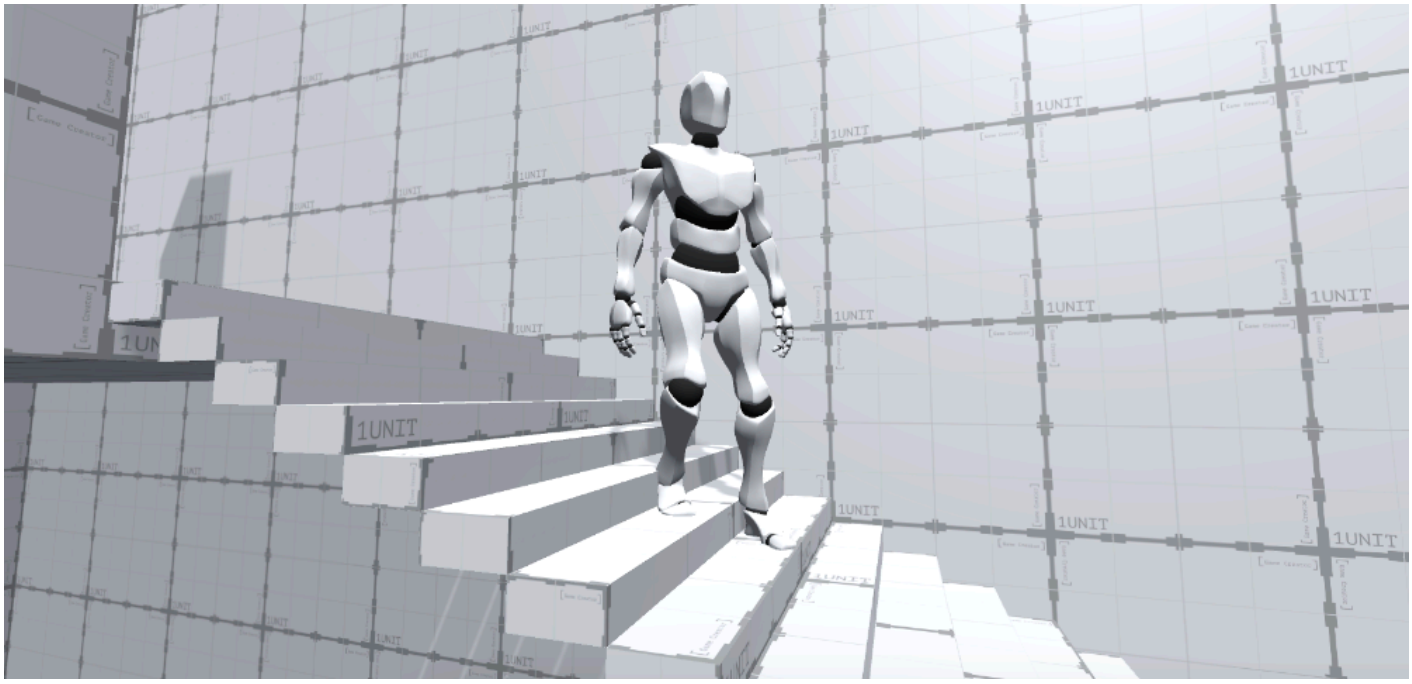
13.2 Rigs

Game Creator comes with a few IK rigs that work out of the box:

- **Feet Align**: Allows to align a Character's feet to uneven terrain.
- **Look at Target**: Allows a Character to use the Look At system from Hotspots.

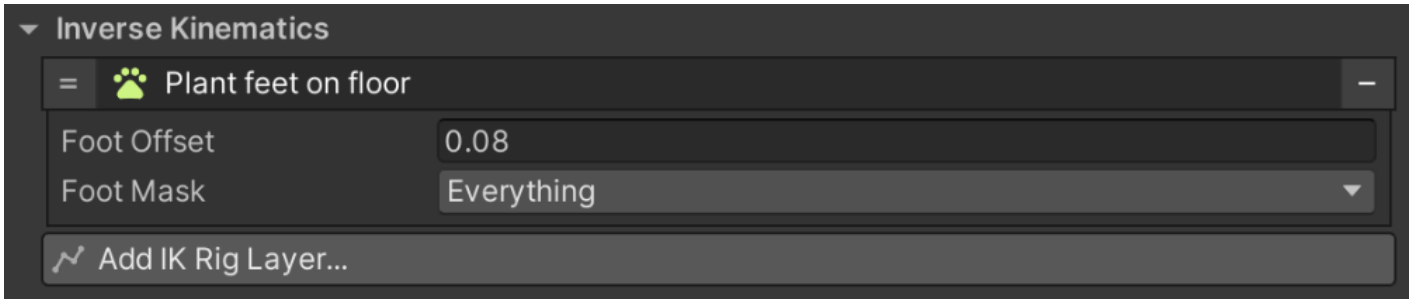
14 Feet Align

This **IK Rig** allows a character to plant their feet and adjust the rotation on uneven terrain. This rig also allows the hips to be lowered by a certain amount if the height difference between both feet is very large.



Only for Humanoids

The **Feet Align** rig only works with *Humanoid* characters.

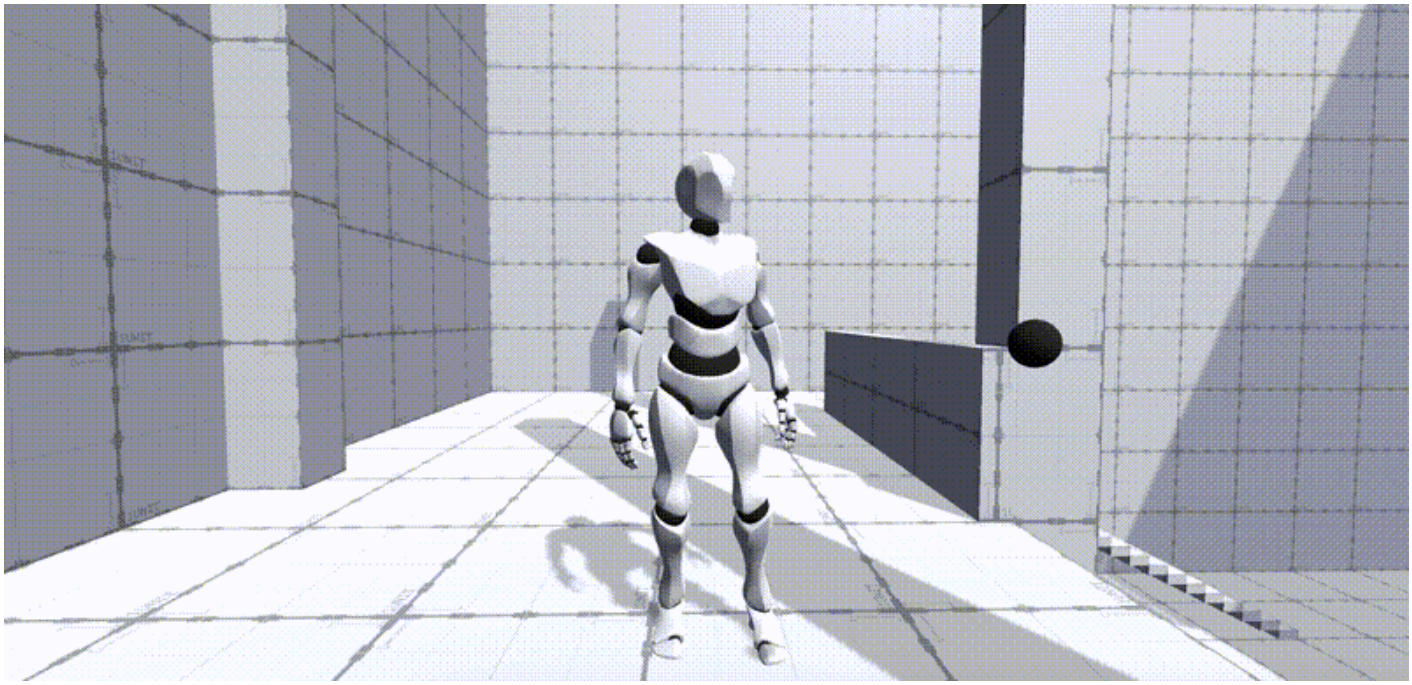


The **Feet Align** rig has the follow options:

- **Foot Offset**: An optional vertical offset applied to each foot. This is useful in cases where the foot penetrates the ground or floats above it, due to differences between the bone's tip position and skin mesh bounds.
- **Foot Mask**: Allows to choose which Layers should the character consider when aligning with ground. For example, water typically has a collider component, but the character should not align its feet on its surface.

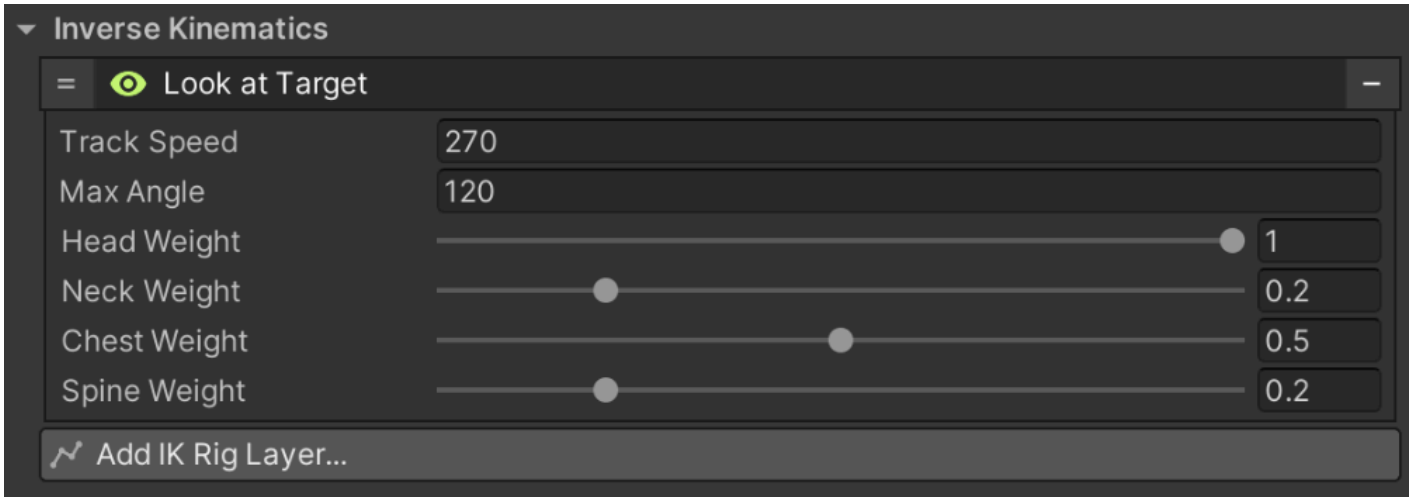
15 Look at Target

The **Look at Target** rig allows a character to rotate their head, neck, chest and body in order to look at a Hotspot.



Only for Humanoids

The **Look at Target** rig only works with *Humanoid* characters.



The **Look at Target** rig has the follow options:

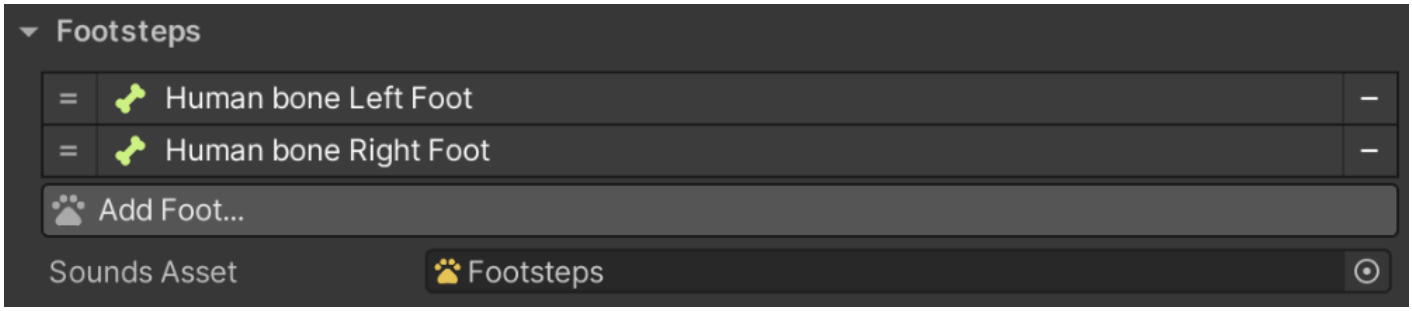
- **Track Speed**: The angular speed at which each bone rotates to track the target. In degrees per second.
- **Max Angle**: The maximum peripheral angle, in degrees.
- **Head Weight**: The contribution of the head to the total rotation.

- **Neck Weight**: The contribution of the neck to the total rotation.
- **Chest Weight**: The contribution of the chest to the total rotation. Note that the Chest is an optional bone and some models may not have it.
- **Spine Weight**: The contribution of the spine bone to the total rotation.

> **Default values**
>
> The default parameters have been carefully picked to work for the majority of human-like characters.

16 Footstep Sounds

Game Creator's characters can mix and play multiple sound effects depending on the type of ground it's stepping on.



Humanoid and Non-Humanoid

This system works for humanoid and non-humanoid characters alike. Though humanoids don't require any kind of setup and work out of the box.

16.1 Detecting Steps

The Footstep System (also known as **Phases** system) uses Animation Curves to detect when a **Character** has one of its limbs in contact with the ground and when it does not.

This system plays a role in other systems, such as correctly aligning the feet when standing on uneven terrain, or detecting when the character takes a step, and plays a tiny dust particle and sound effect.

The **Phases** system supports up to 4 different phases, although humanoids only require 2 (one for reach leg).

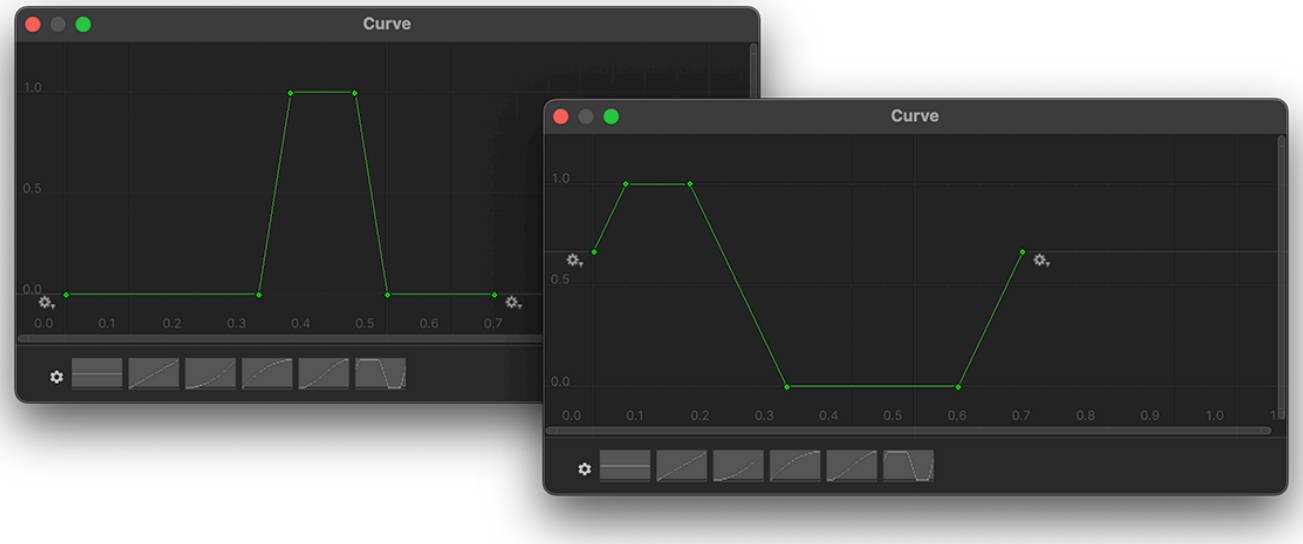
By default, a *Humanoid* character has the following curve names assigned to each leg:

- `Phase-0` to the **Left Leg**
- `Phase-1` to the **Right Leg**

A non-humanoid character can also define the `Phase-2` and `Phase-3` if necessary.

Using custom animations

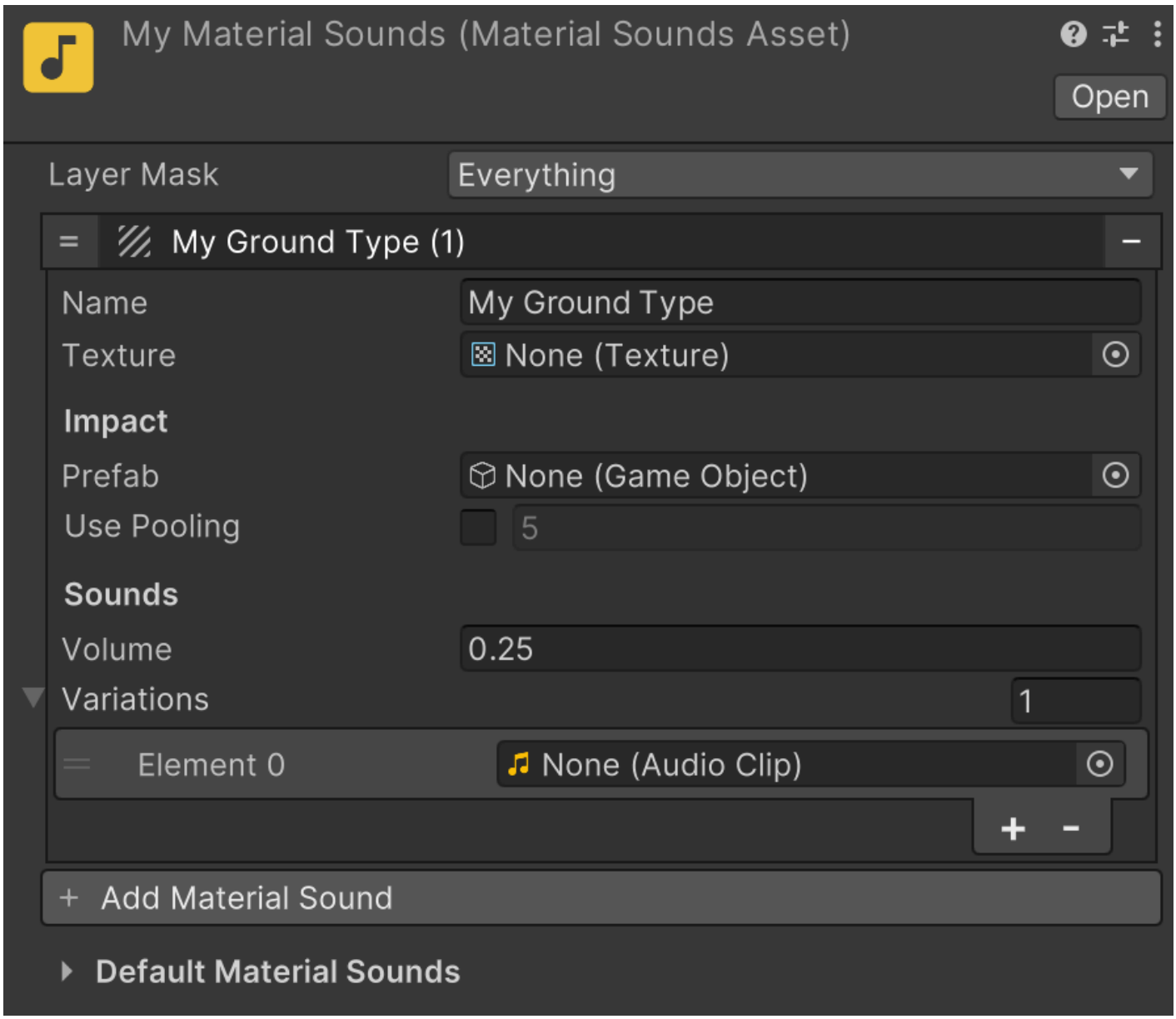
Game Creator animations contain the phase curves already set up for you. However, if you plan on using your own animations, you'll need to set them up by editing the *Animation Clip* and adding the `Phase-0` and `Phase-1` curves.



The phase curves are evaluated at runtime depending on the animation(s) being played at that time. If the value of a phase is **zero** means the limb is currently not touching the ground and is high up in the air. On the other hand, if the curve has a value of **one**, it means the limb is currently planted on the ground.

16.2 Playing Footstep Sounds

The **Footstep Sounds** system comes with a built-in tool for playing different sounds and sound variations depending on the surface the character is stepping onto. To create a material sound library, right click on the *Project Panel* and select `Create - Game Creator - Common - Material Sounds`.



The **Material Sounds** asset allows to define which textures produce which sound effects. Each texture can have multiple sound effects, which will be picked up randomly every time the character takes a step.

Pseudo-Random Sound Picking

Note that although it's completely random, two sound effects will never be played in succession in order to avoid repetition.

The **Material Sounds** asset also allows to instantiate a game object from a pool of prefabs at the impact position. The instantiated object is aligned with the incision angle. This is very useful when spawning particle effects of dust.

The human hearing quickly recognizes sound patterns. To avoid hearing the same sound effects over and over again, the Footstep Sound System intelligently shifts the pitch and speed of each audio clip every time it's played. By doing so, a single clip can be played hundreds of times with various nuances that tricks the human hearing into perceiving each clip as a different sound effect.

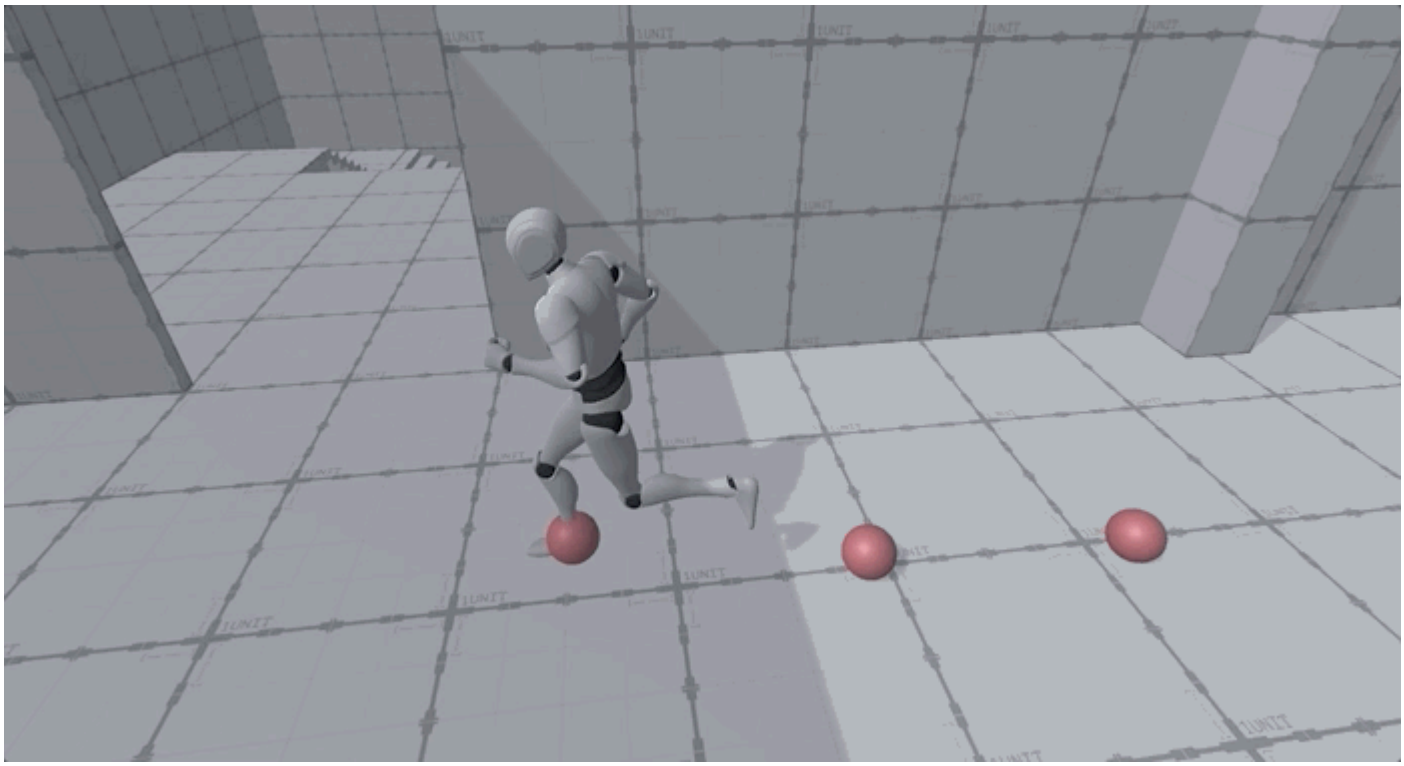
Gradient Footstep Sounds

Floors are not always composed of discreet materials. For example, there might be a sound effect for when the player steps on shallow water and another one when steps on sand. However, if the character runs along the shore, where there's a blend between the water and sand textures, the resulting sound effect is a proportional mix between the two audio clips and their pitch is shifted to fit how real-life audio blending occur.

Drop the **Material Sounds** asset onto the **Character**'s `Sound Asset` to link them.

16.3 Reacting to Footsteps

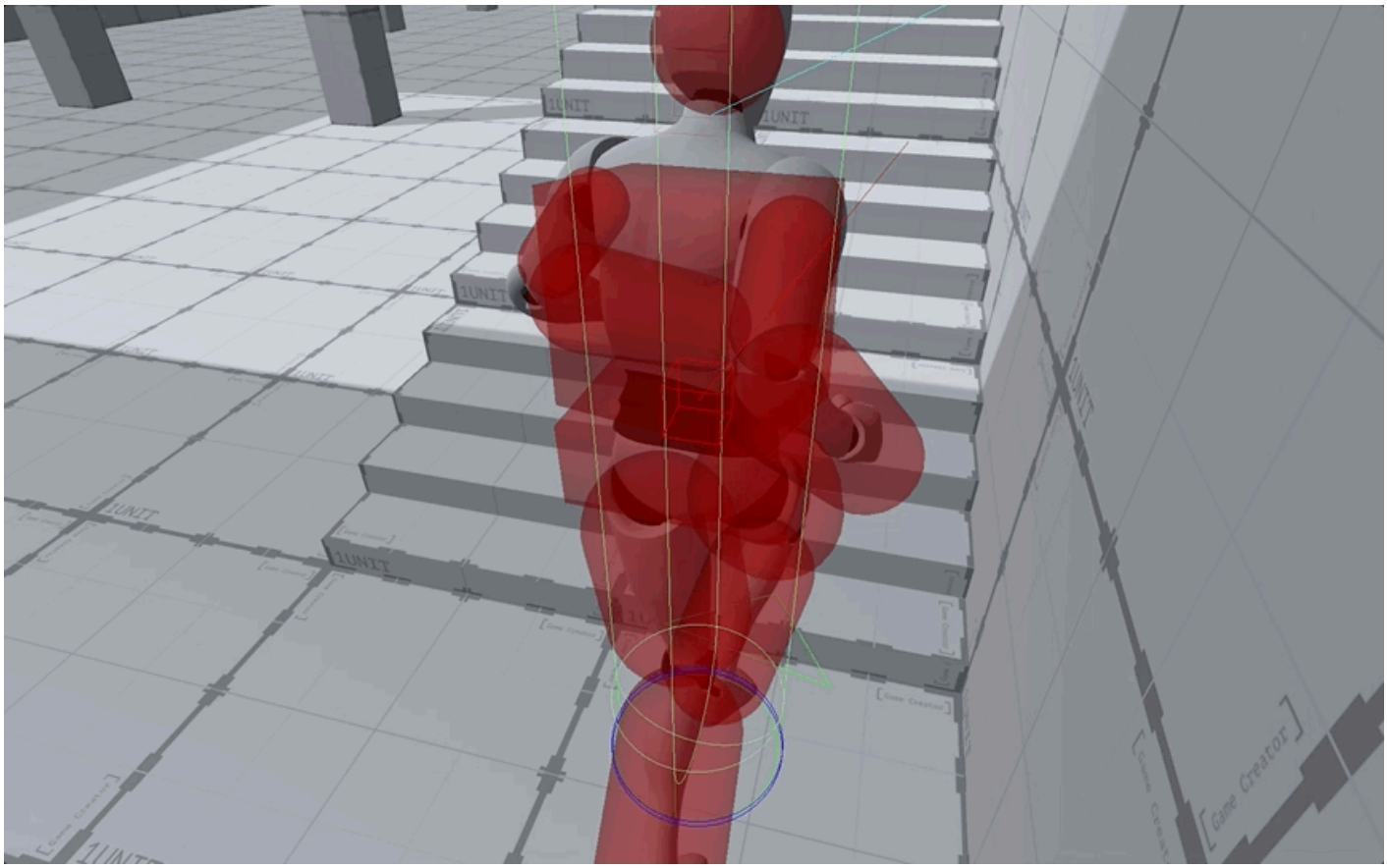
The **Footstep** system also allows Characters to react every time a step is taken. Using the **On Step** Trigger, which is executed every time a defined Character takes a step. This is useful for things like leaving footsteps behind.



I.II.III Ragdoll

17 Ragdoll

A *Ragdoll* system lets characters react to physics and external forces without any direct input from itself. This is commonly used for enemies that have been defeated or when the player falls unconscious due to a strong attack or a big fall.



A **Character** requires a Skeleton definition asset in order to correctly identify the size of each of its bones and how they form the joint connection chain.

Quickly generate a Skeleton

Defining all **Skeleton** volumes and how these relate to their parent bones is tedious and time consuming process. Luckily **Game Creator** makes it very easy to automatically generate a humanoid Ragdoll asset. With the Skeleton asset selected, drag and drop any *Humanoid* 3D model onto the bottom drop-zone and it will generate the structure for you. You can then tweak the values to perfectly match your model.

17.1 Starting and Stopping

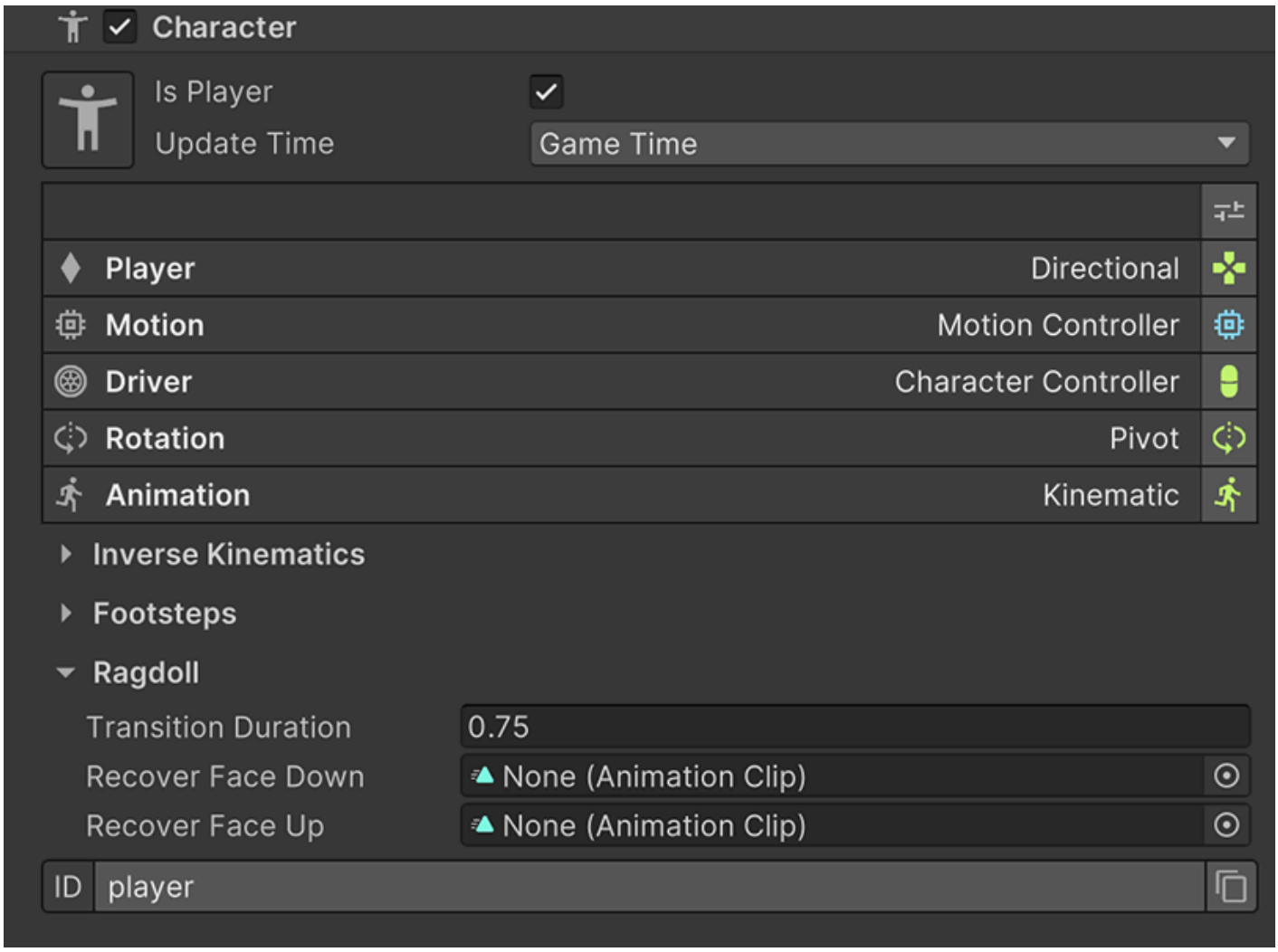
To initiate a ragdoll state, simply use the *Instruction* **Start Ragdoll** and select the targeted character. Notice that the player's input will still be in effect though. This is why Game Creator's default character comes with 2 Triggers that make it even easier to handle Ragdolls: When a character is considered to be *dead* it will automatically trigger the *Start Ragdoll* instruction on the character. When a character is revived, it will also automatically handle playing the correct animation and get the character up from the floor.

This means that, in order to start and stop the ragdoll effects, all that needs to be done is to use the *Instruction* **Kill Character** to disable any interactions from a character and it will automatically enter ragdoll-mode. On the other hand, using the **Revive Character** *Instruction* will give back control to the character and get it up from the floor using the correct animation.

> **Getting up**
>
> The character will automatically handle transitioning from its ragdoll pose to the default idle animation and pick up the most suitable gesture, depending on whether its currently facing down or up.

17.2 Configure Ragdoll Animations

To setup the *getting up* animations, select the Character and drag and drop the desired animations onto the **Recover Face Down** and **Recover Face Up** clip fields.



The **Transition Duration** field allows to specify the duration between the time the character is not controllable due to being in ragdoll-mode and recovered. Ideally this value will be a few milliseconds shorter than both recover animations.

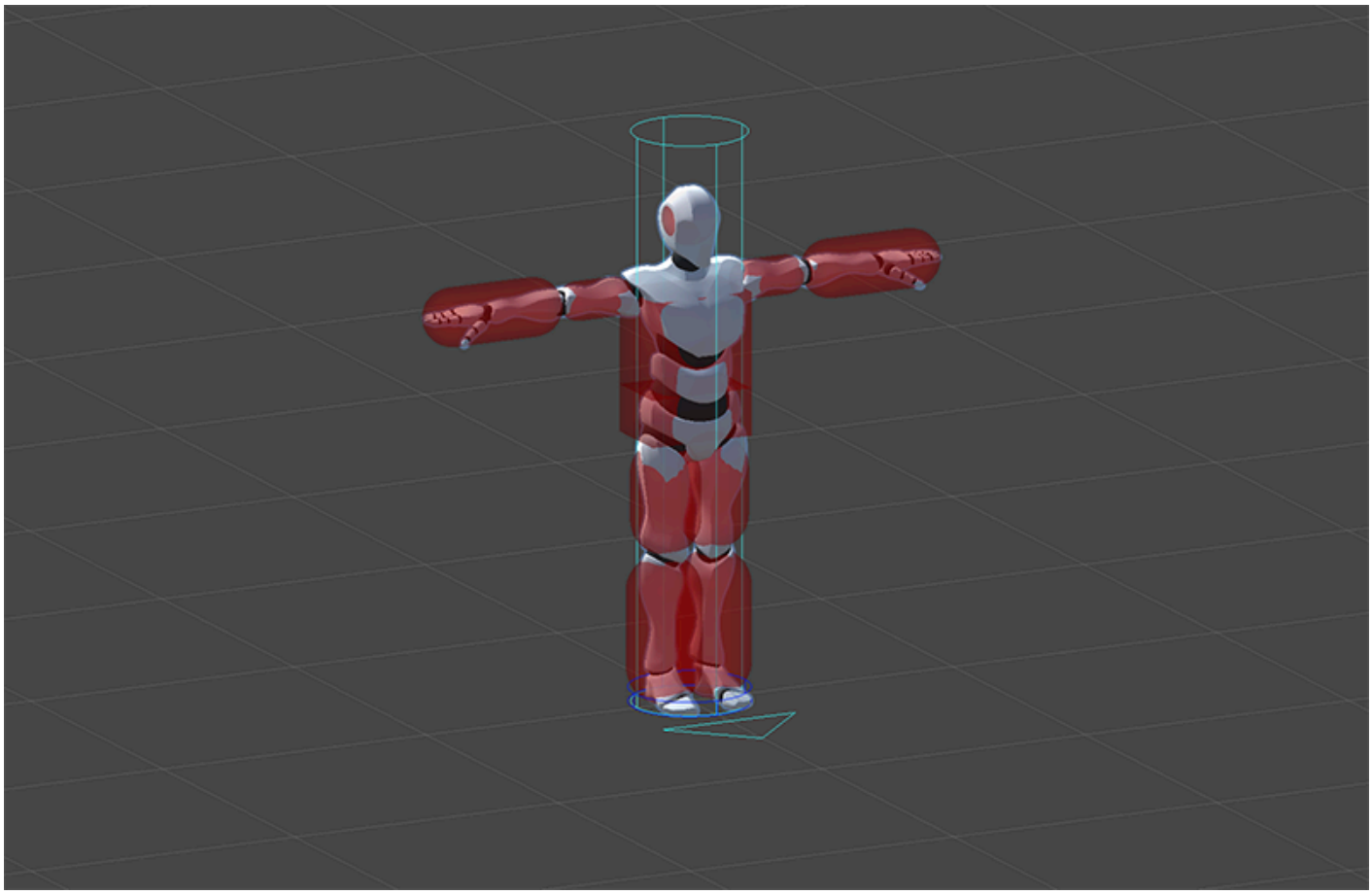
The most important part of a ragdoll is knowing the length and size of each of its physical bones and how they interact with the rest of the body. This is done using the Skeleton asset file. To know more about configuring a Skeleton asset and associate it with a Character, see the Skeleton section.

18 Skeleton

A **Skeleton** asset is a scriptable object asset that contains all the necessary information to identify the bounding volume of a character's bones and how these form a chain of joints that conforms the whole body.

What is it used for?

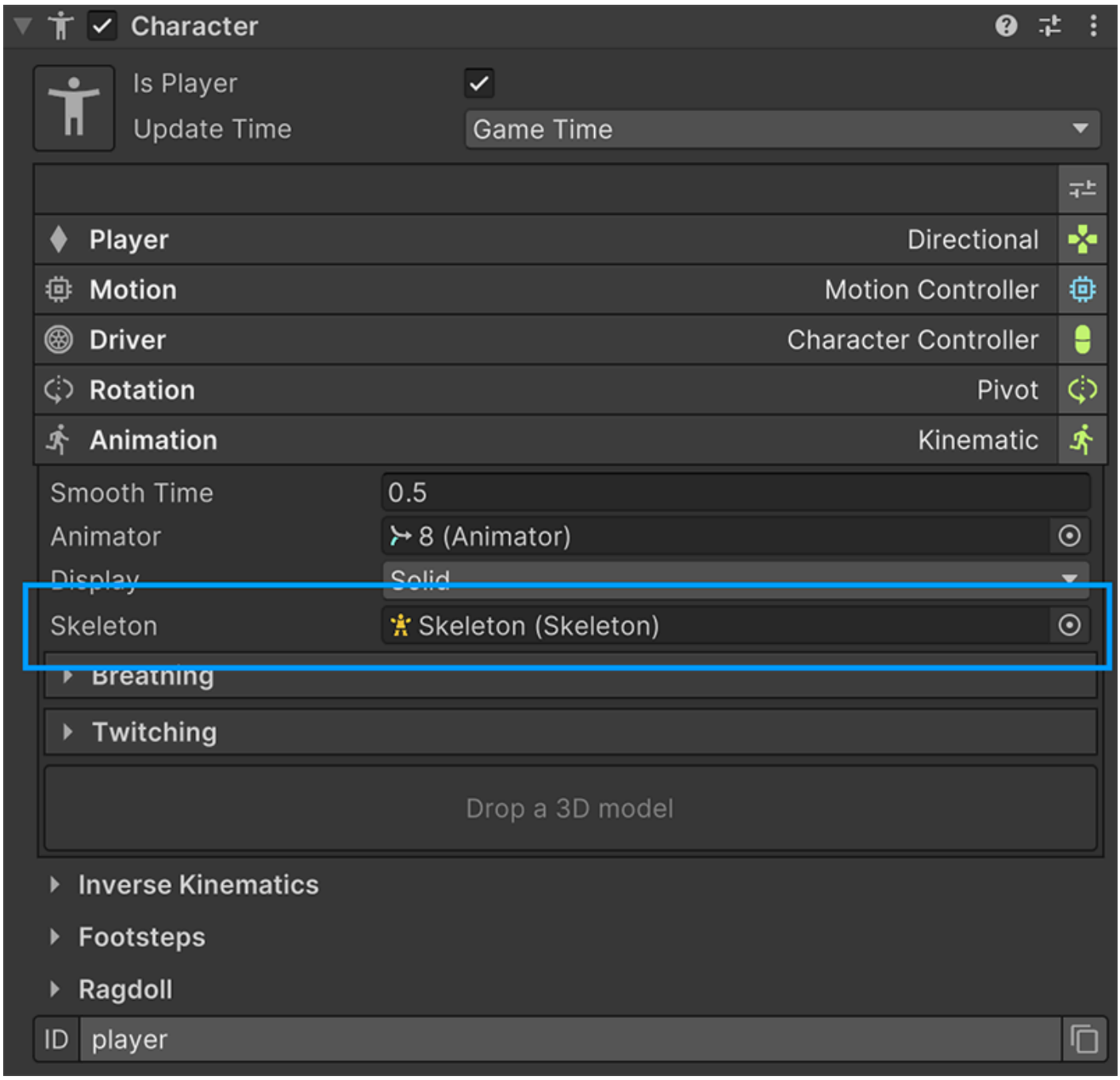
The **Skeleton** asset is used on multiple systems, such as the Ragdoll system, or the Melee and Shooter hit detection systems.



18.1 Create a Skeleton

To Create a Skeleton asset, right click on the *Project Panel* and select **Create → Game Creator → Characters → Skeleton**.

To assign a **Skeleton** asset to a **Character** simply select the desired **Character** and expand the *Animation* tab. Drag and drop the **Skeleton** asset onto its corresponding field.



18.2 Configure Skeleton

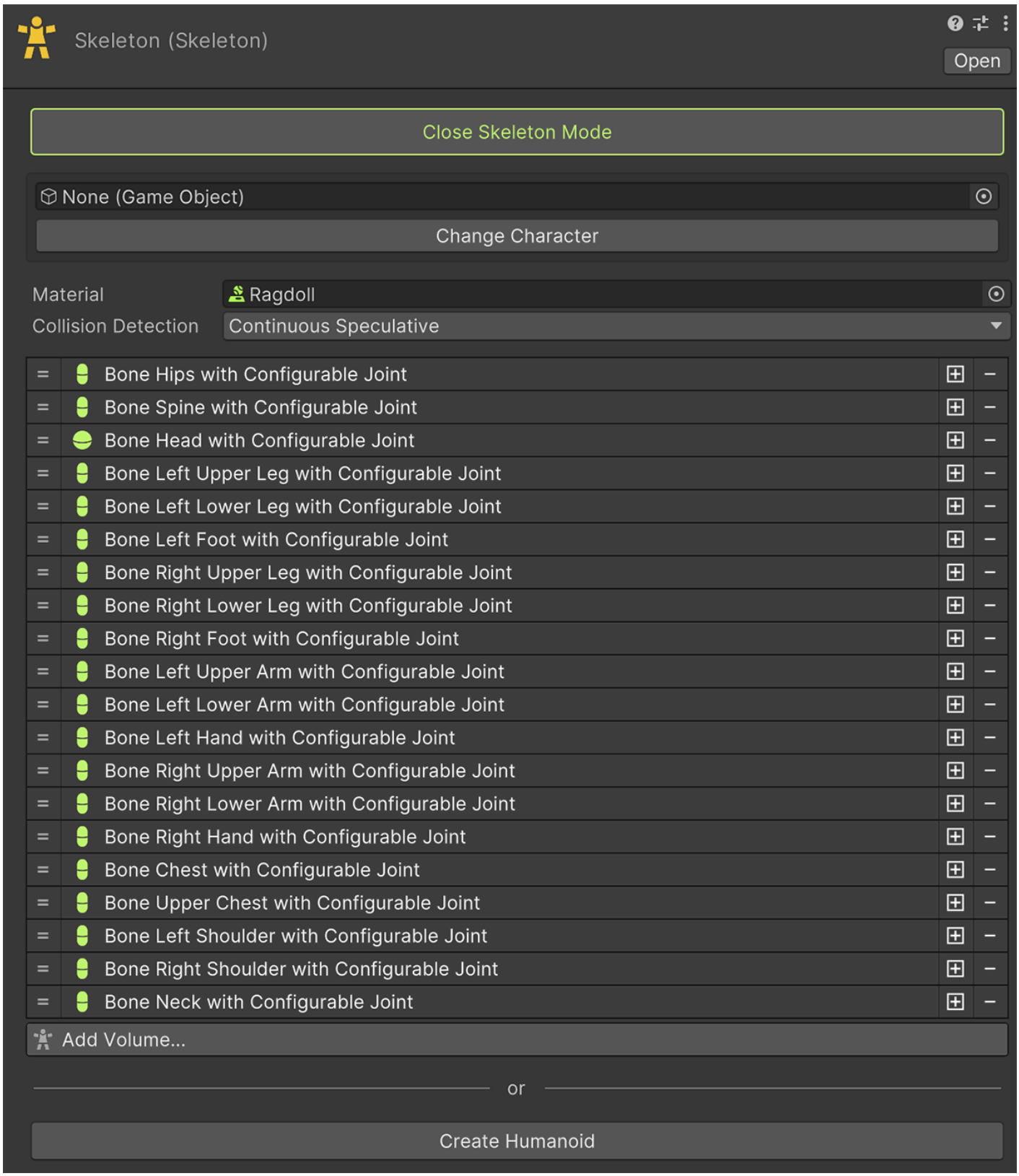
The **Skeleton** asset is divided into different sections:

The first is a big button that allows to enter *Skeleton Configuration* mode. In this mode, the scene is replaced by an empty one with a character in the middle, which can be changed by dragging and dropping a prefab model onto the field below and clicking on the *Change Character* button.

The second section determines the Physical Material and collision detection mode of the rigidbody system stemmed from the volumes.

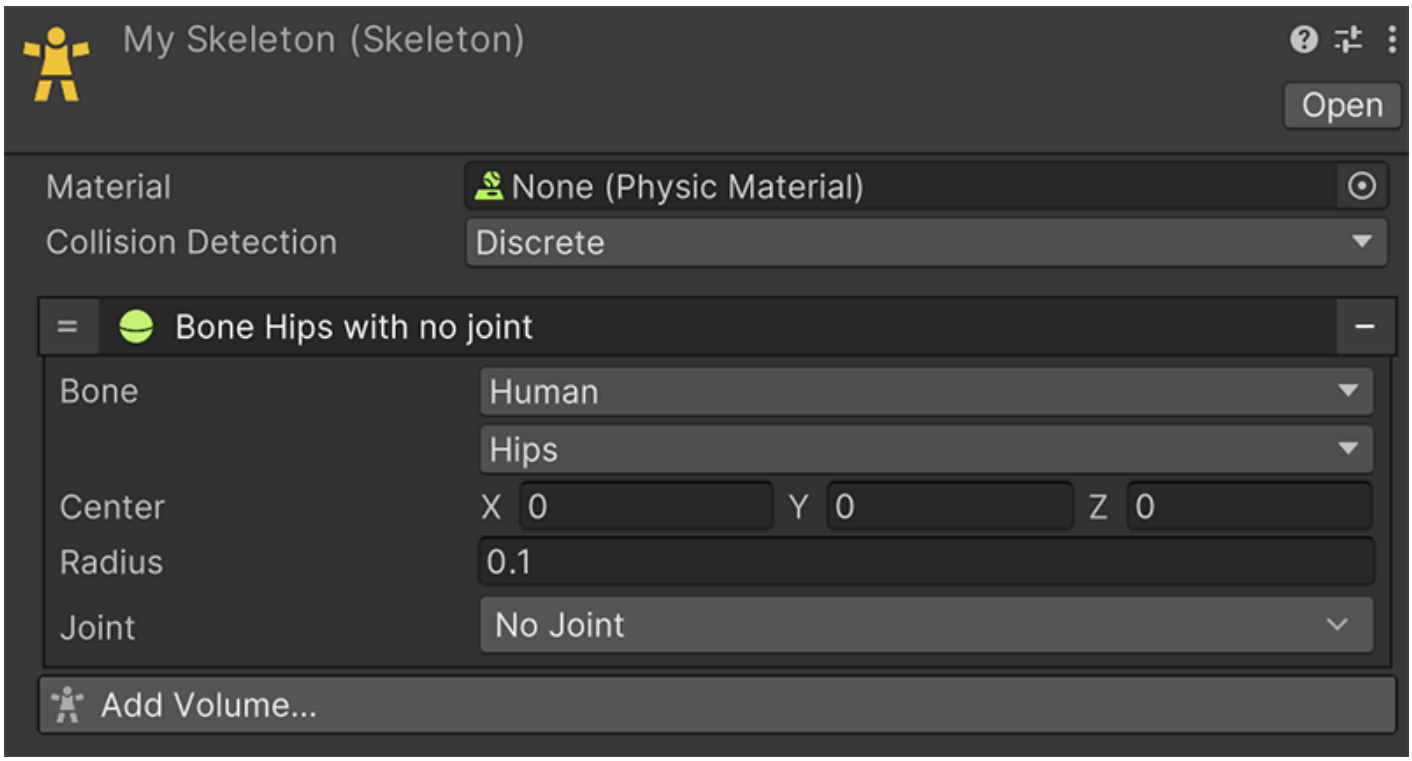
At the bottom there's a list of all volumes set up. This list can be either manually configured or use the heuristic creator for humanoid characters.

> **Readme!**
>
> To more easily configure the volumetric bounds of a humanoid character, see the next section.



To create a volumetric bone, click on *Add Volume* and select the type of bone to create:

- **Box:** A cubic volume. Mostly used for chest and flat surfaces.
- **Sphere:** A spherical volume. Used for hands and head mostly.
- **Capsule:** The most widely used volume bone. Used for most limbs.



A *Volumetric Bone* is composed of a **Bone Type**, a volume definition and an optional **Joint**.

The bone type can be specified by setting the humanoid bone from a dropdown list or from a path. For example, to reference the front right foot of a model of a Dog, the bone could be `Root/Spine/Collar/Right_Leg/Right_Foot`.

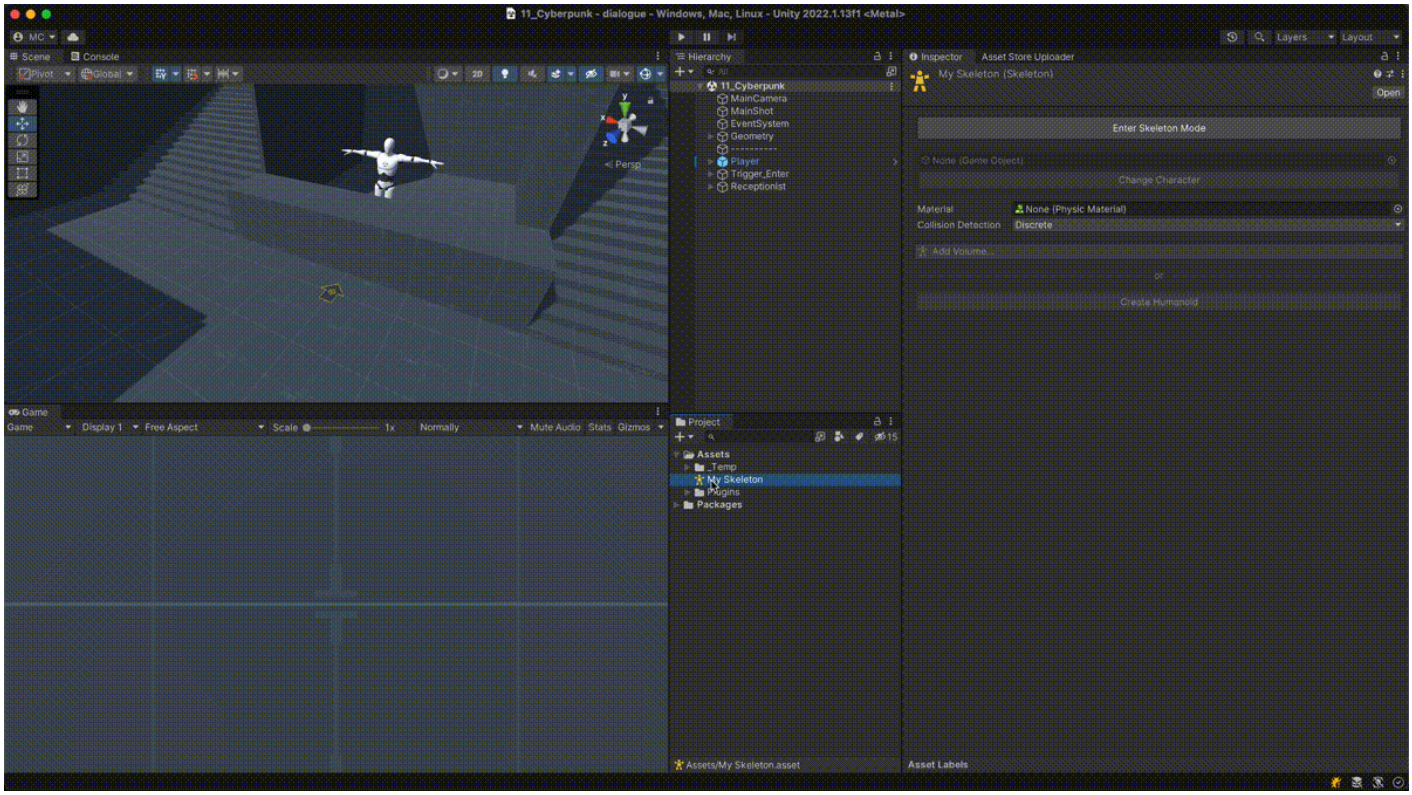
The volume definition depends on the type of volume created. For example, a Sphere volume bone contains a radius and a position offset field.

The Joint field allows to determine how a bone is related to other bones via a joint system..

> **More on Joints**
>
> For more information about character joints, visit this Unity documentation link.

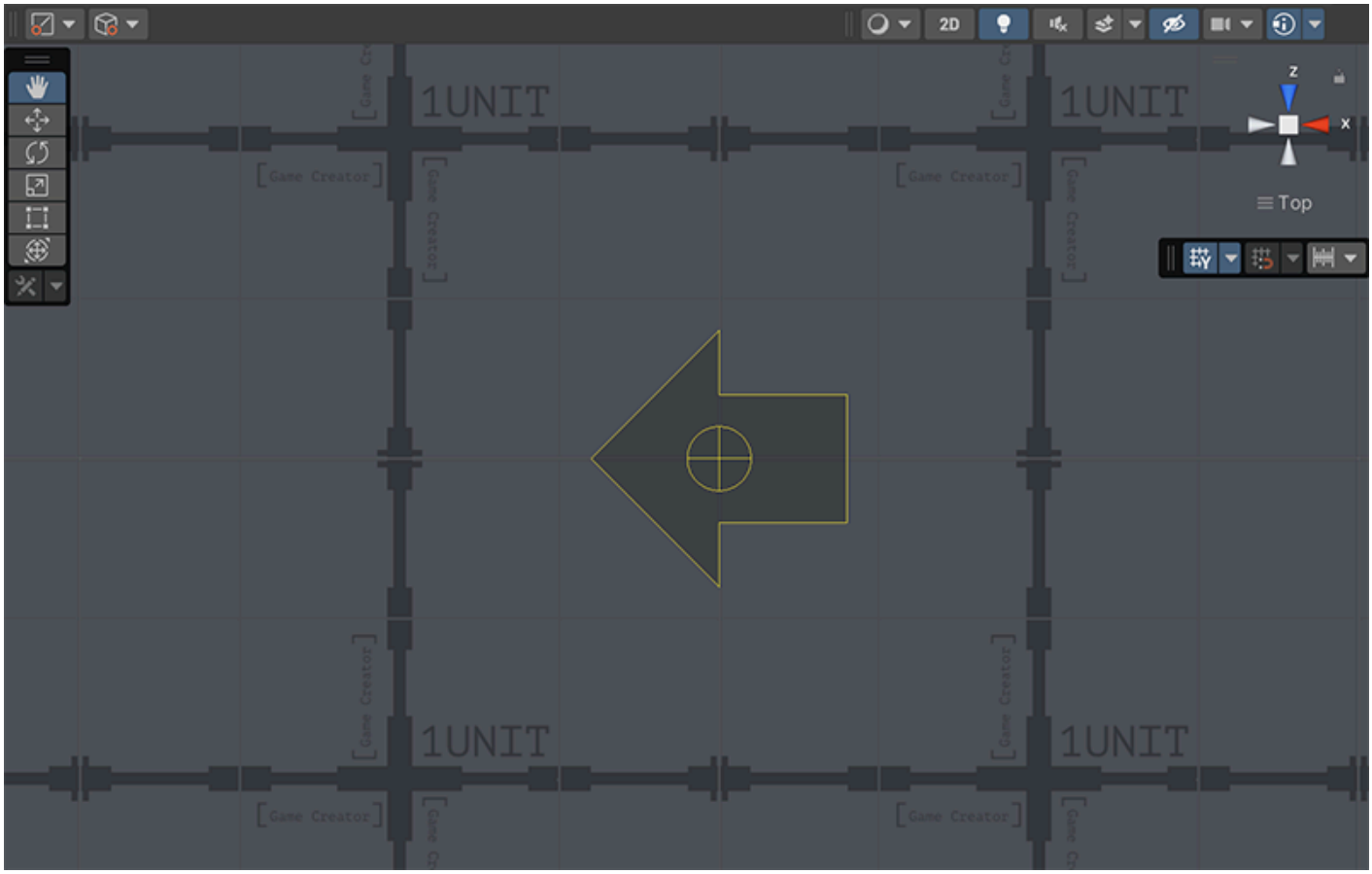
18.3 Setting up a Humanoid Skeleton

Game Creator comes with a tool that makes it much easier to automatically *guess* and extract the bounding volumes of a humanoid model. To use it, simply change the character model using the *Change Character* button and click on the *Create Humanoid* button. It will auto-magically approximate a Skeleton for you that you can then tweak it to your game needs.

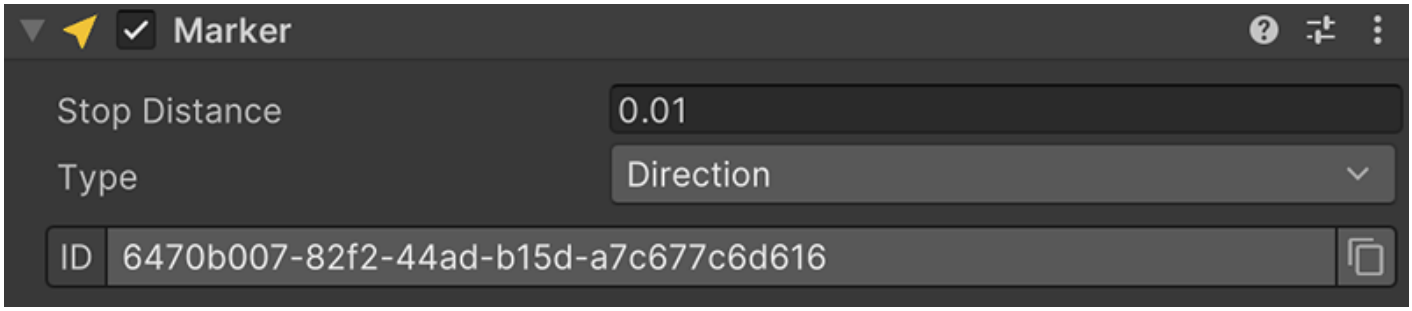

11_Cyberpunk - dialogue - Windows, Mac, Linux - Unity 2022.1.13f1 <Metal>
Scene
Console
Hierarchy
Inspector
Asset Store Uploader
My Skeleton (Skeleton)
Open
Enter Skeleton Mode
None (Game Object)
Change Character
Material
None (Physic Material)
Collision Detection
Discrete
Add Volume...
or
Create Humanoid
11_Cyberpunk
MainCamera
MainShot
EventSystem
Geometry
Player
Trigger_Enter
Receptionist
Persp
Game
Display 1
Free Aspect
Scale
1x
Normally
Mute Audio
Stats
Gizmos
Project
Assets
_Temp
My Skeleton
Plugins
Packages
Assets/My Skeleton.asset
Asset Labels

19 Markers

A **Marker** is a component that is used by **Characters** as destination points. It allows to define a target position and rotation so the **Character** is at the correct location before doing something else, like opening a door.



A **Marker** has a yellow shaped arrow that indicates the direction the Character will face after moving towards it.



Optionally, a Marker can specify a **Stop Distance** threshold from which a Character is considered to have reached its destination.

By default it's zero, but if the destination is a very crowded, there might not be enough space for a character to be at the exact marker's position. Having some error threshold allows Characters to *more or less* reach their destination without getting stuck or pushing other characters around.

The **Type** field allows to determine how the Marker works. By default its set to *Directional* which forces the character to end at the same position and rotation as the arror-shaped gizmo in the scene.

Another available mode is *Inwards* which tells the character to move to the closest point around a circle and rotate towards its center. This is specially useful when you want the character to pick up an item and you don't care from which angle it is picked up.

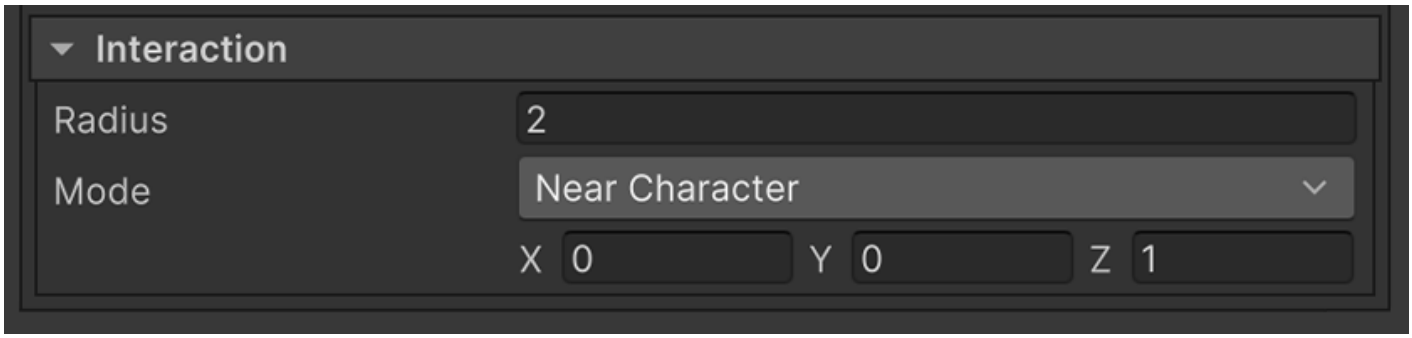
20 Interaction

Game Creator comes with a built-in interaction system that lets characters (both Players and NPCs) dynamically focus on a scene element and decide whether to interact with it or not.

> **Interaction when busy**
>
> It's important to note that a Character that is *Busy* cannot interact with **Interactive** elements.

20.1 Character setup

How a **Character** interacts with scene objects is specified in the **Motion** unit.



The **Radius** option determines the minimum distance an object has to be in order for the character to focus on it.

The **Mode** option allows to determine how to prioritize how objects are focused:

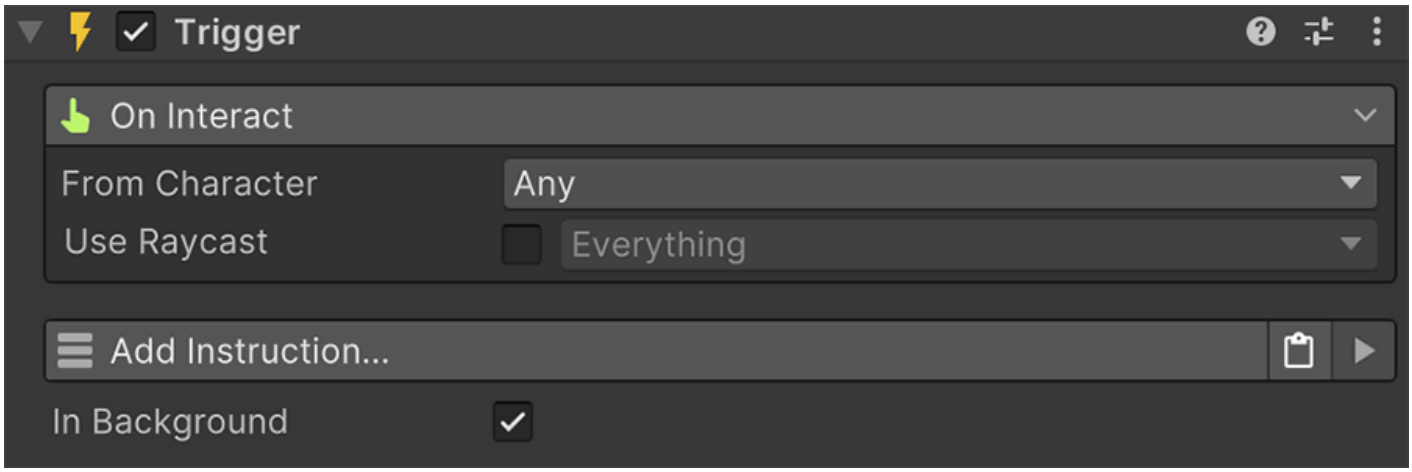
- **Near Character:** Picks the closes object to the character's interaction center, which can be offset by a certain amount. This option is best for console and games that require a controller.
- **Screen Center:** Interactive objects closer to the center of the screen have higher priority. This is the best option for first person games.
- **Screen Cursor:** Interactive objects closer to the cursor take precendence. This option is best for point and click adventures.

> **Interact**
>
> The character will automatically focus and unfocus any interactive object. To interact with the currently focused object, use the **Interact** instruction.

20.2 Interactive Objects

Any game object with the **On Interact** event on a **Trigger** component will be automatically marked as an interactive one.

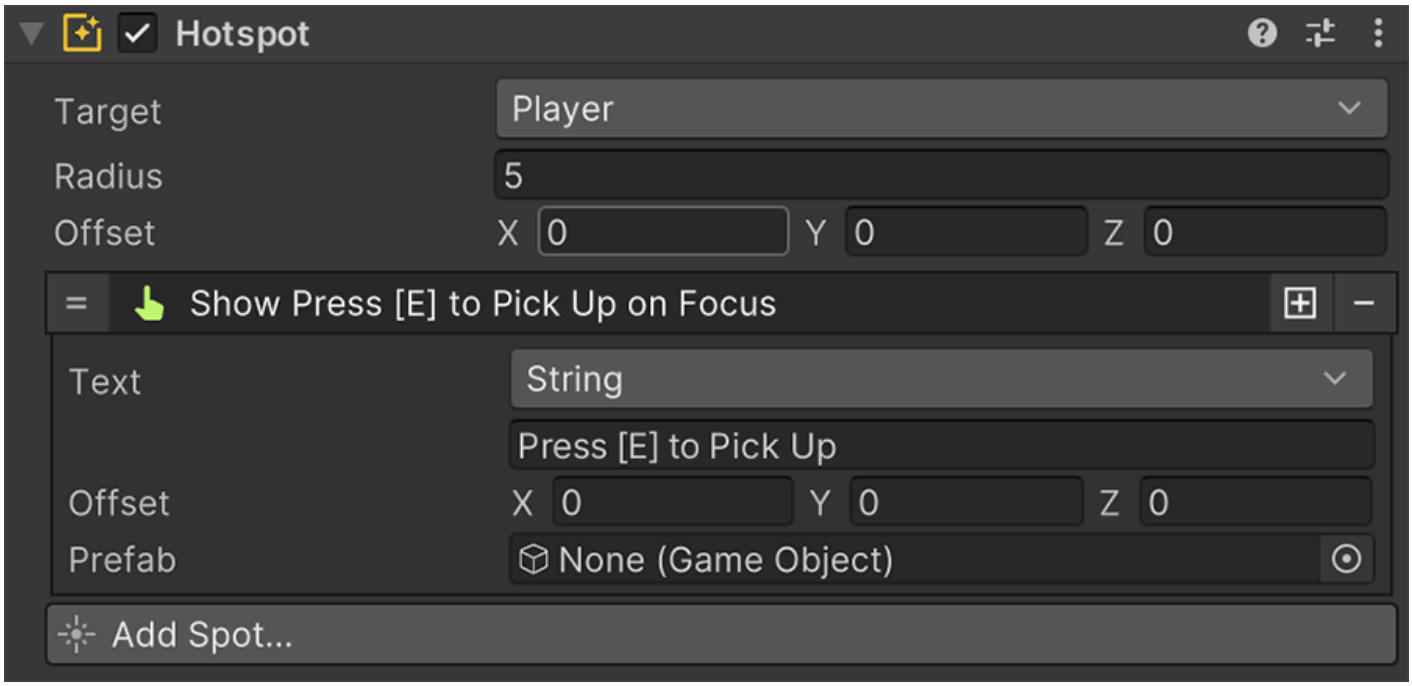
This event will be fired every time a character attempts to interact with this trigger.



If a character attemps to interact, but there is no *Interactive* object available, it will simply ignore the call.

> **Detect new Interaction**
>
> Apart from the **On Interact** event, one can also detect when a Trigger becomes focused or loses focus (also known as *blur*). This can be tracked using the **On Focus** and **On Blur** events.

Hotspots can also display a text or activate a prefab when the game object is focused by a character. To do so, you can add the **Text on Focus** spot on a **Hotspot** component and it will display the chosen text every time the selected character focuses on this interactive element.



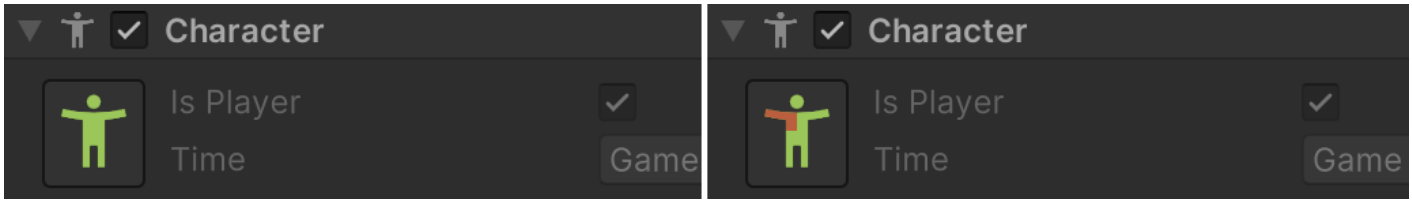
21 Busy

The `Busy` feature allows to query whether a specific limb of the character is being used or not. This allows other systems to determine whether an action can be performed or not.

> **Using the right hand**
>
> For example, a character that is shooting with its right hand can set its right arm as *busy*. By doing so you can prevent the character from opening a door with the right hand until the right arm is available again.

21.1 Busy at Runtime

When entering Play-Mode the mannequin icon at the top of the Character component will change its color from grey to green.



Its color changes in real-time and indicates:

- **Green:** The Limb is available to use.
- **Red:** The Limb is currently busy.

You can use **Instructions** and **Conditions** to set and retrieve the current **Busy** status of a **Character**.

21.2 Scripting

> **Coding Knowledge**
>
> The following concepts are meant for experienced programmers.

The follow properties can be queried and inform of the availability state of the limb or group of limbs:

```
IsArmLeftBusy : boolean
IsArmRightBusy : boolean

IsLegLeftBusy : boolean
IsLegRightBusy : boolean

AreArmsBusy : boolean
AreLegsBusy : boolean

IsBusy : boolean
```

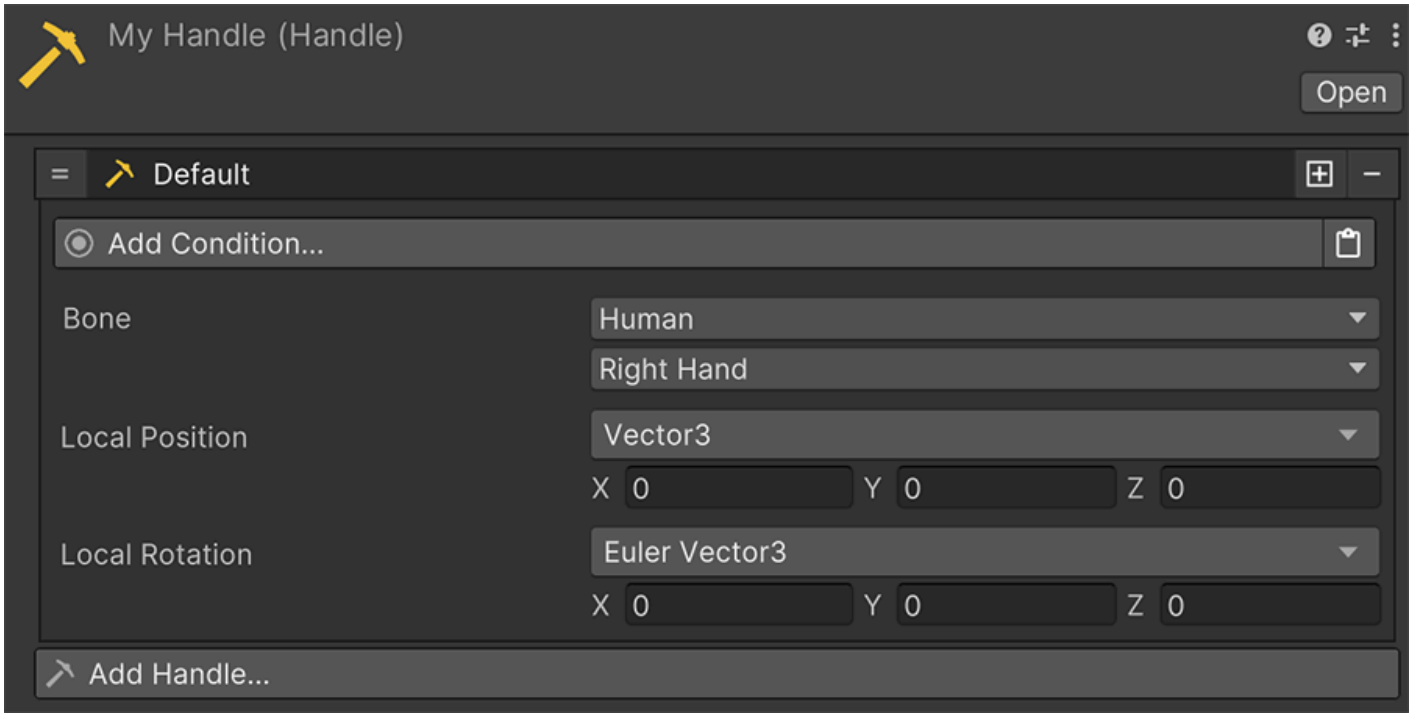
Additionally, limbs can be marked as busy or make them available using the `MakeLimbXXX()` method, where XXX is the limb of the body. For example, to set the *Left Leg* as busy, call the `MakeLegLeftBusy()` method.

All available methods

For more information about all the available methods on the Busy system, check the script under `Plugins/GameCreator/Packages/Core/Runtime/Characters/Busy`.

22 Handles

Handles are an optional asset that can be used to determine the bone where a prop is attached to, and it's precise position and rotation.



The **Handles** asset has a list that checks its **Conditions** from top to bottom. These conditions can determine which location of the handle should be the most optimal.

> **Handles for Humans and Beasts**
>
> For example, you could have a condition that checks if `Self` is a humanoid character or not. If it is, the prop could be attached to the right hand (like a sword). Otherwise the prop would be attached on the beast's mouth.

Handles also help re-use the same position and rotation for multiple weapons, which comes in handy if a game has lots of props to equip, such as swords, shields, daggers, etc...

I.II.IV Scripting

23 Scripting

This section covers topics that require some degree of programming knowledge and assumes certain level of coding expertise.

- **Character:** How to customize and extend the character system.
- **Inverse Kinematics:** How to construct new inverse kinematic character rigs.

24 Character

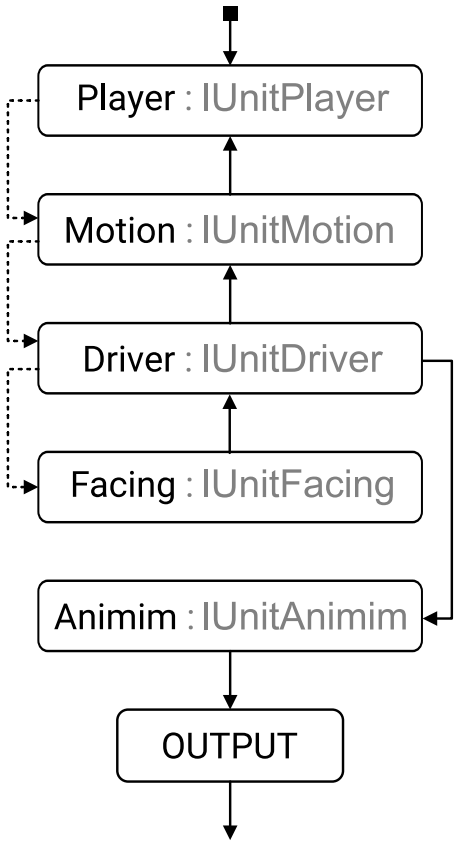
Game Creator Characters have been build to be easy to use and highly customizable. This section go over what a **Character** does every frame cycle. This will put you in perspective in order to create a custom Character that works with Game Creator or you want to integrate a Character system from another package into Game Creator.

24.1 Kernel

The **Character** component is composed of 5 different **Units** which conform the **Kernel**. These units can be changed at runtime without affecting the rest:

- **Player:** Defines whether the Character is a playable one and how the user can interact with it. If you want to create a custom Character input system, you'll need to implements the `IUnitPlayer` interface.
- **Motion:** Acts as an interface between the scene and the Character. All movement commands are relayed through this system and also takes into account the *Player*'s information. It decides which locomotion system should be used. If you want to create a different motion system for your characters, create a class that implements the `IUnitMotion` interface.
- **Driver:** Manages how the Character moves around the scene based on the *Motion*'s input. If you want to integrate another Character system from another Asset Store package, create a new class that implements from `IUnitDriver`.
- **Facing:** Is responsible for rotating the character towards a desired direction. For example, the default behavior is to have the character look towards where it's moving. If you want to customize where the character faces, create a custom class that implements the `IUnitFacing` interface.
- **Animim:** This system takes the *Driver*'s input and tells the Animator component which animation should be played via Mecanim parameters. If you want to use a custom Animator for your Character, crete a class that implements `IUnitAnimim` interface.

Every new cycle tick the **Character** updates all these systems in a very specific order.



It starts by calling the **Player**'s system `Update()` method. This takes the user's input and calls one of the **Motion**'s public movement methods:

- `MoveToDirection()`
- `MoveToPosition()`

After the **Player**'s system has been processed, the **Character** calls the **Motion** system's `Update()` method. This is where external forces are calculated, such as gravity, sliding through slopes, dashing, jumping, ...

> **Communication between systems**
>
> The **Motion** system takes into account the **Player**'s system before running the update. A system can access any of the other's systems data before processing its `Update()` cycle.

After the final **Motion** movement is calculated, the **Character** executes the **Driver**'s `Update()` method. This is where the *Transform* component is updated based on the movement type provided by the **Motion** parameter.

After the **Driver** system is completed, the **Facing** system starts. Based on the information provided by the **Driver** and **Motion** systems it calculates the direction in which the Character should be facing at.

Finally, the **Character** system calls the **Animim**'s `Update()` method, which feeds the **Animator** component with the necessary parameter values based on the information of the rest of the systems.

> **Modular design**
>
> It is important to highlight the fact that each system is independent of the other. You can create a custom animation system by implementing a `IUnitAnimim` interface and still use the default **Player**, **Motion** and **Driver** systems.

24.1.1 Player

The **Player** unit handles how the user interacts with the Player character. If the Character does not have the `Is Player` field checked, this unit is skipped entirely.

The Player also contains the `IsControllable` flag that defines whether a character processes the input received or not. This is very useful when a character is in the middle of a cutscene and you don't want the user to have control over the player.

24.1.2 Motion

The **Motion** unit is the brain of the character. It contains all of its quirks, such as its height, its move speed, terminal velocity and so.

The **Motion** unit also is in charge of receiving any locomotion commands:

- `MoveToDirection` defines a direction towards where the character must go. This method has to be called every frame or the character will stop.
- `StopToDirection` stops the character's movement. Useful when the character moves due to its deceleration value.

A character can also be instructed to move to a certain position:

- `MoveToLocation` instructs a character to move to a specific location. The `Location` class accepts a position and/or a rotation.
- `MoveToTransform` instructs the character to move to a specific transform's position. If the transform changes its position, the character will follow it until it reaches the target.
- `MoveToMarker` is similar to the previous method, but also takes into account the marker's rotation and forces the character to end facing the same direction as the navigation marker.

A character can also follow another target without an end condition:

- `StartFollowingTarget` starts following a target and stays within a `minRadius` and `maxRadius` distance.
- `StopFollowingTarget` instructs a character to stop following a target.

The **Motion** unit is also responsible for dealing with character's jumps. The `Jump()` method will instruct a character to perform a jump (or air jump), if it's possible.

24.1.3 Driver

The **Driver** unit controls *how* a character moves around the scene: Whether it's using Unity's Character Controller, the Navigation Mesh Agent for obstacle avoidance or a physics-based rigidbody entity.

This unit recieves the locomotion information of *Motion* and *Facing*, and transforms it into a physical translation and rotation.

24.1.4 Facing

The **Facing** unit controls where the body of the character (not the head) points at. By default all characters do not rotate their body unless they are moving; in which case the body rotates towards where the character is moving.

However, there are certain situations where the character might want to temporary face at a certain direction. For example, when the character aims with the gun at a certain object, or when talking to a character. **Game Creator** comes with a layer system that provides a neat solution for these cases.

> **Recommendation**
>
> If you plan on creating your own facing system, we recommend creating a class that inherits from `TUnitFacing` instead of the interface `IUnitFacing`. This base class comes with the layer system built out of the box, so you don't have to recode it.

The **Facing** system interfaces provides access to 3 methods:

- `int SetLayerDirection(int key, Vector3 direction, bool autoDestroyOnReach)`
- `int SetLayerTarget(int key, Transform target)`
- `void DeleteLayer(int key)`

The first two methods, `SetPlayerDirection` and `SetLayerTarget` allow to make the character look at a certain direction or keep track of a particular scene object. Making the character change its default direction is done using a layer system.

When any of these methods is called for the first time, it creates a new entry in the layer system and returns its identifier: an integer known as `key`. To subsequently update a particular layer, simply pass as the `key` argument the resulting key from the previous iteration.

For example, if you want to make a character look at a certain character (defined by the variable `lookAtTransform`), you'll simply need to call:

```
private int key = -1;
public Character character;
public Transform lookAtTransform;

public void StartFacing()
{
    IUnitFacing face = this.character.Facing.Current;
    this.key = face.SetLayerTarget(this.key, this.lookAtTransform, false);
}

public void StopFacing()
{
    IUnitFacing face = this.character.Facing.Current;
    face.DeleteLayer(this.key);
}
```

No Exceptions

It is important to note that the layer system won't throw any exceptions. If you try to attempt to delete a layer but the key doesn't exist, it will simply do nothing.

When calling the `StartFacing()` method, the character will smoothly rotate towards the target defined until the `StopFacing()` method is called.

However, in some cases, you may not want to manually remove the facing layer, but instead stop facing a particular direction when the character reaches its target direction. For these cases, simply set the `SetLayerDirection` method's last parameter to `true`. This will tell Game Creator to automatically remove the layer when the character reaches its target direction.

For example:

```
public Character character;
public Vector3 direction;

public void LookAt()
{
    IUnitFacing face = this.character.Facing.Current;
    face.SetLayerDirection(-1, this.direction, true);
}
```

24.1.5 Animim

The **Animim** unit handles everything related to the visual representation of a character: From its appearance to its animations.

Animator required

This unit requires an Animator component reference in order to deal with animations

The default character system comes with a set of procedural animations played on top that add subtle but consistent movement across different animations, such as breathing and exertion. The breathing rate and exertion amount can be modified using the `HeartRate`, `Exertion` and `Twitching` proprerties.

24.2 Change Model

To change a character model, call the `ChangeModel(...)` method. Its signature contains 2 parameters:

- A prefab object reference, which should be the FBX model
- A configuration struct of type `ChangeOptions`

This last optional parameter allows to define the new model's footstep sounds, its skeleton's bounding volumes as well as a new animator controller and an offset. For example, to change the player's model without any optional parameters:

```
GameObject instance = character.ChangeModel(prefab, default);
```

25 Custom IK

Characters in **Game Creator** have a layered *Inverse Kinematic* system that can be stack one after another in order to modify the animation of a character. The most common form of inverse kinematics is the Feet IK, which makes sure a character's feet are correctly placed and aligned with the floor below it.

25.1 Accessing a Rig

Accessing a rig is done using the IK property of the Character's component. To deactivate the rig that aligns the feet on the ground, for example, can be done using:

```
character.IK.GetRig<RigFeetPlant>().IsActive = false;
```

Note that `character.IK.GetRig<RigFeetPlant>()` returns an instance of that particular rig (null if it can't be found).

25.2 Creating a custom Rig

Game Creator offsers two types of IK system wrappers:

- Riggings powered by DOTS
- Riggings powered by the `AnimatorIK` method

To create a new IK system you must crete a class that inherits from either `TRigAnimationRigging` (for DOTS) or `TRigAnimatorIK` (for AnimatorIK). We recommend using the new DOTS-based approach when possible, as it's more performant.

In either case, you should override the `DoStartup(...)` and `DoUpdate(...)` methods, which are called once at the beginning and every frame respectively.

```
public class MyCustomRig : TRigAnimationRigging
{
    protected override bool DoStartup(Character character)
    { }

    protected override bool DoEnable(Character character)
    { }

    protected override bool DoDisable(Character character)
    { }

    protected override bool DoUpdate(Character character)
    { }
}
```

I.III Cameras

26 Cameras

Cameras are devices that capture and display the world to the user. **Game Creator** uses two components to determine how the action is framed:

- **Camera Controllers:** A component attached to the camera. For itself it does nothing but mimic the behavior that its active camera shot feeds. By default, the `Main Camera` component is the primary camera controller.
- **Camera Shot:** A component that has multiple configurations, depending on which, its associated camera controller will respond in one way or another.

For example, if the camera controller `Main Camera` has the *Third Person* Shot associated with it, the main camera will mimic the behavior of that shot, which is to follow and look at a target, while the user can orbit around it.

A camera controller can transition to another camera shot. This transition can either happen over time, or instantly.

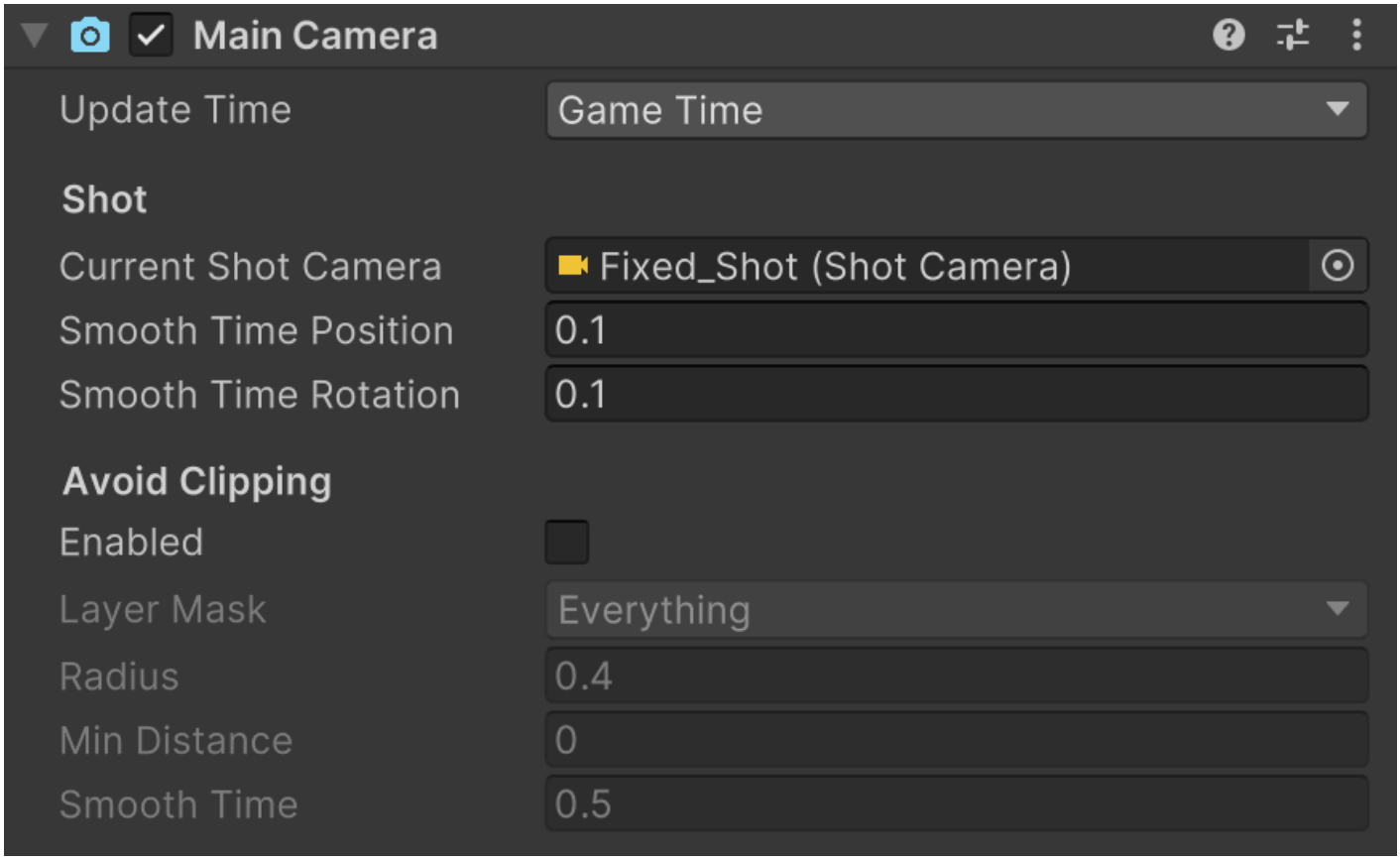
27 Camera Controller

A **Camera Controller** is a component attached to a camera object that has a associated at most one **Camera Shot** reference. This associated camera shot can be changed at runtime and will dictate the behavior of the camera controller.

> **Main Camera**
>
> Most games will only have one single camera. The camera in these cases will have the `Main Camera` component attached, which is a camera controller that can be accessed globally by any script.

27.1 Creating the Main Camera

To creata a main camera, right click on the *Hierarchy Panel* and select Game Creator → Cameras → Main Camera from the dropdown menu.



The **Main Camera** component has three distinct sections:

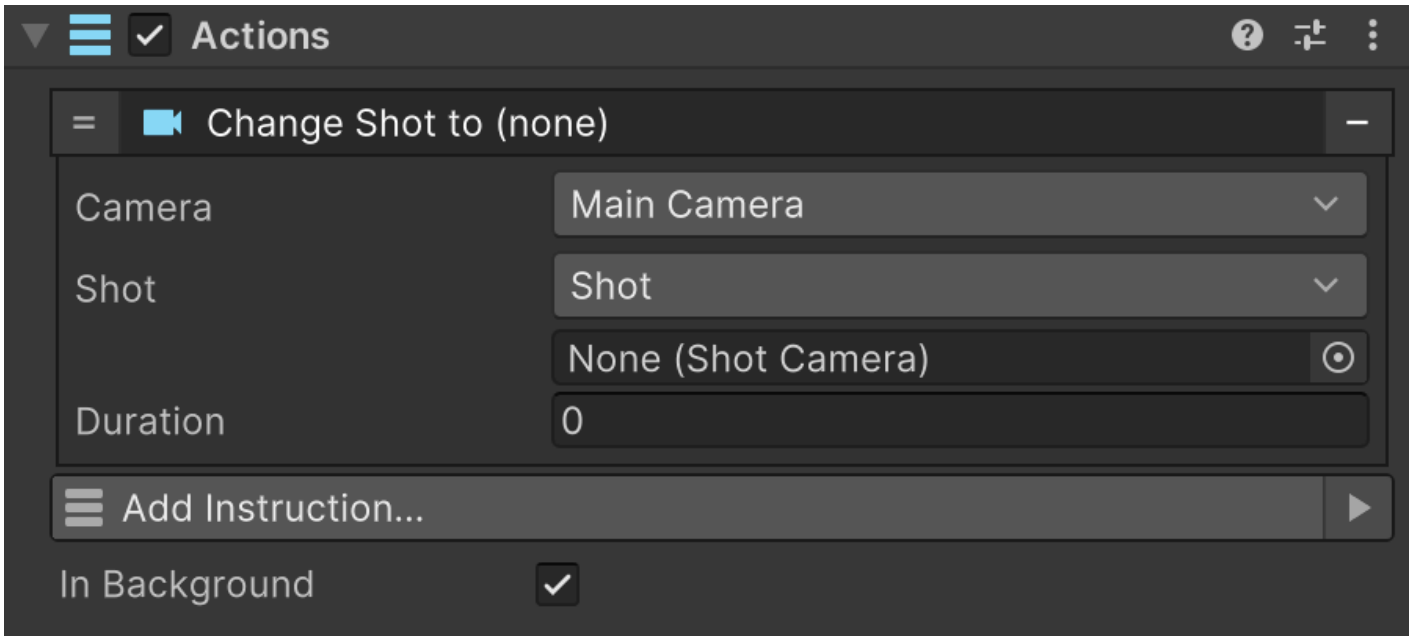
- **Game Time:** Defines the time mode used to update the camera. By default it uses the Game Time option, which can pause time when the time scale is set to zero.

- **Shot:** Determines the **Camera Shot** associated with this camera controller. If none is set, the camera won't have any behavior.
- **Avoid Clipping:** Allows the camera to avoid clipping through the geometry of the scene.

> **Smooth Camera Movement**
>
> The Shot's smoothing options determine how much the camera lags from the Shot's behavior. It's recommended to add some lag to avoid any jittering. However, introducing too much lag will make controls feel a a bit unresponsive.

27.2 Transition to a new Shot

To transition a Camera Controller from one Camera Shot to another one, it's recommended to use the **Change Shot** instruction.



Simply drop in the Camera Shot you want the Camera Controller mimic and how long should it take to transition. **Game Creator** will handle the rest.

28 Camera Shots

Camera Shots are components that provide the **Camera Controller** (or **Main Camera**) information about how they should move and behave.

Camera Shots Analogy

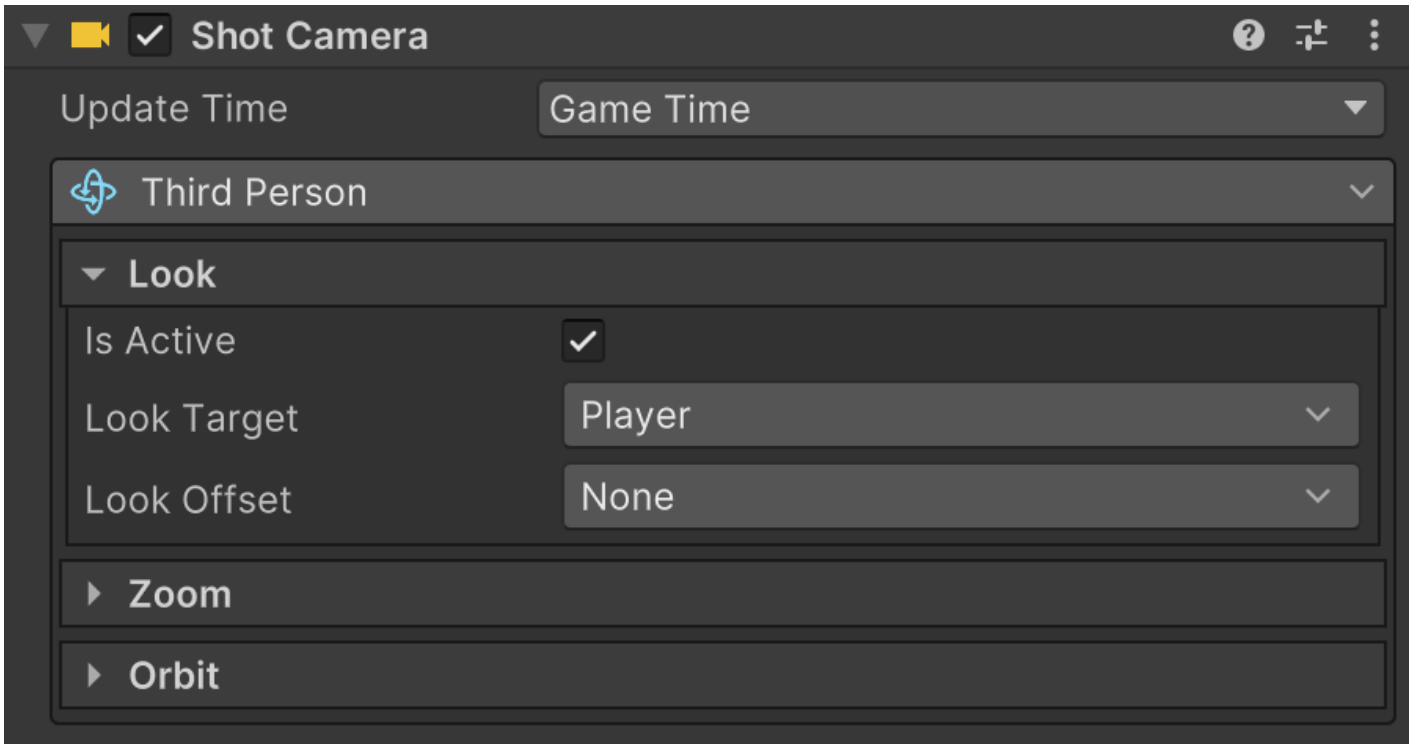
Think of Shots as a collecion of camera angles scattered around the scene, each trying to frame the action as best as possible. Then you, the Director, decide which camera is visualized on the screen, for how long and when to swap to another shot.

28.1 Creating a Camera Shot

To create a **Camera Shot** right click on the *Hierarchy* panel and select Game Creator → Cameras → Shot Camera from the dropdown menu. This will place a new game object on the scene with the **Camera Shot** attached to it.

Camera Shot + Main Camera

If your scene doesn't have a Main Camera attached to the scene camera, creating a new **Camera Shot** will create one for you and link it to the newly created shot automatically for you.

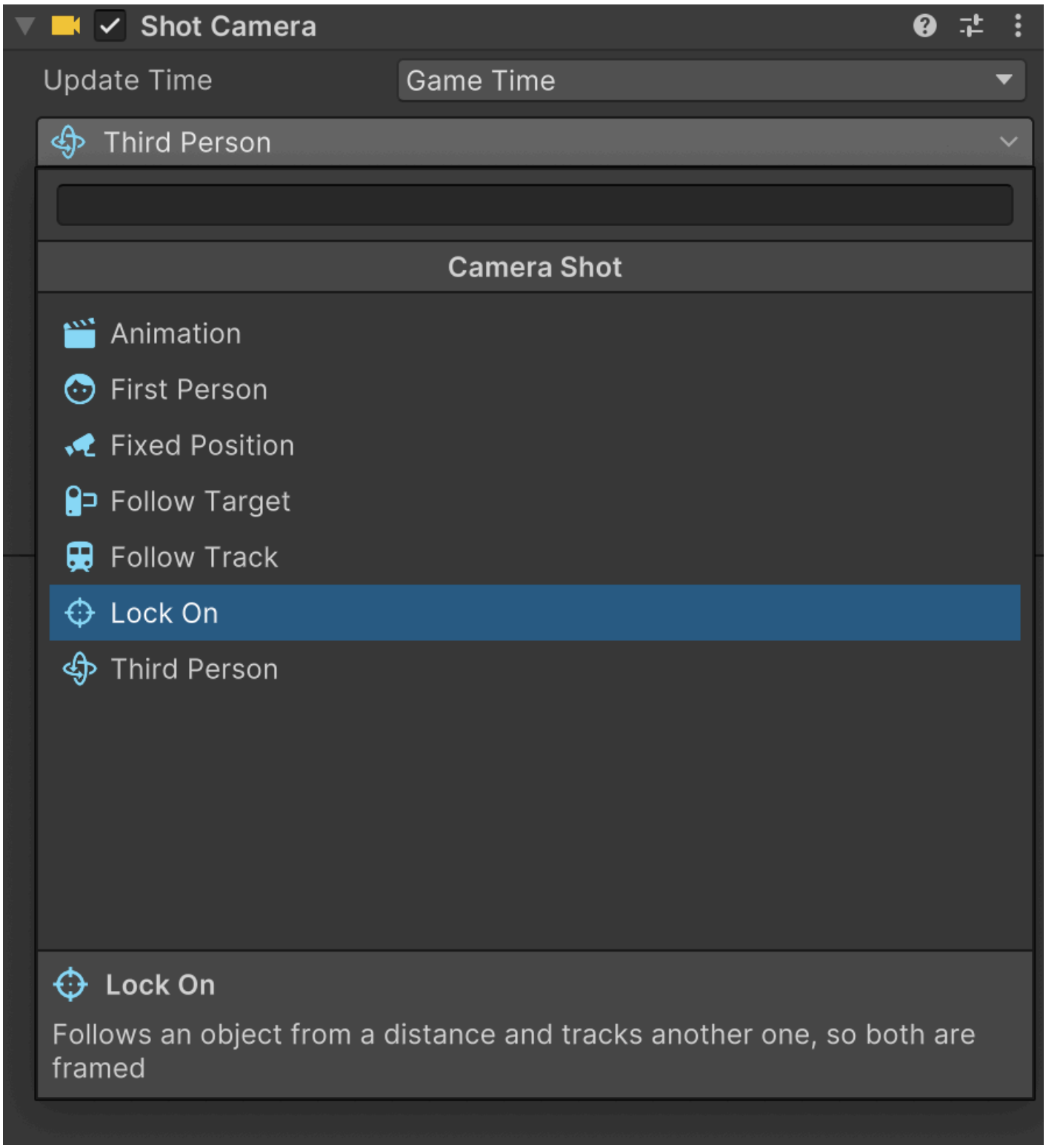


A **Camera Shot** component contains its shot type and a collection of parameters that can be modified to fine-tune its behavior. In the example above, the *Third Person* camera shot has 3 sections that allow to modify the target tracked, whether the user should be able to zoom in/out and how the orbit should be done. Clicking on each of these sections reveals or hides its content.

> ✓ **Is Main Shot**
>
> Since version 2.3.15 all **Camera Shots** have a toggle field called *Is Main Shot*.
>
> Ticking this will allow to define it as the primary one, which can be used as a shortcut when selecting the **Main Camera Shot** field drop a camera selection dropdown.

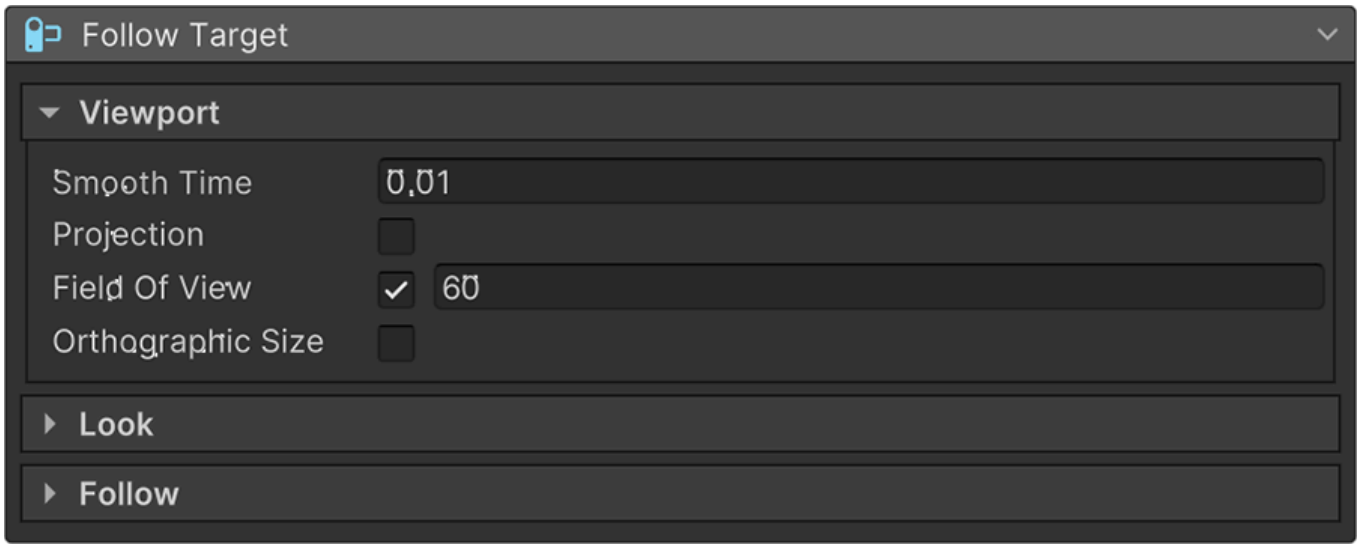
28.2 Camera Shot Types

To change a camera shot type, simply click on its type name. A dropdown menu will appear from which the new type can be selected.


Shot Camera
Update Time
Game Time
Third Person
Camera Shot
Animation
First Person
Fixed Position
Follow Target
Follow Track
Lock On
Third Person
Lock On
Follows an object from a distance and tracks another one, so both are framed

Camera Viewport

Since version **2.7.28** all **Camera Shots** come with a *Viewport* section that allows to customize multiple properties of the camera when switching to the **Shot**, including the *Field of View* and the *Projection* mode.



28.2.1 Fixed Position

This camera shot doesn't move from its place. However, it can be instructed to keep track of a target's position by pivoting around itself. Think of this camera's behavior as a security camera.

28.2.2 Follow Target

This camera is very similar to the *Fixed Position* but also allows to follow the target from a certain distance. Useful for top-down view games like Diablo.

28.2.3 Follow Track

This camera shot allows to track a target as well as move along a pre-defined rail-like path. This path's position is defined by the position of the targeted object along another path. This camera shot is useful for games that have very linear corridors but want to smoothly turn the camera around corners.

28.2.4 Animation

This camera shot moves along a pre-defined path over a certain amount of time. When it reaches the end of the animation, it stops there and does nothing else. This shot is very useful for cinematic sequences where multiple animation shots can be chained together to dynamically follow the action.

28.2.5 First Person

This shot is perfect for first person games. The target object (usually a humanoid) determines the position of the shot and follows it while allowing to spin the head around.

Comes with a vast collection of features such as:

- **Head Bobbing:** The amount of up and down and side movement due to the character's change of weight when walking or running.
- **Head Leaning:** A subtle rotation on the local X and Z axis that is applied when the character moves in order to display the impulse required to go towards that particular direction.
- **Noise:** Another subtle yet realistic random movement applied to both the rotation and translation of the shot to simulate restless idle motion and breathing.

All these parameters can be changed at runtime to accomodate to different situations, such as increasing the noise after sprinting and such.

28.2.6 Third Person

This shot is used on third person games where the camera follows a target but the user is free to orbit around it.

28.2.7 Lock On

This shot allows to follow a target's position while the rotation follows another one, always framing both targets on screen. This shot is perfect for locking on enemies when making an action game or hinting the player something they should not be missing.

28.2.8 Anchor Peek

This shot anchors itself to the chosen game object and allows to pan and tilt the camera vertically and horizontally, up to a certain amount. The *restitute* field brings back the shot to the center if no further input is detected. This is specially useful when using a gamepad controller and you want the character to peek around corners.

I.IV Visual Scripting

29 Visual Scripting

Game Creator comes with a unique high-level and intuitive visual scripting toolset that makes it very easy to *code* interactions. It only consists of 3 components:

- **Actions:** A list of instructions that are executed one after another.
- **Triggers:** A component that listens to events in the scene
- **Conditions:** Branch off to instructions, depending on certain conditions.

> **Visual Scripting nomenclature**
>
> The **Actions** component consists of a list of **Instructions**. The **Conditions** component is made of **Branches**, which contain a list of **Conditions** and **Instructions**. Lastly, the **Trigger** component listens for a specific **Event** in the scene.

Apart from these three visual scripting components, **Game Creator** also includes **Hotspots**, which is a special type of component that doesn't directly affect gameplay, but highlights interactive objects in different ways: For example, making a character's head turn towards a point when near, showing a text above an interactive element, and so on.

29.1 High Level Scripting

A high-level scripting language is a methodology in which programming interactions is closer to what humans are used to use. For example, in **Game Creator** you can tell a character to follow a target object; freeing the user from having to think what it means to *follow* an object.

> **Game Creator Hub**
>
> **Game Creator** and each module comes packed with a unique set visual scripting tools. The Game Creator Hub is a web platform where community members upload free Instructions, Conditions and Events for everyone to download and use in their projects. Be sure to check it out!

29.2 Why not Playmaker

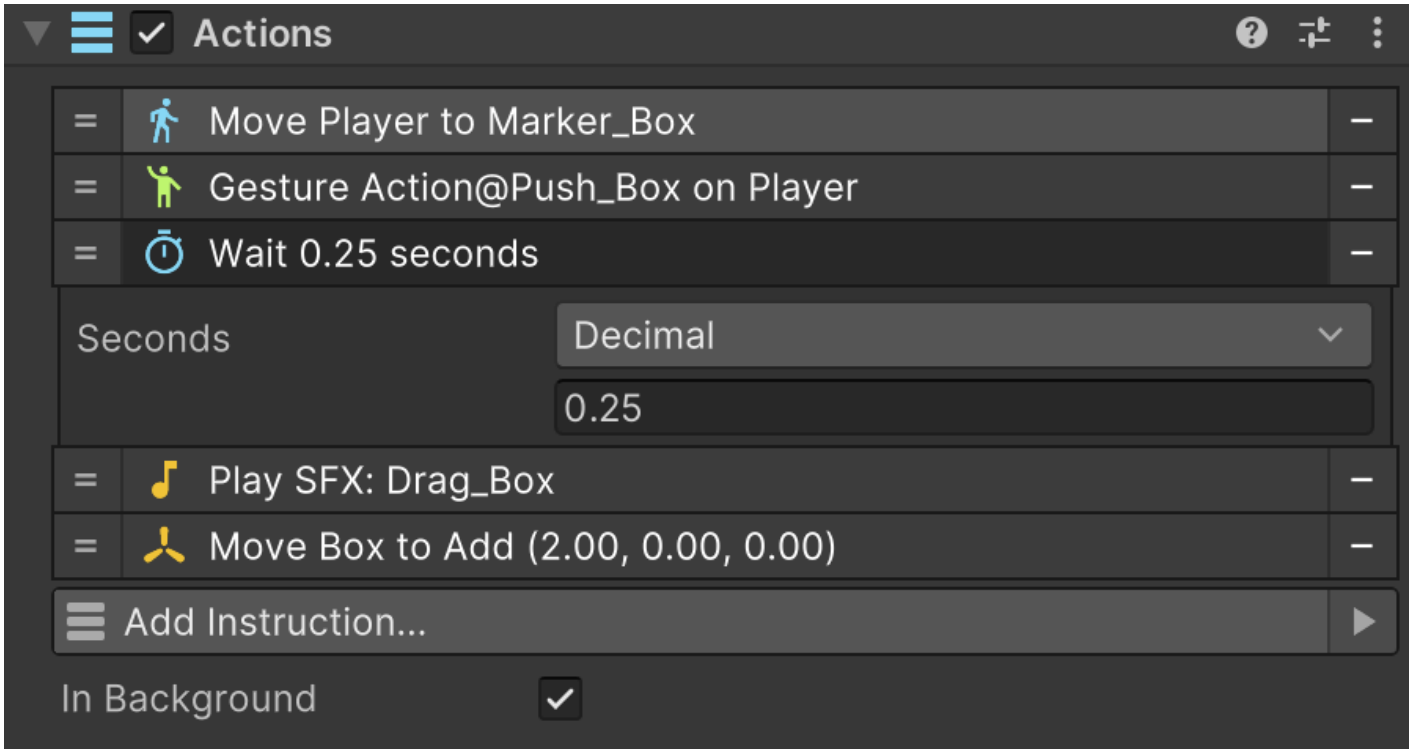
Why not both? Playmaker and Unity's Visual Scripting solution are graph-based, which tend to be closer to a programming language. If you're used to using these, you'll find these complement **Game Creator** very well.

On one hand, **Game Creator** makes it very fast and easy to structure common interactions without the need to *code* the low-level stuff. However, if you need more fine-grain control over some parts and you don't know how to code your own Instructions, you can use these graph-based solutions that perfectly complement the process of making games.

I.IV.I Actions

30 Actions

Actions are components that have a list of individual **Instructions** which are executed from top to bottom. It's important to note that an **Instruction** won't be executed until the previous one has finished.



Task List

Actions can be thought as task lists that must be completed from top to bottom.

30.1 Creating Actions

There are two ways to create an Actions object. One is to create an object that contains an Actions component, by right clicking on the *Hierarchy* panel and selecting *Game Creator* → *Visual Scripting* → *Actions*. This creates a scene object with the component attached to it.

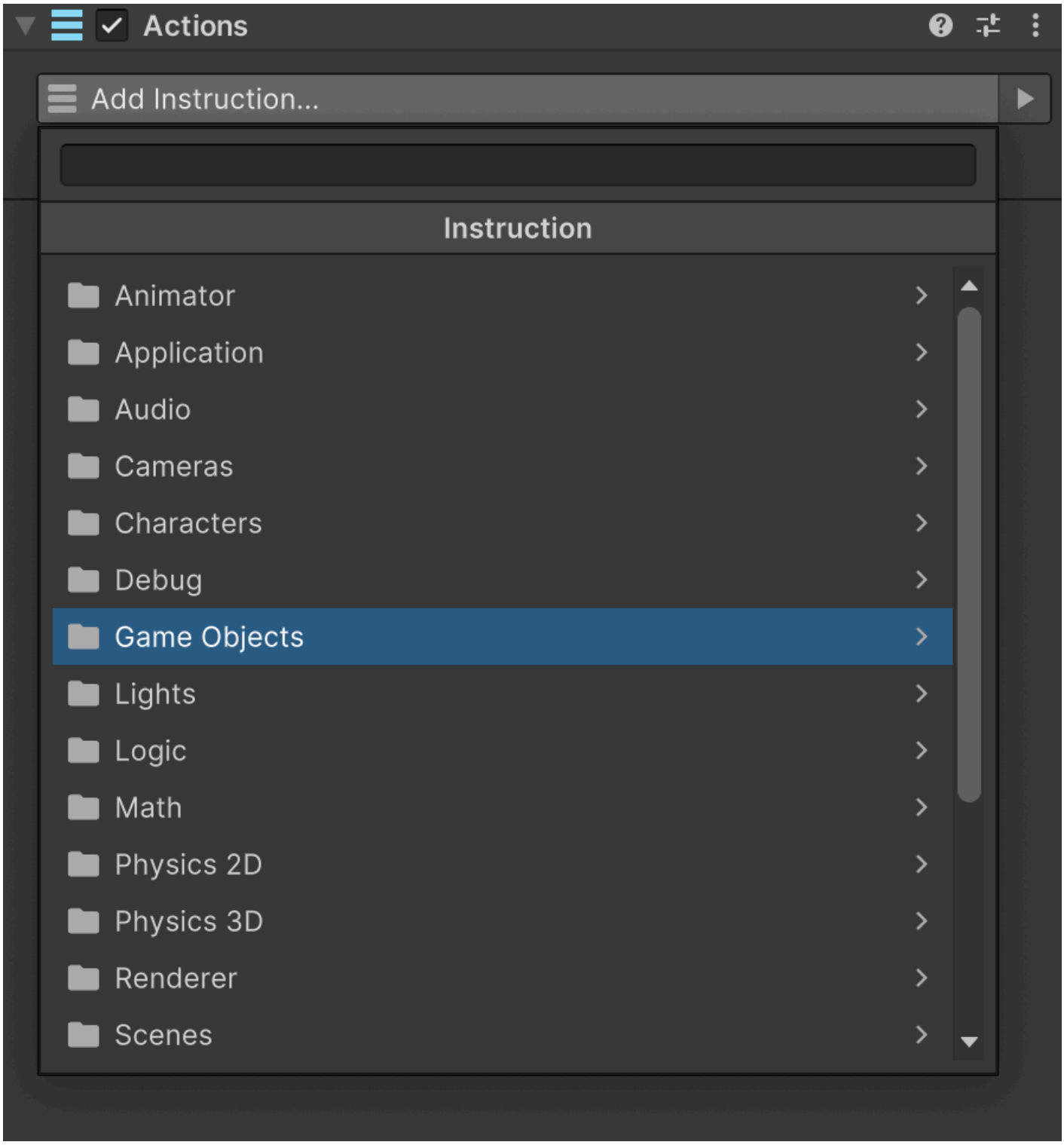
However, an Actions component can also be added to any game object. Simply click on any game object's *Add Component* button and type Actions.

Deleting Actions

To delete an Actions component, simply click on the component's little cog button and select "Remove Component" from the dropdown menu.

30.2 Adding Instructions

To add an **Instruction** to an **Actions** component, click on the "Add Instruction" button to pop a dropdown list with a searchable field. Navigate through the different categories or search for a specific instruction and click it to add it at the bottom of the list.



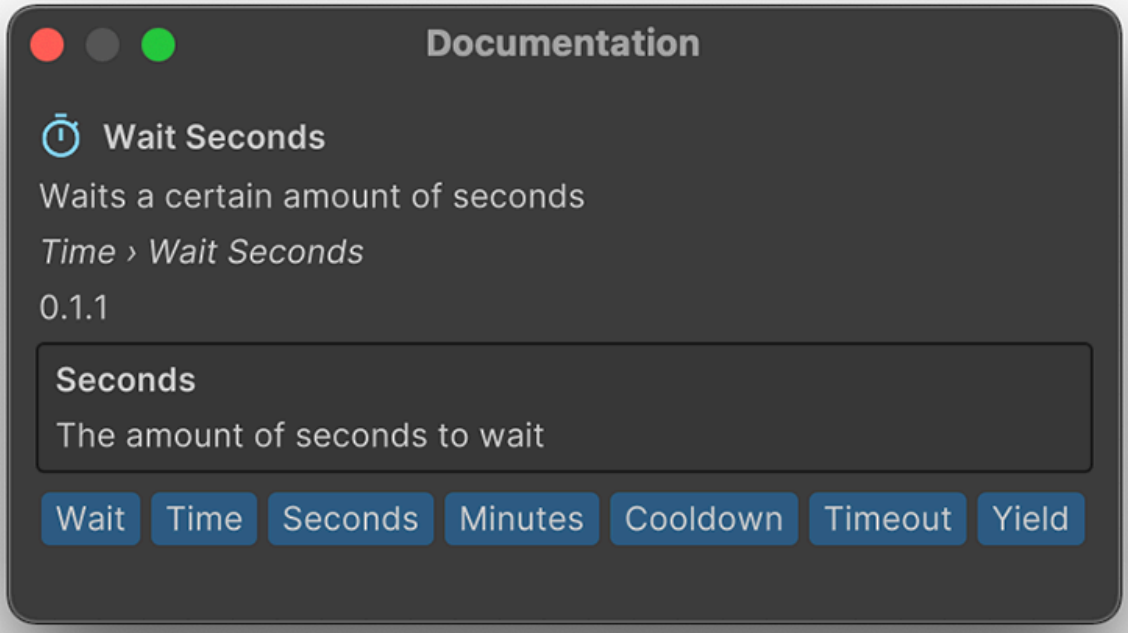
It is also possible to add **Instructions** at any point of the list. To do so, right click on any existing **Instruction** and choose "Insert Above" or "Insert Below" from the contextual menu that appears.

Accessible Fuzzy Search

Game Creator uses an advanced indexed search algorithm that allows to both syntactically and semmantically understand what the user is trying to search, even if the search contains mispelled words. For example, searching for "move" will display the "Move Character" instruction, but also the "Change Position" one.

30.3 Built-in Documentation

All **Instructions** have built-in documentation that explain what it does as well as a small description of each of its parameters. To access its documentation, either search for that particular instruction on the documentation, or right click it on the **Instruction** and select *Help*. A new floating window will appear with all the necessary information.

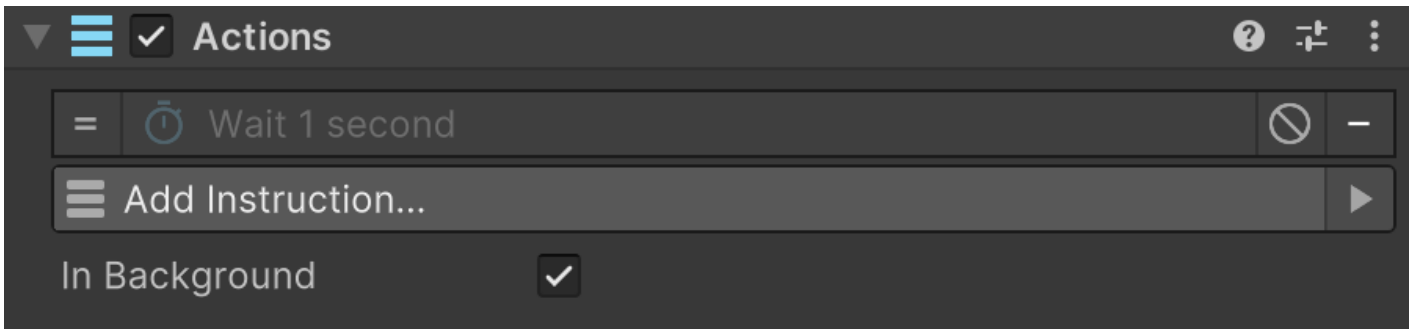


30.4 Debugging Tools

Actions come with built-in tools that allow to easily visualize and what's happening at runtime. Right click on any **Instruction** to pop a context menu with the *Disable* and add a *Breakpoint* options.

30.4.1 Disable Instruction

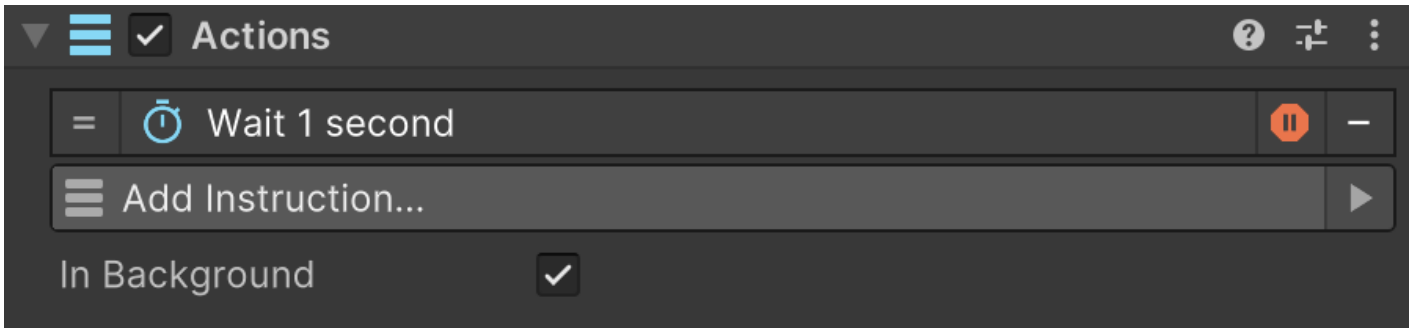
This option disables a particular instruction, as if it was not there.



The **Instruction** is greyed out and a special icon appears on its right side. Click the icon to enable the instruction again.

30.4.2 Add a Breakpoint

A breakpoint pauses the Unity Editor upon reaching a particular Instruction, right before executing it. This is very useful if you want to check the state of certain data before the execution progresses any further.



When an **Instruction** has a breakpoint, it displays a red icon on its right side. Clicking it will remove the breakpoint from the Instruction.

Editor only

It is important to note that *breakpoints* only work on the Editor and have no effect when building the project as a standalone application.

I.IV.I.I Instructions

31 Instructions

31.1 Sub Categories

- Animations
- Application
- Audio
- Cameras
- Characters
- Debug
- Game Objects
- Input
- Lights
- Math
- Physics 2D
- Physics 3D
- Renderer
- Scenes
- Storage
- Testing
- Time
- Transforms
- Ui
- Variables
- Visual Scripting

I.IV.I.I.I ANIMATIONS

32 Animations

32.1 Instructions

- Change Animator Float
- Change Animator Integer
- Change Animator Layer
- Change Blend Shape
- Play Animation Clip
- Set Animation
- Set Animator Boolean
- Set Animator Trigger

33 Change Animator Float

`Animations » Change Animator Float`

33.1 Description

Changes the value of a 'Float' Animator parameter

33.2 Parameters

Name	Description
Parameter Name	The Animator parameter name to be modified
Value	The value of the parameter that is set
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished
Animator	The Animator component attached to the game object

33.3 Keywords

`Parameter` `Number`

34 Change Animator Integer

`Animations » Change Animator Integer`

34.1 Description

Changes the value of a 'Integer' Animator parameter

34.2 Parameters

Name	Description
Parameter Name	The Animator parameter name to be modified
Value	The value of the parameter that is set
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished
Animator	The Animator component attached to the game object

34.3 Keywords

`Parameter` `Number`

35 Change Animator Layer

`Animations » Change Animator Layer`

35.1 Description

Changes the weight of an Animator Layer

35.2 Parameters

Name	Description
Layer Index	The Animator's Layer index that's being modified
Weight	The target Animator layer weight
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished
Animator	The Animator component attached to the game object

35.3 Keywords

`Weight`

36 Change Blend Shape

`Animations » Change Blend Shape`

36.1 Description

Changes the value of a Blend Shape parameter

36.2 Parameters

Name	Description
Skinned Mesh	The Skinned Mesh Renderer component attached to the game object
Blend Shape	Name of the Blend Shape to change
Value	The target value of the blend shape
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished

36.3 Keywords

`Morph` `Target`

37 Play Animation Clip

`Animations » Play Animation Clip`

37.1 Description

Plays an Animation Clip on the chosen Animator

37.2 Parameters

Name	Description
Animation Clip	The Animation Clip that is played
Animator	The Animator component attached to the game object

37.3 Keywords

`Animate` `Reproduce` `Sequence` `Cinematic`

38 Set Animation

`Animations » Set Animation`

38.1 Description

Sets the value of an Animation Clip

38.2 Parameters

Name	Description
To	The location where to save the Animation Clip
Animation Clip	The Animation Clip reference to store

38.3 Keywords

`Animation` `Clip` `Animator`

39 Set Animator Boolean

`Animations » Set Animator Boolean`

39.1 Description

Sets the value of a 'Bool' Animator parameter

39.2 Parameters

Name	Description
Parameter Name	The Animator parameter name to be modified
Value	The value of the parameter that is set
Animator	The Animator component attached to the game object

39.3 Keywords

`Parameter` `Bool`

40 Set Animator Trigger

`Animations » Set Animator Trigger`

40.1 Description

Sets the value of a 'Trigger' Animator parameter

40.2 Parameters

Name	Description
Parameter Name	The Animator parameter name modified
Animator	The Animator component attached to the game object

40.3 Keywords

`Parameter` `Once` `Flag` `Notify`

I.IV.I.I.II APPLICATION

41 Application

41.1 Sub Categories

- Cursor

41.2 Instructions

- Open Web Page
- Quit Application

42 Open Web Page

```
Application » Open Web Page
```

42.1 Description

Opens the specified URL with the default web browser

42.2 Parameters

Name	Description
URL	The route link to open. Must include the protocol prepended (http or https)

42.3 Keywords

`Site` `Internet`

43 Quit Application

```
Application » Quit Application
```

43.1 Description

Closes the application and exits the program. This instruction is ignored in the Unity Editor or WebGL platforms

43.2 Keywords

`Exit` `Close` `Shutdown` `Turn`

I.IV.I.I.II.I Cursor

44 Cursor

44.1 Instructions

- Cursor Texture
- Cursor Visibility
- Lock Cursor

45 Cursor Texture

`Application » Cursor » Cursor Texture`

45.1 Description

Changes the image of the hardware cursor

45.2 Parameters

Name	Description
Texture	The new appearance of the cursor. The texture must be set to Cursor type
Tip	The offset from the top left of the texture used as the target point
Mode	Determines if the cursor is rendered using software or hardware rendering

45.3 Keywords

`Mouse` `Crosshair` `Click`

46 Cursor Visibility

`Application » Cursor » Cursor Visibility`

46.1 Description

Determines if the hardware cursor is visible or not

46.2 Parameters

Name	Description
Is Visible	If true the cursor is visible, unless it is set as Locked

46.3 Keywords

`Mouse` `FPS` `Crosshair`

47 Lock Cursor

`Application » Cursor » Lock Cursor`

47.1 Description

Determines if the hardware pointer is locked to the center of the view or not

47.2 Parameters

Name	Description
Lock Mode	The behavior of the cursor. The default value is None

47.3 Keywords

`Mouse` `State` `FPS` `Center` `Confine`

I.IV.I.I.III AUDIO

48 Audio

48.1 Instructions

- Audio Mixer Parameter
- Audio Source Pitch
- Audio Source Volume
- Change Ambient Volume
- Change Master Volume
- Change Music Volume
- Change Snapshot
- Change Sound Effects Volume
- Change Speech Volume
- Change Ui Volume
- Fade All Ambient
- Fade All Music
- Play Ambient
- Play Music
- Play Sound Effect
- Play Speech
- Play Ui Sound
- Stop Ambient
- Stop Music
- Stop Sound Effect
- Stop Speech On Game Object

49 Audio Mixer Parameter

`Audio » Audio Mixer Parameter`

49.1 Description

Changes the value of an Audio Mixer exposed parameter

49.2 Parameters

Name	Description
Audio Mixer	The Audio Mixer asset with the exposed parameter
Parameter Name	A string representing the name of the exposed parameter
Parameter Value	The value which the exposed parameter is set

49.3 Keywords

`Float` `Exposed` `Effect` `Change`

50 Audio Source Pitch

```
Audio » Audio Source Pitch
```

50.1 Description

Changes the pitch of an Audio Source component

50.2 Parameters

Name	Description
Audio Source	The Audio Source component
Pitch	The new targeted pitch to change
Transition	How long it takes to reach the new value

50.3 Keywords

`Clip` `Music`

51 Audio Source Volume

`Audio » Audio Source Volume`

51.1 Description

Changes the volume of an Audio Source component

51.2 Parameters

Name	Description
Audio Source	The Audio Source component
Volume	The new targeted volume to change
Transition	How long it takes to reach the new value

51.3 Keywords

`Clip` `Music`

52 Change Ambient volume

`Audio » Change Ambient volume`

52.1 Description

Change the Volume of Ambient music

52.2 Parameters

Name	Description
Volume	A value between 0 and 1 that indicates the volume percentage

52.3 Keywords

`Audio` `Ambience` `Background` `Volume` `Level`

53 Change Master volume

`Audio » Change Master volume`

53.1 Description

Change the Master volume. The Master volume controls how loud all other channels are

53.2 Parameters

Name	Description
Volume	A value between 0 and 1 that indicates the volume percentage

53.3 Keywords

`Audio` `Sounds` `Volume` `Level`

54 Change Music volume

`Audio » Change Music volume`

54.1 Description

Change the Volume of Music

54.2 Parameters

Name	Description
Volume	A value between 0 and 1 that indicates the volume percentage

54.3 Keywords

`Audio` `Music` `Background` `Volume` `Level`

55 Change Snapshot

`Audio » Change Snapshot`

55.1 Description

Smoothly transitions to a new snapshot over a period of time

55.2 Parameters

Name	Description
Snapshot	The Audio Mixer Snapshot that is activated
Transition	How long it takes to transition to the new Snapshot

55.3 Keywords

`Effect` `Transition` `Effect` `Change`

56 Change Sound Effects volume

`Audio » Change Sound Effects volume`

56.1 Description

Change the Volume of Sound Effects

56.2 Parameters

Name	Description
Volume	A value between 0 and 1 that indicates the volume percentage

56.3 Keywords

`Audio` `Sounds` `Volume` `Level`

57 Change Speech volume

`Audio » Change Speech volume`

57.1 Description

Change the Volume of character Speech

57.2 Parameters

Name	Description
Volume	A value between 0 and 1 that indicates the volume percentage

57.3 Keywords

`Audio` `Character` `Voice` `Voices` `Volume` `Level`

58 Change UI volume

`Audio » Change UI volume`

58.1 Description

Change the Volume of UI elements

58.2 Parameters

Name	Description
Volume	A value between 0 and 1 that indicates the volume percentage

58.3 Keywords

`Audio` `User` `Interface` `Button` `Volume` `Level`

59 Fade all Ambient

`Audio » Fade all Ambient`

59.1 Description

Stops all Ambient currently playing

59.2 Parameters

Name	Description
Wait To Complete	Check if you want to wait until the sound has faded out
Transition Out	Time it takes for the sound to fade out

59.3 Keywords

`Audio` `Ambience` `Background` `Fade` `Mute`

60 Fade all Music

`Audio » Fade all Music`

60.1 Description

Stops all Music currently playing

60.2 Parameters

Name	Description
Wait To Complete	Check if you want to wait until the sound has faded out
Transition Out	Time it takes for the sound to fade out

60.3 Keywords

`Audio` `Music` `Background` `Fade` `Mute`

61 Play Ambient

```
Audio » Play Ambient
```

61.1 Description

Plays a looped Audio Clip. Useful for background effects or persistent sounds.

61.2 Parameters

Name	Description
Audio Clip	The Audio Clip to be played
Transition In	Time it takes for the sound to fade in
Spatial Blending	Whether the sound is placed in a 3D space or not
Target	A Game Object reference that the sound follows as the source

61.3 Keywords

`Audio` `Ambience` `Background`

62 Play Music

```
Audio » Play Music
```

62.1 Description

Plays a looped Audio Clip. Useful for background music or persistent sounds.

62.2 Parameters

Name	Description
Audio Clip	The Audio Clip to be played
Transition In	Time it takes for the sound to fade in
Spatial Blending	Whether the sound is placed in a 3D space or not
Target	A Game Object reference that the sound follows as the source

62.3 Keywords

`Audio` `Ambience` `Background`

63 Play Sound Effect

`Audio » Play Sound Effect`

63.1 Description

Plays an Audio Clip sound effect just once

63.2 Parameters

Name	Description
Audio Clip	The Audio Clip to be played
Wait To Complete	Check if you want to wait until the sound finishes
Pitch	A random pitch value ranging between two values
Transition In	Time it takes for the sound to fade in
Spatial Blending	Whether the sound is placed in a 3D space or not
Target	A Game Object reference that the sound follows as its source

63.3 Keywords

`Audio` `Sounds` `SFX` `FX`

64 Play Speech

```
Audio » Play Speech
```

64.1 Description

Plays an Audio Clip speech over just once

64.2 Parameters

Name	Description
Audio Clip	The Audio Clip to be played
Wait To Complete	Check if you want to wait until the sound finishes
Spatial Blending	Whether the sound is placed in a 3D space or not
Target	A Game Object reference that the sound follows as its source

64.3 Keywords

`Audio` `Voice` `Voices` `Sounds` `Character`

65 Play UI sound

```
Audio » Play UI sound
```

65.1 Description

Plays a non-diegetic user interface Audio Clip

65.2 Parameters

Name	Description
Audio Clip	The Audio Clip to be played
Wait To Complete	Check if you want to wait until the sound finishes
Pitch	A random pitch value ranging between two values
Spatial Blending	Whether the sound is placed in a 3D space or not
Target	A Game Object reference that the sound follows as its source

65.3 Keywords

`Audio` `Sounds` `User` `Interface` `Beep` `Button`

66 Stop Ambient

```
Audio » Stop Ambient
```

66.1 Description

Stops a currently playing Ambient audio

66.2 Parameters

Name	Description
Audio Clip	The Audio Clip to be played
Wait To Complete	Check if you want to wait until the sound has faded out
Transition Out	Time it takes for the sound to fade out

66.3 Keywords

`Audio` `Ambience` `Background` `Fade` `Mute`

67 Stop Music

```
Audio » Stop Music
```

67.1 Description

Stops a currently playing Music audio

67.2 Parameters

Name	Description
Audio Clip	The Audio Clip to be played
Wait To Complete	Check if you want to wait until the sound has faded out
Transition Out	Time it takes for the sound to fade out

67.3 Keywords

`Audio` `Music` `Background` `Fade` `Mute`

68 Stop Sound Effect

```
Audio » Stop Sound Effect
```

68.1 Description

Stops a currently playing Sound Effect

68.2 Keywords

`Audio` `Sounds` `Silence` `Fade` `Mute` `SFX` `FX`

69 Stop Speech on Game Object

`Audio » Stop Speech on Game Object`

69.1 Description

Stops any Speech clips being played by a specific Game Object

69.2 Parameters

Name	Description
Target	A game object that is set as the source of the speech

69.3 Keywords

`Audio` `Voice` `Voices` `Sounds` `Character` `Silence` `Mute` `Fade`

I.IV.I.I.IV CAMERAS

70 Cameras

70.1 Sub Categories

- Properties
- Shakes
- Shots

70.2 Instructions

- Change To Shot
- Revert To Previous Shot
- Set Main Shot

71 Change to Shot

`Cameras » Change to Shot`

71.1 Description

Changes the active Shot for a particular camera

71.2 Parameters

Name	Description
Camera	The target camera component
Shot	The camera Shot that becomes active
Duration	How long it takes to transition to the new Shot, in seconds
Wait To Complete	If the instruction waits till the transition is complete

71.3 Keywords

`Cameras` `Render` `Switch` `Move`

72 Revert to Previous Shot

```
Cameras » Revert to previous Shot
```

72.1 Description

Reverts the active Shot of a particular camera to the previous one

72.2 Parameters

Name	Description
Camera	The target camera component
Duration	How long it takes to transition to the new Shot, in seconds

72.3 Keywords

`Cameras` `Render` `Switch` `Move`

73 Set Main Shot

```
Cameras » Set Main Shot
```

73.1 Description

Assigns a Camera Shot as the new Main Shot

73.2 Parameters

Name	Description
Shot	The new main Camera Shot

I.IV.I.I.IV.I Properties

74 Properties

74.1 Instructions

- Change Culling Mask
- Change Field Of View
- Change Orthographic Size
- Change Projection
- Change Smooth Time

75 Change Culling Mask

`Cameras » Properties » Change Culling Mask`

75.1 Description

Changes the camera culling mask

75.2 Parameters

Name	Description
Camera	The camera component whose property changes
Culling Mask	The mask the camera uses to discern which objects to render

75.3 Keywords

`Cameras` `Render`

76 Change Field of View

`Cameras » Properties » Change Field of View`

76.1 Description

Changes the camera field of view

76.2 Parameters

Name	Description
Camera	The camera component whose property changes
FoV	The field of view of the camera, measured in degrees
Duration	The time in seconds, it takes for the camera to complete the change
Easing	The easing function used to transition

76.3 Keywords

`Cameras` `Perspective` `FOV` `3D`

77 Change Orthographic Size

`Cameras » Properties » Change Orthographic Size`

77.1 Description

Changes the camera's orthographic size

77.2 Parameters

Name	Description
Camera	The camera component whose property changes
Size	The new size of the orthographic view
Duration	The time in seconds, it takes for the camera to complete the change
Easing	The easing function used to transition

77.3 Keywords

`Cameras` `Orthographic` `Size` `2D`

78 Change Projection

`Cameras » Properties » Change Projection`

78.1 Description

Changes the camera projection to either Perspective or Orthographic

78.2 Parameters

Name	Description
Camera	The camera component whose property changes
Projection	Whether to change to Orthographic or Perspective mode

78.3 Keywords

`Cameras` `Orthographic` `Perspective` `3D` `2D`

79 Change Smooth Time

`Cameras » Properties » Change Smooth Time`

79.1 Description

Changes the camera Smooth Time

79.2 Parameters

Name	Description
Camera	The camera component whose property changes
Smooth Position	The new smooth value for translation
Smooth Rotation	The new smooth value for rotation

79.3 Keywords

`Cameras`

I.IV.I.I.IV.II Shakes

80 Shakes

80.1 Instructions

- Shake Camera Burst
- Shake Camera Sustain
- Stop Camera Sustain Shake
- Stop Shake Camera Bursts

81 Shake Camera Burst

`Cameras » Shakes » Shake Camera Burst`

81.1 Description

Shakes the camera for an amount of time

81.2 Parameters

Name	Description
Camera	The camera that receives the burst shake effect
Delay	Amount of time in seconds before the shake effect starts
Duration	Amount of time the shake effect stays active
Shake Position	If the shake affects the position of the camera
Shake Rotation	If the shake affects the rotation of the camera
Magnitude	The maximum amount the camera displaces from its position
Roughness	Frequency or how violently the camera shakes
Transform	[Optional] Defines the origin of the shake
Radius	[Optional] Distance from the origin that the shake starts to fall-off

81.3 Keywords

`Cameras` `Animation` `Animate` `Shake` `Impact` `Play`

82 Shake Camera Sustain

`Cameras » Shakes » Shake Camera Sustain`

82.1 Description

Starts shaking the camera until the effect is manually turned off

82.2 Parameters

Name	Description
Camera	The camera that receives the sustain shake effect
Delay	Amount of time in seconds before the shake effect starts
Transition	Amount of seconds the shake effect takes to blend in
Shake Position	Whether the shake affects the position of the camera
Shake Rotation	Whether the shake affects the rotation of the camera
Magnitude	The maximum amount the camera displaces from its position
Roughness	Frequency or how violently the camera shakes
Transform	[Optional] Defines the origin of the shake
Radius	[Optional] Distance from the origin that the shake starts to fall-off

82.3 Keywords

`Cameras` `Animation` `Animate` `Shake` `Wave` `Play`

83 Stop Camera Sustain Shake

`Cameras » Shakes » Stop Camera Sustain Shake`

83.1 Description

Stops a Sustain Shake camera effect in a particular layer layer

83.2 Parameters

Name	Description
Camera	The camera target that stops a Sustain Shake effect
Layer	The camera layer from which the Sustain Shake effect is removed
Delay	Amount of time before the Sustain Shake effect starts blending out
Transition	Amount of time it takes to blend out the Sustain Shake effect

83.3 Keywords

`Cameras` `Animation` `Animate` `Shake` `Wave` `Play`

84 Stop Camera Shake Bursts

`Cameras » Shakes » Stop Shake Camera Bursts`

84.1 Description

Stops any ongoing camera Burst Shake effects

84.2 Parameters

Name	Description
Camera	The camera target that stops all its active Burst Shake effects
Delay	Amount of time before all Burst Shake effects start blending out
Transition	Amount of time it takes to blend out all Burst Shake effects

84.3 Keywords

`Cameras` `Animation` `Animate` `Shake` `Impact` `Play`

I.IV.I.I.IV.III Shots

85 Shots

85.1 Sub Categories

- Anchor
- Animation
- First Person
- Follow
- Head Bobbing
- Head Leaning
- Lock On
- Look
- Third Person
- Zoom

I.IV.I.I.IV.IV Anchor

86 Anchor

86.1 Instructions

- Change Distance
- Change Offset
- Change Target

87 Change Distance

`Cameras » Shots » Anchor » Change Distance`

87.1 Description

Changes the anchored position the Shot sits relative to the target

87.2 Parameters

Name	Description
Distance	The new distance relative to the target in local coordinates
Shot	The camera Shot targeted

87.3 Keywords

`Cameras` `View` `Cameras` `Shot`

88 Change Offset

`Cameras » Shots » Anchor » Change Offset`

88.1 Description

Changes the offset position of the targeted object

88.2 Parameters

Name	Description
Offset	The new offset in target local coordinates
Shot	The camera Shot targeted

88.3 Keywords

`Cameras` `Track` `View` `Cameras` `Shot`

89 Change Target

`Cameras » Shots » Anchor » Change Target`

89.1 Description

Changes the targeted game object

89.2 Parameters

Name	Description
Target	The new target
Shot	The camera Shot targeted

89.3 Keywords

`Cameras` `Track` `View` `Cameras` `Shot`

I.IV.I.I.IV.V Animation

90 Animation

90.1 Instructions

- Change Duration

91 Change Duration

`Cameras » Shots » Animation » Change Duration`

91.1 Description

Changes the duration it takes for the Animation shot to complete

91.2 Parameters

Name	Description
Duration	The new duration in seconds
Shot	The camera Shot targeted

91.3 Keywords

`Cameras` `Track` `View` `Cameras` `Shot`

I.IV.I.I.IV.VI First person

92 First Person

92.1 Instructions

- Change Bone
- Change Max Pitch
- Change Sensitivity
- Change Smooth Time
- Change Target

93 Change Bone

`Cameras » Shots » First Person » Change Bone`

93.1 Description

Changes the Bone mount of the targeted object

93.2 Parameters

Name	Description
Bone	The new bone of the character
Shot	The camera Shot targeted

93.3 Keywords

`Cameras` `Shot`

94 Change Max Pitch

`Cameras » Shots » First Person » Change Max Pitch`

94.1 Description

Changes the maximum rotation (up and down) allowed

94.2 Parameters

Name	Description
Max Pitch	The amount the Shot is allowed to look up and down, in degrees
Shot	The camera Shot targeted

94.3 Keywords

`Cameras` `Shot`

95 Change Sensitivity

`Cameras » Shots » First Person » Change Sensitivity`

95.1 Description

Changes how sensitive the Shot reacts to input

95.2 Parameters

Name	Description
Sensitivity	Input sensitivity for X and the Y axis
Shot	The camera Shot targeted

95.3 Keywords

`Cameras` `Shot`

96 Change Smooth Time

`Cameras » Shots » First Person » Change Smooth Time`

96.1 Description

Changes the maximum rotation (up and down) allowed

96.2 Parameters

Name	Description
Smooth Time	How smooth the camera operates when rotating
Shot	The camera Shot targeted

96.3 Keywords

`Cameras` `Shot`

97 Change Target

`Cameras » Shots » First Person » Change Target`

97.1 Description

Changes the targeted game object to view from

97.2 Parameters

Name	Description
Target	The new target
Shot	The camera Shot targeted

97.3 Keywords

`Cameras` `Track` `View` `Cameras` `Shot`

I.IV.I.I.IV.VII Follow

98 Follow

98.1 Instructions

- Change Distance
- Change Target

99 Change Distance

`Cameras » Shots » Follow » Change Distance`

99.1 Description

Changes the offset distance between the Shot and the targeted object

99.2 Parameters

Name	Description
Distance	The new offset distance in world coordinates
Shot	The camera Shot targeted

99.3 Keywords

`Cameras` `Track` `View` `Cameras` `Shot`

100 Change Target

`Cameras » Shots » Follow » Change Target`

100.1 Description

Changes the targeted game object to Follow

100.2 Parameters

Name	Description
Follow	The new target to follow
Shot	The camera Shot targeted

100.3 Keywords

`Cameras` `Track` `View` `Cameras` `Shot`

I.IV.I.I.IV.VIII Head bobbing

101 Head Bobbing

101.1 Instructions

- Enable Head Bobbing

102 Enable Head Bobbing

`Cameras » Shots » Head Bobbing » Enable Head Bobbing`

102.1 Description

Toggles the active state of a Camera Shot's Head Bobbing system

102.2 Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

102.3 Keywords

`Cameras` `Disable` `Activate` `Deactivate` `Bool` `Toggle` `Off` `On` `Cameras` `Shot`

I.IV.I.I.IV.IX Head leaning

103 Head Leaning

103.1 Instructions

- Enable Head Leaning

104 Enable Head Leaning

`Cameras » Shots » Head Leaning » Enable Head Leaning`

104.1 Description

Toggles the active state of a Camera Shot's Head Leaning system

104.2 Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

104.3 Keywords

`Cameras` `Disable` `Activate` `Deactivate` `Bool` `Toggle` `Off` `On` `Cameras` `Shot`

I.IV.I.I.IV.X Lock on

105 Lock On

105.1 Instructions

- Change Anchor
- Change Distance
- Change Offset

106 Change Anchor

`Cameras » Shots » Lock On » Change Anchor`

106.1 Description

Changes the targeted game object to Lock On

106.2 Parameters

Name	Description
Anchor	The new target to Anchor onto
Shot	The camera Shot targeted

106.3 Keywords

`Cameras` `Track` `View` `Cameras` `Shot`

107 Change Distance

`Cameras » Shots » Lock On » Change Distance`

107.1 Description

Changes the distance from the anchor point

107.2 Parameters

Name	Description
Distance	The new distance in self local coordinates
Shot	The camera Shot targeted

107.3 Keywords

`Cameras` `Track` `View` `Cameras` `Shot`

108 Change Offset

`Cameras » Shots » Lock On » Change Offset`

108.1 Description

Changes the offset position of the targeted object

108.2 Parameters

Name	Description
Offset	The new offset in self local coordinates
Shot	The camera Shot targeted

108.3 Keywords

`Cameras` `Track` `View` `Cameras` `Shot`

I.IV.I.I.IV.XI Look

109 Look

109.1 Instructions

- Change Offset
- Change Target
- Enable Look

110 Change Offset

`Cameras » Shots » Look » Change Offset`

110.1 Description

Changes the offset position of the targeted object

110.2 Parameters

Name	Description
Offset	The new offset in self local coordinates
Shot	The camera Shot targeted

110.3 Keywords

`Cameras` `Track` `View` `Cameras` `Shot`

111 Change Target

`Cameras » Shots » Look » Change Target`

111.1 Description

Changes the targeted game object to look

111.2 Parameters

Name	Description
Target	The new target
Shot	The camera Shot targeted

111.3 Keywords

`Cameras` `Track` `View` `Cameras` `Shot`

112 Enable Look

`Cameras » Shots » Look » Enable Look`

112.1 Description

Toggles the active state of a Camera Shot's Look system

112.2 Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

112.3 Keywords

`Cameras` `Disable` `Activate` `Deactivate` `Bool` `Toggle` `Off` `On` `Cameras` `Shot`

I.IV.I.I.IV.XII Third person

113 Third Person

113.1 Instructions

- Change Aim
- Change Alignment
- Change Max Pitch
- Change Sensitivity

114 Change Aim

`Cameras » Shots » Third Person » Change Aim`

114.1 Description

Changes the aim settings of a Shot keeping the focus point

114.2 Parameters

Name	Description
Shoulder	The horizontal distance from the pivot
Lift	The amount of upwards distance from the pivot
Radius	The maximum amount of distance from the pivot allowed
Keep Center	If true the point at the center of the screen is kept when aiming
Layer Mask	The layer mask for the hit-scan to check the focus point
Shot	The camera Shot targeted

114.3 Keywords

`Cameras` `Shot`

115 Change Alignment

`Cameras » Shots » Third Person » Change Alignment`

115.1 Description

Changes whether and how the Shot aligns behind the targeted object

115.2 Parameters

Name	Description
Align with Target	If the Shot should move behind the target after some idle time
Delay	If the Shot should move behind the target after some idle time
Smooth Time	The speed at which
Shot	The camera Shot targeted

115.3 Keywords

`Cameras` `Shot`

116 Change Max Pitch

`Cameras » Shots » Third Person » Change Max Pitch`

116.1 Description

Changes the maximum rotation (up and down) allowed

116.2 Parameters

Name	Description
Max Pitch	The amount the Shot is allowed to look up and down, in degrees
Shot	The camera Shot targeted

116.3 Keywords

`Cameras` `Shot`

117 Change Sensitivity

`Cameras » Shots » Third Person » Change Sensitivity`

117.1 Description

Changes how sensitive the Shot reacts to input

117.2 Parameters

Name	Description
Sensitivity	Input sensitivity for X and the Y axis
Shot	The camera Shot targeted

117.3 Keywords

`Cameras` `Shot`

I.IV.I.I.IV.XIII Zoom

118 Zoom

118.1 Instructions

- Change Level Zoom
- Change Min Distance
- Change Smooth Time

119 Change Level Zoom

`Cameras » Shots » Zoom » Change Level Zoom`

119.1 Description

Changes the targeted zoom level percentage

119.2 Parameters

Name	Description
Level	The zoom level value between zero and one
Shot	The camera Shot targeted

119.3 Keywords

`Cameras` `Shot`

120 Change Min Distance

`Cameras » Shots » Zoom » Change Min Distance`

120.1 Description

Changes the targeted zoom level percentage

120.2 Parameters

Name	Description
Min Distance	The minimum zoom distance between the target and the Shot
Shot	The camera Shot targeted

120.3 Keywords

`Cameras` `Shot`

121 Change Smooth Time

`Cameras » Shots » Zoom » Change Smooth Time`

121.1 Description

Changes how smooth the zoom responds to input

121.2 Parameters

Name	Description
Smooth Time	How smooth is the zoom transition
Shot	The camera Shot targeted

121.3 Keywords

`Cameras` `Shot`

I.IV.I.I.V CHARACTERS

122 Characters

122.1 Sub Categories

- Animation
- Busy
- Combat
- Footsteps
- Ik
- Interaction
- Navigation
- Player
- Properties
- Ragdoll
- Visuals

I.IV.I.I.V.I Animation

123 Animation

123.1 Instructions

- Change Smooth Time
- Change State Weight
- Enter State
- Play Gesture
- Stop Gesture
- Stop State

124 Change Smooth Time

`Characters » Animation » Change Smooth Time`

124.1 Description

Changes the average blend time between locomotion animations

124.2 Parameters

Name	Description
Smooth Time	The target Smooth Time value. Values usually range between 0 and 0.5
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished
Character	The game object with the Character target

124.3 Example 1

The Smooth Time controls how fast a Character animation blends into another when reacting to external factors. A value of 0 makes the Character react instantly whereas a value of 0.5 takes half a second to completely blend in. A value between 0.2 and 0.4 usually provide the best results, though it depends on the look and feel the creator wants to achieve.

124.4 Keywords

`Fade` `Realistic` `Old` `School` `Reaction`

125 Change State Weight

`Characters » Animation » Change State Weight`

125.1 Description

Changes the weight of the State over time at the specified layer

125.2 Parameters

Name	Description
Character	The character that plays the animation state
Layer	Slot number in which the animation state is allocated
Weight	The targeted opacity of the animation
Transition	The duration of the transition, in seconds

125.3 Keywords

`Characters` `Animation` `Blend` `State` `Opacity`

126 Enter State

`Characters » Animation » Enter State`

126.1 Description

Makes a Character start an animation State

126.2 Parameters

Name	Description
Character	The character that plays the animation state
State	The animation data necessary to play a state
Layer	Slot number in which the animation state is allocated
Blend Mode	Additively adds the new animation on top of the rest or overrides any lower layer animations
Delay	Amount of seconds to wait before the animation starts to play
Speed	Speed coefficient at which the animation plays
Weight	The opacity of the animation that plays. Between 0 and 1
Transition	The amount of seconds the animation takes to blend in

126.3 Keywords

`Characters` `Animation` `Animate` `State` `Play`

127 Play Gesture

`Characters » Animation » Play Gesture`

127.1 Description

Plays an Animation Clip on a Character once

127.2 Parameters

Name	Description
Character	The character that plays the animation
Animation Clip	The Animation Clip that is played
Avatar Mask	(Optional) Allows to play the animation on specific body parts of the Character
Blend Mode	Additively adds the new animation on top of the rest or overrides any lower layer animations
Delay	Amount of seconds to wait before the animation starts to play
Speed	Speed coefficient at which the animation plays. 1 means normal speed
Transition In	The amount of seconds the animation takes to blend in
Transition Out	The amount of seconds the animation takes to blend out
Wait To Complete	If true this Instruction waits until the animation is complete

127.3 Keywords

`Characters` `Animation` `Animate` `Gesture` `Play`

128 Stop Gestures

`Characters » Animation » Stop Gesture`

128.1 Description

Stops any animation Gestures playing on the Character

128.2 Parameters

Name	Description
Character	The character that plays animation Gestures
Delay	Amount of seconds to wait before the animation starts to blend out
Transition	The amount of seconds the animation takes to blend out

128.3 Keywords

`Characters` `Animation` `Animate` `Gesture` `Play`

129 Stop State

`Characters » Animation » Stop State`

129.1 Description

Stops an animation State from a Character

129.2 Parameters

Name	Description
Character	The character that stops its animation State
Layer	Slot number from which the state is removed
Delay	Amount of seconds to wait before the animation stops playing
Transition	The amount of seconds the animation takes to blend out

129.3 Keywords

`Characters` `Animation` `Animate` `State` `Exit` `Stop`

I.IV.I.I.V.II Busy

130 Busy

130.1 Instructions

- Set Available
- Set Busy

131 Set Available

`Characters » Busy » Set Available`

131.1 Description

Sets the Available state of a Character's Limbs

131.2 Parameters

Name	Description
Character	The Character game object
Limbs	The Limbs that are changed to Available

131.3 Keywords

`Characters` `Busy` `Occupied` `Using`

132 Set Busy

`Characters » Busy » Set Busy`

132.1 Description

Sets the Busy state of a Character's Limbs

132.2 Parameters

Name	Description
Character	The Character game object
Limbs	The Limbs that are changed to Busy

132.3 Keywords

`Characters` `Busy` `Occupied` `Using`

I.IV.I.I.V.III Combat

133 Combat

133.1 Sub Categories

- Invincibility
- Poise
- Targeting

I.IV.I.I.V.IV Invincibility

134 Invincibility

134.1 Instructions

- Set Invincible

135 Set Invincible

`Characters » Combat » Invincibility » Set Invincible`

135.1 Description

Changes the Invincibility state of a Character

135.2 Parameters

Name	Description
Character	The Character that attempts to change its invincibility
Duration	The duration of the invincibility
Wait Until Complete	Whether to wait until the invincibility wears off

135.3 Keywords

`Character` `Combat` `Invincibility`

I.IV.I.I.V.V Poise

136 Poise

136.1 Instructions

- Set Poise

137 Set Poise

`Characters » Combat » Poise » Set Poise`

137.1 Description

Changes the current Poise value of a Character

137.2 Parameters

Name	Description
Character	The Character that attempts to change its Poise value
Poise	The new Poise value

137.3 Keywords

`Character` `Combat`

I.IV.I.I.V.VI Targeting

138 Targeting

138.1 Instructions

- Add Target Candidate
- Clear Target
- Cycle Closest Target
- Cycle Direction Target
- Cycle Next Target
- Cycle Previous Target
- Remove Target Candidate
- Set Target

139 Add Target Candidate

`Characters » Combat » Targeting » Add Target Candidate`

139.1 Description

Adds a new candidate target for the specified character

139.2 Parameters

Name	Description
Character	The Character that attempts to change its candidate target
Target	The new target candidate game object by the character

139.3 Keywords

`Character` `Combat` `Focus` `Pick`

140 Clear Target

`Characters » Combat » Targeting » Clear Target`

140.1 Description

Clears the targeted game object by the specified Character

140.2 Parameters

Name	Description
Character	The Character that attempts to change its target

140.3 Keywords

`Character` `Combat` `Focus` `Pick`

141 Cycle Closest Target

`Characters » Combat » Targeting » Cycle Closest Target`

141.1 Description

Cycles to the closest candidate target to the character from the Targets list

141.2 Parameters

Name	Description
Character	The Character that attempts to change its candidate target

141.3 Keywords

`Character` `Combat` `Focus` `Pick` `Candidate` `Targets`

142 Cycle Direction Target

`Characters » Combat » Targeting » Cycle Direction Target`

142.1 Description

Cycles to the visually closest target candidate from the Targets list and camera

142.2 Parameters

Name	Description
Character	The Character that attempts to change its candidate target
Camera	The point of view from which the direction is calculated
Direction	The local space direction (only [X,Y] components are used)

142.3 Keywords

`Character` `Combat` `Focus` `Pick` `Candidate` `Targets`

143 Cycle Next Target

`Characters » Combat » Targeting » Cycle Next Target`

143.1 Description

Cycles to the next candidate target from the Targets list

143.2 Parameters

Name	Description
Character	The Character that attempts to change its candidate target

143.3 Keywords

`Character` `Combat` `Focus` `Pick` `Candidate` `Targets`

144 Cycle Previous Target

`Characters » Combat » Targeting » Cycle Previous Target`

144.1 Description

Cycles to the previous candidate target from the Targets list

144.2 Parameters

Name	Description
Character	The Character that attempts to change its candidate target

144.3 Keywords

`Character` `Combat` `Focus` `Pick` `Candidate` `Targets`

145 Remove Target Candidate

`Characters » Combat » Targeting » Remove Target Candidate`

145.1 Description

Removes a new candidate target for the specified character

145.2 Parameters

Name	Description
Character	The Character that attempts to change its target candidate
Target	The target candidate to remove by the character

145.3 Keywords

`Character` `Combat` `Focus` `Pick`

146 Set Target

`Characters » Combat » Targeting » Set Target`

146.1 Description

Changes the targeted game object by the specified Character

146.2 Parameters

Name	Description
Character	The Character that attempts to change its target
Target	The new targeted game object by the character

146.3 Keywords

`Character` `Combat` `Focus` `Pick`

I.IV.I.I.V.VII Footsteps

147 Footsteps

147.1 Instructions

- Change Footstep Sounds
- Play Footstep

148 Change Footstep Sounds

`Characters » Footsteps » Change Footstep Sounds`

148.1 Description

Changes the sound table that links textures with footstep sounds

148.2 Parameters

Name	Description
Character	The character that plays animation Gestures
Footsteps	The sound table asset that contains information about how and when footstep sounds play

148.3 Keywords

`Character` `Foot` `Step` `Stomp` `Foliage` `Audio` `Run` `Walk` `Move`

149 Play Footstep

`Characters » Footsteps » Play Footstep`

149.1 Description

Plays a Footstep sound from a Material Sound asset

149.2 Parameters

Name	Description
Character	The character target
Material Sound	The material sound asset

149.3 Keywords

`Step` `Foot` `Impact` `Land` `Sound`

I.IV.I.I.V.VIII Ik

150 Ik

150.1 Instructions

- Active Feet Ik
- Active Lean Ik
- Active Look Ik
- Clear Looking Around
- Start Looking At
- Stop Looking At

151 Active Feet IK

`Characters » IK » Active Feet IK`

151.1 Description

Changes the active state of the Character Feet IK

151.2 Parameters

Name	Description
Character	The character target
Active	Whether the IK system is active or not

151.3 Keywords

`Inverse` `Kinematics` `IK`

152 Active Lean IK

`Characters » IK » Active Lean IK`

152.1 Description

Changes the active state of the Character Lean IK

152.2 Parameters

Name	Description
Character	The character target
Active	Whether the IK system is active or not

152.3 Keywords

`Inverse` `Kinematics` `IK`

153 Active Look IK

`Characters » IK » Active Look IK`

153.1 Description

Changes the active state of the Character Look IK

153.2 Parameters

Name	Description
Character	The character target
Active	Whether the IK system is active or not

153.3 Keywords

`Inverse` `Kinematics` `IK`

154 Clear Looking Around

`Characters » IK » Clear Looking Around`

154.1 Description

Stops looking at any target that isn't in a Hotspot (priority zero)

154.2 Parameters

Name	Description
Character	The character target

154.3 Keywords

`Inverse` `Kinematics` `IK`

155 Start Looking At

`Characters » IK » Start Looking At`

155.1 Description

Starts looking at a target using the Look At IK system

155.2 Parameters

Name	Description
Character	The character target
Target	The targeted Transform to look at
Layer	The priority of this IK over other Look At attempts

155.3 Keywords

`Inverse` `Kinematics` `IK`

156 Stop Looking At

`Characters » IK » Stop Looking At`

156.1 Description

Stops looking at a target using the Look At IK system

156.2 Parameters

Name	Description
Character	The character target
Target	The targeted Transform to look at
Layer	The priority of this IK over other Look At attempts

156.3 Keywords

`Inverse` `Kinematics` `IK`

I.IV.I.I.V.IX Interaction

157 Interaction

157.1 Instructions

- Interact

158 Interact

`Characters » Interaction » Interact`

158.1 Description

Changes how the Player Character reacts to input commands

158.2 Parameters

Name	Description
Character	The Character that attempts to interact

158.3 Keywords

`Character` `Button` `Pick` `Do` `Use` `Pull` `Press` `Push` `Talk`

I.IV.I.I.V.X Navigation

159 Navigation

159.1 Instructions

- Cancel Dash
- Dash
- Jump
- Move Direction
- Move To
- Set Character Driver
- Set Character Rotation
- Start Following
- Stop Following
- Stop Move
- Teleport

160 Cancel Dash

`Characters » Navigation » Cancel Dash`

160.1 Description

Cancels any existing Dash on the chosen Character

160.2 Parameters

Name	Description
Character	The game object with the Character target

160.3 Keywords

`Leap` `Blink` `Roll` `Flash` `Character` `Player`

161 Dash

`Characters » Navigation » Dash`

161.1 Description

Moves the Character in the chosen direction for a brief period of time

161.2 Parameters

Name	Description
Direction	Vector oriented towards the desired direction
Velocity	Velocity the Character moves throughout the whole movement
Duration	Defines the duration it takes to move forward at a constant velocity
Wait to Finish	If true this Instruction waits until the dash is completed
Mode	Whether to use Cardinal Animations (4 clips for each direction) or a single one
Animation Speed	Determines the speed coefficient applied to the animation played
Transition In	The time it takes to blend into the animation
Transition Out	The time it takes to blend out of the animation
Character	The game object with the Character target

161.3 Example 1

The Transition Out parameter is also used to determine the movement blend between the dash and the character's intended movement. Higher values will make characters take longer to regain control after dashing

161.4 Keywords

`Leap` `Blink` `Roll` `Flash` `Character` `Player`

162 Jump

`Characters » Navigation » Jump`

162.1 Description

Instructs the Character to jump

162.2 Parameters

Name	Description
Character	The game object with the Character target

162.3 Keywords

`Hop` `Leap` `Reach` `Character` `Player`

163 Move Direction

`Characters » Navigation » Move Direction`

163.1 Description

Attempts to move the Character towards the specified direction

163.2 Parameters

Name	Description
Direction	The the direction to move towards
Priority	Indicates the priority of this command against others
Character	The game object with the Character target

163.3 Keywords

`Constant` `Walk` `Run` `To` `Vector` `Character` `Player`

164 Move To

`Characters » Navigation » Move To`

164.1 Description

Instructs the Character to move to a new location

164.2 Parameters

Name	Description
Location	The position and rotation of the destination
Stop Distance	Distance to the destination that the Character considers it has reached the target
Cancel on Fail	Stops executing the rest of Instructions if the path has been obstructed
On Fail	A list of Instructions executed when it can't reach the destination
Character	The game object with the Character target

164.3 Example 1

The Stop Distance field is useful if you want [Character A] to approach another [Character B]. With a Stop Distance of 0, [Character A] tries to occupy the same space as the other one, bumping into it. Having a Stop Distance value of 2 allows [Character A] to stop 2 units away from [Character B]'s position

164.4 Keywords

`Walk` `Run` `Position` `Location` `Destination` `Character` `Player`

165 Set Character Driver

`Characters » Navigation » Set Character Driver`

165.1 Description

Changes the driver behavior of the Character

165.2 Parameters

Name	Description
Character	The Character that changes its Driver behavior
Driver	The Driver behavior that decides how the Character moves

165.3 Keywords

`Character` `Drive` `Controller` `Navmesh` `Agent` `Rigidbody`

166 Set Character Rotation

`Characters » Navigation » Set Character Rotation`

166.1 Description

Changes the rotation behavior of the Character

166.2 Parameters

Name	Description
Character	The Character that changes its Rotation behavior
Rotation	The Rotation behavior that decides where the Character faces

166.3 Keywords

`Character` `Face` `Look` `Direction` `Pivot` `Lock`

167 Start Following

`Characters » Navigation » Start Following`

167.1 Description

Instructs a Character to follow another game object

167.2 Parameters

Name	Description
Target	The target game object to follow
Min Distance	Distance from the Target the Character aims to move when approaching the Target
Max Distance	Maximum distance to the Target the Character leaves before attempting to move closer
Character	The game object with the Character target

167.3 Keywords

`Lead` `Pursue` `Chase` `Walk` `Run` `Position` `Location` `Destination` `Character` `Player`

168 Stop Following

`Characters » Navigation » Stop Following`

168.1 Description

Instructs a Character to stop following a game object

168.2 Parameters

Name	Description
Character	The game object with the Character target

168.3 Keywords

`Cancel` `Lead` `Pursue` `Chase` `Character` `Player`

169 Stop Move

`Characters » Navigation » Stop Move`

169.1 Description

Attempts to stop the character from moving

169.2 Parameters

Name	Description
Priority	Indicates the priority of this command against others
Character	The game object with the Character target

169.3 Keywords

`Constant` `Walk` `Run` `To` `Vector` `Character` `Player`

170 Teleport

`Characters » Navigation » Teleport`

170.1 Description

Instantaneously moves a Character from its current position to a new one

170.2 Parameters

Name	Description
Location	The position and/or rotation where the Character is teleported
Character	The game object with the Character target

170.3 Keywords

`Change` `Position` `Location` `Respawn` `Spawn` `Character` `Player`

I.IV.I.I.V.XI Player

171 Player

171.1 Instructions

- Change Player
- Set Player Input

172 Change Player

```
Characters » Player » Change Player
```

172.1 Description

Changes the Character identified as the Player

172.2 Parameters

Name	Description
Character	The Character becomes the new Player character

172.3 Keywords

`Character` `Is` `Control`

173 Set Player Input

`Characters » Player » Set Player Input`

173.1 Description

Changes how the Player Character reacts to input commands

173.2 Parameters

Name	Description
Character	The Character that changes its Player Input behavior
Input	The new input method that the Character starts to listen

173.3 Keywords

`Character` `Button` `Control` `Keyboard` `Mouse` `Gamepad` `Joystick`

I.IV.I.I.V.XII Properties

174 Properties

174.1 Instructions

- Axonometry
- Can Collide
- Can Jump
- Change Angular Speed
- Change Gravity
- Change Height
- Change Jump Force
- Change Mass
- Change Movement Speed
- Change Radius
- Change Terminal Velocity
- Change Time Mode
- Is Controllable
- Kill Character
- Mannequin Position
- Mannequin Rotation
- Mannequin Scale
- Reset Vertical Velocity
- Revive Character

175 Change Axonometry

`Characters » Properties » Axonometry`

175.1 Description

Changes the Character's Axonometry value

175.2 Parameters

Name	Description
Axonometry	The new Axonometry value
Character	The game object with the Character target

175.3 Keywords

`Isometric` `Side` `Scroll`

176 Can Collide

Characters » Properties » Can Collide

176.1 Description

Changes whether the Character can collide with other objects or not

176.2 Parameters

Name	Description
Character	The character target
Can Collide	Whether the character collides with other physic objects

177 Can Jump

`Characters » Properties » Can Jump`

177.1 Description

Changes whether the Character is allowed to jump or not

177.2 Parameters

Name	Description
Character	The character target
Can Jump	Whether the character is allowed to jump or not

177.3 Keywords

`Hop` `Elevate`

178 Change Angular Speed

`Characters » Properties » Change Angular Speed`

178.1 Description

Changes the Character's angular speed over time

178.2 Parameters

Name	Description
Angular Speed	The target Angular Speed value for the Character, measured in degrees per second
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished
Character	The game object with the Character target

178.3 Keywords

`Rotation` `Euler` `Direction` `Face` `Look`

179 Change Gravity

`Characters » Properties » Change Gravity`

179.1 Description

Changes the Character's gravity over time

179.2 Parameters

Name	Description
Mode	Whether the upwards, downwards or both Gravity values are changed
Gravity	The target Gravity value for the Character
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished
Character	The game object with the Character target

179.3 Keywords

`Space`

180 Change Height

`Characters » Properties » Change Height`

180.1 Description

Changes the Character's height over time

180.2 Parameters

Name	Description
Height	The target Height value for the Character
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished
Character	The game object with the Character target

180.3 Keywords

`Length`

181 Change Jump Force

`Characters » Properties » Change Jump Force`

181.1 Description

Changes the Character's jump force over time

181.2 Parameters

Name	Description
Jump Force	The target Jump Force value for the Character
Duration	How long it will take to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished
Character	The game object with the Character target

181.3 Keywords

`Hop` `Build` `Wind` `Fly`

182 Change Mass

`Characters » Properties » Change Mass`

182.1 Description

Changes the Character's mass over time

182.2 Parameters

Name	Description
Mass	The target Mass value for the Character
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished
Character	The game object with the Character target

182.3 Keywords

`Weight`

183 Change Movement Speed

`Characters » Properties » Change Movement Speed`

183.1 Description

Changes the Character's maximum speed over time

183.2 Parameters

Name	Description
Speed	The target movement Speed value for the Character
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished
Character	The game object with the Character target

183.3 Keywords

`Linear` `Walk` `Run` `Jog` `Sprint` `Velocity` `Throttle`

184 Change Radius

`Characters » Properties » Change Radius`

184.1 Description

Changes the Character's radius over time

184.2 Parameters

Name	Description
Radius	The target Radius value for the Character
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished
Character	The game object with the Character target

184.3 Keywords

`Diameter` `Space` `Fat` `Thin`

185 Change Terminal Velocity

`Characters » Properties » Change Terminal Velocity`

185.1 Description

Changes the Character's maximum fall-speed over time. Useful for gliding

185.2 Parameters

Name	Description
Terminal Velocity	The target Terminal Velocity value for the Character
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished
Character	The game object with the Character target

185.3 Keywords

`Fall` `Glide` `Parachute` `Height`

186 Change Time Mode

`Characters » Properties » Change Time Mode`

186.1 Description

Changes the Character's Time Mode

186.2 Parameters

Name	Description
Time Mode	The target Time Mode for the Character
Character	The game object with the Character target

186.3 Keywords

`Scale` `Game`

187 Is Controllable

187.1 Description

Changes whether the Character (Player) responds using input commands

187.2 Parameters

Name	Description
Character	The character target
Is Controllable	Whether the character responds to input commands

188 Kill Character

`Characters » Properties » Kill Character`

188.1 Description

Changes the state of the Character to dead

188.2 Parameters

Name	Description
Character	The character target

188.3 Keywords

`Dead` `Die` `Murder`

189 Mannequin Position

`Characters » Properties » Mannequin Position`

189.1 Description

Changes the local position of the Mannequin object within the Character

189.2 Parameters

Name	Description
Character	The character target
Position	The Local Position of the Mannequin

189.3 Keywords

`Location` `Model` `Local` `Change` `Set` `Root`

190 Mannequin Rotation

`Characters » Properties » Mannequin Rotation`

190.1 Description

Changes the local rotation of the Mannequin object within the Character

190.2 Parameters

Name	Description
Character	The character target
Rotation	The Local Rotation of the Mannequin

190.3 Keywords

`Location` `Model` `Local`

191 Mannequin Scale

`Characters » Properties » Mannequin Scale`

191.1 Description

Changes the local scale of the Mannequin object within the Character

191.2 Parameters

Name	Description
Character	The character target
Scale	The Local Scale of the Mannequin

191.3 Keywords

`Location` `Model` `Local`

192 Reset Vertical Velocity

`Characters » Properties » Reset Vertical Velocity`

192.1 Description

Changes the Character's vertical velocity to zero

192.2 Parameters

Name	Description
Character	The game object with the Character target

192.3 Keywords

`Fall` `Speed`

193 Revive Character

`Characters » Properties » Revive Character`

193.1 Description

Changes the state of the Character to alive

193.2 Parameters

Name	Description
Character	The character target

193.3 Keywords

`Respawn` `Alive` `Resurrect`

I.IV.I.I.V.XIII Ragdoll

194 Ragdoll

194.1 Instructions

- Recover Ragdoll
- Start Ragdoll

195 Recover from Ragdoll

`Characters » Ragdoll » Recover Ragdoll`

195.1 Description

Recovers a Character from the Ragdoll state and stands up

195.2 Parameters

Name	Description
Character	The Character game object that recovers from the Ragdoll state

195.3 Keywords

`Characters` `Ragdoll` `Recover` `Stand`

196 Start Ragdoll

`Characters » Ragdoll » Start Ragdoll`

196.1 Description

Makes a Character enter a ragdoll state

196.2 Parameters

Name	Description
Character	The Character game object that changes to a Ragdoll state

196.3 Keywords

`Characters` `Ragdoll` `Dead` `Kill` `Die`

I.IV.I.I.V.XIV Visuals

197 Visuals

197.1 Instructions

- Attach Prop
- Change Model
- Drop Prop
- Put On Skin Mesh
- Remove Prop
- Take Off Skin Mesh

198 Attach Prop

`Characters » Visuals » Attach Prop`

198.1 Description

Attaches a prefab or instance Prop onto a Character's bone

198.2 Parameters

Name	Description
Character	The character target
Type	Whether to attach the prop as a prefab or instance
Prop	The prefab or instance object that is attached to the character
Bone	Which bone the prop is attached to
Position	Local offset from which the prop is distanced from the bone
Rotation	Local offset from which the prop is rotated from the bone

198.3 Keywords

`Characters` `Add` `Grab` `Draw` `Pull` `Take` `Object`

199 Change Model

`Characters » Visuals » Change Model`

199.1 Description

Changes the Character current model

199.2 Parameters

Name	Description
Character	The character target
Model	The prefab object that replaces the current Character model
Skeleton	Optional parameter that replaces the configuration of volumes
Footstep Sounds	Optional parameter that replaces the current Footstep sounds
Offset	A local offset from the center of the Character

199.3 Keywords

`Characters` `Model`

200 Drop Prop

`Characters » Visuals » Drop Prop`

200.1 Description

Drops a prefab or instance Prop (if any) from a Character

200.2 Parameters

Name	Description
Character	The character target
Type	Whether to drop the prop form a prefab or as its instance
Prop	The prefab or instance object prop that is dropped from the character

200.3 Keywords

`Characters` `Detach` `Let` `Sheathe` `Put` `Holster` `Object`

201 Put on Skin Mesh

`Characters » Visuals » Put on Skin Mesh`

201.1 Description

Creates a new instance of a skin mesh renderer and puts it on a Character

201.2 Parameters

Name	Description
Prefab	Game Object reference with a Skin Mesh Renderer that is instantiated
On Character	Target Character that uses its armature to wear the skin mesh

201.3 Keywords

`Renderer` `New` `Game Object` `Armature`

202 Remove Prop

`Characters » Visuals » Remove Prop`

202.1 Description

Removes a prefab or instance Prop (if any) from a Character

202.2 Parameters

Name	Description
Character	The character target
Type	Whether to remove the prop form a prefab or as its instance
Prop	The prefab or instance object prop that is removed from the character

202.3 Keywords

`Characters` `Detach` `Let` `Sheathe` `Put` `Holster` `Object`

203 Take off Skin Mesh

`Characters » Visuals » Take off Skin Mesh`

203.1 Description

Removes an instance of a Skin Mesh from a Character

203.2 Parameters

Name	Description
Prefab	Game Object reference with a Skin Mesh Renderer that is removed
From Character	Target Character that uses its armature to wear the skin mesh

203.3 Keywords

`Renderer` `Game Object` `Armature`

I.IV.I.I.VI DEBUG

204 Debug

204.1 Sub Categories

- Console
- Gizmos

204.2 Instructions

- Beep
- Clear Console
- Comment
- Frame Step
- Log Number
- Log Text
- Pause Editor
- Toggle Console

205 Beep

Debug » Beep

205.1 Description

Plays the Operative System default 'beep' sound. This is intended for debugging purposes and doesn't do anything on a runtime application

205.2 Keywords

`Debug`

206 Clear Console

```
Debug » Clear Console
```

206.1 Description

Clears the console in a development or Editor build

206.2 Keywords

`Debug` `Terminal`

207 Comment

`Debug » Comment`

207.1 Description

Displays an explanation or annotation in the instructions list. It is intended to make instructions easier for humans to understand

207.2 Parameters

Name	Description
Text	The text of the comment

207.3 Keywords

`Debug` `Note` `Annotation` `Explanation`

208 Frame Step

```
Debug » Frame Step
```

208.1 Description

Performs a single frame step. It requires the Editor to be paused

208.2 Keywords

`Debug`

209 Log Number

`Debug » Log Number`

209.1 Description

Prints a text from a numeric source to the Unity Console

209.2 Parameters

Name	Description
Number	The number to log

209.3 Keywords

`Debug` `Log` `Print` `Show` `Display` `Test` `Float` `Double` `Decimal` `Integer` `Message`

210 Log Text

`Debug » Log Text`

210.1 Description

Prints a message to the Unity Console

210.2 Parameters

Name	Description
Message	The text message to log

210.3 Keywords

`Debug` `Log` `Print` `Show` `Display` `Name` `Test` `Message` `String`

211 Pause Editor

```
Debug » Pause Editor
```

211.1 Description

Pauses the Editor. This has no effect on standalone applications

211.2 Keywords

`Debug` `Break` `Pause` `Stop`

212 Toggle Console

```
Debug » Toggle Console
```

212.1 Description

Shows or hides the Console in a standalone development build

212.2 Keywords

`Debug` `Terminal`

I.IV.I.I.VI.I Console

213 Console

213.1 Instructions

- Console Close
- Console Command
- Console Open
- Console Text
- Console Toggle

214 Console Close

`Debug » Console » Console Close`

214.1 Description

Closes the Runtime Console

214.2 Keywords

`Terminal` `Log` `Debug`

215 Console Command

`Debug » Console » Console Command`

215.1 Description

Submits a Command onto the Runtime Console

215.2 Parameters

Name	Description
Command	The command message to submit

215.3 Keywords

`Debug` `Log` `Terminal` `Submit` `Send` `Execute` `Run`

216 Console Open

`Debug » Console » Console Open`

216.1 Description

Opens the Runtime Console

216.2 Keywords

`Terminal` `Log` `Debug`

217 Console Text

`Debug » Console » Console Text`

217.1 Description

Prints a message to the Runtime Console

217.2 Parameters

Name	Description
Message	The text message to log

217.3 Keywords

`Debug` `Log` `Print` `Show` `Display` `Name` `Test` `Message` `String` `Terminal`

218 Console Toggle

`Debug » Console » Console Toggle`

218.1 Description

Toggles the Runtime Console

218.2 Keywords

`Terminal` `Log` `Debug`

I.IV.I.I.VI.II Gizmos

219 Gizmos

219.1 Instructions

- Gizmo Line

220 Gizmo Line

```
Debug » Gizmos » Gizmo Line
```

220.1 Description

Displays a line between two points for a certain time

220.2 Keywords

`Debug` `Gizmo` `Draw`

I.IV.I.I.VII GAME OBJECTS

221 Game Objects

221.1 Sub Categories

- Components
- Pooling

221.2 Instructions

- Change Layer
- Change Name
- Change Tag
- Destroy
- Instantiate
- Set Active
- Set Game Object
- Toggle Active

222 Change Layer

```
Game Objects » Change Layer
```

222.1 Description

Changes the layer value of a game object

222.2 Parameters

Name	Description
Layer	The layer where the game object belongs to
Children Too	Whether to also change the layer of the game object's children or not
Game Object	Target game object

222.3 Keywords

`MonoBehaviour` `Behaviour` `Script`

223 Change Name

```
Game Objects » Change Name
```

223.1 Description

Changes the name of a game object

223.2 Parameters

Name	Description
Name	The new name assigned to the game object
Game Object	Target game object

223.3 Keywords

`MonoBehaviour` `Behaviour` `Script`

224 Change Tag

`Game Objects » Change Tag`

224.1 Description

Changes the Tag of a game object

224.2 Parameters

Name	Description
Tag	The tag value which the game object belongs to
Game Object	Target game object

224.3 Keywords

`MonoBehaviour` `Behaviour` `Script`

225 Destroy

```
Game Objects » Destroy
```

225.1 Description

Destroys a game object scene instance

225.2 Parameters

Name	Description
Game Object	Target game object

225.3 Keywords

`Remove` `Delete` `Flush` `MonoBehaviour` `Behaviour` `Script`

226 Instantiate

```
Game Objects » Instantiate
```

226.1 Description

Creates a new instance of a referenced game object

226.2 Parameters

Name	Description
Game Object	Game Object reference that is instantiated
Position	The position of the new game object instance
Rotation	The rotation of the new game object instance
Save	Optional value where the newly instantiated game object is stored

226.3 Keywords

`Create` `New` `Game Object`

227 Set Active

`Game Objects » Set Active`

227.1 Description

Changes the state of a game object to active or inactive

227.2 Parameters

Name	Description
Game Object	Target game object

227.3 Keywords

`Activate` `Deactivate` `Enable` `Disable` `MonoBehaviour` `Behaviour` `Script`

228 Set Game Object

`Game Objects » Set Game Object`

228.1 Description

Sets a game object value equal to another one

228.2 Parameters

Name	Description
Set	Where the value is set
From	The value that is set

228.3 Keywords

`Change` `Instance` `Variable` `Asset`

229 Toggle Active

`Game Objects » Toggle Active`

229.1 Description

Toggles the state of a game object to active or to inactive

229.2 Parameters

Name	Description
Game Object	Target game object

229.3 Keywords

`Activate` `Deactivate` `Enable` `Disable` `Switch` `Swap` `MonoBehaviour` `Behaviour` `Script`

I.IV.I.I.VII.I Components

230 Components

230.1 Instructions

- Add Component
- Disable Collider
- Disable Component
- Disable Renderer
- Enable Collider
- Enable Component
- Enable Renderer
- Remove Component

231 Add Component

`Game Objects » Components » Add Component`

231.1 Description

Adds a component class to the game object

231.2 Parameters

Name	Description
Game Object	Target game object

231.3 Keywords

`Add` `Append` `MonoBehaviour` `Behaviour` `Script`

232 Disable Collider

`Game Objects » Components » Disable Collider`

232.1 Description

Disables a Collider component from the game object

232.2 Parameters

Name	Description
Game Object	Target game object

232.3 Keywords

`Inactive` `Turn` `Off` `Box` `Sphere` `Capsule` `Mesh`

233 Disable Component

`Game Objects » Components » Disable Component`

233.1 Description

Disables a component class from the game object

233.2 Parameters

Name	Description
Game Object	Target game object

233.3 Keywords

`Deactivate` `Turn` `Off` `MonoBehaviour` `Behaviour` `Script`

234 Disable Renderer

`Game Objects » Components » Disable Renderer`

234.1 Description

Disables a Renderer component from the game object

234.2 Parameters

Name	Description
Game Object	Target game object

234.3 Keywords

`Inactive` `Turn` `Off` `Mesh`

235 Enable Collider

`Game Objects » Components » Enable Collider`

235.1 Description

Enables a Collider component from the game object

235.2 Parameters

Name	Description
Game Object	Target game object

235.3 Keywords

`Active` `Turn` `On` `Box` `Sphere` `Capsule` `Mesh`

236 Enable Component

`Game Objects » Components » Enable Component`

236.1 Description

Enables a component class from the game object

236.2 Parameters

Name	Description
Game Object	Target game object

236.3 Keywords

`Active` `Turn` `On` `MonoBehaviour` `Behaviour` `Script`

237 Enable Renderer

`Game Objects » Components » Enable Renderer`

237.1 Description

Enables a Renderer component from the game object

237.2 Parameters

Name	Description
Game Object	Target game object

237.3 Keywords

`Inactive` `Turn` `Off` `Mesh`

238 Remove Component

`Game Objects » Components » Remove Component`

238.1 Description

Removes an existing component from the game object

238.2 Parameters

Name	Description
Game Object	Target game object

238.3 Keywords

`Delete` `Destroy` `MonoBehaviour` `Behaviour` `Script`

I.IV.I.I.VII.II Pooling

239 Pooling

239.1 Instructions

- Pool Destroy
- Pool Prewarm

240 Pool Destroy

`Game Objects » Pooling » Pool Destroy`

240.1 Description

Destroys an existing game object pool

240.2 Parameters

Name	Description
Game Object	The Game Object reference is used as the template for the pool

240.3 Example 1

Use this Instruction to dispose those pools that have been pre-warmed. Pools created at runtime are automatically disposed when their scene is unloaded.

240.4 Keywords

`Dispose` `Destroy` `Delete` `Game Object`

241 Pool Prewarm

`Game Objects » Pooling » Pool Prewarm`

241.1 Description

Creates or makes sure an existing game object pool has enough instances

241.2 Parameters

Name	Description
Game Object	The Game Object reference is used as the template for the pool
Pool Size	The size of the pool of game objects

241.3 Example 1

Pre-warming a Pool moves it to the DontDestroyOnLoad scene. This means its contents will never be destroyed even after loading new scenes. To delete a pre-warmed pool use the Pool Destroy instruction.

241.4 Keywords

`Create` `New` `Initialize` `Game Object`

I.IV.I.I.VIII INPUT

242 Input

242.1 Instructions

- Disable Input Action
- Disable Input Map
- Display Touchstick Left
- Display Touchstick Right
- Enable Input Action
- Enable Input Map

243 Disable Input Action

`Input » Disable Input Action`

243.1 Description

Disables an Input Action asset which stops it from reading user input

243.2 Parameters

Name	Description
Input Asset	The Input Asset reference

243.3 Keywords

`Deactivate` `Inactive`

244 Disable Input Map

```
Input » Disable Input Map
```

244.1 Description

Disables an Input Action asset with a Map value which stops reading user input

244.2 Parameters

Name	Description
Input Asset	The Input Asset reference

244.3 Keywords

`Deactivate` `Inactive`

245 Display Touchstick Left

```
Input » Display Touchstick Left
```

245.1 Description

Shows or hides the default Touchstick on the left side

245.2 Parameters

Name	Description
Show	Shows the touchstick if ticked. Hides the touchstick otherwise

245.3 Keywords

`Joystick`

246 Display Touchstick Right

```
Input » Display Touchstick Right
```

246.1 Description

Shows or hides the default Touchstick on the right side

246.2 Parameters

Name	Description
Show	Shows the touchstick if ticked. Hides the touchstick otherwise

246.3 Keywords

`Joystick`

247 Enable Input Action

`Input » Enable Input Action`

247.1 Description

Enables an Input Action asset which allows it to start reading user input

247.2 Parameters

Name	Description
Input Asset	The Input Asset reference

247.3 Keywords

`Activate` `Active` `Start`

248 Enable Input Map

`Input » Enable Input Map`

248.1 Description

Enables an Input Action asset with a Map value which allows reading user input

248.2 Parameters

Name	Description
Input Asset	The Input Asset reference

248.3 Keywords

`Activate` `Active` `Start`

I.IV.I.I.IX LIGHTS

249 Lights

249.1 Instructions

- Light Color
- Light Intensity

250 Light Color

`Lights » Light Color`

250.1 Description

Smoothly changes the color of a Light component

250.2 Parameters

Name	Description
Color	The color the Light component starts emitting
Light	The game object with a Light component
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished

250.3 Keywords

`Colour` `Hue` `Mood` `RGB` `Light` `Light` `Spot` `Sun` `Point` `Strength` `Burn` `Dark`

251 Light Intensity

`Lights » Light Intensity`

251.1 Description

Smoothly changes the intensity of a Light component

251.2 Parameters

Name	Description
Intensity	The intensity change that the Light component undergoes
Light	The game object with a Light component
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished

251.3 Keywords

`Light` `Spot` `Sun` `Point` `Strength` `Burn` `Dark`

I.IV.I.I.X MATH

252 Math

252.1 Sub Categories

- Arithmetic
- Boolean
- Geometry
- Shading
- Text

I.IV.I.I.X.I Arithmetic

253 Arithmetic

253.1 Instructions

- Absolute Number
- Add Numbers
- Clamp Number
- Cosine
- Divide Numbers
- Increment Number
- Modulus Numbers
- Multiply Numbers
- Set Number
- Sign Of Number
- Sine
- Subtract Numbers
- Tangent

254 Absolute Number

`Math » Arithmetic » Absolute Number`

254.1 Description

Sets a value without its sign

254.2 Parameters

Name	Description
Set	Where the value is stored
Number	The input value

254.3 Keywords

`Change` `Float` `Integer` `Variable` `Sign` `Positive` `Modulus` `Magnitude`

255 Add Numbers

`Math » Arithmetic » Add Numbers`

255.1 Description

Add two values together

255.2 Parameters

Name	Description
Set	Where the resulting value is set
Value 1	The first operand of the arithmetic operation
Value 2	The second operand of the arithmetic operation

255.3 Keywords

`Sum` `Plus` `Float` `Integer` `Variable`

256 Clamp Number

`Math » Arithmetic » Clamp Number`

256.1 Description

Clamps a value between a range defined by two others (inclusive)

256.2 Parameters

Name	Description
Set	Where the resulting value is set
Value	The value that is clamped between two others
Minimum	The smallest possible value
Maximum	The largest possible value

256.3 Keywords

`Min` `Max` `Negative` `Minus` `Float` `Integer` `Variable`

257 Cosine

`Math » Arithmetic » Cosine`

257.1 Description

Sets a value equal the Cosine of a number

257.2 Parameters

Name	Description
Set	Where the value is stored
Cosine	The angle input in radians

257.3 Keywords

`Change` `Float` `Integer` `Variable`

258 Divide Numbers

`Math » Arithmetic » Divide Numbers`

258.1 Description

Performs a division between the first and the second values

258.2 Parameters

Name	Description
Set	Where the resulting value is set
Value 1	The first operand of the arithmetic operation
Value 2	The second operand of the arithmetic operation

258.3 Keywords

`Fraction` `Float` `Integer` `Variable`

259 Increment Number

```
Math » Arithmetic » Increment Number
```

259.1 Description

Sets a value equal the sum of itself, plus another number

259.2 Parameters

Name	Description
Set	The value being incremented
Value	The value to add

259.3 Keywords

`Change` `Float` `Integer` `Variable`

260 Modulus Numbers

`Math » Arithmetic » Modulus Numbers`

260.1 Description

Calculates the modulus between the first and the second value

260.2 Parameters

Name	Description
Set	Where the resulting value is set
Value 1	The first operand of the arithmetic operation
Value 2	The second operand of the arithmetic operation

260.3 Keywords

`Fraction` `Float` `Integer` `Variable` `Module`

261 Multiply Numbers

`Math » Arithmetic » Multiply Numbers`

261.1 Description

Multiplies two values together

261.2 Parameters

Name	Description
Set	Where the resulting value is set
Value 1	The first operand of the arithmetic operation
Value 2	The second operand of the arithmetic operation

261.3 Keywords

`Product` `Float` `Integer` `Variable`

262 Set Number

`Math » Arithmetic » Set Number`

262.1 Description

Sets a value equal to another value

262.2 Parameters

Name	Description
Set	Where the value is set
From	The value that is set

262.3 Keywords

`Change` `Float` `Integer` `Variable`

263 Sign of Number

`Math » Arithmetic » Sign of Number`

263.1 Description

Sets a value equal to -1 if the input number is negative. 1 otherwise

263.2 Parameters

Name	Description
Set	Where the value is stored
Number	The input value

263.3 Keywords

`Change` `Float` `Integer` `Variable` `Positive` `Negative`

264 Sine

`Math » Arithmetic » Sine`

264.1 Description

Sets a value equal the Sine of a number

264.2 Parameters

Name	Description
Set	Where the value is stored
Sine	The angle input in radians

264.3 Keywords

`Change` `Float` `Integer` `Variable`

265 Subtract Numbers

`Math » Arithmetic » Subtract Numbers`

265.1 Description

Subtracts the second value from the first one

265.2 Parameters

Name	Description
Set	Where the resulting value is set
Value 1	The first operand of the arithmetic operation
Value 2	The second operand of the arithmetic operation

265.3 Keywords

`Rest` `Negative` `Minus` `Float` `Integer` `Variable`

266 Tangent

`Math » Arithmetic » Tangent`

266.1 Description

Sets a value equal the Tangent of a number

266.2 Parameters

Name	Description
Set	Where the value is stored
Tangent	The angle input in radians

266.3 Keywords

`Change` `Float` `Integer` `Variable`

I.IV.I.I.X.II Boolean

267 Boolean

267.1 Instructions

- And Bool
- Nand Bool
- Nor Bool
- Or Bool
- Set Bool
- Toggle Bool

268 AND Bool

`Math » Boolean » AND Bool`

268.1 Description

Executes an AND operation between to values and saves the result

268.2 Parameters

Name	Description
Set	Where the resulting value is set
Value 1	The first operand of the boolean operation
Value 2	The second operand of the boolean operation

268.3 Keywords

`Subtract` `Minus` `Variable` `Boolean`

269 NAND Bool

`Math » Boolean » NAND Bool`

269.1 Description

Executes a NAND operation between to values and saves the result

269.2 Parameters

Name	Description
Set	Where the resulting value is set
Value 1	The first operand of the boolean operation
Value 2	The second operand of the boolean operation

269.3 Keywords

`Not` `Negative` `Subtract` `Minus` `Variable` `Boolean`

270 NOR Bool

`Math » Boolean » NOR Bool`

270.1 Description

Executes a NOR operation between to values and saves the result

270.2 Parameters

Name	Description
Set	Where the resulting value is set
Value 1	The first operand of the boolean operation
Value 2	The second operand of the boolean operation

270.3 Keywords

`Not` `Negative` `Sum` `Plus` `Variable` `Boolean`

271 OR Bool

`Math » Boolean » OR Bool`

271.1 Description

Executes an OR operation between to values and saves the result

271.2 Parameters

Name	Description
Set	Where the resulting value is set
Value 1	The first operand of the boolean operation
Value 2	The second operand of the boolean operation

271.3 Keywords

`Sum` `Plus` `Variable` `Boolean`

272 Set Bool

`Math » Boolean » Set Bool`

272.1 Description

Sets a boolean value equal to another value

272.2 Parameters

Name	Description
Set	Where the value is set
From	The value that is set

272.3 Keywords

`Change` `Boolean` `Variable`

273 Toggle Bool

`Math » Boolean » Toggle Bool`

273.1 Description

Toggles the value of a Boolean value

273.2 Parameters

Name	Description
Set	The boolean value that stores the result
From	The boolean value that is toggled

273.3 Keywords

`Change` `Boolean` `Variable` `Not` `Flip` `Switch`

I.IV.I.I.X.III Geometry

274 Geometry

274.1 Instructions

- Add Directions
- Add Points
- Clamp
- Cross Product
- Distance
- Dot Product
- Normalize
- Project On Plane
- Reflect On Plane
- Remap Coordinates
- Scale Product
- Set Direction
- Set Point
- Set Vector X
- Set Vector Y
- Set Vector Z
- Subtract Directions
- Subtract Points
- Transform To Local Direction
- Transform To Local Point
- Transform To World Direction
- Transform To World Point
- Uniform Scale

275 Add Directions

`Math » Geometry » Add Directions`

275.1 Description

Adds two values that represent a direction in space and saves the result

275.2 Parameters

Name	Description
Set	Where the resulting value is set
Direction 1	The first operand of the geometric operation that represents a direction
Direction 2	The second operand of the geometric operation that represents a direction

275.3 Keywords

`Sum` `Plus` `Position` `Location` `Variable`

276 Add Points

`Math » Geometry » Add Points`

276.1 Description

Adds two values that represent a point in space and saves the result

276.2 Parameters

Name	Description
Set	Where the resulting value is set
Point 1	The first operand of the geometric operation that represents a point in space
Point 2	The second operand of the geometric operation that represents a point in space

276.3 Keywords

`Sum` `Plus` `Position` `Location` `Variable`

277 Clamp

`Math » Geometry » Clamp`

277.1 Description

Clamps all components of a Vector3 between two values

277.2 Parameters

Name	Description
Set	Dynamic variable where the resulting value is set
Value	The Vector3 value clamped between Minimum and Maximum
Minimum	The minimum value
Maximum	The maximum value

277.3 Keywords

`Limit` `Vector3` `Vector2` `Constraint` `Variable`

278 Cross Product

`Math » Geometry » Cross Product`

278.1 Description

Calculates the cross product of two direction values and saves the result

278.2 Parameters

Name	Description
Set	Where the resulting value is set
Direction 1	The first operand of the geometric operation that represents a direction
Direction 2	The second operand of the geometric operation that represents a direction

278.3 Keywords

`Multiply` `Orthogonal` `Perpendicular` `Normal` `Position` `Location` `Variable`

279 Distance

`Math » Geometry » Distance`

279.1 Description

Calculates the distance between two points in space and saves the result

279.2 Parameters

Name	Description
Set	Where the resulting value is set
Point 1	The first operand of the geometric operation that represents a point in space
Point 2	The second operand of the geometric operation that represents a point in space

279.3 Keywords

`Magnitude` `Position` `Location` `Variable`

280 Dot Product

`Math » Geometry » Dot Product`

280.1 Description

Calculates the dot product between two directions and saves the result

280.2 Parameters

Name	Description
Set	Where the resulting value is set
Direction 1	The first operand of the geometric operation that represents a direction
Direction 2	The second operand of the geometric operation that represents a direction

280.3 Keywords

`Direction` `Parallel` `Perpendicular`

281 Normalize

`Math » Geometry » Normalize`

281.1 Description

Makes the magnitude of a direction vector equal to 1

281.2 Parameters

Name	Description
Set	Dynamic variable where the resulting value is set
From	The direction vector that is normalized

281.3 Keywords

`Change` `Vector3` `Vector2` `Unit` `Magnitude` `Variable`

282 Project on Plane

`Math » Geometry » Project on Plane`

282.1 Description

Projects a direction on a plane defined by a normal vector and saves the result

282.2 Parameters

Name	Description
Set	Where the resulting value is set
Direction	The direction vector that is projected on a plane
Plane Normal	The plane represented by the direction of its normal vector

282.3 Keywords

`Direction` `Surface` `Sway`

283 Reflect on Plane

`Math » Geometry » Reflect on Plane`

283.1 Description

Reflects a direction on a plane defined by a normal vector and saves the result

283.2 Parameters

Name	Description
Set	Where the resulting value is set
Direction	The direction vector that is reflected on a plane
Plane Normal	The plane represented by the direction of its normal vector

283.3 Keywords

`Direction` `Bounce` `Ricochet` `Snell`

284 Remap Coordinates

`Math » Geometry » Remap Coordinates`

284.1 Description

Changes each of the components of a Vector3 value

284.2 Parameters

Name	Description
Value	The Vector3 value affected by the operation
X	Where the X coordinate component is remapped
Y	Where the Y coordinate component is remapped
Z	Where the Z coordinate component is remapped

284.3 Keywords

`Change` `Vector3` `Vector2` `Component` `Towards` `Look` `Variable` `Axis`

285 Scale Product

`Math » Geometry » Scale Product`

285.1 Description

Multiplies two vectors component-wise

285.2 Parameters

Name	Description
Set	Where the resulting value is set
Direction 1	The first operand of the geometric operation that represents a direction
Direction 2	The second operand of the geometric operation that represents a direction

285.3 Keywords

`Multiply` `Uniform` `Component` `Axis` `Position` `Location` `Variable`

286 Set Direction

```
Math » Geometry » Set Direction
```

286.1 Description

Changes the value of a Vector3 that represents a direction in space

286.2 Parameters

Name	Description
Set	Dynamic variable where the resulting value is set
From	The value that is set

286.3 Keywords

`Change` `Vector3` `Vector2` `Towards` `Look` `Variable`

287 Set Point

`Math » Geometry » Set Point`

287.1 Description

Changes the value of a Vector3 that represents a position in space

287.2 Parameters

Name	Description
Set	Dynamic variable where the resulting value is set
From	The value that is set

287.3 Keywords

`Change` `Vector3` `Vector2` `Position` `Location` `Variable`

288 Set Vector X

`Math » Geometry » Set Vector X`

288.1 Description

Changes the X component of a vector

288.2 Parameters

Name	Description
Set	Where the resulting value is set
X	The value that is changed for

288.3 Keywords

`Change` `Component` `Axis`

289 Set Vector Y

`Math » Geometry » Set Vector Y`

289.1 Description

Changes the Y component of a vector

289.2 Parameters

Name	Description
Set	Where the resulting value is set
Y	The value that is changed for

289.3 Keywords

`Change` `Component` `Axis`

290 Set Vector Z

`Math » Geometry » Set Vector Z`

290.1 Description

Changes the Z component of a vector

290.2 Parameters

Name	Description
Set	Where the resulting value is set
Z	The value that is changed for

290.3 Keywords

`Change` `Component` `Axis`

291 Subtract Directions

`Math » Geometry » Subtract Directions`

291.1 Description

Subtracts two values that represent a direction in space and saves the result

291.2 Parameters

Name	Description
Set	Where the resulting value is set
Direction 1	The first operand of the geometric operation that represents a direction
Direction 2	The second operand of the geometric operation that represents a direction

291.3 Keywords

`Minus` `Rest` `Position` `Location` `Variable`

292 Subtract Points

`Math » Geometry » Subtract Points`

292.1 Description

Subtracts two values that represent a point in space and saves the result

292.2 Parameters

Name	Description
Set	Where the resulting value is set
Point 1	The first operand of the geometric operation that represents a point in space
Point 2	The second operand of the geometric operation that represents a point in space

292.3 Keywords

`Rest` `Minus` `Position` `Location` `Variable`

293 Transform to Local Direction

`Math » Geometry » Transform to Local Direction`

293.1 Description

Transform the Direction from World to Local space

293.2 Parameters

Name	Description
Set	Where the resulting value is set
Transform	The reference object to transform the coordinates
Direction	The direction that changes its space mode

293.3 Keywords

`Direction` `Local` `World` `Space` `Variable` `Inverse`

294 Transform to Local Point

`Math » Geometry » Transform to Local Point`

294.1 Description

Transform the Point from World to Local space

294.2 Parameters

Name	Description
Set	Where the resulting value is set
Transform	The reference object to transform the coordinates
Point	The point that changes its space mode

294.3 Keywords

`Location` `Position` `Local` `World` `Space` `Variable` `Inverse`

295 Transform to World Direction

`Math » Geometry » Transform to World Direction`

295.1 Description

Transform the Direction from Local to World space

295.2 Parameters

Name	Description
Set	Where the resulting value is set
Transform	The reference object to transform the coordinates
Direction	The direction that changes its space mode

295.3 Keywords

`Direction` `Local` `World` `Space` `Variable`

296 Transform to World Point

`Math » Geometry » Transform to World Point`

296.1 Description

Transform the Point from Local to World space

296.2 Parameters

Name	Description
Set	Where the resulting value is set
Transform	The reference object to transform the coordinates
Point	The point that changes its space mode

296.3 Keywords

`Location` `Position` `Local` `World` `Space` `Variable`

297 Uniform Scale

`Math » Geometry » Uniform Scale`

297.1 Description

Multiplies each component of a vector with a decimal

297.2 Parameters

Name	Description
Set	Where the resulting value is set
Vector	The first operand of the geometric operation that represents a direction
Value	The second operand of the geometric operation that represents a decimal number

297.3 Keywords

`Direction` `Homogeneous` `Multiply` `Product`

I.IV.I.I.X.IV Shading

298 Shading

298.1 Instructions

- Lerp Color
- Lerp Lightness
- Lerp Saturation
- Set Color

299 Lerp Color

`Math » Shading » Lerp Color`

299.1 Description

Linearly interpolates between to colors over time

299.2 Parameters

Name	Description
Color 1	The starting Color value
Color 2	The targeted Color value
Duration	How long it takes to perform the transition
Easing	The change rate of the transition over time
Wait to Complete	Whether to wait until the transition is finished or not
Set	Where the resulting Color value is set

299.3 Keywords

`Change` `Value` `Transition` `Shade` `Tint` `Hue` `Colour` `Color` `Paint` `Tone`

300 Lerp Lightness

`Math » Shading » Lerp Lightness`

300.1 Description

Linearly interpolates between to the desired lightness value over time

300.2 Parameters

Name	Description
Lightness	The targeted Lightness value (between 0 and 1)
Duration	How long it takes to perform the transition
Easing	The change rate of the transition over time
Wait to Complete	Whether to wait until the transition is finished or not
Set	Where the resulting Color value is set

300.3 Keywords

`Change` `Value` `Transition` `Shade` `Tint` `Hue` `Colour` `Color` `Paint` `Tone`

301 Lerp Saturation

`Math » Shading » Lerp Saturation`

301.1 Description

Linearly interpolates between to the desired saturation value over time

301.2 Parameters

Name	Description
Saturation	The targeted Saturation value (between 0 and 1)
Duration	How long it takes to perform the transition
Easing	The change rate of the transition over time
Wait to Complete	Whether to wait until the transition is finished or not
Set	Where the resulting Color value is set

301.3 Keywords

`Change` `Value` `Transition` `Shade` `Tint` `Hue` `Colour` `Color` `Paint` `Tone`

302 Set Color

`Math » Shading » Set Color`

302.1 Description

Sets the value of a Color

302.2 Parameters

Name	Description
Color	The Color value to set
Set	Where the resulting Color value is set

302.3 Keywords

`Change` `Value` `Shade` `Tint` `Hue` `Colour` `Color` `Paint` `Tone`

I.IV.I.I.X.V Text

303 Text

303.1 Instructions

- Join
- Replace
- Set Text
- Substring

304 Join

`Math » Text » Join`

304.1 Description

Joins two string values and stores them

304.2 Parameters

Name	Description
Text 1	The source of the first text
Text 2	The source of the second text
Set	Where the resulting value is set

304.3 Keywords

`Concat` `Concatenate` `Together` `Mix` `String` `Text` `Character`

305 Replace

```
Math » Text » Replace
```

305.1 Description

Replaces all occurrences of a string with another string

305.2 Parameters

Name	Description
Text	The source of the text
Old Text	The text replaced
New Text	The text that replaces each occurrence
Set	Where the resulting value is set

305.3 Keywords

`Substitute` `Change` `String` `Text` `Character`

306 Set Text

```
Math » Text » Set Text
```

306.1 Description

Changes the value of a string

306.2 Parameters

Name	Description
Text	The source of the text
Set	Where the resulting value is set

306.3 Keywords

`String` `Text` `Character`

307 Substring

`Math » Text » Substring`

307.1 Description

Extracts a substring based on an index and length

307.2 Parameters

Name	Description
Text	The source of the text
Index	Starting index of the substring
Length	Amount of characters extracted
Set	Where the resulting value is set

307.3 Keywords

`String` `Text` `Character`

I.IV.I.I.XI PHYSICS 2D

308 Physics 2D

308.1 Instructions

- Add Explosion Force 2D
- Add Force 2D
- Change Mass 2D
- Change Velocity 2D
- Gravity Scale 2D
- Is Kinematic 2D

309 Add Explosion Force 2D

`Physics 2D » Add Explosion Force 2D`

309.1 Description

Applies a force to a Rigidbody2D that simulates explosion effects

309.2 Parameters

Name	Description
Rigidbody	The game object with a Rigidbody2D component that receives the force
Origin	The position where the explosion originates
Radius	How far the blast reaches
Force	The force of the explosion, which its at its maximum at the origin
Force Mode	How the force is applied

309.3 Keywords

`Apply` `Velocity` `Impulse` `Propel` `Push` `Pull` `Boom` `Physics` `Rigidbody`

310 Add Force 2D

`Physics 2D » Add Force 2D`

310.1 Description

Adds a force to a game object with a Rigidbody2D

310.2 Parameters

Name	Description
Rigidbody	The game object that will receive the force. A Rigidbody2D attached is required
Direction	The direction in which the force will be applied
Force	The amount of force applied
Force Mode	The type of force applied

310.3 Keywords

`Apply` `Velocity` `Impulse` `Propel` `Push` `Pull` `Physics` `Rigidbody`

311 Change Mass 2D

`Physics 2D » Change Mass 2D`

311.1 Description

Changes the mass of a Rigidbody2D

311.2 Parameters

Name	Description
Rigidbody	The game object with a Rigidbody2D attached that will change its mass
Mass	The new mass the game object will be set to have

311.3 Keywords

`Weight` `Physics` `Rigidbody`

312 Change Velocity 2D

`Physics 2D » Change Velocity 2D`

312.1 Description

Changes the current velocity of a Rigidbody2D

312.2 Parameters

Name	Description
Rigidbody	The game object with a Rigidbody2D attached that will change its velocity
Velocity	The velocity the game object will change to

312.3 Keywords

`Speed` `Movement` `Physics` `Rigidbody`

313 Gravity Scale 2D

`Physics 2D » Gravity Scale 2D`

313.1 Description

Controls whether how gravity affects the Rigidbody2D

313.2 Parameters

Name	Description
Rigidbody	The game object with a Rigidbody2D attached that changes its gravity scale
Gravity Scale	The degree to which this object is affected by gravity

313.3 Keywords

`Physics` `Rigidbody`

314 Is Kinematic 2D

`Physics 2D » Is Kinematic 2D`

314.1 Description

Controls whether physics affects the Rigidbody2D

314.2 Parameters

Name	Description
Rigidbody	The game object with a Rigidbody2D attached that changes its kinematic usage
Is Kinematic	If enabled, forces, collisions or joints do not affect the rigidbody anymore

314.3 Keywords

`Physics` `Rigidbody`

I.IV.I.I.XII PHYSICS 3D

315 Physics 3D

315.1 Instructions

- Add Explosion Force 3D
- Add Force 3D
- Change Mass 3D
- Change Velocity 3D
- Is Kinematic 3D
- Overlap Box 2D
- Overlap Box 3D
- Overlap Circle 3D
- Overlap Sphere 3D
- Trace Line 3D
- Use Gravity 3D

316 Add Explosion Force 3D

`Physics 3D » Add Explosion Force 3D`

316.1 Description

Applies a force to a Rigidbody that simulates explosion effects

316.2 Parameters

Name	Description
Rigidbody	The game object with a Rigidbody component that receives the force
Origin	The position where the explosion originates
Radius	How far the blast reaches
Force	The force of the explosion, which its at its maximum at the origin
Force Mode	How the force is applied

316.3 Keywords

`Apply` `Velocity` `Impulse` `Propel` `Push` `Pull` `Boom` `Physics` `Rigidbody`

317 Add Force 3D

`Physics 3D » Add Force 3D`

317.1 Description

Adds a force to a game object with a Rigidbody

317.2 Parameters

Name	Description
Rigidbody	The game object with a Rigidbody component that receives the force
Direction	The direction in which the force is applied
Force	The amount of force applied
Force Mode	The type of force applied
Space Mode	Whether the force is applied in local or world space

317.3 Keywords

`Apply` `Velocity` `Impulse` `Propel` `Push` `Pull` `Physics` `Rigidbody`

318 Change Mass 3D

`Physics 3D » Change Mass 3D`

318.1 Description

Changes the mass of a Rigidbody

318.2 Parameters

Name	Description
Rigidbody	The game object with a Rigidbody attached that changes its mass
Mass	The new mass the game object

318.3 Keywords

`Weight` `Physics` `Rigidbody`

319 Change Velocity 3D

`Physics 3D » Change Velocity 3D`

319.1 Description

Changes the current velocity of a Rigidbody

319.2 Parameters

Name	Description
Rigidbody	The game object with a Rigidbody attached that changes its velocity
Velocity	The velocity the game object changes to

319.3 Keywords

`Speed` `Movement` `Physics` `Rigidbody`

320 Is Kinematic 3D

`Physics 3D » Is Kinematic 3D`

320.1 Description

Controls whether physics affects the Rigidbody

320.2 Parameters

Name	Description
Rigidbody	The game object with a Rigidbody attached that changes its kinematic usage
Is Kinematic	If enabled, forces, collisions or joints do not affect the rigidbody anymore

320.3 Keywords

`Physics` `Rigidbody`

321 Overlap Box 2D

`Physics 3D » Overlap Box 2D`

321.1 Description

Captures all colliders caught inside a box

321.2 Parameters

Name	Description
Center	The center of the box
Size	The size of the box in each axis
Angle	The rotation of the box in world space
Store In	The list where the colliders (if any) are stored
Layer Mask	A mask that determines which colliders are ignored and which aren't

321.3 Keywords

`Cube` `Cast` `Collect` `Physics` `Rigidbody`

322 Overlap Box 3D

`Physics 3D » Overlap Box 3D`

322.1 Description

Captures all colliders caught inside a box

322.2 Parameters

Name	Description
Center	The center of the box
Half Extents	Half of the size of the box in each axis
Rotation	The rotation of the box in world space
Store In	The list where the colliders (if any) are stored
Layer Mask	A mask that determines which colliders are ignored and which aren't

322.3 Keywords

`Cube` `Cast` `Collect` `Physics` `Rigidbody`

323 Overlap Circle 2D

`Physics 3D » Overlap Circle 3D`

323.1 Description

Captures all colliders caught inside a Circle defined by a point and radius

323.2 Parameters

Name	Description
Center	The center of the circle
Radius	The radius of the circle
Store In	The list where the colliders (if any) are stored
Layer Mask	A mask that determines which colliders are ignored and which aren't

323.3 Keywords

`Cast` `Collect` `Physics` `Rigidbody`

324 Overlap Sphere 3D

`Physics 3D » Overlap Sphere 3D`

324.1 Description

Captures all colliders caught inside a sphere defined by a point and radius

324.2 Parameters

Name	Description
Center	The center of the sphere
Radius	The radius of the sphere
Store In	The list where the colliders (if any) are stored
Layer Mask	A mask that determines which colliders are ignored and which aren't

324.3 Keywords

`Circle` `Cast` `Collect` `Physics` `Rigidbody`

325 Trace Line 3D

`Physics 3D » Trace Line 3D`

325.1 Description

Captures all colliders caught inside a line between A and B

325.2 Parameters

Name	Description
Point A	The position of the first point
Point B	The position of the second point
Store In	The list where the colliders (if any) are stored
Layer Mask	A mask that determines which colliders are ignored and which aren't

325.3 Keywords

`Line` `Trace` `Raycast` `Cast` `Collect` `Physics` `Rigidbody`

326 Use Gravity 3D

`Physics 3D » Use Gravity 3D`

326.1 Description

Controls whether gravity affects the Rigidbody

326.2 Parameters

Name	Description
Rigidbody	The game object with a Rigidbody attached that changes its gravity usage
Use Gravity	If set to false the rigidbody behaves as in outer space

326.3 Keywords

`Physics` `Rigidbody`

I.IV.I.I.XIII RENDERER

327 Renderer

327.1 Instructions

- Change Material Color
- Change Material Float
- Change Material Texture
- Change Material
- Change Sprite

328 Change Material Color

`Renderer » Change Material Color`

328.1 Description

Changes over time the Color property of an instantiated material of a Renderer component

328.2 Parameters

Name	Description
Property	Name of the property to change
Color	Color target that the instantiated Material turns into
Duration	How long it takes to perform the transition
Easing	The change rate of the transition over time
Wait to Complete	Whether to wait until the transition is finished or not
Renderer	The game object with a Renderer component attached

328.3 Keywords

`Set` `Shader` `Hue` `Change`

329 Change Material Float

`Renderer » Change Material Float`

329.1 Description

Changes over time the Float property of an instantiated material of a Renderer component

329.2 Parameters

Name	Description
Property	Name of the property to change
Float	Decimal target that the instantiated Material's property turns into
Duration	How long it takes to perform the transition
Easing	The change rate of the transition over time
Wait to Complete	Whether to wait until the transition is finished or not
Renderer	The game object with a Renderer component attached

329.3 Keywords

`Set` `Shader` `Hue` `Change`

330 Change Material Texture

`Renderer » Change Material Texture`

330.1 Description

Changes the main texture of an instantiated material of a Renderer component

330.2 Parameters

Name	Description
Texture	Texture that replaces the Renderer's instantiated material
Renderer	The game object with a Renderer component attached

330.3 Keywords

`Set` `Shader` `Change`

331 Change Material

`Renderer » Change Material`

331.1 Description

Changes instantiated material of a Renderer component

331.2 Parameters

Name	Description
Material	Material that is set as the primary type of the Renderer
Renderer	The game object with a Renderer component attached

331.3 Keywords

`Set` `Shader` `Texture` `Change`

332 Change Sprite

`Renderer » Change Sprite`

332.1 Description

Sets the Sprite value

332.2 Parameters

Name	Description
To	Where to store the new Sprite value
Sprite	The Sprite value to be stored

332.3 Keywords

`Texture` `Renderer`

I.IV.I.I.XIV SCENES

333 Scenes

333.1 Instructions

- Load Scene
- Unload Scene

334 Load Scene

Scenes » Load Scene

334.1 Description

Loads a new Scene

334.2 Parameters

Name	Description
Scene	The scene to be loaded
Mode	Single mode replaces all other scenes. Additive mode loads the scene on top of the others
Async	Loads the scene in the background or freeze the game until its done
Scene Entries	Define the starting location of the player and other characters after loading the scene

334.3 Keywords

Change

335 Unload Scene

`Scenes » Unload Scene`

335.1 Description

Unloads an active scene

335.2 Parameters

Name	Description
Scene	The scene to be unloaded

335.3 Keywords

`Change` `Remove`

I.IV.I.I.XV STORAGE

336 Storage

336.1 Instructions

- Delete Game
- Load Game
- Load Latest Game
- Reset Game
- Save Game

337 Delete Game

```
Storage » Delete Game
```

337.1 Description

Deletes a previously saved game state

337.2 Parameters

Name	Description
Save Slot	Slot number that is erased. Default is 1

337.3 Keywords

`Load` `Save` `Delete` `Profile` `Slot` `Game` `Session`

338 Load Game

```
Storage » Load Game
```

338.1 Description

Loads a previously saved state of a game

338.2 Parameters

Name	Description
Save Slot	ID number to load the game from. It can range between 1 and 9999

338.3 Keywords

`Load` `Save` `Profile` `Slot` `Game` `Session`

339 Load Latest Game

```
Storage » Load Latest Game
```

339.1 Description

Loads the latest previously saved state of a game

339.2 Keywords

`Load` `Save` `Last` `Profile` `Game` `Session`

340 Reset Game

```
Storage » Reset Game
```

340.1 Description

Resets the current game to its default values

340.2 Parameters

Name	Description
Scene	The scene to move after resetting the data

340.3 Keywords

`Load` `Save` `Profile` `Slot` `Game` `Session`

341 Save Game

`Storage » Save Game`

341.1 Description

Saves the current state of the game

341.2 Parameters

Name	Description
Save Slot	ID number to save the game. It can range between 1 and 9999

341.3 Keywords

`Load` `Save` `Profile` `Slot` `Game` `Session`

I.IV.I.I.XVI TESTING

342 Testing

342.1 Instructions

- Instruction Tester

343 Tester

```
Testing » Instruction Tester
```

343.1 Description

Appends a character to a static Chain field. For internal testing use only

343.2 Parameters

Name	Description
Character	A character that will be appended to InstructionTester.Chain

343.3 Example 1

Note that this Instruction is not accessible through the Inspector to avoid confusing new users. To run the test suit environment, create a new `InstructionList` object and append as many `InstructionTester` instances as your test requires.

```
InstructionList instructions = new InstructionList(
    new InstructionTester('a'),
    new InstructionTester('b'),
    new InstructionTester('c')
);

InstructionTester.Clear();
instructions.Run(null);

Debug.Log(InstructionTester.Chain);
// Prints: 'abc'
```

This instruction is for internal testing only.

I.IV.I.I.XVII TIME

344 Time

344.1 Instructions

- Time Scale
- Wait Frames
- Wait Seconds

345 Time Scale

```
Time » Time Scale
```

345.1 Description

Changes the Time Scale of the game

345.2 Parameters

Name	Description
Time Scale	The scale at which time passes. This can be used for slow motion effects
Blend Time	How long it takes to transition from the current time scale to the new one
Layer	Any time scale values using the same Layer is overwritten by this one.

345.3 Example 1

Setting a Time Scale of 0 will freeze the game. Useful for pausing the game

345.4 Example 2

The resulting Time Scale will be equal to the lowest time scale value between all Layers. For example, if the Time Scale with Layer = 0 has a value of 0.5 (which makes characters move in slow motion), and another Time Scale with Layer = 1 with a value of 0, the resulting Time Scale will be 0

345.5 Keywords

`Slow` `Motion` `Bullet` `Time` `Matrix`

346 Wait Frames

`Time » Wait Frames`

346.1 Description

Waits a certain amount of frames

346.2 Parameters

Name	Description
Frames	The amount of frames to wait

346.3 Example 1

This instruction is particularly useful in cases where you want to control the order of execution of two Actions. For example, imagine there are two Triggers executing at the same time, but you want to execute the instructions associated with one after the execution of the other one. You can use the 'Wait Frames' instruction to defer its execution 1 frame so the other one has had time to complete its own execution

346.4 Keywords

`Wait` `Time` `Frames` `Yield`

347 Wait Seconds

`Time » Wait Seconds`

347.1 Description

Waits a certain amount of seconds

347.2 Parameters

Name	Description
Seconds	The amount of seconds to wait
Mode	Whether to use the time scale or not

347.3 Keywords

`Wait` `Time` `Seconds` `Minutes` `Cooldown` `Timeout` `Yield`

I.IV.I.I.XVIII TRANSFORMS

348 Transforms

348.1 Instructions

- Change Position
- Change Rotation
- Change Scale
- Clear Parent
- Look At
- Set Parent

349 Change Position

`Transforms » Change Position`

349.1 Description

Changes the position of a game object over time

349.2 Parameters

Name	Description
Position	The desired position of the game object
Space	If the transformation occurs in local or world space
Duration	How long it takes to perform the transition
Easing	The change rate of the translation over time
Wait to Complete	Whether to wait until the translation is finished or not
Transform	The Transform of the game object

349.3 Keywords

`Location` `Translate` `Move` `Displace` `Set`

350 Change Rotation

`Transforms » Change Rotation`

350.1 Description

Changes the rotation of a game object over time

350.2 Parameters

Name	Description
Rotation	The desired rotation of the game object
Space	If the transformation occurs in local or world space
Duration	How long it takes to perform the transition
Easing	The change rate of the rotation over time
Wait to Complete	Whether to wait until the rotation is finished or not
Transform	The Transform of the game object

350.3 Keywords

`Rotate` `Angle` `Euler` `Tilt` `Pitch` `Yaw` `Roll`

351 Change Scale

`Transforms » Change Scale`

351.1 Description

Changes the local scale of a game object over time

351.2 Parameters

Name	Description
Scale	The desired scale of the game object
Duration	How long it takes to perform the transition
Easing	The change rate of the scaling over time
Wait to Complete	Whether to wait until the scaling is finished or not
Transform	The Transform of the game object

351.3 Keywords

`Size` `Resize` `Grow` `Reduce` `Small` `Big`

352 Clear Parent

`Transforms » Clear Parent`

352.1 Description

Clears the parent of a game object

352.2 Parameters

Name	Description
Transform	The Transform of the game object

352.3 Keywords

`Child` `Children` `Hierarchy` `Orphan`

353 Look At

`Transforms » Look At`

353.1 Description

Rotates the transform towards the chosen target

353.2 Parameters

Name	Description
Target	The desired targeted object to look at
Transform	The Transform of the game object

353.3 Keywords

`Rotate` `Rotation` `See`

354 Set Parent

`Transforms » Set Parent`

354.1 Description

Changes the parent of a game object

354.2 Parameters

Name	Description
Parent	The game object that becomes the parent
Transform	The Transform of the game object

354.3 Keywords

`Child` `Children` `Hierarchy` `Hang` `Inherit`

I.IV.I.I.XIX UI

355 Ui

355.1 Instructions

- Canvas Group Alpha
- Canvas Group Block Raycasts
- Canvas Group Interactable
- Change Dropdown
- Change Font Size
- Change Graphic Color
- Change Height
- Change Image
- Change Input Field
- Change Slider
- Change Text
- Change Toggle
- Change Width
- Focus On
- Submit
- Unfocus

356 Canvas Group Alpha

```
UI » Canvas Group Alpha
```

356.1 Description

Changes the opacity of the Canvas Group and affects all of its children

356.2 Parameters

Name	Description
Canvas Group	The Canvas Group component that changes its value
Alpha	The new opacity value transformation of the Canvas Group
Duration	How long it takes to perform the transition
Easing	The change rate of the parameter over time
Wait to Complete	Whether to wait until the transition is finished

357 Canvas Group Block Raycasts

```
UI » Canvas Group Block Raycasts
```

357.1 Description

Changes whether the Canvas Group blocks raycasts or not

357.2 Parameters

Name	Description
Canvas Group	The Canvas Group component that changes its value
Block Raycasts	If true, the canvas group and its children block raycasts

358 Canvas Group Interactable

```
UI » Canvas Group Interactable
```

358.1 Description

Changes the interactable value of a Canvas Group component

358.2 Parameters

Name	Description
Canvas Group	The Canvas Group component that changes its value
Interactable	The on/off state value

359 Change Dropdown

UI » Change Dropdown

359.1 Description

Changes the value of a Dropdown or Text Mesh Pro Dropdown component

359.2 Parameters

Name	Description
Text	The Text or Text Mesh Pro component that changes its value
Index	The new index value of the Dropdown

360 Change Font Size

`UI » Change Font Size`

360.1 Description

Changes the size of the Text or Text Mesh Pro component content

360.2 Parameters

Name	Description
Text	The Text or Text Mesh Pro component that changes its font size
Size	The new text size, in pixels

360.3 Keywords

`Text`

361 Change Graphic Color

```
UI » Change Graphic Color
```

361.1 Description

Changes the color of a Graphic component

361.2 Parameters

Name	Description
Graphic	The Graphic component that changes its tint color
Color	The new Color

362 Change Height

```
UI » Change Height
```

362.1 Description

Changes the Height of a Rect Transform

362.2 Parameters

Name	Description
Rect Transform	The Rect Transform component to change
Height	The new height value. Also known as sizeDelta.y

363 Change Image

```
UI » Change Image
```

363.1 Description

Changes the Sprite of an Image component

363.2 Parameters

Name	Description
Override Sprite	If the Sprite replaced is the original or the overriden
Image	The Image component that changes its sprite value
Sprite	The new Sprite reference

364 Change Input Field

```
UI » Change Input Field
```

364.1 Description

Changes the value of an Input Field or Text Mesh Pro Input Field

364.2 Parameters

Name	Description
Input Field	The Input Field or TMP Input Field component that changes its value
Value	The new value set

365 Change Slider

```
UI » Change Slider
```

365.1 Description

Changes the value of a Slider component

365.2 Parameters

Name	Description
Slider	The Slider component that changes its value
Value	The new value set

366 Change Text

```
UI » Change Text
```

366.1 Description

Changes the value of a Text or Text Mesh Pro component

366.2 Parameters

Name	Description
Text	The Text or Text Mesh Pro component that changes its value
Value	The new value set

367 Change Toggle

```
UI » Change Toggle
```

367.1 Description

Changes the value of a Toggle component

367.2 Parameters

Name	Description
Toggle	The Toggle component that changes its value
Value	The new value set

368 Change Width

```
UI » Change Width
```

368.1 Description

Changes the Width of a Rect Transform

368.2 Parameters

Name	Description
Rect Transform	The Rect Transform component to change
Width	The new width value. Also known as sizeDelta.x

369 Focus On

`UI » Focus On`

369.1 Description

Focuses on a specific UI component

369.2 Parameters

Name	Description
Focus On	The UI component that takes focus

369.3 Keywords

`Select`

370 Submit

```
UI » Submit
```

370.1 Description

Performs a submit action on a UI element

370.2 Keywords

`Enter` `Press` `Confirm`

371 Unfocus

```
UI » Unfocus
```

371.1 Description

Removes the focus from any UI component

371.2 Keywords

`Deselect` `Lose`

I.IV.I.I.XX VARIABLES

372 Variables

372.1 Instructions

- Change Id
- Clear List
- Collect Characters
- Collect Markers
- Filter List
- Iterator Next
- Iterator Previous
- Iterator Random
- Loop List
- Move List
- Remove From List
- Reverse List
- Shuffle List
- Sort List Alphabetically
- Sort List By Distance
- Swap List

373 Change ID

`Variables » Change ID`

373.1 Description

Changes the Local Name or List Variable's ID. It only works on non-Savable variables

373.2 Parameters

Name	Description
ID	The new ID of the Local Variable

373.3 Keywords

`Unique` `Guid`

374 Clear List

`Variables » Clear List`

374.1 Description

Removes all elements of a given Local or Global List Variables

374.2 Parameters

Name	Description
List Variable	Local List or Global List which elements are removed

374.3 Keywords

`Clean` `Remove` `Delete` `Destroy` `Size` `Array` `List` `Variables`

375 Collect Characters

`Variables » Collect Characters`

375.1 Description

Collects all Characters that within a certain radius of a position

375.2 Parameters

Name	Description
Origin	The position where the rest of the game objects are collected
Max Radius	How far from the Origin the game objects are collected
Min Radius	How far from the Origin game objects start to be collected
Store In	List where the collected game objects are saved
Filter	Checks a set of Conditions with each collected game object

375.3 Example 1

Note that in most cases it is not desirable to set the Min Radius to 0. Doing so will also collect game objects at a distance of 0 from the Origin. For example, if we want to collect all enemies around the Player and we set a Min Radius of 0, the Player will also be collected because it's a Character at a distance 0 from himself

375.4 Keywords

`Gather` `Get` `Set` `Array` `List` `Variables`

376 Collect Markers

`Variables » Collect Markers`

376.1 Description

Collects all Markers that within a certain radius of a position

376.2 Parameters

Name	Description
Origin	The position where the rest of the game objects are collected
Max Radius	How far from the Origin the game objects are collected
Min Radius	How far from the Origin game objects start to be collected
Store In	List where the collected game objects are saved
Filter	Checks a set of Conditions with each collected game object

376.3 Example 1

Note that in most cases it is not desirable to set the Min Radius to 0. Doing so will also collect game objects at a distance of 0 from the Origin. For example, if we want to collect all enemies around the Player and we set a Min Radius of 0, the Player will also be collected because it's a Character at a distance 0 from himself

376.4 Keywords

`Gather` `Get` `Set` `Array` `List` `Variables`

377 Filter List

`Variables » Filter List`

377.1 Description

Checks Conditions against each element of a list and removes it if the Condition is not true

377.2 Parameters

Name	Description
List Variable	Local List or Global List which elements are filtered
Filter	Checks a set of Conditions with each collected game object and removes the element if the Condition is not true

377.3 Example 1

The Filter field runs the Conditions list for each element in a Local List Variables or Global List Variables. It sets as the 'Target' value the currently examined game object. For example, filtering by the tag name 'Enemy' can be done using the 'Tag' Condition and comparing the field 'Target' with the string 'Enemy'. All game objects that are not tagged as 'Enemy' are removed

377.4 Keywords

`Remove` `Pick` `Select` `Array` `List` `Variables`

378 Iterator Next

```
Variables » Iterator Next
```

378.1 Description

Increases in one unit the value used as an iterator for a List Variable

378.2 Parameters

Name	Description
Index	The numeric value used as an index
List Variables	The List Variable targeted
Mode	Whether the index loops back to the first index or is clamped

378.3 Keywords

`Iterate` `Index` `For` `Loop` `Access`

379 Iterator Previous

`Variables » Iterator Previous`

379.1 Description

Decreases in one unit the value used as an iterator for a List Variable

379.2 Parameters

Name	Description
Index	The numeric value used as an index
List Variables	The List Variable targeted
Mode	Whether the index loops back to the last index or is clamped at zero

379.3 Keywords

`Iterate` `Index` `For` `Loop` `Access`

380 Iterator Random

`Variables » Iterator Random`

380.1 Description

Sets a random value between zero and the list count

380.2 Parameters

Name	Description
Index	The numeric value used as an index
List Variables	The List Variable targeted

380.3 Keywords

`Iterate` `Index` `For` `Loop` `Access`

381 Loop List

`Variables » Loop List`

381.1 Description

Loops a Game Object List Variables and executes an Actions component for each value

381.2 Parameters

Name	Description
List Variable	Local List or Global List which elements are iterated
Actions	The Actions component executed for each element in the list. The Target argument of any Instruction contains the object inspected

381.3 Keywords

`Iterate` `Cycle` `Every` `All` `Stack`

382 Move List

`Variables » Move List`

382.1 Description

Move a position from a list to another position

382.2 Parameters

Name	Description
List Variable	Local List or Global List which elements are moved

382.3 Keywords

`Order` `Change` `Array` `List` `Variables`

383 Remove from List

```
Variables » Remove from List
```

383.1 Description

Deletes an element from a given Local or Global List Variables

383.2 Parameters

Name	Description
List Variable	Local List or Global List which elements are removed

383.3 Keywords

`Delete` `Destroy` `Size` `Array` `List` `Variables`

384 Reverse List

`Variables » Reverse List`

384.1 Description

Reorders the elements of a list so the first ones become the last ones

384.2 Parameters

Name	Description
List Variable	Local List or Global List which elements are reversed

384.3 Keywords

`Invert` `Order` `Sort` `Array` `List` `Variables`

385 Shuffle List

`Variables » Shuffle List`

385.1 Description

Randomly shuffles the position of each element on a List Variable

385.2 Parameters

Name	Description
List Variable	Local List or Global List which elements are shuffled

385.3 Keywords

`Randomize` `Sort` `Array` `List` `Variables`

386 Sort List Alphabetically

`Variables » Sort List Alphabetically`

386.1 Description

Sorts the List Variable elements based on their alphabet distance

386.2 Parameters

Name	Description
List Variable	Local List or Global List which elements are sorted
Order	Sort alphabetically ascending or descending
Ignore Case	Whether the string comparison should ignore upper/lower case

386.3 Keywords

`Order` `Organize` `Array` `List` `Variables`

387 Sort List by Distance

`Variables » Sort List by Distance`

387.1 Description

Sorts the List Variable elements based on their distance to a given position

387.2 Parameters

Name	Description
List Variable	Local List or Global List which elements are sorted
Position	The reference position that is used to measure the sorting distance
Order	From Closest to Farthest puts the closest elements to the Position first

387.3 Keywords

`Order` `Organize` `Array` `List` `Variables`

388 Swap List

`Variables » Swap List`

388.1 Description

Swaps two positions of a list

388.2 Parameters

Name	Description
List Variable	Local List or Global List which elements are swapped

388.3 Keywords

`Order` `Change` `Array` `List` `Variables`

I.IV.I.I.XXI VISUAL SCRIPTING

389 Visual Scripting

389.1 Instructions

- Activate Hotspots
- Broadcast Message
- Check Conditions
- Emit Signal
- Invoke Method
- Restart Instructions
- Run Actions
- Run Conditions
- Run Trigger
- Stop Actions
- Stop Conditions
- Stop Trigger

390 Activate Hotspots

`Visual Scripting » Activate Hotspots`

390.1 Description

Determines whether Hotspots can be activated or are inactive by type

390.2 Parameters

Name	Description
Type	The type of Hotspots to activate or deactivate
Active	Determines if Hotspots can run or are inactive

390.3 Keywords

`Execute` `Enable` `Disable` `Show` `Hide` `Deactivate`

391 Broadcast Message

`Visual Scripting » Broadcast Message`

391.1 Description

Invokes any method on any component found on the target game object

391.2 Parameters

Name	Description
Game Object	The target game object that receives the broadcast message
Message	The name of the method or methods that are called
Send Upwards	If true the message travels from the game object towards the root

391.3 Example 1

By default all broadcast messages travel from the target game object and towards all its children. Setting the Send Upwards field to true makes the message travel from the game object towards the root parent

391.4 Keywords

`Execute` `Call` `Invoke` `Function`

392 Check Conditions

`Visual Scripting » Check Conditions`

392.1 Description

If any of the Conditions list is false it early exits and skips the execution of the rest of the Instructions below

392.2 Parameters

Name	Description
Conditions	List of Conditions that can evaluate to true or false
Mode	Whether to check the Conditions as an AND or an OR set

392.3 Keywords

`Execute` `Call` `Check` `Evaluate`

393 Emit Signal

`Visual Scripting » Emit Signal`

393.1 Description

Emits a specific signal, which is captured by other listeners

393.2 Parameters

Name	Description
Signal	The signal name emitted

393.3 Keywords

`Event` `Raise` `Command` `Fire` `Trigger` `Dispatch` `Execute`

394 Invoke Method

`Visual Scripting » Invoke Method`

394.1 Description

Invokes a method from any script attached to a game object

394.2 Parameters

Name	Description
Method	The method/function that is called on a game object reference

394.3 Keywords

`Execute` `Call` `Invoke` `Function`

395 Restart Instructions

`Visual Scripting » Restart Instructions`

395.1 Description

Stops executing the current list of Instructions and starts again from the top

395.2 Keywords

`Reset` `Call` `Again`

396 Run Actions

`Visual Scripting » Run Actions`

396.1 Description

Executes an Actions component object

396.2 Parameters

Name	Description
Actions	The Actions object that is executed
Wait Until Complete	If true this instruction waits until the Actions object finishes running

396.3 Keywords

`Execute` `Call` `Instruction` `Action`

397 Run Conditions

`Visual Scripting » Run Conditions`

397.1 Description

Executes a Conditions component object

397.2 Parameters

Name	Description
Conditions	The Conditions object that is executed
Wait Until Complete	If true this instruction waits until the Conditions object finishes running

397.3 Keywords

`Execute` `Call` `Check` `Evaluate`

398 Run Trigger

`Visual Scripting » Run Trigger`

398.1 Description

Executes a Trigger component object

398.2 Parameters

Name	Description
Trigger	The Trigger object that is executed
Wait Until Complete	If true this instruction waits until the Trigger object finishes running

398.3 Keywords

`Execute` `Call`

399 Stop Actions

`Visual Scripting » Stop Actions`

399.1 Description

Stops an Actions component object that is being executed

399.2 Parameters

Name	Description
Actions	The Actions object that is stopped

399.3 Keywords

`Cancel` `Pause`

400 Stop Conditions

```
Visual Scripting » Stop Conditions
```

400.1 Description

Stops a Conditions component object that is being executed

400.2 Parameters

Name	Description
Conditions	The Conditions object that is stopped

400.3 Keywords

`Cancel` `Pause`

401 Stop Trigger

```
Visual Scripting » Stop Trigger
```

401.1 Description

Stops a Trigger component object that is being executed

401.2 Parameters

Name	Description
Trigger	The Trigger object that is stopped

401.3 Keywords

`Cancel` `Pause`

402 Custom Instructions

Game Creator allows to very easily create custom **Instructions** and use them along with the rest.

> **Programming Knowledge Required**
>
> This section assumes you have some programming knowledge. If you don't know how to code you might be interested in checking out the Game Creator Hub page. Programmers altrusitically create custom **Instructions** for others to download and use in their project.

402.1 Creating an Instruction

The easiest way to create an **Instruction** C# script is to right click on your *Project* panel and select *Create* → *Game Creator* → *Developer* → *C# Instruction*. This will create a template script with the boilerplate structure of an Instruction:

```
using System;
using System.Threading.Tasks;
using GameCreator.Runtime.Common;
using GameCreator.Runtime.VisualScripting;

[Serializable]
public class MyInstruction : Instruction
{
    protected override Task Run(Args args)
    {
        // Your code here...
        return DefaultResult;
    }
}
```

402.1.1 Anatomy of an Instruction

An **Instruction** is a class that inherits from the `Instruction` super class. The abstract `Run(...)` method is the entry point of an **Instruction**'s execution, which is automatically called when it's this instruction's time to be executed.

The `Run(...)` method has a single parameter of type `Args`, which is a helper class that contains a reference to the game object that initiated the call (`args.Self`) and the targeted game object (`args.Target`), if any.

402.1.2 Yielding in Time

Most instruction will be executed in a single frame. However, some instructions might require to put the execution on hold for a certain amount of time, before resuming the execition. The most simple example is with the "Wait for Seconds" instruction, which pauses the execution for a few seconds before resuming.

The `Instruction` super class contains a collection of methods that helps with time management.

> **Async/Await**
>
> **Instructions** use the async/await methodology to manage the flow of an instruction over the course of time. Using the `await` symbol requires the `Run()` method to have the `async` symbol on its method definition:
>
> ```
> protected override async Task Run(Args args)
> { }
> ```

402.1.2.1 NextFrame

The `NextFrame()` methods pauses the execution of the Instruction for a single frame, then resumes.

```
protected override async Task Run(Args args)
{
    await this.NextFrame();
}
```

402.1.2.2 Time

The `Time(float time)` method pauses the execution of an Instruction for a certain amount of time. The `time` parameter is in seconds.

```
protected override async Task Run(Args args)
{
    await this.Time(5f);
}
```

402.1.2.3 While

The `While(Func<bool> function)` method pauses the execution of an Instruction for as long as the result of the method passed as a parameter returns true. This method is executed every frame and the execution will resume as soon as it returns `false`.

```
protected override async Task Run(Args args)
{
    await this.While(() => this.IsPlayerMoving());
}
```

402.1.2.4 Until

The `Until(Func<bool> function)` method pauses the execution of an Instruction for as long as the result of the method passed as a parameter returns true. This method is executed every frame and the execution will resume as soon as it returns `true`.

```
protected override async Task Run(Args args)
{
    await this.Until(() => this.PlayerHasReachedDestination());
}
```

402.1.3 Decoration & Documentation

It is highly recommended to document and decorate the **Instruction** so it's easier to find and use. It is done using class-type attributes that inform **Game Creator** of the quirks of this particular instruction.

For example, to set the title of an instruction to "Hello World", use the `[Title(string name)]` attribute right above the class definition:

```
using System;
using System.Threading.Tasks;
using GameCreator.Runtime.Common;
using GameCreator.Runtime.VisualScripting;

[Title("Hello World")]
[Serializable]
public class MyInstruction : Instruction
{
    protected override Task Run(Args args)
    {
        // ...
    }
}
```

402.1.3.1 Title

The title of the Instruction. If this attribute is not provided, the title will be a beautified version of the class name.

```
[Title("Title of Instruction")]
```

402.1.3.2 Description

A description of what the Instruction does. This is both used in the floating window documentation, as well as the description text when uploading an Instruction to the Game Creator Hub.

```
[Description("Lorem Ipsum dolor etiam porta sem magna mollis")]
```

402.1.3.3 Image

The `[Image(...)]` attribute changes the default icon of the Instruction for one of the default ones. It consists of 2 parameters:

- **Icon [`Type`]:** a Type class of an `IIcon` derived class. **Game Creator** comes packed with a lot of icons although you can also create your own.
- **Color [`Color`]:** The color of the icon. Uses Unity's `Color` class.

For example, one of the icons included is the "Solid Cube" icon. To display a red solid cube as the icon of the instruction, use the following attribute:

```
[Image(typeof(IconCubeSolid), Color.red)]
```

402.1.3.4 Category

A sequence of sub-categories organized using the slash (`/`) character. This attribute helps keep the Instructions organized when the Instructions list dropdown is displayed.

```
[Category("Category/Sub Category/Name")]
```

The example above will display the Instruction under the sub directory *Category* → *Sub Category* → *Name*.

402.1.3.5 Version

A semmantic version to keep track of the development of this Instruction. It's important to note that when updating an Instruction to the Game Creator Hub, the version number must always be higher than the one on the server.

The semmantic version follows the standard *Major Version*, *Minor Version*, *Patch Version*. To know more about how semmantic versioning works, read the following page: https://semver.org.

```
[Version(1, 5, 3)]
```

402.1.3.6 Parameters

When an Instruction has exposed fields in the Inspector, it's a good idea to document what these do. You can add as many `[Parameter(name, description)]` attributes as exposed fields has the Instruction.

For example, if the Instruction has these two fields:

```
public bool waitForTime = true;
public float duration = 5f;
```

You can document those fields adding:

```
[Parameter("Wait For Time", "Whether to wait or not")]
[Parameter("Duration", "The amount of seconds to wait")]
```

402.1.3.7 Keywords

Keywords are strings that help the fuzzy finder more easily search for an instruction. For example, the "Change Position" instruction doesn't reference the word "move" or "translate" anywhere in its documentation. However, these words are very likely to reference this instruction when the user types them in the search box.

```
[Keywords("Move", "Translate")]
```

402.1.3.8 Example

The Example attribute allows to display a text as an example of use of this Instruction. There can be more than one `[Example(...)]` attribute per instruction. This is particularly useful when uploading instructions on the Game Creator Hub.

Markdown

It is recommended to use Markdown notation when writing examples

```
[Example("Sed posuere consectetur est at lobortis)]
```

Multiple Lines

You can use the `@` character in front of a string to break the example text in multiple lines. To create a new paragraph, simply add two new lines. For example:

```
[Example(@"
    This is the first paragraph.
    This is also in the first paragraph, right after the previous sentence

    This line is part of a new paragraph.
)]
```

402.1.3.9 Dependency

This attribute is optional and only used in the Game Creator Hub. If this Instruction uses some particular feature of a specific module, it will first check if the user downloading this instruction has that module installed. If it does not, it will display an error message and forbid downloading it. This is useful to avoid throwing programming errors.

The `[Dependency(...)]` attribute consists of 4 parameters:

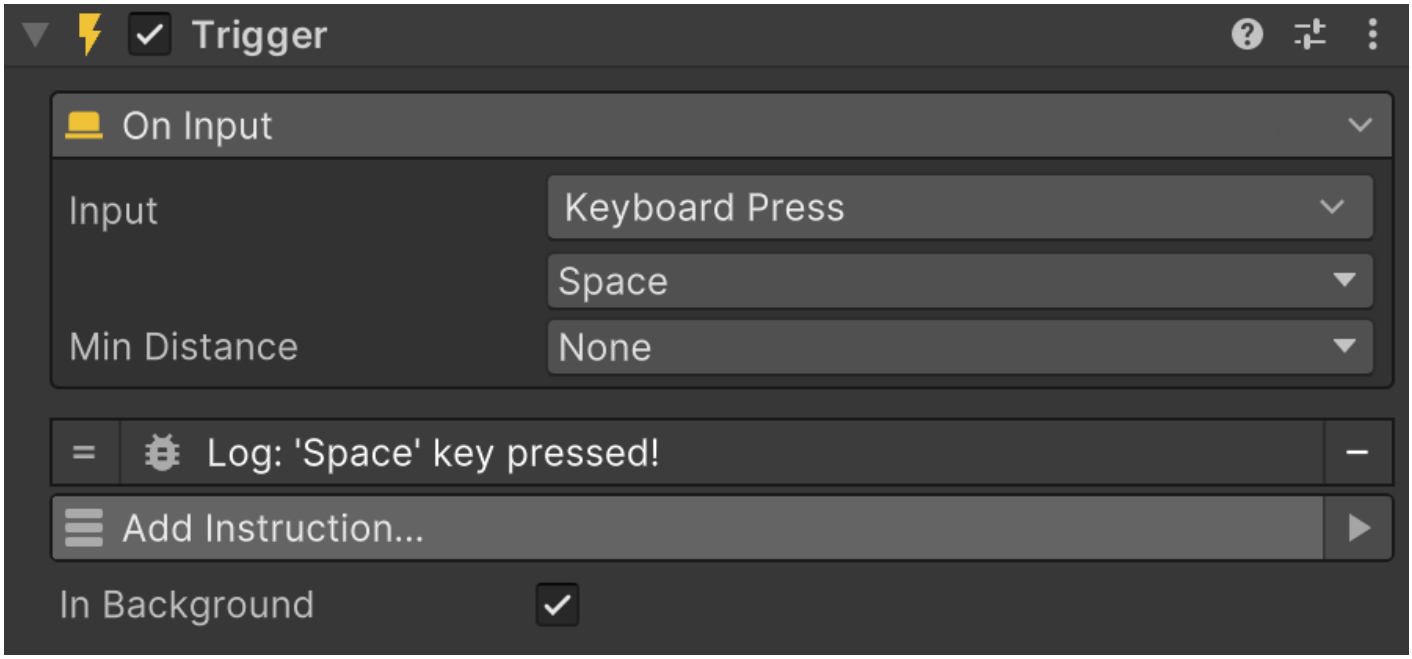
- **Module ID:** For example, the ID of the Inventory module is `gamecreator.inventory`.
- **Major Version:** The minimum major version of the dependency module.
- **Minor Version:** The minimum minor version of the dependency module.
- **Patch Version:** The minimum patch version of the dependency module.

```
[Dependency("gamecreator.inventory", 1, 5, 2)]
```

I.IV.II Triggers

403 Triggers

Triggers are components attached to game objects that listen to events that happen on the scene and react by executing a sequence of instructions.



Example

In the image above, the **Trigger** is listening for the *Space* keyboard key to be pressed down. As soon as that happens, it calls the instructions list from below, which prints the message "Space key pressed!"

403.1 Creating a Trigger

Right click on the *Hierarchy* panel and select *Game Creator* → *Visual Scripting* → *Trigger*. A game object named 'Trigger' will appear in the scene with a component of the same name.

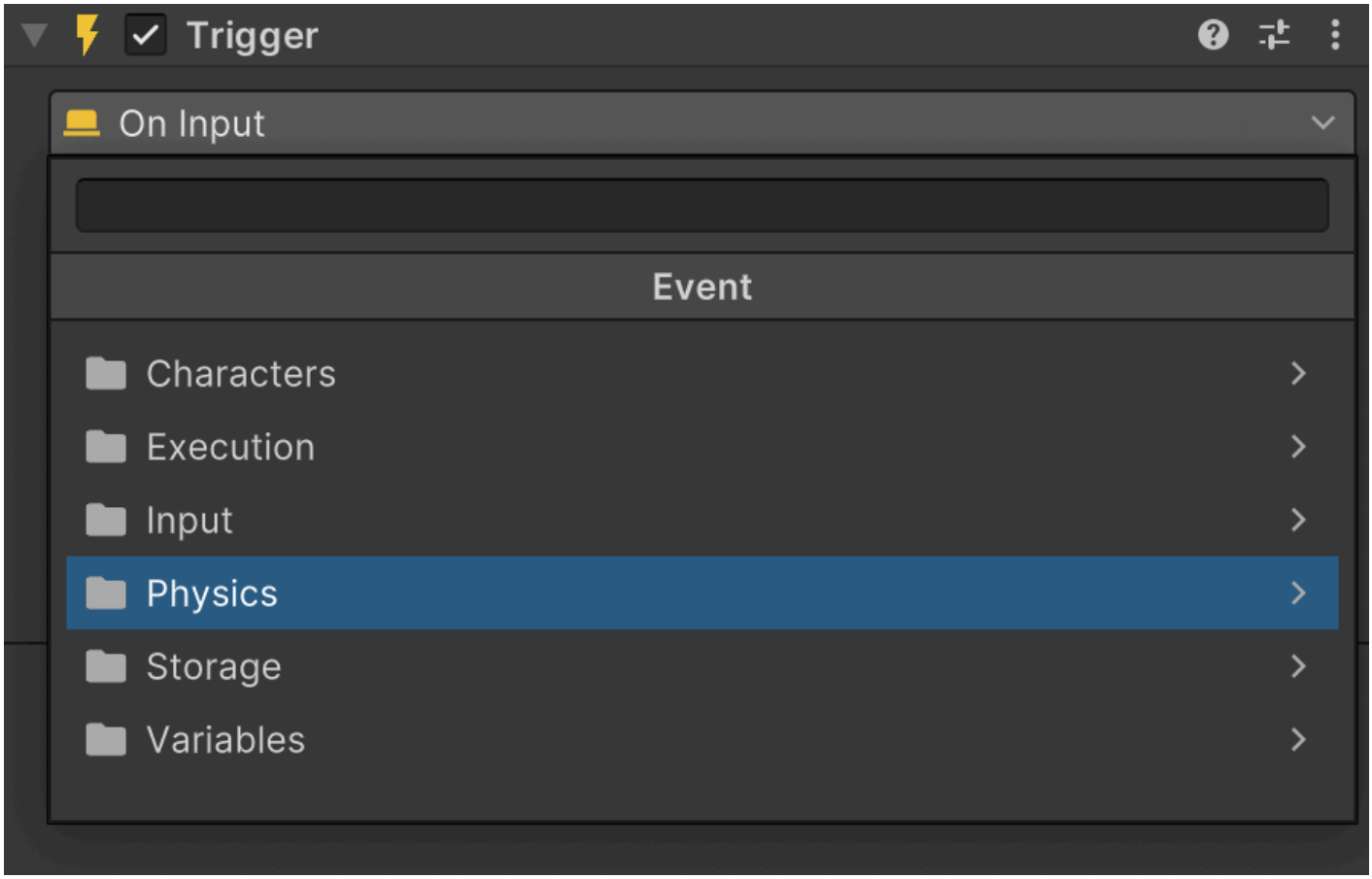
Alternatively you can also add the **Trigger** component to any game object clicking on the Inspector's Add Component button and searching for Trigger.

Deleting Triggers

To delete a Trigger component, simply click on the component's little cog button and select "Remove Component" from the dropdown menu.

403.2 Changing the Event

Triggers listen to very specific events, chosen by the user. To change the type of **Event** a Trigger listens, click on the event name and a dropdown menu will appear. Navigate it using the mouse or searching for a specific event in the seach box field.



403.3 Instructions

The **Instructions** list that appear below work exactly the same was the **Actions** component. For more information about this component, visit the Actions page.

I.IV.II.I Events

404 Events

404.1 Sub Categories

- Audio
- Cameras
- Characters
- Input
- Interactive
- Lifecycle
- Logic
- Physics
- Storage
- Ui
- Variables

I.IV.II.I.I AUDIO

405 Audio

405.1 Events

- On Change Ambient Volume
- On Change Master Volume
- On Change Music Volume
- On Change Sound Effects Volume
- On Change Speech Volume
- On Change Ui Volume

406 On Change Ambient Volume

```
Audio » On Change Ambient Volume
```

406.1 Description

Executed when the Ambient Volume is changed

406.2 Keywords

`Audio` `Sound` `Level`

407 On Change Master Volume

```
Audio » On Change Master Volume
```

407.1 Description

Executed when the Master Volume is changed

407.2 Keywords

`Audio` `Sound` `Level`

408 On Change Music Volume

```
Audio » On Change Music Volume
```

408.1 Description

Executed when the Music Volume is changed

408.2 Keywords

`Audio` `Sound` `Level`

409 On Change Sound Effects Volume

`Audio » On Change Sound Effects Volume`

409.1 Description

Executed when the Sound Effects Volume is changed

409.2 Keywords

`Audio` `Sound` `Level`

410 On Change Speech Volume

```
Audio » On Change Speech Volume
```

410.1 Description

Executed when the Speech Volume is changed

410.2 Keywords

`Audio` `Sound` `Level`

411 On Change UI Volume

```
Audio » On Change UI Volume
```

411.1 Description

Executed when the UI Volume is changed

411.2 Keywords

`Audio` `Sound` `Level`

I.IV.II.I.II CAMERAS

412 Cameras

412.1 Events

- On Camera Change
- On Change From Shot
- On Change To Shot

413 On Camera Change

```
Cameras » On Camera Change
```

413.1 Description

Executed when the Camera changes to another Camera Shot

413.2 Keywords

`Shot` `Switch` `Cut`

414 On Change from Shot

```
Cameras » On Change from Shot
```

414.1 Description

Executed when the Camera Shot is deactivated

414.2 Keywords

`Shot` `Switch` `Cut`

415 On Change to Shot

```
Cameras » On Change to Shot
```

415.1 Description

Executed when the Camera Shot is activated

415.2 Keywords

`Shot` `Switch` `Cut`

I.IV.II.I.III CHARACTERS

416 Characters

416.1 Sub Categories

- Combat
- Navigation
- Ragdoll

416.2 Events

- On Become Npc
- On Become Player
- On Change Model
- On Die
- On Revive

417 On Become NPC

```
Characters » On Become NPC
```

417.1 Description

Executed when a character that is a Player becomes an NPC

418 On Become Player

```
Characters » On Become Player
```

418.1 Description

Executed when a character becomes the Player

419 On Change Model

```
Characters » On Change Model
```

419.1 Description

Executed when a character changes its model

420 On Die

```
Characters » On Die
```

420.1 Description

Executed when the character dies

421 On Revive

```
Characters » On Revive
```

421.1 Description

Executed when a dead character revives

421.2 Keywords

`Resurrect` `Respawn`

I.IV.II.I.III.I Combat

422 Combat

422.1 Events

- On Defense Change
- On Dodge
- On Invincibility Change
- On Poise Break
- On Poise Change
- On Target Change

423 On Defense Change

`Characters » Combat » On Defense Change`

423.1 Description

Executed when the Character's defense changes

423.2 Keywords

`Defend` `Block` `Combat`

424 On Dodge

Characters » Combat » On Dodge

424.1 Description

Executed every time the character evades an attack

425 On Invincibility Change

Characters » Combat » On Invincibility Change

425.1 Description

Executed when the character's Invincibility changes

426 On Poise Break

`Characters » Combat » On Poise Break`

426.1 Description

Executed when a character's Poise is broken

426.2 Keywords

`Resistance` `Combat`

427 On Poise Change

`Characters » Combat » On Poise Change`

427.1 Description

Executed every time the character's combat Poise changes

427.2 Keywords

`Resistance` `Combat`

428 On Target Change

`Characters » Combat » On Target Change`

428.1 Description

Executed every time the character's combat Target changes

428.2 Keywords

`Focus` `Combat` `Aim`

I.IV.II.I.III.II Navigation

429 Navigation

429.1 Events

- On Dash
- On Jump
- On Land
- On Step

430 On Dash

Characters » Navigation » On Dash

430.1 Description

Executed every time the character performs a dash

431 On Jump

Characters » Navigation » On Jump

431.1 Description

Executed every time the character performs a jump

432 On Land

Characters » Navigation » On Land

432.1 Description

Executed every time the character lands on the ground

433 On Step

```
Characters » Navigation » On Step
```

433.1 Description

Executed every time the character takes a step

433.2 Keywords

`Footstep` `Foot` `Feet` `Ground`

I.IV.II.I.III.III Ragdoll

434 Ragdoll

434.1 Events

- On Recover Ragdoll
- On Start Ragdoll

435 On Recover Ragdoll

435.1 Description

Executed when the character recovers from the ragdoll mode

436 On Start Ragdoll

436.1 Description

Executed when the character enters the ragdoll mode

I.IV.II.I.IV INPUT

437 Input

437.1 Events

- On Cursor Click
- On Input Button
- On Input Flick
- On Touch

438 On Cursor Click

`Input » On Cursor Click`

438.1 Description

Detects when the cursor clicks this game object

438.2 Parameters

Name	Description
Button	The mouse button to detect
Min Distance	If set to None, the mouse input acts globally. If set to Game Object, the event only fires if the target object is within a certain radius

438.3 Keywords

`Down` `Mouse` `Button` `Hover` `Left` `Middle` `Right`

439 On Input Button

```
Input » On Input Button
```

439.1 Description

Detects when a button is interacted with

439.2 Parameters

Name	Description
Button	The button that triggers the event
Min Distance	If set to None, the input acts globally. If set to Game Object, the event only fires if the target object is within the specified radius

439.3 Keywords

`Down` `Up` `Press` `Release` `Keyboard` `Mouse` `Button` `Gamepad` `Controller` `Joystick`

440 On Input Flick

```
Input » On Input Flick
```

440.1 Description

Detects when Input (Vector 2) is flicked

440.2 Parameters

Name	Description
Value	The Input value read
Compare	The comparison applied to the input value
Min Distance	If set to None, the input acts globally. If set to Game Object, the event only fires if the target object is within the specified radius

440.3 Keywords

`Left` `Right` `Down` `Up` `Press` `Move` `Direction` `Keyboard` `Mouse` `Button` `Gamepad` `Controller` `Joystick`

441 On Touch

`Input » On Touch`

441.1 Description

Detects when a finger touches this game object on a touchscreen

441.2 Parameters

Name	Description
Min Distance	If set to None, the touch input acts globally. If set to Game Object, the event only fires if the target object is within a certain radius

441.3 Keywords

`Down` `Finger` `Press` `Click` `Finger` `Press` `Click`

I.IV.II.I.V INTERACTIVE

442 Interactive

442.1 Events

- On Blur
- On Focus
- On Interact

443 On Blur

```
Interactive » On Blur
```

443.1 Description

Executed when the Character loses focus on this Interactive object

444 On Focus

```
Interactive » On Focus
```

444.1 Description

Executed when the Character focuses on this Interactive object

445 On Interact

```
Interactive » On Interact
```

445.1 Description

Executed when a Character interacts with this Trigger

445.2 Parameters

Name	Description
Use Raycast	Checks if there is something between the character and the Trigger

445.3 Example 1

The 'Use Raycast' option checks if there is no other collider between the Character and the Trigger

I.IV.II.I.VI LIFECYCLE

446 Lifecycle

446.1 Events

- On App Focus
- On App Pause
- On App Quit
- On Become Invisible
- On Become Visible
- On Disable
- On Enable
- On Fixed Update
- On Interval
- On Invoke
- On Late Update
- On Start
- On Update

447 On App Focus

```
Lifecycle » On App Focus
```

447.1 Description

Executed when the standalone application is brought to focus

447.2 Keywords

`Foreground`

448 On App Pause

```
Lifecycle » On App Pause
```

448.1 Description

Executed when the standalone application loses its focus

448.2 Keywords

`Background` `Suspend`

449 On App Quit

```
Lifecycle » On App Quit
```

449.1 Description

Executed right before exiting the standalone application

449.2 Keywords

`Exit` `Close`

450 On Become Invisible

```
Lifecycle » On Become Invisible
```

450.1 Description

Executed when the game object it is attached to is no longer visible by any camera

450.2 Keywords

`Hide` `Disappear`

451 On Become Visible

```
Lifecycle » On Become Visible
```

451.1 Description

Executed when the game object it is attached to becomes visible to any camera

451.2 Keywords

`Show` `Render` `Appear`

452 On Disable

```
Lifecycle » On Disable
```

452.1 Description

Executed when the game object it is attached to becomes disabled or inactive

452.2 Keywords

`Inactive` `Active` `Enable`

453 On Enable

```
Lifecycle » On Enable
```

453.1 Description

Executed when the game object it is attached to becomes enabled and active

453.2 Keywords

`Active` `Disable` `Inactive`

454 On Fixed Update

```
Lifecycle » On Fixed Update
```

454.1 Description

Executed every fixed frame as long as the game object is enabled (physics loop

454.2 Keywords

`Loop` `Tick` `Continuous` `Physics` `Rigidbody`

455 On Interval

```
Lifecycle » On Interval
```

455.1 Description

Executes after an amount of seconds have passed between each call

455.2 Parameters

Name	Description
Time Mode	The time scale in which the interval is calculated
Interval	Amount of seconds between each iteration

455.3 Keywords

`Loop` `Tick` `Continuous` `FPS`

456 On Invoke

```
Lifecycle » On Invoke
```

456.1 Description

Executed only when calling its Invoke() method

456.2 Keywords

`Script` `Manual`

457 On Late Update

```
Lifecycle » On Late Update
```

457.1 Description

Executed every frame after all On Update events are fired, as long as the game object is enabled

457.2 Keywords

`Loop` `Tick` `Continuous`

458 On Start

```
Lifecycle » On Start
```

458.1 Description

Executed on the frame when the game object is enabled for the first time

458.2 Keywords

`Initialize`

459 On Update

```
Lifecycle » On Update
```

459.1 Description

Executed every frame as long as the game object is enabled

459.2 Keywords

`Loop` `Tick` `Continuous`

I.IV.II.I.VII LOGIC

460 Logic

460.1 Events

- On Hotspot Activate
- On Hotspot Deactivate
- On Receive Signal

461 On Hotspot Activate

```
Logic » On Hotspot Activate
```

461.1 Description

Executed when its associated Hotspot is activated

461.2 Keywords

`Spot`

462 On Hotspot Deactivate

```
Logic » On Hotspot Deactivate
```

462.1 Description

Executed when its associated Hotspot is deactivated

462.2 Keywords

`Spot`

463 On Receive Signal

```
Logic » On Receive Signal
```

463.1 Description

Executed when receiving a specific signal name from the dispatcher

463.2 Keywords

`Event` `Command` `Fire` `Trigger` `Dispatch` `Execute`

I.IV.II.I.VIII PHYSICS

464 Physics

464.1 Events

- On Collide Exit
- On Collide
- On Trigger Enter Tag
- On Trigger Enter
- On Trigger Exit Tag
- On Trigger Exit
- On Trigger Stay

465 On Collide Exit

```
Physics » On Collide Exit
```

465.1 Description

Executed when the Trigger that collided with a game object, stops colliding

465.2 Keywords

`Crash` `Touch` `Bump` `Collision` `Stop`

466 On Collide

```
Physics » On Collide
```

466.1 Description

Executed when the Trigger collides with a game object

466.2 Keywords

`Crash` `Touch` `Bump` `Collision`

467 On Trigger Enter Tag

```
Physics » On Trigger Enter Tag
```

467.1 Description

Executed when a game object with a Tag enters the Trigger collider

467.2 Parameters

Name	Description
Tag	A string that represents a group of game objects

467.3 Keywords

`Pass` `Through` `Touch` `Collision` `Collide`

468 On Trigger Enter

```
Physics » On Trigger Enter
```

468.1 Description

Executed when a game object enters the Trigger collider

468.2 Keywords

`Pass` `Through` `Touch` `Collision` `Collide`

469 On Trigger Exit Tag

`Physics » On Trigger Exit Tag`

469.1 Description

Executed when a game object with a Tag exists the Trigger collider

469.2 Parameters

Name	Description
Tag	A string that represents a group of game objects

469.3 Keywords

`Pass` `Through` `Touch` `Collision` `Collide`

470 On Trigger Exit

```
Physics » On Trigger Exit
```

470.1 Description

Executed when a game object leaves the Trigger collider

470.2 Keywords

`Leave` `Through` `Touch` `Collision` `Collide`

471 On Trigger Stay

```
Physics » On Trigger Stay
```

471.1 Description

Executed while a game object stays inside the Trigger collider

471.2 Keywords

`Pass` `Through` `Touch` `Collision` `Collide`

I.IV.II.I.IX STORAGE

472 Storage

472.1 Events

- On Delete
- On Load
- On Save

473 On Delete

```
Storage » On Delete
```

473.1 Description

Executed when a previously saved game deleted

473.2 Keywords

`Load` `Save` `Delete` `Profile` `Slot` `Game` `Session`

474 On Load

```
Storage » On Load
```

474.1 Description

Executed when a previously saved game is loaded

474.2 Keywords

`Load` `Save` `Profile` `Slot` `Game` `Session`

475 On Save

```
Storage » On Save
```

475.1 Description

Executed when the game is saved

475.2 Keywords

`Load` `Save` `Profile` `Slot` `Game` `Session`

I.IV.II.I.X UI

476 Ui

476.1 Events

- On Deselect
- On Hover Enter
- On Hover Exit
- On Select

477 On Deselect

```
UI » On Deselect
```

477.1 Description

Executed when the UI element is deselected

477.2 Keywords

`Mouse` `Choose` `Focus` `Pick` `Pointer`

478 On Hover Enter

```
UI » On Hover Enter
```

478.1 Description

Executed when the pointer hovers the UI element

478.2 Keywords

`Mouse` `Over` `Pointer`

479 On Hover Exit

```
UI » On Hover Exit
```

479.1 Description

Executed when the pointer exits the hovered UI element

479.2 Keywords

`Mouse` `Over` `Pointer`

480 On Select

```
UI » On Select
```

480.1 Description

Executed when the UI element is selected

480.2 Keywords

`Mouse` `Choose` `Focus` `Pick` `Pointer`

I.IV.II.I.XI VARIABLES

481 Variables

481.1 Events

- On Global List Variable Change
- On Global Name Variable Change
- On Local List Variable Change
- On Local Name Variable Change

482 On Global List Variable Change

```
Variables » On Global List Variable Change
```

482.1 Description

Executed when the Global List Variable is modified

483 On Global Name Variable Change

```
Variables » On Global Name Variable Change
```

483.1 Description

Executed when the Global Name Variable is modified

484 On Local List Variable Change

```
Variables » On Local List Variable Change
```

484.1 Description

Executed when the Local List Variable is modified

485 On Local Name Variable Change

```
Variables » On Local Name Variable Change
```

485.1 Description

Executed when the Local Name Variable is modified

486 Custom Events

Game Creator allows to create custom **Events** that listen to events and react accordingly. Note that it's up to the programmer to determine the most performant way to detect an event.

> **Programming Knowledge Required**
>
> This section assumes you have some programming knowledge. If you don't know how to code you might be interested in checking out the Game Creator Hub page. Programmers altrusitically create custom **Events** for others to download and use in their project.

486.1 Creating an Event

The easiest way to create an **Event** C# script is to right click on your *Project* panel and select _Create → Game Creator → Developer → C# Event. This will create a template script with the boilerplate structure:

```
using System;
using GameCreator.Runtime.VisualScripting;

[Serializable]
public class MyEvent : Event
{
    protected override void OnStart(Trigger trigger)
    {
        base.OnStart(trigger);
        _ = trigger.Execute(this.Self);
    }
}
```

486.1.1 Anatomy of an Event

An **Event** is a class that inherits from the `Event` super class. It contains a large collection of virtual methods to inherit from, which are very similar to `MonoBeheaviour` methods.

> **Example**
>
> For example, to detect when the **Trigger** component is initialized, you can override the `OnAwake()` or the `OnStart()` methods. For a full list of all available methods to override, check the *Event.cs* script file.

All methods come with a `trigger` parameter, which references the **Trigger** component that owns this **Event**.

486.1.2 Fire an Event

Once you have setup the necessary code to detect an event, it's time to tell the **Trigger** to exeecute the specified reaction. This is done using the `Execute(target)` method from the Trigger component:

```
trigger.Execute(this.Self);
```

> ✓ **Async/Await**
>
> Note that the `Execute(...)` method returns an async task so the code can wait until the reaction completes before resuming the execution. Most of the times however, you will prefer to fire and forget about the reaction. In those cases you can use the discard (`_`) modifier:
>
> ```
> _ = trigger.Execute(this.Self);
> ```
>
> On the other hand, if you want to wait until the instruction sequence has completed, you can await for the resolution of these:
>
> ```
> await trigger.Execute(this.Self);
> ```

The `Execute(target)` method allows to pass a game object parameter, which is the *Target* game object of the instructions list. For example, if the **Event** you are programming is trying to detect the collision between 2 colliders, the `target` should reference the other collider game object.

486.1.3 Decoration & Documentation

It is highly recommended to document and decorate the **Event** so it's easier to find and use. It is done using class-type attributes that inform **Game Creator** of the quirks of this particular event.

For example, to set the title of an Event to "Hello World", use the `[Title(string name)]` attribute right above the class definition:

```
using System;
using GameCreator.Runtime.VisualScripting;

[Title("Hello World")]
[Serializable]
public class MyEvent : Event
{
    protected override void OnStart(Trigger trigger)
    {
        base.OnStart(trigger);
        _ = trigger.Execute(this.Self);
    }
}
```

486.1.3.1 Title

The title of the Event. If this attribute is not provided, the title will be a beautified version of the class name.

```
[Title("Title of Event")]
```

486.1.3.2 Description

A description of what the Event does. This is used as the description text when uploading an Event to the Game Creator Hub.

```
[Description("Lorem Ipsum dolor etiam porta sem magna mollis")]
```

486.1.3.3 Image

The `[Image(...)]` attribute changes the default icon of the Event for one of the default ones. It consists of 2 parameters:

- **Icon [`Type`]:** a Type class of an `IIcon` derived class. **Game Creator** comes packed with a lot of icons although you can also create your own.
- **Color [`Color`]:** The color of the icon. Uses Unity's `Color` class.

For example, one of the icons included is the "Solid Cube" icon. To display a red solid cube as the icon of the event, use the following attribute:

```
[Image(typeof(IconCubeSolid), Color.red)]
```

486.1.3.4 Category

A sequence of sub-categories organized using the slash (`/`) character. This attribute helps keep the Events organized when the dropdown list is displayed.

```
[Category("Category/Sub Category/Name")]
```

The example above will display the Event under the sub directory *Category* → *Sub Category* → *Name*.

486.1.3.5 Version

A semmantic version to keep track of the development of this Event. It's important to note that when updating an Event to the Game Creator Hub, the version number must always be higher than the one on the server.

The semmantic version follows the standard *Major Version*, *Minor Version*, *Patch Version*. To know more about how semmantic versioning works, read the following page: https://semver.org.

```
[Version(1, 5, 3)]
```

486.1.3.6 Parameters

When an Event has exposed fields in the Inspector, it's a good idea to document what these do. You can add as many `[Parameter(name, description)]` attributes as exposed fields has the Event.

For example, if the Event has these two fields:

```
public bool checkDistance = true;
public float distance = 5f;
```

You can document those fields adding:

```
[Parameter("Check Distance", "Whether to check the distance or not")]
[Parameter("Distance", "The maximum distance between targets")]
```

486.1.3.7 Keywords

Keywords are strings that help the fuzzy finder more easily search for an Event. For example, the "On Become Visible" event doesn't reference the word "hide" anywhere in its documentation. However, these words are very likely to reference this event when the user types them in the search box.

```
[Keywords("Hide")]
```

486.1.3.8 Example

The Example attribute allows to display a text as an example of use of this Event. There can be more than one `[Example(...)]` attribute per event. This is particularly useful when uploading events on the Game Creator Hub.

Markdown

It is recommended to use Markdown notation when writing examples

```
[Example("Sed posuere consectetur est at lobortis)]
```

Multiple Lines

You can use the `@` character in front of a string to break the example text in multiple lines. To create a new paragraph, simply add two new lines. For example:

```
[Example(@"
    This is the first paragraph.
    This is also in the first paragraph, right after the previous sentence

    This line is part of a new paragraph.
)]
```

486.1.3.9 Dependency

This attribute is optional and only used in the Game Creator Hub. If this Event uses some particular feature of a specific module, it will first check if the user downloading this event has that module installed. If it does not, it will display an error message and forbid downloading it. This is useful to avoid throwing programming errors.

The `[Dependency(...)]` attribute consists of 4 parameters:

- **Module ID:** For example, the ID of the Inventory module is `gamecreator.inventory`.
- **Major Version:** The minimum major version of the dependency module.
- **Minor Version:** The minimum minor version of the dependency module.
- **Patch Version:** The minimum patch version of the dependency module.

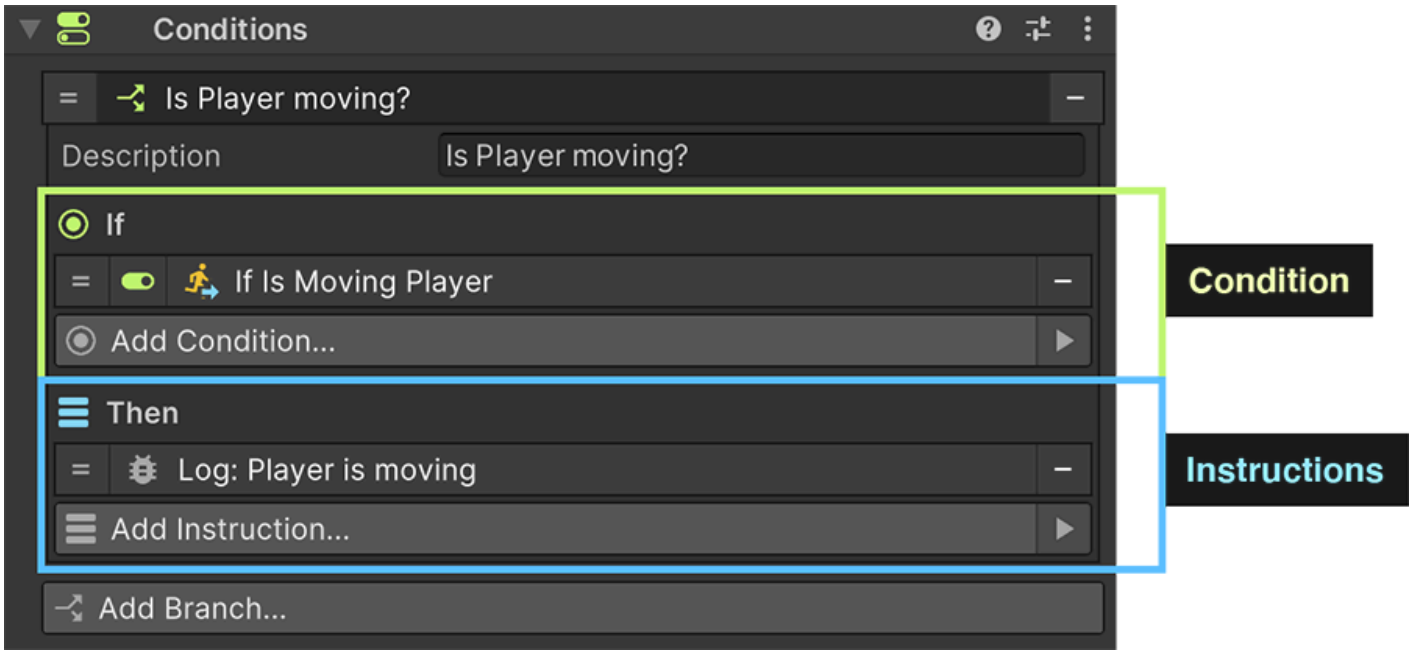
```
[Dependency("gamecreator.inventory", 1, 5, 2)]
```

I.IV.III Conditions

487 Conditions

Conditions are components attached to game objects that, when executed, start checking the conditions in each **Branch**, from top to bottom. If all the **Conditions** of a branch return success, then the **Instructions** associated to that branch are executed, and stops checking any further.

If any of the **Conditions** of a **Branch** returns `false`, it skips to the next branch.



Example

In the image above, the **Conditions** component has just one **Branch**. This branch checks whether the player is moving or not. If it happens to move moving while this Conditions component is executed, it will print the "Player is moving" message on the console.

487.1 Creating Conditions

Right click on the *Hierarchy* panel and select *Game Creator* → *Visual Scripting* → *Conditions*. A game object named 'Conditions' will appear in the scene with a component of the same name.

Alternatively you can also add the **Conditions** component to any game object clicking on the Inspector's Add Component button and searching for Conditions.

Deleting Conditions

To delete a Conditions component, simply click on the component's little cog button and select "Remove Component" from the dropdown menu.

487.2 Adding Branches

To add a new **Branch** simply click on the *Add Branch* button. This will create a new branch at the bottom of the **Conditions** component. You can then click and drag the `=` symbol on the right and reorder the branch list.

Branch Order

Remember that top branches have higher priority than lower ones when executed.

All **Branches** have a *Description* field, which can be used to more easily identify what that branch does. It has no gameplay effect.

487.3 Conditions and Instructions

A **Branch** is composed of a list of **Conditions** and a list of **Instructions**. Adding them is as easy as clicking on the *Add Condition* and *Add Instruction* respectively and choose the desired element.

Negate Condition

It is important to note that a specific **Condition** can be negated. For example, if the condition "Is Player Moving" returns success when the player is moving, but false when it's not, you can check for the opposite effect clicking on the small green toggle. It will now return true of the player is not moving, and true otherwise.

Empty Conditions List

An empty conditions list will always return success.

I.IV.III.I Conditions

488 Conditions

488.1 Sub Categories

- Audio
- Cameras
- Characters
- Game Objects
- Input
- Math
- Physics
- Platforms
- Scenes
- Storage
- Text
- Transforms
- Variables
- Visual Scripting

I.IV.III.I.I AUDIO

489 Audio

489.1 Conditions

- Is Ambient Playing
- Is Music Playing
- Is Sound Effect Playing
- Is Speech Playing
- Is Speech Target Playing
- Is Ui Playing

490 Is Ambient Playing

```
Audio » Is Ambient Playing
```

490.1 Description

Returns true if the given Ambient sound is playing

490.2 Parameters

Name	Description
Audio Clip	The audio clip to check

490.3 Keywords

`SFX` `Music` `Audio` `Running`

491 Is Music Playing

```
Audio » Is Music Playing
```

491.1 Description

Returns true if the given music is playing

491.2 Parameters

Name	Description
Audio Clip	The audio clip to check

491.3 Keywords

`SFX` `Music` `Audio` `Running`

492 Is Sound Effect Playing

`Audio » Is Sound Effect Playing`

492.1 Description

Returns true if the given sound effect is playing

492.2 Parameters

Name	Description
Audio Clip	The audio clip to check

492.3 Keywords

`SFX` `Music` `Audio` `Running`

493 Is Speech Playing

`Audio » Is Speech Playing`

493.1 Description

Returns true if the given Speech sound is playing

493.2 Parameters

Name	Description
Audio Clip	The audio clip to check

493.3 Keywords

`SFX` `Music` `Audio` `Running`

494 Is Speech Target Playing

```
Audio » Is Speech Target Playing
```

494.1 Description

Returns true if the given target game object is playing any audio clip

494.2 Parameters

Name	Description
Target	The game object target

494.3 Keywords

`SFX` `Speech` `Audio` `Running`

495 Is UI Playing

```
Audio » Is UI Playing
```

495.1 Description

Returns true if the given UI sound is playing

495.2 Parameters

Name	Description
Audio Clip	The audio clip to check

495.3 Keywords

`SFX` `Music` `Audio` `Running`

I.IV.III.I.II CAMERAS

496 Cameras

496.1 Conditions

- Is Shot Active

497 Is Shot Active

```
Cameras » Is Shot Active
```

497.1 Description

Returns true if the Camera Shot is assigned to the Main Camera

497.2 Parameters

Name	Description
Shot	The camera shot

497.3 Keywords

`Camera` `Enabled` `Assigned` `Running`

I.IV.III.I.III CHARACTERS

498 Characters

498.1 Sub Categories

- Animation
- Busy
- Combat
- Interaction
- Navigation
- Properties
- Visuals

I.IV.III.I.III.I Animation

499 Animation

499.1 Conditions

- Has State In Layer

500 Has State in Layer

`Characters » Animation » Has State in Layer`

500.1 Description

Returns true if the Character has a State running at the specified layer index

500.2 Parameters

Name	Description
Layer	The layer in which the Character may have a State running
Character	The Character instance referenced in the condition

500.3 Keywords

`Characters` `Animation` `Animate` `State` `Play` `Character` `Player`

I.IV.III.I.III.II Busy

501 Busy

501.1 Conditions

- Are Arms Available
- Are Legs Available
- Is Available
- Is Busy
- Is Humanoid
- Is Left Arm Available
- Is Left Leg Available
- Is Right Arm Available
- Is Right Leg Available

502 Are Arms Available

`Characters » Busy » Are Arms Available`

502.1 Description

Returns true if the Character's arms are available to start a new action

502.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

502.3 Keywords

`Occupied` `Available` `Free` `Doing` `Hand` `Finger` `Character` `Player`

503 Are Legs Available

`Characters » Busy » Are Legs Available`

503.1 Description

Returns true if the Character's legs are available to start a new action

503.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

503.3 Keywords

`Occupied` `Available` `Free` `Doing` `Foot` `Feet` `Character` `Player`

504 Is Available

`Characters » Busy » Is Available`

504.1 Description

Returns true if the Character is not doing any action and is free to start one

504.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

504.3 Keywords

`Occupied` `Available` `Free` `Doing` `Character` `Player`

505 Is Busy

`Characters » Busy » Is Busy`

505.1 Description

Returns true if the Character doing an action that prevents from starting another one

505.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

505.3 Keywords

`Occupied` `Available` `Free` `Doing` `Character` `Player`

506 Is Humanoid

`Characters » Busy » Is Humanoid`

506.1 Description

Returns true if the Character has a humanoid model

506.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

506.3 Keywords

`Human` `Biped` `Character` `Player`

507 Is Left Arm Available

`Characters » Busy » Is Left Arm Available`

507.1 Description

Returns true if the Character's left arm is available to start a new action

507.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

507.3 Keywords

`Occupied` `Available` `Free` `Doing` `Hand` `Finger` `Character` `Player`

508 Is Left Leg Available

`Characters » Busy » Is Left Leg Available`

508.1 Description

Returns true if the Character's left leg is available to start a new action

508.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

508.3 Keywords

`Occupied` `Available` `Free` `Doing` `Foot` `Feet` `Character` `Player`

509 Is Right Arm Available

`Characters » Busy » Is Right Arm Available`

509.1 Description

Returns true if the Character's right arm is available to start a new action

509.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

509.3 Keywords

`Occupied` `Available` `Free` `Doing` `Hand` `Finger` `Character` `Player`

510 Is Right Leg Available

`Characters » Busy » Is Right Leg Available`

510.1 Description

Returns true if the Character's right leg is available to start a new action

510.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

510.3 Keywords

`Occupied` `Available` `Free` `Doing` `Foot` `Feet` `Character` `Player`

I.IV.III.I.III.III Combat

511 Combat

511.1 Conditions

- Is Invincible

512 Is Invincible

`Characters » Combat » Is Invincible`

512.1 Description

Returns true if the Character is Invincible

512.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

512.3 Keywords

`Invincibility` `Combat` `Character` `Player`

I.IV.III.I.III.IV Interaction

513 Interaction

513.1 Conditions

- Can Interact

514 Can Interact

`Characters » Interaction » Can Interact`

514.1 Description

Returns true if the Character has any interactive element available

514.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

514.3 Keywords

`Character` `Button` `Pick` `Do` `Use` `Pull` `Press` `Push` `Talk` `Character` `Player`

I.IV.III.I.III.V Navigation

515 Navigation

515.1 Conditions

- Is Airborne
- Is Dashing
- Is Grounded
- Is Idle
- Is Moving
- Raycast Floor

516 Is Airborne

`Characters » Navigation » Is Airborne`

516.1 Description

Returns true if the Character not touching the ground

516.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

516.3 Keywords

`Fly` `Fall` `Flail` `Jump` `Float` `Suspend` `Character` `Player`

517 Is Dashing

`Characters » Navigation » Is Dashing`

517.1 Description

Returns true if the Character is dashing

517.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

517.3 Keywords

`Leap` `Blink` `Roll` `Flash` `Character` `Player`

518 Is Grounded

`Characters » Navigation » Is Grounded`

518.1 Description

Returns true if the Character touching the floor

518.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

518.3 Keywords

`Floor` `Stand` `Land` `Character` `Player`

519 Is Idle

`Characters » Navigation » Is Idle`

519.1 Description

Returns true if the Character is not moving

519.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

519.3 Keywords

`Stay` `Quiet` `Still` `Character` `Player`

520 Is Moving

`Characters » Navigation » Is Moving`

520.1 Description

Returns true if the Character is currently in an active moving phase

520.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

520.3 Keywords

`Translate` `Towards` `Destination` `Target` `Follow` `Walk` `Run` `Character` `Player`

521 Raycast Floor

`Characters » Navigation » Raycast Floor`

521.1 Description

Returns true if there is an obstacle the specified units below the character

521.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

521.3 Keywords

`Floor` `Stand` `Land` `Ground` `Obstacle` `Character` `Player`

I.IV.III.I.III.VI Properties

522 Properties

522.1 Conditions

- Can Jump
- Compare Foot Phase
- Compare Gravity
- Compare Height
- Compare Mass
- Compare Radius
- Compare Speed
- Is Controllable
- Is Dead
- Is Player
- Jump Force
- Terminal Velocity

523 Compare Mass

`Characters » Properties » Can Jump`

523.1 Description

Returns true if the character has the Can Jump property set to true

523.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

523.3 Keywords

`Active` `Enabled` `Leap` `Hop` `Character` `Player`

524 Compare Foot Phase

`Characters » Properties » Compare Foot Phase`

524.1 Description

Returns true if the chosen foot phase is currently grounded

524.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

524.3 Example 1

Phases are the name given to the feet system that detects when a limb is grounded

524.4 Example 2

Characters can have up to 4 phases

524.5 Example 3

By default, humanoid characters assign the 'Phase 0' value to the left foot, and 'Phase 1' to the right foot. This can be customized in the Footsteps section

524.6 Keywords

`Feet` `Foot` `Grounded` `Character` `Player`

525 Compare Gravity

`Characters » Properties » Compare Gravity`

525.1 Description

Returns true if the comparison between a number and the Character's gravity is satisfied

525.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

525.3 Keywords

`Force` `Vertical` `Character` `Player`

526 Compare Height

`Characters » Properties » Compare Height`

526.1 Description

Returns true if the comparison between a number and the Character's height is satisfied

526.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

526.3 Keywords

`Length` `Long` `Character` `Player`

527 Compare Mass

`Characters » Properties » Compare Mass`

527.1 Description

Returns true if the comparison between a number and the Character's mass is satisfied

527.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

527.3 Keywords

`Weight` `Character` `Player`

528 Compare Radius

`Characters » Properties » Compare Radius`

528.1 Description

Returns true if the comparison between a number and the Character's radius is satisfied

528.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

528.3 Keywords

`Diameter` `Width` `Fat` `Skin` `Space` `Character` `Player`

529 Compare Speed

`Characters » Properties » Compare Speed`

529.1 Description

Returns true if the comparison between a number and the Character's speed is satisfied

529.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

529.3 Keywords

`Velocity` `Travel` `Movement` `Walk` `Run` `Step` `Character` `Player`

530 Is Controllable

`Characters » Properties » Is Controllable`

530.1 Description

Returns true if the Player unit of the Character is controllable

530.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

530.3 Keywords

`Control` `Character` `Player` `Character` `Player`

531 Is Dead

`Characters » Properties » Is Dead`

531.1 Description

Returns true if the character has been killed

531.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

531.3 Keywords

`Kill` `Kaput` `Character` `Player`

532 Is Player

`Characters » Properties » Is Player`

532.1 Description

Returns true if the Character is marked as a Player

532.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

532.3 Keywords

`Control` `Character` `Character` `Player`

533 Compare Jump Force

`Characters » Properties » Jump Force`

533.1 Description

Returns true if the comparison between a number and the Character's jump force is satisfied

533.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

533.3 Keywords

`Hop` `Leap` `Character` `Player`

534 Compare Terminal Velocity

`Characters » Properties » Terminal Velocity`

534.1 Description

Returns true if the comparison between a number and the Character's terminal velocity is satisfied

534.2 Parameters

Name	Description
Character	The Character instance referenced in the condition

534.3 Keywords

`Max` `Fall` `Vertical` `Down` `Character` `Player`

I.IV.III.I.III.VII Visuals

535 Visuals

535.1 Conditions

- Has Prop Attached

536 Has Prop Attached

`Characters » Visuals » Has Prop Attached`

536.1 Description

Returns true if the Character has a Prop attached to the specified bone

536.2 Parameters

Name	Description
Bone	The bone that has the prop attached to
Character	The Character instance referenced in the condition

536.3 Keywords

`Characters` `Holds` `Grab` `Draw` `Pull` `Take` `Object` `Character` `Player`

I.IV.III.I.IV GAME OBJECTS

537 Game Objects

537.1 Conditions

- Compare Game Objects
- Compare Layer
- Compare Tag
- Does Component Exist
- Does Game Object Exist
- Is Component Enabled
- Is Game Object Active

538 Compare Game Objects

`Game Objects » Compare Game Objects`

538.1 Description

Returns true if the game object is the same as another one

538.2 Parameters

Name	Description
Game Object	The game object instance used in the comparison
Compare To	The game object instance that is compared against

538.3 Keywords

`Same` `Equal` `Exact` `Instance`

539 Compare Layer

`Game Objects » Compare Layer`

539.1 Description

Returns true if the game object belongs to any of the layer mask values

539.2 Parameters

Name	Description
Game Object	The game object instance used in the condition
Layer Mask	A bitmask of Layer values

539.3 Keywords

`Mask` `Physics` `Belong` `Has`

540 Compare Tag

```
Game Objects » Compare Tag
```

540.1 Description

Returns true if the game object is tagged with a concrete name

540.2 Parameters

Name	Description
Game Object	The game object instance used in the condition
Tag	The Tag name checked against the game object

540.3 Keywords

`Belong` `Has` `Is`

541 Does Component Exist

```
Game Objects » Does Component Exist
```

541.1 Description

Returns true if the game object has the component attached

541.2 Parameters

Name	Description
Game Object	The game object instance used in the condition
Component	The component type that is searched

541.3 Keywords

`Null` `Scene` `Lives`

542 Does Game Object Exist

`Game Objects » Does Game Object Exist`

542.1 Description

Returns true if the game object reference is not null

542.2 Parameters

Name	Description
Game Object	The game object instance used in the condition

542.3 Keywords

`Null` `Scene` `Lives`

543 Is Component Enabled

```
Game Objects » Is Component Enabled
```

543.1 Description

Returns true if the game object has the component enabled

543.2 Parameters

Name	Description
Game Object	The game object instance used in the condition
Component	The component type checked

543.3 Keywords

`Null` `Active`

544 Is Game Object Active

```
Game Objects » Is Game Object Active
```

544.1 Description

Returns true if the game object reference exists and is active

544.2 Parameters

Name	Description
Game Object	The game object instance used in the condition

544.3 Keywords

`Null` `Scene` `Enabled`

I.IV.III.I.V INPUT

545 Input

545.1 Conditions

- Is Input Held Down
- Is Input Pressed
- Is Input Released
- Is Key Held Down
- Is Key Pressed
- Is Key Released
- Is Mouse Held Down
- Is Mouse Pressed
- Is Mouse Released

546 Is Input Held Down

```
Input » Is Input Held Down
```

546.1 Description

Returns true while the Input Action asset with a button behavior is being pressed

546.2 Parameters

Name	Description
Input	A reference to the Input Action asset with map and action name

546.3 Keywords

`Unity` `Button` `While` `Hold` `Press` `Input` `Action` `System` `Map`

547 Is Input Pressed

```
Input » Is Input Pressed
```

547.1 Description

Returns true if the Input Action asset with a button behavior is pressed during this frame

547.2 Parameters

Name	Description
Input	A reference to the Input Action asset with map and action name

547.3 Keywords

`Unity` `Button` `Down` `Input` `Action` `System` `Map`

548 Is Input Released

```
Input » Is Input Released
```

548.1 Description

Returns true if the Input Action asset with a button behavior is released during this frame

548.2 Parameters

Name	Description
Input	A reference to the Input Action asset with map and action name

548.3 Keywords

`Unity` `Button` `Up` `Input` `Action` `System` `Map`

549 Is Key Held Down

```
Input » Is Key Held Down
```

549.1 Description

Returns true if the keyboard key is being held down this frame

549.2 Parameters

Name	Description
Key	The Keyboard key that is checked

549.3 Keywords

`Button` `Active` `Down` `Press`

550 Is Key Pressed

```
Input » Is Key Pressed
```

550.1 Description

Returns true if the keyboard key is pressed during this frame

550.2 Parameters

Name	Description
Key	The Keyboard key that is checked

550.3 Keywords

`Button` `Down`

551 Is Key Released

```
Input » Is Key Released
```

551.1 Description

Returns true if the keyboard key is released during this frame

551.2 Parameters

Name	Description
Key	The Keyboard key that is checked

551.3 Keywords

`Button` `Up`

552 Is Mouse Held Down

```
Input » Is Mouse Held Down
```

552.1 Description

Returns true if the mouse button is being held down

552.2 Parameters

Name	Description
Button	The Mouse button that is checked

552.3 Keywords

`Key` `Up` `Click` `Cursor`

553 Is Mouse Pressed

```
Input » Is Mouse Pressed
```

553.1 Description

Returns true if the mouse button is pressed during this frame

553.2 Parameters

Name	Description
Button	The Mouse button that is checked

553.3 Keywords

`Key` `Down` `Cursor`

554 Is Mouse Released

```
Input » Is Mouse Released
```

554.1 Description

Returns true if the mouse button is released during this frame

554.2 Parameters

Name	Description
Button	The Mouse button that is checked

554.3 Keywords

`Key` `Up` `Click` `Cursor`

I.IV.III.I.VI MATH

555 Math

555.1 Sub Categories

- Arithmetic
- Boolean
- Geometry

I.IV.III.I.VI.I Arithmetic

556 Arithmetic

556.1 Conditions

- Compare Decimal
- Compare Integer

557 Compare Decimal

`Math » Arithmetic » Compare Decimal`

557.1 Description

Returns true if a comparison between two decimal values is satisfied

557.2 Parameters

Name	Description
Value	The decimal value that is being compared
Comparison	The comparison operation performed between both values
Compare To	The decimal value that is compared against

557.3 Keywords

`Number` `Float` `Comma` `Equals` `Different` `Bigger` `Greater` `Larger` `Smaller`

558 Compare Integer

```
Math » Arithmetic » Compare Integer
```

558.1 Description

Returns true if a comparison between two integer values is satisfied

558.2 Parameters

Name	Description
Value	The integer value that is being compared
Comparison	The comparison operation performed between both values
Compare To	The integer value that is compared against

558.3 Keywords

`Number` `Whole` `Equals` `Different` `Bigger` `Greater` `Larger` `Smaller`

I.IV.III.I.VI.II Boolean

559 Boolean

559.1 Conditions

- Always False
- Always True
- Compare Boolean

560 Always False

```
Math » Boolean » Always False
```

560.1 Description

Always returns false

560.2 Keywords

`Boolean` `No` `Contradiction`

561 Always True

```
Math » Boolean » Always True
```

561.1 Description

Always returns true

561.2 Keywords

`Boolean` `Yes` `Tautology`

562 Compare Bool

`Math » Boolean » Compare Boolean`

562.1 Description

Returns true if a comparison between two boolean values is satisfied

562.2 Parameters

Name	Description
Value	The boolean value that is being compared
Comparison	The comparison operation performed between both values
Compare To	The boolean value that is compared against

562.3 Keywords

`Boolean`

I.IV.III.I.VI.III Geometry

563 Geometry

563.1 Conditions

- Compare Direction
- Compare Distance Flat
- Compare Distance Vertical
- Compare Distance
- Compare Point

564 Compare Direction

`Math » Geometry » Compare Direction`

564.1 Description

Returns true if a comparison between two direction values is satisfied

564.2 Parameters

Name	Description
Value	The direction value that is being compared
Comparison	The comparison operation performed between both values
Compare To	The direction value that is compared against

564.3 Keywords

`Towards` `Vector` `Magnitude` `Length` `Equals` `Different` `Greater` `Larger` `Smaller`

565 Compare Distance Flat

`Math » Geometry » Compare Distance Flat`

565.1 Description

Returns true if a comparison of the flat XZ distance between two points is satisfied

565.2 Parameters

Name	Description
Point A	The first operand that represents a point in space
Point B	The second operand that represents a point in space
Comparison	The comparison operation performed between both values
Distance	The distance value compared against

565.3 Keywords

`Position` `Vector` `Magnitude` `Length` `Equals` `Different` `Greater` `Larger` `Smaller`

566 Compare Distance Vertical

`Math » Geometry » Compare Distance Vertical`

566.1 Description

Returns true if a comparison of the vertical distance between two points is satisfied

566.2 Parameters

Name	Description
Point A	The first operand that represents a point in space
Point B	The second operand that represents a point in space
Comparison	The comparison operation performed between both values
Distance	The distance value compared against

566.3 Keywords

`Position` `Vector` `Magnitude` `Length` `Equals` `Different` `Greater` `Larger` `Smaller`

567 Compare Distance

`Math » Geometry » Compare Distance`

567.1 Description

Returns true if a comparison of the distance between two points is satisfied

567.2 Parameters

Name	Description
Point A	The first operand that represents a point in space
Point B	The second operand that represents a point in space
Comparison	The comparison operation performed between both values
Distance	The distance value compared against

567.3 Keywords

`Position` `Vector` `Magnitude` `Length` `Equals` `Different` `Greater` `Larger` `Smaller`

568 Compare Point

`Math » Geometry » Compare Point`

568.1 Description

Returns true if a comparison between two points in space is satisfied

568.2 Parameters

Name	Description
Value	The point in space that is being compared
Comparison	The comparison operation performed between both values
Compare To	The point in space that is compared against

568.3 Keywords

`Position` `Vector` `Magnitude` `Length` `Equals` `Different` `Greater` `Larger` `Smaller`

I.IV.III.I.VII PHYSICS

569 Physics

569.1 Conditions

- Check Box 2D
- Check Box 3D
- Check Capsule
- Check Character 3D Fits
- Check Circle
- Check Sphere
- Is Kinematic
- Is Sleeping
- Raycast 2D
- Raycast 3D

570 Check Box 2D

`Physics » Check Box 2D`

570.1 Description

Returns true if casting a 2D box at a position collides with something

570.2 Parameters

Name	Description
Position	The scene position where the box's center is cast. Z axis is ignored
Size	Size of each side's extension along its local axis
Angle	Clock-wise rotation measured in degrees
Layer Mask	A bitmask that skips any objects that don't belong to the list

570.3 Example 1

Note that this Instruction uses Unity's 2D physics engine. It won't collide with any 3D objects

570.4 Keywords

`Check` `Collide` `Touch` `Suit` `Square` `Cube` `2D`

571 Check Box 3D

`Physics » Check Box 3D`

571.1 Description

Returns true if casting a 3D box at a position collides with something

571.2 Parameters

Name	Description
Position	The scene position where the box's center is cast
Rotation	The rotation of the cube cast in world space
Half Extents	Half size of the cube that extents along its local axis
Layer Mask	A bitmask that skips any objects that don't belong to the list

571.3 Example 1

Note that this Instruction uses Unity's 3D physics engine. It won't collide with any 2D objects

571.4 Keywords

`Check` `Collide` `Touch` `Suit` `Square` `Cube` `3D`

572 Check Capsule

`Physics » Check Capsule`

572.1 Description

Returns true if casting a capsule at a position collides with something

572.2 Parameters

Name	Description
Position	The scene position where the capsule's center is cast
Height	The height of the capsule in Unity units
Radius	The radius of the capsule in Unity units
Layer Mask	A bitmask that skips any objects that don't belong to the list

572.3 Example 1

Note that this Instruction uses Unity's 3D physics engine. It won't collide with any 2D objects

572.4 Keywords

`Check` `Collide` `Touch` `Suit` `Character` `Fit` `3D`

573 Check Character 3D Fits

`Physics » Check Character 3D Fits`

573.1 Description

Returns true if the character fits with the new radius and height values

573.2 Parameters

Name	Description
Character	The character to check
Height	The height of the character in Unity units
Radius	The radius of the character in Unity units
Layer Mask	A bitmask that skips any objects that don't belong to the list

573.3 Example 1

Note that this Instruction uses Unity's 3D physics engine. It won't collide with any 2D objects

573.4 Keywords

`Check` `Collide` `Capsule` `Touch` `Suit` `Character` `Fit` `3D`

574 Check Circle

```
Physics » Check Circle
```

574.1 Description

Returns true if casting a circle at a position doesn't collide with anything

574.2 Parameters

Name	Description
Position	The scene position where the circle's center is cast. Z axis is ignored
Radius	The radius of the circle in Unity units
Layer Mask	A bitmask that skips any objects that don't belong to the list

574.3 Example 1

Note that this Instruction uses Unity's 2D physics engine. It won't collide with any 3D objects

574.4 Keywords

`Check` `Collide` `Touch` `Suit` `Sphere` `Circumference` `Round` `2D`

575 Check Sphere

```
Physics » Check Sphere
```

575.1 Description

Returns true if casting a sphere at a position collides with something

575.2 Parameters

Name	Description
Position	The scene position where the sphere's center is cast
Radius	The radius of the sphere in Unity units
Layer Mask	A bitmask that skips any objects that don't belong to the list

575.3 Example 1

Note that this Instruction uses Unity's 3D physics engine. It won't collide with any 2D objects

575.4 Keywords

`Check` `Collide` `Touch` `Suit` `Circle` `Circumference` `Round` `3D`

576 Is Kinematic

```
Physics » Is Kinematic
```

576.1 Description

Returns true if the game object's Rigidbody or Rigidbody2D is marked as Kinematic

576.2 Parameters

Name	Description
Game Object	The game object instance with a Rigidbody or Rigidbody2D

576.3 Keywords

`Affect` `Physics` `Force` `Rigidbody`

577 Is Sleeping

`Physics » Is Sleeping`

577.1 Description

Returns true if the game object's Rigidbody or Rigidbody2D is sleeping

577.2 Parameters

Name	Description
Game Object	The game object instance with a Rigidbody or Rigidbody2D

577.3 Keywords

`Affect` `Physics` `Force` `Rigidbody` `Awake`

578 Raycast 2D

`Physics » Raycast 2D`

578.1 Description

Returns true if there any object between two positions in 2D space

578.2 Parameters

Name	Description
Source	The scene position where the raycast originates
Target	The targeted position where the raycast ends
Layer Mask	A bitmask that skips any objects that don't belong to the list

578.3 Example 1

Note that this Instruction uses Unity's 2D physics engine. It won't collide with any 3D objects

578.4 Keywords

`Check` `Collide` `Linecast` `See` `2D`

579 Raycast 3D

`Physics » Raycast 3D`

579.1 Description

Returns true if there's an object between two positions

579.2 Parameters

Name	Description
Source	The scene position where the raycast originates
Target	The targeted position where the raycast ends
Layer Mask	A bitmask that skips any objects that don't belong to the list

579.3 Example 1

Note that this Instruction uses Unity's 3D physics engine. It won't collide with any 2D objects

579.4 Keywords

`Check` `Collide` `Linecast` `See` `3D`

I.IV.III.I.VIII PLATFORMS

580 Platforms

580.1 Conditions

- Check Platform
- Is Batch Mode
- Is Console
- Is Editor
- Is Mobile

581 Check Platform

```
Platforms » Check Platform
```

581.1 Description

Check if the running platform matches the selected one

582 Is Batch mode

```
Platforms » Is Batch mode
```

582.1 Description

Returns true if the running platform is in batch mode (no interface)

582.2 Keywords

`Server`

583 Is Console

```
Platforms » Is Console
```

583.1 Description

Returns true if the running platform is a console

583.2 Keywords

`PS4` `PS5` `Switch` `XBox` `Deck`

584 Is Editor

```
Platforms » Is Editor
```

584.1 Description

Returns true if the running platform is the Unity Editor

584.2 Keywords

`Unity`

585 Is Mobile

```
Platforms » Is Mobile
```

585.1 Description

Returns true if the running platform is a smartphone or tablet

585.2 Keywords

`Smartphone` `Tablet` `iOS` `Android`

I.IV.III.I.IX SCENES

586 Scenes

586.1 Conditions

- Is Scene Loaded

587 Is Scene Loaded

Scenes » Is Scene Loaded

587.1 Description

Returns true if the scene has been loaded

587.2 Parameters

Name	Description
Scene	The Unity Scene reference used in the condition

I.IV.III.I.X STORAGE

588 Storage

588.1 Conditions

- Has Save At Slot
- Has Save

589 Has Save at Slot

```
Storage » Has Save at Slot
```

589.1 Description

Returns true if there is a saved game at the specified slot

589.2 Keywords

`Game` `Load` `Continue` `Resume` `Can` `Is`

590 Has Save

```
Storage » Has Save
```

590.1 Description

Returns true if there is at least one saved game

590.2 Keywords

`Game` `Load` `Continue` `Resume` `Can` `Is`

I.IV.III.I.XI TEXT

591 Text

591.1 Conditions

- Text Contains
- Text Equals

592 Text Contains

```
Text » Text Contains
```

592.1 Description

Returns true if the second text string occurs in the first one

592.2 Parameters

Name	Description
Text	The text string
Substring	The text string contained in Text

592.3 Keywords

`String` `Char` `Sub`

593 Text Equals

```
Text » Text Equals
```

593.1 Description

Returns true if two text Strings are equal

593.2 Parameters

Name	Description
Text 1	The first text string to compare
Text 2	The second text string to compare

593.3 Keywords

`String` `Char`

I.IV.III.I.XII TRANSFORMS

594 Transforms

594.1 Conditions

- Child Count
- Is Child Of
- Is Sibling Of

595 Child Count

`Transforms » Child Count`

595.1 Description

Compares the amount of direct children of a game object

595.2 Parameters

Name	Description
Target	The children amount of this game object instance
Comparison	The comparison operation between the child count and a value
Compare To	The second value compared

595.3 Keywords

`Transform` `Hierarchy` `Descendant` `Ancestor` `Parent` `Father` `Amount`

596 Is Child Of

`Transforms » Is Child Of`

596.1 Description

Returns true if the game object is the parent of the other one

596.2 Parameters

Name	Description
Child	The game object instance further down in the hierarchy of the parent
Parent	The game object instance that is higher in the hierarchy

596.3 Keywords

`Transform` `Hierarchy` `Descendant` `Ancestor` `Parent` `Father` `Mother`

597 Is Sibling Of

`Transforms » Is Sibling Of`

597.1 Description

Returns true if the game object shares the same parent as the other one

597.2 Parameters

Name	Description
Sibling A	The game object instance compared
Sibling B	Another game object instance compared

597.3 Keywords

`Transform` `Hierarchy` `Ancestor` `Brother` `Sister`

I.IV.III.I.XIII VARIABLES

598 Variables

598.1 Conditions

- List Is Empty

599 List is Empty

```
Variables » List is Empty
```

599.1 Description

Checks whether a List Variable is empty or not

599.2 Parameters

Name	Description
List Variables	The Local or Global List Variable to check

599.3 Keywords

`Size` `Length` `Any` `Local` `Global` `Variable`

I.IV.III.I.XIV VISUAL SCRIPTING

600 Visual Scripting

600.1 Conditions

- Conditions As And
- Run Conditions As Or

601 Conditions as AND

```
Visual Scripting » Conditions as AND
```

601.1 Description

Returns true only if all the Conditions from the list are True

601.2 Keywords

`&` `All` `Sequence`

602 Conditions as OR

```
Visual Scripting » Run Conditions as OR
```

602.1 Description

Returns true if at least one of the Conditions from the list is True

602.2 Keywords

`|` `One` `Selector`

603 Custom Conditions

Game Creator allows to very easily create custom **Conditions**.

> **Programming Knowledge Required**
>
> This section assumes you have some programming knowledge. If you don't know how to code you might be interested in checking out the Game Creator Hub page. Programmers altrusitically create custom **Conditions** for others to download and use in their project.

603.1 Creating a Condition

The easiest way to create an **Condition** C# script is to right click on your *Project* panel and select *Create* → *Game Creator* → *Developer* → *C# Condition*. This will create a template script with the boilerplate structure:

```
using System;
using GameCreator.Runtime.Common;
using GameCreator.Runtime.VisualScripting;

[Serializable]
public class MyCondition : Condition
{
    protected override bool Run(Args args)
    {
        return true;
    }
}
```

603.1.1 Anatomy of an Instruction

A **Condition** is a class that inherits from the `Condition` super class. The abstract `Run(...)` method is the entry point of a **Condition**'s execution, which is automatically called. This method must always return `true` if it's successful, or `false` otherwise.

The `Run(...)` method has a single parameter of type `Args`, which is a helper class that contains a reference to the game object that initiated the call (`args.Self`) and the targeted game object (`args.Target`), if any.

603.1.2 Decoration & Documentation

It is highly recommended to document and decorate the **Condition** so it's easier to find and use. It is done using class-type attributes that inform **Game Creator** of the quirks of this particular condition.

For example, to set the title of a condition to "Hello World", use the `[Title(string name)]` attribute right above the class definition:

```
using System;
using GameCreator.Runtime.Common;
using GameCreator.Runtime.VisualScripting;

[Title("Hello World")]
[Serializable]
public class MyCondition : Condition
{
    protected override bool Run(Args args)
    {
        return true;
    }
}
```

603.1.2.1 Title

The title of the Condition. If this attribute is not provided, the title will be a beautified version of the class name.

```
[Title("Title of Condition")]
```

603.1.2.2 Description

A description of what the Condition does. This is both used in the floating window documentation, as well as the description text when uploading a Condition to the Game Creator Hub.

```
[Description("Lorem Ipsum dolor etiam porta sem magna mollis")]
```

603.1.2.3 Image

The `[Image(...)]` attribute changes the default icon of the Condition for one of the default ones. It consists of 2 parameters:

- **Icon [`Type`]:** a Type class of an `IIcon` derived class. **Game Creator** comes packed with a lot of icons although you can also create your own.
- **Color [`Color`]:** The color of the icon. Uses Unity's `Color` class.

For example, one of the icons included is the "Solid Cube" icon. To display a red solid cube as the icon of the condition, use the following attribute:

```
[Image(typeof(IconCubeSolid), Color.red)]
```

603.1.2.4 Category

A sequence of sub-categories organized using the slash (`/`) character. This attribute helps keep the Conditions organized when the dropdown list is displayed.

```
[Category("Category/Sub Category/Name")]
```

The example above will display the Condition under the sub directory *Category* → *Sub Category* → *Name*.

603.1.2.5 Version

A semmantic version to keep track of the development of this Condition. It's important to note that when updating a Condition to the Game Creator Hub, the version number must always be higher than the one on the server.

The semmantic version follows the standard *Major Version*, *Minor Version*, *Patch Version*. To know more about how semmantic versioning works, read the following page: https://semver.org.

```
[Version(1, 5, 3)]
```

603.1.2.6 Parameters

When a Condition has exposed fields in the Inspector, it's a good idea to document what these do. You can add as many `[Parameter(name, description)]` attributes as exposed fields has.

For example, if the Condition has these two fields:

```
public bool condition1 = true;
public bool condition2 = false;
```

You can document those fields adding:

```
[Parameter("Condition 1", "First condition value to check")]
[Parameter("Condition 2", "Second condition value to check")]
```

603.1.2.7 Keywords

Keywords are strings that help the fuzzy finder more easily search for a condition. For example, the "Is Character Moving" condition doesn't reference the word "idle" or "walk" anywhere in its documentation. However, these words are very likely to reference this condition when the user types them in the search box.

```
[Keywords("Idle", "Walk", "Run")]
```

603.1.2.8 Example

The Example attribute allows to display a text as an example of use of this Condition. There can be more than one `[Example(...)]` attribute per condition. This is particularly useful when uploading conditions on the Game Creator Hub.

> **Markdown**
>
> It is recommended to use Markdown notation when writing examples

```
[Example("Sed posuere consectetur est at lobortis)]
```

Multiple Lines

You can use the `@` character in front of a string to break the example text in multiple lines. To create a new paragraph, simply add two new lines. For example:

```
[Example(@"
    This is the first paragraph.
    This is also in the first paragraph, right after the previous sentence

    This line is part of a new paragraph.
)]
```

603.1.2.9 Dependency

This attribute is optional and only used in the Game Creator Hub. If this Condition uses some particular feature of a specific module, it will first check if the user downloading this condition has that module installed. If it does not, it will display an error message and forbid downloading it. This is useful to avoid throwing programming errors.

The `[Dependency(...)]` attribute consists of 4 parameters:

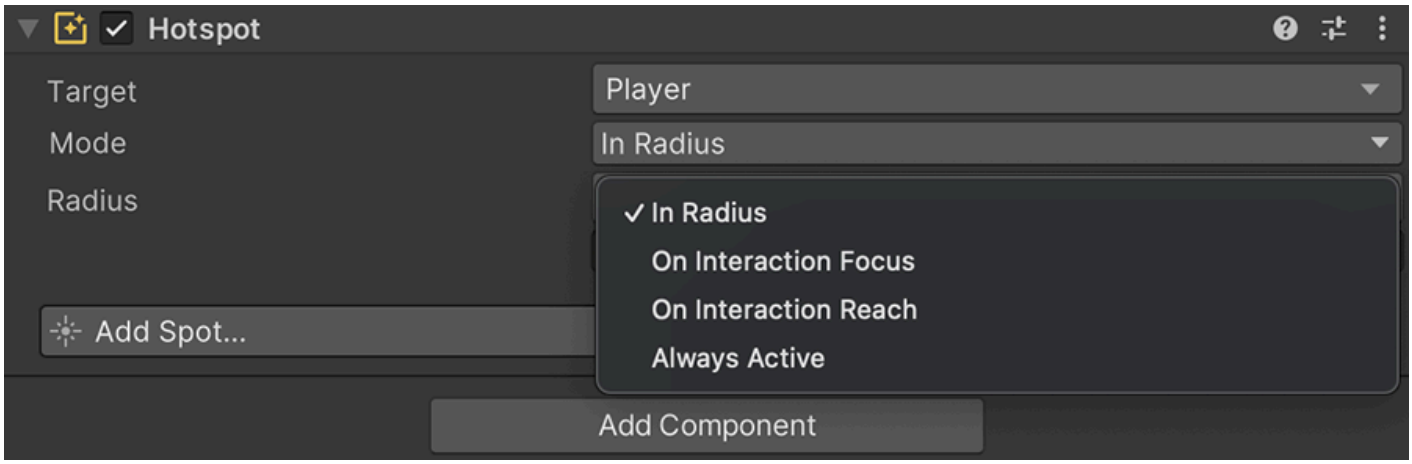
- **Module ID:** For example, the ID of the Inventory module is `gamecreator.inventory`.
- **Major Version:** The minimum major version of the dependency module.
- **Minor Version:** The minimum minor version of the dependency module.
- **Patch Version:** The minimum patch version of the dependency module.

```
[Dependency("gamecreator.inventory", 1, 5, 2)]
```

I.IV.IV Hotspots

604 Hotspots

Hotspots are components attached to game objects that don't have any direct impact on gameplay. Instead, they help the user understand what's interactive and what is not. For example, highlighting a specific object when the player character is nearby, making the head turn towards an important object and so on.



Trigger + Hotspot

Triggers are usually placed along side with **Hotspot** components. One deals with the interaction itself, while the other hints the player about the **Trigger** being an interactive object.

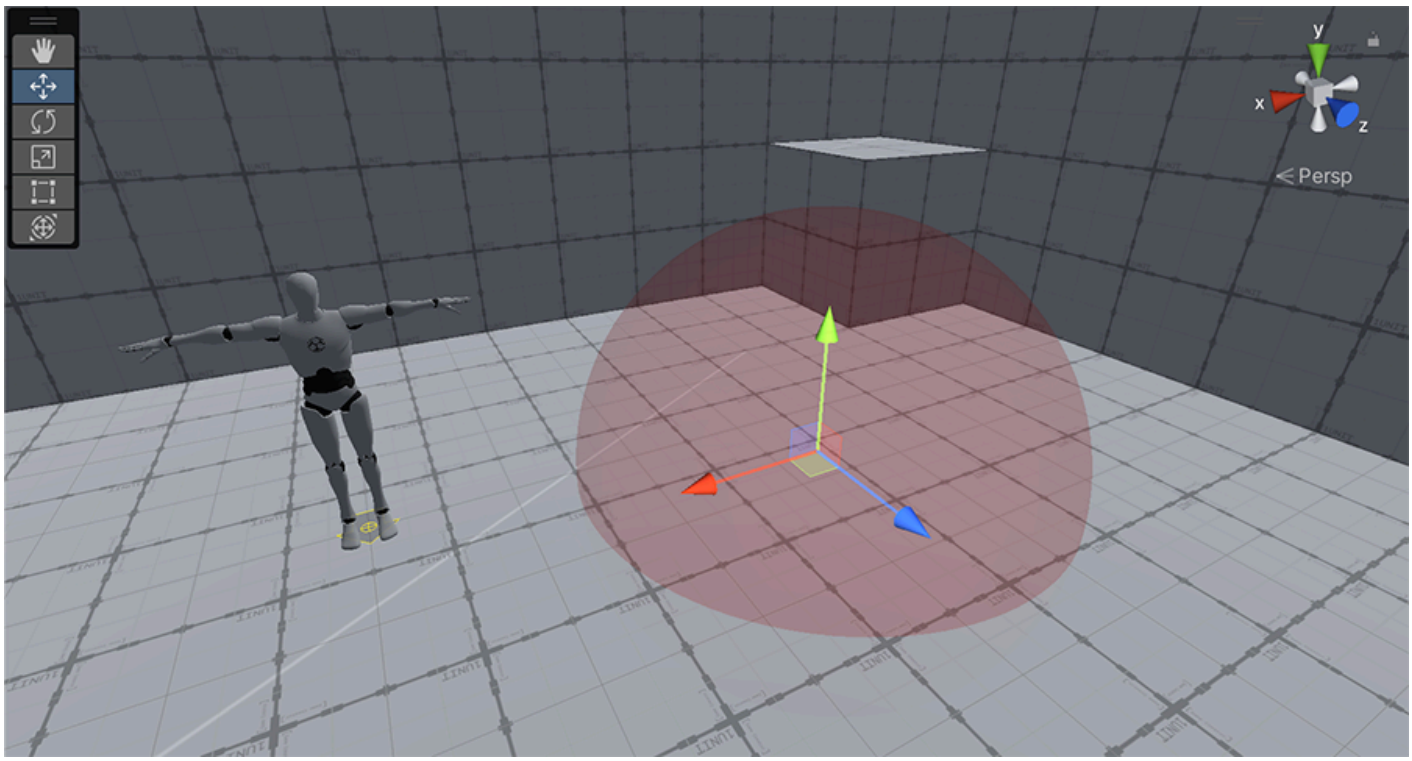
604.1 How it works

A **Hotspot** consists of a *Target* field and a *Mode*, which determine the object being followed and when it reacts. There are 4 possible modes:

- **Radius:** Displays an extra field with a numeric value. The Hotspot will react when the target is inside its radius.
- **On Interaction Focus:** The Hotspot will react whenever the Target's Interaction system focuses on the Hotspot.
- **On Interaction Reach:** The Hotspot will react whenever the Target's Interaction system has the Hotspot is within reach but isn't focused on it.
- **Always Active:** The Hotspot will always react regardless of the distance to the Target.

On Interaction Focus & Reach

These two modes require the Target to be a Character component. To know more about how the Interaction system works, see the Interaction section.



Selecting a game object with a **Hotspot** component with a *Radius* mode will display in the scene a visual representation of the distance at which the target is considered close enough to activate it.

Debugging

On playmode, the red gizmo appears in a much lighter color. If the targeted object activates the Hotspot, the Hotspot's gizmo will change to green, to indicate the Hotspot is active.

No Phyics Engine

The **Hotspot** distance check doesn't use Unity's Phyics engine because it would force both the Hotspot and the targeted object to have a *Collider* component attached to them. Instead it simply checks the distance between the center of the hotspot and the targeted game object.

604.2 Creating Hotspots

There are two ways to create a Hotspot object. One is to create an object that contains a Hotspot component, by right clicking on the *Hierarchy* panel and selecting *Game Creator* → *Visual Scripting* → *Hotspot*. This creates a scene object with the component attached to it.

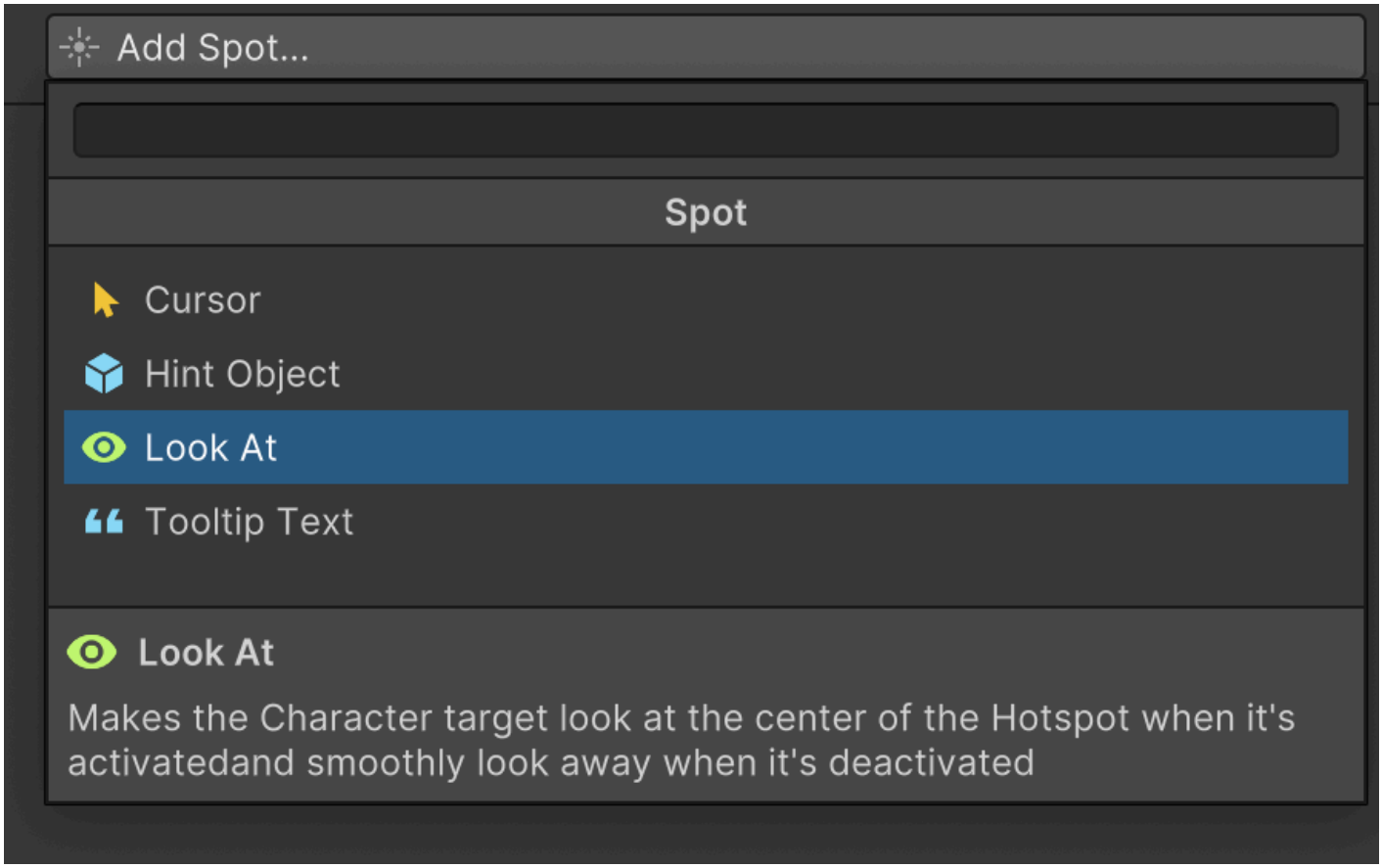
However, an Actions component can also be added to any game object. Simply click on any game object's *Add Component* button and type Actions.

Deleting Actions

To delete an Actions component, simply click on the component's little cog button and select "Remove Component" from the dropdown menu.

604.3 Adding Spots

Spots are individual elements that highlight something specific and are evaluated from top to bottom.



To add a new **Spot** click on the *Add Spot* button and choose the desired one from the dropdown list. Note that **Spots** are evaluated from top to bottom. There can be two spots of the same type, but if they both overlap, the last one will override the effect.

I.IV.IV.I Spots

605 Spots

605.1 Sub Categories

- Audio
- Characters
- Game Objects
- Materials
- Ui

I.IV.IV.I.I AUDIO

606 Audio

606.1 Spots

- Play Sound

607 Play Sound

```
Audio » Play Sound
```

607.1 Description

Plays a User Interface sound effect when the Hotspot is activated or deactivated

607.2 Keywords

`Audio` `Sounds`

I.IV.IV.I.II CHARACTERS

608 Characters

608.1 Spots

- Look At

609 Look At

609.1 Description

Makes the Character look at the center of the Hotspot when it's activatedand smoothly look away when it's deactivated

I.IV.IV.I.III GAME OBJECTS

610 Game Objects

610.1 Spots

- Activate Object
- Instantiate Prefab

611 Activate Object

```
Game Objects » Activate Object
```

611.1 Description

Activates a game object scene instance when the Hotspot is enabled and deactivates it when the Hotspot is disabled

612 Instantiate Prefab

```
Game Objects » Instantiate Prefab
```

612.1 Description

Creates or Activates a prefab game object when the Hotspot is enabled and deactivates it when the Hotspot is disabled

I.IV.IV.I.IV MATERIALS

613 Materials

613.1 Spots

- Change Material

614 Change Material

```
Materials » Change Material
```

614.1 Description

Changes the Material depending on whether the Hotspot is active or not

614.2 Keywords

`Material` `Color` `Shader`

I.IV.IV.I.V UI

615 Ui

615.1 Spots

- Change Text
- Cursor
- Show Floating Text

616 Change Text

```
UI » Change Text
```

616.1 Description

Changes the chosen Text value

617 Cursor

```
UI » Cursor
```

617.1 Description

Changes the cursor image when hovering the Hotspot

618 Show Floating Text

```
UI » Show Floating Text
```

618.1 Description

Displays a text in a world-space canvas when the Hotspot is enabled and hides it when is disabled. If no Prefab is provided, a default UI is displayed

I.V Variables

619 Variables

Variables are data containers that allow to dynamically change their value and let the game keep track of the player's progress.

Example

A very simple use case of **Variables** is keeping track of the player's score. Let's say we have a named variable called *score* and has an initial value of 0. Every time the player picks up a star, the *score* variable is incremented and its value is displayed.

619.1 Types of Variables

Game Creator has two types of variables:

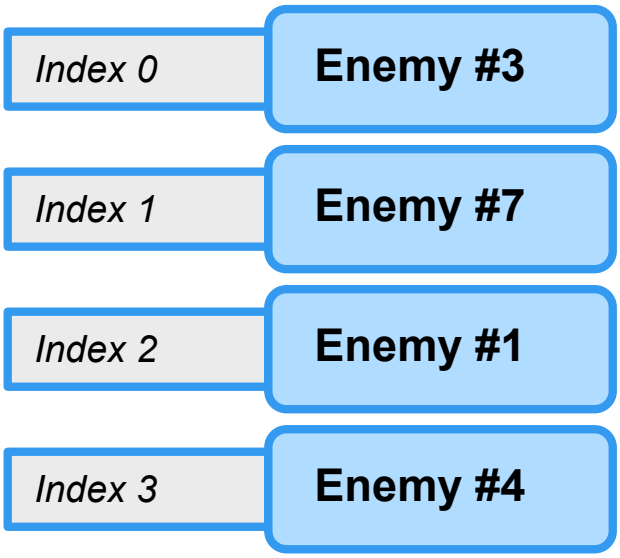
619.1.1 Name Variables

Are identified by their unique name. For example, the name *score* can reference a numeric variable that keeps track of the player's score value.

619.1.2 List Variables

Are identified by their 0-based index. Think of them as a collection of values, placed one after another. For example, to access the first value, use the index *0*. To access the second position, use the index *1*, etc...

Note all values of a **List Variable** are of a particular type.



Name or List?

As a rule of thumb, it is recommended the use of **Name Variables**. **List Variables** are useful when you have an unknown number of objects to choose from. For example, when locking on an enemy from a group that surrounds the player.

619.2 Scope of Variables

Variables can either be local or global.

619.2.1 Local Variables

Local Variables are bound to a particular scene and can't be used outside of it.

619.2.2 Global Variables

On the other hand, **Global Variables** can be queried and modified from any scene.

Types

Both **Global Variables** and **Local Variables** can be *List* or *Name* based.

619.3 Value Types

All **Variables** have an initial value assigned to them that can be modifed at runtime. By default, **Game Creator** comes with a limited number of types to choose from, but other modules might increment the amount available.

- **Number:** Stores numeric values. Both decimal and integers.
- **String:** Stores text-based characters.
- **Boolean:** Can only store two values: *true* or *false*.
- **Vector 3:** Stores an (x,y,z) vector value
- **Color:** Stores an RGBA color value. Can also contain HDR information.
- **Texture:** Stores a reference to a Texture asset.
- **Sprite:** Stores a reference to a Sprite asset.
- **Game Object:** Stores a reference to a game object.

> **Saving Values**
>
> It is important to note that not all data types can be saved between play-sessions. **Textures**, **Sprites** and **Game Objects** and not primitive types and thus, they can't be serialized at runtime.

619.4 Nested Access

Nested Access is a concept that allows jumping between different variables using one single command.

For example, let's say the Player object has a **Local Named Variable** called `target` of type Game Object. This game object is dynamic but let's say the targeted object will always have another **Local Named Variable** called `health` that contains how many hit points the enemy has.

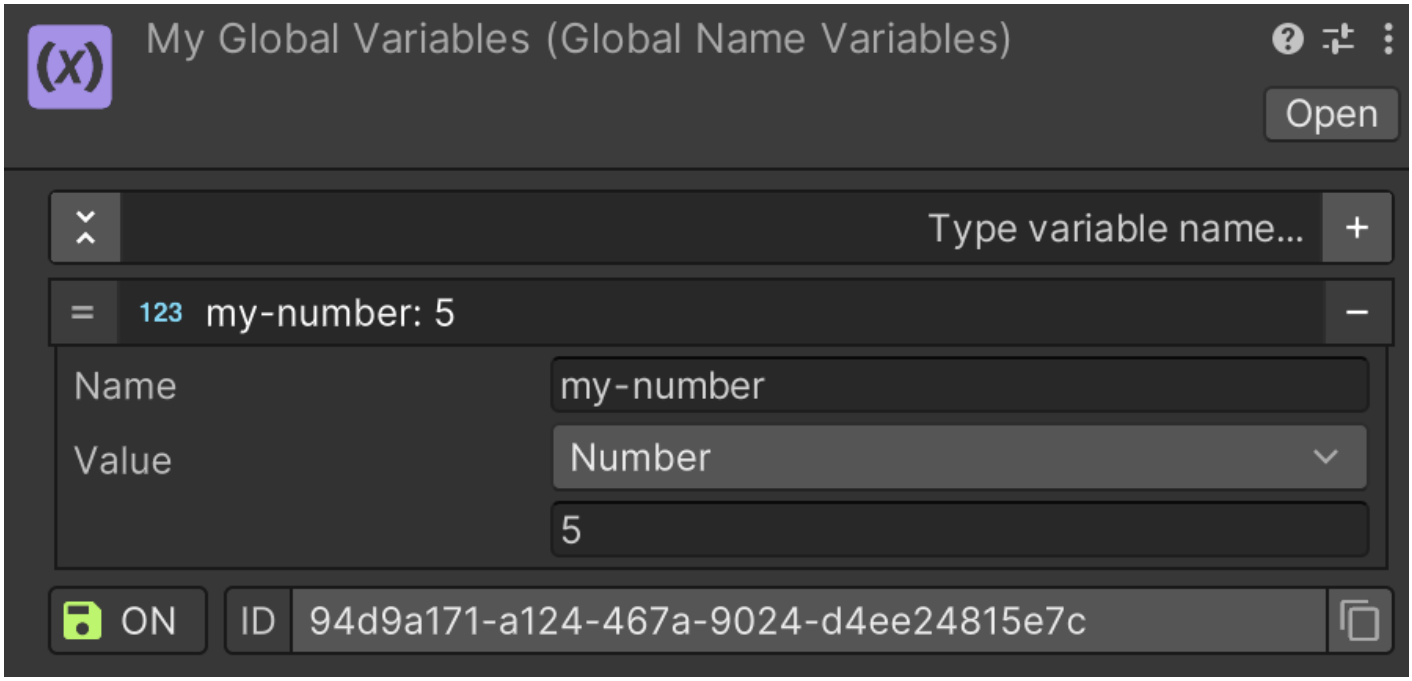
The `health` variable can be accessed using the key `target/health` (with a slash). This means: Get the variable value `health` that the variable `target` points to.

620 Global Name Variables

Global Name Variables are variables identified by a unique string of characters that live outside the scene and can be accessed and modified from anywhere.

620.1 Creating a Global Name Variable

To create a **Global Name Variable**, right click on the *Project Panel* and select *Create* → *Game Creator* → *Variables* → *Name Variables*. A new asset will appear in the project panel, which can be used to define each of the variables contained within.



Conflicting ID

Note that two Global Variables can't have the same unique ID. Otherwise they'll override each other's values. To generate a new unique ID, expand the *ID* field and click the "Regenerate" button.

620.2 Adding new entries

To add a new variable entry, type the name of the variable on the creation field and press enter (or click on the little [+] button).

The name of a variable can be modified, as well as its value type. The *Value* field also contains the starting value of this particular variable entry.

Save & Load

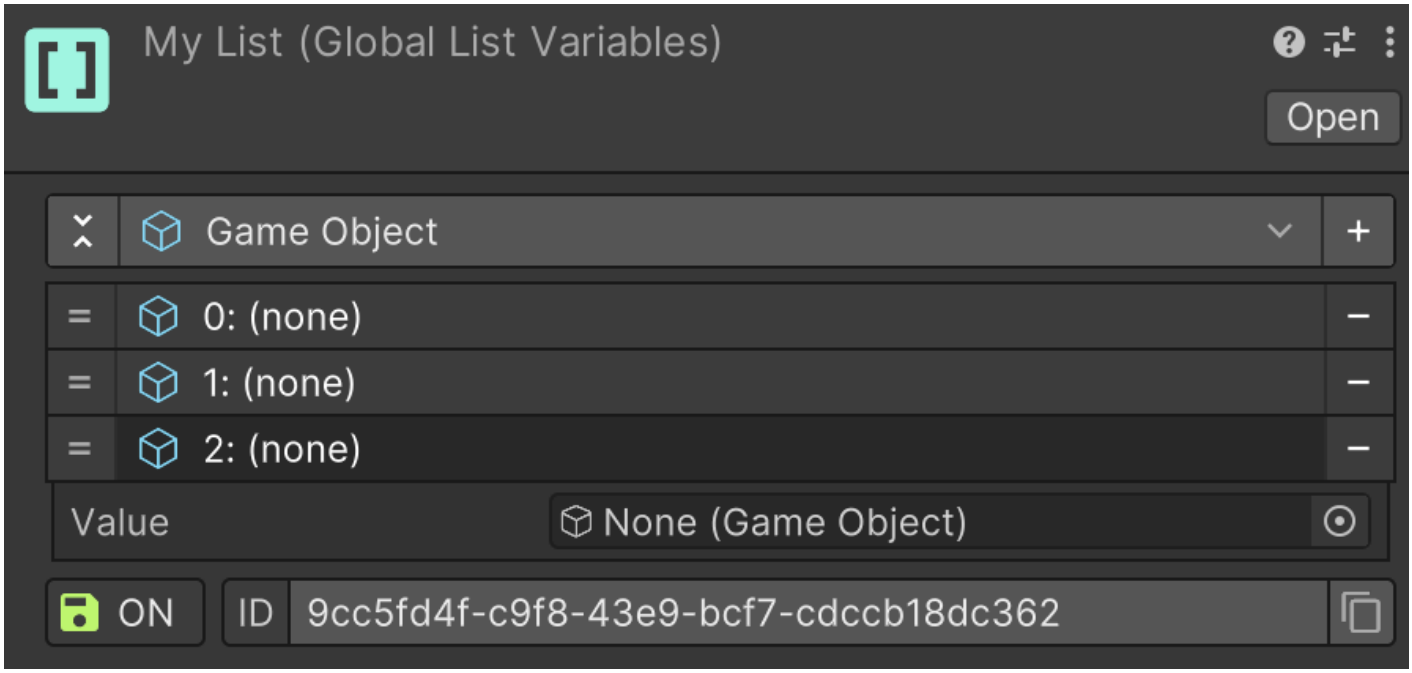
Values can be saved between play sessions to later be restored when loading a game. Disabling the *save* option will make all variables keep the initial value as their starting value, even after loading a previously saved game.

621 Global List Variables

Global List Variables are variables identified by their numberic index value and can be accessed from anywhere.

621.1 Creating a Global List Variable

To create a **Global List Variable**, right click on the *Project Panel* and select *Create* → *Game Creator* → *Variables* → *List Variables*. A new asset will appear in the project panel, which can be used to define the collection of variables.



Conflicting ID

Note that two Global Variables can't have the same unique ID. Otherwise they'll override each other's values. To generate a new unique ID, expand the *ID* field and click the "Regenerate" button.

Save & Load

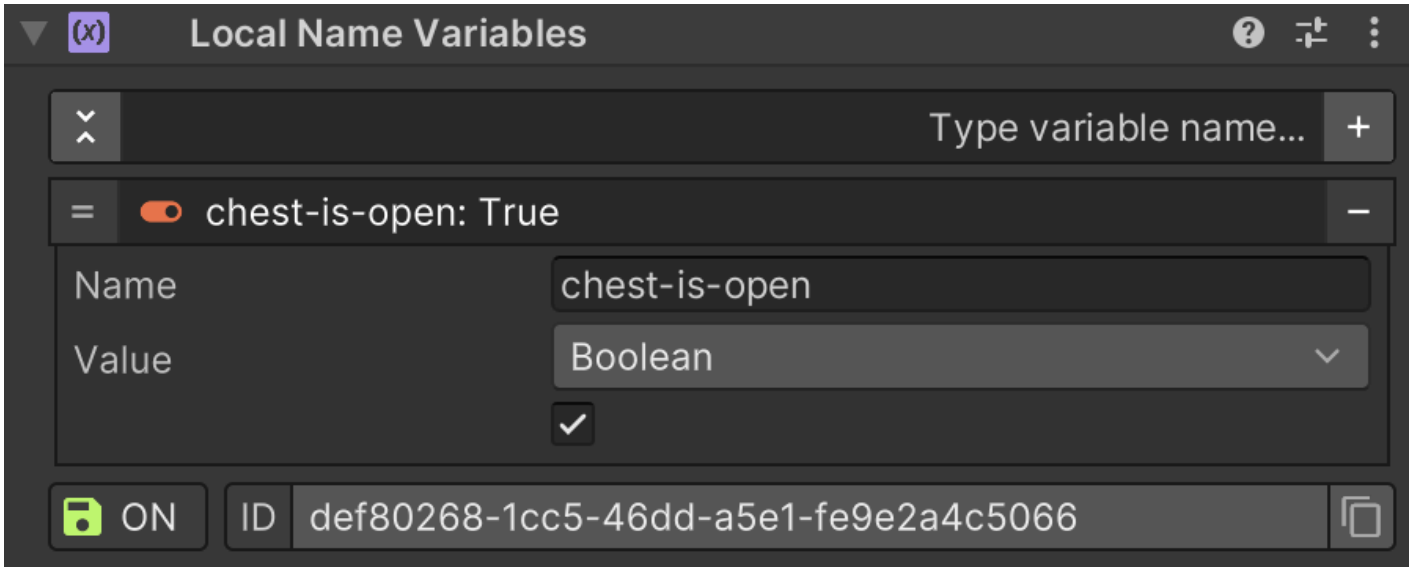
Vales can be saved between play sessions to later be restored when loading a game. Disabling the *save* option will make all variables keep the initial value as their starting value, even after loading a previously saved game.

622 Local Name Variables

Local Name Variables are variables identified by a unique string of characters that live inside a scene and can only reference objects that are contained inside this scene.

622.1 Creating a Local Name Variable

To create a **Local Name Variable**, right click on the Hierarchy Panel_ and select *Game Creator* → *Variables* → *Name Variables*. A new game object will appear with the **Local Name Variables** component. Alternatively you can also add this component to any existing game object.



Conflicting ID

Note that two Local Variables can't have the same unique ID. Otherwise they'll override each other's values. To generate a new unique ID, expand the *ID* field and click the "Regenerate" button.

622.2 Adding new entries

To add a new variable entry, type the name of the variable on the creation field and press enter (or click on the little [+] button).

The name of a variable can be modified, as well as its value type. The *Value* field als contains the starting value of this particular variable entry.

Save & Load

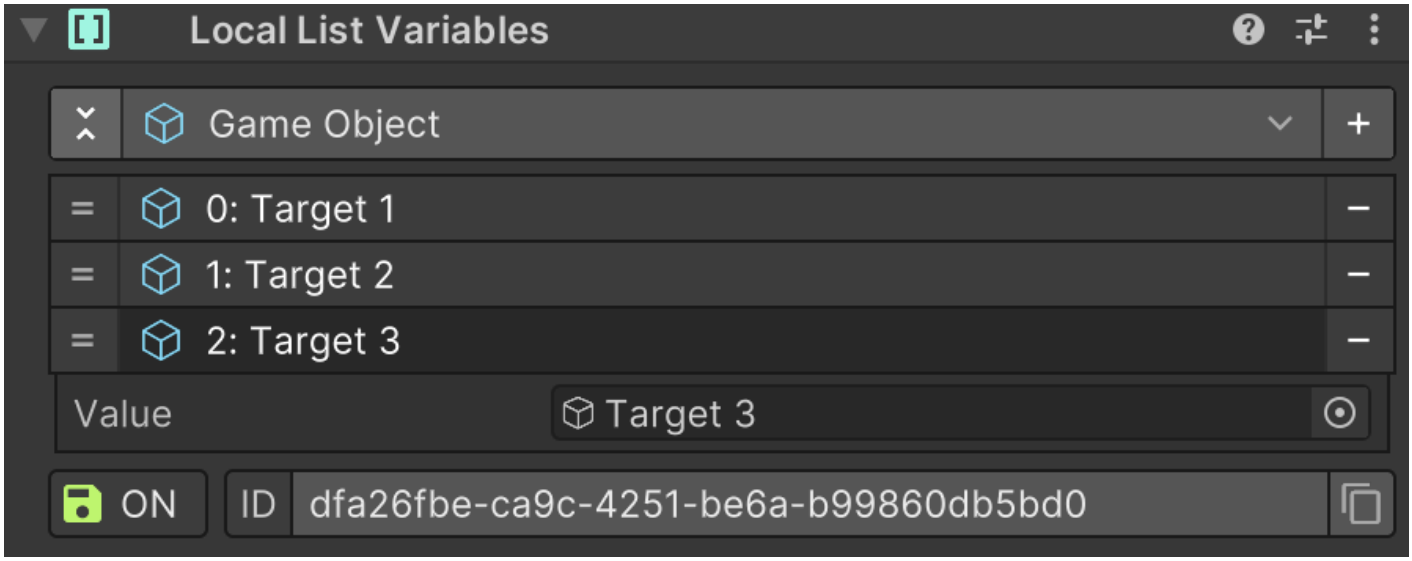
Vales can be saved between play sessions to later be restored when loading a game. Disabling the *save* option will make all variables keep the initial value as their starting value, even after loading a previously saved game.

623 Local List Variables

Local List Variables are variables identified by their numberic index value and can only be accessed from the scene they are part of.

623.1 Creating a Local List Variable

To create a **Local List Variable**, right click on the Hierarchy Panel_ and select *Create* → *Game Creator* → *Variables* → *List Variables*. A new game object with the component will appear in the scene and hierarchy. Alternatively, you can also add the *Local List Variables* component to any existing game object.



Conflicting ID

Note that two Local Variables can't have the same unique ID. Otherwise they'll override each other's values. To generate a new unique ID, expand the *ID* field and click the "Regenerate" button.

Save & Load

Vales can be saved between play sessions to later be restored when loading a game. Disabling the *save* option will make all variables keep the initial value as their starting value, even after loading a previously saved game.

I.VI Advanced

624 Advanced

Game Creator includes a collection of tools used throughout the entire ecosystem. This section briefly goes over all of them and provides a link to each tool's page, where they are explained in-depth, with use cases and examples.

> **Advanced Level**
>
> This section of the Documentation assumes you are familiar with Unity and Game Creator. Some sections may require you to also have some coding knowledge.

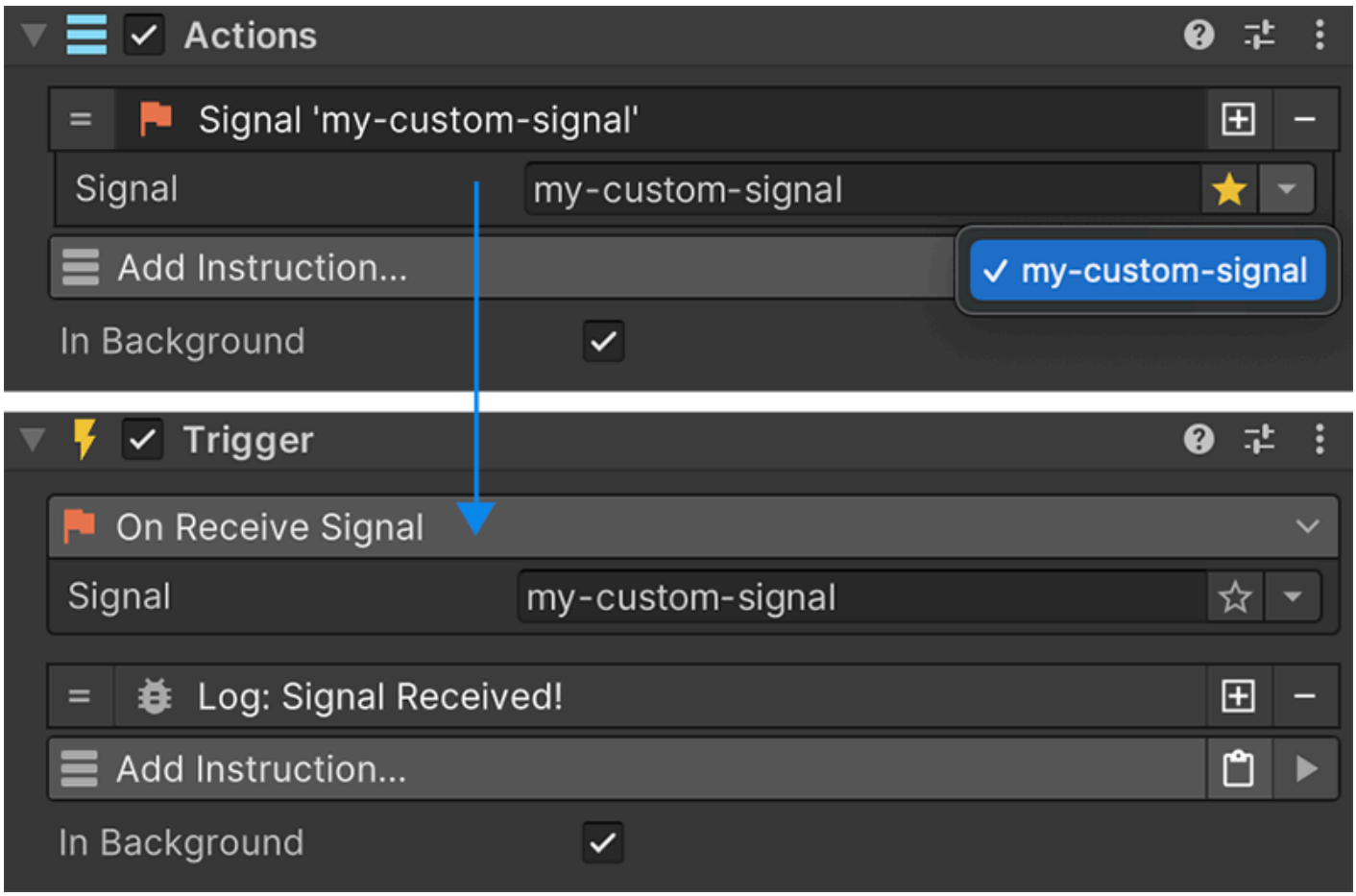
624.1 Audio

Game Creator has a 4 channel audio system that makes it very easy to change volume settings and play both diegetic and non-diegetic sound effects.

Learn about **Audio**

624.2 Signals

Communication between game objects is handled using the visual scripting tools, such as **Triggers** and **Actions**. However, there may be cases where the developer needs to respond to more tailored events that don't exist in Game Creator.



The **Raise Signal** instruction broadcasts a message with a specific identifier and any **Trigger**(s) listening to that specific id will be executed. To receive a signal message, use the **On Receive Signal** and specify the identifier.

> **Mark as Favorite**
>
> To avoid misspelling mistakes you can mark a **Signal** name as *favorite*, which can be used selecting them from the dropdown button on the right side. To unfavorite a name, simply click again on the *star* button.

624.3 Data Structures

Advanced Data Structures (also known as *ADS*) are generic data structures that help better perform certain tasks.

- **Unique ID**: Uniquely identifies an object with a serializable Guid.
- **Singleton**: It ensures there's zero or one instance of a class at any given moment and its value is globally accessible.
- **Dictionary**: A serializable dictionary.
- **Hash Set**: A serializable Hash Set.
- **Link List**: A serializable Linked List.
- **Matrix 2D**: A serializable 2D matrix.

- **Tree:** Generic structure that allows to have acyclic parent-child depenedencies between multiple class instances.
- **Ring Buffer:** This structure is similar to a generic list, but sequentially accessing its elements yields in an infinite circular loop, where the last element connects with the first one.
- **State Machine:** A data structure that allows to dynamically manipulate a state machine and define logic on each of its nodes independently.
- **Spatial Hash:** An advanced data structure that allows to detect collisions of any radial size inside an infinite spatial domain with an O complexity of *log(n)*.

624.4 Variables API

Local Variables and **Global Variables** can be modified at runtime using the exposed API. Note that **Local** variables are accessed via their component and **Global** variables require to be accessed through a singleton manager that contain their runtime values.

Learn how to use the **Variables API**

624.5 Properties

Properties are a core feature that allows to dynamically access a value. They are usually displayed as a drop-down menu and allow to retrieve them depending on the option selected.

For example, a `PropertyGetPosition` allows to get a `Vector3` that represents a position, from different sources; A constant value, the Player's position, the main camera's position, from a Local Variable, etc...

Learn more about **Properties**

624.6 Saving & Loading

Game Creator comes with a fully extensible save and load system that allows to easily keep track of the game progress and restore its state at any time. All that needs to be done is to implement an interface called `IGameSave` and subscribe/unsubscribe inside the `OnEnable()` and `OnDisable()` methods respectively.

- **Saving and Loading**
- **Saving custom data**
- **Saving on custom databases**

There is a special component called **Remember** that allows to cherry-pick the bits of data you want to save when saving a game.

624.7 Tweening

Game Creator comes packged with a powerful **Tweening** (or automatic frame interpolation, from in-between-ing) system. It allows to *fire & forget* a command that creates a tween between a starting value and end value. The transition can be linear or an easing function can be specified.

Learn more about **Tweening**

624.8 Examples and Templates

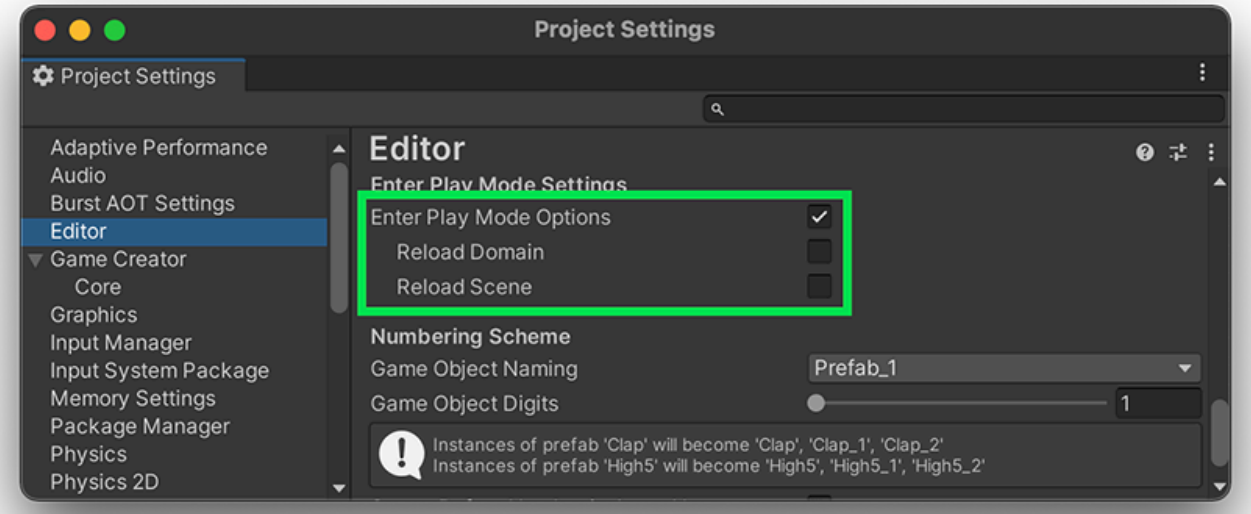
Game Creator and all modules come with a collection of examples and templates ready to be used on your games and applications. Other developers can leverage this feature in order to create reusable examples that can be installed/uninstalled across multiple projects or share them if you are a module developer using the **Example Manager** window.

Learn more about **Creating custom Examples**

624.9 Domain Reload

Game Creator supports skipping domain reloading, which reduces the time it takes for Unity to enter and exit play-mode.

Make sure **Enter Play Mode Options** is ticked and the **Reload Domain** option is disabled.



625 Audio

Game Creator comes with an audio manager that automatically manages and optimizes the creation and decomission of audio sources. There are 4 different types of audio channels, each with its own volume slider and properties.

625.1 Ambient

Ambient sounds are what one could also call background music or ambience. It's a looped tracked played in the background, and can be diegetic or non-diegetic. For example, a battle music track, the chirping of birds in a forest, or the sound of a waterfall.

Play Ambient Instruction

Use the **Play Ambient** Instruction to play an audio clip as an Ambient sound. It will keep playing until a **Stop Ambient** Instruction is executed.

625.2 Sound Effects

Sound Effects (also known as SFX) are one-time clips played at a very specific time. The majority of sounds on a game will be sound effects, for example: Punching a character, footstep sounds, or a slash of a sword. Most sound effects are diegetic and thus, by default expect a spatial position.

Sound Variation

To avoid the jarring effect where the same sound effect is played over and over again in a small time window, sound effects can automatically randomly alter the *speed* and *pitch* of sounds. This allows to, for example, play a machine gun sound effect, where each shot is slightly different than the previous one.

Play Sound Effect Instruction

Use the **Play Sound Effect** Instruction to play an audio clip as a Sound Effect. It will automatically decommision the audio source once the clip finishes playing.

625.3 UI

UI sound effects are non-diegetic clips played when the player interacts with the user interface. For example, hovering over a button, clicking it or crafting an item after the user waits a timeout.

Play UI Instruction

Use the **Play UI** Instruction to play an audio clip as a UI sound effect.

625.4 Speech

Speech clips are very similar to **Sound Effects** with the difference that they are bound to a Character, so that a specific character can only play one speech clip at a time.

Play Sound Effect Instruction

Use the **Play Speech** Instruction to play an audio clip as a Speech sound effect. If another clip is was being played on the same target, it will stop the previous speech and play the new one. This is useful when the user skips conversations.

I.VI.I Data Structures

626 Index

626.1 Data Structures

Advanced Data Structures (also known as *ADS*) are generic data structures that help better perform certain tasks.

- **Unique ID:** Uniquely identifies an object with a serializable Guid.
- **Singleton:** It ensures there's zero or one instance of a class at any given moment and its value is globally accessible.
- **Dictionary:** A serializable dictionary.
- **Hash Set:** A serializable Hash Set.
- **Link List:** A serializable Linked List.
- **Matrix 2D:** A serializable 2D matrix.
- **Tree:** Generic structure that allows to have acyclic parent-child depenedencies between multiple class instances.
- **Ring Buffer:** This structure is similar to a generic list, but sequentially accessing its elements yields in an infinite circular loop, where the last element connects with the first one.
- **State Machine:** A data structure that allows to dynamically manipulate a state machine and define logic on each of its nodes independently.
- **Spatial Hash:** An advanced data structure that allows to detect collisions of any radial size inside an infinite spatial domain with an O complexity of *log(n)*.

627 Unique ID

To generate unique identifiers, it is usually used the `System.Guid` class, because it provides a fast and reliable mechanism to generate long enough IDs that the collision chance is almost zero.

However, this class is not serializable. That's why **Game Creator** comes with the `UniqueID` class, which serves two purposes:

- **Serializable:** This means that any changes made to this ID will be kept between editor sessions.
- **Custom UI:** When showing this ID in a Unity Window, it automatically displays a nice and handy box with buttons that allow to easily modify this ID or even regenerate it, in case that's necessary.

627.1 Initialization

To initialize a class instance of `UniqueID` is as easy as calling the constructor class. For example, let's say we want to add a unique ID to a `MonoBehaviour` class:

```
public class MyComponent : MonoBehaviour
{
    public UniqueID myID = new UniqueID();
}
```

This will automagically assign a unique ID to the `myID` field. If we drag and drop this component onto a scene game object, we'll see this field with its associated ID.

627.2 Accessing ID

Accessing the ID value can be performed getting the `IdString` struct, which contains a string based ID and its hash value. This last one is recommended when comparing to ids:

To get the hash value:

```
int hash = this.myID.Get.Hash;
```

To get the `string` value:

```
string id = this.myID.Get.String;
```

Best Practices

Accessing the `string` value of the UniqueID should only be done if you plan on serializing this value somewhere. For comparing two IDs, it is best if you simply compare their `hash` value, as the probablity that two strings have the same hash value its very, very very low. On the other hand, comparing two `int` values is extremely fast and performant.

628 Singleton

The **Singleton** pattern ensures there's, at most, one instance of a class at any given time. Because of that, it can be globally accessed from its class name. To make a singleton class, inherit from the `Singleton<T>` type:

```
public MyClass : Singleton<MyClass>
{ }
```

To access this class, use `MyClass.Instance` which returns an instance of the MyClass. If none was present, it creates one and then it returns it, so you don't have to worry about keeping track whether it has been created or not.

> **MonoBehaviour**
>
> This Singleton pattern is specifically designed to work with Unity and thus, it requires the `MyClass` to inherit from `MonoBehaviour`. However, this is defined automatically when inheriting from the `Singleton<T>` class.

If you need to perform some setup when creating a new class instance, override the the `OnCreate()` method. Likewise, you can also override the `OnDestroy()` method to execute some logic when the instance is destroyed.

```
public MyClass : Singleton<MyClass>
{
    protected override void OnCreate()
    {
        base.OnCreate();
        // This is executed only once when created
    }

    protected override void OnDestroy()
    {
        base.OnDestroy();
        // This is executed only once when destroyed
    }
}
```

Singleton instances can survive or be destroyed every time their scene is unloaded. By default all singleton classes survivde scene reloading. But if you want to destroy them when changing between scenes, override the `SurviveSceneLoads` and set it to `false`:

```
public MyClass : Singleton<MyClass>
{
    protected override bool SurviveSceneLoads => false;
}
```

629 Dictionary

The serializable dictionary allows to have the whole fully fledged functionality of `System.Collections.Dictionary` but also allows to automatically serialize its values.

To create a serializable dictionary, simply inherit from `TSerializableDictionary<TKey, TValue>`. For example, to create a dictionary that uses `string` as their key and `GameObject` as their value:

```
public MyDictionary : TSerializableDictionary<string, GameObject>
{ }
```

You can now create a dictionary that automatically serializes its values and use it as any normal dictionary:

```
public MyComponent : MonoBehaviour
{
    public MyDictionary dictionary = new MyDictionary();

    private void Awake()
    {
        // Add element to dictionary:
        this.dictionary.Add("Hello World", this.gameObject);

        // Print element added
        Debug.Log(this.dictionary["Hello World"].name);
    }
}
```

630 Hash Set

The serializable hash set allows to have the functionality of `System.Collections.HashSet` but also allows to automatically serialize its values.

To create a serializable hash set, simply inherit from `TSerializableHashSet<T>`. For example, to create a hash set that uses `string` types:

```
public MyHashSet : TSerializableHash<string>
{ }
```

You can now create a hash set that automatically serializes its values and use it as:

```
public MyComponent : MonoBehaviour
{
    public MyHashSet hashSet = new MyHashSet();

    private void Awake()
    {
        // Add element:
        this.hashSet.Add("Hello World");

        // Print if it can find the elements
        Debug.Log(this.hashSet.Contains("Hello World"));
        Debug.Log(this.hashSet.Contains("Foo"));
    }
}
```

631 Link List

The serializable linked list allows to have the functionality of `System.Collections.LinkedList` but also allows to automatically serialize its values.

To create a serializable linked list, simply inherit from `TSerializableLinkList<T>`. For example, to create a hash set that uses `GameObject` types:

```
public MyLinkedList : TSerializableLinkList<GameObject>
{ }
```

You can now create a list that automatically serializes its values and use it as:

```
public MyComponent : MonoBehaviour
{
    public MyLinkedList list = new MyLinkedList();

    public GameObject objectA;
    public GameObject objectB;
    public GameObject objectC;

    private void Awake()
    {
        // Add element:
        this.list.Add(this.objectA);
        this.list.AddLast(this.objectB);
        this.list.AddFirst(this.objectC);

        // Print the first element:
        Debug.Log(this.list.First().name);
    }
}
```

632 Matrix 2D

The serializable 2D matrix allows to have an array of arrays (where all rows and columns have the same size) and the structure can be serialized in order to persist in the Inspector or saving the game.

To create a serializable matrix, simply inherit from `TSerializableMatrix2D<T>`. For example, to create a matrix that uses `GameObject`:

```
public MyMatrix : TSerializableMatrix2D<GameObject>
{ }
```

You can now create a matrix that automatically serializes its values:

```
public MyComponent : MonoBehaviour
{
    public MyMatrix matrix = new MyMatrix(10, 5);

    private void Awake()
    {
        // Add element:
        this.matrix[2, 3] = this.gameObject;

        // Print element added
        Debug.Log(this.matrix[2, 3].name);
    }
}
```

633 Tree

The Tree class allows to create acyclic dependency graphs that start from a root node and end with leaf nodes. A single node can have an unlimited number of branches.

To create a Tree, inherit from the `Tree<T>` class, where T is the value type of the node. For example, to create a tree of game objects:

```
public MyTree : Tree<GameObject>
{ }
```

```
public MyComponent : MonoBehaviour
{
    public MyTree tree = new MyTree();

    private void Awake()
    {
        // Add element:
        this.tree.AddChild(this.gameObject);

        foreach (var child in this.tree)
        {
            // Print child id:
            Debug.Log(child.Value.id);

            // Print child game object:
            Debug.Log(child.Value.Data.name);
        }
    }
}
```

A `Tree<T>` class is both the tree and the node class. So any child of a tree returns a tree object too. A tree can return its parent:

```
MyTree parent = this.tree.Parent
```

And it's children, which is a dictionary indexed by its Ids:

```
KeyValuePair<string, GameObject> = this.tree.Children;
```

634 Ring Buffer

The **Ring Buffer** is a very interesting data structure that works very similar to an array, except that its capacity is capped and iterating over its elements will automatically jump from its tail to its head when reaching the end of the list. Think of it as an array with a limited capacity where the tail joins the head, thus shaping it a ring.

To create a ring buffer, create a class that inherits from the `Ring<T>` class or directly use the `Ring<T>` type. For example, to create a ring buffer with 5 elements:

```
Ring<string> myRing = new Ring<string>(
    "string 1",
    "string 2",
    "string 3",
    "string 4",
    "string 5",
);
```

The ring buffer starts with its index pointing to the first element. Calling `Next()`, `Current()` and `Previous()` will change the pointer and return the new value. For example:

```
// Set the index to 0:
myRing.Index = 0;

// Iterate 100 times:
for (int i = 0; i < 100; ++i)
{
    // Print the next value:
    Debug.Log(myRing.Next());
}
```

The previous code snippet will iterate the previous ring 20 times (100 / 5) and print the name of each entry.

An interesting method of the ring buffer is the `Update(callback)`. This method accepts a method as its parameter and executes it for every element of the ring. For example:

```
myRing.Update(Debug.Log);
```

The previous method will print each of the entries of the ring buffer, as the `Debug.Log()` method is applied to each one of them.

635 State Machine

A **State Machine** is a commonly used pattern that allows to isolated the complexity of multiple tasks in different nodes, in a way that each node is not aware of what others do.

> **About State Machines**
>
> For a full description of what a finite state machine is check this Wikipedia article.

635.1 Creating States

Let's start seeing how to create states before creating a state machine. A **State** is a single node unit from the state machine. To create one, create a class that inherits from the `StateMachine.State` abstract class:

```
public class MyState1 : StateMachine.State
{ }
```

A State has 3 virtual methods that can be overriden in order to execute its custom logic:

```
// Executed when the machine changes to this state
void WhenEnter(StateMachine machine)
{ }

// Executed when the machine exists from this state
protected virtual void WhenExit(StateMachine machine)
{ }

// Executed every frame while this state is active
protected virtual void WhenUpdate(StateMachine machine)
{ }
```

A state has an `IsActive` property that can be queried to check if this state is currently the active one.

If you need to hook events to a State in order to make it work with other scripts, you can also subscribe to its event system.

```
// Executed when the machine changes to this state
event Action<StateMachine, State> EventOnEnter;

// Executed when the machine exists from this state
event Action<StateMachine, State> EventOnExit;

// Executed every frame while this state is active, before the WhenUpdate(...)
event Action<StateMachine, State> EventOnBeforeUpdate;
```

For example, let's first create an instance of `MyState1`:

```
MyState1 state1 = new MyState();
```

Now let's hook an external method that prints a message when the state is entered:

```
state1.EventOnEnter += this.OnEnterState;
```

The `OnEnterState(...)` method must have the following signature:

```
public void OnEnterState(StateMachine machine, State state)
{
    Debug.Log("Hello World!");
}
```

635.2 Creating a State Machine

To create a state machine, create a class that inherits from `StateMachine`:

```
public class MyStateMachine : StateMachine
{
    public MyStateMachine(State state) : base(state)
    { }
}
```

First State

Note that a State Machine requires at least one state to be passed to the constructor. This is the first starting state that the machine will begin with.

The developer is responsible for calling its `Update()` method. We recommend calling it in a *MonoBehaviour*'s `Update()`.

To instruct the machine to change from one state to another, use the `Change(State)` method:

```
MyState1 state1 = new MyState1();
MyState2 state2 = new MyState2();

// Initialize with state1
MyStateMachine machine = new MyStateMachine(state1);

// Change to state2
machine.Change(state2);
```

A State Machine also has 2 events that allow methods to be subscribed, which are launched as soon as there is a change in the currently active state:

```
event Action<State> EventStateEnter;
event Action<State> EventStateExit;
```

636 Spatial Hash

The **Spatial Hash** algorithm is a performant non-physics based query system that returns a list of objects contained in a position and a certain radius.

> **Performance**
>
> This algorithm scales with the amount of objects tracked. Its performance shines the most when there are multiple queries launched in a single frame. For more information about how this algorithm works check this Twitter post:
>
> https://twitter.com/catsoftstudios/status/1201520331724333058

636.1 Creating a Domain

The first thing needed is to create a world domain from where to track all objects and organize the space partitioning. We recommend setting up a static class that will handle registering all the changes that happen in the scene. For example:

```
public static class MySpatialHash
{
    public static SpatialHash Value { get; private set; } = new SpatialHash();

    [RuntimeInitializeOnLoadMethod(RuntimeInitializeLoadType.SubsystemRegistration)]
    private static void OnSubsystemsInit()
    {
        Value = new SpatialHash();
    }
}
```

The previous code snippet initializes the `Value` field with the default `SpatialHash` constructor. the `OnSubsystemInit()` is a method that gets called at the very beginning of starting the game, before any scene is loaded, thanks to its attribute.

636.2 Tracking Changes

Each object instance is responsible for updating the domain value when it changes. To do so, the object must implement the `ISpatialHash` interface, as well as call the `Insert()`, `Remove()` and `Update()` methods to start, stop and update the spatial hash's domain. For example:

```
public class MyComponent : MonoBehaviour, ISpatialHash
{
    void OnEnable()
    {
        // Start tracking this object
        MySpatialHash.Value.Insert(this);
    }

    void OnDisable()
    {
        // Stop tracking this object
        MySpatialHash.Value.Remove(this);
    }

    void Update()
    {
        // Update tracking position
        MySpatialHash.Value.Update(this);
    }

    // ISpatialHash interface. Position in space:
    Vector3 ISpatialHash.Position => this.transform.position;

    // ISpatialHash interface. Identifies this class:
    int ISpatialHash.UniqueCode => this.gameObject.GetInstanceID();
}
```

Boost Performance

This code is meant for demonstration purposes and might not be optimal on every case. If you want to squeeze every drop of performance, you may want to cache the last tracked position and only call the `Update(this)` method when its position has changed.

636.3 Requesting Collections

To request all the objects around a point and within a specific radius, use the `Query(Vector3 point, float radius)` method, which returns a list of game objects contained in the specified region.

```
// Define a point and radius in the 3D space:
Vector3 point = new Vector3(0,0,0);
float radius = 10f;

// request for all tracked game object within:
List<ISpatialHash> list = MySpatialHash.Value.Query(point, radius);
```

The list contains all components that implement the `ISpatialHash` interface tracked in this domain that are within the spherical region defined.

637 Variables API

637.1 Local Variables

Local Name Variables and **Local List Variables** are components attached to game objects and their value is bound to the scene they are. To access their runtime values you reference the component and call one of their public methods.

637.1.1 Local Name Variables

Local Name Variables are components attached to game objects and can be referenced like any other script. To access any of its values you can use the following methods:

637.1.1.1 Getting values

```
bool Exists(string name)
```

Returns true if the variable exists. False otherwise

```
object Get(string name)
```

Returns the value of the variable. Requires to be casted to the correct value

637.1.1.2 Setting values

```
void Set(string name, object value)
```

Sets the value of a variable

637.1.1.3 Listening to events

You can also register when a **Local Name Variable** changes using the following methods:

```
void Register(Action<string> callback)
```

Executes the callback every time a variable changes its value

```
void Unregister(Action<string> callback)
```

Stops executing the callback when the variable changes

637.1.2 Local List Variables

A **Local List Variables** component has the following methods for getting and manipulating its values:

637.1.2.1 Getting values

```
object Get(IListGetPick pick)
```

Returns the value indexed by the pick parameter

```
int Count
```

Property that returns the number of elements of the list

637.1.2.2 Setting values

```
void Set(IListSetPick pick, object value)
```

Sets a value indexed by the pick parameter

```
void Insert(IListGetPick pick, object content)
```

Inserts a value at the indexed position

```
void Push(object value)
```

Adds a new value at the end of the list

```
void Remove(IListGetPick pick)
```

Removes the value indexed by the pick parameter

```
void Clear()
```

Removes all values from the list

```
void Move(IListGetPick pickA, IListGetPick pickB)
```

Moves the value indexed at a position to a new index

637.1.2.3 Listening to events

You can also register when a **Local List Variable** changes any of its items using the following methods:

```
void Register(Action<ListVariableRuntime.Change, int> callback)
```

Executes the callback method whenever there's a change

```
void Unregister(Action<ListVariableRuntime.Change, int> callback)
```

Stops executing the callback when the list changes

637.2 Global Variables

Global Name Variables and **Global List Variables** are scriptable objects and their runtime value is stored in a separate singleton manager called `GlobalNameVariablesManager` and `GlobalListVariablesManager`.

637.2.1 Global Name Variables

The `GlobalNameVariablesManager` has the following methods available:

637.2.1.1 Getting values

```
bool Exists(GlobalNameVariables asset, string name)
```

Returns true if the variable exists. False otherwise

```
object Get(GlobalNameVariables asset, string name)
```

Returns the value of the variable. Requires to be casted to the correct value

637.2.1.2 Setting values

```
void Set(GlobalNameVariables asset, string name, object value)
```

Sets the value of a variable

637.2.1.3 Listening to events

You can also register when a **Global Name Variable** changes using the following methods:

```
void Register(GlobalNameVariables asset, Action<string> callback)
```

Executes the callback every time the variable changes its value

```
void Unregister(GlobalNameVariables asset, Action<string> callback)
```

Stops executing the callback when the variable changes

637.2.2 Global List Variables

The `GlobalListVariablesManager` has the following methods:

637.2.2.1 Gettings values

```
int Count(GlobalListVariables asset)
```

Returns the number of elements of the list

```
object Get(GlobalListVariables asset, IListGetPick pick)
```

637.2.2.2 Setting values

Returns the value indexed by the pick parameter

```
void Set(GlobalListVariables asset, IListSetPick pick, object value)
```

Sets a value indexed by the pick parameter

```
void Insert(GlobalListVariables asset, IListGetPick pick, TValue content)
```

Inserts a value at the indexed position

```
void Push(GlobalListVariables asset, TValue value)
```

Adds a new value at the end of the list

```
void Remove(GlobalListVariables asset, IListGetPick pick)
```

Removes the value indexed by the pick parameter

```
void Clear(GlobalListVariables asset)
```

Removes all values from the list

```
void Move(GlobalListVariables asset, IListGetPick pickA, IListGetPick pickB)
```

Moves the value indexed at a position to a new index

637.2.2.3 Listening to events

You can also register when a **Global List Variable** changes any of its items using the following methods:

```
void Register(GlobalListVariables asset, Action<ListVariableRuntime.Change, int> callback)
```

Executes the callback method whenever there's a change

```
void Unregister(GlobalListVariables asset, Action<ListVariableRuntime.Change, int> callback)
```

Stops executing the callback when the list changes

638 Properties

Game Creator properties are a special type of class that allows to dynamically specify the source of a field value using a dropdown menu. The menu's options are dynamic and can be added without the need of overwriting **Game Creator** core code, allowing to write maintainable and decoupled code.

> **Polymorphic Serialization**
>
> **Properties** take advantage of Unity's polymorphic serialzation, which means that the dropdown menu options are decoupled from the core code. Anyone can plug in their own menu options without overwriting any scripts.

There are different types of **Properties**, each with its own set of options. All of them have in common that, when retrieving them, an instance of `Args` parameter is passed, which contains two fields:

- **Target:** A reference to the `Game Object` responsible for calling the property
- **Self:** A reference to the `Game Object` containing the property reference.

> **Args Parameter**
>
> There are some cases where the `Target` and `Self` fields will reference the same game object.

Property *Get* types allow to retrieve a value and Property *Set* types allow to set a value. **Game Creator** comes with a collection of both types, but each module increases the amount available. You can even create your own property types to extend the existing ones.

638.1 Property Types

There are a multiple default property types available, which start with `PropertyGet ~` and end with the type. For example `PropertyGetNumber` is the property type for numeric values, and `PropertyGetBool` is the analog for boolean (true/false) values.

There are also property setters, which allow to set the value of a property. They start with `PropertySet ~` and also end with the type name. For example the `PropertySetGameObject` allows to set the value of a game object reference.

638.2 Using Properties

UI Toolkit

Using properties requires the Editor scripts to be written using Unity's UI Toolkit. IMGUI is not supported.

To use a property it's very simple. You just need to declare them as you would with a primitive type, but instead of getting the value directly, call the `Get(args)` method to retrieve its value.

For example, let's say that in a component, you want to get a `string` value. Instead of declaring a value like this:

```
public string myValue = "This is my string";
```

You could use a property so the source of that string value isn't hard-coded, but set from the Inspector. Like this:

```
public PropertyGetString myValue = new PropertyGetString();
```

This will display a dropdown menu on the Inspector with the current option selected. By default it's a constant string, but the value can be chosen to come from the name of a game object, a local or global variable, etc.

To get the value you simply call the `Get(args)` method:

```
string value = this.myValue.Get(args);
```

Args

The `Args` (arguments) class is a two-field struct that contains the game object considered as the *source* of the call as well as the *targeted* game object. This class is necessary in order to use properties that reference the "Self" or "Target" values. If you are not sure what the self and target objects are, simply pass in the current MonoBehaviour's game object:

```
Args args = new Args(this.gameObject);
```

638.3 Creating Properties

Just like **Instructions** and other visual scripting nodes, one can create custom properties to interact with other assets or custom code. To create a new GET Property simply inherit the `PropertyTypeGet[TYPE]`.

Example of a custom number property

For example let's say we want to create a custom number GET property that always returns 42 (for some reason). In that case we create a new script that inherits from `PropertyTypeGetNumber` called `GetNumber42`:

```
public class GetNumber42 : PropertyTypeGetNumber
{
    public override Vector3 Get(Args args)
    {
        return 42;
    }
}
```

Adding fields

You can also expose fields just like you would do in a custom Inspector script. For example, if you want to display an integer field which will be returned by the property you can do so:

```
public class GetNumberInteger : PropertyTypeGetNumber
{
    [SerializedField] private int myNumber = 42;

    public override Vector3 Get(Args args)
    {
        return this.myNumber;
    }
}
```

You can add as many fields as you want. Even other properties.

To return the value the `Get(args)` method must be implemented. The `Args` parameter contains the `Self` and `Target` values calling the property, which can be used to dynamically get the final value if necessary.

Optionally the `PropertyTypeGetNumber` child class can also override the `String` property to display a nicer title in the Unity Inspector. For example:

```
public class GetNumber42 : PropertyTypeGetNumber
{
    public override Vector3 Get(Args args)
    {
        return 42;
    }

    public override string String => "42";
}
```

Property classes can also be decorated with the `Title`, `Category`, `Description` and other attributes, just like it is done on **Instructions** and other visual scripting nodes.

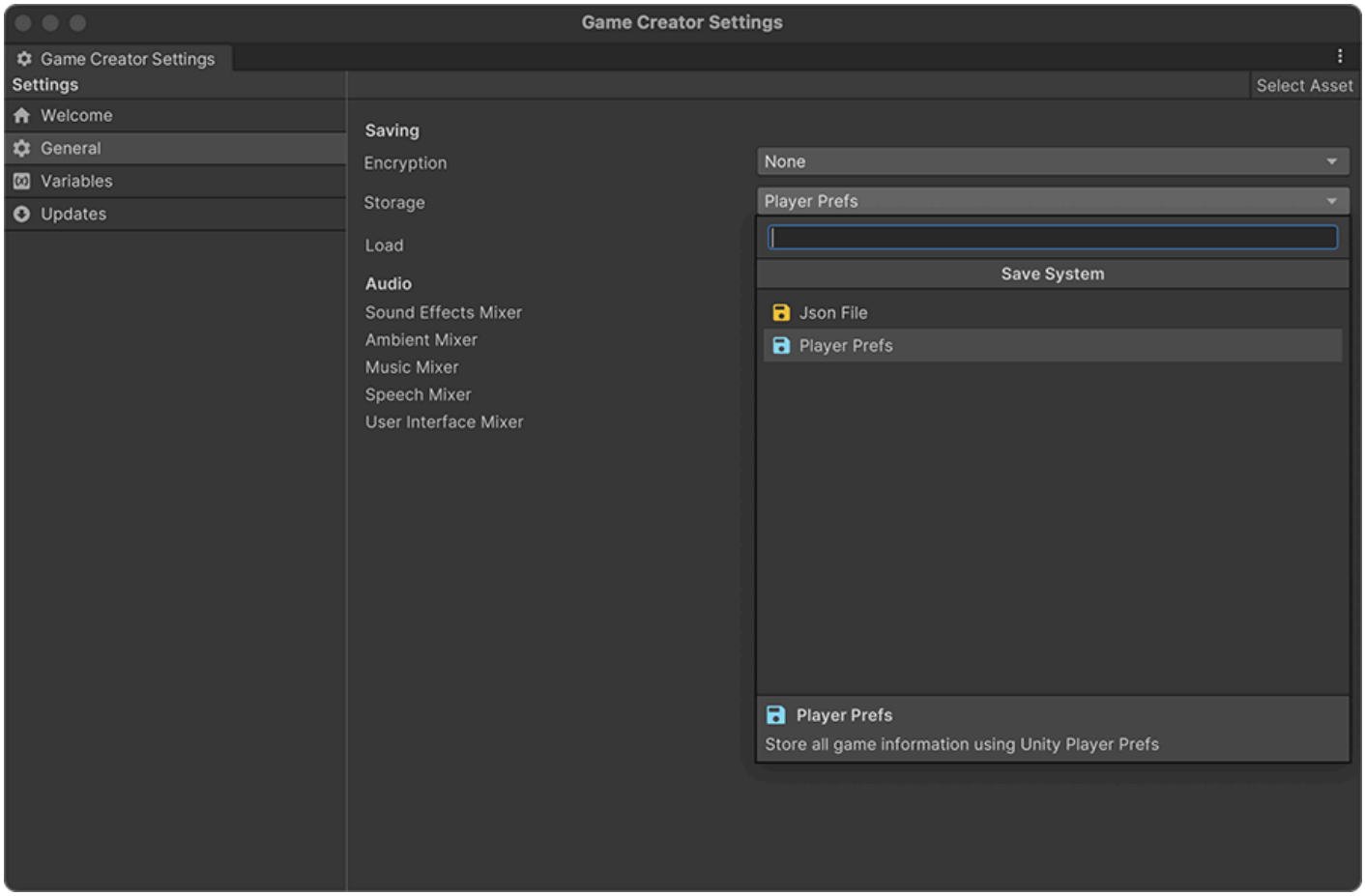
I.VI.II Save & Load

639 Saving and Loading

Game Creator comes with a flexible mechanism to keep track of changes made at runtime and store these by calling a simple `Save()` method. Likewise, restoring any previously saved game can be done executing a `Load()` method from the class responsible for managing this functionality.

639.1 Storage Location

Game Creator makes it very easy to choose how data is saved. By default it uses the *Player Prefs* system from Unity, which stores all the data in a file which varies its location depending on the runtime platform. See the Unity documentation for Player Prefs for more information.



639.2 Storage Encryption

Game Creator also makes it very easy to encrypt your game saves using various encryption algorithms, which you can choose from the dropdown button above the storage location.

The default algorithms are very simple ones that prioritize speed over security.

- **None:** No encryption is applied. This is the default value.

- **XOR:** A symmetric algorithm that obfuscates the data by performing a logic *XOR* operation with a pass-phrase.
- **Caesar:** Another symmetric algorithm that obfuscates the data by shifting each alphanumeric value by a number specified.

639.3 What can be saved and loaded

The Save/Load system can save any primitive serializable field: integers, booleans, strings, positions, rotations or any managed instance type marked with the `[System.Serializable]` attribute.

However, it does not serialize objects inheriting or fields referencing objects that inherit from `Unity.Object`. For example: Game Objects, Transforms, MonoBehaviours, ...

639.4 Save Slots

Most games allow to store multiple saves and allow the user to choose which one to restore when loading a previous saved play. With **Game Creator**, each one of these save spaces are called **slots** and they are represented by an integer number ranging from 1 up to 999.

> **Note**
>
> Notice that you can have up to 998 slots. The number 0 is reserved for *shared settings*.

639.5 Saving

To save a game, it's as easy as calling the `Save(slot: integer)` method through the `SaveLoadManager` singleton class. This class is responsible for tracking all objects in the scene and silently collects their state in a background process. Saving a game can be done using the following line, passing a constant save slot number 1 as a parameter:

```
SaveLoadManager.Instance.Save(1);
```

By default, the saving system uses Unity's *PlayerPrefs* system, which blocks the main thread until al data is written. However, **Game Creator** provides tools that allow to customize how data is saved. You could even have an online database where you dump the player's save files.

Because we can't assume the saving will be done synchronously, the `Save(slot: int)` method returns a `Task` that can be awaited. This is very useful if you plan on synchronizing the game save with an external database, such as Steam, Firebase or any other online data warehouse service.

To handle these cases, all that needs to be done is use an async method and await the result. Like so:

```
public async Task MySaveFunction()
{
    Debug.Log("Start saving game");
    await SaveLoadManager.Instance.Save(1);
    Debug.Log("Game has been saved");
}
```

However, if you are using the default *PlayerPrefs* save system or your custom one does block the main thread when saving, you can either await the task or use a discard operator:

```
public void MySaveFunction()
{
    Debug.Log("Start saving game");
    _ = SaveLoadManager.Instance.Save(1);
    Debug.Log("Game has been saved");
}
```

639.6 Loading

Loading a previously saved game is very similar to saving one.

It is important to highlight that loading a game forces to unload the current scene and loads the saved one afterwards. Even if they are the same.

```
SaveLoadmManager.Instance.Load(1);
```

The `Load(slot: int)` method returns a `Task` object, just like the `Save(slot: int)`. You can choose to either await the load or, in most cases, use the discard operator:

```
public void MyLoadFunction()
{
    _ = SaveLoadManager.Instance.Load(1);
}
```

639.7 Deleting

A user may want to delete all the information associated to a save *slot*. This can be done using the following line:

```
SaveLoadManager.Instance.Delete(1);
```

The `Delete(slot: int)` method also returns a `Task` object. However, in this case, it may be more interesting knowing when a delete operation has finished.

639.8 Events

The saving and loading system contains 6 events that programmers can hook onto to detect when a saving and a loading process has started.

- `public event Action<int> EventBeforeSave;`
- `public event Action<int> EventAfterSave;`
- `public event Action<int> EventBeforeLoad;`
- `public event Action<int> EventAfterLoad;`
- `public event Action<int> EventBeforeDelete;`
- `public event Action<int> EventAfterDelete;`

For example, doing something when a *save* operation is about to start can be achieved subscribing to the `EventBeforeSave` event:

```
void Start()
{
    SaveLoadManager.Instance.EventBeforeStart += this.OnBeforeSave;
}

public void OnBeforeSave(int slot)
{
    Debug.Log("About to save game in slot " + slot);
}
```

You can subscribe to as many methods as you need in each event. However, make sure to remove the subscription when the class that is doing subscribing is destroyed. For example, following the excerpt from above, it would also be optimal to do:

```
void OnDestroy()
{
    SaveLoadManager.Instance.EventBeforeStart -= this.OnBeforeSave;
}
```

639.9 Customize

As mentioned before, **Game Creator** doesn't assume a specific save or load procedure. In fact, it provides with tools to customize how data is collected and stored in order for the developer to customize it and tailor it to its needs.

In the following sections we'll see how to:

- Create a custom class that can be saved
- Determine a custom data location
- Create a custom encryption

640 Custom Data

The `SaveLoadManager` class keeps track of all savable objects in the scene and collects their state in a background process so when the `Save()` method is invoked, it contains all the information required to successfully perfom the oepration.

In order to let the `SaveLoadManager` know what objects it needs to keep track of the developers need to implement the `IGameSave` interface on each object that contains data to save.

As soon as the object is available, it must call the `Subscribe(reference: IGameSave, priority: int)` method. Likewise, when the object is destroyed it should call `Unsubscribe(reference: IGameSave)`.

640.1 The IGameSave interface

The `IGameSave` interface requires to fill the following methods and properties:

- `string SaveID`: Gives an id that uniquely identifies this data
- `bool IsShared`: Tells whether this data is shared across all save games
- `Type SaveType`: Returns the type of the object to be serialized and stored
- `object SaveData`: Returns the instance of the object that's going to be saved
- `LoadMode LoadMode`: Define whether loading happens following a `Greedy` or a `Lazy` format
- `void OnLoad(object value)`: Callback for when the game is loaded

In order to understand better how this works, it's better to demonstrate this with an example.

Let's say that in our game we have one single chest in a scene that the player can only open once.

```
public class MyChest: MonoBehaviour
{
    public bool hasBeenOpened = false;

    public void OnOpen()
    {
        Debug.Log("Do something, like giving a potion to player");
        this.hasBeenOpened = true;
    }
}
```

In order to keep track of whether the chest has been opened or not, we implement the `IGameSave` interface on the component that defines the behavior of the chest:

```
public class MyChest: MonoBehaviour, IGameSave
{
    public bool hasBeenOpened = false;

    public void OnOpen()
    {
        if (this.hasBeenOpened) return;

        Debug.Log("Do something, like giving a potion to player");
        this.hasBeenOpened = true;
    }

    // The id for this save game is 'my-chest'
    public string SaveID => "my-chest";

    // This save should not be shared across multiple slots
    public bool IsShared => false;

    // The object type we're going to be saving
    public Type SaveType => typeof(bool);

    // The value we're going to store
    public object SaveData => this.hasBeenOpened;

    // The loading mode should be set as lazy
    public LoadMode LoadMode => LoadMode.Lazy;

    // When loading the game, restore the state
    public void OnLoad(object value)
    {
        this.hasBeenOpened = (bool)value;
    }
}
```

Most fields should be self explanatory. It is important to highlight though, that it's up to the developer to implement how the state is restored. The `OnLoad(object value)` is called when a game is loaded, and the `value` parameter is the value from a previously saved game. It's the developer's responsibility to cast the object value to a valid type and assign the values to whichever fields are necessary.

The **Load Mode** is a tricky concept. It's an enum that allows to choose between two options:

- **Lazy**: This should be the default option for 90% of the cases. When this option is selected, the save and load system will restore the state of an object when this object is created. Not before.
- **Greedy**: This requires a persistent object that survives cross-scene transitions (set as `DontDestroyOnLoad()` method). Most commonly used with singleton patterns, this mode forces the load as soon as the event is triggered.

640.2 Subscription

Now, all that's left to do is tell the `SaveLoadManager` to keep track of this component as soon as it's initialized, and unsubscribe from it when the component is destroyed. Following the previous example, we implement the `OnEnable()` and `OnDisable()` Unity methods to subscribe and unsubscribe respectively:

```
public class MyChest: MonoBehaviour, IGameSave
{
    public bool hasBeenOpened = false;

    void OnEnable()
    {
        _ = SaveLoadManager.Subscribe(this);
    }

    void OnDisable()
    {
        _ = SaveLoadManager.Unsubscribe(this);
    }

    // IGameSave implementation below
    // ...
}
```

This gives all the necessary information to the save and load system about the life-cycle of this object so it can keep track of its state progress. If your object is never destroyed and survives scene transitions, you can skip the un-subscription.

To wrap things up, here's the full script of the example:

```
public class MyChest: MonoBehaviour, IGameSave
{
    public bool hasBeenOpened = false;

    public void OnOpen()
    {
        if (this.hasBeenOpened) return;

        Debug.Log("Do something, like giving a potion to player");
        this.hasBeenOpened = true;
    }

    void OnEnable()
    {
        _ = SaveLoadManager.Subscribe(this);
    }

    void OnDisable()
    {
        _ = SaveLoadManager.Unsubscribe(this);
    }

    public string SaveID => "my-chest";
    public bool IsShared => false;

    public Type SaveType => typeof(bool);
    public object SaveData => this.hasBeenOpened;

    public LoadMode LoadMode => LoadMode.Lazy;

    public void OnLoad(object value)
    {
        this.hasBeenOpened = (bool)value;
    }
}
```

The `hasBeenOpened` property will always return `false` if the `OnOpen()` method has never been executed, but will return `true` if it has at some point. If the user saves and loads back the game, its value will be kept.

641 Custom Location

By default, **Game Creator** saves games using the *Player Prefs* built-in system. However, although this solution is cross-platform and will work for most users, some might prefer to sync their saves with an online database or use a different system than Unity's *PlayerPrefs*.

Here we will explore how easy it is to extend the save location.

641.1 TDataStorage class

To create a custom save location, one must create a class that inherits from the abstract class `TDataStorage`, which contains all the necessary methods to store game information.

> **Note**
>
> Notice that in the following example(s) aren't any error handling mechanism for sake of simplicity. A production-ready product should also check and inform of the necessary errors that may occur.

Let's create our storage location class called `StorageMyDB.cs`:

> **Convention**
>
> When creating a new storage database, we precede the name of the class with the `Storage` word. So if your class is called `MyDB` the convention would be to call it `StorageMyDB`.

```
[Title("My Online Database")]
[Category("My Online Database")]

[Image(typeof(IconDiskSolid), ColorTheme.Type.TextLight)]
[Description("Stores the data in a custom database location")]

[Serializable]
public class MyOnlineDatabase: TDataStorage
{
    public async override Task DeleteAll()
    {
        // ...
    }

    public async override Task DeleteKey(string key)
    {
        // ...
    }

    public async override Task<bool> HasKey(string key)
    {
        // ...
    }

    public async override Task<object> Get(string key, Type type)
    {
        // ...
    }

    public async override Task Set(string key, object value)
    {
        // ...
    }

    public async override Task Commit()
    {
        // ...
    }
}
```

The `Title` and `Description` attributes allow to define the name and give a brief description of what this storage does, so it can be easily identified when choosing it from the *Setting*'s dropdown menu.

The `Image` attribute determines the visual icon from the dropdown menu. We recommend using the disk icon and only change the color.

The `Category` attribute determines the location in the dropdown menu.

The `TDatabaseStorage` class has a collection of abstract methods that need to be overridden and implemented in order to use the custom storage.

- `DeleteAll`: Is used to erase all information stored.
- `DeleteKey`: Is used when deleting a single entry in the database.
- `HasKey`: Returns `true` or `false` depending on whether the database has a field with that key name.

- `Get` : Returns the contents of the database field with the specified key name.
- `Set` : Sets the new value on the database with the specified key name.
- `Commit` : Only used when setting multiple values on a database is very slow. The commit is always called after a batch of data is send to be stored.

Using `async/await`

It is important to note though that all methods have the `async` prefix and either return a `Task` object or a `Task` associated with an object.

This is because there's a certain amount of time elapsed between the http request and the answer from the server. Being able to await requests let's you tailor how to safely chain commands and make sure each request is successfully fulfilled.

642 Custom Encryption

To create a custom encryption algorithm you need to inherit from the `TDataEncryption` abstract class and override both the `Encrypt(...)` and `Decrypt(...)` methods.

Each method has a single `string` argument and returns another `string` argument, which can either be the decrypted message or the encrypted message.

```
[Title("My Custom Encryption")]
[Category("My Custom Encryption")]

[Image(typeof(IconCubeSolid), ColorTheme.Type.Yellow)]
[Description("Uses my own custom and super-secret encryption algorithm")]

[Serializable]
public class EncryptionMyCustom : TDataEncryption
{
    public override string Encrypt(string input)
    {
        // Logic for taking the input and returning it as an encrypted output
    }

    public override string Decrypt(string input)
    {
        // Logic for taking the input and returning it as an decrypted output
    }
}
```

The **`Title`** and **`Description`** attributes allow to define the name and give a brief description of what this encryption algorithm does, so it can be easily identified when choosing it from the *Setting*'s dropdown menu.

The **`Image`** attribute determines the visual icon from the dropdown menu.

The **`Category`** attribute determines the location in the dropdown menu.

The `TDataEncryption` class has two abstract methods that need to be overridden and implemented in order to use the custom encryption.

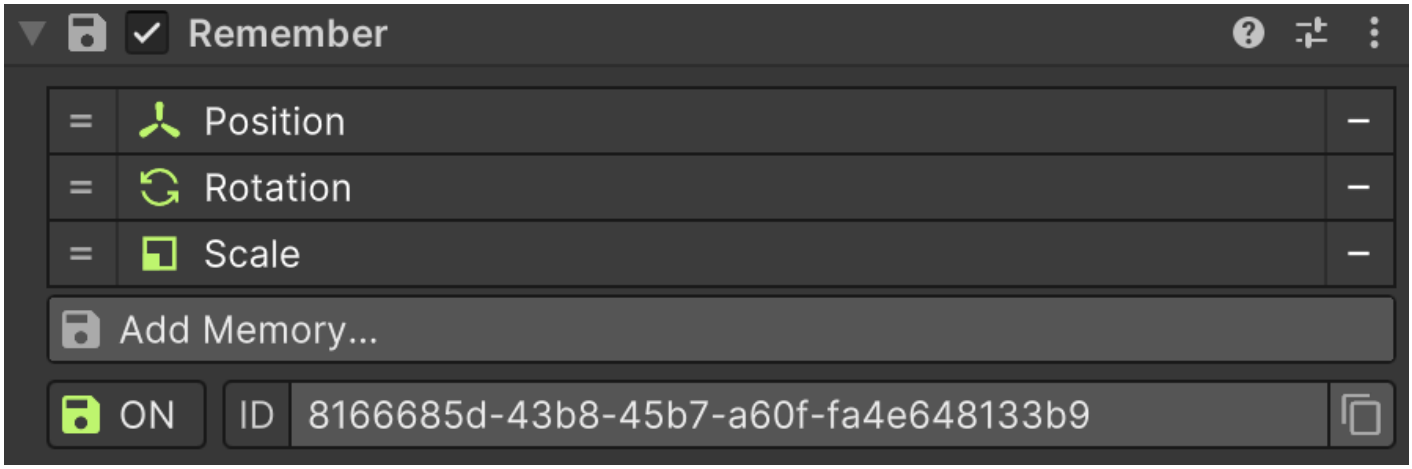
- **`Encrypt(input)`** : Takes an input string and returns the encrypted value.
- **`Decrypt(input)`** : Takes an input string and returns the decrypted value.

Note that you can add serializable methods to the class and these values will appear in the *Settings* menu. For example, if your encryption algorithm requires a private string key called `privateKey` and an integer number called `salt` you can add them inside your class with the serialized attribute:

```
[SerializeField] private string privateKey;
[SerializeField] private int salt;
```

643 Remember

The **Remember** component allows to cherry-pick the data that is stored when saving the game. By default, it stores the position, rotation and scale.



To add a new element to be saved, click on the *Add Memory* button and select the type of data to save.

643.1 Creating a Memory

Game Creator comes with a set of default memories, but you can create custom ones that extend the data stored. To create a new **Memory** create a new class that inherits from the `Memory` class. For this example, we'll create a *memory* that saves name of the game object attached to this memory.

```
[Serializable]
public class MemoryName : Memory
{
    public override string Title => "Name of Game Object";

    public override Token GetToken(GameObject target)
    {
        return new TokenName(target);
    }

    public override void OnRemember(GameObject target, Token token)
    {
        if (token is TokenName tokenName)
        {
            target.name = tokenName.text;
        }
    }
}
```

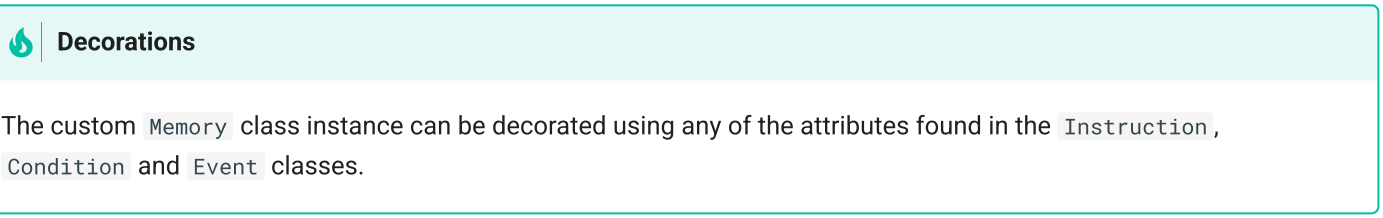
The `Title` property determines the name of this memory. This has no effect on the data stored but it displays this value on the Inspector.

The `GetToken(...)` method returns the `Token` instance of this memory and is called when the game data is scheduled to be saved. A `Token` is a data container that contains the data to be stored. In this case, we'll need to create a new class called `TokenName` that inherits from `Token` and has a serializable field to save the name of the object.

```
[Serializable]
public class TokenName : Token
{
    public string text;

    public TokenName(GameObject target) : base()
    {
        this.text = target.name;
    }
}
```

The `OnRemember(...)` method is called when loading a previously saved game and is used to restore its state. In this case, it changes the name of the game object to the one it tries to *remember*.



644 Tween

Tweening is the process to define a starting positon and an end position, and let it transition from one to the other over the course of a specifed duration.

For exmaple, opening a door can be easily achieved defining it's starting position as its current position and its end point as the same as its starting one, plus 2 units up in the Y axis. Once you specify the duration, the door will slide upwards when the tweening is activated.

The Tweening library has been created with Game Creator in mind, but can also be leveraged to be used in other scripts. Use the `Tween.To(...)` static method to create a new transition.

The `To(gameObject, input)` has two parameters: The *Game Object* that recieves the tweening, and an instance of a `TweenInput` class, which configures the animation.

Following the example from above, let's say we want to slide a "door" object 2 units up in the air. We can define the `TweenInput` class instance like this:

```
Vector3 valueSource = door.position;
Vector3 valueTarget = door.position + Vector3(0,2,0);
float duration = 5f;

ITweenInput tween = new TweenInput<Vector3>(
    valueSource,
    valueTarget,
    duration,
    (a, b, t) => door.position = Vector3.Lerp(a, b, t),
    Tween.GetHash(typeof(Transform), "transform"),
    Easing.Type.QuadInOut
);
```

Transition Type

In this example we use a Vector3 transition, but it accepts any value type, like numbers, colors, quaternions, ... It's up to the *updateCall* to interpolate between the initial and final value.

Let's break down each of these parameters in order:

```
TweenInput<Vector3>(
    Vector3 start,
    Vector3 end,
    float duration
    Update updateCall,
    int hash,
    Easing.Type easing
);
```

- **start:** A value indicating the starting position

- **end:** A value indicating the end position
- **duration:** The amount of time it takes to complete the transition
- **updateCall:** A method called every frame while the transition occurs. Contains 3 parameters: The starting value, the end value and the completion ratio between 0 and 1.
- **hash:** An integer that uniquely identifies this transition. If another transition with the same id starts, it cancels the previous one.
- **easing:** An optional easing function. If none is provided, it will use a linear function.

645 Custom Installs

Game Creator comes with the **Install** window, which allows a user to install and uninstall examples and templates from all modules. This is something available to all module developers and here you'll learn how to create, step by step, a template for a module called "My Module".

645.1 Installer

The **installer** directory is where the compressed file with the information about it is located. This folder is usually found under the custom Module's path but can be anywhere on the project folder. It must contain two files:

- An **Installer** configuration file, which contains all the information related to the example, including its name, the module it belongs to, a description and the version of this package.
- A **Package.unitypackage** file, which contains the compressed assets that will be unpacked upon installing.

645.2 Installation Location

The installed location is the directory where the example is decompressed after installing an example in order to be used by the user. This folder is always located at the following route:

```
Assets/Plugins/Game Creator/Installs/
```

An installed extension will always have a folder parent called after the name of the module, followed by a dot, followed by the name of the example, followed by an @ symbol and the semmantic version of the example. For example, if the example is called "My Example" and it's from a module called "My Module", the installation location of the example will be:

```
Assets/Plugins/Game Creator/Installs/MyModule.MyExample@1.0.0/
```

645.3 Creating a custom Installer

The example installer can be placed anywhere in the project. For simplicity it should be created where you have the rest of the module's assets. For example, if you are creating a module called "My Module" and an example of that called "My Example", at the root of the Unity project, you may want to place the installer inside the *MyModule* folder:

```
Assets/
    MyModule/
        Examples/
            MyExample/
        Scripts/
        Textures/
        ...
```

645.3.1 The Installer asset

Now that there is a folder where we can drop in the installation files, we'll create an **Installer** asset inside the **MyExample** folder. To do so, right click on the aforementioned folder and select `Create -> Game Creator -> Developer -> Installer`. If the option doesn't appear, you can also duplicate any existing Installer asset. Once you have the Installer asset you can rename it so it makes sense for your project.

> **Name Convention**
>
> We recommend sticking to Game Creator's naming convention and name the asset following "[ModuleName].[ExampleName]". This makes it easier to identify the asset and avoids conflicting names with other examples from other modules.

With the **Installer** in place, click on the *Configuration* button to expand the properties available and fill in the fields:

- **Name:** Name of the Example. Following the example from above, this would be "My Example.
- **Module:** Name of the module. It is important to note that this determines the category of the example. In the use case from above, the name would be "My Module".
- **Description:** A thorough description of this example. Make sure to indicate any quirks the example may have or how to get started once the example is installed.
- **Author:** Name of the creator of this example. This has no implication other than giving credit to the creator.
- **Version:** The semmantic version of this example. Make sure to increase the value every time you create a new version of the example.
- **Complexity:** How difficult it is for users to understand this example. This is for informational purposes only.
- **Dependencies:** A collection of ID (module name + example name) that this example depends on.

> **Dealing with Dependencies**
>
> The **Install** window will automatically install any dependencies that an example may depend on, without prompting the user to do so. This allows to quickly resolve any conflicts between this example and others that are required to be installed.
>
> For example, if the example *Example A* has *Example B* as a dependency, and this last one is not yet installed, attempting to install *Example A* will install both *Example A* and *Example B*.
>
> If *Example B* cannot be found, it won't be possible to install *Example A* from the Install window and will prompt the user an error message telling which module could not be found.

645.3.2 Making the skeleton

Now that we have the installer in place it's time to create the skeleton from which to build our example. To do so, select the previously created **Installer** and in the Inspector, right click on the name of the installer. This will make a dropdown menu appear with a bunch of options:

- **Install Package:** Forces the installation of this example. However, it is recommended to use the Install window to perform any installation instructions.
- **Delete Package:** Deletes the installed example, if there's any.
- **Build Package:** Changes the name of the installation path to fit the version number and creates a *Package.unitypackage* file at the installation location.
- **Create Package:** Creates the bare bones structure that allows to develop a new example.

In our case, we want to click on the "Create Package" option. This will create a new folder at:

```
Assets/Plugins/Game Creator/Installs/MyModule.MyExample@1.0.0/
```

Inside this folder you can place all prefabs, materials, scenes or any content that the example must have. To generate (or compress) this folder so it can be shared, select the option "Build Package" from the previous dropdown menu. This will export all assets inside the aforementioned folder and create a file called **Package.unitypackage** at the same directory as the **Installer**.

645.4 Sharing your example

Once you have the example built, it is ready to be distributed. To share this example installer, you just need to export the folder with the installer and the Package.unitypackage file generated.

If you (or the user) opens the Install window, the module will be displayed as a sub category of the specificed module with the option to install it, update it and/or delete it, depending on whether there is an installed version or not.

I.VII Releases

646 Releases

646.1 2.17.51 (Latest)

Released October 18, 2024

New

- Cameras: FPS shot has an offset value

Changes

- Editor: Support for Unity 6
- Cameras: TPS shot uses dynamic shoulder and lift

Fixes

- General: Smooth Time causing NaN values when Time Scale is 0
- Character: Time scale affecting time unbound values
- Cameras: First Person Set Rotation incorrect pitch
- Editor: Fuzzy Finder not registering shortcuts
- Properties: Set String Input Field missing Text Mesh Pro
- Properties: Wrong Property Set method name

Removes

- Navmesh: Navmesh Areas have been deprecated

646.2 2.16.50

Released July 30, 2024

Changes

- Combat: Internal options for attack blocking

Fixes

- Footsteps: Custom texture name in Materials
- Editor: Prevent Variables access in Editor-Mode
- Editor: Incorrect name on Finger Screen Position
- Editor: Null check for TMP reference
- Time: Allow a time scale greater than 1

Removes

- Character: Unique Identifier system

646.3 2.15.49

Released February 23, 2024

New

- Property: Search Component in Children
- Property: Search Component in Parents
- Property: Character Bone Position
- Property: Constant numeric Properties
- Instruction: Debug Console Clear
- Instruction: Debug Console Show/Hide
- Instruction: Change Camera Shot Aim
- Instruction: Change Camera Smooth Times
- Input: Scroll has direction options
- Saving: Caesar encryption cipher

Changes

- Cameras: Third Person and First Person Shots
- Characters: Turn off smooth angular speed
- Markers: Inward option has a dynamic Radius
- Saving: Decoupled encryption from storage

Fixes

- Property: Get Direction Axis incorrect order
- Characters: Incorrect snap when height is not two
- Markers: Gizmos not respecting object scale
- Saving: Incorrect algorithm when encrypting

Removes

- Instruction: Obsolete Camera Shot properties

646.4 2.14.48

Released January 16, 2024

Fixes

- Characters: Crouching when enabling component
- Save: Incorrect order right before loading
- Structures: Spatial Hash false negative candidates
- Cameras: Input for camera using delta time twice

646.5 2.14.47

Released January 10, 2024

New

- Property: Direction for Input Action
- Property: Decimal for Input Action

Fixes

- Regression: States no longer transition properties
- Trigger: Flick uses magnitude of Vector 2

646.6 2.14.46

Released January 9, 2024

New

- Internal: New high performance spatial hashing
- Condition: Is Speech Playing by Target
- Condition: Character Fits
- Condition: Check Capsule
- Instruction: Draw Gizmo Line
- Properties: Materials access by Index
- Properties: Decimal Condition

Enhances

- State: Properties change over time during transition

Changes

- Instruction: Enter State uses a animation clip Property

Fixes

- Save/Load: Scenes loading twice when loading a game
- Save/Load: Invisible exception thrown saving the game
- Driver: Navmesh Agent now detects collisions
- Driver: Rigidbody radius not reacting on change
- Driver: Rigidbody incorrect drag value when airborne
- Tweening: Incorrect order when duration is zero
- Condition: Box 2D incorrect return value

646.7 2.13.45

Released November 12, 2023

This update does not come with any breaking changes. However it requires to uninstall Game Creator first before upgrading in order to replace the old search engine for the new one.

New

- Editor: New search engine

Enhances

- Runners: Toggle visibility in Project Settings

Fixes

- Script: Incorrect location of some scripts
- Property: Get Position Vector axis values
- Demos: Characters example wrong jump animation

646.8 2.13.44

Released November 3, 2023

New

- Instruction: Set Character Busy
- Instruction: Set Character Available

Fixes

- Load: Ignore loading an empty save slot
- Instruction: Change Position incorrect use local/world space
- Instruction: Change Rotation incorrect use local/world space
- Input: Incorrect empty string check on Action Maps
- Camera: Avoid Clipping checks for null ignorers

646.9 2.13.43

Released October 31, 2023

This version comes with new features, but also breaks compatibility with the previous core and submodule versions.

We recommend updating only if you're in a prototyping phase or you're far from releasing your project(s).

In order to upgrade, be sure to backup your project(s) first and uninstall any previous versions of Game Creator and its modules.

New

- Instruction: Hotspots Active
- Instruction: Prewarm pool of Game Objects
- Instruction: Destroy pool of Game Objects
- Instruction: Set Animation Clip
- Instruction: Enable Input System Action asset
- Instruction: Disable Input System Action asset
- Condition: Check OR Conditions list
- Condition: Check AND Conditions list
- Property: Material type
- Property: String with ID format
- Property: Decimal have Math operations
- Property: Get and Set Sprite Renderer
- UX: Favorite Signals stored per-project
- Props: Handle asset for handling multiple characters
- Variables: Material value references
- Variables: Animation Clip value references

Enhances

- Performance: Improved performance of Instructions
- Camera: Decoupled Avoid Clipping systems
- Pooling: Improved performance managing instances
- Variables: Drop zones to auto-fill List Variables
- Instruction: Move To detects when it gets stuck on a path

Changes

- Hotspot: More flexible options
- Input: Input Action assets require manual enable/disable
- Properties. Faster and new Location system
- Properties: Replaced Camera properties with Game Object

- Properties: Replaced Shot properties with Game Object
- Properties: Rearranged Game Object properties
- Scripting: Audio Instructions use Audio Properties
- Variables: Use built-in polymorphic serialization
- Characters: Jump and Land no longer set Legs as Busy

Fixes

- Trigger: Interaction working when Trigger is inactive
- Saving: JSON File with Encryption throws error
- Staging: Forbid open in play-mode
- Editor: Error uninstall module with Settings open
- UX: Vertical alignment of elements in Inspector
- UX: Use Raycast field expands in Inspector
- Instruction: Submit UI uses all components in game object
- Character: Screen Center interaction with elements behind
- Character: Screen Cursor interaction with elements behind
- Saving: Exist differentiates between unloading and destroying
- Characters: Player input direction depending on Y axis

Removes

- Hotspot: Look at with Focus
- Instruction: Change Hotspot Radius
- Characters: Twitching an Breathing layers deprecated
- Properties: Offset properties are Direction properties

646.10 2.12.42

Released August 29, 2023

New

- Hotspot: Play Audio on Enter/Exit
- Condition: Check Audio Effect is Playing
- Condition: Variables List is Empty
- Condition: Is UI Sound Playing
- Condition: Is Music Playing
- Condition: Is Ambient Playing
- Condition: Is Speech Playing
- Property: Check Conditions
- Property: Constant Boolean True
- Property: Constant Boolean False
- Property: Boolean Local/Global List is Empty
- Property: Boolean Local/Global List has entries
- Property: Rotation Euler by Axis
- Character: Rotation Towards Input
- Character: Change Is Controllable from State
- Character: Option for Simple Ragdoll
- Character: Option for No Ragdoll
- IK: Ported Look Track system to Animator IK

Enhances

- UX: Sorting Lists in the Inspector
- UX: Reorganized Axonometry dropdown
- UX: Reorganized Hotspots dropdown

Changes

- Hotspot: Option With Focus set as a Hotspot field
- Character: Decoupled Skeletons and Ragdolls

Fixes

- Conditions: Raycast better titles
- Camera: Shots use correct orthographic size
- Camera: Residual Zoom in Third-Person Shots
- Camera: Head Bobbing throwing NaN value
- Audio: Stop playing after suspending runtime app

Removes

- Hotspot: Look at with Focus
- Hotspot: Activate Object with Focus
- Hotspot: Instantiate Prefab with Focus
- Hotspot: SHow Text with Focus
- Camera: Removed preview of Camera Shots
- IK: Look Track system with Animation Rigging
- Editor: Dependencies with Animation Rigging

646.11 2.11.41

Released June 12, 2023

New

- Instruction: Change Axonometry
- Instruction: Change Audio Source volume
- Instruction: Change Audio Source pitch
- Hotspot: Activate Game Object
- Hotspot: Activate Game Object on Focus
- Hotspot: Renamed Activate Prefab to Instantiate Prefab

Enhances

- Hotspot: Optional infinite radius value

Changes

- Local Variables: Access using Game Object Properties

Fixes

- Interaction: Near Mode using wrong Character
- Input: Wrong setup when using Input System Actions
- Input: Wrong Action selection when retrieving by Map
- Input Field not returning TMP component value
- Property: Location Character with Offset values
- Mobile: Support for Point & Click and Follow Cursor
- Global Variables: Not resetting after loading without save

646.12 2.10.40

Released May 26, 2023

New

- Events: New Command Args entry point

Enhances

- Camera: Search for any Camera Shot after setup

Fixes

- Editor: Error creating Player from context menu
- Input: Loading before scene is set up

Removes

- Props: Removed obsolete api
- Signals: Removed obsolete api
- Location: Removed obsolete api
- Editor: Removed obsolete Property Tool class

646.13 2.9.39

Released May 25, 2023

New

- Instruction: Next Iterator for List Variable
- Instruction: Previous Iterator for List Variable
- Instruction: Random Iterator for List Variable
- Instruction: Calculate Modulus between two numbers
- Instruction: Change Mannequin Position
- Instruction: Change Mannequin Rotation
- Instruction: Change Mannequin Scale
- Instruction: Clear Looking Around
- Property: Get String of Saved Slot Date
- Input: Finger in Screen and World Space
- Component: Text Property String UI component
- Console: Save/Load Game commands

Enhances

- Execution: New execution order for certain components

Fixes

- Variables: Not collecting correctly during build
- Variables: Reset Game does not reset variables

646.14 2.9.38

Released May 13, 2023

Fixes

- Settings: Opening during domain reloads
- Variables: Initialize before subscribers
- Events: Initialize before subscribers

646.15 2.9.37

Released May 12, 2023

New

- Console: Runtime console for debugging
- Instruction: Log Text on Runtime Console
- Instruction: Submit Command to Runtime Console
- Instruction: Open/Close/Toggle Runtime Console
- Variables: Refresh button in Settings window

Enhances

- Examples: New Console example scene

Fixes

- Variables: Not loading on standalone builds
- Settings: Window missing entries on startup

646.16 2.9.36

Released May 8, 2023

New

- Instruction: Change Local Variable ID
- Instruction: New Dash instruction parameters
- Variables: Set at Index uses dynamic property
- Driver: Axonometry field for Isometric games
- Driver: Axonometry field for Side-Scroller games

Enhances

- Execution: Order in which components are initialized

Fixes

- Build: Crash when compling to Windows or Android
- Font: Incorrect resource font name
- Instruction: Move to Transform rotation ignored
- Variables: Edge case Global Variables not loading
- Trigger: On Blur throws error if object destroyed
- Align: Name Variables pick field
- Align: Input System pick field
- Align: Navigation Area Mask field
- Align: Navigation Agent field
- Align: Layer Mask field
- Repository: Deferred initializing database
- Combat: Not set default Target to first Candidate
- Touchstick: Icon not appearing on skin asset

646.17 2.9.35

Released March 28, 2023

Enhances

- Icon: Equated dropdown arrow to standard

Fixes

- Build: Forbidden access of m_Dirty member
- Align: Labels in Instantiate instruction
- Align: List Variables pick field

646.18 2.9.34

Released March 24, 2023

New

- Settings: Custom scene when loading application
- Settings: Displays current and update version
- Settings: Notification when there is an update
- Instruction: Change Character ID
- Instruction: Change Hotspot Radius
- Instruction: Set Sprite
- Instruction: Set Character Combat Target
- Instruction: Clear Character Combat Target
- Instruction: Reset Character Vertical Velocity
- Instruction: Set Character Invincibility
- Instruction: Set Character Poise
- Instruction: Cycle to Closest Target
- Instruction: Cycle to Next Target
- Instruction: Cycle to Previous Target
- Instruction: Cycle to Target by Direction
- Instruction: Enable/Disable Collider
- Instruction: Enable/Disable Renderer
- Event: On Change Combat Target
- Event: On Change Invincibility
- Event: On Dash
- Event: On Dodge
- Event: On Input Flick
- Condition: Is Character Invincible
- Condition: Character Raycast Floor
- Condition: Compare Vertical Distance
- Condition: Compare Horizontal Distance
- Property: Character Combat Target
- Property: Game Object Floor Position
- Property: Get Last Dodge Location
- Property: Get Last Dodge Position
- Property: Get Poise
- Property: Get Defense

- Input: Gamepad Left/Right Stick
- Input: Mouse Scroll-Wheel
- States: Change Motion fields from within States
- IK: Aim Towards Rig for First Person mode
- Examples: New Interaction and redone some others

Enhances

- Variables: Access index with dynamic Property
- Instruction: Finer grain control over Dash
- Condition: Non-Alloc raycast methods for Physics
- Camera: First Person has smoother bobbing and sway
- Examples: New model for First Person mode
- QoL: Right click to Expand/Collapse items
- QoL: Facelift of the Character inspector

Changes

- Variables: Save is disabled by default
- Event: On Character Step renamed to Character On Step
- Event: On Input renamed to On Input Button
- Physics: Boolean result when checking raycasts

Fixes

- Instruction: Dash wrong left/right fields
- Condition: Physics reported opposite result
- Footsteps: Avoid creating material instances
- Character: Allow zero linear speed
- Character: States dangling after Stop if delayed
- Character: Missing Avatar changing model in Editor
- Character: Incorrect bones when wearing Skinned Meshes
- Variables: Conversion from Texture throws exception
- Font: Use LegacyRuntime.ttf for Unity 2022.2 or higher
- Property: Get/Set Sprite UI Image incorrect name
- Editor: Changing Character unit throws error if selected

646.19 2.8.33

Released January 31, 2023

Fixes

- Skeleton: Error in Unity 2022.2 and higher
- Camera: Moved execution to Late Update
- Camera: Incorrect execution order

646.20 2.8.32

Released January 30, 2023

New

- Skeleton: Revamped the whole workflow
- States: Root Motion for Entry/Exit clips
- Event: On Camera Change Shot
- Event: On Change to/from Camera Shot
- Property: Option to get Character Look Target
- Property: Get Character Bone position

Enhances

- IK: Feet on ground uses softer values
- Hotspots: Show Text can use Text Mesh Pro components

Fixes

- Animim: More consistent Gestures system
- Animim: States spawned in layered order
- Shot: Lock On Camera jitters when close to target
- Audio: Forbids playing the same clip at the same frame
- Ragdoll: Humanoids without Neck or Chest bones
- IK: Looking at a target jitters spinal chain
- Variables: Local ones not correctly initialized
- Interaction: Control Labels do not properly display

646.21 2.8.31

Released January 8, 2022

New

- Dash: new Character settings under Motion
- IK: Align Body with Ground
- Instruction: Stop Character Dash
- Instruction: Change Input Field
- Instruction: Move List Variable
- Instruction: Change Orthographic Size
- Property: Unity Editor Version
- Property: Application Version

Enhances

- Character: Not allowed to stand on top of others
- Instruction: Dash uses improved Dash feature
- Shots: Viewport changes use Transitions duration
- Icons: New UI icons for common components

Fixes

- Variables: Loading missing Global Name Variables
- Variables: Loading missing Local Name Variables
- Instruction: Cross product operator symbol
- Property: Location Game Object uses Markers
- Property: Location Game Object with Offset uses Markers
- Property: Display hidden labels on some Variables
- Gizmos: Error when inspecting a prefab with Gizmo calls

Removes

- Property: Get Player Bone Location
- Property: Get Player Bone with Offset

646.22 2.8.30

Released December 8, 2022

Fixes

- Props: Retrocompatibility with previous versions

646.23 2.8.29

Released December 8, 2022

New

- Instruction: Drop Prop from Character
- Instruction: Reset Game
- Example: Nested variable access

Enhances

- Instruction: Attach Prop accepts direct instance
- Instruction: Remove Prop accepts direct instance
- Shots: Reduced the amount of unselected gizmos

Changes

- Faster Spatial Hash with better layout
- Prop system accepts prefabs and instances

Fixes

- Ragdoll: Joint constraints use projection
- Variables: Error if two variables have same ID
- Remember: Error if two Remembers have same ID
- Deter IL2CPP from stripping certain assemblies
- States example where character does not sit down

646.24 2.7.28

Released November 8, 2022

New

- Character: New feet phases curves
- Character: New Rigidbody driver controller
- Camera: Shots can override camera values
- Instruction: Set Vector X/Y/Z value
- Condition: Is Foot Phase on Ground
- Condition: Is Character Humanoid
- Event: On Application Focus
- Event: On Application Pause
- Event: On Application Quit
- Property: Find Game Object by Tag
- Property: Constant Zero
- Property: Constant One
- Property: Round Decimal
- Property: Ceiling Decimal
- Property: Floor Decimal
- Example: Loop List Variables

Changes

- Phases: New character foot planting
- Character: Jumps with the grounded foot
- Removed 'In Background' field on Actions
- Removed 'In Background' field on Triggers
- Input: Using Enhanced Touch Support
- Instructions: Removed activate Shot systems
- Camera: Overhauled Shot systems
- Character: Split gravity into up/down

Fixes

- Condition: Has State in Layer
- Memory: Exists game object works again
- Hotspot: Not allowing multiple cursor icons
- Instruction: Change Position incorrect space
- Brake velocity capped to at least 1 unit

- Character: Look at feet instead of eyes
- Consistent Label width in 2021 LTS
- Time scale not reaching zero with transition

646.25 2.6.27

Released September 23, 2022

New

- Copy-runners for Visual Scripting

Enhances

- Support for dropping 3D models improved
- States use new Copy-runners
- Sequencing uses new Copy-Runners

Fixes

- Remember components run after initialization

646.26 2.6.26

Released September 16, 2022

New

- Instruction: Set Color
- Instruction: Lerp between Colors
- Instruction: Transition Color to Saturation
- Instruction: Transition Color to Lightness
- Property: Opposite of Color
- Property: Black & White of Color

Enhances

- Experimental: Volume uses quadratic roll-off

Fixes

- Character squatting due to frame hiccups
- Camera Shot generating garbage in Editor
- Wrong value when counting List Variables
- Renamed Graphics instruction

646.27 2.6.25

Released September 6, 2022

New

- Instruction: Transform Direction
- Instruction: Inverse Transform Direction
- Instruction: Transform Point
- Instruction: Inverse Transform Point
- Event: On Fixed Update
- Property: Camera Field of View
- Property: Character Model

Enhances

- Slight Trigger design facelift
- Faster Event System queries
- Rearranged Hotspot menu
- Redesigned welcome screenshots

Fixes

- Save/Load: Leak when destroying Remember
- Character: Unable to move/rotate when dead
- Inverse Kinematics: Deactivate when is Dead

646.28 2.6.24

Released August 19, 2022

New

- Instruction: Change Character Time Mode
- Instruction: Unfocus UI object
- Maximum collect radius set to 500
- Screen Width/Height numeric Properties

Enhances

- Keywords on visual scripting nodes

Fixes

- Instruction: Add Force has space mode
- Shot: Third Person direction after transition
- Pool sets position before activating
- Save/Load wrong format when deleting slots
- Time scale affects Character animation
- Sequence tool creates empty clips

646.29 2.6.23

Released July 7, 2022

New

- Character can use Driver/Motion directions
- Property: Screen and World cursor positions

Enhances

- Touchstick can subclass and override properties

Fixes

- Instruction: Transform Change Position
- Instruction: Join Text incorrect values
- Serializable data structures null error
- Error thrown by polymorphic list items
- Scroll not appearing on Install window
- Order in which SaveLoad system is executed
- Copy & Paste multiple times does deep copy
- Update serialized object when getting managed

646.30 2.6.22

Released June 21, 2022

New

- New non-diegetic Music audio channel
- Instruction: Play Music
- Instruction: Stop Music
- Instruction: Change Music Volume
- Instruction: Stop all Music
- Instruction: Stop all Ambient
- Event: On Change Music Volume
- Property: Music volume getters and setters

Fixes

- Gestures and States ignore time scale
- Character physical material crash
- Character not saving position/rotation/scale
- Instruction: Change Position self space
- Condition: Raycasts wrong object reports
- Props: Incorrect prefab scale

646.31 2.6.21

Released June 14, 2022

New

- Option to uninstall modules
- Input: Any button
- Input: Constant Motion
- Instruction: Parent of Game Object
- Instruction: Root of Game Object
- Property: No Sprite
- Character Rotation: Look at Pointer
- Variables: Show error if duplicate ID

Changes

- Scene Entries decoupled from Instruction

Fixes

- Global List Variables collect methods work
- Condition: Are Arms Busy incorrect spelling
- Serialization error during domain reloads
- IK: Deactivate IK Lean at runtime
- Navigation: Disable rotation in movement

646.32 2.5.20

Released May 24, 2022

New

- Named Variables: Nested Access
- Settings: Choose how to save game data
- Save: Json File option with simple encryption
- States: Instructions run on every change
- Instruction: Physics 3D Trace Line
- Instruction: Physics 3D Overlap Sphere
- Instruction: Physics 3D Overlap Box
- Instruction: Physics 2D Overlap Circle
- Instruction: Physics 2D Overlap Box

Enhances

- Spatial Hash algorithm performance
- Tweaks on padding on Editor UI

Fixes

- Acceleration uses vertical speed
- States using wrong duration for entries

646.33 2.5.19

Released May 12, 2022

New

- Instruction: Increment Number
- Instruction: Change RectTransform Width
- Instruction: Change RectTransform height
- Instruction: Transform Look At
- Instruction: Scale Product
- Instruction: Change Character Driver
- Instruction: Swap List Elements
- Instruction: Start Looking At
- Instruction: Stop Looking At
- Event: On Collide Exit With
- Condition: Raycast 3D and 2D
- Condition: Is Editor
- Condition: Is Batch mode
- Condition: Is Console
- Condition: Is Mobile
- Condition: Check Runtime Platform
- Property: Empty String
- Property: Rect Transform
- Property: Random Audio Clip
- Property: Last Collided Enter/Exit
- Property: Last Trigger Enter/Exit
- Input: Mouse Double Press/Release
- Input: Touchscreen Press/Release
- Driver: NavmeshAgent has Agent Type exposed
- Memory: Exists

Enhances

- Footsteps support LOD Groups
- Acceleration feels more natural
- Keywords for boolean values
- Fine-tuned Fuzzy Finder algorithm
- Lock characters on a 2D plane
- Increased scope of Breathing and Twitching

- Breathing and Twitching can be nullified
- Offset values default to zero

Fixes

- Signals not initialized on AoT platforms
- Picking component from a Property reference
- Null check before playing Audio Clips
- States flicker before playing exit clip
- Deep copy when getting Tree children
- List picker has dropdown menu title
- States using wrong entry Avatar Mask
- Exception with uncaught Kernel events
- Crash with Rigidbody Driver caused by Material

646.34 2.5.18

Released March 25, 2022

New

- Condition: Is Character Controllable

Enhances

- Scope for changing character rotation state

Fixes

- Input: Holding contains release cycle
- Input: Renamed properties to follow standard
- Template character using incorrect height
- Template player checks if is controllable

646.35 2.5.17

Released March 23, 2022

New

- Condition: Is Input Pressed
- Condition: Is Input Released
- Condition: Is Input Held Down
- Event: On Input Action Press
- Event: On Input Action Release
- Event: On Input Action Hold
- Icons for visual scripting nodes

Changes

- Character has a proxy object for model

Fixes

- Orphan object destroying a ragdoll character
- Settings window elements not appearing
- SceneReferene error when building a binary
- Skeleton throw null reference exception

646.36 2.4.16

Released March 21, 2022

New

- Player: Follow Pointer Unit
- Instruction: Show/Hide Touchsticks
- Instruction: Activate Feet IK
- Instruction: Activate Lean IK
- Instruction: Activate Look IK
- Condition: Has Save at Slot
- Event: On Load Game
- Event: On Delete Game
- Property: Audio Clips
- Property: Random Strings
- Input: Detection for Press/Release
- Support for TreeView API

Changes

- Properties return editor references
- Smooth in/out landing compression

Fixes

- Sync physics with main thread transforms
- Changing units when character is selected
- Changing model null exception
- Locating camera by tag overridden by FindByType
- Looping variables works with all types
- List selectors not being displayed
- Changing character height stutters
- Fields alignment in Inspector
- Signals throw an error when exiting
- Null error after deleting some objects
- Spawn prefabs every frame in Point & Click
- Changing Is Controllable stops any motion
- Greedy systems automatically initialize
- Description of surface/volume properties
- Instruction: Quit Application exits playmode

646.37 2.3.15

Released January 28, 2022

New

- Game Creator Toolbar
- Signal dispatching
- Instruction: Character move to direction
- Instruction: Character stop movement
- Instructions: Camera Shots
- Instruction: Raise Signal
- Event: Receive Signal
- Event: On Change Audio Volume
- Property: Audio Mixer Parameter

Enhances

- Run Visual Scripting components from Unity events
- Easier to navigate dropdown menus
- Footsteps textures mimic character rotation
- A Camera Shot can be assigned as the main one
- Improved performance of Editor UI elements

Changes

- Tree class renamed to Trie

Fixes

- Variables now accept integers, floats and doubles
- Some events were invoked when the Trigger was disabled
- Error thrown with inactive Local Variables
- Dead characters don't twitch or breathe anymore
- Async Manager exception throw exiting Play-Mode
- Settings window compressing overflowing elements
- Event: On Click does not execute over UI elements
- UI Controls have the UI layer as default
- Locations allow to specify the rotation
- Procedural animations take into account Time Scale

646.38 2.2.14

Released December 27, 2021

New

- Shot: New Anchor Peek camera shot
- Marker: New Inwards type
- Instruction: Play Footstep
- Spot: Look on Focus
- Shots: Can use easing functions
- New deep clone utility to duplicate instances
- Properties: Get and Set audio volumes

Enhances

- Spots: Disabled while interacting
- Spots: Offset option for World and Self space
- Event: Lifecycle events have better description
- Play button is contextually hidden
- Colors have HDR and non-HDR option
- Name Variables display non-available options
- String Variables can get values from other types

Changes

- Instruction: Toggle Bool uses one single property

Fixes

- Shots interpolate based on its duration
- Event: Characters not registering changes
- Prefab Variables error at runtime
- Tweening UI elements uses unscaled time
- Actions and Triggers catch exceptions
- Spatial Hash queries on Markers

646.39 2.1.13

Released December 1, 2021

New

- Interaction system
- Condition: Can Interact
- Instruction: Interact
- Event: On Focus
- Event: On Blur
- Event: On change NPC to Player
- Event: On change Player to NPC
- Spot: Text on Focus
- Spot: Object on Focus

Enhances

- Leaning IK default values
- Character inspector UX
- Conditions have more friendly names

Changes

- Name of Point and Click button
- Motion unit is more compartmentalized
- Hide Character gizmos collapsing each unit

Fixes

- Spatial Hash returning farther values

646.40 2.0.12

Released November 24, 2021

New

- Driver: Skin width exposed in Inspector
- Ragdoll animations

Enhances

- Save/Load format does not use special characters

Fixes

- Shot: Lock On ignores Anchor and Target clipping
- Event: On Enter NavLink not detected
- Event: On Exit NavLink not detected
- NavMesh: Agents move between Off-Mesh Links
- Scene asset were null in standalone builds
- Character: Sinking in ground when using Feet IK

646.41 2.0.11

Released November 16, 2021

New

- Paste button for Visual Scripting
- Instruction: Sort List alphabetically
- States: Weight uses a range control

Enhances

- Conditions redesign
- Focus on search fields automatically
- Event: Input distance has offset option
- Shot: Lock on includes better default values

Fixes

- Airborne animations did not loop correctly
- Null check for characters Bone Rack

646.42 2.0.10

Released November 2, 2021

New

- Event: On Hover Enter
- Event: On Hover Exit
- Event: On Select
- Event: On Deselect
- Event: On Late Update
- Event: On Trigger Stay
- Condition: Has Prop Attached
- Property: Transform Offset
- Property: Character Bone
- Property: Spherical random point
- Property: Rotation of Camera
- Input: Interaction
- Point and Click examples

Enhances

- Right click on Dropdown options to go back
- Virtualized `TPolymorphicListTool` methods

Fixes

- Missing scroll in Game Creator Hub
- Regression: Point & Click on Player unit
- Characters Props out of range access

646.43 2.0.9

Released October 20, 2021

New

- Input: Mobile virtual joystick support
- IK: Lean towards motion direction
- Event: On Hotspot Activate
- Event: On Hotspot Deactivate
- Property: Light Intensity and Range

Enhances

- Rendering Pipeline in documentation
- Visual Scripting search engine precision
- Renamed Example Manager to Install window
- Renamed execution events to lifecycle path

Fixes

- Character radius out of sync with driver unit
- Crouch and Walk string input codes
- Memory leak in Camera Shot preview window
- Skeleton valid prefab type
- Conversion between float and double values
- Test Runner using float values

646.44 2.0.8

Released October 6, 2021

New

- New getters for each Vector3 component
- Instruction: Clamp Vector3

Enhances

- Examples with higher contrasting textures

Fixes

- Null check for gamepads and keyboards
- Null check for material _MainTex
- Input for walking using crouch settings
- Character footstep bones incorrect instance

646.45 2.0.7

Released September 27, 2021

New

- Start State to Character component
- Latest documentation PDF file
- Option to run camera in Fixed Update
- Dust FX on examples when character lands
- Rigidbody character Driver
- Instruction: Set Text
- Instruction: Text Join
- Instruction: Text Replace
- Instruction: Text Substring

Enhances

- Handling on Character units
- Performance on Reflective properties

Fixes

- Examples and improved their visuals
- Physics engine methods being called every frame

646.46 2.0.6

Released September 22, 2021

New

- Tank Controls to characters
- Copy & Paste to all lists
- Duplicate button to all lists
- Faster method to get managed reference values
- Get and Set values from Input devices
- Get and Set fields using C# Reflection
- Get and Set properties using C# Reflection
- Event: On Navigation Link Enter
- Event: On Navigation Link Exit
- Condition: Compare Child Count
- Instruction: Remap Coordinates
- Instruction: Uniform Scale a Vector3 value
- Instruction: Loop List

Fixes

- Animator null when changing model in Editor
- Audio not taking into account time scale
- Incorrect description on some Input methods
- Changing kernel units while in play-mode
- Global variable access in standalone builds

646.47 2.0.5

Released September 17, 2021

New

- IsRunning property to Actions and Conditions
- Property to search an object by name
- Memory: Name
- Memory: Tag
- Memory: Layers
- Memory: Is Active
- Memory: Light Color
- Memory: Light Intensity
- Instruction: Change name of Game Object

Fixes

- Point & Click incorrect raycast order
- Point & Click ignore over UI game objects
- Memories not drawing some properties
- Date not parsing using system culture

646.48 2.0.4

Released September 16, 2021

New

- NavMeshAgent avoidance quality
- NavMeshAgent avoidance priority

Fixes

- Material Sound error when texture is null
- Player not moving without a Main Camera
- Description of Usage Input buttons

646.49 2.0.3

Released September 14, 2021

New

- Mouse button modifier to Delta Mouse input
- Youtube cover image to welcome screen

Fixes

- Game Creator Hub paths on Windows
- Game Creator Hub package install hierarchy
- Examples Manager installer version check

646.50 2.0.2

Released September 13, 2021

New

- Option to create impacts for Material Sounds
- Model position offset to Character animation
- Complete & Basic Locomotion States
- Instruction: Toggle Active
- Bool Property: Does not Exist
- Bool Property: Is not Active
- Input: Usage/Crouch
- Input: Usage/Walk

Fixes

- Invalid Hub URL on Windows machines
- Invalid Documentation URL
- Skeleton asset error when using 3D models
- Stop State instruction layer index
- Primary motion input with joystick dead-zone
- Foot IK disabled during gestures with root-motion
- Look IK alignment with target's line of sight
- Animation time scale on characters

646.51 2.0.1

Released September 10, 2021

New

- First release

II. Inventory

647 Inventory

Using items, combining them, crafting new ones or trading them with other characters is at the heart of many games.

The **Inventory** module has been meticulously crafted to support a wide variety of situations that involve the use and management of items.

Get Inventory

Requirements

The **Inventory** module is an extension of **Game Creator 2** and won't work without it

648 Setup

Welcome to getting started with the **Inventory** module. In this section you'll learn how to install this module and get started with the examples which it comes with.

648.1 Prepare your Project

Before installing the **Inventory** module, you'll need to either create a new Unity project or open an existing one.

> **Game Creator**
>
> It is important to note that **Game Creator** should be present before attempting to install any module.

648.2 Install the Inventory module

If you haven't purchased the **Inventory** module, head to the Asset Store product page and follow the steps to get a copy of this module.

Once you have purchased it, click on Window → Package Manager to reveal a window with all your available assets.

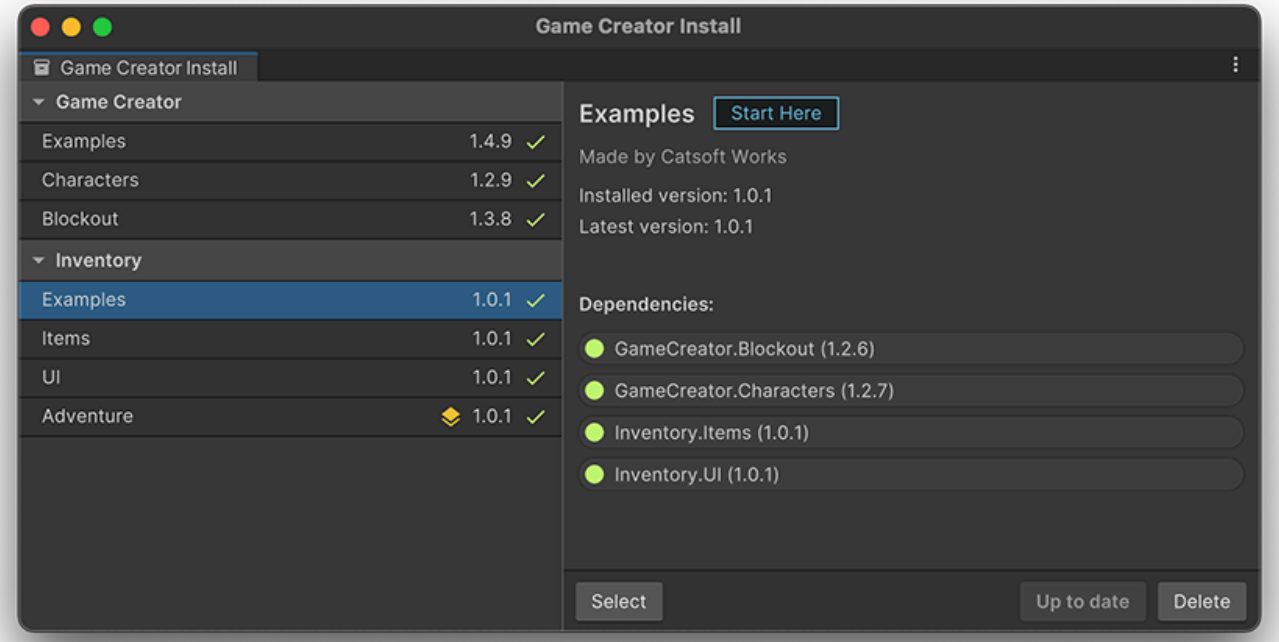
Type in the little search field the name of this package and it will prompt you to download and install the latest stable version. Follow the steps and wait till Unity finishes compiling your project.

648.3 Examples

We highly recommend checking the examples that come with the **Inventory** module. To install them, click on the *Game Creator* dropdown from the top toolbar and then the *Install* option.

The **Installer** window will appear and you'll be able to manage all examples and template assets you have in your project.

- **Items**: Template items ready to be used in your games
- **UI**: Samples for creating loot user interfaces, inventories, merchants and crafting windows
- **Examples**: A collection of scenes that will help you understand each and every option of the Inventory module, in an organized and tidy way.

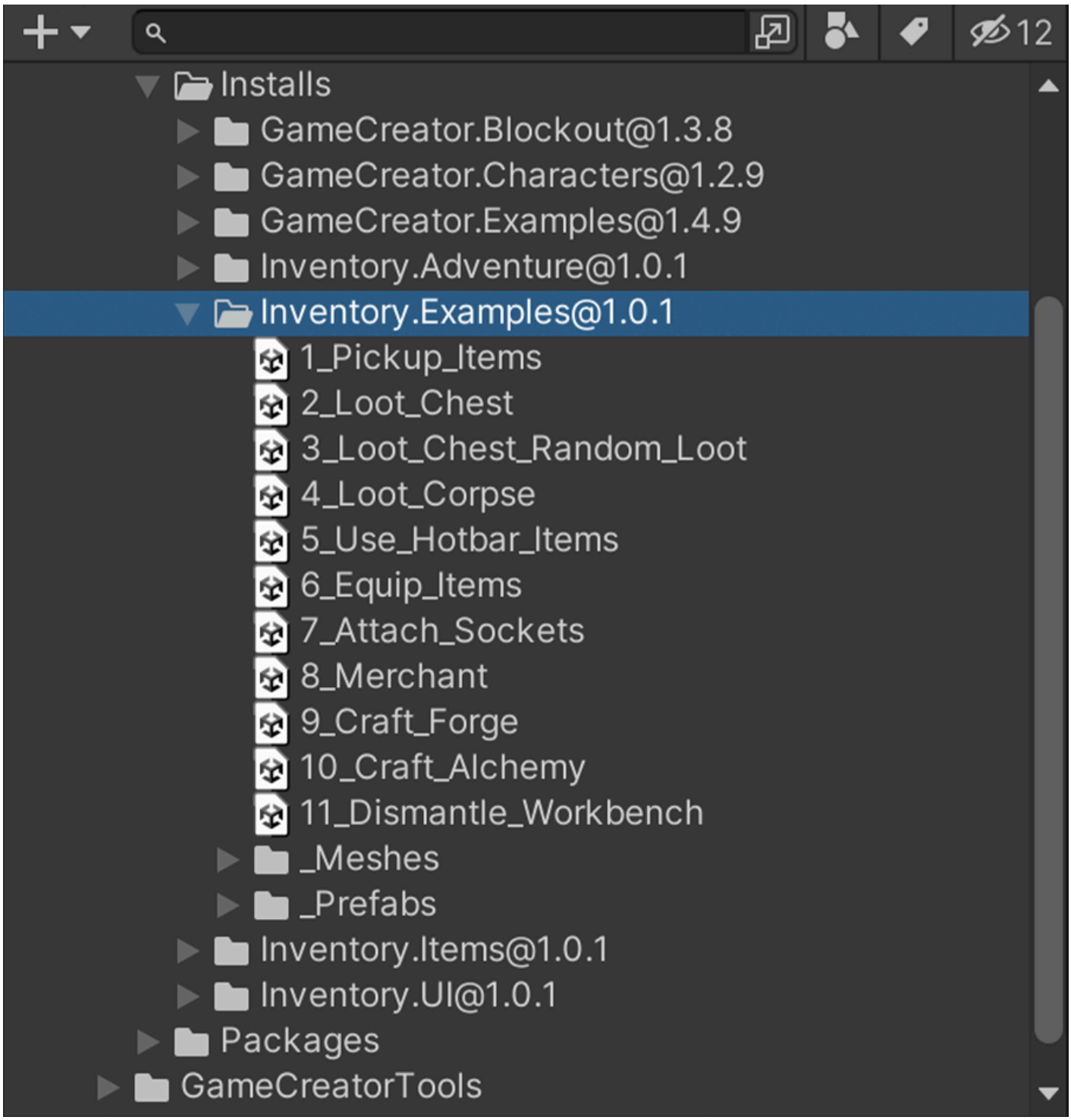


The **Examples** requires both the **Items** and **UI** extensions in order to work.

There is also an extra *skin* for adventure games that allows to swap the default inventory for a typical old-school point and click inventory.

> **Dependencies**
>
> Clicking on the **Examples** install button will install all dependencies automatically.

Once you have the examples installed, click on the *Select* button or navigate to `Plugins/GameCreator/Installs/Inventory.Examples/`.


12
Installs
GameCreator.Blockout@1.3.8
GameCreator.Characters@1.2.9
GameCreator.Examples@1.4.9
Inventory.Adventure@1.0.1
Inventory.Examples@1.0.1
1_Pickup_Items
2_Loot_Chest
3_Loot_Chest_Random_Loot
4_Loot_Corpse
5_Use_Hotbar_Items
6_Equip_Items
7_Attach_Sockets
8_Merchant
9_Craft_Forge
10_Craft_Alchemy
11_Dismantle_Workbench
_Meshes
_Prefabs
Inventory.Items@1.0.1
Inventory.UI@1.0.1
Packages
GameCreatorTools

II.I Items

649 Items

Items are in-game objects that can be added to a Bag, and represent the name and description, properties, visual representation, and other information that allows to craft, trade, use and equip them.

649.1 Items vs Runtime Items

An **Item** is a scriptable object that contains all the generic information about a particular *item*. For example, its name, its weight, what Item Properties it has and their default values, etc...

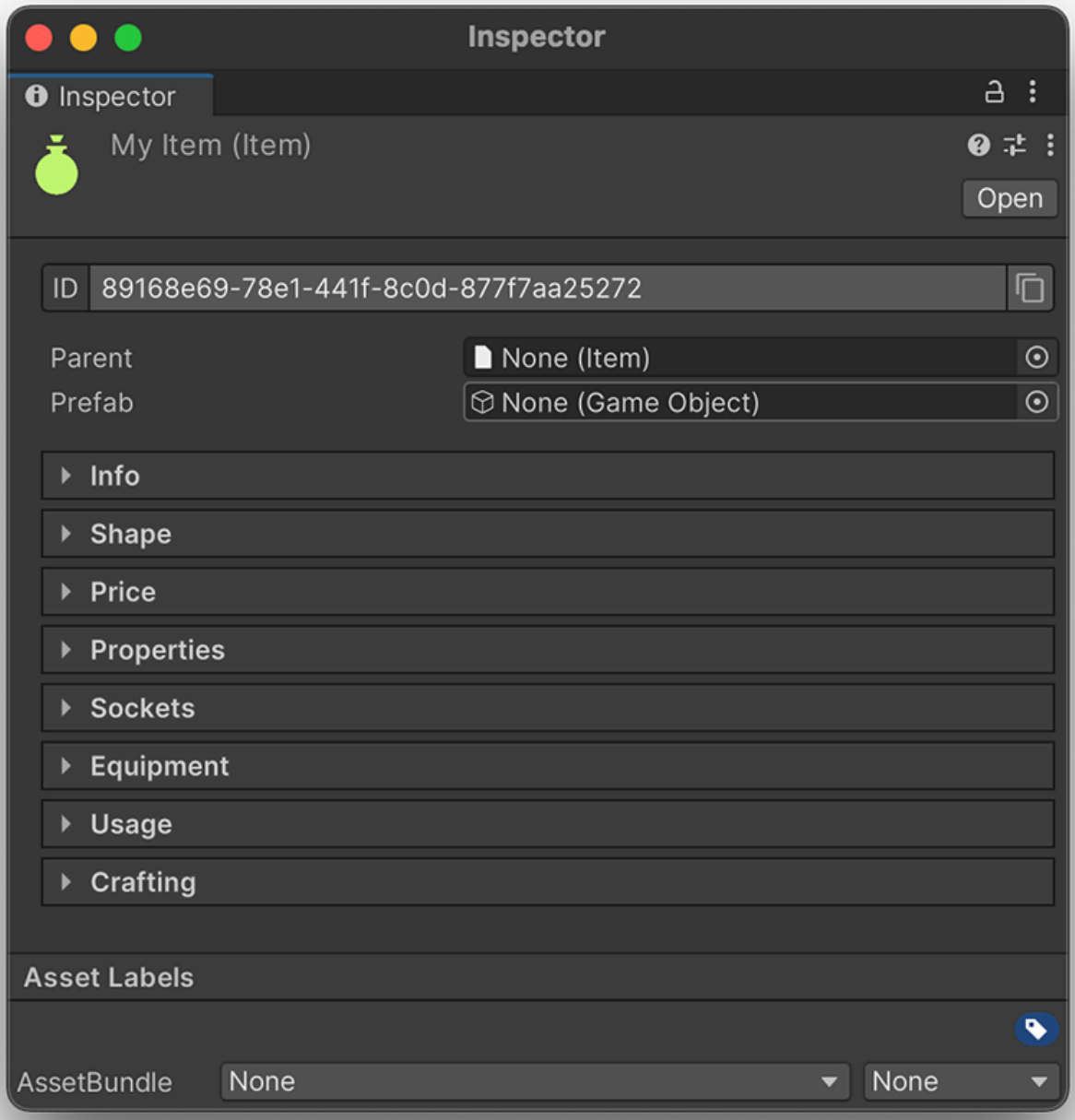
A **Runtime Item** on the other hand, is an instance of an **Item** that lives in the scene. This instance can be saved between play-sessions and has specific values to that particular item instance.

> **Sword Durability**
>
> Let's say we have an **Item** called *Metal Sword*. All *Metal Swords* will come from the same **Item** definition. When you give a *Metal Sword* to the player, you're creating a **Runtime Item** of *Metal Sword*, which can have its own unique values, such as its own durability that decreases with every impact, for example.

Item and **Runtime Item** are conceptually similar to Unity's **Prefabs** and **Prefab Instances**, respectively. The first one lives in the project and works as a template, from which you can spawn multiple instances.

649.2 Creating an Item

Items are scriptable objects and to create one, you'll need to right click on the *Project Panel* and navigate to *Create → Game Creator → Inventory → Item*.



An **Item** asset will appear, with a list of sections that can be expanded or collapsed so it is easy for the user to modify and organize your items.

The **ID** value is a unique text that represents an item. When creating a new asset, it will be completely unique. However, duplicating an existing item will also duplicate the ID and a red message will appear above stating that there are two items with the same **ID**.

To solve that, expand the field and click on the *Regenerate* button to create a new unique ID. You can also type in a name if you follow a naming convention that ensures that all item IDs are unique.

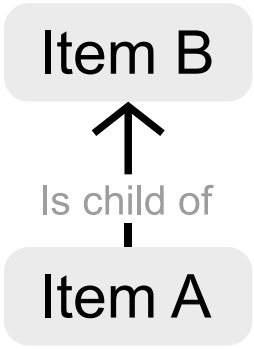
The **Prefab** field is used to drop/instantiate an item onto the scene. If no prefab is provided, the item will not be instantiated.

649.2.1 Inheritance

The **Parent** field allows an item to inherit values from another item, such as Properties and Sockets.

Item A equals Item B?

Comparing two items takes into account their parent-child relationship. For example, if Item *A* inherits from Item *B* and a Condition is trying to determine if an object is equal to another one:

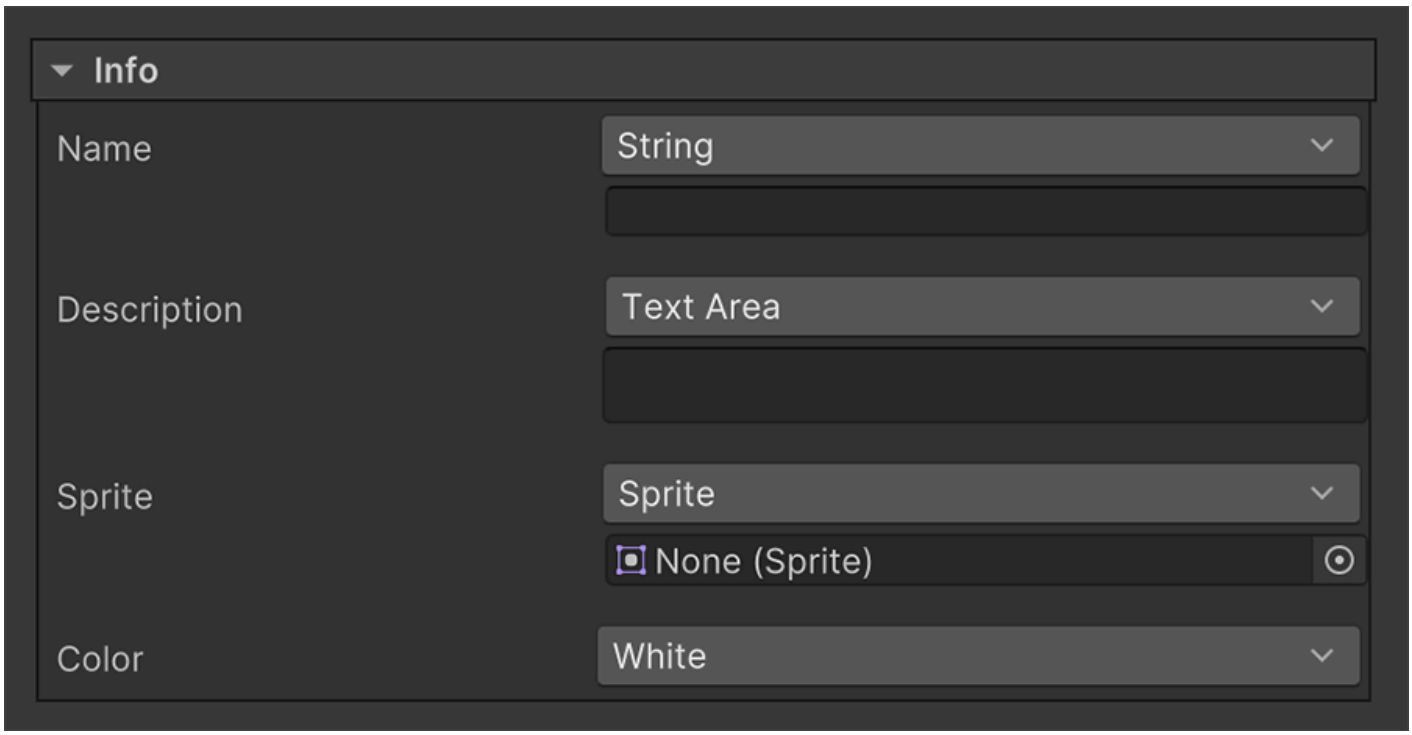


- *A* will always return success when comparing if *A* equals *B* or equals *A*.
- *B* will always return success when comparing if *B* equals *B* but not to *A*, because *A* is further down in the inheritance chain.

An Item will always return success if asked whether it is equal to itself or any of its parent items.

649.2.2 Information

This section allows to define the **Name**. **Description**, **Sprite** representation and **Color** of the **Item**.



Localization

All these fields use dynamic properties so their values can be localized.

649.2.3 Shape

The shape of an **Item** determines the **Width** and **Height** the item occupies in the inventory bag, if it's a grid-based inventory.

It also determines the **Weight** of the item, in case the bag has a max weight limit.

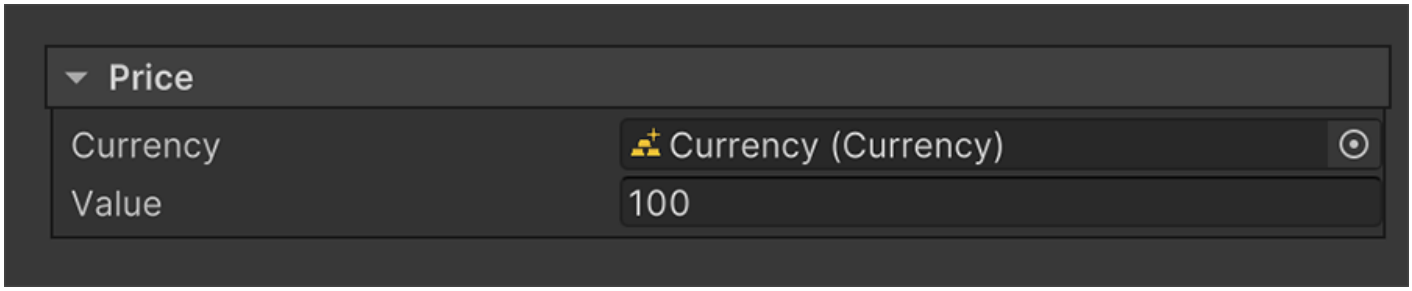
The **Max Stack** field determines how many of the exact same item can be stacked one on top of another.

Stacking restrictions

If an **Item** has one or more Sockets, the **Max Stack** will be automatically restricted to 1, due to technical constraints.

649.2.4 Price

An **Item**'s trading value is determined by a Currency asset and a numeric value. This value is the total *pure* one, without any discounts or modifiers applied.



One Currency

Note that an item can only be traded using a single currency.

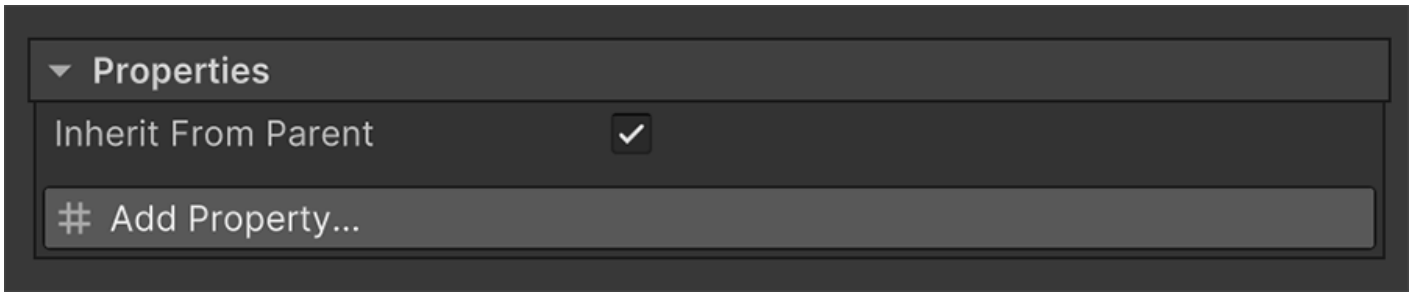
Sockets

The price of an Item that can have other Items attached is the result of the sum of the price of all Items attached, plus the price of the Item itself.

For example, if the item *Sword* has a price of 45 gold and a *Magic Rune* costs 20 gold pieces, the value of the *Sword* with the rune attached will be 65 (45 + 20).

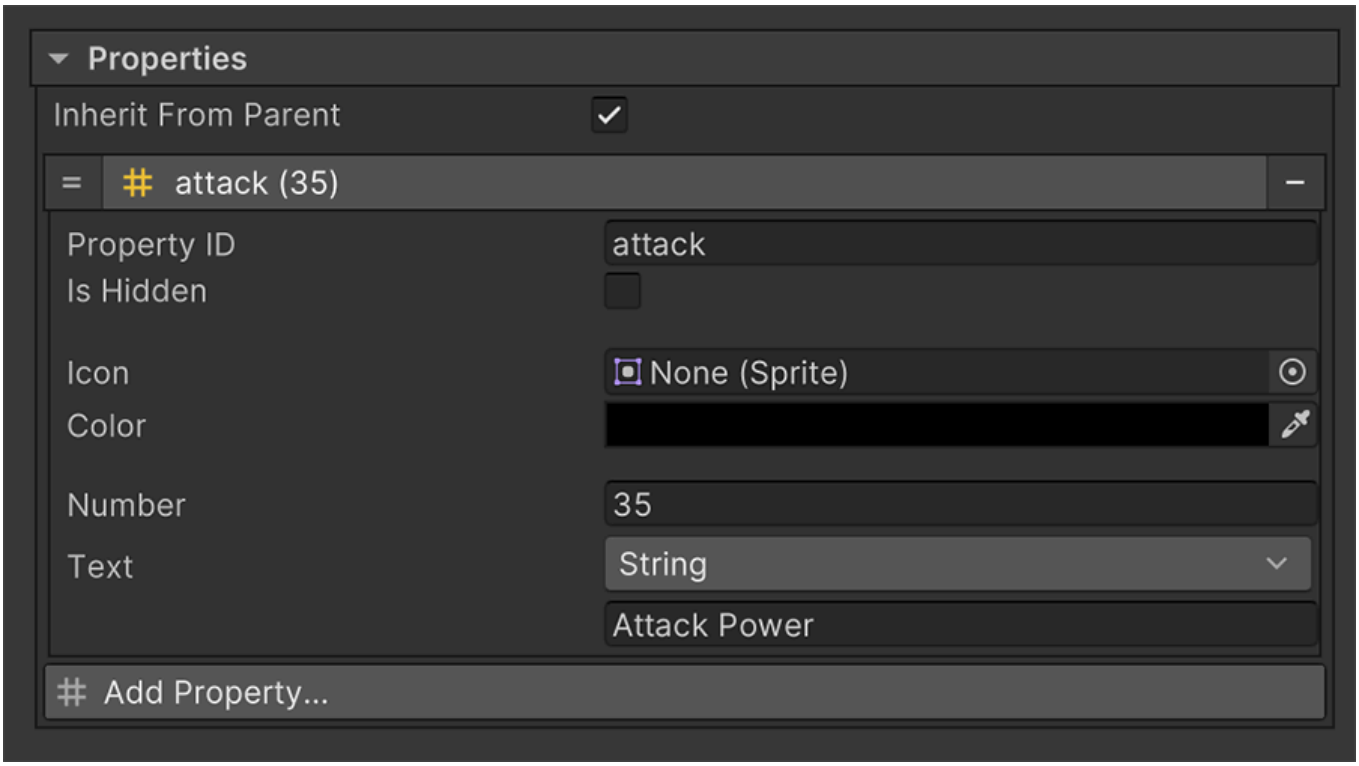
649.2.5 Properties

Properties define mutable values that an item defines. A Property is a data block that is identified by a name and contains a value and a text that can be used to display information about this item and use it in-game.



Use case of Properties

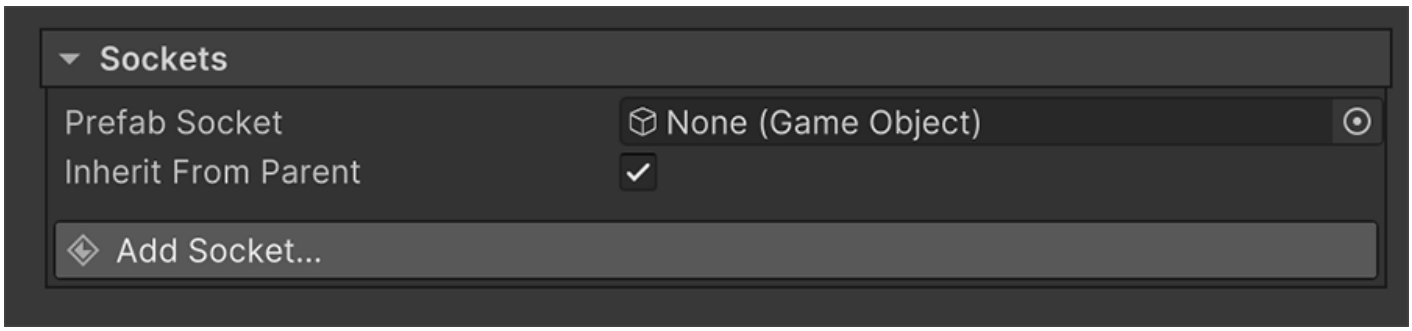
The most common use-case of a property is definining the attack power of a weapon. One could easily use an item that represents a *Sword* and add a property called `attack` and has a value of 35.



See more information about this in the **Properties** page.

649.2.6 Sockets

Sockets allow to attach items onto other items. The type of item that can be attached is determined using item *inheritance*.



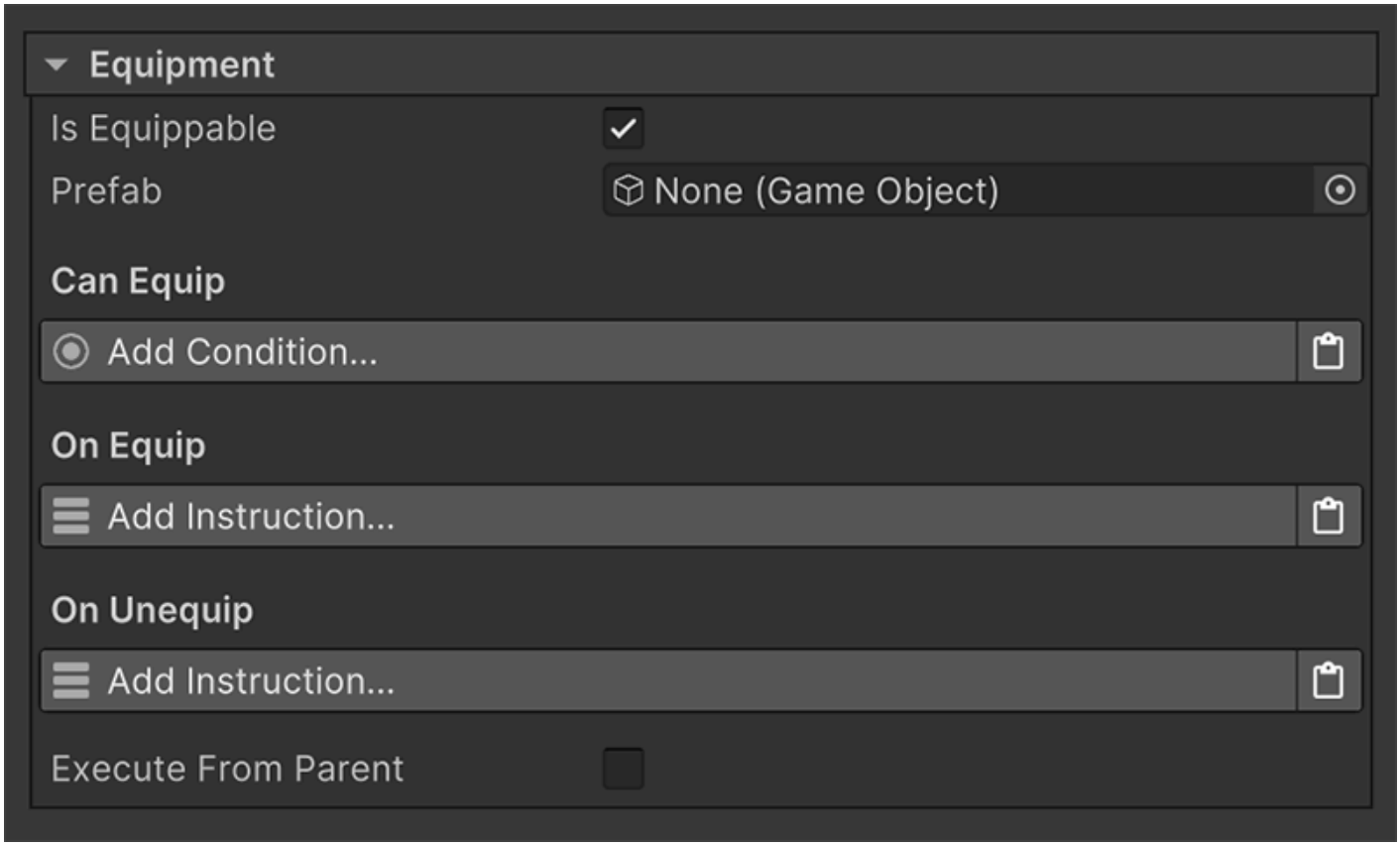
Attaching Runes

For example, a socket accepts the item *Rune*, then all items that inherit from the *Rune* item will be accepted.

See more information about this in the **Sockets** page.

649.2.7 Equipping

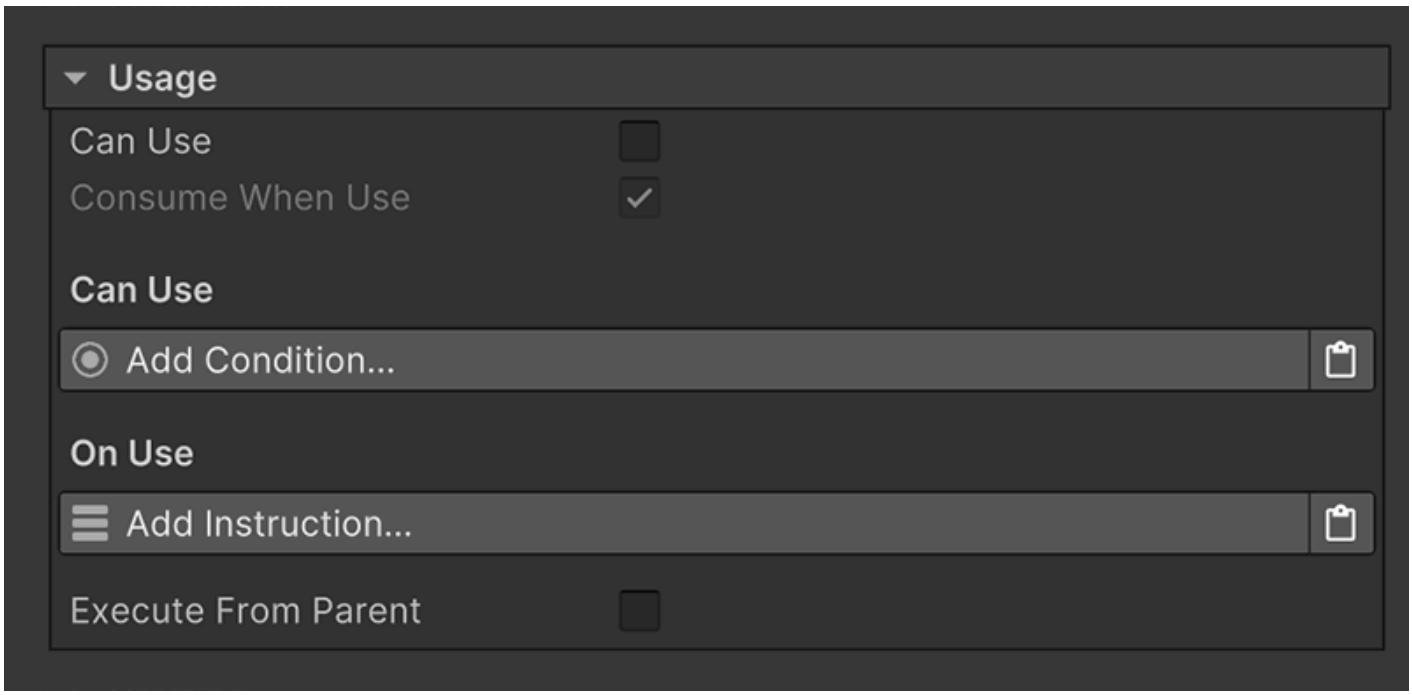
Some items can be equipped by the wearer (usually the Character with the *Bag* component).



See more information about this in the **Equipping** page.

649.2.8 Usage

This section allows to define the behavior of an utility **Item** which can be used at any given time.



A usable item can have a finite or infinite amount of usages. The **Consume on Use** toggle defines whether an item is consumed upon use or not.

Finite vs Infinite usages

For example, a *Health Potion* is consumed when used. However a *Whistle* can be used many times.

The **Can Use** conditions are executed every time a runtime item is attempted to be used. If the result is successful, the item is used.

When an **Item** is used, the **On Use** instructions are executed, where **Self** refers to the game object with the *Bag* component the item belongs to, and the **Target** is the references the wearer of the *Bag*.

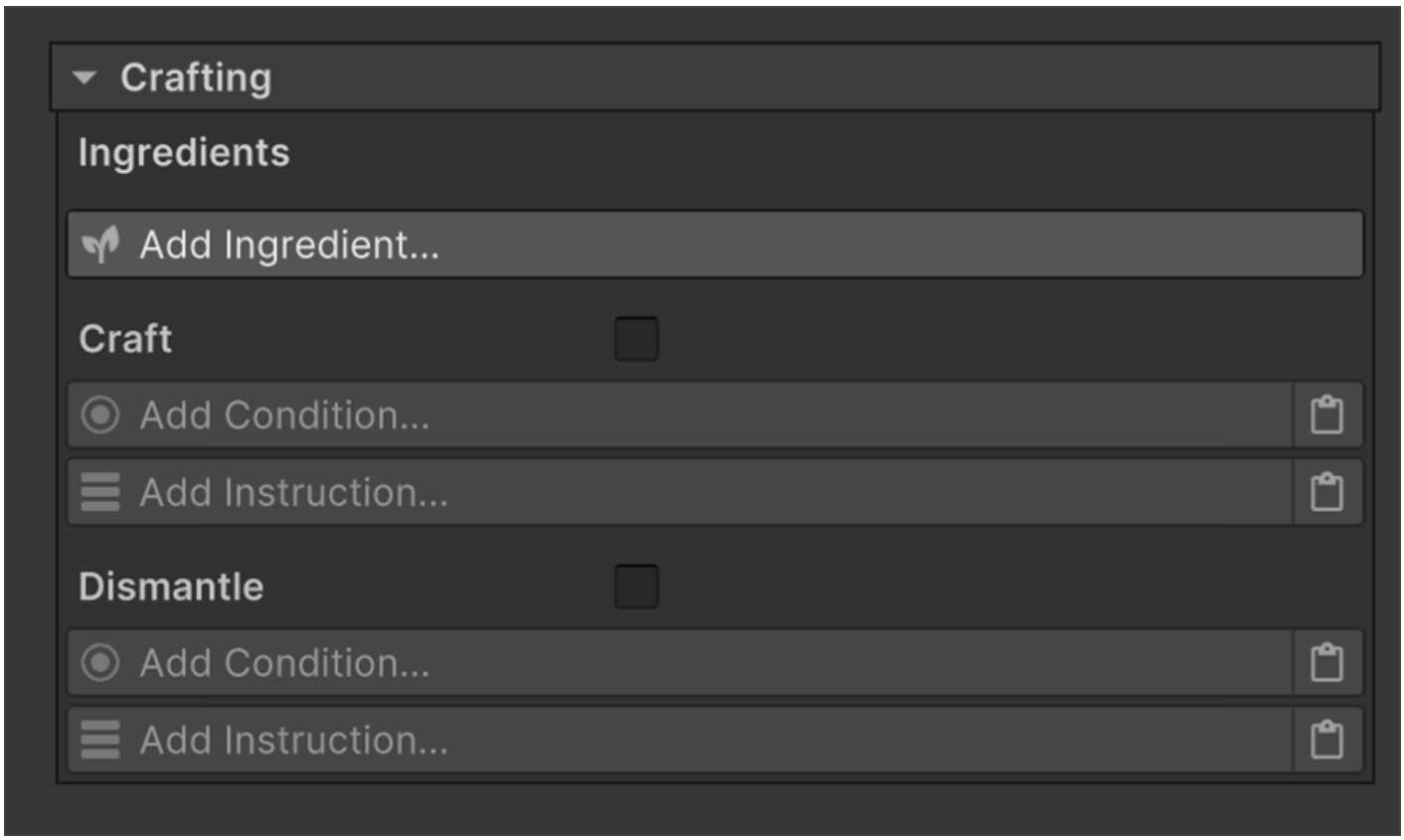
Execute From Parent

Both the **Can Use** conditions and the **On Use** instructions can optionally execute the parent Item's *Can Use* and *On Use* instructions before executing itself.

This is very useful to avoid repeating the same logic over multiple items. For example, if drinking any potion results in the character executing a particular animation and playing a sound effect, these instructions can be placed in a parent Item called *Potions* so each child Item (Health Potion, Mana Potion, ...) does not have to.

649.2.9 Crafting

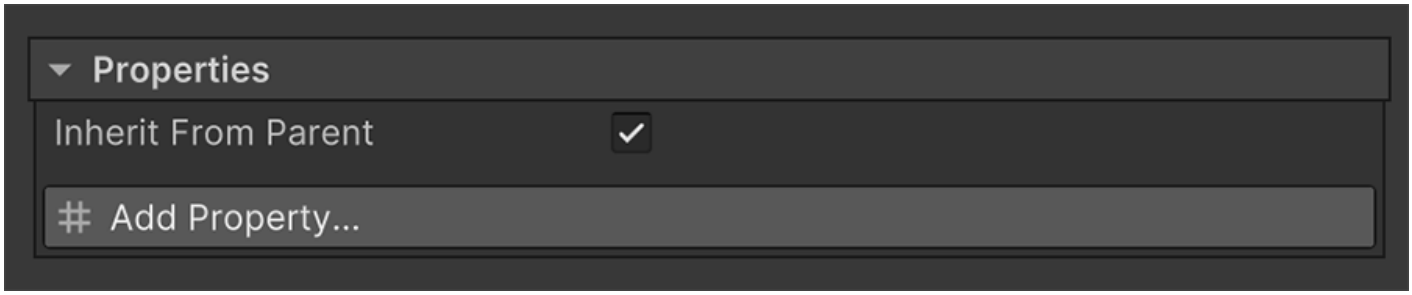
The **Crafting** section allows to define recipes to create new **Items** as well as dismantle them into multiple ingredients.



See more information about this in the **Crafting** page.

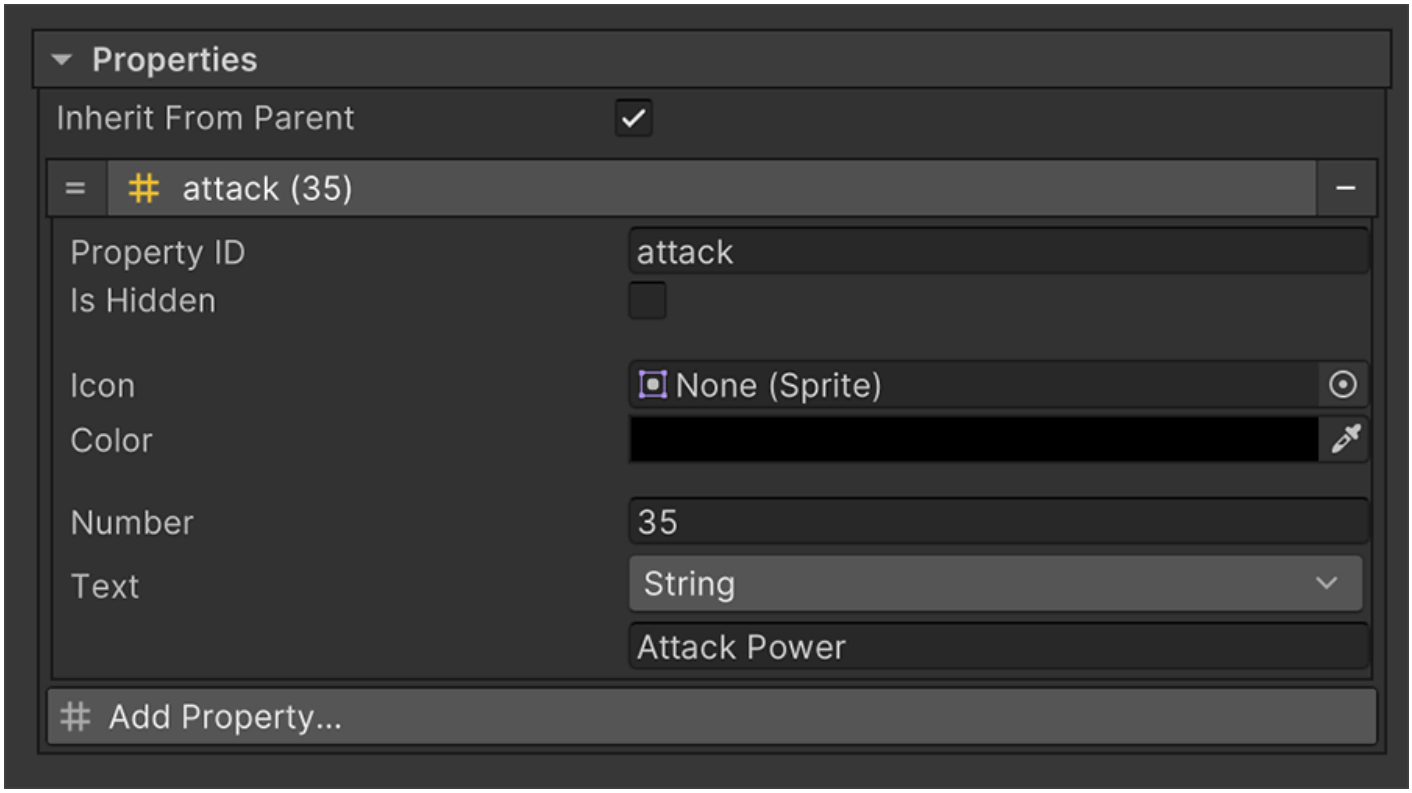
650 Properties

Properties are mutable values that compose a runtime item. For example, an **Item**'s attack power, its durability or whether they apply a special effect, such as *Burn*.



650.1 Creating a new Property

To create a new **Property** all that needs to be done is to click on the *Add Property* button.



The **Property ID** field determines the unique ID of this Property. It is used to identify it, so make sure it's a name that's easy to remember and type.

Is Hidden determines if a Property is hidden in the UI. For more information, see the Hiding Properties section.

The rest of fields are all optional.

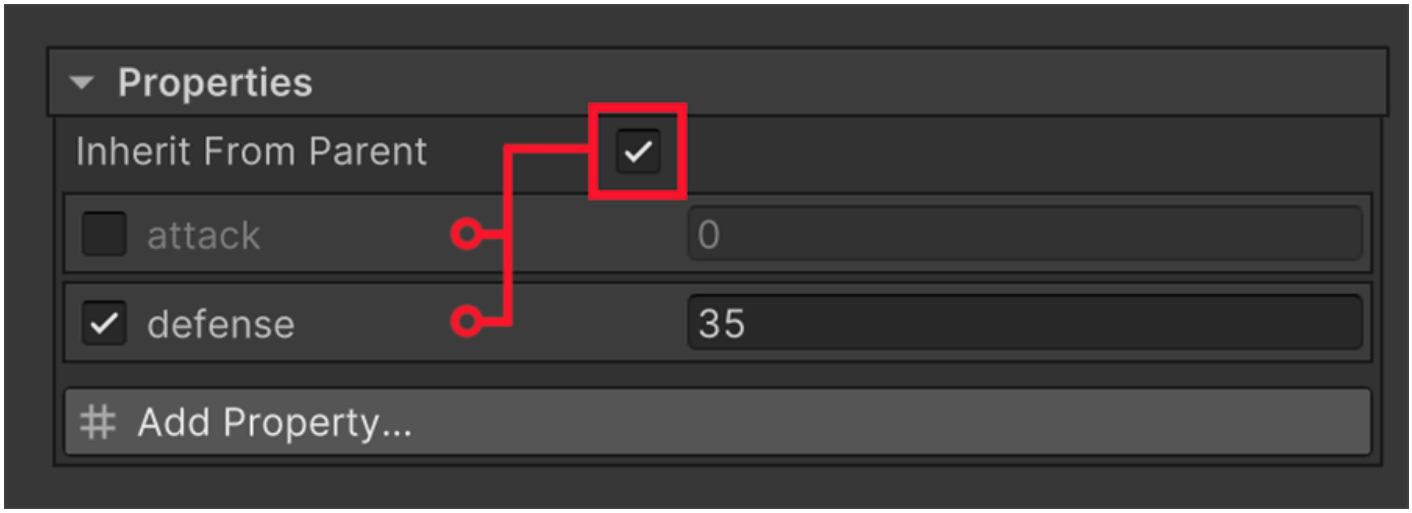
- **Icon**: Provides the Property with a Sprite to be used in user interfaces.

- **Color**: Assigns a color to the Property. Useful to differentiate items in user interfaces.
- **Number**: A mutable value that can be used in-game, such as increasing stats.
- **Text** A dynamic value that is usually used to represent the in-game name of the Property.

> **Mutable vs Immutable**
>
> Mutable is a programming concept which means that the value is dynamic and can be changed at runtime. Immutable, in contrast, means that its value can't be changed once a value is assigned.

650.2 Inheriting Properties

Checking the **Inherit Properties** toggle found at the top will automatically inherit all properties from its parent(s).



The value of an inherited **Property** can be overridden by checking its left toggle and changing the field value.

> **Taking advantage of inheritance**
>
> It is very common to have a type of item that shares the same properties with all its child items. Setting a base value for the parent item type will make it much easier to define what each sub-item does.
>
> For example, let's say all *shield* items have a `defense` value. We could add this property on the base item "Shield" and propagate this property to all other shields that inherit from this item, and just change the final value, so a "Wooden Shield" has a lower `defense` value than a `Steel Shield`.

650.3 Hiding Properties

When displaying properties in the UI, these can be sequentially displayed, without having to manually set them one by one. If the **Is Hidden** checkbox is ticked, these properties will not be displayed in the user interface.

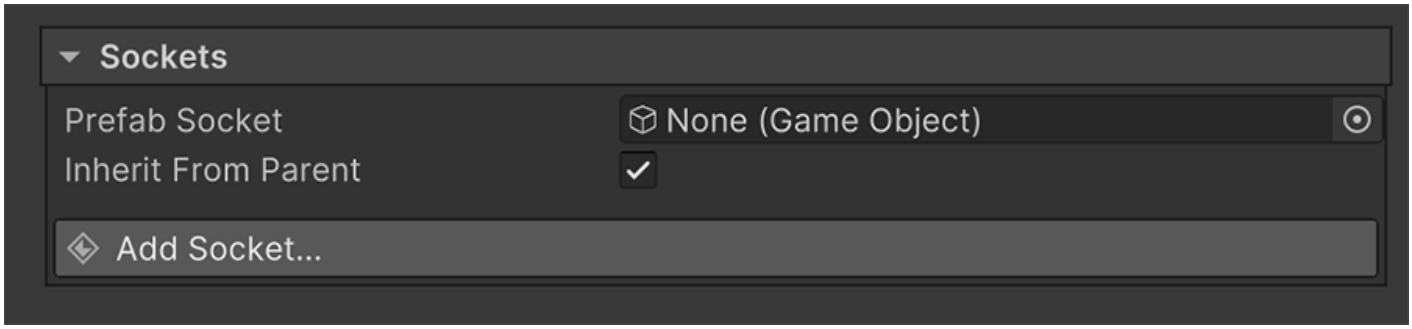
Stuff behind the scenes

This is specially useful when a property represents something that the user should not be aware of.

For example, some items could have the `is-metal` property that determines if an item is a metallic one or not.

651 Sockets

Sockets allow to attach items onto other items. For example, a Sword can have a socket that allows to attach a *Rune* so it increases its properties.



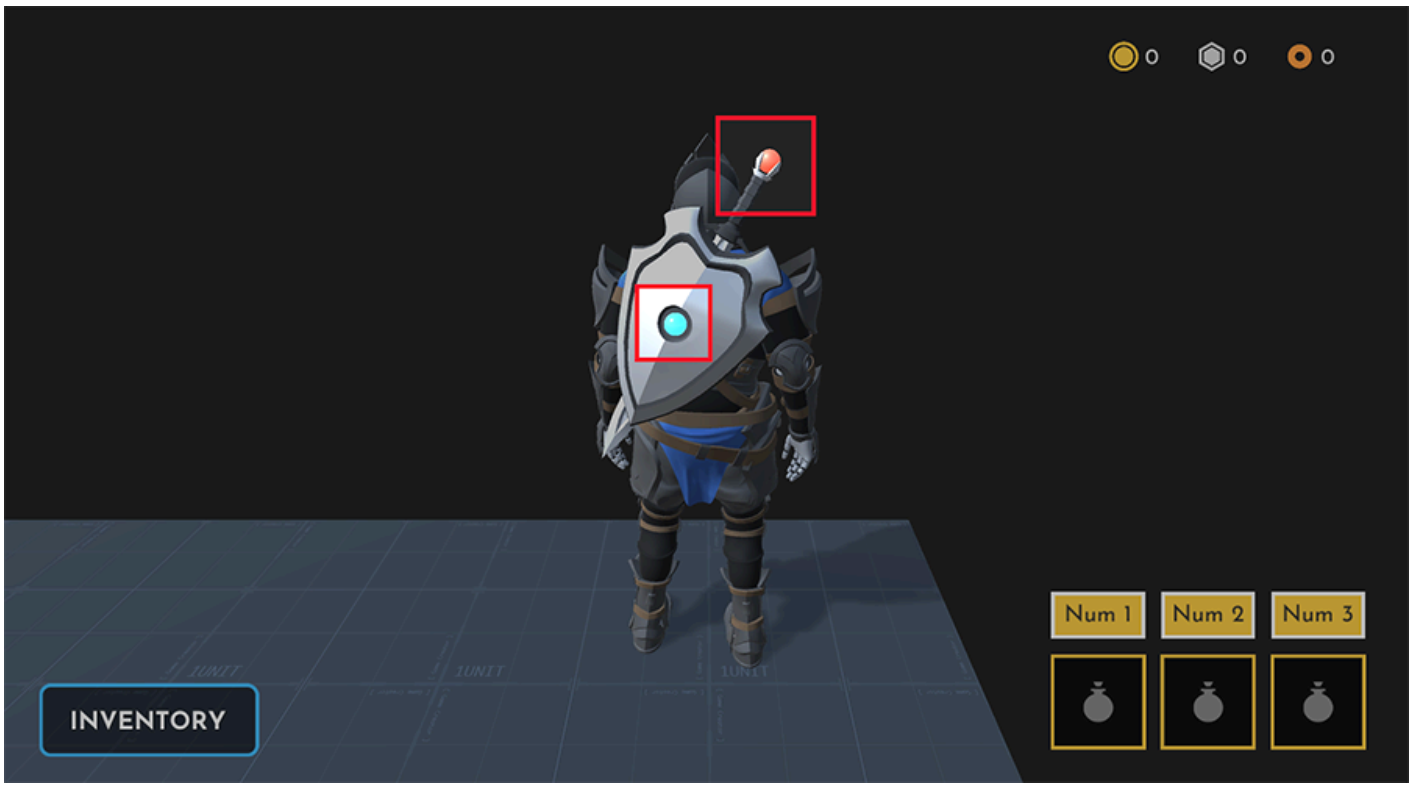
Inherit Parent Sockets

Ticking the **Inherit from Parent** checkbox will instruct the **Item** to inherit all **Sockets** from its parent(s).

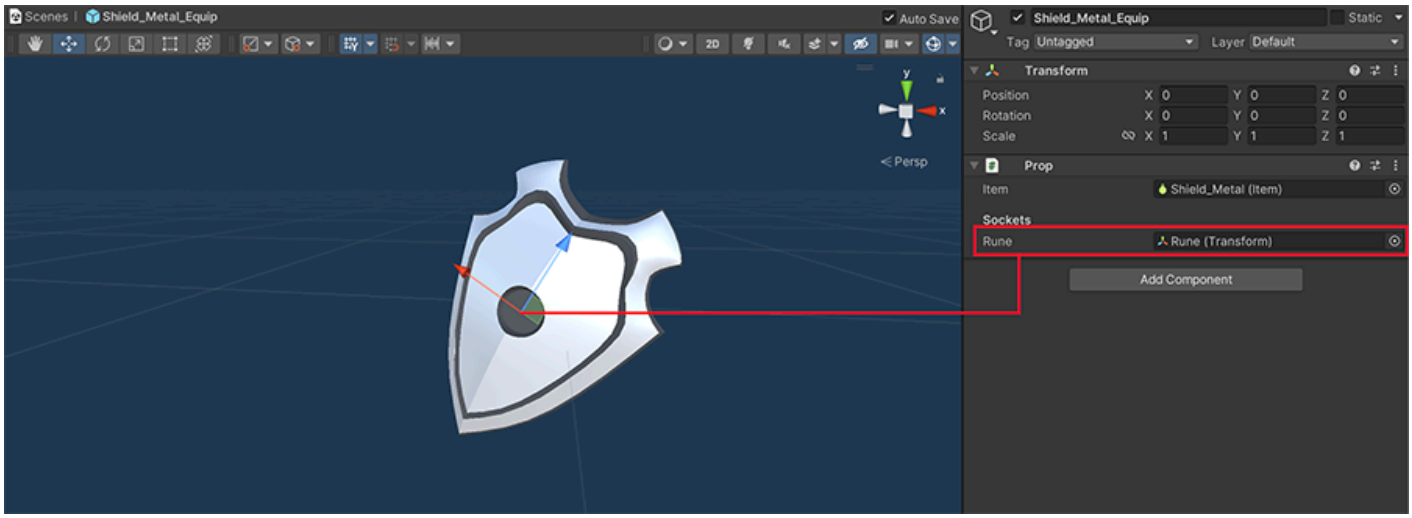
The socket section is divided in two parts: The part that defines the object attached to the socket, and the part that accepts attachments.

651.1 Objects attached to Sockets

The **Socket Prefab** field accepts a prefab game object, which is instantiated when attaching this **Item** onto another Item's **Socket**.



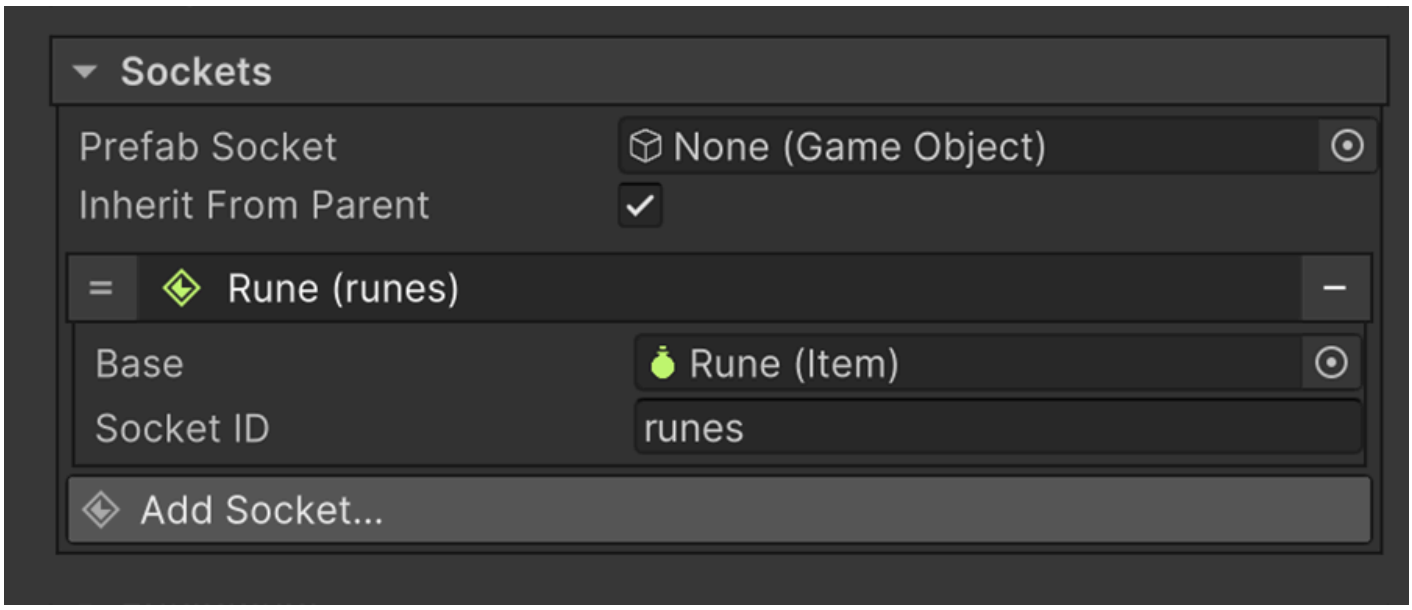
To configure where the prefab is instantiated, the scene prefab object must have a **Prop** component. This component automatically updates and correctly instantiates the attachment prefabs in the right places, defined in the component's Editor.



In this case, the *Metal Shield* has a **Prop** component that inserts the instance of a prefab of any attached rune at the center of the socket.

651.2 Configuration of Sockets

To add a **Socket** to an item, simply click on the *Add Socket* button.



A **Socket** is defined by a **Base** Item that determines which types of objects can be attached to, and a **Socket ID**, which is used by the *Prop* component.

Base Item

It is important to note that the **Base** item determines the type of item that the Sockets accepts, not the specific item. In the example above, it accepts a *Rune* item, but will also accept any item that has a *Rune* item parent, such as the *Rune of Attack* and *Rune of Defense* included in the examples.

651.3 How Properties affect Sockets

When attaching an **Item** onto another one's **Socket**, only their shared **Properties** are added.

Sword with a Rune of Attack

Let's imagine we have a **Sword** with a single *Property*

- `attack` = 10

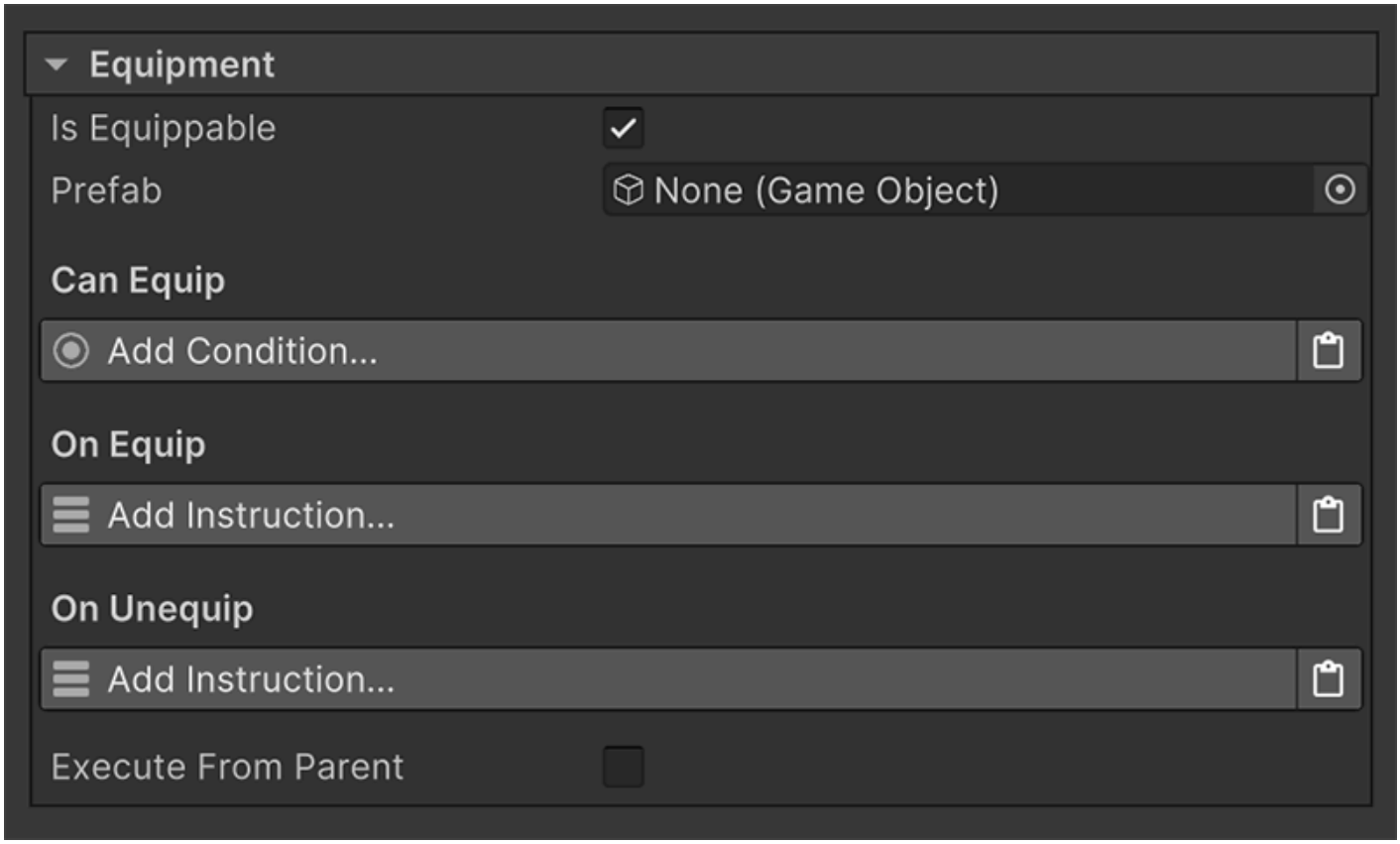
And a **Rune** with the following *Properties*:

- `attack` = 5
- `defense` = 5

Attaching the Rune to the Sword results in the latter have an `attack` value of 15 (10 + 5), but will ignore the `defense` Property because it is not present in the Sword.

652 Equipping

To define an equippable Item, the **Is Equippable** checkbox must be ticked, which enables the rest of the options.



When attempting to equip an **Item**, the Conditions **Can Equip** will first be checked.

If it succeeds, it will instantiate the prefab and execute the **On Equip** instruction list. The **Prefab** field is the game object prefab instantated when equipping this particular Item.

Equipping an item Unequips others

Attempting to equip an **Item** on a slot that is already filled by another **Item** will automatically unequip the current one so the new **Item** can be equipped.

When unequipping an **Item** it will execute the **On Unequip** instruction list.

Equipment

To know more about how to define which **Equipment** slots are available for a character, see Equipment in the Bag section.

When executing the **Can Equip** conditions and the **On Equip** and **On Unequip** instructions:

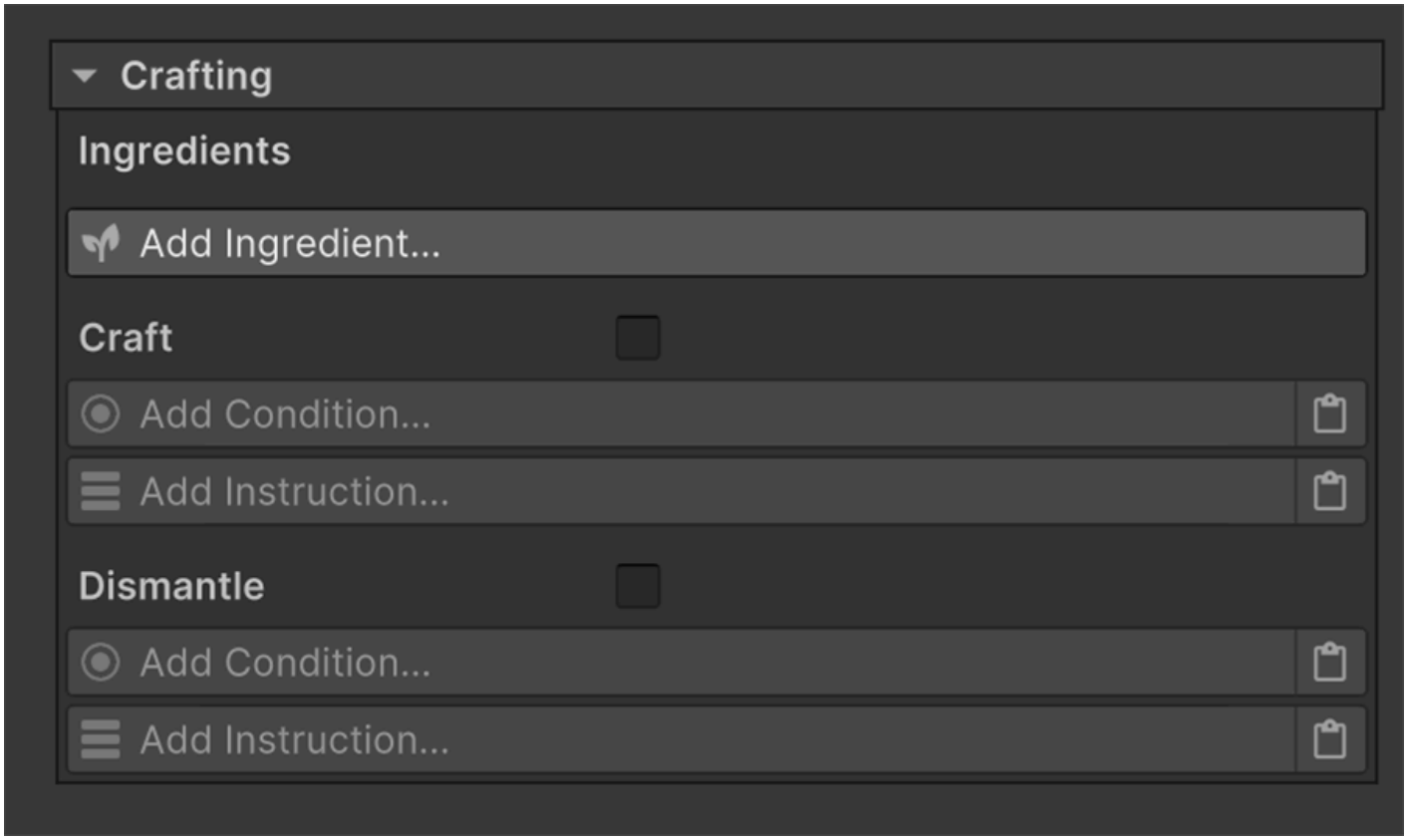
- The **Self** property references the game object that contains the Item being equipped/unequipped.
- The **Target** references the wearer of the **Bag** (which usually is the same as the Bag object itself).

It is important to note that when a currently equipped item changes the value of one of its Sockets, it will first unequip it, change the **Socket** value and equip it again.

> **Execute From Parent**
>
> If the **Execute From Parent** checkbox is marked, the instructions and conditions from the item's parent item will be executed first (and its parent too, if the parent has *Execute From Parent* marked).
>
> This is very useful to avoid repeating the same logic over multiple items. For example, if the parent type *Swords* contains a **Property** called `attack` and all sub-items from Swords have different `attack` values, there is no need for all sword sub-items to add a **Stat Modifier** with that property.
>
> Instead, the *Swords* item can execute the common logic between all swords, and each sub-item just needs to have the *Execute From Parent* checkbox enabled.

653 Crafting

The **Crafting** section both defines a way to craft the **Item** being examined, as well as tear it apart and dismantle it into multiple **Items**.

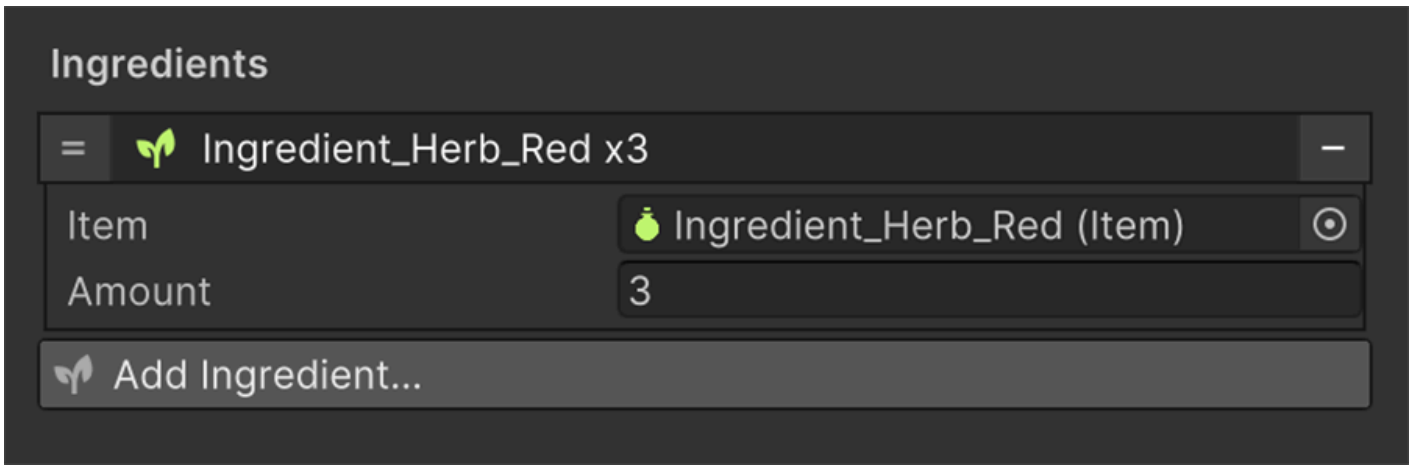


There are 3 distinct sections inside the **Crafting** tab.

653.1 Ingredients

Ingredients are **Items** that can be used to craft the current one, or dismantle it into these ingredients.

To create a new **Ingredient** click on the *Add Ingredient*.



This will create a new ingredient entry with an **Item** field and the amount of those necessary.

> **Infinite ingredients**
>
> There is no limit to the amount of **Ingredients** you can create.

653.2 Craft

When attempting to craft an **Item** it will first check if the **Conditions** are sufficient. If so, it will then require a certain amount of **Ingredients** defined.

If there are enough ingredients, these will be subtracted from the Bag.

> **Empty Conditions**
>
> Leaving the **Conditions** field empty will always return success and means there are no conditions to craft it, outside from the **Igredients**.

Once the **Conditions** and **Ingredients** requirements are fulfilled, it will create a new instance of the **Item** and add it to the Bag.

Afterwards, it will call the **Instructions**, in case the designer wants to do something afterwards, such as increasing the proficiency of the Player in crafting.

653.3 Dismantle

Dismantling an **Item** is the inverse process of **Crafting**: Instead of creating the current **Item** from a collection of **Ingredients**, it destroys the **Item** and reclaim the **Ingredients**.

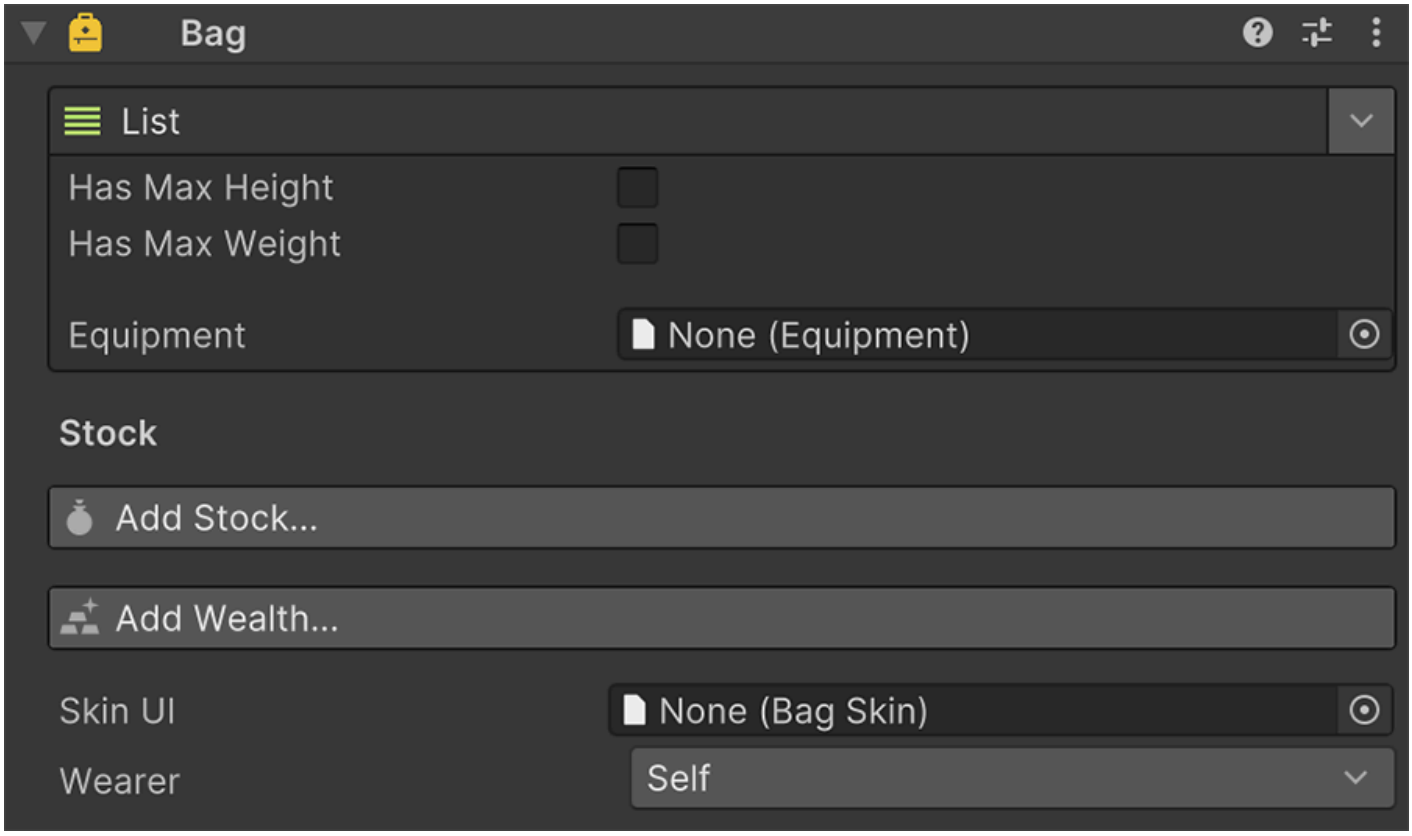
Reclaim Probability

When **Dismantling** an **Item** there is a *Reclaim Chance* value that determines the chance to recover each of the **Ingredients**. A value of 1 will always recover all ingredients, while a value of 0.5 will only have a chance to recover around 50% of them.

II.II Bags

654 Bags

A **Bag** is a component that can be attached to any game object, and contains **Items** and **Currencies**.



The **Inventory** module comes with 2 types of **Bags**:

- **List**: Sequentially displays the items one after the other and all occupy the same amount of space.
- **Grid**: Each item occupies a certain amount of cells and these can be manually arranged inside the inventory grid-view.

> **Recommendation**
>
> We recommend sticking with the **List** type, as it is easier to understand and manage. **Grid** inventory systems should be only used by experienced users.

To change the type of **Bag** click on the right-side arrow button and choose the type from the dropdown menu.

654.1 Bag Options

A **Bag** can define a **Maximum Weight** and a **Maximum Height**.

- If a maximum height is defined, there is a maximum amount of **Items** it can hold.

- If a maximum weight is defined, if the sum of all **Item**'s weight exceeds the maximum value, the **Bag** is considered overloaded.

> **Too much weight**
>
> It is important to note that a **Bag** can't exceed a maximum amount of height (if any is defined). However, a **Bag** will still accept new **Items** even if its content weight exceeds the maximum weight defined.

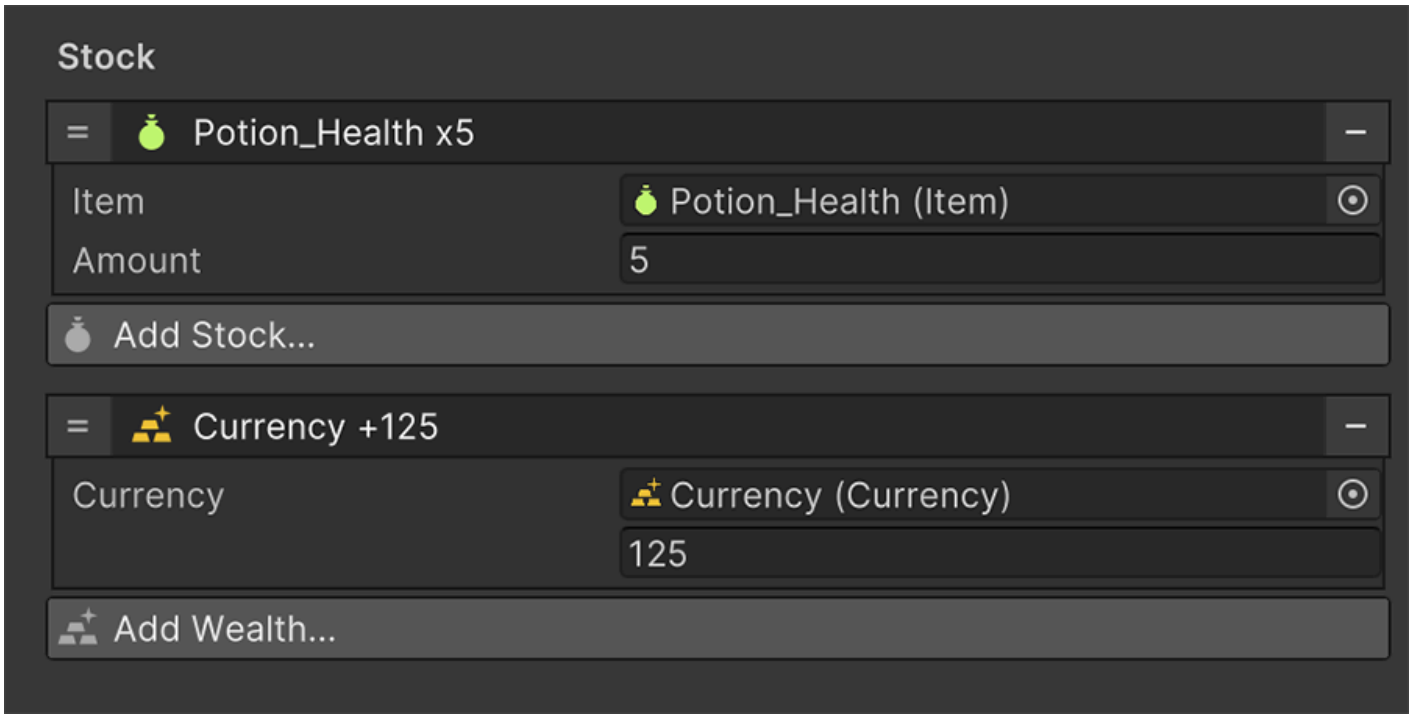
654.2 Equipment

The **Equipment** field is an optional value that accepts an **Equipment Asset**. If provided, it allows the wearer of the **Bag** to equip **Items**.

To know more about how to configure it, see the Equipment section.

654.3 Stock and Wealth

Some **Bags** may contain a certain amount of **Items** and **Currency** by default. For example, a Merchant may have some default stock available.



- Clicking on the *Add Stock* button creates a new **Stock** option that accepts an **Item** and a certain amount of it.
- Clicking on the *Add Wealth* button creates a new **Wealth** option that accepts a **Currency** and its value.

Random Loot

A **Bag** can also be used as a Chest where the player loots its contents. To generate random loot, we recommend using **Loot Tables**, instead of **Stock** options.

654.4 Skin UI

The **Skin UI** field is a UI skin asset that displays a different type of user interface that depends on what the purpose of the Bag is. For example, a **Bag** attached to the Player character could display an Inventory UI, while a Chest displays a UI with its content and a button to transfer all of them to the Player's bag.

Custom Skins

To know more about designing custom skins, see the User Interface section.

654.5 Wearer

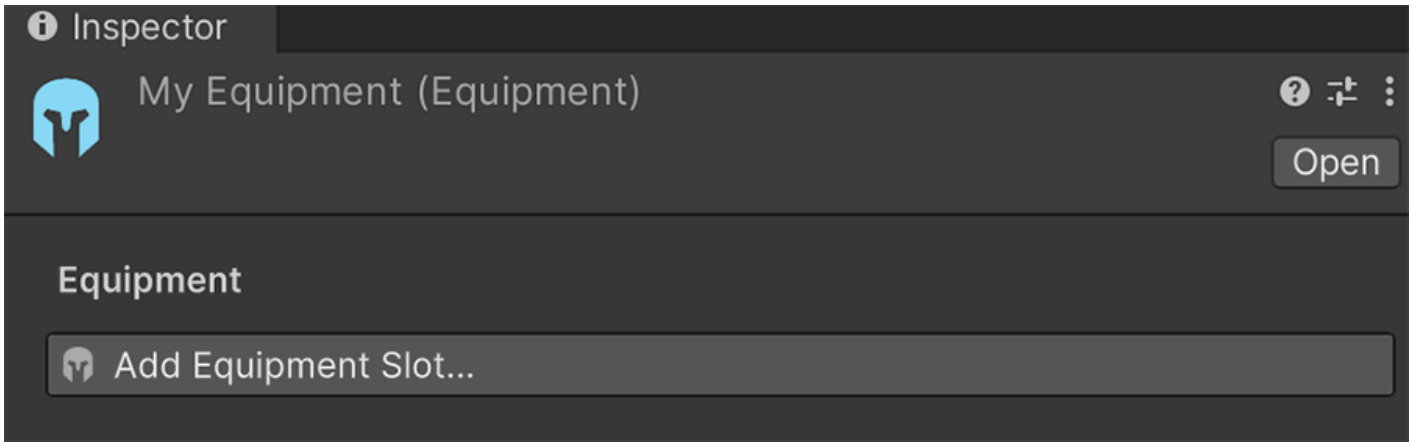
The **Wearer** selector refers to the targeted game object that wears the **Bag**'s equipment. By default it is set to *Self* because the **Bag** is usually attached along the **Character** component. However, if for some reason that is not the case, you can choose which character should be targeted as the equipment wearer.

655 Equipment

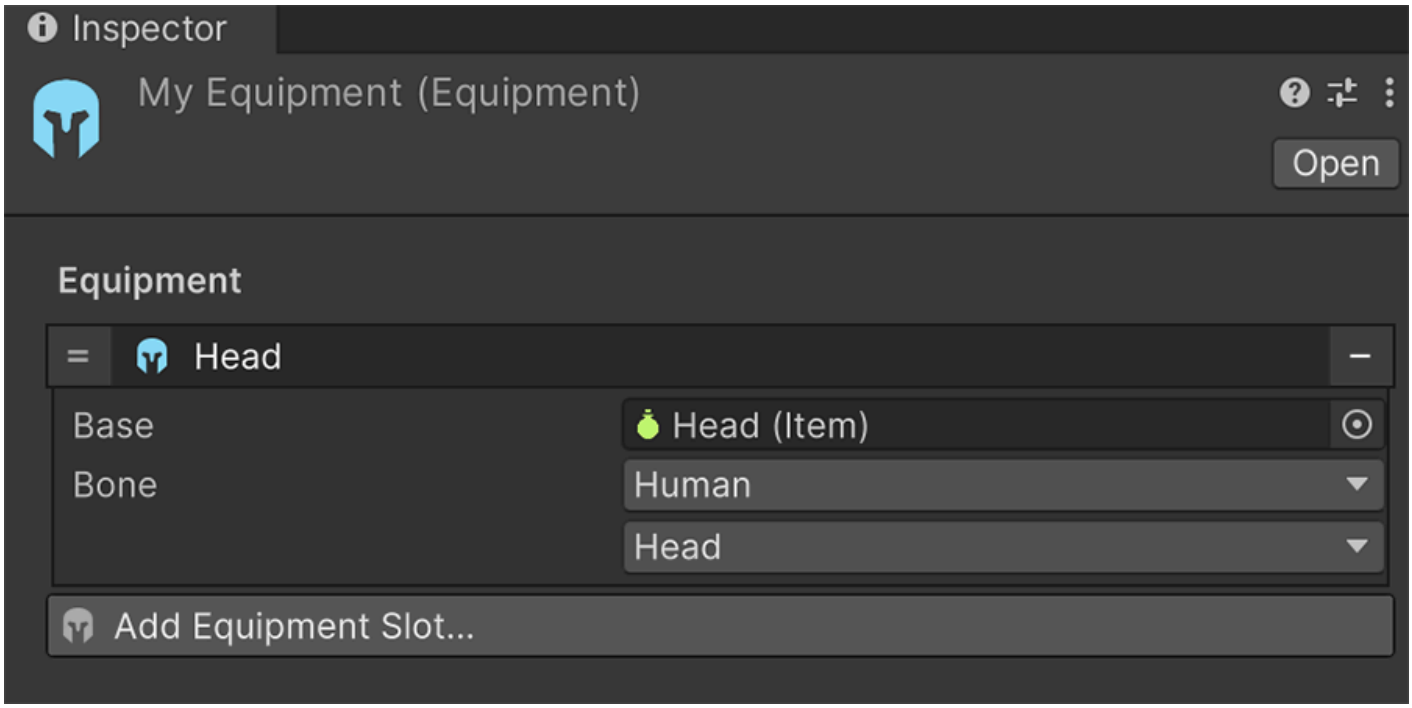
The **Equipment** asset is a scriptable object that lives in the *Project Panel* which contains information about the amount of equippable slots and what bone matches each one of them.

655.1 The Equipment Asset

To create an **Equipment** asset, right click on the *Project Panel* and select Create → Game Creator → Inventory → Equipment.



An **Equipment** initially has no equipment. Click on the *Add Equipment Slot* button to add a new slot.



An equipment slot has a **Base Item** and a **Bone** reference.

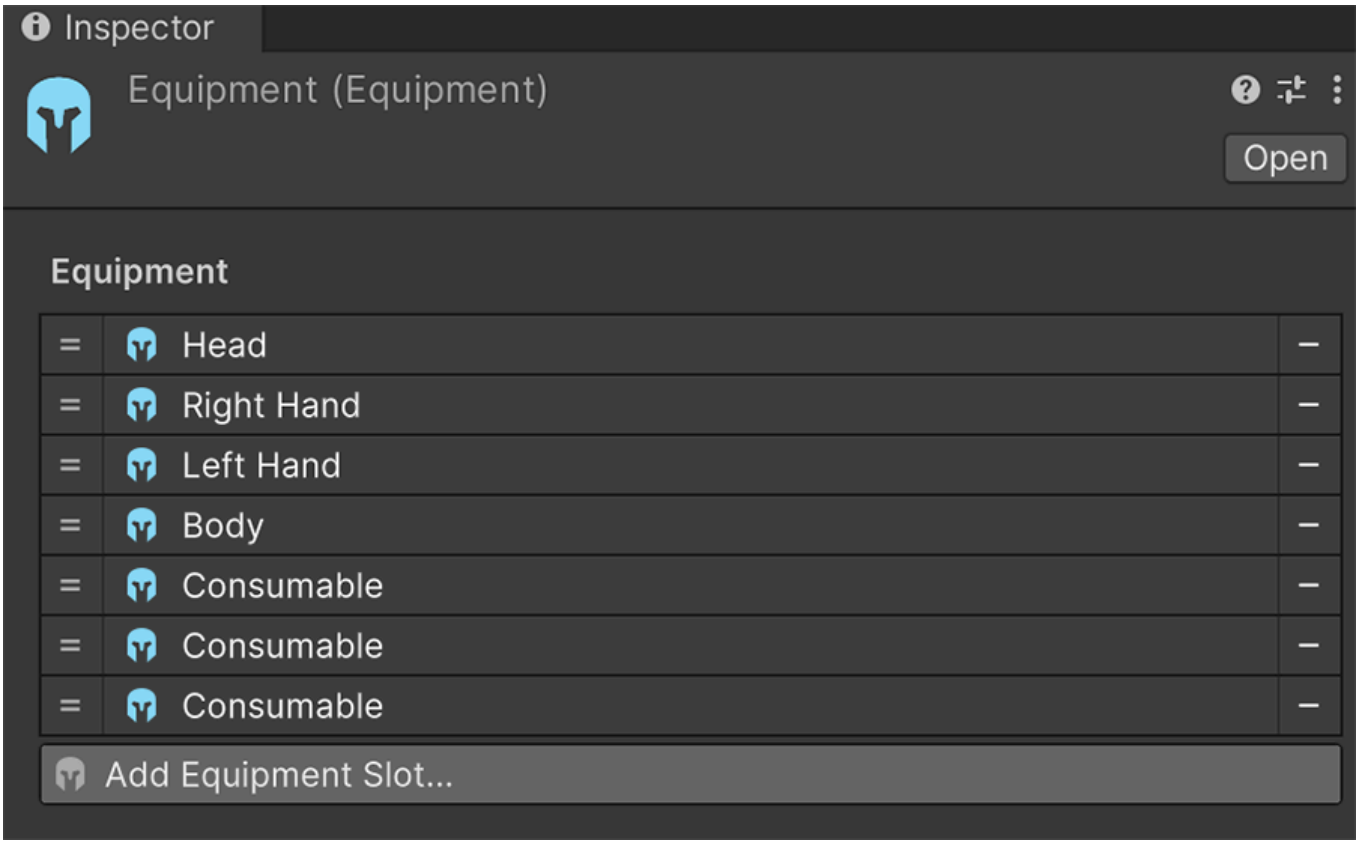
- The **Base Item** is the type of **Item** it accepts. For example, if all *Helmets* inherit from a *Head* item, using the *Head* template item will allow to equip all helmets in this slot.
- The **Bone** is a reference to the chosen skeletal bone. If the targeted character is a *Humanoid*, the bone can be picked from a dropdown list. If the character is a non-humanoid, the bone must be referenced using its hierarchy path.

655.2 Using the Equipment

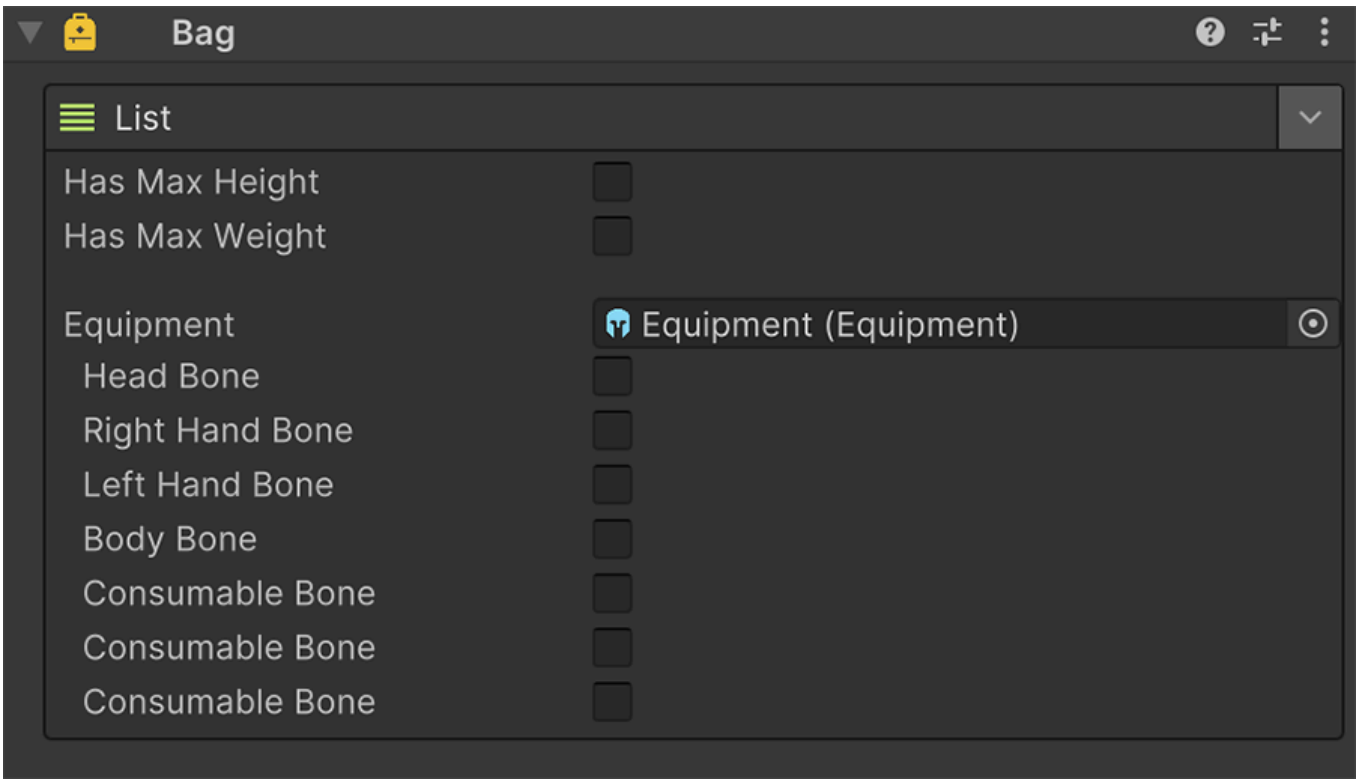
Once the **Equipment** asset is created, this can be linked to a **Bag** component so the character knows which equipment slots it has available and where each is mapped to which bone.

Example

For example, the equipment that comes with the **Inventory** module has 4 equippable slots (head, body, right and left hand), plus three extra slots for consumable items:



We can assign this **Equipment** asset to a **Bag** and all available slots will appear below.

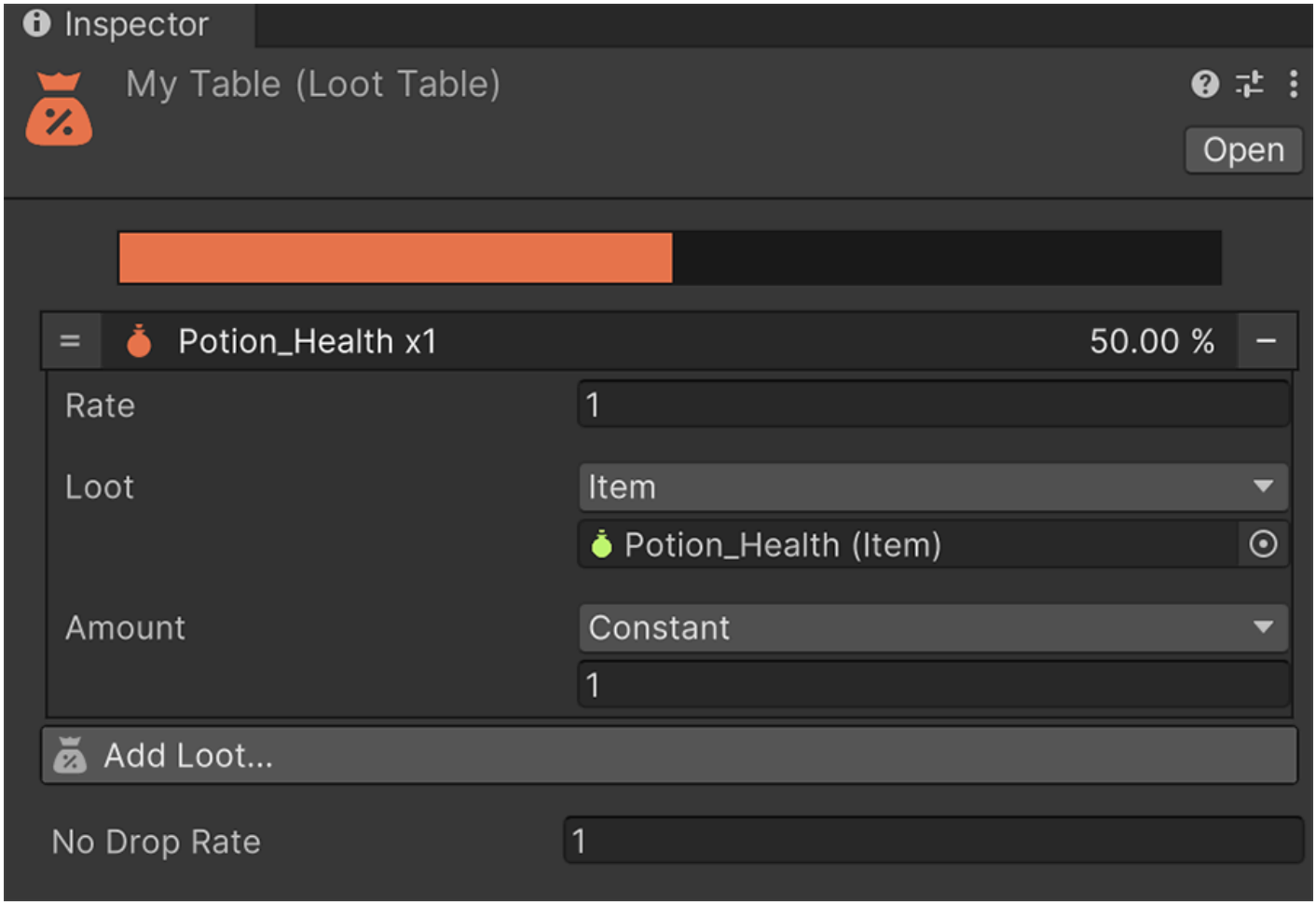


After assigning an **Equipment** asset to a **Bag**, the bone that is linked to each slot can be overridden. This is specially useful for non-humanoids, where their bone hierarchy names might not match.

656 Loot Tables

Loot Tables are probablility sheets that when executed, pick an option from its entries based on a weighted chance and send the chosen element (if any at all) to a **Bag** component.

To create one, right click on the *Project Panel* and select Create → Game Creator → Inventory → Loot Table.



To add a new loot entry, click on the *Add Loot* button. A new entry will appear with the following options:

- **Rate**: A number that represents the weight of the chance. The higher the value, the greater the chance.
- **Loot**: A dropdown that allows to pick an **Item** or a **Currency**.
- **Amount**: The amount picked if the entry is chosen. It can either be a constant value or a random one.

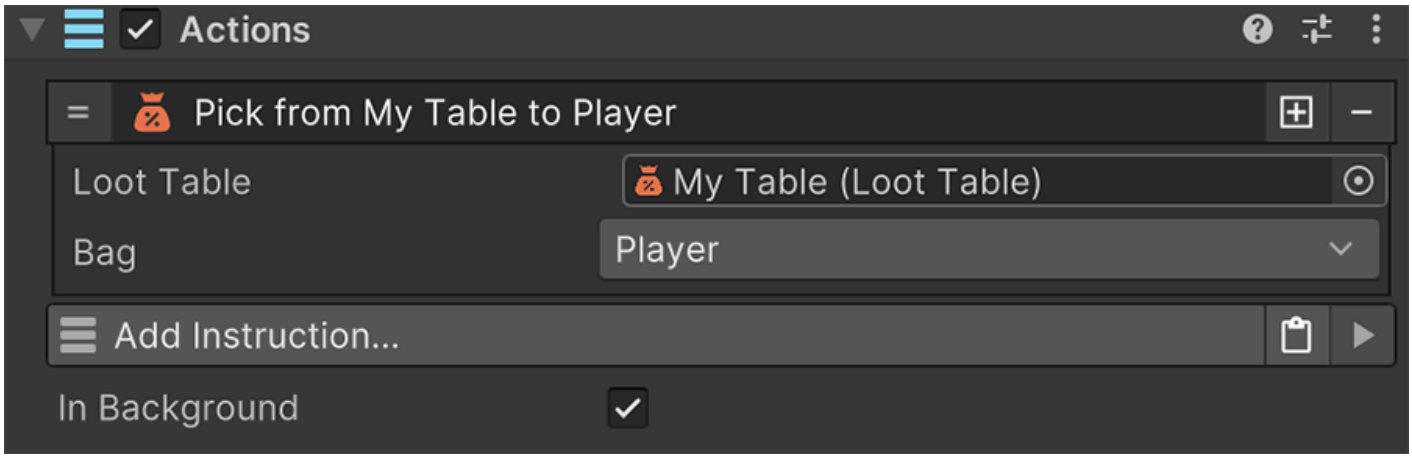
Weight vs Probability

It is important to note the distinction between a **Rate** (or weight) and a probability percentage.

The **Rate** depends on the total sum of all rates from all entries. For example, two entries with a **Rate** of 1 is equal to two entries with a **Rate** of 5. In both cases, the chance of picking them is 50%.

Optionally there is a **No Drop Rate** field that enables the **Loot Table** to pick nothing.

To execute a **Loot Table** it is as easy as using the **Loot Table** instruction and choosing both a **Loot Table** asset and the targeted **Bag** where the items/currency will be sent to.



Run multiple times

Note that each time a **Loot Table** is executed, it picks one entry from the table. A **Loot Table** can be used multiple times in sequence to fill, for example, a Chest with multiple items.

Chest with Random Loot

One easy way to randomize the loot of a level is to populate them with a Chest prefab that has an **On Start** Trigger. This Trigger then runs one or more times a **Loot Table** and sends its contents to the Chest's **Bag** component.

This allows to very easily populate all the Chests of a level with different content, while at the same time controlling the kind of content they contain.

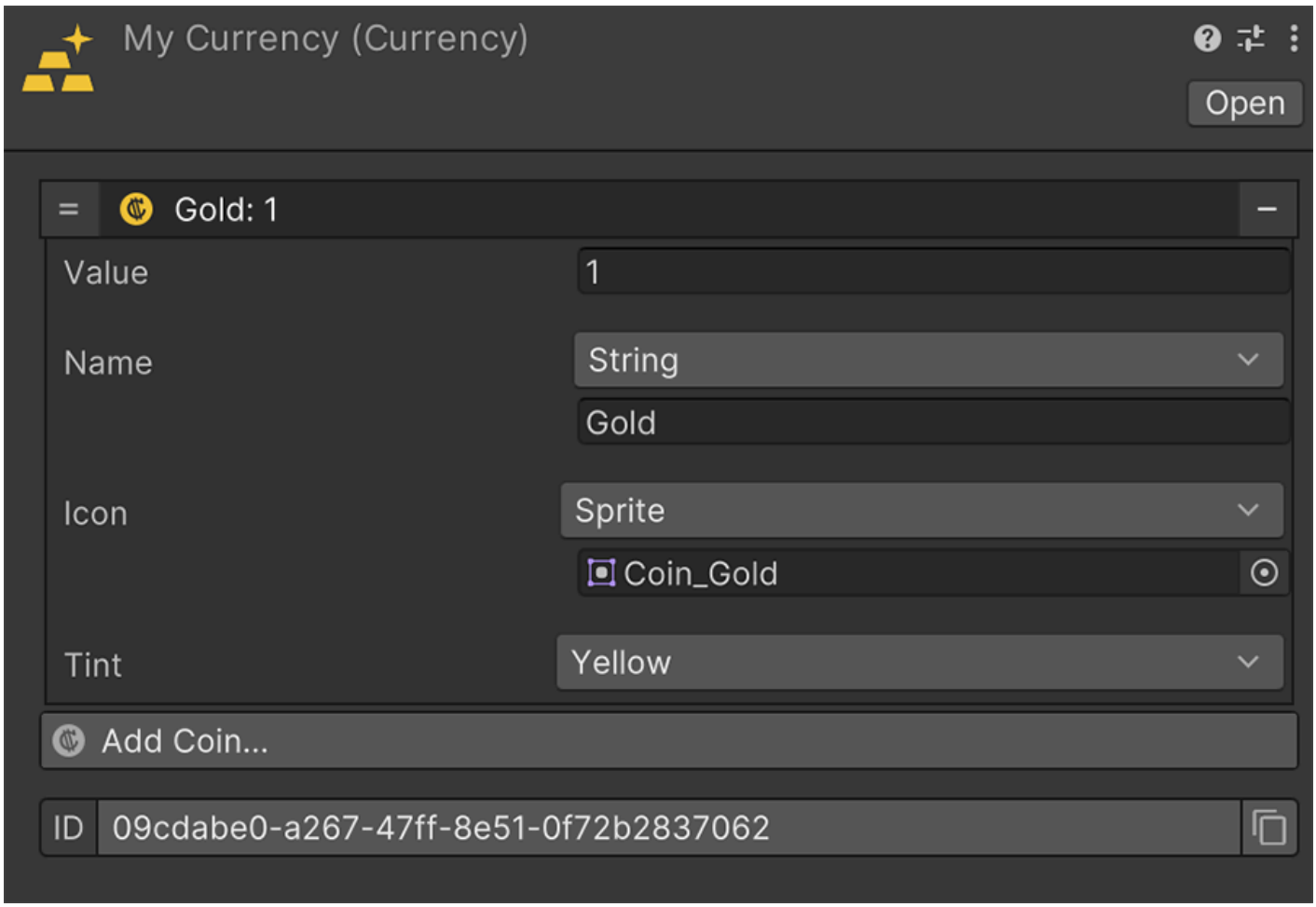
657 Currencies

To determine the value of an **Item**, Game Creator uses the concept of **Currency**.

A **Currency** is an asset that contains one or more **Coins**. Each **Coin** has a value relative to a single unit. To create one, right click on the *Project Panel* and select Create → Game Creator → Inventory → Currency.

Single Currency

Most games make use of a single **Currency**. However, some mobile games and hard-core resource management games use multiple ones.



In the example above, the **Currency** just has a single **Coin** called **Gold** which value is 1. This is the most simple currency one can create and it's the most commonly used in most games.

No decimals

It is important to note that a currency cannot have a decimal value. If you wish to represent a value with 2 decimals, one can multiple the value x100 and then shift the comma two units left.

However, some games make use of a multi-coin **Currency** where each coin represents a different value.

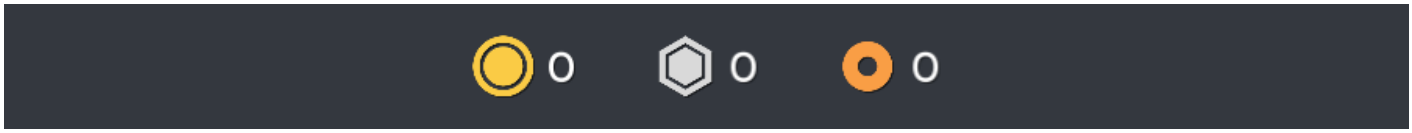
Copper, Silver and Gold

Let's say we are making a game where the currency has three different coins, each with a different value:

- A Copper coin is the smallest one.
- A Silver coin is equal to 25 of Copper coins.
- A Gold coin is equal to 5 Silver coins.

In that case, we would create a **Currency** asset with three coins:

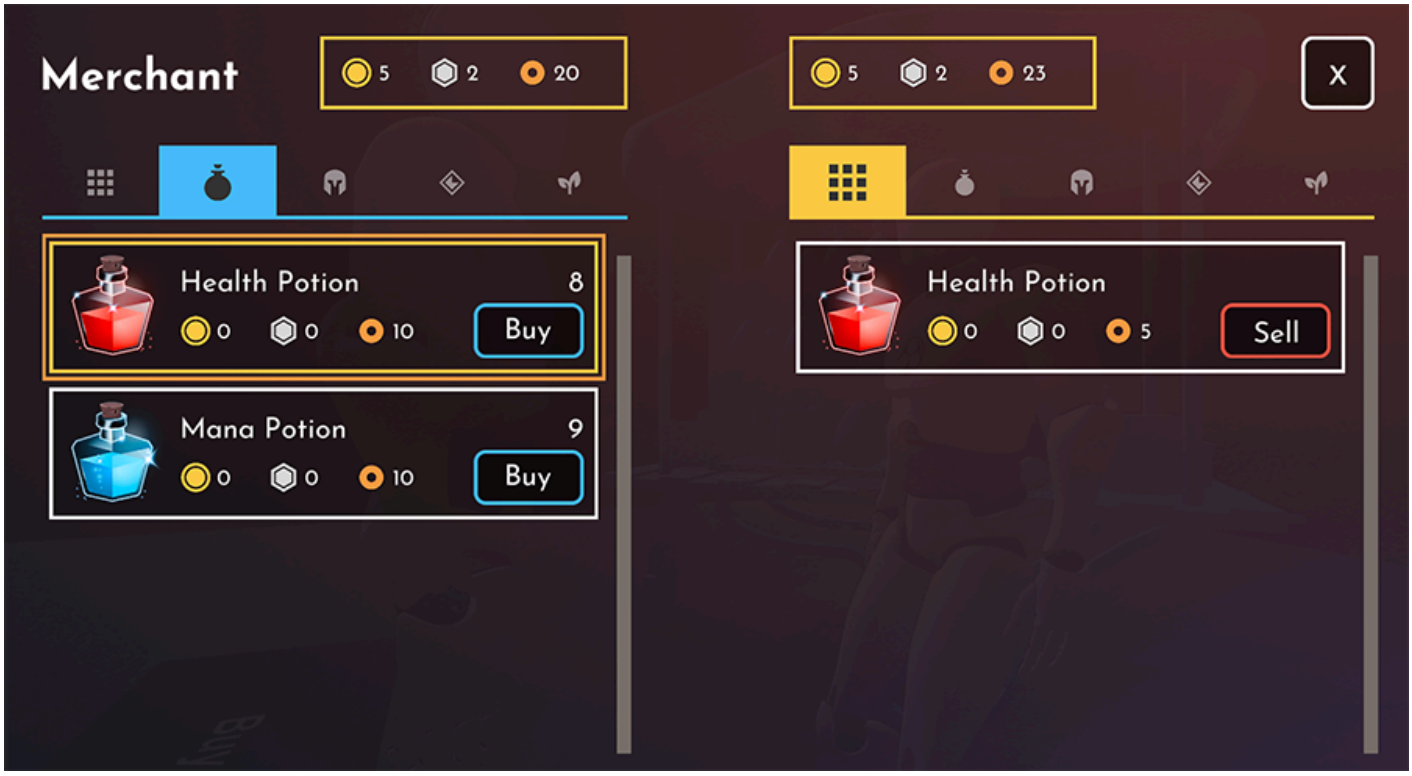
- **Copper**: Is the smallest possible value, so it has a value of **1**.
- **Silver**: Is equal to 25 copper coins, so it has a value of **25**.
- **Gold**: Is equal to 5 silver coins, which cost 25 copper coins each, so it has a value of **125**.



It is important to note that when adding or subtracting a value of a particular **Currency** the value used is relative to the unit. Following the example above, if we want to give one *Gold Coin* to the Player, we simply increase its wealth by **125**.

658 Merchants

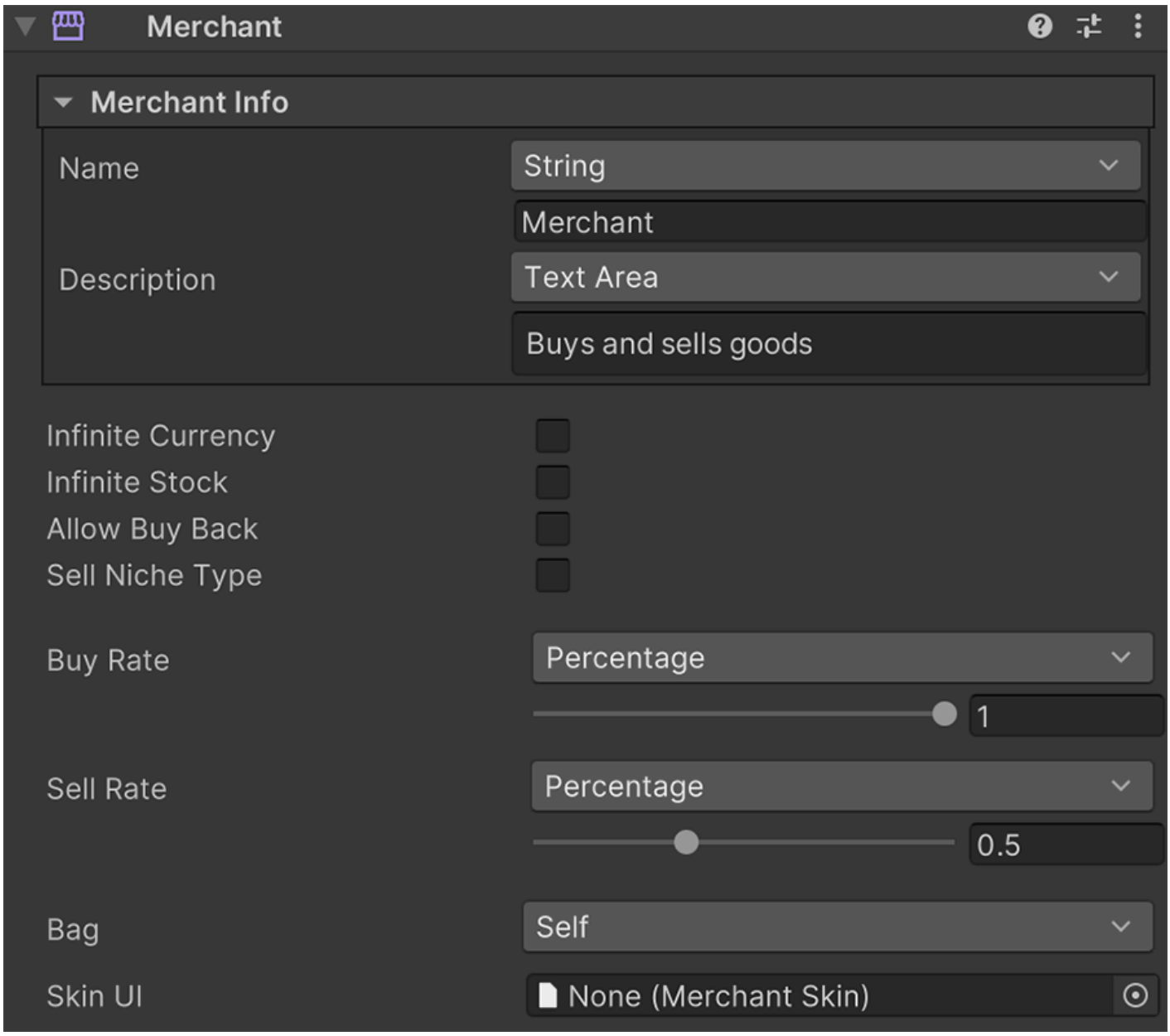
The **Inventory** module comes with a built-in system that allows two **Bags** to trade their contents in exchange for a specified Currency.



658.1 Merchant Component

To initiate a trade between two **Bags**, one of them (the merchant) must have a **Merchant** component attached along a **Bag** component.

- The **Bag** component provides the stock of items available.
- The **Merchant** component determines the type of transactions made.



658.1.1 Merchant Info

The *Merchant Info* section allows to give the **Merchant** a name and a description. This is completely optional, but can be useful to display the type of trading made by a certain Merchant.

> **Example**
>
> For example, having a merchant called *Herbologist* already gives a clue of the type of **Items** this merchant trades with.

658.1.2 Configuration

- **Infinite Currency**: If checked, the Merchant will have an infinite amount of currency supply to buy Items from the client (Player). Otherwise it will use the Bag's wealth.

- **Infinite Stock**: If checked, the number of available Items will not decrease after the client (Player) purchases them. Otherwise, the available stock decreases with each purchase made.
- **Allow Buy Back**: If checked, every Item sold by the client (Player) is automatically added to the Merchant's stock. Otherwise, any Item sold cannot be recovered.
- **Sell Niche Type**: If checked, it allows to filter the type of Items sold by this merchant, regardless of its Bag content. For example, if a Merchant only sells *Herbs*, even if its Bag contains a Sword, it will not be available for sale.

The **Buy Rate** is the discount coefficient that the Merchant provides when buying Items from the client (Player). A value of *1* indicates the Items sold have no discount. To provide a 90% discount on all Items, this field should be set to *0.9*.

The **Sell Rate** is the coefficient applied when the Merchant purchases Items from the client (Player). In most games, the selling price of an Item is lower (commonly half the price) than its real one.

The **Bag** field is a reference to the Bag component from where the Merchant takes its stock.

> ✓ **Reference a Bag**
>
> If your Bag is placed along another game object, you can change the value of this field from *Self* to *Bag* and manually reference the correct object.

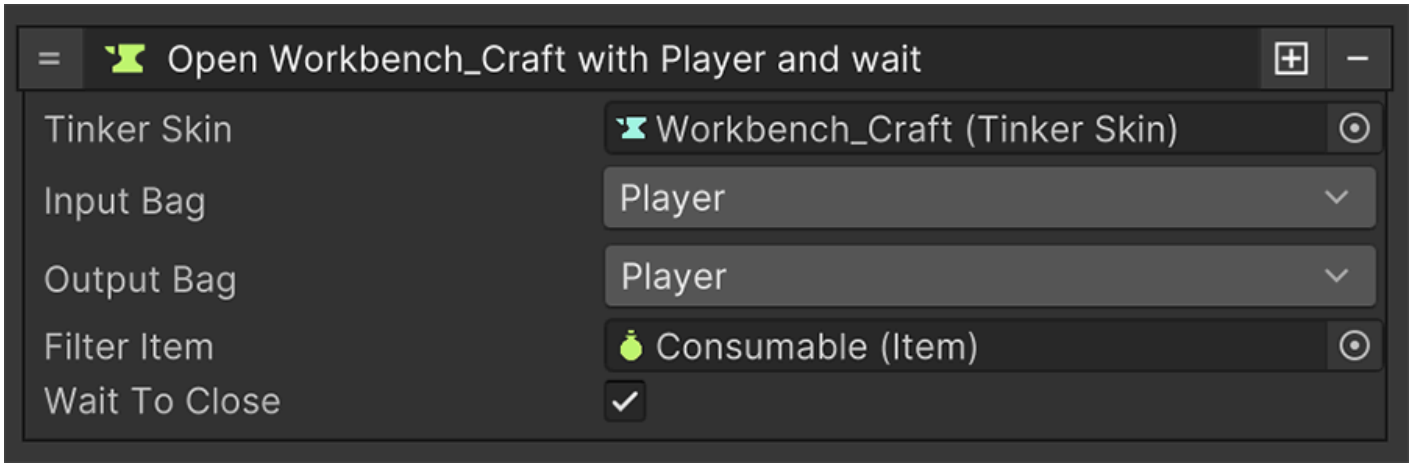
Skin UI is the user interface skin used by this merchant.

659 Tinkering

The process of transforming items into other ones is called **Tinkering**, which includes:

- **Crafting**: Creating a single item from multiple ones.
- **Dismantling**: Destroying an item in order to recover multiple ones.

To open a **Crafting** or **Dismantle** interface, use the **Open Tinker UI** instruction.



This instruction uses a **Tinker Skin** that determines whether the UI crafts new items or dismantles existing ones.

The **Input Bag** and **Output Bag** are the bags used by the tinker process. In most games, both bag references will match, but there might be some cases where the game outputs the new items onto another bag, from where the player can pick them.

The **Filter Item** field determines the type of items displayed.

> **Filtering by Type**
>
> Blacksmithing and brewing potions use the exact same process. The only difference between an Alchemy station and a Forge is that the first one filters the types of items to craft by *Potion* type and the latter filters by *Equipment* type.

To know more about how to create your own custom tinkering UI elements, see the Tinker UI section and the examples that come with the **Inventory** module.

II.III Visual Scripting

660 Visual Scripting

The **Inventory** module symbiotically works with **Game Creator** and the rest of its modules using its visual scripting tools.

- **Instructions**
- **Conditions**
- **Events**

Each scripting node allows other modules to use any **Inventory** feature, and adds a list of **Properties** ready to be used by other interactive elements.

II.III.I Conditions

661 Conditions

661.1 Sub Categories

- Inventory

II.III.I.I Inventory

662 Inventory

662.1 Sub Categories

- Bags
- Cooldowns
- Equipment
- Merchant
- Properties
- Tinker
- Ui
- Wealth

662.2 Conditions

- Can Add
- Has Item
- Has Runtime Item
- Is Overloaded
- Is Type Of Item
- Is Usable

663 Can Add

```
Inventory » Can Add
```

663.1 Description

Returns true if the item can be added to the Bag component

663.2 Parameters

Name	Description
Item	The item type to add
To Bag	The target destination Bag

663.3 Keywords

`Inventory` `Give` `Put` `Set`

664 Has Item

```
Inventory » Has Item
```

664.1 Description

Returns true if the Bag component contains, at least, the specified amount of an item

664.2 Parameters

Name	Description
Item	The item type to check
Amount	The minimum amount of a particular item
Bag	The targeted Bag

664.3 Keywords

`Inventory` `Contains` `Includes` `Wears` `Amount`

665 Has Runtime Item

```
Inventory » Has Runtime Item
```

665.1 Description

Returns true if the Bag component contains the Item instance

665.2 Parameters

Name	Description
Runtime Item	The item instance to check
Bag	The targeted Bag

665.3 Keywords

`Inventory` `Contains` `Includes` `Wears`

666 Is Overloaded

```
Inventory » Is Overloaded
```

666.1 Description

Returns true if the Bag's maximum weight is surpassed

666.2 Parameters

Name	Description
Bag	The Bag component

666.3 Keywords

`Inventory` `Weight` `Amount`

667 Is Type of Item

```
Inventory » Is Type of Item
```

667.1 Description

Returns true if the item is equal or a sub-type of another one

667.2 Parameters

Name	Description
Item	The item source
Compare To	The item compared to

667.3 Keywords

`Inventory` `Compare`

668 Is Usable

```
Inventory » Is Usable
```

668.1 Description

Returns true if the chosen Item can be used

668.2 Parameters

Name	Description
Item	The item type to check

668.3 Keywords

`Inventory` `Consume` `Drink`

II.III.I.I.I BAGS

669 Bags

669.1 Conditions

- Enough Space

670 Enough Space

`Inventory » Bags » Enough Space`

670.1 Description

Returns true if the item can be added to the Bag component

670.2 Parameters

Name	Description
Bag	The Bag to check
Min Space	The minimum amount of free spaces

670.3 Keywords

`Inventory` `Has` `Free` `Available` `Full` `Empty`

II.III.I.I.II COOLDOWNS

671 Cooldowns

671.1 Conditions

- Is Item Cooldown
- Is Runtime Item Cooldown

672 Is Item Cooldown

`Inventory » Cooldowns » Is Item Cooldown`

672.1 Description

Returns true if the Bag's Item is currently on a cooldown state

672.2 Parameters

Name	Description
Bag	The Bag targeted
Item	The Item that checks its cooldown state

672.3 Keywords

`Bag` `Cooldown` `Timer` `Timeout`

673 Is Runtime Item Cooldown

`Inventory » Cooldowns » Is Runtime Item Cooldown`

673.1 Description

Returns true if the Bag's Runtime Item is currently on a cooldown state

673.2 Parameters

Name	Description
Runtime Item	The Runtime Item that checks its cooldown state

673.3 Keywords

`Bag` `Cooldown` `Timer` `Timeout`

II.III.I.I.III EQUIPMENT

674 Equipment

674.1 Conditions

- Can Equip
- Is Equipment Slot Free
- Is Equippable
- Is Equipped
- Is Runtime Item Equipped

675 Can Equip

`Inventory » Equipment » Can Equip`

675.1 Description

Returns true if the chosen Item can be equipped by the targeted Bag's wearer

675.2 Parameters

Name	Description
Item	The item type to check
Bag	The targeted Bag

675.3 Keywords

`Inventory` `Contains` `Includes` `Wears` `Amount`

676 Is Equipment Slot Free

`Inventory » Equipment » Is Equipment Slot Free`

676.1 Description

Returns true if the Bag's equipment slot does not have any Item assigned

676.2 Parameters

Name	Description
Bag	The targeted Bag component
Equipment Slot	The Equipment slot to check

676.3 Keywords

`Inventory` `Wears` `Slot` `Hotbar`

677 Is Equippable

`Inventory » Equipment » Is Equippable`

677.1 Description

Returns true if the chosen Item can be equipped

677.2 Parameters

Name	Description
Item	The item type to check

677.3 Keywords

`Inventory` `Wear` `Equip`

678 Is Equipped

```
Inventory » Equipment » Is Equipped
```

678.1 Description

Returns true if the Bag's wearer has an Item of that type currently equipped

678.2 Parameters

Name	Description
Item	The item type to check
Bag	The targeted Bag

678.3 Keywords

`Inventory` `Wears`

679 Is Runtime Item Equipped

`Inventory » Equipment » Is Runtime Item Equipped`

679.1 Description

Returns true if the Bag's wearer has the Runtime Item currently equipped

679.2 Parameters

Name	Description
Runtime Item	The Runtime Item to check

679.3 Keywords

`Inventory` `Wears`

II.III.I.I.IV MERCHANT

680 Merchant

680.1 Conditions

- Can Buy
- Can Sell

681 Can Buy

`Inventory » Merchant » Can Buy`

681.1 Description

Returns true if the item can be bought from a Merchant

681.2 Parameters

Name	Description
From Merchant	The Merchant component
Item	The item type attempted to purchase
To Bag	The destination Bag for the item

681.3 Keywords

`Inventory` `Purchase` `Get` `Bargain` `Haggle`

682 Can Sell

`Inventory » Merchant » Can Sell`

682.1 Description

Returns true if the item can be sold to a Merchant

682.2 Parameters

Name	Description
From Bag	The Bag where the item is sold
Item	The item type attempted to sell
To Merchant	The Merchant target

682.3 Keywords

`Inventory` `Vend` `Trade` `Exchange` `Part` `Bargain` `Haggle`

II.III.I.I.V PROPERTIES

683 Properties

683.1 Conditions

- Item Has Property
- Runtime Item Has Property

684 Item has Property

`Inventory » Properties » Item has Property`

684.1 Description

Returns true if the chosen Item has the specified item Property

684.2 Parameters

Name	Description
Item	The item type to check
Property	The item property

684.3 Keywords

`Inventory` `Contains` `Exists`

685 Runtime Item has Property

`Inventory » Properties » Runtime Item has Property`

685.1 Description

Returns true if the chosen Runtime Item has the specified item Property

685.2 Parameters

Name	Description
Runtime Item	The Runtime Item type to check
Property ID	The item property ID to check

685.3 Keywords

`Inventory` `Contains` `Exists`

II.III.I.I.VI TINKER

686 Tinker

686.1 Conditions

- Can Craft
- Can Dismantle
- Enough Ingredients
- Is Craftable
- Is Dismantable

687 Can Craft

`Inventory » Tinker » Can Craft`

687.1 Description

Returns true if the item can be crafted

687.2 Parameters

Name	Description
From Bag	The Bag where ingredients are picked
Item	The item type attempted to craft
To Bag	The target destination Bag after creating the new Item

687.3 Keywords

`Inventory` `Create` `Make` `Cook` `Smith` `Combine` `Assemble`

688 Can Dismantle

`Inventory » Tinker » Can Dismantle`

688.1 Description

Returns true if the item can be dismantled

688.2 Parameters

Name	Description
From Bag	The Bag where item is picked
Item	The item type attempted to dismantle
To Bag	The destination Bag for all ingredients after dismantling the Item

688.3 Keywords

`Inventory` `Apart` `Disassemble` `Deconstruct` `Tear` `Separate`

689 Enough Ingredients

`Inventory » Tinker » Enough Ingredients`

689.1 Description

Returns true if the item can be crafted

689.2 Parameters

Name	Description
From Bag	The Bag where ingredients are picked
Item	The item type attempted to craft

689.3 Keywords

`Inventory` `Create` `Make` `Cook` `Smith` `Combine` `Assemble`

690 Is Craftable

`Inventory » Tinker » Is Craftable`

690.1 Description

Returns true if the chosen Item can be crafted

690.2 Parameters

Name	Description
Item	The item type to check

690.3 Keywords

`Inventory` `Create` `Forge` `Alchemy` `Brew`

691 Is Dismantable

`Inventory » Tinker » Is Dismantable`

691.1 Description

Returns true if the chosen Item can be dismantled

691.2 Parameters

Name	Description
Item	The item type to check

691.3 Keywords

`Inventory` `Destroy` `Tear` `Break`

II.III.I.I.VII UI

692 Ui

692.1 Conditions

- Is Bag Ui Open
- Is Merchant Ui Open
- Is Tab Ui Active
- Is Tinker Ui Open

693 Is Bag UI Open

```
Inventory » UI » Is Bag UI Open
```

693.1 Description

Returns true if the there is a Bag UI open

693.2 Keywords

`Inventory` `Close` `Stash` `Loot` `Container` `Chest`

694 Is Merchant UI Open

```
Inventory » UI » Is Merchant UI Open
```

694.1 Description

Returns true if the there is a Merchant UI open

694.2 Keywords

`Shop` `Exchange` `Trader`

695 Is Tab UI Active

```
Inventory » UI » Is Tab UI Active
```

695.1 Description

Returns true if the chosen Tab UI component is currently active

695.2 Keywords

`Shop` `Exchange` `Trader`

696 Is Tinker UI Open

```
Inventory » UI » Is Tinker UI Open
```

696.1 Description

Returns true if the there is a Crafting/Dismantling UI open

696.2 Keywords

`Close` `Craft` `Dismantle` `Assemble` `Disassemble` `Smith` `Upgrade`

II.III.I.I.VIII WEALTH

697 Wealth

697.1 Conditions

- Compare Wealth

698 Compare Wealth

`Inventory » Wealth » Compare Wealth`

698.1 Description

Returns true if a comparison between the wealth and another integer is satisfied

698.2 Parameters

Name	Description
Bag	The Bag component with the Wealth being compared
Currency	The currency type to compare
Comparison	The comparison operation performed between both values
Compare To	The integer value that is compared against

698.3 Keywords

`Price` `Money` `Cash` `Currency` `Coin` `Gold`

II.III.II Events

699 Events

699.1 Sub Categories

- Inventory

II.III.II.I Inventory

700 Inventory

700.1 Sub Categories

- Currency
- Equipment
- Merchant
- Sockets
- Tinker
- Ui

700.2 Events

- On Add
- On Drop Item
- On Instantiate Item
- On Remove

701 On Add

```
Inventory » On Add
```

701.1 Description

Executes after adding an item to the specified Bag

701.2 Keywords

`Bag` `Inventory` `Item` `Add`

702 On Drop Item

```
Inventory » On Drop Item
```

702.1 Description

Detects when a Bag's item is dropped onto the Trigger

703 On Instantiate Item

```
Inventory » On Instantiate Item
```

703.1 Description

Executes after dropping an item from a Bag to the scene

704 On Remove

```
Inventory » On Remove
```

704.1 Description

Executes after removing an item from the specified Bag

704.2 Keywords

`Bag` `Inventory` `Item` `Take`

II.III.II.I.I CURRENCY

705 Currency

705.1 Events

- On Change Currency

706 On Change Currency

Inventory » Currency » On Change Currency

706.1 Description

Detects when a Bag's Currency value changes

II.III.II.I.II EQUIPMENT

707 Equipment

707.1 Events

- On Equip
- On Unequip

708 On Equip

```
Inventory » Equipment » On Equip
```

708.1 Description

Executes after equipping an item from the specified Bag

708.2 Keywords

`Bag` `Inventory` `Item` `Add` `Wear`

709 On Unequip

```
Inventory » Equipment » On Unequip
```

709.1 Description

Executes after unequipping an item from the specified Bag

709.2 Keywords

`Bag` `Inventory` `Item` `Remove` `Wear`

II.III.II.I.III MERCHANT

710 Merchant

710.1 Events

- On Buy
- On Sell

711 On Buy

```
Inventory » Merchant » On Buy
```

711.1 Description

Executes after successfully purchasing an item from any Merchant

712 On Sell

```
Inventory » Merchant » On Sell
```

712.1 Description

Executes after successfully selling an item to any Merchant

II.III.II.I.IV SOCKETS

713 Sockets

713.1 Events

- On Socket Attach
- On Socket Detach

714 On Socket Attach

Inventory » Sockets » On Socket Attach

714.1 Description

Detects when an Item's Socket gets another Item attached

715 On Socket Detach

Inventory » Sockets » On Socket Detach

715.1 Description

Detects when an Item is detached from another Item's Socket

II.III.II.I.V TINKER

716 Tinker

716.1 Events

- On Craft
- On Dismantle

717 On Craft

Inventory » Tinker » On Craft

717.1 Description

Executes right after successfully crafting any item

718 On Dismantle

```
Inventory » Tinker » On Dismantle
```

718.1 Description

Executes right after successfully dismantling any item

II.III.II.I.VI UI

719 Ui

719.1 Events

- On Close Bag Ui
- On Close Merchant Ui
- On Close Tinker Ui
- On Open Bag Ui
- On Open Merchant Ui
- On Open Tinker Ui

720 On Close Bag UI

```
Inventory » UI » On Close Bag UI
```

720.1 Description

Detects when a Bag UI is closed

721 On Close Merchant UI

```
Inventory » UI » On Close Merchant UI
```

721.1 Description

Detects when a Merchant UI is closed

722 On Close Tinker UI

```
Inventory » UI » On Close Tinker UI
```

722.1 Description

Detects when a Tinker UI is closed

723 On Open Bag UI

```
Inventory » UI » On Open Bag UI
```

723.1 Description

Detects when a Bag UI is opened

724 On Open Merchant UI

```
Inventory » UI » On Open Merchant UI
```

724.1 Description

Detects when a Merchant UI is opened

725 On Open Tinker UI

```
Inventory » UI » On Open Tinker UI
```

725.1 Description

Detects when a Tinker UI is opened

II.III.III Instructions

726 Instructions

726.1 Sub Categories

- Inventory

II.III.III.I Inventory

727 Inventory

727.1 Sub Categories

- Bags
- Cooldowns
- Currency
- Equipment
- Loot
- Sockets
- Ui
- Variables

II.III.III.I.I BAGS

728 Bags

728.1 Instructions

- Add Item
- Add Runtime Item
- Drop Item
- Drop Runtime Item
- Increment Bag Height
- Increment Bag Width
- Move Content To Bag
- Move Wealth To Bag
- Remove Item
- Remove Runtime Item

729 Add Item

`Inventory » Bags » Add Item`

729.1 Description

Creates a new item and adds it to the specified Bag

729.2 Parameters

Name	Description
Item	The type of item created
Bag	The targeted Bag component

729.3 Keywords

`Bag` `Inventory` `Container` `Stash` `Give` `Take` `Borrow` `Lend` `Buy` `Purchase` `Sell` `Steal` `Rob`

730 Add Runtime Item

`Inventory » Bags » Add Runtime Item`

730.1 Description

Adds an existing instance of an Item and adds it to the specified Bag

730.2 Parameters

Name	Description
Runtime Item	The existing Item instance
Bag	The targeted Bag component

730.3 Keywords

`Bag` `Inventory` `Container` `Stash` `Give` `Take` `Borrow` `Lend` `Buy` `Purchase` `Sell` `Steal` `Rob`

731 Drop Item

`Inventory » Bags » Drop Item`

731.1 Description

Drops an Item type from a Bag onto the scene

731.2 Parameters

Name	Description
Item	The type of item created
Bag	The targeted Bag component
Distance	The distance from the Bag where the Item is dropped

731.3 Keywords

`Leave` `Eliminate` `Take`

732 Drop Runtime Item

`Inventory » Bags » Drop Runtime Item`

732.1 Description

Drops a Runtime Item from its Bag onto the scene

732.2 Parameters

Name	Description
Runtime Item	The instance of an Item dropped
Distance	The distance from the Bag where the Item is dropped

732.3 Keywords

`Leave` `Eliminate` `Take`

733 Increment Bag Height

`Inventory » Bags » Increment Bag Height`

733.1 Description

Increases the amount of rows a Bag has, if possible

733.2 Parameters

Name	Description
Bag	The targeted Bag component
Rows	The number of rows to increment by

733.3 Keywords

`Bag` `Inventory` `Container` `Stash` `Column` `Size`

734 Increment Bag Width

`Inventory » Bags » Increment Bag Width`

734.1 Description

Increases the amount of columns a Bag has, if possible

734.2 Parameters

Name	Description
Bag	The targeted Bag component
Columns	The number of columns to increment by

734.3 Keywords

`Bag` `Inventory` `Container` `Stash` `Column` `Size`

735 Move Content to Bag

`Inventory » Bags » Move Content to Bag`

735.1 Description

Moves all the contents of a Bag to another Bag

735.2 Parameters

Name	Description
From Bag	The Bag component where its contents are removed
To Bag	The targeted Bag component where the contents end up

735.3 Keywords

`Bag` `Inventory` `Container` `Stash` `Chest` `Take` `All` `Give` `Take` `Borrow` `Lend` `Buy` `Purchase` `Sell` `Steal` `Rob`

736 Move Wealth to Bag

`Inventory » Bags » Move Wealth to Bag`

736.1 Description

Moves all wealth from one Bag to another one

736.2 Parameters

Name	Description
From Bag	The Bag component where its wealth is taken from
To Bag	The targeted Bag component where the wealth ends up

736.3 Keywords

`Bag` `Inventory` `Container` `Stash` `Chest` `Take` `All` `Give` `Take` `Borrow` `Lend` `Buy` `Purchase` `Sell` `Steal` `Rob` `Currency` `Cash` `Money` `Coins`

737 Remove Item

```
Inventory » Bags » Remove Item
```

737.1 Description

Removes an Item from the specified Bag

737.2 Parameters

Name	Description
Item	The parent type of item to be removed
Bag	The targeted Bag component

737.3 Keywords

`Bag` `Inventory` `Container` `Stash` `Give` `Take` `Borrow` `Lend` `Buy` `Purchase` `Sell` `Steal` `Rob`

738 Remove Runtime Item

`Inventory » Bags » Remove Runtime Item`

738.1 Description

Removes an Item instance from its associated Bag

738.2 Parameters

Name	Description
Runtime Item	The item instance to be removed

738.3 Keywords

`Bag` `Inventory` `Container` `Stash` `Give` `Take` `Borrow` `Lend` `Buy` `Purchase` `Sell` `Steal` `Rob`

II.III.III.I.II COOLDOWNS

739 Cooldowns

739.1 Instructions

- Add Item Cooldown
- Add Runtime Item Cooldown
- Clear Cooldowns
- Reset Item Cooldown
- Reset Runtime Item Cooldown

740 Add Item Cooldown

`Inventory » Cooldowns » Add Item Cooldown`

740.1 Description

Adds a cooldown timer for a Bag's Item

740.2 Parameters

Name	Description
Bag	The Bag where the Item belongs to
Item	The Item asset to add its cooldown

740.3 Keywords

`Bag` `Cooldown` `Timer` `Timeout`

741 Add Runtime Item Cooldown

`Inventory » Cooldowns » Add Runtime Item Cooldown`

741.1 Description

Adds a cooldown timer for a Runtime Item's Bag

741.2 Parameters

Name	Description
Runtime Item	The Runtime Item instance to add a cooldown

741.3 Keywords

`Bag` `Cooldown` `Timer` `Timeout`

742 Clear Cooldowns

`Inventory » Cooldowns » Clear Cooldowns`

742.1 Description

Removes all cooldowns on a Bag

742.2 Parameters

Name	Description
Bag	The Bag where all cooldowns are removed from

742.3 Keywords

`Bag` `Cooldown` `Timer` `Timeout`

743 Reset Item Cooldown

`Inventory » Cooldowns » Reset Item Cooldown`

743.1 Description

Removes the cooldown timer of a Bag's Item

743.2 Parameters

Name	Description
Bag	The Bag where the Item belongs to
Item	The Item asset to reset its cooldown

743.3 Keywords

`Bag` `Cooldown` `Timer` `Timeout`

744 Reset Runtime Item Cooldown

`Inventory » Cooldowns » Reset Runtime Item Cooldown`

744.1 Description

Removes the cooldown timer of the Runtime Item's Bag

744.2 Parameters

Name	Description
Item	The Runtime Item instance to reset its cooldown

744.3 Keywords

`Bag` `Cooldown` `Timer` `Timeout`

II.III.III.I.III CURRENCY

745 Currency

745.1 Instructions

- Change Currency

746 Change Currency

`Inventory » Currency » Change Currency`

746.1 Description

Modifies the value of a Bag's currency

746.2 Parameters

Name	Description
Currency	The currency type to modify
Amount	The value and operation performed
Bag	The targeted Bag component

746.3 Keywords

`Bag` `Inventory` `Container` `Stash` `Give` `Take` `Borrow` `Lend` `Buy` `Purchase` `Sell` `Steal` `Rob` `Coin` `Cash` `Bill` `Value` `Money`

II.III.III.I.IV EQUIPMENT

747 Equipment

747.1 Instructions

- Equip Item
- Equip Runtime Item
- Unequip Item
- Unequip Runtime Item

748 Equip Item

```
Inventory » Equipment » Equip Item
```

748.1 Description

Equips an Item from the Bag that inherits from the specified type

748.2 Parameters

Name	Description
Item	The parent type of item to equip
Bag	The targeted Bag component

748.3 Keywords

`Bag` `Inventory` `Equipment` `Put` `Wear` `Inventory` `Wield`

749 Equip Runtime Item

`Inventory » Equipment » Equip Runtime Item`

749.1 Description

Equips the specified Runtime Item

749.2 Parameters

Name	Description
Runtime Item	The item instance to equip

749.3 Keywords

`Bag` `Inventory` `Equipment` `Put` `Wear` `Inventory` `Wield`

750 Unequip Item

`Inventory » Equipment » Unequip Item`

750.1 Description

Unequip an Item from the Bag that inherits from the specified type

750.2 Parameters

Name	Description
Item	The parent type of item to equip
Bag	The targeted Bag component

750.3 Keywords

`Bag` `Inventory` `Equipment` `Take` `Sheathe` `Inventory` `Remove`

751 Unequip Runtime Item

`Inventory » Equipment » Unequip Runtime Item`

751.1 Description

Unequip an Item instance that is currently equipped

751.2 Parameters

Name	Description
Runtime Item	The Item instance to unequip

751.3 Keywords

`Bag` `Inventory` `Equipment` `Take` `Sheathe` `Inventory` `Remove`

II.III.III.I.V LOOT

752 Loot

752.1 Instructions

- Instantiate Item
- Loot Table

753 Instantiate Item

`Inventory » Loot » Instantiate Item`

753.1 Description

Instantiates the prefab of an item on the scene

753.2 Parameters

Name	Description
Item	The type of item created
Location	The position and rotation where the item instance is placed

753.3 Keywords

`Drop` `Inventory` `Instance`

754 Loot Table

`Inventory » Loot » Loot Table`

754.1 Description

Picks a random choice from a Loot Table and sends it to the specified Bag

754.2 Parameters

Name	Description
Loot Table	The Loot Table that generates the Item instance
Bag	The targeted Bag component

754.3 Keywords

`Bag` `Inventory` `Container` `Stash` `Give` `Take` `Borrow` `Lend` `Corpse` `Generate`

II.III.III.I.VI SOCKETS

755 Sockets

755.1 Instructions

- Attach Runtime Item
- Detach Runtime Item

756 Attach Runtime Item

`Inventory » Sockets » Attach Runtime Item`

756.1 Description

Attaches a Runtime Item onto the first available Runtime Item socket

756.2 Parameters

Name	Description
Runtime Item	The item instance
Attach	The item instance attached to the other runtime item

756.3 Keywords

`Bag` `Inventory` `Sockets` `Attach` `Enchant` `Embed` `Imbue`

757 Detach Runtime Item

`Inventory » Sockets » Detach Runtime Item`

757.1 Description

Detaches a Runtime Item from another Runtime Item socket

757.2 Parameters

Name	Description
Runtime Item	The item instance with an occupied socket
Detach	The item instance to detach from the other runtime item

757.3 Keywords

`Bag` `Inventory` `Sockets` `Detach` `Disenchant`

II.III.III.I.VII UI

758 Ui

758.1 Instructions

- Close Bag Ui
- Close Merchant Ui
- Close Tinker Ui
- Open Bag Ui
- Open Merchant Ui
- Open Tinker Ui
- Set Bag Ui
- Set Drop Amount
- Set Split Amount
- Set Transfer Amount

759 Close Bag UI

```
Inventory » UI » Close Bag UI
```

759.1 Description

Closes the current inventory UI

759.2 Keywords

`Item` `Inventory` `Catalogue` `Content` `Sort` `Equipment` `Hotbar` `Consume`

760 Close Merchant UI

`Inventory » UI » Close Merchant UI`

760.1 Description

Closes the current Merchant UI

760.2 Keywords

`Trade` `Merchant` `Shop` `Buy` `Sell` `Junk`

761 Close Tinker UI

```
Inventory » UI » Close Tinker UI
```

761.1 Description

Closes the current Tinker UI

761.2 Keywords

`Craft` `Make` `Create` `Dismantle` `Disassemble` `Torn` `Alchemy` `Blacksmith`

762 Open Bag UI

`Inventory » UI » Open Bag UI`

762.1 Description

Opens an inventory UI of a specific Bag

762.2 Parameters

Name	Description
Bag	The Bag component
Wait to Close	If the Instruction waits until the UI closes

762.3 Keywords

`Item` `Inventory` `Catalogue` `Content` `Sort` `Equipment` `Hotbar` `Consume`

763 Open Merchant UI

`Inventory » UI » Open Merchant UI`

763.1 Description

Opens a trading window for a specific Merchant

763.2 Parameters

Name	Description
Merchant	The currency type to modify
Client Bag	The client's Bag component
Wait to Close	If the Instruction waits until the UI closes

763.3 Keywords

`Trade` `Merchant` `Shop` `Buy` `Sell` `Junk`

764 Open Tinker UI

`Inventory » UI » Open Tinker UI`

764.1 Description

Opens an Tinkering UI for a specific Bag

764.2 Parameters

Name	Description
Tinker Skin	The skin that is used to display the UI
Input Bag	The Bag component where items are chosen
Output Bag	The Bag component where new items are placed
Wait to Close	If the Instruction waits until the UI closes

764.3 Keywords

`Craft` `Make` `Create` `Dismantle` `Disassemble` `Torn` `Alchemy` `Blacksmith`

765 Set Bag UI

```
Inventory » UI » Set Bag UI
```

765.1 Description

Changes the targeted Bag of a Bag UI component

765.2 Parameters

Name	Description
Bag UI	The Bag UI that changes its target
Bag	The new Bag component

766 Set Drop Amount

```
Inventory » UI » Set Drop Amount
```

766.1 Description

Changes whether a Bag drops a single item or the whole stack when dropping them

766.2 Parameters

Name	Description
Drop	Whether to drop one, or the whole stack

766.3 Keywords

`Item` `Inventory` `Let` `Leave` `Take` `Place`

767 Set Split Amount

`Inventory » UI » Set Split Amount`

767.1 Description

Changes whether a Bag splits by unstacking a single item or the whole stack is split in half

767.2 Parameters

Name	Description
Drop	Whether to split one, or the whole stack in half

767.3 Keywords

`Item` `Inventory` `Stack` `Unstack` `Split` `Divide`

768 Set Transfer Amount

`Inventory » UI » Set Transfer Amount`

768.1 Description

Changes whether a Bag moves a single item or the whole stack when transferring them

768.2 Parameters

Name	Description
Transfer	Whether to transfer one, or the whole stack

768.3 Keywords

`Item` `Inventory` `Transfer` `Move` `Content` `Place`

II.III.III.I.VIII VARIABLES

769 Variables

769.1 Instructions

- Set Item
- Set Runtime Item

770 Set Item

`Inventory » Variables » Set Item`

770.1 Description

Saves an Item type on a Variable

770.2 Parameters

Name	Description
Set	The Variable that saves the Item
Item	The type of item saved

770.3 Keywords

`Save` `Keep`

771 Set Runtime Item

`Inventory » Variables » Set Runtime Item`

771.1 Description

Saves a Runtime Item on a Variable

771.2 Parameters

Name	Description
Set	The Variable that saves the Runtime Item
Runtime Item	The Item instance saved

771.3 Keywords

`Save` `Keep`

II.IV User Interface

772 User Interface

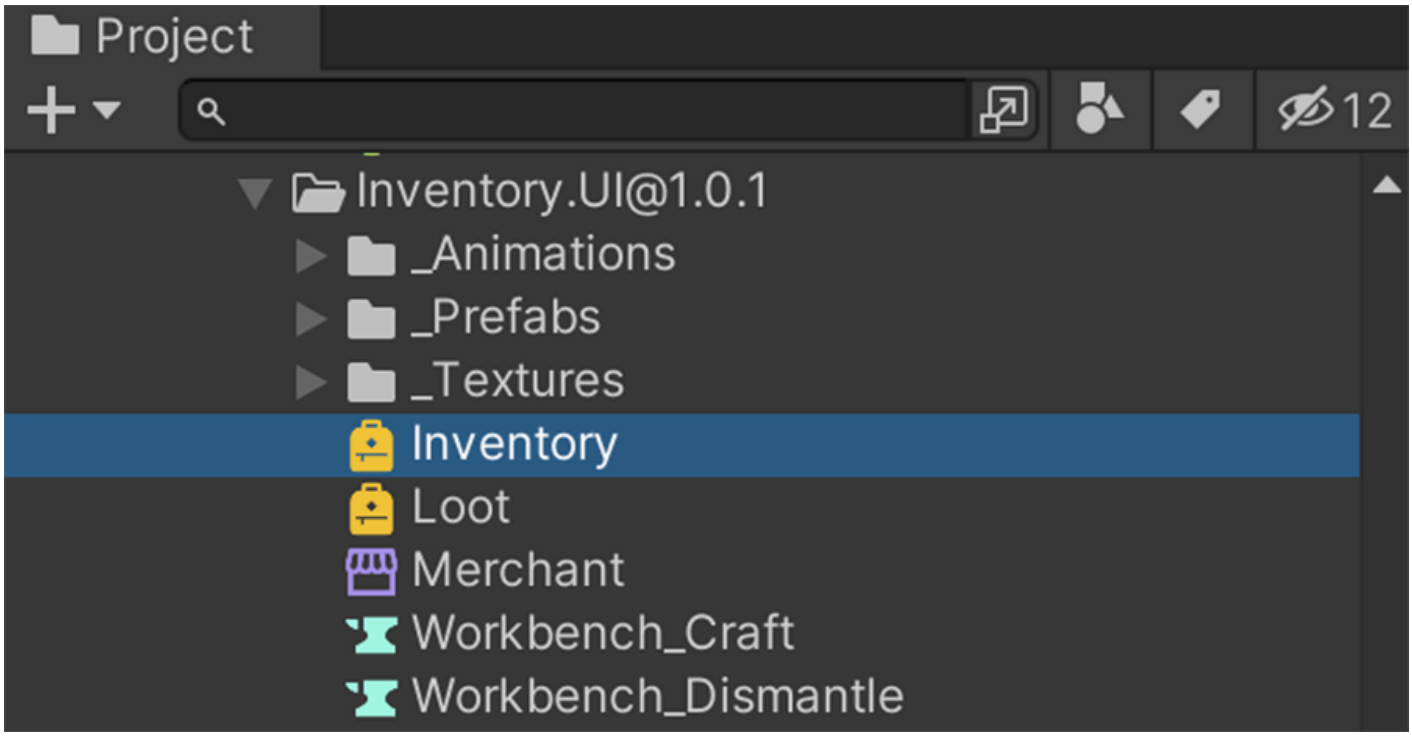
The **Inventory** module comes with a large collection of components so you have complete freedom to make your own game UI.

> **UI Examples**
>
> To get started, it is recommended to install the UI examples that come with this module, which include a HUD, a classic inventory, as well as a merchant and crafting/dismantle interfaces.

772.1 Skins

Skins are assets that contain a prefab with a specific UI component. There are three types of skins:

- **Bag Skins**: These skins are linked to Bag components and require a Bag UI component at the root of the prefab.
- **Merchant Skins**: These skins are linked to Merchant components and require a Merchant UI component at the root of the prefab.
- **Tinker Skin**: These skins are directly accessed when opening a Craft/Dismantle interface. They require a Tinker UI component at the root of the prefab.



The Inventory module comes with a lot of components that make it very easy to build a user interface that synchronizes with a Bag, Merchant or Tinkering object. Each component has a very specific use-case that is covered in each relevant sub-section.

Component Dependency

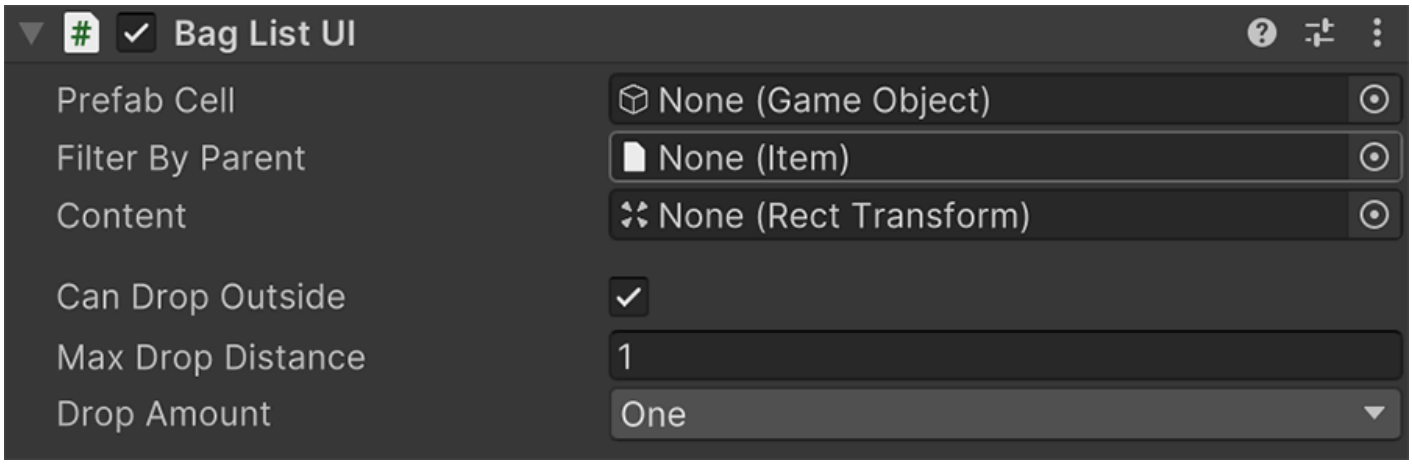
Some UI components depend on others that feed information to them. For example, the **Coin UI** component depends on the **Price UI** component, that instantiates and reuses a prefab with a Coin UI component for each currency coin.

773 Bag UI

The **Bag UI** is the root component for any UI prefab that displays information about a Bag. There are two types of **Bag UI** components, which depend on the type of **Bag** used:

- **Bag List UI**: Used for list-like Bags
- **Bag Grid UI**: Used for grid-like Bags

> ✓ **Lists vs Grids**
>
> This documentation focuses on Bags with a List-type, as they are most commonly used. The use of a Grid-type requires a deeper understanding on how each UI component works, but the concepts and components used are mostly the same.



Prefab Cell is a prefab game object with a **Bag Cell UI** component. This component is automatically instantiated and updated by its parent, for each Item in the Bag displayed.

Filter by Parent is an optional Item-type filter. If none is provided, it will display all Items of all types. This is particularly useful when creating tabs or sections.

Content is the parent game object where all prefab cells will be instantiated - One for each Item in the Bag.

Can Drop Outside determines whether an Item can be dragged outside of the UI canvas to drop it into the scene world.

Max Drop Distance determines the maximum distance that an Item can be dropped from the Bag object.

Drop Amount determines whether a dropped object removes the whole stack of objects or just the top-most.

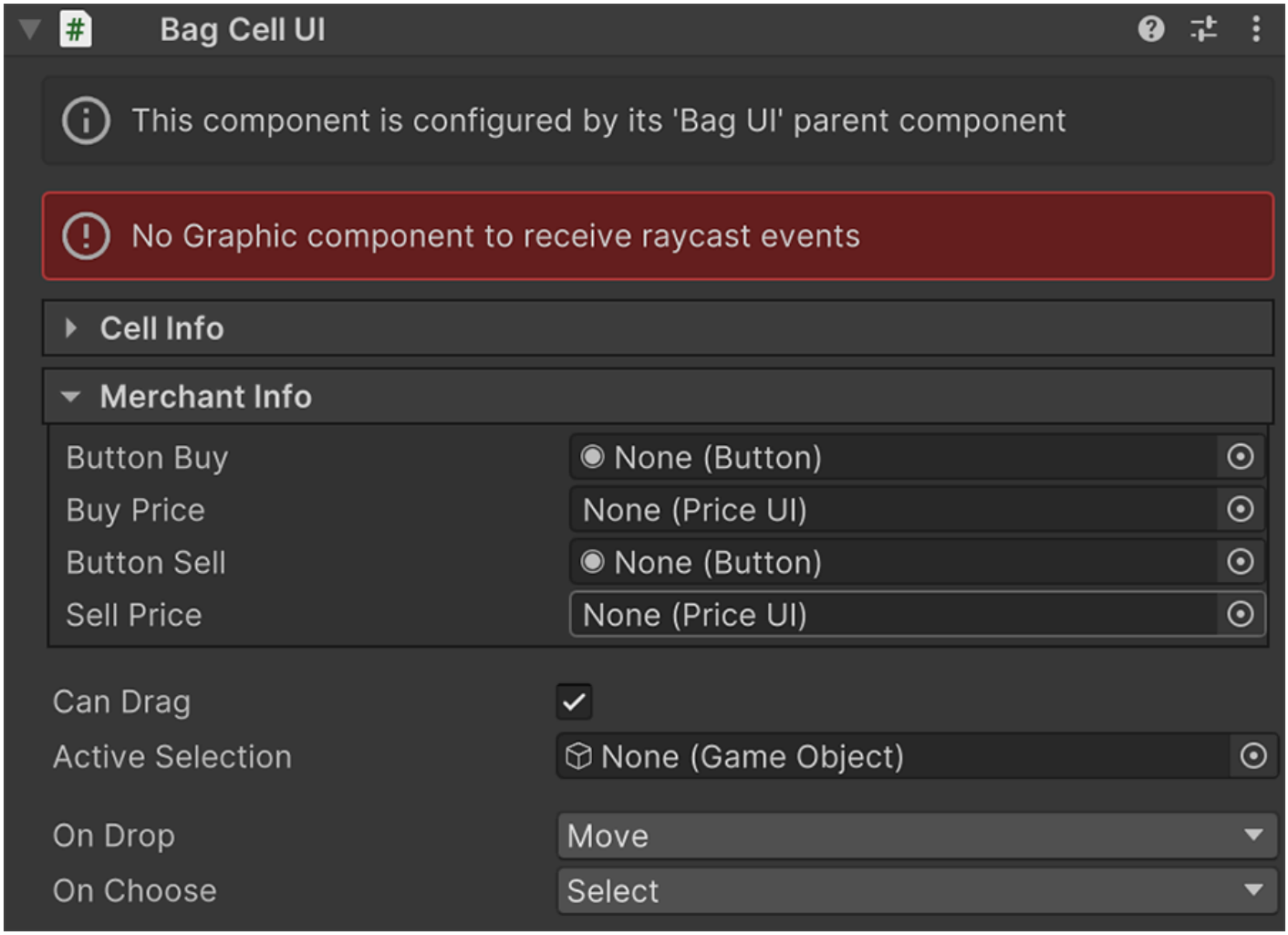
> ⚠ **Dropping Items**
>
> Note that only Items that have a **Prefab** object in their Item definition can be dropped.

773.1 Components

There are a few extra components that can synchronize a **Bag**'s information with UI controls, which can either be linked to a Bag, or to the Bag linked to a **Bag List/Grid UI** component.

773.1.1 Cell UI

This component is automatically set up and refreshed by its **Bag List UI** or **Bag Grid UI** parent component.



The **Cell Info** section contains an optional collection of UI control fields that can be plugged in order to be updated when the **Item**(s) associated with this inventory cell change.

Graphic component required

This component requires a **Graphic** component (either an Image or a Text) in order to receive input events, such as clicks and drags.

The **Merchant Info** field is optional and only useful if the **Bag Cell UI** component is part of a Merchant UI component.

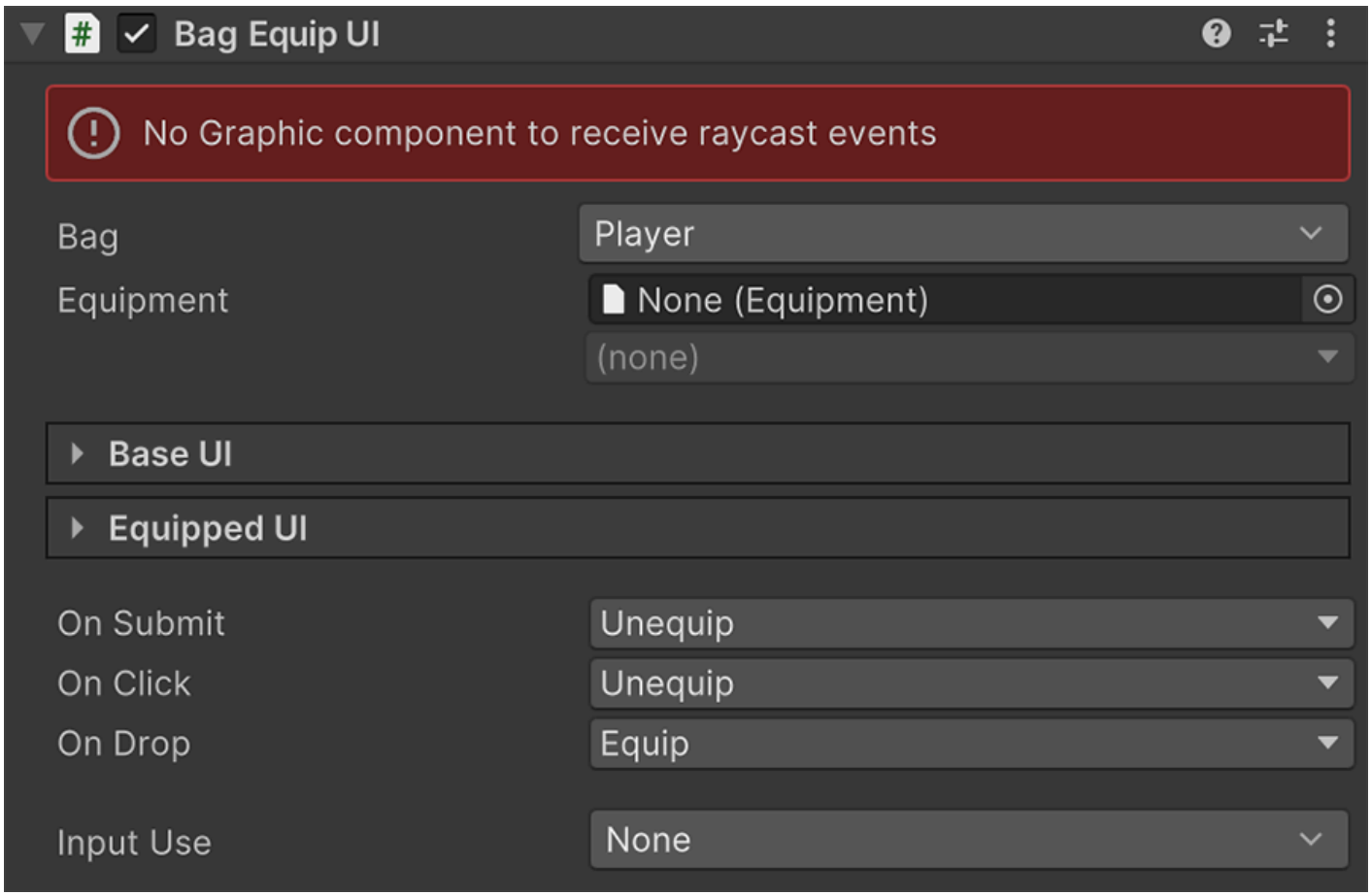
The **Can Drag** toggle determines whether an **Item** can be dragged and dropped.

On Drop and **On Select** defines the behavior when this Item cell is dragged and dropped, and when it is focused.

> **Selected Cell UI, Socket UI and Property UI**
>
> When a **Bag Cell UI** is selected, any **Selected Cell UI** component will be refreshed with the information of the currently selected cell. This allows to display information about a particular cell outside from the cell itself.
>
> In both **Bag Cell UI** and **Selected Cell UI** components, one can create a prefab with a **Socket UI**/**Property UI** component that displays the current sockets/properties.

773.1.2 Equip UI

This component is used for equipping items and assigning consumables to hotbars.



The **Bag** and **Equipment** fields determine the targeted Bag and the equipment slot that this refers to.

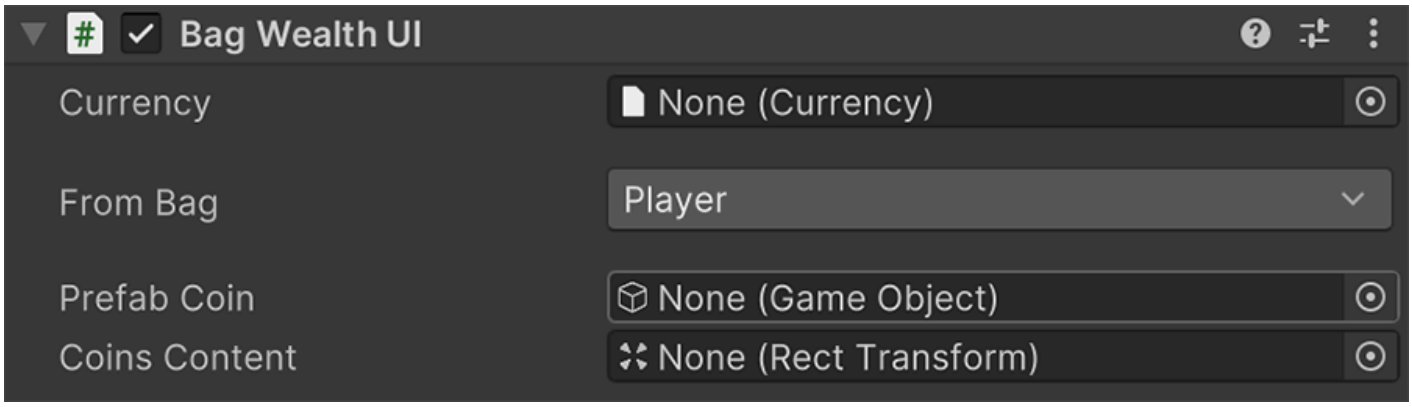
There are two main sections:

- **Base UI**: Allows to display a collection of optional controls that reference the base-type **Item**
- **Equipped UI**: Allows to display a collection of optional controls that reference the currently equipped **Item** (if there is one).

The rest of the fields define the behavior when the **Bag Equip UI** is interacted with.

773.1.3 Wealth UI

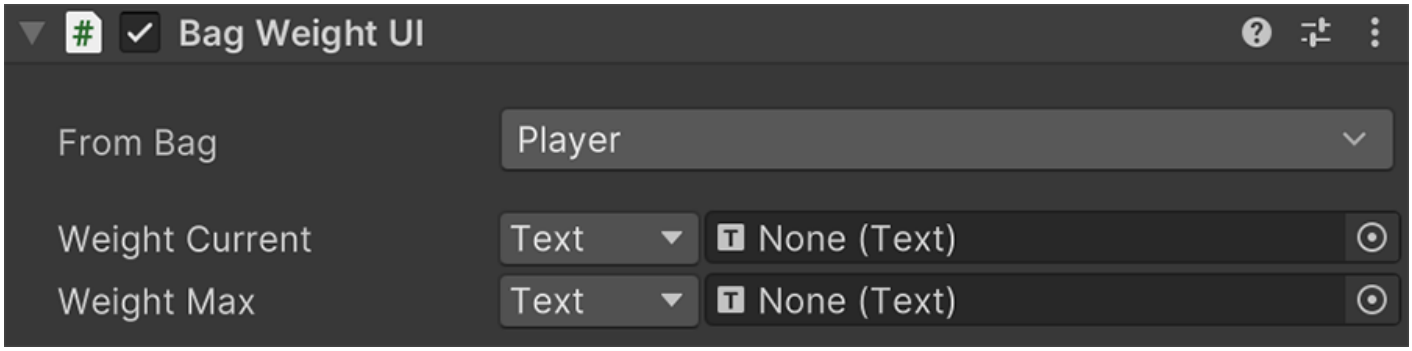
The **Bag Wealth UI** component is used to display the selected **Currency** and how much of it the Bag carries.



This component requires a prefab that represents each coin's **Currency** value, and must contain the **Coin UI** component.

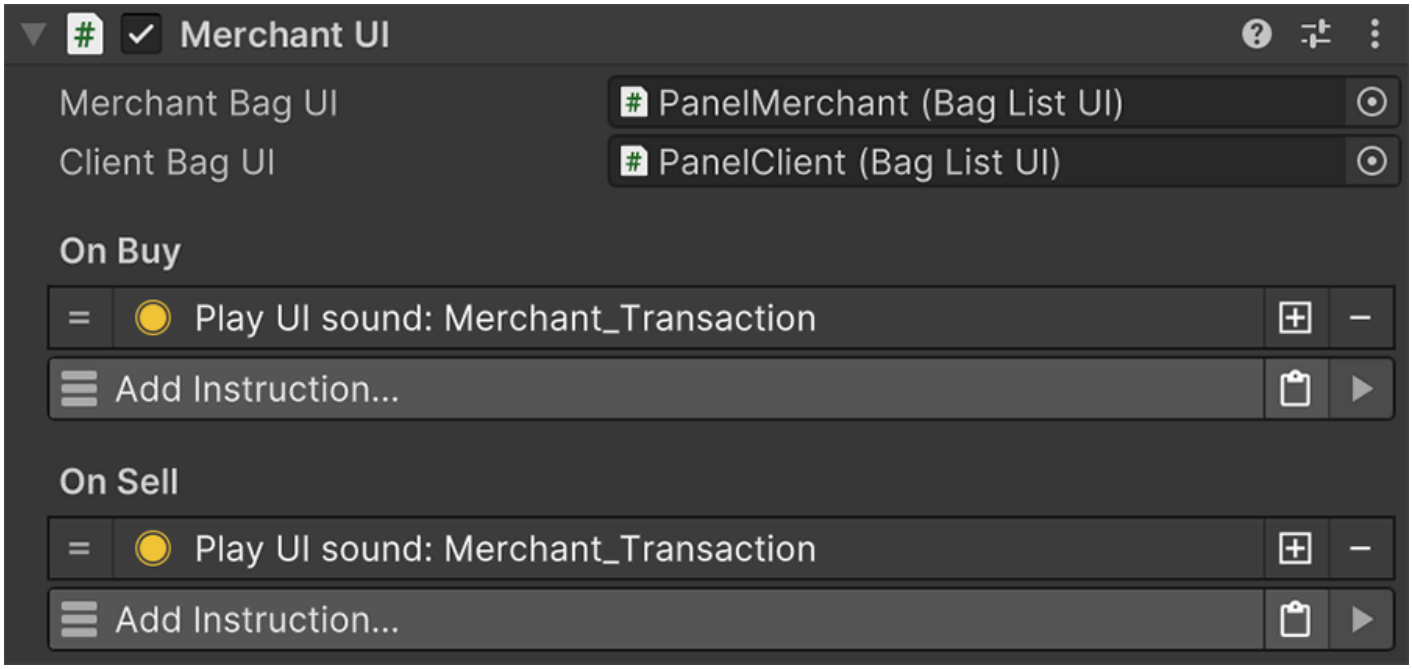
773.1.4 Weight

This component displays the current and max weight of the selected Bag.



774 Merchant UI

The **Merchant UI** is a very simple component that acts as a middle-man between two **Bag UI** components - Allowing both ends to transfer or trade their contents based on a particular set of rules.



This component has two fields at the top:

- **Merchant Bag UI**: A Bag UI component that contains information about the Bag that represents the merchant.
- **Client Bag UI**: A Bag UI component that contains information about the Bag that represents the client (usually, the Player).

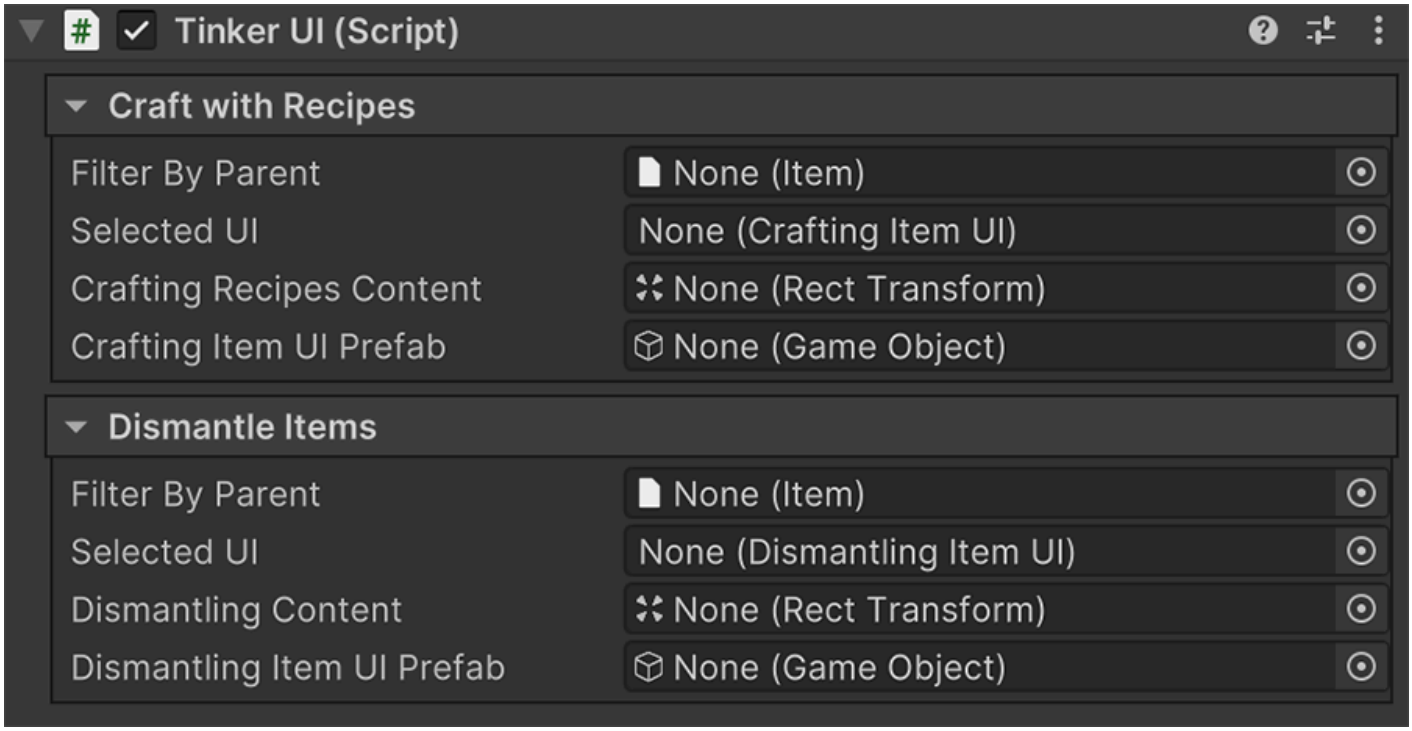
> **Trading**
>
> When a **Bag UI** component is referenced by a **Merchant UI**, the **Bag UI** obtains information about the trading rules, which cascade and can be accessed from the *Merchant Info* section on a Bag Cell UI component.

There are also a couple of **Instruction** lists at the bottom that are executed when this **Merchant UI** executes a transaction.

> **Buy and Sell**
>
> Note that *Buy* and *Sell* are from the client's perspective (aka the Player). So the *On Buy* instructions run when the client purchases an item, and *On Sell* run when the client sells an item.

775 Tinker UI

Tinkering involves both **Crafting** and **Dismantling** items, and the **Tinker UI** component allows to display a list of UI controls that handle the transformation.



There are two distinct sections in this component, but both work very similarly: There is a container object where all available recipes/items are displayed, from where the user can pick one and begin the transformation process.

- **Filter By Parent** allows to display only those **Items** that inherit, at some point, from the selected type. If none is set, it will not filter any items.
- **Selected UI** references a **Crafting UI** or **Dismantling UI** component, which is used to display the currently selected **Item** from the list.

The following two fields allow to populate the list of **Items**:

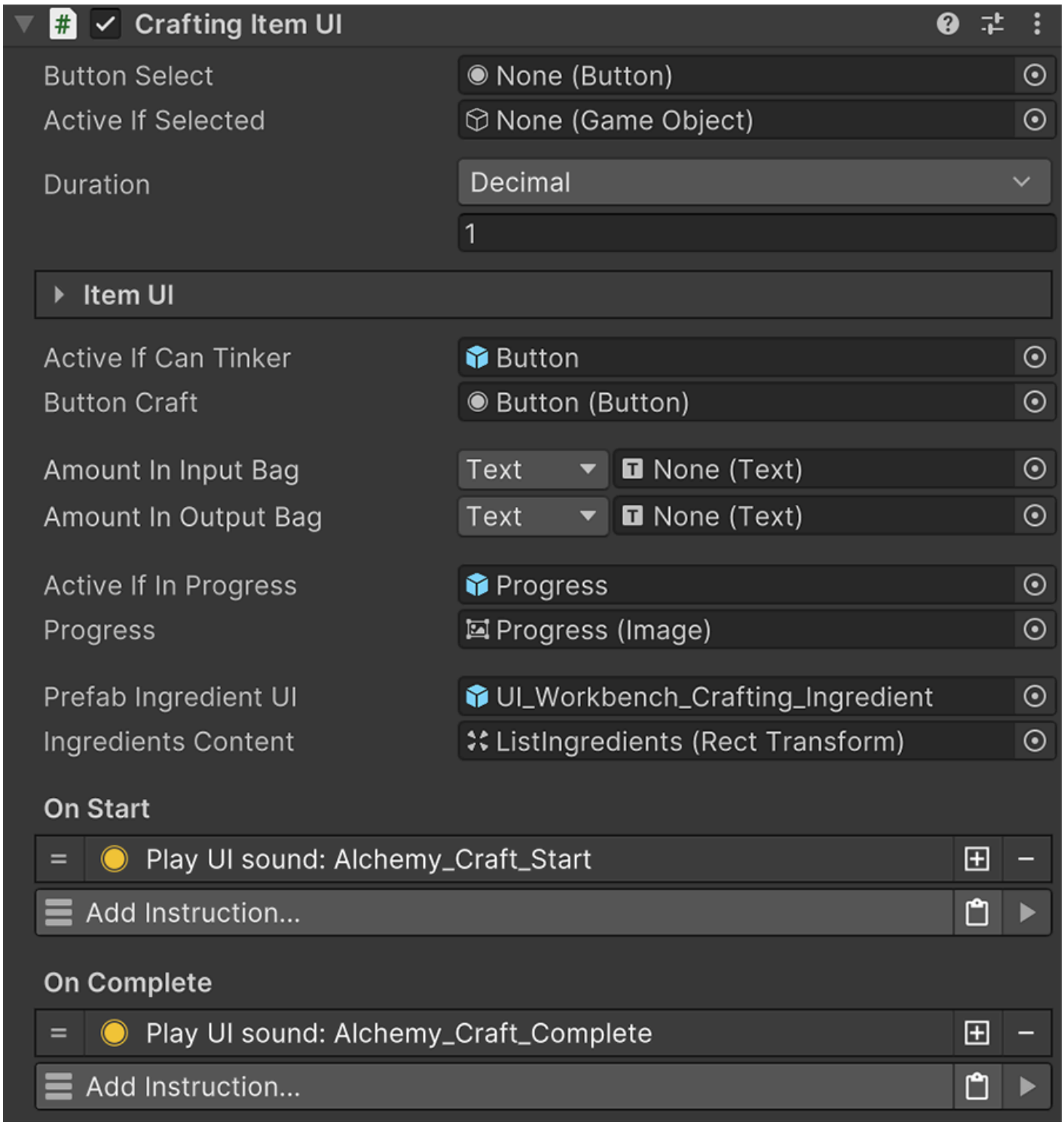
- The **Content** field must reference a UI game object which will be populated by an instance of a prefab for each element in the list.
- The **Prefab** field references a prefab game object, which will be instantiated in the container object.

Prefab requires component

The **Prefab** field requires a **Crafting Item UI** or a **Dismantling Item UI** component in order to work. This will be automatically synchronized and refreshed with the information provided by the Tinker UI list.

775.1 Crafting Item UI

The **Crafting Item UI** component is both used when selecting an **Item** from the recipe list as well as to display each entry from the list.



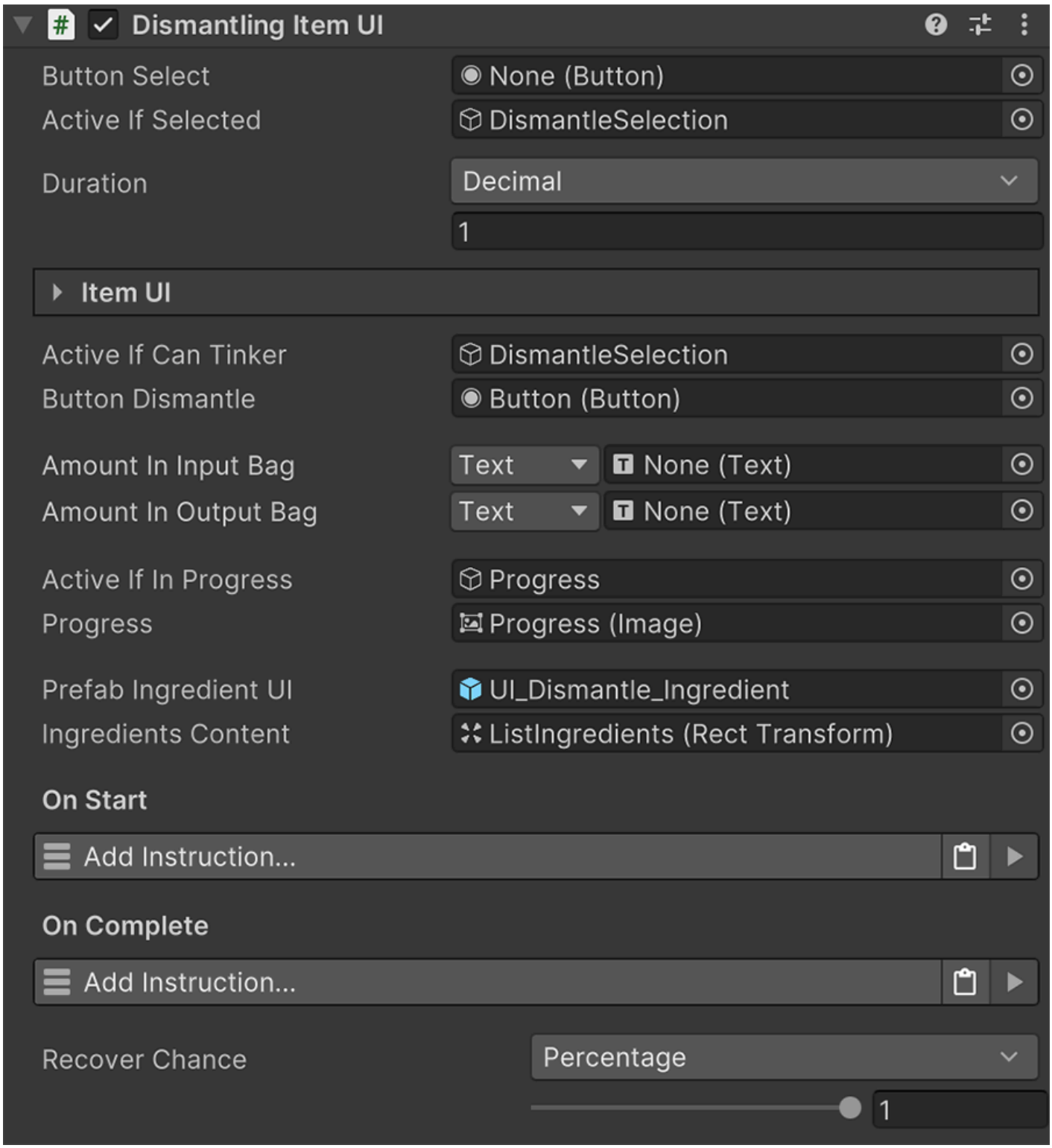
This component is automatically refreshed with the correct information about the current **Item**.

On Start & On Complete

The **On Start** and **On Complete** instructions are executed when either a dismantle or crafting operation starts, and successfully finishes. This is the perfect place to add sound and visual effects.

775.2 Dismantling Item UI

The **Dismantling Item UI** component is both used when selecting an **Item** from the available item list as well as to display each entry from the list.



This component is automatically refreshed with the correct information about the current **Item**.

Recover Chance is a value between 0 and 1 that determines the chance to recover each and every one of the ingredients that constitute the dismantled **Item**.

II.V Releases

776 Releases

776.1 2.8.19 (Latest)

Released October 18, 2024

New

- Property: Set Items in Bag using Number property
- UI: Destroy Item method in Cell UI

Enhances

- Editor: Support for Unity 6

776.2 2.8.18

Released August 3, 2024

Fixes

- UI: Empty cell created after picking up Item
- Merchant: Empty values first time opening Merchant
- Event: On Socket Attach null reference in Bag
- Event: On Socket Detach null reference in Bag

776.3 2.8.17

Released July 30, 2024

New

- Property: Get Item price

Enhances

- Trigger: On Socket Attach options for Item and Attachment
- Trigger: On Socket Detach options for Item and Attachment

Fixes

- UI: Hide Equipment displayes incorrect items
- UI: Merchant UI being called twice when opening

776.4 2.8.16

Released February 23, 2024

New

- Property: Empty Item, Runtime Item and Loot Table

Enhances

- Examples: Cleaner and simpler demo scenes

Fixes

- Saving: Grid Bags keep order when loading
- UI: Sprites displayed partially in Equip UI
- UI: Merchant refreshes interface after trading
- UI: Allow Send Equipment applies to the whole stack
- Equipment: Missing options overriding slots
- Instruction: Drop Amount shows incorrect title

776.5 2.8.15

Released November 12, 2023

New

- Demo: New alchemy example with recipe learning

Enhances

- Crafting: Items not Craftable are not listed

Fixes

- Bag: Partially shown Items in Equipment
- Bag: Error if bag and skin types do not match

776.6 2.8.14

Released October 31, 2023

This version breaks compatibility with previous versions and will only work with Game Creator 2.13.43 or higher.

New

- Grid: New Grid Inventory system
- Condition: Has Enough Available Space
- Equipment: Optional use of Handles
- Property: Last Item Created
- UI: Option to hide equipped Items
- Examples: Three new grid inventory demos

Changes

- Items: Instructions with optimized workflows
- Internal: Support for Core 2.13.42 version

Fixes

- UI: Tooltips showing after destroying UI cell

776.7 2.7.13

Released September 1, 2023

New

- Item: Instructions On Create Item under Info
- Item: Hide number/text from item Properties
- Loot Table: Variable type Loot Table
- Property: Loot Table instance
- Property: Loot Table from Variables
- Settings: Refresh button on Inventory window

Enhances

- UX: Auto detect when new Items are created
- UX: Items display parent hierarchy in Inspector

Changes

- Instruction: Loot Table uses a Property

Fixes

- Item: Refresh ID if no Items available
- Property: Mixed Last Item Sold / Bought
- Remember: Equipment error if no equipment

776.8 2.6.12

Released June 13, 2023

New

- Condition: Enough Ingredients to Craft
- Event: On Change Currency

Fixes

- Trigger: On Drop Item has Bag object as Target
- Trigger: On Drop Item not working with previous API
- Property: Get Random Item returns a valid value
- Property: Get Random Runtime Item returns a valid value
- Variables: Incorrect initialization phase
- Examples: Support for core version 2.11.41

776.9 2.6.11

Released May 9, 2023

New

- Items: Can now have Cooldowns after using them
- Instruction: Add Item/Runtime Item Cooldown
- Instruction: Remove Item/Runtime Item Cooldown
- Instruction: Clear Cooldowns
- Condition: Is Item/Runtime Item in Cooldown
- Property: Random Item and Runtime Item from Bag
- UI: Option to disable exchanging equipped items
- UI: Option to split stack by one or in half

Enhances

- Remember: Memorizes time left of Item cooldowns

Fixes

- Instruction: Set Drop Amount incorrect settings
- Items: Can Run conditions not running properly
- UI: Bag UI component missing field throws error
- Align: Equipment index alignement regression
- Align: Coin index alignement regression

776.10 2.6.10

Released March 24, 2023

New

- Instruction: Set Transfer Amount
- Instruction: Set Drop Amount
- Condition: Is Tab UI Active
- Property: Last Item attempted to Use
- Property: Last Item attempted to Equip/Unequip
- Property: Last Item attempted to Craft/Dismantle
- UI: Allow to split stack of Items
- Settings: Displays current and update version

Enhances

- UI: Tab support selection/gamepads
- Examples: Shortcuts to cycle through UI tabs

Fixes

- Equipment: Wrong Skinned Meshes bones
- Triggers: Bags not detecting the Player
- UI: Incorrect buy/sell conditions

776.11 2.6.9

Released December 8, 2022

Enhances

- Performance when using On Drop Item
- Exposed Bag UI members for modification

Fixes

- Support for new Props system
- Null reference when retrieving Item properties

776.12 2.6.8

Released November 8, 2022

New

- Property: Get Item Sprite
- Property: Get Item Color
- Property: Get Runtime Item Sprite
- Property: Get Runtime Item Color

Changes

- Copy Runners use less memory footprint

Fixes

- Remember: Ignore if no Bag is present

776.13 2.5.7

Released September 19, 2022

New

- Instruction: Close Bag UI
- Instruction: Close Merchant UI
- Instruction: Close Tinker UI
- Example: Save and Load inventory

Enhances

- Drag & drop swaps Items instead of shifting
- Merchant UI Cell: Field to check if cell is valid

Fixes

- Save/Load: Preserves order of Items
- Grouping Items when stacking deletes source Item
- Failing to Load Equipment of previously saved game
- Instruction: Can Increase Width incorrect check
- Instruction: Can Increase Height incorrect check

776.14 2.4.6

Released August 21, 2022

New

- Instruction: Increment Bag Height
- Instruction: Increment Bag Width
- Condition: Is Equipment Slot Available
- Dropping Items use a LayerMask
- UI Items can be rearranged by default

Enhances

- Loot Table redesign top plot

Changes

- Rearranged Equipment Index class

Fixes

- Detect new Items before enter Play Mode

776.15 2.3.5

Released June 29, 2022

New

- Option to uninstall modules
- Condition: Item has Property
- Condition: Runtime Item has Property
- Condition: Is Runtime Item Equipped
- Property: Get Item/Runtime Item Sprite
- Property: Get Item Sprite
- Property: Get Runtime Item counterparts
- Property: Set Runtime Item counterparts
- Property: Get Current Open Bag
- Property: Get Current Merchant Bag
- Property: Get Current Client Bag
- Property: Get Current Tinker Bag
- Example: Storage Chest

Enhances

- Reorganized Item dropdown
- Reorganized Runtime Item dropdown

Fixes

- Log error when exception in Item instructions
- Wrong Item tinkered when changing UI window
- Condition: Is Item Equipped with sub items
- Serialization error during domain reloads

776.16 2.3.4

Released May 17, 2022

New

- New Runtime Item properties
- New Runtime Item Variable type
- Instruction: Add/Remove Runtime Item
- Instruction: Drop Runtime Item
- Instruction: Equip/Unequip Runtime Item
- Instruction: Attach/Detach to Socket
- Condition: Has Runtime Item
- Checkbox determines if Item can be sold
- Checkbox determines if Item can be bought
- Checkbox determines if Item can be dropped

Enhances

- Reorganized Inventory instructions

Fixes

- Edge case when saving Equipment and Wealth
- Retrieving a Bag from a Property
- Loot Table displays NaN with no drops
- Bag wealth updated at runtime upon change
- Selected item would show wrong one

776.17 2.2.3

Released March 25, 2022

New

- Instruction: Drop Item
- Condition: Compare Wealth
- Property: Bag Set Wealth
- Property: Item Get Property Text
- Property: Item Get Property Value
- Property: Item Get Property Color
- Property: Item Get Property Sprite
- Property: Item Set Property Text
- Property: Item Set Property Value

Enhances

- Editor: Properties have scene refs

Changes

- Hide properties from within Item
- Support Socketing from external sources

Fixes

- Fields alignment in Inspector
- Missing Price UI editor drawer
- Incorrect dropped item in Example scenes

776.18 2.1.2

Released January 28, 2022

New

- Items have usage conditions
- Equip/Unequip can inherit logic from its parents
- Using Items can inherit logic from its parents
- Condition: Can Equip to Bag
- Condition: Is Equippable
- Condition: Is Equipped
- Condition: Is Craftable
- Condition: Is Dismantable
- Condition: Is Usable
- Instruction: Change target Bag of Bag UI
- UI: Bag UI can have a default Bag
- UI: Properties with a value of 0 can be skipped
- Properties: Access to recent socketed Items

Changes

- Item price increments with socketed Items
- Compatibility with Game Creator 2.3.15

776.19 2.0.1

Released January 12, 2022

New

- First release

III. Dialogue

777 Dialogue

Most games allow verbal communication between the player and other characters - Whether that's using *barks*, cinematic sequences or dialogues where the player is prompted to choose between different choices.

The **Dialogue** module caters all these using simple and intuitive tools that help keep dialogues at a glance while allowing to fully tailor it to the user's needs.

Get Dialogue

Requirements

The **Dialogue** module is an extension of **Game Creator 2** and won't work without it

778 Setup

Welcome to getting started with the **Dialogue** module. In this section you'll learn how to install this module and get started with the examples which it comes with.

778.1 Prepare your Project

Before installing the **Dialogue** module, you'll need to either create a new Unity project or open an existing one.

> **Game Creator**
>
> It is important to note that **Game Creator** should be present before attempting to install any module.

778.2 Install the Dialogue module

If you haven't purchased the **Dialogue** module, head to the Asset Store product page and follow the steps to get a copy of this module.

Once you have purchased it, click on Window → Package Manager to reveal a window with all your available assets.

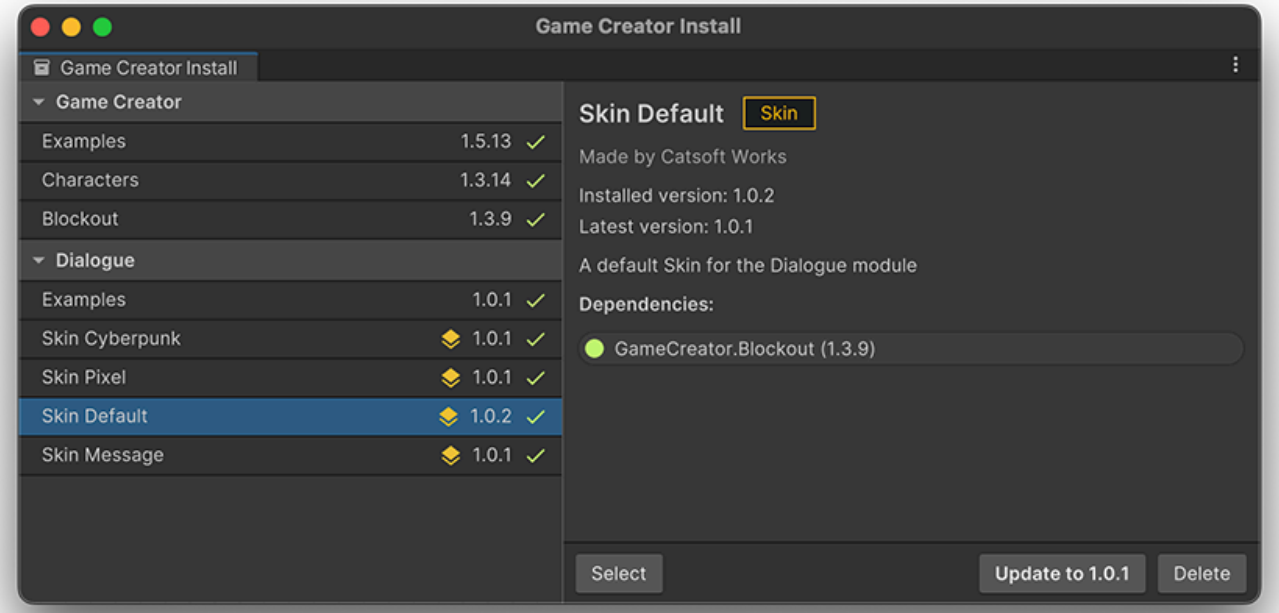
Type in the little search field the name of this package and it will prompt you to download and install the latest stable version. Follow the steps and wait till Unity finishes compiling your project.

778.3 Examples

We highly recommend checking the examples that come with the **Dialogue** module. To install them, click on the *Game Creator* dropdown from the top toolbar and then the *Install* option.

The **Installer** window will appear and you'll be able to manage all examples and template assets you have in your project.

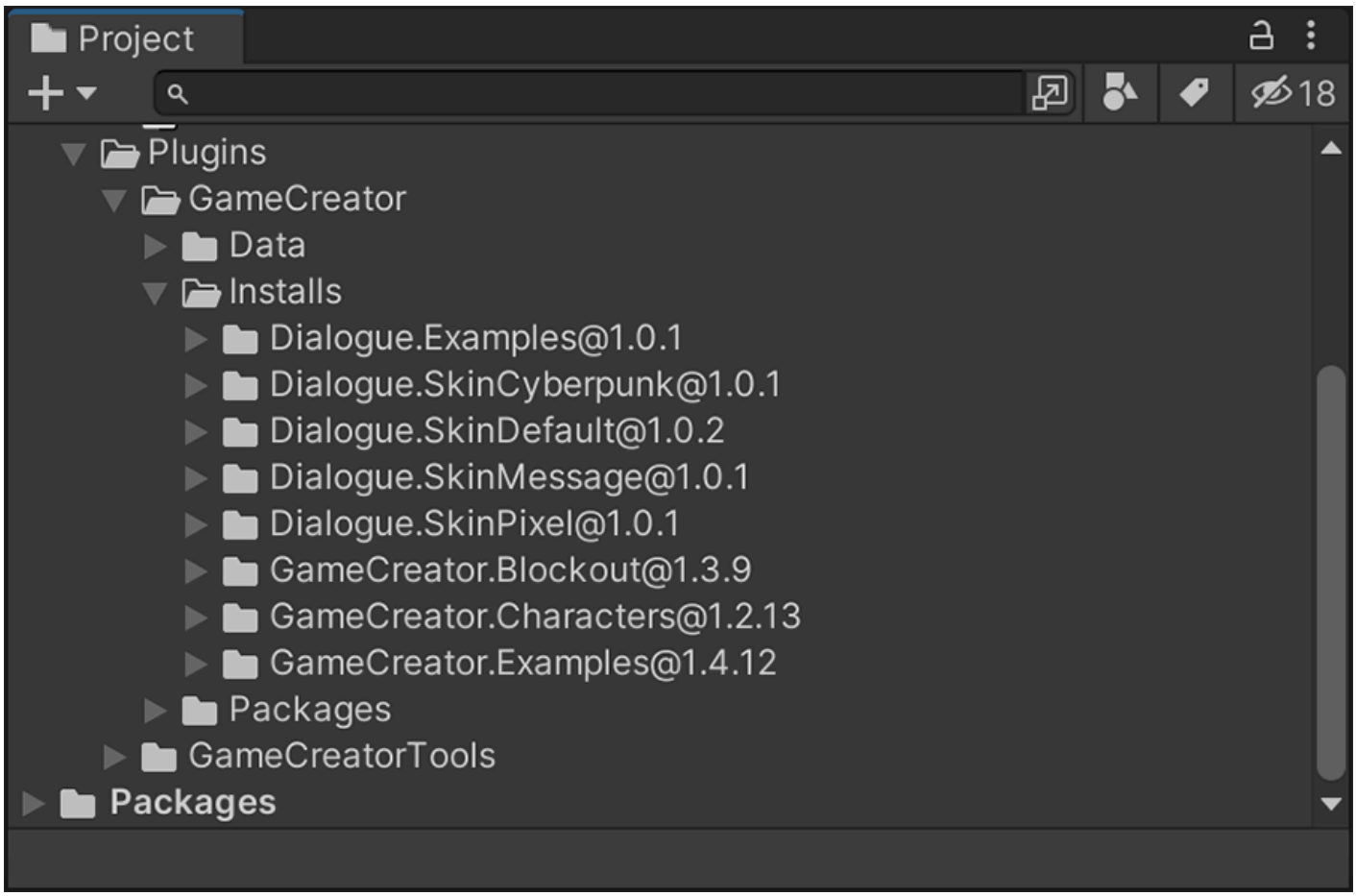
- **Examples**: A collection of scenes with different use-case scenarios
- **Skin Default**: A minimalist template UI skin for your dialogues
- **Skin Message**: A UI skin that shows conversations like SMS/Text messages
- **Skin Pixel**: A fantasy UI skin that displays floating conversations
- **Skin Cyberpunk**: A futuristic UI skin with glitches and HUD portraits



The **Examples** requires all the skins in order to work..

> **Dependencies**
>
> Clicking on the **Examples** install button will install all dependencies automatically.

Once you have the examples installed, click on the *Select* button or navigate to `Plugins/GameCreator/Installs/Dialogue.Examples/`.


Project
18
Plugins
GameCreator
Data
Installs
Dialogue.Examples@1.0.1
Dialogue.SkinCyberpunk@1.0.1
Dialogue.SkinDefault@1.0.2
Dialogue.SkinMessage@1.0.1
Dialogue.SkinPixel@1.0.1
GameCreator.Blockout@1.3.9
GameCreator.Characters@1.2.13
GameCreator.Examples@1.4.12
Packages
GameCreatorTools
Packages

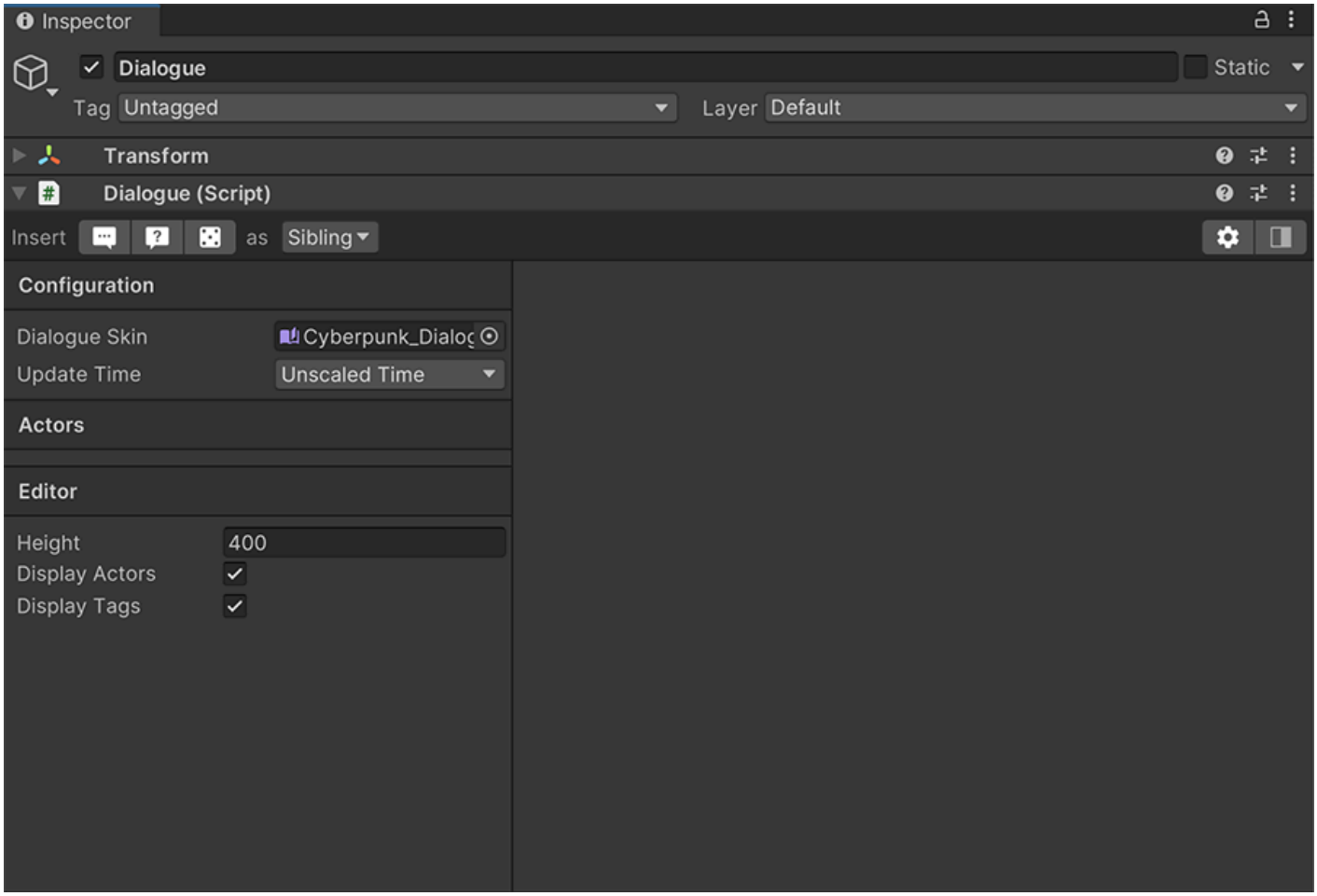
III.I Dialogues

779 Dialogues

All conversations are written in a **Dialogue** component. To create one, right click on the *Hierarchy Panel* and select *Dialogue* → *Dialogue*.

Add Component

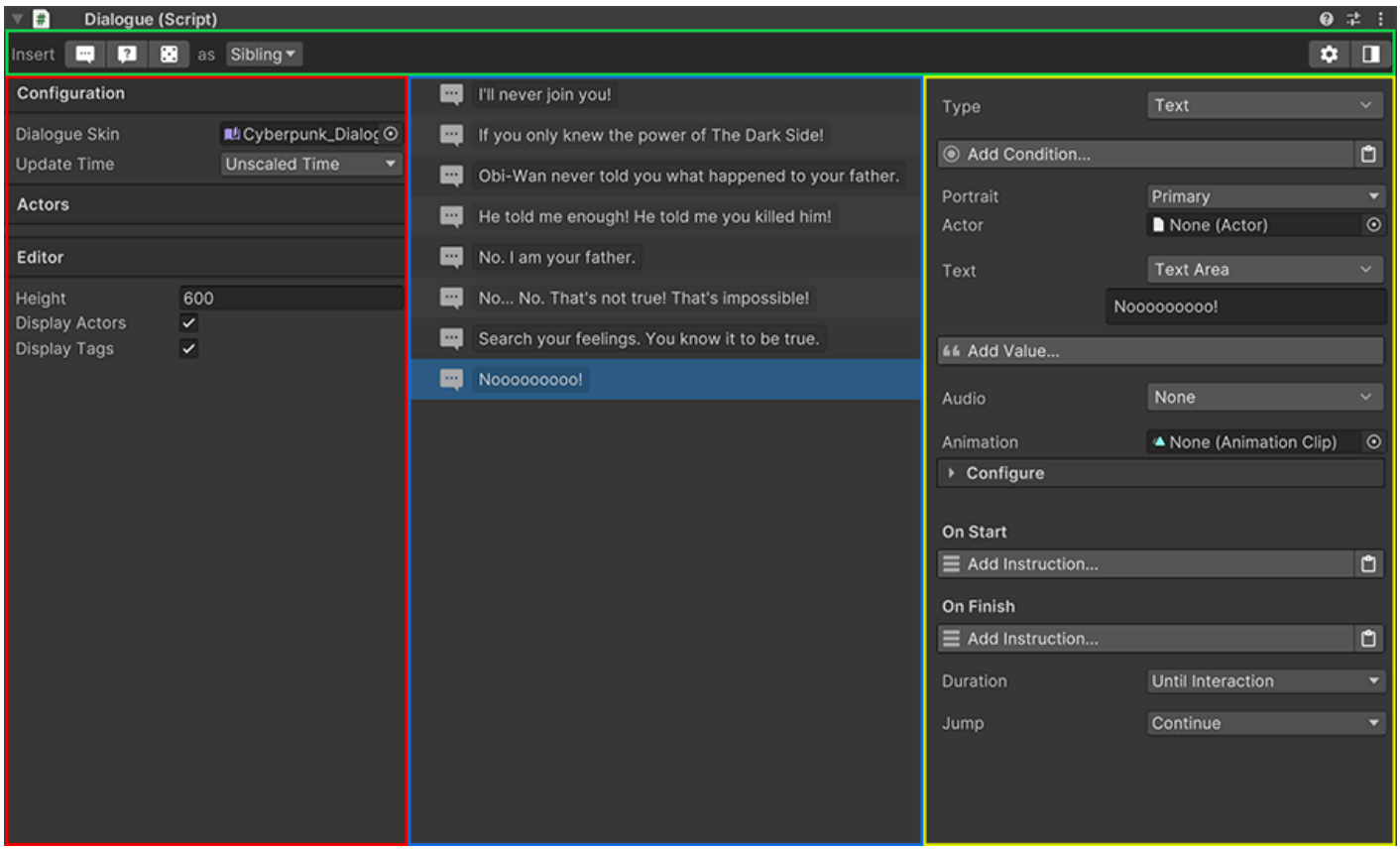
Alternatively, you can select any existing game object and click on the *Add Component* button and search for **Dialogue**.



This is the basic view of the **Dialogue** component, and it's where all the text is written and configured. However, there are multiple sidebars and windows that can be hidden/shown in order to make it easier to work.

780 Anatomy of a Dialogue

The **Dialogue** component, fully expanded, has 4 different sections, two of which can be collapsed to increase the amount of space available when these are not needed.



780.1 Top Toolbar

The top toolbar has two distinct sections.

The buttons on the left allow to add new nodes to the conversation. These nodes can either be:

- A **Text** element, which is the most common type. It displays a text on screen.
- A **Choice** element, which allows to present a choice to the player
- A **Random** selection element, which is similar to the **Choice** element, but automatically selects a random value.

> **Shortcuts**
>
> Holding the 'Shift' key while clicking on any of the buttons will perform the opposite operation stated next to the buttons.
>
> For example, clicking on a **Text** node that is set as a **Sibling**, while holding the Shift key, it will create a new node as a **Child** of the current one.

To learn more about the different nodes, head to the Nodes section

This section also allows to select where to create the new element. By default, it will always create it right below the currently selected entry, as a sibling. However, this can be changed to create a new element as a child of the selection.

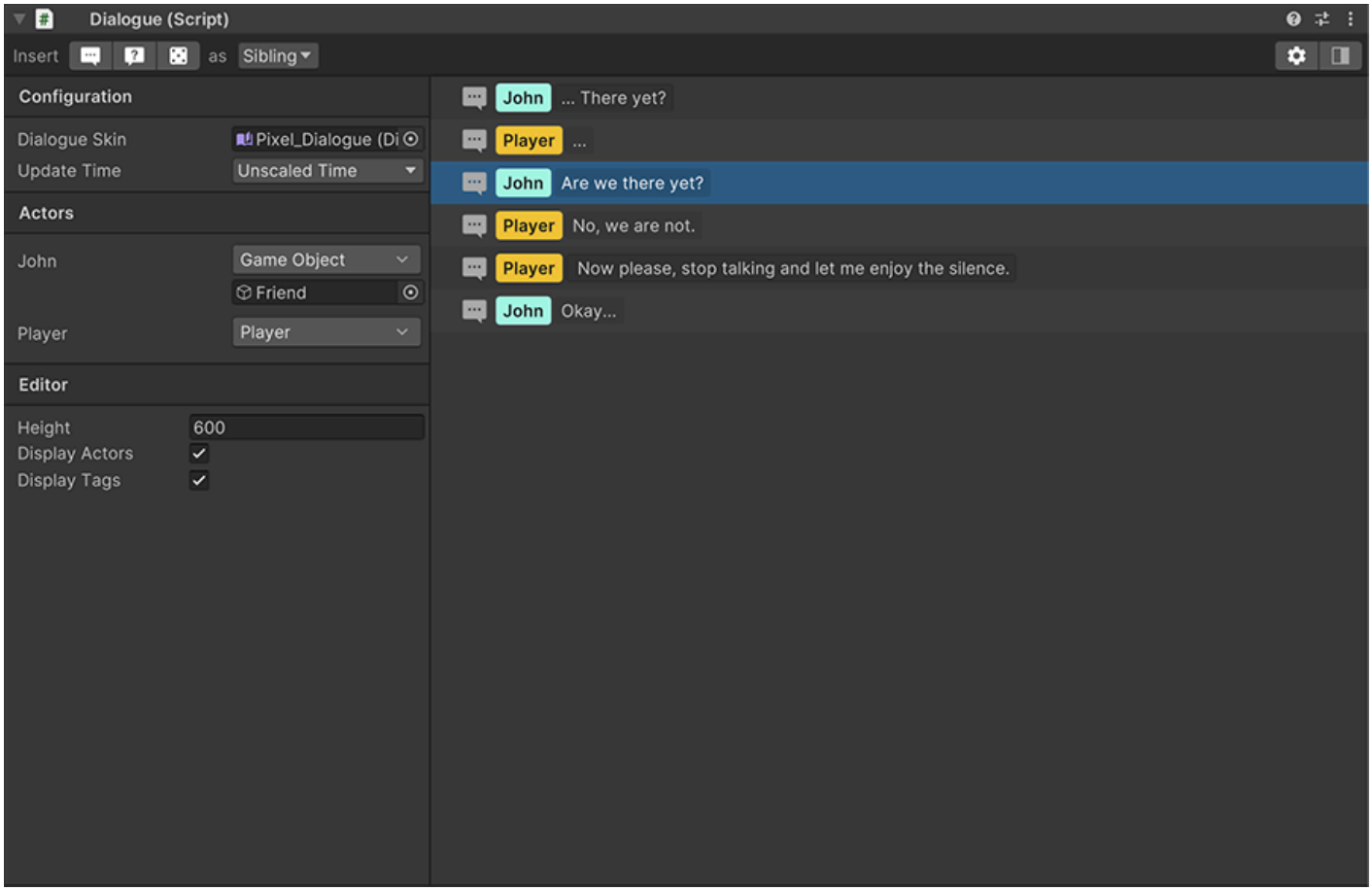
On the far right there are two toggle buttons.

- The first one with the gear icon, toggles the left sidebar, which is the Settings window.
- The second one with the square, toggles the right sidebar, which is the Inspector window.

780.2 Settings

The **Settings** window allow to configure the general values of the current conversation. There are 3 sections:

- **Configuration**: Determines the skin used by the Dialogue when displaying the conversation, as well as whether it is affected by the time scale or not.
- **Actors**: This section is automatically filled when new Actors are added or removed, and allows to link a scene reference with the *Actor*.
- **Editor**: This allows to customize how the Editor looks like, in order to have more real estate and work more comfortable. These options have no impact on gameplay.



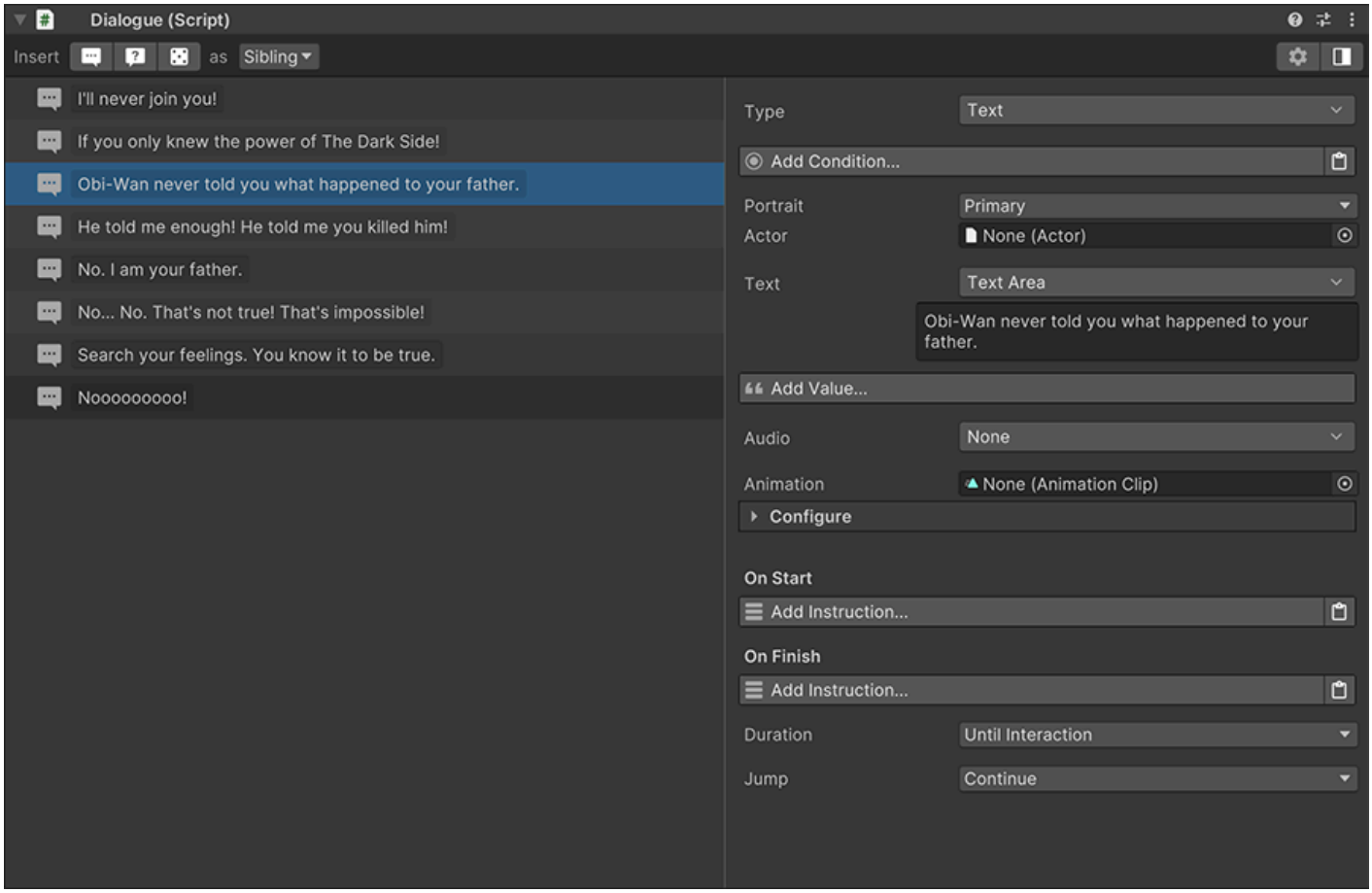
780.3 Conversations

This section is the most important one, which allows to overview the whole conversation flow at a glance. Each row is a spoken dialogue line, and they are executed from top to bottom, and examining the child nodes first, before jumping to the next sibling.

> **Double Click**
>
> Because opening and closing the Inspector sidebar is a very common operation, double clicking on any node will open (and focus on the current node) or hide the sidebar.

780.4 Inspector

The inspector sidebar allows to set and modify the currently selected node of a Dialogue.



Starting from the top, any node allows to change its type, which can either be a **Text**, **Choice** or **Random**.

> **Node Types**
>
> For more information about node types, see the Nodes section.

The **Conditions** list below determines whether this node can be executed or not.

The **Portrait** field allows to choose where the Actor's portrait is displayed (if any at all). It allows three options:

- **None**: No portrait is displayed. This is the default option.
- **Primary**: The primary position of all portraits.
- **Alternate**: An alternate position where to show the portrait, if the skin supports it.

The **Actor** field allows to reference an Actor asset. If one is provided, it also allows to choose which expression to use for this dialogue line (if any are available).

> **Actors**
>
> Note that whenever an **Actor** field is modified, the **Dialogue** component re-scans the whole conversation tree and gathers which Actors are being used, which can be configured in the Settings sidebar.

The **Text** field is probably the most important one, and it defines the text displayed by the dialogue.

There's a button below that reads *Add Value...*, which allows to create a list of key-value pairs. These values can be used by the text to add dynamic values. For example, displaying the real name of the Player saved in a global variable.

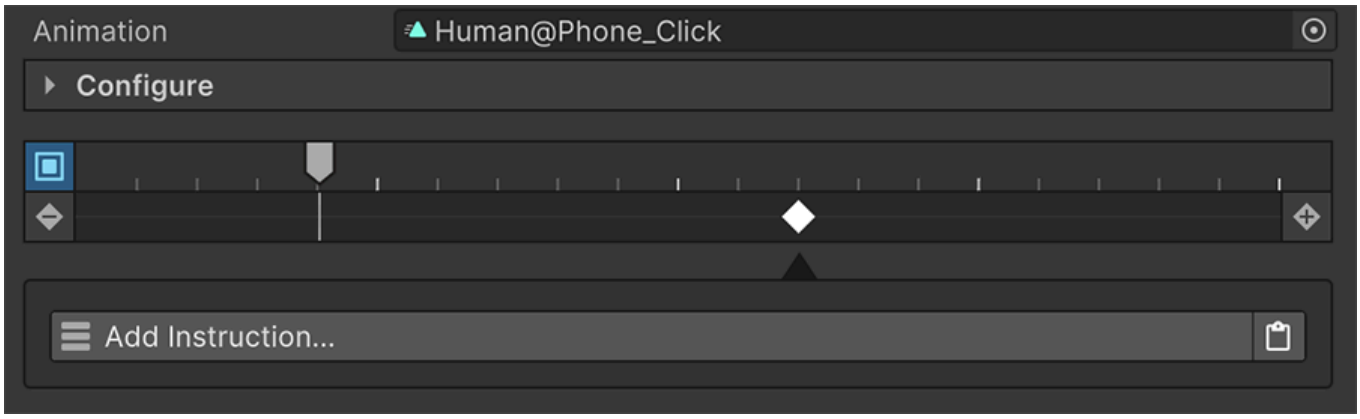
> **More about Dynamic Values**
>
> Dynamic values are incredibly powerful. Read more on how to use them at the Dynamic Values section.

The **Audio** field, as it name implies, allows to use a voice clip while the text is being displayed.

The **Animation** field allows to choose an animation field, which is played on the object linked to the current Actor. If none is provided or the scene reference is empty, the animation is ignored.

Animation Timeline

The **Animation** field is more powerful than regular **Gestures**, as it allows to play instructions at any point of the animation.



For more information about the animation timeline tool, see the Animation Timeline section.

The **On Start** and **On End** instructions are executed when the text starts to display and disappears, respectively.

The **Duration** field determines how long the text will stay on screen. By default, it waits until the user presses any button to jump to the next line. However, this can be changed with one of the following options:

- **Until Interaction**: The default value. Waits until the element is ordered to skip to the next line.
- **Timeout**: Waits until the specified time has passed.
- **Audio**: Waits until the specified Audio Clip finishes playing.
- **Animation**: Waits until the Animation Clip finishes playing.

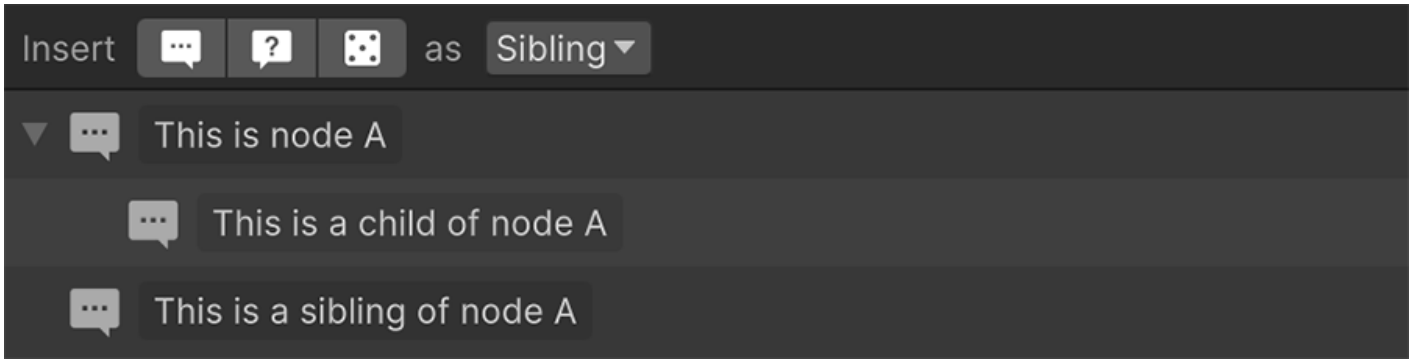
No Audio or Animation

It's important to note that if **Audio** or **Animation** are selected, but no asset for those values are present, the duration will be zero seconds and will skip immediately to the next text line.

The **Jump** field, by default, indicates the next dialogue line to play is the natural one (child if any, otherwise the next bottom sibling). However, this field can also be changed to jump to any arbitrary point marked with a specific Tag, or even exit the **Dialogue** after the current line is executed.

781 Nodes

A **Dialogue** is composed of nodes displayed from top to bottom, and can even be set as children of other nodes.

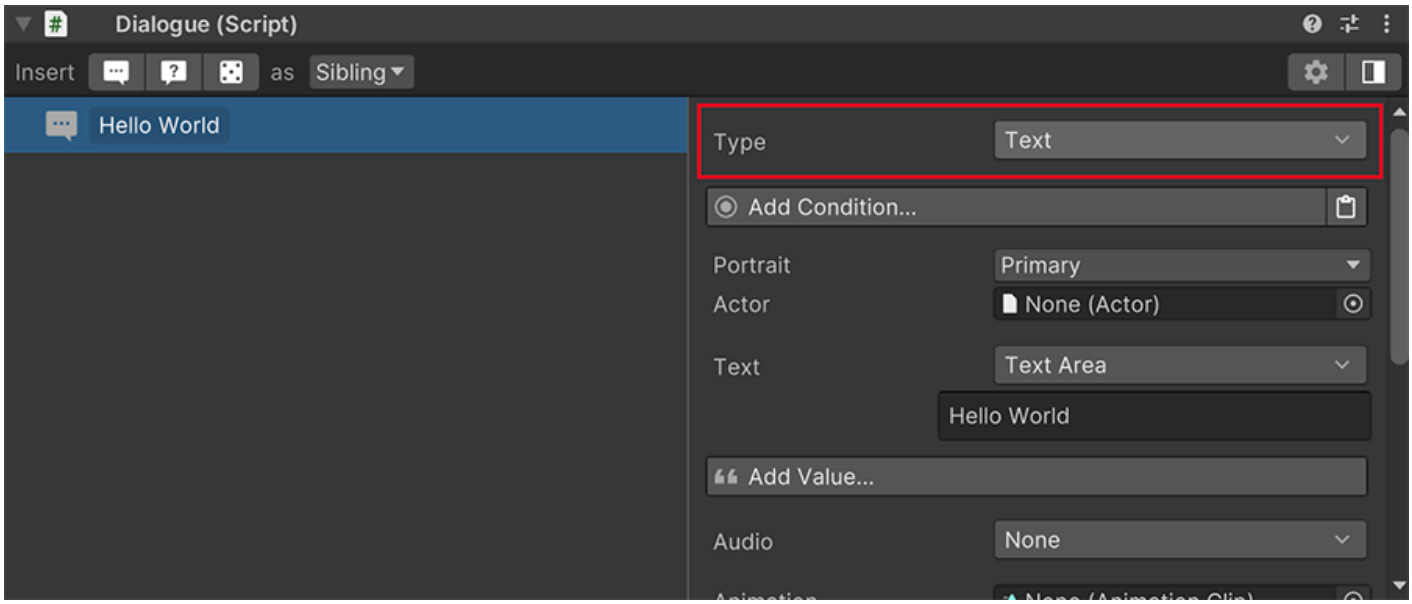


Nodes can be dragged and dropped to change their position in the conversation tree. Dragging and dropping onto another node, will convert the dragged one into a child of the targeted.

There are three different node types: **Text**, **Choices** and **Random** nodes.

781.1 Text

Text nodes are the most common and used to display conversations. They display a text message on screen and simply jump to the next node when they are finished.



Using child nodes of Text

It's important to note that a **Text** node can contain children nodes. These will be executed if, and only if, the parent Text node's conditions are satisfied. This is specially useful if you want to display a conversation only after meeting certain conditions.

Any text can be enhanced with **rich text** tags, which allow to change the color, size and other properties of specific regions. For example, to display the word `James` in white in the phrase `Hello James`, you can surround the specified word between `<color>` tag:

```
Hello <color=#FFFFFF>James</color>
```

More about Rich Text

Read the official Unity documentation on Rich Text

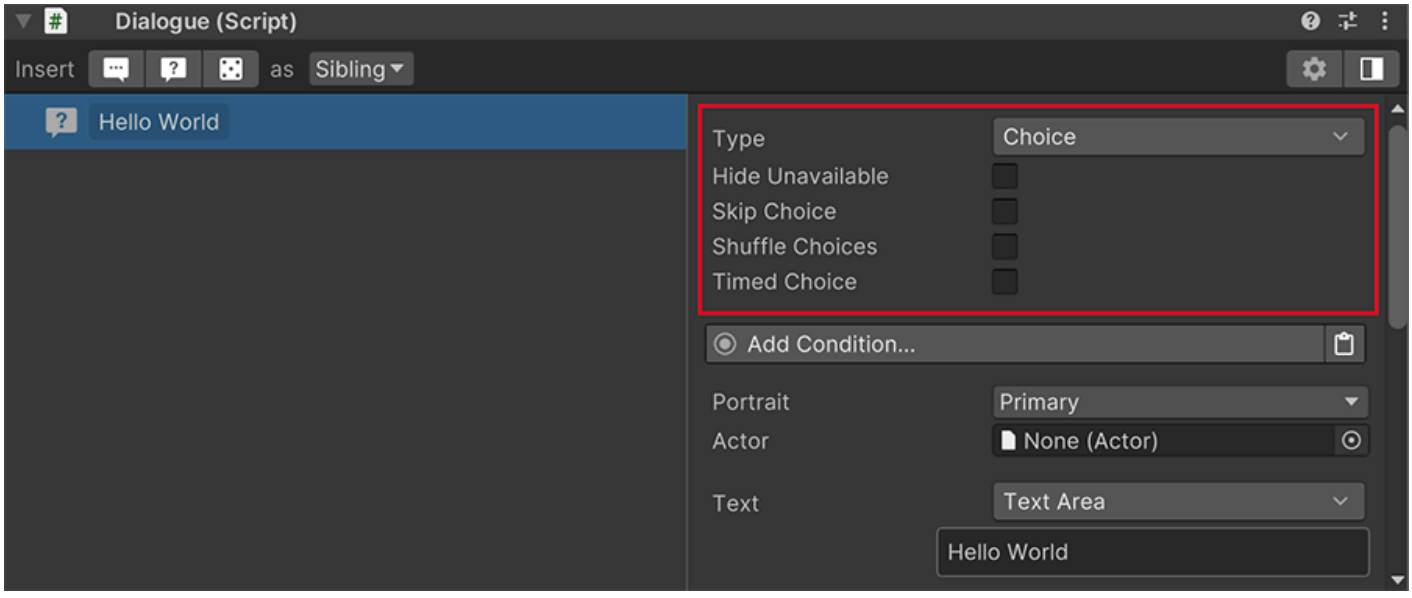
781.2 Choices

Choice nodes prompt the user with a collection of choices. How these choices are presented and their behavior is configured below with a new set of fields that appear.

Options from Skin

Since version 2.2.8 Choice options are configured in the Dialogue Skin by default. However, you can change the dropdown option from *From Skin* to *From Node* and a list of options that override those from the Skin will appear.

The available choices are picked from the direct children of the **Choices** node, which should usually be **Text** nodes.



- **Hide Unavailable**: Determines whether unavailable choices (their Conditions return false) should be displayed (but greyed out) or hide them completely.
- **Hide Visited**: Determines whether the choice is skipped if the line has already been visited.
- **Skip Choice**: Allows to skip the execution of the **Text** choice selected, and skip to the next immediate one.
- **Shuffle Choices**: When ticked, the choices order will be shuffled and displayed randomly.
- **Timed Choice**: Determines if the choice has a time limit. If checked, two new fields wil appear down below.
  - **Duration**: Specifies the amount of time the user has to pick a choice, in seconds.
  - **Timeout**: Defines what happens if the user fails to input a choice, which can either be picking one at random, the first option or the last one (both prior to shuffling, if enabled)

Skipping Choices

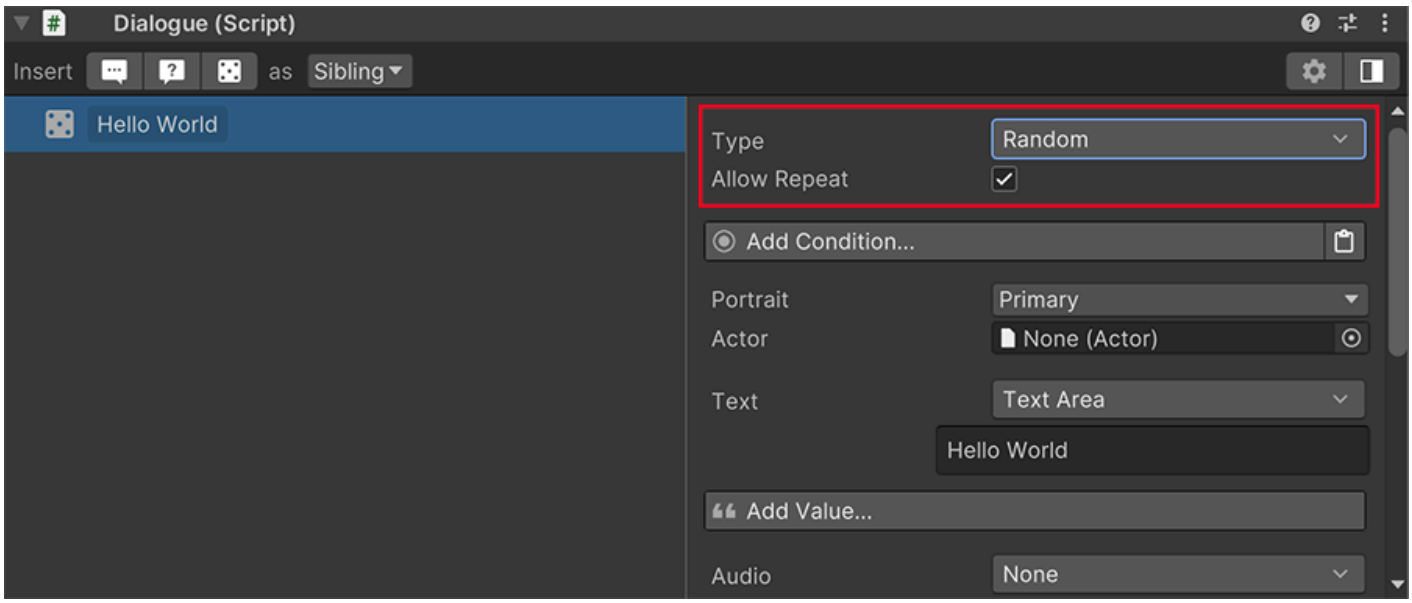
Choosing **Skip Choice** allows the player to not speak the dialogue line when picking it from the prompt. For example, let's say a bartender asks the player whether they want a drink. The Player could see the option "*Yes, a Moonlight Specter*". If left unchecked, the Player would then execute the **Text** node. Some games, however, don't repeat the choice made by the user and assume the player already said it when the user picked the choice.

Single Choice

If the **Choices** does only have a single choice available, it will be automatically selected without requiring the user to choose it.

781.3 Random

Random picks are similar to **Choices**, except for the fact that the user is not prompted to pick them, and instead, they are randomly picked.



Options from Skin

Since version 2.2.8 Random options are configured in the Dialogue Skin by default. However, you can change the dropdown option from *From Skin* to *From Node* and a list of options that override those from the Skin will appear.

The **Random** node also has the field **Allow Repeat** which determines whether the same choice can be picked in a row, or not.

Greeting

Random choices are useful to allow characters to pick a random line from a collection. For example, a shop keeper could greet the player differently every time they talk.

782 Dynamic Values

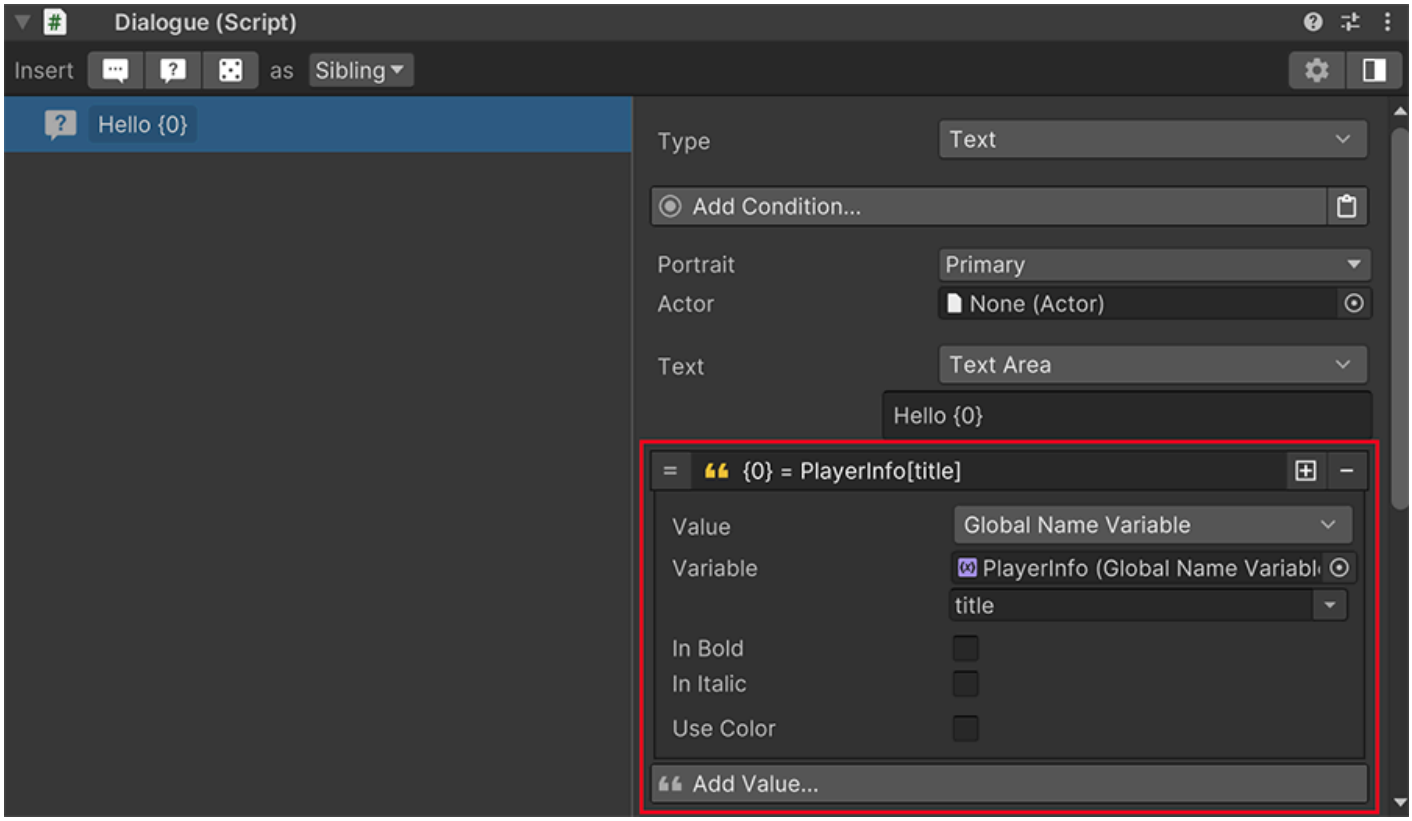
There are times where a dialogue text must contain some sort of variable value. For example, displaying the player's name that has previously been prompted.

Dynamic Values allow to replace special symbols on the text with values that come from more dynamic sources, such as *Local Variables*, *Stats*, etc...

There are two types of dynamic values: **Local** and **Global** ones.

782.1 Local Dynamic Values

Local dynamic values are set up inside the **Dialogue** component, right under the Text field of a node.



Each value is assigned an index value, starting from 0 at the top. Using the index number between curly braces `{` and `}`.

Player Name

In the screenshot above, the text `{0}` will be replaced by the **Global Variable** value called `name`.

A **Local** dynamic value can also have a specific **color** assigned to it, appear in **bold** and/or in **italic** characters.

782.2 Global Dynamic Values

Global dynamic values are very similar to the local ones, but their scope is project-wide, so they only need to be set up once. In the previous example, in order to display the player's name, we'd need to configure a **Local** dynamic value for each dialogue line that displays the player's name.

Instead, it's much more efficient to define a global value that any **Dialogue** can make use of.

To edit or create **Global** dynamic values, click on the top toolbar's Game Creator button and navigate to Settings. Click on the **Dialogue** tab and a list of all created values will appear, with a button to add new ones.

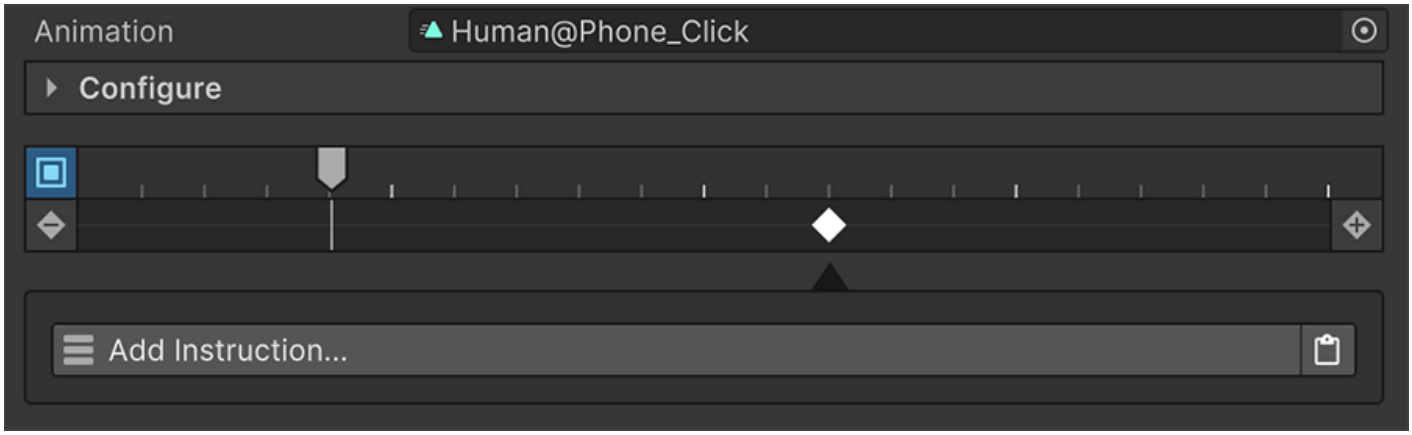
Global dynamic values have an extra field called **Key**, which is the unique ID assigned to that particular value.

In order to use a **Global** dynamic value, one must type the **Key** value between brackets. For example, if the key value is "player-name", the symbol that replaces itself with the **Global** dynamic value is `{player-name}`.

Global dynamic values also allow to specify whether the replaced text should be printed in **Bold**, **Italic** and/or in a specific **color**.

783 Animation Timeline

The **Animation** field available in every **Dialogue** node is a fully-featured Timeline-like sequencing tool that allows to play, preview and add events at different timestamps of an animation.



Dragging and dropping an **Animation Clip** onto the **Animation** field reveals a sequencing tool below.

The first section is called **Configuration** and contains all the setup options any other Gesture has.

The second one is the **Sequencing** tool, where the animation clip can be previewed in the scene view if the **Actor** referenced is present in the Editor scene. To disable scrubbing the preview, click on the squared blue button.

The timeline has rhomboid-like shapes called **Markers**, which execute instructions when the animation clip plays that specific point.

> **Moving Markers**
>
> Markers can be dragged and slide around the timeline. Doing so will automatically enter *animation preview* mode, so it's easier to adjust the exact point where the instructions should be called.

The sequence has two buttons with a `-` and a `+` at each end.

- Clicking on the plus icon will place a new **Marker** on the timeline where the *head* is.
- The minus button removes the currently selected **Marker** and any instructions associated with them.

> **Executing Instructions**
>
> It is very important to note that if the **Dialogue** line stops executing before the animation clips has finished, the **Animation** sequence will be canceled at that point and the rest of **Markers** won't be executed.
>
> If there are some critical events that need to be executed before skipping to the next line, these should be placed inside the **On Start** or **On End** instruction lists of the **Node**.

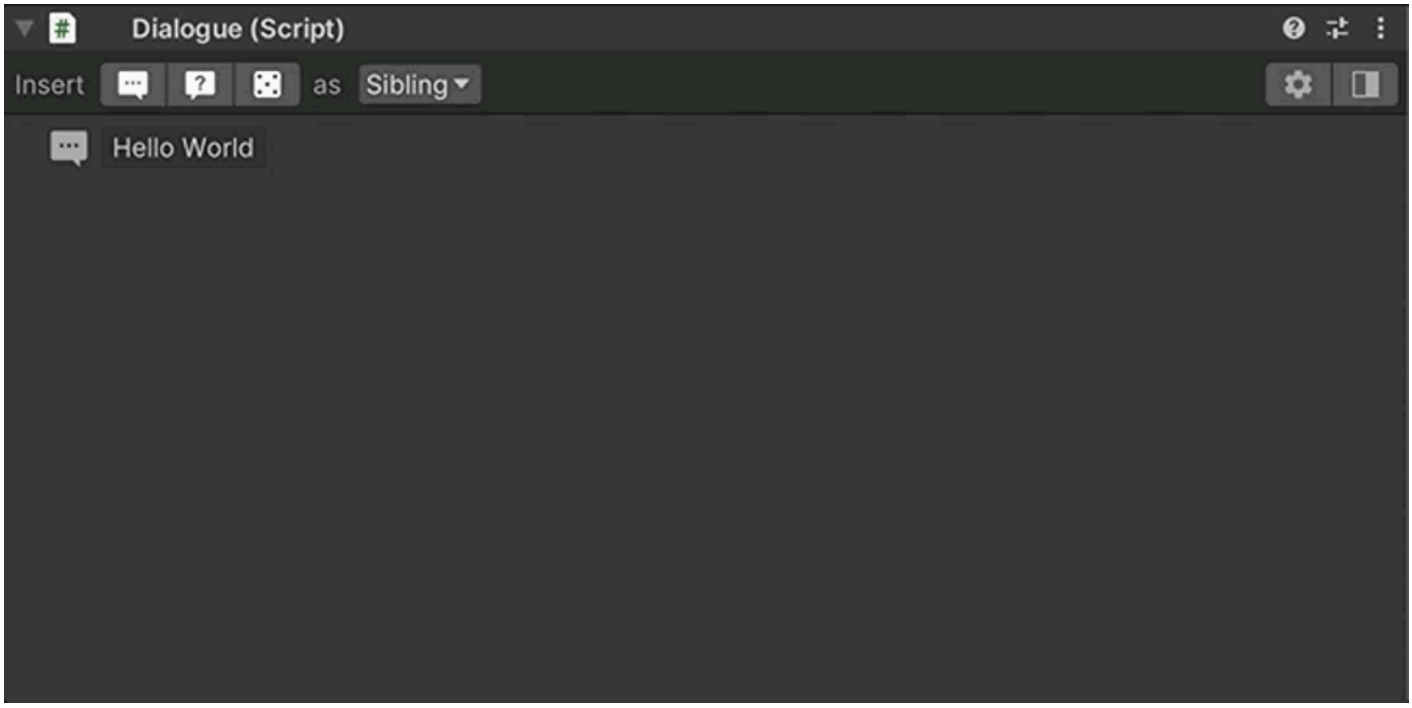
784 Tags

Each **Dialogue** line can be marked with a **Tag**, which is a unique name that identifies that line from the rest.

This identification can then be used for:

- Jumping to a specific line after a node has been executed (useful for looping conversations).
- Using a Condition to check if a node has been executed or not.

To add a **Tag** to a node, right click it and select *Tag...*. A pop up window will appear with a text prompt. After giving it a name, click *Save* and it will display on the right side of the node.



Unique Tags

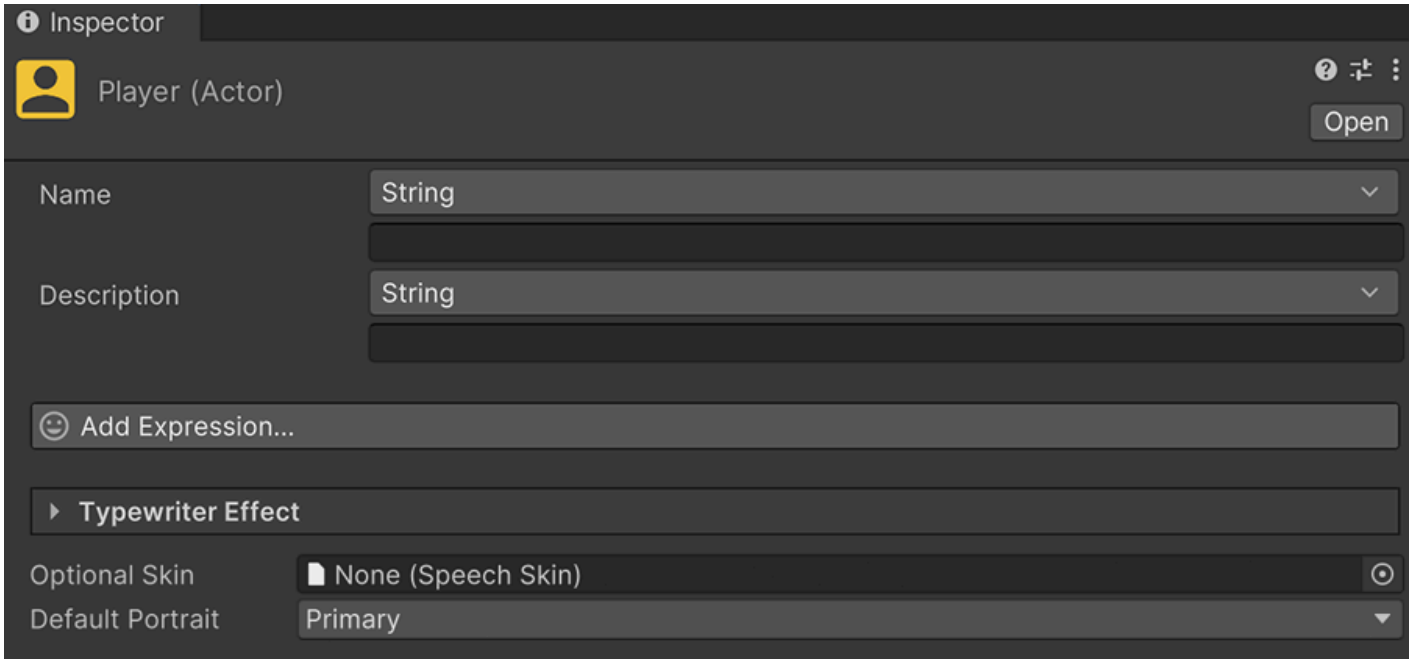
Note that **Tags** should have unique names across the **Dialogue** component and their name can't contain any spaces or non-alphanumeric characters.

Here's an example of a **Condition** checking if the `my-tag` **Tag** has been executed or not.

III.II Actors

785 Actors

Actors are assets that represent a character speaking in a **Dialogue** and allow to configure their name, how they speak, appear and writing effects.



785.1 Actors Name

The first two fields allow to give the **Actor** a **Name** and a **Description**.

Both fields are optional, but can be used in the **Dialogue** component to automatically display the name of the speaker when a character linked to this actor says something.

785.2 Expressions

The **Expressions** list is a collection of states in which a character can be when speaking a line. You can use these to express anger, surprise, confusion or any other mental state when a line is spoken, with their respective animation, sound and visual queues.

More about Expressions

For more information about **Expressions**, see the Expressions section.

785.3 Effects

The **Typewrite** section allows **Dialogue** lines to appear word by word at a certain pace. This is very useful when different characters have different voice cadence and you want to reflect that without using voice-over.

The **Frequency** field determines how many characters per second appear.

Gibberish is an audio effect played during non-voice acted characters that provide a cheap and easy way to imbue mood into each spoken line. Commonly used in older RPG games, each character plays a random collection of sounds with varying pitch and speed.

Default Gibberish

The **Dialogue** module comes with a built-in gibberish sound effect ready to be used and customized. Simply select it from the Audio Clip drop down and change the **Pitch** value to fit your needs.

785.4 Custom Skin

Most of the time, all characters will use the same speech bubble displayed in the user interface. However, some games require some characters to have a custom speech bubble, like a robot character using a different typography and speech bubble aesthetic.

The **Optional Skin** field allows a character to override its speech bubble whenever this **Actor** is used.

About Skins

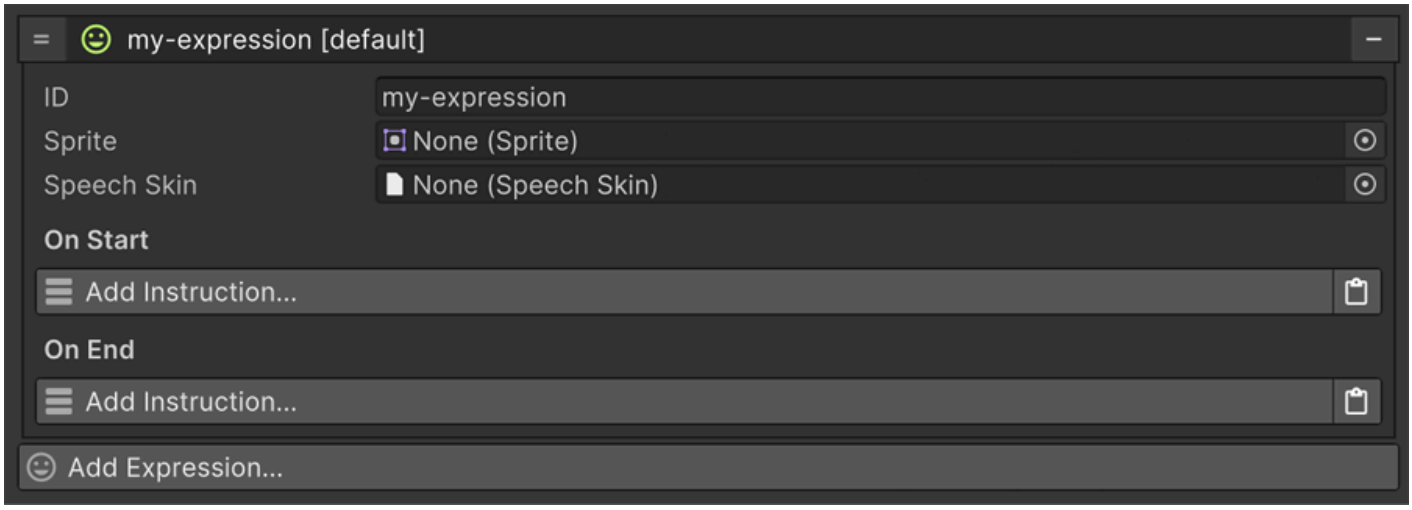
For more information about how **Skins** work, see the Skins section.

The field **Default Portrait** allows to define a default position for this **Actor**'s portrait. This is used by the **Dialogue**'s component, when a node portrait is set to *Actor Default*.

786 Expressions

Expressions allow to deliver dialogue lines in a specific mood. For example, changing the *Sprite* character that represents the speaker with the associated emotion, show an onomatopoeia, sound effect and/or an animation.

To create a new **Expression**, click on the *Add Expression* button.



Default Expression

It's important to note that the top most **Expression** is considered the *default* expression, and thus it should be the most commonly used one.

The **ID** field determines the unique name that identifies this **Expression** among the rest.

The **Sprite** is a texture that is used as a portrait when the speaker uses this emotion.

The **Speech Skin** is an optional field that allows to override the speech UI skin used when the **Actor** uses this particular expression. If none is provided, the **Actor** skin is used. And if the **Actor** doesn't have any either, the default one is used.

Learn more about Speech Skins

To know more about what a **Speech Skin** is and how to use it, visit the UI section.

The **On Start** and **On End** instructions are executed at the very beginning and end of the **Expression**. This can be used to play a **Gesture** or even enter/exit a **State** when using a specific expression.

When instructions are executed

When a new **Expression** is used, the **On Start** instructions will be executed. However, the **On End** instructions won't be called until a new **Expression** is used, or the **Dialogue** is finished.

For example, let's say the Player delivers a new dialogue line with the *Angry* expression. If the next line also uses the *Angry* expression, the **On End** instructions won't be called until the Player delivers a new line with a different expression, or the dialogue finishes.

III.III Skins

787 Skins

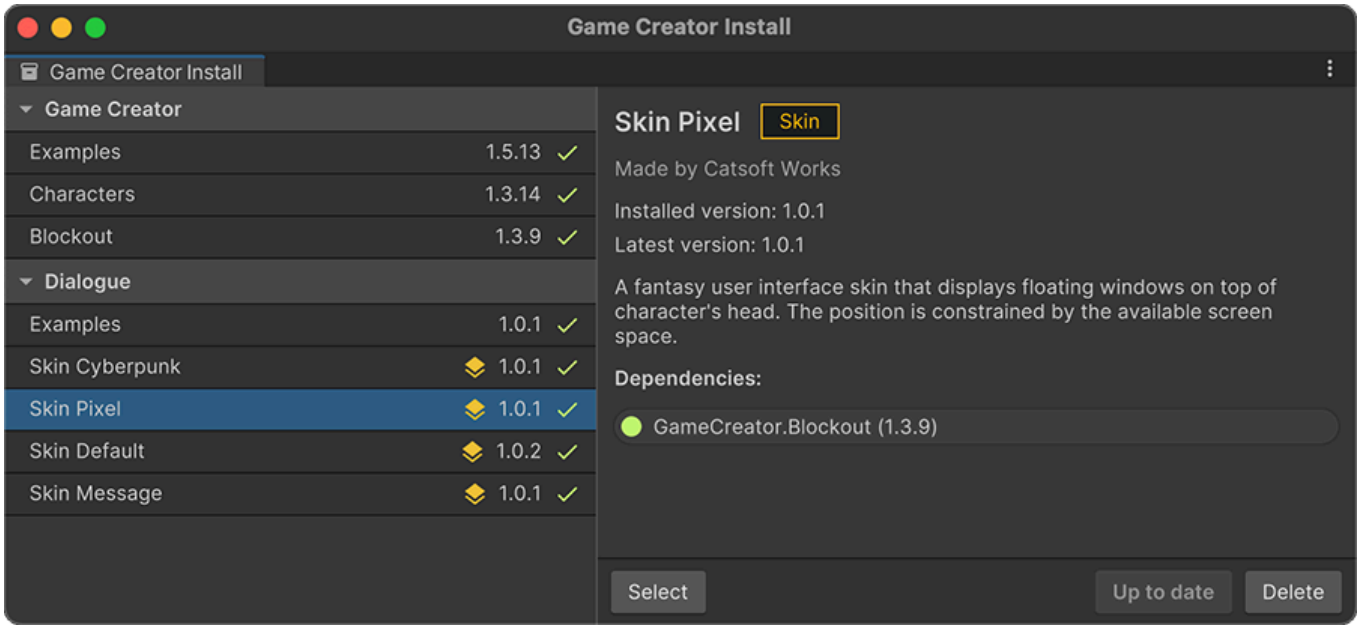
Skins are assets that allow a **Dialogue** to quickly change its looks by swapping them, as well as configure various aspects, such as sound effects and animations.

The **Dialogue** module has primarily two types of **Skins**:

- **Dialogue Skins**: Also known as *Theme* skins, are the most general ones.
- **Speech Skins**: They require to be part of a **Dialogue Skin** and can override the speech bubble of a speaker.

Built-in Skins

The **Dialogue** module comes with a collection of skins that you can use in your games. To install them, click on the toolbar and select Game Creator → Install...

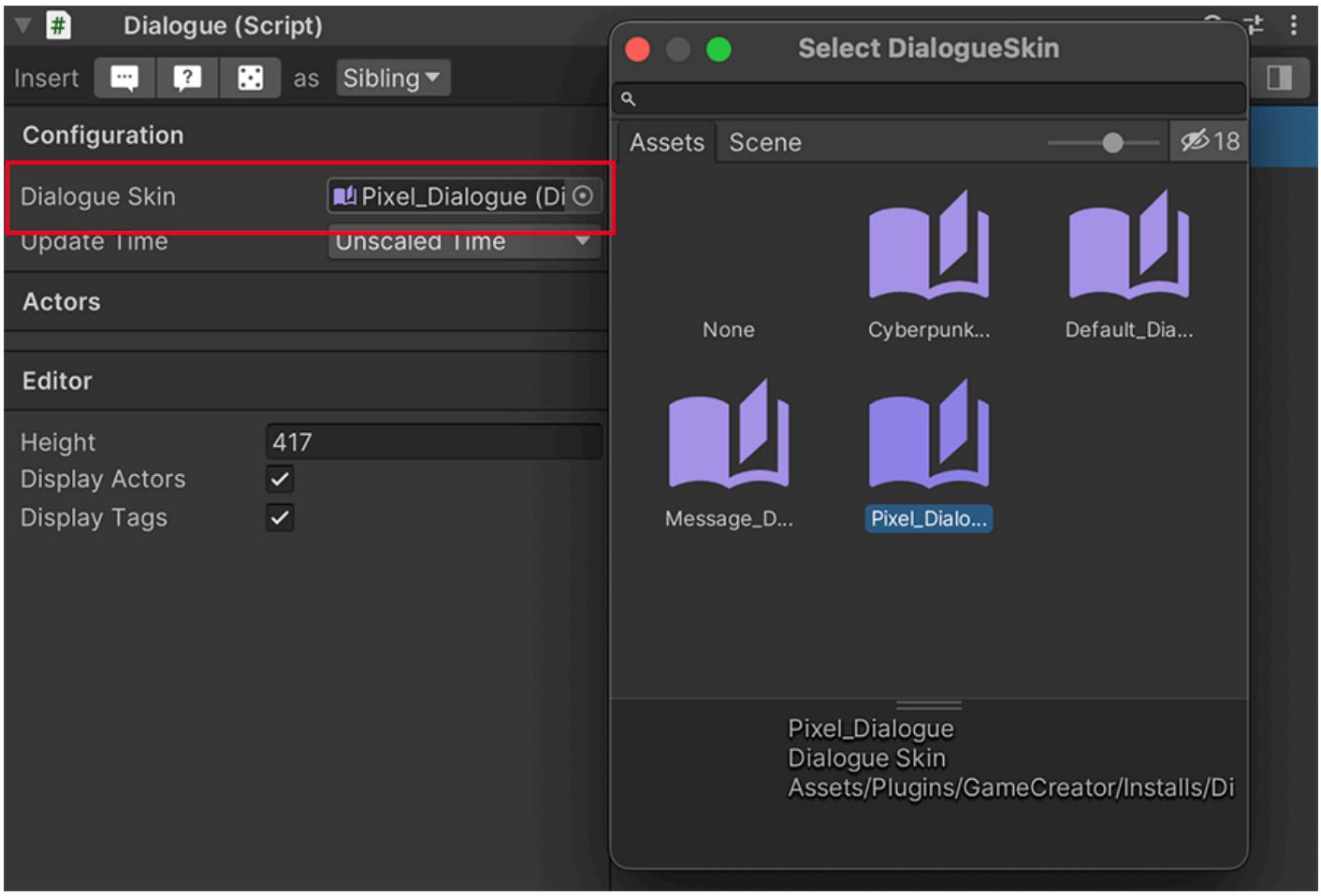


You'll see a list of Skins to install with a short description next to them. Select the one you want to use (or all of them) and click on the *Install* button.

787.1 Dialogue Skins

Dialogue skins change the look and feel of a conversation, and contains all the necessary information to display speech bubbles (through the use of **Speech Skins**), history logs, present choices to the user and show or hide speaker's portraits.

To change a **Dialogue**'s skin, select it and open the Settings sidebar

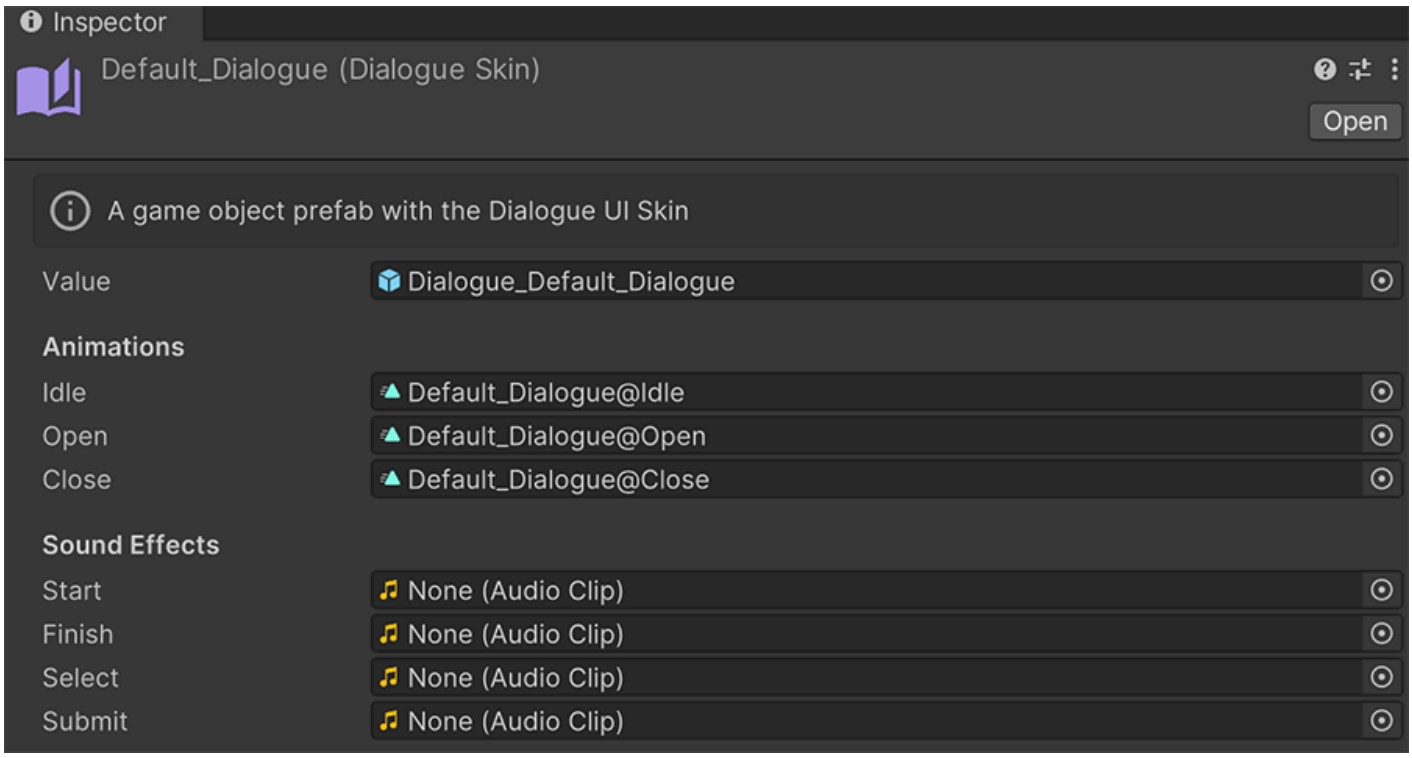


You can drag and drop any available **Dialogue Skins** onto this field and it will automatically use it for this particular conversation component.

A **Dialogue Skin** contains a prefab field, which is the UI schematic with the different components that conform the interface.

Creating a custom Dialogue Skin

To learn more about creating a custom skin, see the User Interface section.



The **Animations** section allows to define which UI animations are played when a **Dialogue** component starts, loops and when it ends. These fields are optional and if none a provided, no animation will be played.

The **Sound Effects** section allows to define which sounds are played at different times.

- **Start**: Played when a dialogue starts.
- **Finish**: Played when a dialogue finishes and closes.
- **Select**: Played when the user hovers or selects any choice.
- **Submit**: Played when the user submits a choice.

Default node configuration options

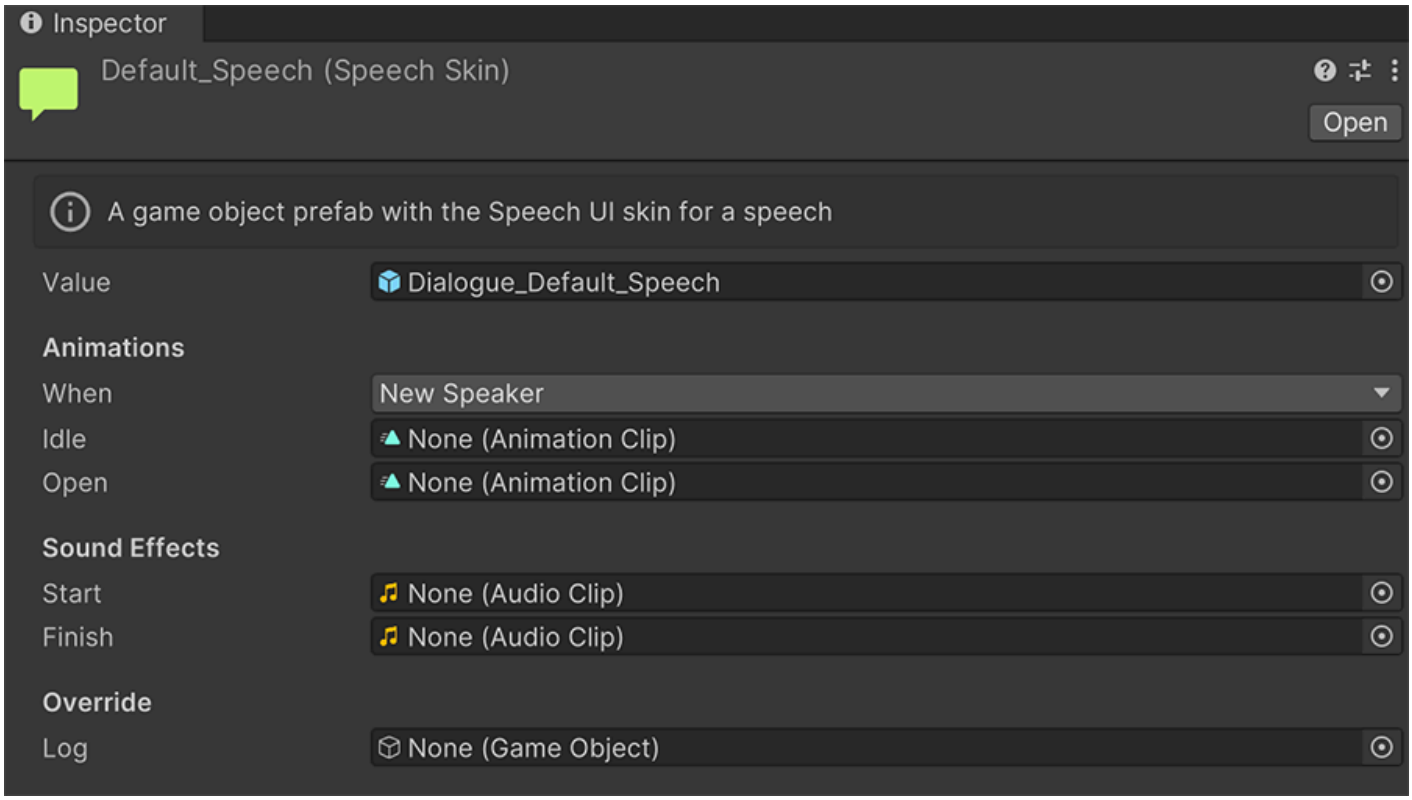
Since version 2.2.8 the Dialogue options are configured globally in each skin.

At the end of the **Dialogue Skin** asset there's another section called **Nodes** where the default options for Text, Choice and Random nodes are configured. Unless a node overrides the values, these will be used.

787.2 Speech Skins

A **Speech Skin** is used by the **Dialogue Skin** to display a speech bubble by the current speaker.

A **Dialogue Skin** requires to have a default **Speech Skin**. However, this can be overridden by any speaker, assigning a new **Speech Skin** onto its **Actor** asset.



A **Speech Skin** contains a **Prefab** object field which defines the UI schema.

> **Creating a custom Speech Skin**
>
> To learn more about creating a custom skin, see the User Interface section.

The **Animations** section allows to optionally define which animation clips will be played when a new dialogue line is spoken and a looped animation, if any is needed.

It also allows to configure whether the animation should be played only if a new speaker is delivering the line, or should the animation be played for every new line, even if the same character is delivering two or more of them in a row.

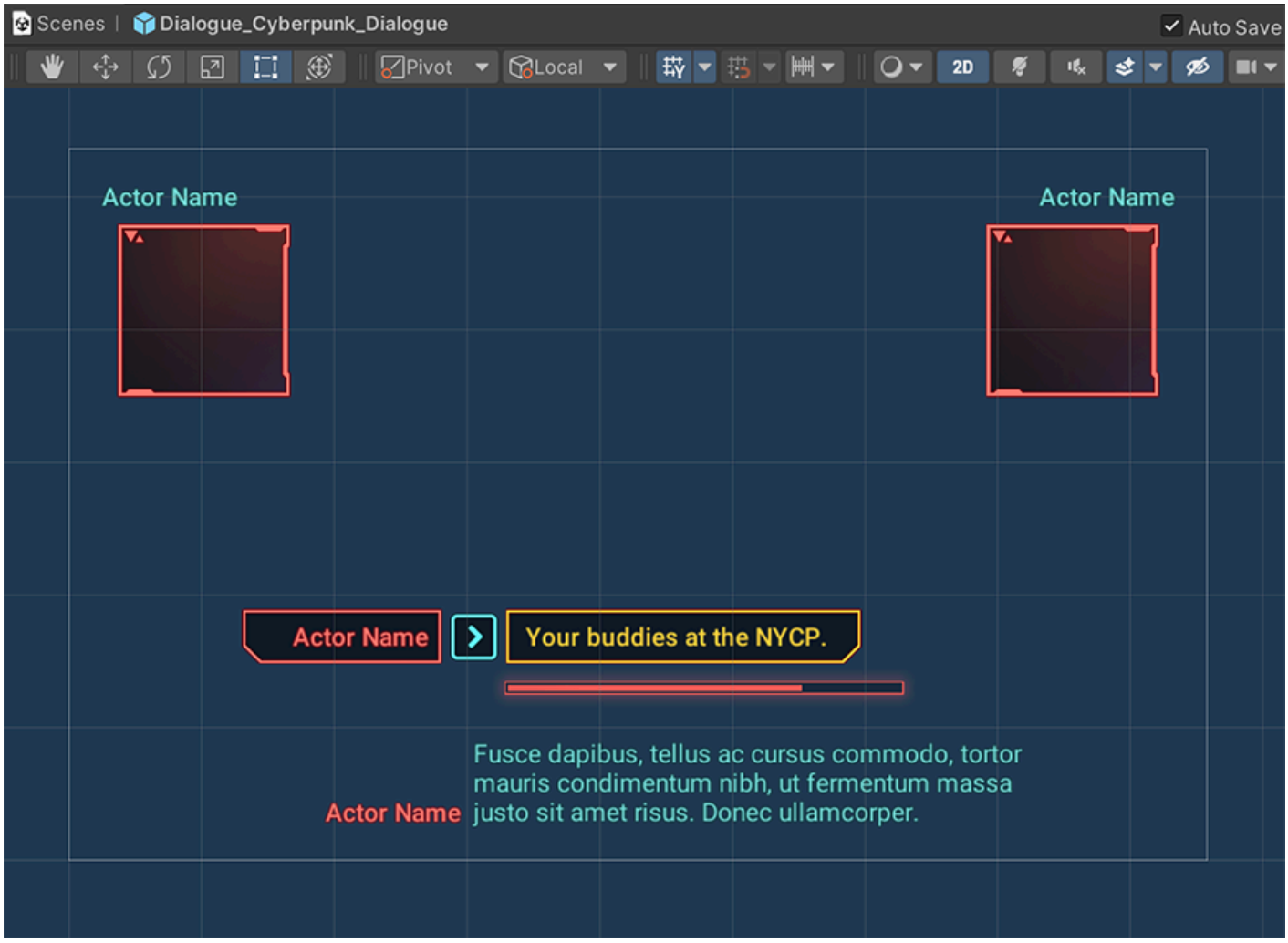
The **Sound Effects** section allows to play a sound effect when a dialogue line starts to be delivered, and when it finishes.

The **Override Log** field is an optional one that allows to customize the log entry (if any available). This is specially useful if you want, for example, the Player to have a different log design than the rest of the characters.

III.IV User Interface

788 User Interface

Creating custom interfaces for a **Dialogue** is fairly straight forward, although we recommend duplicating an existing one and modifying it in order to make the process easier.



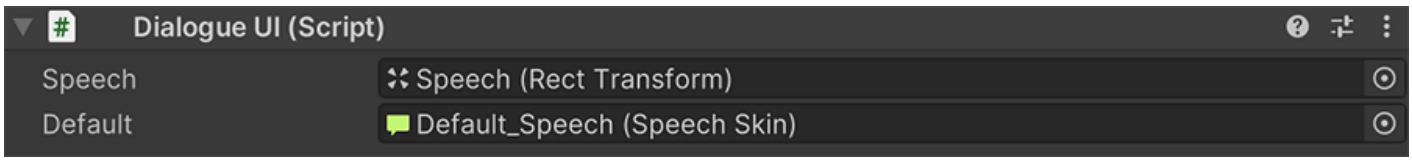
Advanced Section

Customizing the UI requires certain degree of expertise with Unity and its UI system.

788.1 Custom Dialogue Skin

A custom **Dialogue Skin** interface must have, at the top level game object, a **Canvas** component and a **Dialogue UI** component.

The **Dialogue UI** component is te entry point of a conversation and delegates to its the rest of the child dialogue UI components what to do and when to do it.



The **Dialogue UI** component has two fields:

- **Speech**: A Rect Transform reference where the **Speech Skin** is instantiated.
- **Default**: The default **Speech Skin** to use, if the current **Actor** speaker doesn't override it.

This is the bare minimum required to create a custom **Dialogue Skin**.

> **Optional Components**
>
> There rest of the components mention below are all completely optional.

The **Dialogue Unit Timer UI** is a component that allows to display a countdown when a choice is presented to the user and has to make a selection before the time runs out.

The **Dialogue Unit Choices UI** is a component that allows to configure where the choices of an interface go and look like.

> **Choice by Index**
>
> Since version **2.1.7** the **Dialogue Choice UI** component contains a field called `Index` which references a Text or Text Mesh Pro Text component, which indicates the index of the choice, starting from 1.
>
> You can use the **Choice Index** Instruction to attempt to choose an choice by its index. If a choice is available with that idex, it will automatically be chosen.

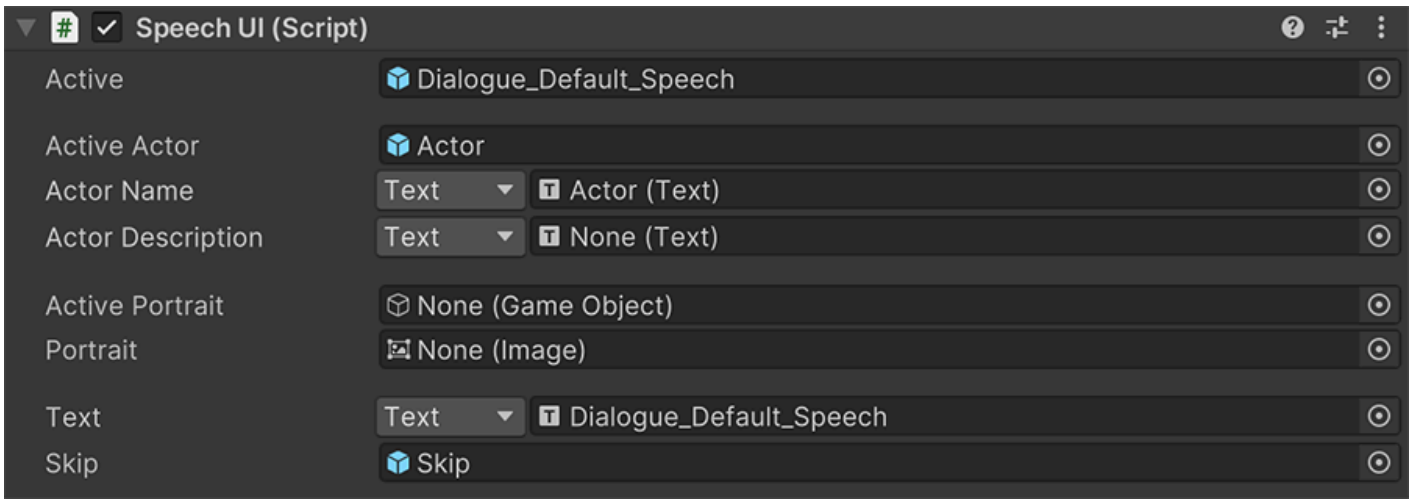
> **Using Layout components**
>
> We recommend using a layout component, such as *Horizontal Layout Group* or a *Vertical Layout Group* in order to automatically align and distribute the choices.

The **Dialogue Unit Logs UI** is a component that collects and stores past lines delivered and choices, so the user can review them.

The **Dialogue Unit Portraits UI** is a component that displays *Sprite* of the current speaker, if any at all.

788.2 Custom Speech Skin

A **Speech Skin** UI prefab must contain, at the root of the game object, the **Speech UI** component.



The **Active** field references a game object from itself that is set as active/inactive, depending on whether a dialogue text is being delivered.

Similarly, the **Actor Active** field is a optional game object reference that is set as active/inactive, depending on whether the currently delivered line contains an **Actor** reference or not.

Actor Name and **Actor Description**, as their name implies, reference a Text component which changes into the current **Actor**'s name and description (if any).

The **Active Portrait** field is another optional one that sets the game object as active or inactive, depending on whether there **Actor** asset and chosen **Expression** contains a *Sprite* to be used. If it does, the **Portrait** Image field is used to fill it with the texture value.

The **Text** field is the most important one, and it references a Text component that changes with the text of the current line being delivered.

The **Skip** game object is an optional game object reference that is used to mark the end of a sentence. It indicates that the user can press any key to jump to the next dialogue line, and it usually has the shape of a small arrow pointing right or downwards.

III.V Visual Scripting

789 Visual Scripting

The **Dialogue** module symbiotically works with **Game Creator** and the rest of its modules using its visual scripting tools.

- **Instructions**
- **Conditions**
- **Events**

Each scripting node allows other modules to use any **Dialogue** feature.

III.V.I Conditions

790 Conditions

790.1 Sub Categories

- Dialogue

III.V.I.I Dialogue

791 Dialogue

791.1 Conditions

- Dialogue Played
- Tag Visited

792 Dialogue Played

`Dialogue » Dialogue Played`

792.1 Description

Returns true if the Dialogue component has been played

792.2 Parameters

Name	Description
Dialogue	The Dialogue component

792.3 Keywords

`Dialogue` `Text` `Line` `Choice`

793 Tag Visited

```
Dialogue » Tag Visited
```

793.1 Description

Returns true if the Tag of a particular Dialogue has ran

793.2 Parameters

Name	Description
Dialogue	The Dialogue component
Tag	The Tag name to check

793.3 Keywords

`Dialogue` `Text` `Line` `Choice`

III.V.II Events

794 Events

794.1 Sub Categories

- Dialogue

III.V.II.I Dialogue

795 Dialogue

795.1 Events

- On Finish Dialogue Line
- On Finish Dialogue
- On Start Dialogue Line
- On Start Dialogue

796 On Finish Dialogue Line

`Dialogue » On Finish Dialogue Line`

796.1 Description

Executed when any or a specific Dialogue finishes playing the current line

796.2 Keywords

`Node` `Conversation` `Speech` `Text` `Play` `New` `Next` `Continue` `Skip`

797 On Finish Dialogue

```
Dialogue » On Finish Dialogue
```

797.1 Description

Executed when a specific Dialogue component finishes playing

797.2 Keywords

`Node` `Conversation` `Speech` `Text` `End` `Complete`

798 On Start Dialogue Line

```
Dialogue » On Start Dialogue Line
```

798.1 Description

Executed when any or a specific Dialogue starts playing a new line

798.2 Keywords

`Node` `Conversation` `Speech` `Text` `Play` `New` `Next`

799 On Start Dialogue

```
Dialogue » On Start Dialogue
```

799.1 Description

Executed when a specific Dialogue component starts to play

799.2 Keywords

`Node` `Conversation` `Speech` `Text` `Begin` `Play`

III.V.III Instructions

800 Instructions

800.1 Sub Categories

- Dialogue

III.V.III.I Dialogue

801 Dialogue

801.1 Sub Categories

- Ui

801.2 Instructions

- Play Dialogue
- Stop Dialogue

802 Play Dialogue

```
Dialogue » Play Dialogue
```

802.1 Description

Plays a dialogue

802.2 Parameters

Name	Description
Dialogue	The Dialogue component to play
Wait to Finish	Whether to wait until the Dialogue is finished or not

802.3 Keywords

`Dialogue` `Narration` `Speech` `Next` `Skip`

803 Stop Dialogue

`Dialogue » Stop Dialogue`

803.1 Description

Stop playing a dialogue

803.2 Parameters

Name	Description
Dialogue	The Dialogue component to stop playing

803.3 Keywords

`Dialogue` `Narration` `Speech` `Next` `Skip`

III.V.III.I.I UI

804 Ui

804.1 Instructions

- Choice Index
- Skip Line

805 Choice Index

`Dialogue » UI » Choice Index`

805.1 Description

Attempts to choose a Choice node by its index (starting at 1), if it exists

805.2 Parameters

Name	Description
Index	The numeric index of the Choice, starting from 1

805.3 Keywords

`Dialogue` `Narration` `Speech` `Choose` `Pick`

806 Skip Line

`Dialogue » UI » Skip Line`

806.1 Description

Finishes a dialogue UI line or skips to the next one

806.2 Parameters

Name	Description
Speech UI	The Speech UI component associated

806.3 Keywords

`Dialogue` `Narration` `Speech` `Next` `Skip`

III.VI Releases

807 Releases

807.1 2.5.15 (Latest)

Released October 18, 2024

Changes

- Editor: Support for Unity 6

Removes

- Editor: Obsolete UI Toolkit APIs

807.2 2.5.14

Released February 23, 2024

New

- Trigger: On Dialogue Start Line
- Trigger: On Dialogue Finish Line

Changes

- Internal: Support for Core 2.15.49 version

807.3 2.4.13

Released October 31, 2023

This version breaks compatibility with previous versions and will only work with Game Creator 2.13.43 or higher.

New

- Expression: Sprites are dynamic Properties

Changes

- Internal: Support for Core 2.13.42 version

Fixes

- Examples: Compatible with the latest core version
- Expression: Not binding values when adding new ones
- Expressions: Incorrect clamping index value

807.4 2.3.12

Released September 3, 2023

Fixes

- Examples: Compatible with the latest core version

807.5 2.3.11

Released June 27, 2023

New

- Skin: Customize behavior when there's one choice

Fixes

- Choices: Skipping conditions when using keyboard
- Examples: Compatible with the latest core version

807.6 2.3.10

Released June 12, 2023

Fixes

- Roles: Generic name displayed in Dialogue roles section
- Portratis: Names and Descriptions cleared before playing

807.7 2.3.9

Released March 24, 2023

New

- Settings: Displays current and update version

Enhances

- QoL: Align labels with Unity 2022.2 standard

Fixes

- Edge case in which Dialogue would not save changes

807.8 2.2.8

Released January 31, 2023

New

- Skins: Contains node information set by default

Fixes

- Nodes: Skip visited not working correctly
- Nodes: Error upon stopping a Dialogue while in Choice

807.9 2.1.7

Released November 8, 2022

New

- Instruction: Choose choice by Index
- Visited choices can be skipped

Enhances

- Copy-Runner with less memory footprint
- Skins: New indexed choices
- Examples: With indexed choices

Changes

- Compatibility with Game Creator 2.7.28

Fixes

- Choice nodes disable Instructions if skipped

807.10 2.0.6

Released September 22, 2022

Enhances

- Editor: Dialogue remembers last selection

Fixes

- Portraits exception when set to default

807.11 2.0.5

Released August 22, 2022

New

- Default Portrait set in Actor asset

Enhances

- Hold Shift to create Child/Sibling node
- Rearranged UI components in Unity menus

Fixes

- Gibberish audio playing after skipping line
- Conflicting metadata GUIDs with Inventory
- Inspector sidebar remembers its position

807.12 2.0.4

Released July 6, 2022

Fixes

- Sequencing tool not executing markers
- Using non-existing Tag throws error

807.13 2.0.3

Released June 24, 2022

New

- Option to uninstall Dialogue
- Icon for Dialogue Skin

Enhances

- Default skin uses darker background
- Behavior of the Skip/Continue button
- Improved Cyberpunk Dialogue Skin

Fixes

- Serialization error during domain reloads
- Null Actor reference in Log UI
- Typo in Example scenes

807.14 2.0.2

Released June 8, 2022

Fixes

- Marketing images fit better
- Conflicting meta files with other modules

807.15 2.0.1

Released June 8, 2022

New

- First release

IV. Stats

808 Stats

Nearly all games one can play has some kind of *Stat* system; Whether it is a simple health bar with a fixed amount of hit points or a complex RPG with dozens of stats that influence the progress of the player and the outcome of any interaction.

The **Stats** module has been envisioned to help game designers more naturally and easily architect their games.

Get Stats

Requirements

The **Stats** module is an extension of **Game Creator 2** and won't work without it

809 Setup

Welcome to getting started with the **Stats** module. In this section you'll learn how to install this module and get started with the examples which it comes with.

809.1 Prepare your Project

Before installing the **Stats** module, you'll need to either create a new Unity project or open an existing one.

> **Game Creator**
>
> It is important to note that **Game Creator** should be present before attempting to install any module.

809.2 Install the Stats module

If you haven't purchased the **Stats** module, head to the Asset Store product page and follow the steps to get a copy of this module.

Once you have purchased it, click on Window → Package Manager to reveal a window with all your available assets.

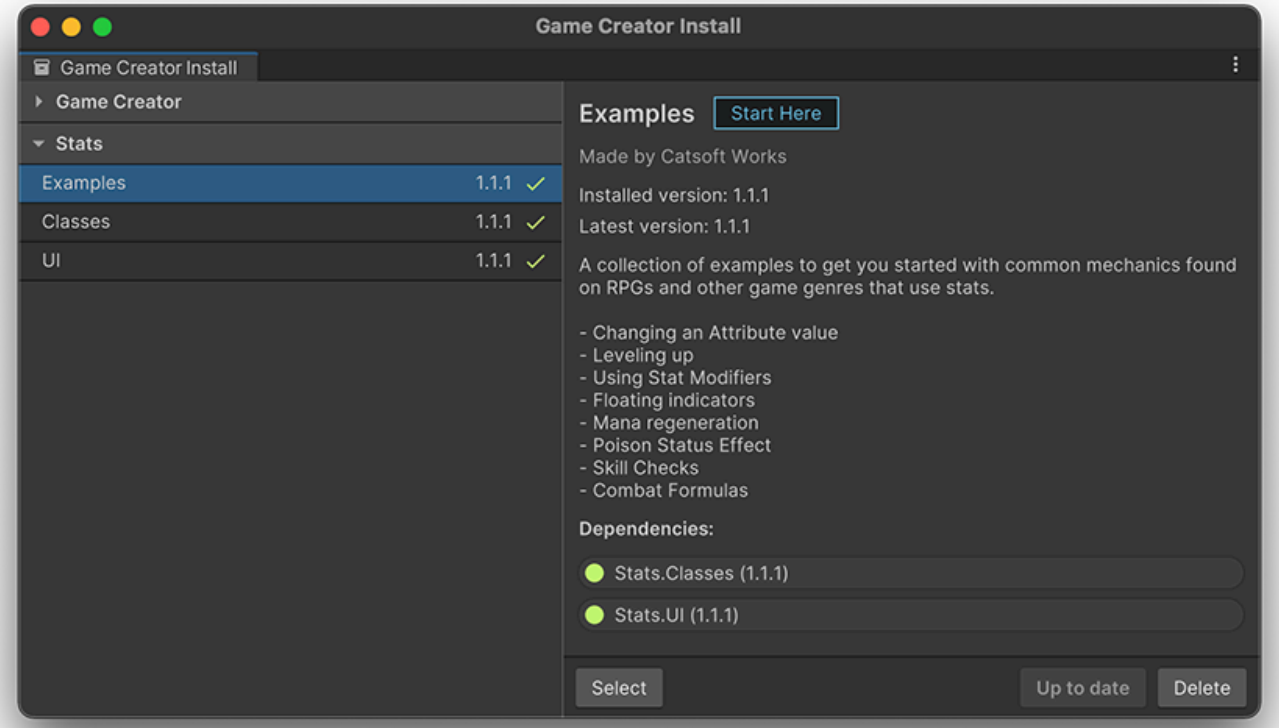
Type in the little search field the name of this package and it will prompt you to download and install the latest stable version. Follow the steps and wait till Unity finishes compiling your project.

809.3 Examples

We highly recommend checking the examples that come with the **Stats** module. To install them, click on the *Game Creator* dropdown from the top toolbar and then the *Install* option.

The **Installer** window will appear and you'll be able to manage all examples and template assets you have in your project.

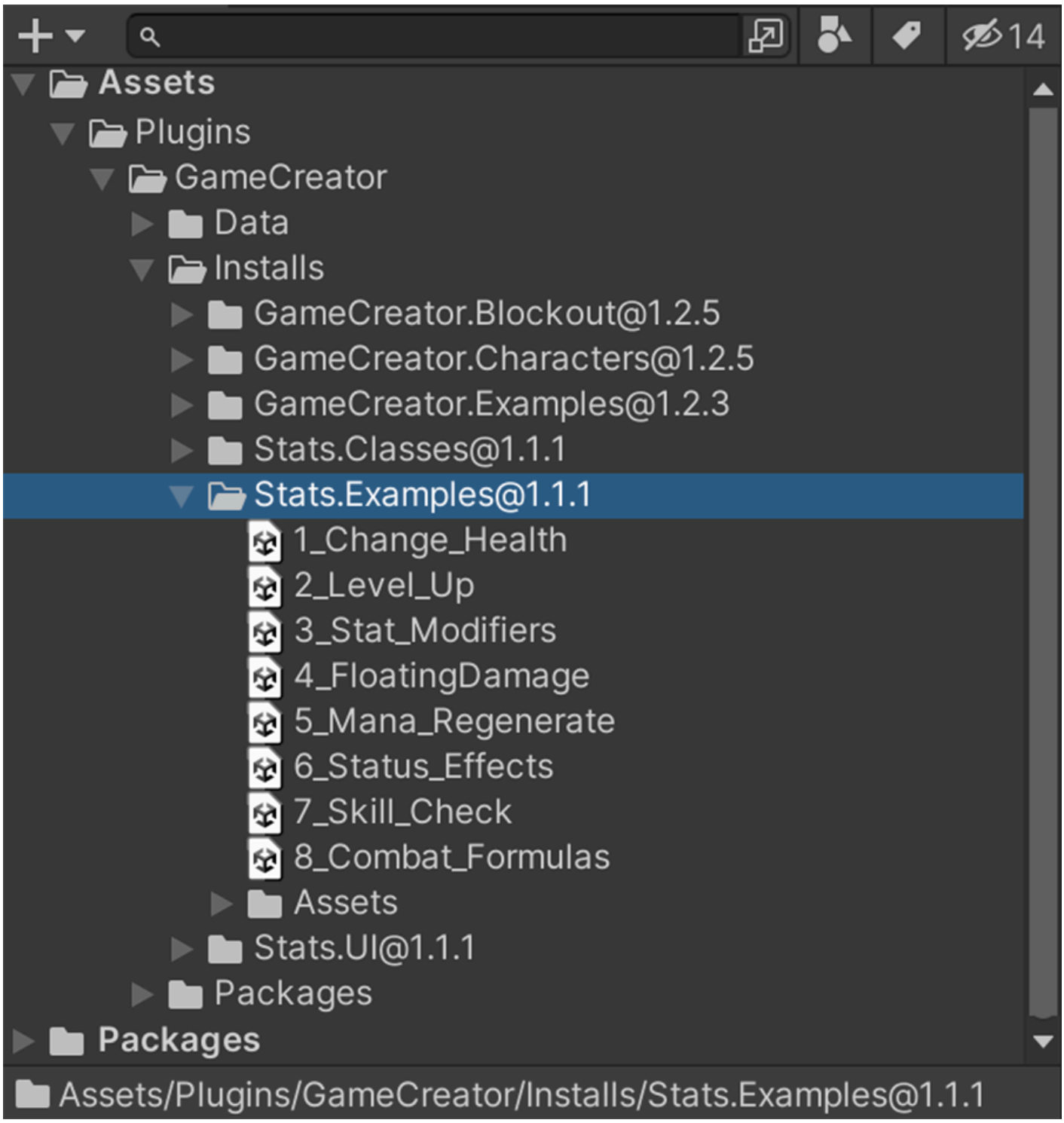
- **Examples**: A collection of scenes with different use-case scenarios
- **Classes**: A template with Stats, Attributes and Classes to kickstart your game
- **UI**: Samples for creating a HUD and a Character Stats menu



The **Examples** requires both the **Classes** and **UI** extensions in order to work.

> ✓ **Dependencies**
>
> Clicking on the **Examples** install button will install all dependencies automatically.

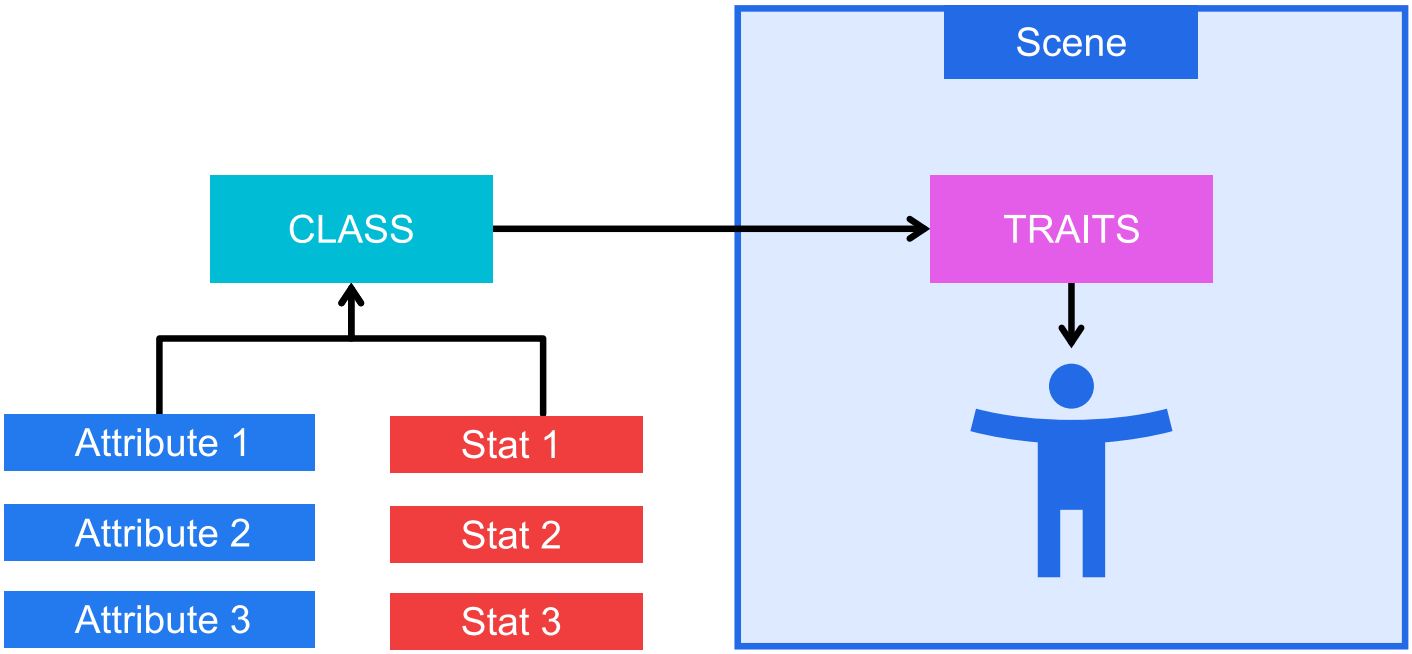
Once you have the examples installed, click on the *Select* button or navigate to `Plugins/GameCreator/Installs/Stats.Examples/`.


14
Assets
Plugins
GameCreator
Data
Installs
GameCreator.Blockout@1.2.5
GameCreator.Characters@1.2.5
GameCreator.Examples@1.2.3
Stats.Classes@1.1.1
Stats.Examples@1.1.1
1_Change_Health
2_Level_Up
3_Stat_Modifiers
4_FloatingDamage
5_Mana_Regenerate
6_Status_Effects
7_Skill_Check
8_Combat_Formulas
Assets
Stats.UI@1.1.1
Packages
Packages
Assets/Plugins/GameCreator/Installs/Stats.Examples@1.1.1

IV.I Classes

810 Classes

Taking inspiration from classic pen and paper RPG games, the **Stats** module lets you create character **Classes** which contain a collection of **Stats** and **Attributes**. On the other end, **Classes** can be assigned to any number of characters or game objects using the **Traits** component.



Example

This concepts are more easily understood with an example. Let's say we want to create a Warrior character. In this case, we would create a **Class** called "Warrior" which would contain the following **Attributes**:

- `Health`
- `Stamina`

And the following **Stats**:

- `Strength`
- `Constitution`

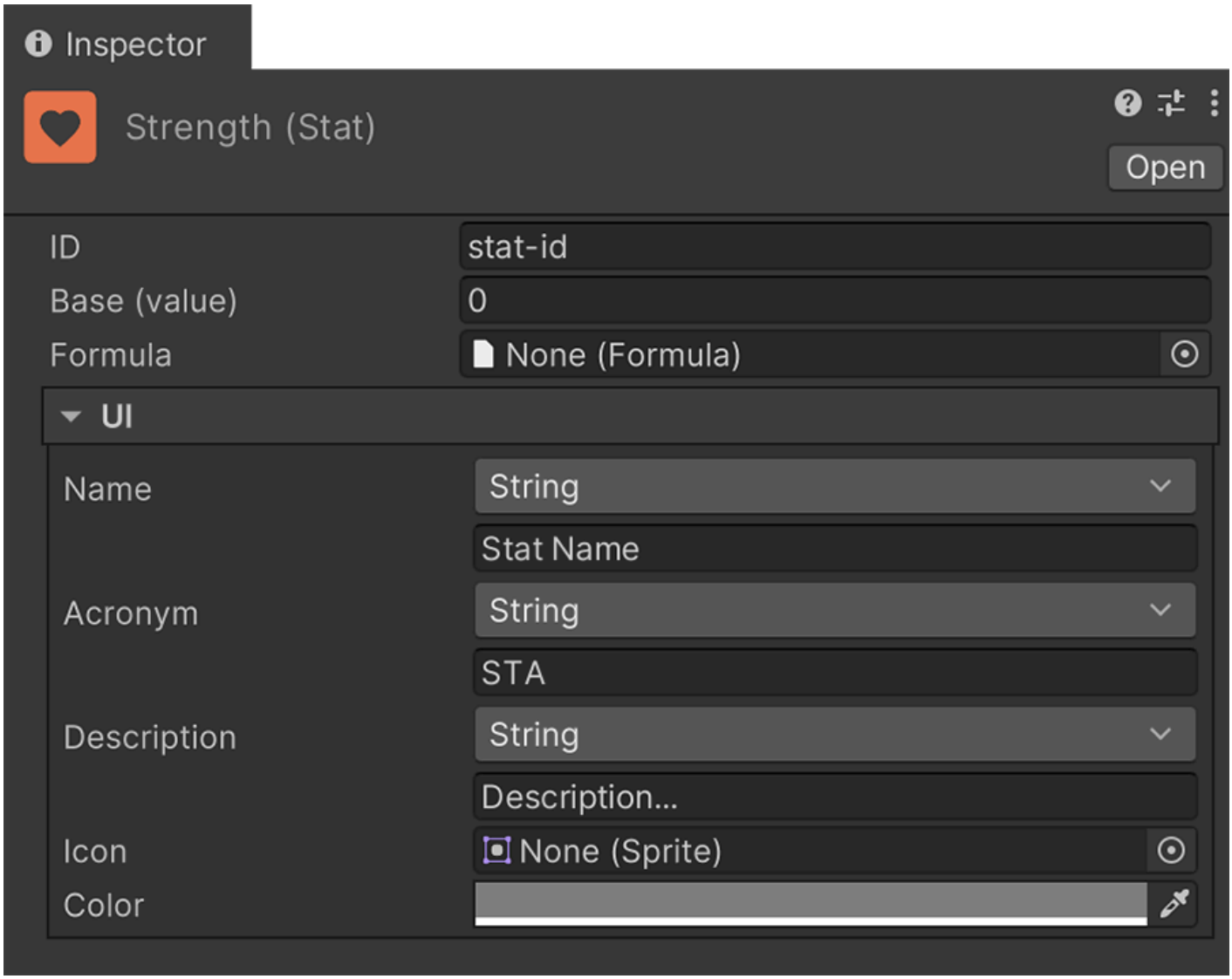
Now that we have the Warrior class, we can create a scene Character with the **Traits** component and assign it the Warrior **Class** defined above. This same class can be reused for other characters, such as enemies and NPCs.

811 Stats

Stats are objects that represent a particular numeric trait of a character. This value can evolve throughout the whole game and its final value can be modified using a **Formula**.

> **Common Stats**
>
> Common stat values on games are `strength`, `dexterity`, `wisdom`, `luck`, ...

To create a **Stat** asset, right click on the *Project panel* folder you want to create it and select Create → Game Creator → Stats → Stat.



The **ID** value must be unique throughout the whole project and it is used to identify this particular numeric trait. It is also used in **Formulas** so be sure to give it a name that's easy to remember.

Naming Stats

We recommend sticking to acronyms or short and single worded names. For example, if the **Stat** represents the strength of the character, its ID should be `str` or `strength`.

The **Base Value** is the numeric value that the **Stat** starts with. It is worth noting this value is not necessarily the final value of the **Stat**, just a mutable numeric value.

The final value of a **Stat** is calculated applying a **Formula**. If none asset is provided, the final value is simply the **Base Value**.

Base and Formula

Let's say we have a stat with a **Base** value of 100 and a **Formula** that multiplies this value by the level (another stat value) of the character. In this case, the resulting final value of the stat would depend on the character's level.

For example, if the character is at level 1, the value would be 100 (100 * 1). At level 2, it would be 200 (100 * 2), at level 3 it would be 300 (100 * 3), etc...

The **UI** dropdown contains a list of fields that can be used to display information about this particular **Stat** on the game scene, including a name, acronym, description, color and icon.

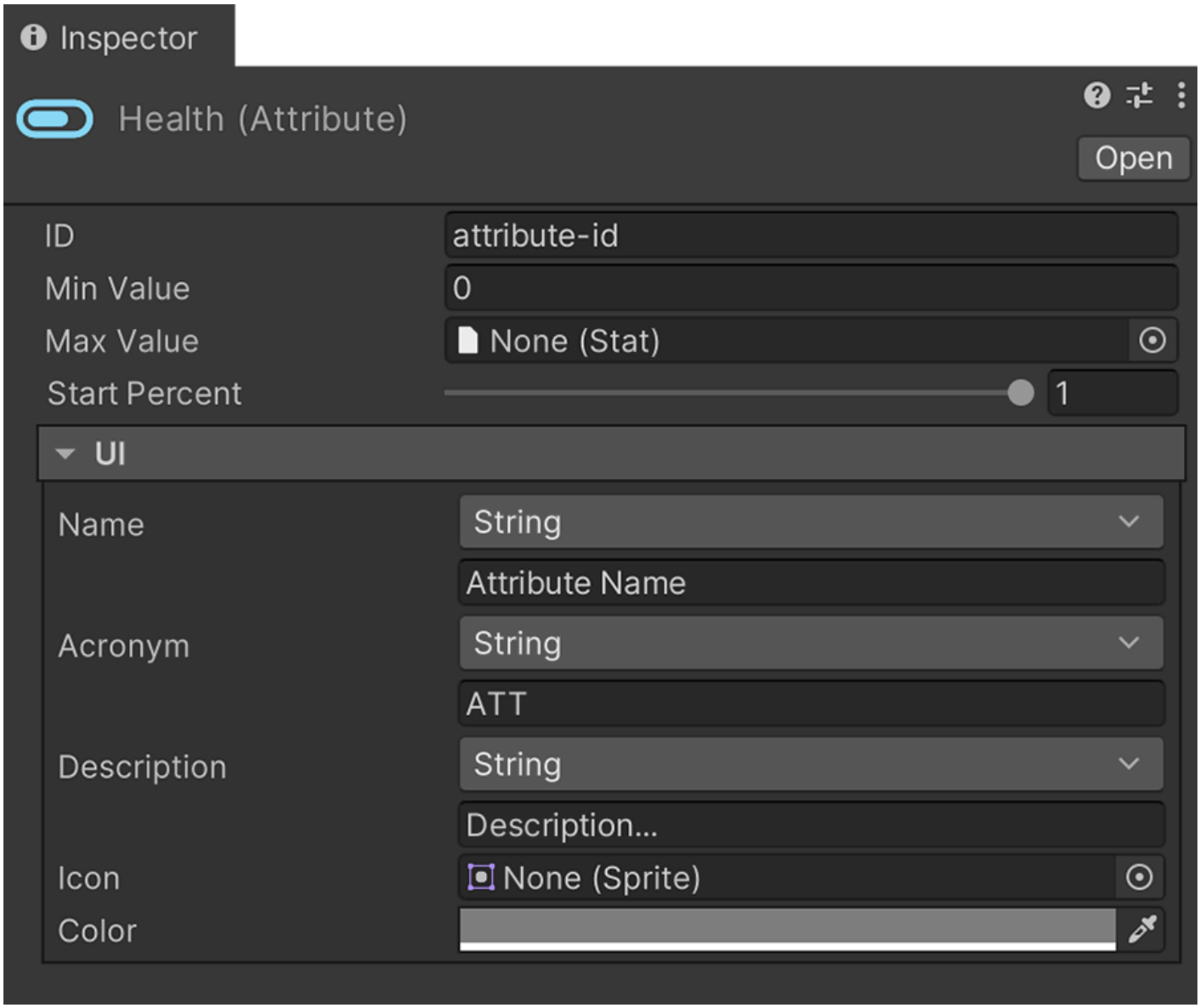
812 Attributes

Attributes are objects that represent a numeric trait of a character, but its value is clamped between a min/max range.

Common Attributes

The most common attribute is the `health` of a character. Its value could a value clamped between 0 and 100.

To create an **Attribute** asset, right click on the *Project panel* folder you want to create it and select Create → Game Creator → Stats → Attribute.



The **ID** value must be unique throughout the whole project and it is used to identify this particular numeric trait. It is also used in **Formulas** so be sure to give it a name that's easy to remember.

Naming Attributes

We recommend sticking to acronyms or short and single worded names. For example, if the **Attribute** represents the health of the character, its ID should be `hp` or `health`.

The **Min Value** and **Max Value** are numeric values that represent the minimum and maximum range of the value. The **Max Value** comes from a Stat as this value can change at runtime.

Max Value is a Stat

For example, if the attribute represents the health of the player, levelling up could increase the maximum health. In this case, increasing a **Stat** called "Max_Health" would automatically increase the max cap of the health **Attribute**.

The **Start Percent** field defines the percent at which the character's attribute starts. By default most games should start with their attributes completely filled.

The **UI** dropdown contains a list of fields that can be used to display information about this particular **Attribute** on the game scene, including a name, acronym, description, color and icon.

813 Classes

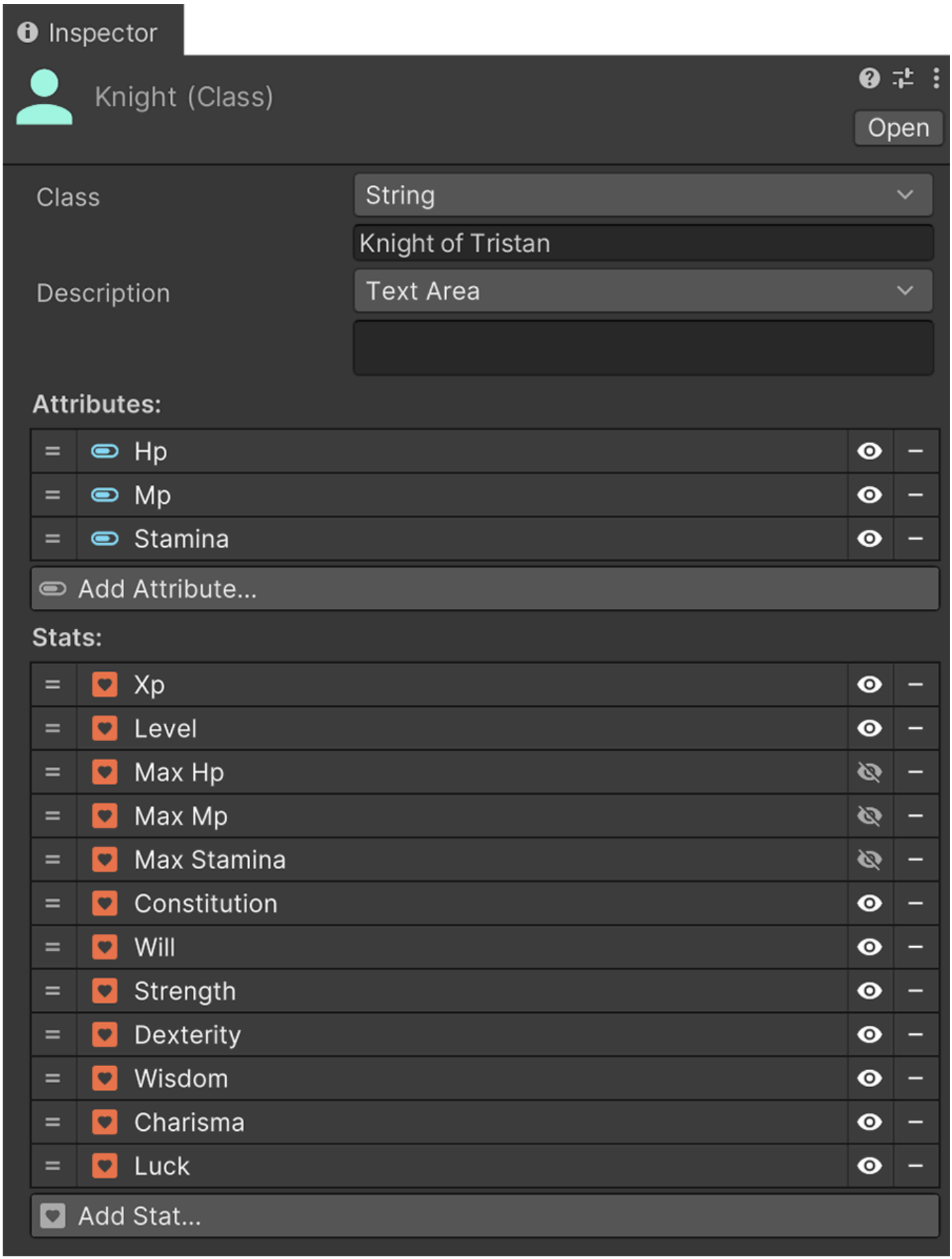
Classes are objects that represent a type of character or object with RPG traits, and contains a list of Stats and Attributes.

> **Classes in an RPG**
>
> Just like in most RPGs, a **Class** defines a type character with different values. For example, a *Mage* will have the same **Stats** and **Attributes** as a *Knight*, but their values and progression may differ, making the *Mage* grow his magic abilities at a much higher rate than the *Knight*, which focuses on its physical ones.

813.1 Class

To create a **Class** asset, right click on the *Project panel* folder you want to create it and select Create → Game Creator → Stats → Class.

By default, a **Class** has an empty list of fields. The image below represents a **Class** filled with a collection of **Stats** and **Attributes**.


Inspector
Knight (Class)
Open
Class
String
Knight of Tristan
Description
Text Area
Attributes:
Hp
Mp
Stamina
Add Attribute...
Stats:
Xp
Level
Max Hp
Max Mp
Max Stamina
Constitution
Will
Strength
Dexterity
Wisdom
Charisma
Luck
Add Stat...

Eye Icon

The eye icon that appears next to all Attributes and Stats is a button that can be toggled. It has no impact on the game whatsoever. Instead it hides the option from the Traits component. This is useful if you have hundreds of Stats and Attributes and want to keep the important ones at a glance.

The **Class** and **Description** fields are used to display information about the current class in the game's user interface.

813.2 Attributes

The **Attributes** list defines all the attributes linked to this particular class.

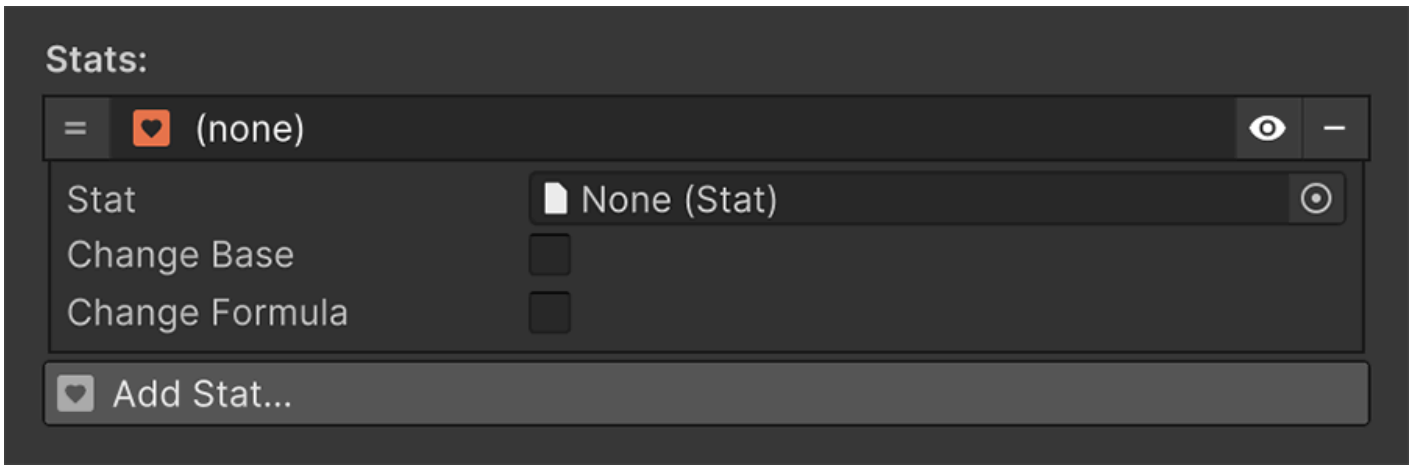
To add a new **Attribute**, click on the "Add Attribute" button at the bottom and pick (or drag and drop) the desired **Attribute** asset.

In this section, the selcted **Attribute**'s starting percent can be overriden, in case a particular **Class** has a different starting value than another.

813.3 Stats

The **Stats** list defines all the stats linked to this particular class, including the ones that define the max cap of Attributes.

To add a new **Stat**, click on the "Add Stat" button at the bottom and pick (or drag and drop) the desired **Stat** asset.



In this section, the selected **Stat** base value and formula can be overriden.

Override Stat Base and Formula

When creating multiple RPG classes, such as Mages, Knights and Archers, it's a good practice to have the same Attributes and Stats. In order to change their progression rates, their values can be overriden within the **Class** asset itself.

For example, the `wisdom` base stat value may have a much higher one in a *Mage* class than in a *Knight*.

814 Traits

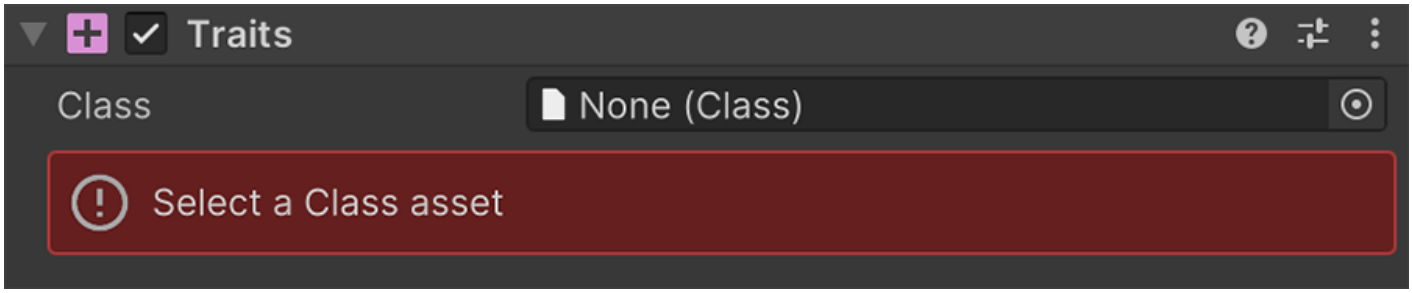
Traits are components that link a Class asset with a scene game object.

> **Game Objects with Traits**
>
> It is important to note that, although Characters will most likely be the objects with a **Traits** component, these can be attached to any game object.

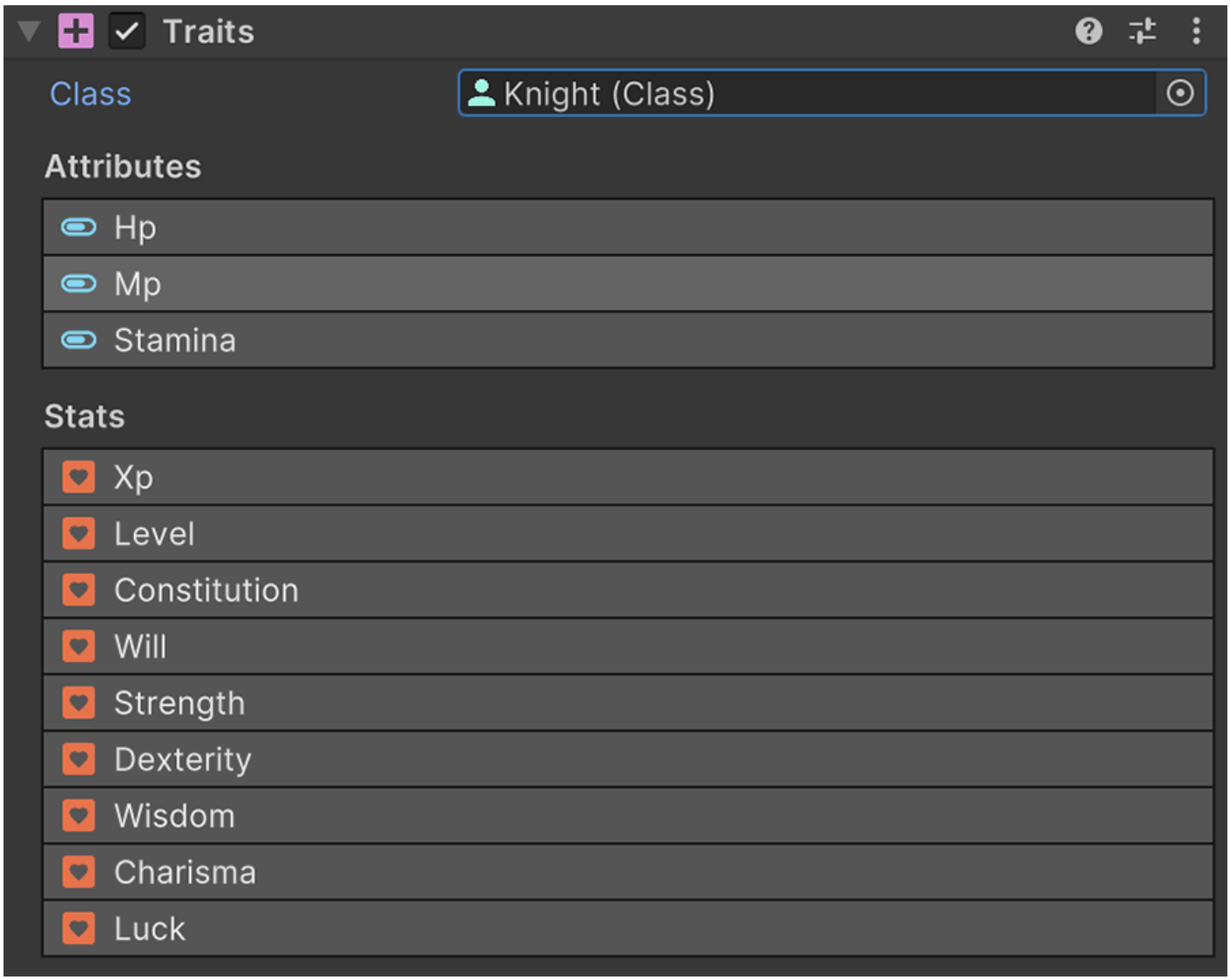
For example, to assign the *Player* with the *Knight* **Class** one just has to click on the *Player* game object "Add Component" button at the bottom of the *Inspector* and look for the **Traits** component.

814.1 Traits in Editor

Once the *Player* has the **Traits** component a message appears prompting to assign it a **Class** asset.



Drag and drop any **Class** asset onto the designated field and it will change its appearance to display the asset's information.

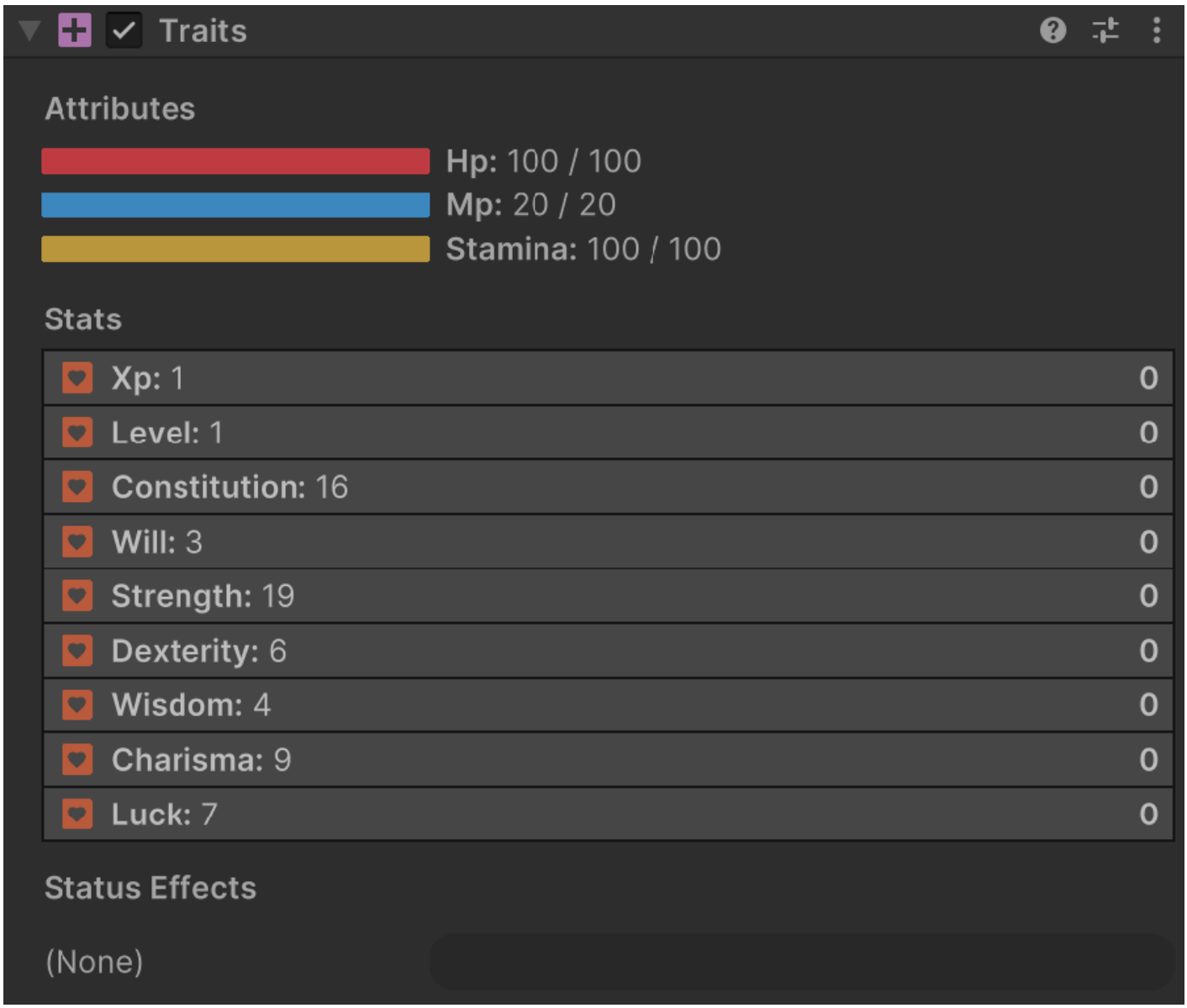


Each **Attribute** and **Stat** can be expanded and their values can be overriden, just like in the **Class** asset.

814.2 Traits at Runtime

Once the game object has a **Traits** component linked with a **Class** asset, it is ready to interact in play mode.

To help the designer understand what's happening in play mode and debug any possible problems, the **Traits** component changes its *Inspector* appearance to display real-time information about its current Attribute and Stat values.


Traits
Attributes
Hp: 100 / 100
Mp: 20 / 20
Stamina: 100 / 100
Stats
Xp: 1 0
Level: 1 0
Constitution: 16 0
Will: 3 0
Strength: 19 0
Dexterity: 6 0
Wisdom: 4 0
Charisma: 9 0
Luck: 7 0
Status Effects
(None)

815 Formulas

Formulas are at the core of the Stats module; They allow the game designer to elaborate simple or complex systems that intertwine different stat and attribute values.

Math Expressions

Formulas are written using math expressions. For example the following formula:

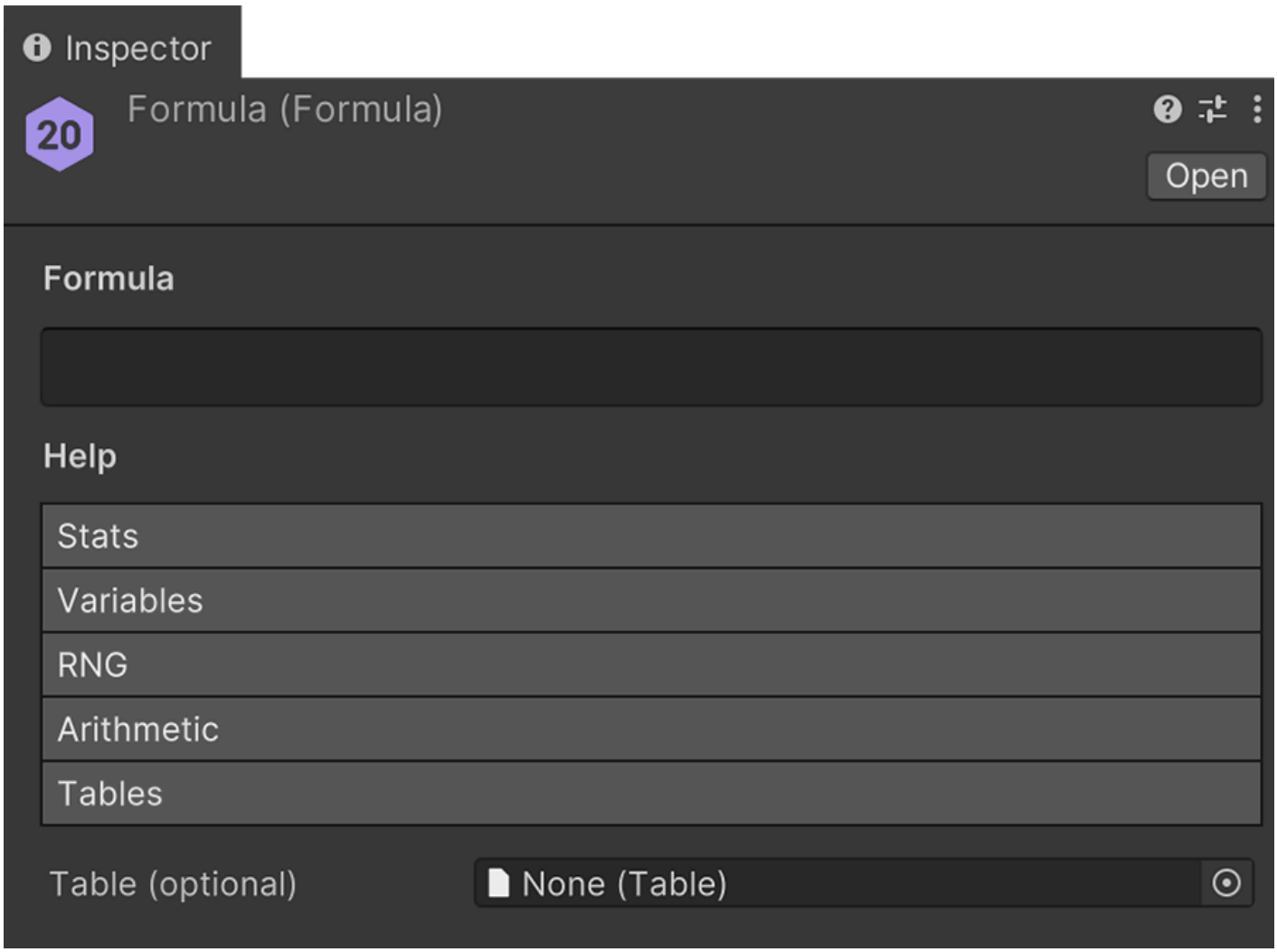
```
source.stat[attack] - target.stat[defense]
```

Can be used to calculate the damage dealt to an enemy. It calculates the output taking into account the `attack` stat from the player and subtracting the `defense` stat from the enemy.

It is up to the game designer defining how simple or complex these formulas should be.

815.1 Creating a Formula

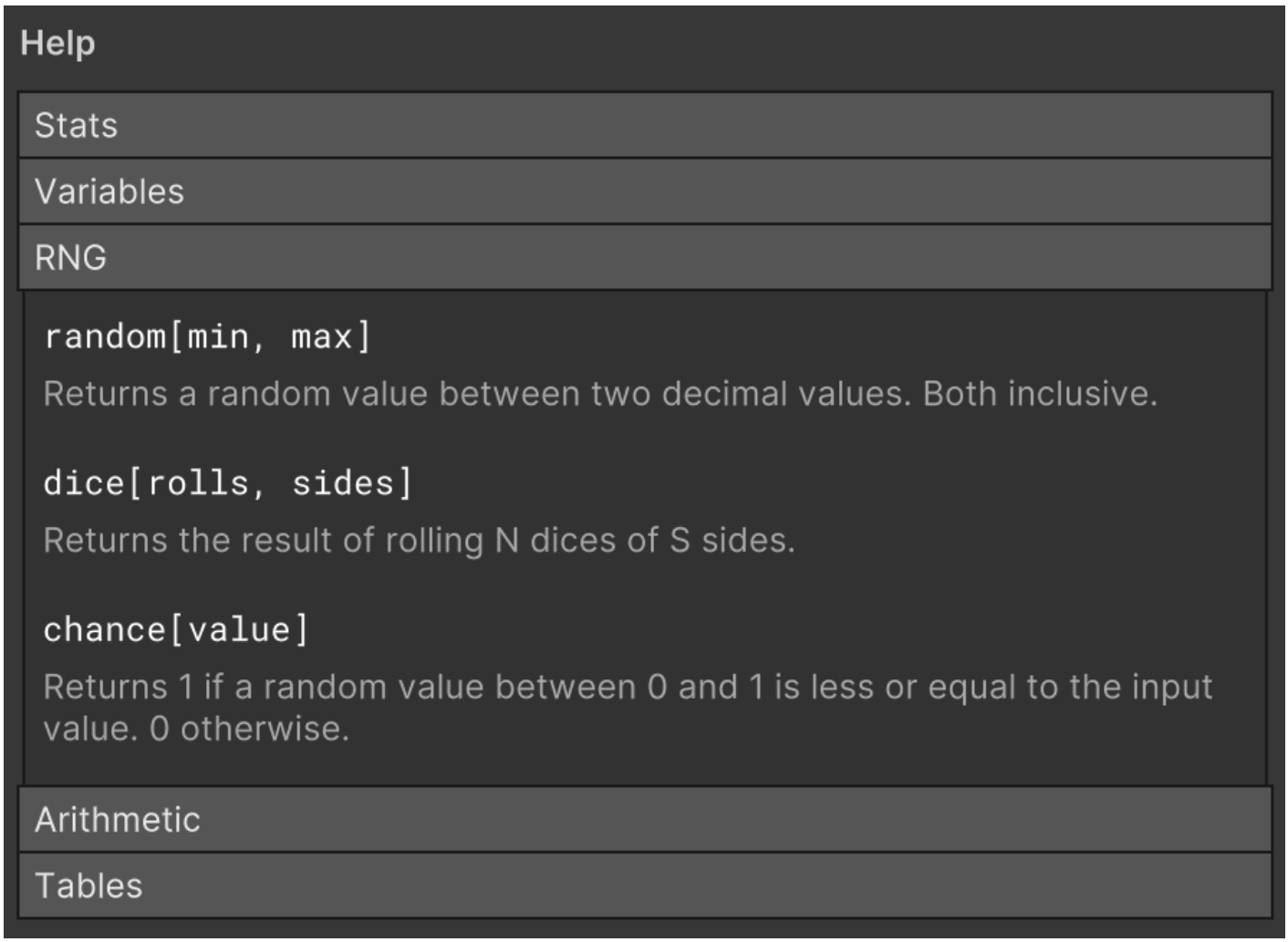
To create a **Formula** asset, right click on the *Project panel* folder you want to create it and select Create → Game Creator → Stats → Formula.



The **Formula** asset has a text field at the top, where the the math expression can be written.

The *Help* section contains a list of all possible symbols that can be used. For example, to retrieve the final value of a **Stat** called "strength" from the caller, use the `source.stat[strength]` symbol.

Each section can be expanded and collapsed to keep the important information at a glance.



Symbols

Check the list of all symbols at the end of this page.

The *Table* field is an optional one, that can be used to reference a Table asset from within the formula expression.

815.2 Symbols

A formula expression is composed of a series of symbols, joined together by a math expression, such as the sum, subtraction, product and division.

For example, the attack power of a character could be it's base strength value multiplied by its level. In this case, the expression would be:

```
source.base[strength] * source.stat[level]
```

815.2.1 Stats

This section covers all values found inside a game object with a **Traits** component. A stat or attribute can either come from the **Source** object or the **Target** object. For example, when calculating the damage dealt to an enemy, **Source** references the attacker and **Target** the attacked object.

Source and Target

In some cases, there may be no distinction between source and target. For example, when calculating the level of a character. In this case, we recommend ignoring the **Target** symbols and use **Source**.

To get the value of a **Stat** or **Attribute**, the target object of the query is first specified, followed by a dot (.) and the value type. Between brackets, the *id* of the stat or attribute is specified.

Stat Example

For example, to retrieve the attribute "mana" from the source object it's done using:

```
source.attr[mana]
```

- `base`: The base stat value of the object.
- `stat`: The final stat value of the object.
- `attr`: The attribute value of the object.

Circular Formulas

It is up to the game designer to avoid circular dependencies, and Game Creator will not warn about them. A circular dependency happens when a formula requires a value, which must be calculated using the first formula. This locks the process in an infinite loop.

815.2.2 Variables

Variables work very similarly to retrieving Stats and Attributes. The targeted object is first specified, followed by a dot (.) and the keyword *var*. And between brackets, the name of the variable.

Example

For example, if a numeric Local Variable attached to the targetted object with the id "hit-counter" should be accessed, the expression would be:

```
target.var[hit-counter]
```

> **Local Variables**
>
> For the moment, a Formula can only access **Local Variables** by name. In a future update, **List Variable** access will be supported.

815.2.3 Random

Most skill checks use some sort of random values. The **Formula** analyzer provides three symbols to generate a random value.

- `random[min, max]` : Returns a value between *min* and *max*, both included.

> **Random[min, max]**
>
> Using `random[1, 4]` returns a decimal value between these ranges.

- `dice[rolls, sides]` : For those old-school game designers, you can roll X amount of dices of Y sides and this symbol will return the sum of values.

> **Dice[rolls, sides]**
>
> Using `dice[2, 6]` returns the result of rolling 2 dices of 6 sides (the most common one).

- `chance[value]` : Returns 1 if a random value between 0 and 1 is lower or equal than the value specified.

> **Chance[value]**
>
> Using `chance[0.2]` has a 20% chance of returning a value of 1 and an 80% chance of returning 0.

815.2.4 Arithmetic

Number manipulation is also useful and commonly used. For example, to round numbers or choosing between two.

- `min[a, b]` : Returns the lowest value between two.
- `max[a, b]` : Returns the greatest value between two.
- `round[value]` : Returns the value rounded up or down to the closest integer.
- `floor[value]` : Returns the integer part of the value.
- `ceil[value]` : Returns the next integer of the input value.

815.2.5 Tables

Tables are mostly used for player progression, as they map a certain input value to another value. For more information about **Tables** see this link.

> **Table asset**
>
> It is required to provide the **Formula** with a **Table** asset.

Table symbols start with `table` followed by a dot (.) and the type of value to retrieve. The value is specified between brackets afterwards.

> **Level from Experience**
>
> For example, let's say we have a stat called `experience` and we want to calculate the character's level based on that. We can use a **Table** that transforms the accumulated experience points to a value that represents the level. In this case, the expression would be:
>
> ```
> table.level[experience]
> ```

- `level[value]` : Returns the *level* at from the table based on the input cummulative value.
- `value[level]` : Returns the cummulative value necessary to reach the input level.
- `increment[level]` : Returns the amount left to reach the next level.
- `current[value]` : Returns the value gained at the current level.
- `next[value]` : Returns the value left to gain to reach the next level.
- `ratio[value]` : Returns a unit ratio that represents the progress made at the current level.

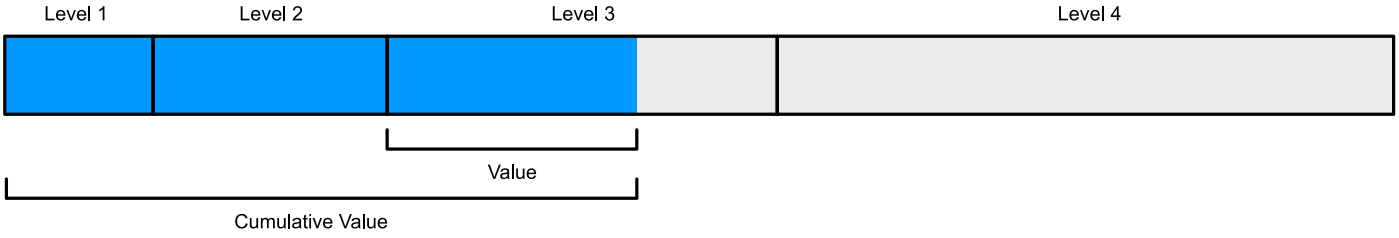
816 Tables

Commonly used for character progression, **Tables** are charts that map a range of values to an integer.

816.1 Concepts

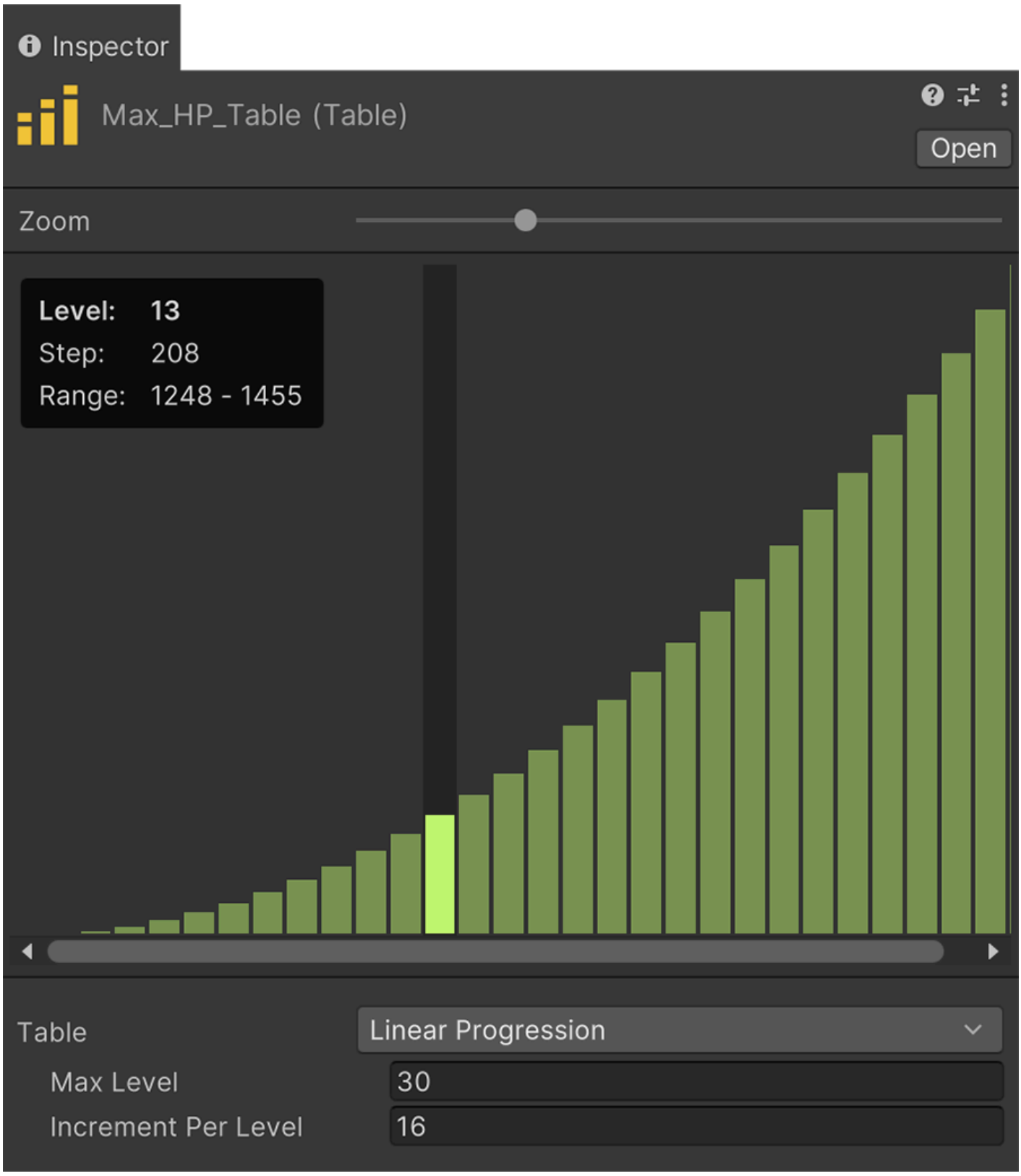
Here are some concepts to better understand how **Tables** work.

- **Level**: An integer value that is calculated based on the cumulative value.
- **Cumulative Value**: This is the total amount of value (or experience) accumulated.
- **Value**: The difference between the current level's cumulative value and the total cumulative value.



816.2 Creating a Table

To create a **Table** asset, right click on the *Project panel* folder you want to create it and select Create → Game Creator → Stats → Table.



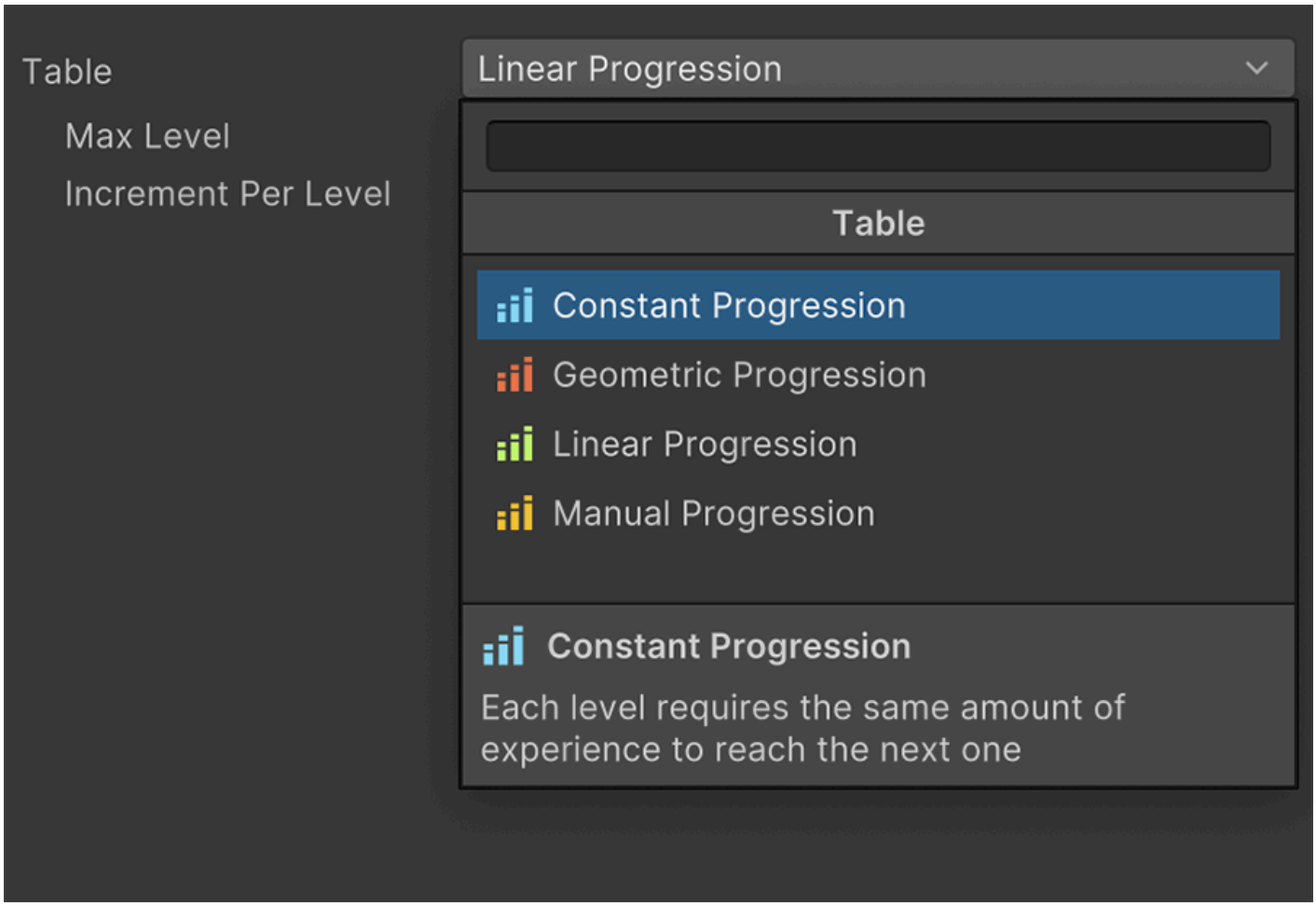
A **Table** asset has a visual chart and a configuration box at the bottom. The chart can be scrubbed to reveal the different cumulative values at each level.

Example

In the example above, at *Level 13*, the cumulative value is 1248 and it will require 208 more (for a total of 1455) to reach *Level 14*.

816.3 Types of Progressions

A character can progress linearly, exponentially, or at a custom rate. That's why Game Creator provides a range of different tables for the user to choose from.



To change the type of progression, click onl the **Table** field and choose one from the dropdown menu:

- **Manual**: Each level requires a pre-defined amount of experience.
- **Constant**: Each level requires the same amount of value (or experience).
- **Linear**: Each level requires a value equal to the product of a constant and the current level.
- **Geometric**: Each level requires a value equal to the current level multiplied by a fixed coefficient rate.

Recommendation

We recommend using **Linear Progression** for most cases, as it's the one commonly used in games where the player progressively receives more experience. **Geometric Progression** is recommended for short games where power ramps up very quickly (like in MOBAS).

817 Stat Modifiers

We've seen so far that objects with a **Traits** component can change their **Stat** and **Attribute** values at runtime using **Formulas** and **Tables**. However, characters in games can also increment/decrement their stats when equipping weapons and other kinds of wearables.

This is where **Stat Modifiers** come into play: They increase or decrease a **Stat** value by a certain amount, and can be added and removed at any time.

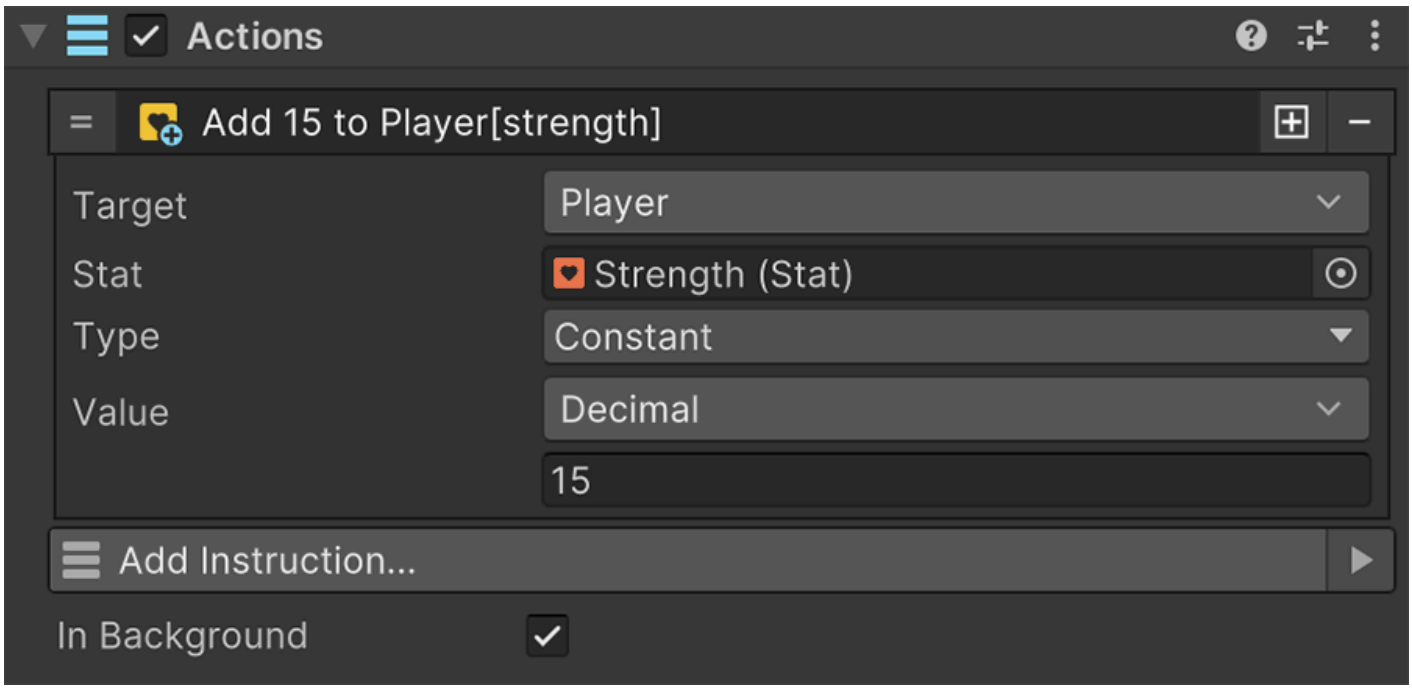
817.1 Adding Stat Modifiers

To add a **Stat Modifier** to a **Traits** component, use the visual scripting Instruction **Add Stat Modifier**. This instruction allows to specify a target object, which must have a **Traits** component, a **Stat** to affect and a value.

This value can either be a percentage or a constant and can be displayed separately in the UI.

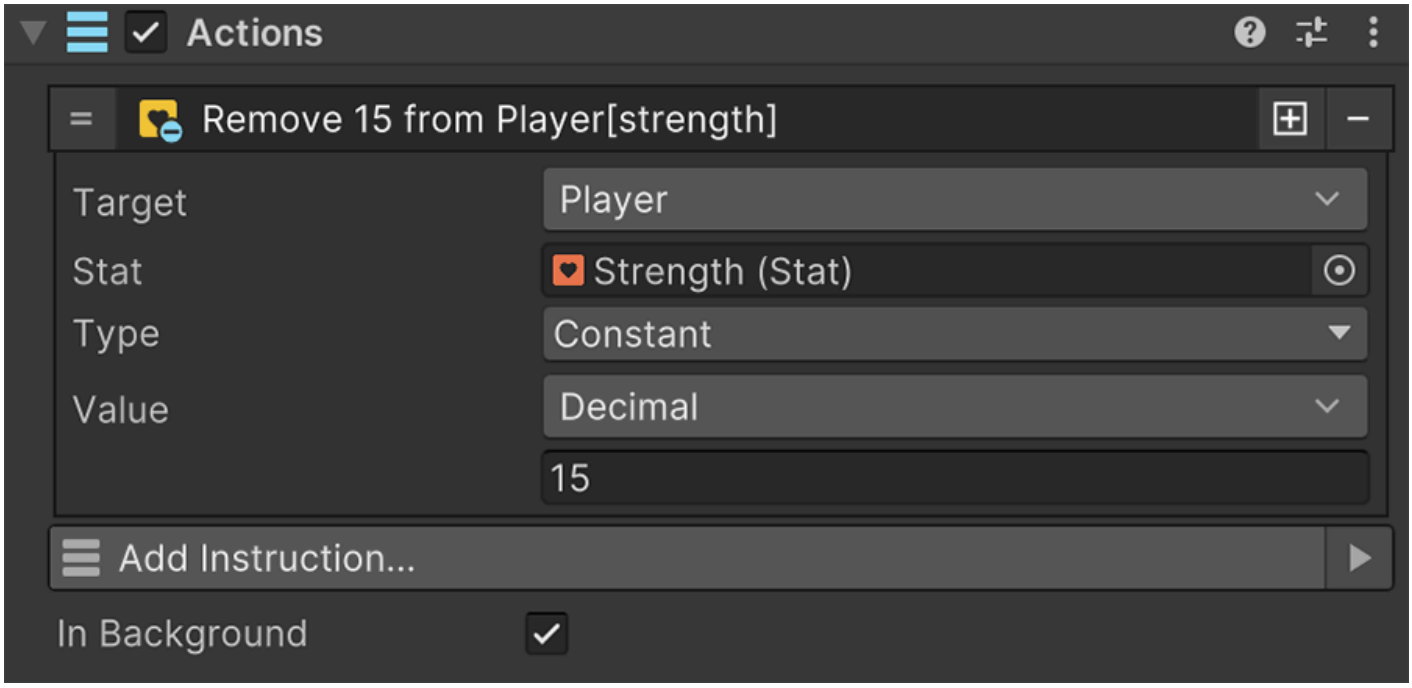
Percentage and Constants

You may have raised an eyebrow when **Stat Modifiers** can use constant and percentage values, as the result is different when applying a product after an addition or vice versa. The **Stats** module always applies percentage based modifiers first, and then adds any constant modifiers.



817.2 Removing Stat Modifiers

Removing a **Stat Modifier** is as easy as adding one. All that needs to be done is to use the visual scripting instruction **Remove Stat Modifier** and input the same values as a previously added one.



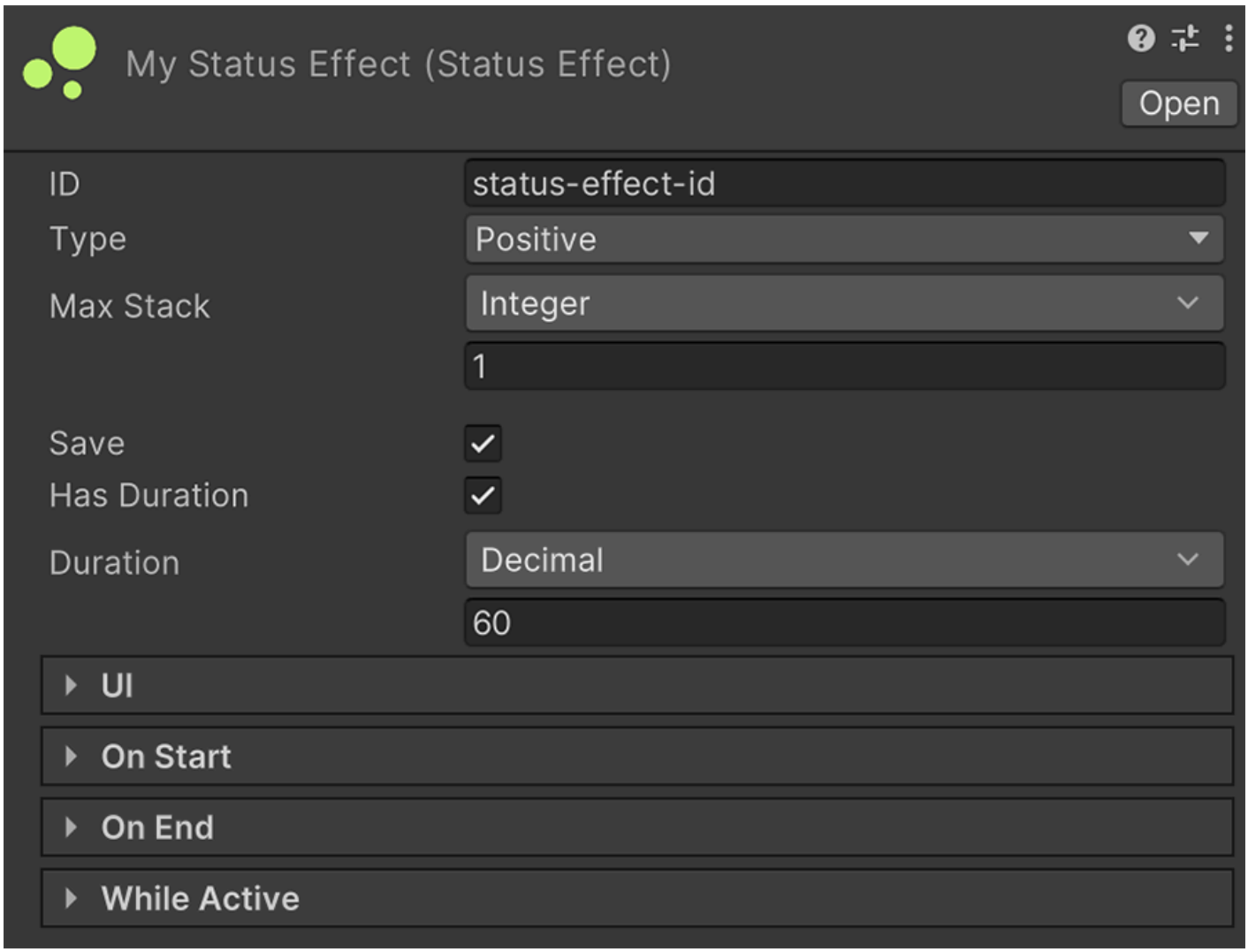
818 Status Effects

Status Effects are temporal ailments that affect a character.

Most RPG games use the same **Status Effects**, such as *Poison*, which drains the character's health for a period of time. However, you can create your own and completely customize the affliction.

818.1 Creating a Status Effect

To create a **Status Effect** asset, right click on the *Project panel* folder you want to create it and select Create → Game Creator → Stats → Status Effect.



A **Status Effect** has an ID which is used to uniquely identify it among all other afflictions. It is very important to keep this value unique across the whole project.

The **Type** field determines whether this effect is positive, negative or neutral for the targeted character. This is useful when using the instruction **Remove Status Effects**, where you can choose to remove only those that have a negative impact.

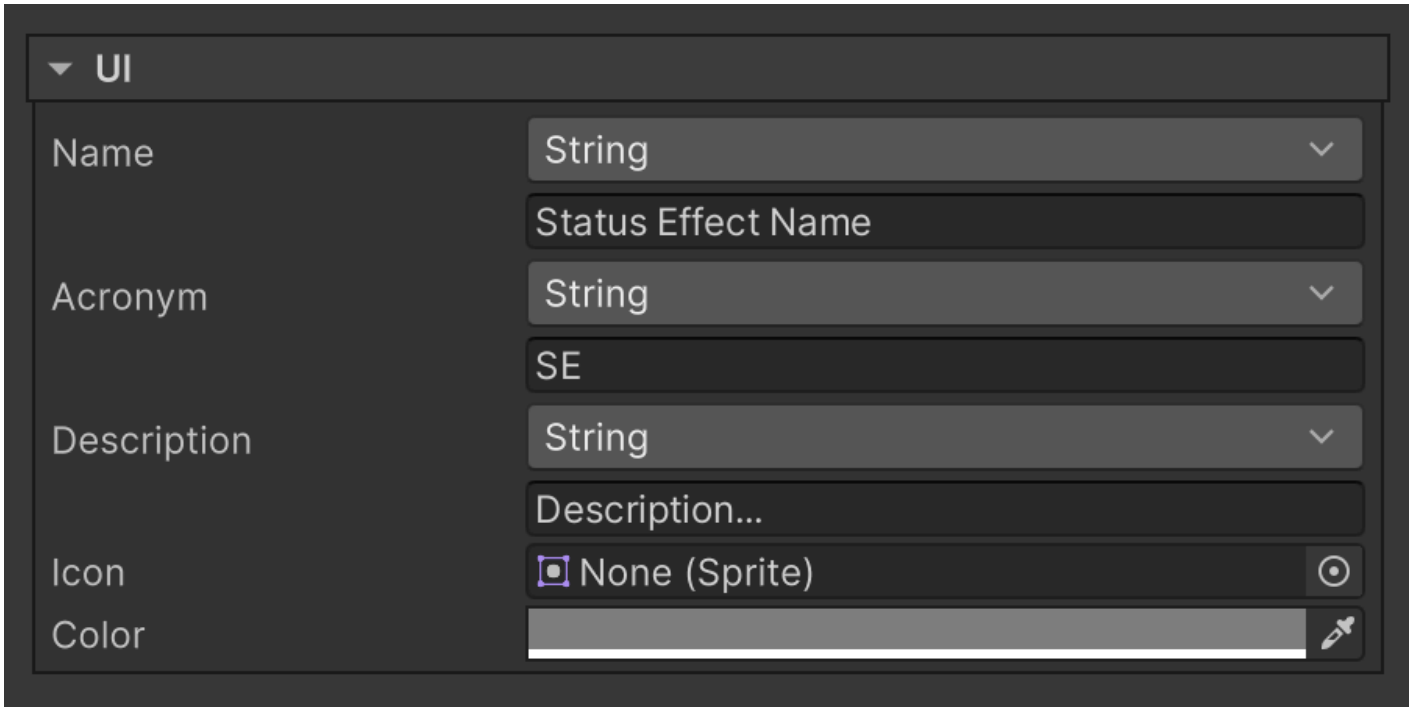
Max Stack determines how many of the same **Status Effect** can be active at a give time on a target.

By default, most **Status Effects** will have a stack of 1, and adding subsequent effects refresh the duration. However, it is entirely possible to stack multiple (for example) *Poison* aflictions, increasing their health drain.

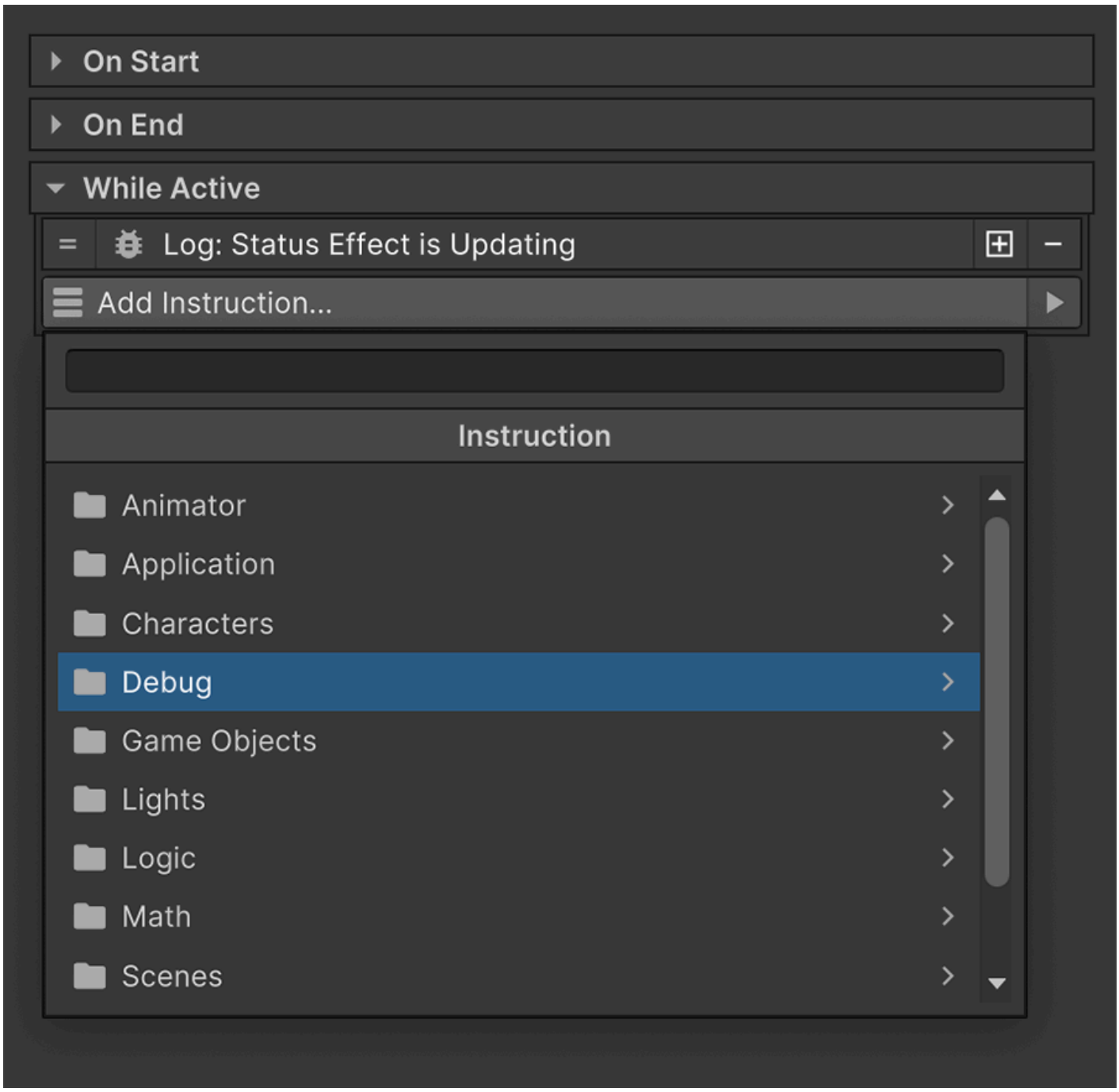
The **Save** toggle determines whether the **Status Effect** persists after saving and loading back the game. Saving a **Status Effect** keeps track of the remaining time.

Has Duration allows the **Status Effect** to run for a certain amount of time (specified in the **Duration** field, in seconds).

If this field is unticked, the **Status Effect** will continue until it's manually removed, using the appropriate visual scripting instruction.



The **UI** section allows the user to define any information displayable to the player, such as the name, a description of what the ailment does, its color and even an icon.



Inside the **OnStart**, **On End** and **While Active** sections is where the logic of the **Status Effect** goes and it uses Game Creator's visual scripting tools.

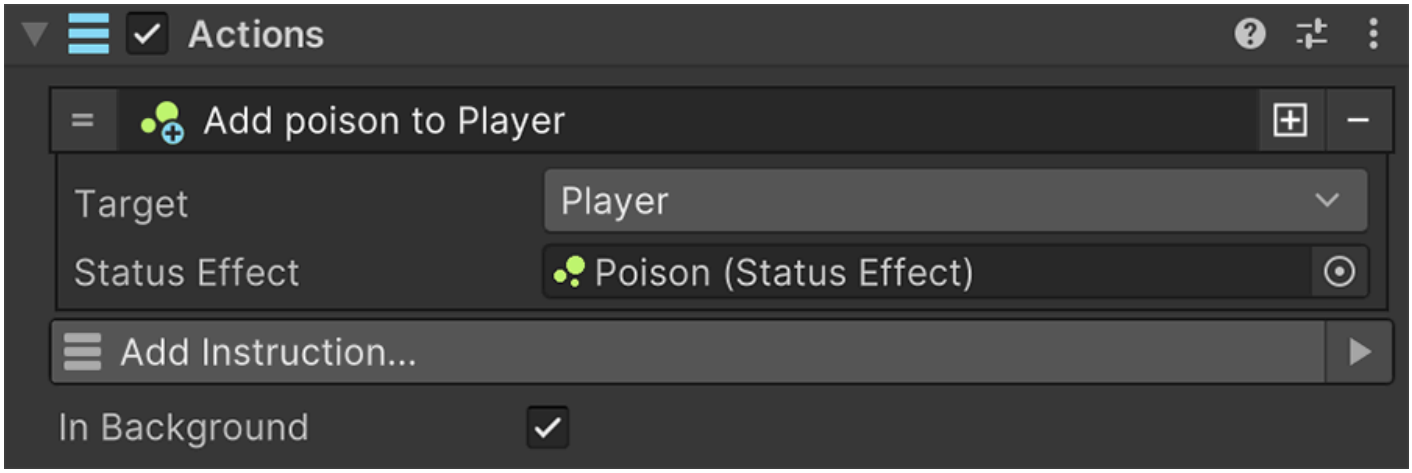
- **On Start**: A list of instructions executed as soon as the **Status Effect** is added onto a target.
- **On End**: A list of instructions executed when the **Status Effect** stops taking effect on a target.
- **While Active**: A list of instructions that runs every frame, as long as the **Status Effect** is active.

Poison

For example, a **Poison** status effect could start spawning a particle effect onto the targeted character using the **On Start** instruction list. To damage the player, it would use the **While Active** instruction list and subtract a bit of the Target's health every few seconds.

818.2 Adding a Status Effect

To add a **Status Effect** onto a target you can use the visual scripting instruction **Add Status Effect**.



All that needs to be done is to select the targeted character, which must have a **Traits** component, and specify the type of **Status Effect**.

IV.II User Interface

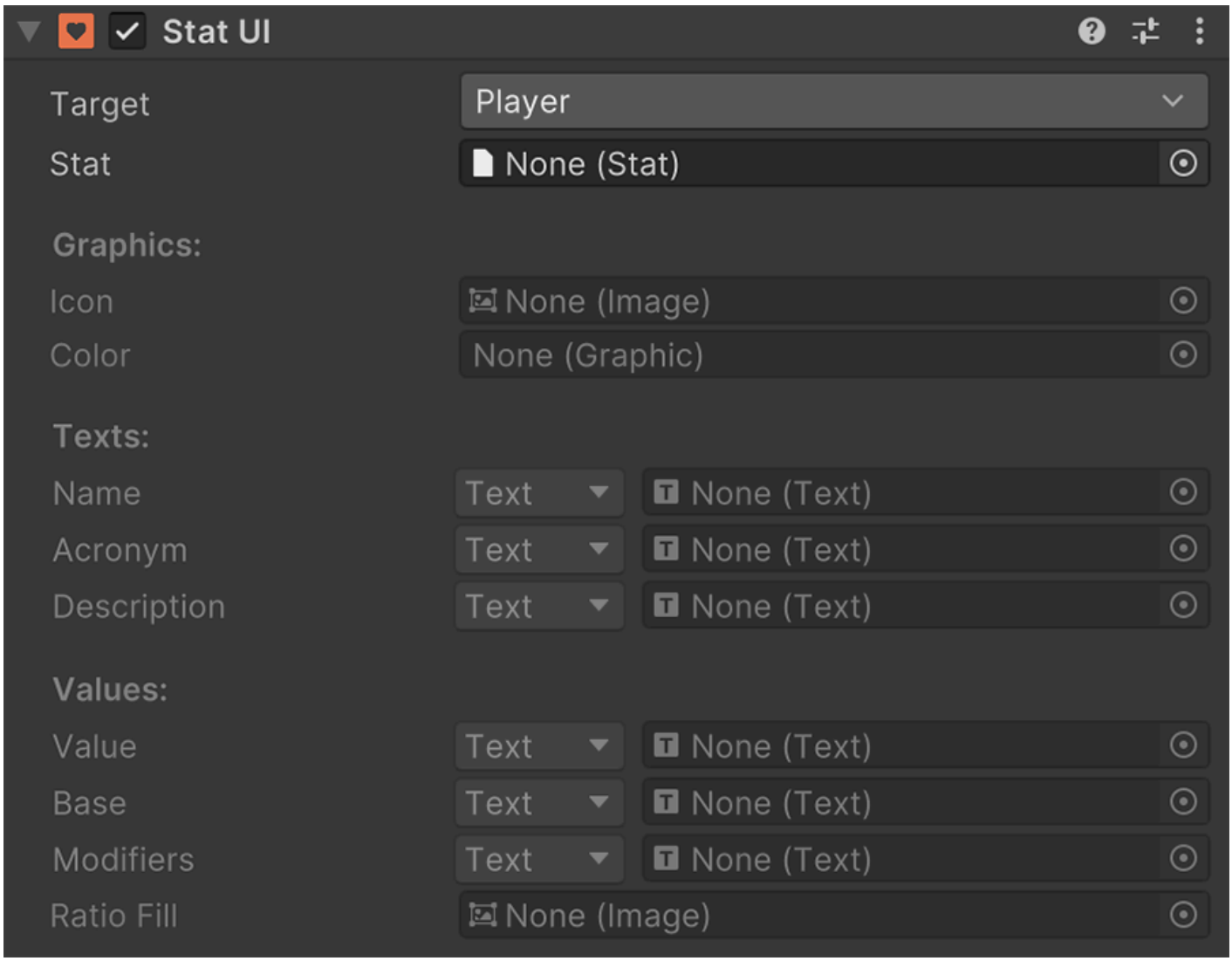
819 User Interface

The **Stats** module makes it really easy to build flexible user interfaces (UI) using Unity UI.

It comes with a few components that work fairly similar. You can attach each component to any UI game object and drag and drop any Text and Images to each of its fields.

- **Stat UI**
- **Attribute UI**
- **Formula UI**
- **Status Effects UI**

These components are all found under the *Add Component* submenu on any game object and navigating to Game Creator → UI → Stats. For example, this is the **Stat UI** component.



The first two fields are required: **Target** is the game object with a **Traits** component and **Stat** is the asset to be referenced by this UI component.

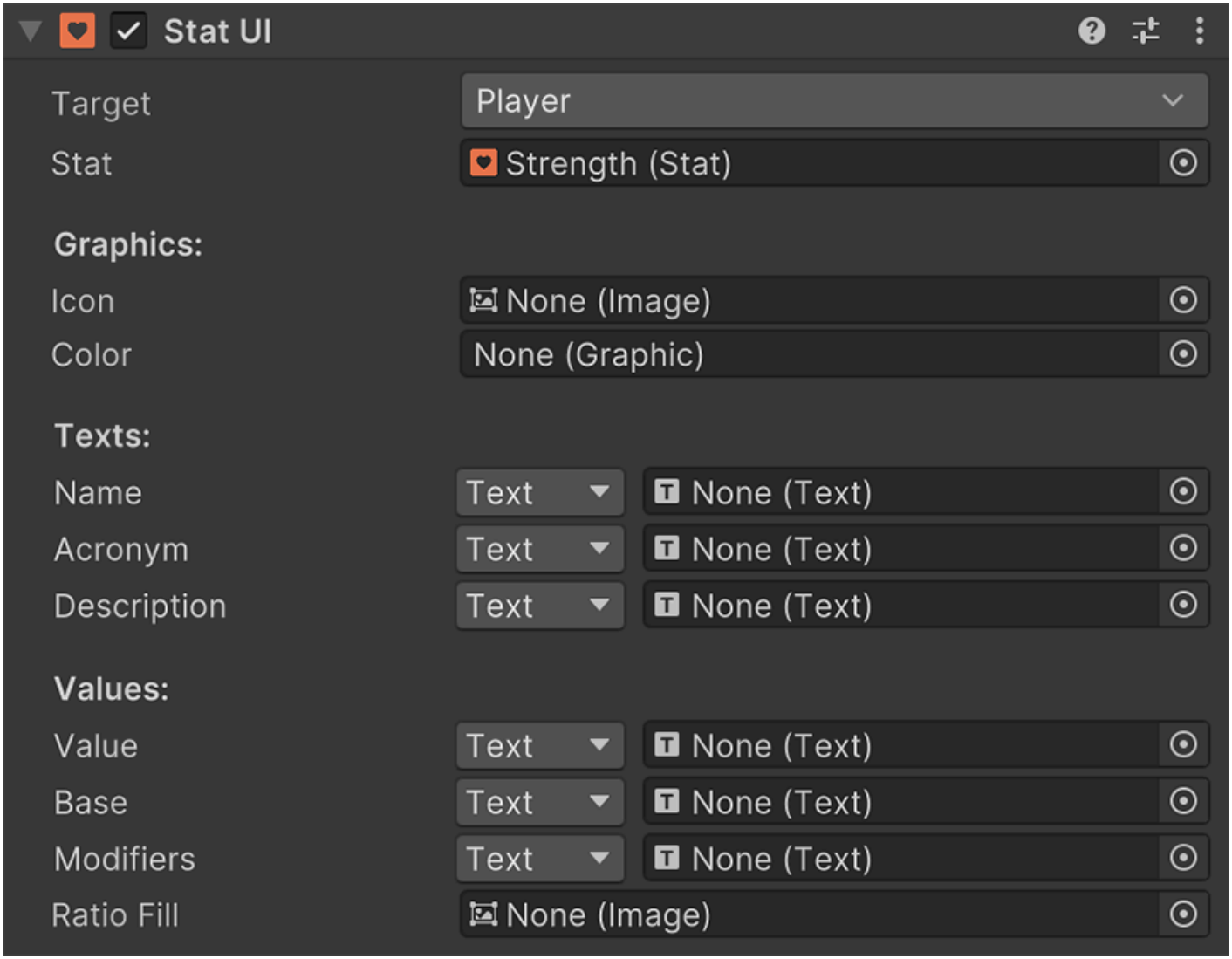
All other fields are optional and will only be updated if a change is detected.

Stat UI

For example, dragging a **Text** component onto the *Value* field will change the contents to a numeric value that represents the selected **Stat** value.

820 Stat UI

The **Stat UI** component allows to display the runtime information about a specific target's **Stat**. To create one, click on a game object's *Add Component* button and navigate to Game Creator → UI → Stats → Stat UI.



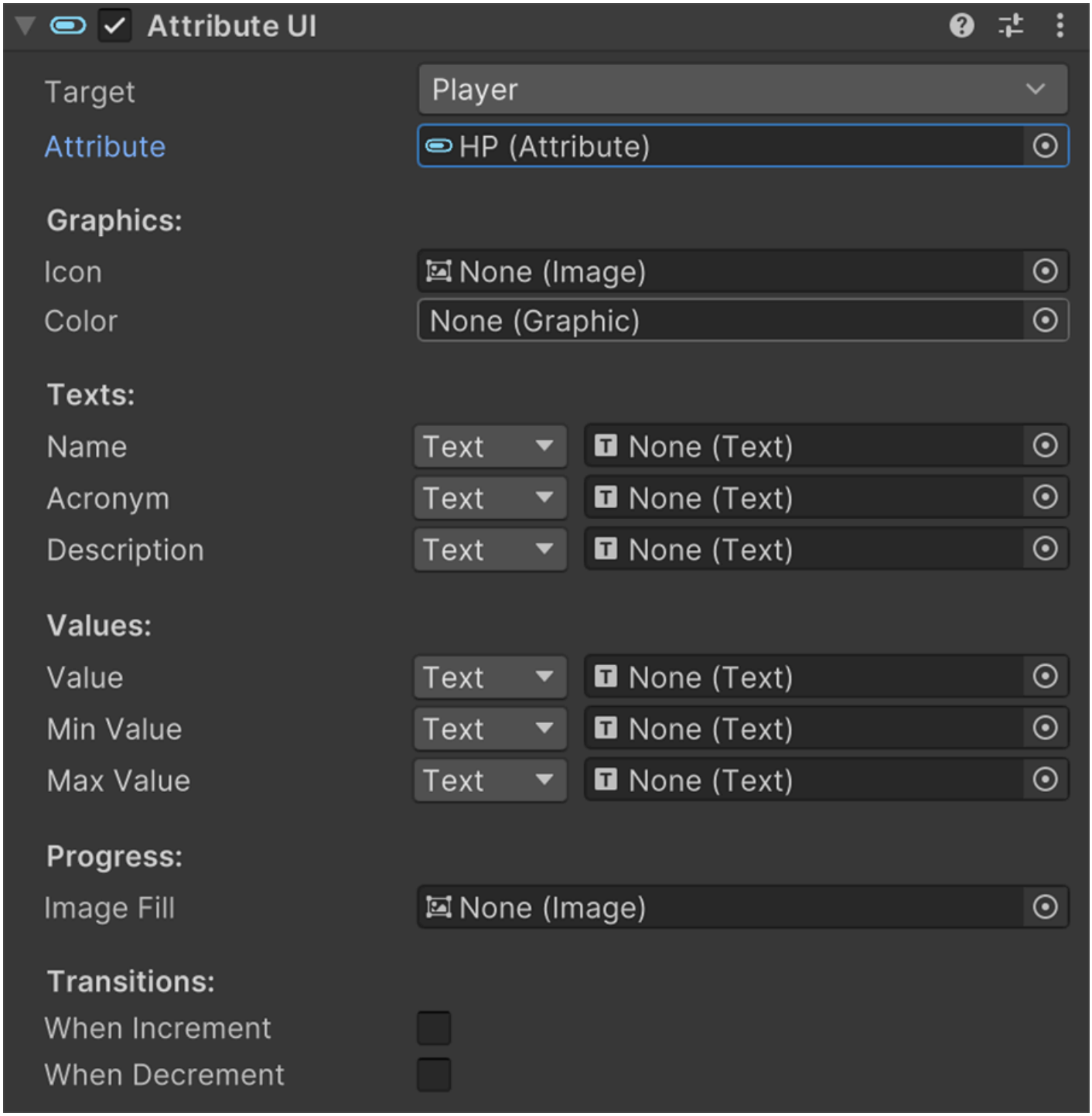
All fields are optional and all that needs to be done is to drag **Text** and **Image** components to the corresponding fields.

Stat UI

For example, to display the *Name* of a **Stat**, drag and drop the **Text** component onto the *Name* field and it will automagically update its content, even if the targeted game object changes.

821 Attribute UI

The **Attribute UI** component allows to display the runtime information about a specific target's **Attribute**. To create one, click on a game object's *Add Component* button and navigate to Game Creator → UI → Stats → Attribute UI.



All fields are optional and all that needs to be done is to drag **Text** and **Image** components to the corresponding fields.

Attribute UI

For example, to display the *Name* of an **Attribute**, drag and drop the **Text** component onto the *Name* field and it will automagically update its content, even if the targeted game object changes.

Transitions are a feature that allow the **Image** fill progress to animate and stall for a certain amount of time.

Transitions

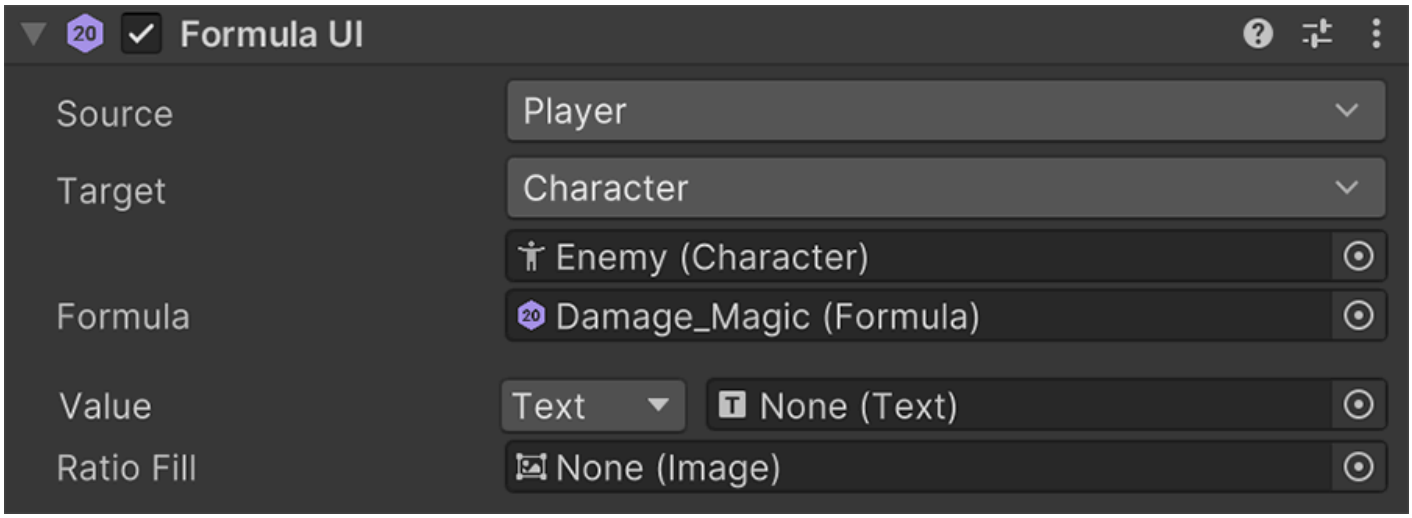
This is mostly used on health and mana bars, where getting hit makes the HP bar display a second bar below that decreases after a few seconds, in order for the player to get a sense of the amount of damage taken.

Ticking any of both options reveals two new options below.

- **Stall Duration**: Amount of seconds debounced between the value change and the start of the transition
- **Transition Duration**: Amount of seconds it takes to animate towards the targeted value.

822 Formula UI

The **Formula UI** component allows to display the result of an expression between two game objects with a **Traits** component. To create one, click on a game object's *Add Component* button and navigate to Game Creator → UI → Stats → Formula UI.



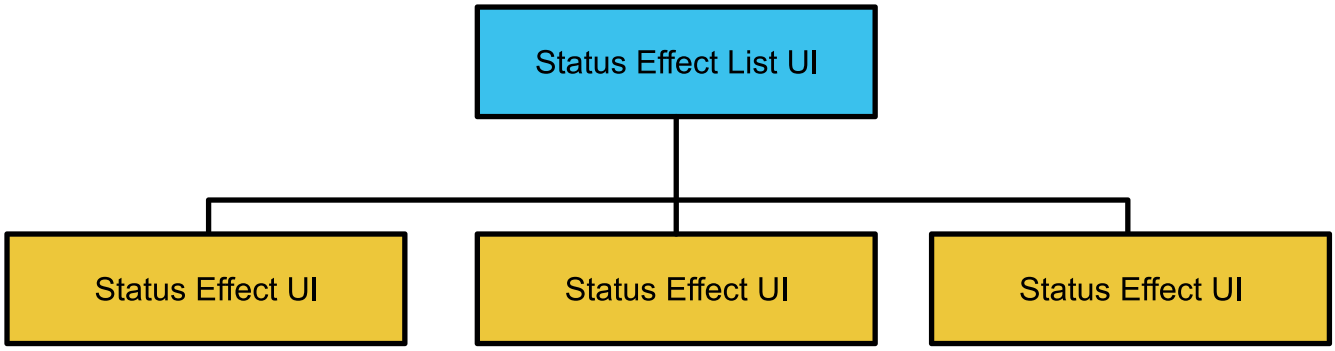
All fields are optional and all that needs to be done is to drag **Text** and **Image** components to the corresponding fields.

Formula UI

For example, to display the resulting value of a **Formula** applied to the Player and another character, drag and drop the **Text** component onto the *Value* field and it will automagically update its content, even if any of the targeted game objects changes.

823 Status Effects UI

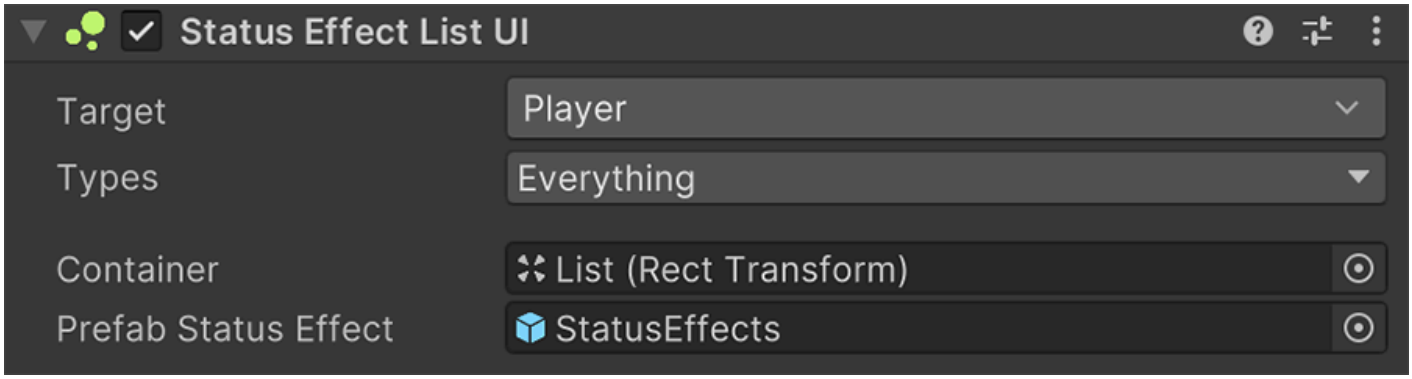
Status Effects have two components to display their information.



- **Status Effect List UI**: Gathers information about a targeted game object and manages the concrete list of activet aflictions.
- **Status Effect UI**: Displays information about a particular affliction. It is spawned by the Status Effect List UI component.

823.1 Status Effect List UI

To create one, click on a game object's *Add Component* button and navigate to Game Creator → UI → Stats → Status Effect List UI.



The **Target** field should point at the game object with a **Traits** component.

Types allows to filter which status effects to display: Negative, Positive, Neutral, or any combination of them.

Container and **Prefab Status Effect** are the most important ones: For each affliction on the targeted character, the **Status Effect List UI** component will spawn (or reuse) an instance of a prefab. The spawn location is as a child of the **Container** rect transform.

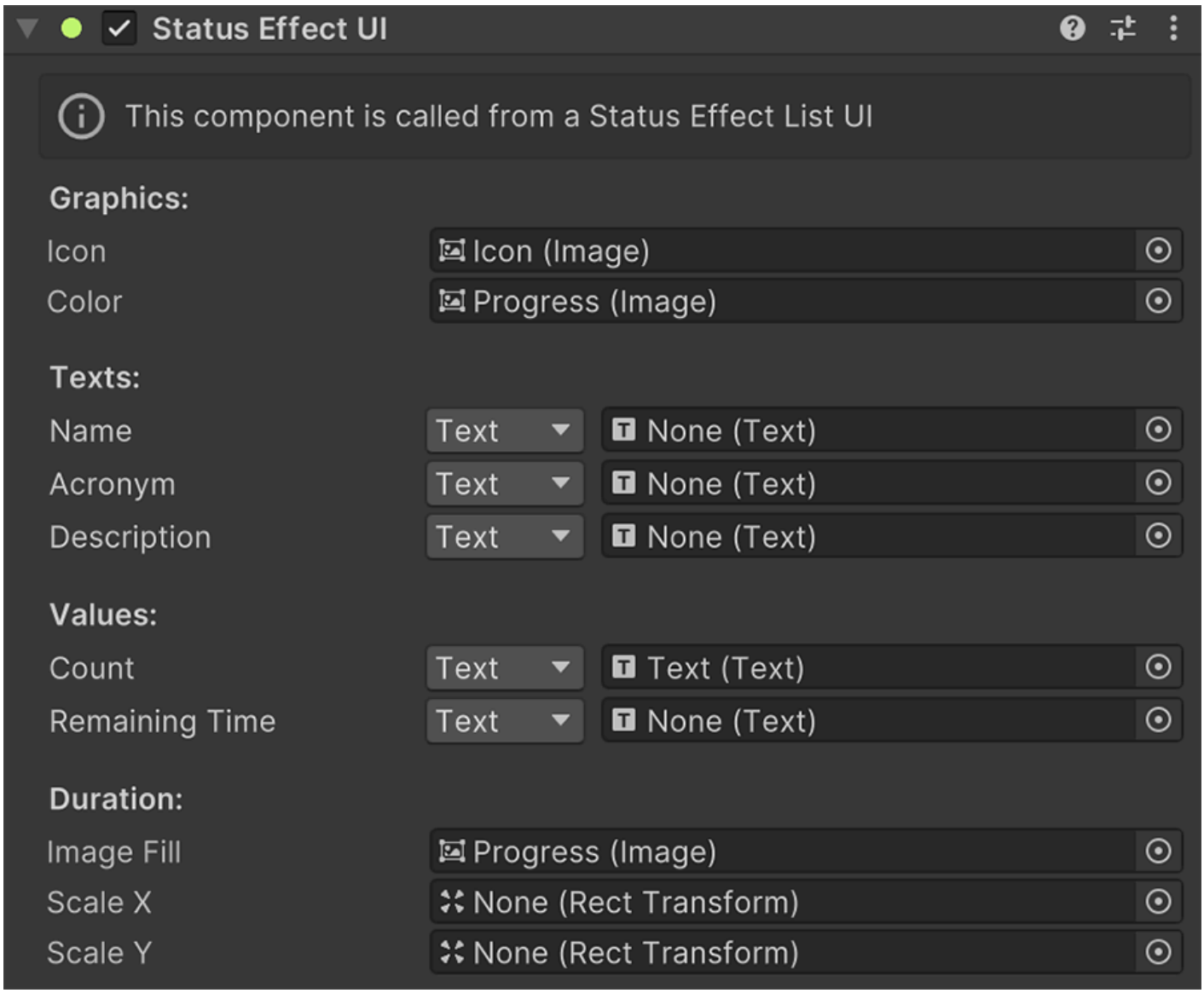
Example

So if the Player has 3 ailments: *Poison*, *Paralyzed* and *Bleeding*, the **Status Effect List UI** component will spawn 3 instances of the prefab as a child of the **Container** transform.

Each spawned instance must have, at the root level, the component **Status Effect UI** component, which communicates with the **Status Effect List UI** which affliction to display.

823.2 Status Effect UI

To create one, click on a game object's *Add Component* button and navigate to Game Creator → UI → Stats → Status Effect UI.



As can be seen, this component does not have a **Target** field. Instead, its the **Status Effect List UI** component that feeds it the target and concrete affliction.

All fields are optional and automatically update the values according to changes sent by the parent component.

IV.III Visual Scripting

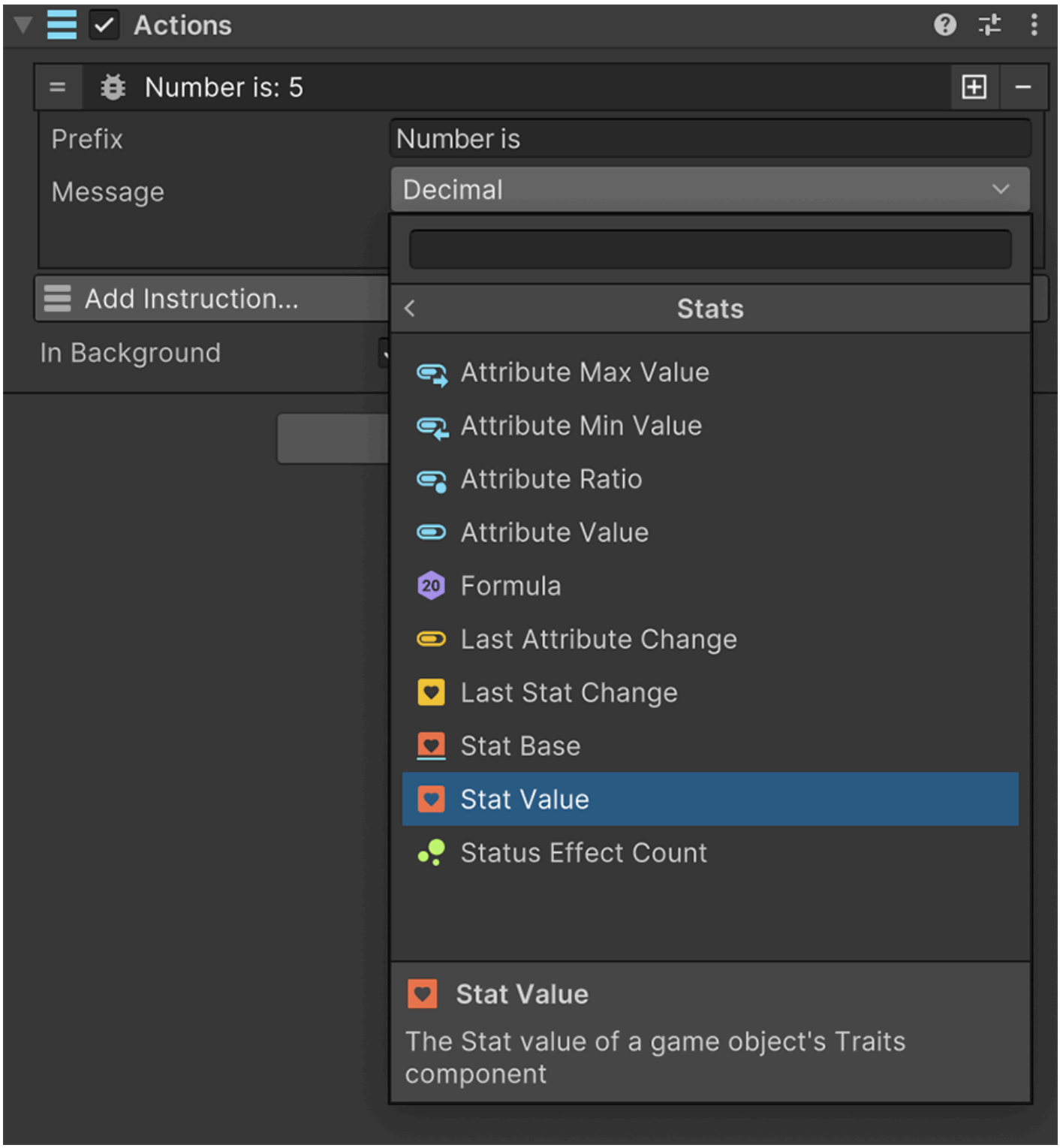
824 Visual Scripting

The **Stats** module symbiotically works with **Game Creator** and the rest of its modules using its visual scripting tools.

- **Instructions**
- **Conditions**
- **Events**

Each scripting node allows other modules to use any **Stats** feature.

The **Stats** module also comes with a collection of custom **Properties**. Any interactive element can request the value of a **Stat**, **Attribute** and **Formula** using the value dropdown, as seen in the image below.


Actions
Number is: 5
Prefix
Number is
Message
Decimal
Add Instruction...
In Background
Stats
Attribute Max Value
Attribute Min Value
Attribute Ratio
Attribute Value
Formula
Last Attribute Change
Last Stat Change
Stat Base
Stat Value
Status Effect Count
Stat Value
The Stat value of a game object's Traits component

IV.III.I Conditions

825 Conditions

825.1 Sub Categories

- Stats

IV.III.I.I Stats

826 Stats

826.1 Conditions

- Check Formula
- Compare Attribute
- Compare Stat
- Has Stat Modifiers
- Has Status Effect
- Is Traits Of Class
- Traits Has Attribute
- Traits Has Stat

827 Check Formula

`Stats » Check Formula`

827.1 Description

Returns the comparison between the result of a Formula against another value

827.2 Parameters

Name	Description
Formula	The Formula used in the operation
Source	The game object that the Formula identifies as the Source
Target	The game object that the Formula identifies as the Target
Compare To	The value that the result of the Formula is compared to

827.3 Keywords

`Skill` `Throw` `Check` `Dice` `Lock` `Pick` `Charisma` `Speech`

828 Compare Attribute

`Stats » Compare Attribute`

828.1 Description

Returns true if the Attribute comparison is successful

828.2 Parameters

Name	Description
Traits	The targeted game object with a Traits component
Attribute	The Attribute type value that is compared
Value	The type of value from the attribute to compare
Comparison	The comparison operation performed between both values
Compare To	The decimal value that is compared against

828.3 Keywords

`Health` `Mana` `Stamina` `Magic` `Life` `HP` `MP`

829 Compare Stat

`Stats » Compare Stat`

829.1 Description

Returns true if the Stat comparison is successful

829.2 Parameters

Name	Description
Traits	The targeted game object with a Traits component
Stat	The Stat type value that is compared
Comparison	The comparison operation performed between both values
Compare To	The decimal value that is compared against

829.3 Keywords

`Vitality` `Constitution` `Strength` `Dexterity` `Defense` `Armor` `Magic` `Wisdom` `Intelligence`

830 Has Stat Modifiers

`Stats » Has Stat Modifiers`

830.1 Description

Returns true if the targeted Stat component has a Stat Modifier

830.2 Parameters

Name	Description
Target	The targeted game object with a Traits component
Stat	The Stat that checks if it has a Stat Modifier

830.3 Keywords

`Skill` `Throw` `Check` `Dice` `Lock` `Pick` `Charisma` `Speech`

831 Has Status Effect

`Stats » Has Status Effect`

831.1 Description

Returns true if the game object has a particular Status Effect active

831.2 Parameters

Name	Description
Target	The targeted game object with a Traits component
Status Effect	The type of Status Effect that is checked
Min Amount	The minimum amount of stacked and active Status Effects

831.3 Keywords

`Buff` `Debuff` `Enhance` `Ailment` `Blind` `Dark` `Burn` `Confuse` `Dizzy` `Stagger` `Fear` `Freeze` `Paralyze` `Shock` `Silence` `Sleep` `Silence` `Slow` `Toad` `Weak` `Strong` `Poison` `Haste` `Protect` `Reflect` `Regenerate` `Shell` `Armor` `Shield` `Berserk` `Focus` `Raise`

832 Is Traits of Class

```
Stats » Is Traits of Class
```

832.1 Description

Returns true if the targeted Traits component has the specified Class

832.2 Parameters

Name	Description
Traits	The targeted game object with a Traits component
Class	The Class asset

833 Traits has Attribute

```
Stats » Traits has Attribute
```

833.1 Description

Returns true if the targeted Traits component has the specified Attribute

833.2 Parameters

Name	Description
Traits	The targeted game object with a Traits component
Attribute	The Attribute asset

834 Traits has Stat

Stats » Traits has Stat

834.1 Description

Returns true if the targeted Traits component has the specified Stat

834.2 Parameters

Name	Description
Traits	The targeted game object with a Traits component
Stat	The Stat asset

IV.III.II Events

835 Events

835.1 Sub Categories

- Stats

IV.III.II.I Stats

836 Stats

836.1 Events

- On Attribute Change
- On Stat Change
- On Status Effect Change

837 On Attribute Change

```
Stats » On Attribute Change
```

837.1 Description

Executed when the value of a specific game object's Attribute is modified

837.2 Parameters

Name	Description
Target	The targeted game object with a Traits component
When	Determines if the event executes when the Attribute increases, decreases or both
Attribute	The Attribute from which the event detects its changes

837.3 Keywords

`Health` `HP` `Mana` `MP` `Stamina`

838 On Stat Change

`Stats » On Stat Change`

838.1 Description

Executed when the value of a specific game object's Stat is modified. Including due to Stat Modifiers

838.2 Parameters

Name	Description
Target	The targeted game object with a Traits component
When	Determines if the event executes when the Stat increases, decreases or both
Stat	The Stat from which the event detects its changes

838.3 Keywords

`Health` `HP` `Mana` `MP` `Stamina`

839 On Status Effect Change

`Stats » On Status Effect Change`

839.1 Description

Executed when a Status Effect is added or removed from a Traits component

839.2 Parameters

Name	Description
Target	The targeted game object with a Traits component
Status Effect	Determines if the event detects any Status Effect change or a specific one

839.3 Keywords

`Buff` `Debuff` `Enhance` `Ailment` `Blind` `Dark` `Burn` `Confuse` `Dizzy` `Stagger` `Fear` `Freeze` `Paralyze` `Shock` `Silence` `Sleep` `Silence` `Slow` `Toad` `Weak` `Strong` `Poison` `Haste` `Protect` `Reflect` `Regenerate` `Shell` `Armor` `Shield` `Berserk` `Focus` `Raise`

IV.III.III Instructions

840 Instructions

840.1 Sub Categories

- Stats

IV.III.III.I Stats

841 Stats

841.1 Sub Categories

- Ui

841.2 Instructions

- Add Stat Modifier
- Add Status Effect
- Change Attribute
- Change Stat
- Clear Status Effects Type
- Remove Stat Modifier
- Remove Status Effect
- Set Attribute
- Set Formula
- Set Stat
- Set Status Effect

842 Add Stat Modifier

`Stats » Add Stat Modifier`

842.1 Description

Adds a value Modifier to the selected Stat on a game object's Traits component

842.2 Parameters

Name	Description
Target	The targeted game object with a Traits component
Stat	The Stat that removes the Modifier
Type	If the Modifier changes the Stat by a constant value or by a percentage
Value	The constant or percentage-based value of the Modifier

842.3 Keywords

`Slot` `Increase` `Equip` `Fortify` `Vitality` `Constitution` `Strength` `Dexterity` `Defense` `Armor` `Magic` `Wisdom` `Intelligence`

843 Add Status Effect

```
Stats » Add Status Effect
```

843.1 Description

Adds a Status Effect to the selected game object's Traits component

843.2 Parameters

Name	Description
Target	The targeted game object with a Traits component
Status Effect	The type of Status Effect that is added

843.3 Keywords

`Buff` `Debuff` `Enhance` `Ailment` `Blind` `Dark` `Burn` `Confuse` `Dizzy` `Stagger` `Fear` `Freeze` `Paralyze` `Shock` `Silence` `Sleep` `Silence` `Slow` `Toad` `Weak` `Strong` `Poison` `Haste` `Protect` `Reflect` `Regenerate` `Shell` `Armor` `Shield` `Berserk` `Focus` `Raise`

844 Change Attribute

```
Stats » Change Attribute
```

844.1 Description

Changes the current Attribute value of a game object's Traits component

844.2 Parameters

Name	Description
Target	The targeted game object with a Traits component
Attribute	The Attribute type that changes its value
Change	The value changed

844.3 Keywords

`Health` `HP` `Mana` `MP` `Stamina`

845 Change Stat

`Stats » Change Stat`

845.1 Description

Changes the base Stat value of a game object's Traits component

845.2 Parameters

Name	Description
Target	The targeted game object with a Traits component
Stat	The Stat type that changes its value
Change	The value changed

845.3 Keywords

`Vitality` `Constitution` `Strength` `Dexterity` `Defense` `Armor` `Magic` `Wisdom` `Intelligence`

846 Clear Status Effects Type

`Stats » Clear Status Effects Type`

846.1 Description

Clears any Status Effects based on their type from the selected game object's Traits component

846.2 Parameters

Name	Description
Target	The targeted game object with a Traits component
Types	The type of Status Effects that are cleared

846.3 Keywords

`Buff` `Debuff` `Enhance` `Ailment` `Blind` `Dark` `Burn` `Confuse` `Dizzy` `Stagger` `Fear` `Freeze` `Paralyze` `Shock` `Silence` `Sleep` `Silence` `Slow` `Toad` `Weak` `Strong` `Poison` `Haste` `Protect` `Reflect` `Regenerate` `Shell` `Armor` `Shield` `Berserk` `Focus` `Raise`

847 Remove Stat Modifier

```
Stats » Remove Stat Modifier
```

847.1 Description

Removes an equivalent Modifier from the selected Stat on a game object's Traits component.

847.2 Parameters

Name	Description
Target	The targeted game object with a Traits component
Stat	The Stat that receives the Modifier
Type	If the Modifier changes the Stat by a constant value or by a percentage
Value	The constant or percentage-based value of the Modifier

847.3 Keywords

`Slot` `Decrease` `Unequip` `Weaken` `Vitality` `Constitution` `Strength` `Dexterity` `Defense` `Armor` `Magic` `Wisdom` `Intelligence`

848 Remove Status Effect

```
Stats » Remove Status Effect
```

848.1 Description

Removes a Status Effect from the selected game object's Traits component

848.2 Parameters

Name	Description
Target	The targeted game object with a Traits component
Amount	Indicates how many Status Effects are removed at most
Status Effect	The type of Status Effect that is removed

848.3 Keywords

`Buff` `Debuff` `Enhance` `Ailment` `Blind` `Dark` `Burn` `Confuse` `Dizzy` `Stagger` `Fear` `Freeze` `Paralyze` `Shock` `Silence` `Sleep` `Silence` `Slow` `Toad` `Weak` `Strong` `Poison` `Haste` `Protect` `Reflect` `Regenerate` `Shell` `Armor` `Shield` `Berserk` `Focus` `Raise`

849 Set Attribute

```
Stats » Set Attribute
```

849.1 Description

Sets a Attribute value

849.2 Parameters

Name	Description
To	Where to store the Attribute asset
Attribute	The Attribute asset to store

850 Set Formula

```
Stats » Set Formula
```

850.1 Description

Sets a Formula value

850.2 Parameters

Name	Description
To	Where to store the Formula asset
Formula	The Formula asset to store

851 Set Stat

```
Stats » Set Stat
```

851.1 Description

Sets a Stat value

851.2 Parameters

Name	Description
To	Where to store the Stat asset
Stat	The Stat asset to store

852 Set Status Effect

852.1 Description

Sets a Status Effect value

852.2 Parameters

Name	Description
To	Where to store the Status Effect asset
Status Effect	The Status Effect asset to store

IV.III.III.I.I UI

853 Ui

853.1 Instructions

- Change Attributeui Attribute
- Change Attributeui Target
- Change Statui Stat
- Change Statui Target
- Change Status Effects List Ui Target

854 Change AttributeUI Attribute

```
Stats » UI » Change AttributeUI Attribute
```

854.1 Description

Changes the Attribute from a Attribute UI component

854.2 Parameters

Name	Description
Attribute UI	The game object with the Attribute UI component
Attribute	The new Attribute asset

855 Change AttributeUI Target

```
Stats » UI » Change AttributeUI Target
```

855.1 Description

Changes the targeted game object of an Attribute UI component

855.2 Parameters

Name	Description
Attribute UI	The game object with the Attribute UI component
Target	The new targeted game object with a Traits component

856 Change StatUI Stat

```
Stats » UI » Change StatUI Stat
```

856.1 Description

Changes the Stat asset from a Stat UI component

856.2 Parameters

Name	Description
Stat UI	The game object with the Stat UI component
Stat	The new Stat asset

857 Change StatUI Target

```
Stats » UI » Change StatUI Target
```

857.1 Description

Changes the targeted game object of an Stat UI component

857.2 Parameters

Name	Description
Stat UI	The game object with the Stat UI component
Target	The new targeted game object with a Traits component

858 Change Status Effects List UI Target

```
Stats » UI » Change Status Effects List UI Target
```

858.1 Description

Changes the targeted game object of an Status Effects List UI component

858.2 Parameters

Name	Description
Status Effects List UI	The game object with the Status Effects List UI component
Target	The new targeted game object with a Traits component

IV.IV Releases

859 Releases

859.1 2.6.18 (Latest)

Released October 18, 2024

Enhances

- Editor: Support for Unity 6

859.2 2.6.17

Released July 30, 2024

Enhances

- Formula: Display Table field at the top

Fixes

- Stat Modifiers: Not raising event when using Clear Modifiers

859.3 2.6.16

Released March 4, 2024

Fixes

- Instruction: Set Attribute incorrect icon

859.4 2.6.15

Released February 23, 2024

This version breaks compatibility with previous versions. Stats, Attributes, Status Effects and Formulas are now dynamic Properties and can be stored and retrieved using Local and Global Variables.

New

- Instruction: Set Attribute
- Instruction: Set Stat
- Instruction: Set Status Effect
- Instruction: Set Formula
- Condition: Traits is of Class
- Condition: Traits contains Stat
- Condition: Traits contains Attribute
- UI: Option display Stat UI if has modifiers

Changes

- Properties: Attributes are now Properties
- Properties: Stats are now Properties
- Properties: Status Effects are now Properties
- Properties: Formulas are now Properties

Fixes

- Examples: Demo scenes use new Properties

859.5 2.5.14

Released October 31, 2023

This version breaks compatibility with previous versions and will only work with Game Creator 2.13.43 or higher.

Changes

- Status Effects: More performant instructions
- UX: Different layout for Stat overrides
- UX: Different layout for Attribute overrides
- Internal: Support for Core 2.13.42 version

Fixes

- Stat Modifiers: Clear method does not zero value
- UI: Attribute scale on Y axis scales on X

859.6 2.4.13

Released August 31, 2023

New

- Status Effect: Option to make them Hidden

Fixes

- Examples: Compatibility with latest core version

859.7 2.4.12

Released June 27, 2023

Fixes

- Formulas: Source and Target only use Traits components
- Formulas: Incorrect Regex expressions in parsing clauses
- Examples: Not working with latest core version

859.8 2.4.11

Released June 12, 2023

New

- UI: Display attributes as independent units
- Condition: Has Stat Modifiers
- Property: Stat and Attribute Sprite values
- Examples: New Attribute Unit example

Changes

- Formulas: New precomputable math library

Fixes

- Formulas: Chance ratio is inverted
- Formulas: Error when Tables are missing

859.9 2.3.10

Released March 20, 2023

New

- Class: Contains Sprite field
- Class: Contains Color field
- Property: Get Class/Traits/Stat/Attribute Sprite
- Property: Get Class/Traits/Stat/Attribute Color
- Settings: Displays current and update version

Changes

- Signature format from Core 2.9.34
- Property: Reference Status Effects Last Added
- Property: Reference Status Effects Last Removed

859.10 2.2.9

Released November 8, 2022

New

- Property: Last Formula Result

Changes

- Copy-Runners with less memory footprint

Fixes

- Formula: Incorrect parenthesis parsing
- Traits debug view display up to two decimals
- Missing Text Mesh Pro assembly reference

859.11 2.1.8

Released September 21, 2022

Fixes

- Constant Table: Experience calculation
- Geometry Table: Experience calculation

859.12 2.1.7

Released August 21, 2022

Fixes

- Example: Regenerate Mana Exception
- Manual Progression Table incorrect Level
- Light theme with dark background in Table

859.13 2.1.6

Released June 24, 2022

New

- Option to uninstall module

Fixes

- Serialization error during domain reloads

859.14 2.1.5

Released May 12, 2022

Fixes

- Incorrect Stat Modifiers application order
- Crash when overriding Trait component values
- Math expressions support line breaks
- Removed duplicate internal method

859.15 2.1.4

Released March 25, 2022

New

- Property: Stat Modifiers value

Enhances

- Formulas can have multiple lines
- Moved UI components to submenu

Changes

- Example scenes compatibility

Fixes

- Attribute UI: Scale options disappeared
- Incorrect caching of Status Effects
- Alignment of elements in Inspector

859.16 2.0.3

Released January 28, 2022

Enhances

- Classes installer has no dependencies
- Easier to understand examples

859.17 2.0.2

Released November 22, 2021

New

- Instruction: Change AttributeUI Attribute
- Instruction: Change StatUI Stat

Enhances

- UI instructions are now found under Stats/UI/
- Disallow multiple Traits component per object

Fixes

- Event: Attribute Change not running

859.18 2.0.1

Released November 19, 2021

New

- First release

V. Quests

860 Quests

Between main quests, side quests, bestiary and flora information gathering, lore, ... Managing the progress of the game can quickly become a daunting task (no pun intended).

The **Quests** module aims to help automatizing the creation and management of quests using a simple set of rules. These rules allow to easily create any type of quests while keeping it intuitive and easy to modify and iterate over.

Moreover, the **Quests** module also comes with common user interface tools, such as a Minimap, visual Indicators and a Navigation Compass system that automagically displays active Tasks and where the destination is.

Get Quests

Requirements

The **Quests** module is an extension of **Game Creator 2** and won't work without it

861 Setup

Welcome to getting started with the **Quests** module. In this section you'll learn how to install this module and get started with the examples which it comes with.

861.1 Prepare your Project

Before installing the **Quests** module, you'll need to either create a new Unity project or open an existing one.

> **Game Creator**
>
> It is important to note that **Game Creator** should be present before attempting to install any module.

861.2 Install the Quests module

If you haven't purchased the **Quests** module, head to the Asset Store product page and follow the steps to get a copy of this module.

Once you have bought it, click on Window → Package Manager to reveal a window with all your available assets.

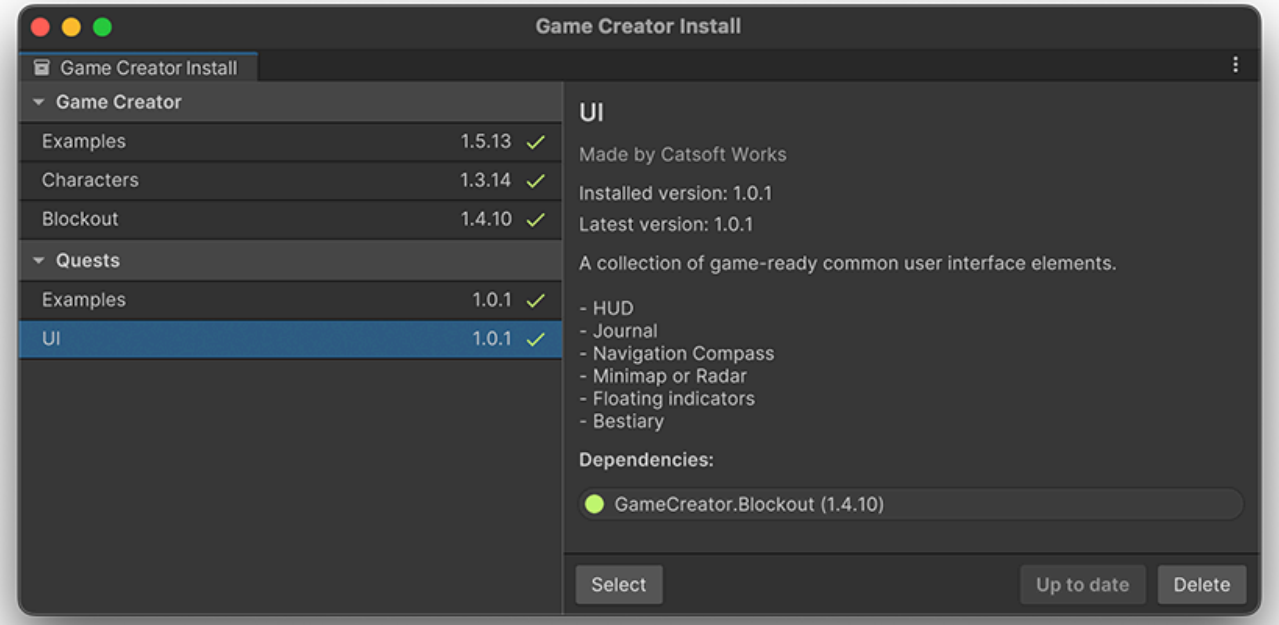
Type in the little search field the name of this package and it will prompt you to download and install the latest stable version. Follow the steps and wait till Unity finishes compiling your project.

861.3 Examples

We highly recommend checking the examples that come with the **Quests** module. To install them, click on the *Game Creator* dropdown from the top toolbar and then the *Install* option.

The **Installer** window will appear and you'll be able to manage all examples and template assets you have in your project.

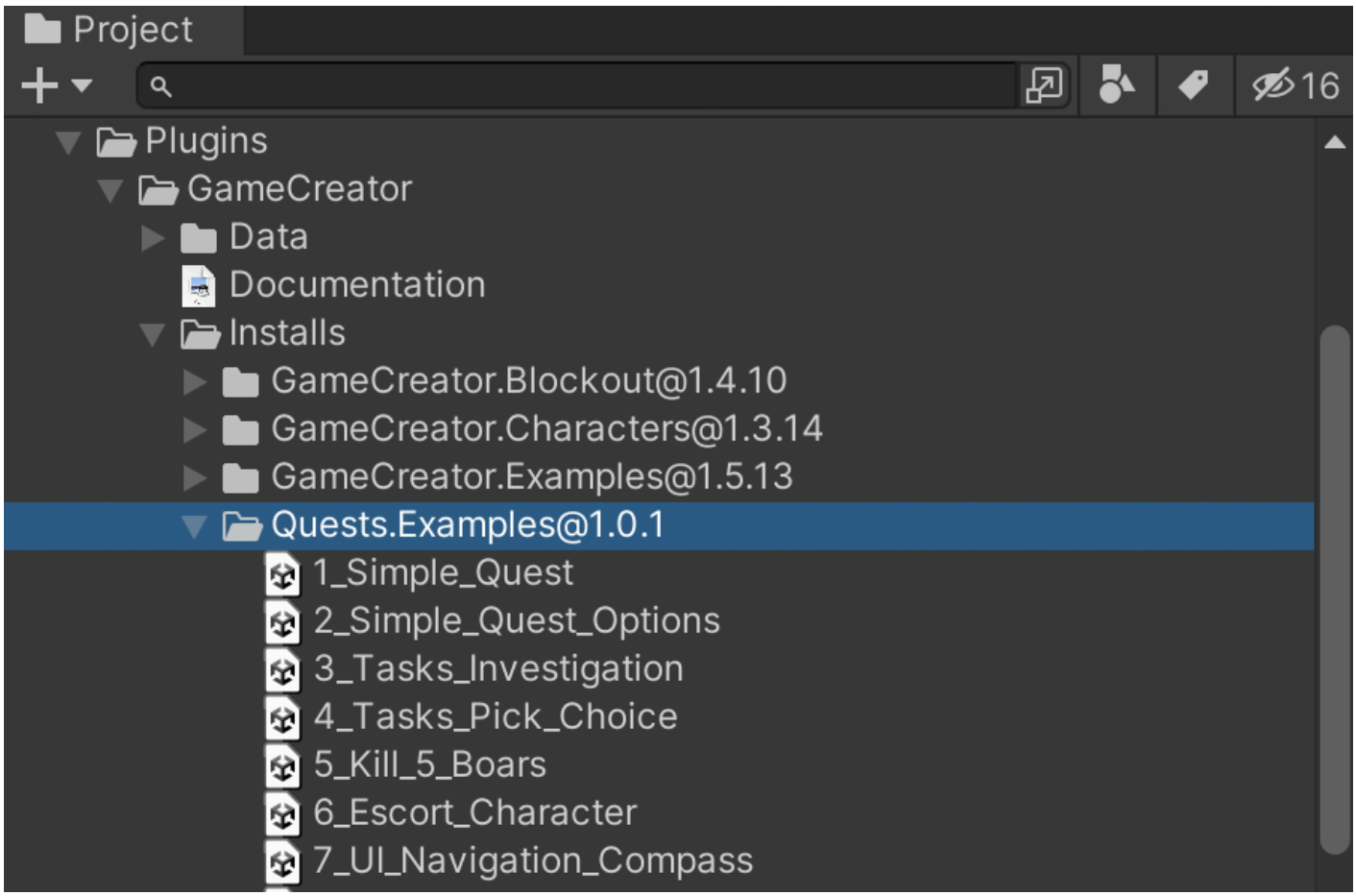
- **Examples**: A collection of scenes with different use-case scenarios
- **UI**: A bundle of common user interface elements



The **Examples** requires all the skins in order to work.

> **Dependencies**
>
> Clicking on the **Examples** install button will install all dependencies automatically.

Once you have the examples installed, click on the *Select* button or navigate to `Plugins/GameCreator/Installs/Quests.Examples/`.


Project
16
Plugins
GameCreator
Data
Documentation
Installs
GameCreator.Blockout@1.4.10
GameCreator.Characters@1.3.14
GameCreator.Examples@1.5.13
Quests.Examples@1.0.1
1_Simple_Quest
2_Simple_Quest_Options
3_Tasks_Investigation
4_Tasks_Pick_Choice
5_Kill_5_Boars
6_Escort_Character
7_UI_Navigation_Compass

V.I Quests

862 Quest

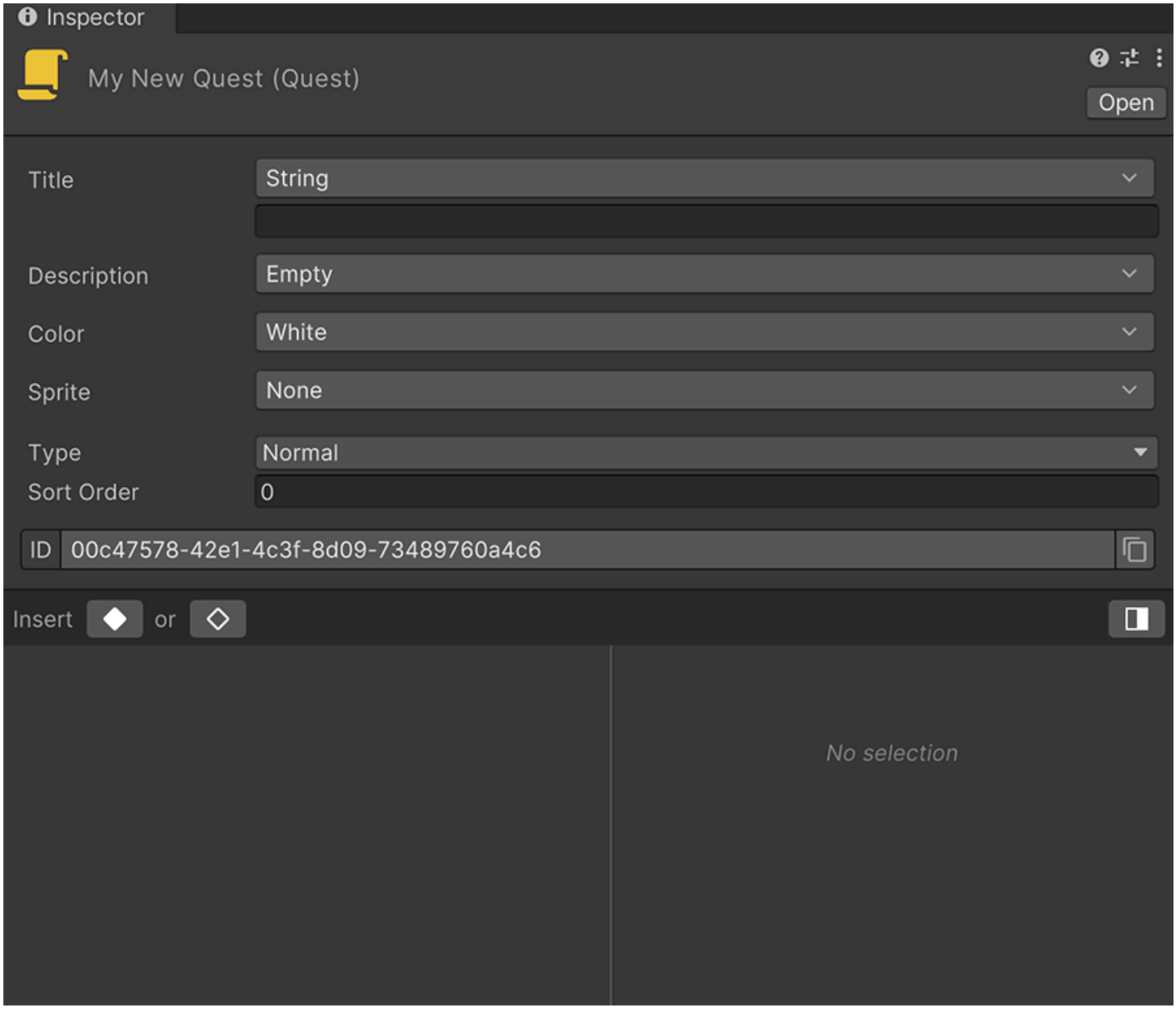
The **Quest** asset contains a collection of *Tasks* that are required to be completed in order to consider the Quest fulfilled.

Splitting Quests

A naive approach is to consider a single **Quest** as the main quest, while having multiple **Quest** assets for each side-quest of a game. However, because the main quest of a game might quickly become very big, it's advisable to split it into multiple Quests and activate these when completing the previous ones.

At the end though, it's you who decides how to organize the Quests of your game.

To create a new **Quest** asset, right click on the *Project Panel* and select Create → Game Creator → Quests → Quest.



862.1 Overview

The **Quest** asset has three very distinct sections:

The top section includes general information about the *Quest* such as its **Name** or a **Description** (if any). It also optionally allows to determine a **Color** and a **Sprite** image used in UI.

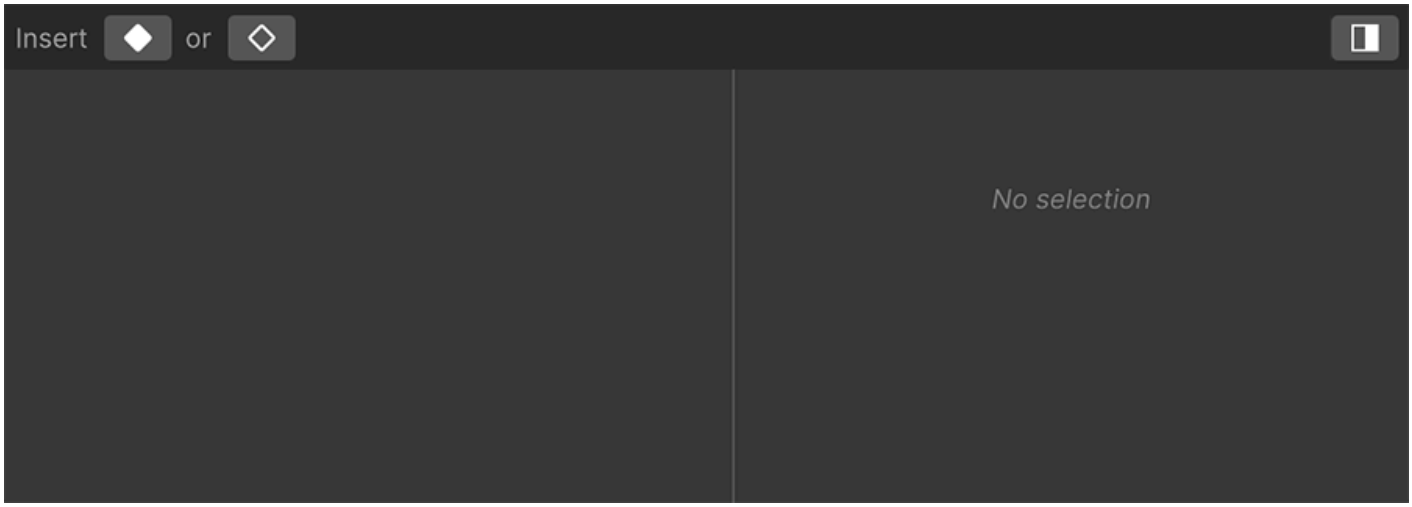
The **Type** field determines whether the *Quest* is a *hidden* quest, or a *normal* one.

> **Hidden Quests**
>
> Hidden quests can be hidden from UI elements and are useful for setting up missions that should not be displayed to the user. For example, an achievement system.

The **Sorting Order** determines the priority of the *Quest* compared to the rest, when being displayed as a list on UI elements. A *Quest* with a higher value will be displayed above other *Quest* assets.

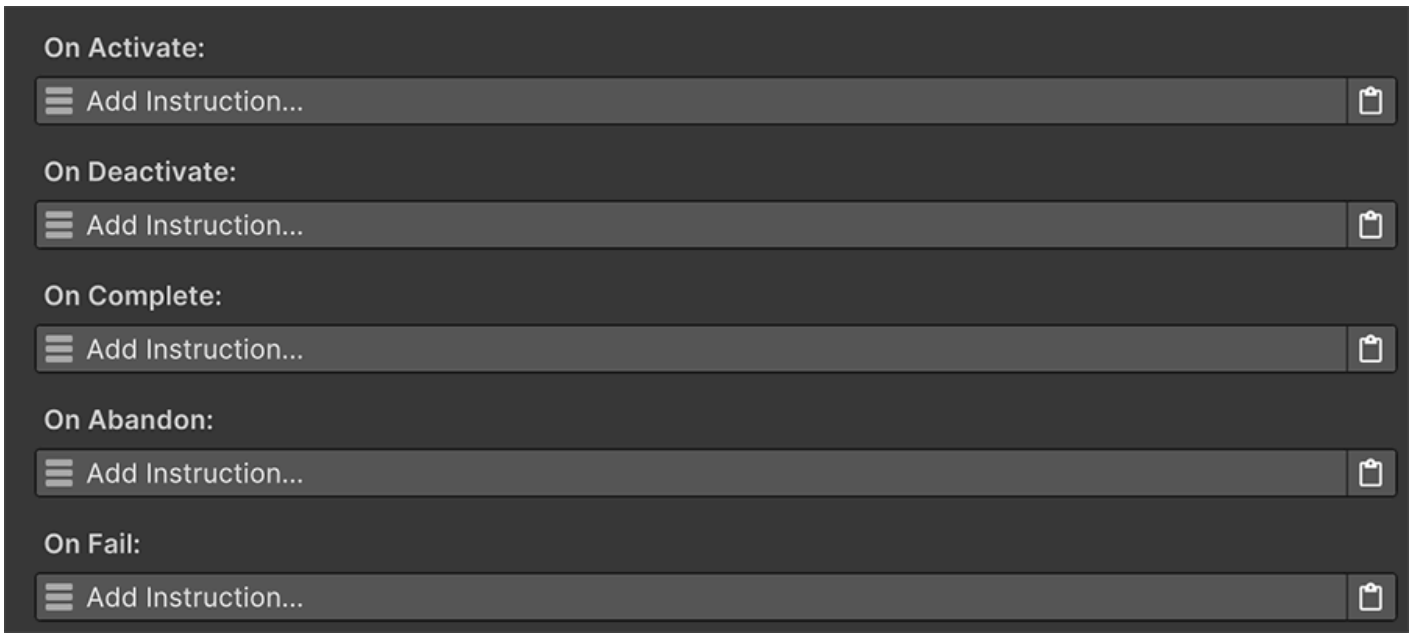
The **ID** is a unique identifier that distinguishes a *Quest* from others.

> **Two Quests with the same ID**
>
> If there are two *Quest* assets with the same **ID** value, an error message will appear above. To resolve it, click on any of the fields and it will reveal a button that regenerates the current value with a unique one.



The second section of the *Quest* asset is the **Tasks Hierarchy**, which controls how the **Quest** runs. We cover this section in detail on the **Tasks** page.

The last section contains a collection of **Instructions** that are executed when the **Quest** changes its state.

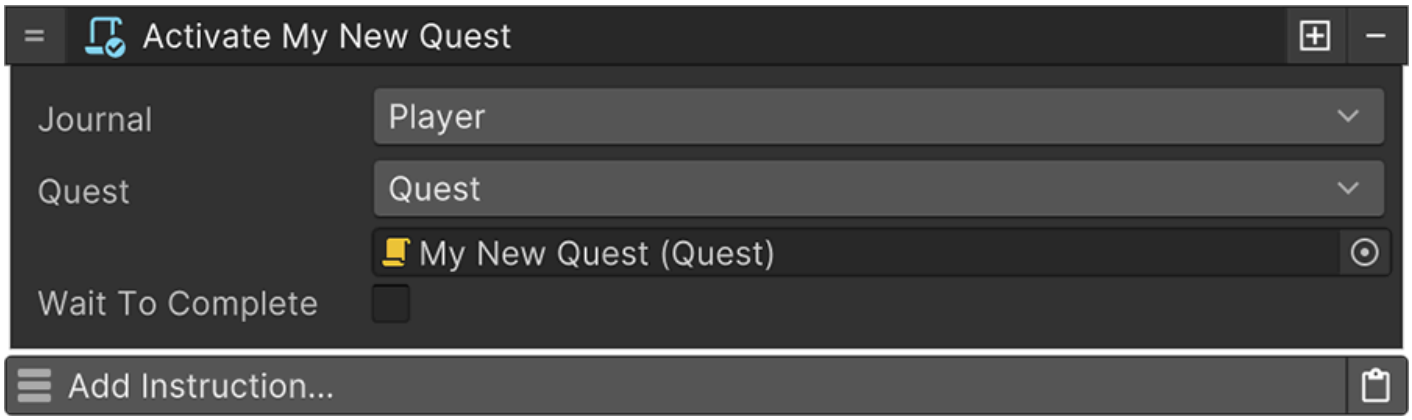


When a Quest is Completed

For example, the **On Complete** instructions will be executed as soon as the **Quest** is successfully completed. This can be used to give the Player some rewards, display a notification, etc...

862.2 States

A **Quest** starts in an **Inactive** state. In order to start a quest, the instruction **Quest Activate** can be used, which will enable it in a particular **Journal** component.



When activating a **Quest**, the first root **Task** is also activated. This process cascades to any other subtasks the **Task** may have. Once the first **Task** is completed, its next sibling is **Activated**. This process is repeated until all root **Tasks** are finished.

About Tasks

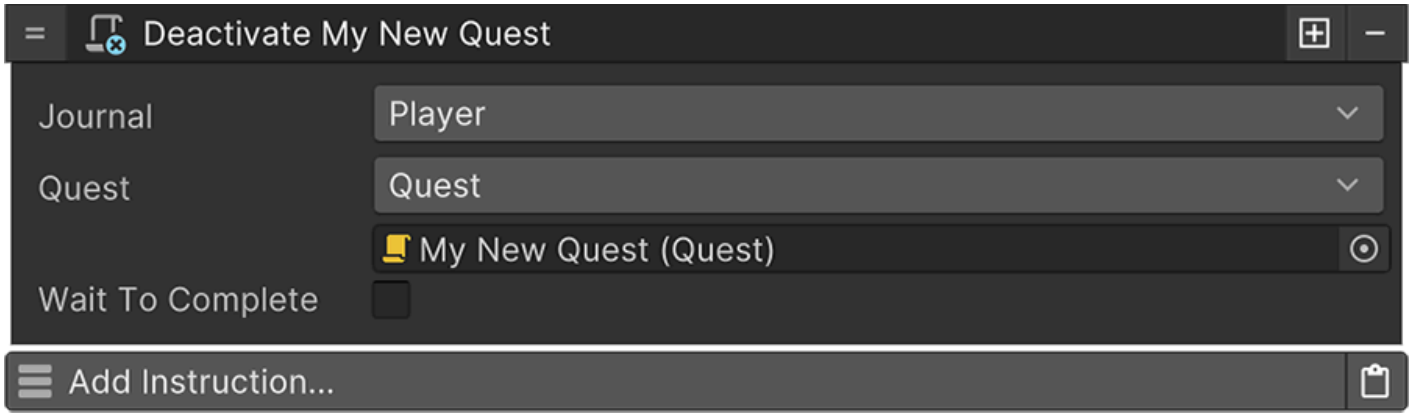
See the Tasks States for more information about running tasks.

An **Active** quest can then either transition to **Inactive**, or one of the following *Finished* states:

- **Completed**
- **Abandoned**
- **Failed**

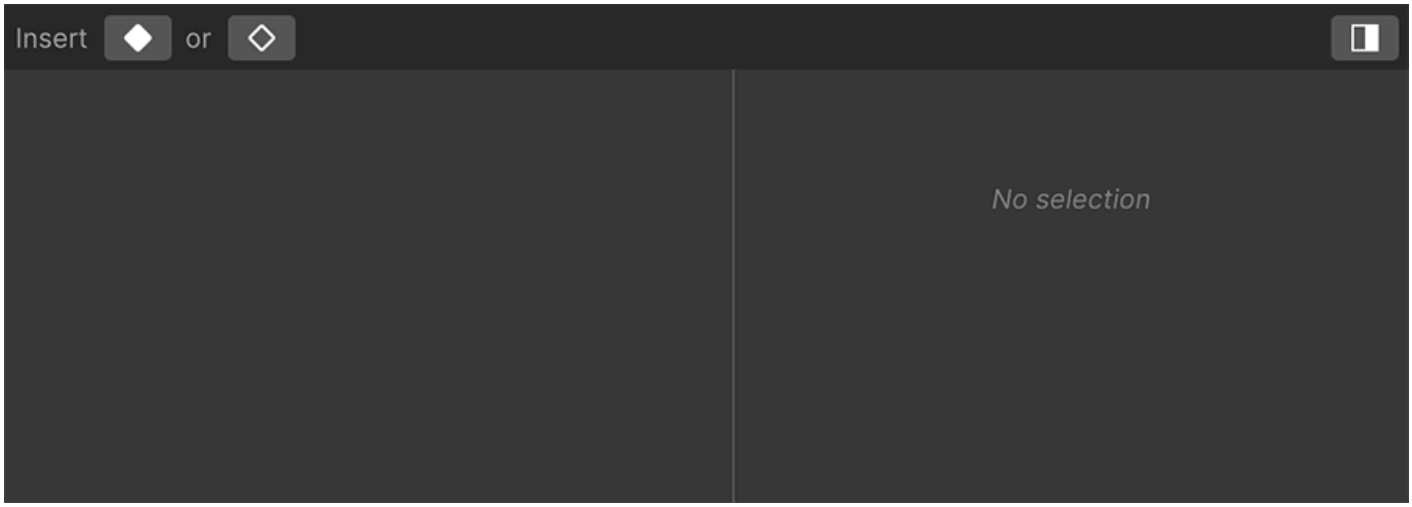
A quest is automatically **Completed** if all of its root tasks are completed (in sequence, from top to bottom). If a root task is **Abandoned** or **Failed**, the quest will also be automatically **Abandoned** or **Failed** respectively.

At any point, a quest can be deactivated using the **Quest Deactivate** instruction.



863 Tasks

At the bottom section of the **Quest** asset there's the *Tasks Hierarchy* panel, which controls the logic behind the **Quest**.



What is a Task

A **Task** is a node that can contain a series of *Subtasks*, which in turn may contain other *Subtasks*.

The two buttons at the left of the top toolbar allow creating a new **Task**: The left one creates a *Task* node as a sibling of the current selected one, while the right one creates a child *Task*.

The right button toggles the *Task Inspector* tab, which allows to edit the currently selected **Task** details.

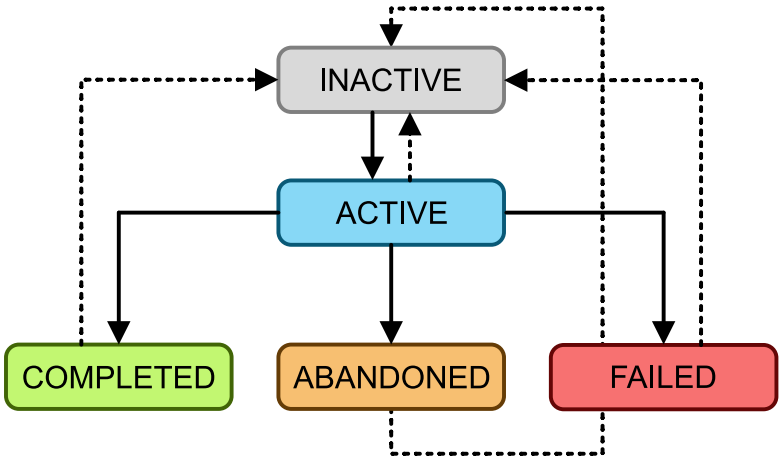
Drag to move Tasks

You can hold the left mouse button over a Task and drag it somewhere else to reorganize your Tasks

863.1 Task States

A **Task** can be in one of the following states at any given time:

- **Inactive:** The default state.
- **Active:** An active task is currently being executed and can transition to a finished state.
- **Completed:** The task has been successfully resolved.
- **Abandoned:** The task has been abandoned, with similar effects to the failed state.
- **Failed:** The task has been failed.



A **Task** can't transition to and from any state. Instead, there's a set of rules that define those.

- An **Inactive** Task can only transition to an **Active** state.
- An **Active** Task can transition to either **Inactive**, or to any finished state.
- A *Finished* state can only transition to an **Inactive** state.

Finished States

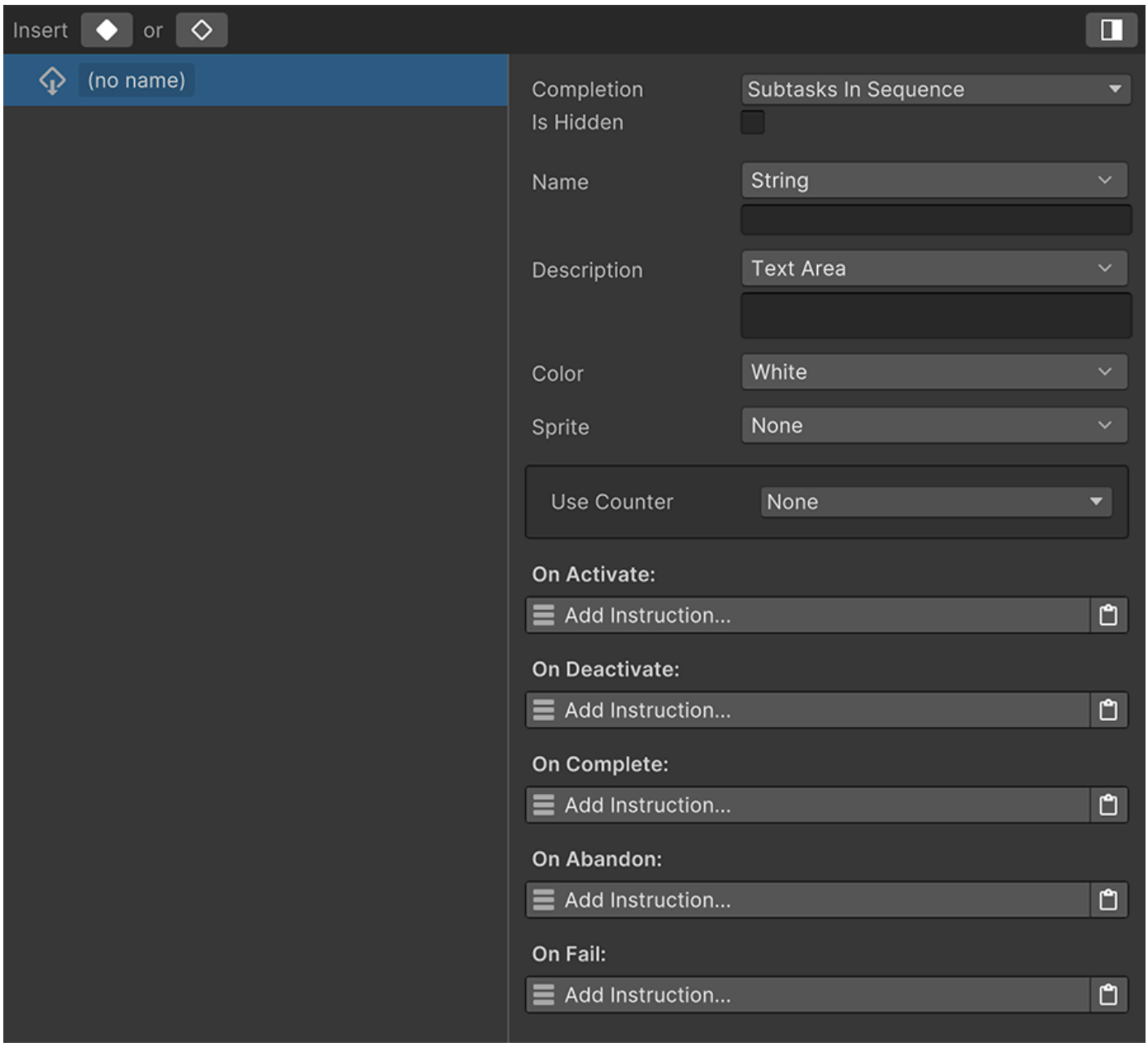
A *Finished* state means either **Completed**, **Abandoned** or **Failed**.

Switch to an invalid State

If an **Inactive** task tries to change its state to **Completed**, the command will be ignored because only an **Active** task can be completed.

863.2 Task Anatomy

To modify the properties of a **Task**, select it from the *Tasks Hierarchy* and reveal the *Inspector* on the right side by clicking on the top-right button of its toolbar.



863.2.1 Settings

The **Completion** mode field determines how this **Task** is completed, if it has any subtasks.

> **More Information**
>
> More information about Subtasks at the **Running Subtasks** section.

The **Is Hidden** field determines whether this particular task should be considered as hidden. This is used to skip displaying a particular task-line in the UI.

The **Name** and **Description** fields are also used by the user interface to communicate the information about this particular task.

The next fields, **Color** and **Sprite**, are optional and can be used to customize the appearance of different tasks.

Using Sprites for Tasks

For example, it may be desirable to display a different icon on the HUD depending on the task at hand. Some investigation tasks might display a magnifier, while an assassination task could display a skull icon.

863.2.2 Counters

The **Use Counter** allows to define a task as a countable one or not. The options available are *None*, *Value* and *Property*.

863.2.2.1 No Counter

By default, a task is set to *None* by default. This means that the task must be completed using the *Complete Task* instruction. However, tasks can also include a counter that automatically completes the quest when the value and the counter become equal.

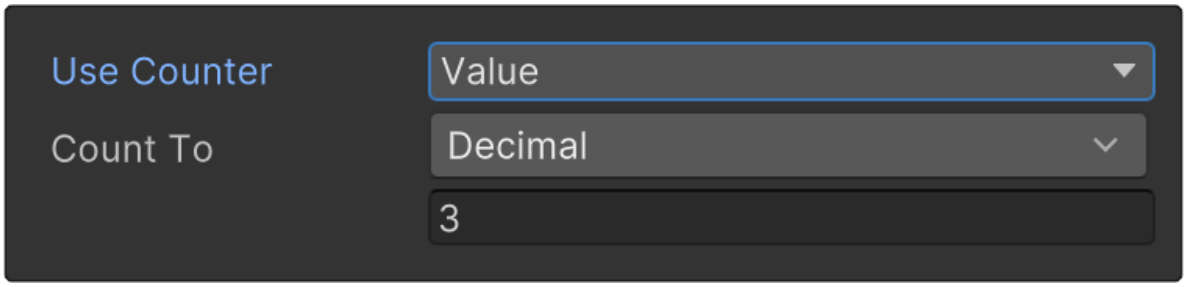
Example of Counter task

The most common example of a Counter task is when an NPC asks the player to kill a certain number of enemies. The *counter* would be the amount of enemies to kill, while the *value* would be the enemies killed so far.

As soon as the *value* and the *counter* are the same, the task is automatically completed.

863.2.2.2 Value Counter

This option displays a single **Count To** field, which is the value to reach in order to complete this task.



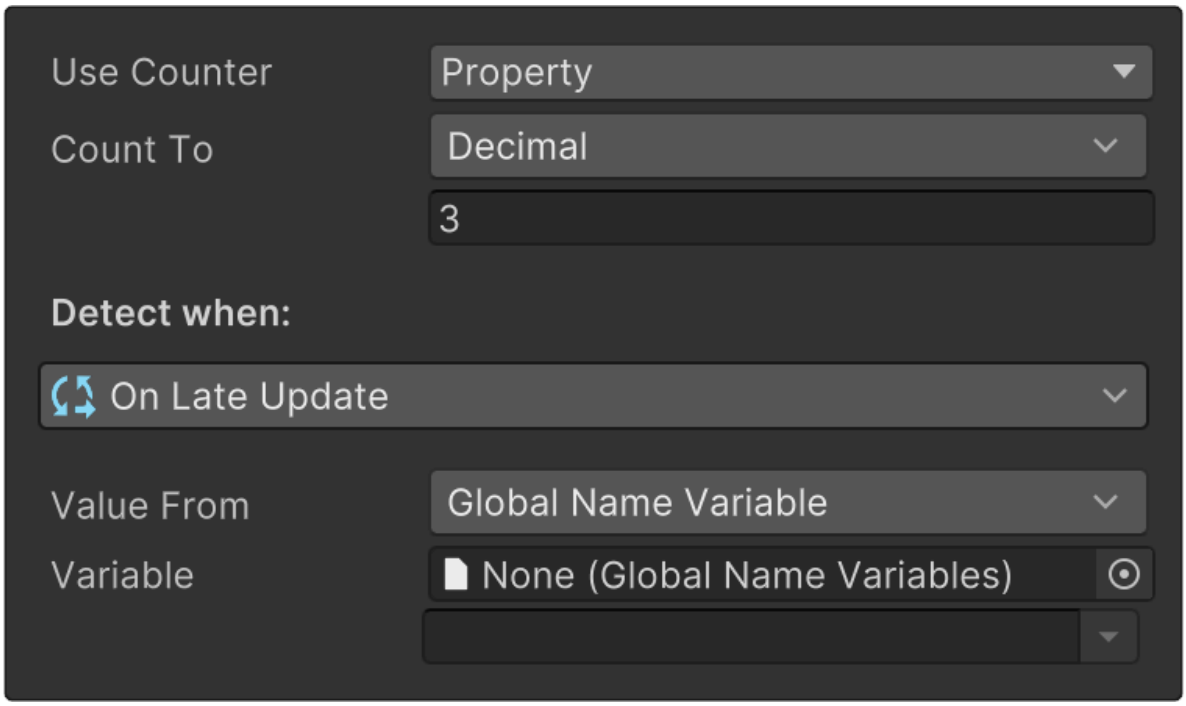
Kill 5 boars

For example, if an NPC tasks the player to kill 5 boars, the **Count To** field would be 5. The starting value is zero at the beginning, and can be changed using the **Task Value** instruction.

In this case, the instruction would increment in +1 the value of the task, automatically completing it after defeating 5 boars.

863.2.2.3 Property Counter

The **Property** option is a bit more advanced, and allows to also count up to a certain amount in order to automatically complete the task, but the value is synchronized with a dynamic property.



The **Count To** field, just like in the previous option, defines the desired value to reach.

The **Value From** field is a dynamic property that allows to choose the source from which the current value is taken. For example, a **Global Variable**.

> **From other Game Creator modules**
>
> This option allows to seamlessly combine Quests with other **Game Creator** modules. For example, a quest giver may ask to collect a certain amount of *Potions*, which is defined as an item in the **Inventory** module. The **Value From**, in this case, would be the amount of *Potions*.

The **Detect When** event is used to determine when the synchronization should be executed. For example, if the dynamic value comes from a **Global Name Variable**, the detection should be set to run when a global variable changes.

> **Follow-up with the Inventory module**
>
> Similarly, if we are using the amount of a particular *Item* of the **Inventory** module as the value of a counter task, the detection should be set whenever the **Bag** component changes.

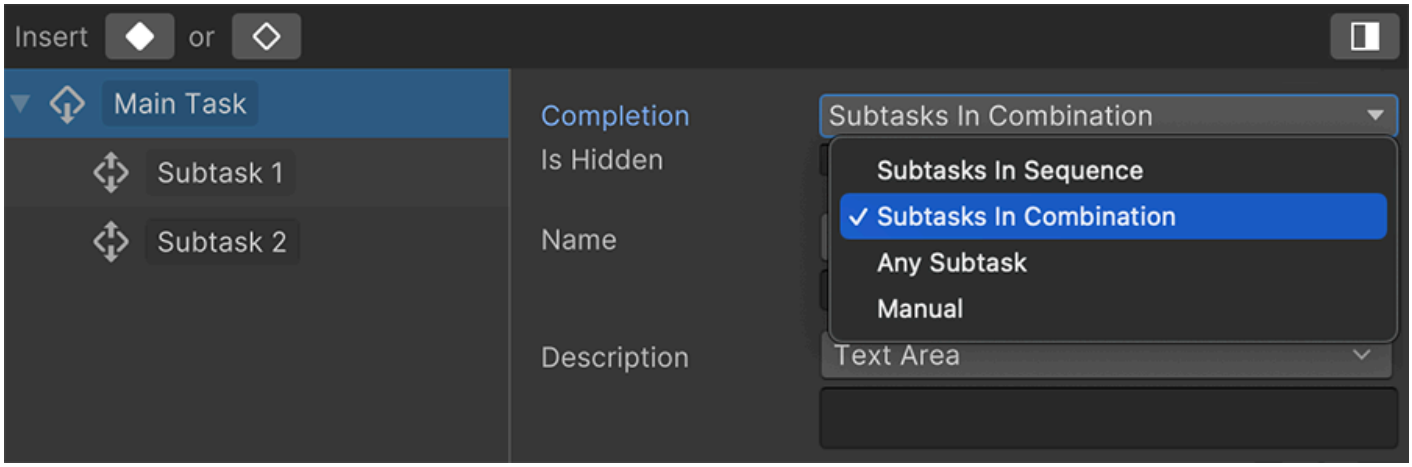
863.2.3 Instructions

A **Task**, just like a **Quest**, has a collection of **Instructions** that can be executed whenever a task changes its state.

- The **On Deactivate** is executed when a task changes its state to *Inactive*.
- The **On Activate** is executed when a task changes its state to *Active*.
- The **On Complete** is executed when a task changes its state to *Completed*.
- The **On Abandon** is executed when a task changes its state to *Abandoned*.
- The **On Fail** is executed when a task changes its state to *Failed*.

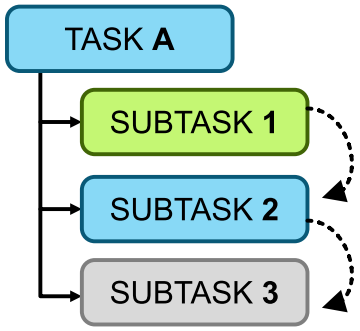
863.3 Running Subtasks

A **Task** that has one or more child **Subtasks** will be automatically *Completed*, *Abandoned* or *Failed*, depending on the value of its **Completion** field.



863.3.1 Subtasks in Sequence

This type of **Task** activates the first **Subtask** as soon as it is activated, leaving any subsequent subtasks inactive.



When the **Subtask** is completed, the next sibling task is activated. This is repeated until all **Subtasks** are completed, at which point the **Task** is automatically completed too.

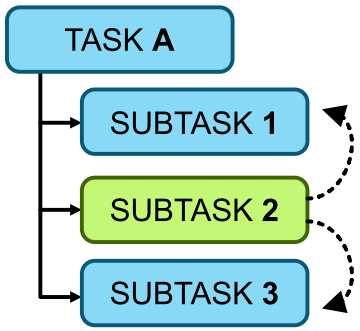
If any **Subtask** is abandoned or failed, the **Task** is also abandoned or failed, respectively.

Use case

Running a series of tasks in order is the most common type. For example, a quest-giver asking to find its *Magic Sword* and return it to them. In this case, finding the *Magic Sword* would be the first subtask, and completing it would activate the second subtask: returning the item to the quest-giver.

863.3.2 Subtasks in Combination

This type of **Task** activates all **Subtasks** as soon as it is activated.



These **Subtasks** can be completed in any order, and as soon as all of them are completed, the **Task** will also become completed.

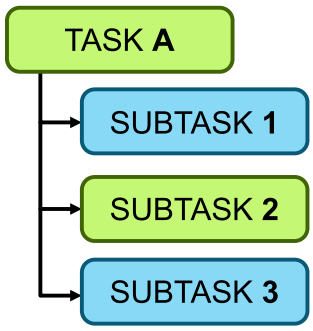
If any **Subtask** is abandoned or failed, the **Task** is also abandoned or failed, respectively.

Use case

This type is mostly used during investigation segments: The player arriving at a crime scene and having to investigate multiple clues, in any order. For example, talking to a witness, investigating the footprints and doing a preliminary autopsy on the victim. After all these subtasks have been completed, the task will be completed too.

863.3.3 Any Subtask

This type of **Task** activates all **Subtasks** as soon as it is activated.



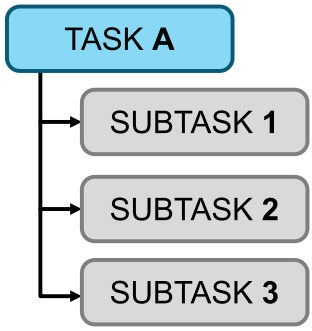
As soon as any **Subtask** is completed, the **Task** will automatically be completed too and leave the rest of the **Subtasks** as active.

Because it only requires a single **Subtask** to be completed in order to complete the **Task**, the **Task** won't be abandoned or failed unless there are no other inactive **Subtasks**.

> **Use case**
>
> This type is used when making branching decisions where completing one subtask determines a different path than completing another subtask. For example, killing a targeted enemy or sparing its life. Once a decision has been made (aka a subtask has been completed), it locks the player from doing the other one.

863.3.4 Manual

This type of **Task** does not activate any **Subtasks** when activated.



If the other modes do not fit a particular quest flow, this one can be selected in order to customize each step, as it doesn't automatize any changes.

> **Use case**
>
> There aren't any particular use cases. However, if you want to take full control over when a task is completed (for example, despite its children subtasks not being completed), this might be useful.

864 Tracking

Tracking a **Quest** means the player will prominently see that particular quest highlighted among the rest.

HUD

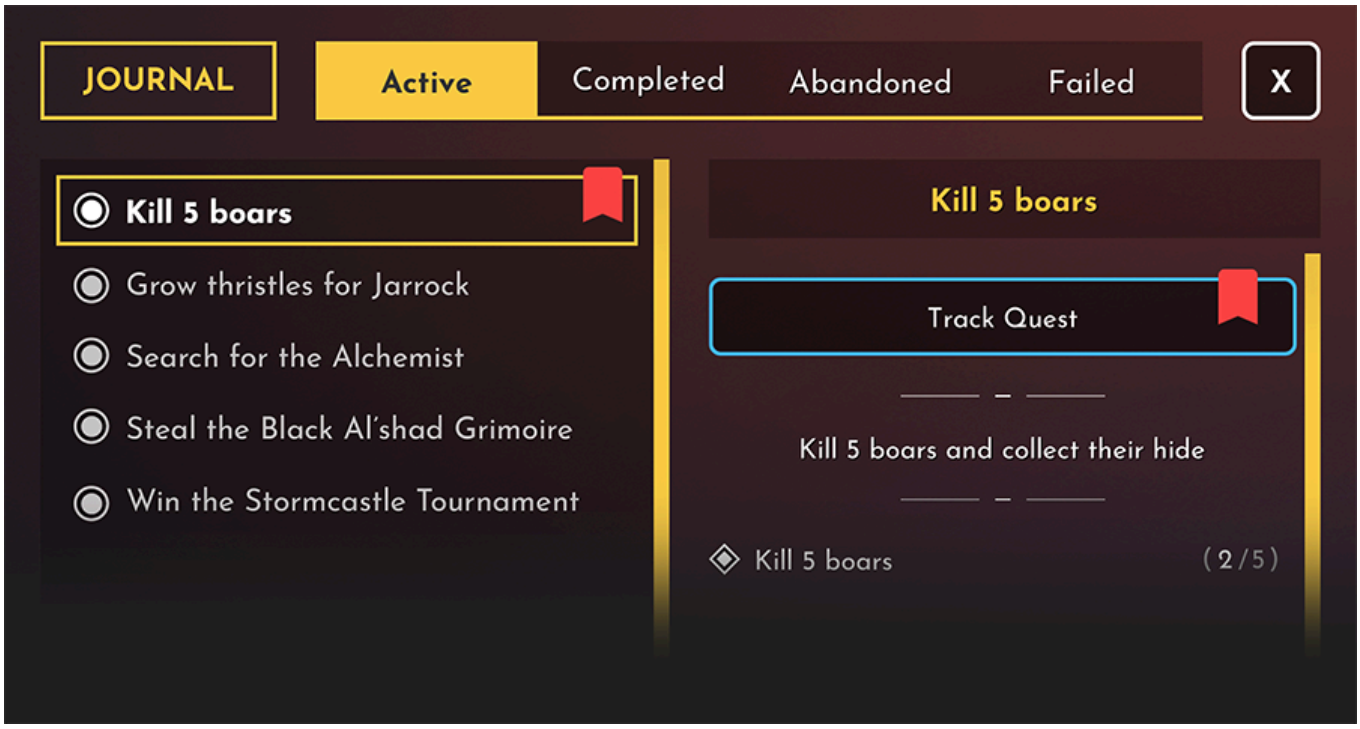
For example, by default, the **HUD** will only display those Quests being tracked, so the player is not overwhelmed having too many quests active at a time.

The **Quests** module allows to either limit the amount of quests tracked to a single one, or multiple ones. You can customize this behavior by changing it in the dropdown menu field in the **Journal** component.

To start **Tracking** a quest, you can either use the **Quest Track** instruction, or let the **UI** components that the **Quests** module comes with, handle it.

Working examples

The UI *Journal* template that the **Quests** module comes with, contains an example where a list of active quests are displayed on the left side, and selecting one allows to toggle its tracking state.



To **Untrack** a quest, you can either toggle it from the UI elements or use the **Quest Untrack** instruction. Alternatively, you can also stop tracking all quests by using the **Quests Untrack All** instruction.

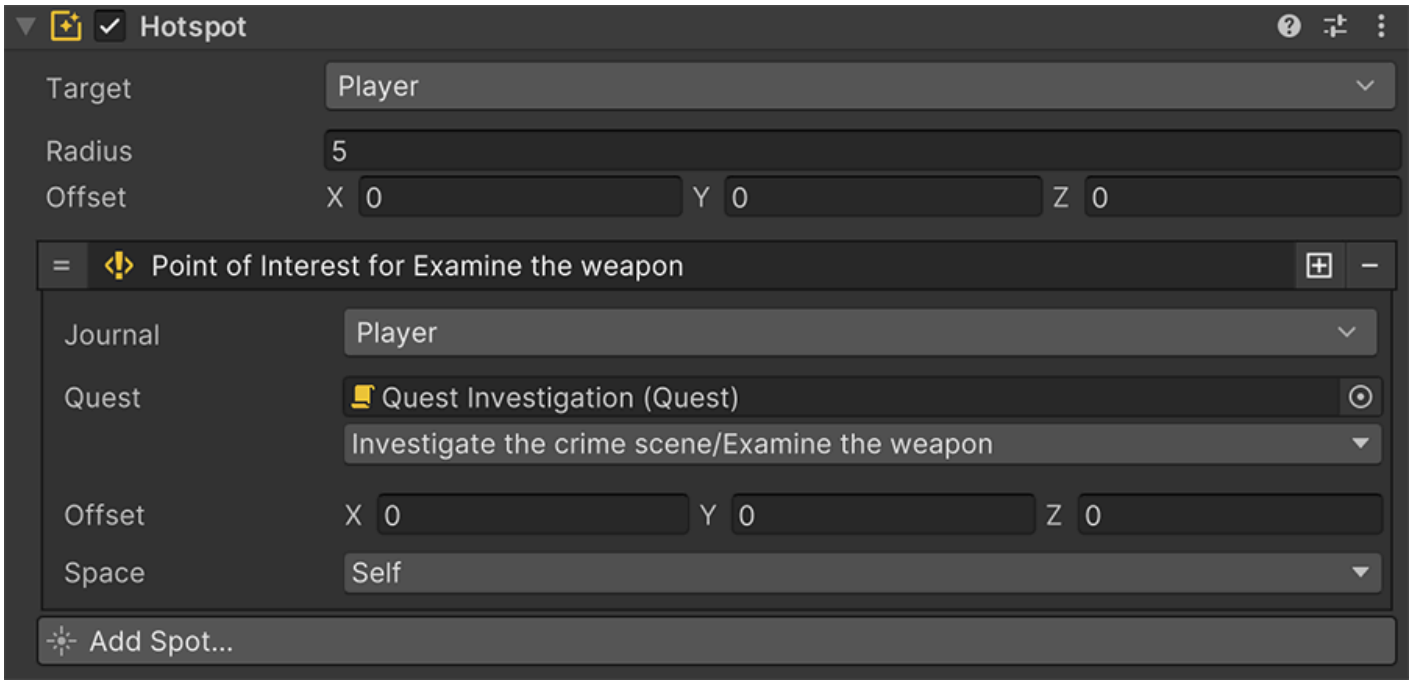
865 Points of Interest

A *Point of Interest* is a highlighted location that is of interest to the player.

865.1 Setup

Defining one is done by adding either the **Task Point of Interest** or the **Custom Point of Interest**.

- **Task Point of Interest:** Defines a point of interest linked to a specific *Task*. When the task is in an *Active* state, the point of interest is enabled. Otherwise, it's disabled.
- **Custom Point of Interest:** Defines a point of interest not bound to any specific task or quest. Useful for positioning objects that are not related to quests, such as enemies, collectibles, etc, ...

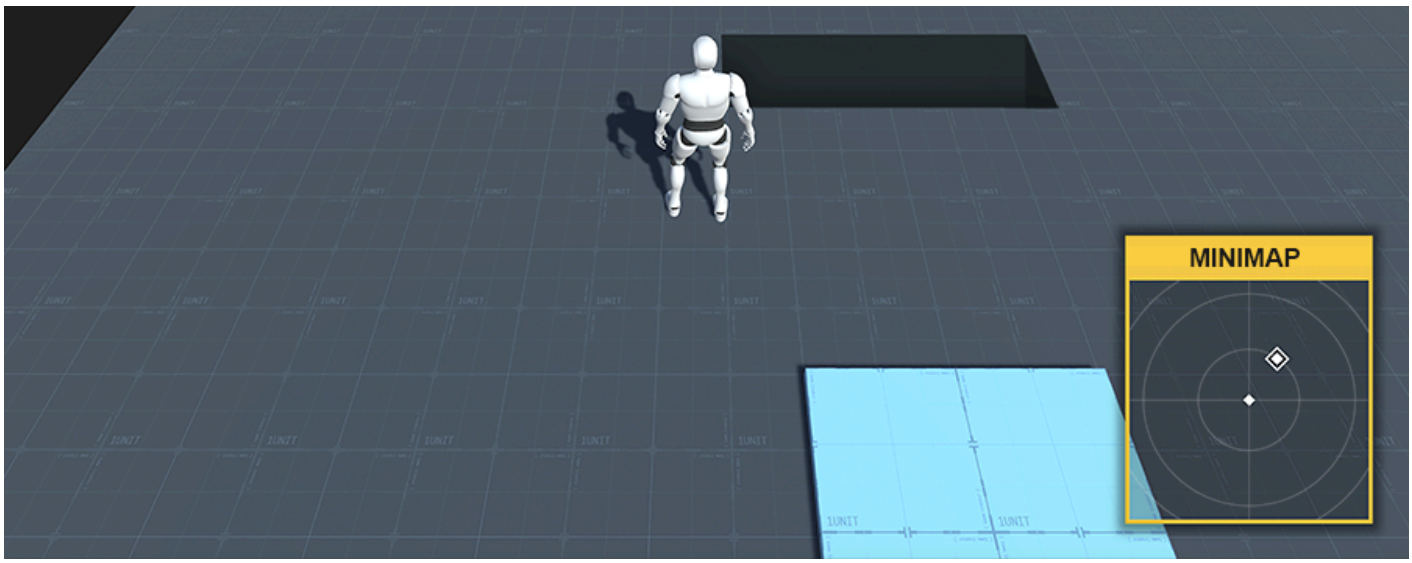


865.2 Showing Points of Interest

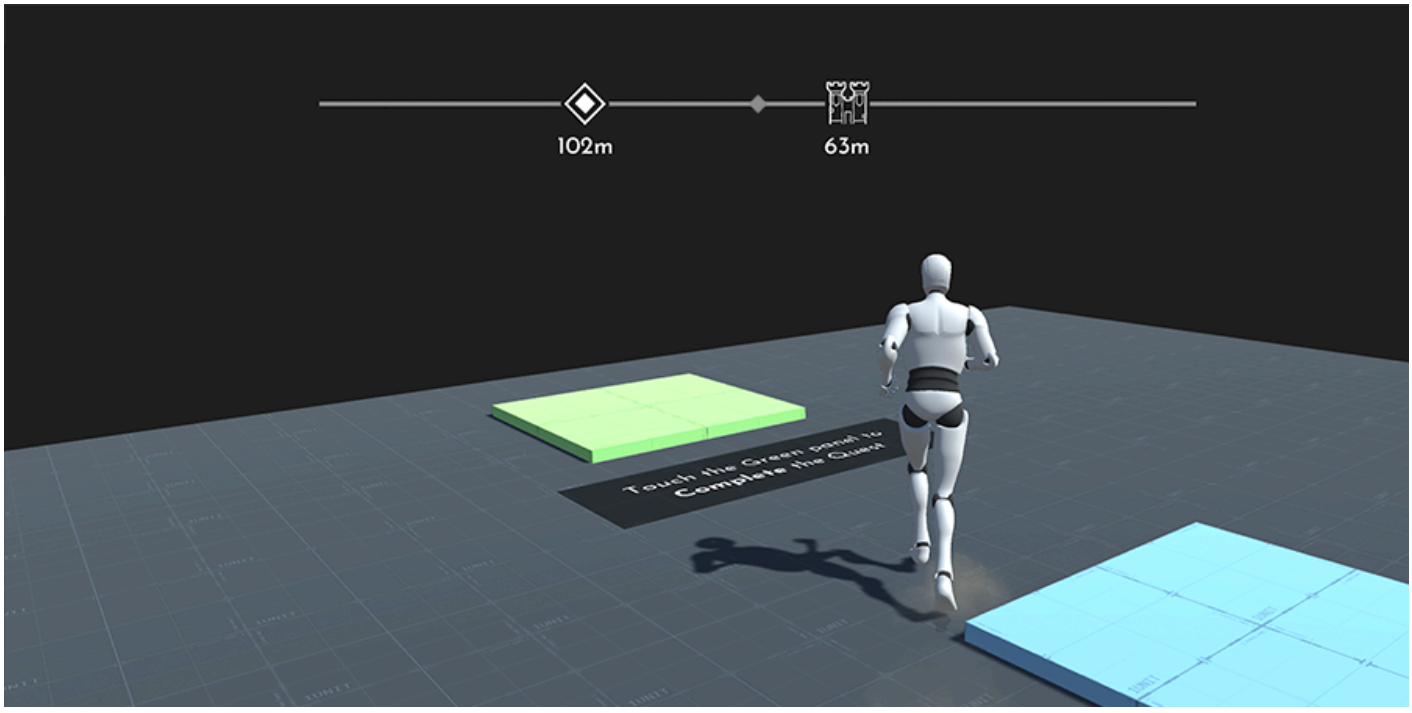
A Point of Interest is automatically displayed using one of the Points of Interest UI components.

The **Quests** module comes with a collection of game-ready systems that you can drag and drop onto your game and they will automagically work.

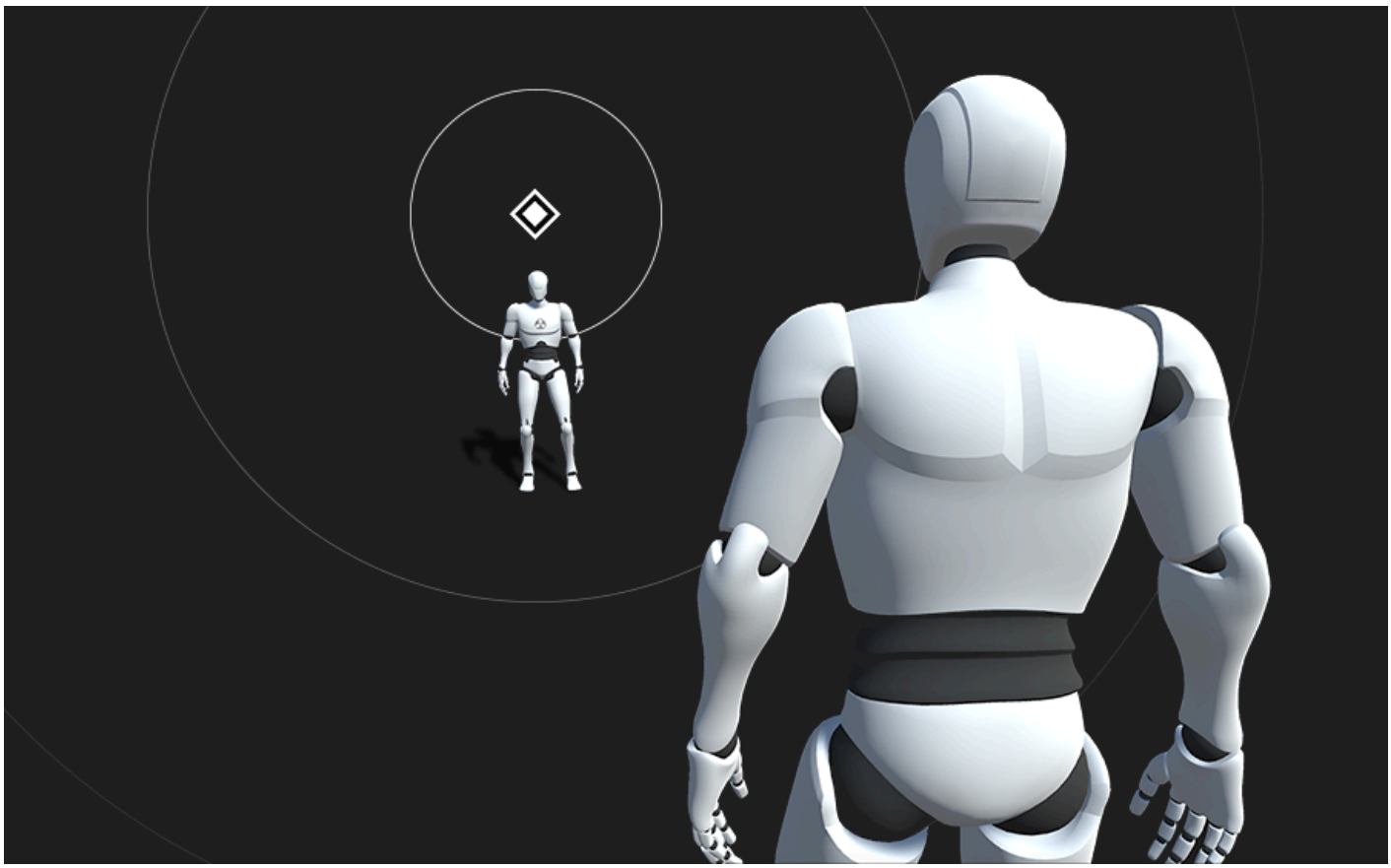
For example, the **Minimap** prefab from the examples displays a rectangle on the bottom right corner of the screen.



The **Compass** from the examples shows a minimalist line at the top of the screen with elements that fade in and out as they are shown on-screen.



The **Indicators** prefab displays the icon of the Task directly on top of the screen space position of the scene object.



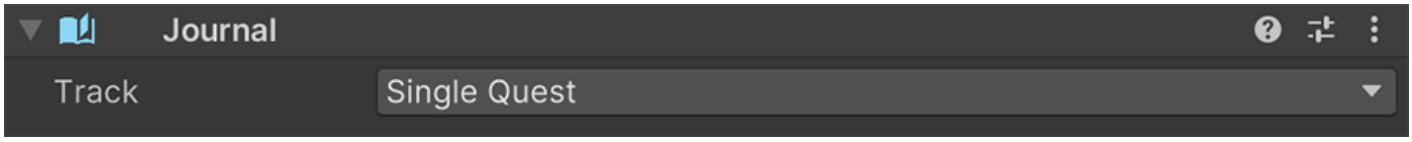
Off-Screen Indicators

By default, the **Indicators** prefab displays off-screen elements at the closest edge of the screen, with an arrow indicating its direction.

However, this can be disabled unticking the `Keep in Bounds` field from the **Indicators UI** component.

866 Journal

The **Journal** is a component that keeps track of the current state of **Quests** and its tasks.



Journal on Player

It is usually attached to the **Player** character object so it's easy to access. However, you can decide to attach it to some other object or even have multiple characters, each with their own quests log.

866.1 Tracking

The **Journal** component determines whether it can track only one **Quest** at a time, or multiple quests. If the value is set to **Single Quest**, attempting to track a quest will untrack any previous tracked one.

However, if the value is set to **Multiple Quests**, tracking another one will insert it to the list of tracked quests, without untracking any others.

More information

To know more about tracking quests and how is it used, see the **Tracking** section.

866.2 Debugging

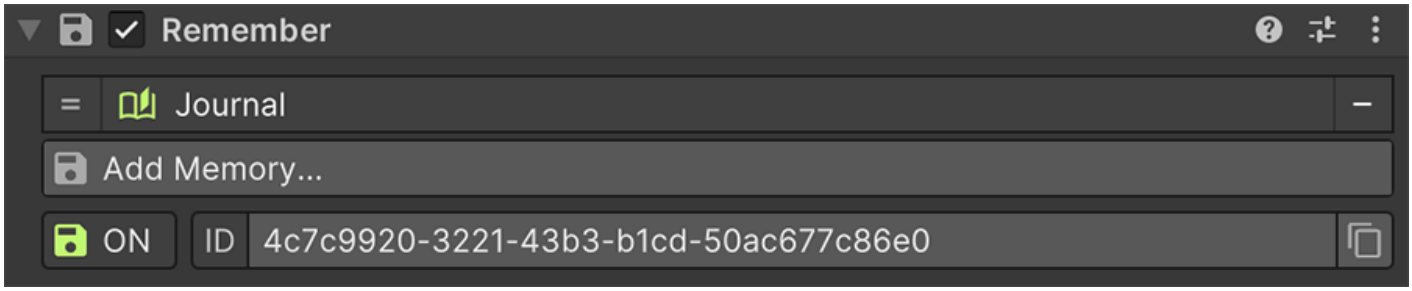
After entering play-mode, the **Journal** component changes its appearance and will display real-time information about the current state of *Quests* and *Tasks*.

This allows to easily debug whether a **Quest** has been properly activated, which **Tasks** are completed, and so on.

> **Expand and Collapse**
>
> You can click on the **Quest** and **Task** to toggle its expand state, in case there is a lot of visual noise due to the amount of elements.

866.3 Saving the Game

The **Journal** doesn't automatically store the quests and tasks states. In order to do so, simply add the **Remember** component to where the Journal component is and add the **Journal** memory.



This will automatically handle saving the state of Tasks and Quests, and loading them back when a previously saved game is loaded.

V.II Visual Scripting

867 Visual Scripting

The **Quests** module symbiotically works with **Game Creator** and the rest of its modules using its visual scripting tools.

- **Instructions**
- **Conditions**
- **Events**

Each scripting node allows other modules to use any **Quests** feature.

V.II.I Conditions

868 Conditions

868.1 Sub Categories

- Quests

V.II.I.I Quests

869 Quests

869.1 Sub Categories

- Groups

869.2 Conditions

- Are Quests Equal
- Is Quest Abandoned
- Is Quest Active
- Is Quest Completed
- Is Quest Failed
- Is Quest Inactive
- Is Task Abandoned
- Is Task Active
- Is Task Completed
- Is Task Failed
- Is Task Inactive

870 Are Quests Equal

```
Quests » Are Quests Equal
```

870.1 Description

Returns true if two given Quest assets are the same

870.2 Keywords

`Journal` `Mission` `Task`

871 Is Quest Abandoned

```
Quests » Is Quest Abandoned
```

871.1 Description

Returns true if a Quest from a Journal is abandoned

871.2 Keywords

`Journal` `Mission`

872 Is Quest Active

```
Quests » Is Quest Active
```

872.1 Description

Returns true if a Quest from a Journal is active

872.2 Keywords

`Journal` `Mission`

873 Is Quest Completed

```
Quests » Is Quest Completed
```

873.1 Description

Returns true if a Quest from a Journal is completed

873.2 Keywords

`Journal` `Mission`

874 Is Quest Failed

```
Quests » Is Quest Failed
```

874.1 Description

Returns true if a Quest from a Journal is failed

874.2 Keywords

`Journal` `Mission`

875 Is Quest Inactive

```
Quests » Is Quest Inactive
```

875.1 Description

Returns true if a Quest from a Journal is inactive

875.2 Keywords

`Journal` `Mission`

876 Is Task Abandoned

```
Quests » Is Task Abandoned
```

876.1 Description

Returns true if a Task from a Journal is abandoned

876.2 Keywords

`Journal` `Mission`

877 Is Task Active

```
Quests » Is Task Active
```

877.1 Description

Returns true if a Task from a Journal is active

877.2 Keywords

`Journal` `Mission`

878 Is Task Completed

```
Quests » Is Task Completed
```

878.1 Description

Returns true if a Task from a Journal is completed

878.2 Keywords

`Journal` `Mission`

879 Is Task Failed

```
Quests » Is Task Failed
```

879.1 Description

Returns true if a Task from a Journal is failed

879.2 Keywords

`Journal` `Mission`

880 Is Task Inactive

```
Quests » Is Task Inactive
```

880.1 Description

Returns true if a Task from a Journal is inactive

880.2 Keywords

`Journal` `Mission`

V.II.I.I.I GROUPS

881 Groups

881.1 Conditions

- Are All Quests Completed
- Is Any Quest Completed

882 Are all Quests Completed

`Quests » Groups » Are all Quests Completed`

882.1 Description

Returns true if at least one Quest from a List is Complete

882.2 Keywords

`Journal` `Mission` `Group`

883 Is any Quest Completed

```
Quests » Groups » Is any Quest Completed
```

883.1 Description

Returns true if at least one Quest from a List is Complete

883.2 Keywords

`Journal` `Mission` `Group`

V.II.II Events

884 Events

884.1 Sub Categories

- Quests

V.II.II.I Quests

885 Quests

885.1 Events

- On Any Quest Track
- On Any Quest Untrack
- On Quest Abandon
- On Quest Activate
- On Quest Complete
- On Quest Deactivate
- On Quest Fail
- On Task Abandon
- On Task Activate
- On Task Complete
- On Task Deactivate
- On Task Fail
- On Task Value Change

886 On Any Quest Track

```
Quests » On Any Quest Track
```

886.1 Description

Executes after a Quest from a Journal starts being tracked

886.2 Keywords

`Journal` `Mission` `Follow`

887 On Any Quest Untrack

```
Quests » On Any Quest Untrack
```

887.1 Description

Executes after a Quest from a Journal stops being tracked

887.2 Keywords

`Journal` `Mission` `Follow`

888 On Quest Abandon

```
Quests » On Quest Abandon
```

888.1 Description

Executes after a Quest from a Journal is abandoned

888.2 Keywords

`Journal` `Mission`

889 On Quest Activate

```
Quests » On Quest Activate
```

889.1 Description

Executes after a Quest from a Journal is activated

889.2 Keywords

`Journal` `Mission`

890 On Quest Complete

```
Quests » On Quest Complete
```

890.1 Description

Executes after a Quest from a Journal is completed

890.2 Keywords

`Journal` `Mission`

891 On Quest Deactivate

```
Quests » On Quest Deactivate
```

891.1 Description

Executes after a Quest from a Journal is deactivated

891.2 Keywords

`Journal` `Mission`

892 On Quest Fail

```
Quests » On Quest Fail
```

892.1 Description

Executes after a Quest from a Journal is failed

892.2 Keywords

`Journal` `Mission`

893 On Task Abandon

```
Quests » On Task Abandon
```

893.1 Description

Executes after a Task from a Journal is abandoned

893.2 Keywords

`Journal` `Mission`

894 On Task Activate

```
Quests » On Task Activate
```

894.1 Description

Executes after a Task from a Journal is activated

894.2 Keywords

`Journal` `Mission`

895 On Task Complete

```
Quests » On Task Complete
```

895.1 Description

Executes after a Task from a Journal is completed

895.2 Keywords

`Journal` `Mission`

896 On Task Deactivate

```
Quests » On Task Deactivate
```

896.1 Description

Executes after a Task from a Journal is deactivated

896.2 Keywords

`Journal` `Mission`

897 On Task Fail

```
Quests » On Task Fail
```

897.1 Description

Executes after a Task from a Journal is failed

897.2 Keywords

`Journal` `Mission`

898 On Task Value Change

```
Quests » On Task Value Change
```

898.1 Description

Executes after a specific Active Task from a Journal changes its value

898.2 Keywords

`Journal` `Mission`

V.II.III Instructions

899 Instructions

899.1 Sub Categories

- Quests

V.II.III.I Quests

900 Quests

900.1 Instructions

- Quest Activate
- Quest Deactivate
- Quest Track
- Quest Untrack All
- Quest Untrack
- Set Quest
- Task Abandon
- Task Complete
- Task Fail
- Task Value

901 Quest Activate

`Quests » Quest Activate`

901.1 Description

Changes the state of a Quest on a Journal component to Active

901.2 Parameters

Name	Description
Journal	The Journal component that changes the state of the Quest
Quest	The Quest asset reference
Wait to Complete	Whether to wait until the Quest finishes running its Instructions

901.3 Keywords

`Mission` `Start` `Active` `Enable`

902 Quest Deactivate

`Quests » Quest Deactivate`

902.1 Description

Changes the state of a Quest and its Tasks on a Journal component to Inactive

902.2 Parameters

Name	Description
Journal	The Journal component that changes the state of the Quest
Quest	The Quest asset reference
Wait to Complete	Whether to wait until the Quest finishes running its Instructions

902.3 Keywords

`Mission` `Start` `Deactivate` `Inactive` `Disable`

903 Quest Track

```
Quests » Quest Track
```

903.1 Description

Starts tracking a Quest if it is active

903.2 Parameters

Name	Description
Journal	The Journal component that starts tracking the Quest
Quest	The Quest asset reference

903.3 Keywords

`Mission` `Follow` `Bookmark`

904 Quest Untrack All

```
Quests » Quest Untrack All
```

904.1 Description

Stops tracking all Quests that are being tacked

904.2 Parameters

Name	Description
Journal	The Journal component that tracks the Quest

904.3 Keywords

`Mission` `Follow` `Bookmark` `Track`

905 Quest Untrack

`Quests » Quest Untrack`

905.1 Description

Stops tracking a Quest if it is being tacked

905.2 Parameters

Name	Description
Journal	The Journal component that tracks the Quest
Quest	The Quest asset reference

905.3 Keywords

`Mission` `Follow` `Bookmark` `Track`

906 Set Quest

```
Quests » Set Quest
```

906.1 Description

Sets a Quest value equal to another one

906.2 Parameters

Name	Description
Set	Where the value is set
From	The value that is set

906.3 Keywords

`Change` `Task` `Variable` `Asset`

907 Task Abandon

`Quests » Task Abandon`

907.1 Description

Abandons the state of an active Task on a Journal component

907.2 Parameters

Name	Description
Journal	The Journal component that changes the state of the Task
Quest	The Quest asset reference
Task	The Task identifier from the Quest
Wait to Complete	Whether to wait until the Task finishes running its Instructions

907.3 Keywords

`Mission` `Leave` `Forget` `Stop` `Restart`

908 Task Complete

`Quests » Task Complete`

908.1 Description

Completes the state of an active Task on a Journal component

908.2 Parameters

Name	Description
Journal	The Journal component that changes the state of the Task
Quest	The Quest asset reference
Task	The Task identifier from the Quest
Wait to Complete	Whether to wait until the Task finishes running its Instructions

908.3 Keywords

`Mission` `Finish` `Finalize`

909 Task Fail

```
Quests » Task Fail
```

909.1 Description

Fails the state of an active Task on a Journal component

909.2 Parameters

Name	Description
Journal	The Journal component that changes the state of the Task
Quest	The Quest asset reference
Task	The Task identifier from the Quest
Wait to Complete	Whether to wait until the Task finishes running its Instructions

909.3 Keywords

`Mission` `Stop` `Restart`

910 Task Value

```
Quests » Task Value
```

910.1 Description

Sets, Adds or Subtracts a value from a Task

910.2 Parameters

Name	Description
Journal	The Journal component that changes the state of the Task
Quest	The Quest asset reference
Task	The Task identifier from the Quest

910.3 Keywords

`Mission` `Increment` `Change` `Add` `Set` `Progress`

V.III User Interface

911 User Interface

The **Quests** module comes with a collection of components designed to streamline the creation of UI windows and elements.

All examples that come with the module have been created with them and are flexible to accommodate any type of window.

911.1 Quest List UI

This is one of the most important components and allows to display a list of **Quests** in a list fashion.

The **Journal** field determines which component the quests are taken from.

The following fields act as filters to display those quests.

- The **Show** dropdown allows to display only quests that are in a particular state. For example, display only those that are complete and active.
- The **Show Hidden** toggle determines whether hidden quests should be displayed or not.
- The **Hide Untracked** determines if the quests that aren't tracked should be visible or not.
- The **Filter** dropdown allows to define whether to only display those quests that are present in a Global or Local List Variable. This is useful to display achievements or non-standard quests.

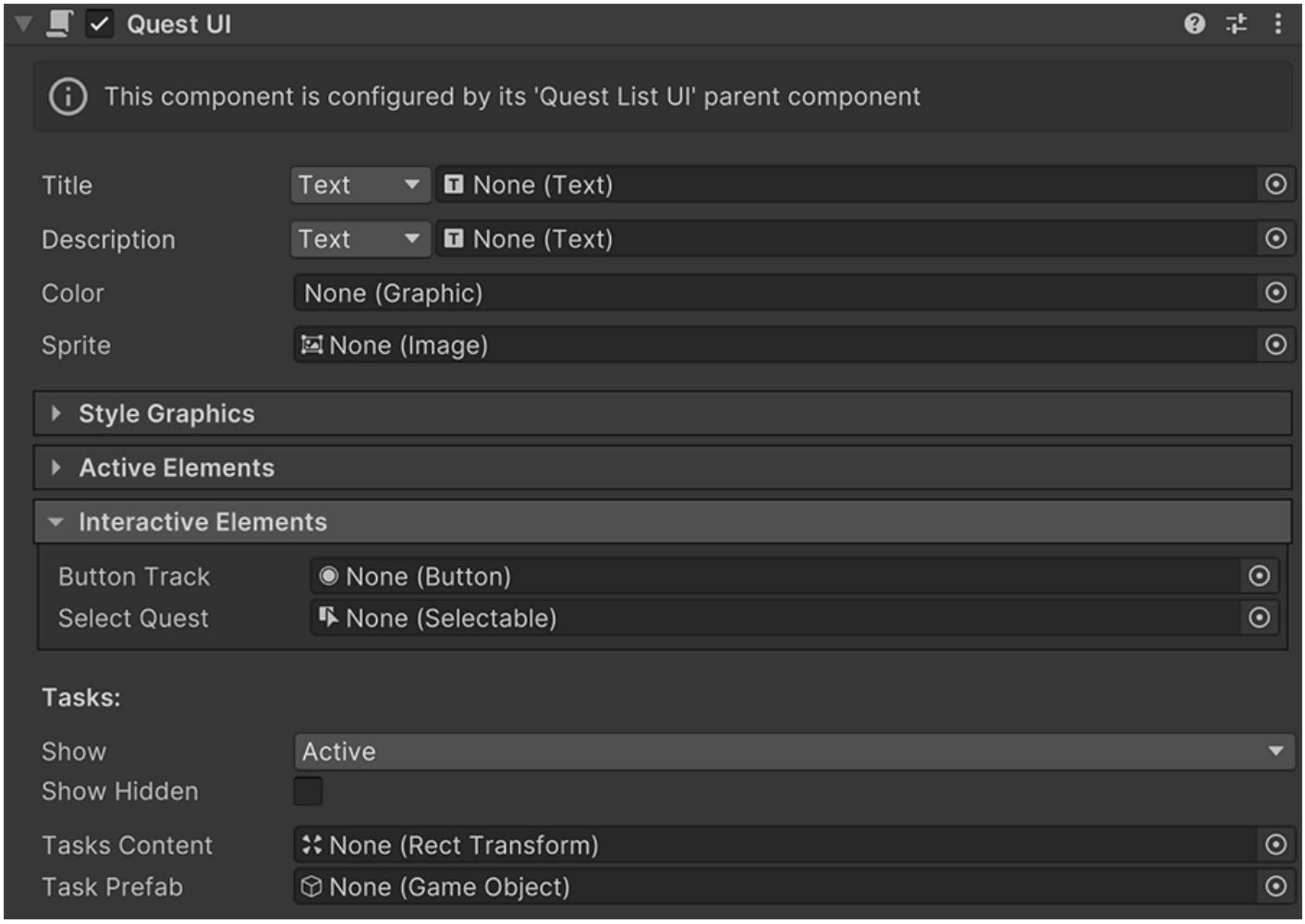
The **Content** field defines the `Rect Transform` where each prefab instance will be instantiated, for every visible quest.

> **Layout component**
>
> The **Content** value should contain an auto-layout component, such as `Vertical Layout Group`, `Horizontal Layout Group` or `Grid Layout Group`.

The **Prefab** is the prefab instantiated inside the *Content*. It must contain a **Quest UI** component, which is automatically configured by its parent.

911.2 Quest UI

This component is used in tandem with the **Quest List UI** to display a list of quests based on a set of rules and filters.



The **Title**, **Description**, **Color** and **Sprite** fields are all optional and reference the indexed quest's homonymous values.

The **Style Graphics** section contains a collection of color codes to change the graphics based on different conditions, such as whether a quest is *Active*, *Inactive*, *Completed*, *Tracked*, etc...

The **Active Elements** section defines a set of optional game objects that are activated/deactivated according to different conditions.

Show a Tracking Bookmark

It is common to mark the currently tracked quest with an icon or a different color. You can do this by selecting a game object that contains a bookmark image, and drag and drop this element onto the `Active if Tracking` field.

This will deactivate the bookmark if the quest is not being tracked, and activate it otherwise.

The **Interactive** elements allow to define different types of interactions performed by the player.

For example, the `Button Track` field instructs a button to toggle the tracking state of the quest when clicked.

The `Select Quest` field allows to define a selection element as a button to select this particular quest.

More about Selections

More information about selecting quests and tasks below at the Selection UI section.

The **Show** and **Show Hidden** fields work exactly like the ones from **Quest List UI** but instead of quests, it refers to tasks.

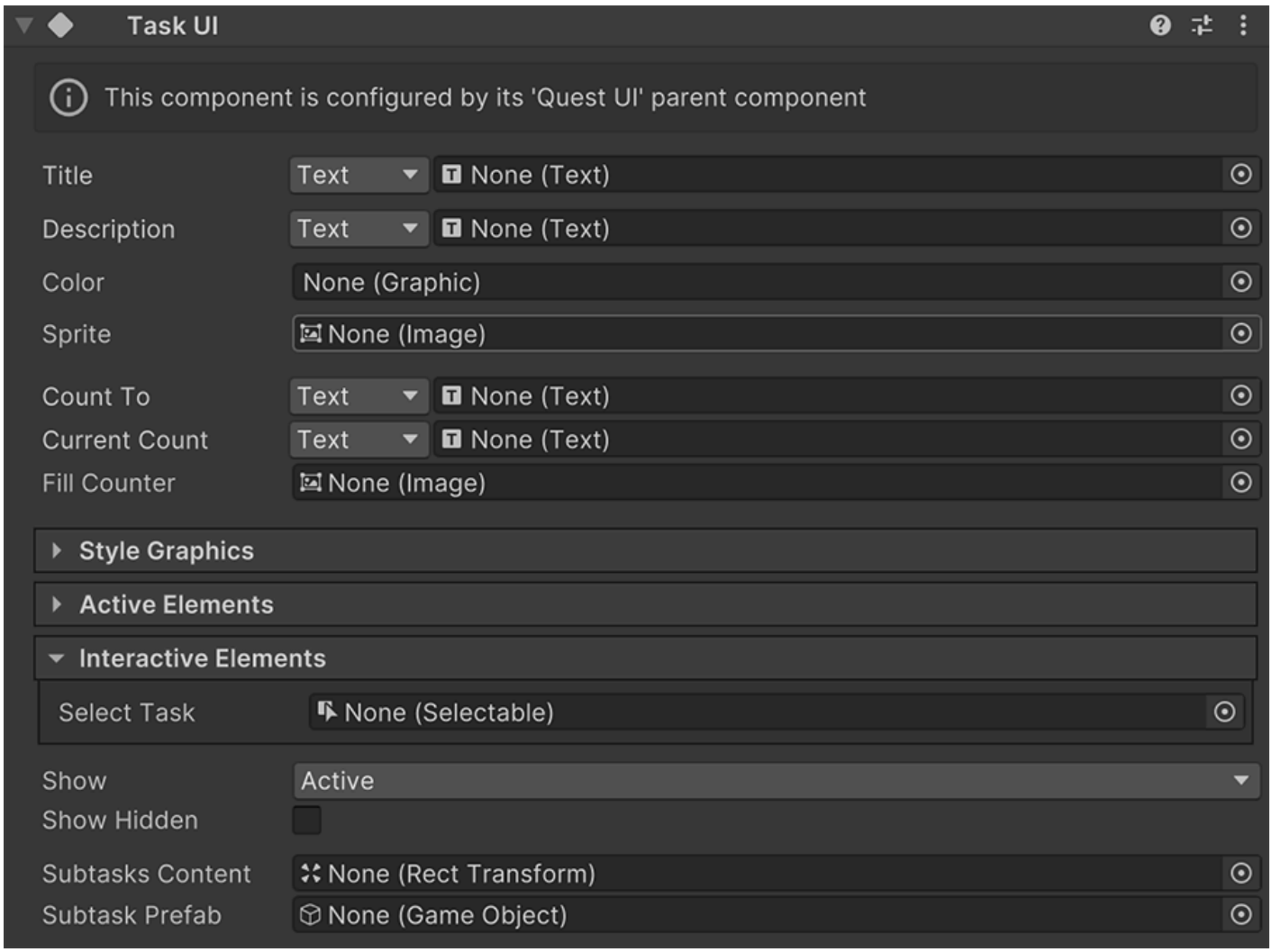
The **Tasks Content** and the **Task Prefab** are two optional fields that allow to define a place where to list the tasks of this quest based on the previous filters.

Task UI required

Just like the **Quest List UI** component requires a prefab with a **Quest UI** component to configure, the latter requires a prefab with a **Task UI** component.

911.3 Task UI

This component is very similar to **Quest UI** but instead of working with quests, it does work with tasks.



As seen in the upper screenshot, most fields are exactly the same, and only a handful differ.

911.4 Selection UI

Upon selecting a quest, any Quests UI component with the *Selection* keyword will be automatically updated.

The components affected are:

- **Selected Quest UI**
- **Selected Task UI**

Both components have the exact same interface as **Quest UI** and **Task UI** respectively. But instead of targeting a specific quest or task, they target the currently selected one, and automatically change upon receiving any change or selecting a new one.

911.5 Points of Interest UI

The points of interest UI components are all related to the highlighting and location of specific Tasks and scene objects around the scene.

For example, displaying a minimap where dots appear around a certain radius, or floating indicators as an overlay over the camera.

911.5.1 Minimap UI

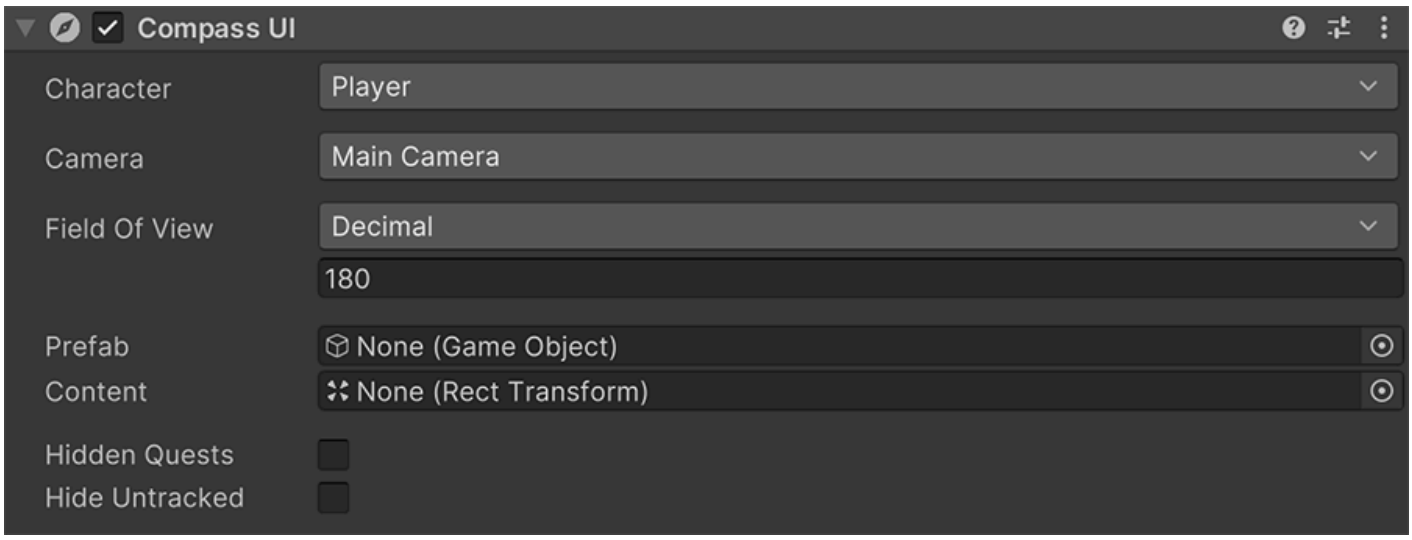
This component is used to display a rectangle and displays nearby points of interest within a certain radius.

Each **Prefab** field must contain a **Minimap Item UI** component, which is configured by this component.

> **Changing Radius**
>
> The radius of the minimap can be changed at runtime, and can be increased when the player goes at a high speed, or even as an unlockable skill that allows to view further away.

911.5.2 Compass UI

The **Compass UI** is a thin line that usually appears at the top of the screen, and displays the direction of points of interest from the camera's point of view.

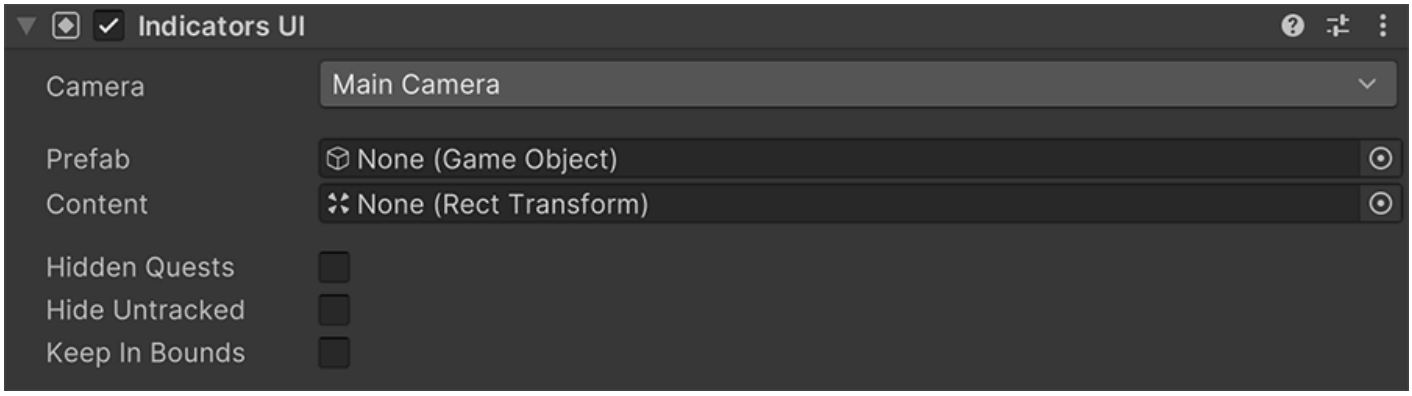


The **Character** field determines the origin of the compass, and the **Camera** field the forward direction to be considered.

Each **Prefab** field must contain a **Compass Item UI** component, which is automatically configured by this component.

911.5.3 Indicators UI

The **Indicators UI** component displays floating images on top of the interface that shows the exact position of the point of interest.



The **Keep in Bounds** field determines whether indicators should stay at the edge of the screen when the world space instance is off-screen.

Each **Prefab** field must contain a **Indicator Item UI** component, which is automatically configured by this component.

V.IV Releases

912 Releases

912.1 2.3.9 (Latest)

Released October 18, 2024

Enhances

- Editor: Support for Unity 6

Fixes

- Editor: Removed obsolete UI Toolkit APIs
- Hotspot: Exception when loading a saved game
- Minimap UI: Null reference when loading a saved game
- Compass UI: Null reference when loading a saved game

912.2 2.3.8

Released February 23, 2024

Fixes

- UI: Indicators incorrect cycle-through
- UI: Components run after all scene changes

912.3 2.3.7

Released October 31, 2023

This version breaks compatibility with previous versions and will only work with Game Creator 2.13.43 or higher.

Changes

- Tasks: Better performance on Task property checks
- Internal: Support for Core 2.13.42 version

Fixes

- Quests: Destruction of Events with same Task ID
- Condition: Group all Complete with latest core version
- Condition: Group any Complete with latest core version

912.4 2.2.6

Released August 29, 2023

Fixes

- Quests: Destruction of Events with same Task ID
- Condition: Group all Complete with latest core version
- Condition: Group any Complete with latest core version

912.5 2.2.5

Released June 13, 2023

Fixes

- Variables: Quest type initialized in correct phase

912.6 2.2.4

Released March 24, 2023

New

- Hotspots: Allow to define a fade in/out distance
- Compass: Display distance with units
- Compass: Fade in/out based on distance/direction
- Minimap: Fade in/out based on distance
- Indicators: Fade in/out based on distance
- Property: Get Quest/Task Sprite
- Property: Get Quest/Task Color
- Settings: Displays current and update version

Changes

- Signature format from Core 2.9.34

912.7 2.1.3

Released November 8, 2022

New

- Points of Interest icon
- Points of Interest now use Layers

Changes

- Copy-Runner with less memory footprint

Fixes

- Hotspot: Error when deleting Point of Interest

912.8 2.0.2

Released September 22, 2022

New

- Trigger: On Task Value Change

Enhances

- Editor: Quests remembers last selection

Fixes

- Indicators: Wrong position when off-screen

912.9 2.0.1

Released September 15, 2022

New

- First release

VI. Behavior

913 Behavior

The **Behavior** module allows to easily create and manage all your game's intelligent agents using a wide variety of industry-standard tools:

- **State Machines**
- **Behavior Trees**
- **GOAP**
- **Utility AI**

Choosing one or another is a matter of preference and what makes more sense. It's a *the right tool for the job* kind-of situation where there's not one definitive answer.

This documentation goes over them in detail from the most basic to the most complex systems.

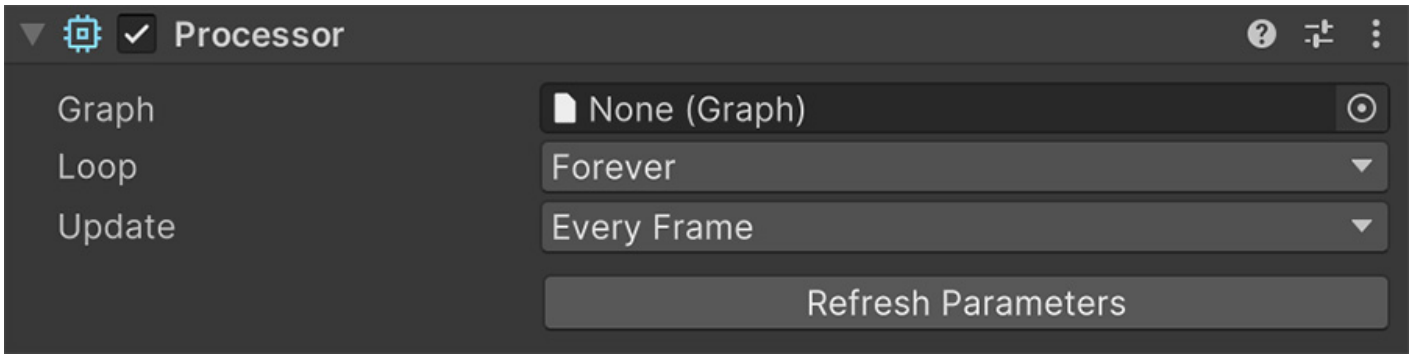
Get Behavior

Requirements

The **Behavior** module is an extension of **Game Creator 2** and won't work without it

913.1 The Processor

The **Processor** component is responsible for executing the logic of any of the aforementioned AI systems and can be added to any game object in the scene, not just characters.



This component has a **Graph** field which accepts a **State Machine**, **Behavior Tree**, **Action Plan** or **Utility Board** graph asset.

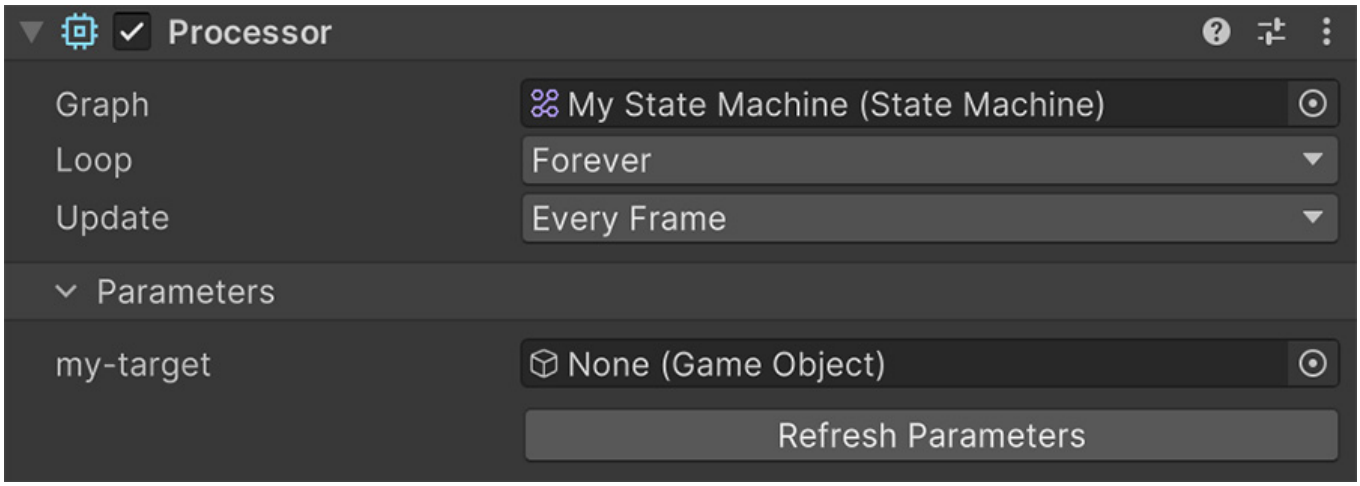
The **Loop** option determines whether the graph should be ran once or start over when it finishes executing.

The **Update** option determines whether the graph is executed every frame, manually via a script or at a custom interval, which can be specified using a dynamic property.

Whenever a graph is added it collects all the Blackboard parameters and displays them as fields, which can be dragged and dropped or set via visual scripting.

Display using a Parameter

If we create a parameter called `my-target` on a Blackboard and assign this graph onto a Processor component, it will display like in the screenshot below so its value can be assigned.

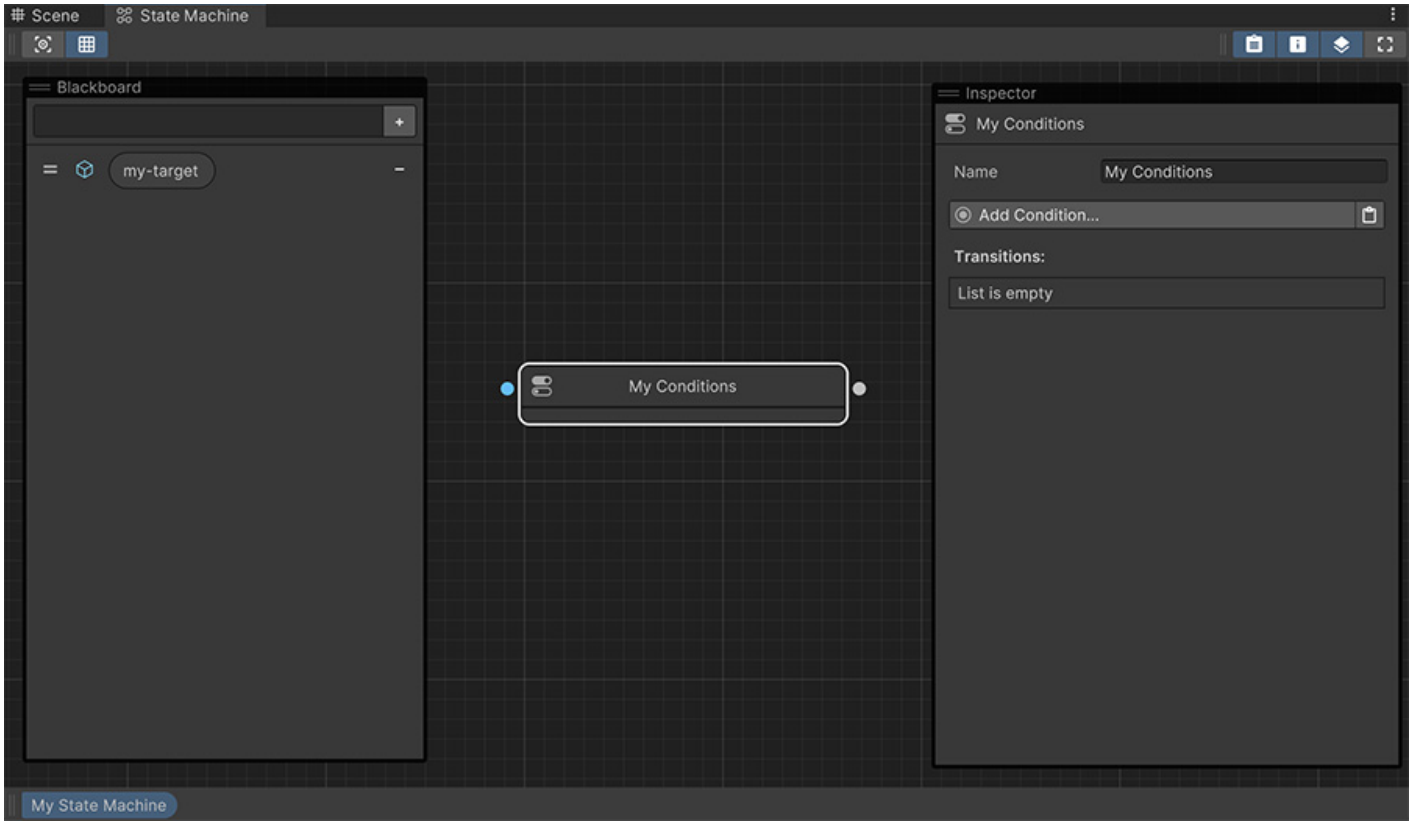


Runtime Assignment

Parameters can be changed at runtime but a **Processor**'s graph cannot be changed when in play-mode.

913.2 The Graph

All AI systems included in the **Behavior** module use a similar graph window with some common elements.



The top toolbar's left side contains a button that allows to focus on the currently selected element(s) on the view as well as toggle the grid-mode. On the right side there's a collection of toggles that allow to show and hide other sections of the window.

The bottom toolbar tracks which graphs have been opened so you can quickly go back to editing a parent graph.

> ✓ **Automatic display**
>
> The breadcrumb toolbar will automatically be displayed whenever you edit a sub-graph asset from a parent graph asset.

913.2.1 The Blackboard

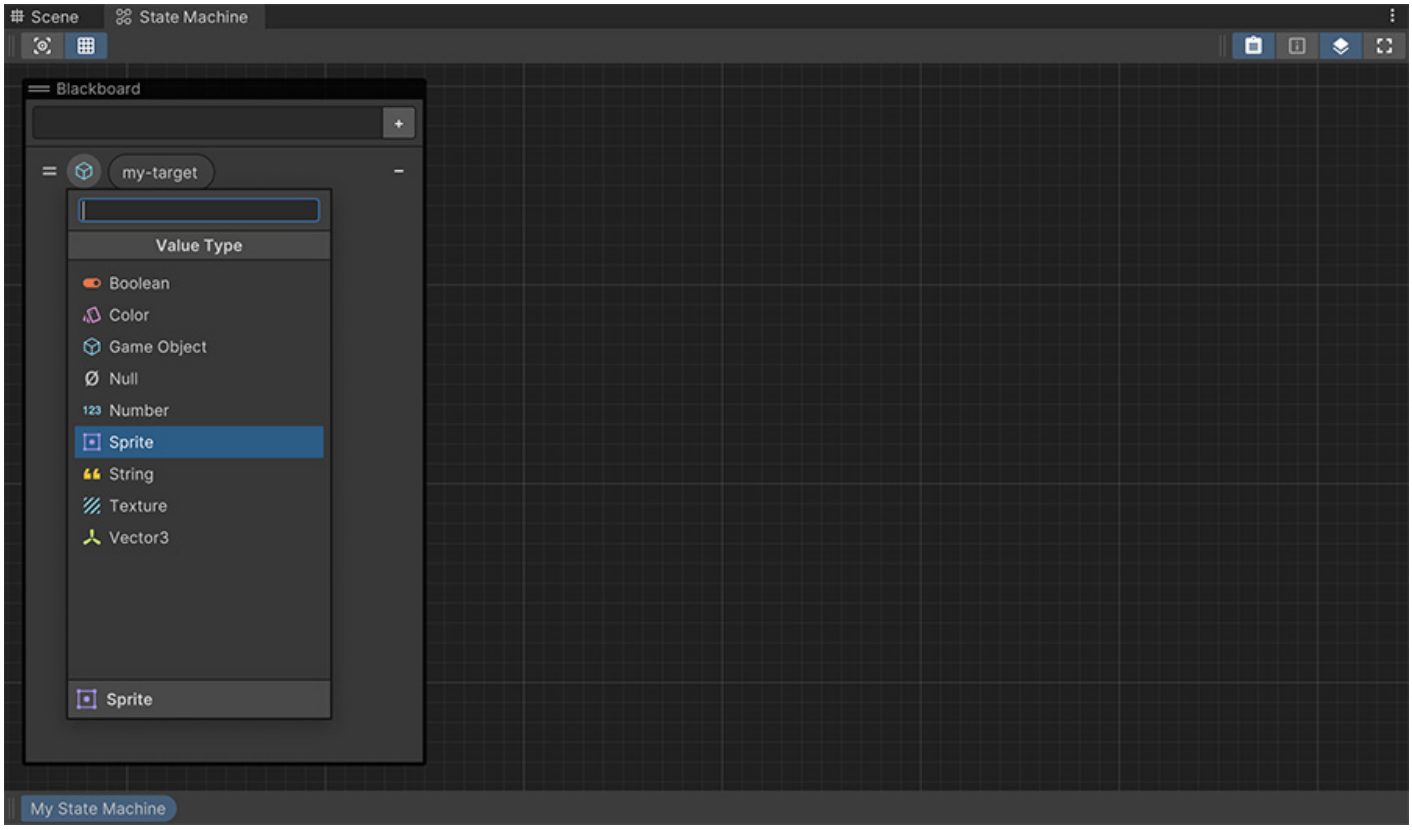
It's a collection of parameters with a name and a type that allow to interface between the agent running the AI system and the graph itself.

Patrolling

Let's say we have an AI system that requires guards to patrol an area, each having their own route. We can create a **Blackboard** entry called `patrol-route` and change its type to *Game Object*. By doing so, every guard that uses this AI system will have a *Patrol Route* field that can be used to define its individual route.

To create a new entry simply type in the name and press *Enter* or click the `+` button.

By default a parameter doesn't have any type and thus won't appear in the **Processor** component. To change its type click on the icon and select it from the dropdown.

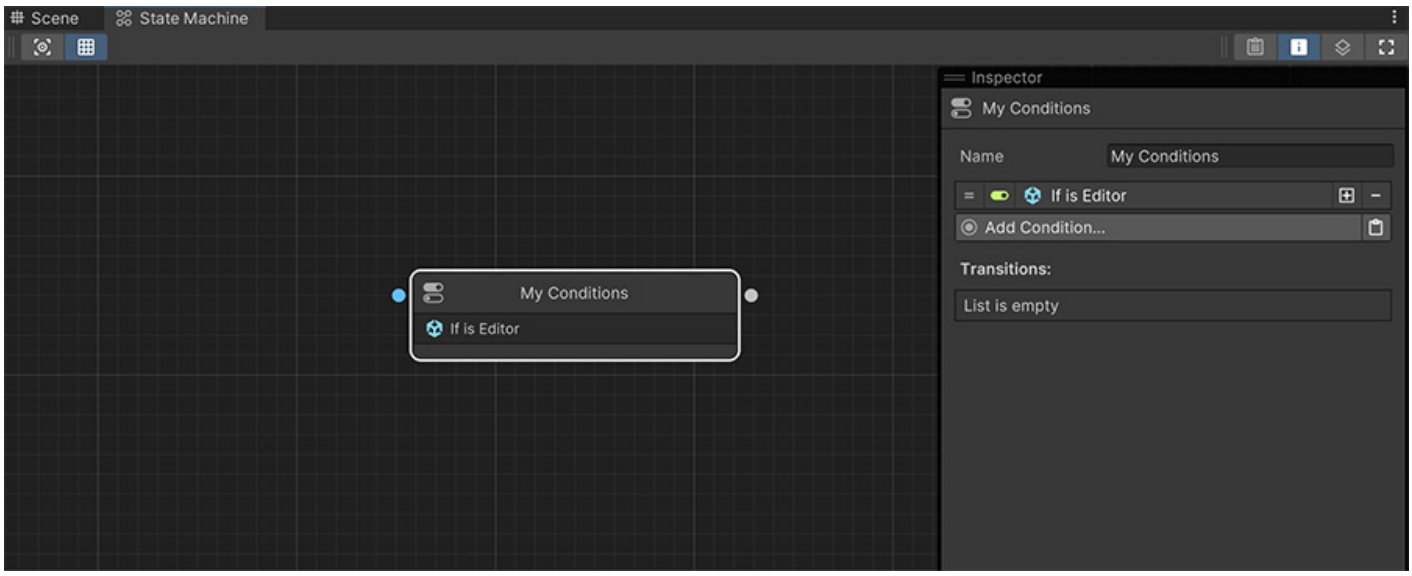


After creating or editing a parameter of a **Blackboard** you'll need to refresh the **Processors** using this graph so the parameters are re-sync.

913.2.2 Inspector

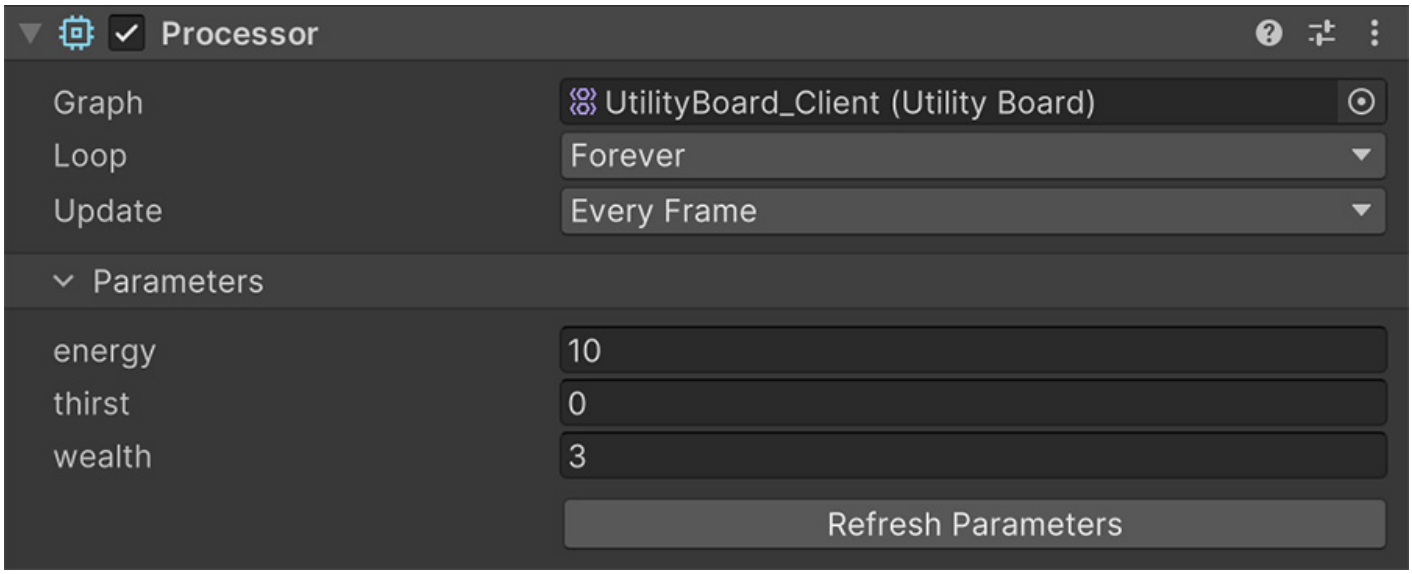
The **Inspector** panel allows to edit any nodes created inside the graph.

To edit a node simply select it and open the *Inspector* panel if it isn't already. Each node type will have its own configuration options.



913.3 Parameters

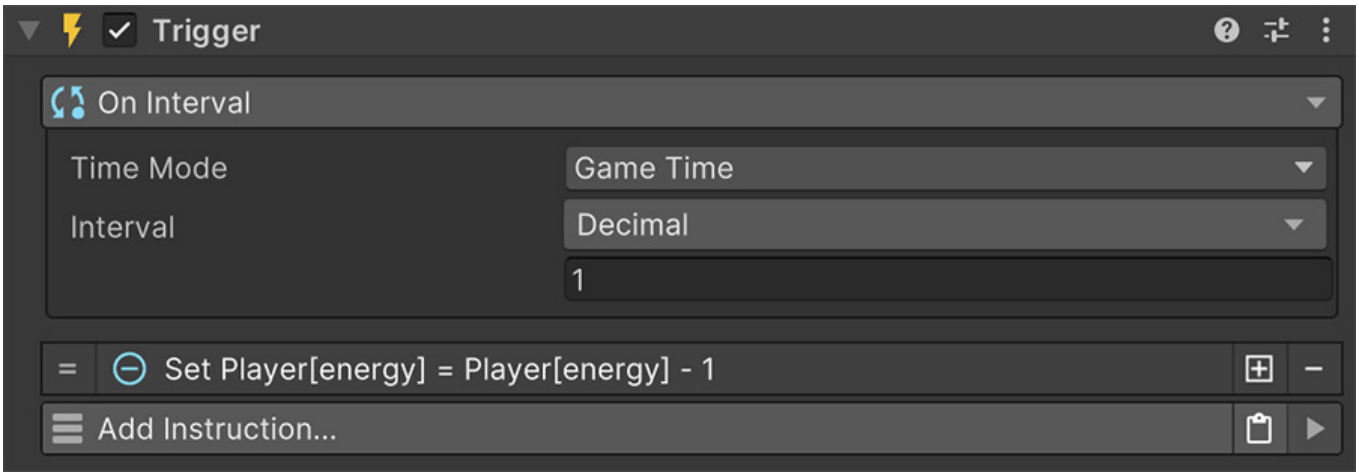
After assigning an AI system to a **Processor** component it will display all available parameters from the **Blackboard** at the bottom of the component.



These values can be set by dragging and dropping values from the scene or the project panel or using *Game Creator*'s **Visual Scripting**.

Changing Parameters

For example, let's say there's a parameter called `energy` and we can to subtract 1 unit from it every second. We can create a **Trigger** component with an *Interval* value of 1 second, and use the **Subtract Numbers** instruction.



We assume it's the Player who has the **Processor** component, so we use it as the targeted game object and as the name of the parameter we use `energy`.

Each **Property** dropdown will have a `Behavior/` section with the corresponding parameter value.

914 Setup

Welcome to getting started with the **Behavior** module. In this section you'll learn how to install this module and get started with the examples which it comes with.

914.1 Prepare your Project

Before installing the **Behavior** module, you'll need to either create a new Unity project or open an existing one.

> **Game Creator**
>
> It is important to note that **Game Creator** should be present before attempting to install any module.

914.2 Install the Behavior module

If you haven't purchased the **Behavior** module, head to the Asset Store product page and follow the steps to get a copy of this module.

Once you have bought it, click on Window → Package Manager to reveal a window with all your available assets.

Type in the little search field the name of this package and it will prompt you to download and install the latest stable version. Follow the steps and wait till Unity finishes compiling your project.

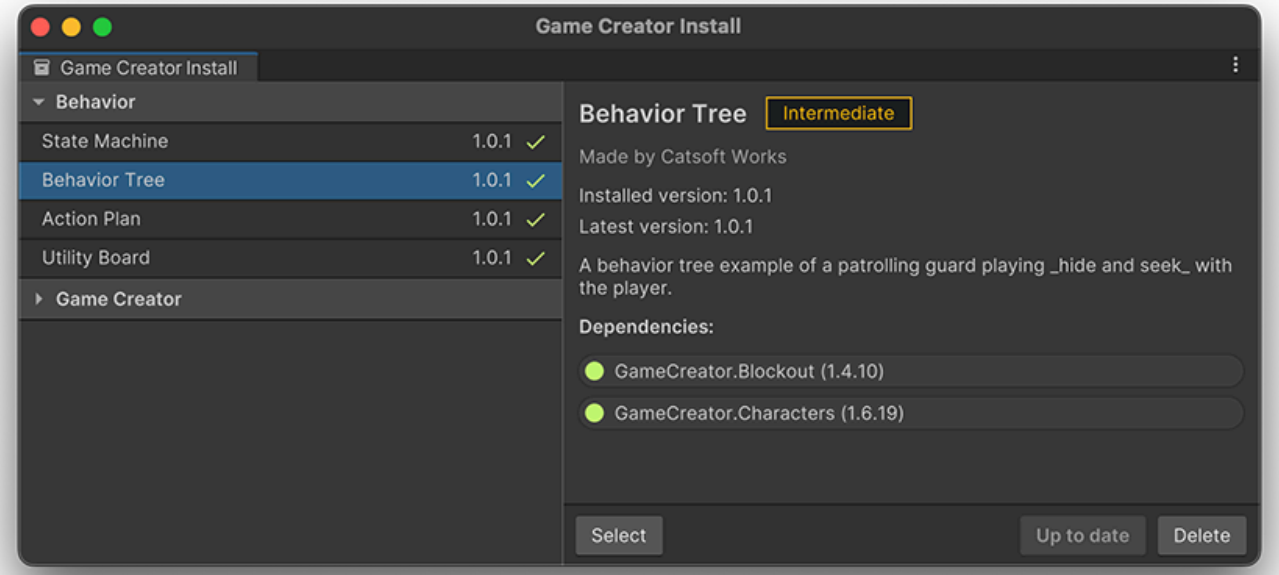
914.3 Examples

We highly recommend checking the examples that come with the **Behavior** module. To install them, click on the *Game Creator* dropdown from the top toolbar and then the *Install* option.

The **Installer** window will appear and you'll be able to manage all examples and template assets you have in your project.

The **Behavior** module comes with four different AI systems, and each one has its own demos. If you're new to AI, we recommend starting in the following order, which is from the most basic to the most complex system.

- **State Machine**: A very simple example of a patrolling guard using a finite state machine.
- **Behavior Tree**: A behavior tree example of a patrolling guard playing *hide and seek* with the player
- **GOAP**: An example using goal-oriented action planning where characters work with each other to pick branches and keep a fire.
- **Utility AI**: An example that uses a needs-based AI system where characters go in a dance club, dance, drink and go home when they are tired.

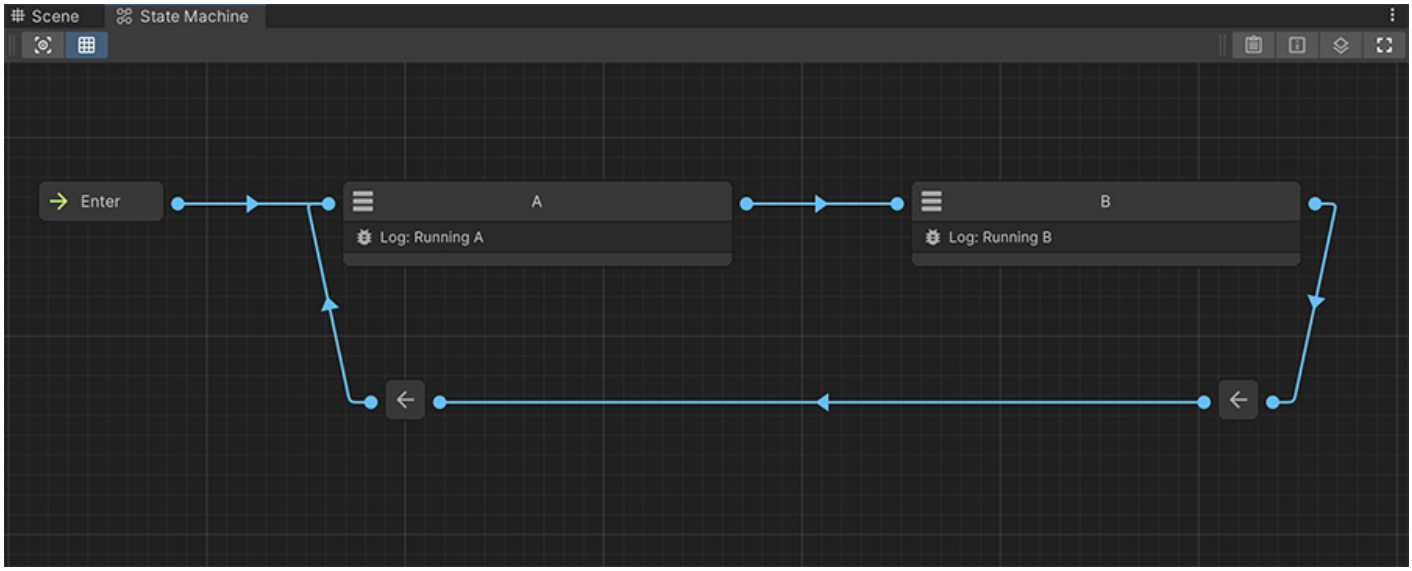


Once you have the examples installed, click on the *Select* button or navigate to each one (for example `Plugins/GameCreator/Installs/Behavior.StateMachine/`).

VI.I State Machines

915 State Machines

State Machines (also known as **Finite State Machines** or **FSM**) are the most basic form of AI.



As its name implies, an entity can be in just one state at a time and can only transition to another state which is linked to the current one.

Simple FSM

For example, a very simple *State Machine* could define the behavior of a guard. We could define two states:

- Patrolling
- Attacking the Player

The guard would start in the *Patrolling* state and only transition to the *Attacking Player* state if the player is in sight.

- The **Nodes** section details all available node types.
- The **Logic** page details how a **State Machine** works and how it's executed.

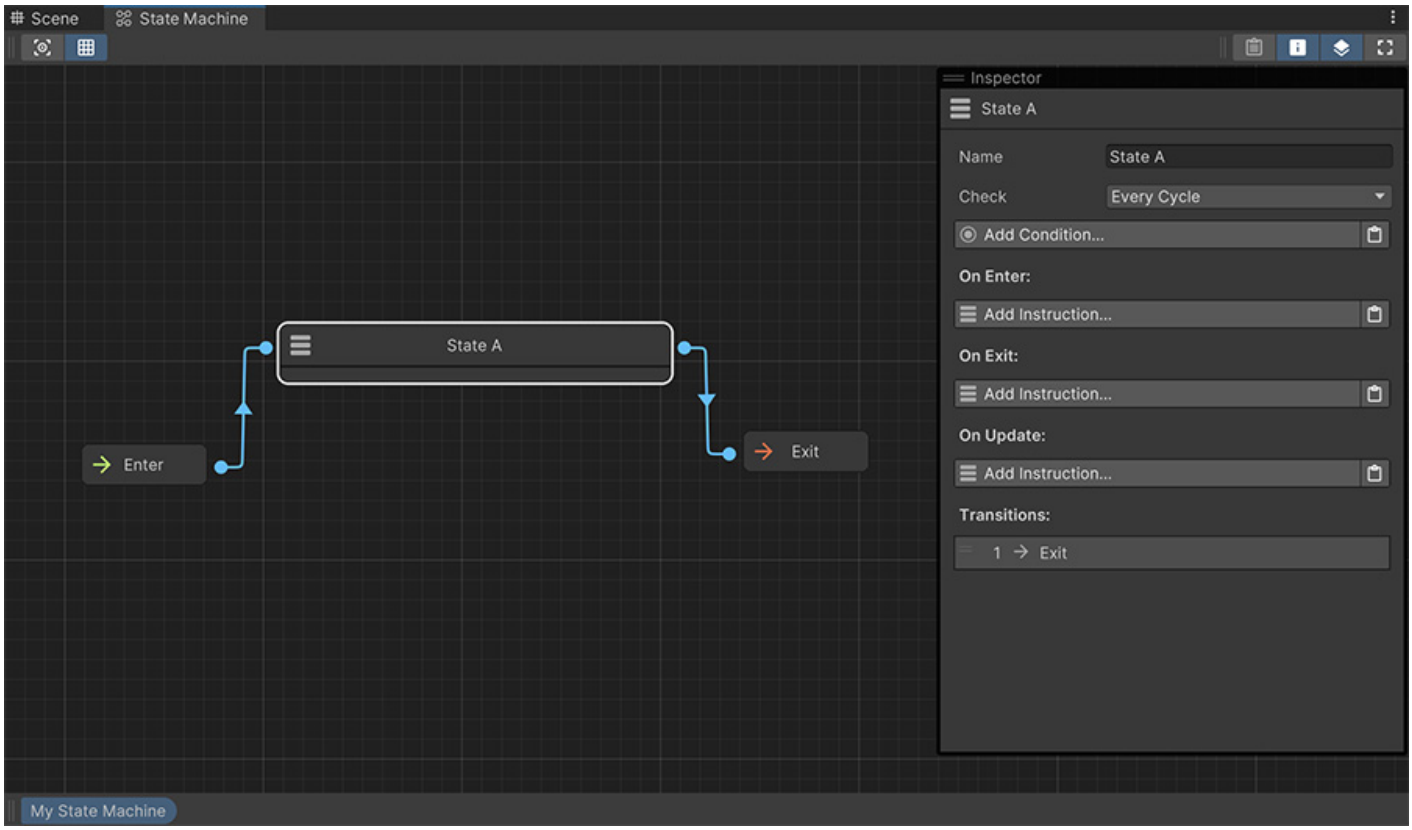
916 Nodes

There are 4 different node types and they are created by right clicking anywhere on the graph, apart from the **Enter** and **Exit** ones:

- The **Enter** node is unique and determines which **State** will be the first one when starting to run the graph.
- The **Exit** node is optional and allows the **State Machine** to *finish* running. Finishing running allows a **State Machine** graph to be used as a subgraph of another AI tool so it has a beginning and an end.

916.1 State

The **State** nodes are the backbone of a *State Machine* and is where the magic happens.



The **State** contains a **Name** field that allows giving the node a name. This has no effect on the execution and is just for information purposes.

The **Conditions** list determines whether this **State** can be transitioned to from another **State** with an edge pointing at this. If the conditions are not successful this **State** won't be transitioned to.

The **Check** field accepts two options:

- **Every Cycle** means that when this node is being executed, it will wait till its **On Update** instructions are completed before checking whether it can transition to another node.

- **Every Frame** means that when this node is being executed, it will check every frame if it can transition to another node.

> **Default to Every Cycle**
>
> It is tempting to check every frame whether the state should transition to another one. However, checking Conditions comes with a (very small) performance overhead. We recommend using *Every Cycle* when possible, so Conditions are called less frequently.

The **On Enter** instructions are called whenever this node starts being executed because of a transition.

The **On Exit** instructions are called whenever this node finishes executing and transitions to another node.

The **On Update** instructions are called every frame while the node is being executed, and will restart again automatically if the node is still being executed after finishing running the instructions.

> **Canceling On Update**
>
> It is important to node that the **On Update** instructions can be interrupted at any moment because of a transition. It's better to add the initialization instructions on the **On Enter** and the post-run instructions on the **On Exit**, which are guaranteed to be executed from start to finish.

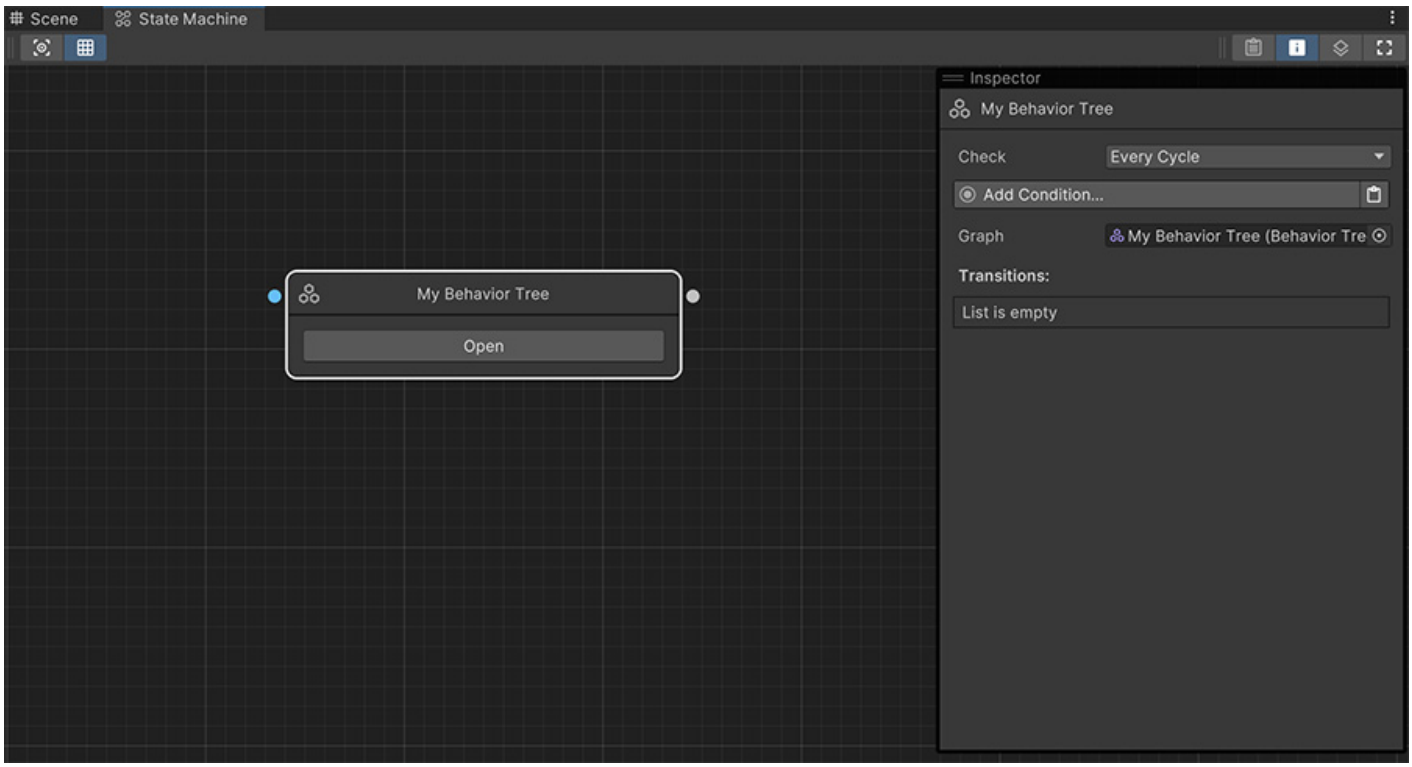
916.2 Conditions

Conditions serve as a gate to move from one state to another. If the conditions return false when attempting to switch states, the transition won't happen.

> **Why Conditions?**
>
> You might be wondering why there's a **Conditions** node when a **State** already has a *Conditions* list that do exactly the same thing.
>
> This is because you might have multiple **States** that require the same *Conditions* and funnel them to a single output **State** node. In order to not repeating the same *Conditions* list on all **States** you can relay them to a single **Conditions** entry point.

916.3 Sub Graphs

Sub Graph nodes allow to encapsulate another graph as if it were a **State**.



Any Graph

It is important to node that a **Sub Graph** accepts any kind of graph, not just **State Machine** graphs. You can, for example, execute a **Behavior Tree** as a **State**.

916.4 Elbows

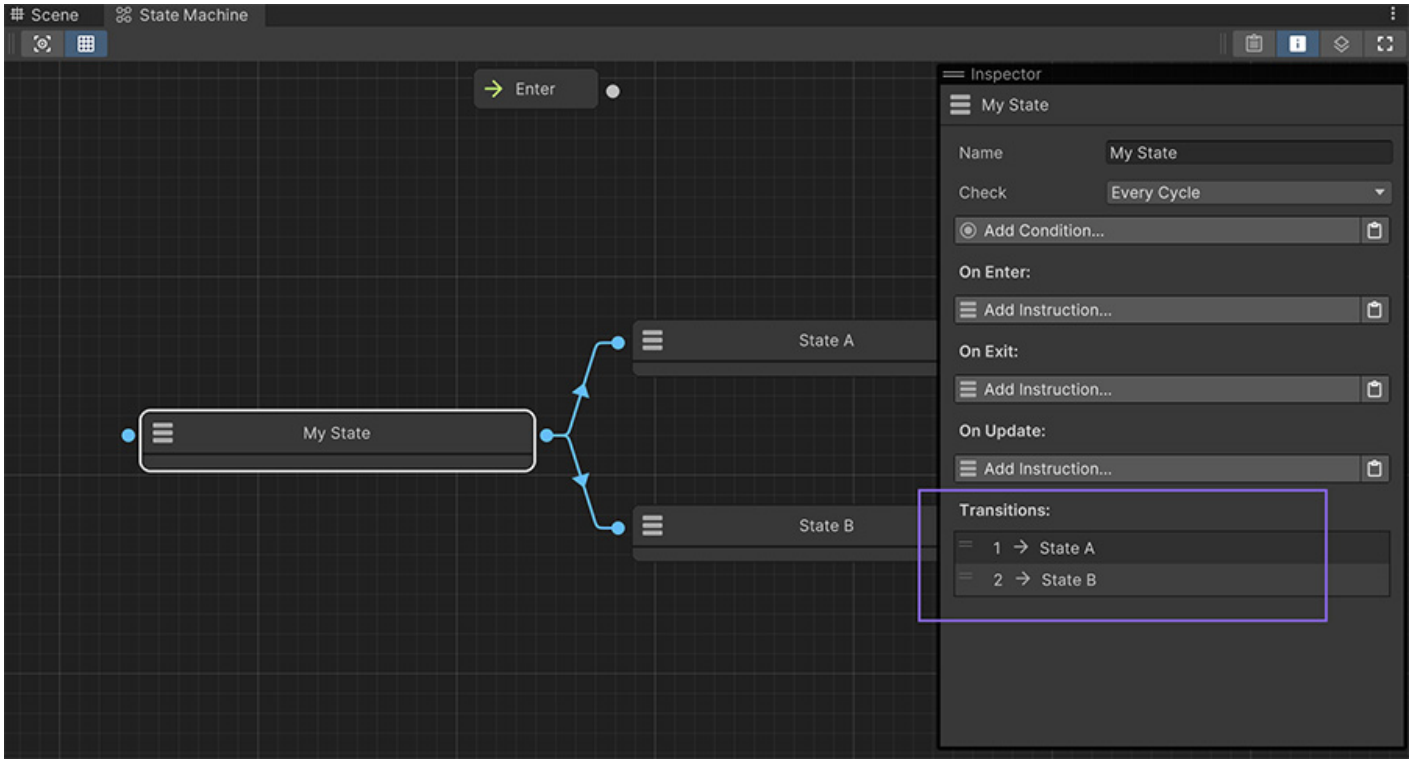
Elbows don't do anything and just allow to improve the readability of graphs by creating corners.

Their shape is determined by the direction after dragging and dropping an edge from another node, but it can also be changed again by selecting the **Elbow** node and changing the direction in the *Inspector*.

917 Logic

State Machines are one of the easiest AI tools to understand and work very intuitively.

There is a starting **State** node which connects to other **State(s)** in a specific order. This order can be seen selecting a **State** node and sorting the transitions at the bottom of the *Inspector* panel.



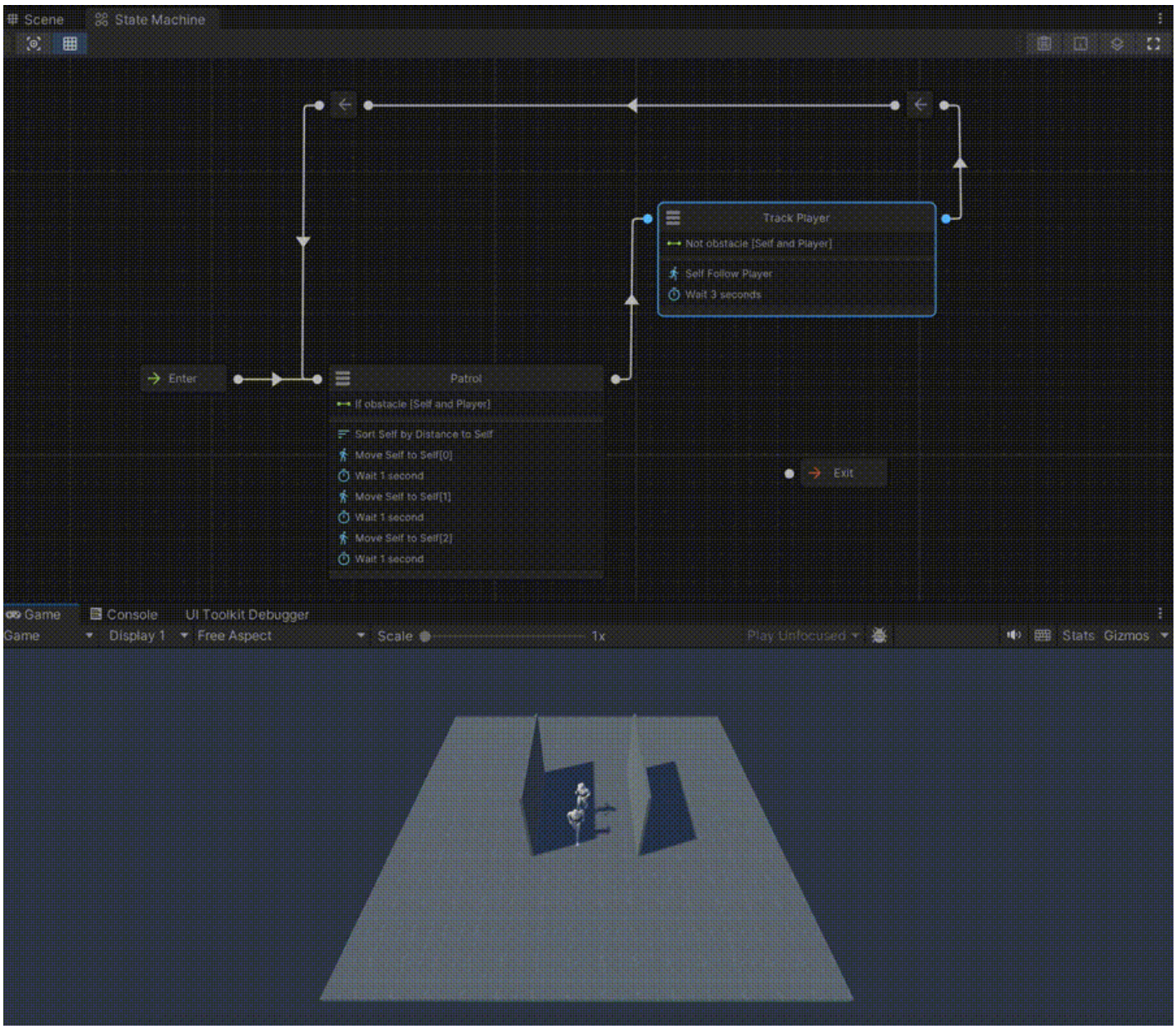
When a **State** is running, depending on the *Check* field value (which can be *Every Cycle* or *Every Frame*) it will check whether it can transition to another **State**.

The order in which it tries to change to another node is from top to bottom, and will move as soon as it finds a new suitable **State** that successfully passes its *Conditions* list.

If not a single connected **State** successfully passes the *Conditions*, the transition won't happen and the current **State** will remain as the running one.

917.1 Example

Here's an example of a **State Machine** with two states: One that makes a character patrol around and one that tracks the player when it's in its line of sight.

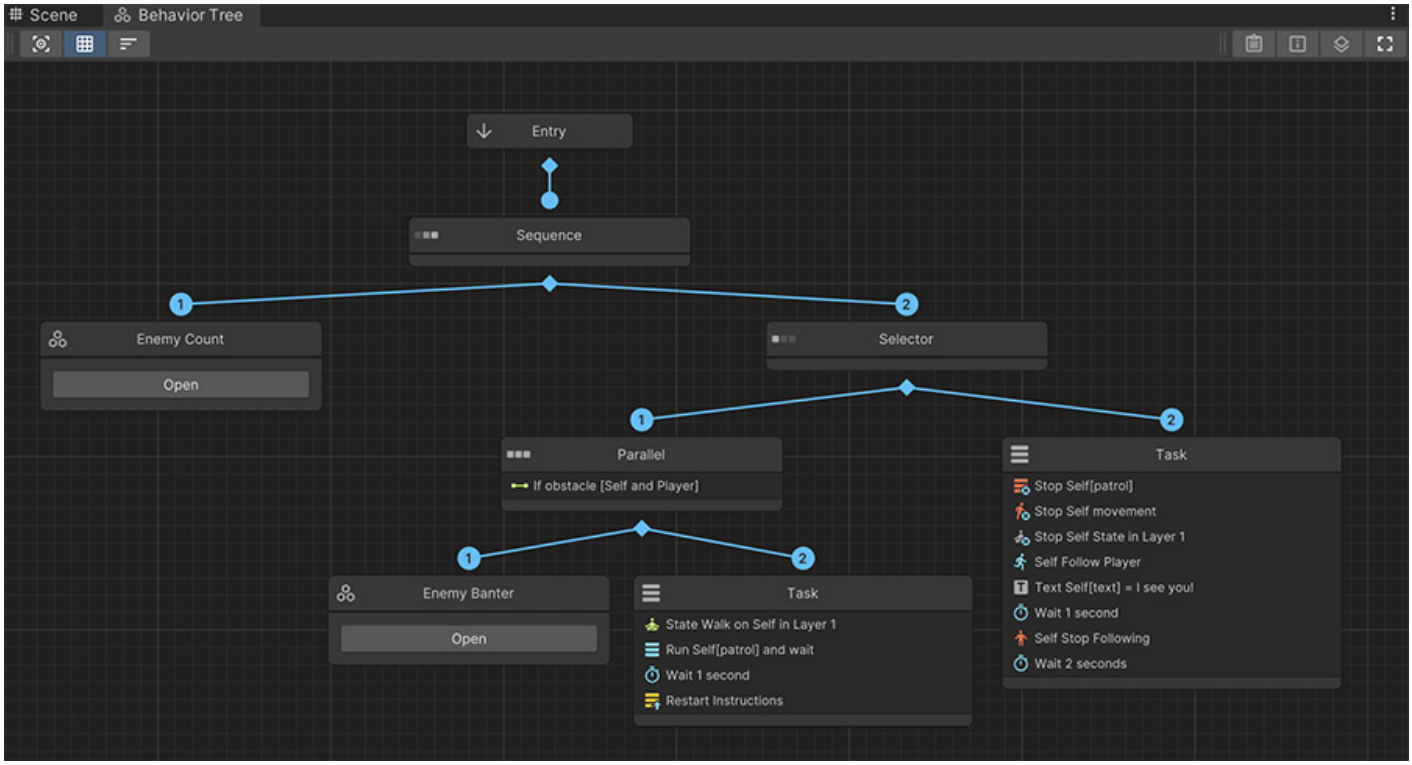


Upon seeing the player, the current **Patrol** state transitions to the **Track Player** state. If the guard loses sight of the player, it transitions back to **Patrol**.

VI.II Behavior Trees

918 Behavior Trees

Behavior Trees are tree-like structures that stem from a single root node and are evaluated from top-to-bottom, and following a left-to-right priority order, having the right one the highest priority.



Behavior Trees vs State Machines

Although **State Machines** are better suited for simple AI systems, they can quickly become messy with lots of connection edges and hard to maintain. **Behavior Trees** are slightly more complex but offer much more flexibility and are easier to read at a glance when having lots of nodes.

- The **Nodes** section details all available node types.
- The **Logic** page details how a **Behavior Tree** works and how it's executed.

919 Nodes

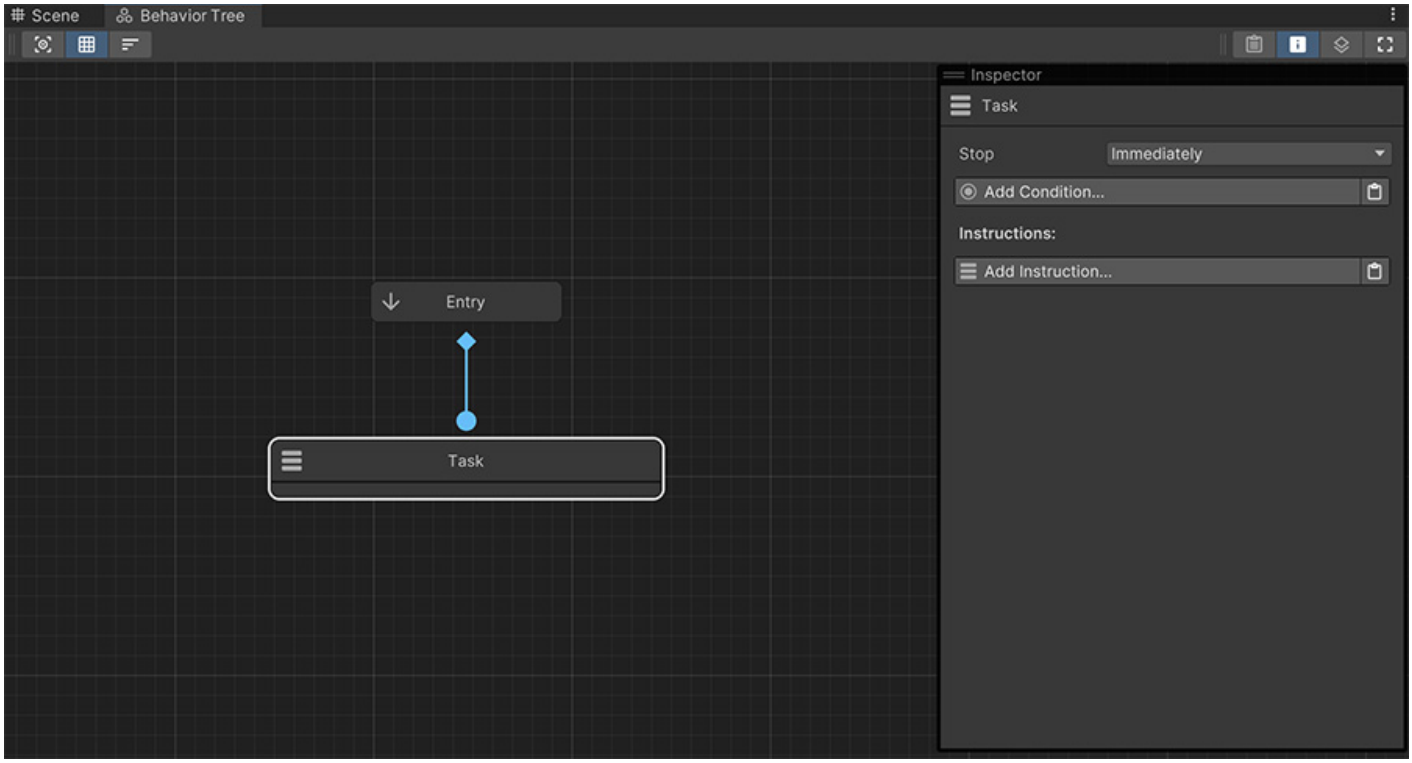
There are 4 types of nodes in **Behavior Trees** plus a special node called **Entry**, which is a single node that can't be deleted and marks the root of the execution.

919.1 Tasks

A **Task** node is in charge of executing a specific set of *Instructions* when it runs.

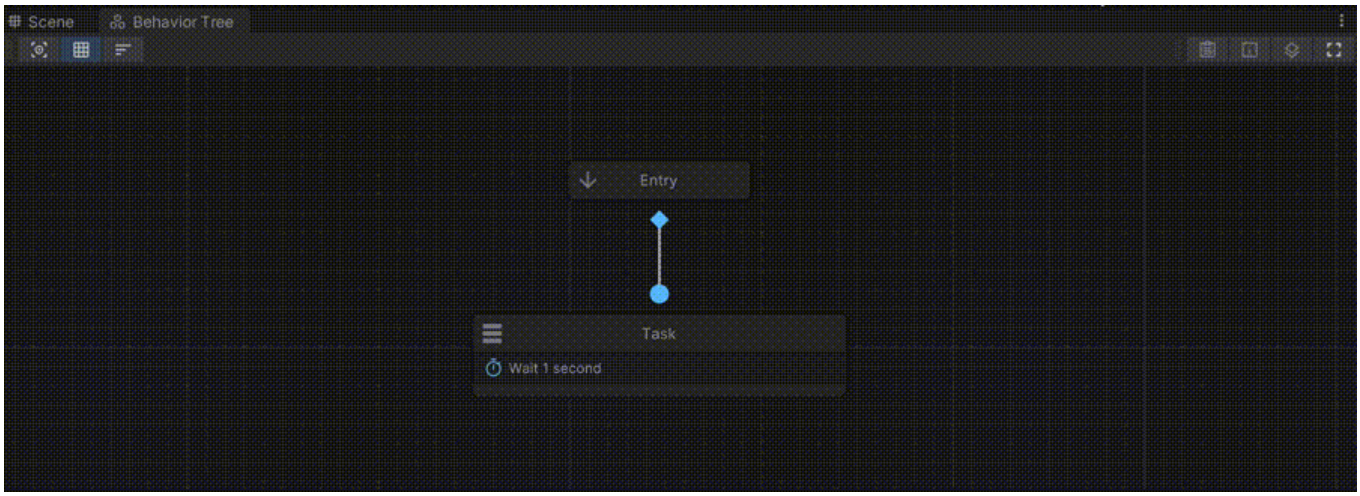
It also contains a *Conditions* list, which is executed every time the graph is evaluated. If their value is not successful and the *Instructions* list are running it will return a ✖ *Failure*.

While the *Instructions* are running, the **Task** node returns ↻ *Running* and upon finishing them it returns ✔ *Success*.



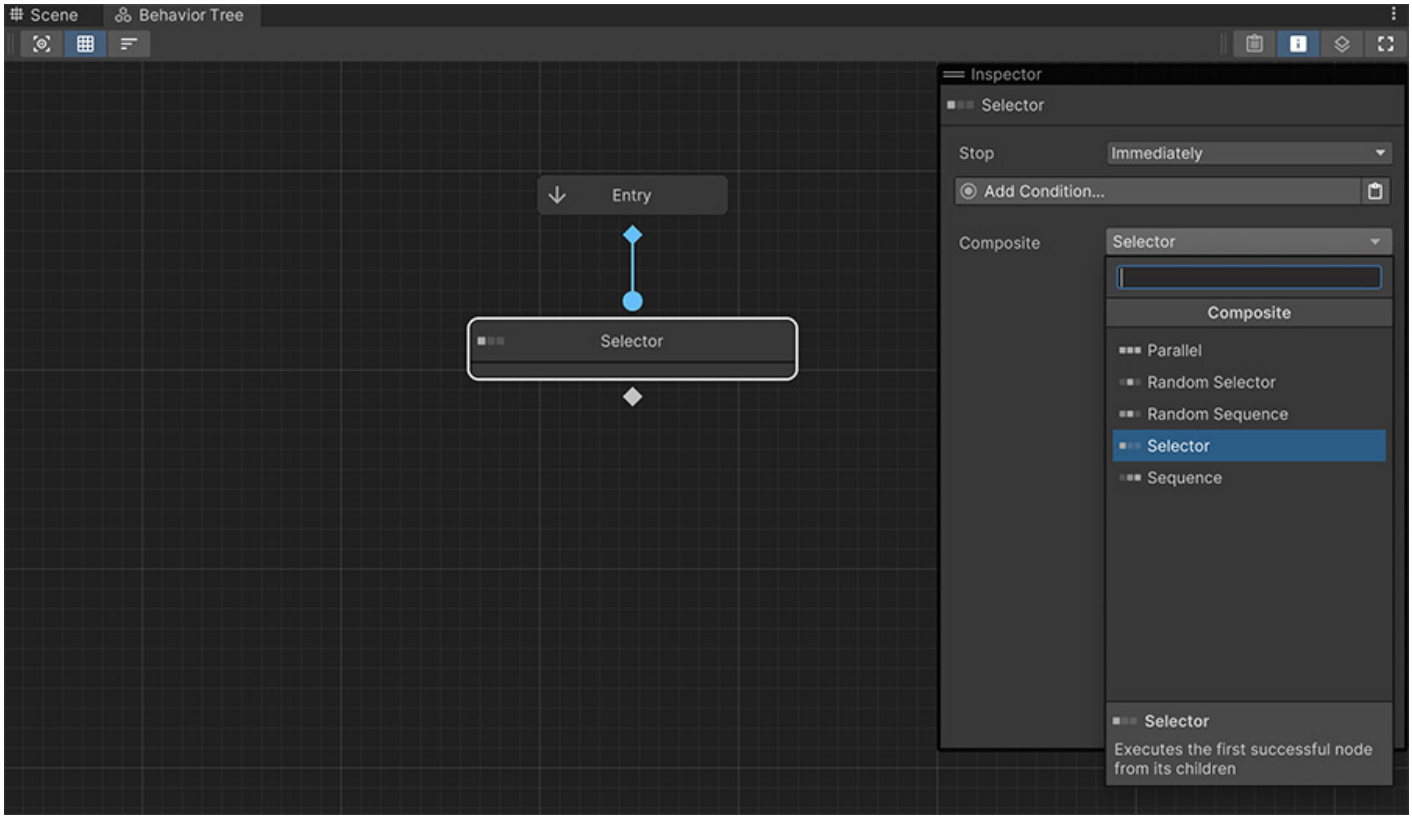
A simple Task

For example if a **Task** node is a direct child of the **Entry** node and it waits 1 second before finishing, running the graph will put the whole graph under the *Running* state and change to *Success* after one second.



919.2 Composites

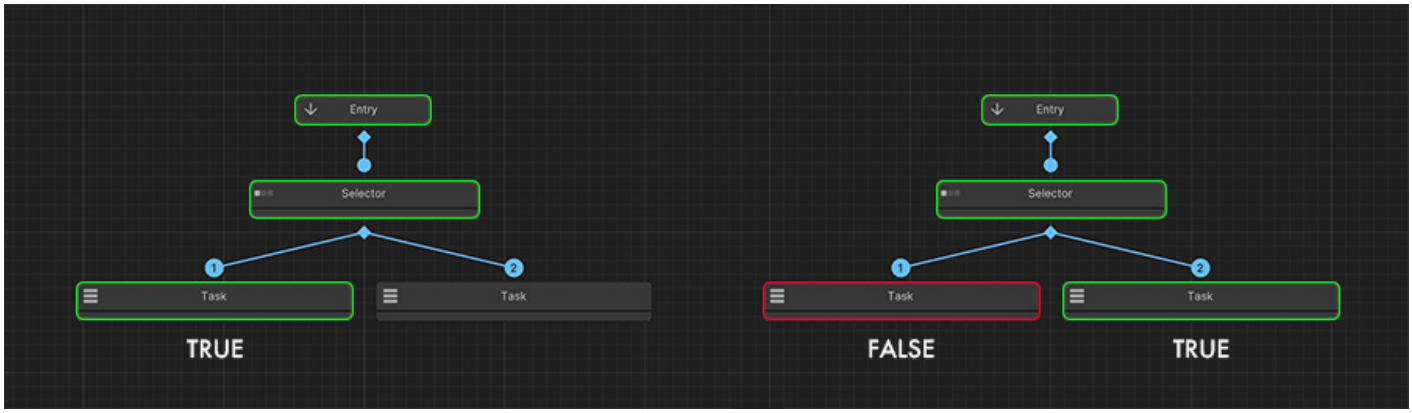
Composite nodes allow to branch and determine the order in which its child nodes are executed. There are multiple types of composites, which can be chosen selecting the *Composite* node and clicking on the field in the *Inspector*.



919.2.1 Selector

The **Selector** composite executes the left-most child first. If the conditions return a ✔ *Success* the composite node also returns ✔ *Success*.

However if the child returns ✘ *Failure* it attempts to execute the next child node.



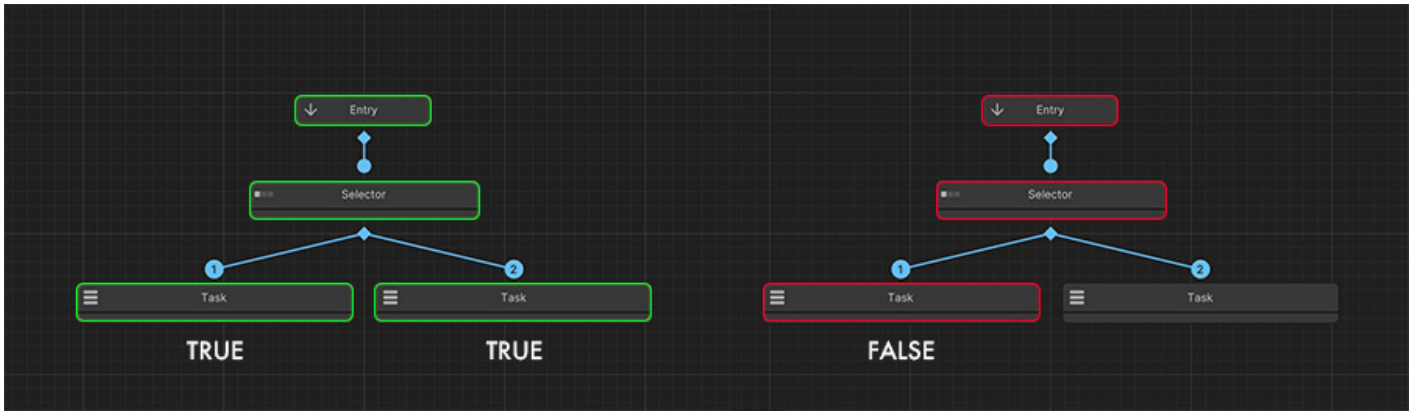
If all nodes return ✘ *Failure* the composite also returns ✘ *Failure*.

> **Selector as an OR**
>
> The **Selector** composite type can be seen as an *OR* operator with their children.

919.2.2 Sequence

The **Sequence** composite executes the left-most child first and follows to the next if the execution of the previous one is ✔ *Success*.

If the execution of a child node returns ✘ *Failure* the composite node will also return a ✘ *Failure*.



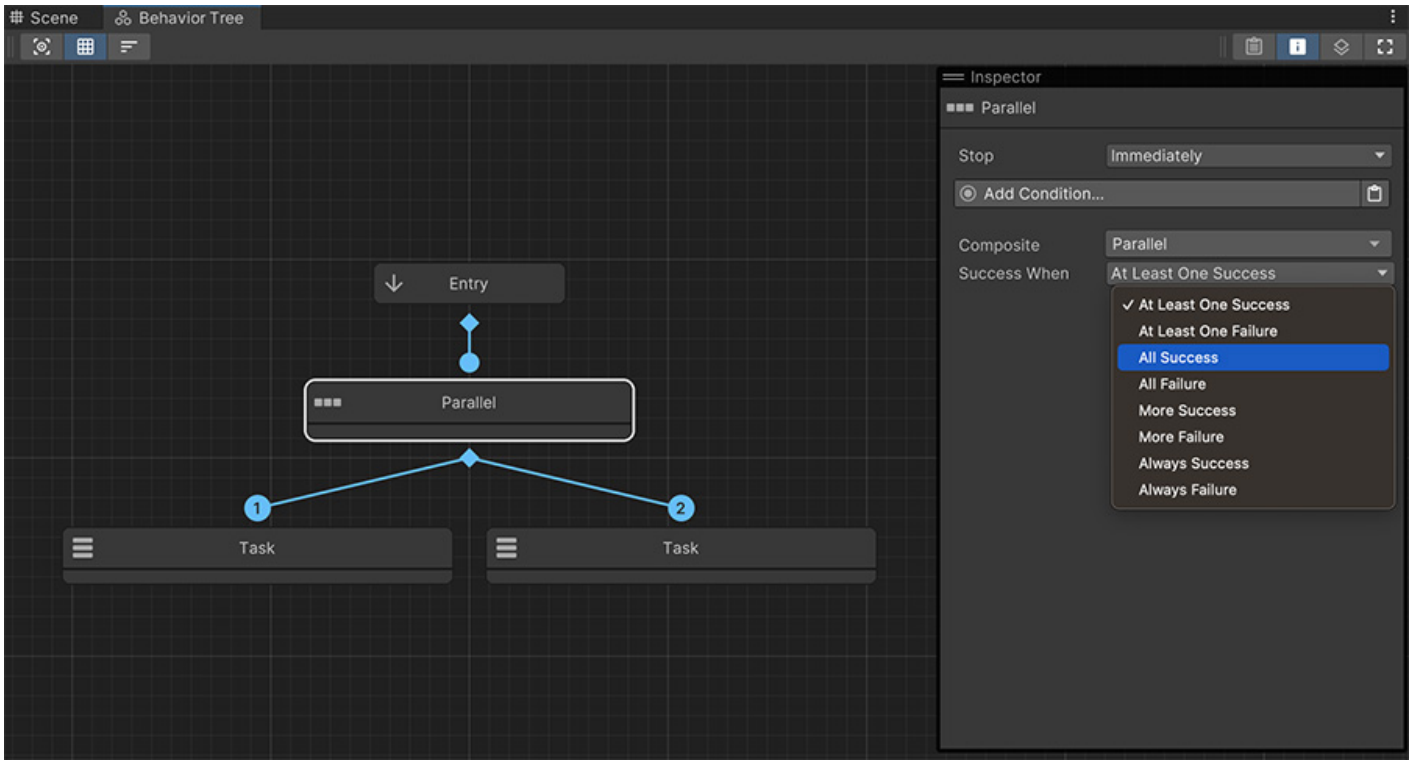
If all nodes return ✔ *Success* the composite also returns ✔ *Success*.

Sequence as an AND

The **Sequence** composite type can be seen as an *AND* operator with their children.

919.2.3 Parallel

The **Parallel** composite, as its name implies, executes all of its children at the same time and it can configure when the composite should be considered as ✔ *Success* by choosing the option from the field that appears in the *Inspector*.



All Successful

For example selecting **All Successful** will make the composite node return ✔ *Success* if and only if all of its children have finished with a ✔ *Success* result. Otherwise it will return ✘ *Failure*.

919.2.4 Random Sequence

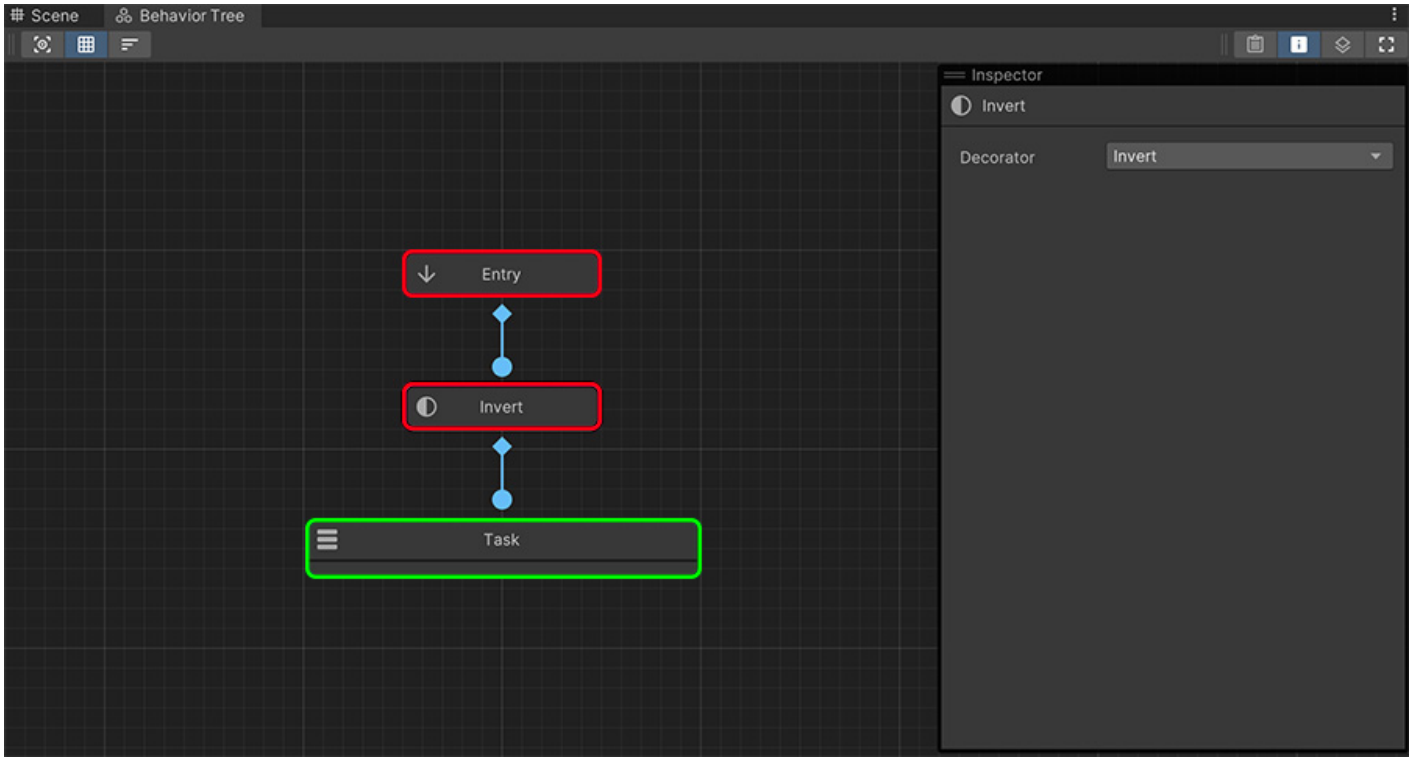
The **Random Sequence** composite works exactly the same way as the **Sequence** composite, except that the order in which its children are evaluated is chosen at random right before the graph is evaluated.

919.2.5 Random Selector

The **Random Selector** composite works exactly the same way as the **Selector** composite, except that the order in which its children are evaluated is chosen at random right before the graph is evaluated.

919.3 Decorators

Decorator nodes don't *do* anything but can transform the results of its child node. For example, the **Invert** node returns ✔ *Success* or ✖ *Failure* depending on the value of its child node.



There are also multiple **Decorator** types of nodes

919.3.1 Fail

Returns ✖ *Failure* regardless of the result of its child.

919.3.2 Success

Returns ✔ *Success* regardless of the result of its child.

919.3.3 Running

Returns ⟳ *Running* regardless of the result of its child.

919.3.4 Invert

Returns ✔ *Success* if its child node is ✖ *Failure*.

Returns ✖ *Failure* if its child node is ✔ *Success*.

Returns ⟳ *Running* otherwise.

919.3.5 Repeat

Returns *Running* as long as the amount of times that its child has ran is below a specific number.

In other words, allows to execute its child a certain amount of times before returning its last result.

919.3.6 While Fail

Returns *Running* as long as its child is either *Running* or *Failure*.

Returns *Failure* otherwise.

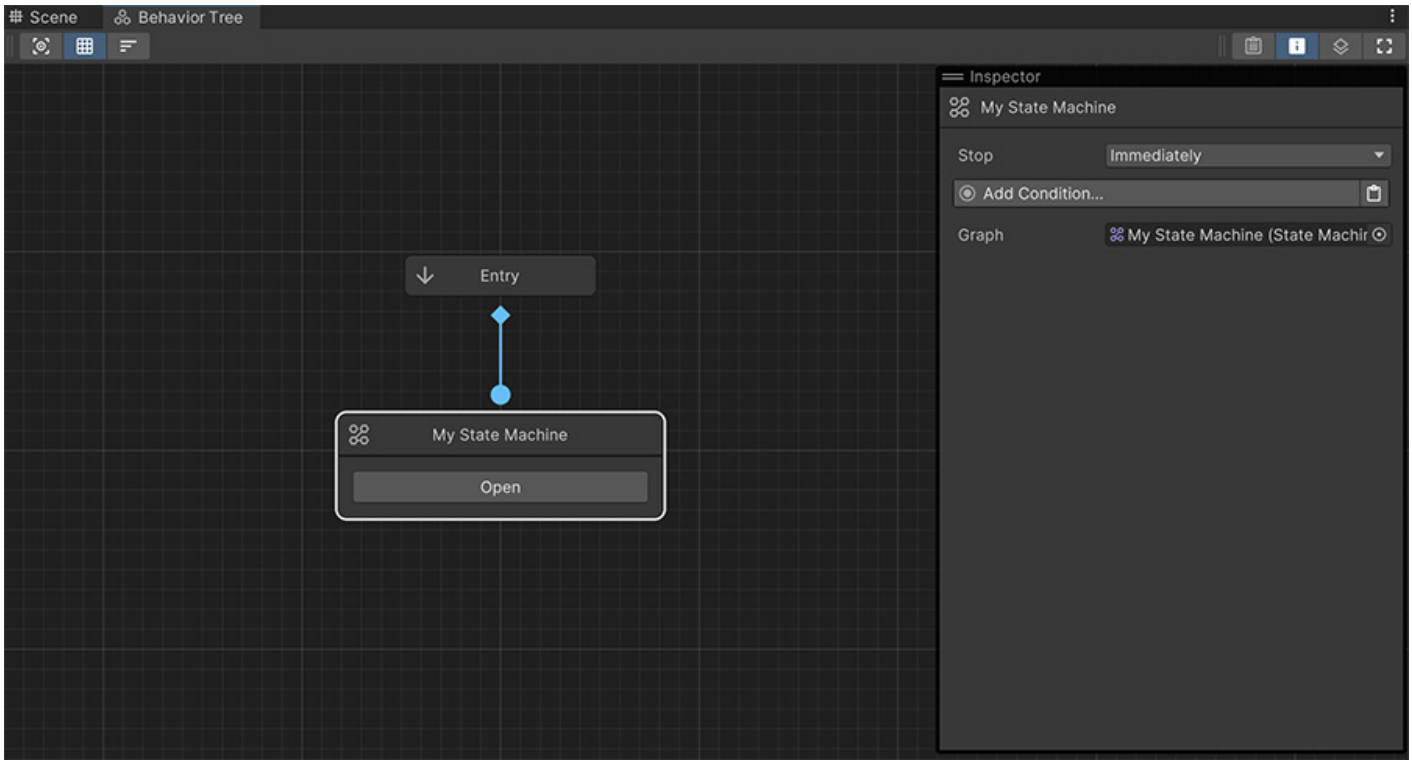
919.3.7 While Success

Returns *Running* as long as its child is either *Running* or *Success*.

Returns *Failure* otherwise.

919.4 Sub Graph

A **Sub Graph** node allows to execute other **Behavior Trees** or even other types of AI systems, such as **State Machines**.



This type of node behaves exactly the same as the **Task** node, except that instead of executing a collection of *Instructions* it executes another AI graph.

920 Logic

A **Behavior Tree** always starts its execution from the root **Entry** node and trickles down following a top-to-bottom fashion, looking for a single **Task** or **Sub Graph** node type.

Once one of these nodes has been found it executes them and the result of the execution bubbles up following the same path. During this phase, *Decorators* might change the returning value.

The return value of a node (and therefore, the return value of a behavior tree) can be:

- **Success**: The node has ran and successfully completed
- **Failure**: The node has attempted to run but unsuccessfully completed
- **Running**: The node is running and has not finished

Apart from these states, a node can also be in a *ready* state, which means it has yet to be executed.

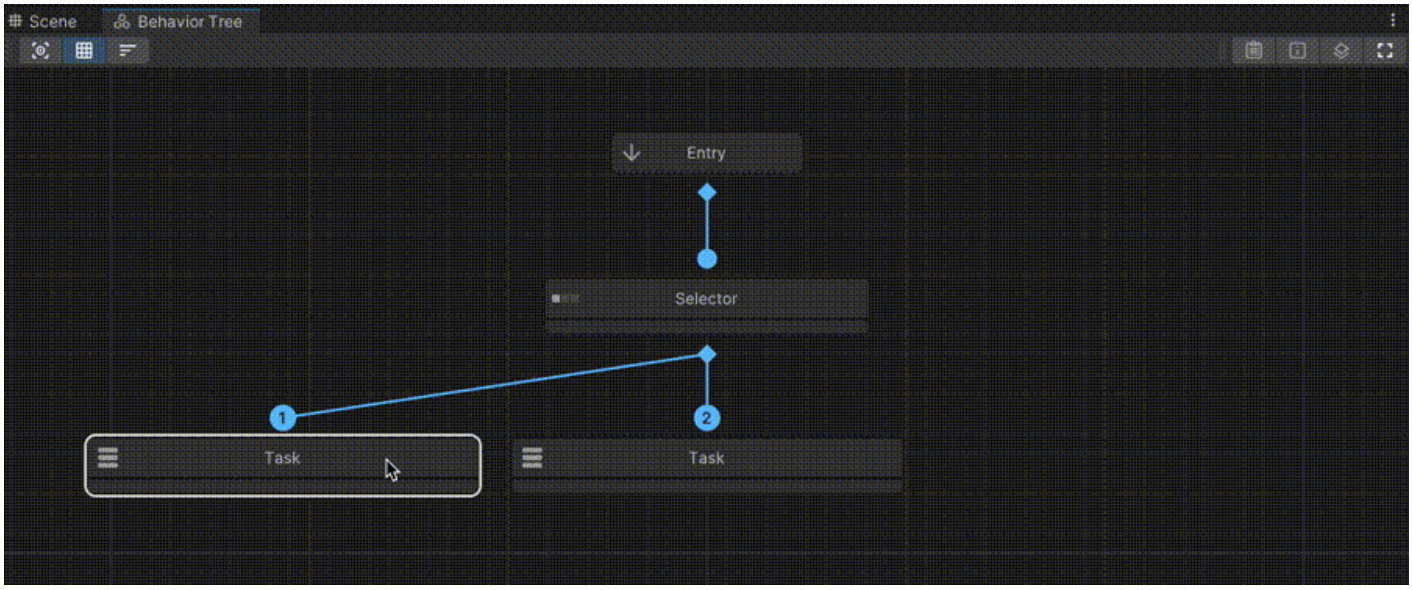
> **Failure is useful**
>
> A common misconception is that a *Failure* state is due to an error, which is not true. A *Failure* state could be due to a character not being able to see the Player and moving on to checking another branch on a **Selector** node.

Every time a **Behavior Tree** is evaluated, whe whole tree structure is checked, taking into account the state of all nodes, which are carried over. For example, a node that has been *Success* ran won't run again unless the tree finishes with a *Success* or a *Failure* state.

Once a **Behavior Tree** has finished running and has a *Success* or *Failure* state it is considered as finished.

920.1 Ordering Nodes

Composite nodes can have multiple children branching from them. The order in which these are executed is denoted by a numeric value at the top of their children, and it's automatically calculated when moving a node around.



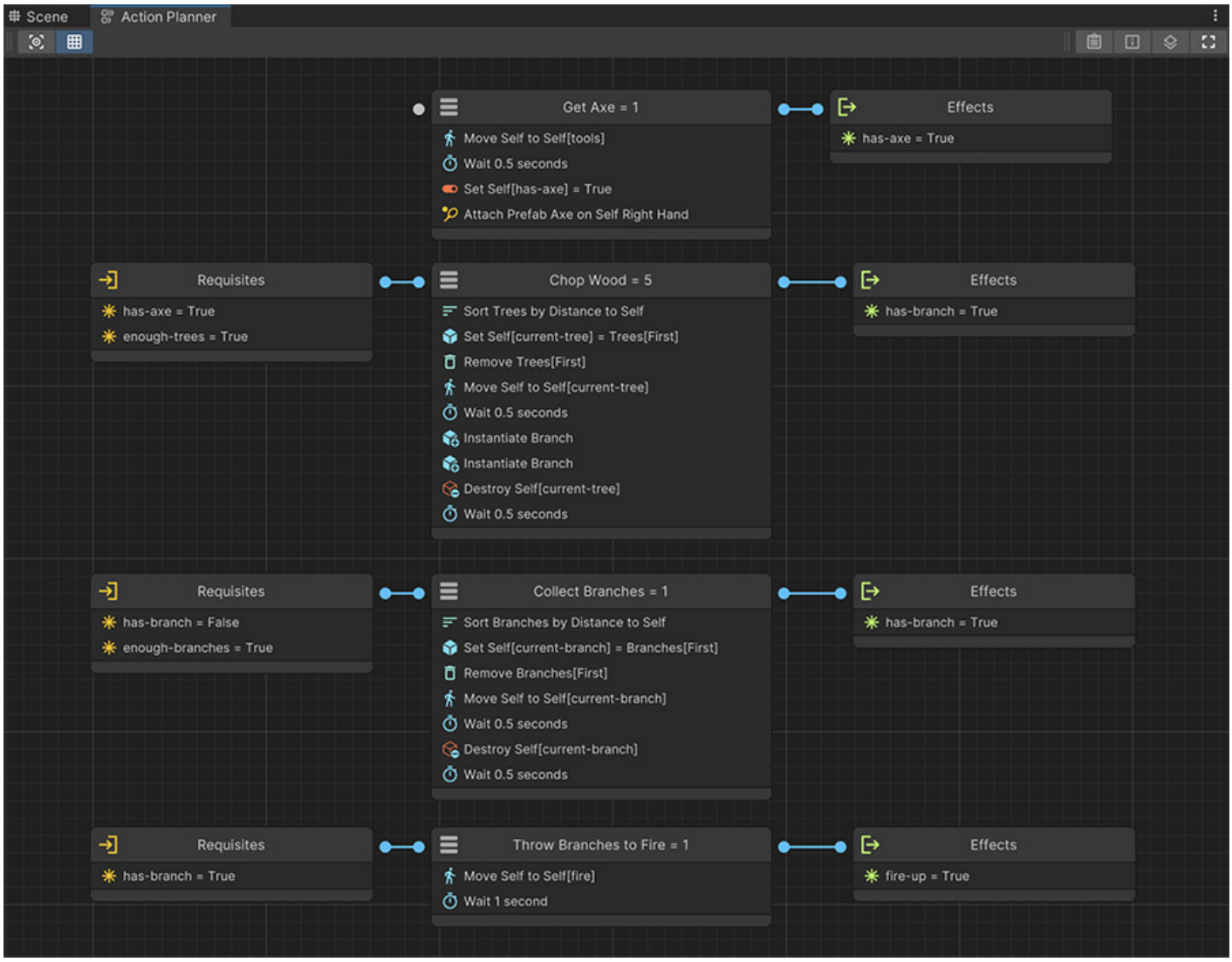
The left-most branching node will be the first one, and the last one will be the one found at the right-most position.

VI.III GOAP

921 GOAP

GOAP systems, also known as **Goal Oriented Action Planning**, are an AI system that automatically builds **Plans** based on a list of **Requisites** and **Effects** that affects the agent's **Beliefs**.

The **Goal** of a **GOAP** system is to build **Plan** that changes the current **Beliefs** into one that satisfies a specific **Requisite**.



- **Plan**: A sequence of nodes executed in order to achieve a goal.
- **Beliefs**: The current knowledge if the agent about the state of the world.
- **Requisites**: A collection of boolean conditions that need to be satisfied to run a node.
- **Effects**: A collection of changes that occur after executing a node.

Similar to Domino

The best analogy to this AI system is by comparing it to the *Domino* game. Each piece has a number of dots on one side (which would be the **Requisites**) and a number of dots on the other side (**Effects**).

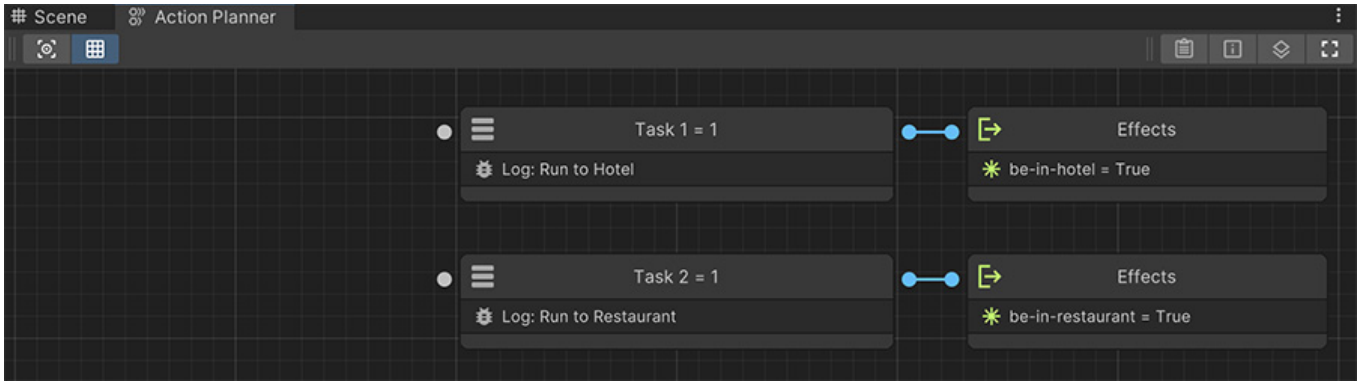
The **Beliefs** would be current number of dots required after placing a piece next to another one, and the **Plan** the sequence of pieces placed in order.

The beauty of **GOAP** is that you can add as many nodes as you want without drawing connections between them and the AI system will come up with the best plan possible. This has the drawback (or an advantage) that it may come up with a plan that isn't foreseen by the game designer.

If there are multiple possible **Plans** the AI system will always prioritize the one that has the lowest overall **Cost**.

Simple Example

Let's say we have the following **Action Plan** and we ask it to build a **Plan** that satisfies the **Goal:** `be-in-hotel`.



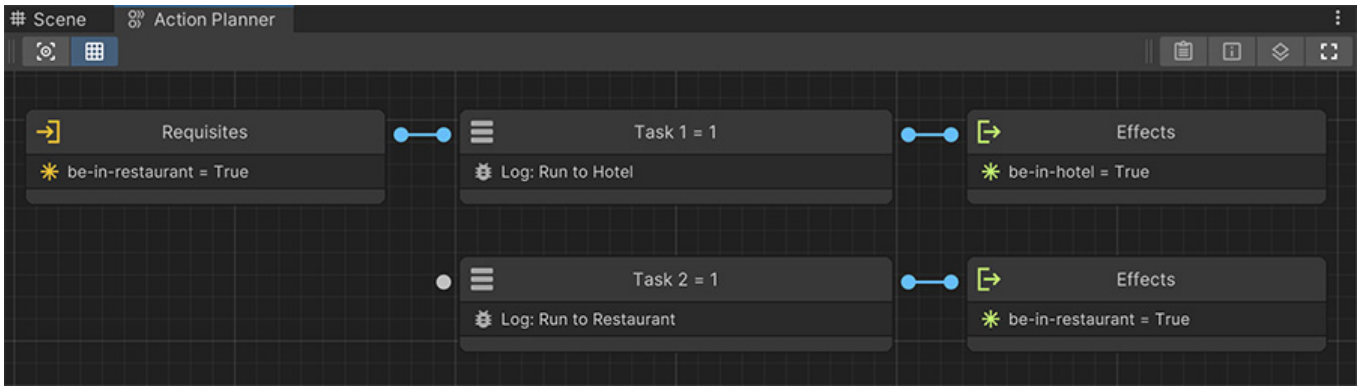
There are two nodes, both of which have zero **Requisites** but both have an **Effect**:

- The first one satisfies `be-in-hotel`
- The second one satisfies `be-in-restaurant`.

If we ask the **Action Plan** to build us a **Plan** it would give us the first node, because running it satisfies the **Goal** `be-in-restaurant`.

A more complex Example

Let's imagine we now have the same case scenario, but in order to enter the *Hotel* we need to walk through the *Restaurant*. This can be represented by adding the **Requisite** `be-in-restaurant` on the first node.

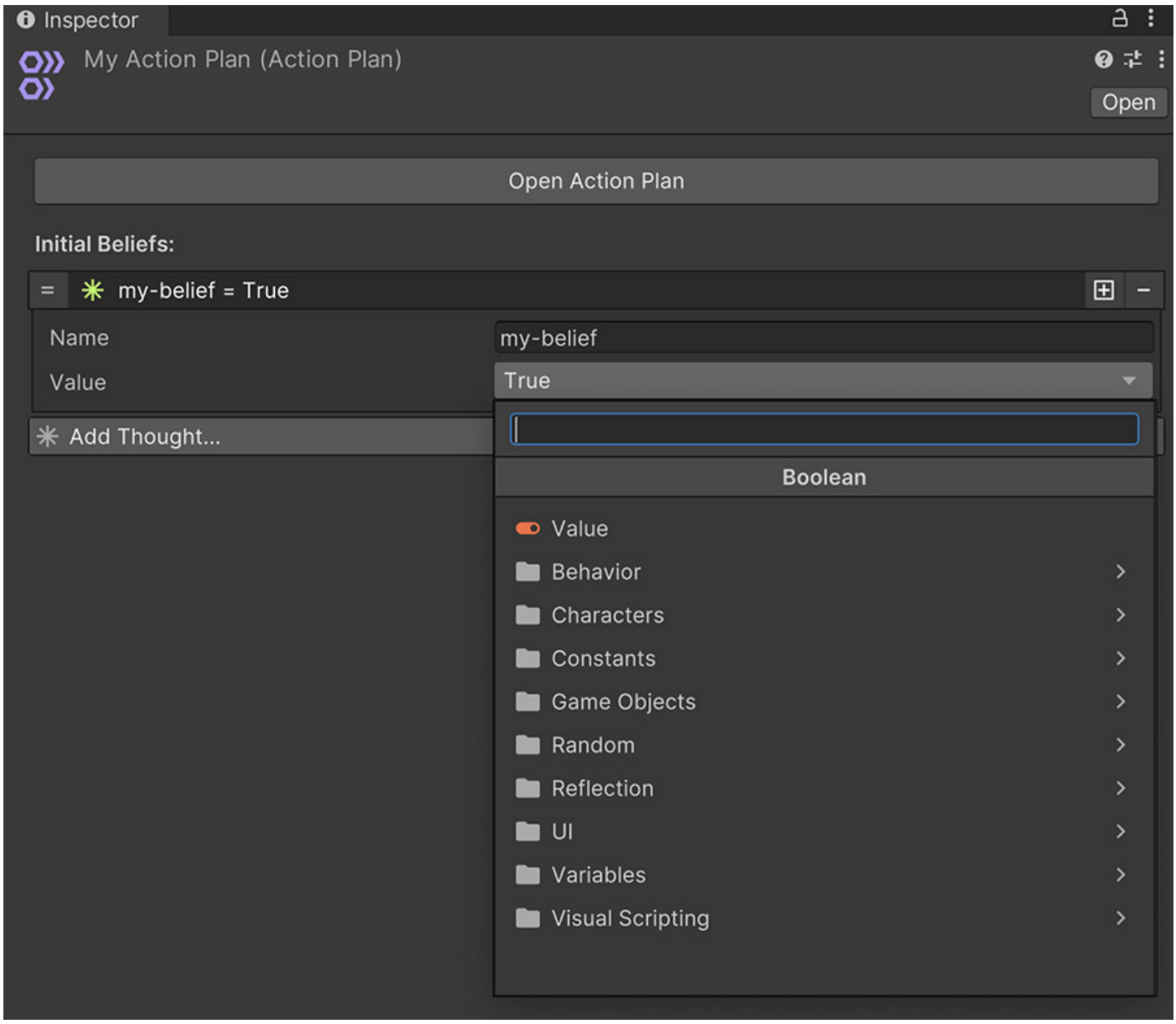


If we ask the AI system to build us a plan, it will quickly realize the plan can't be made of a single node, because it requires `be-in-restaurant` to be satisfied. However, the second node satisfies this condition, and thus it will give us the **Plan** sequence: `Task 2` → `Task 1`

921.1 Thoughts

Beliefs are the agent's local knowledge about the world state at any given time, which can be transformed applying **Effects** in order to reach a goal.

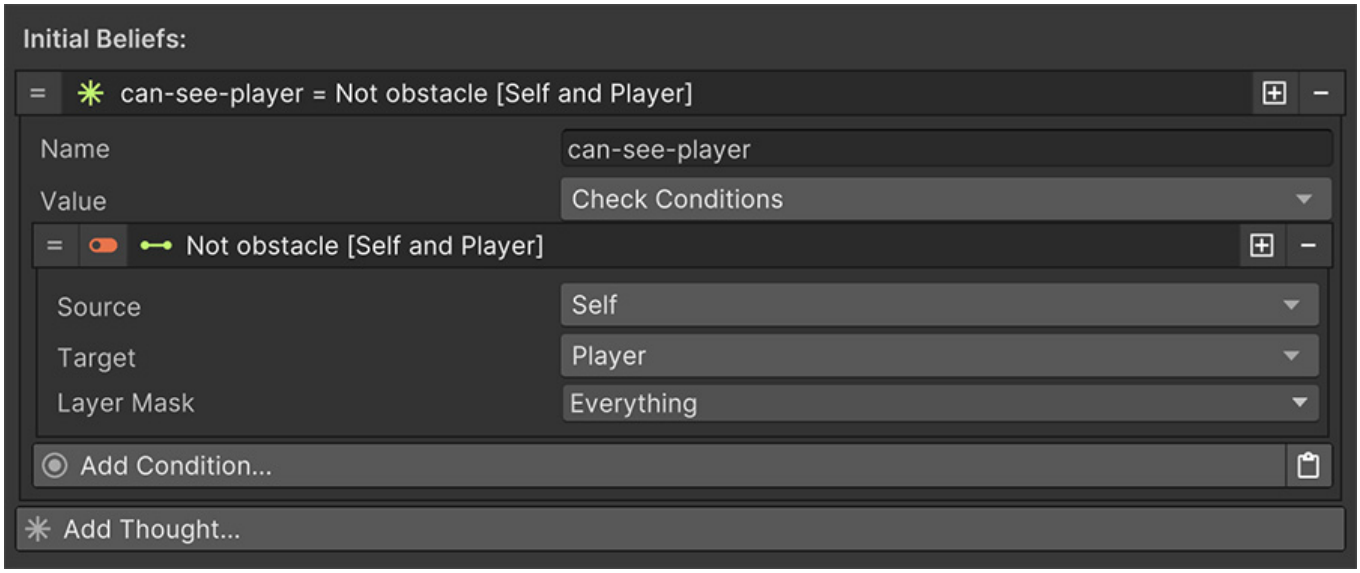
By default when an **Action Plan** attempts to build a **Plan** it starts with a blank slate of **Beliefs**. However we can change that by giving it some default values whenever the plan starts being calculated.



To do so, select the **Action Plan** asset from the *Project Panel* and click on the *Add Thought* button. Thoughts are the initial values of an agent's **Beliefs**.

I am thinking whether I see the Player or not

For example, we could have the initial **Belief** (or **Thought**) of whether the agent can see the player or not. To do so we can use the *Visual Scripting* boolean option of a **Condition** and check whether there's an obstacle between the *Player* and the *Self* (the agent itself).



922 Nodes

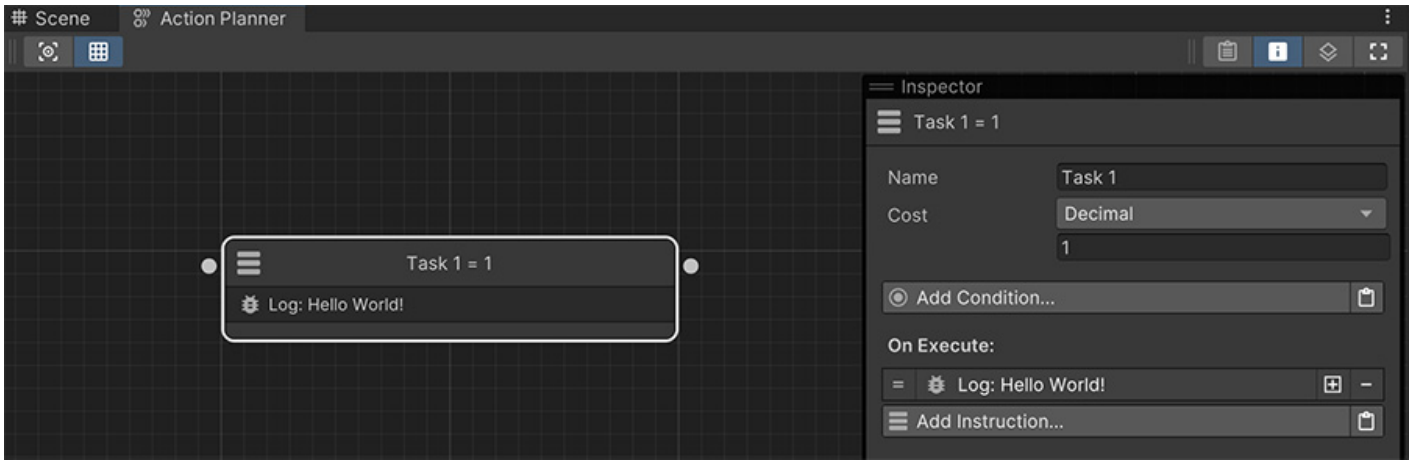
GOAP has two types of nodes:

- **Tasks**
- **Sub Graphs**

Both of them accept a **Requisites** node on the left and an **Effects** node on the right.

922.1 Tasks

The **Task** node is the main node of a **GOAP** AI system.



It contains a **Name** that helps identify what this node does. This has no effect at runtime.

The **Cost** is a numeric value that determines how difficult it is to run this node. When coming up with a plan, the AI system will pick the plan with the least cost value, adding up all costs of all nodes in each plan and comparing the resulting value.

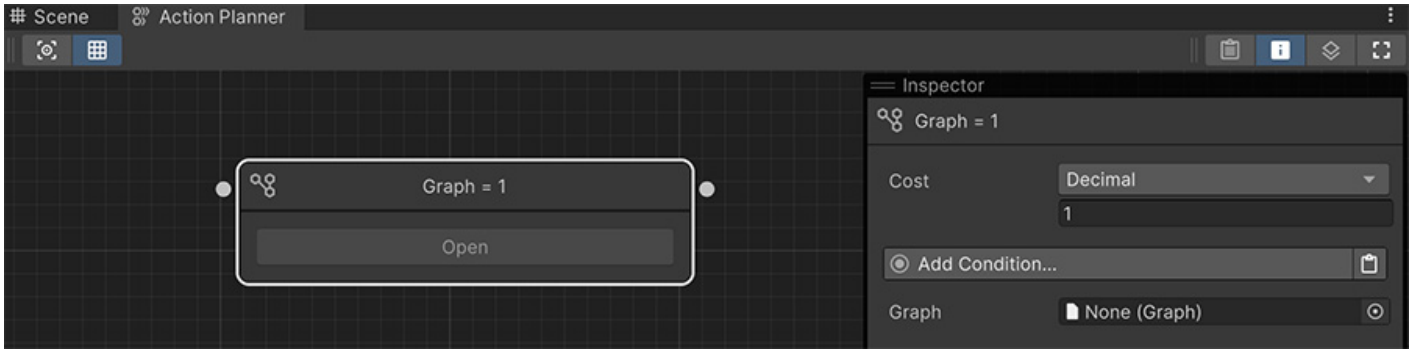
Conditions determine whether this node can be executed or not.

> **Conditions are not Beliefs**
>
> It is extremely important to note that **Conditions** are not the same as **Beliefs**. **Conditions** have no effect when coming up with a plan and will only be evaluated when executing a plan, and cancel the plan if they evaluate to *False*.
>
> It's highly recommended using **Beliefs** instead of **Conditions** unless you want to abort your plans mid-way through. For example, a plan that approaches a character and attacks it, an aborting **Condition** could be checking if the character is already dead when reaching it.

The **On Execute** instructions are where the bulk of the logic happens. A node will be considered finished after all its instructions have been executed in order.

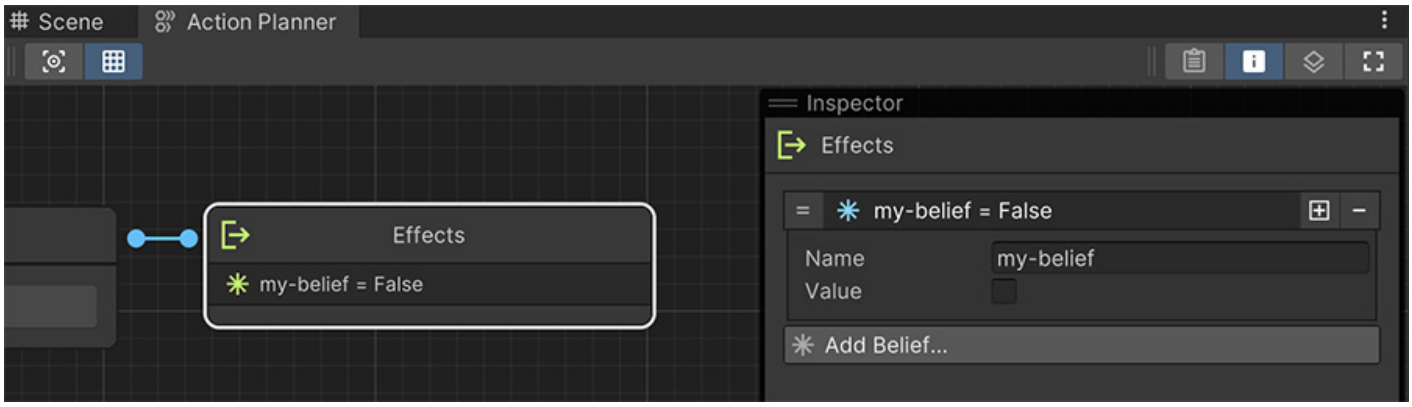
922.2 Sub Graph

The **Sub Graph** node works exactly the same way as a **Task** node does, but instead of executing instructions, it runs another AI graph system, such as a **State Machine** or a **Behavior Tree**.



922.3 Requisites and Effects

The **Requisites** and **Effects** nodes are exactly the same, but the first one links to a **Task** or **Sub Graph** node from their left side, and the former links to them on the right side.



There can be any number of **Beliefs** attached to each one of these nodes, and it can check whether the **Belief** is *True* or *False*.

> **A False Belief**
>
> A **Belief** that is marked as *False* means the belief is not present, which is the default value when coming up with a plan (unless the Thoughts list states otherwise).

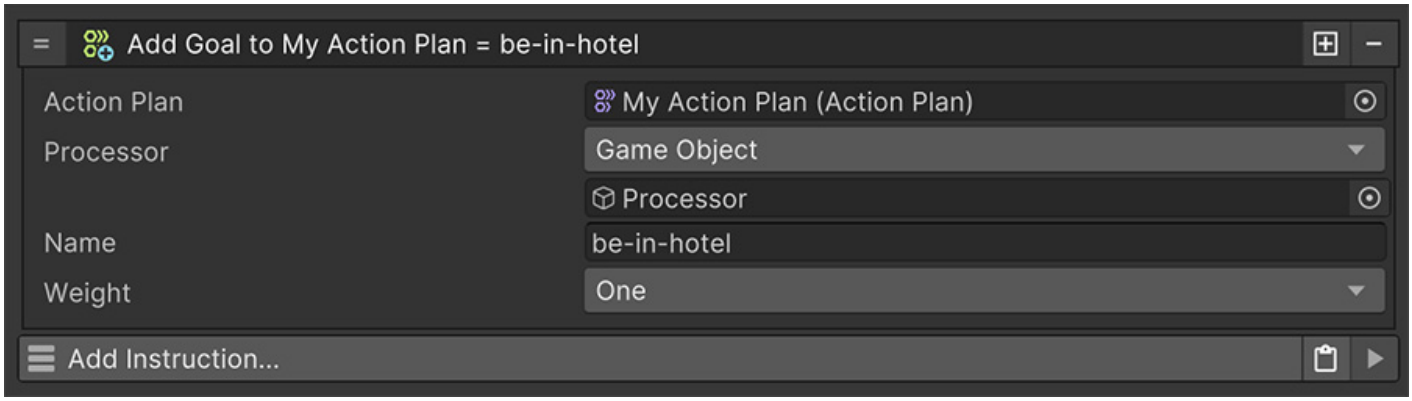
923 Logic

A **GOAP** AI system doesn't do anything by itself. It requires one or multiple **Goals** and come up with a plan to solve them and pick the most beneficial.

923.1 Setting up Goals

The instruction **Add Goal** allows to add a new one to a specific **Processor** component and **Action Plan**.

> **Specify Action Plan**
>
> The **Action Plan** asset must be specified because the AI system might contain multiple **Action Plan** assets running as sub graphs.



The **Name** field determines the **Belief** that will be required to satisfy (meaning it evaluates to *True*) in order to consider the **Goal** as completed.

The **Weight** is a value that is multiplied to the total cost when coming up with a plan that resolves this goal. This allows to prioritize some goals higher than others.

Goal Priorities

Let's say we have two goals: `Stay-Alive` and `Kill-Enemies` and the AI system comes up with a plan for each with the following total costs:

- `Stay-Alive` with a total Cost of 5
- `Kill-Enemies` with a total Cost of 3

In this case, because killing enemies has a lower cost, it would be picked up over staying alive. However this doesn't make sense, because a character should focus on self-preservation first.

In this case, we can give the `Stay-Alive` goal a **Weight** of 0.5, which is a coefficient that multiplies the total cost by this value, yielding the following new results:

- `Stay-Alive` with a total Cost of (5 * 0.5) = 2.5
- `Kill-Enemies` with a total Cost of (3 * 1) = 3

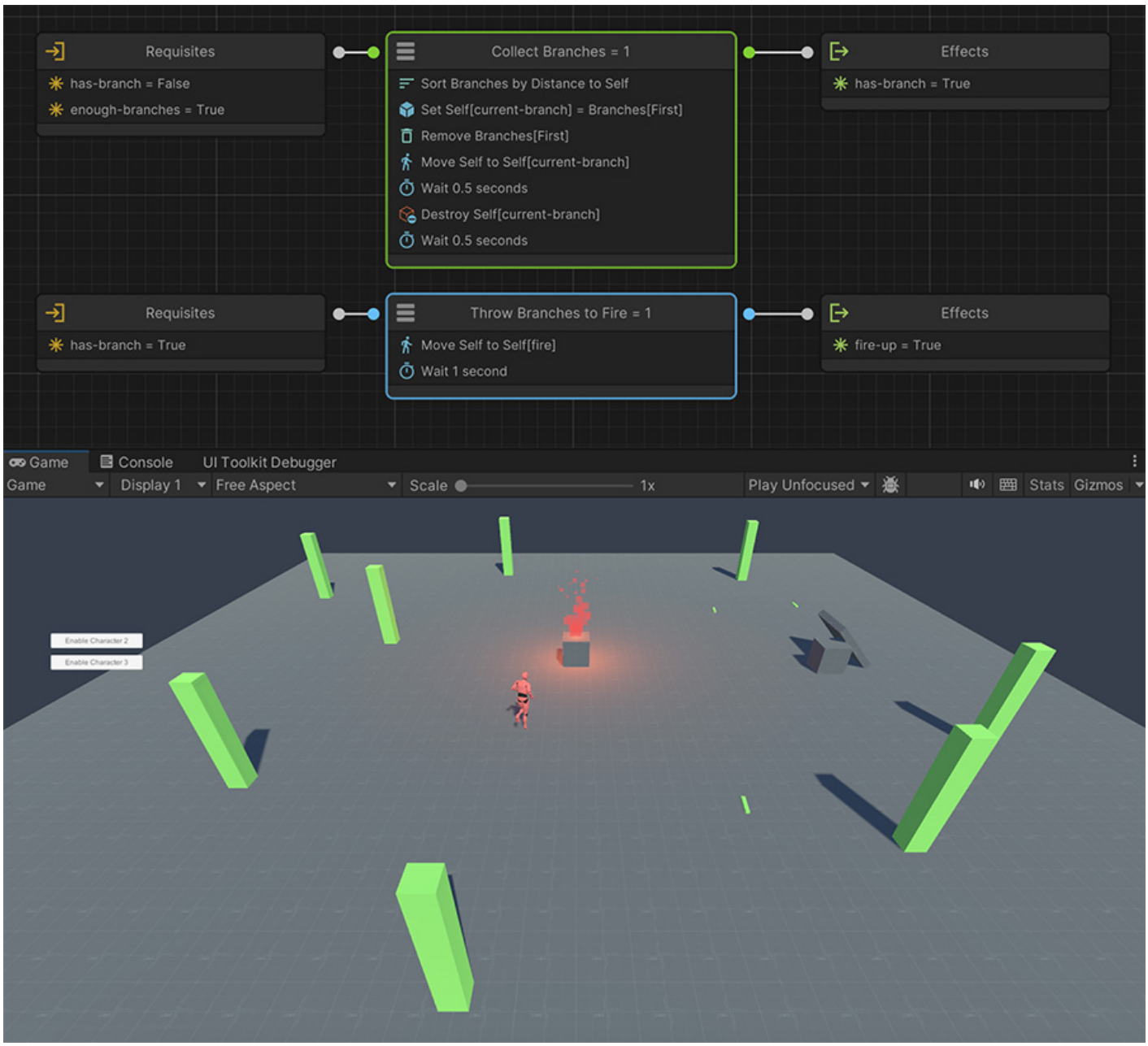
Now staying alive will be prioritized unless killing an enemy comes at a very small cost. Note that we could have also doubled the weight of the killing enemies goal instead and it would result still work.

Just like adding goals, to remove a **Goal** use the **Remove Goal** instruction.

923.2 Planning

Once an **Action Plan** has one or more **Goals** it can come up with a plan, which is only done if there's not an ongoing plan being executed.

The **GOAP** algorithm starts coming up with a plan for each **Goal**, and if there are multiple plans for the same goal, stores the one with the lowest cost.



Once it has zero or one plan for each **Goal** it multiplies each one by their **Weight** value and picks the one with the lowest cost. After than it starts executing the chosen plan until it finishes or is aborted by a *Condition*.

VI.IV Utility AI

924 Utility AI

Utility AI, also known as **Needs-Based AI**, is a behavioral artificial intelligence technique that defines a collection of *needs* that have a necessity curve assigned to them and a **Score** value that can grow or decrease over time.

> **Type of Game**
>
> This AI technique is mostly suited for organic simulation games, such as *The Sims*.

At any point the *need* task to use is determined by comparing all **Scores** and applying the easing curve to it. The *need* task with the highest resulting value will be picked and executed.

> **Two Needs**
>
> Let's say we have an **Utility Board** with just two needs, with very different curves:
>
> - **Cook some Rice**: The *need* to cook and eat grows over time, as the hunger increases.
> - **Call a Friend**: The *need* to call a friend decreases as the socialization value is met.
>
> Note that the **Call a Friend** curve slightly increases a bit at the end. This is because once a character is socializing, it keeps wanting to socialize, unlike with hunger, where once a human is full, it doesn't want to eat anymore.
>
> 
>
>
> If we were to execute this graph, if the hunger level was high it would likely pick the **Cook some Rice** task. However if the socialization needs are very low it would likely pick the option to **Call a Friend**.

Curves allow to tweak the resulting value and model different responses based on a set of dynamic values that change over time.

Game Maker's Toolkit on Utility AI

Mark Brown from **Game Maker's Toolkit** put up a very nice and rounded video covering how the AI of *The Sims* work. It's filled with good ideas and high-level knowledge that designers can use to get started.

Pair with other AI systems

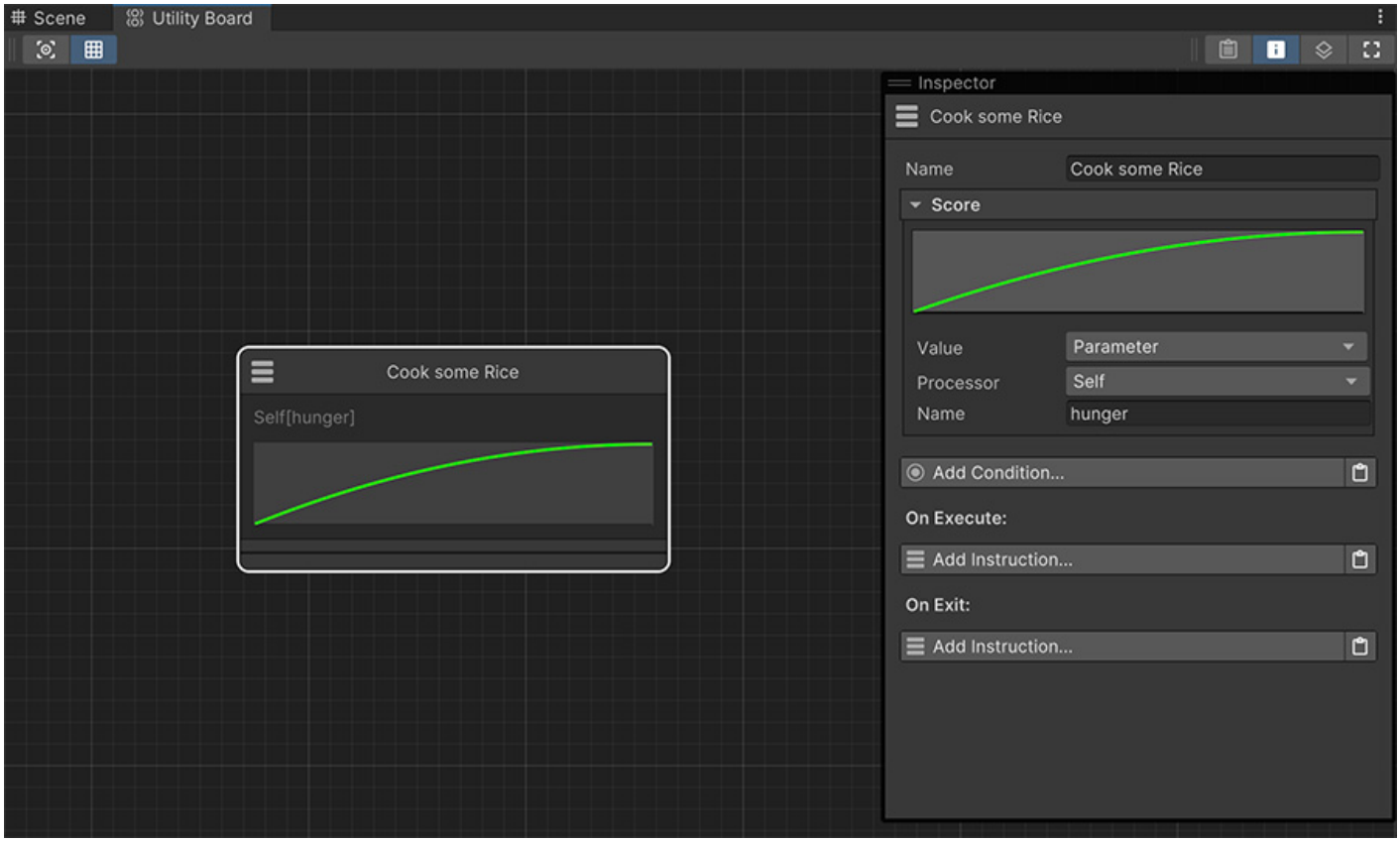
Utility AI pairs very well with other AI systems, such as **Behavior Trees** or **GOAP**. Each *need* node can contain other sub graphs from other systems that delegate the complexity of executing the action that fulfills the *need*.

925 Nodes

Because **Utility AI** systems don't have any connections, there are just two possible types of nodes. Both of them do the exact same thing but one has the logic embedded on them and the other one delegates it to another AI system, such as a **Behavior Tree**, a **GOAP**, a **State Machine** or even another **Utility AI** system.

925.1 Tasks

The **Task** node has the logic of the *need* embedded on itself and is suitable for basic interactions, such as playing a guitar.



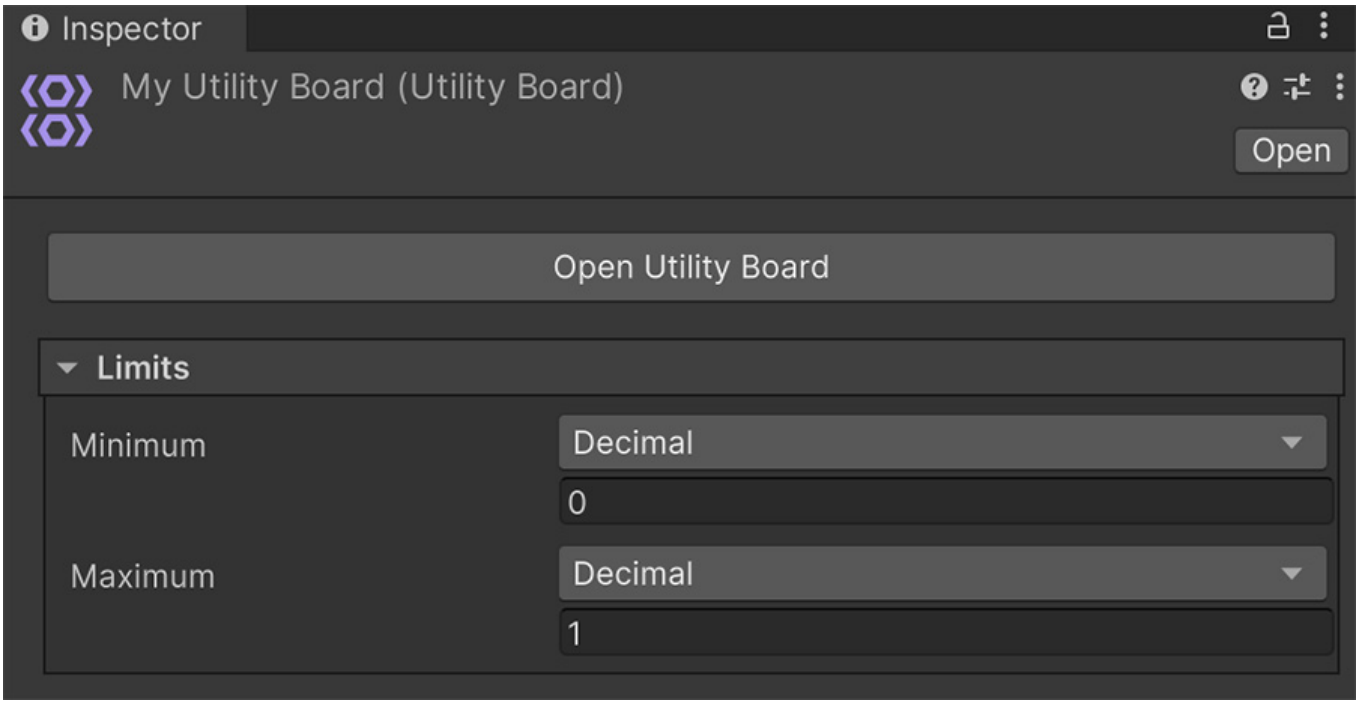
The top part of the node contains a **Name** field which doesn't have any effect on the execution and is used to easily identify it across all other nodes.

The **Score** section determines the easing **Curve** as well as the value used as input on the curve.

The bounds of the Value

By default the bounds of the value range from 0 to 1, meaning that the curve's left-most position is zero and the right-most is 1.

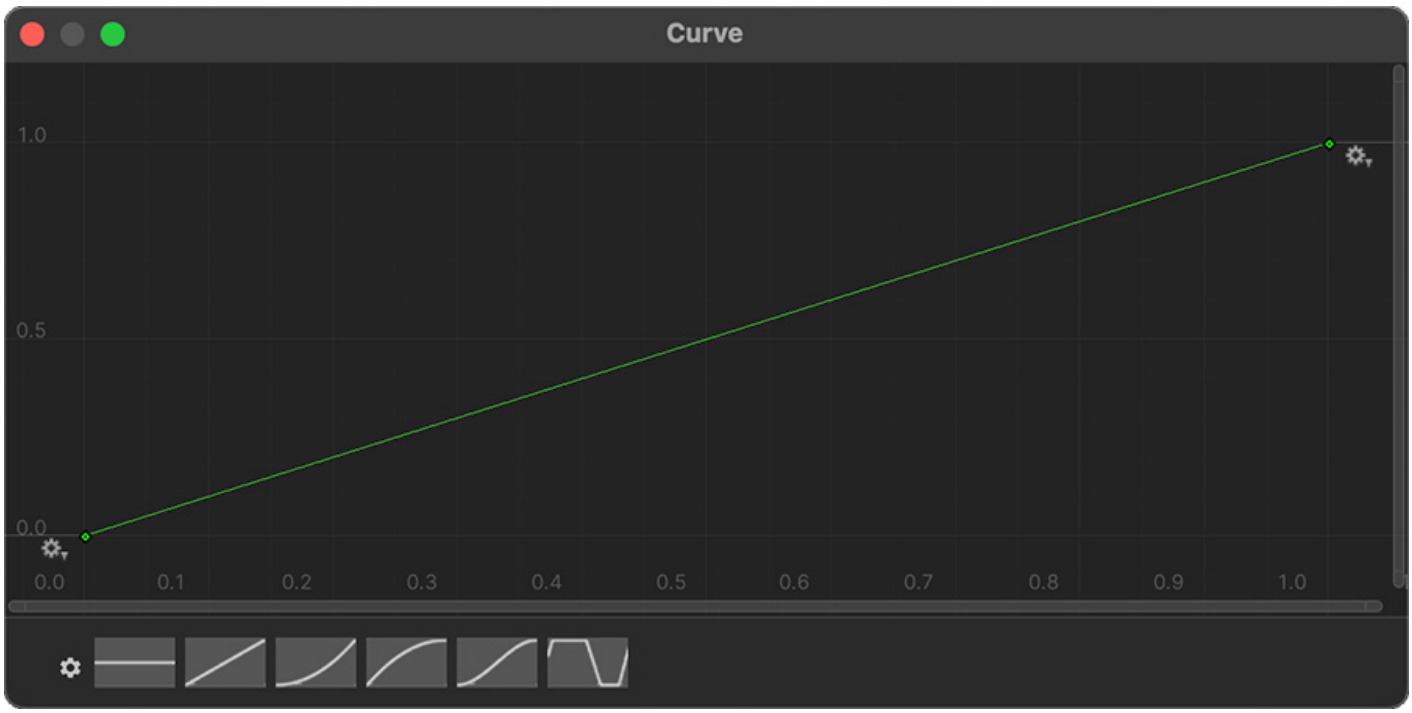
However if your game requires negative values or another range of values, you can modify the minimum and maximum value by selecting the **Utility Board** asset on the *Project Panel* and changing the corresponding fields.



Bear in mind that the curve will always be constrained by 0 an 1, but the resulting value will be transformed to fit the limits defined in the **Minimum** and **Maximum** fields.

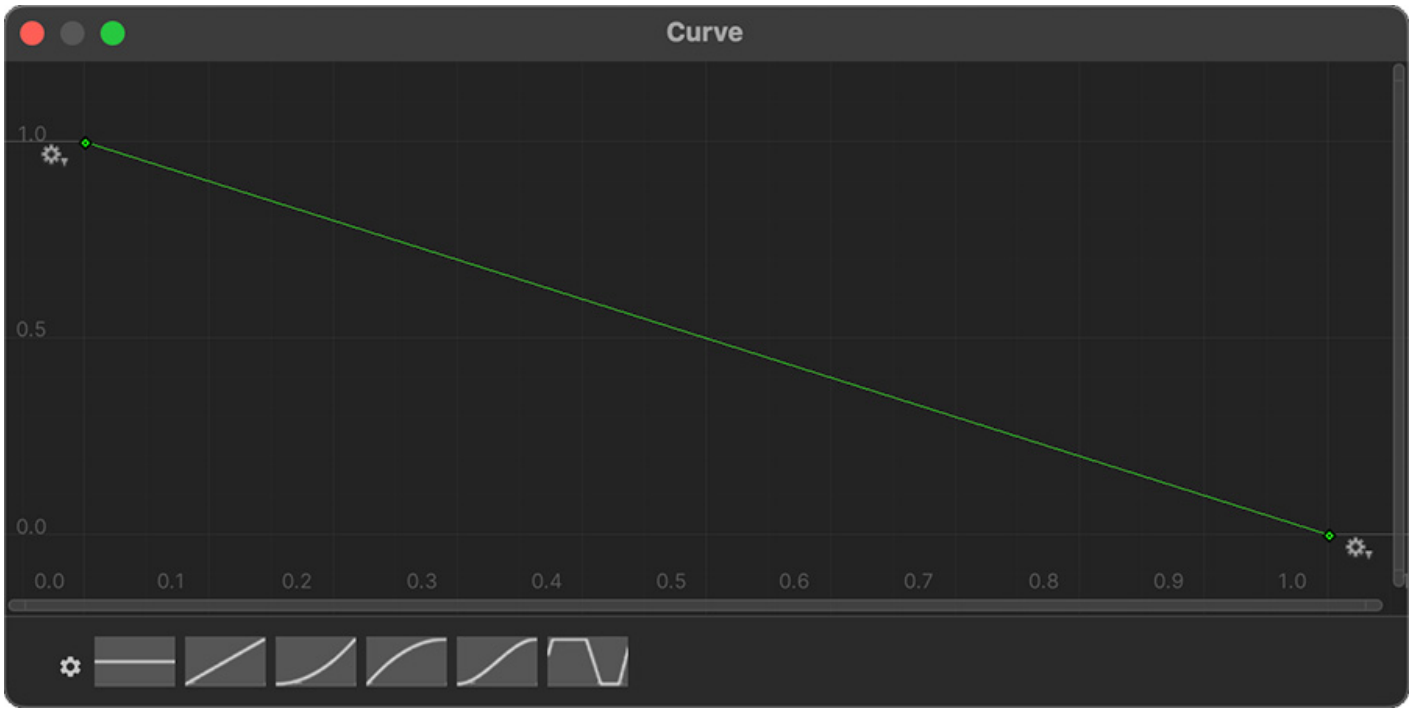
Curves allow to transform the input **Value** into something that's usable. Here are some common use-case scenarios:

925.1.1 Linear Curve



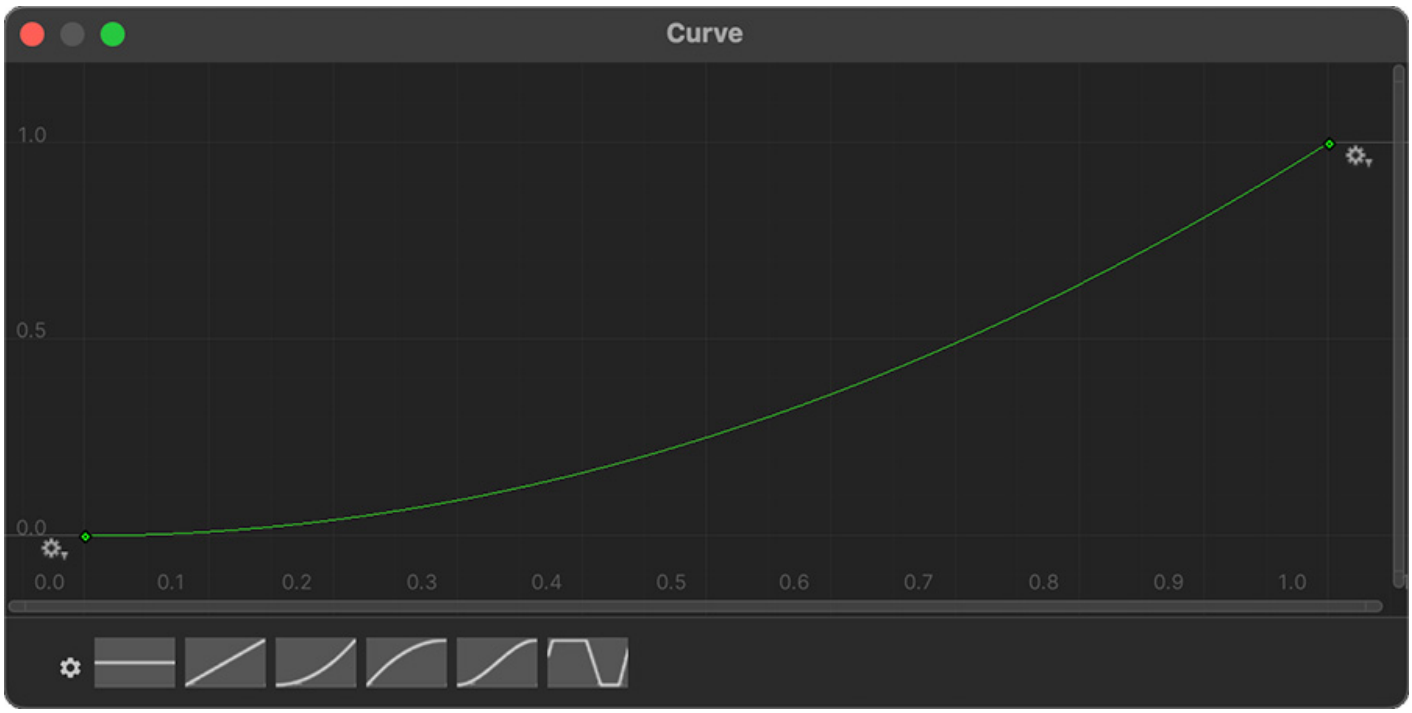
The most basic curve is the **linear** one, which takes the input **Value** and returns it as-is.

925.1.2 Inverse Linear Curve



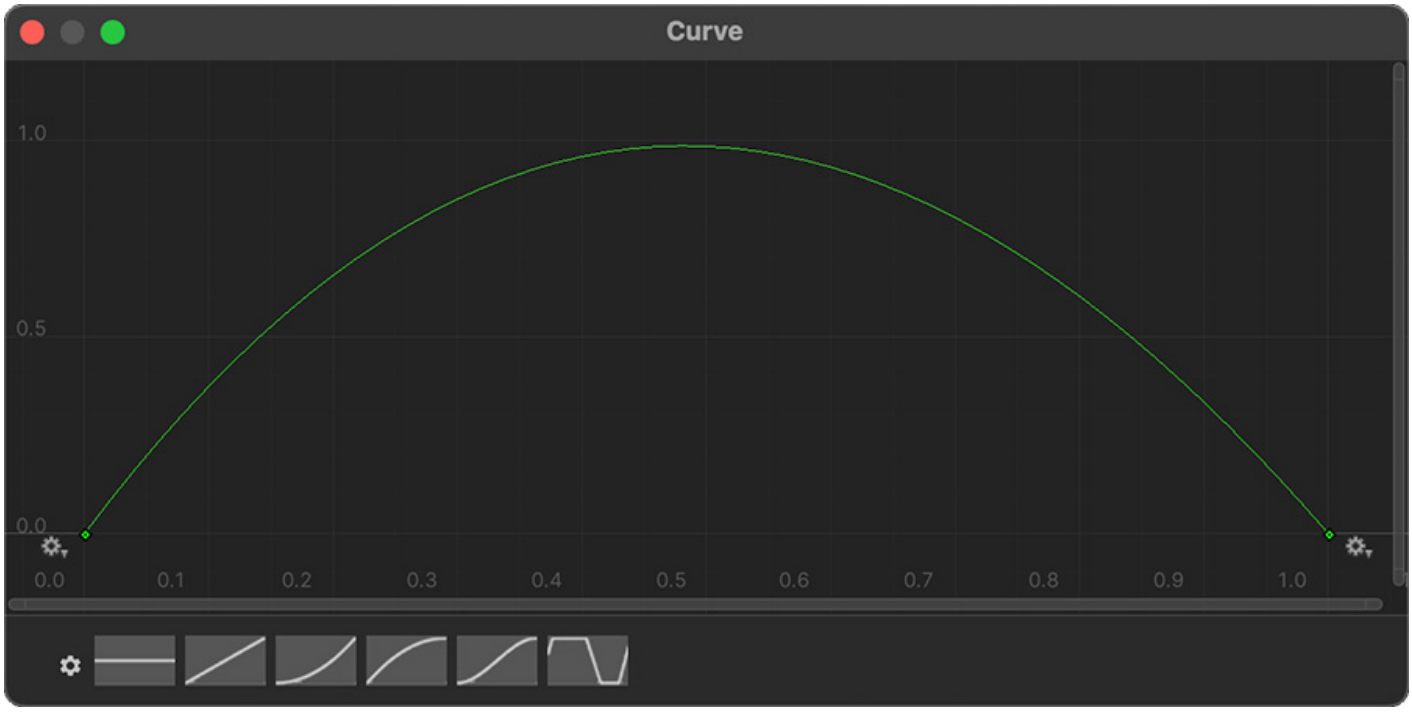
The **inverse linear** curve reverses the value given, meaning that the resulting value decreases as the input value increases, and vice-versa.

925.1.3 Easing Curve



The **smooth easing** curve is similar to the **linear** curve because it grows as the input value grows. However the growth is much more visible as it approaches the end of the range.

925.1.4 Belly Curve



The **belly** curve (aka *Bell* curve or *Gauss* curve) is a very interesting one in which the growth happens in the middle but decreases at the edges. This is usually used for low-priority tasks that are executed out of boredom, such as scratching one's head.

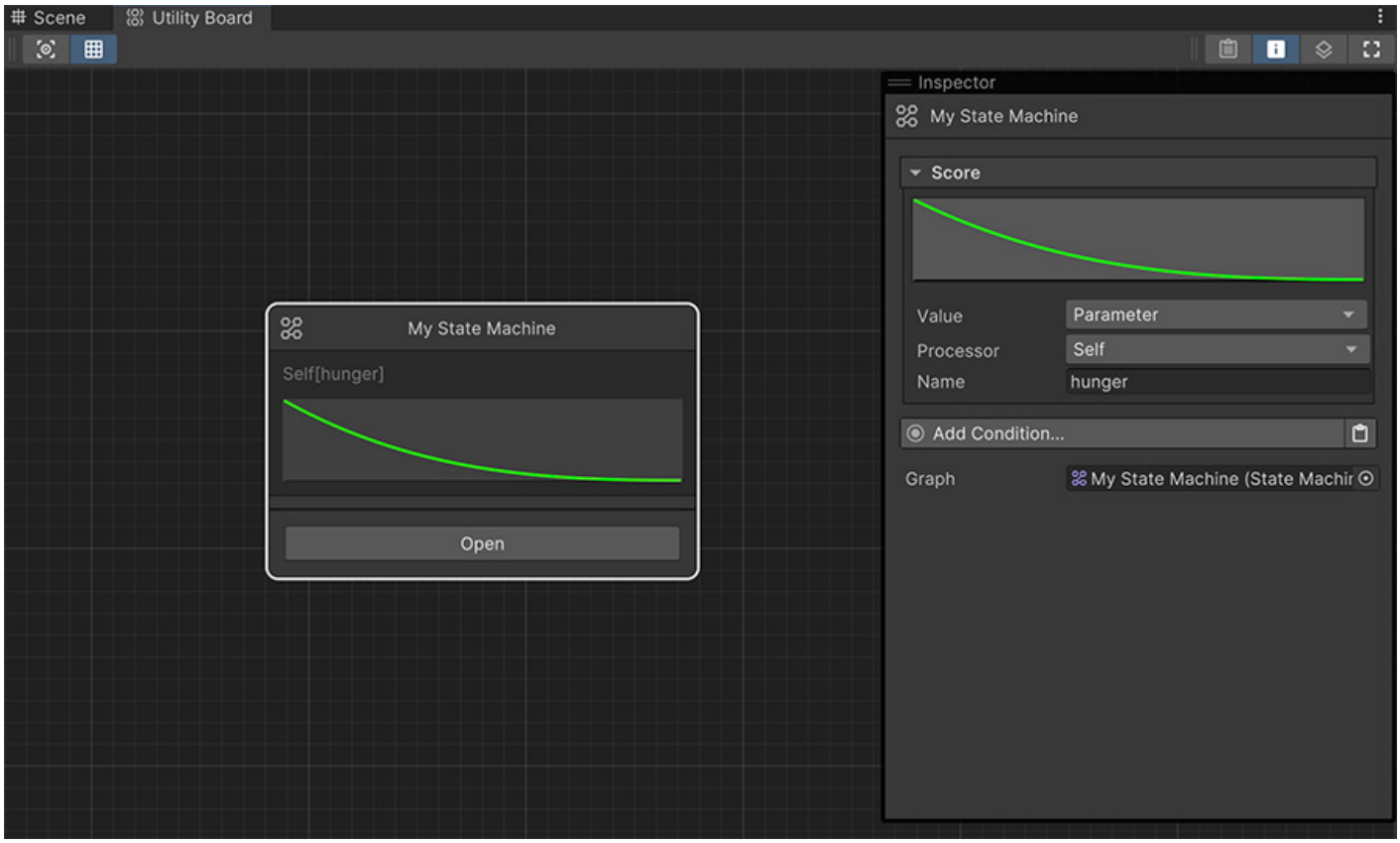
The **Conditions** field allows to determine whether this *need* is valid and can be executed. If the conditions can't be satisfied, the node will not be taken into account.

The **On Execute** instructions run as soon as the *need* node starts executing. After it finishes, the task is considered to have finished.

Because some tasks might exit early due to unforeseen events, such as attempting to play a guitar that no longer exists, the **On Exit** instructions are executed after finishing running a *need*. These instructions are guaranteed to be called from start to finish and can be used to finalize the execution and restore the state of the agent back to before it started.

925.2 Sub Graph

The **Sub Graph** node works exactly the same way as the **Task** one, but instead of executing some **On Execute** and **On Exit** instructions, it delegates the responsibility of running the *need* node to another AI system, such as a **Behavior Tree**, a **State Machine**, an **Action Plan** or even another **Utility Board**.



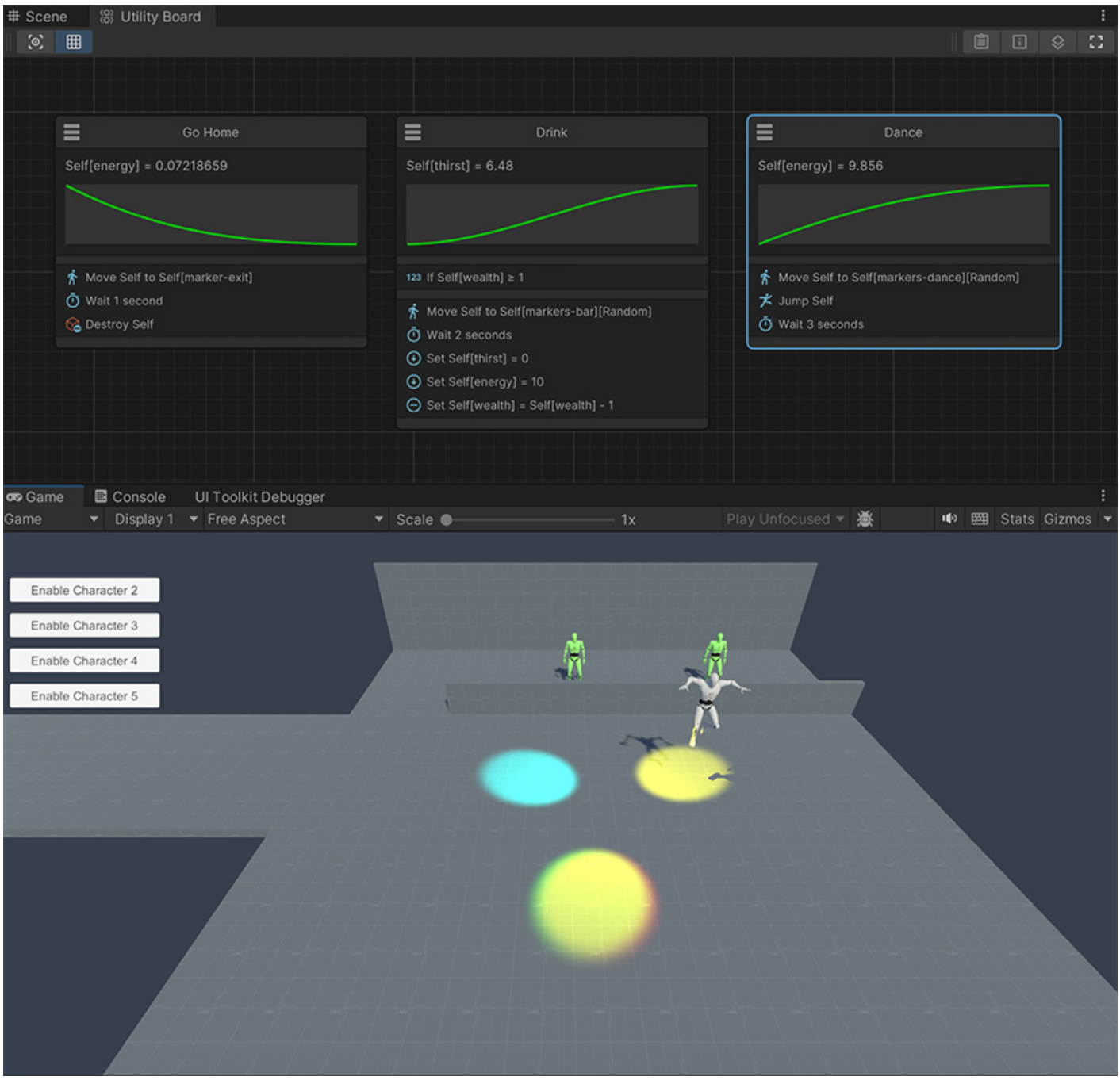
926 Logic

When an **Utility Board** is executed it starts by gathering all **Task** and **Sub Graph** nodes.

It then gets their different **Value** values and applies them to their corresponding **Need Curve**, which returns a value constrained between the **Minimum** and **Maximum** value defined in the **Utility Board** asset.

Once their **Score** value is calculated, it compares all values and picks the one with the highest score and starts running it.

> **Wait to finish**
>
> An **Utility Board** will not recalculate a new *need* node unless the one currently being executed finishes. This means that when a *need* task cannot be completed, it should either early exit or abort itself.



When entering Play-Mode and selecting an agent that has a **Processor** component will display real-time information about the current execution. In the screenshot above the title of each node shows the resulting value of applying the **Value** onto the **Curve**:

- **Go Home** has a value of 0.072
- **Drink** has a value of 6.48
- **Dance** has a value of 9.856

Thus the node chosen to execute the AI system is **Dance** because has the highest score value.

VI.V Visual Scripting

927 Visual Scripting

The **Behavior** module symbiotically works with **Game Creator** and the rest of its modules using its visual scripting tools.

- **Instructions**
- **Conditions**
- **Events**

Each scripting node allows other modules to use any **Behavior** feature.

VI.V.I Conditions

928 Conditions

928.1 Sub Categories

- Behavior

VI.V.I.I Behavior

929 Behavior

929.1 Conditions

- Is Processor Running

930 Is Processor Running

`Behavior » Is Processor Running`

930.1 Description

Returns true if the Processor is in a Running state

930.2 Parameters

Name	Description
Processor	The reference to the Processor component

930.3 Keywords

`AI` `Behavior Tree` `State Machine` `Utility` `Need` `Goal` `Plan` `GOAP`

VI.V.II Events

931 Events

931.1 Sub Categories

- Behavior

VI.V.II.I Behavior

932 Behavior

932.1 Events

- On Processor Finish
- On Processor Start

933 On Processor Finish

```
Behavior » On Processor Finish
```

933.1 Description

Executed when the Processor finishes its current execution

933.2 Keywords

`AI` `Behavior Tree` `State Machine` `Utility` `Need` `Goal` `Plan` `GOAP`

934 On Processor Start

```
Behavior » On Processor Start
```

934.1 Description

Executed when the Processor starts a new execution

934.2 Keywords

`AI` `Behavior Tree` `State Machine` `Utility` `Need` `Goal` `Plan` `GOAP`

VI.V.III Instructions

935 Instructions

935.1 Sub Categories

- Behavior

VI.V.III.I Behavior

936 Behavior

936.1 Sub Categories

- Action Plan

936.2 Instructions

- Processor Update

937 Processor Update

`Behavior » Processor Update`

937.1 Description

Manually executes a new iteration on a Processor

937.2 Parameters

Name	Description
Processor	The targeted Processor component

937.3 Keywords

`AI` `Behavior Tree` `State Machine` `Utility` `Need` `Goal` `Plan` `GOAP`

VI.V.III.I.I ACTION PLAN

938 Action Plan

938.1 Instructions

- Add Goal
- Remove Goal

939 Add Goal

`Behavior » Action Plan » Add Goal`

939.1 Description

Adds a new Goal to the specified Action Plan

939.2 Parameters

Name	Description
Processor	The targeted Processor component
Action Plan	The Action Plan asset to set the goal
Name	Name identifier of the goal
Weight	The weight the goal has when calculating the plan

939.3 Keywords

`AI` `Action` `Goal` `Plan` `GOAP`

940 Remove Goal

`Behavior » Action Plan » Remove Goal`

940.1 Description

Removes an existing Goal from the specified Action Plan

940.2 Parameters

Name	Description
Processor	The targeted Processor component
Action Plan	The Action Plan asset to remove the goal
Name	Name identifier of the goal
Weight	The weight the goal has when calculating the plan

940.3 Keywords

`AI` `Action` `Goal` `Plan` `GOAP`

VI.VI Releases

941 Releases

941.1 2.1.6 (Latest)

Released October 18, 2024

Changes

- Editor: Support for Unity 6

Fixes

- Graph: Removed obsolete UI Toolkit APIs

941.2 2.1.5

Released July 30, 2024

Enhances

- Nodes: Display Breakpoint and Disabled Instructions
- Nodes: Display Breakpoint and Disabled Conditions

Fixes

- Behavior Tree: Composite selector incorrect conditions

941.3 2.1.4

Released February 23, 2024

Fixes

- Editor: Exiting play-mode remembers open graphs

941.4 2.1.3

Released October 31, 2023

This version breaks compatibility with previous versions and will only work with Game Creator 2.13.43 or higher.

Changes

- Demos: Examples support latest core version
- Internal: Support for Core 2.13.42 version

941.5 2.0.2

Released August 31, 2023

Enhances

- UX: Paste from shortcut places node nearby
- UX: Creating a node automatically selects it

Fixes

- Graph: Duplicating special nodes
- Example: Removed State Machine unused object

941.6 2.0.1

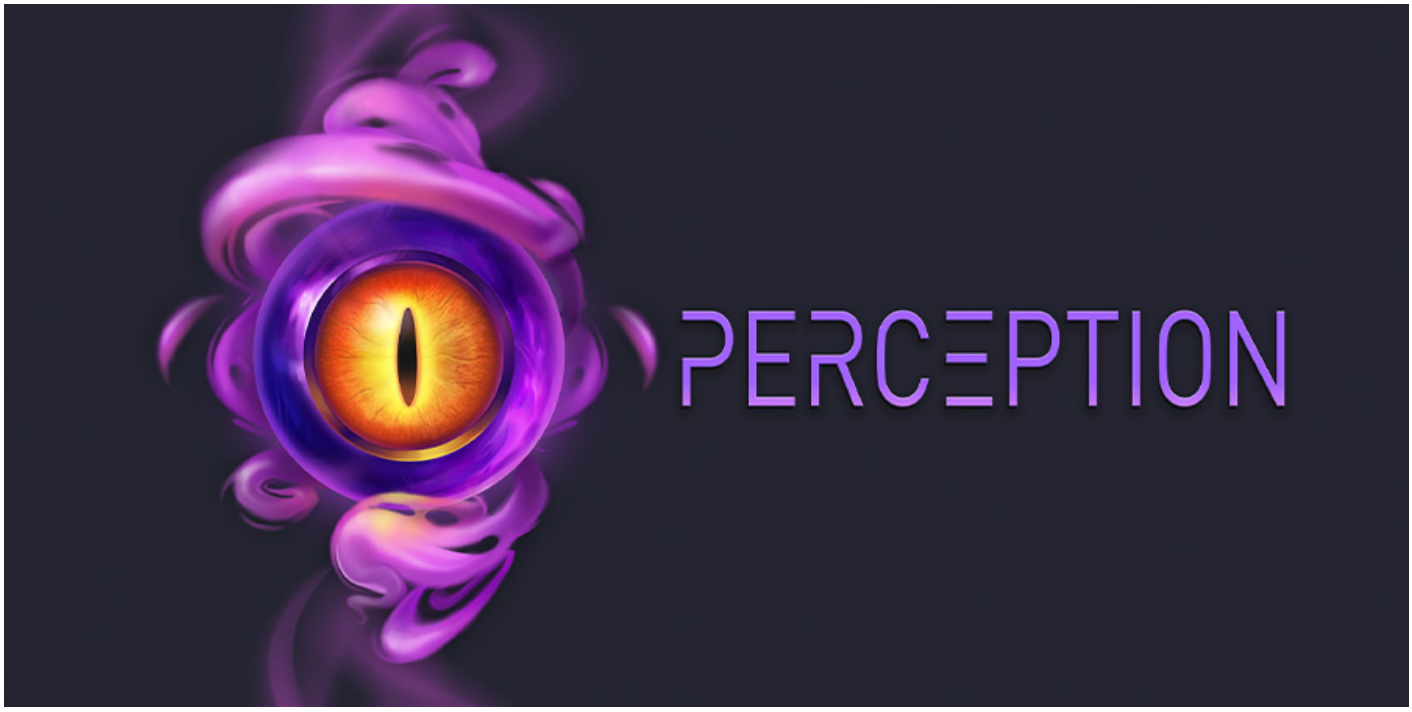
Released August 30, 2023

New

- First release

VII. Perception

942 Perception



Video game characters can read their world through a wide variety of virtual sensors, such as sight, hearing and smell. These sensors have parametrized values that try to emulate the ones from the real world.

The **Perception** module aims to help non-playable characters understand what happens around them and organically react to different stimulus.

Get Perception

Requirements

The **Perception** module is an extension of **Game Creator 2** and won't work without it

The **Perception** component can be attached to any game object in order to make it aware of their surroundings. This component admits four different sensors that help read the world around them:

- **Sight**: Detects other objects within a vision cone and its peripheral vision
- **Hearing**: Detects noises above a certain threshold
- **Smell**: Tracks scent(s) and the direction where they come from
- **Feel**: A sixth sense that detects other objects by proximity

Using the sensors above, the **Perception** component can track a wide variety of scene objects and keeps a log of how aware it is of them.

Moreover the **Perception** module comes with an **Evidence** system that allows agents to notice changes made to the world by other characters.

943 Setup

Welcome to getting started with the **Perception** module. In this section you'll learn how to install this module and get started with the examples which it comes with.

943.1 Prepare your Project

Before installing the **Perception** module, you'll need to either create a new Unity project or open an existing one.

> **Game Creator**
>
> It is important to note that **Game Creator** should be present before attempting to install any module.

943.2 Install the Perception module

If you haven't purchased the **Perception** module, head to the Asset Store product page and follow the steps to get a copy of this module.

Once you have bought it, click on Window → Package Manager to reveal a window with all your available assets.

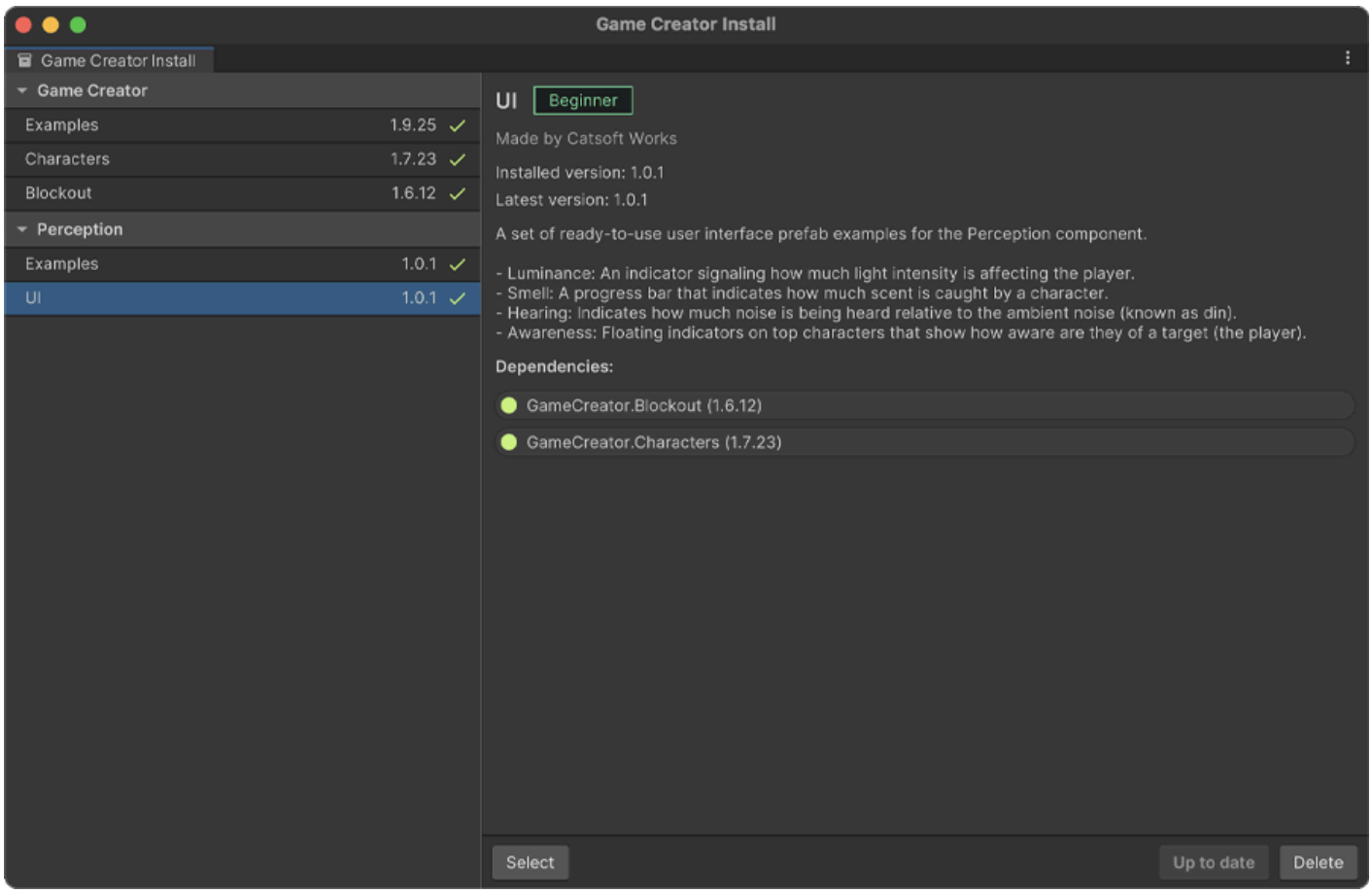
Type in the little search field the name of this package and it will prompt you to download and install the latest stable version. Follow the steps and wait till Unity finishes compiling your project.

943.3 Examples

We highly recommend checking the examples that come with the **Perception** module. To install them, click on the *Game Creator* dropdown from the top toolbar and then the *Install* option.

The **Installer** window will appear and you'll be able to manage all examples and template assets you have in your project.

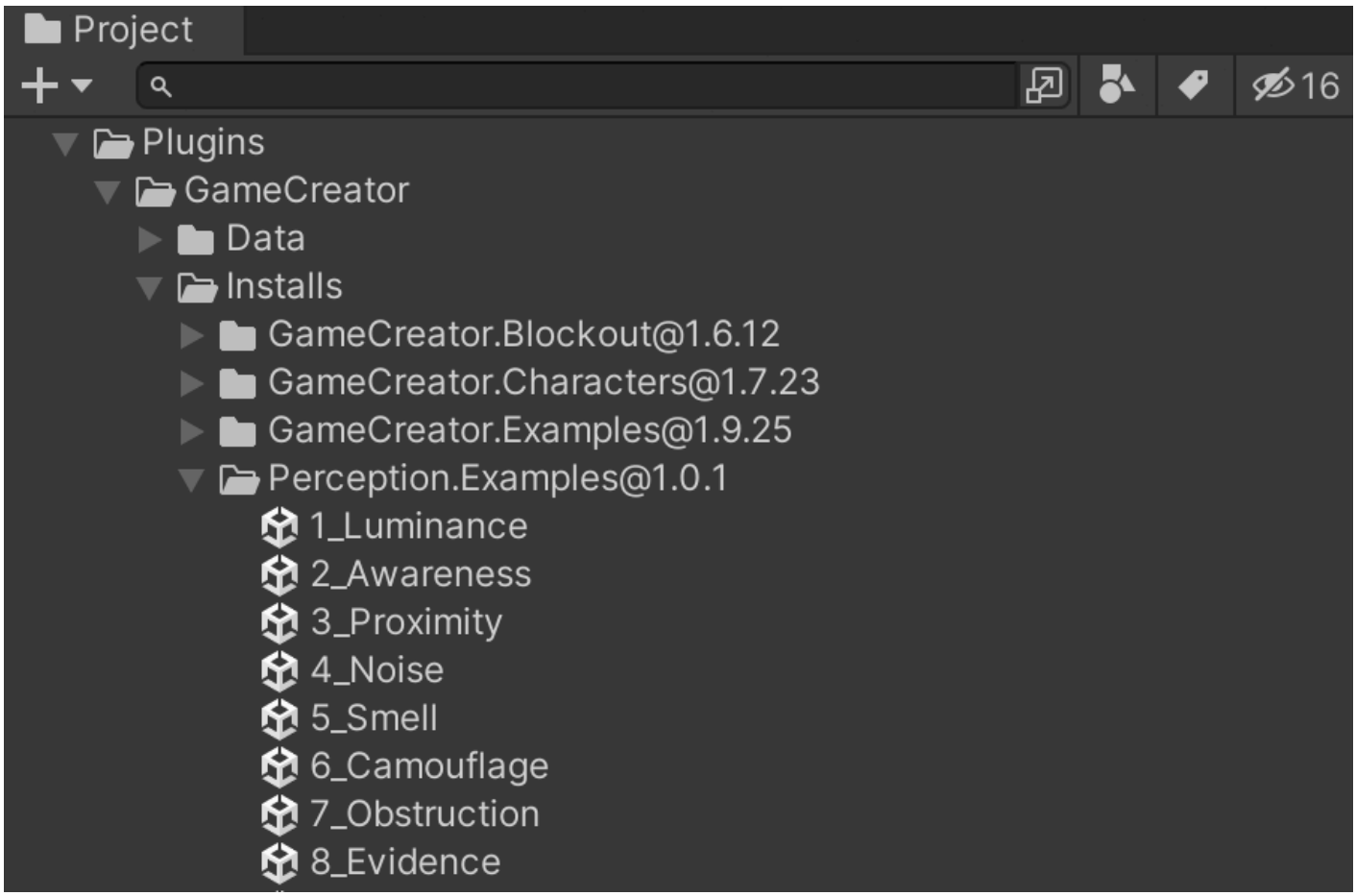
- **Examples**: A collection of scenes with different use-case scenarios.
- **UI**: A bundle of common user interface elements, such as enemy awareness, luminance, smell and hearing.



The **Examples** requires all the skins in order to work.

> ✓ **Dependencies**
>
> Clicking on the **Examples** install button will install all dependencies automatically.

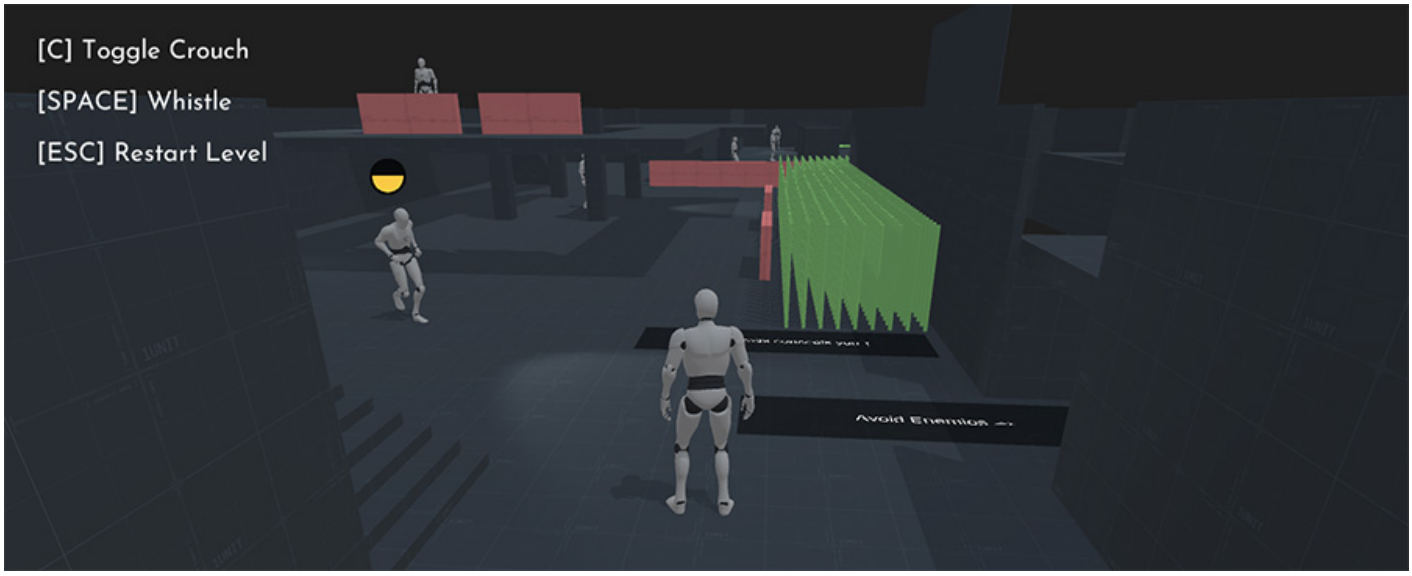
Once you have the examples installed, click on the *Select* button or navigate to `Plugins/GameCreator/Installs/Perception.Examples/`.


Project
16
Plugins
GameCreator
Data
Installs
GameCreator.Blockout@1.6.12
GameCreator.Characters@1.7.23
GameCreator.Examples@1.9.25
Perception.Examples@1.0.1
1_Luminance
2_Awareness
3_Proximity
4_Noise
5_Smell
6_Camouflage
7_Obstruction
8_Evidence

944 Awareness

Even though there are multiple ways to detect characters and objects, the ultimate goal is to determine whether an object A is aware of another B or not.

The **Awareness** is a value that aims to simplify how an agent communicates and reacts with other game objects.



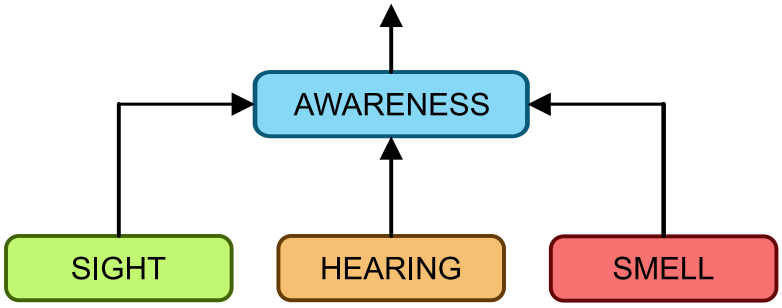
Example of Awareness

Let's say we have an enemy agent that can detect the player using *Sight*, *Hearing* and *Smell*. It would be very difficult to react when the enemy detects the player if we didn't have the **Awareness** meter, because we would need to control what happens when any of the possible combination of all three sensors detect or not the player.

For example, what would happen if the enemy sees the player? What happens if the enemy can see the player, but also hear it? What if it hears it but can't see it? Any of these permutations increase the complexity of building a robust detection system.

In this module the **Awareness** is a unique value stored in the **Perception** component that tracks how aware the agent is of each tracked object. This value ranges between 0 (not aware at all) and 1 (fully aware of the target).

The **Perception** component has a list of Sensors that feed the awareness value independently from each other. By doing so, one can create an enemy AI that reacts according to how aware it is of the player, instead of relying on information from each of the sensors.



Awareness as Stages

The **Awareness** can be read as a value between 0 and 1, but in some cases, it may be easier to give a name to awareness ranges. The **Perception** module provides 4 ranges:

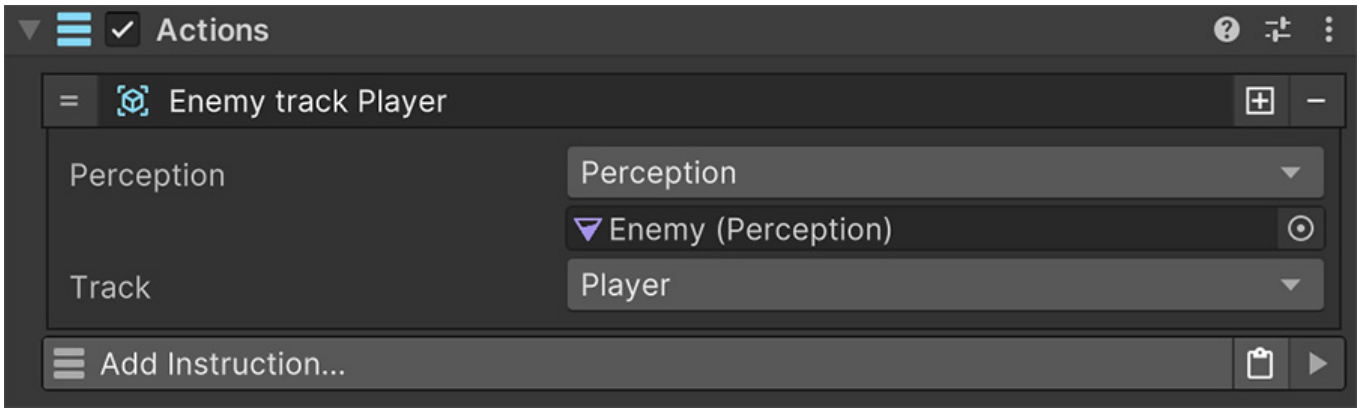
- **None**: The Awareness value is between 0 and 0.05
- **Suspicious**: The Awareness value is between 0.05 and 0.5
- **Alert**: The Awareness value is between 0.5 and 0.95
- **Aware**: The Awareness value is between 0.95 and 1

944.1 Tracking Objects

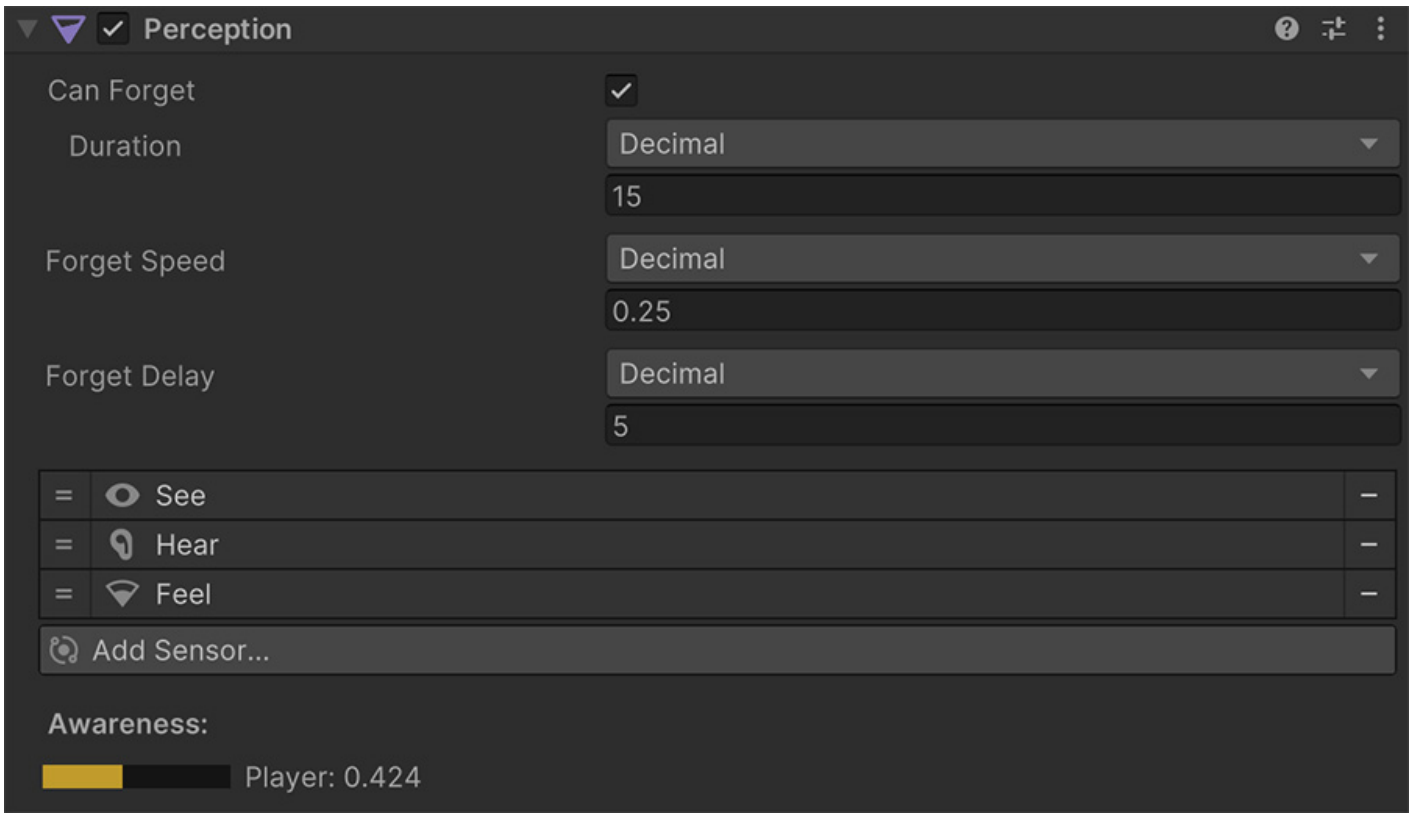
The **Perception** component does not automatically track all scene objects. The user can define which objects are tracked (or untracked) at any moment using the **Track Awareness** and **Untrack Awareness** instructions respectively.

Tracking the Player

The most common use-case is for an enemy to track the Player. To do so, simply add a **Trigger** with the *On Start* event with the following **Track Awareness** instruction:

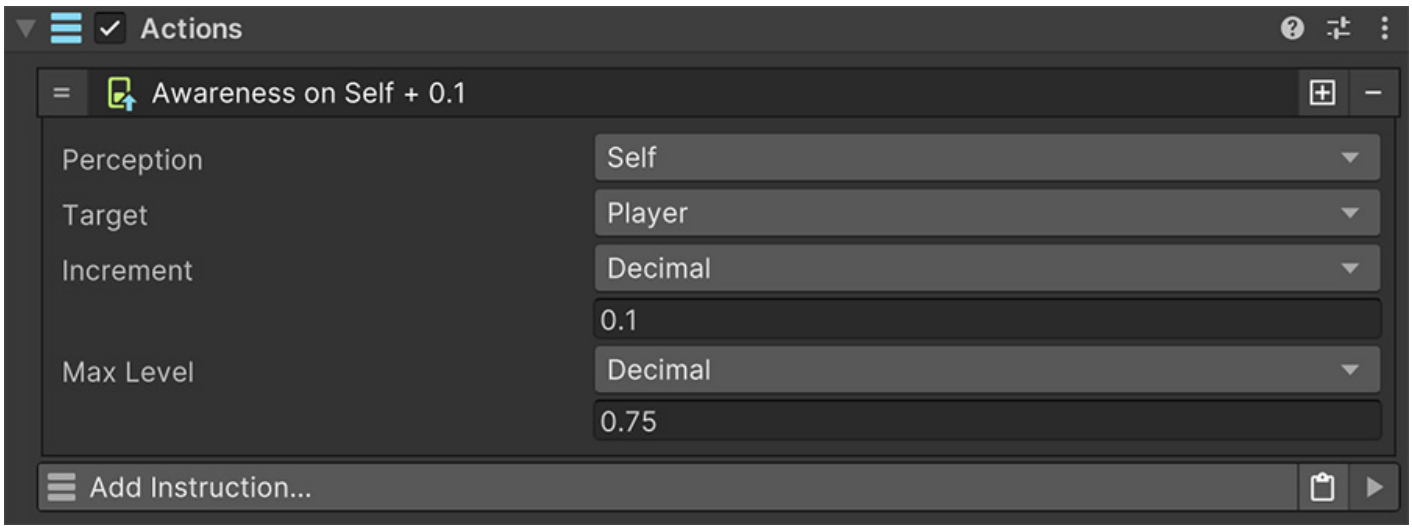


Once an object is being tracked it will appear at the bottom of the **Perception** component during play-mode along with a progress bar. This is useful for debugging how aware the component is of the tracked game object.



944.2 Increasing Awareness

One a **Perception** component tracks a game object there are multiple ways to increase its **Awareness**. The easiest one is using the **Increase Awareness** instruction, which apart from incrementing the awareness, it also allows to cap its increment up to a certain maximum.



Max Level

The **Max Level** field allows to determine a maximum level in which the *Awareness* can increase. This is useful, for example, when the player breaks a crystal glass.

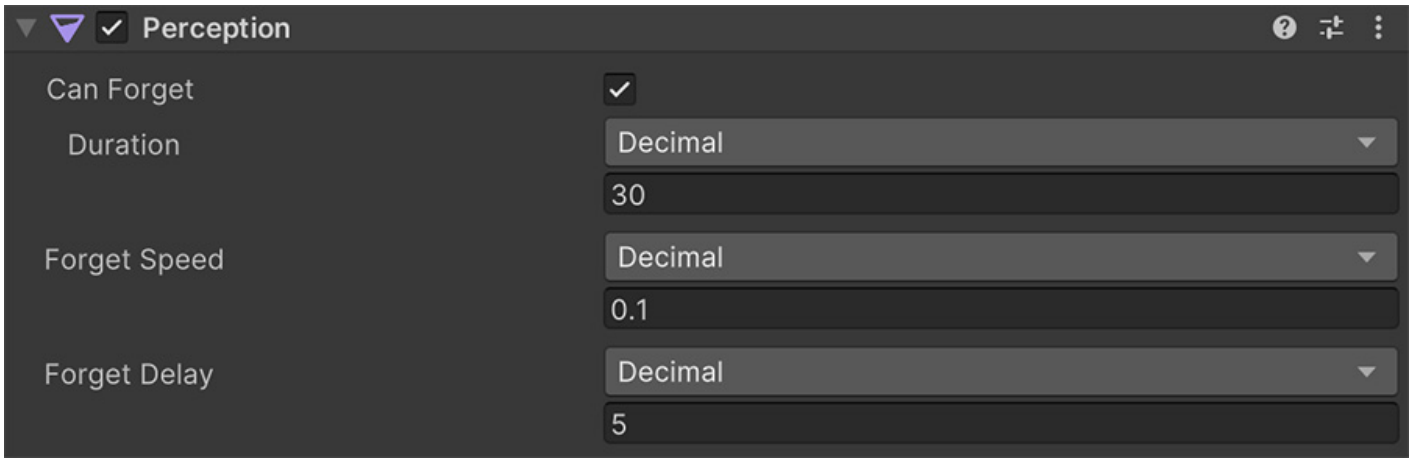
In this case, the enemy will increase its awareness, but even if the player breaks more glasses, the enemy will never reach the point of highest awareness, until it has a clear line of sight.

The other way to increase **Awareness** is using the Sensors, where each one works differently.

944.3 Forgetting Awareness

A **Perception** component requires a rather frequent stream of stimulus in order to keep its awareness on tracked game objects. The **Perception** component has the following fields that helps control how it behaves when stimulus stop being received:

- **Forget Speed**: The speed at which **Awareness** decreases over time.
- **Forget Delay**: The minimum amount of seconds it takes without receiving any stimulus before the **Awareness** starts decreasing.



The exception is when the **Perception** reaches the *Aware* stage. In this case, if the **Can Forget** field is disabled, the **Perception** will never decrease its **Awareness** of the game object.

However if the **Can Forget** field is ticked, instead of the **Forget Delay** it will require the amount of seconds specified in the **Duration** field in order to start decreasing the **Awareness**.

Why Aware stage is different

The *Aware* stage can have a different amount of seconds in order to forget the specified game object because in most games, an enemy being aware of the Player means entering combat mode.

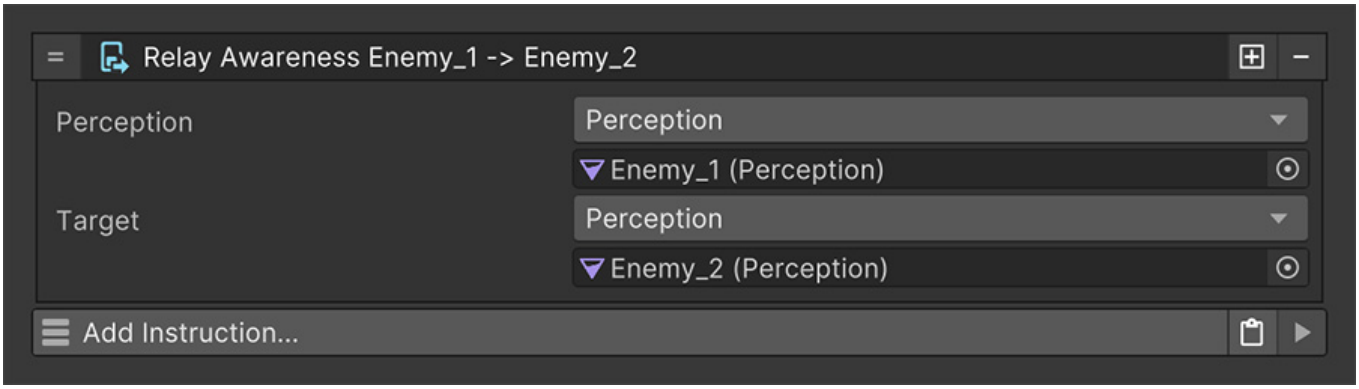
When characters are in combat, the player is likely to seek cover, and enemies could easily lose sight of the player. To avoid enemies being too forgetful it's a good practice to add a high amount of seconds before enemies start forgetting the player was seen.

944.4 Relaying Awareness

Perceptions can also send **Awareness** information to other **Perception** components in order to make them appear like they work as a team.

Inform when the Player is spotted

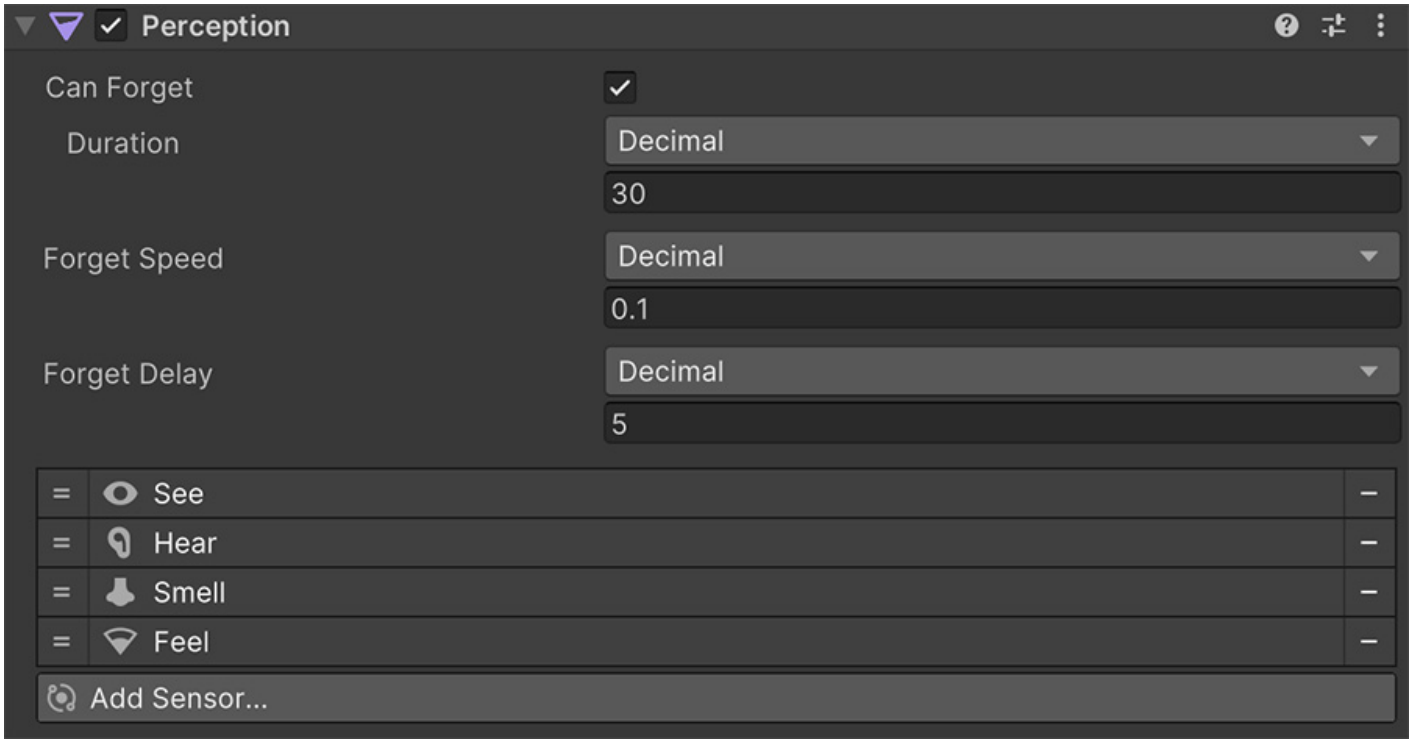
A common practice of an enemy spotting the player is to inform nearby guards that the player has been found, raising their **Awareness**. This can be easily done using the **Relay Awareness** instruction, which transfers all **Awareness** knowledge from one **Perception** component to another, without the second one losing any knowledge.



VII.I Sensors

945 Sensors

The **Perception** component can make use of different *sensors* which emulate real-world senses.

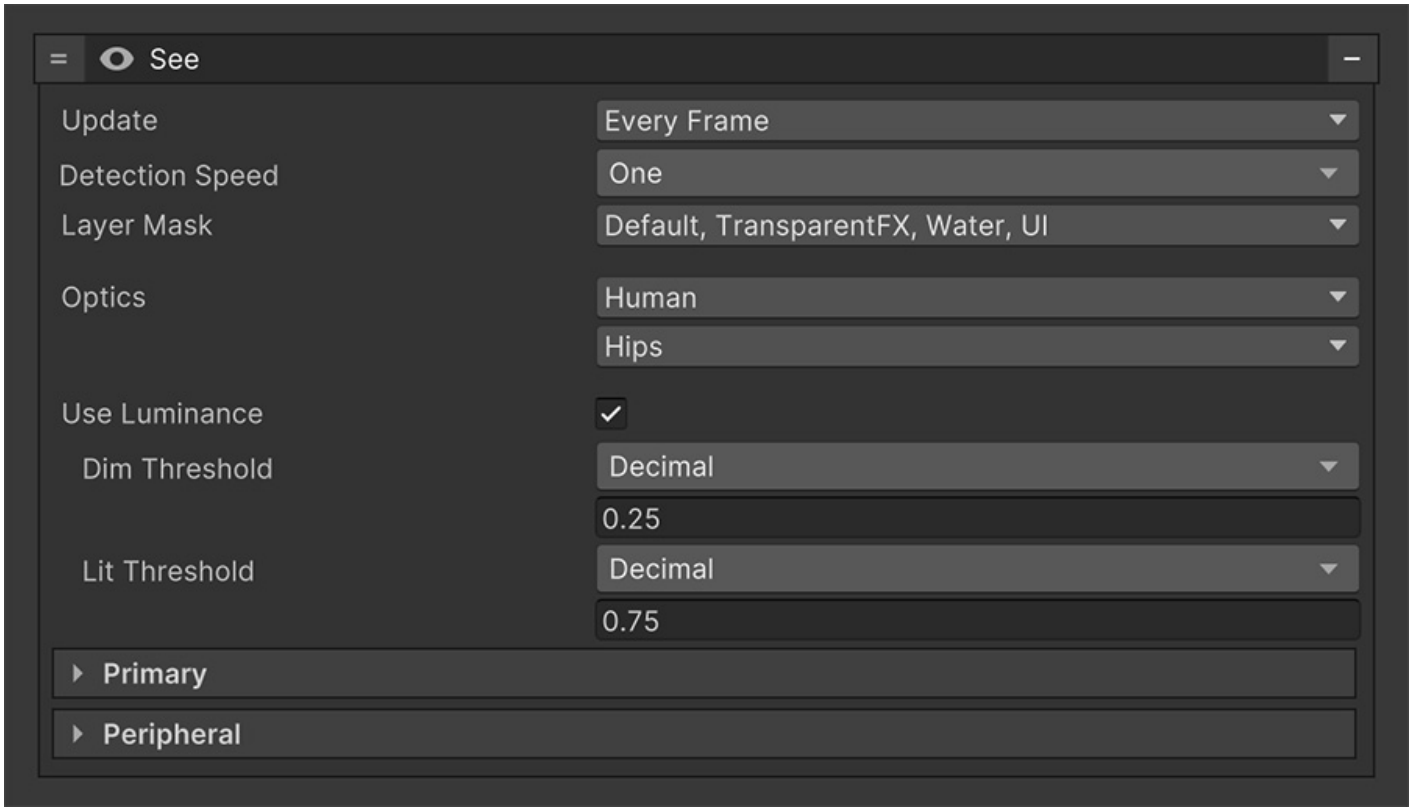


- **Sight**: Use a vision cone.
- **Hearing**: Hear noises made by other entities.
- **Smell**: Detect and track scents emitted by entities.
- **Feel**: Sense other entities by proximity.

946 Sight

The **Sight** is one of the most useful sensors of the **Perception** component and it allows to check whether there's a line of sight between the agent and another tracked object.

946.1 Settings



The **Update** field determines whether the vision cone is updated every frame, at a specified interval, or manually done (using a custom *Instruction* or a script). By default we recommend leaving it to *Every Frame* unless there are performance reasons.

The **Detection Speed** determines how fast the **Awareness** value increases when the tracked object is in its line of sight.

> **Maximum Detection Speed**
>
> Note that it is possible that the detection speed during runtime is slower than **Detection Speed**. This is because this field determines the maximum speed at which the **Perception** component will increase awareness, but there might be factors, such as low light and distance, that dampens the detection speed.

The **Layer Mask** is a physics mask used during the ray-cast phase and allows to determine what is an obstacle between the **Perception** component and the tracked object, and what is not.

The **Optics** field references a humanoid or generic bone from the game object with the **Perception** component, and it's the position where the *eye* should be. Characters will always ray-cast to the center of the tracked game object. When tracking characters, such as the player, the position is also the hips.

Eyes on the hips

Notice that by default, characters see the world from their hips. This is because it's easier to hide from enemies when their *eyes* are at hip-level.

The **Use Luminance** checkbox determines whether light conditions affect the detection speed or not. Unless you're making a stealth game, we recommend leaving the checkbox unticked, since it slightly increases performance.

If this field is ticked, two new fields will appear below:

- **Dim Threshold**: The minimum amount of luminance required for the **Perception** component to barely see a tracked object.
- **Lit Threshold**: The maximum amount of luminance required for the **Perception** to detect tracked objects at full speed.

Example of Dim and Lit thresholds

Let's say we have a **Perception** component with:

- Dim Threshold = **0.2**
- Lit Threshold = **0.5**

This means that any tracked object will require to be illuminated with an intensity of at least **0.2** in order for this **Perception** component to detect it. However the detection speed will be very slow, and will gradually increase until it's illuminated with an intensity of **0.5**. Higher light intensities won't further increase detection speed.

Night Vision

Thanks to the **Dim** and **Lit** thresholds it's very easy to make enemies wear night vision goggles. You can simply turn the **Dim Threshold** all the way down to zero and **Lit Threshold** to something very small, like 0.1. This should be enough to detect the player in poor light conditions.

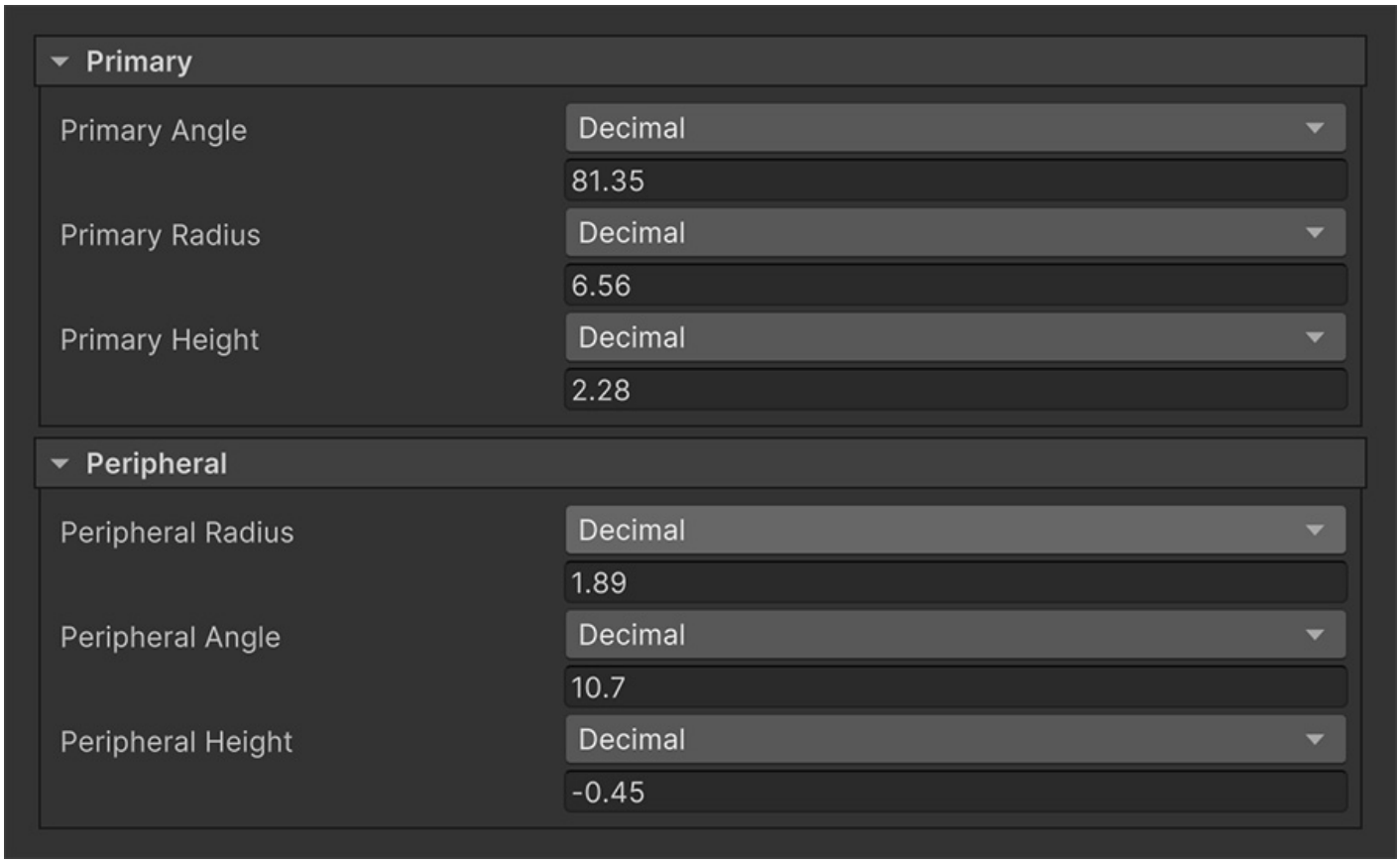
For more information about setting up lights when tracking objects, see the Luminance page.

946.2 Primary & Peripheral

At the bottom of the **Sight** sensor has two expandable boxes called **Primary** and **Peripheral** which represent the primary and peripheral vision cone.

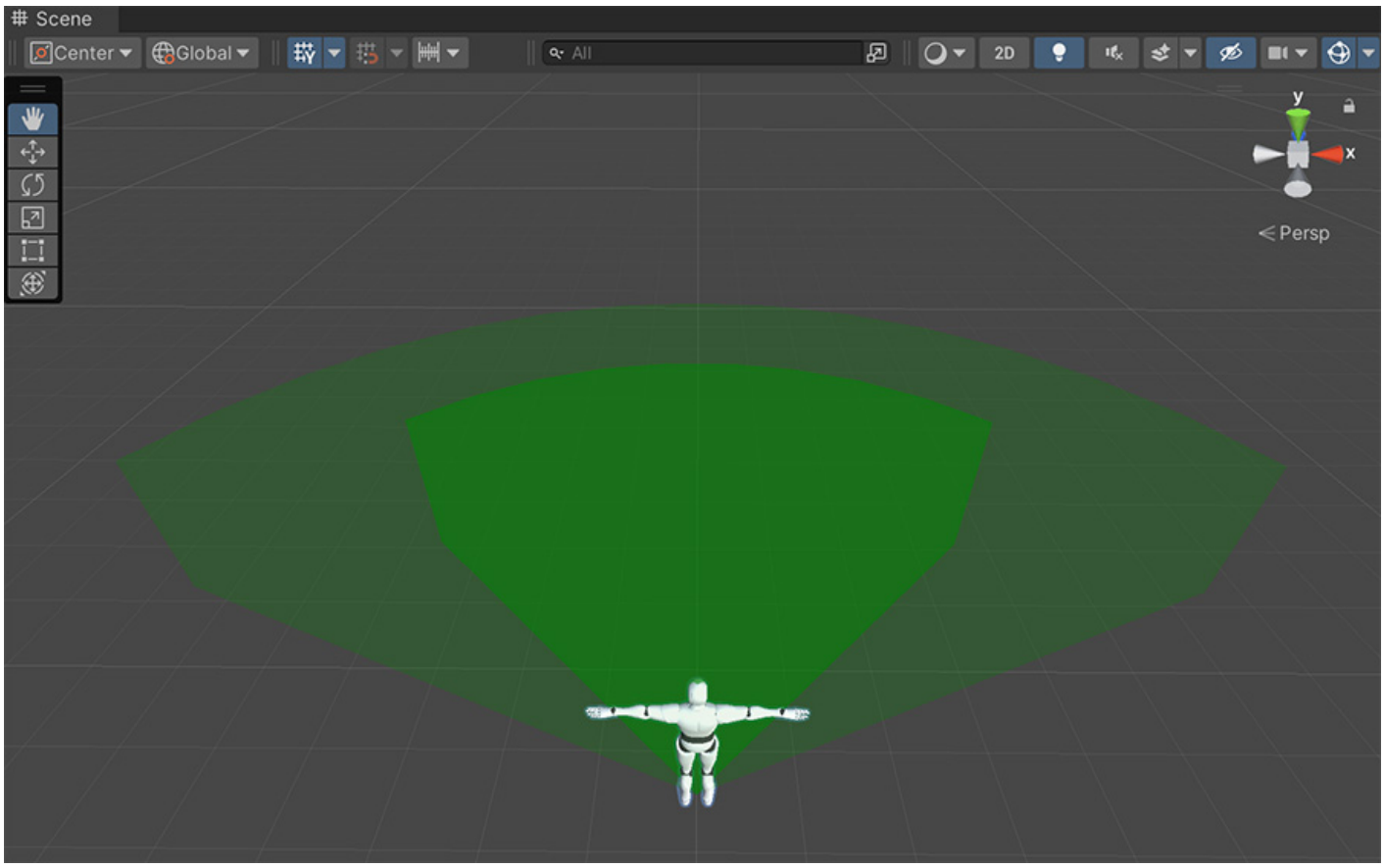
The **Primary** cone is where the **Perception** can fully detect tracked objects. However if the tracked object is inside the **Peripheral** cone the speed at which it is detect is reduced by proportionally.

This means that the further away it is from the **Primary** cone, the slower the detection speed will be.



Both boxes contain identical fields:

- **Angle**: The angle extension in front of the **Perception** component.
- **Radius**: How far the vision cone extends.
- **Height**: The vertical size of the vision cone.



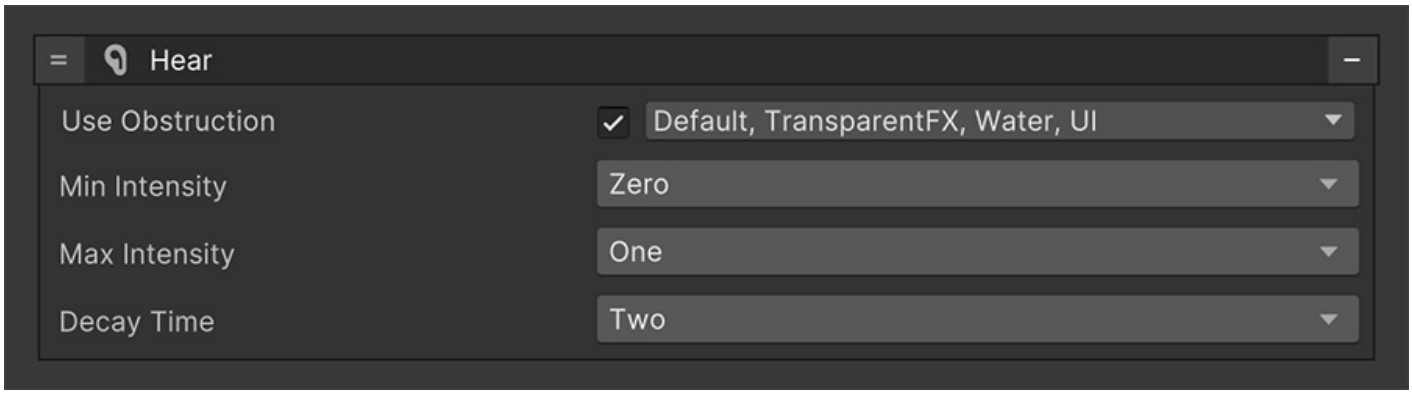
You can see in real-time a gizmo representing the **Primary** and **Peripheral** vision cones in the scene view.

> **Peripheral extends Primary**
>
> The **Peripheral** values extend the **Primary** ones. That means that if the **Primary Radius** is 5 and **Peripheral Radius** is 2, peripheral's radius is actually 5 + 2 = 7.

947 Hearing

The **Hearing** sensor represents the ability of a **Perception** component to hear noises above a certain threshold.

947.1 Settings



The **Use Obstruction** field determines whether sound can be blocked by **Obstruction** components. Ticking this field will reveal a layer mask that determines which **Obstruction** components are considered as such.

> **Not using Obstructions**
>
> If your game is set in open spaces or you don't need noises to be blocked by nearby rooms you can untick the **Use Obstruction** field. Enabling this option comes with a slight performance overhead.

More information about these components can be found in the Obstruction page.

The **Min Intensity** and **Max Intensity** fields determine the range in which noises can be heard. Lower and higher noises will not be acknowledged by the **Perception** component.

> **Using intensities**
>
> It is known that dogs can hear higher pitched noises than human. You could model a situation where the player can use high intensity noises that only dogs can hear in order to distract them, without alerting other guards.

Decay Time is the amount of seconds a noise takes to fade out. Although noises are emitted as a one-shot effect, the hearing of a **Perception** components keeps hearing that noise due to the resonance inside a human's skull. This is more commonly known as *Tinnitus* effect in high-pitched noises.

947.2 Emitting a Noise

In order to emit a **Noise** the instruction **Emit Noise** can be used.

The **Position** field determines the origin of the noise emitted, while the **Radius** indicates how far it reaches.

The **Intensity** determines whether the noise stimulus can be heard by the **Perception** component or not. And the **Tag** is a custom value that can be used when building the AI to react differently depending on its value.

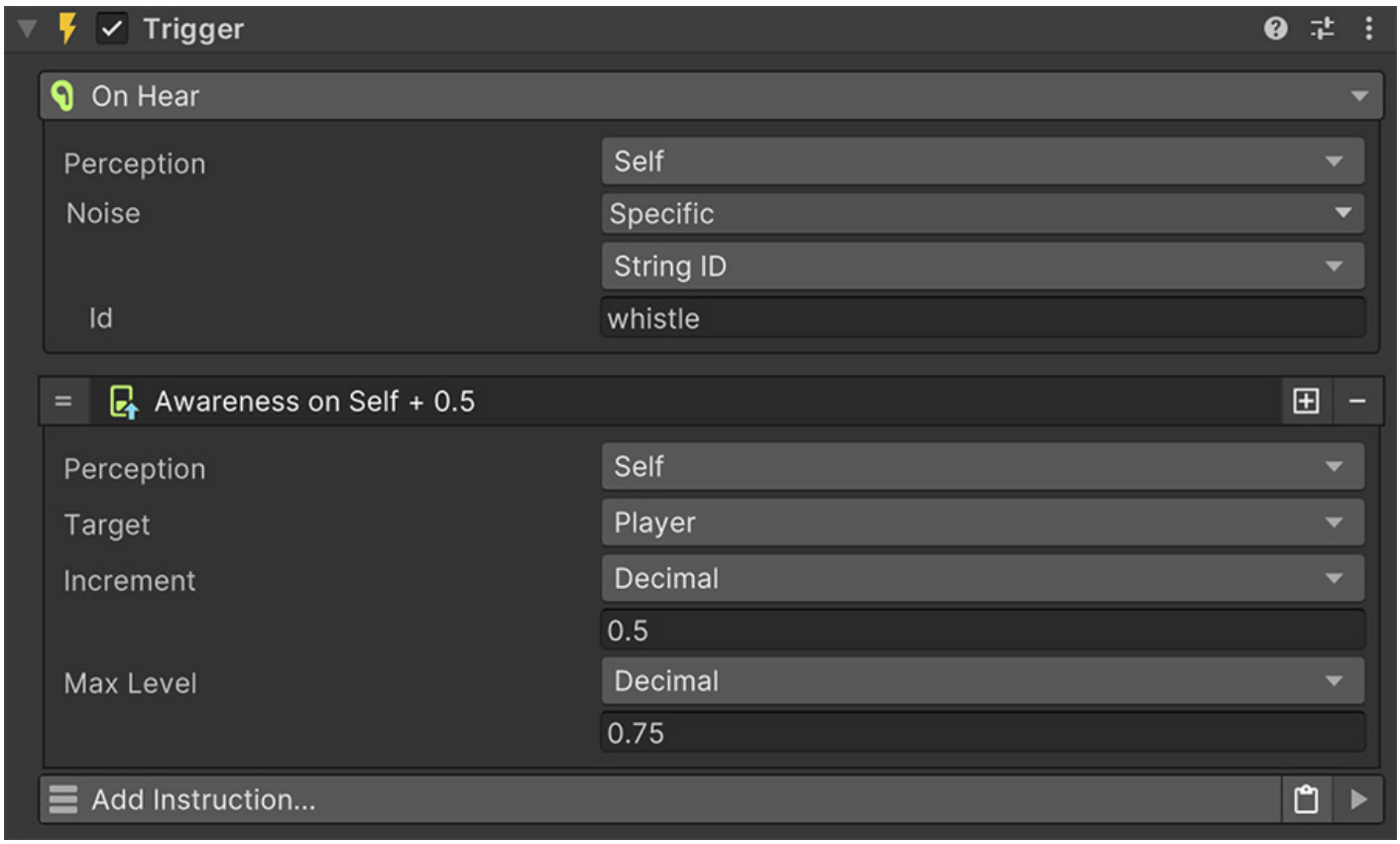
A whistle vs a gun shot

We could conclude that when an enemy hears a *whistle* it will change into a suspicious mode and approach the origin of the noise. However if it hears a gun shot it may turn into *aware* mode.

947.3 Reacting to Noises

The **Perception** component doesn't inherently increase its **Awareness** upon hearing a noise, unlike the sight sensor. This is because each noise *tag* can mean something different.

To react to noises a **Trigger** must be used with the **On Hear** event. Upon hearing any or a specific noise, the resulting reaction can be specified, like increasing the **Awareness** of the **Perception** component towards the player.



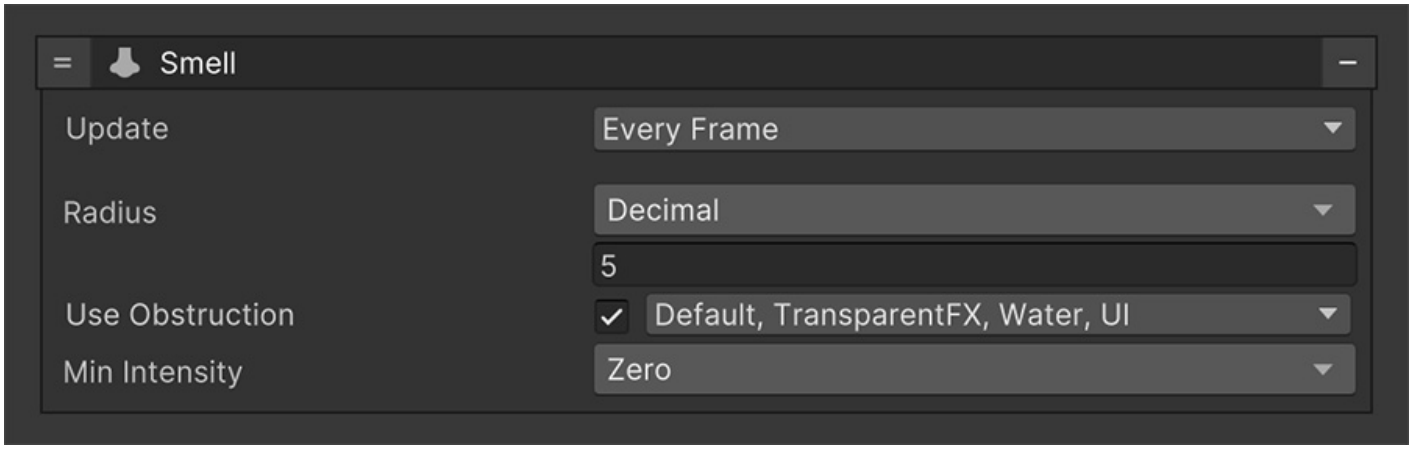
Din (Ambient Noise)

It is worth noting that noises can also be masked by the **din** or ambient noise. The **din** is a more advanced concept and it is covered in depth in the Din section.

948 Smell

The **Smell** sensor works by emitting a **Scent** at a specific point with a *tag*. Emitting more scents links them together creating a chain similar to a breadcrumb trail that **Perception** components can pick to react or follow.

948.1 Settings



The **Update** field allows to choose whether the **Perception** component updates its *smell* sensor every frame, at a specific interval, or manually using a custom script.

> **Update every frame**
>
> If you are starting out we recommend leaving the update mode to *Every Frame*. *Interval* and *Manual* can be used to improve performance at the expense of precision.

The **Radius** determines how far the **Perception** component can smell a scent. Increasing this value allows agents to smell farther scents.

The **Use Obstruction** field allows scents to be blocked by Obstruction components.

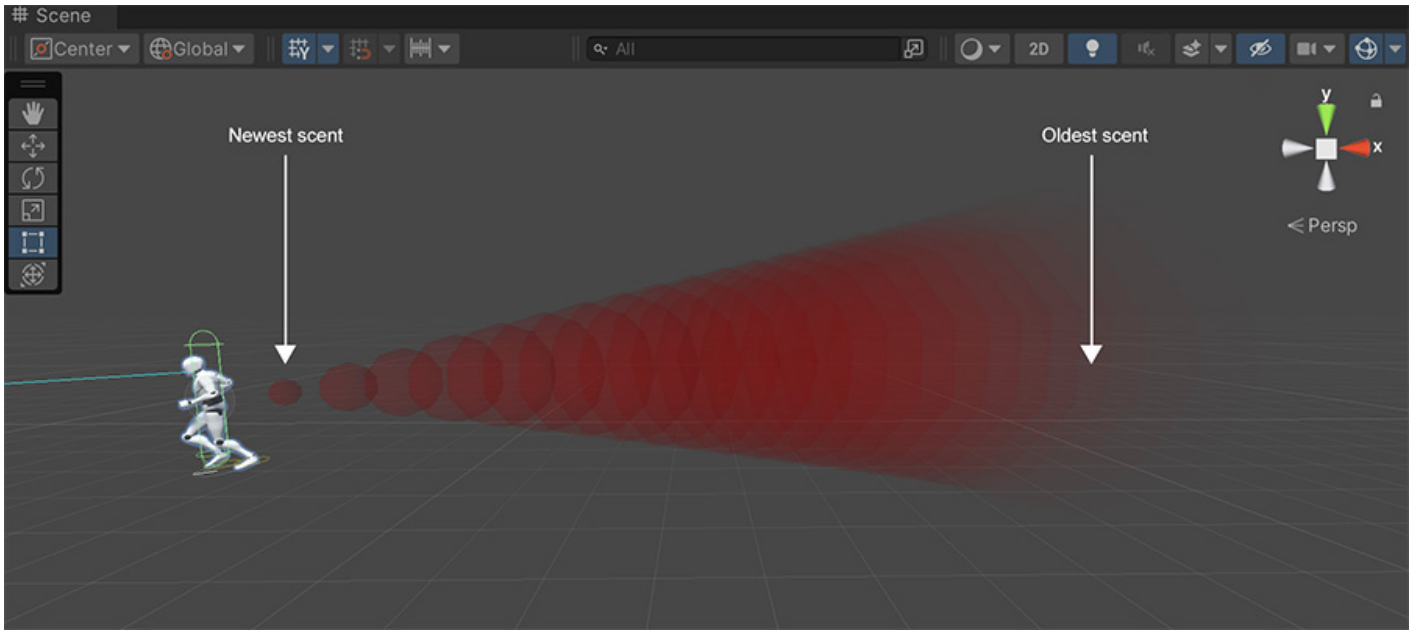
> **Without Obstruction**
>
> If your game is set on on an open area or don't want scents to be blocked by **Obstruction** components, untick the **Use Obstruction** checkbox. It will save some performance overhead.

The **Min Intensity** field allows to define a minimum threshold at which scents are caught. See the Emitting Scents section for more information about how **scents** work.

948.2 Emitting Scents

Scents are one or more points in space connected by their lifetime value, identified by a *tag* name.

Each time a new **Scent** is emitted, it is connected to the previous scent with the same *tag*, allowing to traverse the scent trail from the oldest to the newest point.



The instruction **Emit Scent** can be used to emit a new scent at a specific point.

The **Source** field is a game object emitting the scent and its position is equal to that game object's point in space.

The **Tag** field is a string that identifies the scent. If there already is one or more scents with the same tag, they will be automatically connected forming a trail of breadcrumbs that other characters can track.

The **Duration** field specifies the time it takes to dispel the scent.

The **Intensity** field is a numeric value that indicates how strong the scent is when it starts.

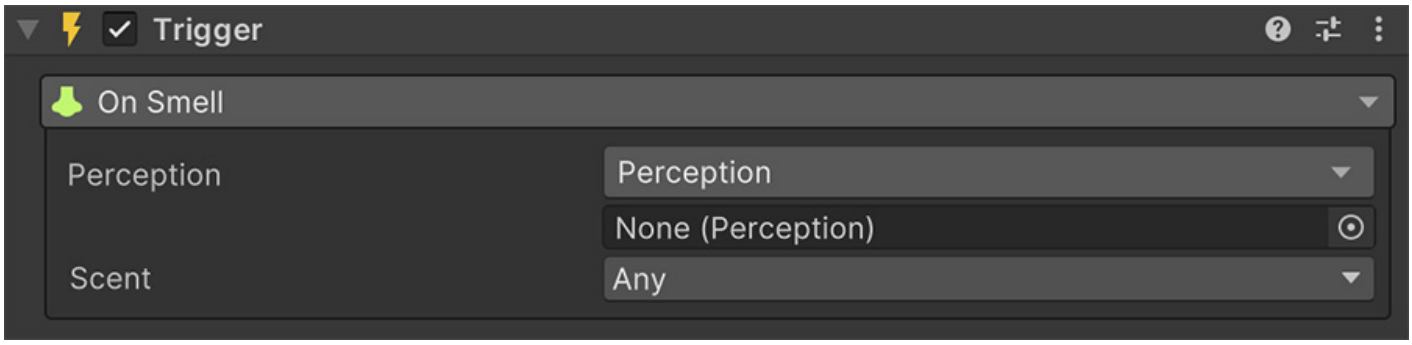
Intensity fades over time

Note that the **Intensity** of a scent fades over time, similar to how gas dispels in real-life. This means that a scent with an intensity of 1 and a duration of 5 seconds will have an intensity of 0.5 after 2.5 seconds have passed.

948.3 Catching Scents

The **Perception** component doesn't inherently increase its **Awareness** upon smelling a scent, unlike the sight sensor. This is because each scent *tag* can mean something different.

To react to scents the **On Smell** Trigger can be used, which is executed whenever the **Perception** component enters a zone with a scent.



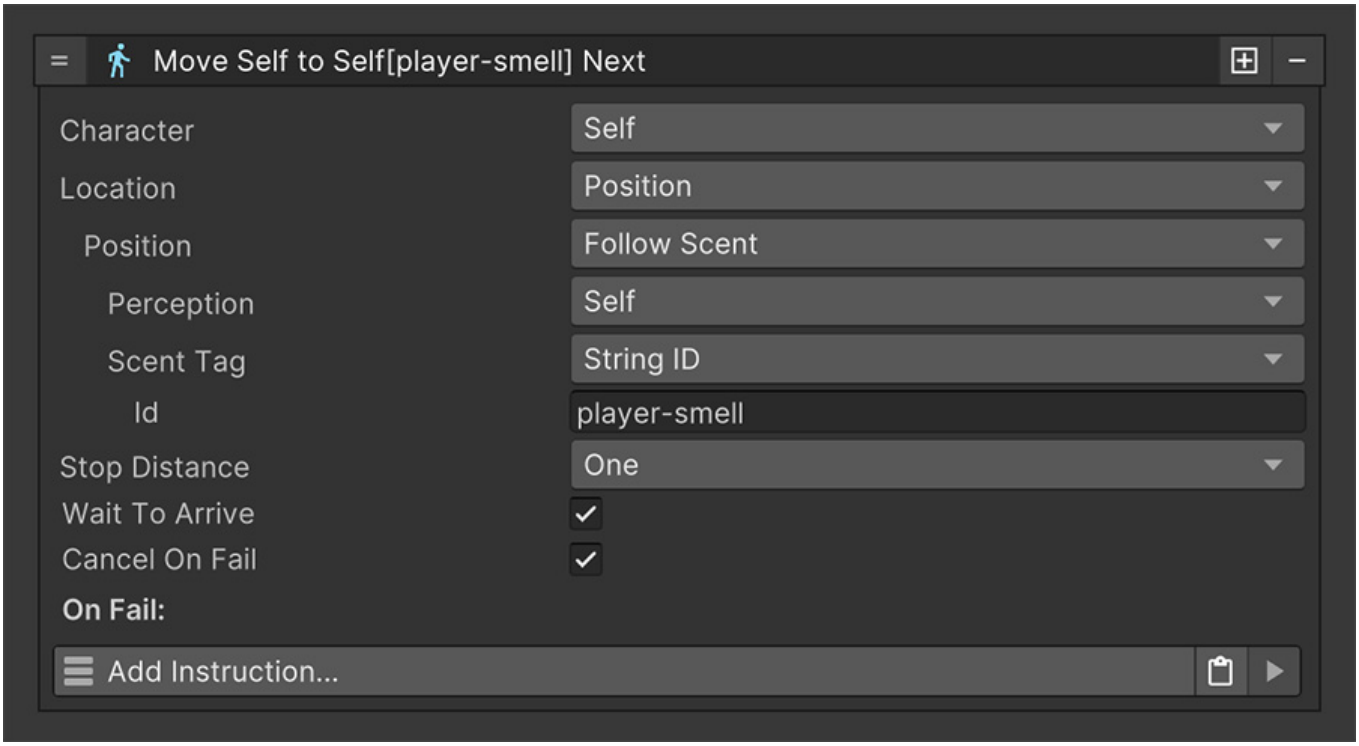
Once a **Perception** component catches a whiff of a scent it can increase the **Awareness** using the **Increment Awareness** instruction or even follow the scent trail.

948.4 Following Scents

A character can query the current point in space of a specific scent, as well as the next scent point (if it exists), using the **Position** property.

This allows characters to follow a scent trail by attempting to go to the next scent point from the one whiffed.

Move To...



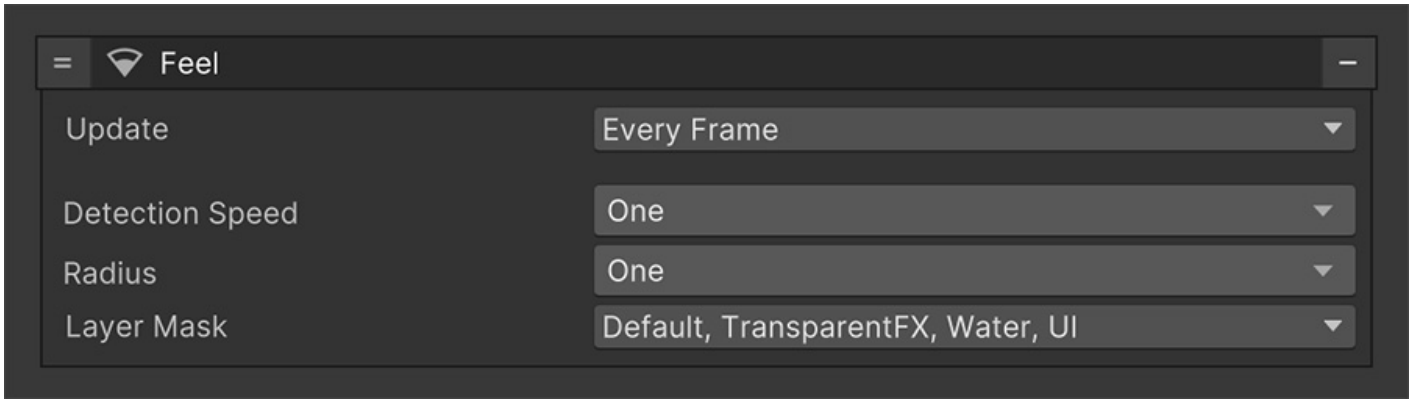
For example you can use the **Move Character To** instruction with the **Follow Scent** option, which selects the next scent point from the closest one, effectively making the character follow the scent like a trail of breadcrumbs.

949 Feel

The **Feel** sensor works similar to sight sensor but it uses the entire space around the **Perception** component.

> **The Sixth Sense**
>
> The **Feel** sensor is meant to be used as a sixth sense in which characters can *feel* another character being very close, almost touching, the character.
>
> However you can also tailor it to your own needs. For example you can increase the radius and change the update mode to regular intervals and simulate a *sonar*.

949.1 Settings



The **Update** field determines when the sensor is updated, which can be either *Every Frame*, at a regular *Interval* or manually from an external script.

> **Update every frame**
>
> If you are starting out we recommend leaving the update mode to *Every Frame*. *Interval* and *Manual* can be used to improve performance at the expense of precision.

The **Detection Speed** is at which rate a tracked object will increase the **Perception**'s **Awareness** when being within the radius.

The **Radius** field determines how far the sixth sense reaches, and the **Layer Mask** allows to filter out (or not) obstacles between the **Perception** component and the tracked object(s).

Automatic Awareness

When a tracked object is inside the detection radius of the **Feel** sensor it will automatically start increasing the **Awareness** meter of the **Perception** component.

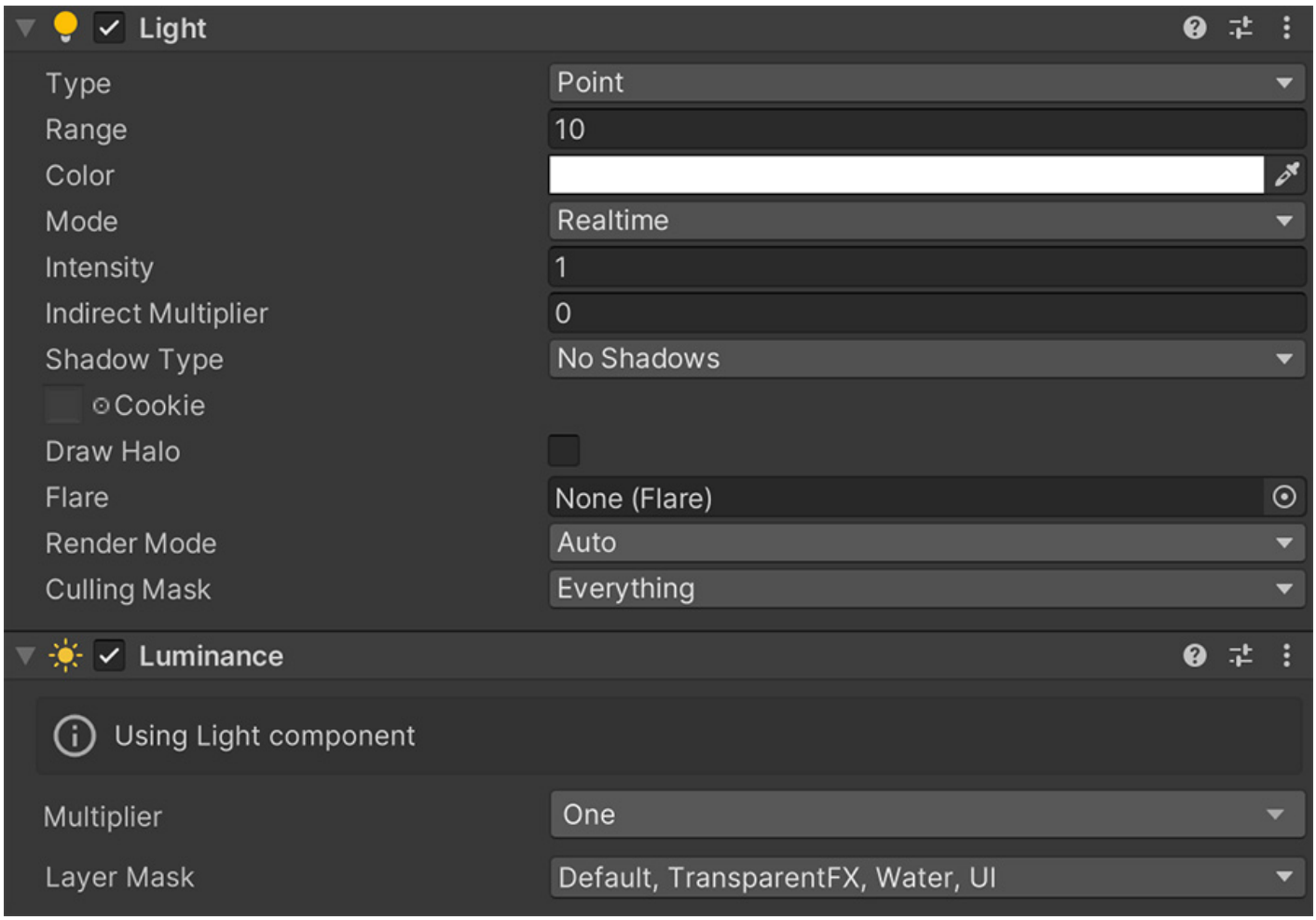
950 Luminance

The **Sight** sensor of a **Perception** component has the option to **Use Luminance** in order to account for an object's reflected light when determining whether it is visible or not, and how much should the **Awareness** increase based on its intensity.

Unity uses the **Light** component to specify light entities, which can take different shapes (Spot lights, Directional lights and Point lights) as well as affecting the scene during the light baking process or in real-time.

950.1 Component

The **Perception** module supports all these shapes and lighting modes through the use of the **Luminance** system, which is a component attached to any light source which indicates that this specific light should affect how visible an object is in the scene.



The **Luminance** component will automatically detect the type of light and shape.

Luminance on Lights

As a general rule of thumb, all **Light** components should also have a **Luminance** component attached to them. However you might also want some lights not to affect player's visibility.

For example, if the player puts on some night vision goggles, you could enable a spotlight in front of it with a green tint that doesn't have any **Luminance** component attached to it. This will prevent this light from affecting visibility.

The **Multiplier** field allows to modify the luminance value compared to the **Light**'s intensity.

Dim Light

For example, let's say our game is set in a very dark room and one of the light sources is a small lamp. But because it's very dark, the intensity of the light must be increased, but we would like the **Luminance** value to stay low.

In that case we can use a 0.5 multiplier so that if our **Light** intensity is 2, the resulting luminance value is 2 * 0.5 = 1.

The **Layer Mask** allows to pick which objects do affect luminance. It is important to note that luminance is calculated based on *colliders*, not on general geometry. If an object (like a fence) doesn't have a collider, although light will be blocked by the opposite side of the fence, the luminance value will still reach the other side.

Add colliders to geometry

It's advised to add colliders to every piece of geometry in the level so that both light and luminance result in similar results.

Transparent geometry

If you have a glass door in your game, light will pass through it and hence luminance should lit objects behind it. In order to achieve this, simply place the collider of the glass door in a **Layer** that isn't affected by the **Luminance**'s **Layer Mask**.

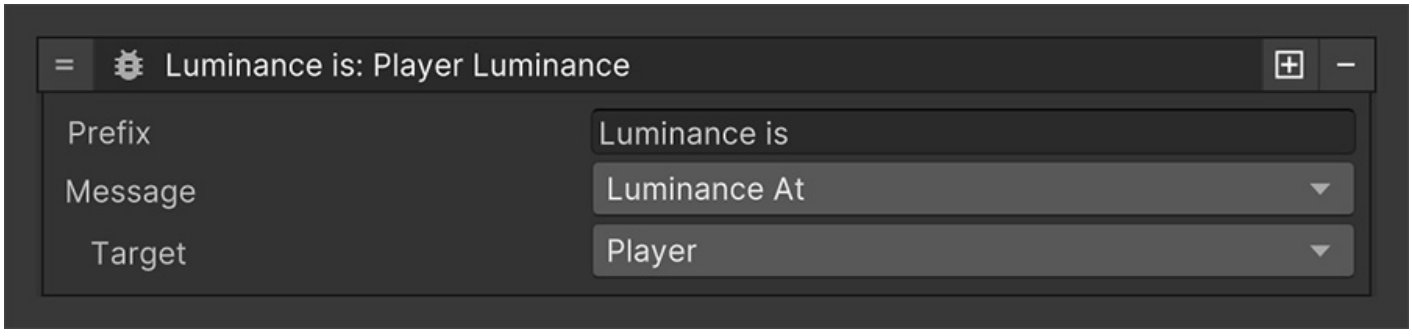
950.2 Environment Luminance

The **Environmental Luminance** can also be set using the **Change Global Luminance** instruction. This instruction changes the minimum light intensity the scene has, even there are no lights in the scene.

This is useful if the Light Window has a bright environment light color or sky-box.

950.3 Checking Luminance

Once all **Luminance** components are set up the resulting **Luminance** value can be queried at any point in the scene using the **Luminance** property, which is a decimal value that represents the intensity of the overall light hitting that spot.

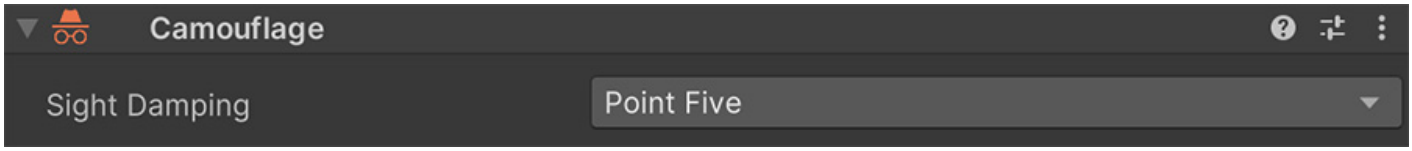


UI

There is a UI component that allows to display UI information about the **Luminance** in real-time to the player. For more information, visit the Luminance UI section.

951 Camouflage

The **Camouflage** component can be attached to any game object in order to dampen their visibility when observed by other **Perception** components.



The **Sight Damping** field is a coefficient that multiplies the resulting visibility value of a **Perception** component tracking this game object.

Camouflage Calculation

Let's say an enemy is tracking the Player character and it's inside its *primary* vision cone. This means that the character will fully see the character if the light conditions are sufficient. For the sake of this example, let's say there's a dim global light with an intensity of 0.5, so the resulting visibility of the player is 0.5.

If the player has a **Camouflage** component with a **Sight Damping** value of 0.25, the resulting visibility of the player will be 0.5 * 0.25 = **0.125**. If the *Dim* threshold is a bigger number than the resulting visibility, the player will be invisible to the enemy.

Dynamic Camouflage

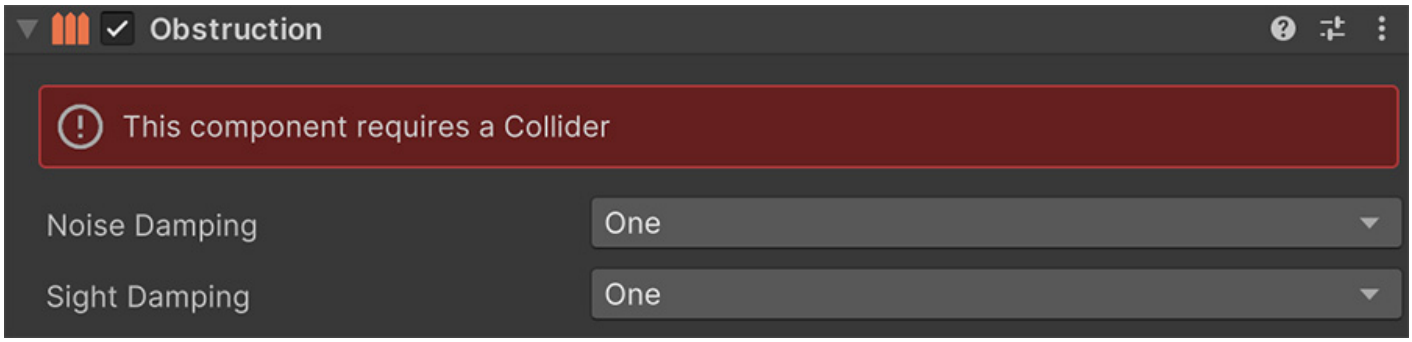
Because the **Sight Damping** value is a dynamic property, you have the flexibility to create a wide variety of game mechanics.

- You can bind the value to a *Local Variable* to turn on or off their invisibility skill.
- You can also bind the property to a *Stat* to increase their stealth skill as the player levels up.
- You can bind it to the player's movement, so that when it's standing still the player is less visible than when moving.

952 Obstruction

Some **Perception** sensors can be partially or completely blocked by scene obstacles, like sound-proof rooms or frozen-glass walls.

The **Obstruction** component allows to dampen the amount of *Sight* and *Hearing* of visual and audible stimulus passing through the object.

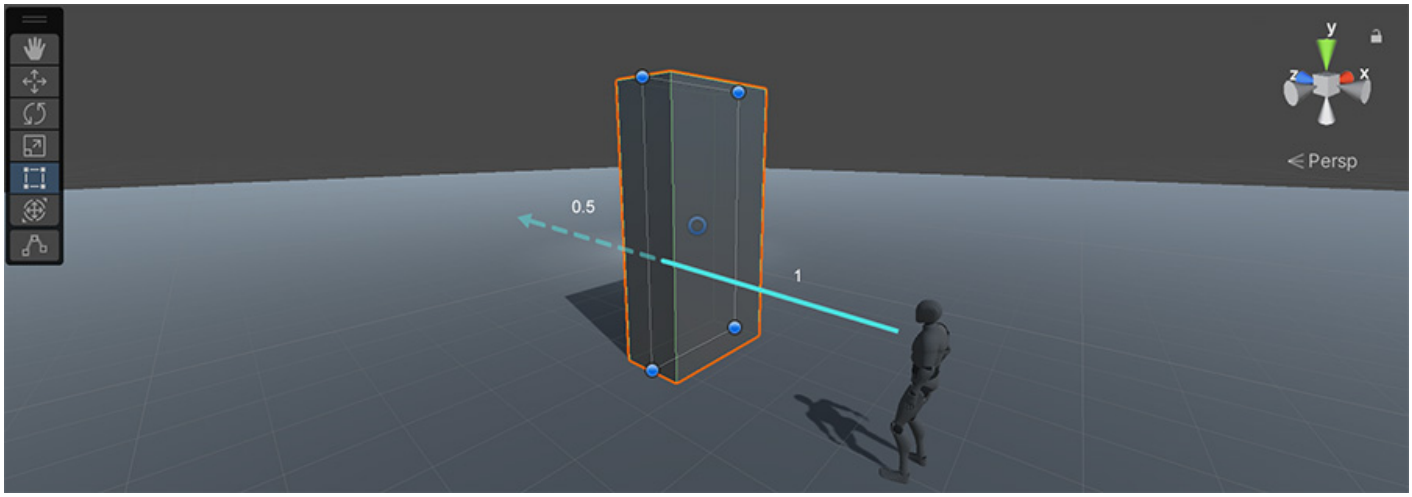


Requires a Collider

The **Obstruction** component requires a Collider component in order to work.

The **Noise Damping** field defines a coefficient that multiplies the resulting noise intensity heard by a **Perception** component when listening for a noise at the other side of one or multiple **Obstruction** components.

The **Sight Damping** does exactly the same for the **Perception**'s sight sensor.



Example

A **Noise Damping** of 0.5 means that any noise coming from the other side of an **Obstruction** component will be muffled by half. If the **Noise Damping** is set to zero the noise is completely muffled.

Blocking Sight

The *Sight* sensor already gets blocked by collider geometry. The **Obstruction** component should only be added if you want to partially block objects at the other size. For example, for semi-transparent walls.

953 Din (Ambient Noise)

There is an exception to when a **Perception** will not hear a noise emitted, even though it's between the **Min Intensity** and **Max Intensity** range, which is when the **din** (also commonly known as *Ambient Noise*) is loud enough to mask the noise emitted.

Thunderclap vs Whistle

Let's say we have an agent with a **Perception** component that can hear noises with an intensity between 0 and 1. If the Player emits a noise with an intensity of 0.5, the agent should be able to hear the noise if it is within the noise radius.

However let's say there is a thunderclap at the same time, which temporally changes the **din** (or ambient noise) to 0.75. In this case, the whistle won't be heard because the **Perception** component will be deaf to noises between 0 (**Min Intensity**) and 0.75 (current **din**). However any noise above 0.75 and below 1 will be heard.

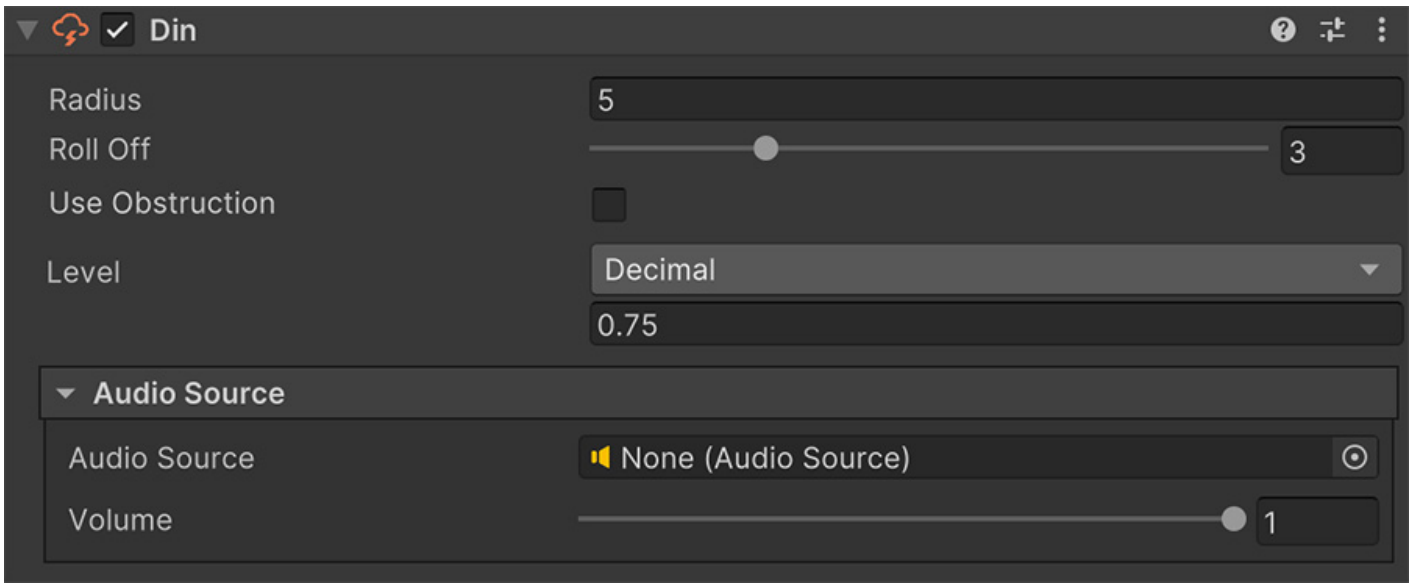
The scope of a **din** source can either be local or global.

953.0.1 Global Din

Global Din affects the entire scene equally and can be set using the **Set Global Din** instruction. A **Duration** can be specified that determines the time it takes to change from the current value to the target one.

953.0.2 Local Din

The **Local Din** affects only a region of the scene and it is configured using the **Din** component.



The **Radius** field determines how far the ambient noise reaches, fading out the intensity at the edges of the sphere.

The **Roll off** slider allows to change how slow or fast the intensity fades. Setting the slider in the middle means the intensity fades out linearly, while moving the knot to the left will take longer for the intensity to fade the closer to the edges the **Perception** component is.

Linear when possible

It is recommended to leave the **Roll off** value at 6. Although in real life sound propagates logarithmically, players will feel more comfortable knowing that the **din** intensity changes linearly the closer they are to the source of the ambient noise.

The **Use Obstruction** field allows to use Obstruction components to block the ambient noise from affecting nearby sound-proof rooms.

The **Level** field is the intensity at which the **din** is at its highest point, gradually fading out towards the perimeter of the sphere.

To more consistently represent how sound and ambient noise affects the computed **din**, there is an **Audio Source** box field at the bottom of the component. This optional field allows to play an audio clip at a volume equal to the component's **din**.

This makes it much easier to synchronize the audio clips played as noise masks and the **din** values.

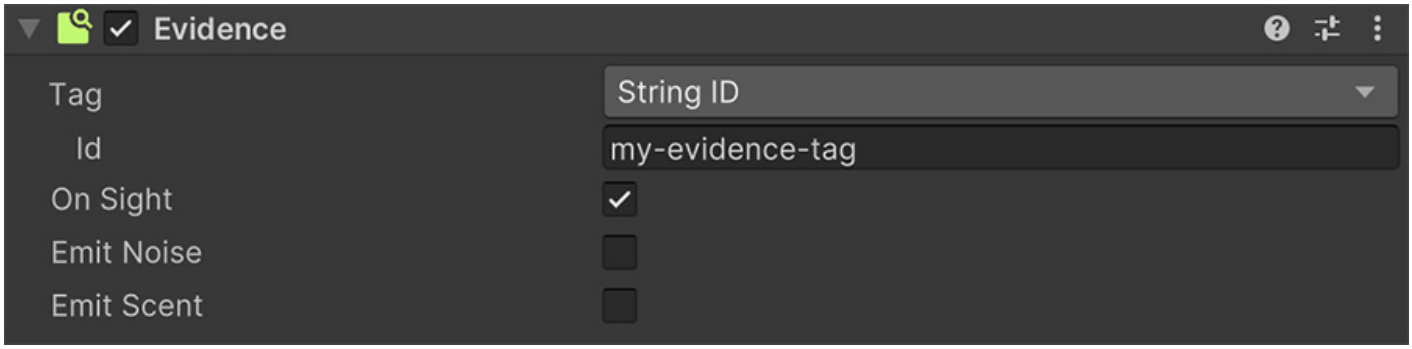
954 Evidence

The **Perception** module comes with a unique **Evidence** system that allows scene agents to detect changes in objects made by other characters (like the player) and react accordingly.

What was that...?

Let's say we are making a stealth game where the player is sneaking through a series of rooms. If the player leaves a door open, guards may notice this change and react accordingly. For example, raising their awareness.

The **Evidence** component can be added to any game object.



The **Tag** field is a string that identifies the **Evidence** type.

Multiple Evidences with the same Tag

You can have multiple **Evidence** components with the same **Tag** value. Discovering one of them will mark all of them as already seen. This is very useful if you want guards to only notice evidence once.

For example, if the player leaves three doors open, a guard should only raise its awareness once and notice there's someone around just once. Otherwise a guard might shout three times in a row the same line and look a bit too goofy.

The **On Sight** allows the **Evidence** to be seen by other agents.

The **Emit Noise** checkbox allows the **Evidence** to emit a noise when it is tampered, and allows other agents to notice it using the *Hearing* sensor.

Noise with Tag

It is worth noting that when an **Evidence** emits a noise, it will also make use of the *Tag* field as the identifier of the noises. Apart from noticing the **Evidence** agents can also react to the noise emitted just like any other noise, using the **On Hear** Trigger.

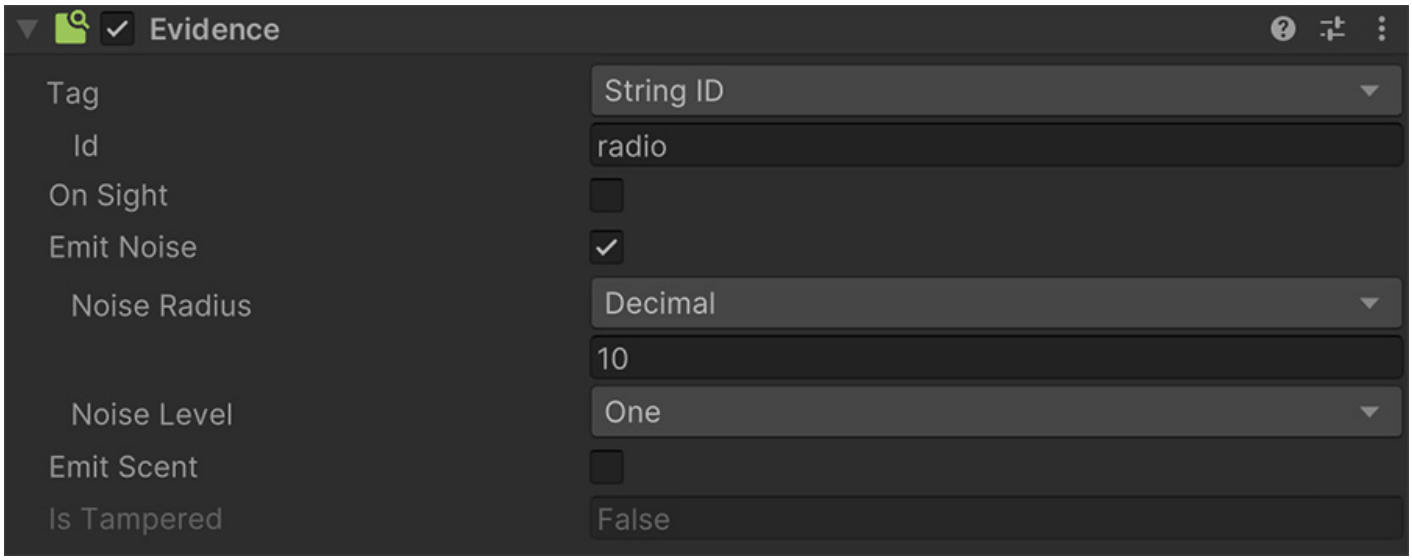
The **Emit Scent** allows the **Evidence** component to emit a scent identified by the *Tag* field that other agents can catch when the component is tampered.

Scent with Tag

Just like with noise, the scent emitted by the **Evidence** component can be used just like any other scent. The **On Smell** Trigger can catch its whiff identifying it by its *Tag* field.

954.1 Tampering

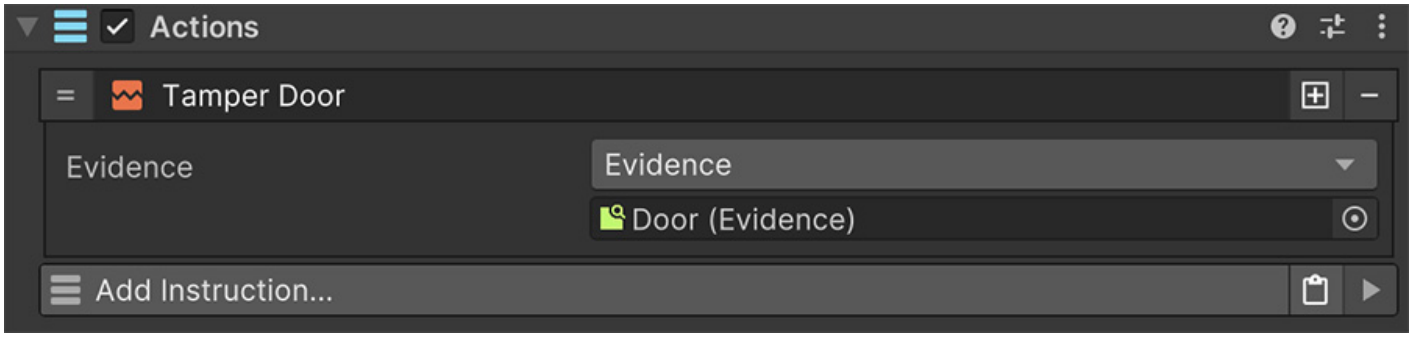
An **Evidence** does nothing by itself. Instead it must be **Tampered** in order for the **Evidence** to be noticeable by other agents.



Debug Evidence at Runtime

When entering Play-Mode you can select any **Evidence** component and a new field will appear at the bottom called *Is Tampered*, which indicates the current value.

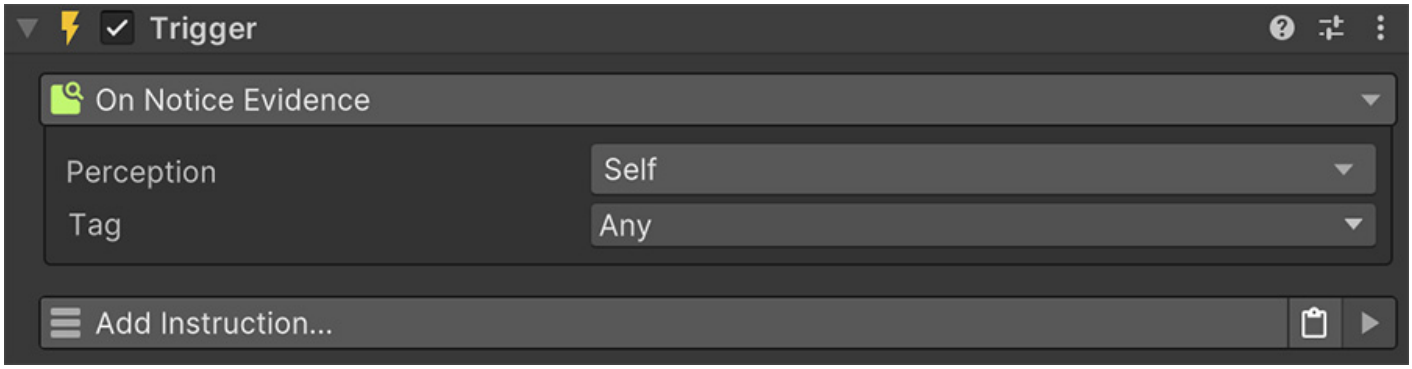
In order to **Tamper** or **Reset** an already tampered evidence you can use the **Tamper Evidence** instruction and **Restore Evidence** instruction, respectively.



Once an **Evidence** is tampered, it will start being noticeable by other **Perception** components.

954.2 Detection

The Trigger **On Notice Evidence** can be used to react when a tampered **Evidence** component is detected.

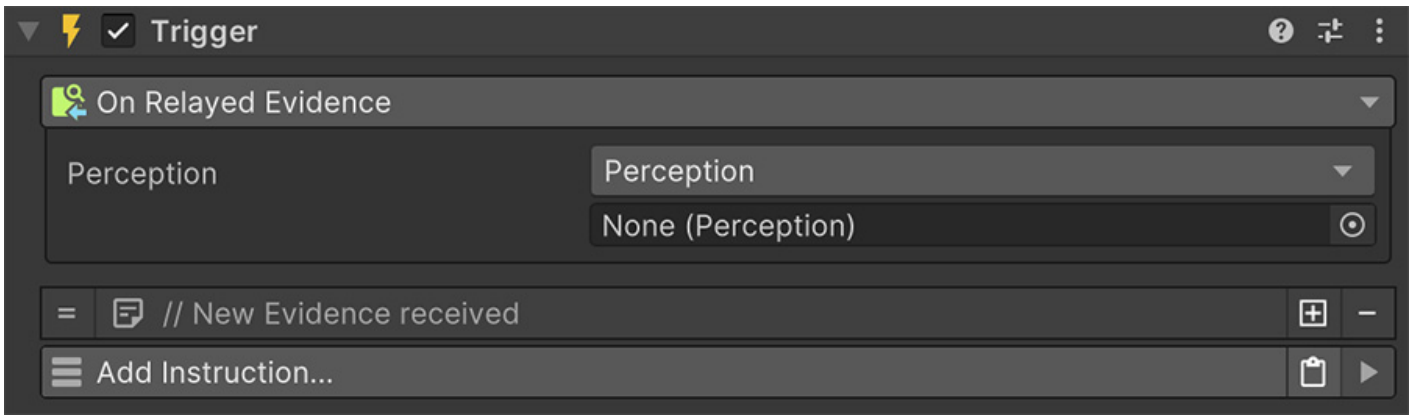


The **On Notice Evidence** component detects when a specific **Perception** component detects a new **Evidence**, which can be optionally filtered by a specific *Tag* or not.

954.3 Relaying Knowledge

In order to make multiple **Perception** agents look like they work as a team, you can also relay **Evidence** knowledge between them. This is done using the **Relay Evidence** instruction, which fills in the knowledge gaps of the targeted agent.

When a **Perception** has new relayed **Evidence** knowledge transferred, it can also react using the **On Relayed Evidence** Trigger.



Communication between Guards

Let's say we have two guards and one of them notices that a door has been opened. In that case, the first guard will receive the **On Notice Evidence** trigger event, upon which it will update its internal knowledge about the current state of **Evidence** components.

After the guard shouts something like *We have company! Someone left a door open!* it could use the **Relay Evidence** instruction in order to communicate to nearby guards that they should be alert.

Nearby guards can use the **Relayed Evidence** Trigger in order to know that a new **Evidence** component has been discovered by another guard nearby and raise their awareness level and shout something like *Understood!*.

VII.II Visual Scripting

955 Visual Scripting

The **Perception** module symbiotically works with **Game Creator** and the rest of its modules using its visual scripting tools.

- **Instructions**
- **Conditions**
- **Events**

Each scripting node allows other modules to use any **Perception** feature.

VII.II.I Conditions

956 Conditions

956.1 Sub Categories

- Perception

VII.II.I.I Perception

957 Perception

957.1 Sub Categories

- Evidence
- Hear
- See
- Smell

957.2 Conditions

- Compare Awareness
- In Awareness Stage

958 Compare Awareness

`Perception » Compare Awareness`

958.1 Description

Compares the Awareness value with another value

958.2 Parameters

Name	Description
Perception	The Perception component
Target	The Game Object checked
Value	The comparison to the Awareness value

958.3 Keywords

`Awareness` `Track` `See` `Alert` `Suspicious` `Aware`

959 In Awareness Stage

`Perception » In Awareness Stage`

959.1 Description

Returns true if the awareness of a target is in any of the specified stages

959.2 Parameters

Name	Description
Perception	The Perception component
Target	The Game Object checked
Stage	The stage(s) to check

959.3 Keywords

`Awareness` `Track` `See` `Alert` `Suspicious` `Aware`

VII.II.I.I.I EVIDENCE

960 Evidence

960.1 Conditions

- Is Evidence Tampered

961 Is Evidence Tampered

`Perception » Evidence » Is Evidence Tampered`

961.1 Description

Determines whether an Evidence game object has been tampered or not

961.2 Parameters

Name	Description
Evidence	The Evidence component

961.3 Keywords

`Notice` `Change` `Tamper` `Modify` `Fiddle`

VII.II.I.I.II HEAR

962 Hear

962.1 Conditions

- Can Hear Noise
- Hears Noise Tag

963 Can Hear Noise

`Perception » Hear » Can Hear Noise`

963.1 Description

Checks whether the Perception component can hear a new Noise stimulus

963.2 Parameters

Name	Description
Perception	The Perception component
Position	The position of the Noise stimulus
Radius	The radius of the Noise stimulus
Intensity	The intensity of the Noise stimulus

963.3 Keywords

`Sound` `Noise` `Bell` `Intensity` `Stimulus`

964 Hears Noise Tag

`Perception » Hear » Hears Noise Tag`

964.1 Description

Checks whether the Perception component is hearing a Noise Tag

964.2 Parameters

Name	Description
Perception	The Perception component
Noise Tag	The Noise Tag to check
Value	The comparison to the noise value

964.3 Keywords

`Sound` `Noise` `Tag` `Bell` `Intensity`

VII.II.I.I.III SEE

965 See

965.1 Conditions

- Can See
- Compare Luminance At

966 Can See

`Perception » See » Can See`

966.1 Description

Returns true if object can be seen by the Perception component

966.2 Parameters

Name	Description
Perception	The Perception component
Target	The Game Object checked

966.3 Keywords

`See` `Sight` `Vision` `Detect`

967 Compare Luminance At

`Perception » See » Compare Luminance At`

967.1 Description

Compares the Luminance value with another value

967.2 Parameters

Name	Description
Target	The object reference that checks its Luminance
Value	The comparison to the Luminance value

967.3 Keywords

`Light` `Dim` `Lit` `Expose` `Sun`

VII.II.I.I.IV SMELL

968 Smell

968.1 Conditions

- Can Smell Scent
- Smells Scent Tag

969 Can Smell Scent

`Perception » Smell » Can Smell Scent`

969.1 Description

Checks whether the Perception component can smell a new Scent stimulus

969.2 Parameters

Name	Description
Perception	The Perception component
Position	The position of the Scent stimulus
Radius	The radius of the Scent stimulus
Intensity	The intensity of the Scent stimulus

969.3 Keywords

`Aroma` `Scent` `Smell` `Sniff` `Nose` `Trace`

970 Smells Scent Tag

`Perception » Smell » Smells Scent Tag`

970.1 Description

Checks whether the Perception component is smelling a Scent Tag

970.2 Parameters

Name	Description
Perception	The Perception component
Scent Tag	The Scent Tag to check
Value	The comparison to the scent value

970.3 Keywords

`Aroma` `Scent` `Smell` `Sniff` `Nose` `Trace`

VII.II.II Events

971 Events

971.1 Sub Categories

- Perception

VII.II.II.I Perception

972 Perception

972.1 Sub Categories

- Awareness
- Evidence
- Hear
- See
- Smell

972.2 Events

- On Change Awareness Level
- On Change Awareness Stage

973 On Change Awareness Level

```
Perception » On Change Awareness Level
```

973.1 Description

Executed when the Awareness value of a target changes

973.2 Keywords

`Perceive` `Alert` `Aware` `Suspicious` `Curious` `Detect`

974 On Change Awareness Stage

`Perception » On Change Awareness Stage`

974.1 Description

Executed when the Awareness value of a target changes

974.2 Keywords

`Perceive` `Alert` `Aware` `Suspicious` `Curious` `Detect`

VII.II.II.I.I AWARENESS

975 Awareness

975.1 Events

- On Relayed Awareness

976 On Relayed Awareness

`Perception » Awareness » On Relayed Awareness`

976.1 Description

Executed when an agent with Perception receives new Awareness information from another agent

976.2 Keywords

`Detect` `Bark` `Info` `Receive` `Propagate` `Transmit` `Communicate`

VII.II.II.I.II EVIDENCE

977 Evidence

977.1 Events

- On Notice Evidence
- On Relayed Evidence
- On Tamper Evidence

978 On Notice Evidence

`Perception » Evidence » On Notice Evidence`

978.1 Description

Executed when an agent with Perception notices a new Evidence component

978.2 Keywords

`See` `Detect`

979 On Relayed Evidence

`Perception » Evidence » On Relayed Evidence`

979.1 Description

Executed when an agent with Perception receives new Evidence information from another agent

979.2 Keywords

`Detect` `Bark` `Info` `Receive` `Propagate` `Transmit` `Communicate`

980 On Tamper Evidence

`Perception » Evidence » On Tamper Evidence`

980.1 Description

Executed when an agent tampers with an Evidence component

980.2 Keywords

`Switch` `Change`

VII.II.II.I.III HEAR

981 Hear

981.1 Events

- On Hear

982 On Hear

`Perception » Hear » On Hear`

982.1 Description

Executed when the Perception hears a Noise

982.2 Keywords

`Sound` `Noise` `Distract` `Alert` `Aural` `Hear`

VII.II.II.I.IV SEE

983 See

983.1 Events

- On See

984 On See

```
Perception » See » On See
```

984.1 Description

Executed when the Perception sees the specified (tracked) game object

984.2 Example 1

This Event will only execute on game objects that are being tracked

984.3 Keywords

`Track` `Vision` `Sight`

VII.II.II.I.V SMELL

985 Smell

985.1 Events

- On Smell

986 On Smell

```
Perception » Smell » On Smell
```

986.1 Description

Executed when the Perception smells a Scent

986.2 Keywords

`Odor` `Smell` `Aroma` `Nose`

VII.II.III Instructions

987 Instructions

987.1 Sub Categories

- Perception

VII.II.III.I Perception

988 Perception

988.1 Sub Categories

- Awareness
- Evidence
- Hear
- See
- Smell

988.2 Instructions

- Track Awareness
- Untrack Awareness

989 Track Awareness

```
Perception » Track Awareness
```

989.1 Description

Starts tracking a game object in order to become aware of it

989.2 Keywords

`Perceive` `Alert`

990 Untrack Awareness

```
Perception » Untrack Awareness
```

990.1 Description

Stops tracking a game object and forgets about it

990.2 Keywords

`Perceive` `Alert`

VII.II.III.I.I AWARENESS

991 Awareness

991.1 Instructions

- Decrease Awareness
- Increase Awareness
- Relay Awareness Knowledge

992 Decrease Awareness

`Perception » Awareness » Decrease Awareness`

992.1 Description

Decreases the awareness of a target on a Perception component

992.2 Parameters

Name	Description
Decrement	The decreasing value of awareness
Perception	The Perception component that changes its awareness
Target	The target game object that changes its awareness

992.3 Keywords

`Remove` `Less` `Know` `Detect` `Alert` `See`

993 Increase Awareness

`Perception » Awareness » Increase Awareness`

993.1 Description

Increases the awareness of a target on a Perception component

993.2 Parameters

Name	Description
Increment	The increment value of awareness
Maximum Level	The maximum Awareness this increment can reach
Perception	The Perception component that changes its awareness
Target	The target game object that changes its awareness

993.3 Example 1

Use the Maximum Level if you want to increase the Awareness up to a certain threshold. For example, throwing a bottle nearby will make guards suspicious but never reach the state of Aware

993.4 Keywords

`Add` `Sum` `Know` `Detect` `Alert` `See`

994 Relay Awareness Knowledge

`Perception » Awareness » Relay Awareness Knowledge`

994.1 Description

Relays the Awareness knowledge of a game object to another Perception agent

994.2 Parameters

Name	Description
Perception	The Perception component that transmits its Awareness knowledge
Target	The Perception component that receives the Awareness knowledge
Perception	The Perception component that changes its awareness
Target	The target game object that changes its awareness

994.3 Keywords

`Communicate` `Shout` `Tell` `Inform` `Transmit` `Propagate` `Know` `Detect` `Alert` `See`

VII.II.III.I.II EVIDENCE

995 Evidence

995.1 Instructions

- Relay Evidence Knowledge
- Restore Evidence
- Tamper Evidence

996 Relay Evidence Knowledge

`Perception » Evidence » Relay Evidence Knowledge`

996.1 Description

Relays the Evidence knowledge of a Perception component to another

996.2 Parameters

Name	Description
Source	The Perception component that transmits its Evidences
Target	The Perception component that receives the Evidence knowledge

996.3 Keywords

`Communicate` `Shout` `Tell` `Inform` `Transmit` `Propagate`

997 Restore Evidence

`Perception » Evidence » Restore Evidence`

997.1 Description

Restores the state of the evidence so that other agents do not notice it

997.2 Parameters

Name	Description
Evidence	The Evidence reference

997.3 Keywords

`Change` `Modify` `Manipulate` `Clue`

998 Tamper Evidence

`Perception » Evidence » Tamper Evidence`

998.1 Description

Tampers the evidence so that other agents notice it

998.2 Parameters

Name	Description
Evidence	The Evidence reference

998.3 Example 1

If a door is closed and the player opens it, the door can be considered as tampered and enemy agents will be able to notice the change

998.4 Keywords

`Change` `Modify` `Manipulate` `Clue`

VII.II.III.I.III HEAR

999 Hear

999.1 Instructions

- Emit Noise
- Global Din

1000 Emit Noise

`Perception » Hear » Emit Noise`

1000.1 Description

Emits a Noise Stimulus that other Perception components can process

1000.2 Parameters

Name	Description
Position	The center of the noise emitted
Radius	The radius of the noise emitted
Tag	The name identifier of the noise
Intensity	The strength value used for the noise emitted

1000.3 Keywords

`Sound` `Noise` `Distract` `Alert` `Aural` `Hear`

1001 Global Din

```
Perception » Hear » Global Din
```

1001.1 Description

Changes the Global ambient din value

1001.2 Parameters

Name	Description
Din	The new value for the ambient background noise
Transition	A set of options that allow to change the value over time

1001.3 Keywords

`Sound` `Noise` `Ambient` `Aural` `Hear` `Deaf`

VII.II.III.I.IV SEE

1002 See

1002.1 Instructions

- Change Global Luminance

1003 Change Global Luminance

`Perception » See » Change Global Luminance`

1003.1 Description

Changes the global ambient Luminance value

1003.2 Parameters

Name	Description
Luminance	The new value for the global ambient Luminance
Transition	A set of options that allow to change the value over time

1003.3 Keywords

`Light` `Bright` `Dark` `Dim` `Night` `Sun`

VII.II.III.I.V SMELL

1004 Smell

1004.1 Instructions

- Emit Scent
- Set Dissipation

1005 Emit Scent

`Perception » Smell » Emit Scent`

1005.1 Description

Emits a Scent Stimulus that other Perception components can process

1005.2 Parameters

Name	Description
Source	The game object emitting the scent
Dispel Duration	The seconds it takes for the odor to fade out
Diffusion Rate	The growth factor of the smell per second
Tag	The name identifier of the noise
Intensity	The strength value used for the noise emitted

1005.3 Keywords

`Odor` `Smell` `Distract` `Alert` `Diffuse` `Dispel`

1006 Set Dissipation

`Perception » Smell » Set Dissipation`

1006.1 Description

Changes the global ambient Dissipation value

1006.2 Parameters

Name	Description
Dissipation	The new dissipation value. Values over zero reduce the smell dispel duration
Transition	A set of options that allow to change the value over time

1006.3 Example 1

Dissipation values increase the time a scent dispels. A value of 0 means it doesn't affect the dispel time. A value of 1 means it doubles the time it takes to dispel it

1006.4 Keywords

`Odor` `Smell` `Scent` `Nose` `Wind`

VII.III User Interface

1007 User Interface

The **Perception** component comes with multiple UI (user interface) components that help communicate with the player the current state of the **Perception** components around.

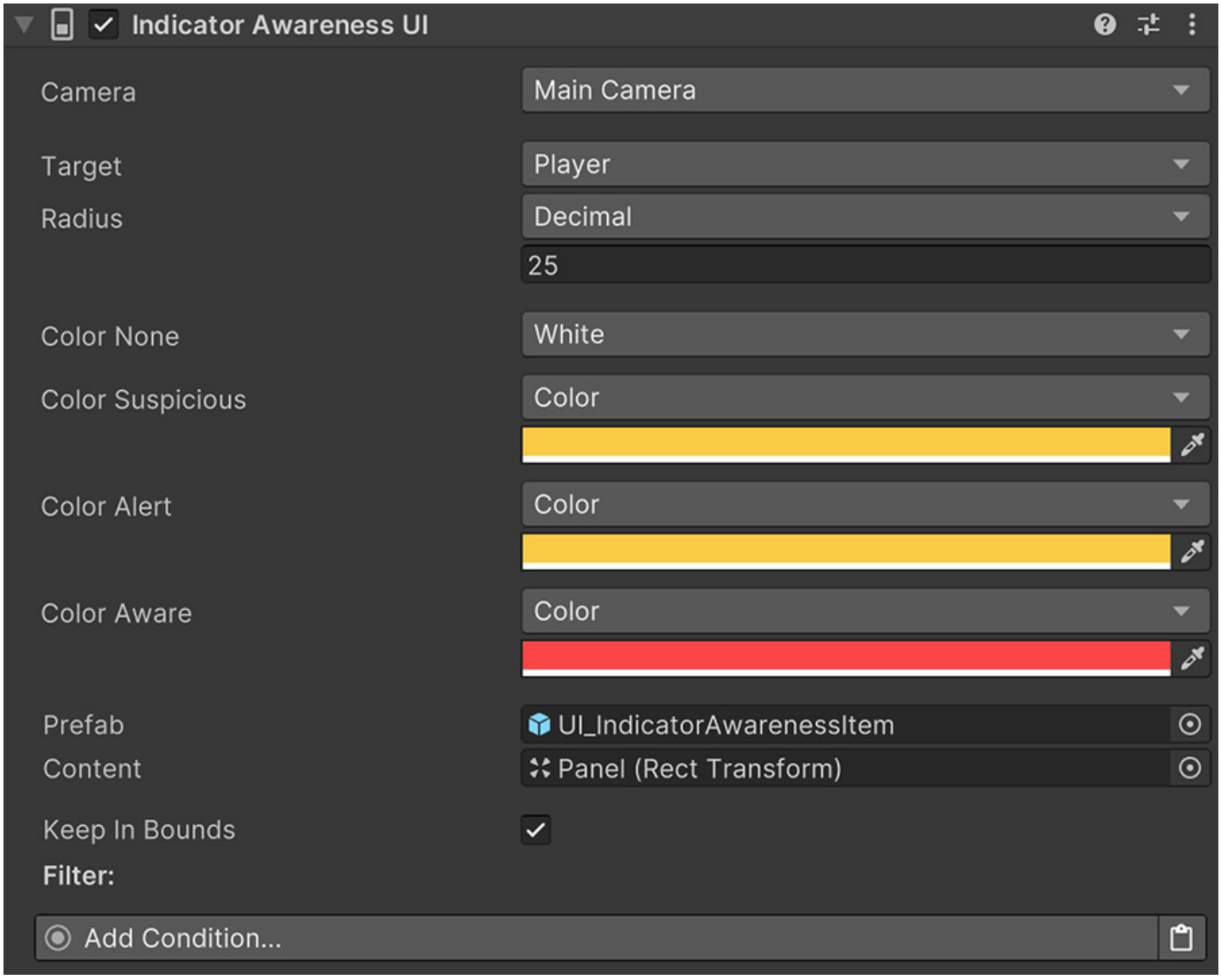
- **Awareness UI**: Allows to show a floating indicator with the amount of awareness towards a certain object.
- **Luminance UI**: Allows to track how much luminance (light intensity) is affecting the chosen target.
- **Noise UI**: Determines the intensity of the highest noise being heard compared to the current din value.
- **Smell UI**: Determines the scent with the highest intensity perceived by an agent.

Ready-to-use Examples

The demos include three examples of UI component that can be dragged and dropped onto your scene(s) which you can use or modify and tailor to your needs.

1008 Awareness UI

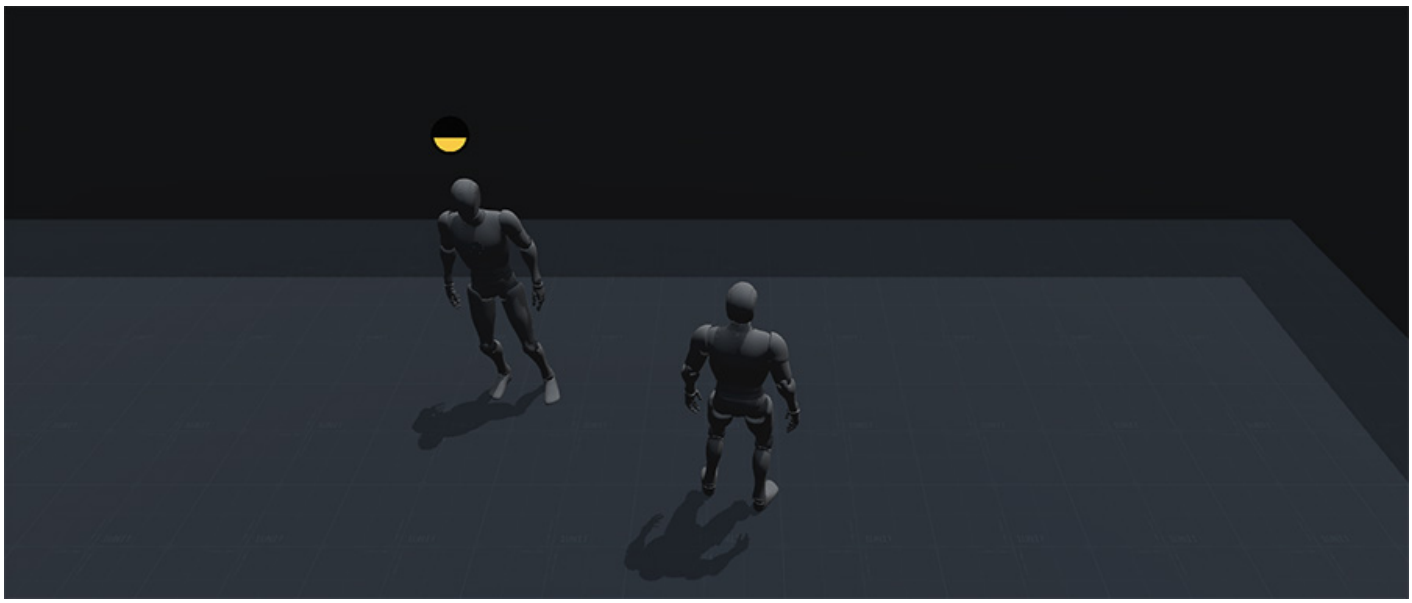
The **Indicator Awareness UI** component is used to communicate the amount of **Awareness** a group of agents has towards a specific game object (usually the Player).



The component shows the **Awareness** value taking as a point of reference a specific game object and gathering all agents around a specific radius.

Filter Enemies

If your game has **Perception** agents that you don't want to display their awareness, you can filter them at the bottom of the component. For example, you can filter them by their game object tag and only display those that are marked as *enemies*.

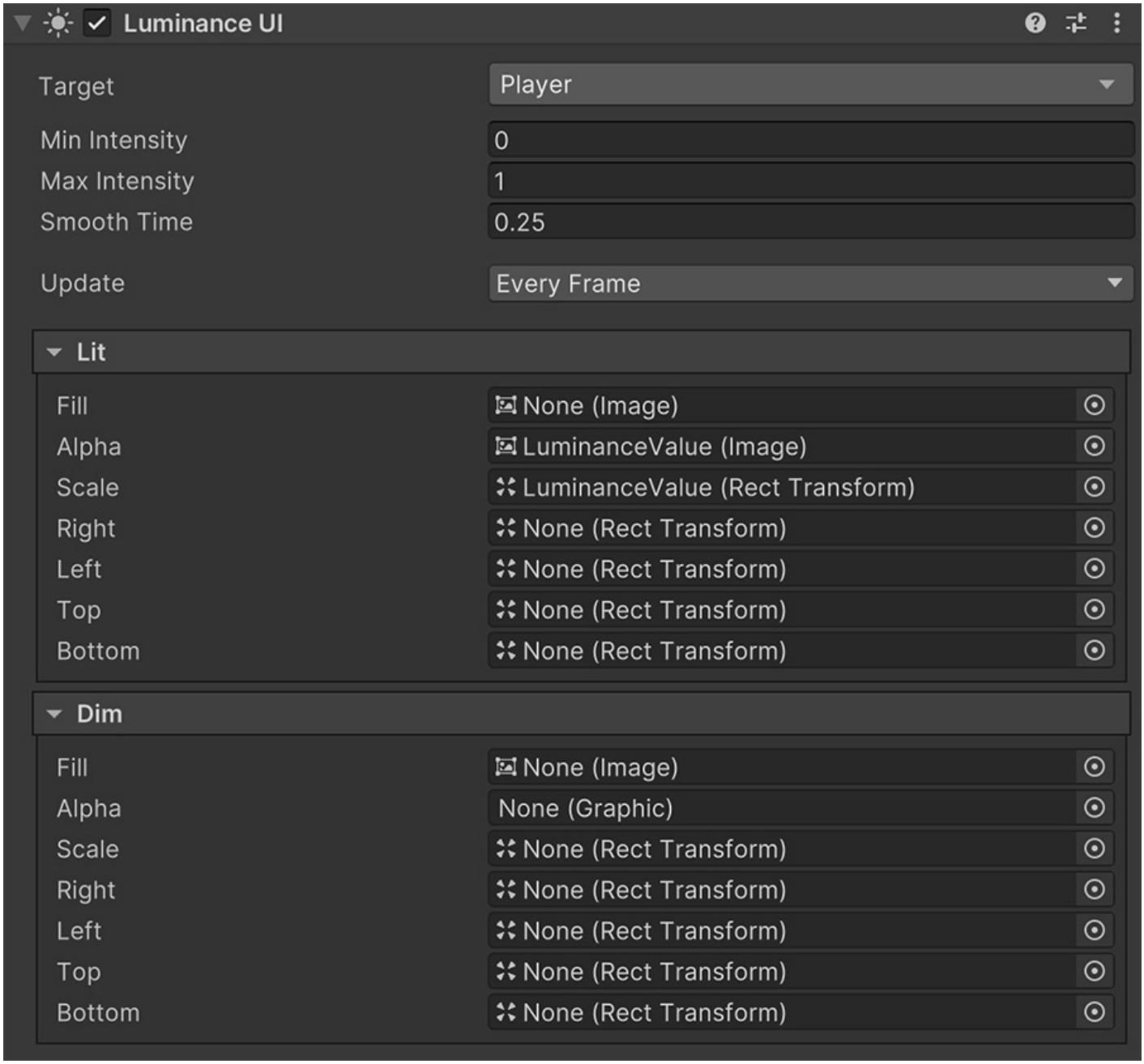


The demos included in the **Perception** module come with a prefab that is ready to be dragged and dropped onto your scene.

If you want to build your own UI it is highly recommended duplicating and modifying the one that comes packed with the module.

1009 Luminance UI

The **Luminance UI** component can be used to communicate with the player the amount of light intensity (also known as **Luminance**) received by a game object.



The **Lit** and **Dim** boxes allow to either draw how much light intensity has a specific game object or how much engulfed in darkness it is.

Update at an Interval

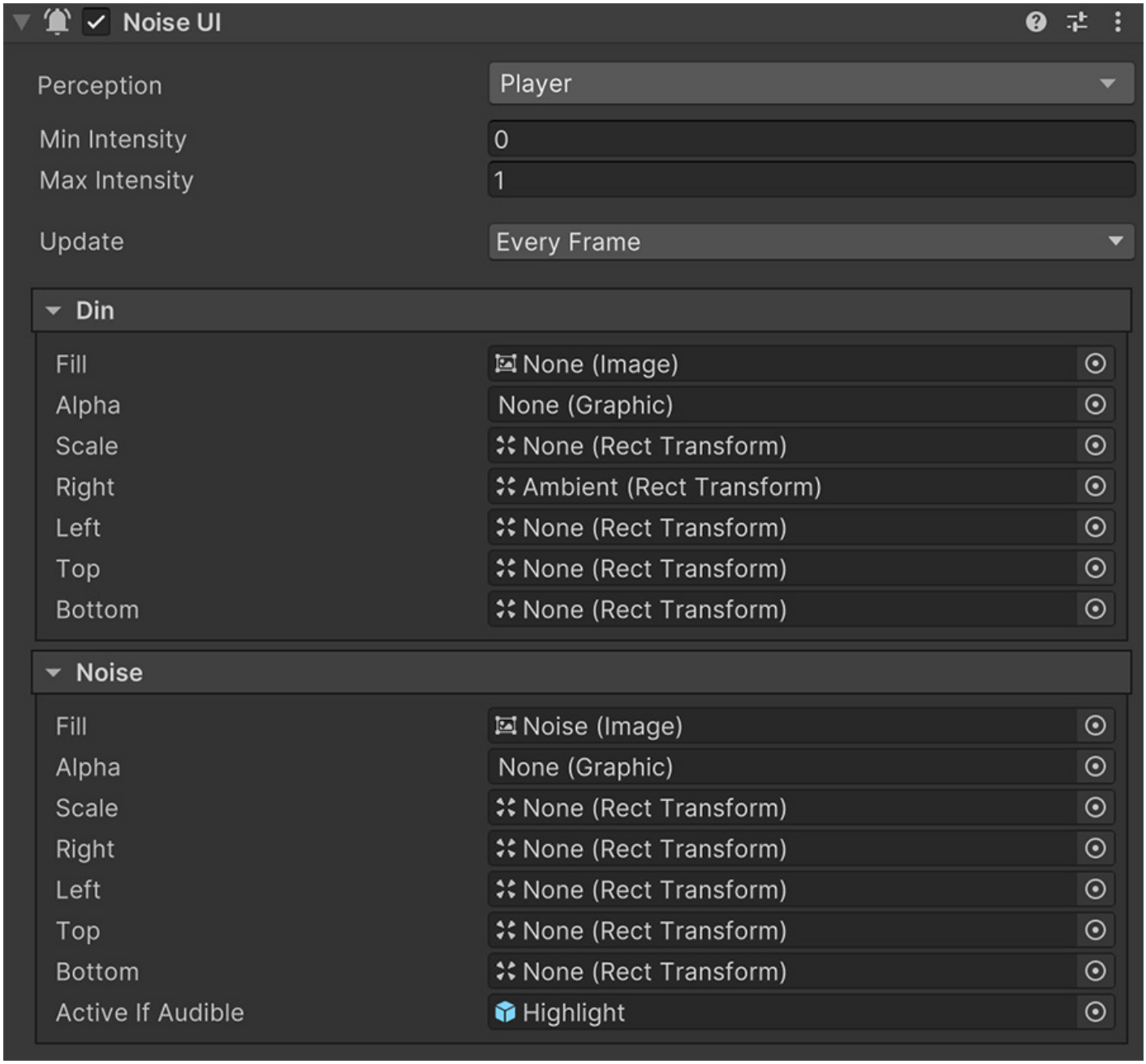
If your game is struggling with performance it is worth changing the **Update** field from *Every Frame* to *Interval*. This will allow to save some precious cycles and improve the performance of the game without barely affecting the gameplay.

The demos included in the **Perception** module come with a prefab that is ready to be dragged and dropped onto your scene.

If you want to build your own UI it is highly recommended duplicating and modifying the one that comes packed with the module.

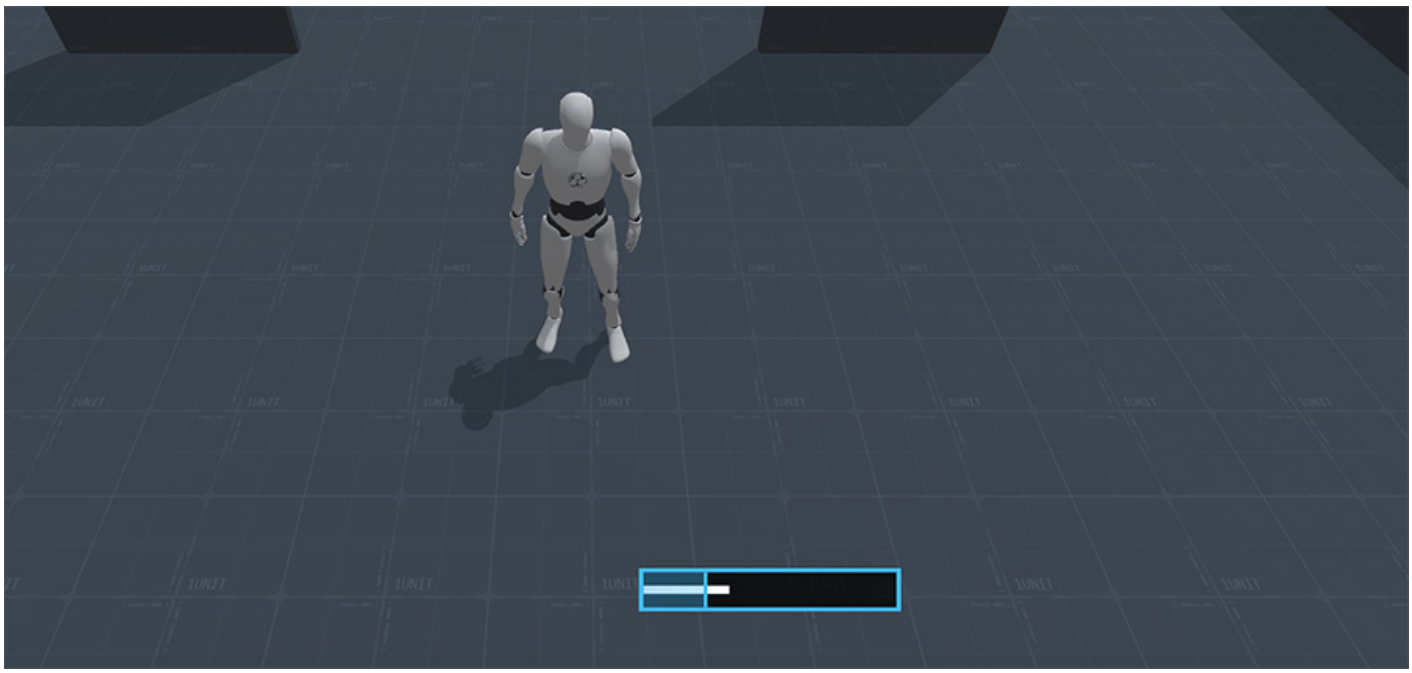
1010 Noise UI

The **Noise UI** component allows to display a progress bar of the noise with the highest intensity heard by a **Perception** component, as well as the amount of din.



Update at an Interval

If your game is struggling with performance it is worth changing the **Update** field from *Every Frame* to *Interval*. This will allow to save some precious cycles and improve the performance of the game without barely affecting the gameplay.

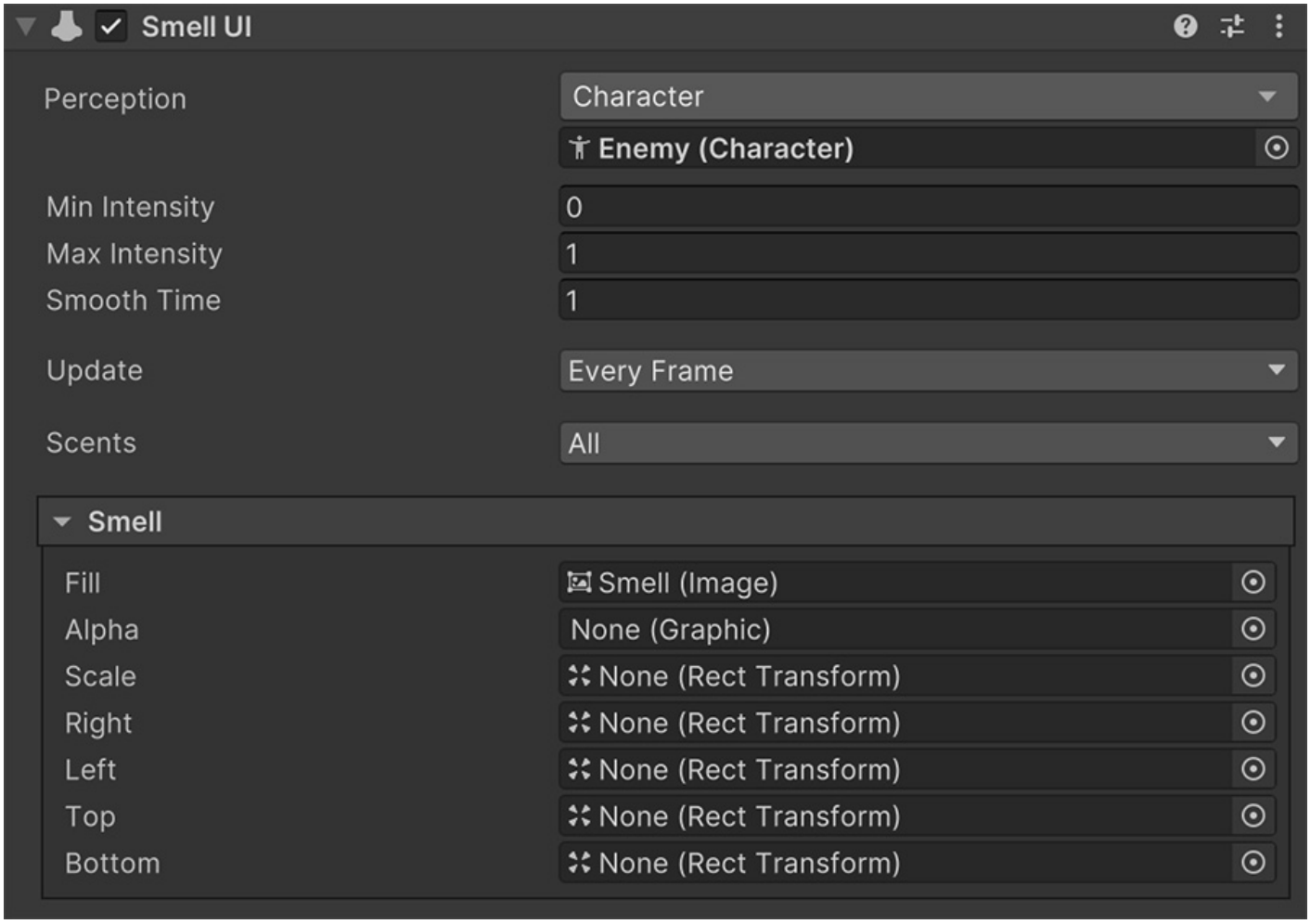


The demos included in the **Perception** module come with a prefab that is ready to be dragged and dropped onto your scene.

If you want to build your own UI it is highly recommended duplicating and modifying the one that comes packed with the module.

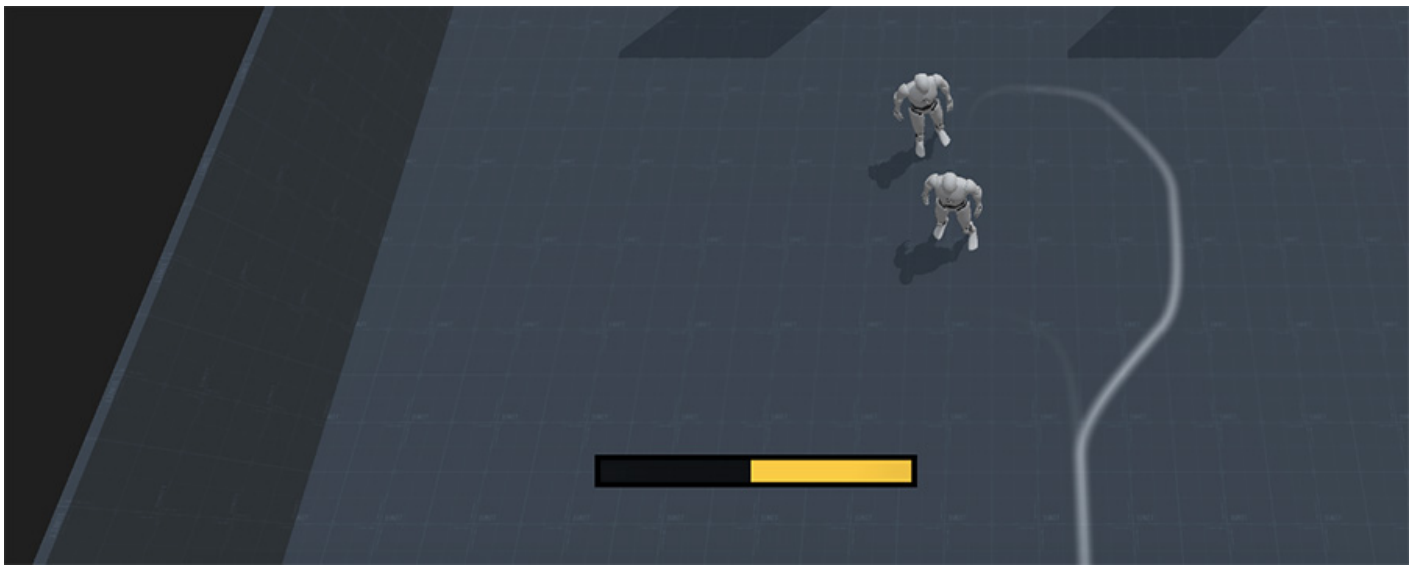
1011 Smell UI

The **Smell UI** component allows to display a progress bar of the smell with the highest intensity caught by a **Perception** component.



Update at an Interval

If your game is struggling with performance it is worth changing the **Update** field from *Every Frame* to *Interval*. This will allow to save some precious cycles and improve the performance of the game without barely affecting the gameplay.



The demos included in the **Perception** module come with a prefab that is ready to be dragged and dropped onto your scene.

If you want to build your own UI it is highly recommended duplicating and modifying the one that comes packed with the module.

VII.IV Releases

1012 Releases

1012.1 2.1.4 (Latest)

Released October 18, 2024

Enhances

- Editor: Support for Unity 6
- Perception: Using more performant Unity 6 features

Fixes

- Trigger: On Awareness Stage change incorrect detection
- Editor: Support for new Unity 6 Light types

1012.2 2.1.3

Released July 30, 2024

New

- Trigger: On Evience becomes Tampered or Restored

Fixes

- Event: On Awareness Stage change skipping decrease

1012.3 2.1.2

Released February 23, 2024

New

- Evidence: Option to start as tampered
- UI: Show Percentage for each sensor

Enhances

- See: Optics improved with more options
- Evidence: Improved inspector layout

Changes

- Internal: Support for Core 2.15.49 version

Fixes

- UI: Components are executed after scene changes
- Editor: Missing version number
- Editor: Missing uninstall option

1012.4 2.0.1

Released January 17, 2024

New

- First release

VIII. Shooter

1013 Shooter

Creating shooting mechanics is more complex than making bullets fly forward.

The **Shooter** module aims to provide all the necessary tools to create from the simplest top-down bullet-hell shooter with hundreds of projectiles to a sniper simulator with realistic ballistic physics and weather conditions.

It also comes with a brand new FK / IK system that procedurally rotates and translates the arms and bodies of humanoid characters in order to accurately aim at their target.

Get Shooter

Requirements

The **Shooter** module is an extension of **Game Creator 2** and won't work without it

1014 Setup

Welcome to getting started with the **Shooter** module. In this section you'll learn how to install this module and get started with the examples which it comes with.

1014.1 Prepare your Project

Before installing the **Shooter** module, you'll need to either create a new Unity project or open an existing one.

> **Game Creator**
>
> It is important to note that **Game Creator** should be present before attempting to install any module.

1014.2 Install the Shooter module

If you haven't purchased the **Shooter** module, head to the Asset Store product page and follow the steps to get a copy of this module.

Once you have bought it, click on Window → Package Manager to reveal a window with all your available assets.

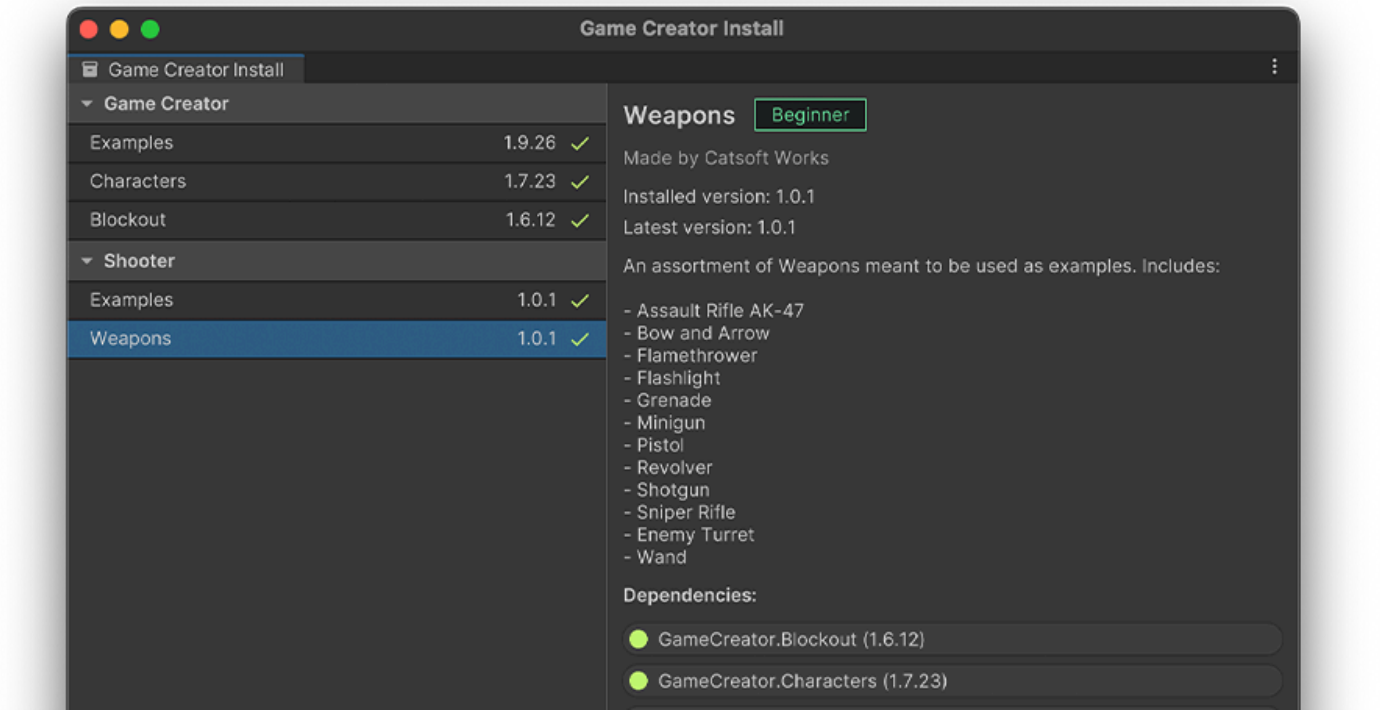
Type in the little search field the name of this package and it will prompt you to download and install the latest stable version. Follow the steps and wait till Unity finishes compiling your project.

1014.3 Examples

We highly recommend checking the examples that come with the **Shooter** module. To install them, click on the *Game Creator* dropdown from the top toolbar and then the *Install* option.

The **Installer** window will appear and you'll be able to manage all examples and template assets you have in your project.

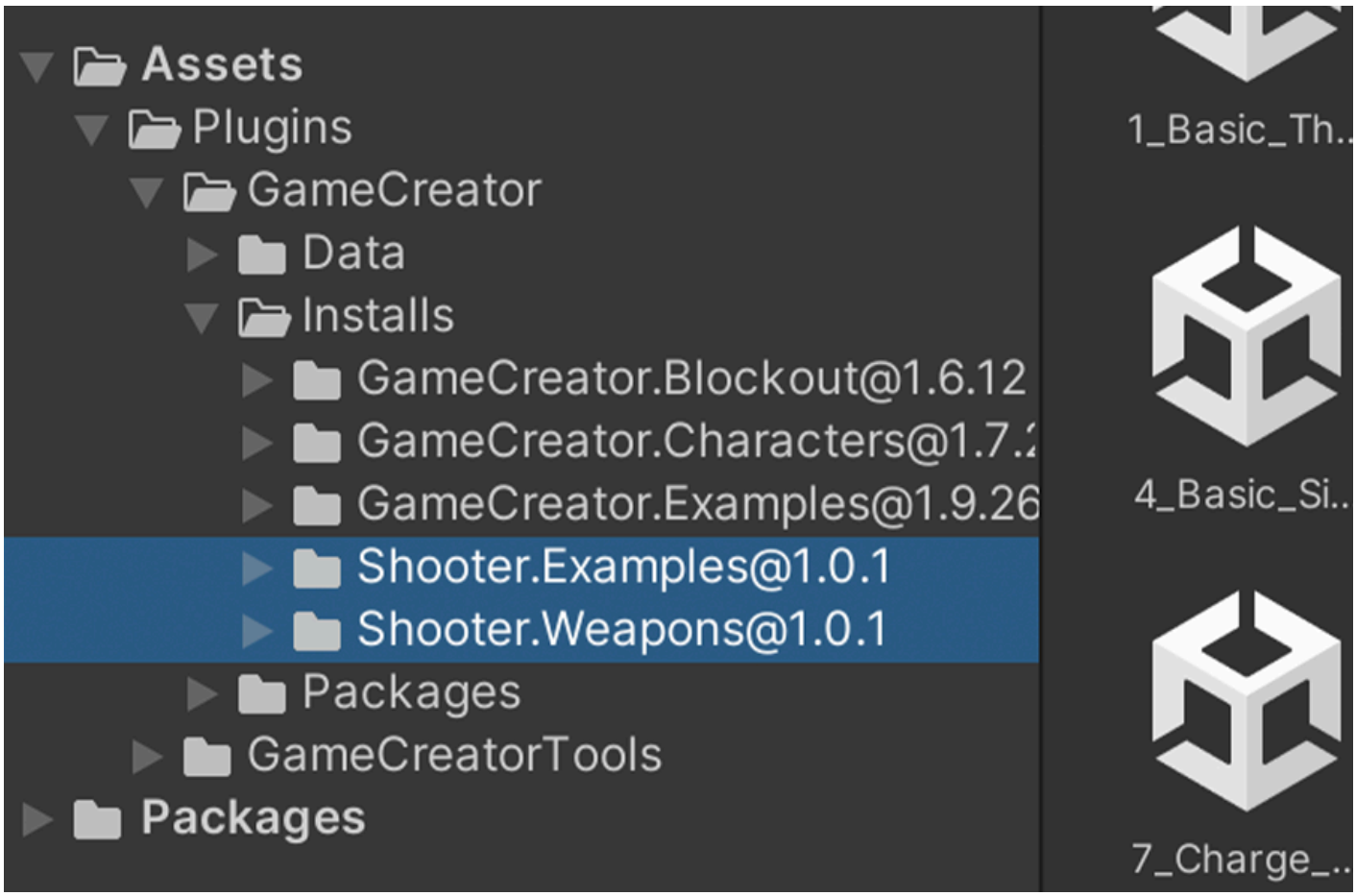
- **Examples**: A collection of scenes with different use-case scenarios
- **Weapons**: A large collection of read-to-use weapons where each showcase a different mechanic



The **Examples** requires all combat systems in order to work.

> ✓ **Dependencies**
>
> Clicking on the **Examples** install button will install all dependencies automatically.

Once you have the examples installed, click on the *Select* button or navigate to `Plugins/GameCreator/Installs/Shooter.Examples/`.


Assets
Plugins
GameCreator
Data
Installs
GameCreator.Blockout@1.6.12
GameCreator.Characters@1.7.2
GameCreator.Examples@1.9.26
Shooter.Examples@1.0.1
Shooter.Weapons@1.0.1
Packages
GameCreatorTools
Packages
1_Basic_Th..
4_Basic_Si..
7_Charge_..

VIII.I Weapons

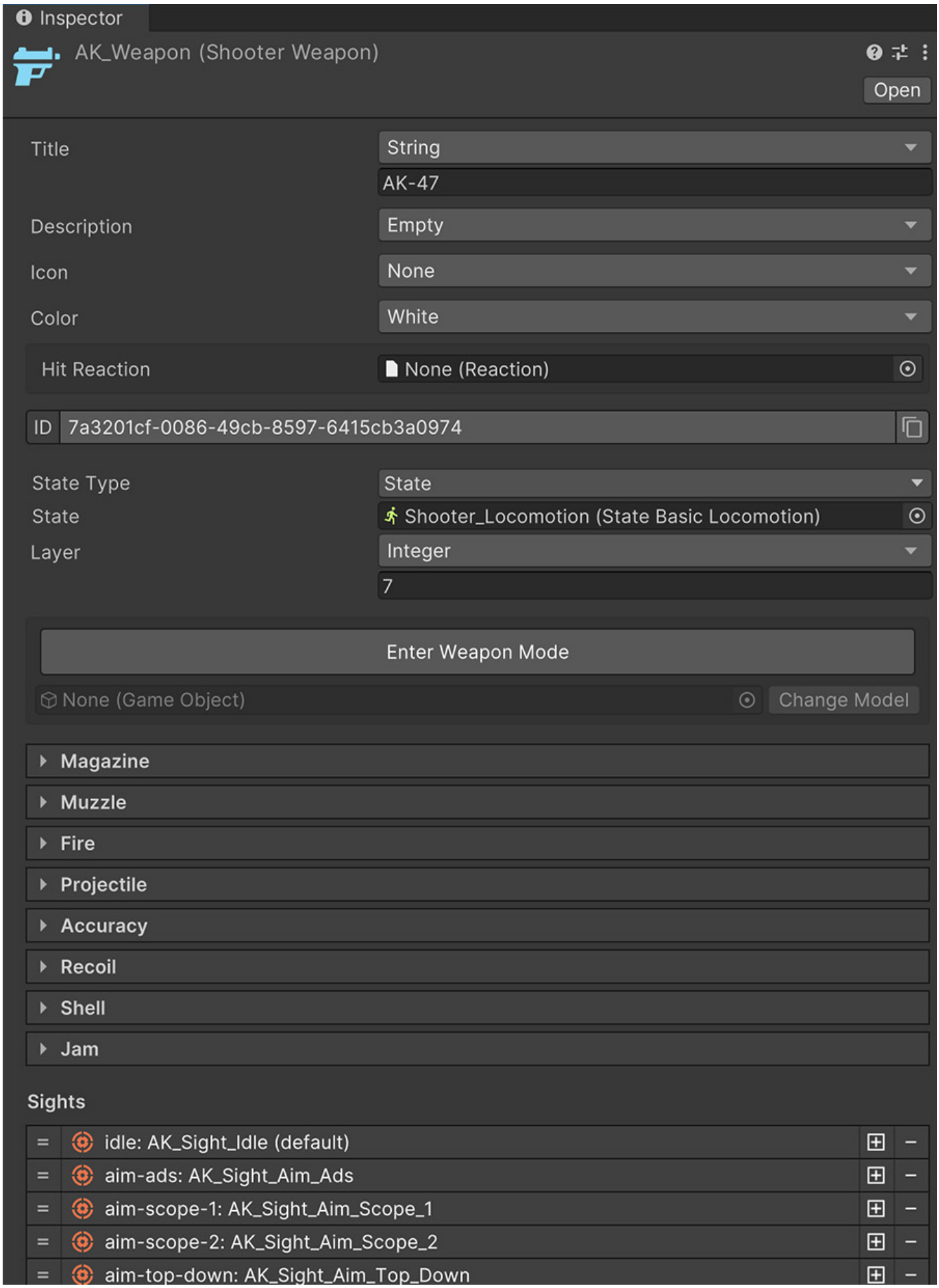
1015 Weapons

Weapons are assets that live in your project that allow to configure how a specific weapon works.

> **Multiple Weapons in a single one**
>
> There are some cases where you'll have weapons that contain multiple shooting modes, such as an *Assault Rifle* that also launches *grenades*. In these cases you should create two **Weapon** assets and equip them on the same *prop*.
>
> You can equip as many **Weapons** as you want.

1015.1 Overview

To create a **Weapon** asset, right click on the *Project Panel* and navigate to *Create* → *Game Creator* → *Shooter* → *Weapon*. This will create a new **Weapon** asset that you can move anywhere you want.


Inspector
AK_Weapon (Shooter Weapon)
Open
Title
String
AK-47
Description
Empty
Icon
None
Color
White
Hit Reaction
None (Reaction)
ID
7a3201cf-0086-49cb-8597-6415cb3a0974
State Type
State
State
Shooter_Locomotion (State Basic Locomotion)
Layer
Integer
7
Enter Weapon Mode
None (Game Object)
Change Model
Magazine
Muzzle
Fire
Projectile
Accuracy
Recoil
Shell
Jam
Sights
idle: AK_Sight_Idle (default)
aim-ads: AK_Sight_Aim_Ads
aim-scope-1: AK_Sight_Aim_Scope_1
aim-scope-2: AK_Sight_Aim_Scope_2
aim-top-down: AK_Sight_Aim_Top_Down

1015.1.1 Weapon Data

Starting from the top there are the common fields:

- **Title**: The name of the weapon. Useful for representing it in the user-interface or inventory.
- **Description**: The description of the weapon, if necessary.
- **Icon**: An icon *Sprite* associated with the weapon, if necessary.
- **Color**: A color associated with the weapon, if necessary.

The next field is the **Hit Reaction** which is an optional field. If a Reaction is set, every time this weapon shoots and hits a character, it will attempt to play a reaction on it.

If no **Hit Reaction** instance is set and the character doesn't have a default reaction, the receiving character won't play any reaction at all.

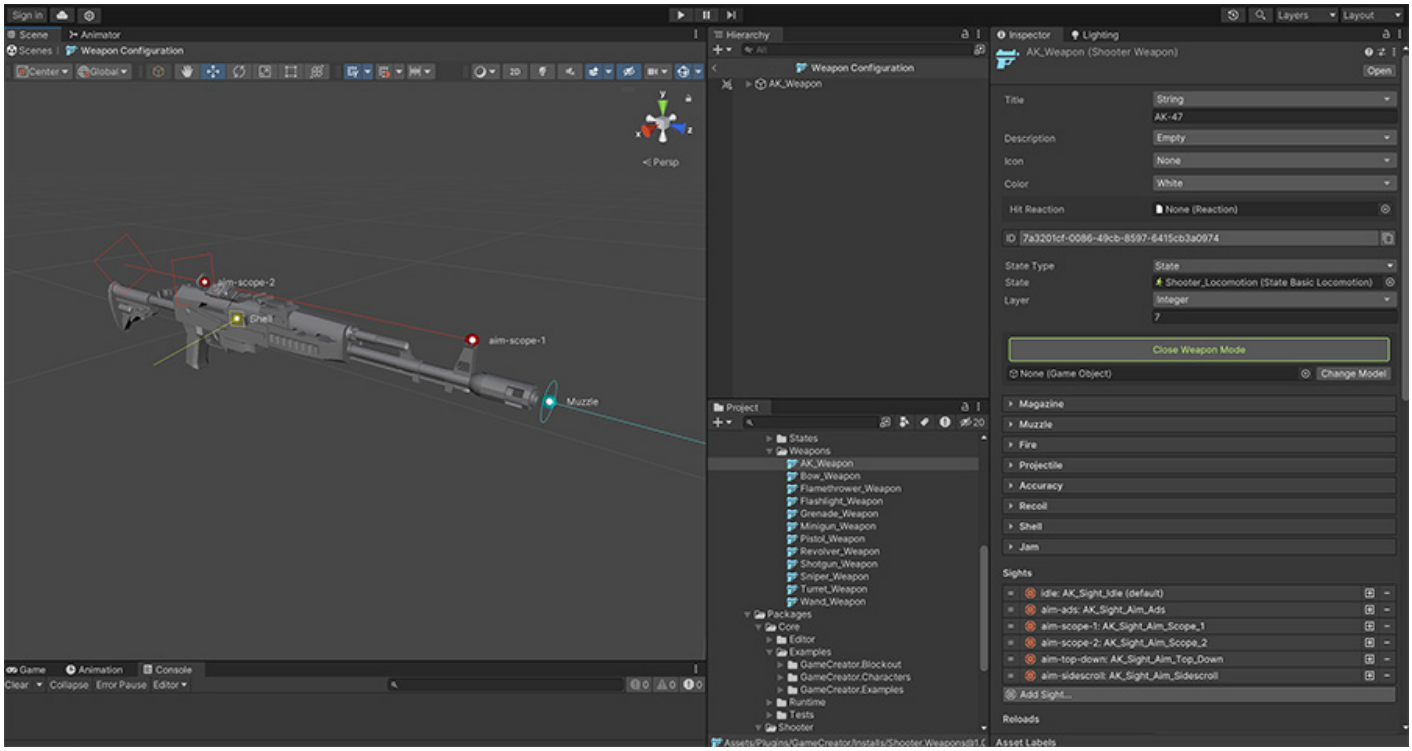
The **ID** field uniquely identifies this weapon among the others. Despite being able to equip any number of weapons simultaneously, it is forbidden to equip two weapons that share the same identifier.

The **Weapon** can optionally make the character enter an animation **State**. These states can also contain an *On Enter* **Gesture** which can play the drawing animation of the weapon, and aiming with it.

The **Layer** field determines at which layer the **State** (if any) will be played.

1015.1.2 Weapon Mode

To configure a **Weapon** more easily you can click on the **Enter Weapon Mode** button and the scene will change into one with a single weapon model in the scene.



Changing the 3D model

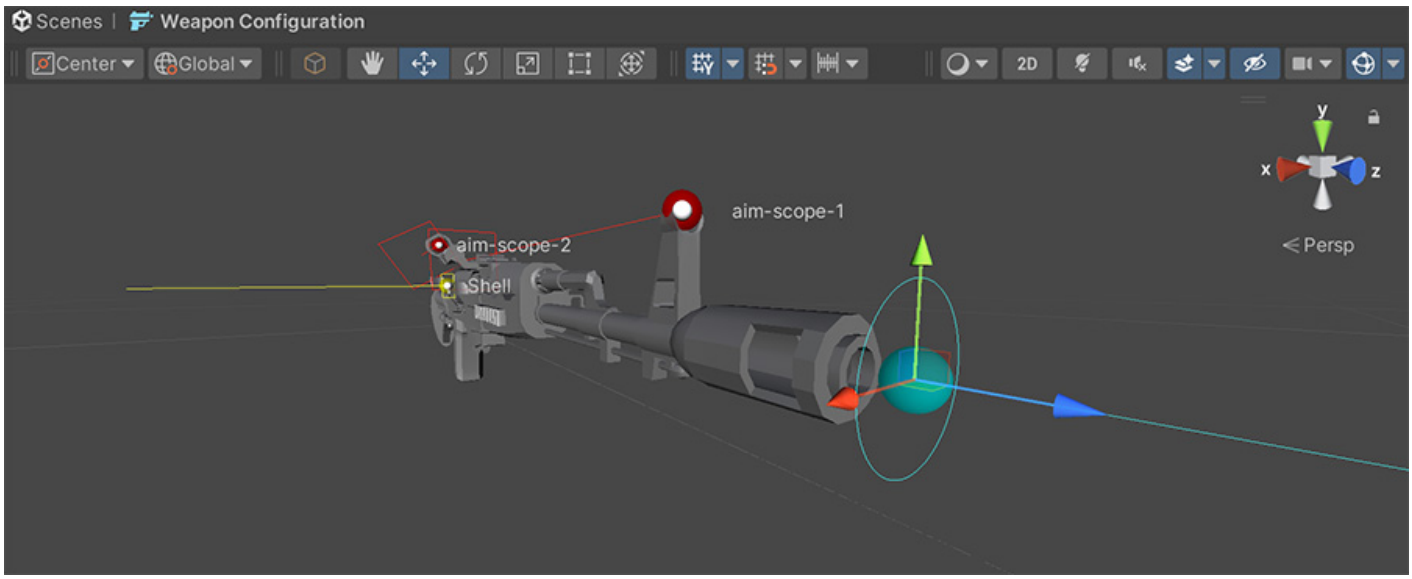
The **Weapon** asset doesn't know which 3D model it will be used on. So by default it displays a water-gun model. You can change it into the model you'll be using to more easily configure the weapon by selecting the model in the **Change Model** field and clicking on the corresponding button.

Unity will remember this selection so every time you open this **Weapon** mode the new model will be picked.

Entering the **Weapon Mode** will change the *Scene View* and *Hierarchy Panel* into a new one similar to how entering prefab mode.

In this mode you can configure:

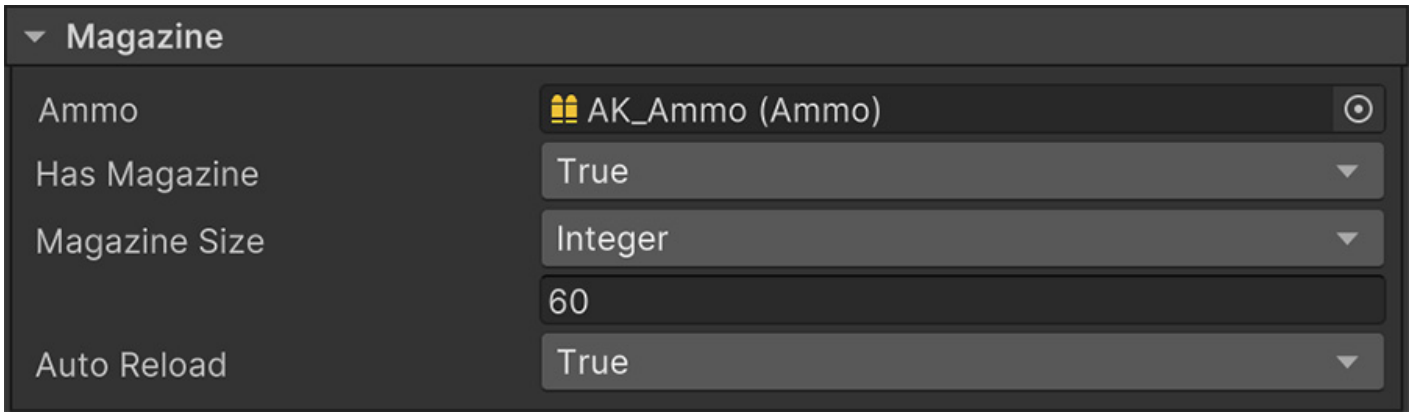
- **The Muzzle**: The tip of the muzzle is represented by a blue dot with a line that determines the direction in which projectiles are shot from.
- **Sights**: Sight points that the character will use as anchor points to determine the best position to aim from, represented with the red color.
- **The Shell Ejection**: A yellow point indicating a direction from which shells will be ejected from (if any).



To modify all of these options, simply click on the white dot and use the Unity handles to translate and rotate the source point and direction to the desired location.

1015.1.3 Magazine

The **Magazine** section is an expandable field that configures the type of ammunition the weapon uses.



The **Ammo** field must reference an **Ammo** asset. For more information about what and how to configure ammunition see the Ammo section.

The **Has Magazine** field determines whether the whole ammunition is used without having to reload (when `false`) or the weapon has a fixed magazine size from which the ammunition must be loaded to before shooting (when `true`).

If the **Weapon** does have a magazine you can determine its size in the **Magazine Size** field.

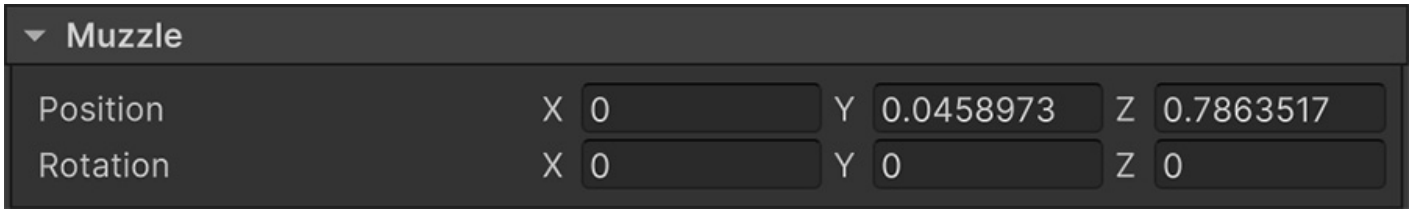
The **Auto Reload** boolean field allows to define whether the character will attempt to reload the weapon when there is no ammo in the magazine (if any) and the character is trying to shoot with it.

Auto Reload for Player and Enemies

The **Auto Reload** field is not only useful for the player but also for creating enemy AI. By switching this field to `true` you can skip checking whether an enemy has enough magazine ammo to shoot the player and simply focus on the *bang-bang*.

1015.1.4 Muzzle

The **Muzzle** section configures where in the model is the point and direction from where projectiles are spawned.



Using the Scene View

Although the **Position** and **Rotation** of this field can be manually modified, it is easier to set by entering *Weapon Mode* and moving the muzzle gizmo handle (the blue one).

1015.1.5 Fire

The **Fire** section determines how the weapon behaves when attempting to shoot with it. To know more about how to shoot with a weapon, see the Shooting section.

The **Projectiles per Shot** determines how many projectiles are used in a single shot action. The **Cartridges per Shot** determines the amount of *ammo* used in a single shot action.

Playing with Ammo and Projectiles

A *Shotgun* that shoots pellets will likely have more than 1 **Projectiles per Shot** because a single shot shoots multiple bullets in a spread area.

On the other hand some weapons might have an alternate shooting mode that uses 4 **Cartridges per Shot** and the potency of those shots is multiplied by a factor, at the risk of wasting more ammo each time the player misses.

The **Mode** is a dropdown field that allows to pick how the weapon behaves when pulling and releasing the trigger.

For more information about the firing modes check the **Fire Mode** section.

The **Fire Animation** field allows the character to play a *Gesture* when shooting.

The fields below allow customizing how this animation plays out, including the **Avatar Mask** for playing only a certain set of bones of the character, set the **Transition In** and **Transition Out** when blending from the current pose as well as choosing whether the character should respect the root motion of the clip or not.

Not using a Fire Animation

For mechanical weapons, such as pistols and rifles, you might want to skip setting an animation and use procedural aiming and recoil. The animation field is meant to be used for cases where the shot is not as precise, such as waving a wand or casting a spell using a hand gesture.

The **Fire Audio** allows to play a sound effect when shooting with the weapon.

If the weapon doesn't have any available ammo however, the **Empty Audio** clip will be used instead (if any).

The **Load Start** is an audio clip that is played as soon as the player presses the weapon's trigger. Although this usually coincides with the shooting, in some cases, such as the *Charge* fire mode or *Full Auto* with *Progressive* or *Wait to Load*.

Using Load to Start

The common scenario is playing a rope stretching sound when starting to pull a *bow* or the gas vault release on a *flamethrower* weapon.

The **Load Loop** field is an audio clip that is only used if the weapon's fire mode is set to *Charge* or *Full Auto*. This will allow the weapon to play a continuous sound effect starting at a **Min Pitch** value all the way to **Max Pitch** if the weapon has any kind of progressive mode.

The **Muzzle Effect** will instantiate a game object at the muzzle's position every time the weapon takes a shot.

Muzzle Flashes

The **Muzzle Effect** field is the perfect place to instantiate a gun's muzzle flash. The object can be pooled for maximum performance, by ticking the **Use Pooling** checkbox.

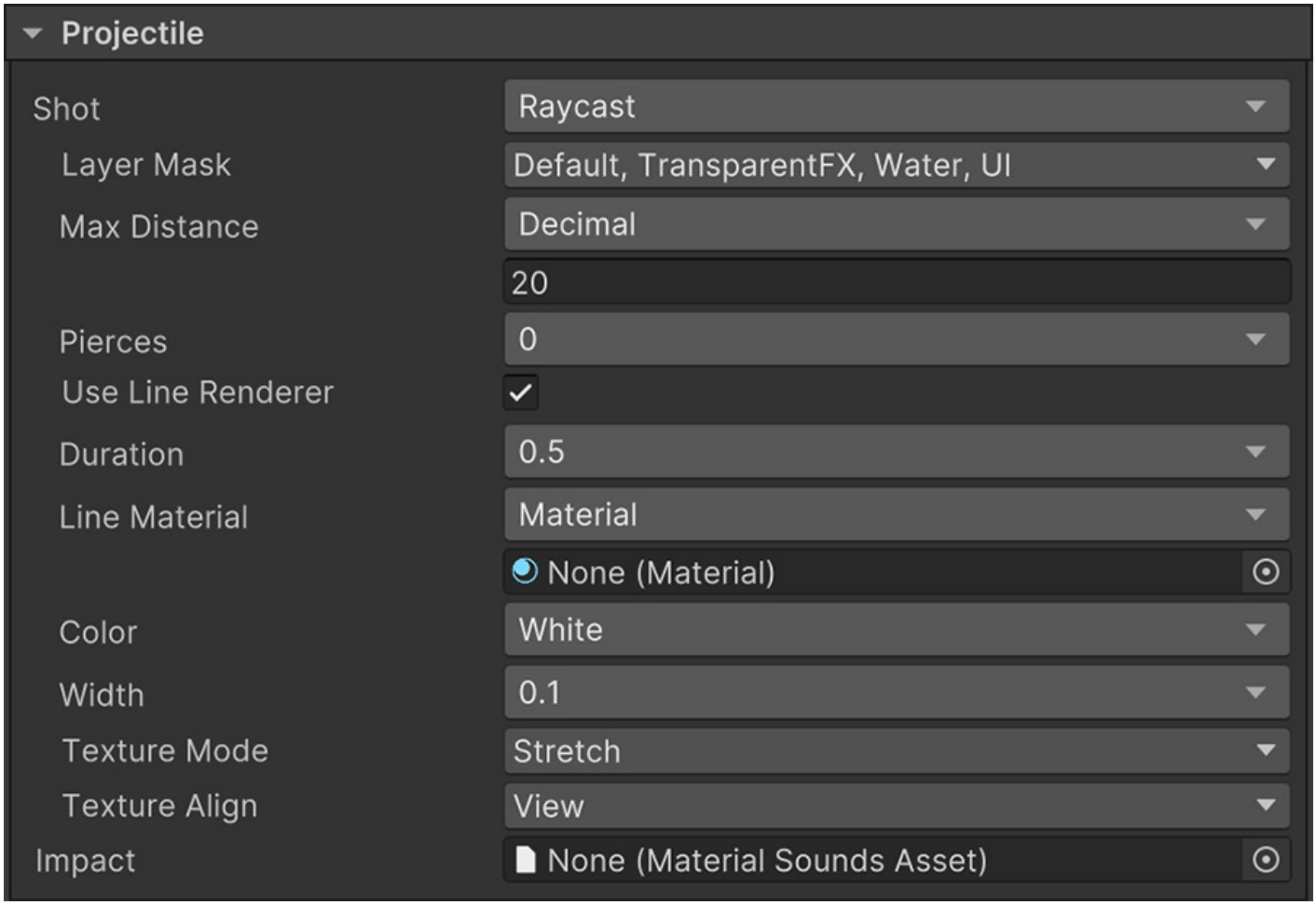
The **Use Force** is an optional field that when ticked, it will allow the projectile shot to apply a force onto any *Rigidbody* collision. If the checkbox is not marked, the projectile won't apply any force at all.

1015.1.6 Projectile

The **Projectile** section configures how the shot behaves once the weapon is instructed to take the shot and make the projectile leave the muzzle.

The **Shot** field controls what type of projectile is shot and its values change depending on the option chosen.

For more information about the types of projectiles available check the **Projectiles** section.



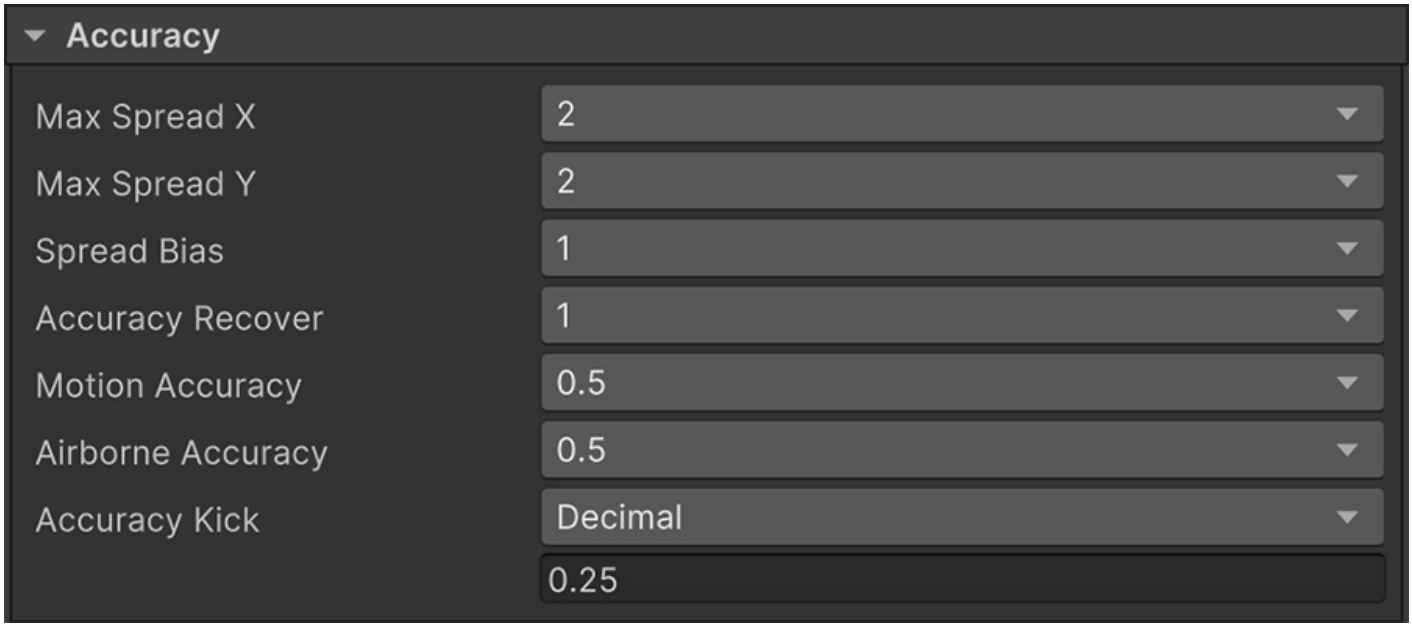
The **Impact** field is optional and allows to attach a *Material Sound* asset that will be used at the point of impact of any projectile shot when colliding with another object.

Impact Effects

The **Impact** field is useful for playing different sound effects depending on the surface impacted and leaving behind impact decals.

1015.1.7 Accuracy

The **Accuracy** section configures how the weapon behaves over time between shots.



What is Accuracy?

Before digging into each of the fields, understand that each weapon has an internal *accuracy* value between 0 and 1, which indicates how accurate is the character when shooting in a direction.

For example, if a character has an accuracy of 0 means that each shot will bullseye the target with a maximum precision. However after taking a shot, the accuracy will likely decrease due to the settings explained below, which makes each consecutive shot less precise, up to a maximum.

The **Max Spread X** and **Max Spread Y** fields indicate, in angle degrees, the maximum amount of error the projectile will have when the *accuracy* value is at its minimum (usually when sprinting or after shooting a barrage of bullets with an assault rifle).

The **Spread Bias** is a field between 0 and 1 that indicates the chance of a projectile landing towards the desired direction or the outer-rim of the maximum spread factor.

Understanding the Spread Bias

In other words, if the character is sprinting and its *accuracy* is at its minimum, the **Spread Bias** determines whether most shots will land at the center of the target (a value of 0) or towards the edges of the circle defined by the **Max Spread** fields.

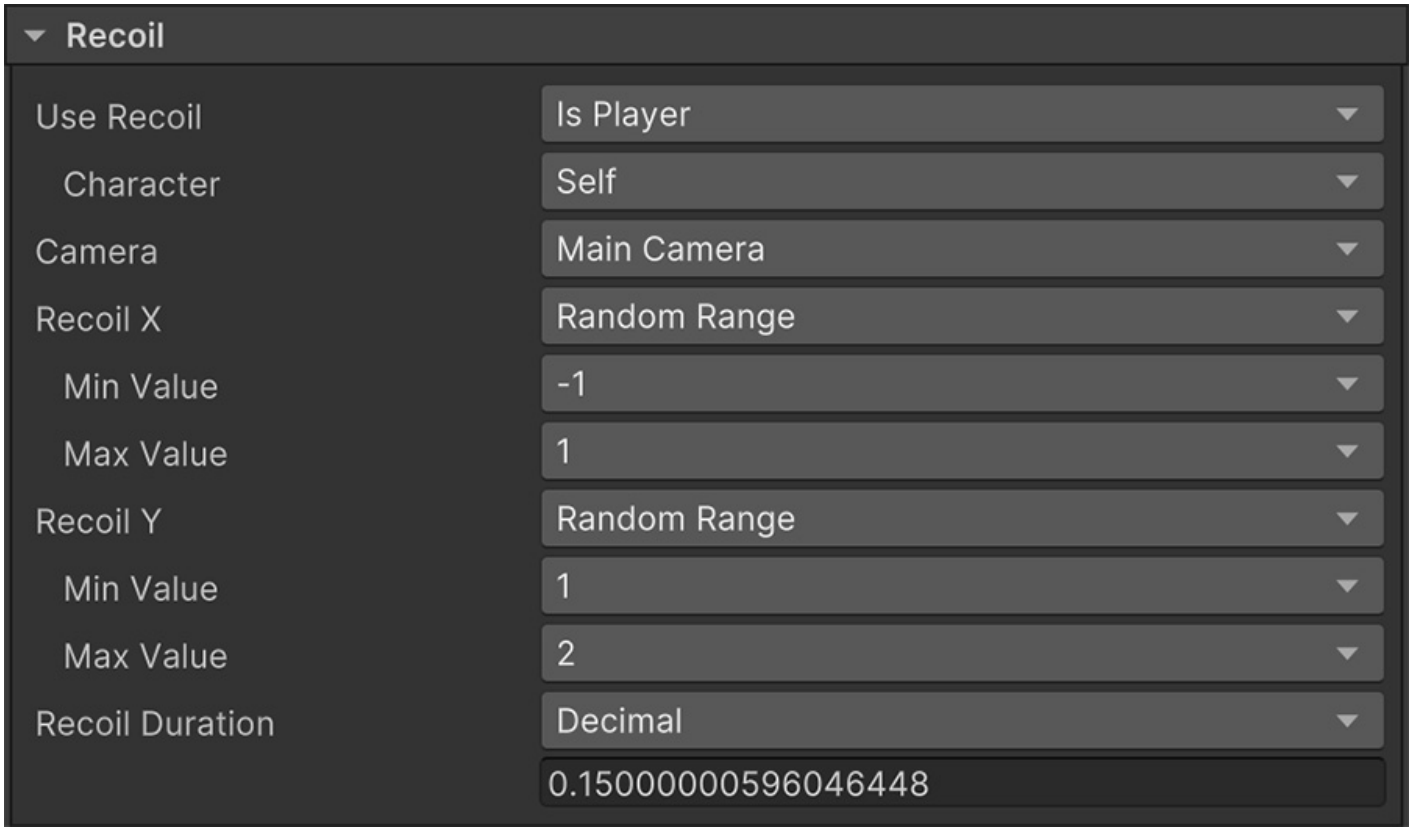
The **Accuracy Recover** indicates the speed rate at which the *accuracy* factor will recover, in seconds.

Motion Accuracy indicates the maximum accuracy a weapon will have when a character is moving and the **Airborne Accuracy** indicates the same when the character is not grounded.

The **Accuracy Kick** value indicates how much the *accuracy* factor decreases with each shot. For example a value of 0.25 means that each shot will reduce by 25% the *accuracy* value.

1015.1.8 Recoil

The **Recoil** section allows to configure how the camera behaves when shooting with a weapon.



Recoil vs Accuracy

The **Recoil** value is separate from the **Accuracy** because *recoil* is meant to only affect the camera. Hence, in most cases will only affect the player.

While the **Accuracy** is an internal value that recovers over time, the recoil is a system that moves the camera on different directions after each shot, making it more or less hard for the player to aim after each consecutive shot.

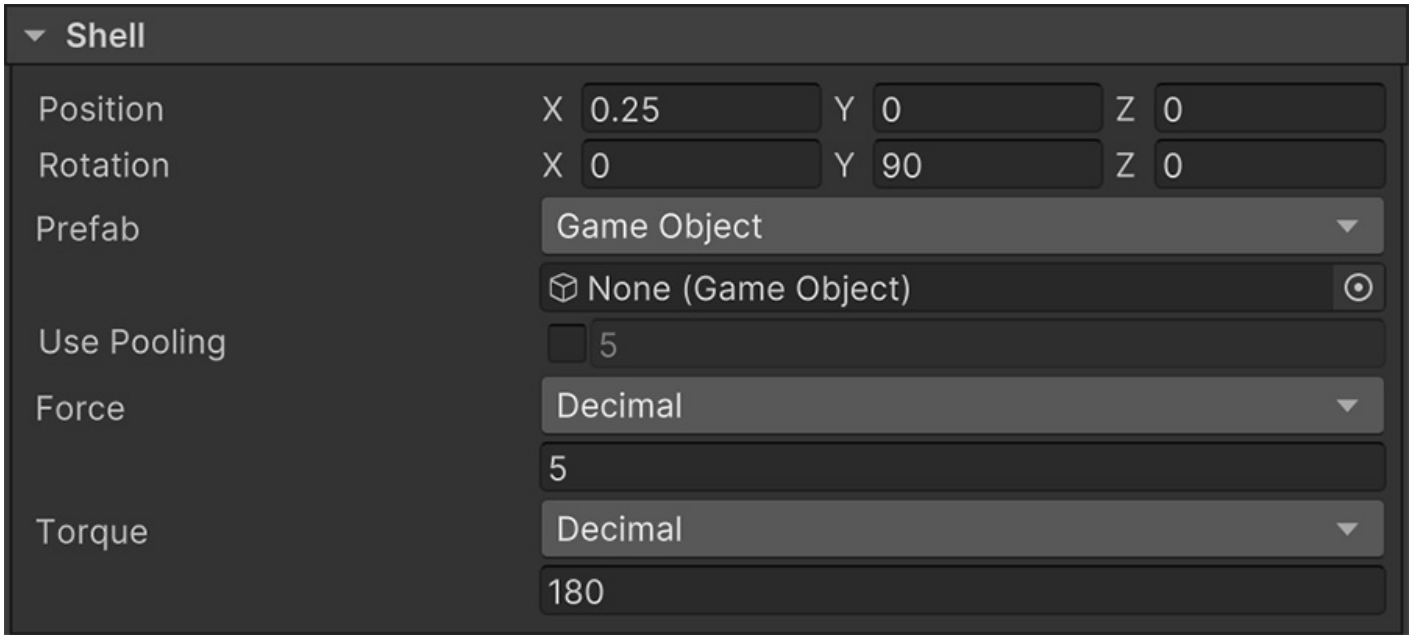
The **Use Recoil** field determines whether to use or not recoil effects. By default it checks whether the character wielding the weapon is the player or not.

The **Camera** field is used to identify which camera will be affected by the recoil, and the **Recoil X** and **Recoil Y** values indicate, in angle degrees, how much the camera will rotate after each shot.

The **Recoil Duration** is the time it will take for the camera to rotate towards the desired recoil rotation after each shot.

1015.1.9 Shell

The **Shell** section optionally configures the ejection of empty shells on the weapon.



The **Position** and **Rotation** fields indicate the point and direction at which shells are ejected from.

Using Weapon Mode

It is recommended to set these values by entering **Weapon Mode** and transforming the yellow gizmo handles.

The **Prefab** field is required if a weapon is going to eject a shell and it's a reference to a prefab object that will be instantiated at the shell's position and rotation.

The **Use Pooling** field allows to improve performance by re-using previous prefab instances and it's automatically handled by the module after ticking the checkbox.

The **Force** and **Torque** fields determine the force at which shells are ejected and rotated.

Using high Torque

The Unity physics engine has some limitations when *rigidbodies* have high rotating velocities and it limits the angular speed at which an object can rotate in order to avoid the whole physics to become unstable.

Ejecting shells

To eject a shell from a weapon all that needs to be done is to use the **Eject Shell** instruction.

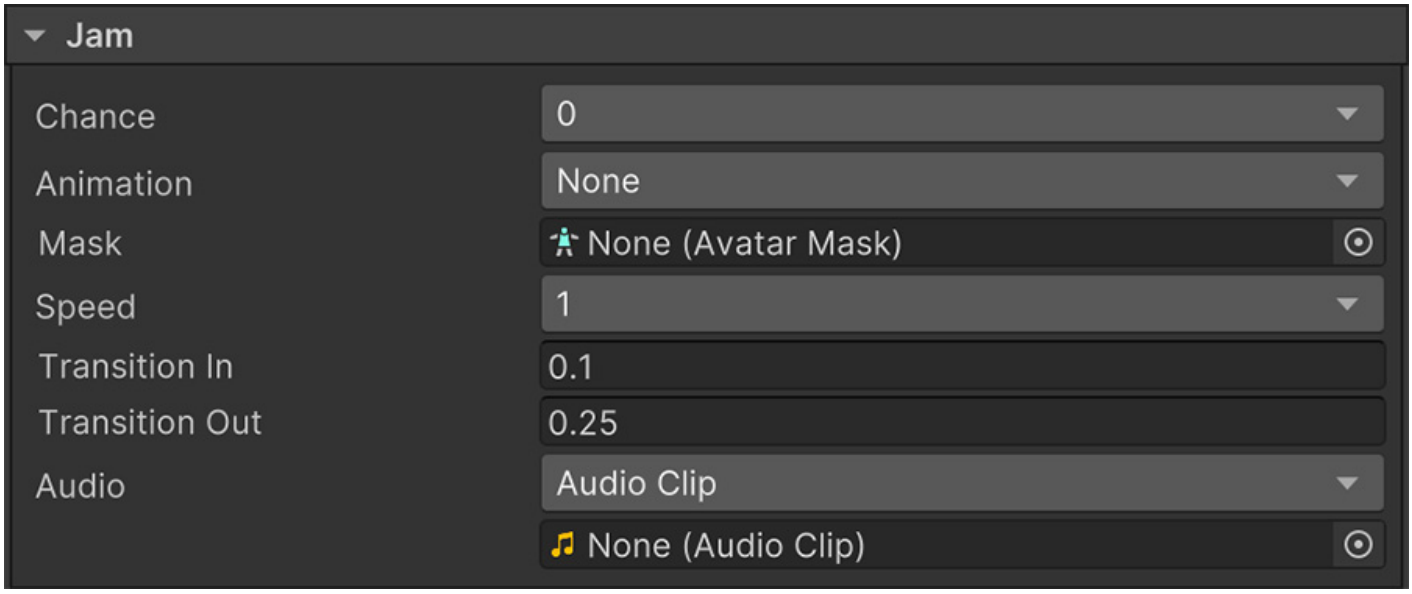
Most semi-automatic weapons will eject the shell right after shooting, so the **On Shoot** instruction list is the perfect place to add the instruction.

However others like a pump-action shotgun will eject the shell after pumping the weapon.

It's up to the game designer to pick the best place to eject a shell from.

1015.1.10 Jam

The **Jam** section configures whether a weapon can get jammed or not, and the animations to fix it.



What is Jamming

Jamming is a built-in mechanic in the **Weapon** asset that allows them to become not operational while the weapon is jammed. A weapon can become jammed right before shooting and it must be fixed before being able to fire or reload again.

The **Chance** field indicates the probability of a weapon becoming jammed. By default a value of 0 will prevent a weapon from ever jamming, but increasing this value will add a chance.

Dynamic Chance

The **Chance** field is dynamic and can change depending on different conditions. For example, a character getting into mud water or rain pouring can increment the chances of a weapon being jammed.

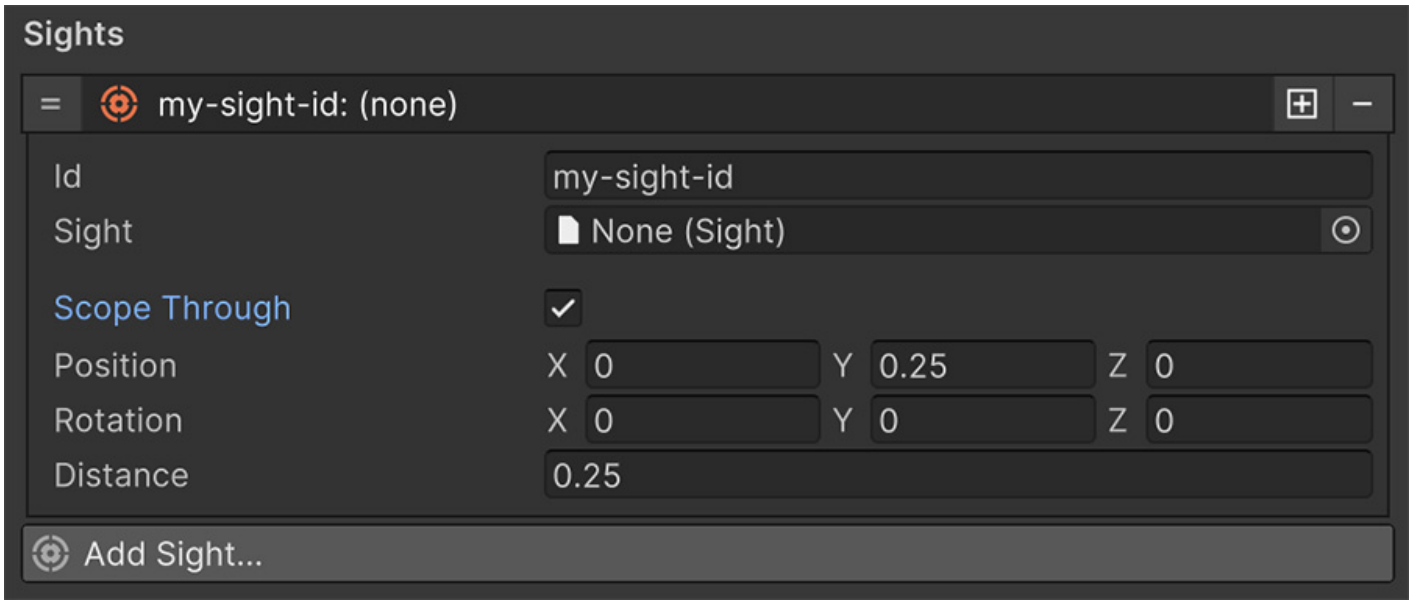
The **Animation** field defines an animation that will be played when fixing a weapon. Note that the player will fix the weapon after the animation finishes.

The **Avatar Mask** allows the animation to be played only on a specific set of bones, and the **Transition In** and **Transition Out** fields control the blending duration of the animation.

The **Audio** field allows an audio clip to play when fixing the weapon.

1015.1.11 Sights

The **Sights** section contains collection of **Sight** assets that are uniquely identified by a name.



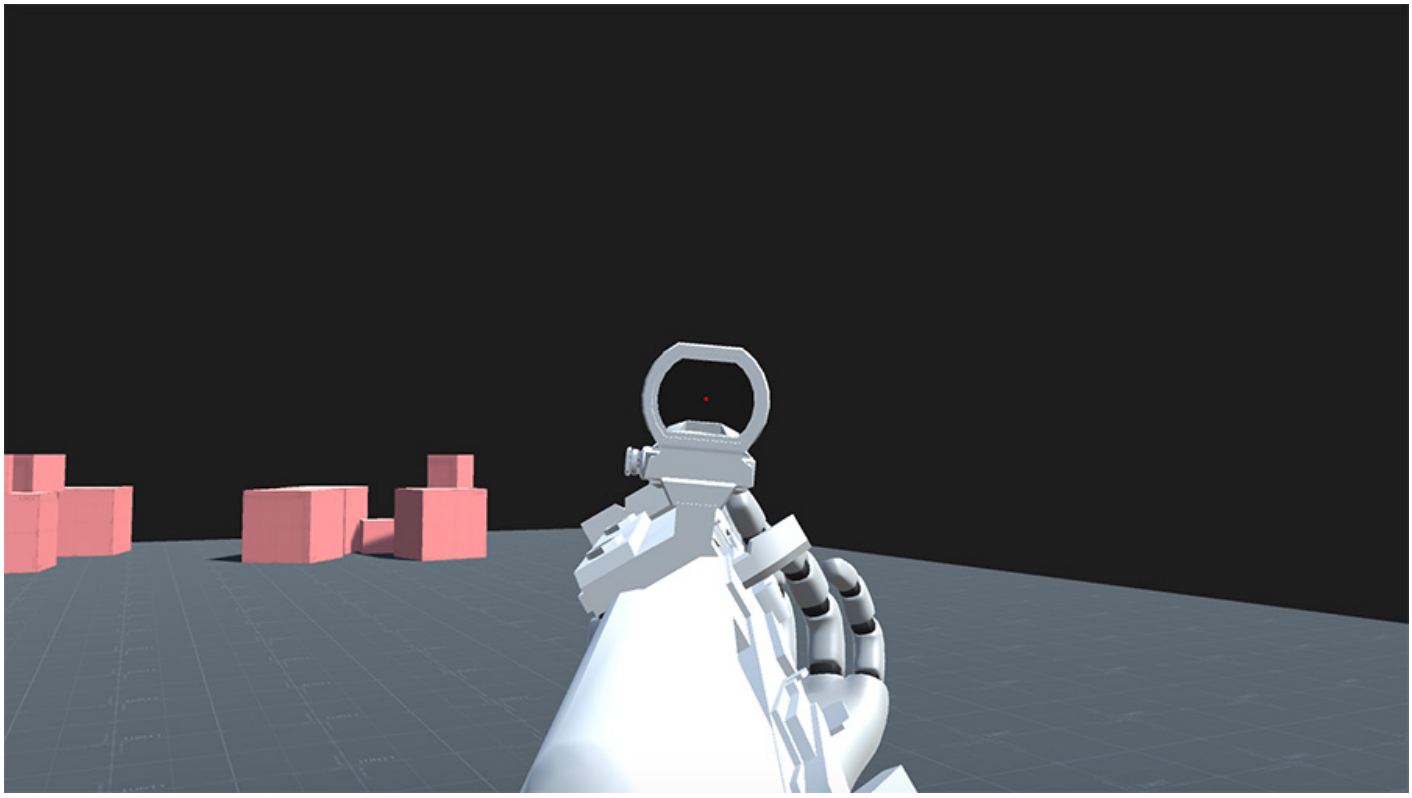
A **Weapon** can have 1 or more **Sight** entries, and each one allows the character to change its aiming mode (or pose).

For more information about what the **Sight** asset is and how to use them see the **Sights** section.

A list entry contains an **ID** field which uniquely identifies the **Sight** in the **Weapon**. This value is used to switch between **Sights** during gameplay.

The **Sight** field is mandatory and is where all the **Sight** information is located.

The **Scope Through** checkbox allows to define a position and a distance from which the character will look through the weapon when aiming. This can only be used if the **Sight** asset uses the **Human IK** bio-mechanic option.



When to use Scope Through

This option is mostly used in first-person perspective games where the weapon is aligned with the main camera.

We recommend not using it for other perspectives because the alignment feels too forced and procedural animations generally look better with forward kinematics from afar.

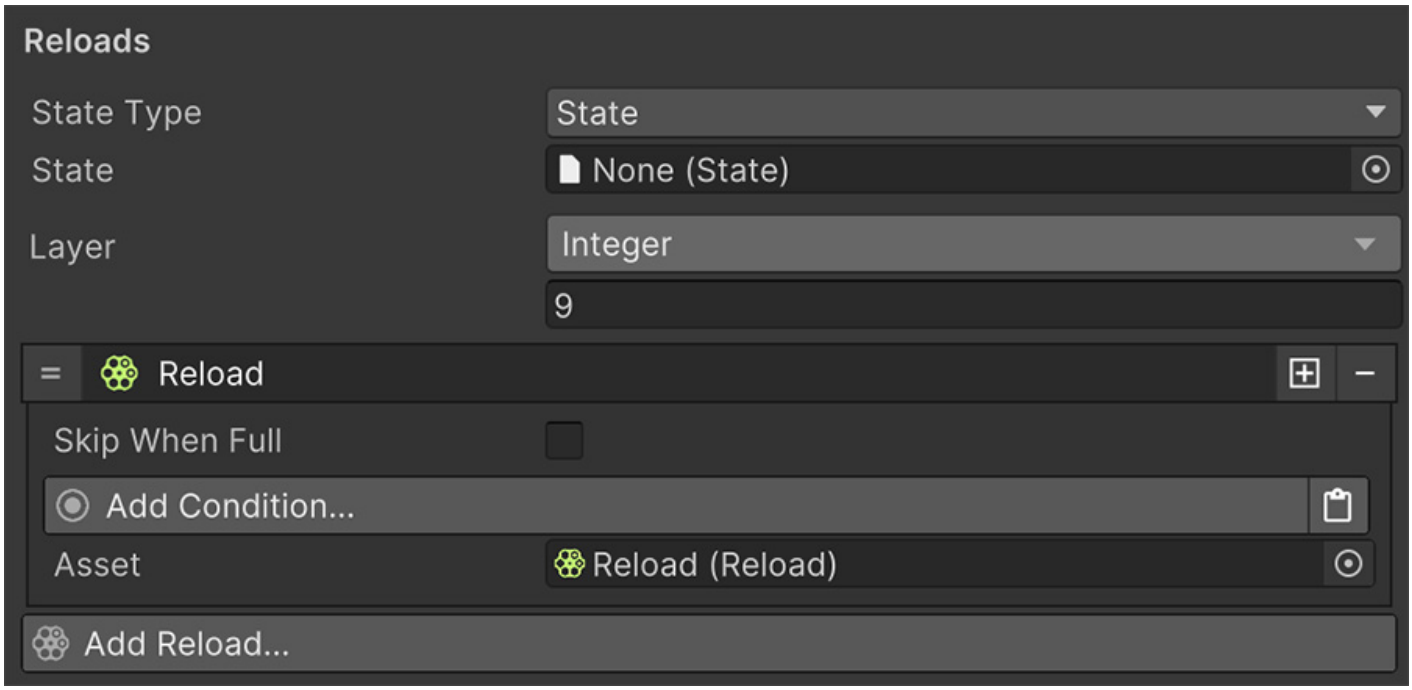
If the **Scope Through** option is checked it reveals a **Position**, **Rotation** and **Distance** fields. These fields define the position and direction of the scope in local space, as well as the distance from the eye of the character.

Set using Weapon Mode

These values can be set entering Weapon Mode, which is generally easier to do.

1015.1.12 Reloads

The **Reloads** section configures how a weapon can be reloaded and choose with **Reload** asset to use.



During a weapon's reload operation the character can optionally enter an animation **State**. The **State** field allows to pick one as well as which **Layer** to set it.

> **When to use an animation State**
>
> The animation **State** can be ignored in most cases, since each **Reload** asset will play its own animation clip and will override the *State*. However there are some cases where having an animation pose below might be useful.
>
> The examples included in this module contain a *Revolver* weapon that reloads its bullets one by one. Each time it picks a bullet from the pocket and puts it in the chamber is a single **Reload** asset being executed, while in the background, the *Revolver* model sits in front of the character with the chamber open.
>
> In these cases where cartridges are loaded one by one, an animation **State** allows to play an *enter* and *exit* animation while having a pose in the background makes all animations flow seamlessly.

The next field is a list of **Reload** entries.

> **How a Reload asset is picked**
>
> When attempting to reload a weapon, the weapon will start checking from the top-most **Reload** entry and will check its conditions.
>
> If there are none or the conditions are `true` then it will pick that **Reload** asset and run it.
>
> Otherwise it will jump to the next one and check whether it is a suitable candidate or not.

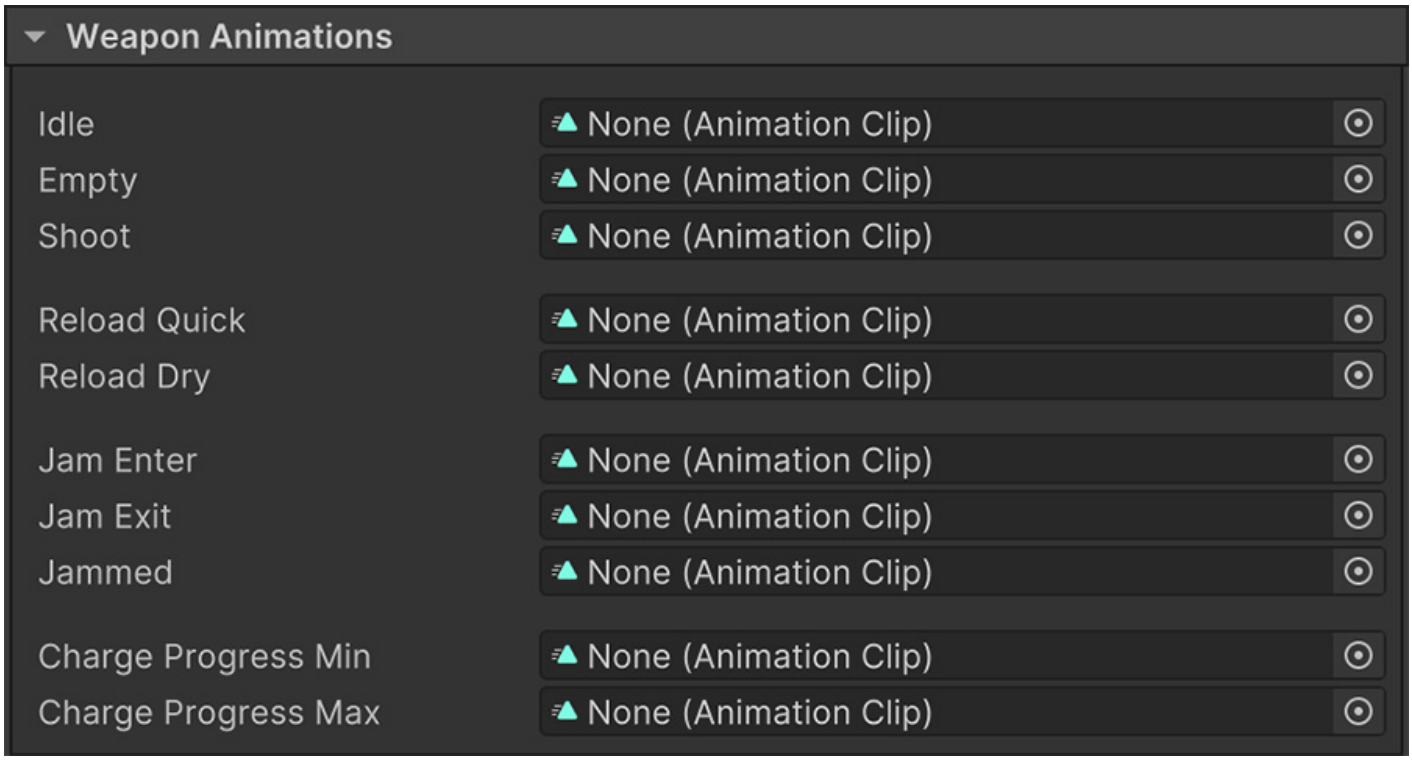
A **Reload** entry contains a **Skip when full** field, which allows to skip the entry if the weapon has its magazine full.

The **Conditions** below allow checking whether this entry is a suitable one or not. If no conditions are present, it automatically returns success.

The **Asset** field is a reference to the **Reload** asset, which is mandatory in order to play a reload animation, and contains all the necessary information to perform a reload action.

1015.1.13 Weapon Animations

The **Weapon Animations** section contains a list of *optional* animation clips that can play under different circumstances on the weapon's prop model.



When to use Weapon Animations

In most cases you won't even need to use weapon animations, and we recommend leaving them until all the other settings have been properly configured.

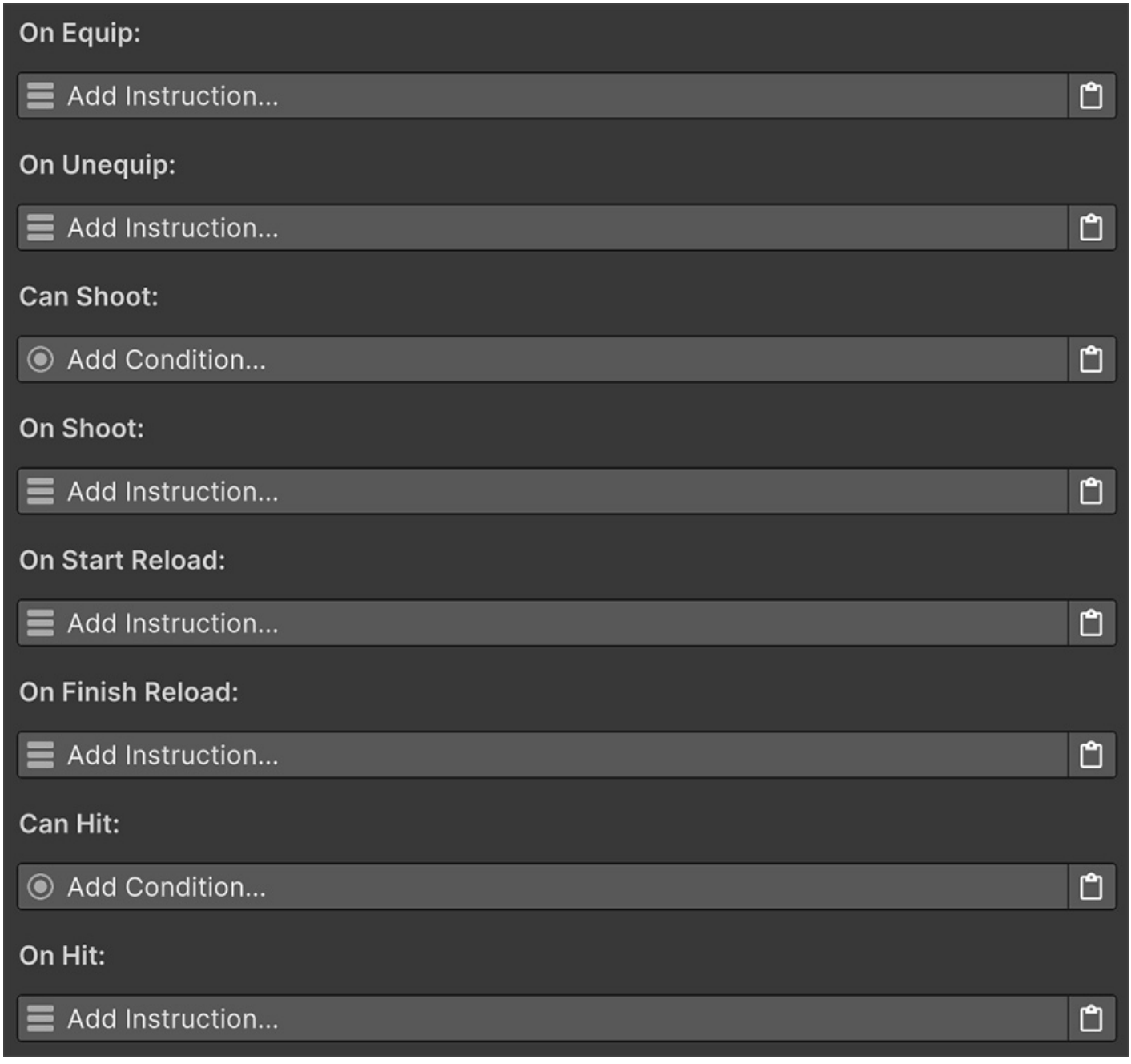
However in some cases, where the weapon changes its shape depending on its state (whether it has been jammed, it's there's no bullet in the chamber, etc...) you might want need to provide an animation to the weapon.

Animator Required

In order for the weapon to use these animations, the weapon model's root object must have an Animator component.

1015.1.14 Instructions

The bottom section of the **Weapon** asset is dedicated to adding your own custom logic via **Instructions** and **Conditions**.



1015.1.14.1 On Equip

The **On Equip** instructions are executed every time the weapon is equipped using the *Equip Weapon* instruction. *Self* refers to the character wielding the weapon while *Target* points at the weapon model.

> **Useful for...**
>
> This is a good place to initialize stored information and instantiate its attachments.

1015.1.14.2 On Unequip

The **On Unequip** instructions are executed when the weapon is unequipped using the *Unequip Weapon* instruction. *Self* refers to the character wielding the weapon while *Target* points at the weapon model unequipped.

> **Useful for...**
>
> Just like its counterpart, this is the perfect place to destroy or undo those actions done in the **On Equip** instructions.

1015.1.14.3 Can Shoot

The **Can Shoot** conditions are checked every time the character attempts to shoot with the weapon. Returning a false value will prevent the weapon from shooting.

Self refers to the character wielding the weapon while *Target* points at the weapon model unequipped.

> **Useful for...**
>
> Situations where the character shouldn't be able to jump, like a cinematic sequence or being inside a non-combat zone.

1015.1.14.4 On Shoot

The **On Shoot** instructions are executed every time the character successfully shoots with the weapon. *Self* refers to the character wielding the weapon while *Target* points at the weapon model unequipped.

> **Useful for...**
>
> Ejecting shells and making noises (if paired with the *Perception* module).

1015.1.14.5 On Start Reload

The **On Start Reload** instructions are executed every time the character starts reloading the weapon. If multiple reloads are chained together, these instructions will only run the first time, until the weapon is fully reloaded or the reloading operation is canceled. *Self* refers to the character wielding the weapon while *Target* points at the weapon model unequipped.

1015.1.14.6 On Finish Reload

The **On Finish Reload** instructions are executed every time the character finishes reloading the weapon. Whether that is because the weapon has been fully reloaded or the user has canceled the reload. *Self* refers to the character wielding the weapon while *Target* points at the weapon model unequipped.

1015.1.14.7 Can Hit

The **Can Hit** conditions are executed for every object that the projectile (in any mode) reported as a hit. If these conditions are empty or the conditions return true the object is considered as hit and will run the **On Hit** instructions from below.

Self refers to the character wielding the weapon while *Target* points at the object reported as a hit.

> **Useful for...**
>
> Filtering objects and characters that shouldn't receive a hit. For example, if you disable friendly-fire, allies of the character shooting should return false.

1015.1.14.8 On Hit

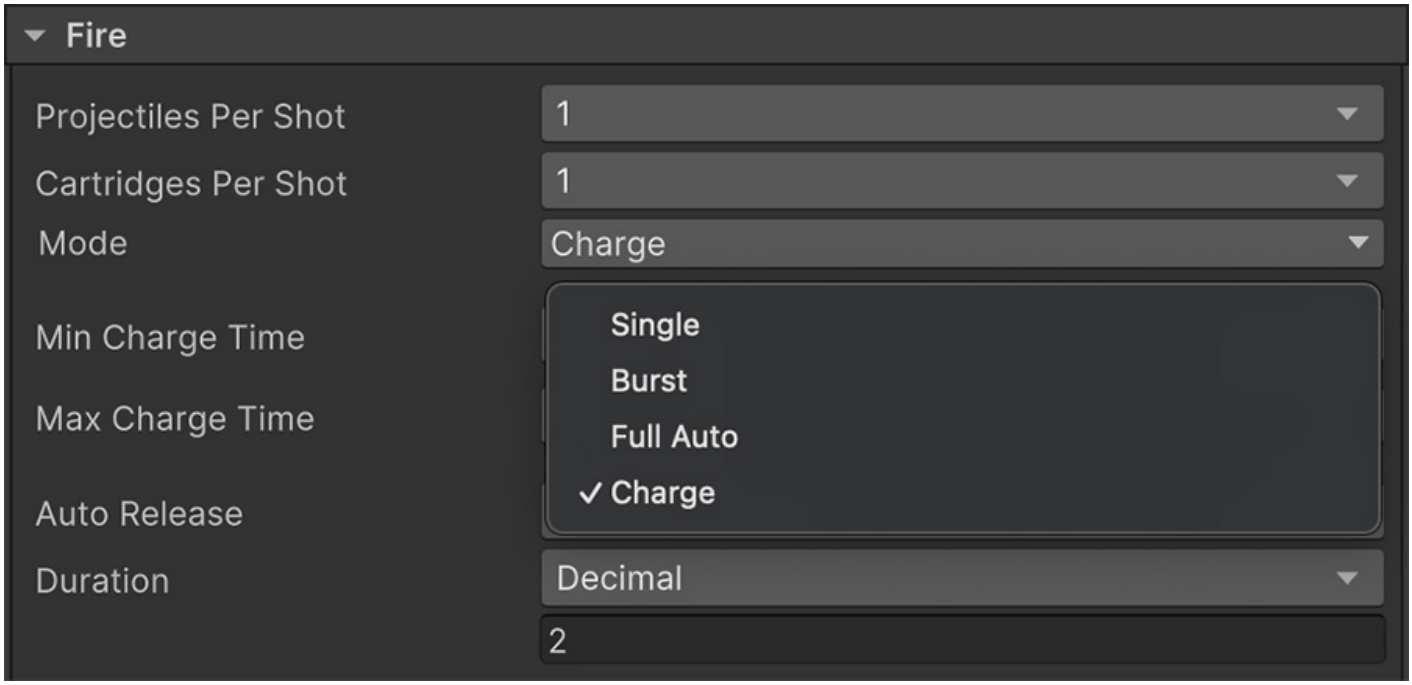
The **On Hit** instructions are executed for every object that the projectile (in any mode) reported as a hit and the **Can Hit** conditions did not filter.

Self refers to the character wielding the weapon while *Target* points at the object reported as a hit.

> **Useful for...**
>
> Applying damage and effects onto each object hit by the projectile.

1016 Fire Modes

Each **Weapon** has a fire-mode that changes its behavior when attempting to pull and/or release the trigger.



1016.1 Single

The **Single** fire mode shoots a projectile once per trigger pull. Holding down the trigger won't make it shoot any more than 1 single time.

This option also displays a **Fire Rate** field that determines the maximum amount of shots the weapon can shoot in a second.

1016.2 Burst

The **Burst** fire mode is similar to the *single* mode except that it shoots a burst of up to *N* projectiles while holding down the trigger.

The **Fire Rate** field sets the spacing and maximum amount of projectiles shot in a second, while the **Burst** field indicates the maximum number of shots while holding down the weapon's trigger.

1016.3 Full Auto

The **Full Auto** fire mode continuously shoots projectiles while the weapon's trigger is being held down, and the magazine has enough ammo.

Choosing this option will reveal the **Fire Rate** field that indicates the rate at which this weapon shoots projectiles as well as the **Auto Loading** field. This field has three options:

- **Instant**: The weapon shoots at its maximum fire rate as soon as the trigger is pressed.
- **Progressive**: The weapon starts with a fire rate of 0 and progressively increases over time defined by the field **Auto Load Duration**.
- **Wait to Load**: The weapon starts with a fire rate of 0 and will change to its maximum fire-rate after holding down the weapon's trigger the duration defined by the field **Auto Load Duration**.

Use cases in Examples

The **Shooter 2** module comes with a wide variety of examples where each weapon has a particular and distinctive feature that differentiates it from the rest.

The **Flamethrower** for example, is a weapon that has an **Full Auto** firing mode with a *Wait to Load* value. When the player attempts to shoot with it, it first needs to release some gas and after a few seconds, it starts spitting fire.

The **Minigun** on the other hand, also has a **Full Auto** firing mode but with the *Progressive* auto-loading mode. This allows the weapon to incrementally shoot more bullets as the barrel starts gaining momentum and spins faster.

Notice how you can create vastly different weapon types changing a few parameters, and it's up to the game designer finding out the best combination.

1016.4 Charge

The **Charge** fire mode shoots a single projectile after the weapon has charged for a certain amount of time, and this mode reveals a few new fields.

THe **Min Charge Time** and **Max Charge Time** determine the minimum and maximum amount of time to consider the weapon is charged and fully-charged respectively.

The **Auto Release** field indicates whether the projectile should be automatically shot when fully-charged or wait until the player manually releases the trigger.

The **Duration** field only works if the *Auto Release* is set to true, and indicates the extra time after it has been fully-charged it gives the weapon until it is forced to shoot the projectile.

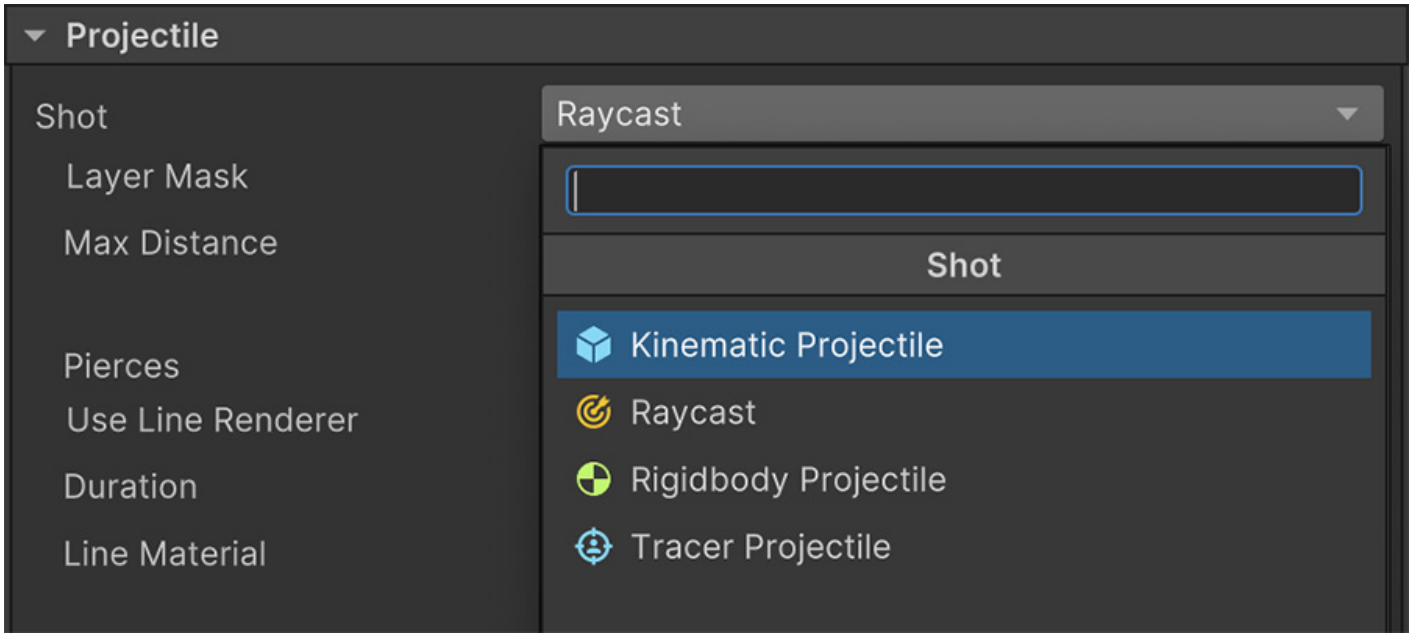
Bow and Arrow

A bow and arrow is the most common example of charged weapon. The **Min Charge Time** would represent the minimum amount of tension the arrow requires to be pulled back in order to be shot. The **Max Charge Time** would be how fast the character can pull the arrow back into tension with the sling.

Some games also make it so the character can't hold the tension of the bow forever. In which case the **Auto Release** would be set to true and the **Duration** would be how many seconds the character can withstand the force before getting the arm tired and releasing the arrow.

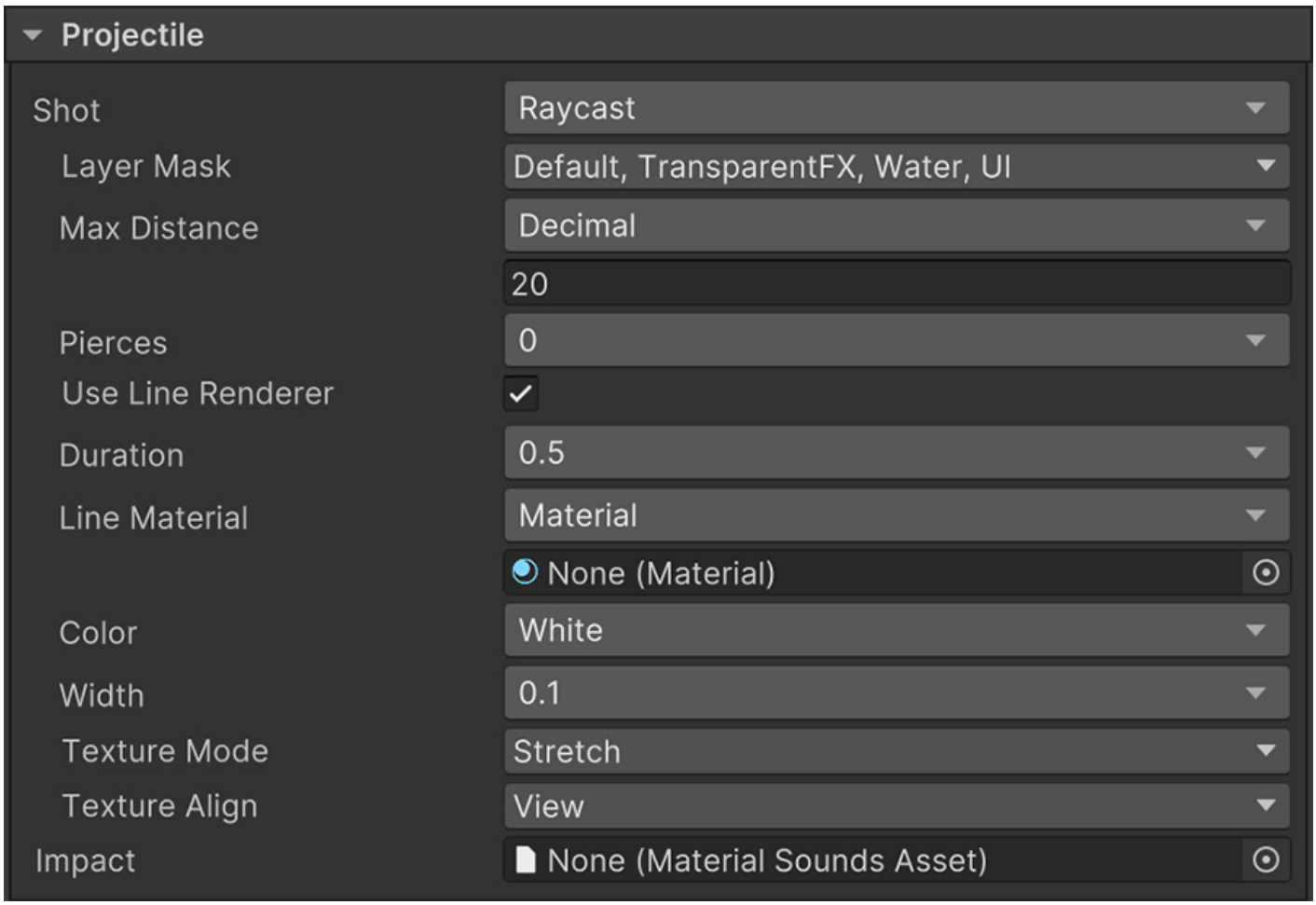
1017 Projectiles

Each **Weapon** can choose its projectile type by selecting it from the dropdown under the *Projectiles* section.



1017.1 Raycast

The **Raycast** projectile option draws a line from the muzzle forward and hits the first collider object that intersects its path.



The **Layer Mask** allows to ignore certain colliders under the unselected mask(s).

The **Max Distance** determines the maximum distance at which the raycast line can reach.

The **Pierces** value is the number of extra objects it can pierce without stopping. By default it is zero, but you can make a weapon pierce through colliders by increasing the value.

If the **Use Line Renderer** field is set, a list of options will appear below, which allow to configure the material, color, width and texture mode of the trail left by the projectile.

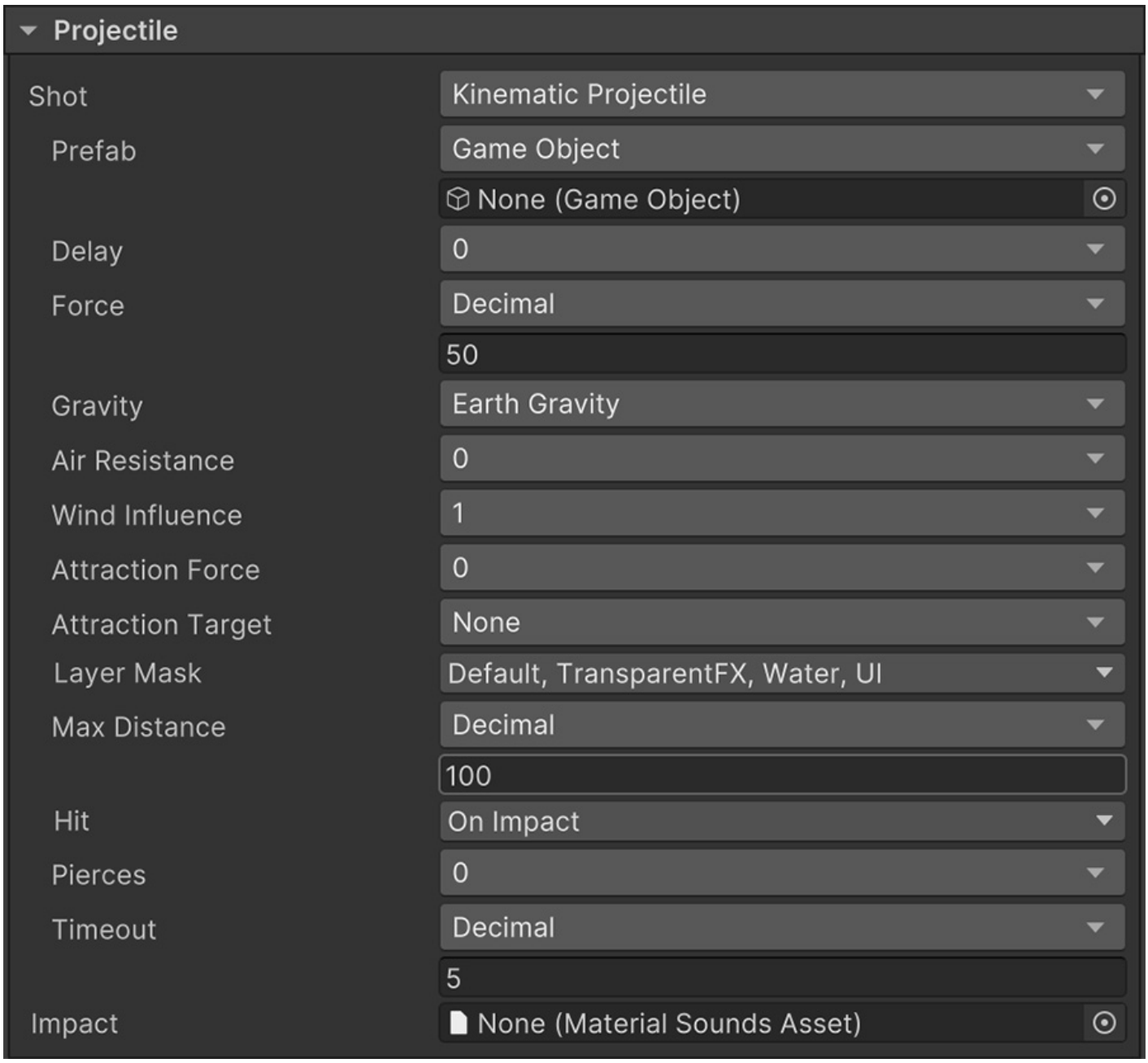
Simulate bullet speed using Line Renderers

Although using the **Raycast** mode makes the projectile have an infinite amount of speed you can simulate the projectile's travel time by making adding a Line Renderer who's trail quickly decreases towards the point of impact.

This will give the player the illusion that the projectile travels very fast, but it's not instantaneous.

1017.2 Kinematic Projectile

The **Kinematic Projectile** option instantiates a game object at the muzzle and shoots it forward using its settings.



Collision with Kinematic

Do not add a **Collider** or **Rigidbody** to the kinematic projectile. Collisions are handled internally using raycasts between frames to avoid very fast projectiles from ghosting through thin geometry.

This means that Kinematic projectiles do not have a volume and are infinitely small. If you want to make projectiles use their shape to collide with other objects use the Rigidbody Projectile.

The **Prefab** field is mandatory and is used to instantiate the projectile at the tip of the muzzle.

The **Delay** field will defer the movement of the projectile the specified amount of seconds. If the value is greater than zero, the projectile will follow the muzzle tip until the timeout has finished and it's ready to be sent forward.

The **Force** value indicates the simulated force the bullet will be shot with. The higher the value, the faster it will travel.

The **Gravity** field allows the projectile to be affected by a downward force.

The **Air Resistance** field allows bullets to lose speed over time. This field can be a combination of both bullet drag, temperature, air pressure and resistance.

The **Wind Influence** field is a coefficient that indicates how much does wind affect the bullet's trajectory. A value of 1 means the wind will completely affect the bullet while a value of zero will skip the wind calculations.

> **Sniper Simulator**
>
> Some types of ammunition are affected more or less by wind, depending on its material, shape and spinning factor. You can model this behavior by letting the **Wind** coefficient be tied together to the ammunition used.

The **Attraction Force** can be used to nudge the projectile towards a specific target. This target must be set in the **Attraction Target** value.

The **Layer Mask** field allows the projectile to ignore certain colliders defined in the mask and the **Max Distance** determines how far the projectile can travel.

The **Hit** field is a dropdown which can be:

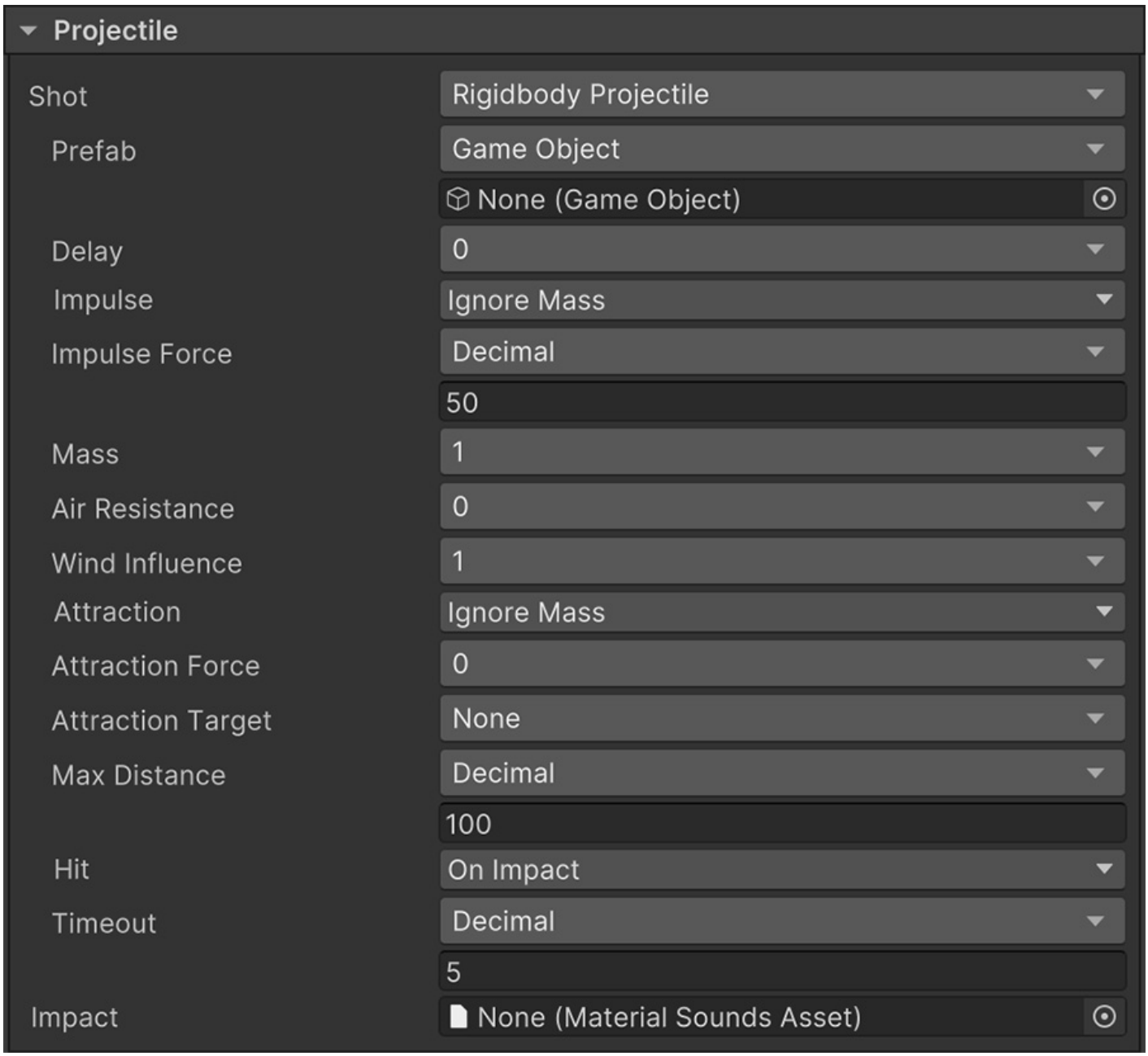
- **On Impact**: The projectile reports a hit as soon as it collides with an object.
- **On Timeout**: The projectile reports a hit after a certain time has passed.

The **Pierces** field allows the projectile to pierce through a number of colliders before being destroyed.

The **Timeout** field allows the projectile to be automatically destroyed, even if it hasn't collided with any object and still has travel distance available.

1017.3 Rigidbody Projectile

The **Rigidbody Projectile** option allows to instantiate an object that uses Unity's physics engine to drive its translation and rotation.



Rigidbody vs Kinematic

The Rigidbody is similar to the Kinematic system, but it uses Unity's physics engine which is multi-threaded, improving performance, but also has fewer options.

The **Prefab** field is mandatory and is used to instantiate the projectile at the tip of the muzzle.

The **Delay** field will defer the movement of the projectile the specified amount of seconds. If the value is greater than zero, the projectile will follow the muzzle tip until the timeout has finished and it's ready to be sent forward.

The **Impulse** and **Impulse Force** determines the force applied to the rigidbody and whether the force takes into account the projectile's mass or not.

The **Mass** field, as its name implies, defines the mass of the projectile.

The **Air Resistance** field allows bullets to lose speed over time. This field can be a combination of both bullet drag, temperature, air pressure and resistance.

The **Wind Influence** field is a coefficient that indicates how much does wind affect the bullet's trajectory. A value of 1 means the wind will completely affect the bullet while a value of zero will skip the wind calculations.

The **Attraction Force** can be used to nudge the projectile towards a specific target. This target must be set in the **Attraction Target** value, and the force applied towards its position may or may not take into account the *mass* of the projectile.

The **Max Distance** determines how far the projectile can travel before being automatically disposed.

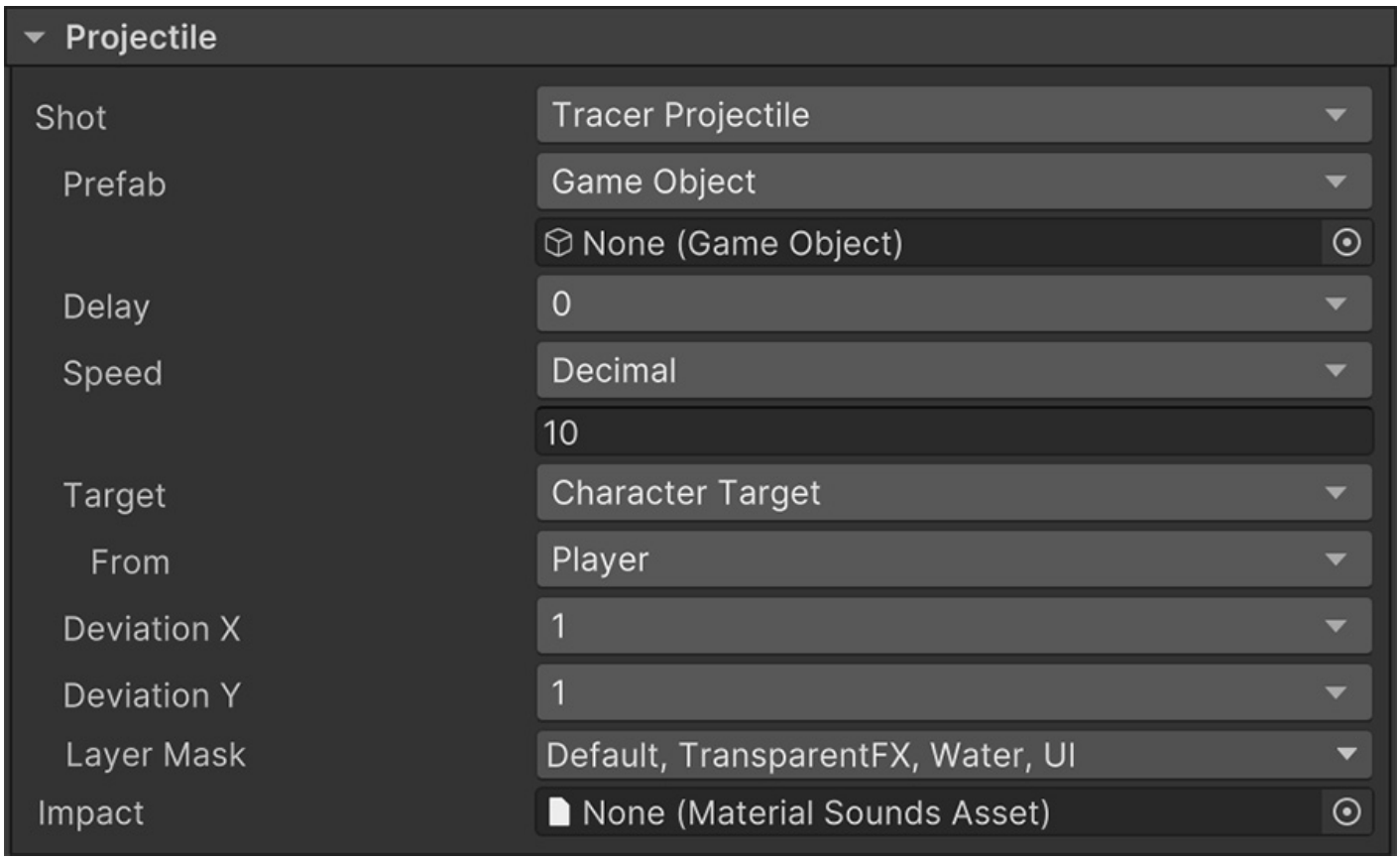
The **Hit** field is a dropdown which can be:

- **On Impact**: The projectile reports a hit as soon as it collides with an object.
- **On Timeout**: The projectile reports a hit after a certain time has passed.

The **Timeout** field allows the projectile to be automatically destroyed, even if it hasn't collided with any object and still has travel distance available.

1017.4 Tracer Target

The **Tracer Projectile** option allows to define a target to shoot at, and the projectile will always move towards it, regardless of its shooting direction.



When to use Tracer

The **Tracer Target** is usually used when you have a lock-on on a target and you want shots to (almost) always impact the target. For example, a barrage of missiles or a weapon that automatically shoots at the nearest enemy.

The **Prefab** field is mandatory and instantiates the projectile at the tip of the muzzle.

The **Delay** field will defer the movement of the projectile the specified amount of seconds. If the value is greater than zero, the projectile will follow the muzzle tip until the timeout has finished and it's ready to be sent forward.

The **Speed** field determines how fast the projectile moves.

The **Target** value is mandatory and is required in order to translate the projectile from the muzzle to the targeted game object's position.

The **Deviation X** and **Deviation Y** fields allow to artistically deviate the path of the projectile while making sure it always lands on the target.

Using Bézier curves

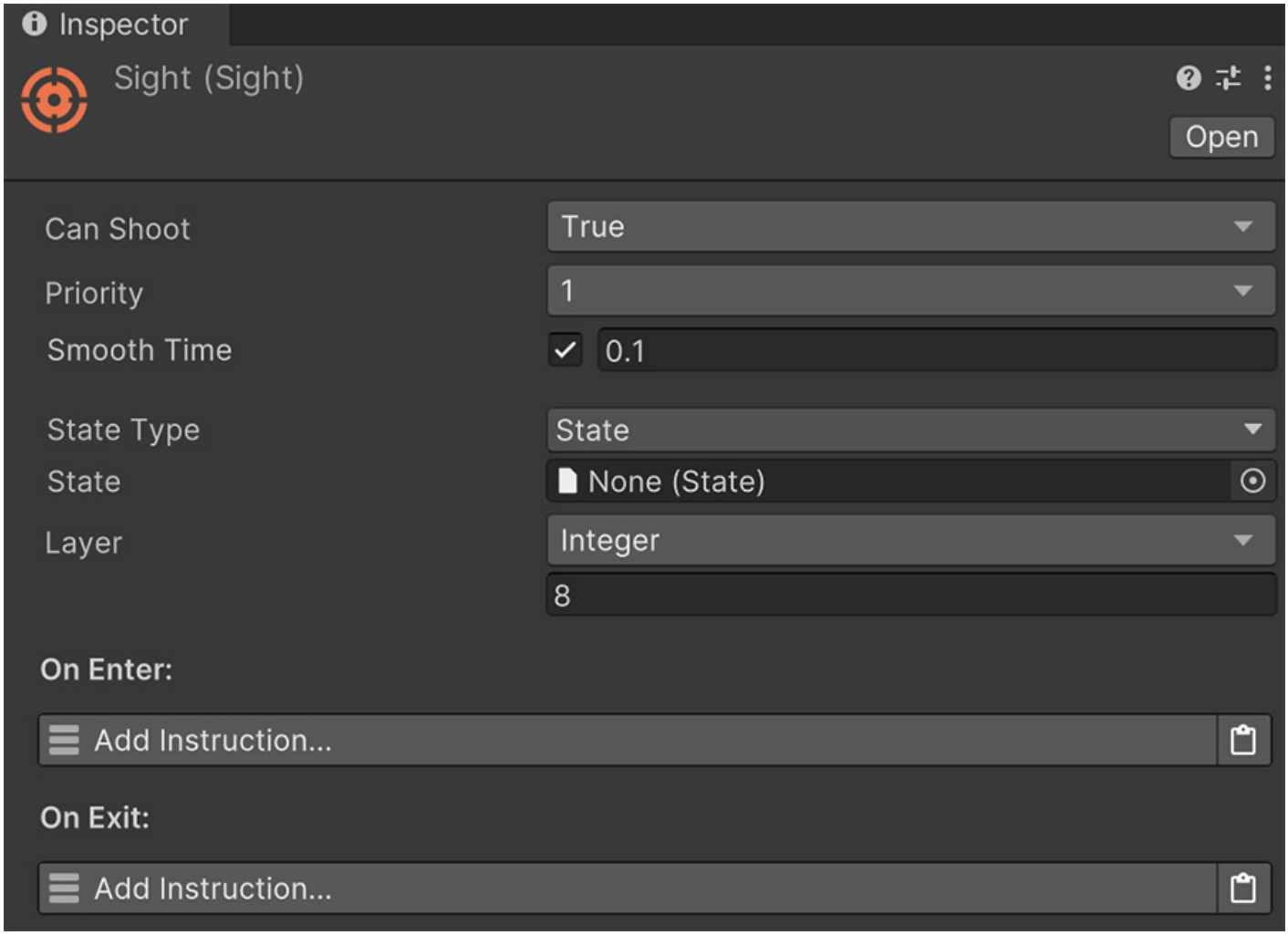
The **Tracer Target** uses a Bézier curve in order to draw the projectile's path. The **Deviation** fields act as control points on the start of the curve, in local space from the muzzle's direction.

The **Layer Mask** field allows the projectile to ignore certain colliders defined in the mask.

VIII.II Sights

1018 Sights

The **Sight** assets determine an aiming mode for a weapon, such as whether it uses forward-kinematics, inverse kinematics, the animations it plays, crosshairs, laser points and so on.



To create a **Sight** asset, right click on the *Project Panel* and navigate to *Create* → *Game Creator* → *Shooter* → *Sight*. This will create a new **Sight** asset that you can move anywhere you want.

The **Can Shoot** field determines whether the weapon using this sight can shoot or not.

Using non-shooting Sights

Sight assets offer the flexibility to create different poses and mechanics depending on the situation. For example, if a character draws the weapon but keeps it on its side, this is a non-shooting sight and the previous value should be set to `false`.

One can even make a cover shooter mechanic using **Sight** assets where being in cover makes it impossible to shoot, but peeking around corners, which could be other **Sight** assets switched to, allows the character to aim and shoot.

When aiming with multiple weapons, the *Inverse Kinematics* system will only use one **Sight** information to translate and rotate limbs. The **Priority** field determines which weapon should be picked up by the system to aim.

> ✓ **Example of Priority**
>
> For example, let's say we're making a game where the player can equip a *pistol* on its right hand and optionally, a *flashlight* on the left side.
>
> The **Sight** of the *pistol* weapon should have a higher priority because aiming with the pistol with precision is more important than with the *flashlight*. In this case, the *pistol* should have a higher priority value.
>
> In case of equipping multiple weapons with equally importance, the priority doesn't matter because each **Sight** should take over both the left and right hands and aim with them.

The **Smooth Time** determines how much the weapon lags behind when aiming. If disabled, there won't be any lag but the character will instantly aim towards the targeted point. Adding some lag helps making the aiming feel more organic and natural.

The **State** field allows to enter an animation **State** when switching to the **Sight**.

> ✓ **Using Avatar Masks in States**
>
> It is specially useful to mix **Weapon** states and **Sight** states. While the animation state in the **Weapon** asset can provide a common locomotion animation on the lower body, the **Sight** state can mask the lower-body so it only changes the upper-body.
>
> This is how the demos in this module are built and helps reduce the number of animations needed.

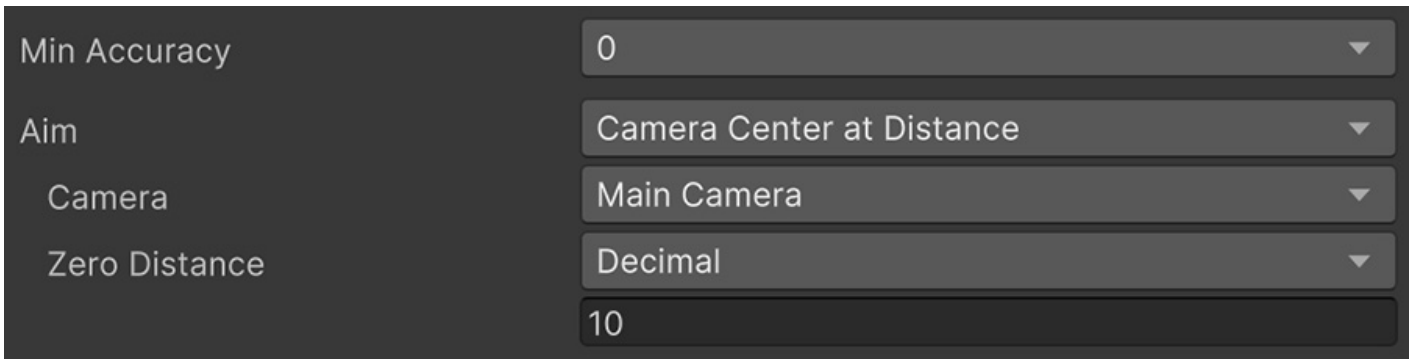
1018.1 Instructions

The **On Enter** and **On Exit** instructions are executed every time a **Sight** is switched to and switched from.

> 🔥 **Changing modes**
>
> A common mechanic in third-person shooters is reducing the field of view when aiming with an over-the-shoulder camera.
>
> This can be very easily done adding a *Change Field of View* instruction on both callbacks: **On Enter** should reduce the field of view and **On Exit** restoring the default value.

1018.2 Aiming

The next section configures where the character aims when using this **Sight**.



The **Accuracy** field allows to define a minimum accuracy value. A value of 0 (default) means the accuracy can be at its highest. However some games make some poses like hip-fire or blind-shooting from cover have less accuracy than aiming down-sides.

The **Aim** field is a dropdown that changes where the character should aim and how this point in space is calculated.

1018.2.1 Camera Center at Distance

The character aims at a point that is aligned with the camera's forward vector and at the specified distance.

> **When to use**
>
> This aiming mode should be the default for the player in first-person and third-person shooters. It sacrifices precision but in return it is more performant.

1018.2.2 Camera Center with Raycast

The character aims at the intersection (if any) between the forward vector from the camera's perspective and the weapon's muzzle vector.

> **When to use**
>
> This aiming mode should be used by first-person and third-person shooters where precision is paramount. It casts a ray from the camera's center forward and aims at the point collided.
>
> This aiming mode avoids the character shooting at obstacles that get in the way between the muzzle and the targeted point by slightly rotating the weapon towards the estimated point of impact, instead of a point at a certain distance.

1018.2.3 Character Target

The character aims at a specific game object's position.

When to use

This aiming mode should be used when the weapon has a lock-on mechanic, and the target does not depend on where the camera or cursor is.

1018.2.4 Pointer on Plane

It creates an abstract plane on the character's position defined by two axis and projects the point onto it from the camera perspective.

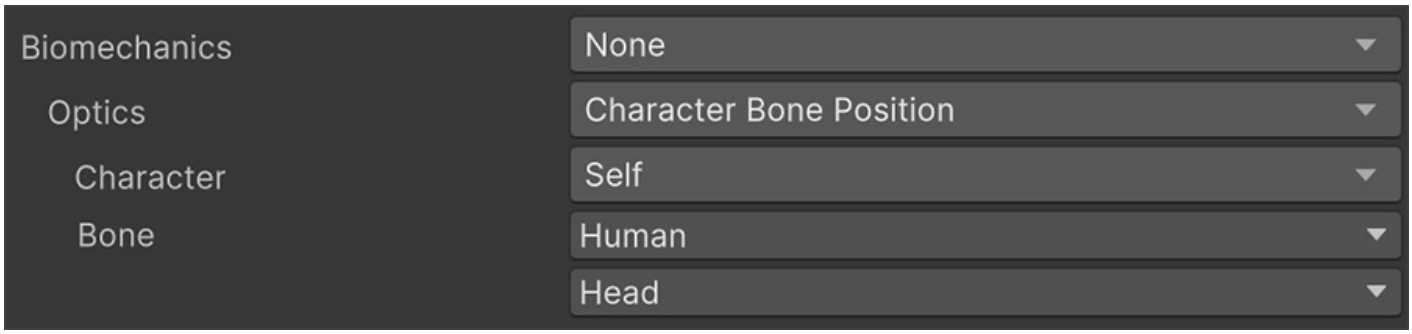
When to use

This aiming mode is perfect for top-down shooters or side-scroll games.

For top-down shooters, the projection plane should be a horizontal one (XZ) and for side-scroll perspectives either XY or ZY, depending on the vertical plane where the characters can move.

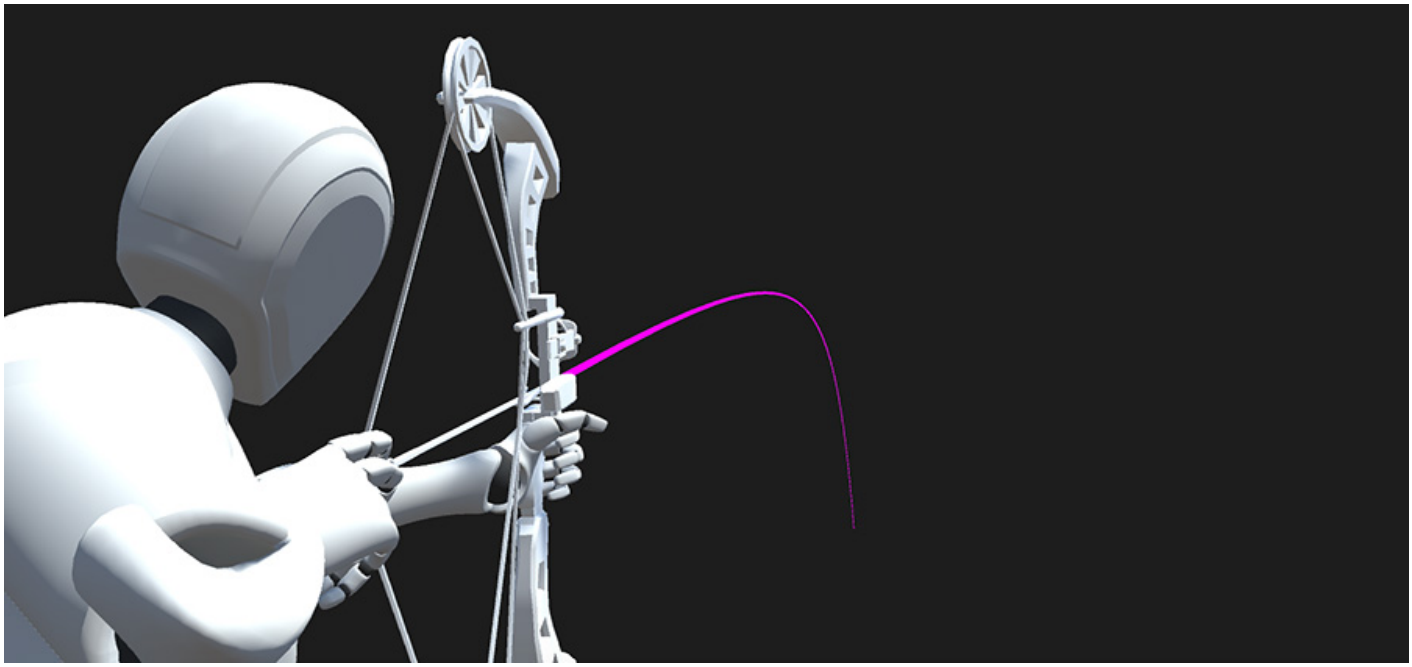
1018.3 Biomechanics

The **Biomechanics** dropdown configures how the character translates and/or rotates its bones in order to attempt to aim at the desired point defined by the **Aim** field from above.



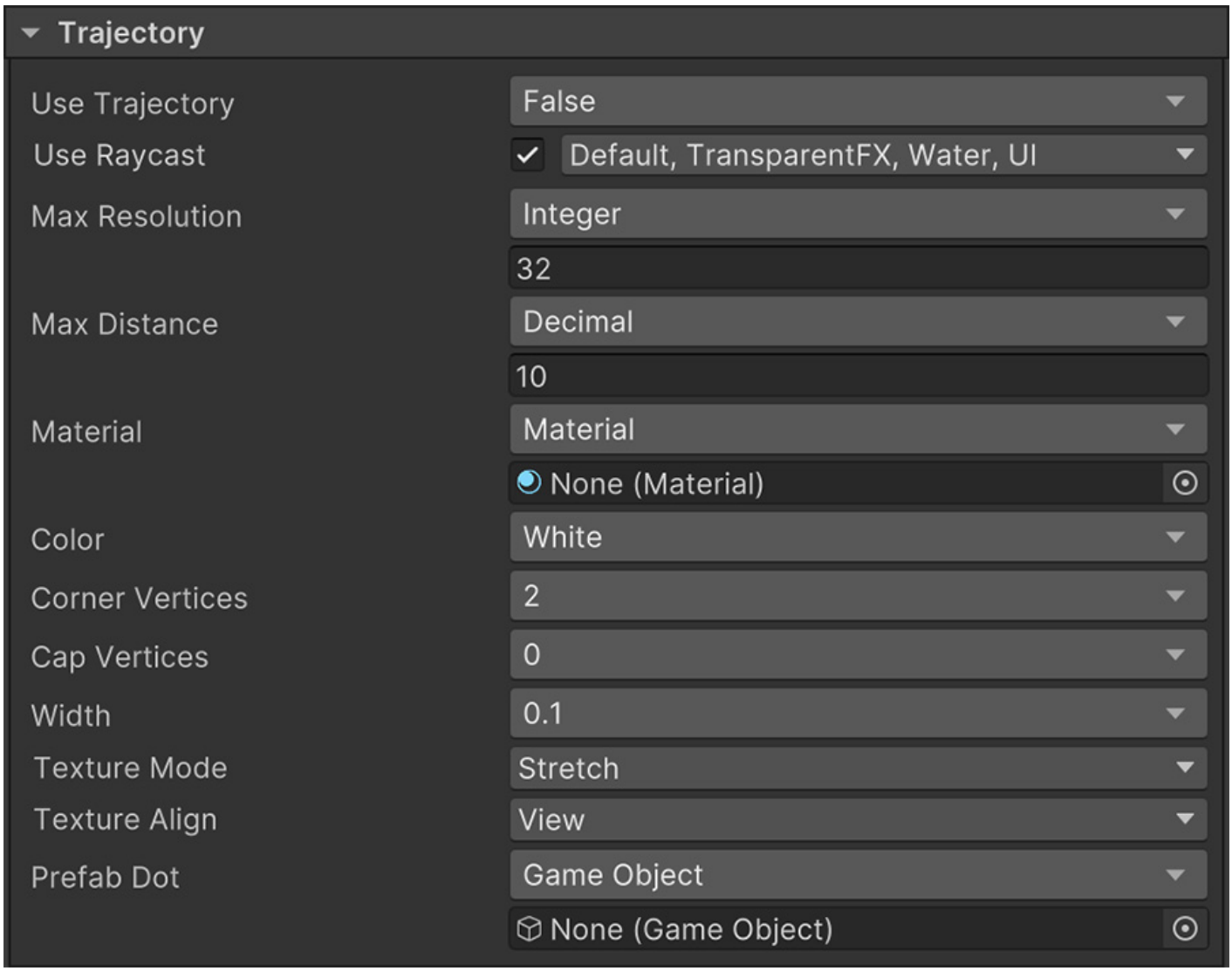
To know more about the **Biomechanics** options see the **Biomechanics** section

1018.4 Trajectory



The **Trajectory** section allows to draw the trajectory of the projectile when using this **Sight**.

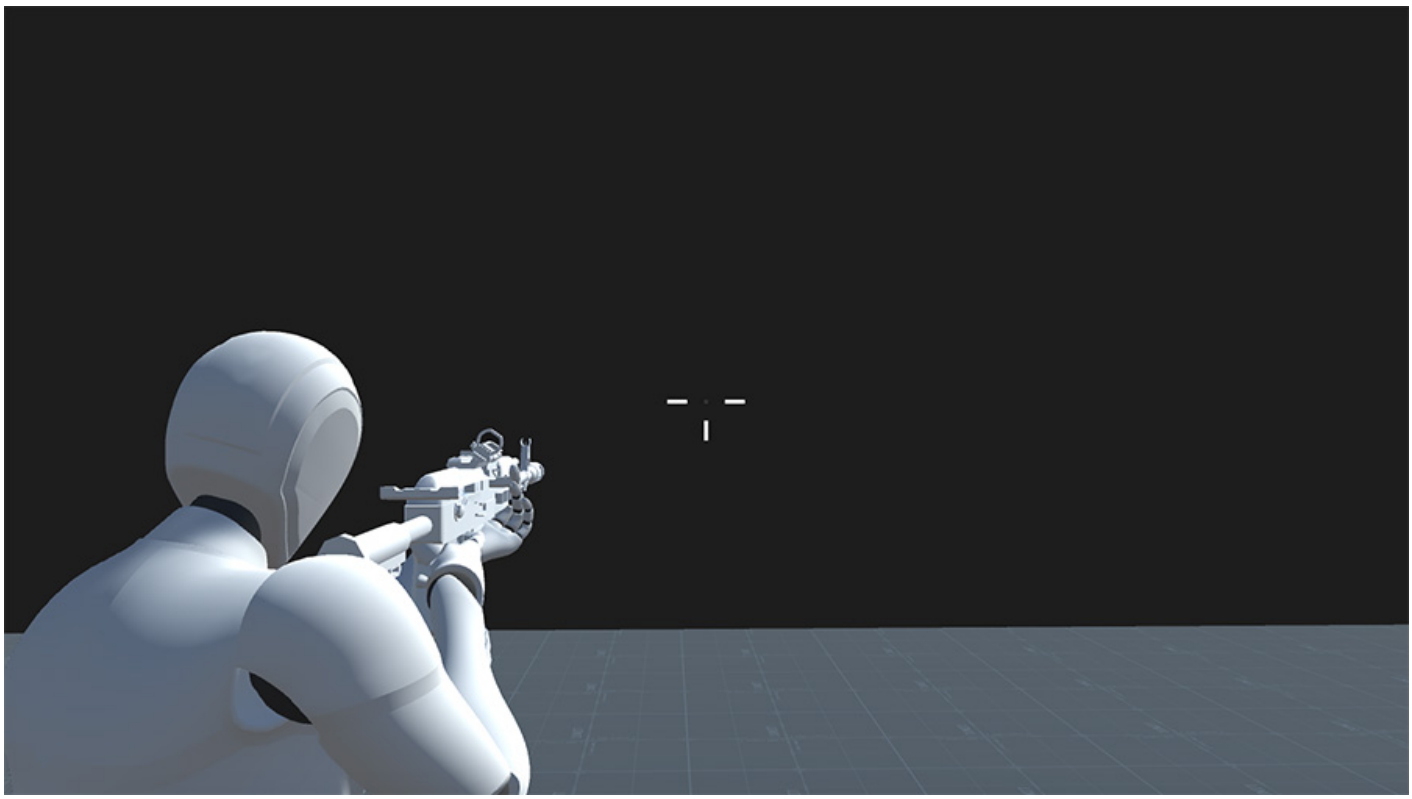
Note that in order to calculate the projectile's trajectory, the system has to trace multiple raycasts every frame and enabling this option could have an impact on performance.



When to use

Trajectories are specially useful for weapons that do not have enough with just a crosshair because the projectile is influenced by physics or other conditions. For example, an arrow, a crossbow or a sniper-rifle.

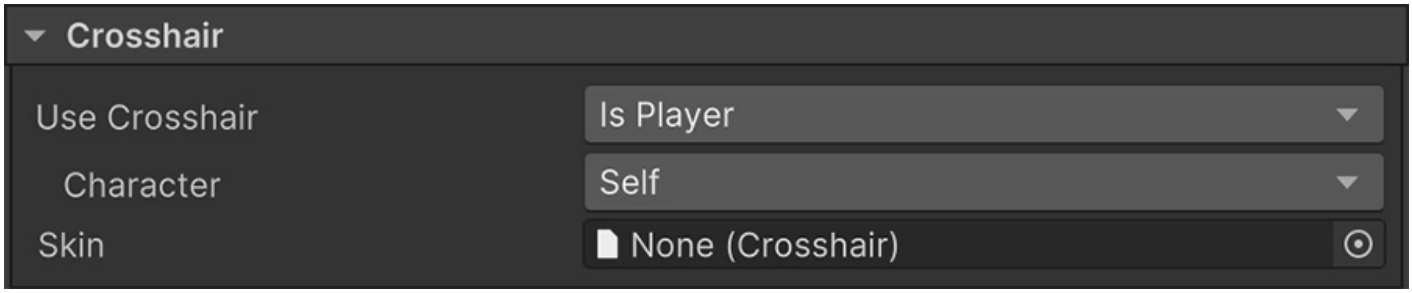
1018.5 Crosshair



The **Crosshair** section allows to display a crosshair UI element on top of the camera which changes its shape to indicate the current character's accuracy.

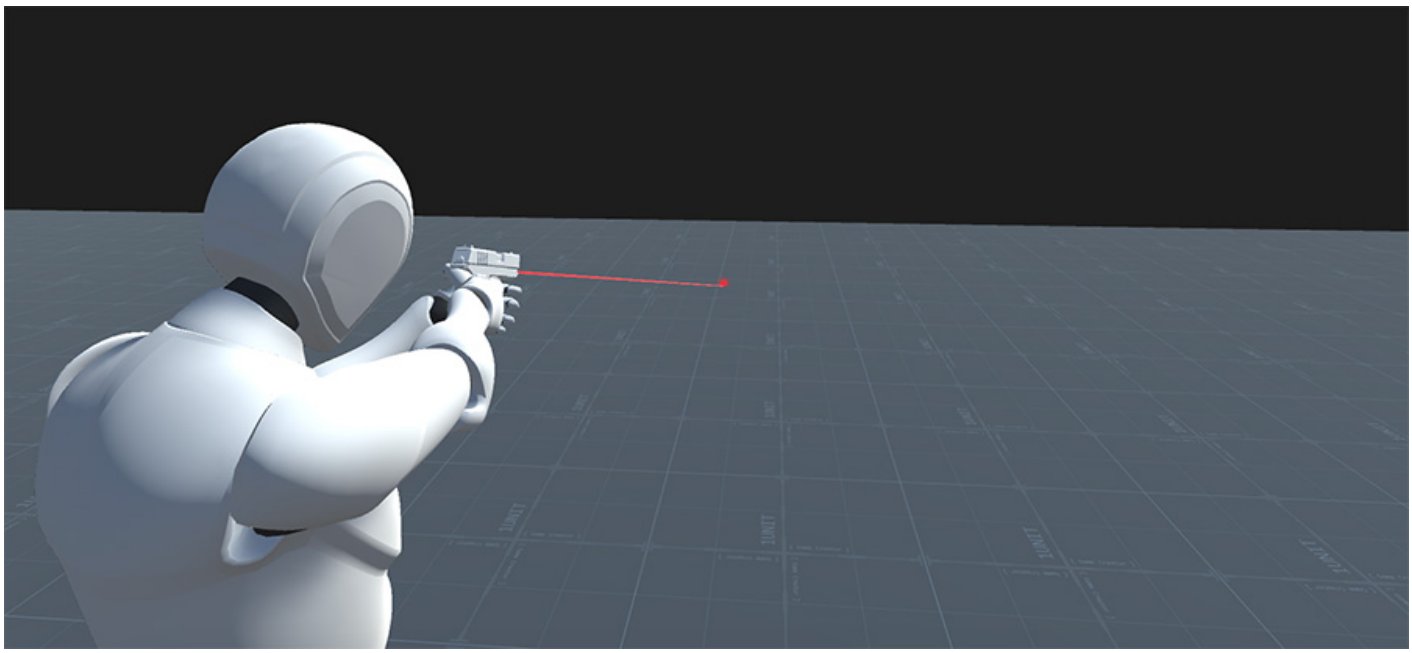
This section accepts a **Crosshair** asset which is an optional reference to the skin of the crosshair, which can be reused for other weapons.

> For more information about creating and using **Crosshair** assets visit the Crosshair section.



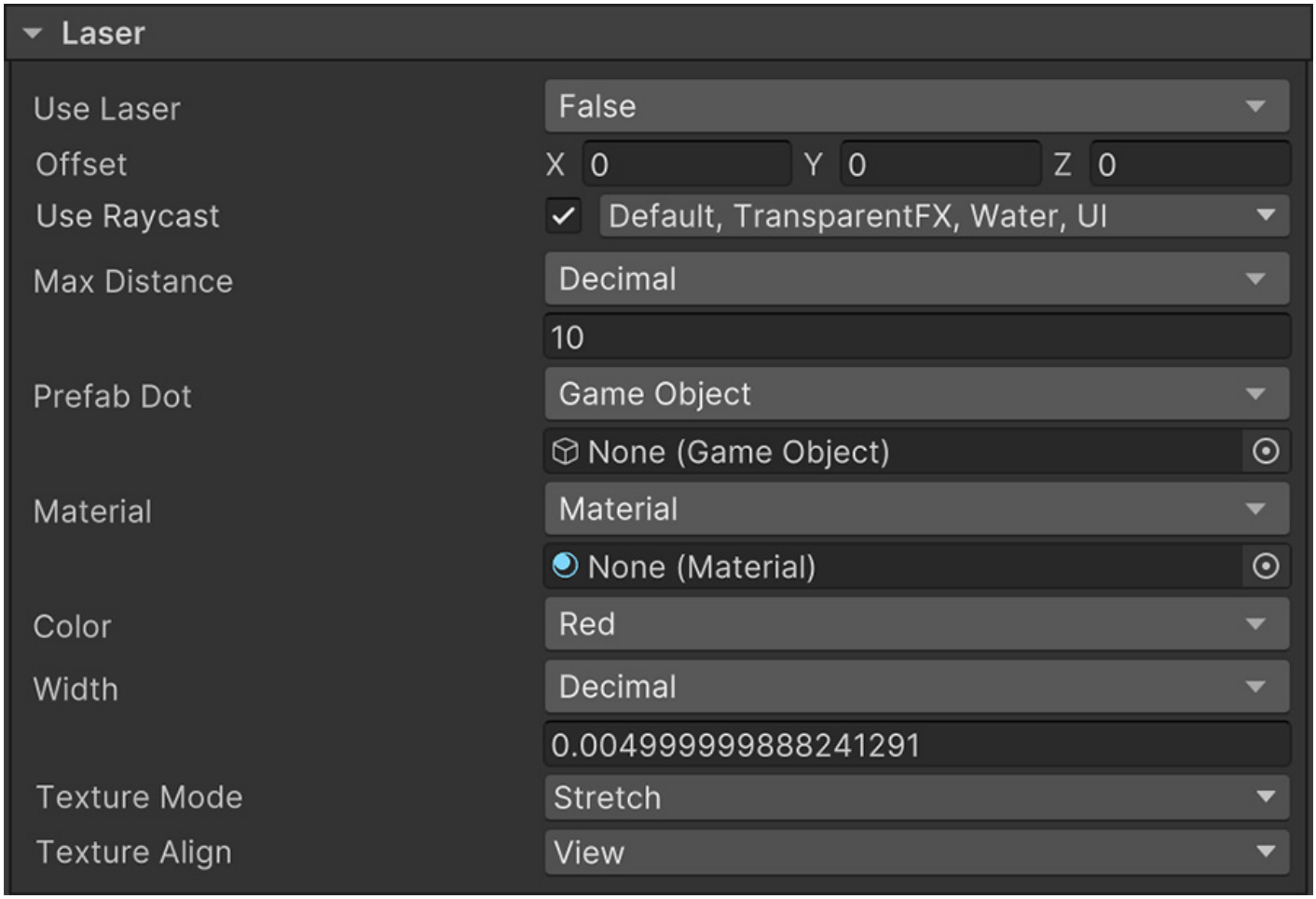
> **When to use**
>
> Crosshairs are meant to be used for weapons that are equipped by the Player and shoot straight projectiles without suffering the effects of external factors.

1018.6 Laser



The **Laser** section allows to display a line renderer that moves in a straight line from the muzzle tip (plus an optional offset) forward.

If an object collides with the laser, an optional **Dot** prefab instance is instantiated at the collision point.

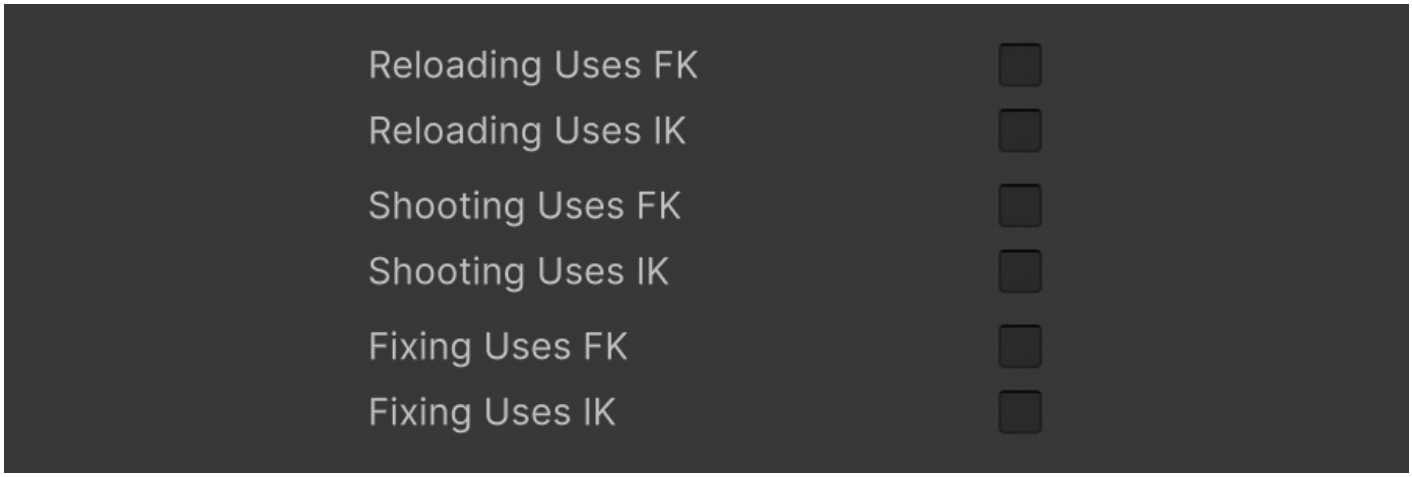


When to use

Lasers are useful for NPCs so the player sees where they are aiming at as well as for the player's weapons in case you want to avoid non-diegetic interface elements.

1018.7 Animations

The last section of **Sights** is dedicated to how playing animations on weapons



The **Reloading uses FK**, **Shooting uses FK** and **Fixing uses FK** fields determine whether during the animation the character should use forward kinematics or turn them off.

The **Reloading uses IK**, **Shooting uses IK** and **Fixing uses IK** fields determine whether during the animation the character should use inverse kinematics or turn them off.

When to enable

In most cases it is recommended to keep those checkboxes turned off because if the character is, for example, reaches to the hip to get a new ammo pack to reload the weapon, if the body is rotated 45 degrees to one side, the hand might reach somewhere else other than the hip and look unnatural.

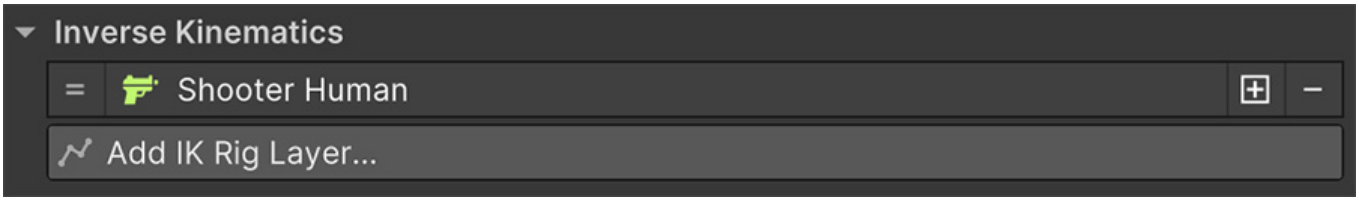
However for cases where the hands don't have to mimic reaching out for a particular spot, enabling these values will allow animations to feel more natural, since they don't reset to the default pose when being played.

1019 Biomechanics

The **Biomechanics** field configures how the character should rotate and translate individual bones in order to reach the desired shooting direction.

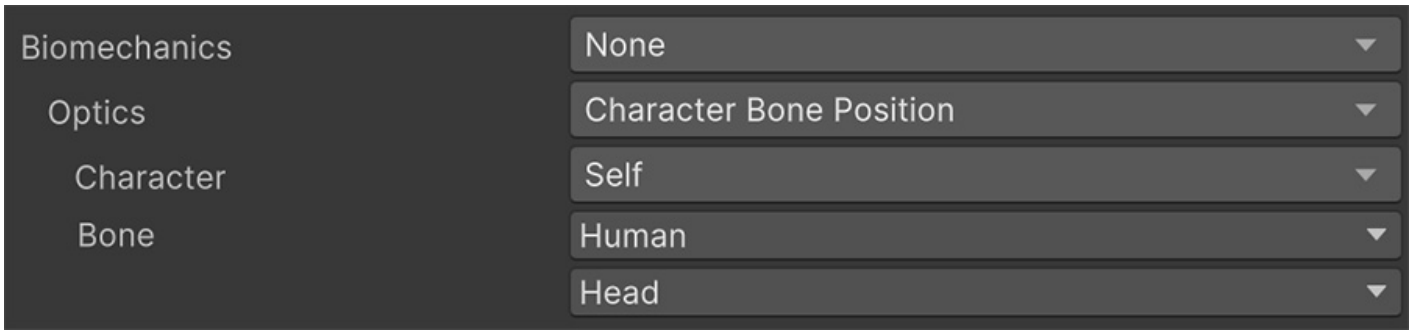
Use Human Shooter Rig

Game Creator will automatically add a **Human Shooter** rig onto the list of *Inverse Kinematics*, it is highly recommended to manually place it in Editor mode so you can choose the order in which rigs run.



1019.1 None

The **None** option is the simplest to understand and most performant. It doesn't bend any bones and the weapon stands still in the direction determined by the current character's animation(s).



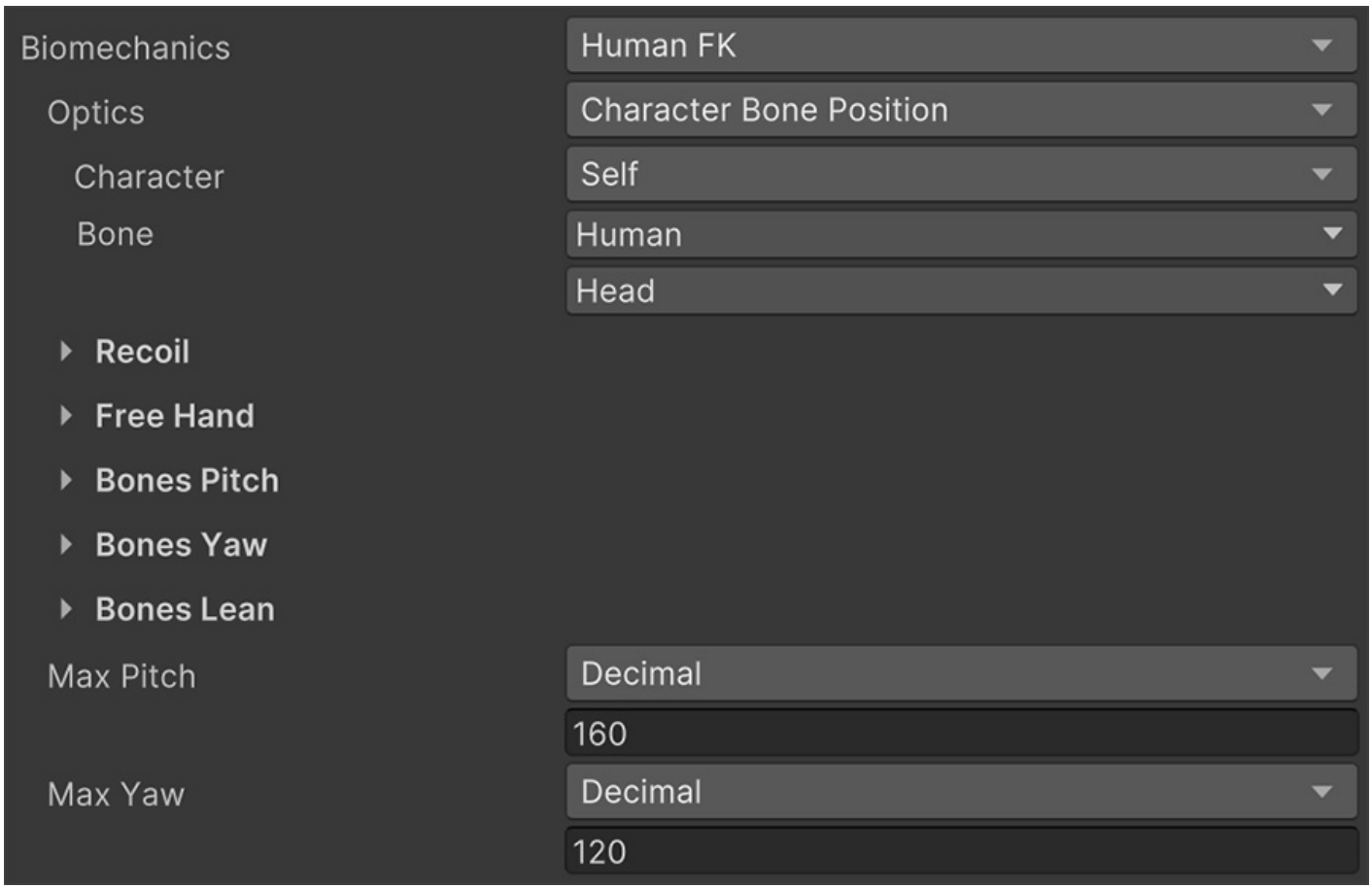
When to use

The **None** option is most suitable for non-humanoid characters such as turrets, where the rotation of the muzzle is handled by another script or visual scripting system.

It is worth noting that the demos in this module include an example of a turret following the player at a constant interval, in which the rotation is handled by an external visual scripting Trigger.

1019.2 Human FK

The **Human FK** option uses forward kinematics in order to distribute the desired rotation among multiple bones.



When to use

The **Human FK** should be the default system used for any humanoid character, except for first-person view where the weapon uses some part of the weapon as the scope. It is the most realistic and natural-looking from afar.

The **Optics** field is used to determine the vision point from which the character looks through. This is used to align the direction of the weapon towards the desired shooting point.

Human FK and IK

Although the name **Human FK** suggests that it only uses forward kinematics, some features do use inverse kinematics. The FK in the name only refers to the fact that it only uses FK for rotating the body-chain to aim. But weapon recoil, off-hand movement and other features use inverse kinematics.

1019.2.1 Recoil

The **Recoil** section configures how each shot affects the procedural recoil of the weapon. It allows to customize the amount of backwards movement and the translation and rotation in local space of the weapon's shooting kickback.

It also allows to customize which bones are affected by the recoil and the force distribution among them.

Where is Recoil applied

The **Recoil** movement is always applied to the parent bone of the weapon prop, as long as it's either the right hand or the left hand. If it's any other bone, these values will be ignored.

1019.2.2 Free Hand

The **Free Hand** section configures how the off-hand (if any) behaves.

Because the main hand holding the weapon can be moved around using procedural motion, the free-hand can be snapped at a specific point of the weapon to also follow it around.

When to use Free Hand

The Free Hand settings are meant to be applied to either one or both hands, and are usually used to place the off-hand on a handle, such as below the barrel of a shotgun.

The hand can either be attached to the weapon prop or a *Transform* object, with an optional position and rotation offset.

Because the hand uses inverse kinematics, an optional **Pole** object can be used to drive the elbow direction between the two-bone kinematic chain.

1019.2.3 Bones Pitch

The **Bones Pitch** configure how the rotation to aim with the weapon upward or downwards is distributed among the bones from the hip, up to the hand, and optionally the neck and head of the character.

The **Max Pitch** is the maximum angle in degrees the character can rotate up and down.

1019.2.4 Bones Pitch

The **Bones Yaw** configure how the rotation to aim with the weapon to the sides is distributed among the bones from the hip, up to the hand, and optionally the neck and head of the character.

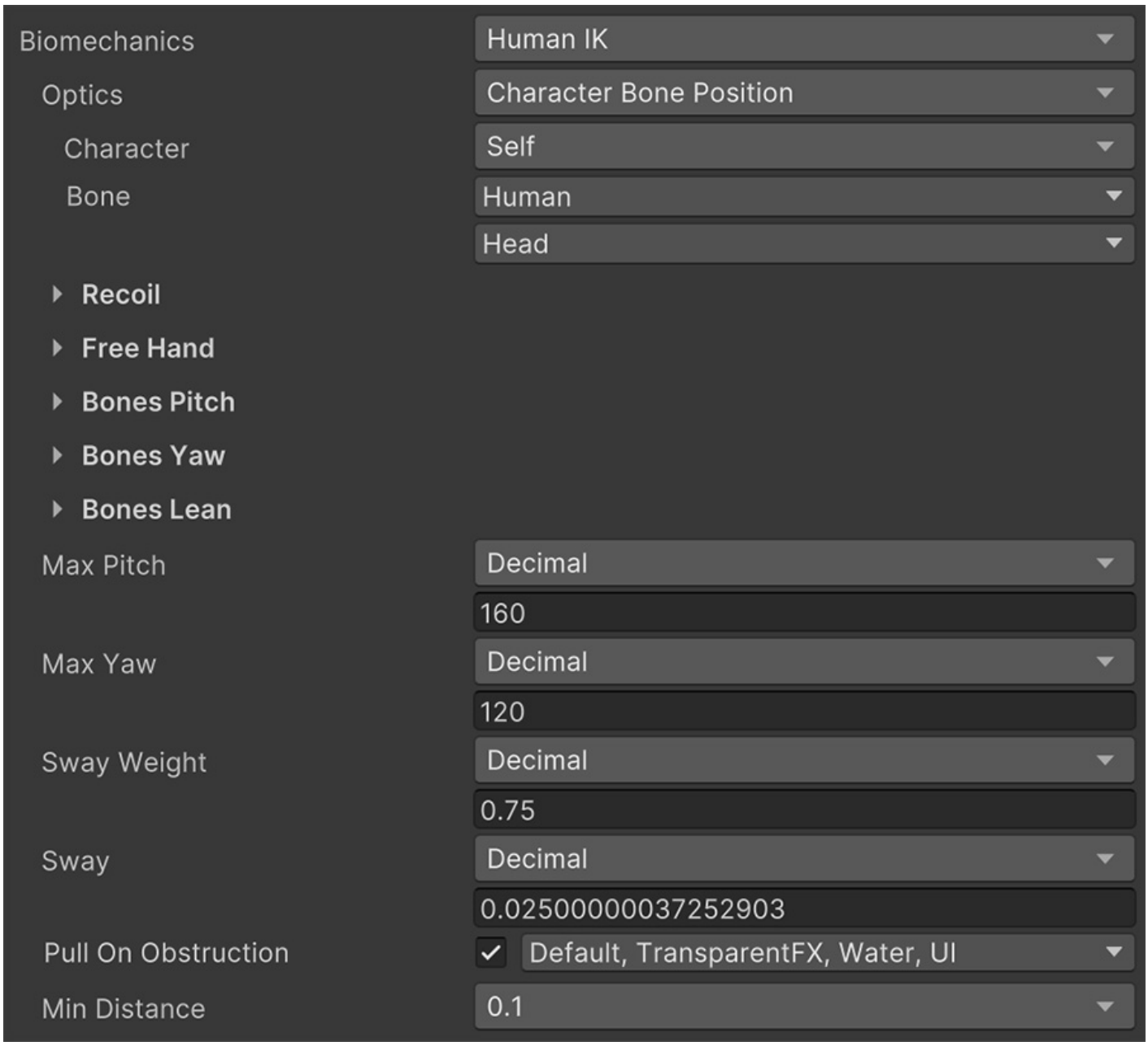
The **Max Yaw** is the maximum angle in degrees the character can rotate to either side.

1019.2.5 Bones Lean

Characters can also lean to the right or left side and while the camera will follow, the character can also bend their spine to peak around corners. The **Bones Lean** section configures how the rotation is distributed among the spine bones when bending.

1019.3 Human IK

The **Human IK** option uses inverse kinematics in order to move the bone holding the weapon prop so it is aligned along the line of sight defined by the optics and the target point.



When to use

The **Human IK** should be used for first-person games where the optics are diegetic, such as iron scopes and reflex sights.

The weapon prop will not respect the original animation and can easily look funny from a third-person view. However it offers unparalleled precision and the shots will land exactly where the sight it set.

1019.3.1 Recoil

The **Recoil** section configures how each shot affects the procedural recoil of the weapon. It allows to customize the amount of backwards movement and the translation and rotation in local space of the weapon's shooting kickback.

It also allows to customize which bones are affected by the recoil and the force distribution among them.

> **Where is Recoil applied**
>
> The **Recoil** movement is always applied to the parent bone of the weapon prop, as long as it's either the right hand or the left hand. If it's any other bone, these values will be ignored.

1019.3.2 Free Hand

The **Free Hand** section configures how the off-hand (if any) behaves.

Because the main hand holding the weapon can be moved around using procedural motion, the free-hand can be snapped at a specific point of the weapon to also follow it around.

> **When to use Free Hand**
>
> The Free Hand settings are meant to be applied to either one or both hands, and are usually used to place the off-hand on a handle, such as below the barrel of a shotgun.

The hand can either be attached to the weapon prop or a *Transform* object, with an optional position and rotation offset.

Because the hand uses inverse kinematics, an optional **Pole** object can be used to drive the elbow direction between the two-bone kinematic chain.

1019.3.3 Bones Pitch

The **Bones Pitch** configure how the rotation to aim with the weapon upward or downwards is distributed among the bones from the hip, up to the hand, and optionally the neck and head of the character.

The **Max Pitch** is the maximum angle in degrees the character can rotate up and down.

1019.3.4 Bones Pitch

The **Bones Yaw** configure how the rotation to aim with the weapon to the sides is distributed among the bones from the hip, up to the hand, and optionally the neck and head of the character.

The **Max Yaw** is the maximum angle in degrees the character can rotate to either side.

1019.3.5 Bones Lean

Characters can also lean to the right or left side and while the camera will follow, the character can also bend their spine to peak around corners. The **Bones Lean** section configures how the rotation is distributed among the spine bones when bending.

1019.3.6 Sway

The **Sway Weight** determines how much the weapon lags behind and the **Sway** field determines how fast the weapon recovers from the sway.

> **Using sway**
>
> Increasing the sway will make weapons feel heavier and slower to use. You can use this value to infuse weight to your weapons and make them distinct from one another.

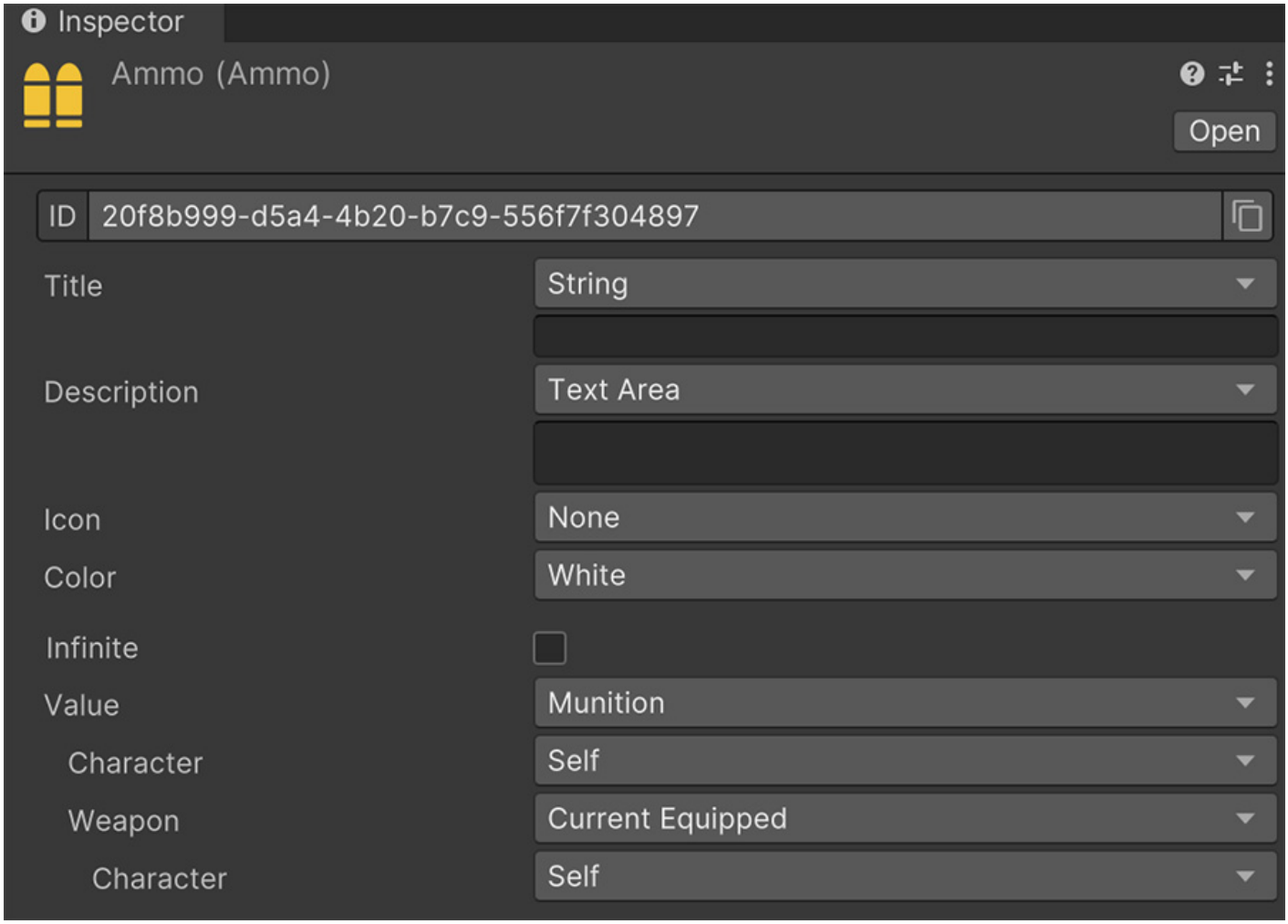
1019.3.7 Obstruction

The **Pull on Obstruction** checkbox allows weapons to be pulled towards the optics if a collider gets between the muzzle and the optics.

This is useful for situations where the player gets very close to a wall and the weapon clips through it. It is worth noting that enabling this option comes with some performance cost in which it casts rays to know if there's a collider obstructing the view.

1020 Ammo

The **Ammo** asset contains information about whether each shot uses a finite resource or an infinite amount of it.



The first field is the **ID** which uniquely identifies the ammunition value.

The **Title**, **Description**, **Color** and **Icon** fields are common values that are useful for representing information in the user interface, but do not have any impact on the game.

The **Infinite** checkbox determines whether the ammunition is infinite or finite. If left unchecked, it will reveal a **Value** field below, which indicates the value to get and set the ammunition from.

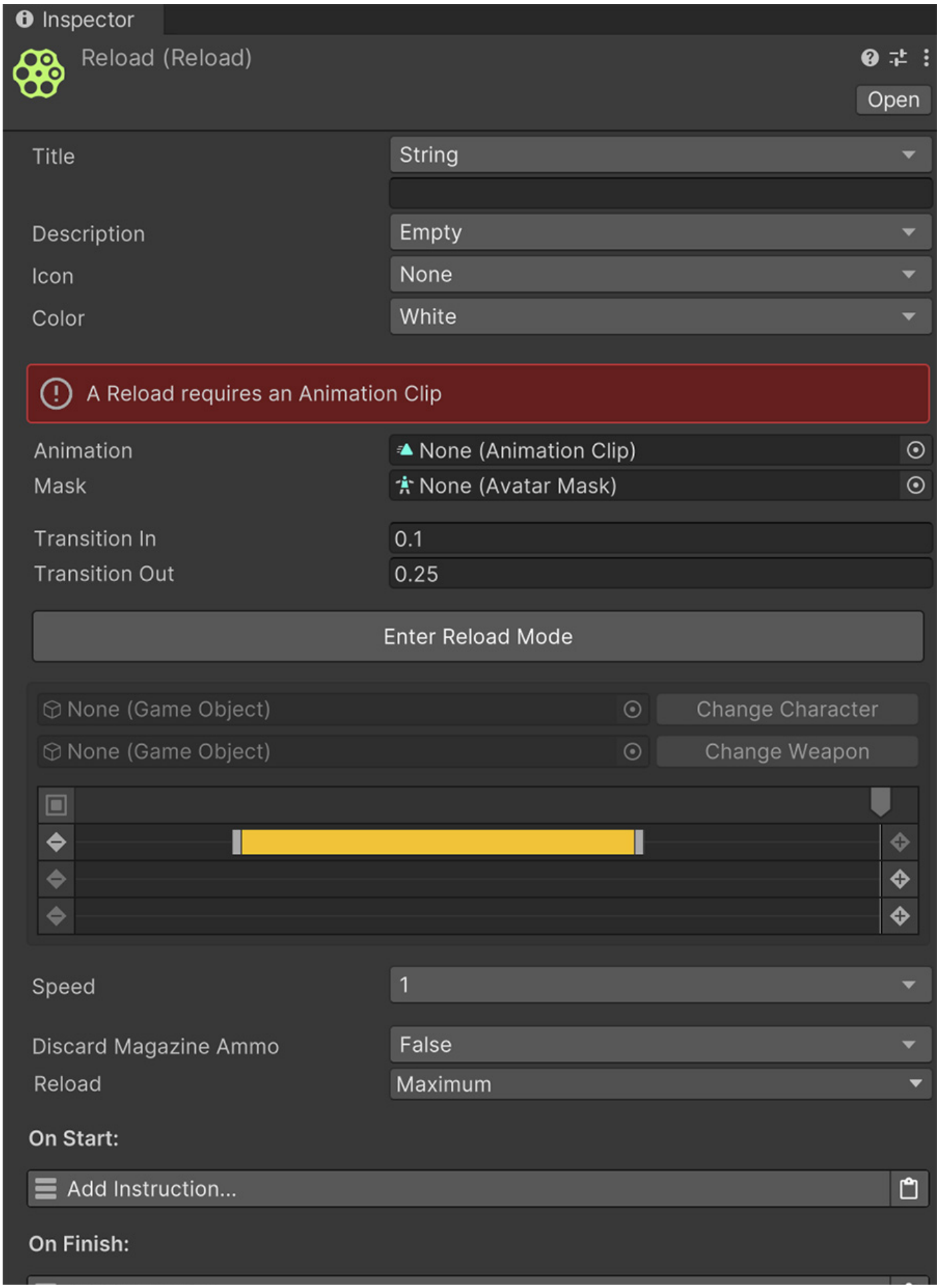
Source of ammunition

By default, every weapon has a *munition* value which tracks a value that represent the weapon's total ammunition. However this value can be changed to use an **Item** from the *Inventory 2* module as the source of ammunition, or a **Stat** value from the *Stats 2* module (such as *mana*).

To create an **Ammo** asset, right click on the *Project Panel* and navigate to *Create* → *Game Creator* → *Shooter* → *Ammo*. This will create a new **Ammo** asset that you can move anywhere you want.

1021 Reloads

The **Reload** asset is used to play a reloading action for one or multiple weapons.


Inspector
Reload (Reload)
Open
Title
String
Description
Empty
Icon
None
Color
White
A Reload requires an Animation Clip
Animation
None (Animation Clip)
Mask
None (Avatar Mask)
Transition In
0.1
Transition Out
0.25
Enter Reload Mode
None (Game Object)
Change Character
None (Game Object)
Change Weapon
Speed
1
Discard Magazine Ammo
False
Reload
Maximum
On Start:
Add Instruction...
On Finish:

To create a **Reload** asset, right click on the *Project Panel* and navigate to *Create* → *Game Creator* → *Shooter* → *Reload*. This will create a new **Reload** asset that you can move anywhere you want.

The **ID** field uniquely identifies the reloading asset among the others.

The **Title**, **Description**, **Color** and **Icon** fields are common values that are useful for representing information in the user interface, but do not have any impact on the game.

1021.1 Animation

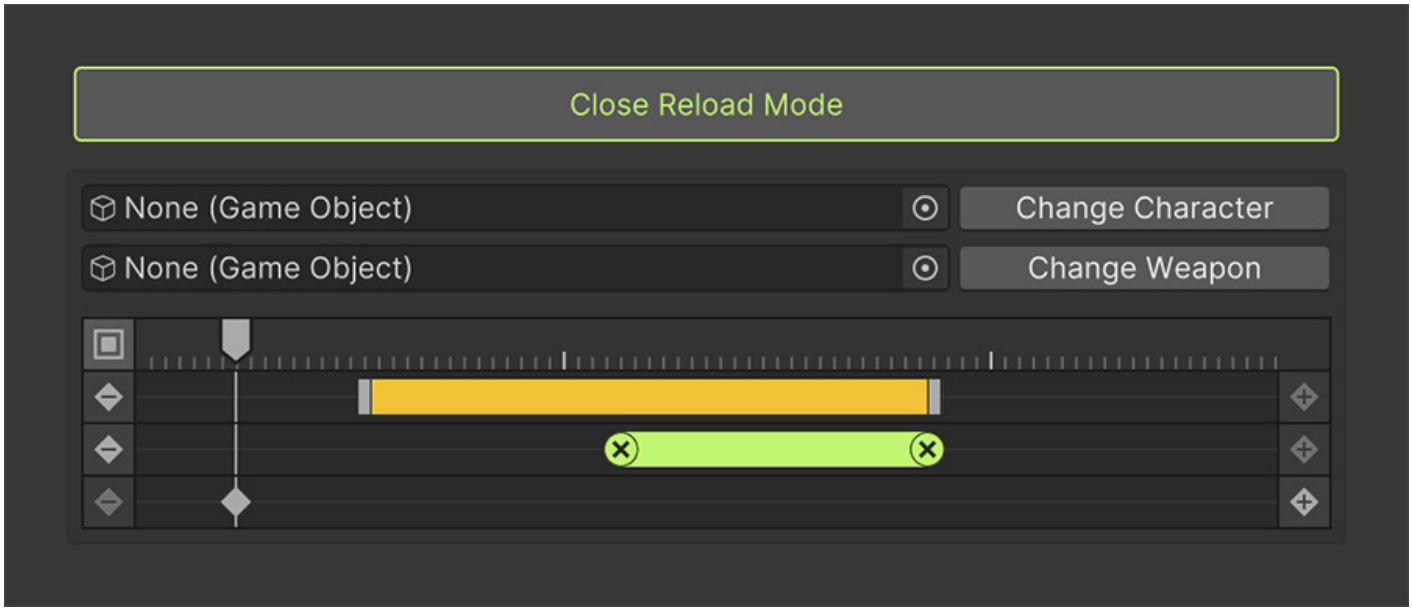
The **Animation** field is a mandatory animation clip that is played when reloading the weapon. It is required in order to set up the sequence from below.

The **Mask** field is optional and allows to ignore the animation on certain character bones.

The **Transition In** and **Transition Out** fields allow the reloading animation to smoothly blend in and out of the current character's pose.

1021.2 Reload Mode

If the **Reload** asset has an animation clip, the **Enter Reload Mode** button will be enabled. Entering this mode will allow to scrub the animation in the scene view and choose where to play different effects and define ranges for specific features.



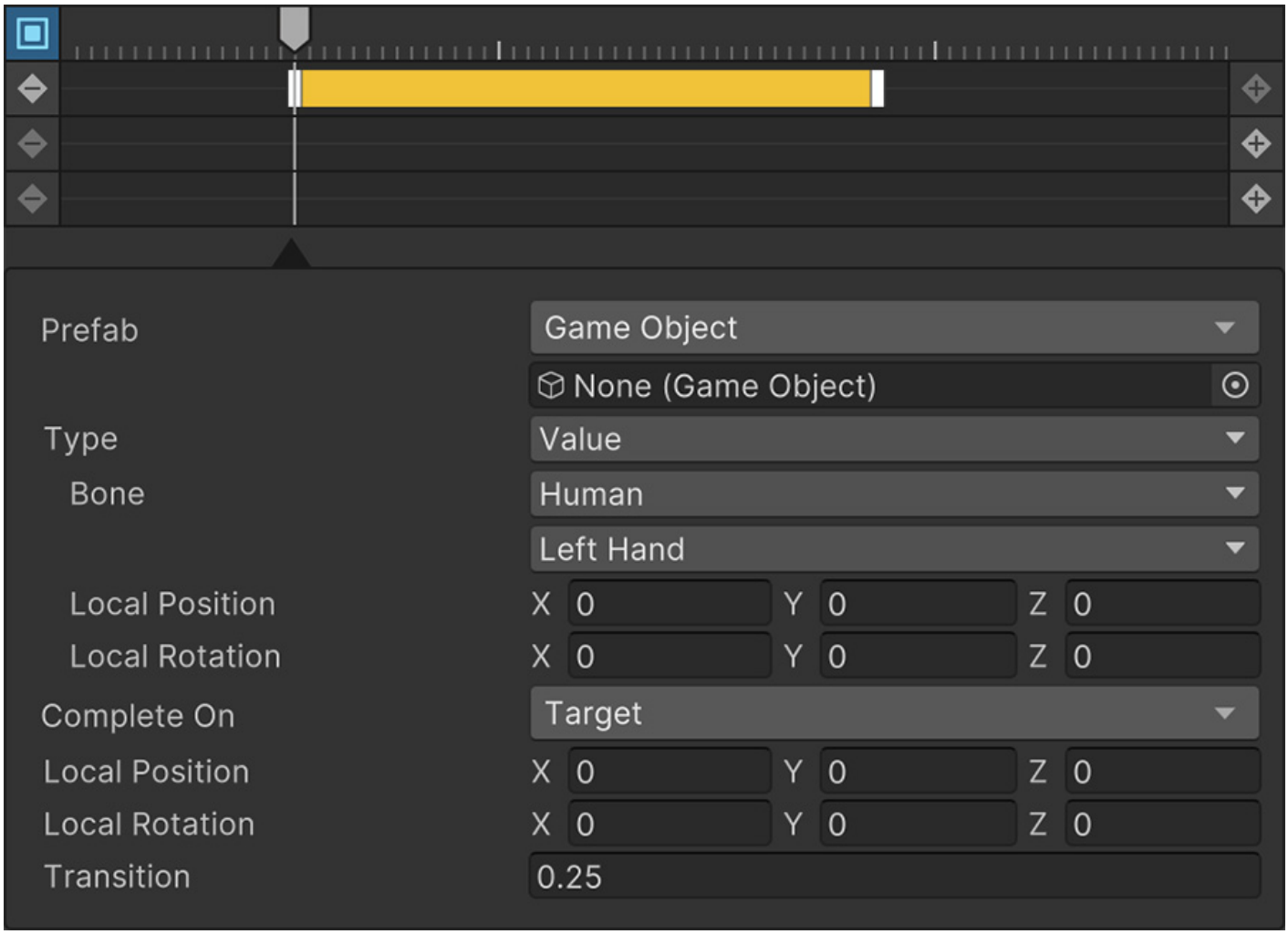
Character and Weapon

The **Reload** asset does not know which character or weapon prop will run this animation. You can change the character and weapon placeholders choosing them from the corresponding fields and clicking on *Change Character* and *Change Weapon* buttons.

These values will be internally saved so you don't need to set them up every time you enter this configuration mode.

1021.2.1 Magazine Track

The first (yellow) track of the **Reload** sequencer serves as a handy magazine system that allows to seamlessly create a new magazine (or any game object instance) and move it from a character's limb and parent it to the weapon.



The yellow track range begins by instantiating an instance of the chosen prefab at the specified bone, and at the end of the track it will re-parent it to the weapon's position while smoothly translating and rotating it into place.

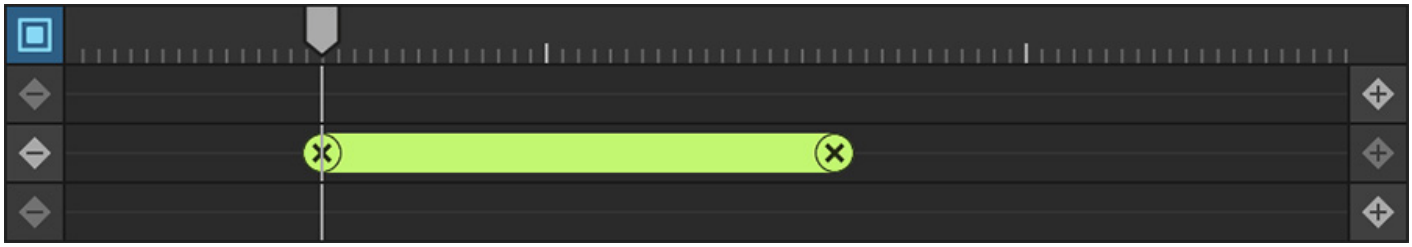
Drop the previous Magazine

You can access the previous and current weapon's magazine from any Game Object property dropdown and selecting *Reloading Previous Magazine* and *Reloading New Magazine* respectively.

For example, the demos include a *pistol* weapon that drops the previous magazine while picking one from the character's pocket and inserting it into the pistol's handle slot.

1021.2.2 Quick-Reload Track

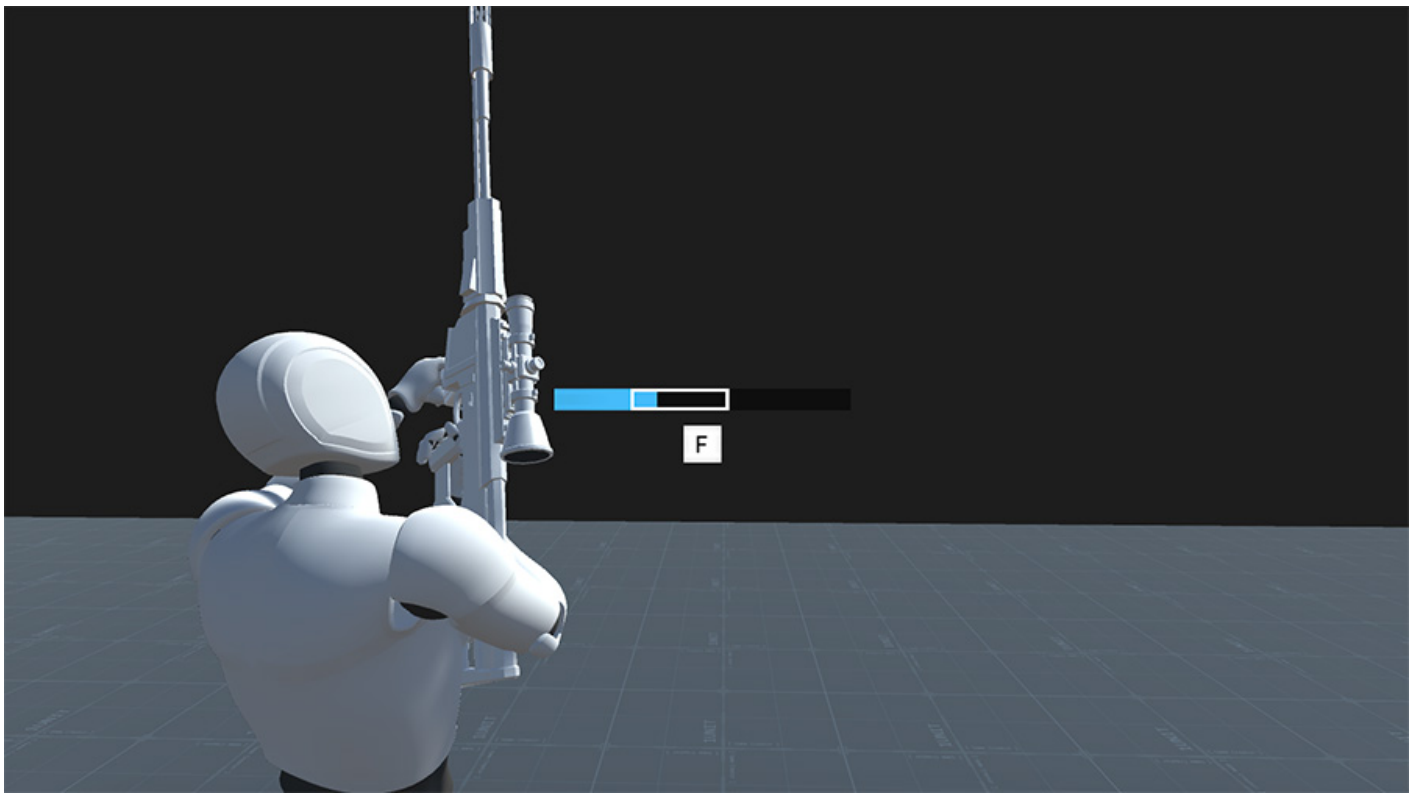
The second (green) track of the **Reload** sequencer allows weapons to be quick-reloaded.



What is a Quick-Reload

The **Quick-Reload** mechanic is also known with other names, such as *active reloading* or *pro reloading*. It allows to skip part of the reloading animation by givin the player one chance to press a key at a specific time.

Adding a **Quick Reload** track will display a green range from which if the instruction **Try Quick Reload** runs it will cancel the remaining of the animation but will successfully finish the reloading.

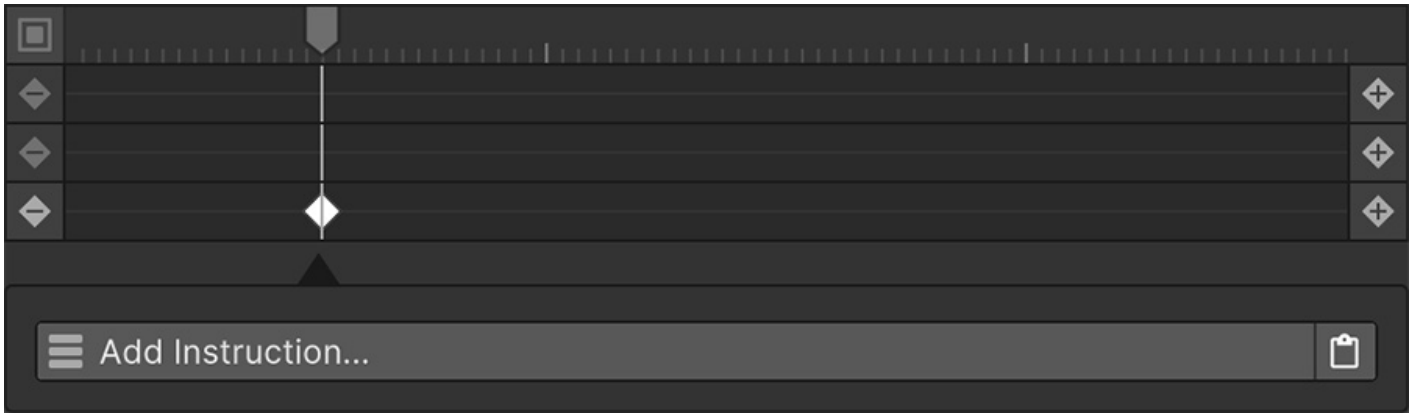


Quick-Reload attempts

Note that if the **Try Quick Reload** instruction runs outside of the green range but during a reloading action, the system will register the attempt as a failed quick-reload and the animation will proceed until it's finished or canceled by another action.

1021.2.3 Instructions Track

The third track is dedicated to adding zero, one or multiple instructions that can run at different points of the reload animation.



Why use Instructions

These instructions points are useful to play sound effects, change blend-shapes during the animation at specific points in time, dropping the previous empty magazine or even ejecting shells.

1021.3 Configuration

The **Speed** field determines the speed at which the reload animation happens. This value is dynamic and can be tied to other values, such as *Stats* or *Variables*.

The **Discard Magazine Ammo** determines whether the remaining ammunition in the magazine should be kept or not after reloading.

Discarding magazine ammo

Most games do not discard magazine ammo, while others offer an option to either play a fast-reload animation that discards the current ammo or play a slower one where the rest of the magazine is kept.

The ultimate choice is yours and will depend on the type of game you want to make.

The **Reload** field determines the amount of ammo added to the magazine. The value can either be:

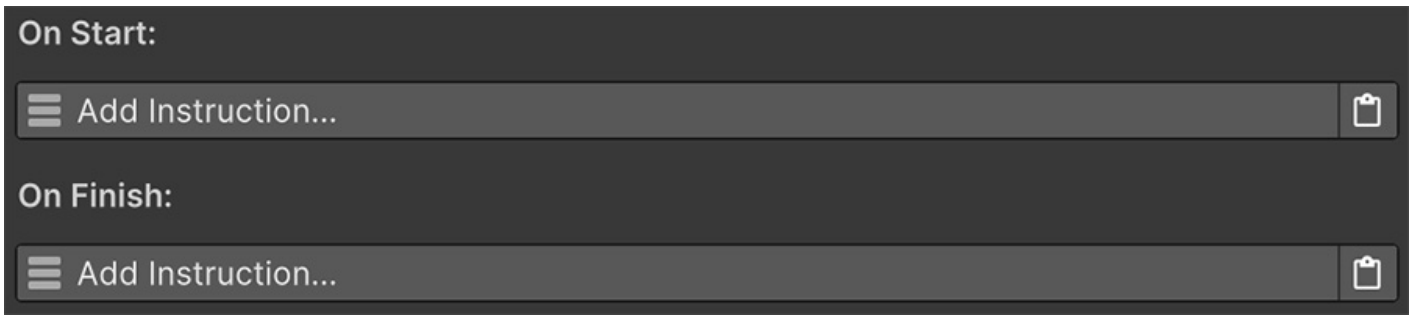
- **Maximum**: The magazine is filled to its maximum, as long as there is enough ammunition.
- **Value**: The magazine increments up to a maximum value defined in another field.

Reloading one by one

Most weapons will refill the magazine to its maximum. However, some games allow certain weapons to be reloaded bullet by bullet, like revolvers or shotguns.

This behavior can be achieved by choosing the *Value* option and increasing the magazine size by 1 each time. As long as the magazine is not filled and there is enough ammunition on the character's pouch, it will run again.

1021.4 Instructions



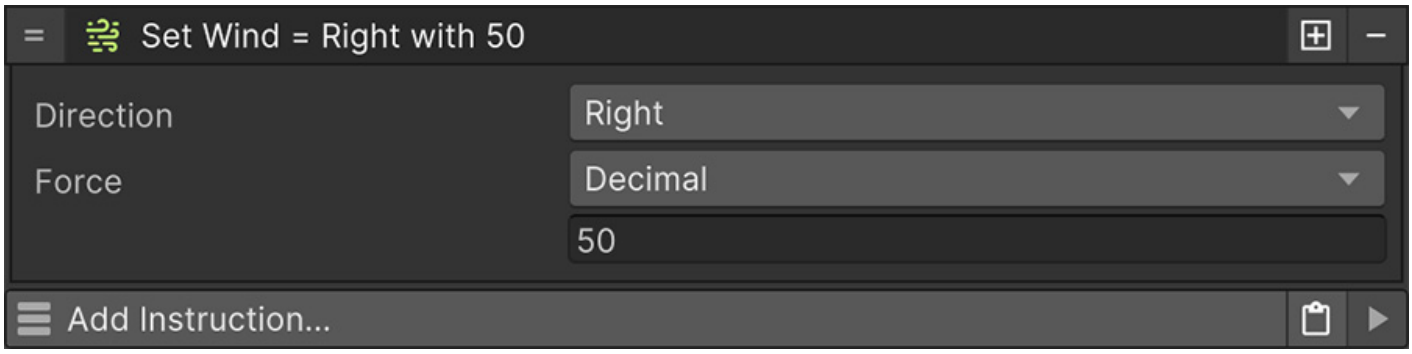
The **On Start** and **On Finish** instructions, as their name implies, are instructions that run at the beginning and at the end of the reloading action.

1022 Wind

The **Shooter** module allows to create from basic shooting mechanics to realistic ballistics that take into account wind force and direction, bullet drag and different gravities.

Wind is a global value that exists in the world that contains a *direction* and *magnitude* value, which indicate the direction of the wind as well as its force.

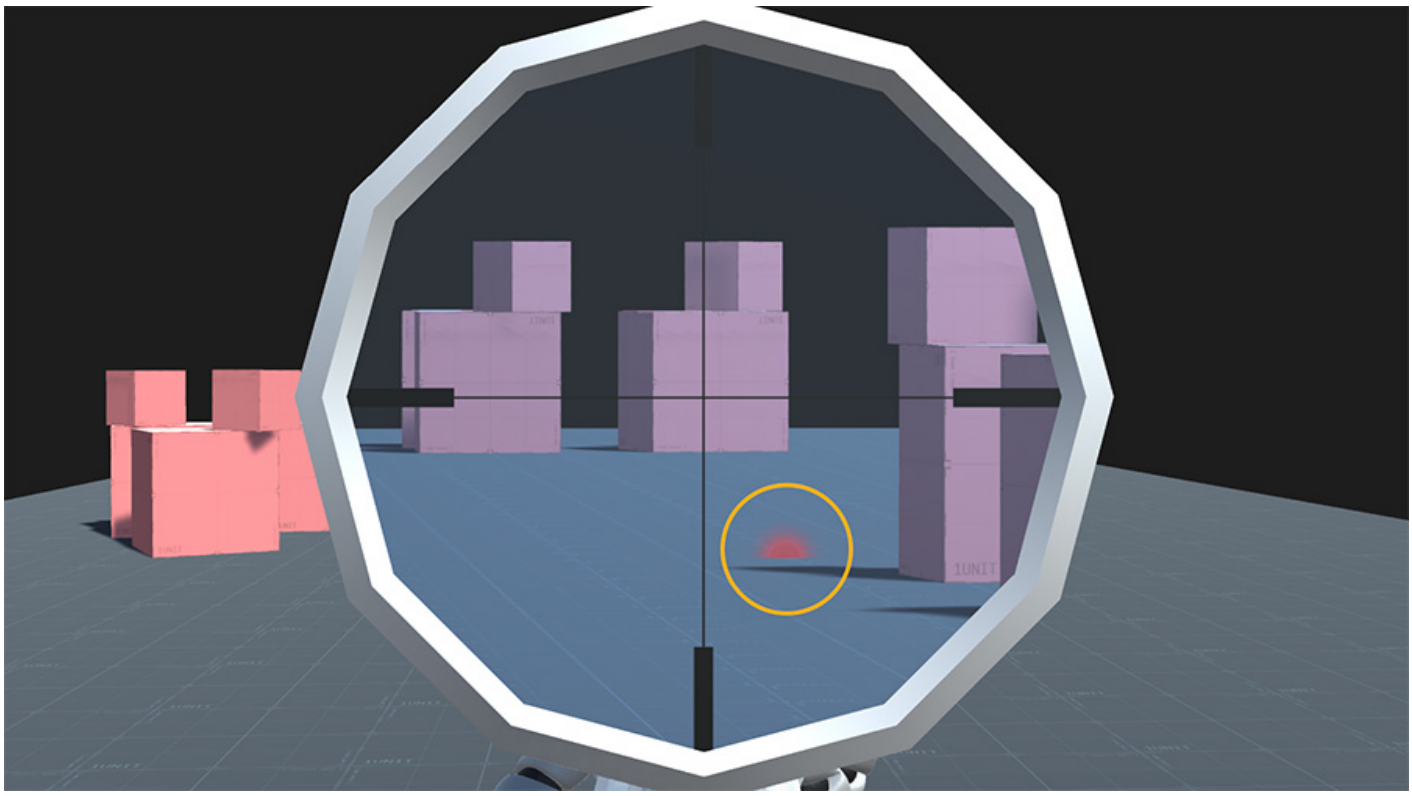
To change the **Wind** value use the **Change Wind** instruction, which accepts a **Direction** value and a **Force**.



More Instructions

Alternatively you can also use the **Change Wind Force** and **Change Wind Direction** instructions if you only want to modify one component of it.

Once the **Wind** has a value it will automatically affect any projectiles that have some degree of exposure to the wind, such as *Kinematic* and *Rigidbody* projectiles.



1023 User Interface

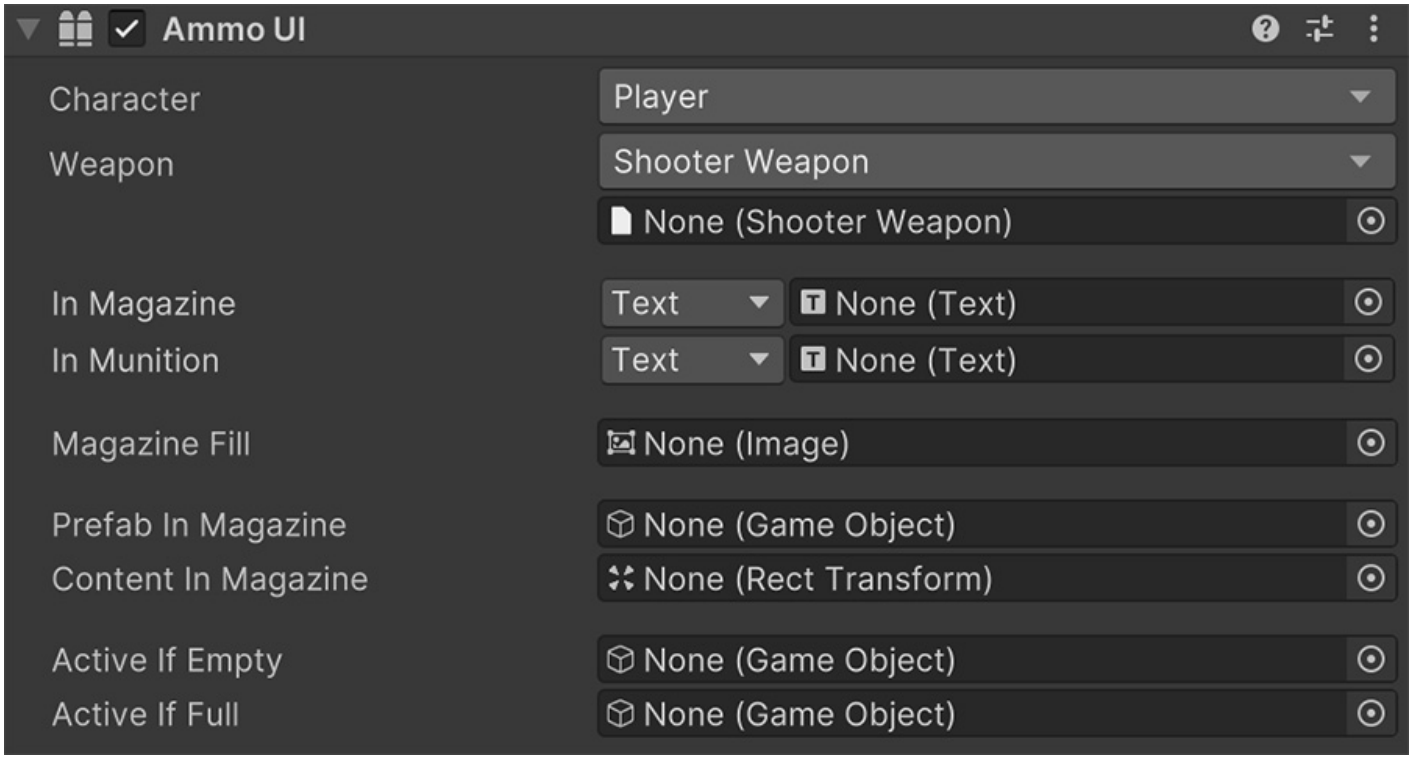
The **Shooter** module comes with a few components and materials that help build user interfaces that communicate vital information to the player about the current amount of ammo, total amount, precision, and so on.

1023.1 UI Components

There are two UI components that can be attached to any game object and refreshes its contents whenever a specific weapon on a character changes its value(s).

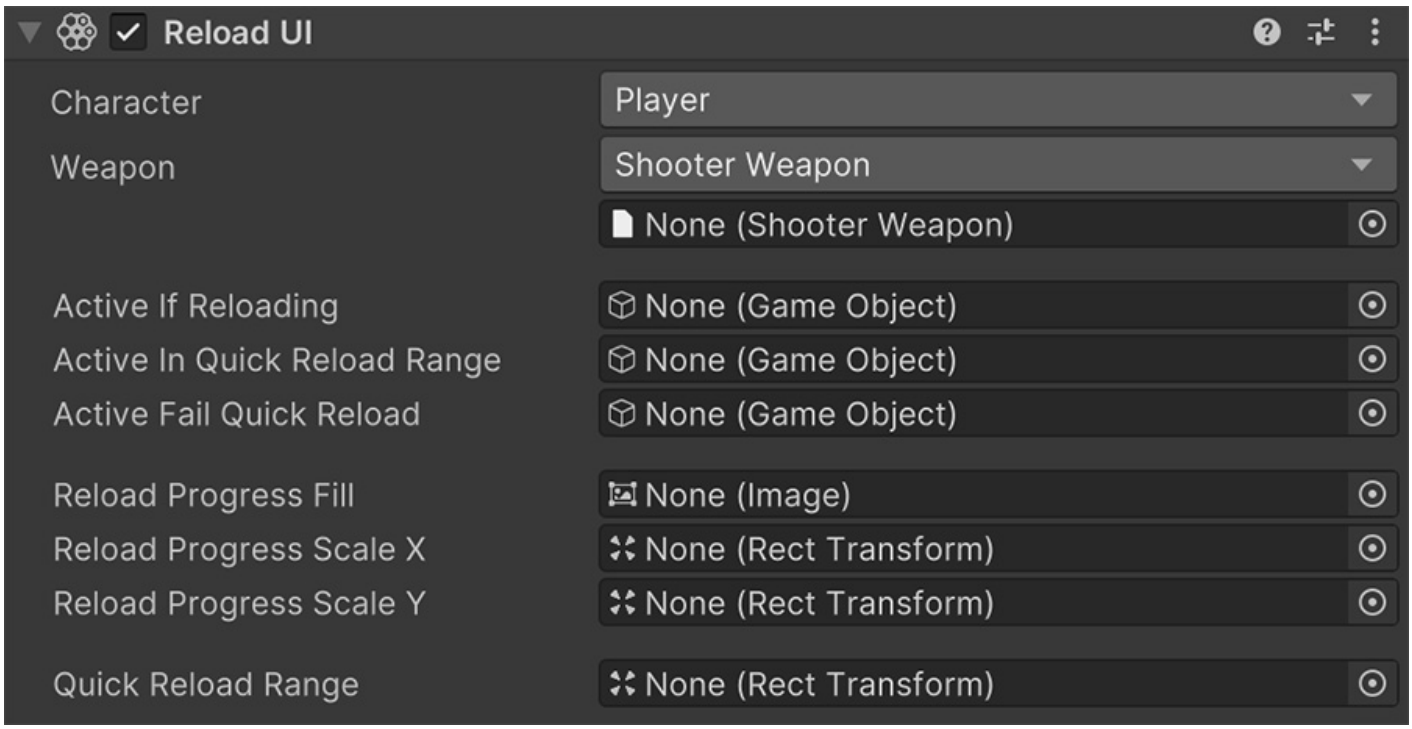
1023.1.1 Ammo UI

This component can display a weapon's ammunition in multiple ways.



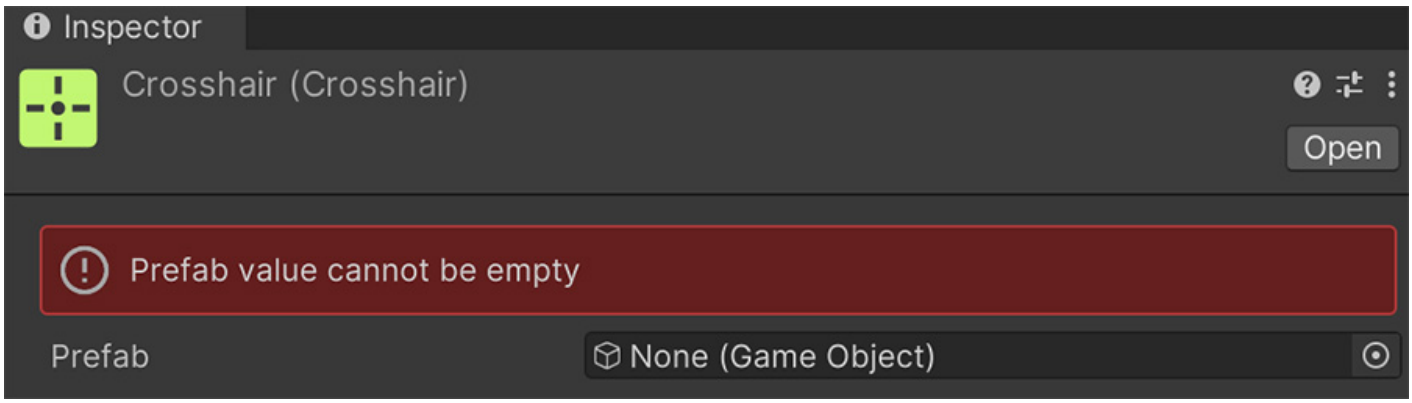
1023.1.2 Reload UI

This component displays information when the chosen weapon is being reloaded, including information about the *Quick-Reload* timings and progress bars that show the remaining duration of a reload action.



1023.2 Crosshairs

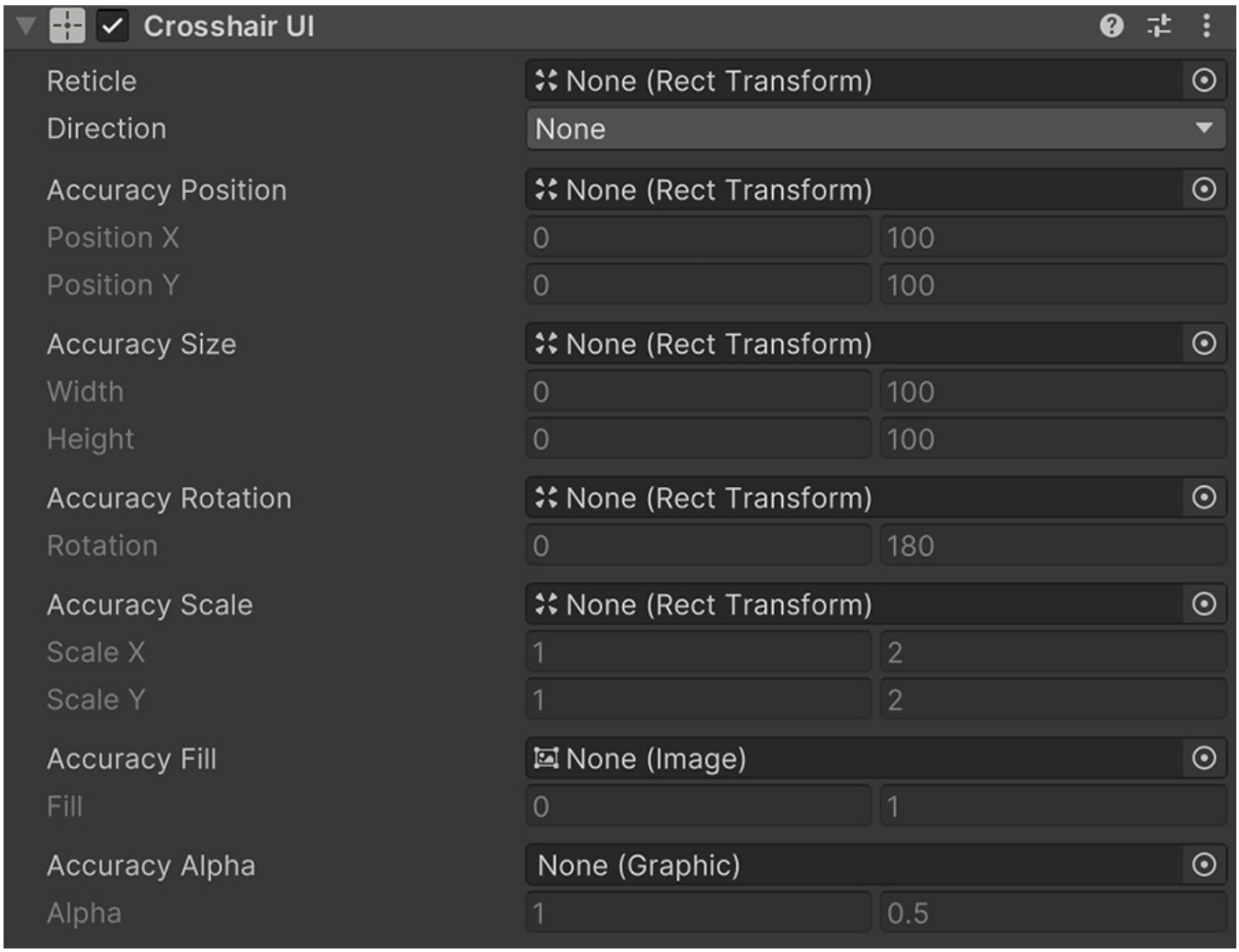
Crosshairs are a special kind of *skins* that can be reused among multiple weapons, and their asset reference must contain a prefab that has a **Crosshair UI** component at the root.



Crosshairs can be set in each Sight's Crosshair section and at runtime they will be displayed on the screen.

1023.2.1 Crosshair UI

The **Crosshair UI** component contains multiple optional fields that can be filled with Unity UI elements in order to customize the behavior and design of the interface elements.



The **Reticle** references the object that can be moved around to represent the point in screen space where the character is aiming at.

The **Direction** field is a dropdown that allows to choose how the reticle behaves. By default it doesn't move at all but its value can be changed to:

- **Away from Player**: The reticle rotates away from the character wielding the weapon.
- **Away from Screen Center**: The reticle rotates away from the character wielding the weapon.

When to use Reticles

In most third and first person games, the reticle won't move so this field can be left in blank. However in some games, the reticle moves around the screen.

In top-down shooters or side-scroll games where the player stands in the middle and the aiming reticle shows where the shots will land, the **Direction** value should be set to **Away from Player** or **Away from Screen Center**, depending on whether the player is always at the center or can also move around.

The rest of the fields have two values in each line. The left value represents the value when the *accuracy* has its minimum value, while the right one represents when it's at its maximum.

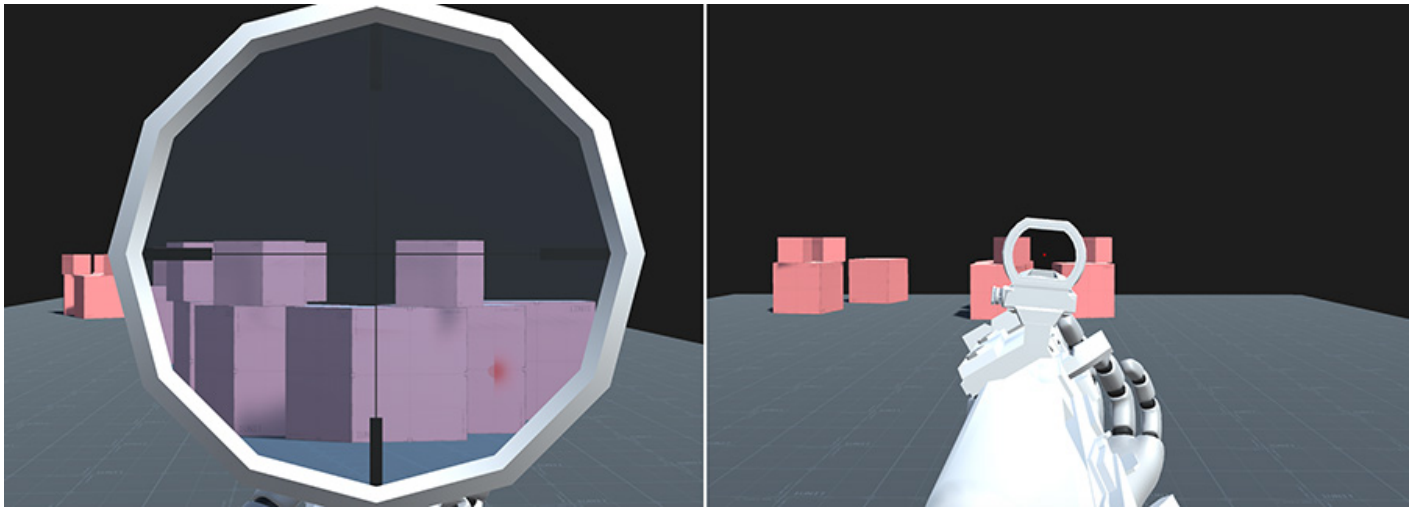
For example, setting an image in the **Accuracy Fill** field with **Fill** value of 0 and 1 means that when the character's *accuracy* is at its lowest, the progress bar won't be filled at all. And when the *accuracy* is at its maximum, the progress bar will be filled.

Multiple examples

There are multiple examples of crosshairs in the demos. It is highly recommended to check them and understand how they work in order to create your own.

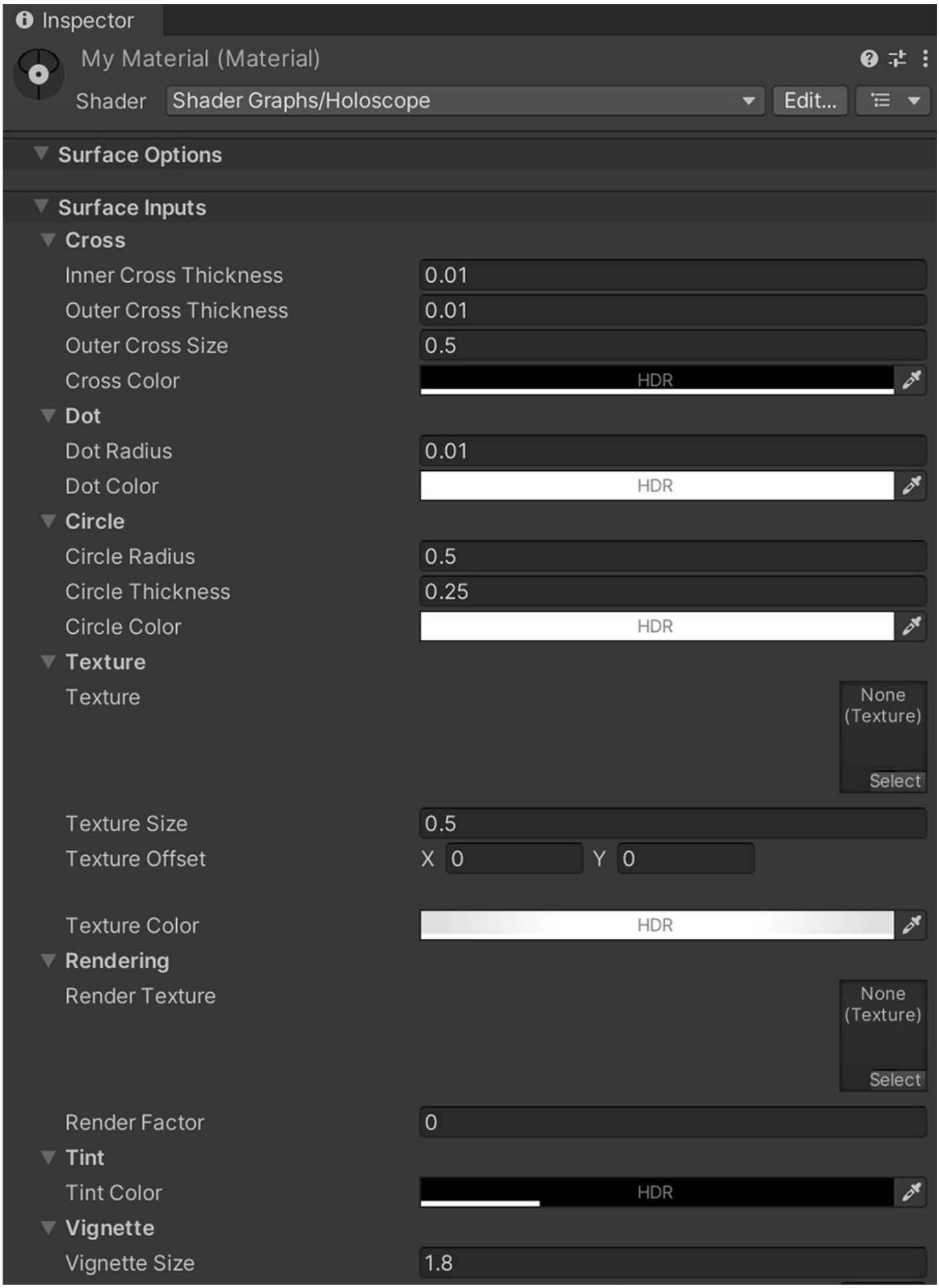
1023.3 Scopes

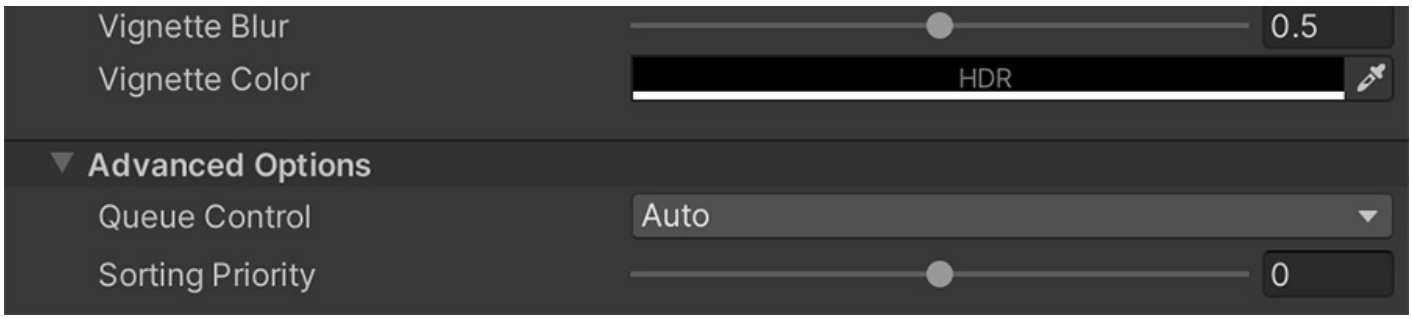
Although technically it's not part of the user interface, the **Shooter** module comes with a shader that can b applied to any material to simulate holographic scopes.



Sniper and Assault Rifle demos

The **Sniper** and **Assault Rifle** weapons included in the demos, both use a material with this shader applied.


Inspector
My Material (Material)
Shader
Shader Graphs/Holoscope
Edit...
Surface Options
Surface Inputs
Cross
Inner Cross Thickness
0.01
Outer Cross Thickness
0.01
Outer Cross Size
0.5
Cross Color
HDR
Dot
Dot Radius
0.01
Dot Color
HDR
Circle
Circle Radius
0.5
Circle Thickness
0.25
Circle Color
HDR
Texture
Texture
None (Texture)
Select
Texture Size
0.5
Texture Offset
X 0
Y 0
Texture Color
HDR
Rendering
Render Texture
None (Texture)
Select
Render Factor
0
Tint
Tint Color
HDR
Vignette
Vignette Size
1.8



This shader has been carefully designed to include the maximum amount of utilities built-in squeezing maximum performance. However it also comes with the *Shader Graph* source in case you want make a copy and add extra features.

Holographic Scopes

Iron sights require two parts to b aligned in order to determine the direction of the weapon. On the other hand, holographic lenses project a dot at the infinite, allowing for a much more faster target acquisition.

The **Holoscope** shader comes with a few utilities that allow projecting multiple elements at the infinite in order to simulate the real-life behavior of a holo sight.

1024 Usage

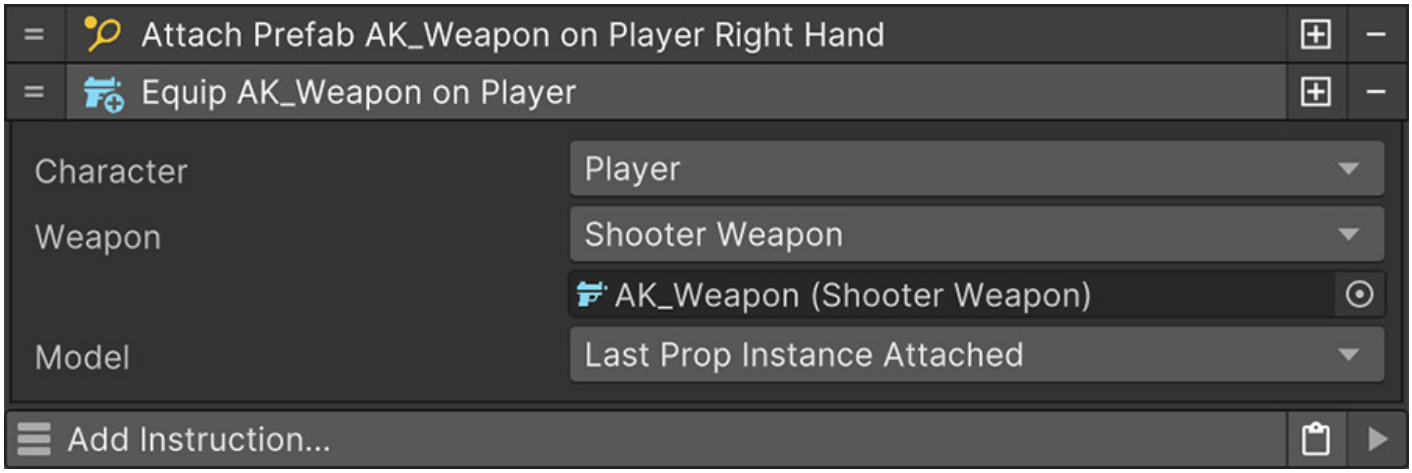
The **Shooter** module has been designed so it's very easy to set up and incrementally add more complex features as your game requires.

> **Check the demos**
>
> It is highly recommended that you check the demo examples. This section assumes you have read the rest of the documentation and you're familiar with the concepts of **Weapon**, **Sight**, **Reload** and **Ammo** assets.

1024.1 Equipping

Before doing any shooting, a character must first equip a **Weapon** asset and identify the prop that will be used as that weapon.

The **Equip Weapon** and the **Unequip Weapon** instructions serve this purpose.



> **Common use-case**
>
> The most common way to equip a weapon is to attach a prop using the **Attach Prop** instruction and right after that use the **Equip Weapon** referencing the last prop equipped.
>
> This workflow works also when using other modules, such as the **Inventory 2**.

1024.2 Shooting

To make a character shoot with their weapon(s) use the **Pull Trigger** and **Release Trigger** instructions. Depending on the type of weapon that listens to these commands, the weapon wil behave one way or another.

By default these instructions affect the primary weapon equipped by the character. However if the character has more than one weapon equipped, you can specify which weapon the trigger pull and release affects.

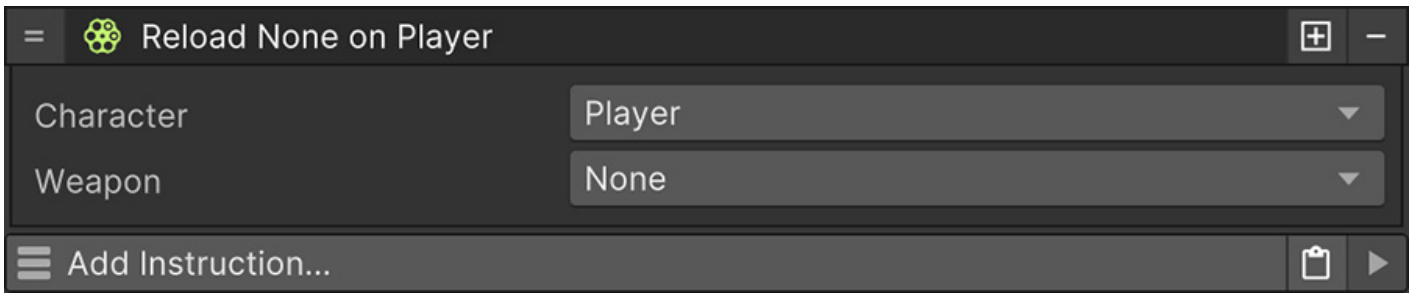
Common use-case

The most common way of instructing the player to shoot is by creating two **Trigger** components: * **On Button Press**: This trigger uses the **Pull Trigger** instruction on the player. * **On Button Release**: This trigger uses the **Release Trigger** instruction on the player.

For NPCs and enemies you can add a **Wait for Seconds** instruction between the pulling and releasing of the weapon's trigger when aiming at their target(s).

1024.3 Reloading

To make a character reload their weapon(s) use the **Reload Weapon** instruction.



By default it reloads the primary weapon, but you can specify a particular one if your character has multiple weapons equipped.

During the reloading phase, a character might attempt to perform a *Quick-Reload* action using the **Try Quick-Reload** instruction. If the weapon being reloaded admits this feature, it will attempt it and shorten the reloading duration if successful.

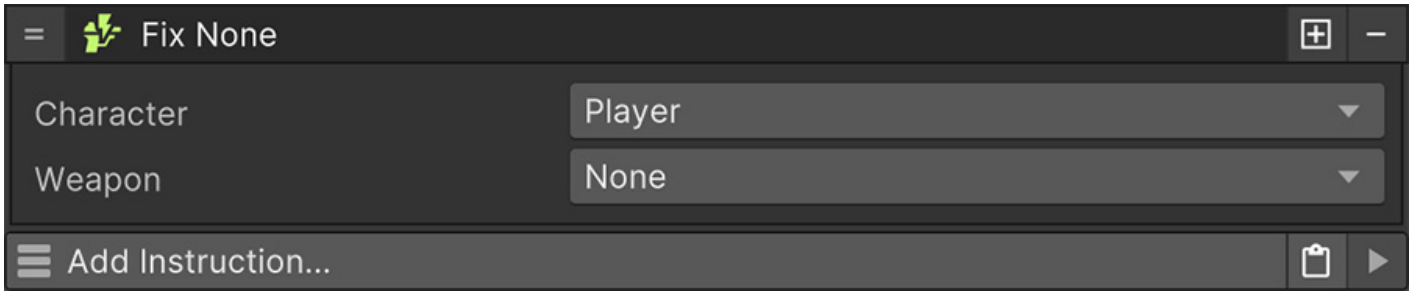
When to use Reload

By default all **Reload** entries automatically attempt to reload when the character shoots with an empty weapon. The **Reload** instruction is meant to be used either by more advanced enemy AI that decides the best time to reload or the player.

You can create a **Trigger** that attempts to reload the player's weapon at any time when pressing the right button. If the weapon cannot be reload, the command will simply be ignored.

1024.4 Jamming

If the **Weapon**'s **Jam** section has a at least a chance to jam the weapon, it will eventually be *jammed* during gameplay. A *jammed* weapon cannot be reloaded nor shot with unless the jam is fixed.

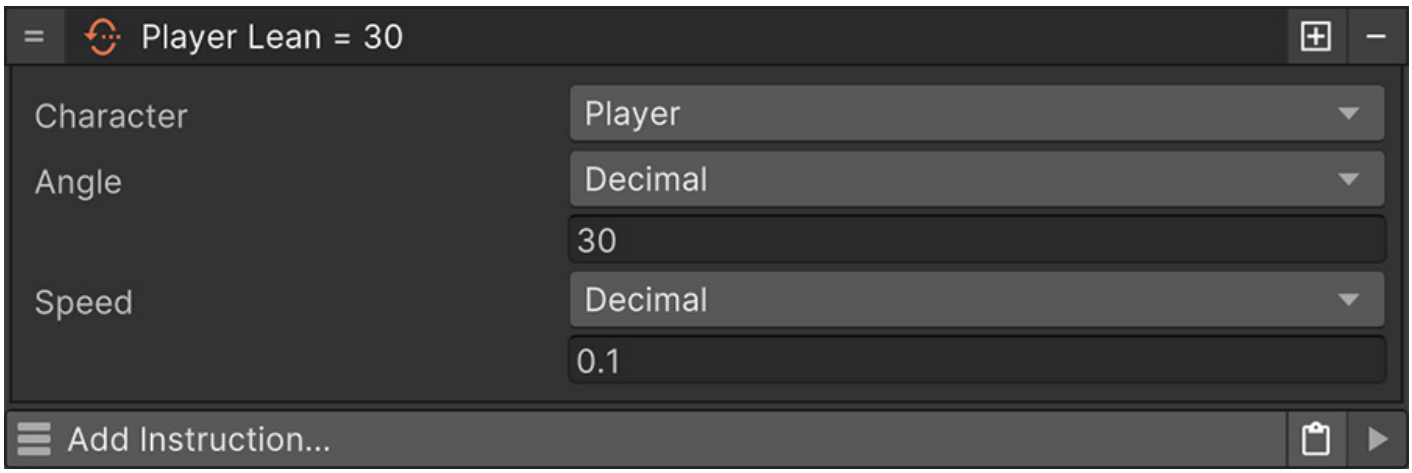


To do so use the **Fix Jam** instruction, which initiates an animation and fixes the jamming issue.

1024.5 Leaning

Characters can lean to the left or the right in order to shoot from corners. These leaning values are configured in the Biomechanics section of the **Sight** assets.

To lean to one side use the **Character Lean** instruction, which will roll the character's spine towards one side (or the other, if the angle is negative).



To restore the value use the **Character Lean** instruction with a value of 0 degrees.

Leaning with Cameras

If the leaning is applied to the player and it is using an **First Person** camera shot, the camera will follow the leaning along with its rotation.

VIII.III Visual Scripting

1025 Visual Scripting

The **Shooter** module symbiotically works with **Game Creator** and the rest of its modules using its visual scripting tools.

- **Instructions**
- **Conditions**
- **Events**

Each scripting node allows other modules to use any **Shooter** feature, and adds a list of **Properties** ready to be used by other interactive elements.

VIII.III.I Conditions

1026 Conditions

1026.1 Sub Categories

- Shooter

VIII.III.I.I Shooter

1027 Shooter

1027.1 Sub Categories

- Jam
- Shooting
- Sights

1027.2 Conditions

- Has Equipped Shooter

1028 Has Equipped Shooter

```
Shooter » Has Equipped Shooter
```

1028.1 Description

Returns true if the Character has a specific Shooter Weapon equipped

1028.2 Parameters

Name	Description
Character	The targeted Character
Weapon	The Shooter Weapon to check if it is equipped

1028.3 Keywords

`Combat` `Shooter`

VIII.III.I.I.I JAM

1029 Jam

1029.1 Conditions

- Is Jammed

1030 Is Jammed

`Shooter » Jam » Is Jammed`

1030.1 Description

Checks if the Shooter Weapon on a Character is jammed

1030.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	The weapon to check

1030.3 Keywords

`Shooter` `Combat` `Jam` `Malfunction`

VIII.III.I.I.II SHOOTING

1031 Shooting

1031.1 Conditions

- Is Pulling Trigger

1032 Is Pulling Trigger

`Shooter » Shooting » Is Pulling Trigger`

1032.1 Description

Checks if the Character is pulling the trigger of a weapon and it's valid

1032.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	The weapon to check

1032.3 Keywords

`Shooter` `Combat` `Shoot` `Execute` `Trigger` `Press` `Blast`

VIII.III.I.I.III SIGHTS

1033 Sights

1033.1 Conditions

- Has Sight Id
- Is Sight Id

1034 Has Sight ID

`Shooter » Sights » Has Sight ID`

1034.1 Description

Checks if the Character has a specific Sight on a Weapon

1034.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	The weapon to check

1034.3 Keywords

`Shooter` `Pose` `Aiming`

1035 Is Sight ID

`Shooter » Sights » Is Sight ID`

1035.1 Description

Checks if the Character is currently in a specific Sight on a Weapon

1035.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	The weapon to check

1035.3 Keywords

`Shooter` `Pose` `Aiming`

VIII.III.II Events

1036 Events

1036.1 Sub Categories

- Shooter

VIII.III.II.I Shooter

1037 Shooter

1037.1 Sub Categories

- Wind

1037.2 Events

- On Equip Weapon
- On Shoot Hit
- On Unequip Weapon

1038 On Equip Weapon

```
Shooter » On Equip Weapon
```

1038.1 Description

Executed when the Character equips a new Shooter Weapon

1038.2 Keywords

`Equip` `Unsheathe` `Take` `Sword` `Shooter`

1039 On Shoot Hit

```
Shooter » On Shoot Hit
```

1039.1 Description

Executed when a shot hits the collider on this Trigger

1039.2 Keywords

`Fire` `Critical` `Gun` `Shot` `Impact`

1040 On Unequip Weapon

```
Shooter » On Unequip Weapon
```

1040.1 Description

Executed when the Character removes a new Shooter Weapon

1040.2 Keywords

`Unequip` `sheathe` `Take` `Sword` `Shooter`

VIII.III.II.I.I WIND

1041 Wind

1041.1 Events

- On Wind Change

1042 On Wind Change

`Shooter » Wind » On Wind Change`

1042.1 Description

Executed when the Wind force or direction changes

1042.2 Keywords

`Wind` `Drift` `Force` `Air` `Storm`

VIII.III.III Instructions

1043 Instructions

1043.1 Sub Categories

- Shooter

VIII.III.III.I Shooter

1044 Shooter

1044.1 Sub Categories

- Ammo
- Equip
- Jam
- Reload
- Shooting
- Sights
- Wind

VIII.III.III.I.I AMMO

1045 Ammo

1045.1 Instructions

- Change Magazine
- Change Munition

1046 Set Magazine

`Shooter » Ammo » Change Magazine`

1046.1 Description

Changes the Magazine value of a particular Weapon on a Character

1046.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	The weapon to reload the munition value
Magazine	The new value for the Weapon's Magazine

1046.3 Keywords

`Shooter` `Combat` `Ammo` `Load`

1047 Set Munition

`Shooter » Ammo » Change Munition`

1047.1 Description

Changes the Munition value of a particular Weapon on a Character

1047.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	The weapon to reload the munition value
Munition	The new value for the Weapon's Munition

1047.3 Keywords

`Shooter` `Combat` `Ammo` `Load`

VIII.III.III.I.II EQUIP

1048 Equip

1048.1 Instructions

- Equip Shooter Weapon
- Unequip Shooter Weapon

1049 Equip Shooter Weapon

`Shooter » Equip » Equip Shooter Weapon`

1049.1 Description

Equips a Shooter Weapon on the targeted Character if possible

1049.2 Parameters

Name	Description
Character	The Character reference equipping the weapon
Weapon	The weapon reference to equip

1049.3 Keywords

`Shooter` `Combat`

1050 Unequip Shooter Weapon

```
Shooter » Equip » Unequip Shooter Weapon
```

1050.1 Description

Unequip a Shooter Weapon from the targeted Character if possible

1050.2 Parameters

Name	Description
Character	The Character reference unequipping the weapon
Weapon	The weapon reference to unequip

1050.3 Keywords

`Shooter` `Combat`

VIII.III.III.I.III JAM

1051 Jam

1051.1 Instructions

- Fix Jam
- Jam

1052 Fix Jam

`Shooter » Jam » Fix Jam`

1052.1 Description

Attempts to fix a jammed Weapon

1052.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	Optional field. The weapon to fix if there are more than one

1052.3 Keywords

`Shooter` `Combat` `Fix` `Jammed` `Jamming` `Malfunction` `Feed`

1053 Jam

`Shooter » Jam » Jam`

1053.1 Description

Jams a Weapon on a Character

1053.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	Optional field. The weapon to jam if there are more than one

1053.3 Keywords

`Shooter` `Combat` `Fix` `Jammed` `Jamming` `Malfunction` `Feed`

VIII.III.III.I.IV RELOAD

1054 Reload

1054.1 Instructions

- Eject Shell
- Reload Weapon
- Try Quick Reload

1055 Eject Shell

`Shooter » Reload » Eject Shell`

1055.1 Description

Ejects a Shell from the Weapon at the specified Weapon

1055.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	Optional field. The weapon if there is more than one

1055.3 Keywords

`Shooter` `Combat` `Reload` `Shell` `Cartridge` `Empty` `Casket`

1056 Reload Weapon

`Shooter » Reload » Reload Weapon`

1056.1 Description

Attempts to Reload a Shooter Weapon

1056.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	Optional field. The weapon to Reload if there is more than one

1056.3 Keywords

`Shooter` `Combat` `Ammo` `Load`

1057 Try Quick Reload

`Shooter » Reload » Try Quick Reload`

1057.1 Description

Attempts to Cancel the Reload during a Quick Reload phase

1057.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	Optional field. The weapon to Quick Reload if there is more than one

1057.3 Keywords

`Shooter` `Combat` `Ammo` `Load` `Quick` `Fast` `Skip`

VIII.III.III.I.V SHOOTING

1058 Shooting

1058.1 Instructions

- Pull Fire Trigger
- Release Fire Trigger

1059 Pull Fire Trigger

`Shooter » Shooting » Pull Fire Trigger`

1059.1 Description

Pulls the fire trigger on a shooter weapon

1059.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	Optional field. The weapon to shoot if there are more than one

1059.3 Keywords

`Shooter` `Combat` `Shoot` `Execute` `Trigger` `Press` `Blast`

1060 Release Fire Trigger

`Shooter » Shooting » Release Fire Trigger`

1060.1 Description

Releases the fire trigger on a shooter weapon

1060.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	Optional field. The weapon to shoot if there are more than one
Shot ID	Optional Shot type to fire. Uses the default Shot if empty

1060.3 Keywords

`Shooter` `Combat` `Shoot` `Execute` `Trigger` `Press` `Blast`

VIII.III.III.I.VI SIGHTS

1061 Sights

1061.1 Instructions

- Character Lean
- Set Default Sight
- Set Sight Id

1062 Character Lean

`Shooter » Sights » Character Lean`

1062.1 Description

Leans a character towards either side

1062.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Angle	How much (in degrees) the Character leans
Speed	How fast the Character leans

1062.3 Example 1

The Character must be a Humanoid

1062.4 Keywords

`Shooter` `Peek` `Snap` `Corner` `Cover`

1063 Set Default Sight

`Shooter » Sights » Set Default Sight`

1063.1 Description

Changes the to a new Sight of the specified Shooter Weapon

1063.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	Optional field. The weapon to shoot if there are more than one

1063.3 Keywords

`Shooter` `Combat` `Aim` `Scope` `Ease` `Draw` `Holster`

1064 Set Sight ID

`Shooter » Sights » Set Sight ID`

1064.1 Description

Changes the to a new Sight of the specified Shooter Weapon

1064.2 Parameters

Name	Description
Character	The Character reference with a Weapon equipped
Weapon	Optional field. The weapon to shoot if there are more than one
Sight ID	The new Sight ID to use

1064.3 Keywords

`Shooter` `Combat` `Aim` `Scope` `Ease` `Draw` `Holster`

VIII.III.III.I.VII WIND

1065 Wind

1065.1 Instructions

- Change Wind Direction
- Change Wind Magnitude
- Change Wind

1066 Change Wind Direction

`Shooter » Wind » Change Wind Direction`

1066.1 Description

Changes the wind direction keeping its current magnitude

1066.2 Parameters

Name	Description
Direction	The new direction of the wind

1066.3 Keywords

`Wind` `Drift` `Force` `Air` `Storm`

1067 Change Wind Magnitude

`Shooter » Wind » Change Wind Magnitude`

1067.1 Description

Changes the force of the Wind keeping its current direction

1067.2 Parameters

Name	Description
Force	The new force of the wind

1067.3 Keywords

`Wind` `Drift` `Force` `Air` `Storm`

1068 Change Wind

`Shooter » Wind » Change Wind`

1068.1 Description

Changes the Direction and Force of the Wind

1068.2 Parameters

Name	Description
Direction	The new normalized direction of the wind in world space
Force	The new force of the wind

1068.3 Keywords

`Wind` `Drift` `Force` `Air` `Storm`

VIII.IV Releases

1069 Releases

1069.1 2.1.3 (Latest)

Released October 18, 2024

New

- Aim: Pointer onto Raycast for top-down and side-scrollers
- Weapon: Power value under Fire section for Reactions
- Weapon: Projectiles have optional Impact Effect spawner
- Instruction: Set Weapon Munition on Character
- Instruction: Set Weapon Magazine on Character
- Condition: Has Weapon Equipped
- Event: On Character equip Shooter Weapon
- Event: On Character unequip Shooter Weapon
- Property: Get Shooter Weapon from Variables
- Property: Last Weapon shot
- Property: Last Weapon Prop shot
- Property: Last Muzzle position and direction shot
- Property: Last Projectile Hit
- Property: Last Shot charge ratio
- Property: Last Shot total distance
- Property: Last Shot number of pierces

Enhances

- Editor: Hide empty IK Biomechanic options
- Examples: Sights with Scopes have offset for head

Changes

- Unity: Support for Unity 6

Fixes

- Weapon: Loop Audio stops when unequipping Weapon

1069.2 2.0.2

Released August 9, 2024

Fixes

- Examples: Error installing demo samples

1069.3 2.0.1

Released August 9, 2024

New

- First release

IX. Melee

1070 Melee

Creating a deep combat system requires much more than playing animations and detecting what enemies pass through the blade of the attacker.

The **Melee** module aims to provide a generic framework to build your own combat system, whether it's a methodical and deliberate or fast paced with crazy combos.

Get Melee

Requirements

The **Melee** module is an extension of **Game Creator 2** and won't work without it

1071 Setup

Welcome to getting started with the **Melee** module. In this section you'll learn how to install this module and get started with the examples which it comes with.

1071.1 Prepare your Project

Before installing the **Melee** module, you'll need to either create a new Unity project or open an existing one.

> **Game Creator**
>
> It is important to note that **Game Creator** should be present before attempting to install any module.

1071.2 Install the Melee module

If you haven't purchased the **Melee** module, head to the Asset Store product page and follow the steps to get a copy of this module.

Once you have bought it, click on Window → Package Manager to reveal a window with all your available assets.

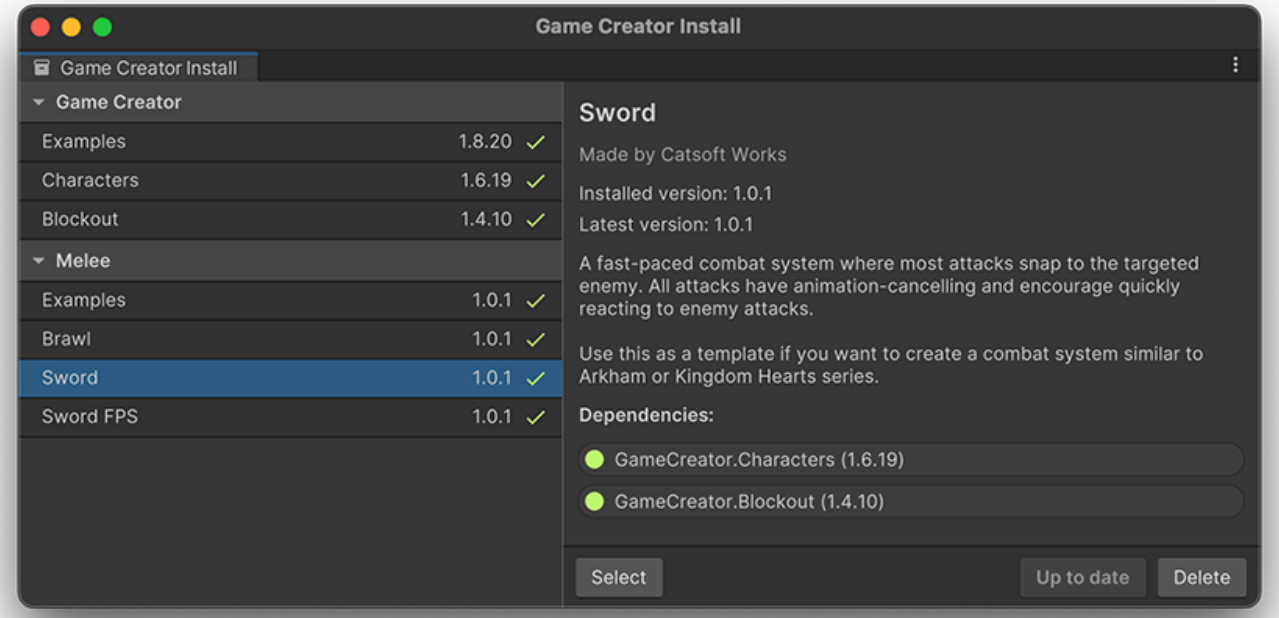
Type in the little search field the name of this package and it will prompt you to download and install the latest stable version. Follow the steps and wait till Unity finishes compiling your project.

1071.3 Examples

We highly recommend checking the examples that come with the **Melee** module. To install them, click on the *Game Creator* dropdown from the top toolbar and then the *Install* option.

The **Installer** window will appear and you'll be able to manage all examples and template assets you have in your project.

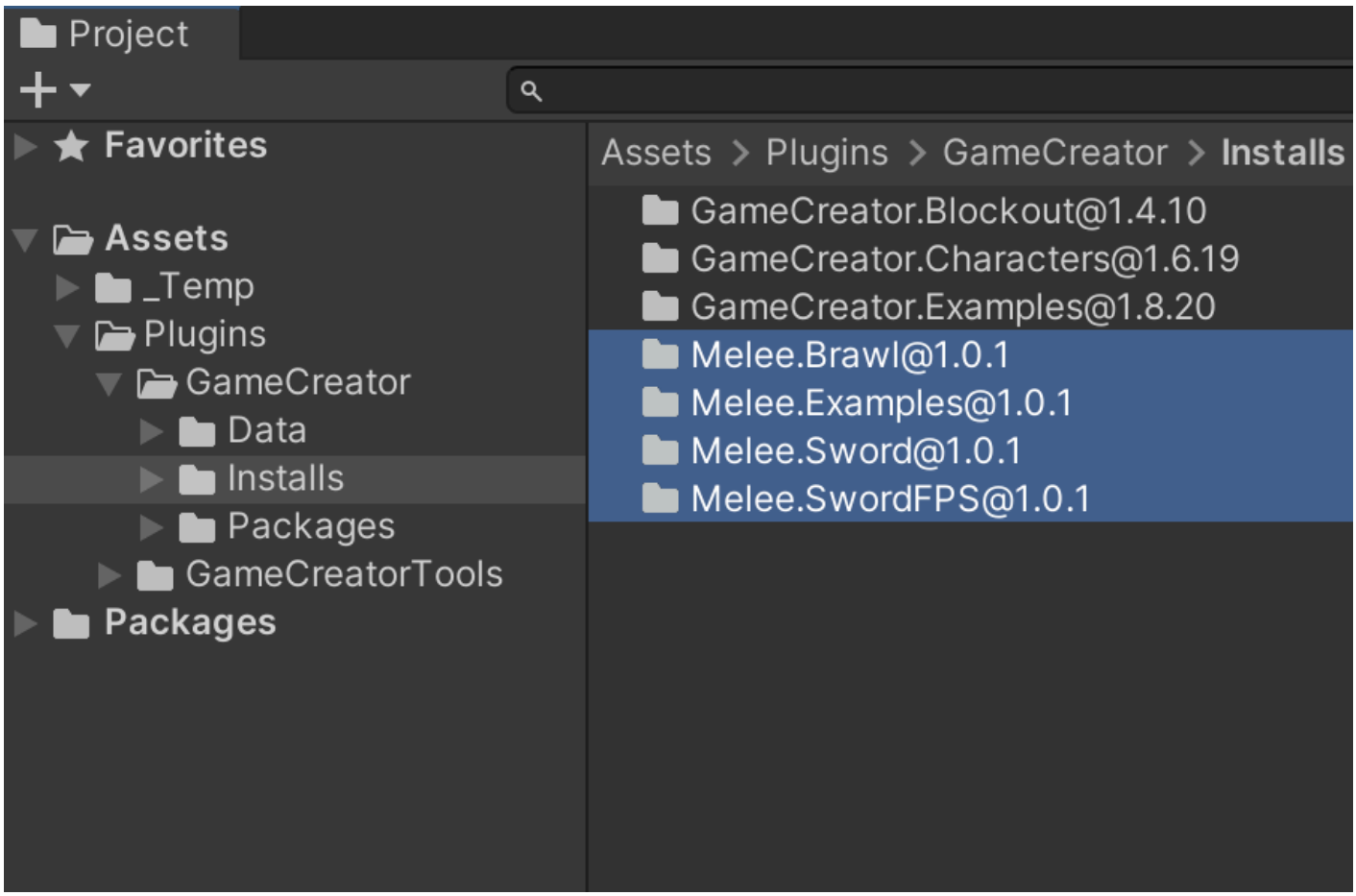
- **Examples**: A collection of scenes with different use-case scenarios
- **Brawl**: A deliberate and realistic combat system where characters fight with punches and kicks similar to Souls-like games
- **Sword**: A more complex and free-flow combat system with fast-paced animations similar to Devil May Cry and Kingdom Hearts
- **Sword FPS**: A simple combat system tailored to first-person view



The **Examples** requires all combat systems in order to work.

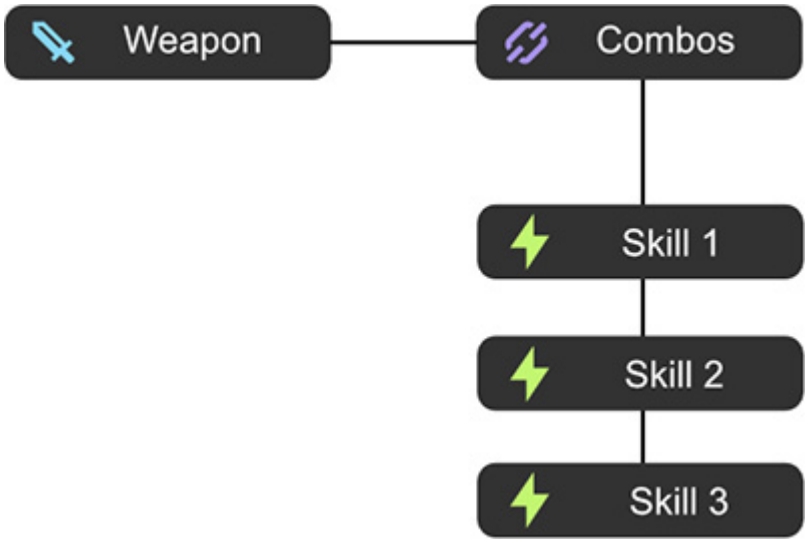
> ✓ **Dependencies**
>
> Clicking on the **Examples** install button will install all dependencies automatically.

Once you have the examples installed, click on the *Select* button or navigate to `Plugins/GameCreator/Installs/Melee.Examples/`.


Project
Favorites
Assets
_Temp
Plugins
GameCreator
Data
Installs
Packages
GameCreatorTools
Packages
Assets > Plugins > GameCreator > Installs
GameCreator.Blockout@1.4.10
GameCreator.Characters@1.6.19
GameCreator.Examples@1.8.20
Melee.Brawl@1.0.1
Melee.Examples@1.0.1
Melee.Sword@1.0.1
Melee.SwordFPS@1.0.1

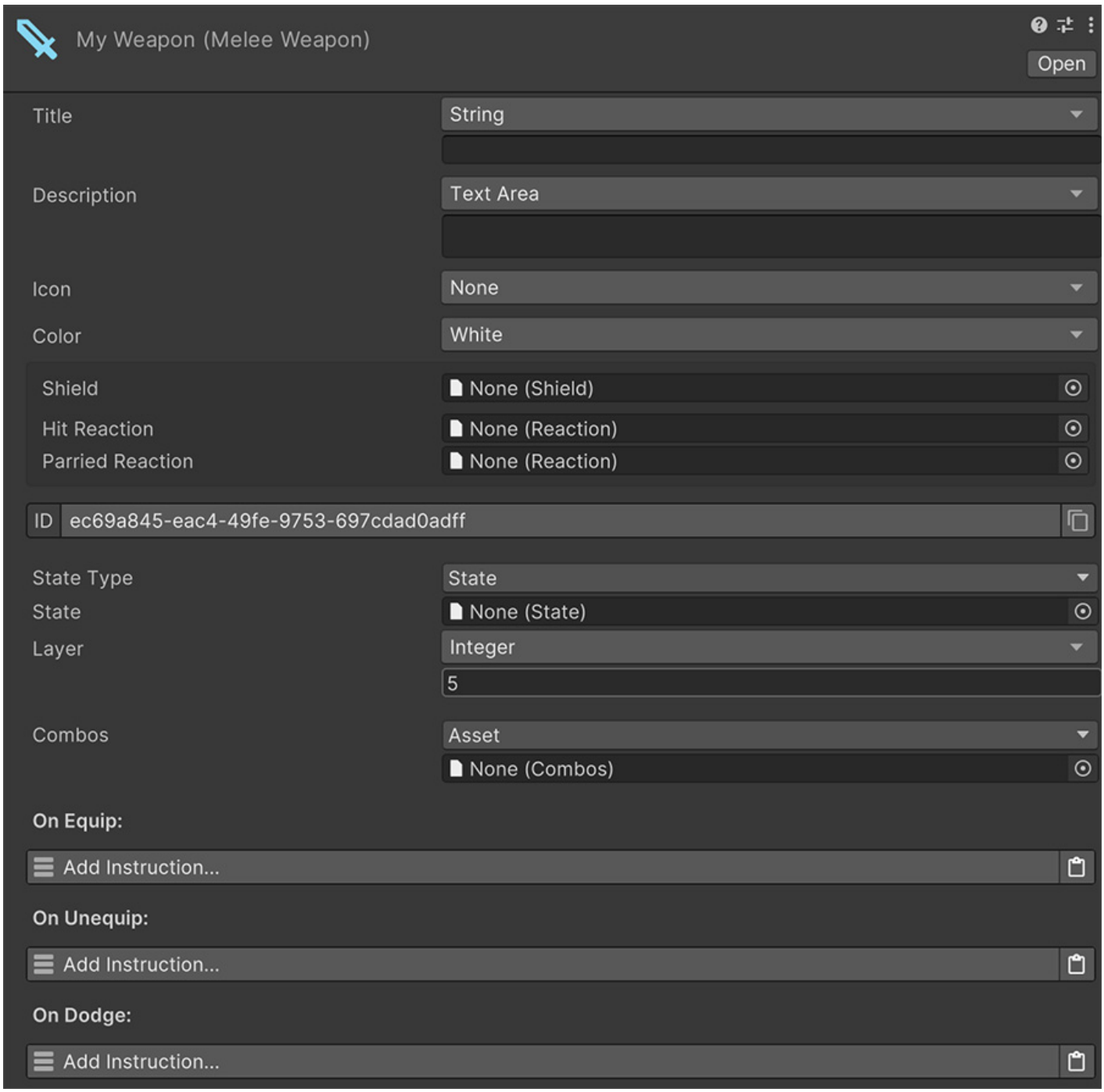
1072 Weapons

When a **Character** has a **Weapon** equipped, it can be used to execute **Skills** using the **Combo** asset defined and the **Input** fed or directly using the **Play Skill** instruction.



1072.1 The Weapon Asset

To create a new **Weapon** asset, right click on the *Project Panel* and select *Create* → *Game Creator* → *Melee* → *Weapon*.



Title and **Description** allow to give it a name and description, which can later be used to display on the user interface. **Icon** and **Color** provide similar functionality for changing the graphic and its tint color.

> **Give it a unique ID**
>
> **Weapons** are identified by their unique **ID** value, not by the asset name. Make sure all your weapons have a unique ID value!

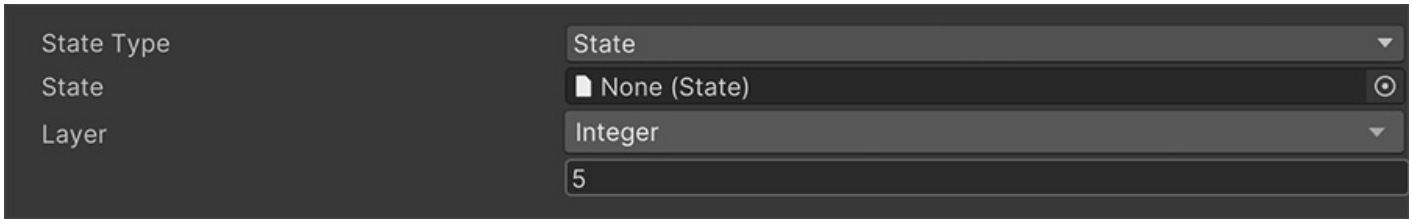
1072.1.1 Shields & Reactions

The **Shield** field is only necessary if you're using any kind of blocking mechanic. How blocking attacks work is covered more in depth in the **Shields** section.

The **Hit Reaction** and **Parried Reaction** fields allow to define a **Reaction** asset that plays an animation when the character gets hit or its attack is parried by another character.

1072.1.2 States

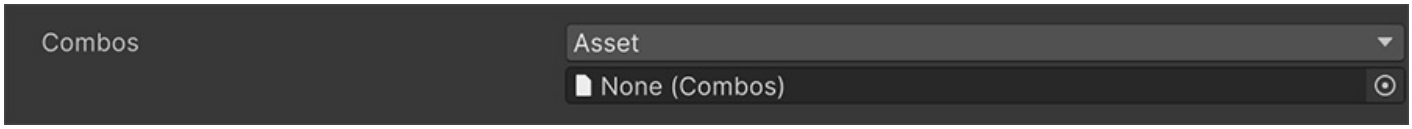
When a **Weapon** is equipped, the character using it can automatically switch to the defined animation **State**. This allows, for example, to hold a sword with the right hand when equipping a *Sword Weapon* and change the gait when wielding it.



> **State Layer**
>
> It's very important to be conscious about the **State Layer** field! By default, all characters equipping a weapon will use the layer index 5 as the layer index. **Shields** use the layer index 7, which is two units higher than the **Weapon** layer index so that the blocking state overrides the weapon one during that state. Layer 6, by default, is reserved for **Charged Skills**.

1072.1.3 Combos

The **Combos** field allows to define which **Skills** will be executed under which conditions when inputting *Charge* and *Execute* commands (see **Input** for more information).

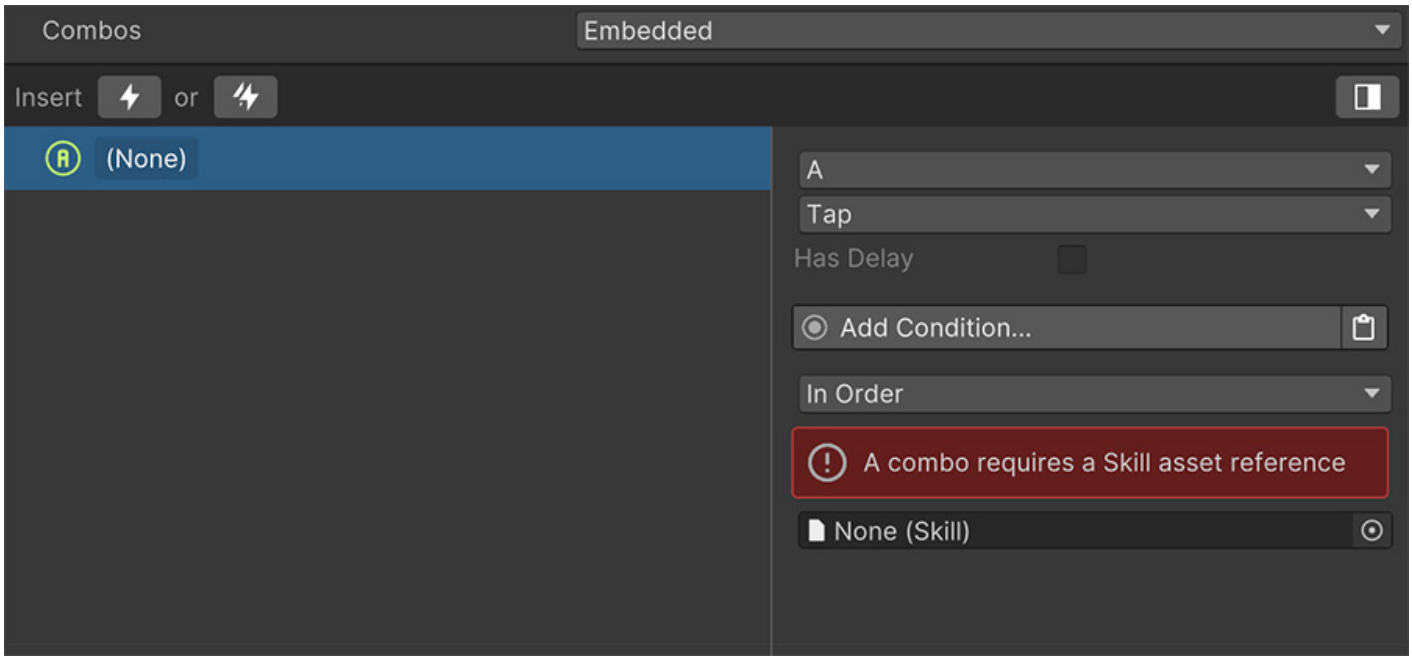


There are two ways to define the **Combos** of a weapon: Using a **Combo** reference asset, or embedding one directly.

Use Combo references

We recommend using **Combo** asset references when possible as they are more flexible and allow to reuse the same move-sets for multiple weapons. However if you're certain you'll only use one move-set for a particular weapon, you can embed it directly and save up space in your project folder.

To embed a **Combo** directly you can use the *Embedded* option and the field below will turn into a **Combo Tree** where you can define the order and conditions in which attacks are executed.



1072.1.4 Instructions

The **On Equip** instructions are executed whenever this **Weapon** is equipped by a *Character*. This is the perfect place to instantiate and attach a prop representing the weapon onto the targeted character.

The **On Unequip** instructions are executed when the **Weapon** is unequipped by the *Character*.

The **On Dodge** instructions are executed when the **Weapon** wielder dashes through an attack and is invulnerable during those frames.

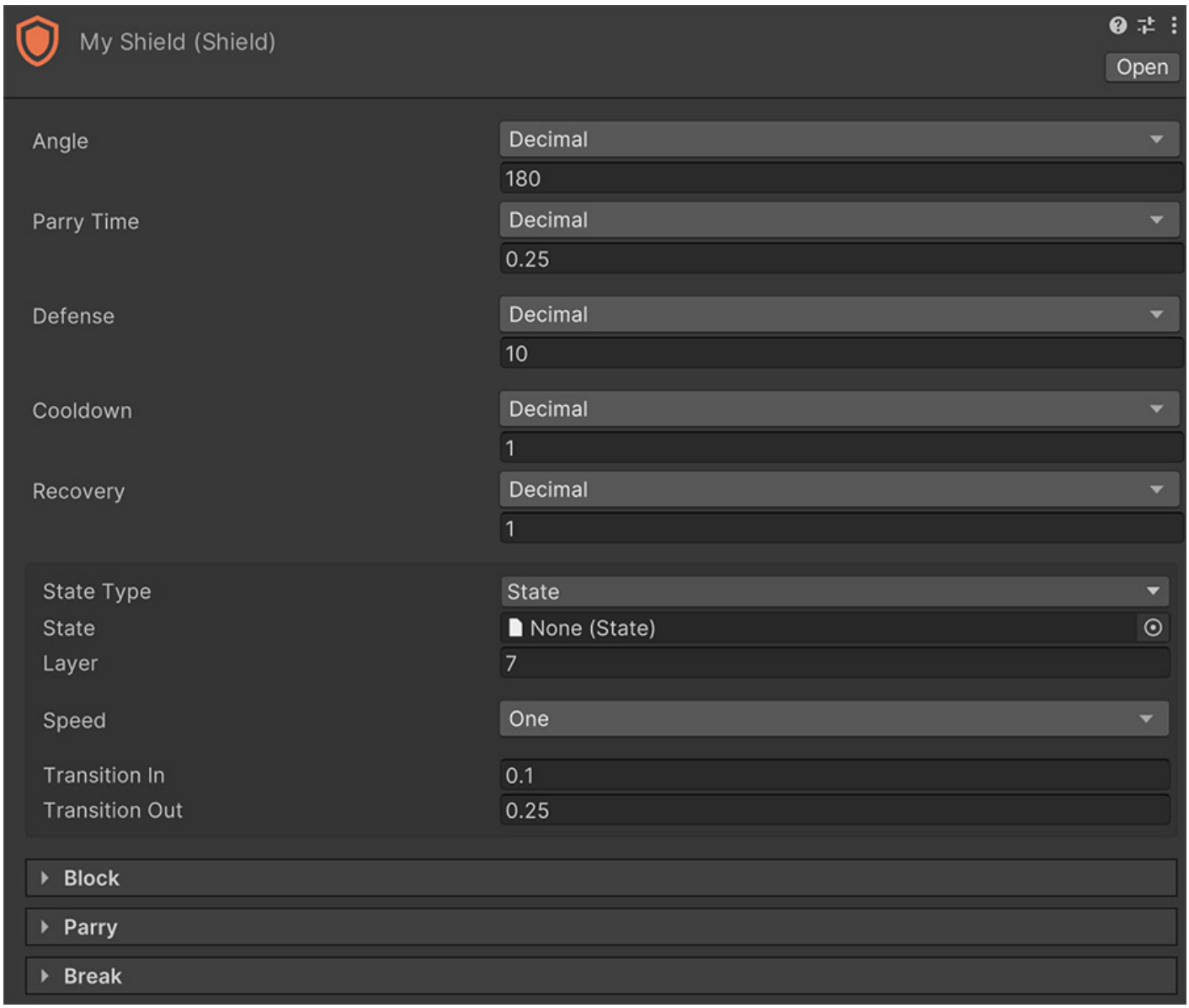
1073 Shields

Shields are optional assets that allow to block incoming attacks.

> **Blocking, Parrying and Breaking**
>
> Because there is no standard nomenclature throughout all games we decided to pick the following terms. However you can choose to name them in your game as you see fit:
>
> - **Block**: Stop any incoming attack while shielding that isn't a *Parry*.
> - **Parry**: Stop an attack where the time window between raising the shield and blocking is shorter than a certain amount. Some games call this *Deflect* or *Perfect Blocking*.
> - **Break**: Whenever the defense position of a character is broken, due to receiving too many impacts.

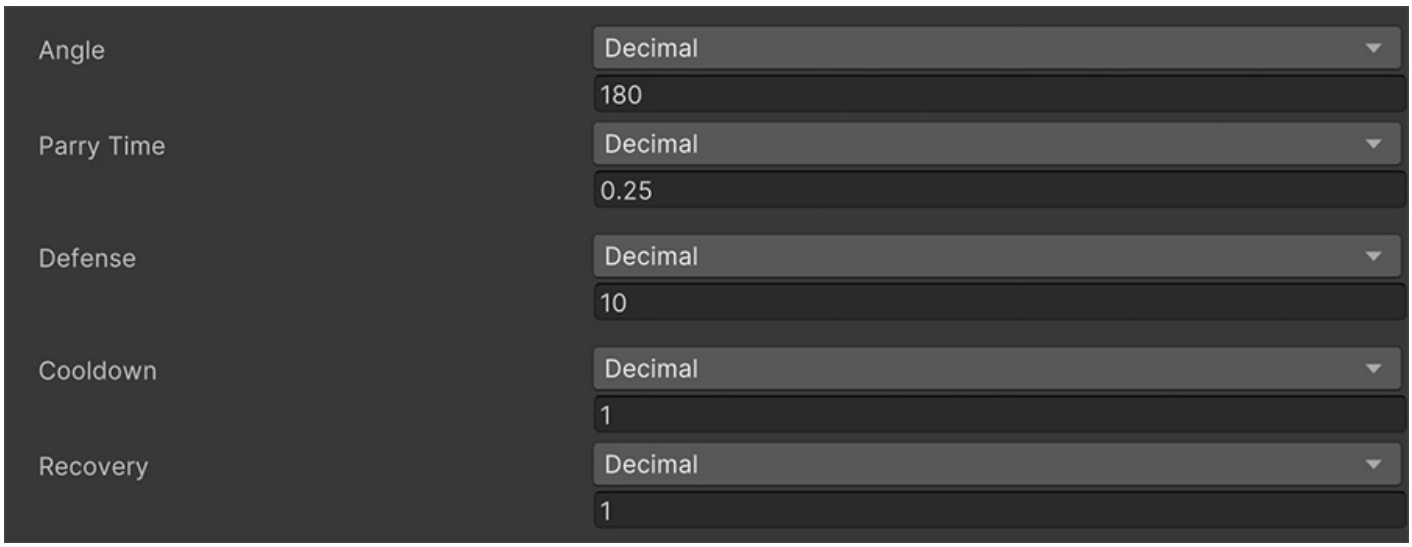
1073.1 The Shield Asset

To create a new **Shield** asset, right click on the *Project Panel* and select *Create* → *Game Creator* → *Melee* → *Shield*.



1073.1.1 Defense

The upper-most values determine how the weapon can defend from incoming attacks.



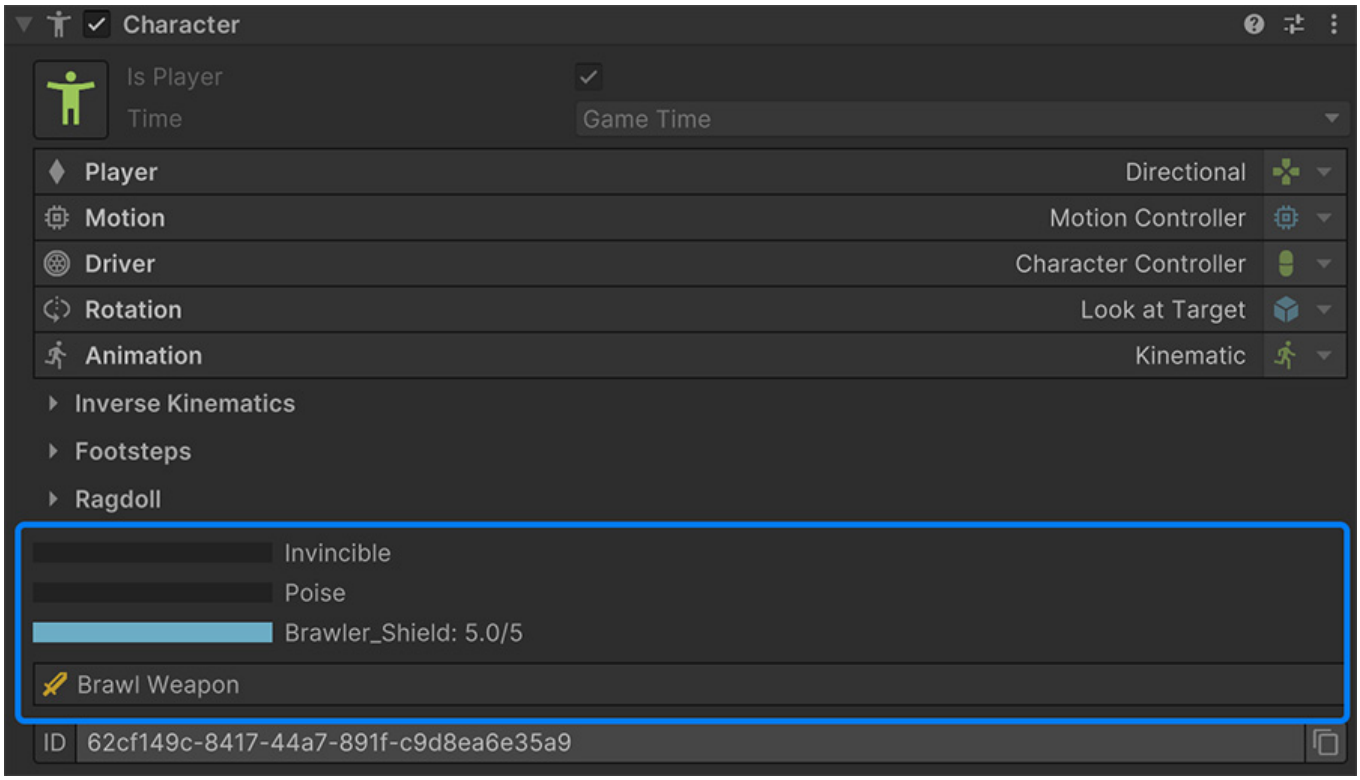
The **Angle** field determines how aligned must the character be towards the attack in order to block it, starting from the front. For example, if the angle is 180 degrees, the character will defend from any attack that comes from the front and sides. A value of 360 will block any attacks from any direction.

The **Parry Time** field determines the maximum time window, in seconds, between the block starts and an attack connects to be considered a **Parry**. If the time between raising the shield and blocking the attack is higher than this value, it will be considered a normal **Block**.

The **Defense** value is a number that decreases with each blocked attack. If the value reaches zero, the defense will be **broken** and any other attack will hit the *Character*.

Visualizing the Defense value

To visualize the current **Defense** of a character, enter *Play Mode* and select the character. Once a weapon is equipped, a few new fields will appear at the end showcasing the currently equipped weapons and combat values.

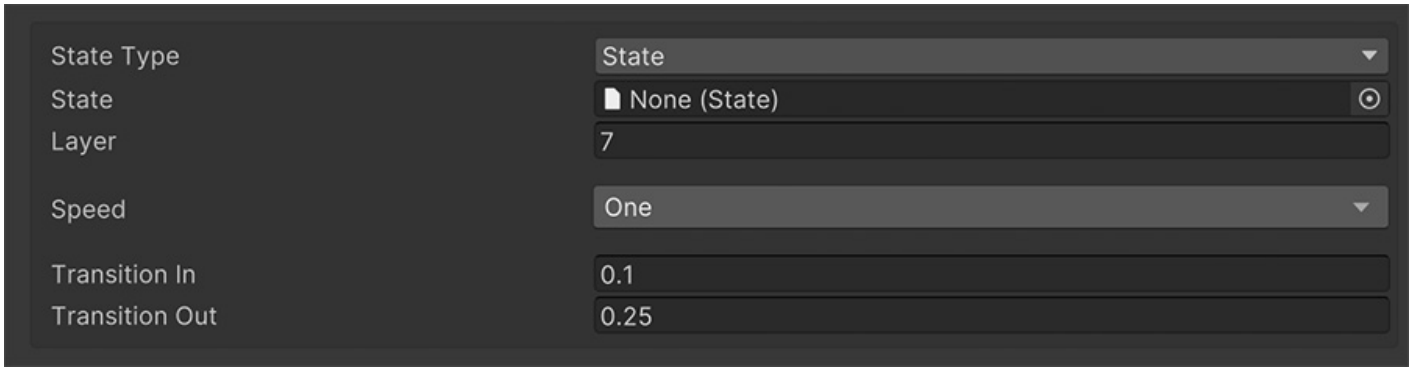


The **Cooldown** determines how long it takes to start recovering **Defense** after decreasing it from a blocked attack.

The **Recovery** field determines the pace at which **Defense** is recovered, in seconds. For example, a value of 2 means it will recover 2 units per second.

1073.1.2 States

A **Shield** allows to change the animation **State** of the character when rising the shield and stop it automatically when lowering the defense.



State Layer

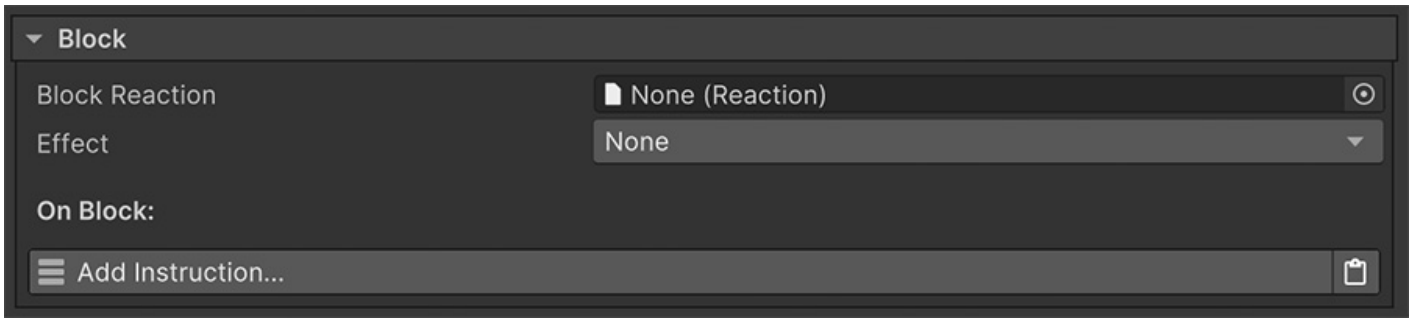
It's very important to be conscious about the **State Layer** field! By default, all characters equipping a weapon will use the layer index 5 as the layer index. **Shields** use the layer index 7, which is two units higher than the **Weapon** layer index so that the blocking state overrides the weapon one during that state. Layer 6, by default, is reserved for **Charged Skills**.

The **Speed** field allows to run the whole **State** animations faster or slower using a coefficient. A value of 1 means the animation will run normally and a value of 0.5 means the animations will be in slow-motion.

Transition In and **Transition Out** fields determine the time in seconds it takes to blend into the state. We recommend using small values, between 0.1 and 0.5 seconds.

1073.1.3 Blocking

Blocking happens whenever the character blocks an incoming attack that isn't perfectly blocked (also known as *parried*).



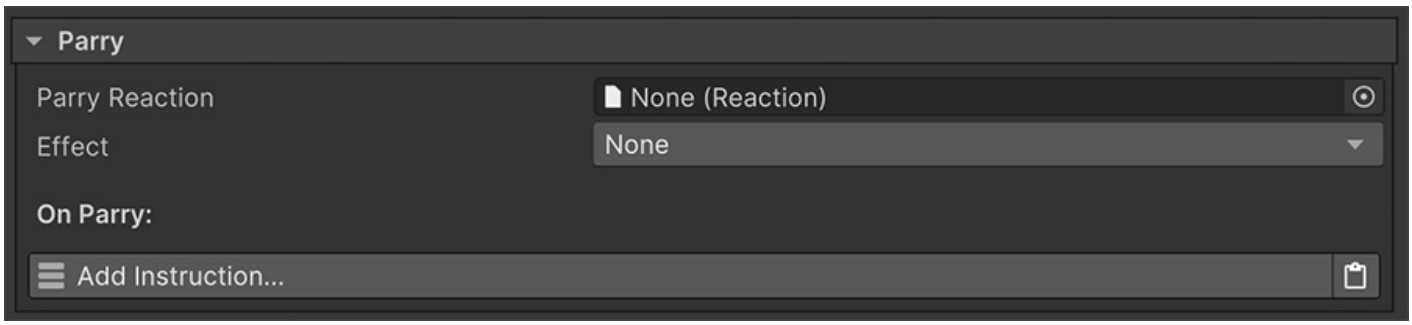
The **Block Reaction** field allows to play an animation gesture when blocking an attack. See **Reactions** for more information.

The **Effect** field allows to instantiate a prefab at the point of impact. For example, a particle effect that highlights the blocking.

The **On Block** instructions are executed every time an attack is blocked, regardless of the type of attack. When these instructions are executed, *Self* refers to the character blocking the attack, and *Target* to the attacker.

1073.1.4 Parrying

Parrying happens whenever the character blocks an incoming attack and the time between raising the shield and the impact is less than a certain amount of time. This mechanic is also commonly known as *perfect blocking*.



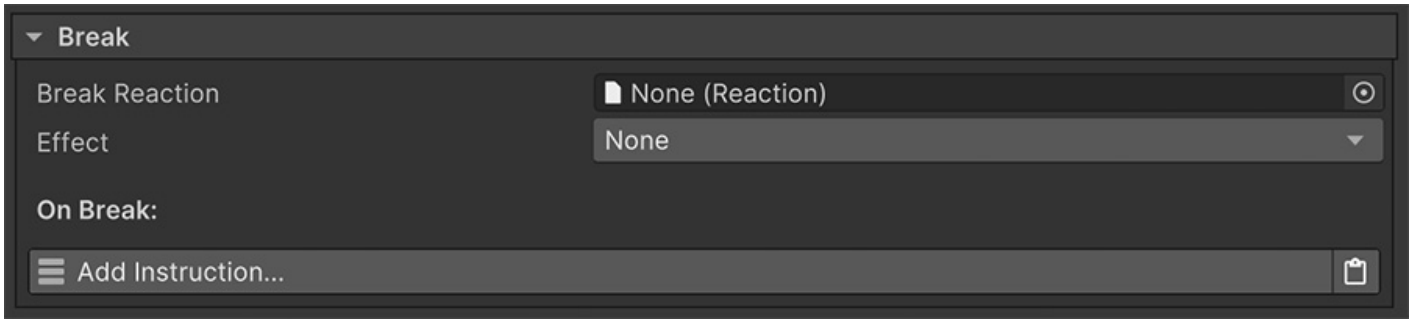
The **Parry Reaction** field allows to play an animation gesture when parrying an attack. See **Reactions** for more information.

The **Effect** field allows to instantiate a prefab at the point of impact. For example, a particle effect that highlights the parry.

The **On Parry** instructions are executed every time an attack is parried, regardless of the type of attack. When these instructions are executed, *Self* refers to the character blocking the attack, and *Target* to the attacker.

1073.1.5 Breaking

Breaking happens whenever the character's blocking defense is broken. When a character starts blocking, it has a defense gauge that decreases with every attack blocked. If the gauge value reaches zero, the defense becomes broken and the character is open to attacks.



The **Break Reaction** field allows to play an animation gesture when the defense is broken. See **Reactions** for more information.

The **Effect** field allows to instantiate a prefab at the point of impact. For example, a particle effect that highlights the point where the defense is broken.

The **On Break** instructions are executed every time the defense is broken, regardless of the type of attack. When these instructions are executed, *Self* refers to the character blocking the attack, and *Target* to the attacker.

IX.I Skills

1074 Skills

Skills are assets that define an action performed by a character.

Wide range of use-cases

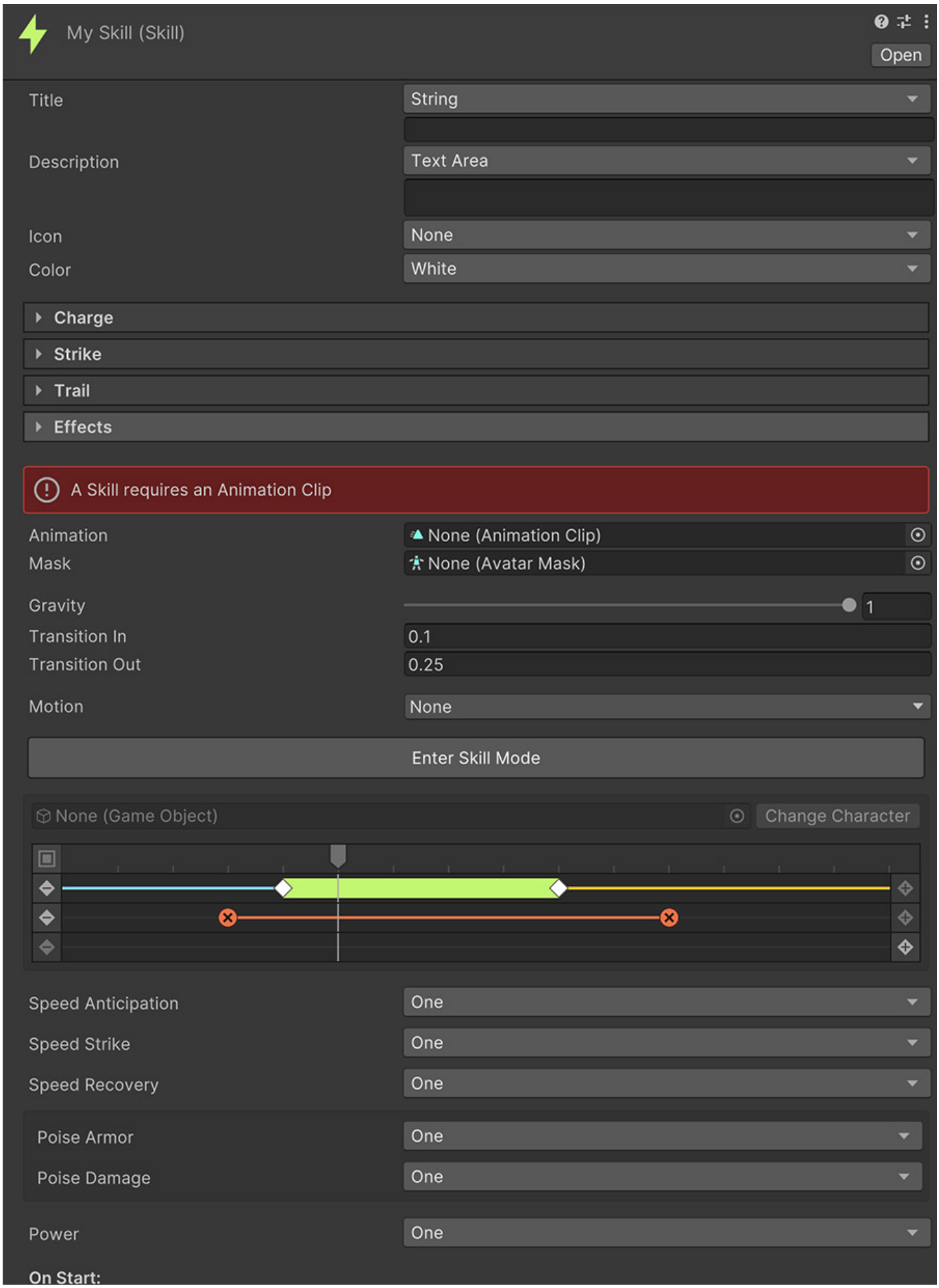
The most common use-case of a **Skill** is a single attack, but it can also be a synchronized takedown, an attack cutscene or even a non-attack animation.

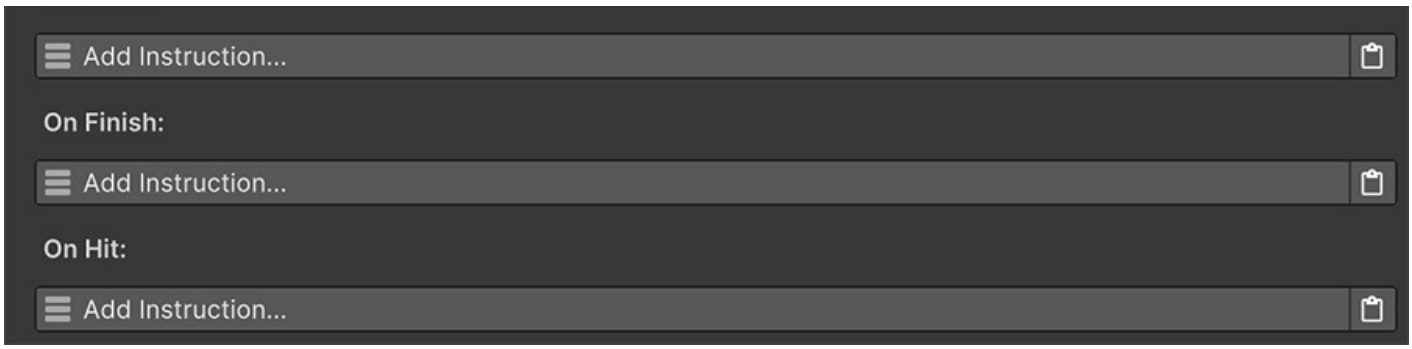
1074.1 The Skill Asset

To create a new **Skill** asset, right click on the *Project Panel* and select *Create* → *Game Creator* → *Melee* → *Skill*.

Asset Complexity

The **Skill** asset is a very complex one. This page goes over each one of its parts without much detail. There will be a link annexed to each sub-section that deep-dives into its features.

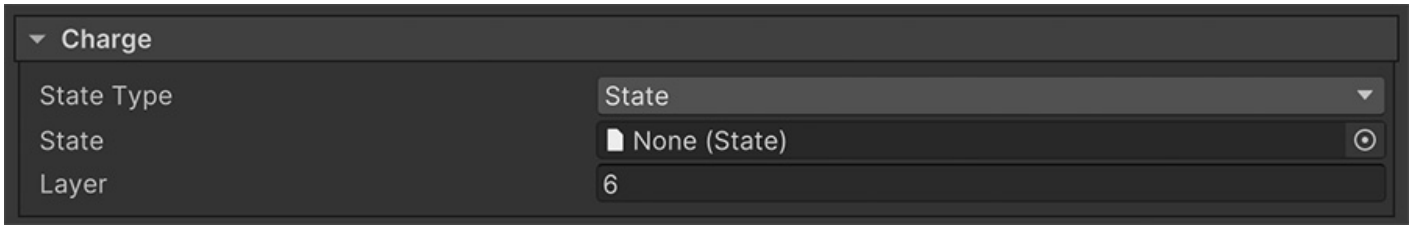

My Skill (Skill)
Open
Title
String
Description
Text Area
Icon
None
Color
White
Charge
Strike
Trail
Effects
A Skill requires an Animation Clip
Animation
None (Animation Clip)
Mask
None (Avatar Mask)
Gravity
1
Transition In
0.1
Transition Out
0.25
Motion
None
Enter Skill Mode
None (Game Object)
Change Character
Speed Anticipation
One
Speed Strike
One
Speed Recovery
One
Poise Armor
One
Poise Damage
One
Power
One
On Start:



Title and **Description** fields allow to optionally give the skill a name and an explanation about what it does. These values, along with **Icon** and **Color** are used to display information on the user interface.

1074.1.1 Charge

The **Charge** section defines the behavior of the skill when using it as a charge. A charge happens when the character holds a pose during a certain amount of time before executing the animation and its effects.

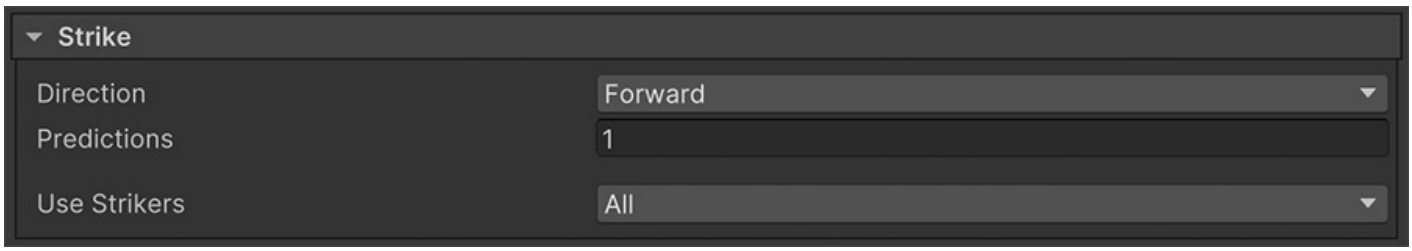


The **Charge** section allows to specify an animation **State** that the character enters before executing the **Skill**.

> **More Information**
>
> For more information about **Charged Attacks**, see the Charges section.

1074.1.2 Strike

The **Strike** section is relevant for **Skills** that deal damage to other characters.



The **Direction** field determines the direction, from the attacker's perspective, in which the **Skill** affects the enemy.

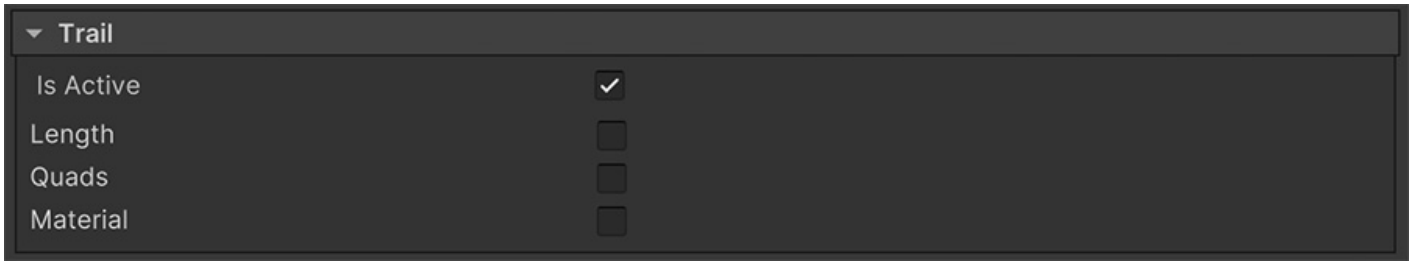
The **Predictions** field allows to define how many inter-frame physics predictions are performed. In most cases, a single prediction should be enough. However if the animations are so fast that the weapon ghosts-through enemies, this value can be fine-tuned until the attack detects all possible enemies.

The **Use Strikers** dropdown allows to define which weapon **Strikers** to use. This is especially useful if your game allows to equip multiple weapons and you only want one of them to hit enemies during this attack.

> **More Information**
>
> For more information about **Strikes** and how to configure them, see the **Strikes** sub-section.

1074.1.3 Trail

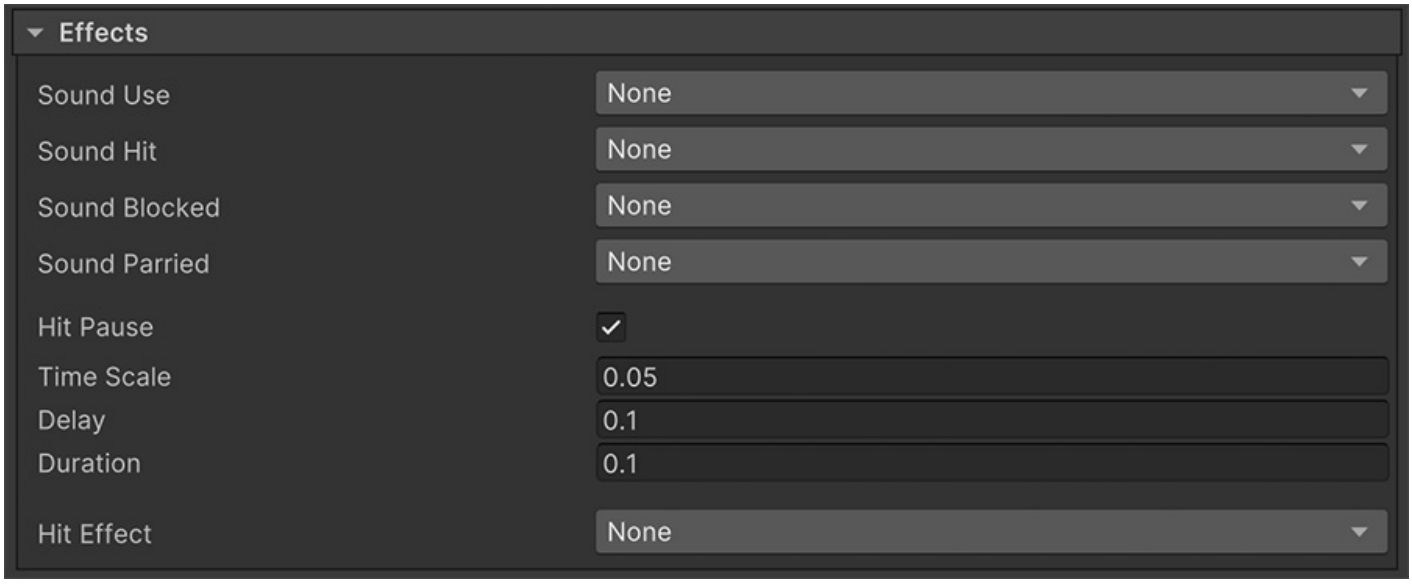
The **Trail** section allows to override the default trail left by **Strikers** when attacking an enemy. Each checkbox allows to change the value of the trail option.



> **More Information**
>
> For more information about **Trails** and what each option does, see the **Striker's Trail** section.

1074.1.4 Effects

The **Effects** section allows to define what happens when the **Skill** is used.



For example, the **Sound** fields allow playing sound effects when using, hitting, getting blocked and parried.

Sound Variation

In order to avoid playing the exact same sound effect over and over again, **Melee 2** sound effects have a slight random pitch variation.

The **Hit Pause** checkbox enables hit-pause (also known as Hit Freeze) when the **Skill** successfully hits something.

Time Scale determines the time coefficient at which time slows during the hit.

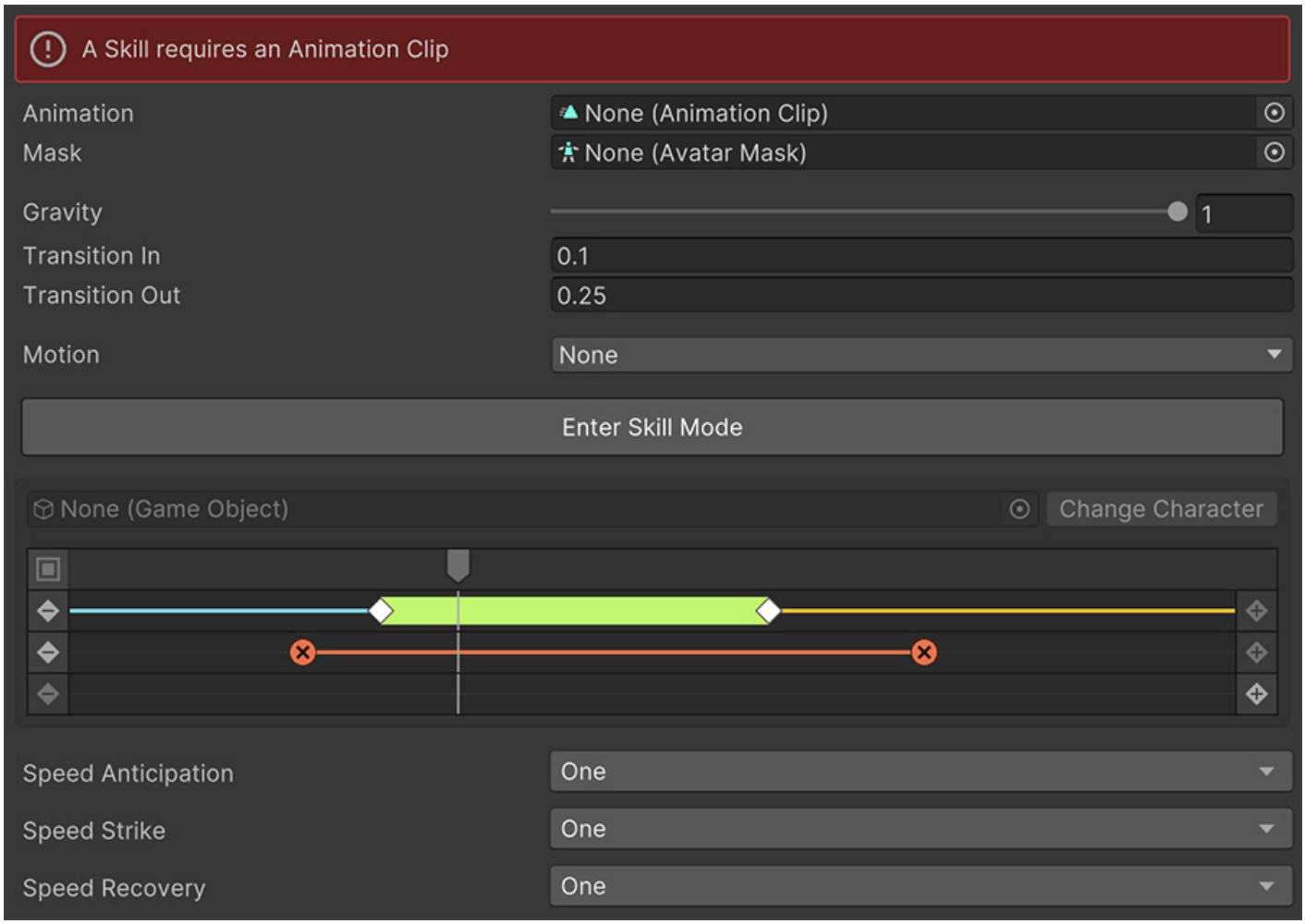
Delay allows to introduce an unscaled time delay. This is useful if you want to slow time after a slash to showcase the trail better.

Duration is the unscaled time in seconds that the hit-pause effect takes effect.

The **Hit Effect** field allows to instantiate a prefab object at the point of impact after a successful hit.

1074.1.5 Sequencer

The **Sequencer** is the most important section of a **Skill**. It determines the animation played and all the events that are executed when it plays.

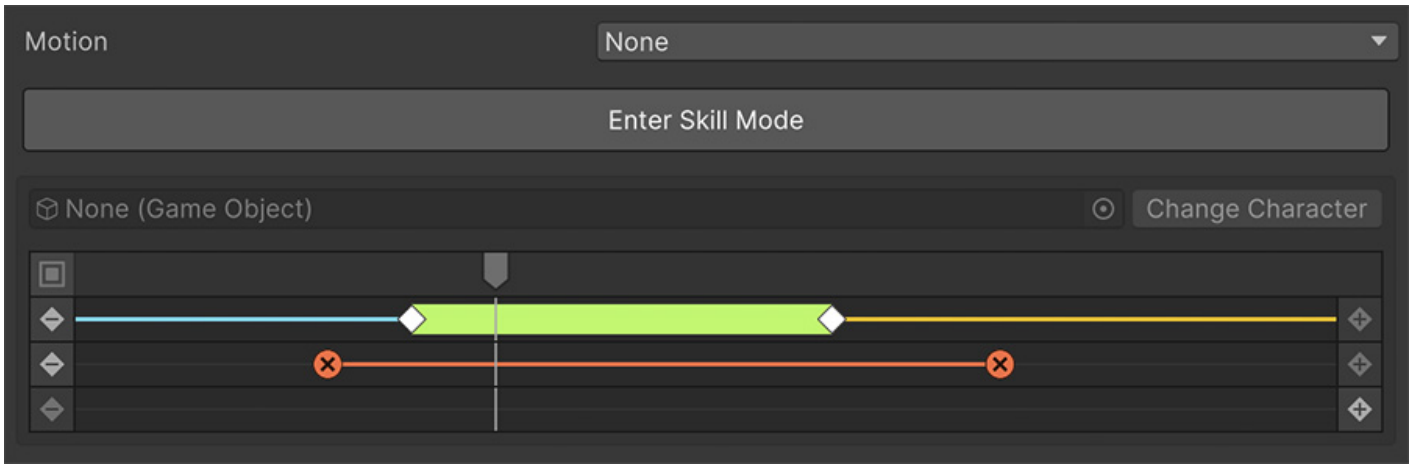


The **Animation** field is required in order to run a **Skill**. It will play an animation using the *Gestures* system from the character and allows to attach events and phases in the timeline tool below.

An **Avatar Mask** can also be provided in order to play the animation on certain bones of the character. For example, slash with a sword with the right hand while letting the rest of the body play the locomotion animation.

Gravity determines how strong the downward force on a character is when executing the **Skill**. The most common scenario will have a value of 1, where the character is affected by gravity. However, if the **Skill** allows the character to jump, reducing or setting the gravity value to zero will help the character snap out of the ground.

The **Transition In** and **Transition Out** fields allow to define the blend-time between the character's current animation and the **Skill**'s animation. It's recommended to use small values such as 0.1 or 0.3.



The **Motion** field defines the type of motion the character will use when playing the **Skill**. There are three possible values:

- **None**: The *Skill* doesn't take over the motion of the character and it's free to move as it plays out.
- **Root Motion**: The *Skill* overrides the character's locomotion and uses the animation clip's root motion.
- **Motion Warping**: Similar to root motion, but also allows to define a range in which the character interpolates its position and rotation towards a destination.

> **Information about Motion**
>
> For a complete deep-dive into **Motion**'s details, see the Motion page.

The **Enter Skill Mode** button allows to preview the animation on the scene-view and tweak the different **Phases** and **Motion** values from the **Sequencer** below.

Once in *Skill Mode* the default character will appear on the screen and the animation can be previewed by scrubbing the timeline below.

Character Model

You can change the character model by dragging and dropping your own model onto the corresponding field and clicking the *Change Model* button. The **Skill** will remember which model is used for this one.

Information about Sequencer

For a complete deep-dive into the **Sequencer**'s options, see the Sequence page.

The three **Speed** fields allow to determine the speed coefficient of each one of the *Attack Phases*. If the **Skill** doesn't have any attack phases, the **Anticipation Speed** will be used as a coefficient of the animation's speed.

A value of 1 means the animation plays at its normal rate, while a value of 2 means it will play twice as fast.

1074.1.6 Poise

A **Skill** has two **Poise** values:

- **Poise Armor**: Determines the poise defense value when a character uses this **Skill**.
- **Poise Damage**: Determines the poise damage it inflicts when a character uses this **Skill**.

When a character starts executing a **Skill** it starts with its full *Poise Armor* value. If during the execution of the **Skill** it receives an attack, it will get its armor damaged by the attacker's *Poise Damage* skill value.

If after receiving an attack its *Poise Armor* reaches zero, the current **Skill** will be interrupted and a **Hit Reaction** will be played instead.

Information about Poise

For a complete deep-dive into the **Poise** system, see the Poise page.

1074.1.7 Power

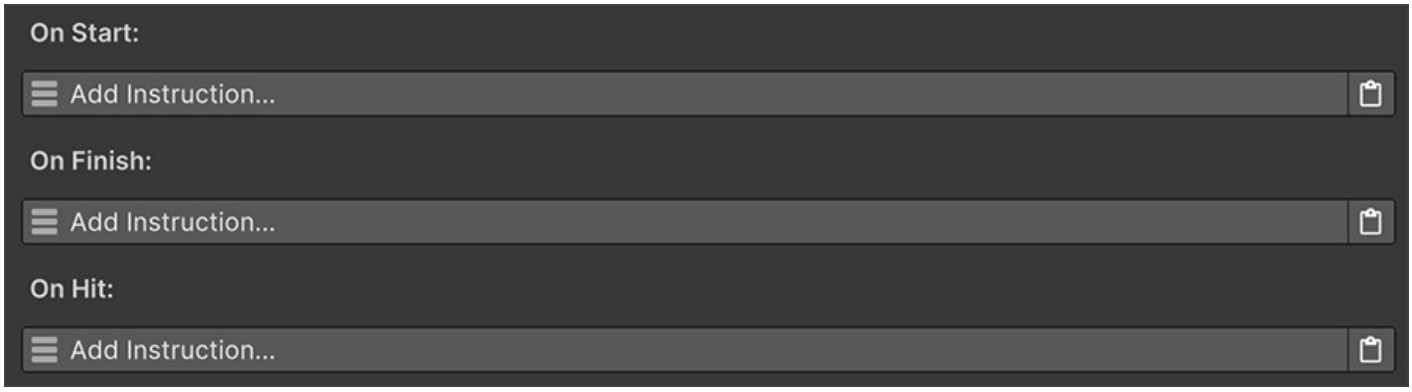
The **Power** of a **Skill** can be used to play different animations depending on its strength. For example, a normal attack could have a value of 1 while a powerful blunt attack could have a value of 2.

These values can be used in the **Reaction** assets to play a different reaction in each case. For example, the normal attack could execute a small flinch while the powerful blunt attack could make the victim play a knock-back animation.

1074.1.8 Instructions

There are three **Instruction Lists** called under different circumstances:

- **On Start**: These instructions are called as soon as the **Skill** starts to play. The *Self* value references the character playing the skill.
- **On End**: These instructions are called whenever the **Skill** stops playing, even if it's interrupted by a poise-break or another skill.
- **On Hit**: These instructions are called whenever the **Skill** lands a successful attack onto another character. The *Self* value references the character attacking and *Target* references the victim.

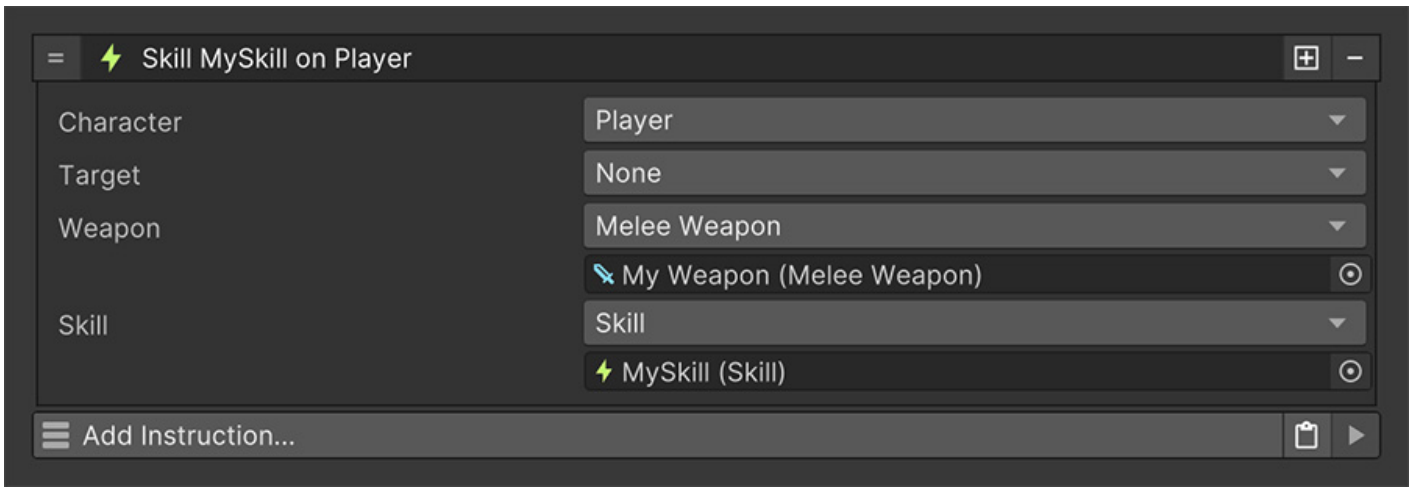


Dealing Damage

The **On Hit** instruction list is the perfect place to deal damage to the enemy, either using a **Formula** from the Stats module or using **Local Variables**.

1074.2 Running Skills

At any given point a **Skill** can be forced on a character using the **Play Melee Skill** instruction.

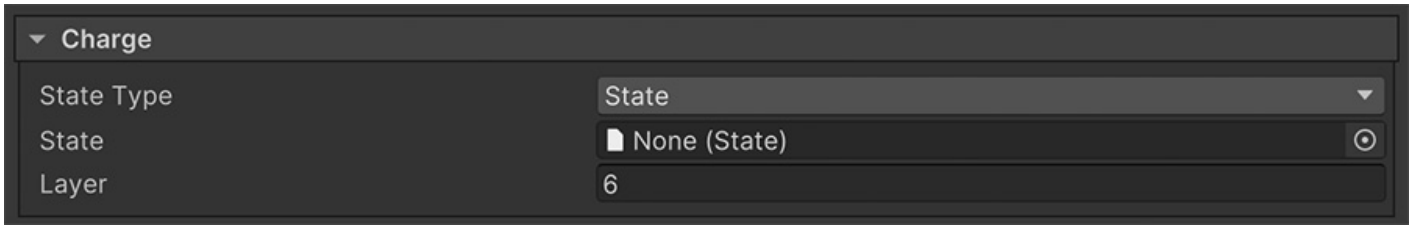


All you need to specify is the character that's going to play the **Skill** and information necessary for the correct execution.

1075 Charges

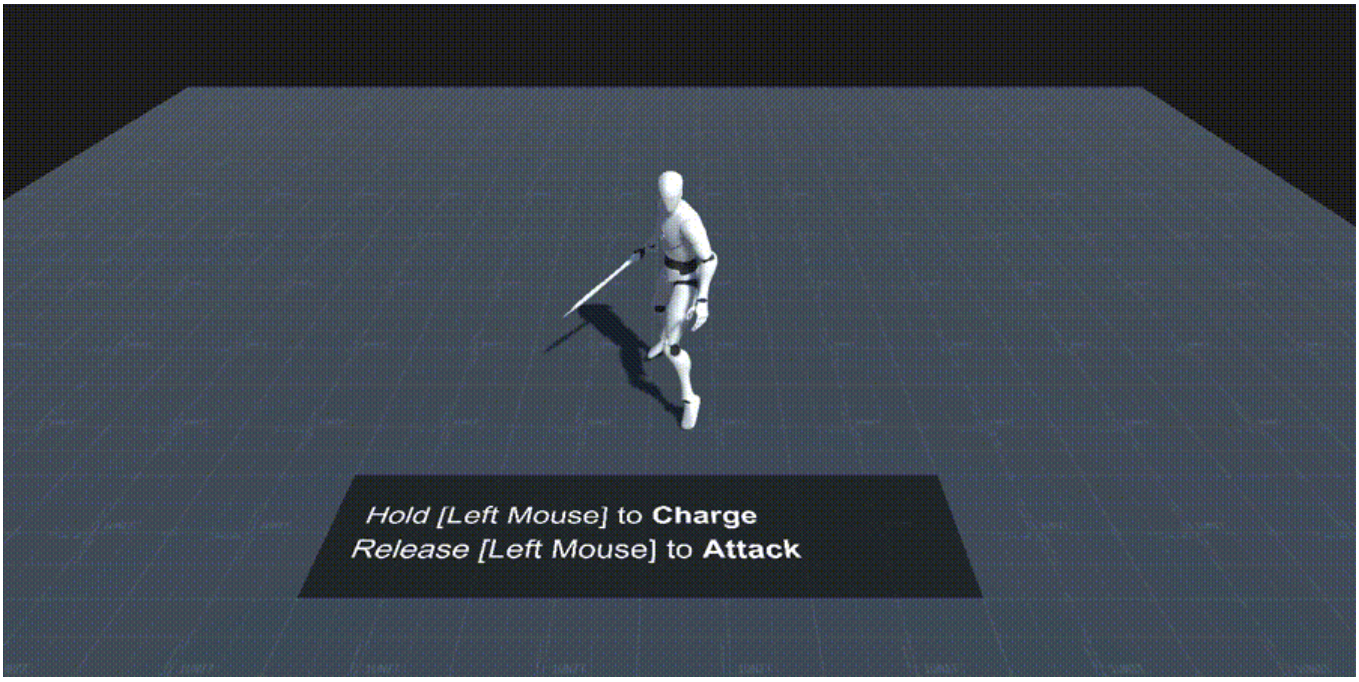
The **Skill** asset allows to very easily define *Charged Attacks*.

When a *Charge* skill starts it will enter an animation **State** which may (or may not) change the character's locomotion properties.

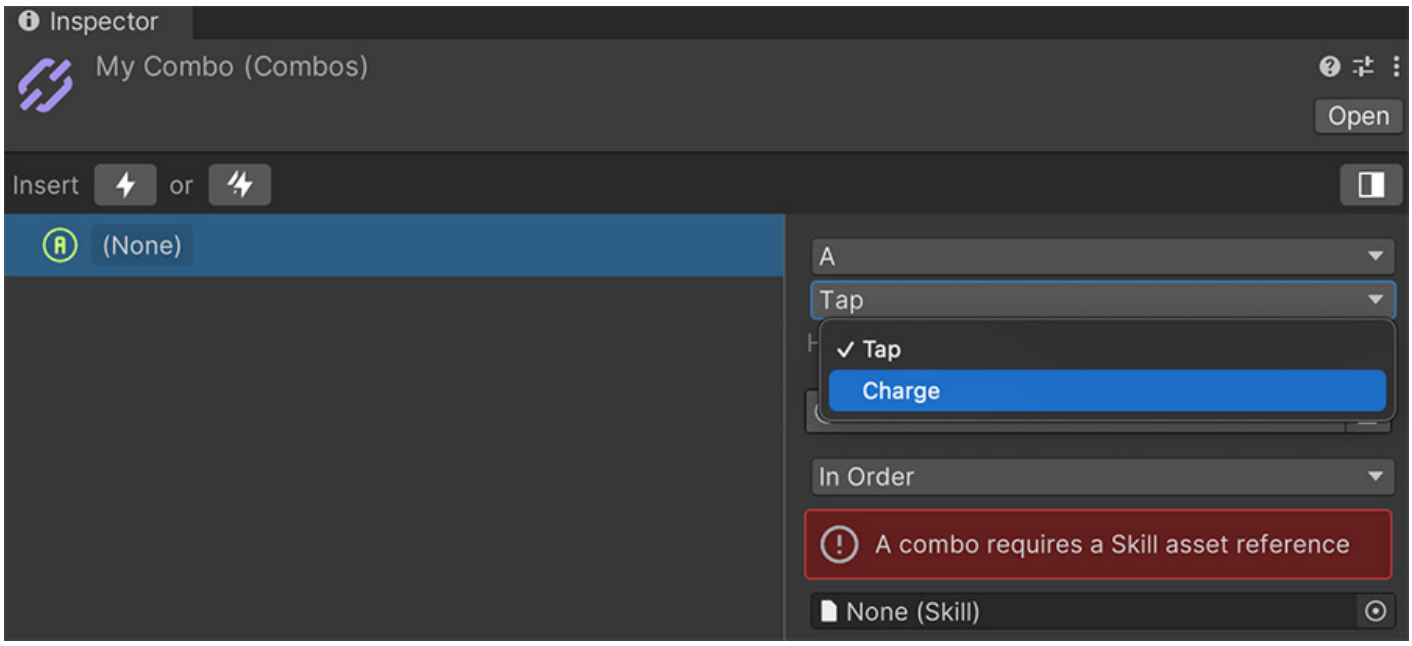


Charging a Slash

In this example, the player holds the left mouse button and the character enters a sheathed state in which it can't move. Upon releasing the button, the character performs the **Skill** attack.



It's important to note that the **Combo** asset defines whether a **Skill** is a charged one or not.



When selecting the **Charge** option from the **Combo** asset, you'll be prompted whether to auto-release the **Skill** after the minimum charge or let the user specify when to release it.

It will also allow to define the minimum amount of time to charge the attack in order to have any effect.

More about Combos

For more information about **Combos**, see the Combos section.

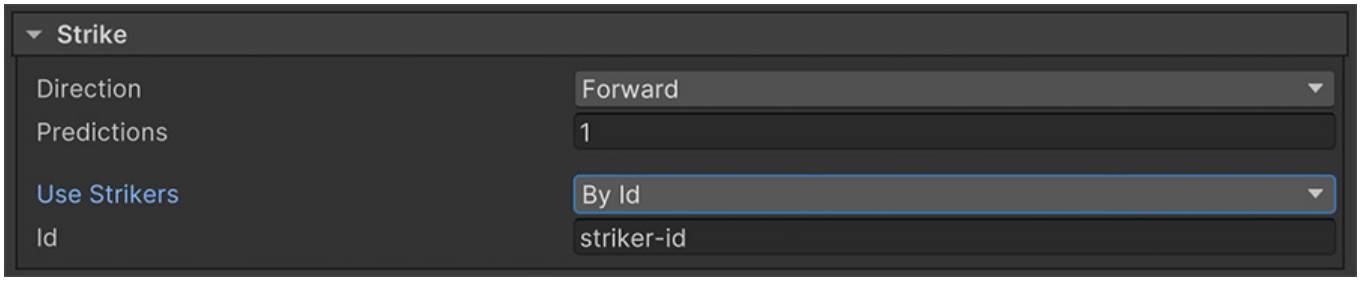
1076 Strikes

When a character attacks with a **Skill** there is a phase called *Strike* in which the current weapon(s) collect any hit enemies and pass the information to the **Skill** in order to determine if each of the enemies hit was successful, blocked, parried or ignored.

Upon entering the *Strike* phase, the **Skill** looks up all the **Striker** components of the weapon object(s) and gathers any overlapping enemies.

Using multiple Weapons

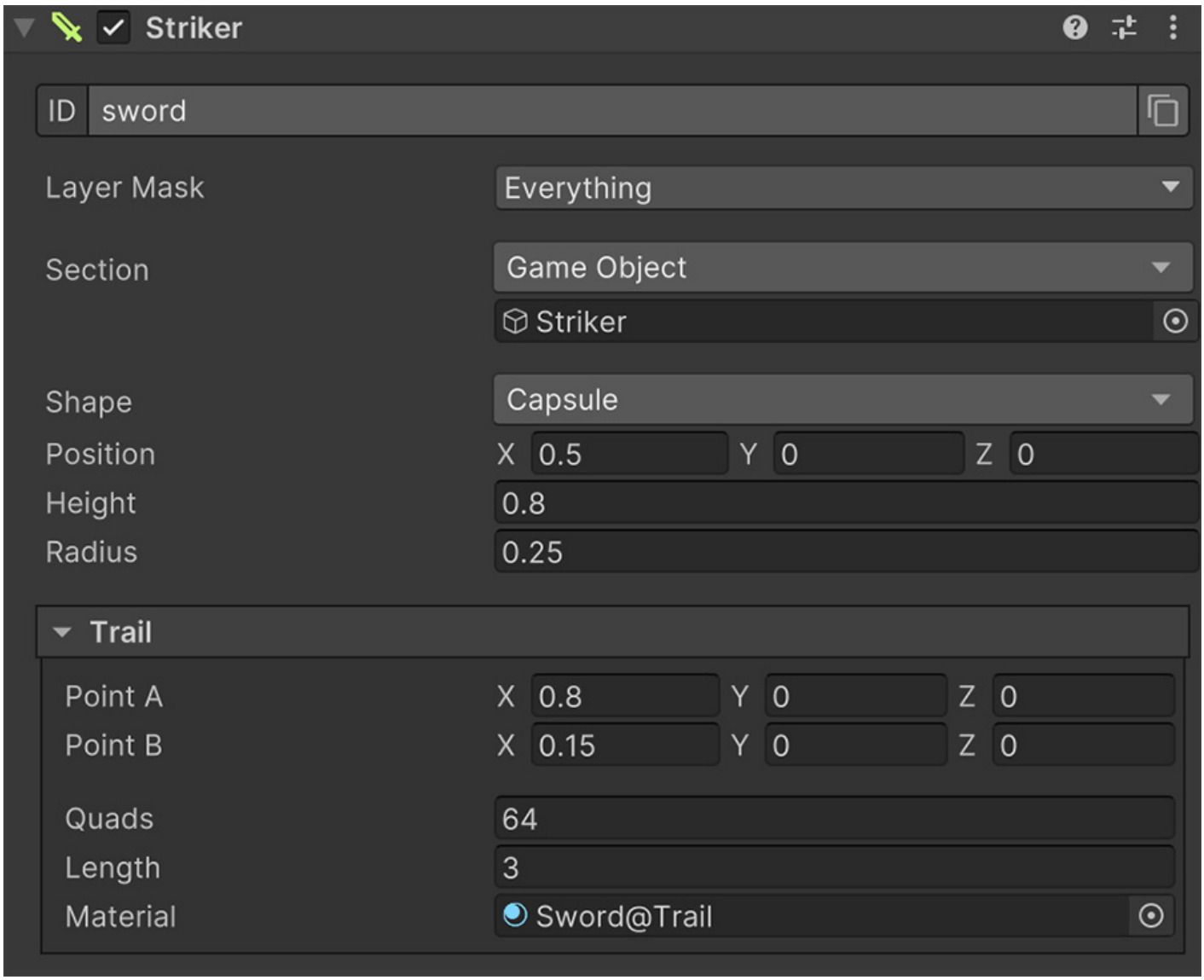
If the character has equipped more than one weapon and the **Skill** requires one of them to hit the enemies, you can specify the ID of the **Striker** by changing the dropdown value from *All* to *By ID*.



A new **ID** field will appear below where the **Striker** id value can be specified

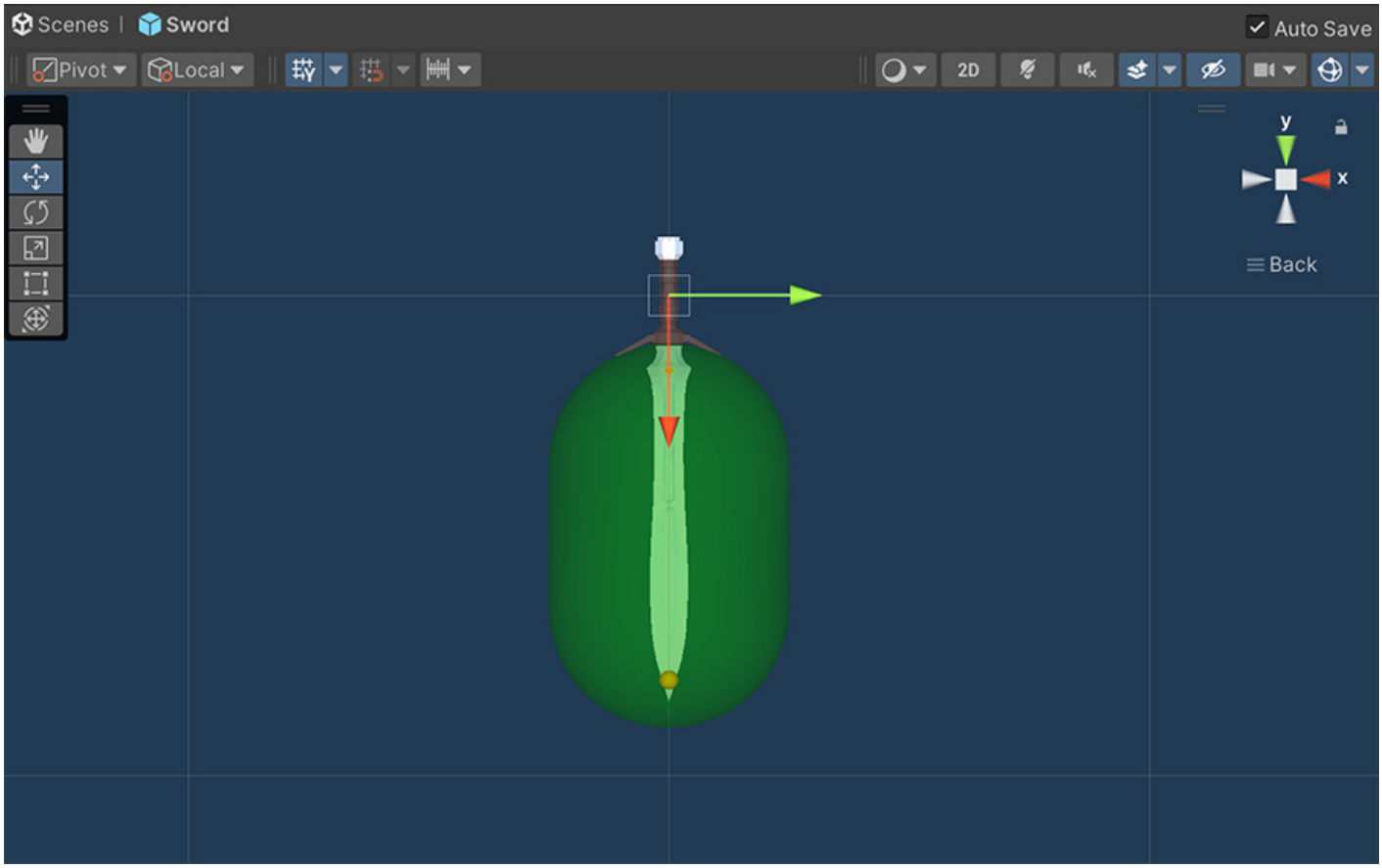
1076.1 The Striker Component

Strikers are components attached to game objects (usually props that represent weapons) that detect hit enemies when the character attacks.



The **ID** allows to hand-pick **Strikers** by their unique identifier in each **Skill**.

The **Section** game object reference allows to define where the *Blade* of the weapon is. By default, it should be the game object where the **Striker** component is attached to, but some weapons, like a whip, might require mobile parts to work as the hitting part.

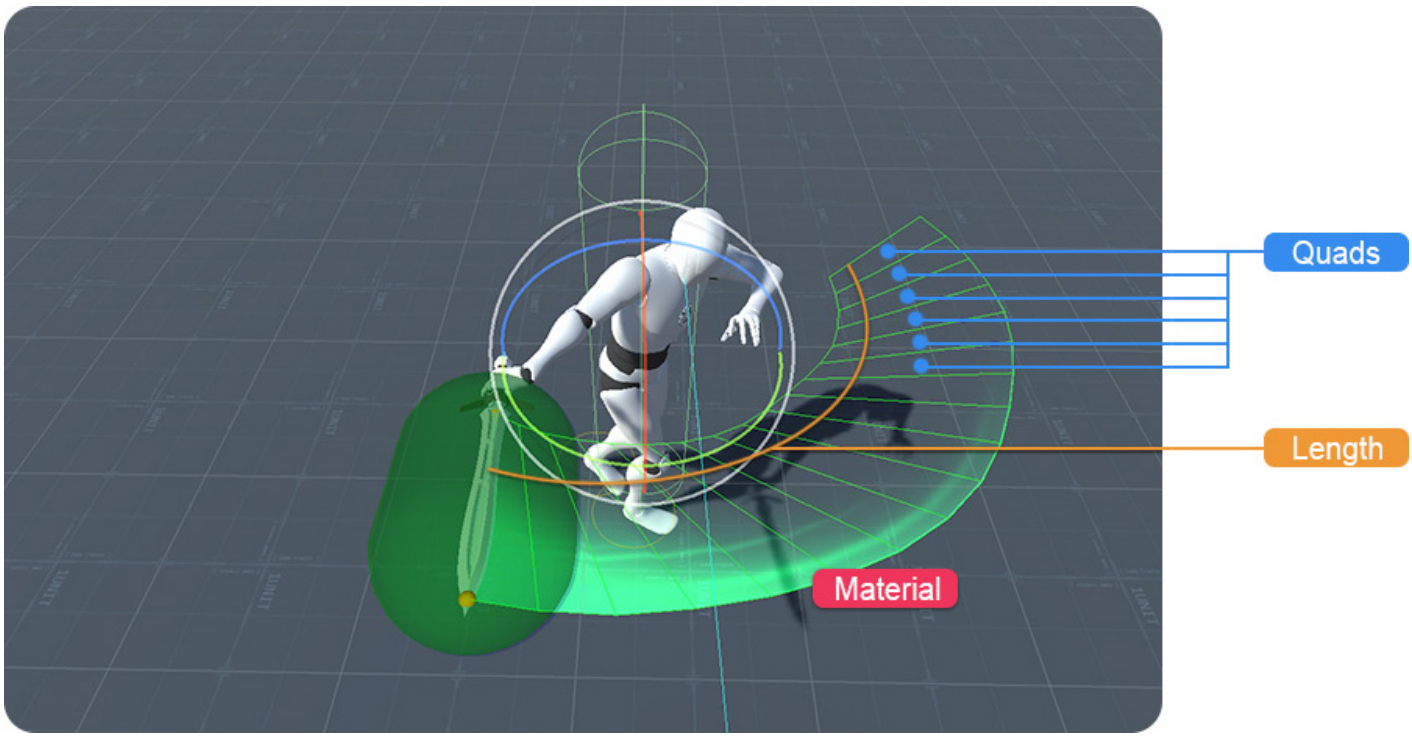


The **Shape** dropdown allows to define the shape of the physics volume that captures enemies when passing through them. There are different options:

- **Sphere**: The most basic shape. It captures enemies within a defined radius.
- **Capsule**: A pill-like shape that captures enemies along its length and is defined by a radius and a height value.

The **Trail** section defines two points in which a trail is drawn whenever the weapon is used during a *Strike* phase.

It also determines the maximum amount of **Quads** allowed to draw the trail mesh, it's total **Length** and the **Material** used.



1076.2 The Trail

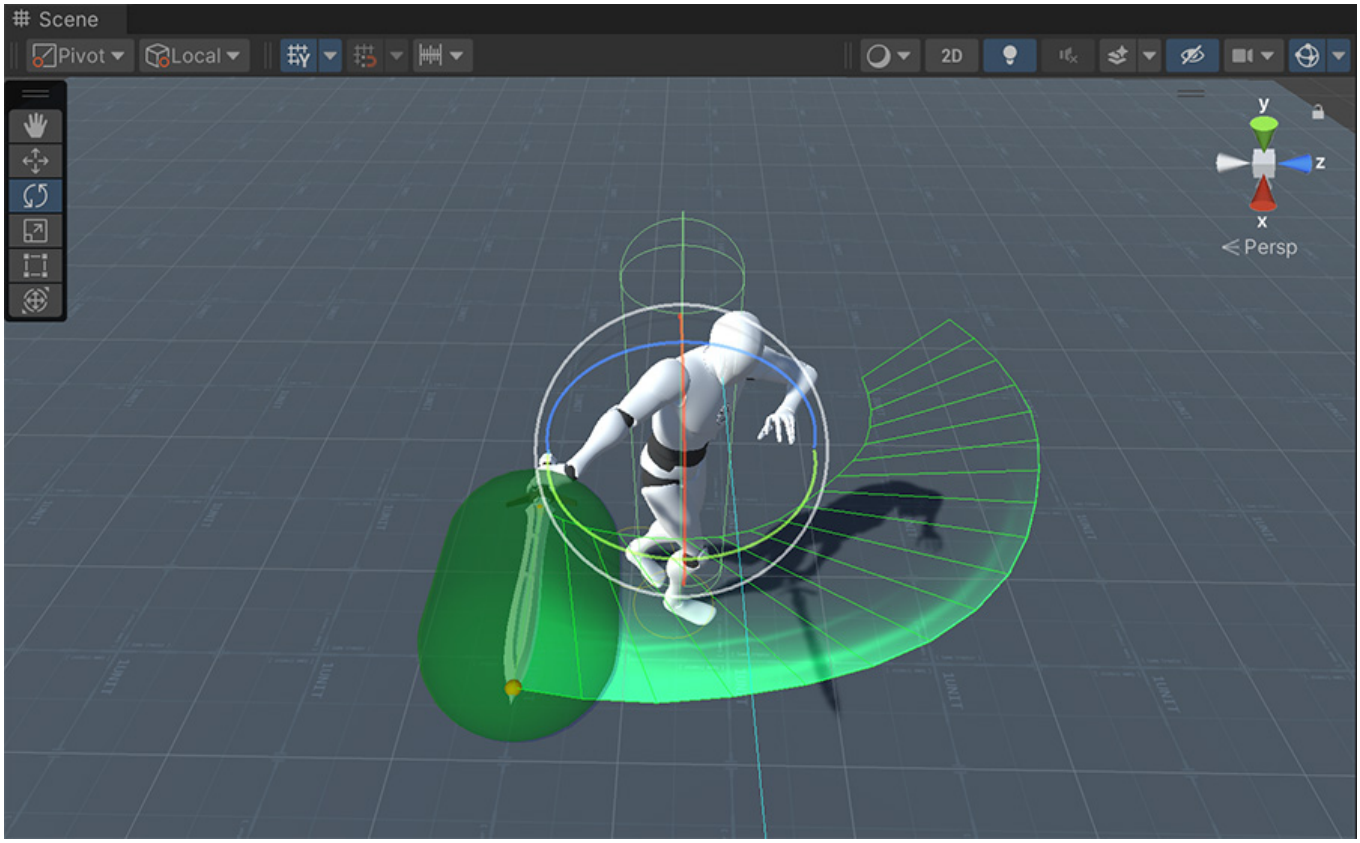
When a **Skill** enters the *Strike* phase, all **Striker** components that are involved start drawing the **Trail** effect, which is automatically faded upon finishing the phase.

The **Trail** is drawn using a Catmull-Rom spline with regular intervals so that it looks smooth regardless of the speed at which the animation plays.

Point A and **Point B** define the segment from which the trail will be drawn.

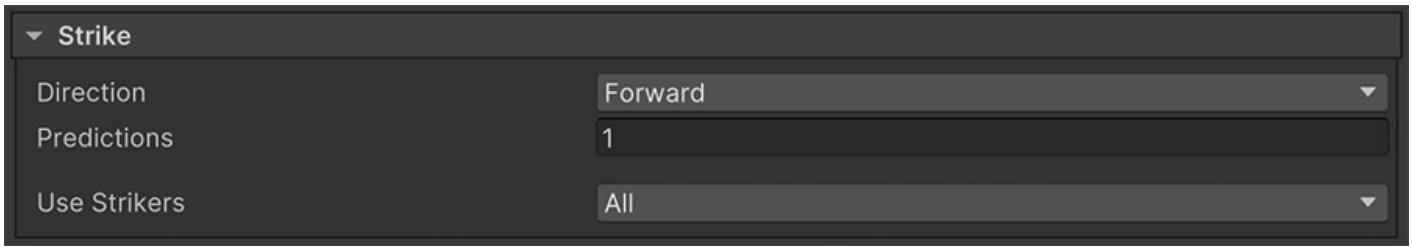
Visualize the Trail

During play-mode you can visualize the **Trail** by selecting the character executing the **Skill**. It will automatically draw the quads on top of the trail's material so you can visually see whether that particular skill needs more or less quads in order to look good.



1076.3 Predictions

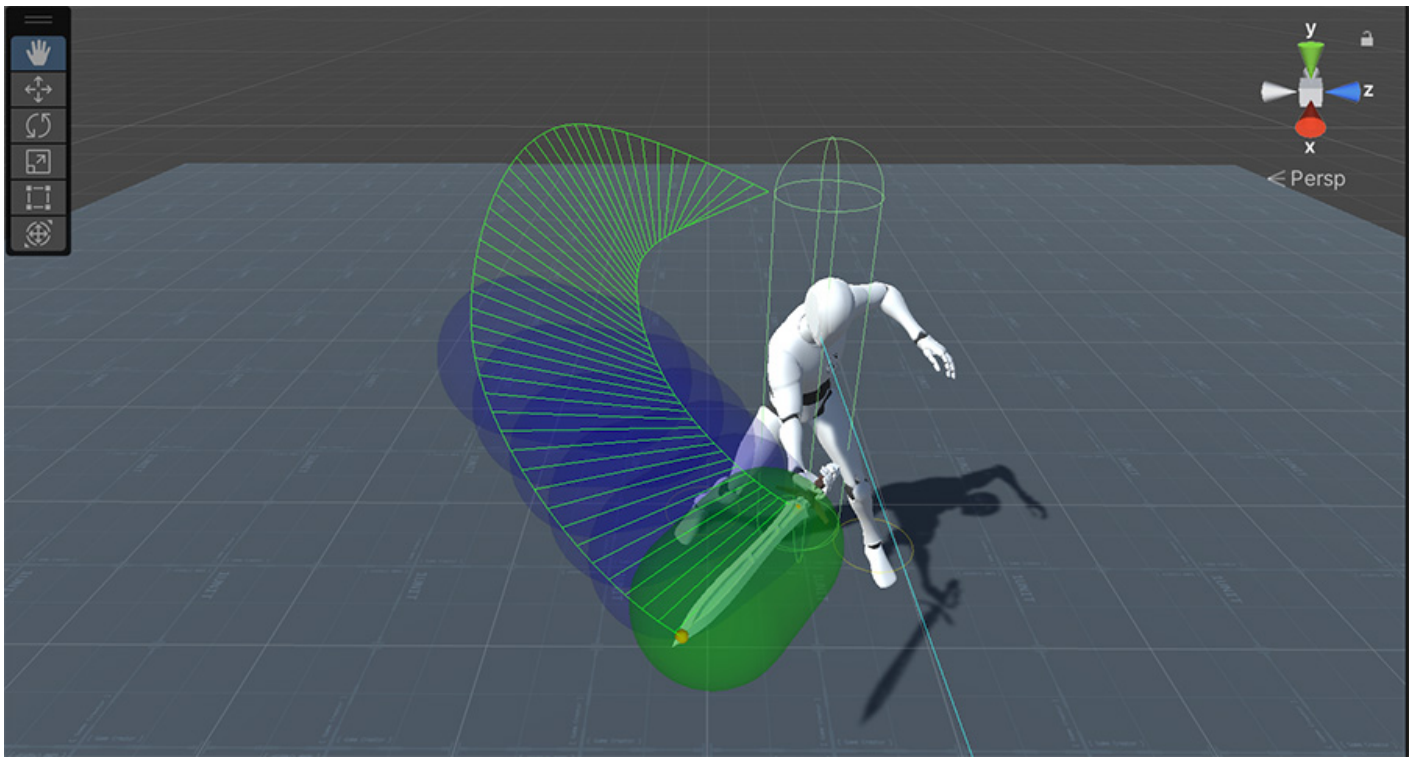
When capturing enemies that the weapon passes through there is a chance that enemies *ghost-through* if the **Striker** shape is very small and the animation plays very fast.



The **Predictions** field allows to determine inter-frame physics casts that are performed each frame to avoid this problem.

For example, setting a value of 5 means it will capsule-cast 5 times every frame between the weapon position at the last frame and the current one. You can visualize the predictions by selecting the character executing the skill and seeing how each colored volume appears:

- **Green Volume**: Shows the current frame weapon's cast volume position.
- **Blue Volume**: Shows the predicted volumes positions.



Performance Toll

While it's easy to increase the number of predictions to minimize the chance of ghosting-through enemies, each prediction has a direct performance impact on the physics engine. It's better to keep them at a minimum if there are going to be lots of enemies fighting at the same time.

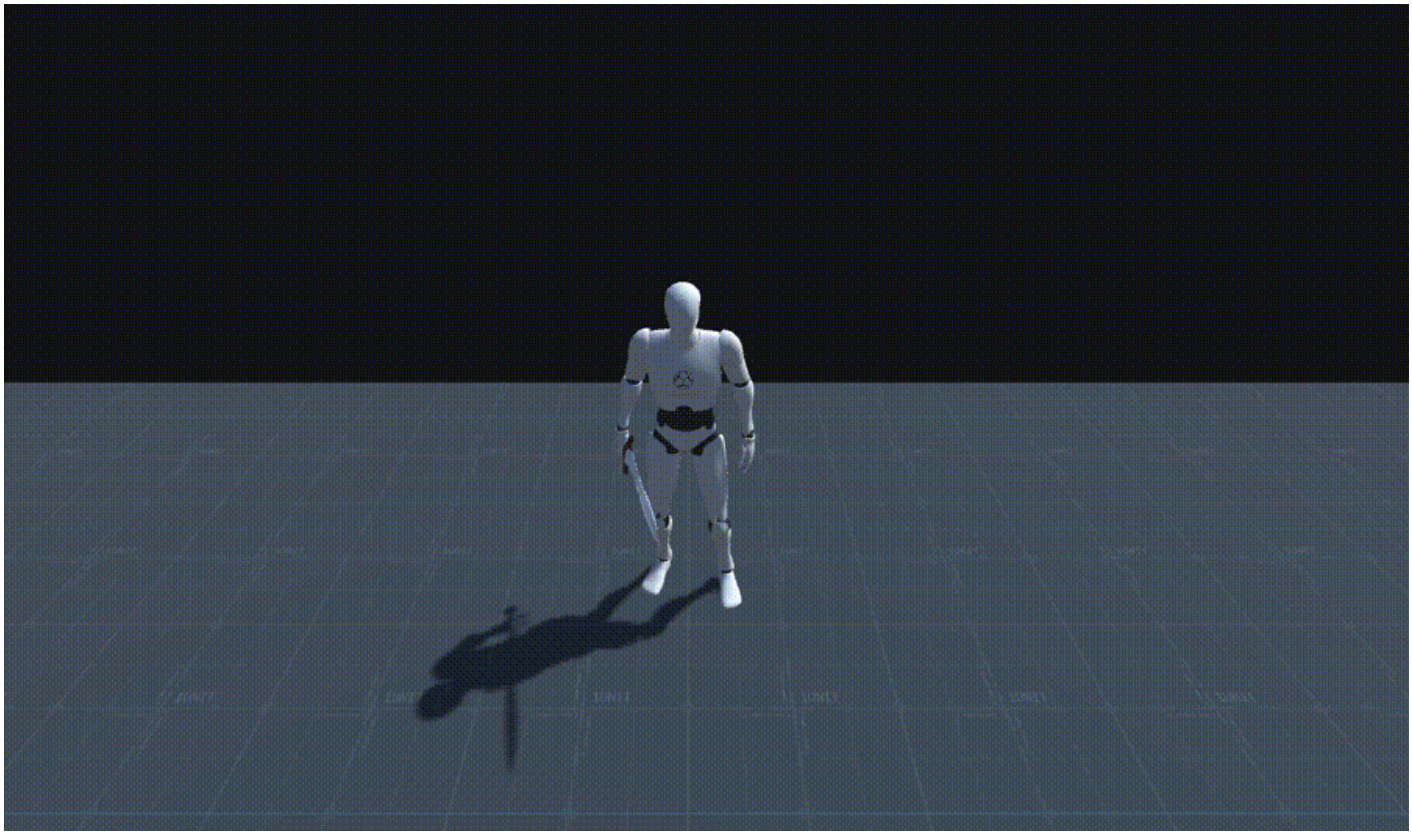
1077 Motion

The **Motion** field determines how the character moves when the **Skill** is executed. There are three possible values:

- **None**: The *Skill* doesn't take over the motion of the character and who's free to move as it plays out.
- **Root Motion**: The *Skill* overrides the character's locomotion and uses the animation clip's root motion.
- **Motion Warping**: Similar to root motion, but also allows to define a range in which the character interpolates its position and rotation towards a destination.

1077.1 None

Setting the **Motion** value to *None* allows the character to move normally during the execution of the **Skill**.

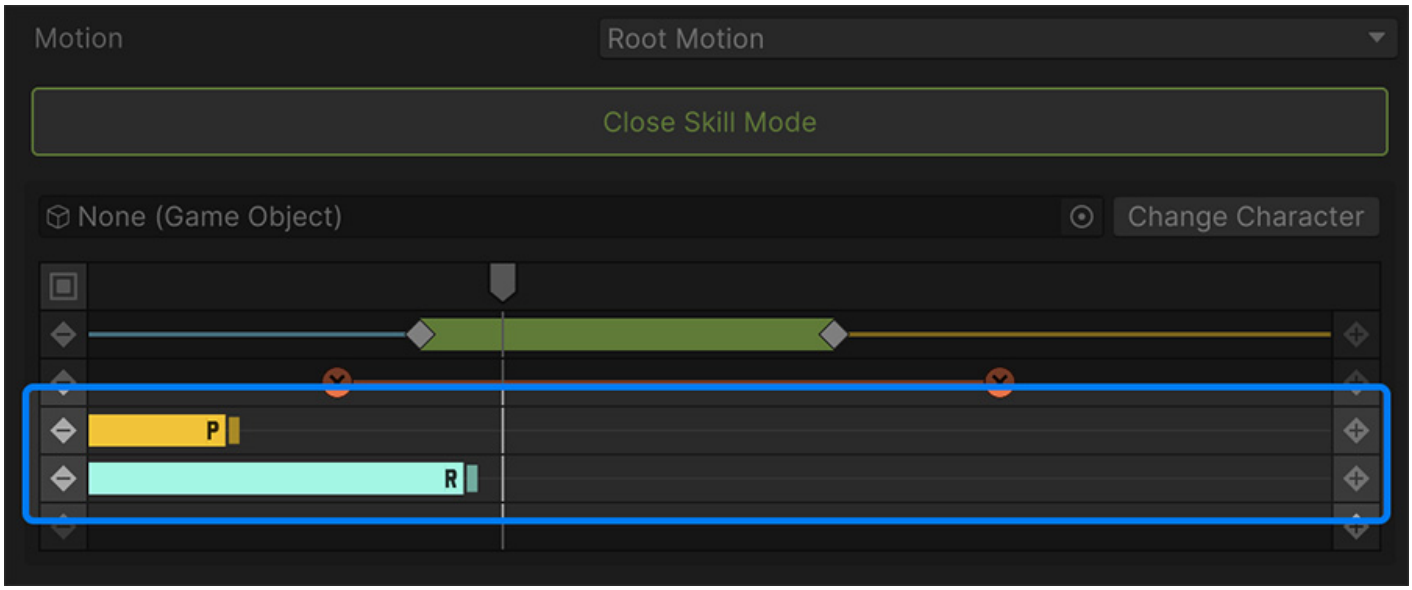


This is useful if you have an upper-body *Avatar Mask* masking the lower-body so that the attack animation only plays on the torso and arms, but not on the legs. This allows the character to move while attacking.

1077.2 Root Motion

Selecting the **Root Motion** option allows the **Skill** to take over the character's control for the duration of the animation, translating and rotating it using its root motion values. This allows very fine-grain control over how far the character moves during an attack combo and where it ends up looking.

Switching to **Root Motion** also adds two new tracks onto the **Sequence** timeline: One with the letter P, which stands for *Position*, and another one with the letter R, which stands for *Rotation*.

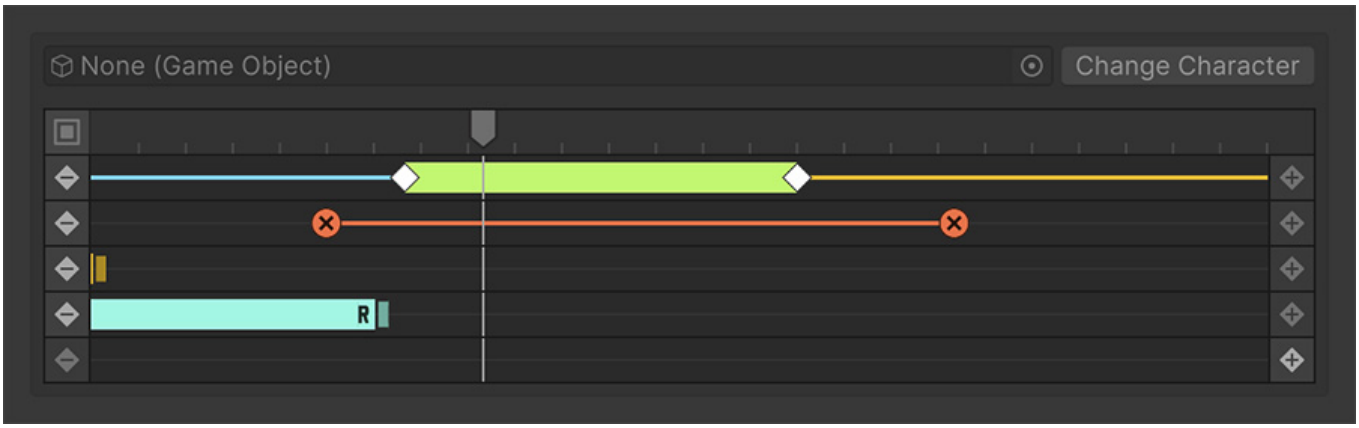


These sliders define a range where the *root motion* doesn't take effect onto the character's animation.

Using Root Motion sliders

For example, let's say you have a **Skill** where the character curls the weapon close to itself for a couple of seconds before launching forward.

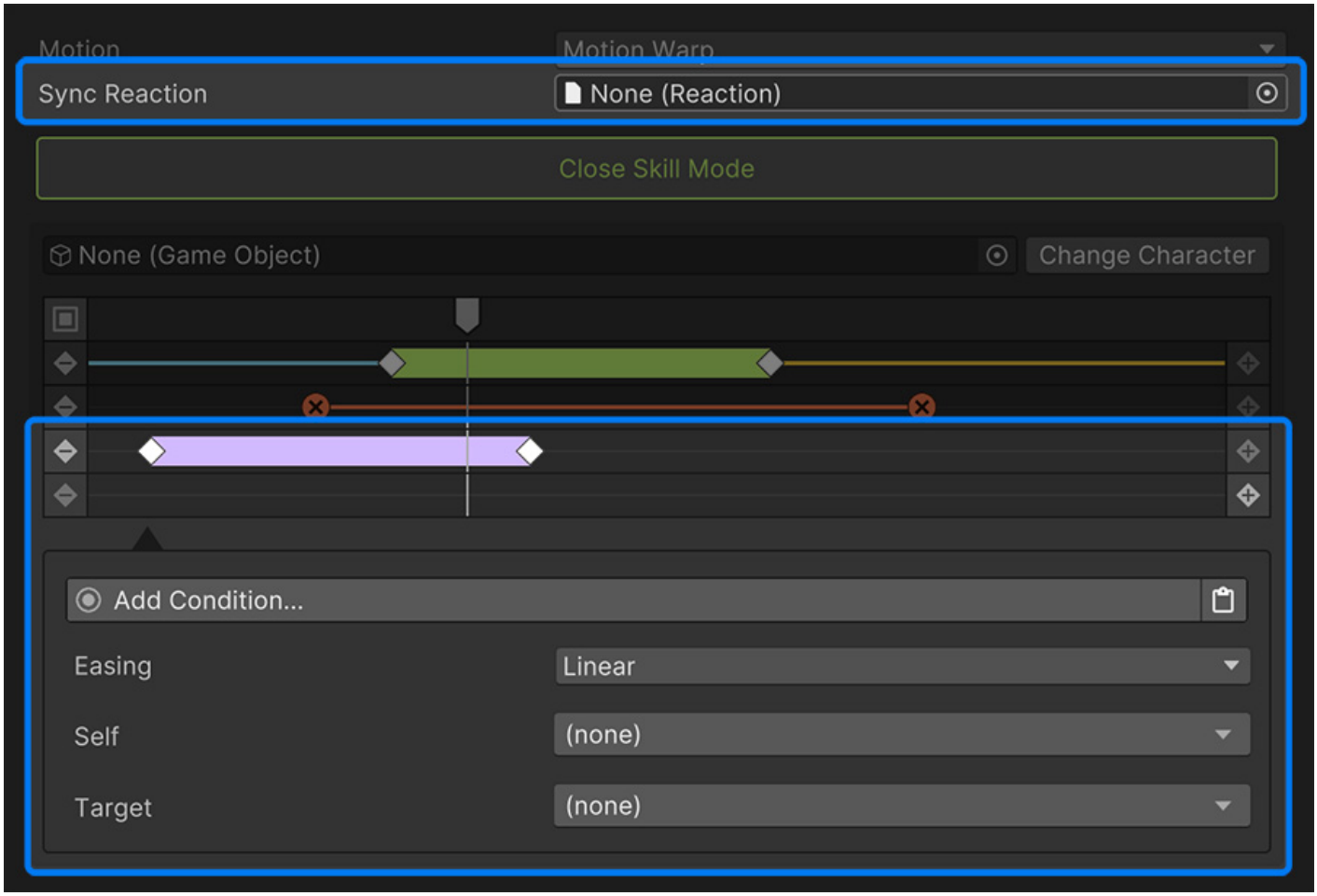
If you were not to use the sliders, the character would not be able to track the enemy during the *Anticipation* frames and they could simply slightly step out of the way of the attack.



Using the **Rotation** slider one can let the character pivot around itself during the first frames in order to keep tracking the enemy during the *Anticipation* frames, before sling-shotting itself towards the enemy.

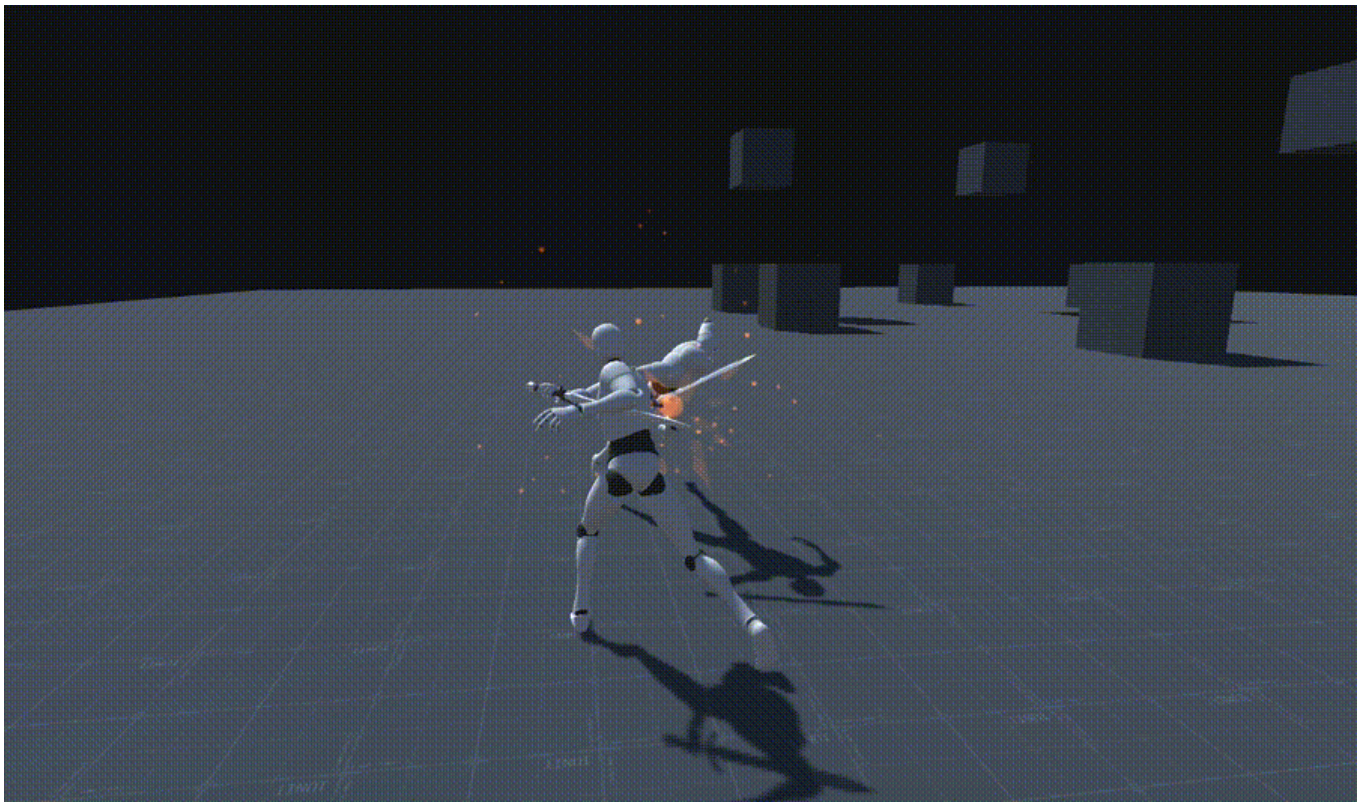
1077.3 Motion Warp

The **Motion Warp** also uses the *root motion* animation of the character, but instead of allowing to define the *position* and *rotation* frames at which the **Skill** takes over the locomotion control of the character, it defines a *warp* range during which the character will smoothly change its position towards the targeted one.



Using the Warp slider

The Warp slider is useful for combat systems that require characters to snap towards enemies, like in *Kingdom Hearts*, *Batman Arkham* game series or *Spiderman*.



At the beginning of each attack, the character attempts to close in the distance to the enemy during a few frames. The distance amount and skill used depends on how far the character is from its target.

The **Warp** slider can be selected to reveal option settings to configure how the *warp* is performed.

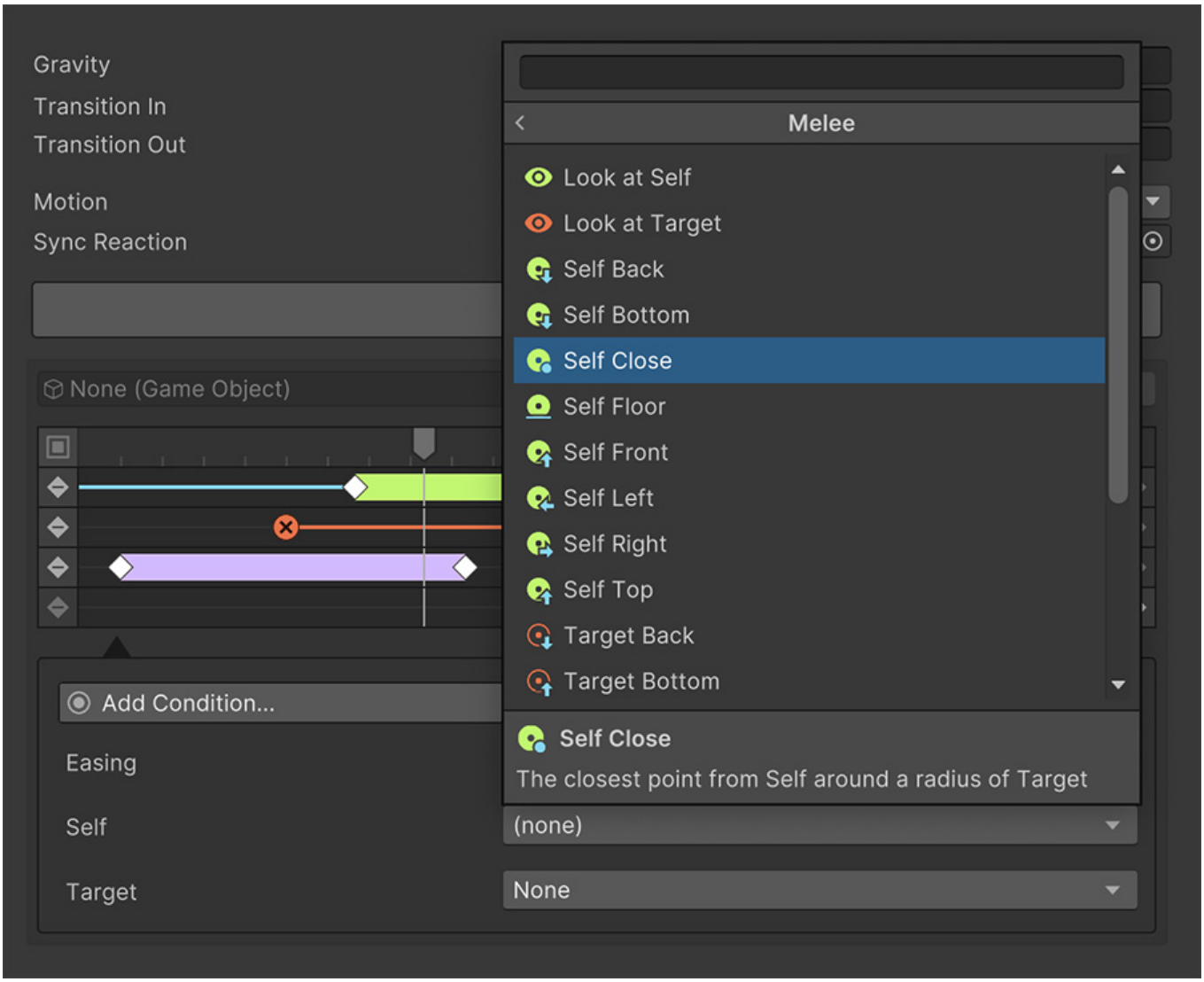
The **Conditions** list at the top allows to check whether the warp should happen or not. The most common use-case is checking whether there is a target available or not.

The **Easing** field specifies the easing curve used when moving the character from its starting position to its destination.

Self and **Target** fields define the final position of both the character executing the **Skill** (*Self*) and the targeted character receiving the attack (*Target*).

Using Melee Locations

For both *Self* and *Target* locations, we recommend using the values found under the Melee section.



There is a collection of options, each with its own description of what it does. The most useful ones are:

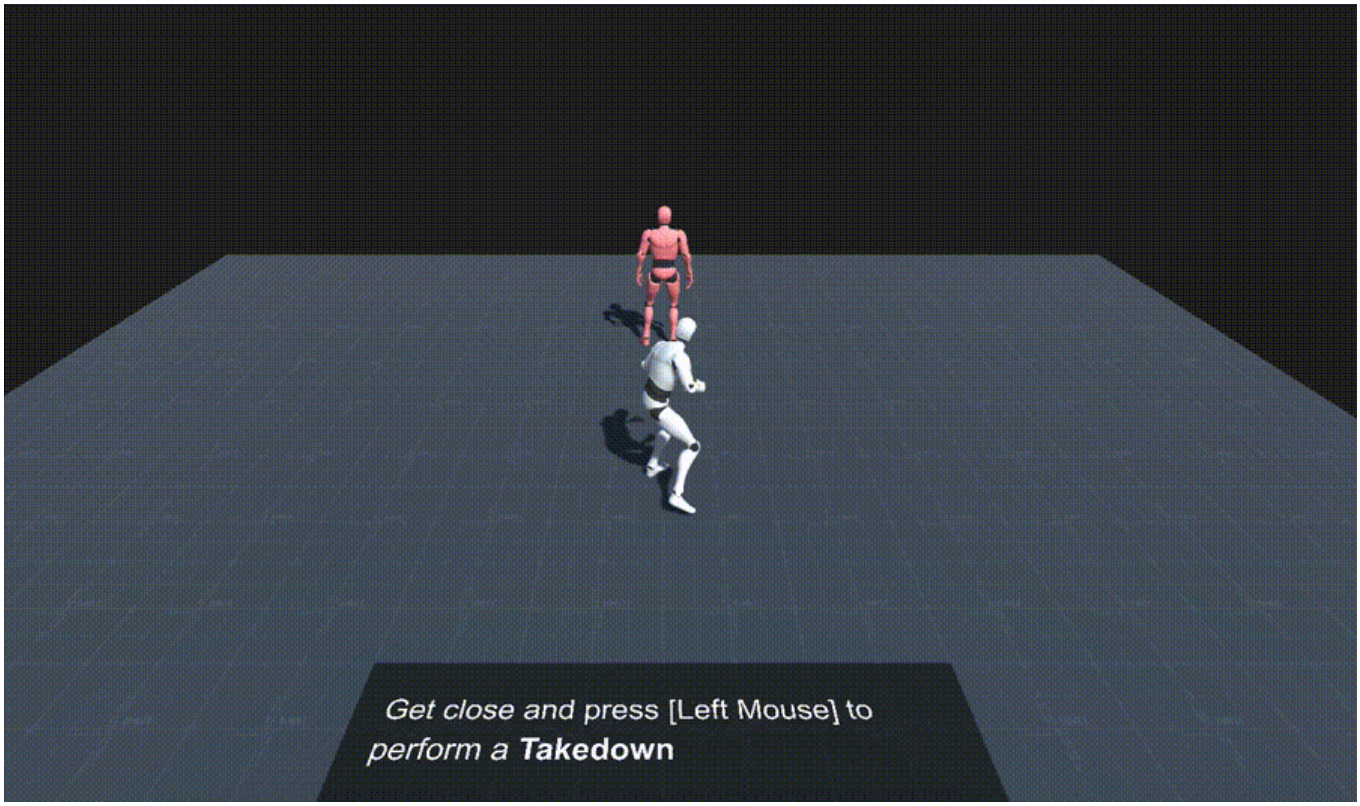
- **Self/Target Close**: Moves the character close to the target, keeping a specified distance, in a straight line. This is mostly used to close-in an attack.
- **Look at Self/Target**: Rotates the character towards the target. Useful for synchronizing takedown attacks.

The rest of the options allow moving the character at each cardinal position of the opponent.

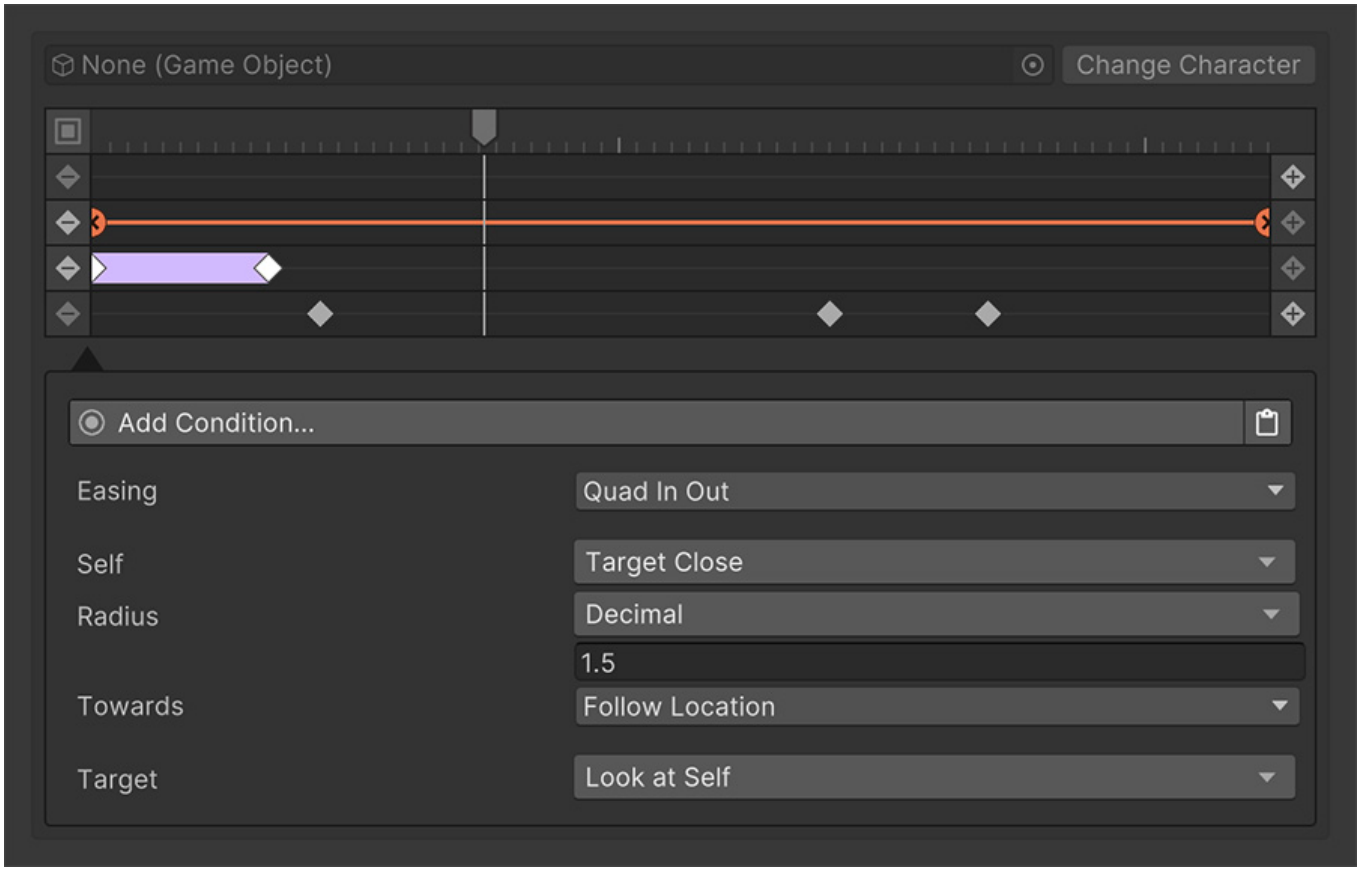
If you don't want either the *Target* or *Self* to change its location, simply set the value to **None**.

Selecting **Motion Warp** also adds a new field called **Sync Reaction**. This option allows to play a synchronized animation onto the *Target* character along with the **Skill**. This is especially useful when performing takedowns or playing animations that require enemies to react in a certain way.

Takedown Skill



In the video above, the unaware enemy plays a *Takedown* animation as soon as the **Skill** starts. In order to synchronize the position of both the attacker and the victim, the **Warp** slider defines the following:



The **Self** character (which is the attacker) moves in close to the enemy, keeping a distance of 1.5 units.

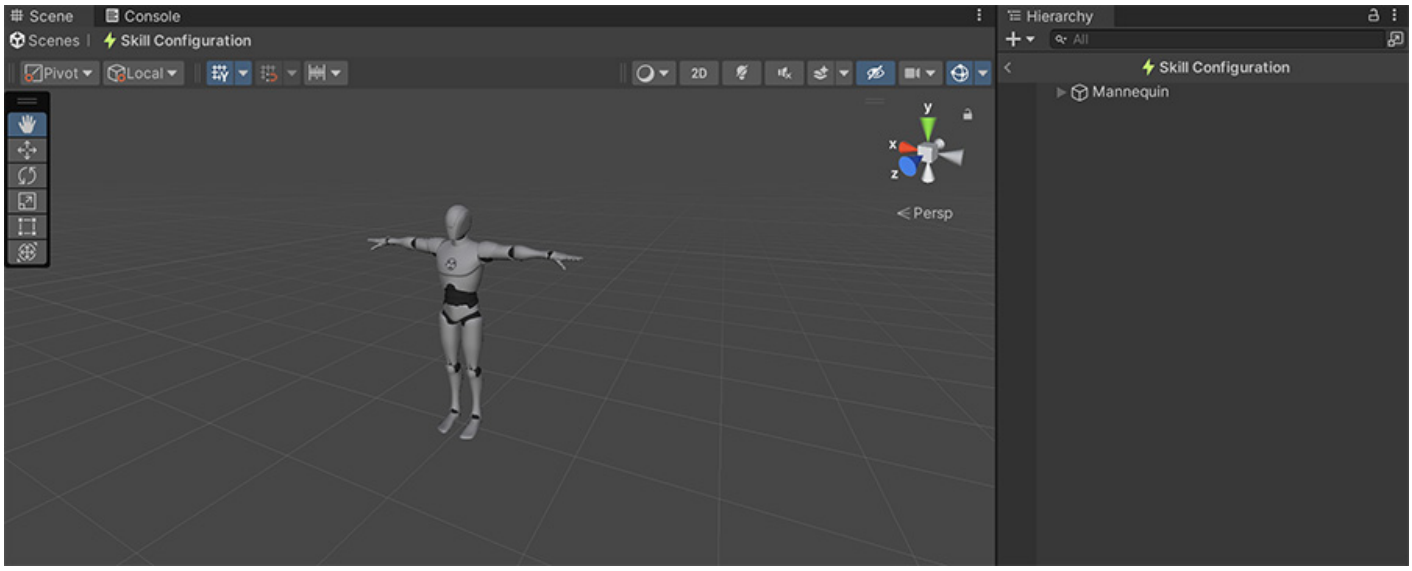
The **Target** character (which is the victim) simply looks at the attacker.

These values allow to define a sync point at which the animation can play synchronized animation on both characters that looks seamless.

1078 Sequence

The **Skill** asset contains a *sequencing* timeline tool called **Sequencer** that allows to configure every little detail that happens during the execution of the animation.

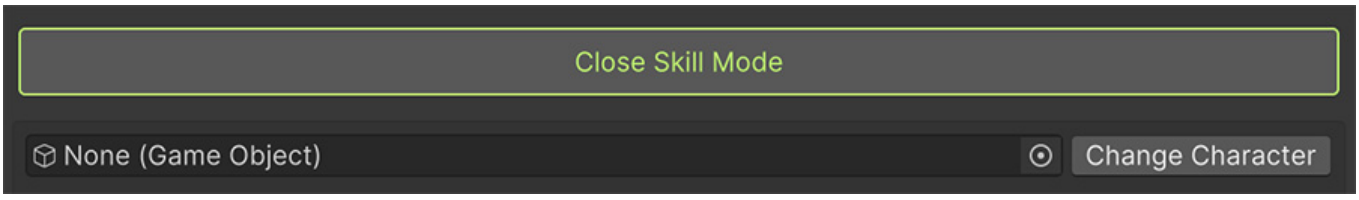
To edit the **Sequencer**, click on the **Enter Skill Mode** button. The *Scene View* and *Hierarchy Panel* will change its appearance to one similar to when editing a prefab.



Entering into **Skill Mode** displays the default character at the center of the screen with nothing else. This character is automatically bound to the sequencer, which you can scrub to play the animation forward and backwards, frame by frame.

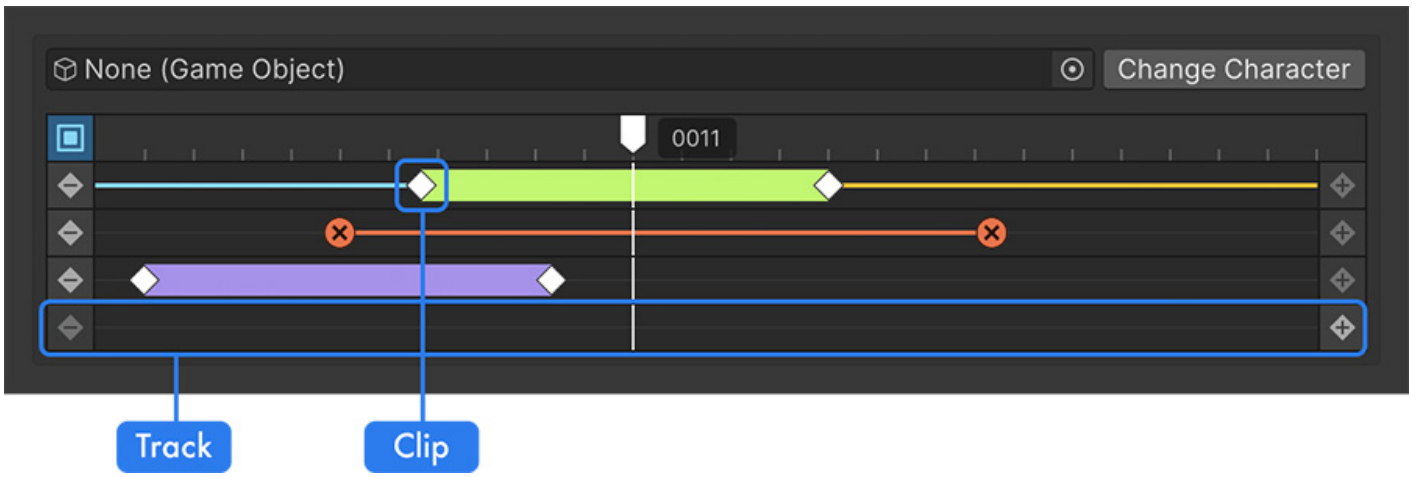
Change Character

To change the preview character model, simply drag and drop the model onto the corresponding field and click on the **Change Character** button. This will change the model for this particular scene and it will remember to use it in the future.



1078.1 Sequencer Anatomy

The **Sequencer** is composed of horizontal **Tracks** and each one defines information using **Clips**, which are the little rhomboids that can be dragged along the timeline.



On the left side of each **Track** there's a rhomboid with a *minus* sign and on the right side, there's a similar one with a *plus*. Each of these buttons allow to remove or add a new **Clip** at the position of the play-head.

> **Track Behavior**
>
> Each **Track** allows to create or remove different amounts of clips. When it's not possible to add new ones, the buttons will be grayed out.

The **Skill Sequencer** has three different **Tracks** by default:

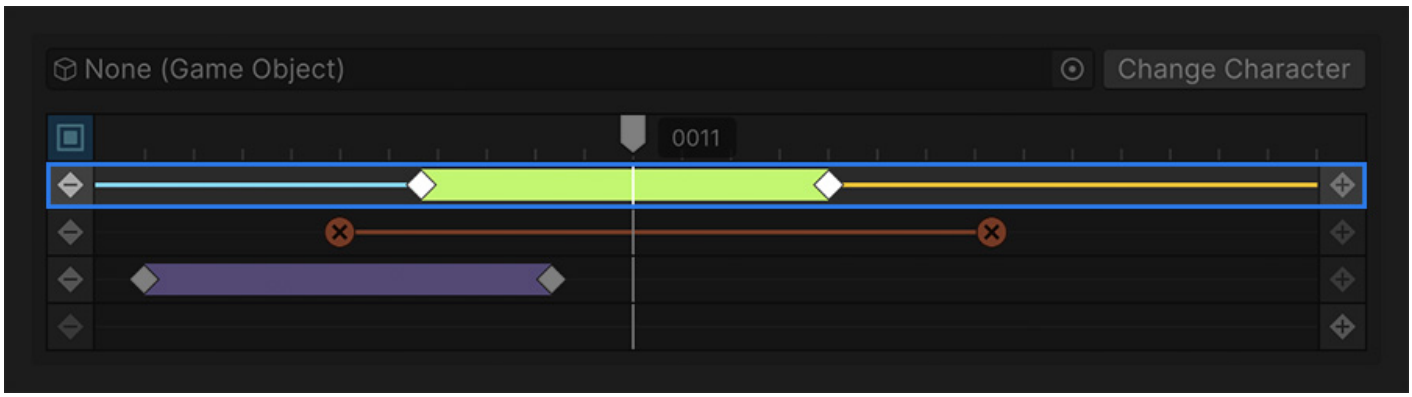
- **Attack Phases Track**: This determines the *Anticipation*, *Strike* and *Recovery* phases of any attack.
- **Animation Cancel Track**: Determines which frames the **Skill** can be canceled by another action.
- **Instructions Track**: Allows to execute **Instructions** at different points of the timeline.

> **Root Motion and Motion Warp Tracks**
>
> Setting the **Motion** of the **Skill** to either **Root Motion** or **Motion Warp** will add other tracks to the **Sequencer**. These ones are covered in their corresponding section under **Motion**.

1078.2 Attack Phases

When executing any **Skill** that is an attack, there will always be three phases:

- **Anticipation**: Also known as *wind-up*. In this phase, the character prepares to execute an attack.
- **Strike**: Also known as *activation*. In this phase, any enemies passing through the edge of the weapon will be hit.
- **Recovery**: Also known as *follow-through*. In this phase the character is exposed to enemy attacks.

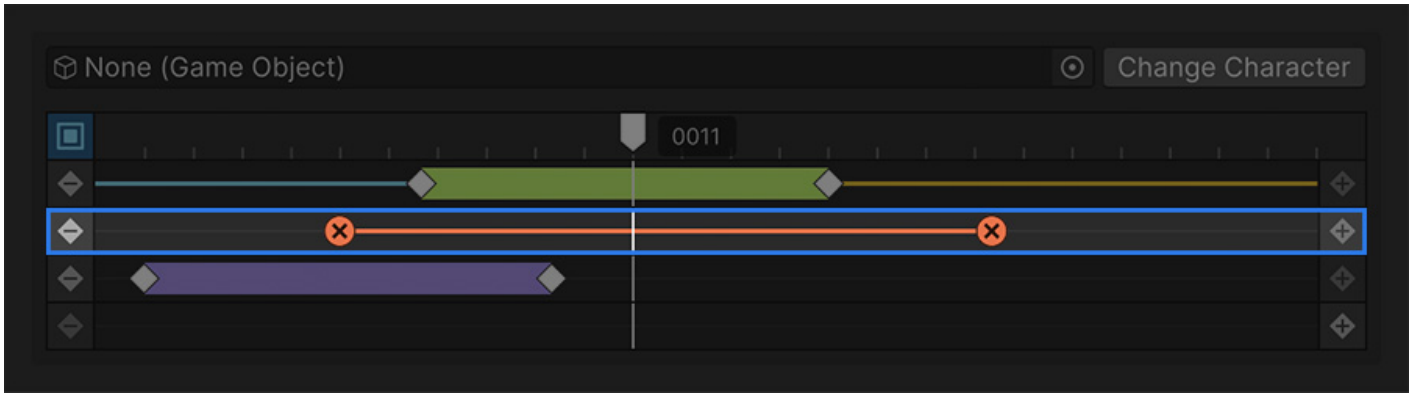


Chaining Combos

When executing an attack that is the follow-up of another one (known as *combo*), the *Recovery* phase of the first attack is skipped in favor of the anticipation of the new one. This makes combos feel faster and more responsive, without having to wait to idle the pose before starting the new attack.

1078.3 Animation Canceling

The **Animation Canceling** track determines at which frames the user can cancel the **Skill** in order to execute something else.



The **red** portion of the **Track** are the frames that the character isn't allowed to cancel. This means that the character may be able to cancel the start and/or the end of the animation.

Executing a Faint

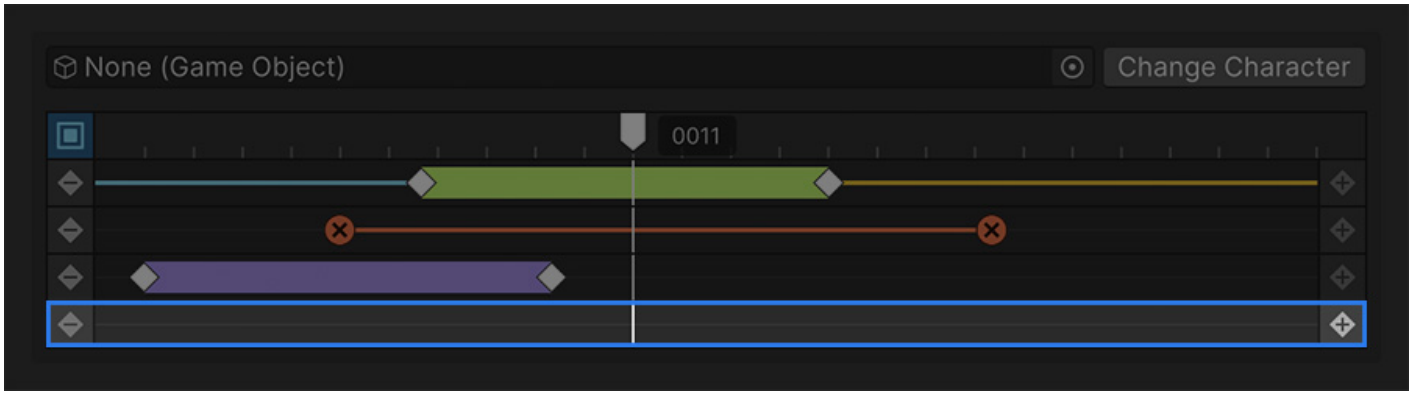
Some games allow to cancel the start of an attack using the *block* during the first few frames of an attack. This can be easily done by dragging the start of the **Animation Canceling Clip** a few frames from the start.

Roll Cancel

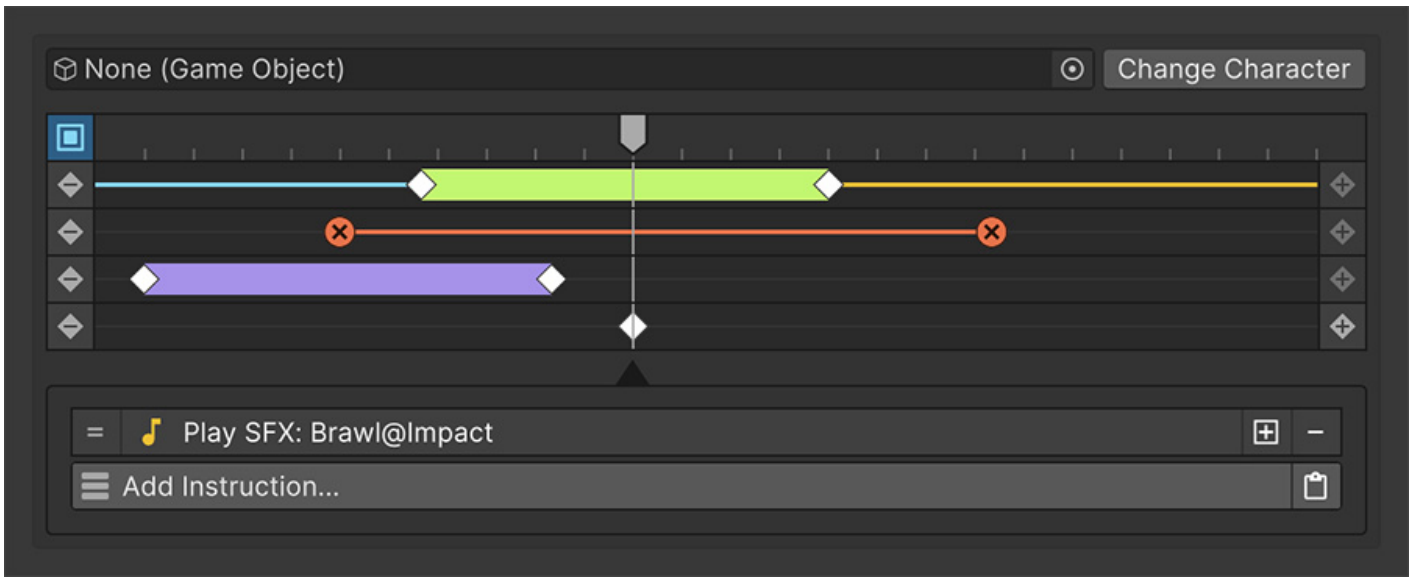
Some games also allow to cancel the recovery phase of an attack using a *roll*. This can be easily done by leaving some empty space between the end-clip of the **Animation Canceling Clip** and the last frame of the track.

1078.4 Instructions

The **Sequencer** allows to run arbitrary **Instructions** at any frame of the **Skill** animation.



To add a new **Instruction** list, simply move the play-head at the frame you want to do something and click the right-most plus button from the **Instructions** track. Select the new **Clip** that appears to reveal the **Instructions** list below, where you can create any logic that will run at that point in time.



Canceling Skills

Note that a **Skill** can be canceled at any point and thus some **Instructions** won't be executed if these are further away in time from the canceling point. Do not run critical logic in this **Track**. Instead, use the **On Start** and **On End** instructions callback, which are guaranteed to run, even if the **Skill** is canceled.

1079 Poise

The **Poise** refers to the ability of a character to withstand other attacks during the execution of a **Skill** without canceling it.

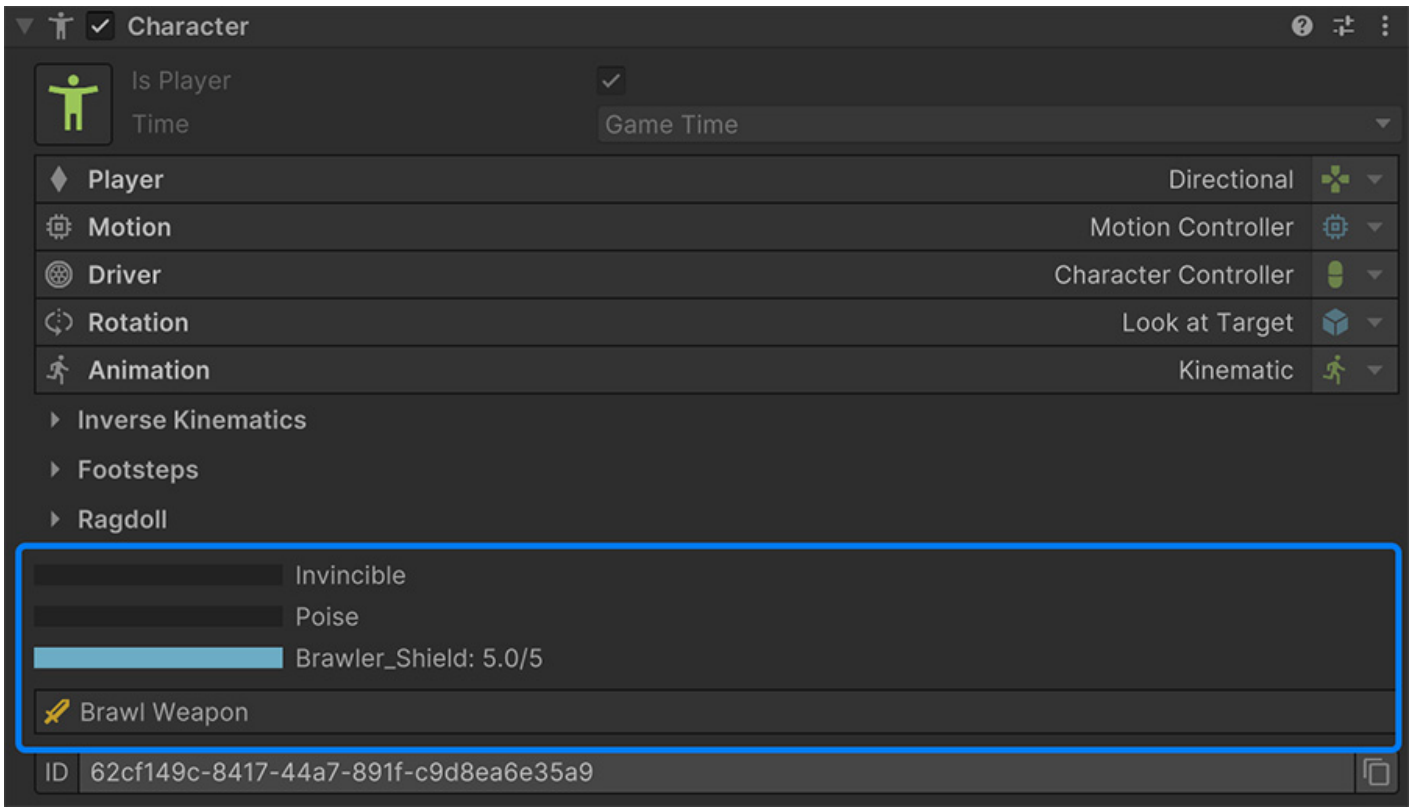
> **Hyper-Armor**
>
> In some games, this is also known as *Hyper-Armor*.

When a character starts playing a **Skill**, its **Poise Armor** is filled. If during the execution of this **Skill** the character receives any attack from an enemy, the **Poise Armor** will be reduced by the **Poise Damage** of the enemy's **Skill**.

Any subsequent attacks will also damage the **Poise Armor**. If it reaches zero or less, the character's **Skill** will be automatically canceled at that frame and will play a **Hit Reaction**.

> **Default Poise**
>
> By default, all **Skills** have a **Poise Armor** of 1 and a **Poise Damage** of also 1 unit. This means that any attack can be interrupted by an enemy's attack. If you want an enemy to withstand more than one attack, increase the **Damage Armor**.

The **Poise** value of a character can be visualized at runtime by simply selecting the character object and looking at the *Inspector* window.



At the very bottom of the character component, there's a **Poise** gauge that is filled whenever the character executes a **Skill**. This gauge diminishes with each attack received.

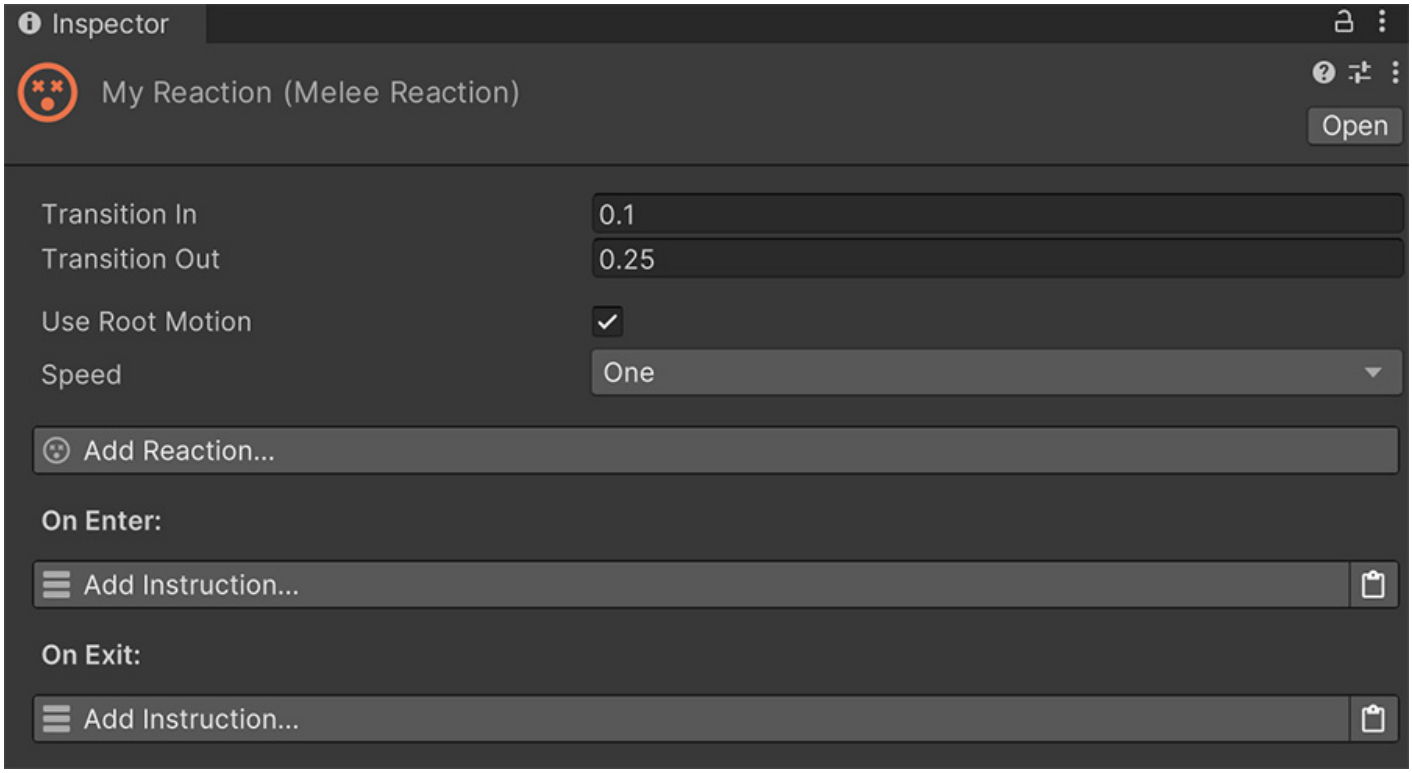
1080 Reactions

The **Reaction** assets allow characters to react to different stimulus, such as being hit, blocking an attack, being the victim of a takedown, etc... It allows to define a list of *Animation Clips* and one of them is picked based on different conditions.

For example, a character being attacked from the front might play a random flinch animation, but the same attack hitting its back might make it stumble or even get knocked down.

1080.1 The Reaction Asset

To create a new **Reaction** asset, right click on the *Project Panel* and select *Create* → *Game Creator* → *Melee* → *Reaction*.

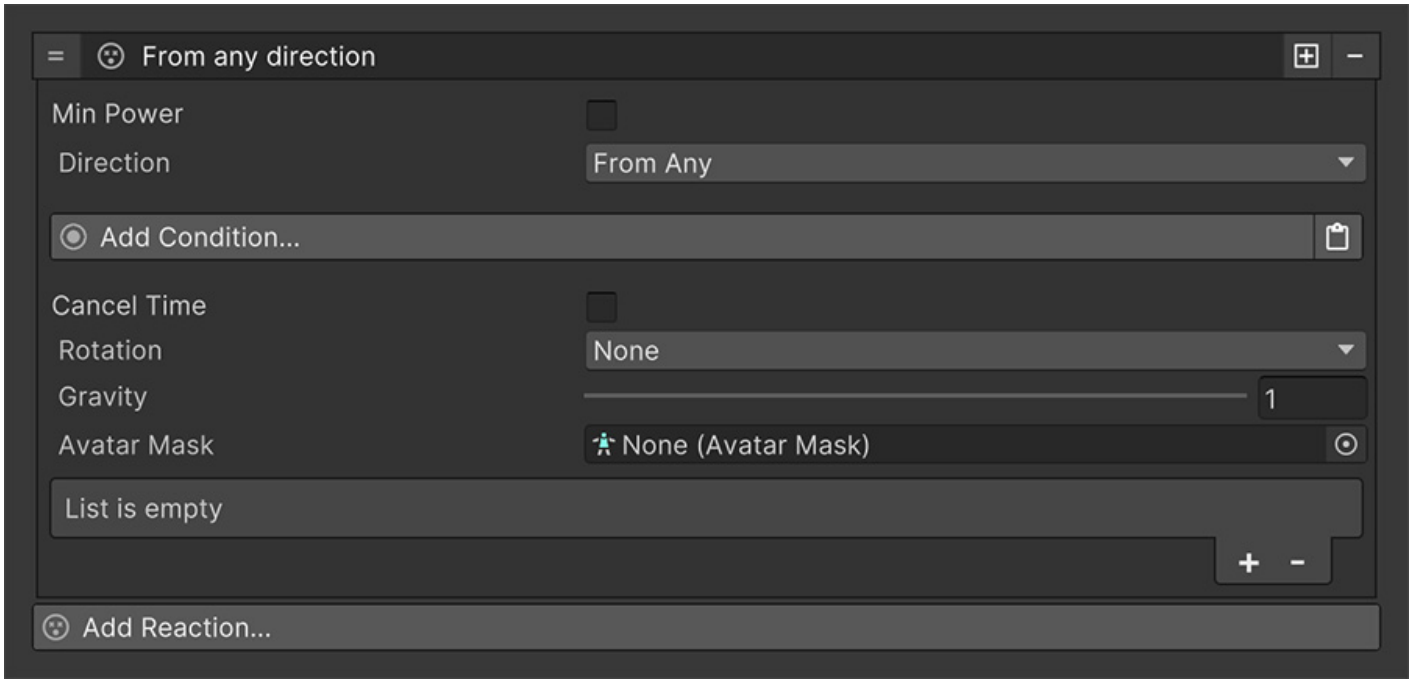


The **Reaction** asset has a **Transition In** and a **Transition Out** field that define how long it takes for a character to blend in and out the selected animation from the reaction. It is recommended to have small values, such as 0.1 up to 0.5 seconds.

The **Use Root Motion** checkbox defines whether the animation being played takes over the character's locomotion and will use the animation clip's root motion to move the character. In most cases, this checkbox should be checked.

The **Speed** field is a coefficient that is used to speed up or down the animation played. By default it's set to 1, which indicates that the animation will play at its original velocity. Setting a value of 2 means the animation will play twice as fast, and a value of 0.5 will play the animation in slow-motion.

Clicking on the **Add Reaction** button creates a new entry, of which you can create as many as needed.



When a **Reaction** decides which animation is played, it starts checking all entries, from top to bottom. If the conditions of an entry are successful, then the animation played is picked randomly between the ones provided by that entry.

1080.1.1 Entry Conditions

The **Min Power** checkbox determines whether the entry requires a minimum power in order to be considered successful. Upon ticking the toggle, a decimal field appears on the right side, which is used to define the minimum power threshold.

> **Power from Skills**
>
> The power is provided by the attacker's **Skill**. This allows to play different hit reactions depending on the power of the attack received, and playing a knock-back animation when the strength of the attack taken is higher than a certain value.

The **Direction** field allows to execute a particular entry only if the direction of the attack received matches the direction of the attack. The *From Any* option ignores the direction of the skill.

On top of these conditions, you can also specify visual scripting **Conditions** such as checking stats, and other kinds of data from both the attacker and the victim.

Self and Target

When checking **Conditions** the *Self* value references the character attempting to play a **Reaction** and the *Target* the attacker character.

1080.1.2 Entry Behavior

The **Cancel Time** toggle allows to define a maximum time at which the character playing the **Reaction** can cancel the reaction and play another **Skill**, *dash* or do any other action.

Stun Locks

A *Stun Lock* is what happens when all attacks of an attacker character are faster than the reaction animation of its victim. If the aggressor constantly attacks a character, it can't break free because each new attack locks it in a new flinching animation.

To avoid that, try ticking the **Cancel Time** checkbox and give it a small threshold time. This will allow characters to attempt dashing out of the way after being hit but won't allow them to move during the reaction time.

This is especially useful for the player character.

The **Rotation** field allows the character to either look away from the attack direction, towards the attack direction or not rotate the character at all. This is usually useful when all your animations are frontal ones and you don't want to create directional animations.

Gravity determines the influence this reaction entry will have on the character's own gravity. This is mostly used when doing airborne hit reactions, where the character stays up in the air while playing the hit animation.

The Avatar Mask allows to play the entry animation clips on just a few bones.

The **Animation Clip** list below determines all animation clips that are part of this **Reaction Entry**. If the *conditions* are successful, a random clip will be picked (without repetition) from the list.

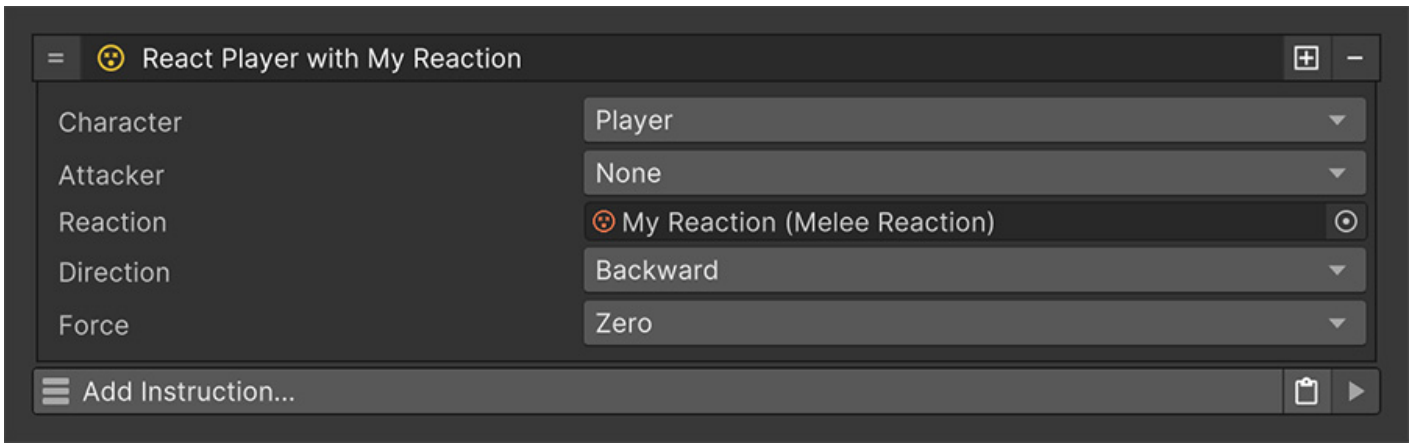
1080.1.3 Instructions

A **Reaction** asset also allows to execute **Instructions** upon starting and/or exiting the animation. These instructions are guaranteed to be executed, even if the **Reaction** being played is canceled.

- The **On Enter** instructions play as soon as the animation starts playing.
- The **On Exit** instructions play as soon as the animation stops, or the reaction is canceled.

1080.2 Running Reactions

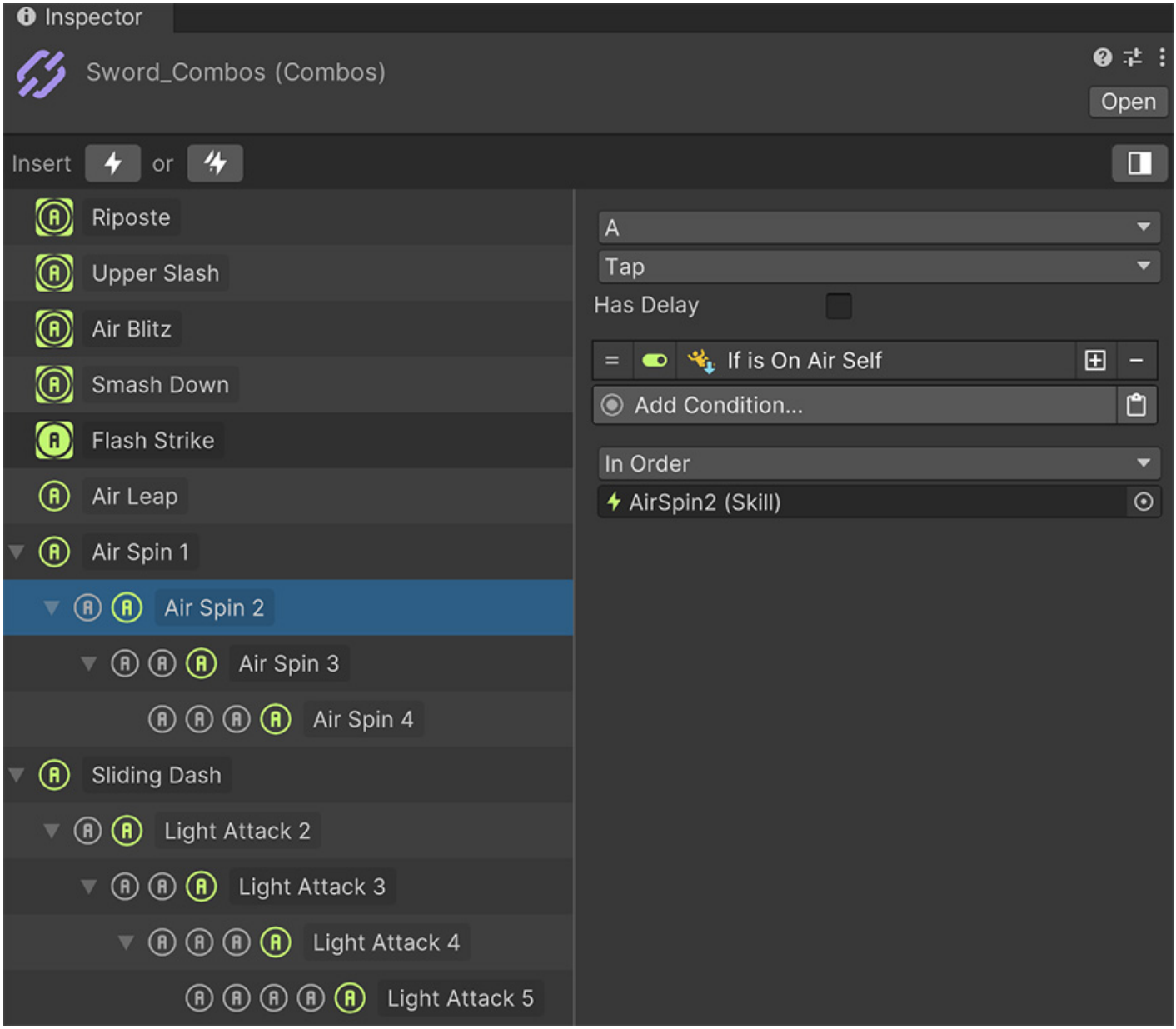
At any given point a **Reaction** can be forced on a character using the **Play Melee Reaction** instruction.



All you need to specify is the character that's going to play the **Reaction** and information necessary for the correct selection of the entry.

1081 Combos

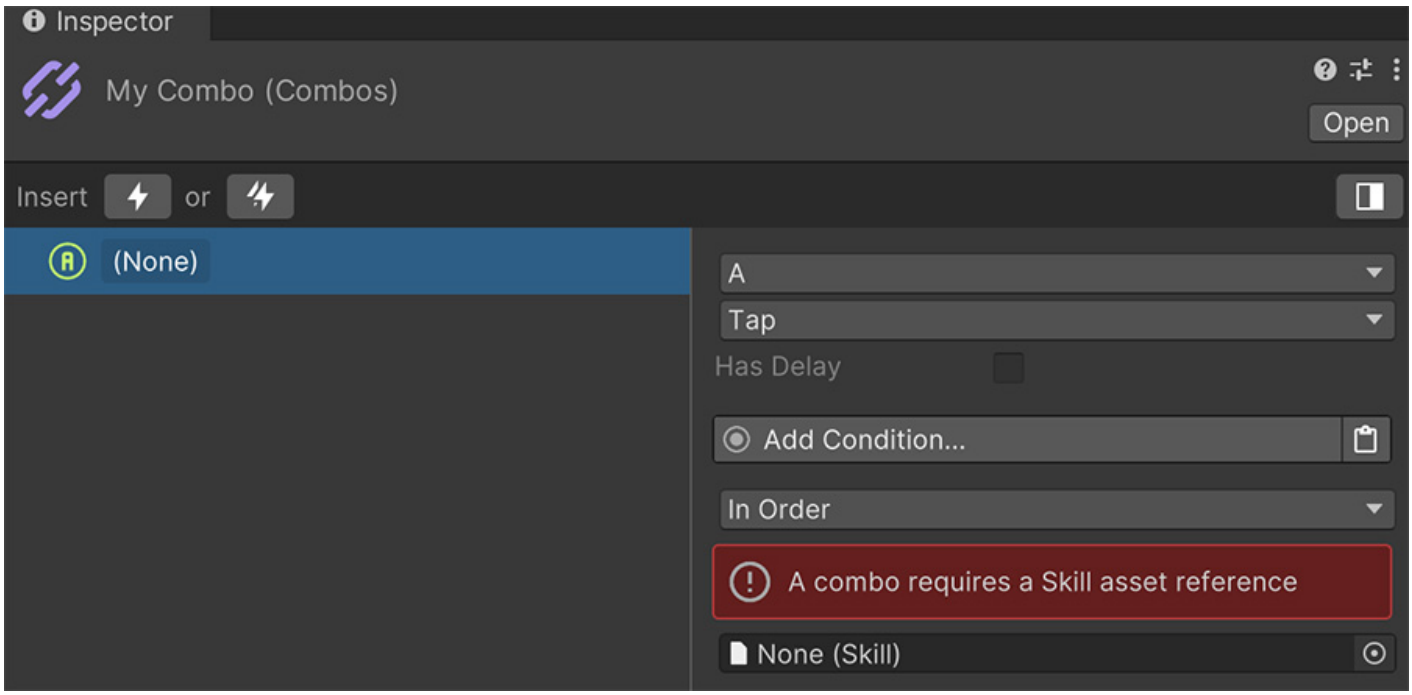
Combos define the order in which **Skills** are executed using different inputs and conditions.



A **Combo** can be either defined as a separate asset or embedded onto the Weapon itself, although we recommend the first option in order to reuse the same combos for multiple weapons.

1081.1 Combo Asset

To create a new **Reaction** asset, right click on the *Project Panel* and select *Create* → *Game Creator* → *Melee* → *Combo*.



1081.2 Combo Anatomy

A **Combo** asset or embedded value have both the exact same layout:

- A left panel with a tree-like structure that defines each **Combo** entry.
- A right panel that displays more information and options for the selected **Combo** entry.

Combos are executed from top to bottom, and upon successfully validating an entry from the left panel, that *Skill* is executed.

Combo entries can be nested into other **Combo** entries in order to create attack combos. For example, having a *Light Attack 2* under the *Light Attack 1* entry will allow to execute the second attack right after finishing the first attack, and skipping the *Recovery Phase*.

To reorder **Combo** entries, simply drag and drop the entry from the left panel where you want it to go. Dropping an entry onto another entry will add it as a child of it.

1081.2.1 Combo Input

The first fields allow to define the input type of a particular **Combo** entry. There are 8 possible keys to use and 2 modes: *Tap* and *Charged* **Skills**.

- **Tap**: Tap skills are executed as soon as the **Execute** input is detected and don't require any waiting time.
- **Charge**: Skills start being charged as soon as the **Charge** input is detected and fully execute when the **Execute** input is input.

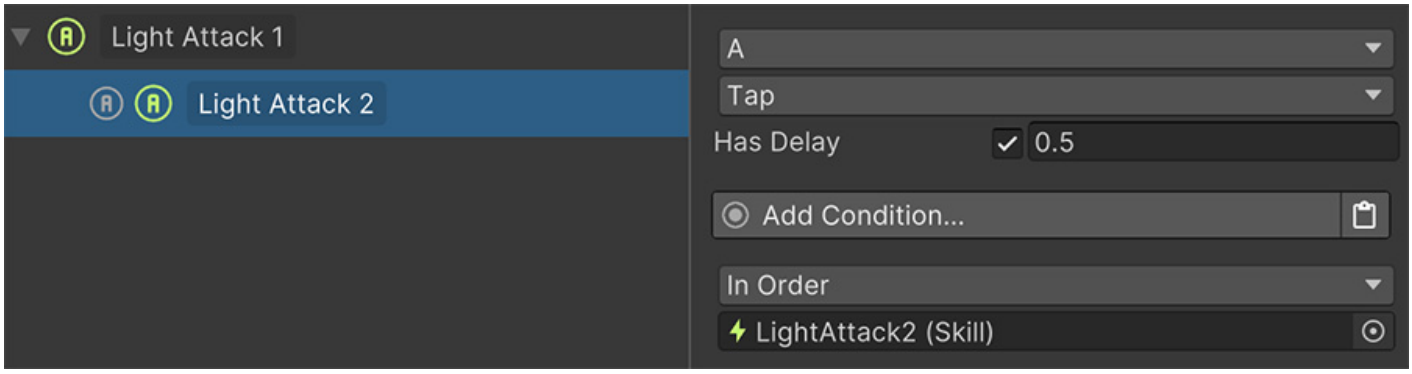
More about Input

For more information about input commands, see the **Input** section.

If the **Charge** option is selected, two fields will be revealed below:

- **Timeout**: The minimum amount of time it needs to pass before the charge can be executed.
- **Auto Release**: Whether the charge can be hold indefinitely or should it execute as soon as the minimum *timeout* expires.

In both **Charged** and **Tap** inputs there's another checkbox field called **Has Delay**. This field is only available when the **combo** entry is a child of another **combo** entry and requires the **Execute** input to happen after a delay.



Delayed Input Commands

Delayed inputs usually execute much more powerful attacks but require precise timing. Hence why these are usually only used by seasoned players that don't button-mash the controller. For example, *Devil May Cry* was one of the first action games to make use of delayed input attacks.

1081.2.2 Combo Execution

The **Conditions** list at each **Combo** entry allows to determine whether this entry should be executed or not.

When to use Conditions

A common use-case of **Conditions** inside **Combo** entries is when the character executes different attack animations when being airborne or grounded.

The **Execution Order** defines whether the **Combo** entry is taken into account in order (option *In Order*), or it can interrupt any combo chain (option *Anytime*).

Interrupting Combos with Skills

Combo entries that are marked as *Anytime* can run even when the character is playing a combo attack.

The last field in the **Combo** entry is the **Skill** itself, which is required in order to execute it.

1082 Input

There are two ways to execute **Skills**:

- Using the **Play Melee Skill** instruction.
- Using the **Input** mechanism and let the **Combo** decide which **Skill** to play.

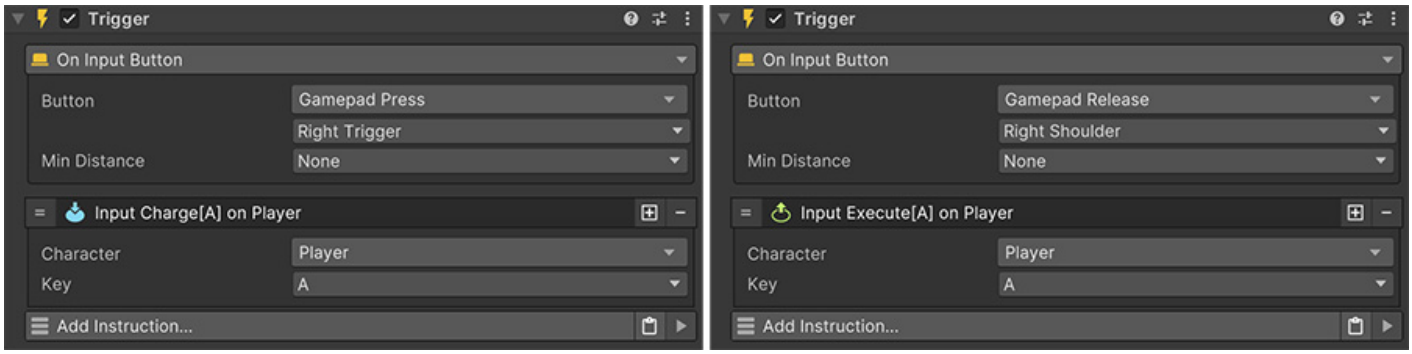
This section focuses on the second one.

1082.1 How to Input

When a character has at least one **Weapon** equipped with a **Combo** asset or embedded value, it is ready to receive input commands, and its combat module will decide whether it can play a **Skill** and which one to run.

There are two instructions to feed characters with:

- **Input Charge** Instruction should be executed when pressing an attack button/key
- **Input Execute** Instruction should be executed when releasing an attack button/key



No Charge? No Problem

If your game does not have any charged attacks you might prefer executing the **Input Execute** directly upon pressing the key, instead of the release, and skipping the **Input Charge**. This will make the controls feel snappier and responsive, but on the other hand, you won't be able to charge attacks.

The **Input** mechanism has been engineered to support multi-platforms out of the box. There are 8 abstract bindable keys which are called *A*, *B*, *C*, ... all the way to *H*.

Keyboard and Gamepads

To allow multi-platform support, simply use Triggers that execute each of the abstract keys from different inputs.

For example, to support both Keyboard and Gamepad controllers, you can use the following **Triggers** for Keyboards:

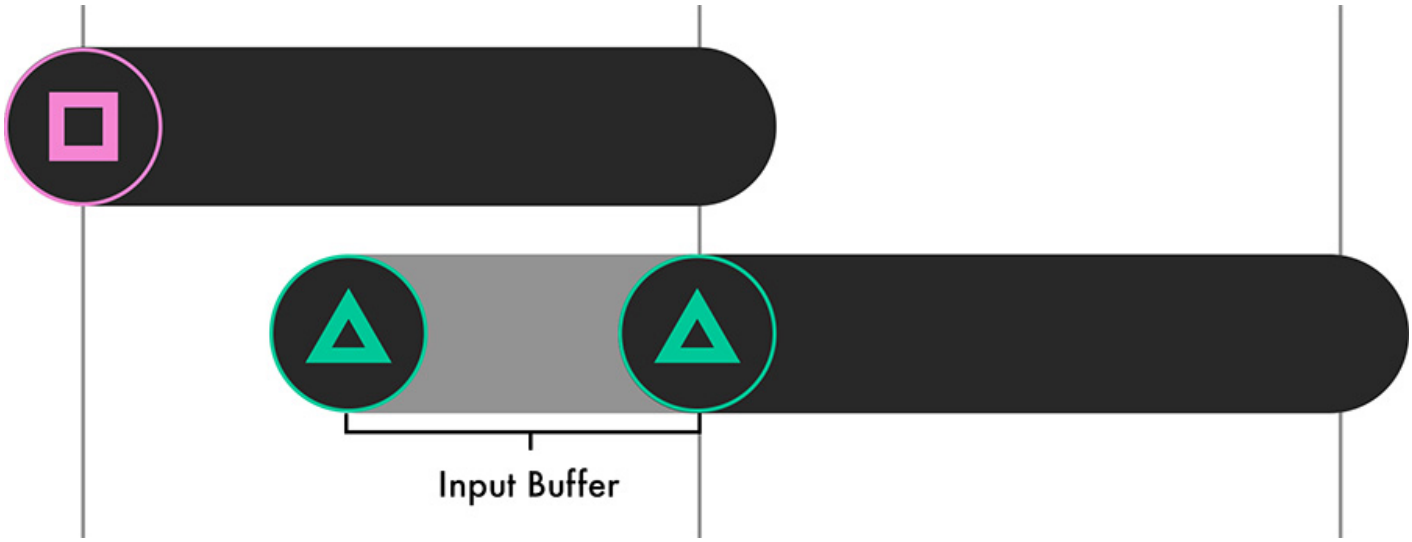
- **Trigger On Mouse Press [Left Button]**: Charge Input A on Player
- **Trigger On Mouse Release [Left Button]**: Execute Input A on Player

And also add the following **Triggers** for gamepads:

- **Trigger On Gamepad Press [Square Button]**: Charge Input A on Player
- **Trigger On Gamepad Release [Square Button]**: Execute Input A on Player

1082.2 Input Buffer

The **Input** mechanism supports a technique called *input buffering* which allows players to input their commands with a slight time window error margin before executing the **Skills** from the input keys.



Input Buffer for Combos

For example, let's say the player is doing a 3-hit light attack combo. The first time they press the **A** key, the player character starts playing the skill *Light Attack 1*, which takes around 1 second to execute.

However, around 0.75 seconds have passed, the player presses the **A** key again to send the command to do a follow-up *Light Attack 2* skill. However, because the first attack hasn't finished, without *input buffering* the second attack would never start.

With *input buffering* the input keys are *remembered* for a maximum amount of time before being consumed.

The **Input Buffer** window duration can be changed at any time using the **Set Buffer Window** instruction.

By default it uses a 0.5 seconds window, but if you feel that's too much, you can easily change it with the aforementioned instruction.

1083 Targets

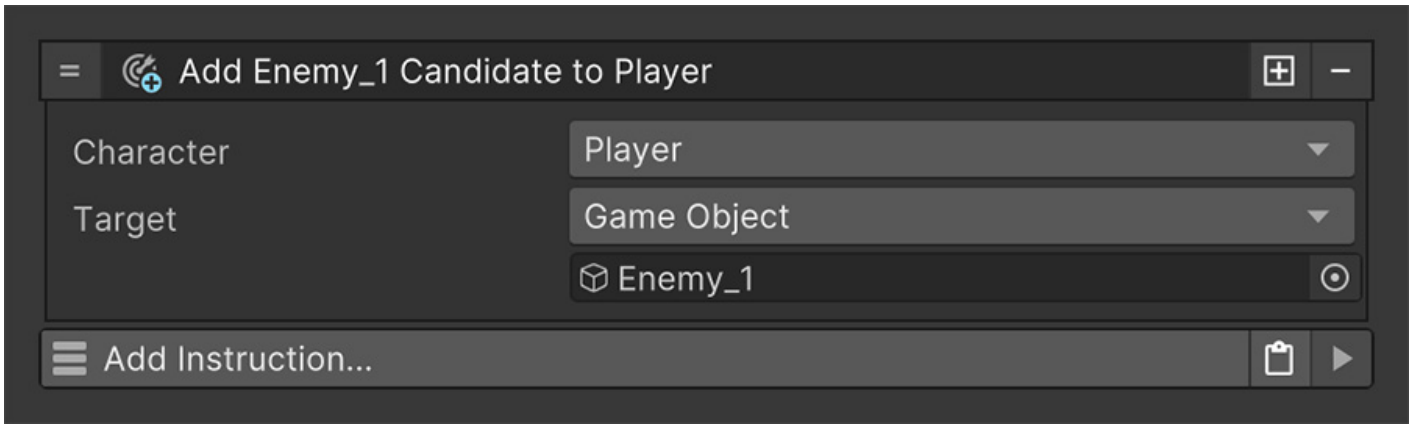
Characters can focus on a targeted character in order to track it and direct their attacks towards them.

On top of that, the **Melee** module also allows to cycle through a list of candidate targets.

To add new *candidate* targets, use the **Add Target Candidate** instruction. To remove it, use the **Remove Target Candidate** instruction.

When to Add/Remove Candidates

In most cases you'll want to set Player target candidates as soon as the enemy appears, and remove the candidate when the enemy dies. To do so, simply add an *On Start* Trigger on the enemy that adds itself to the Player's candidates, and another Trigger set to *On Destroy* that removes itself from the Player's target Candidates.



Simply Focus

If your game doesn't require to cycle through targets, you can skip all this and simply use the **Set Target** instruction to focus a character onto a specific enemy. You can also use the **Clear Target** to remove its current targeted character.

1083.1 Cycling Through Candidates

Once a character has more than 1 candidate target, it can cycle through its list to focus on a particular one. There are multiple ways to cycle through a list of candidates:

1083.1.1 Closest Candidate

Focuses on the closest candidate to the character. This is useful for auto-targeting enemies in fast-paced games where the enemy that's closest to the player should be prioritized.

Use the **Cycle Closest** instruction to automatically select the one that's closest to the character.

1083.1.2 Next / Previous Candidate

Focuses on the next or previous character from its internal list. This is usually done in games with few enemies on screen where the right joystick is used for something else other than targeting. For example, pressing the left shoulder button to cycle through the list of enemies.

Use the **Cycle Next** and **Cycle Previous** instruction to automatically select the next or previous target.

> **Circular Cycles**
>
> Repeatedly calling the **Next** or **Previous** candidate will circle back to the first or last position upon reaching the other end. For example, if there's a 3 candidate list of enemies, and we're currently focusing on the 3rd and run the **Cycle Next** instruction, it will jump back to the first position and focus on the first candidate on the list.

1083.1.3 Cycle by Direction

Focuses on the next candidate that most closely matches the direction given in screen-space from the character's position and the camera reference provided. This is intended to be used with gamepads that have a right-stick that you can use to select the next target.

Use the **Cycle Direction Target** instruction to select the next candidate based on the camera's perspective and direction provided.

IX.II Visual Scripting

1084 Visual Scripting

The **Melee** module symbiotically works with **Game Creator** and the rest of its modules using its visual scripting tools.

- **Instructions**
- **Conditions**
- **Events**

Each scripting node allows other modules to use any **Melee** feature, and adds a list of **Properties** ready to be used by other interactive elements.

IX.II.I Conditions

1085 Conditions

1085.1 Sub Categories

- Melee

IX.II.I.I Melee

1086 Melee

1086.1 Conditions

- Has Equipped Melee
- In Attack Phase
- Is Blocking
- Last Cancel Successful
- Time Since Last Block
- Time Since Last Break
- Time Since Last Parry

1087 Has Equipped Melee

```
Melee » Has Equipped Melee
```

1087.1 Description

Returns true if the Character has a specific Melee Weapon equipped

1087.2 Parameters

Name	Description
Character	The targeted Character
Weapon	The Melee Weapon to check if it is equipped

1087.3 Keywords

`Combat` `Melee`

1088 In Attack Phase

`Melee » In Attack Phase`

1088.1 Description

Returns true if the character is in any of the specified attack phases

1088.2 Parameters

Name	Description
Character	The targeted Character
Phases	The attack phases the character might be in

1088.3 Keywords

`Combat` `Melee` `Attack` `Anticipation` `Strike` `Activation` `Recovery`

1089 Is Blocking

```
Melee » Is Blocking
```

1089.1 Description

Returns true if the specified Character is blocking attacks

1089.2 Parameters

Name	Description
Character	The Character that might be blocking attacks

1089.3 Keywords

`Combat` `Melee` `Block` `Defend`

1090 Last Cancel Successful

```
Melee » Last Cancel Successful
```

1090.1 Description

Returns true if the last attempt to cancel a skill was successful

1090.2 Parameters

Name	Description
Character	The Character that might have attempted to cancel its skill

1090.3 Keywords

`Combat` `Melee` `Attack`

1091 Time since Last Block

`Melee » Time since Last Block`

1091.1 Description

Returns true if the time since the last blocked attack is less than a value

1091.2 Parameters

Name	Description
Character	The Character targeted
Time	The maximum time for this condition to be true

1091.3 Keywords

`Combat` `Melee` `Block` `Defend`

1092 Time since Last Break

`Melee » Time since Last Break`

1092.1 Description

Returns true if the time since the last broken attack is less than a value

1092.2 Parameters

Name	Description
Character	The Character targeted
Time	The maximum time for this condition to be true

1092.3 Keywords

`Combat` `Melee` `Block` `Defend` `Broken` `Destroy`

1093 Time since Last Parry

```
Melee » Time since Last Parry
```

1093.1 Description

Returns true if the time since the last parried attack is less than a value

1093.2 Parameters

Name	Description
Character	The Character targeted
Time	The maximum time for this condition to be true

1093.3 Keywords

`Combat` `Melee` `Block` `Defend`

IX.II.II Events

1094 Events

1094.1 Sub Categories

- Melee

IX.II.II.I Melee

1095 Melee

1095.1 Events

- On Equip Weapon
- On Input Charge
- On Input Execute
- On Melee Hit
- On Unequip Weapon

1096 On Equip Weapon

```
Melee » On Equip Weapon
```

1096.1 Description

Executed when the Character equips a new Melee Weapon

1096.2 Keywords

`Equip` `Unsheathe` `Take` `Sword` `Melee`

1097 On Input Charge

```
Melee » On Input Charge
```

1097.1 Description

Executed when the Character starts to run a Charge input command

1097.2 Parameters

Name	Description
Key	The key being used as a Charge command

1097.3 Keywords

`Charge` `Input` `Melee` `Execute` `Hold` `Load`

1098 On Input Execute

```
Melee » On Input Execute
```

1098.1 Description

Executed when the Character starts to run the Execute input command

1098.2 Parameters

Name	Description
Key	The key being used as an Execute command

1098.3 Keywords

`Charge` `Input` `Melee` `Attack` `Strike`

1099 On Melee Hit

```
Melee » On Melee Hit
```

1099.1 Description

Executed when the Trigger receives a hit from a melee Skill

1099.2 Keywords

`Active` `Disable` `Inactive`

1100 On Unequip Weapon

```
Melee » On Unequip Weapon
```

1100.1 Description

Executed when the Character removes a new Melee Weapon

1100.2 Keywords

`Unequip` `sheathe` `Take` `Sword` `Melee`

IX.II.III Instructions

1101 Instructions

1101.1 Sub Categories

- Melee

IX.II.III.I Melee

1102 Melee

1102.1 Sub Categories

- Defense
- Equip
- Input
- Skills

IX.II.III.I.I DEFENSE

1103 Defense

1103.1 Instructions

- Set Defense
- Set Shield
- Start Blocking
- Stop Blocking

1104 Set Defense

```
Melee » Defense » Set Defense
```

1104.1 Description

Sets the current defensive value of a Shield on a Character

1104.2 Parameters

Name	Description
Character	The Character that has a defensive combat value
Value	The new defense value, clamped between 0 and the maximum defense value

1104.3 Keywords

`Melee` `Combat` `Shield` `Defense` `Block`

1105 Set Shield

`Melee » Defense » Set Shield`

1105.1 Description

Sets the Shield value

1105.2 Parameters

Name	Description
To	The location where to store the Shield
Shield	The Shield asset reference

1105.3 Keywords

`Melee` `Combat`

1106 Start Blocking

```
Melee » Defense » Start Blocking
```

1106.1 Description

Attempts to start blocking with the Melee stance

1106.2 Parameters

Name	Description
Character	The Character that starts blocking

1106.3 Keywords

`Melee` `Combat` `Shield` `Parry` `Deflect` `Block`

1107 Stop Blocking

`Melee » Defense » Stop Blocking`

1107.1 Description

Attempts to stop blocking with the Melee stance

1107.2 Parameters

Name	Description
Character	The Character that stops blocking

1107.3 Keywords

`Melee` `Combat` `Shield` `Parry` `Deflect` `Block`

IX.II.III.I.II EQUIP

1108 Equip

1108.1 Instructions

- Equip Melee Weapon
- Unequip Melee Weapon

1109 Equip Melee Weapon

`Melee » Equip » Equip Melee Weapon`

1109.1 Description

Equips a Melee Weapon on the targeted Character if possible

1109.2 Parameters

Name	Description
Character	The Character reference equipping the weapon
Weapon	The weapon reference to equip
Model	The optional 3D model instance

1109.3 Keywords

`Melee` `Combat`

1110 Unequip Melee Weapon

`Melee » Equip » Unequip Melee Weapon`

1110.1 Description

Unequip a Melee Weapon from the targeted Character if possible

1110.2 Parameters

Name	Description
Character	The Character reference unequipping the weapon
Weapon	The weapon reference to unequip

1110.3 Keywords

`Melee` `Combat`

IX.II.III.I.III INPUT

1111 Input

1111.1 Instructions

- Input Charge
- Input Execute
- Set Buffer Window

1112 Input Charge

```
Melee » Input » Input Charge
```

1112.1 Description

Queues a charging Melee input command on a Character

1112.2 Parameters

Name	Description
Character	The Character reference
Key	The Input key value

1112.3 Keywords

`Melee` `Combat`

1113 Input Execute

`Melee » Input » Input Execute`

1113.1 Description

Queues an execution Melee input command on a particular Character

1113.2 Parameters

Name	Description
Character	The Character reference
Key	The Input key value

1113.3 Keywords

`Melee` `Combat`

1114 Set Buffer Window

`Melee » Input » Set Buffer Window`

1114.1 Description

Sets the maximum time for an input to register before it can be executed

1114.2 Parameters

Name	Description
Character	The Character reference
Buffer Window	The time of the Buffer Window, in seconds

1114.3 Keywords

`Melee` `Combat` `Buffer` `Window`

IX.II.III.I.IV SKILLS

1115 Skills

1115.1 Instructions

- Play Melee Reaction
- Play Melee Skill
- Reset Block Time
- Reset Break Time
- Reset Parry Time
- Reset Skill Hits
- Set Skill
- Try Cancel Skill
- Wait Until Phase

1116 Play Melee Reaction

`Melee » Skills » Play Melee Reaction`

1116.1 Description

Plays a Melee Reaction on a Character

1116.2 Parameters

Name	Description
Character	The Character that plays the Melee Reaction
Attacker	The Character set as the attacker
Reaction	The Melee Reaction asset played

1116.3 Keywords

`Melee` `Combat`

1117 Play Melee Skill

`Melee » Skills » Play Melee Skill`

1117.1 Description

Plays a Skill on a Character regardless of the weapon or state

1117.2 Parameters

Name	Description
Character	The Character that plays the Skill
Target	Optional reference object set as the Target of the Skill
Skill	The Skill asset reference to run

1117.3 Keywords

`Melee` `Combat`

1118 Reset Block Time

`Melee » Skills » Reset Block Time`

1118.1 Description

Resets the registered time of the last blocked attack

1118.2 Parameters

Name	Description
Character	The Character reference resetting the value

1118.3 Keywords

`Melee` `Combat`

1119 Reset Break Time

```
Melee » Skills » Reset Break Time
```

1119.1 Description

Resets the registered time of the last broken attack

1119.2 Parameters

Name	Description
Character	The Character reference resetting the value

1119.3 Keywords

`Melee` `Combat`

1120 Reset Parry Time

`Melee » Skills » Reset Parry Time`

1120.1 Description

Resets the registered time of the last parried attack

1120.2 Parameters

Name	Description
Character	The Character reference resetting the value

1120.3 Keywords

`Melee` `Combat`

1121 Reset Skill Hits

```
Melee » Skills » Reset Skill Hits
```

1121.1 Description

Resets the hit performed by the ongoing Skill

1121.2 Parameters

Name	Description
Character	The Character reference resetting the hit buffer

1121.3 Keywords

`Melee` `Combat`

1122 Set Skill

`Melee » Skills » Set Skill`

1122.1 Description

Sets the Skill value

1122.2 Parameters

Name	Description
To	The location where to store the Skill
Skill	The Skill asset reference

1122.3 Keywords

`Melee` `Combat`

1123 Try Cancel Skill

`Melee » Skills » Try Cancel Skill`

1123.1 Description

Attempts to cancel an ongoing Charge, Skill or Reaction being executed by a character

1123.2 Parameters

Name	Description
Character	The Character reference using a Charge, Skill or Reaction

1123.3 Example 1

If you want to cancel only a specific phase (like a Reaction) check whether the current phase being played is that one

1123.4 Keywords

`Melee` `Combat` `Skill` `Stop` `Reaction` `Charge`

1124 Wait until Phase

`Melee » Skills » Wait until Phase`

1124.1 Description

Waits until the current Skill's phase reaches the chosen one

1124.2 Parameters

Name	Description
Character	The Character reference
Phase	The Phase which waits to

1124.3 Keywords

`Melee` `Combat` `Anticipation` `Strike` `Recovery` `Finish` `Combo` `Skill`

IX.III Releases

1125 Releases

1125.1 2.2.11 (Latest)

Released October 18, 2024

New

- Variables: Setter Properties for Melee Weapons

Changes

- Support for Unity 6

Fixes

- Event: On Equip Melee Weapon filters by Melee Weapon
- Event: On Unequip Melee Weapon filters by Melee Weapon
- Camera: Soft Lock camera incorrect NaN value if time scale is zero
- Skill: On Parried no longer plays Hit Reactions if empty

1125.2 2.1.10

Released July 30, 2024

New

- Skill: Can Block conditions for reach Skill
- Skill: Can Parry conditions for reach Skill

Enhances

- Striker: Capsule has option to set direction
- Skill: Choose audio time scale from caster or unscaled

Fixes

- Invincibility: Not considering without dashing
- Skill: Always play SFX in unscaled time
- Skill: If target is null plays at world origin

1125.3 2.1.9

Released February 23, 2024

Fixes

- Internal: Support for core 2.15.49

1125.4 2.1.8

Released January 10, 2024

Fixes

- Examples: Missing hit detections
- Examples: Focus using gamepad

1125.5 2.1.7

Released January 9, 2024

Fixes

- Skill: On Hit instructions run before victim Reaction
- Editor: Compatibility with Core 2.14.46

1125.6 2.1.6

Released October 31, 2023

This version breaks compatibility with previous versions and will only work with Game Creator 2.13.43 or higher.

New

- Component: Can Hit for hitting non-Character objects
- Property: Melee Self to Target Location
- Property: Melee Target to Self Location
- Instruction: Set Skill
- Instruction: Set Shield
- Skill: On Strike sound effect option

Changes

- Internal: Support for Core 2.13.42 version

Fixes

- Sequencer: Instructions called after cancelling
- Sequencer: Default empty values
- Sequencer: Duplicate value when creating new Clip
- Reactions: No reaction does not stop Gestures
- Skills: Audio Clips use caster time scale
- Skills: Motion Warping not detecting collisions

Removes

- Properties: Location Melee Properties

1125.7 2.0.5

Released June 13, 2023

Fixes

- Examples: Missing variables in some scenes

1125.8 2.0.4

Released June 13, 2023

Fixes

- Trigger: On Hit has attacker as Target
- Examples: Missing Local Name Variables

1125.9 2.0.3

Released May 25, 2023

New

- Skill: Condition Can Hit when striking targets
- Variables: Melee Weapon, Shield and Skill types

Fixes

- Trigger: On Hit calls every frame during attack
- Trail: Not rendering on URP/HDRP
- Examples: Dash not working correctly

1125.10 2.0.2

Released April 26, 2023

New

- Uninstall: Added option to uninstall the module

Fixes

- Example: First-Person example missing character
- Version: Not showing current module version
- Misspell: Example scene typographic error

1125.11 2.0.1

Released April 25, 2023

New

- First release

X. Traversal

1126 Traversal

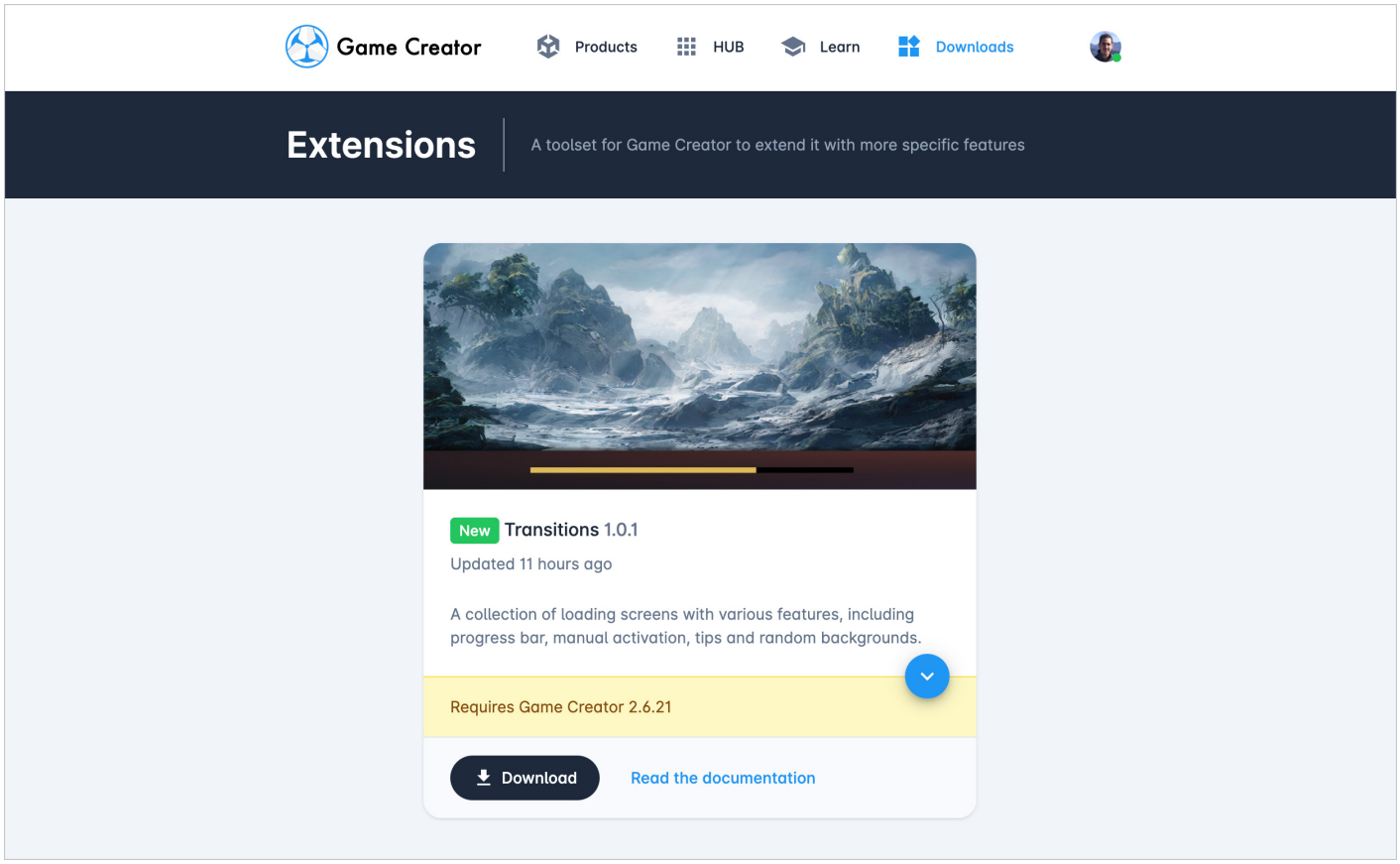
WIP

This module is currently under developement

XI. Extensions

1127 Welcome to Extensions

Extensions are free packages that can be downloaded from the official Game Creator site. As its name implies, **Extensions** add new features that can be easily used.



1127.1 Installation

To install an **Extension**, download it from the **Downloads** page. With your Unity project open, double click the `.unitypackage` file and a screen will prompt you to choose which files you want to add to your project.

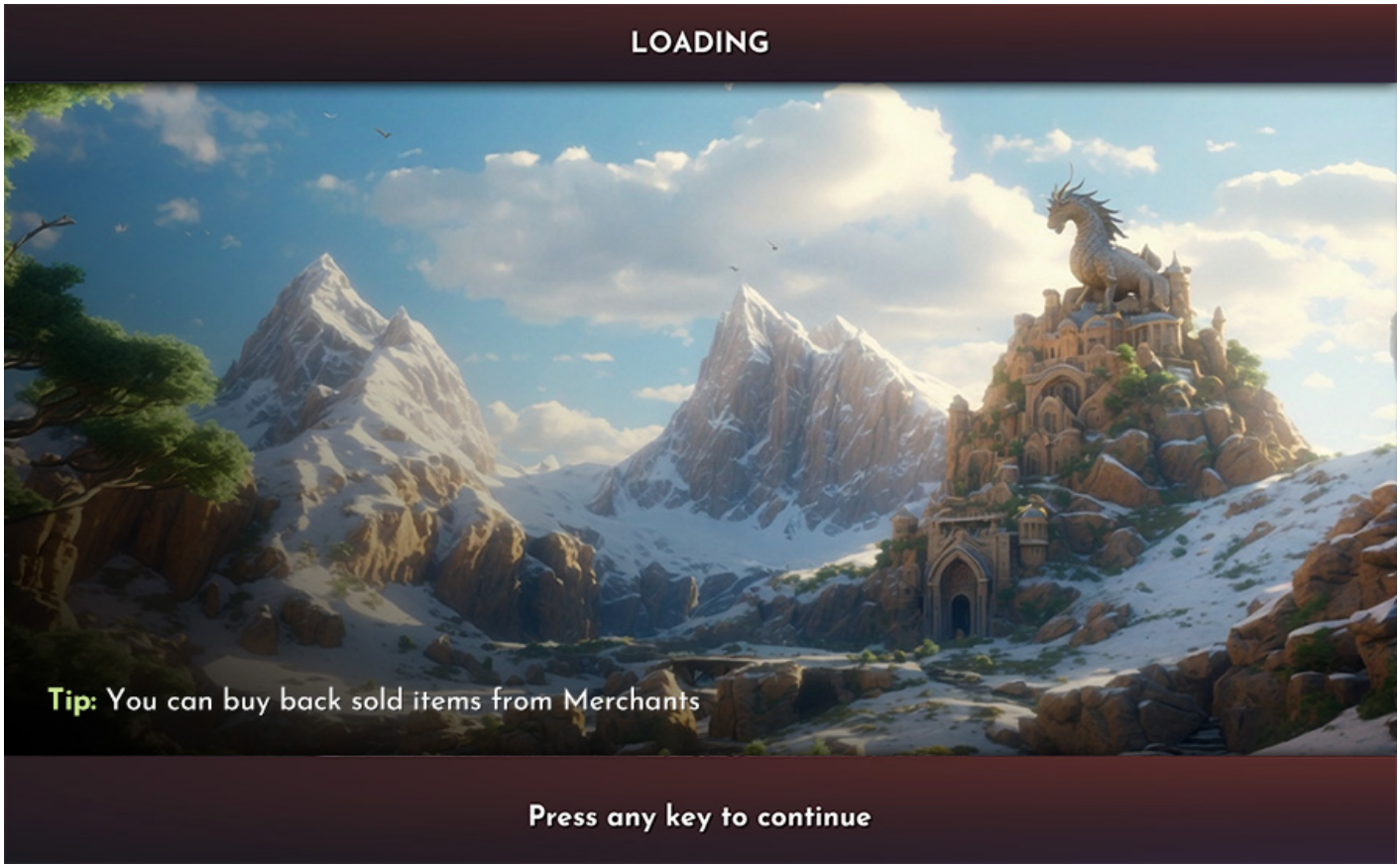
> **Pick all assets**
>
> If it's the first time you're installing an extension, we recommend installing all files. Once you have more experience with it, you can cherry pick which examples to install and which ones to ignore.

An **Extension** will appear like any other normal module and can be uninstalled clicking on the top toolbar → Game Creator → Uninstall... and picking the desired module or extension to delete.

XI.I Transitions

1128 Transitions

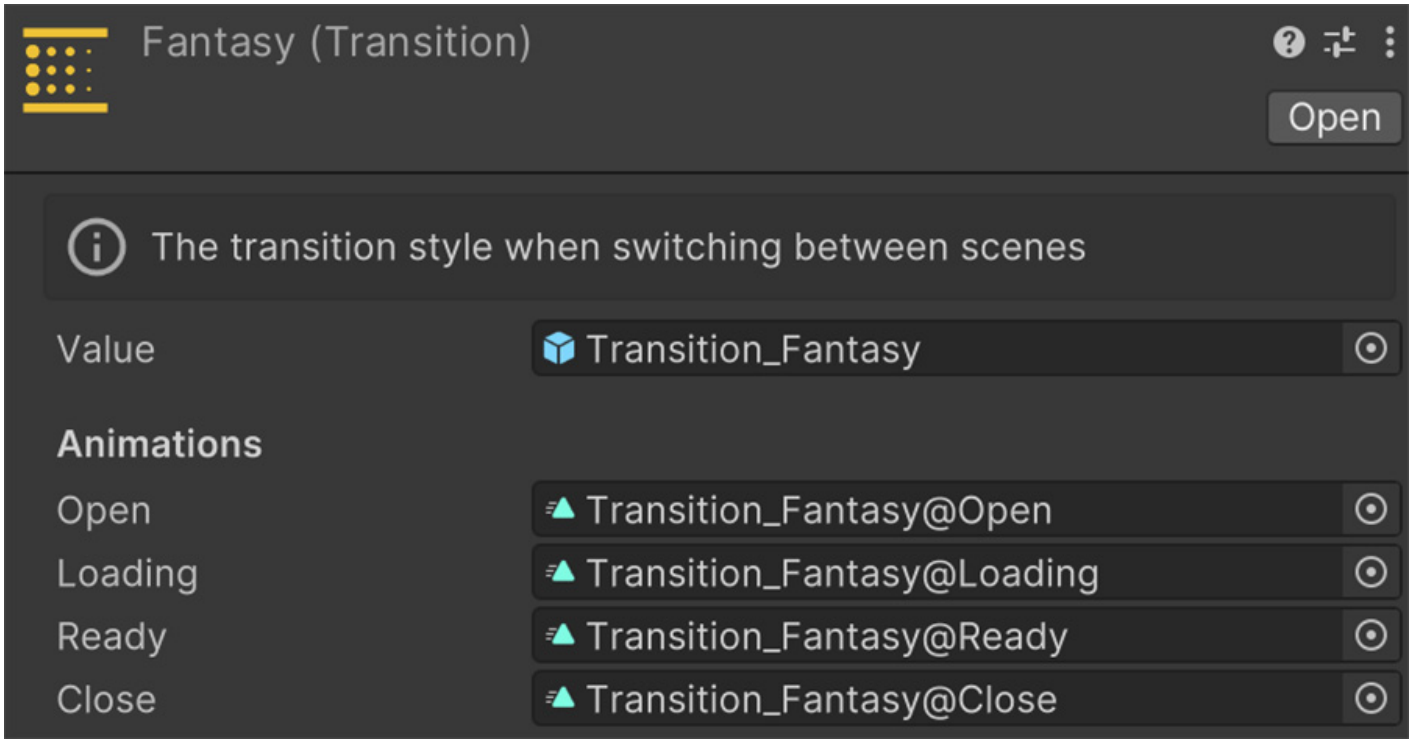
The **Transitions** extension allows to load a new scene using a custom loading screen, that may include game tips, random backgrounds, animations and other kinds of visual elements.



These loading screens can be easily interchanged using the **Transition** asset, which is used in one of the Instructions.

1129 Transitions

Transitions are configured in an asset, which accepts a prefab with a **Transient** component, and a collection of optional animations that are used to fade in, out and an idle the interface screen.



Custom Transitions

We recommend duplicating any of the built-in **Transition** assets and modifying it to create a custom one for your game.

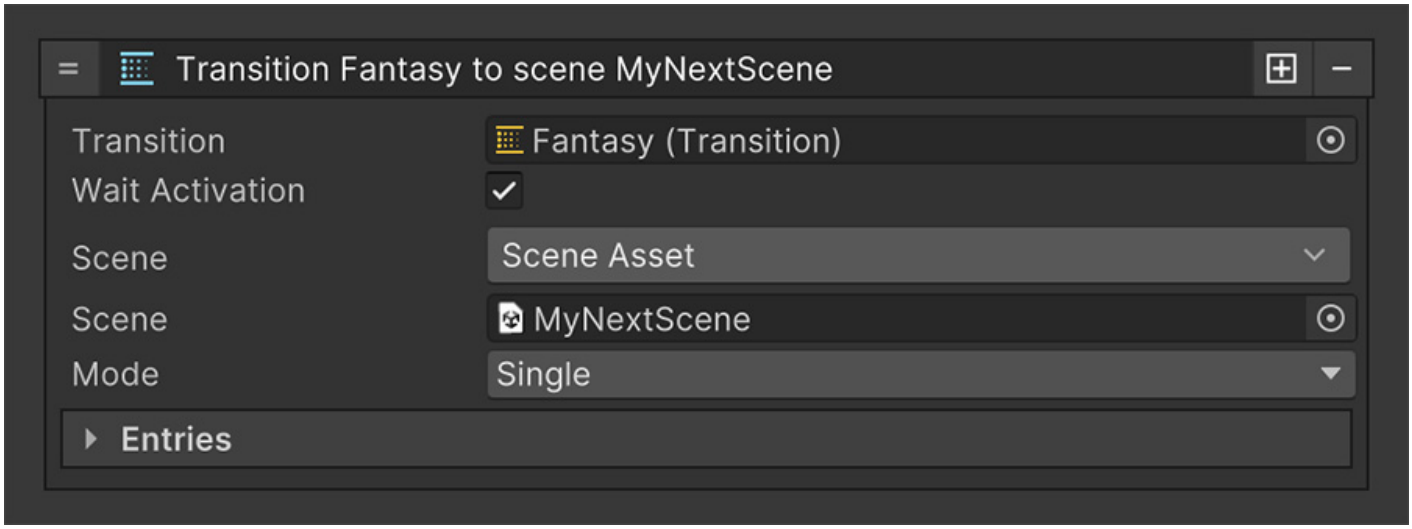
This asset can be used with any of the Instructions available.

1130 Instructions

There are a few **Instructions** available in this module.

1130.1 Transition to Scene

To transition from one screen to another one, use the **Transition to Scene** instruction, which can be found under the *Transitions* category in any visual scripting dropdown list.



The first field must reference a valid **Transition** asset, which determines the type of screen that appears when loading the scene.

Ticking the **Wait Activation** checkbox will load the scene, but won't activate it until something executes the **Transition Complete**.

> **Press any key to continue**
>
> Ticking the **Wait Activation** allows long loading screens to remain after they've been loaded, so it's the user who decides when they are ready to play the next level.
>
> By default, all built-in **Transitions** wait until the player presses any input key to continue, though this can be modified inside the transition prefab.

The **Scene** field allows to choose which scene to load next.

You can also specify wether to load the next scene *Additively* or unload every other scene and just load a new one, using the *Single* option from the **Mode** field.

The **Entries** section below, just like the **Load Scene** instructions, allow to define where each object from the next scene should be position. This is mostly used to post the Player at the correct door entrance when using this method.

Running Time

It's important to note that the loading screen doesn't pause/stop the game while it starts loading.

This means that the Player could get hit and die while the loading screen's animation is starting to run, so it's worth considering adding mechanisms that prevents having gameplay issues with it.

1130.2 Transition Start

The **Transition Start** instruction is used to play a specific **Transition**, just like the previous instruction. However, it won't load a new scene. This can be used to move between cameras. For example, playing a kill-cam using a transition.

1130.3 Transition Complete

The **Transition Complete** instruction allows to resume and finish the current **Transition** being played.

This is most commonly used to transition out from a current loading screen, that's waiting for a Player input in order to activate the newly loaded scene.

XI.II Localization

1131 Localization

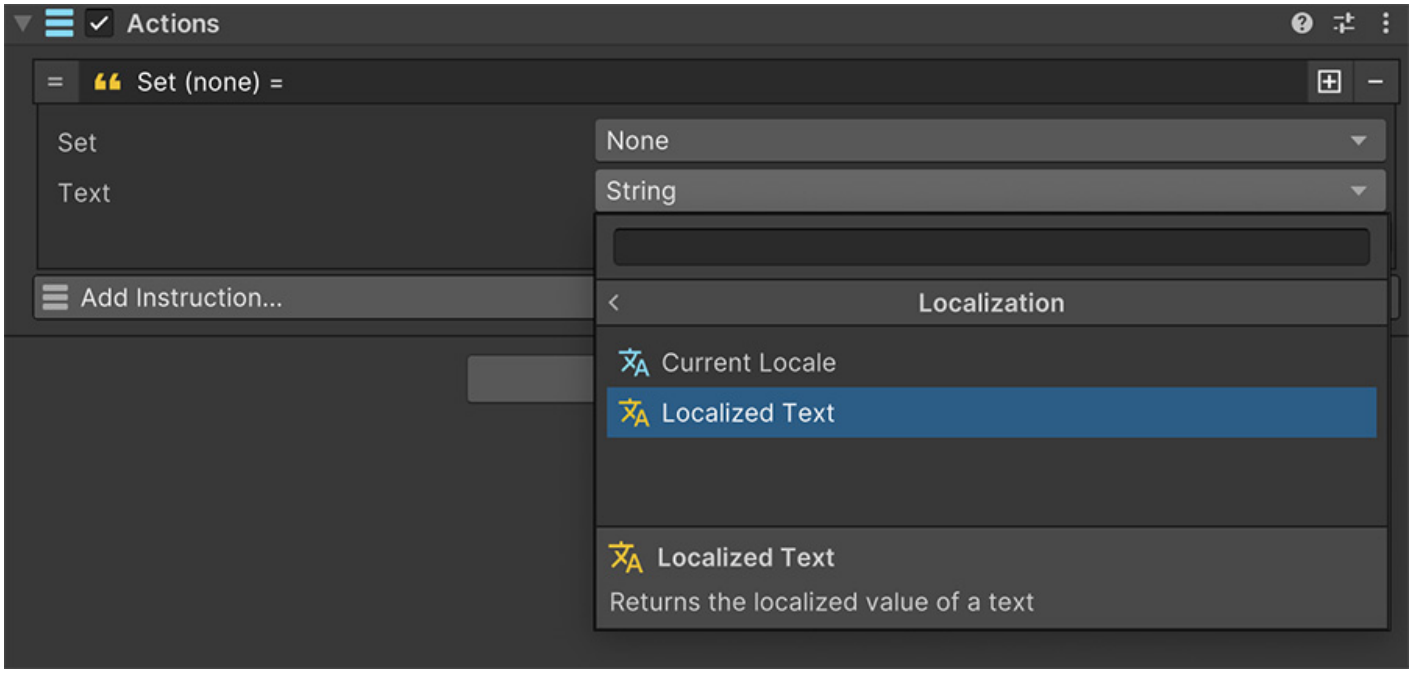
The **Unity Localization** asset allows to manage and show a game translated to two or more languages.

> **Documentation for Unity Localization**
>
> The **Localization** asset comes packed with a lot of out-of-the-box components that make it effortless to add translations to your games. This page assumes you're a bit familiar with its workflows. You can learn more about it at the **Unity Localization Documentation**

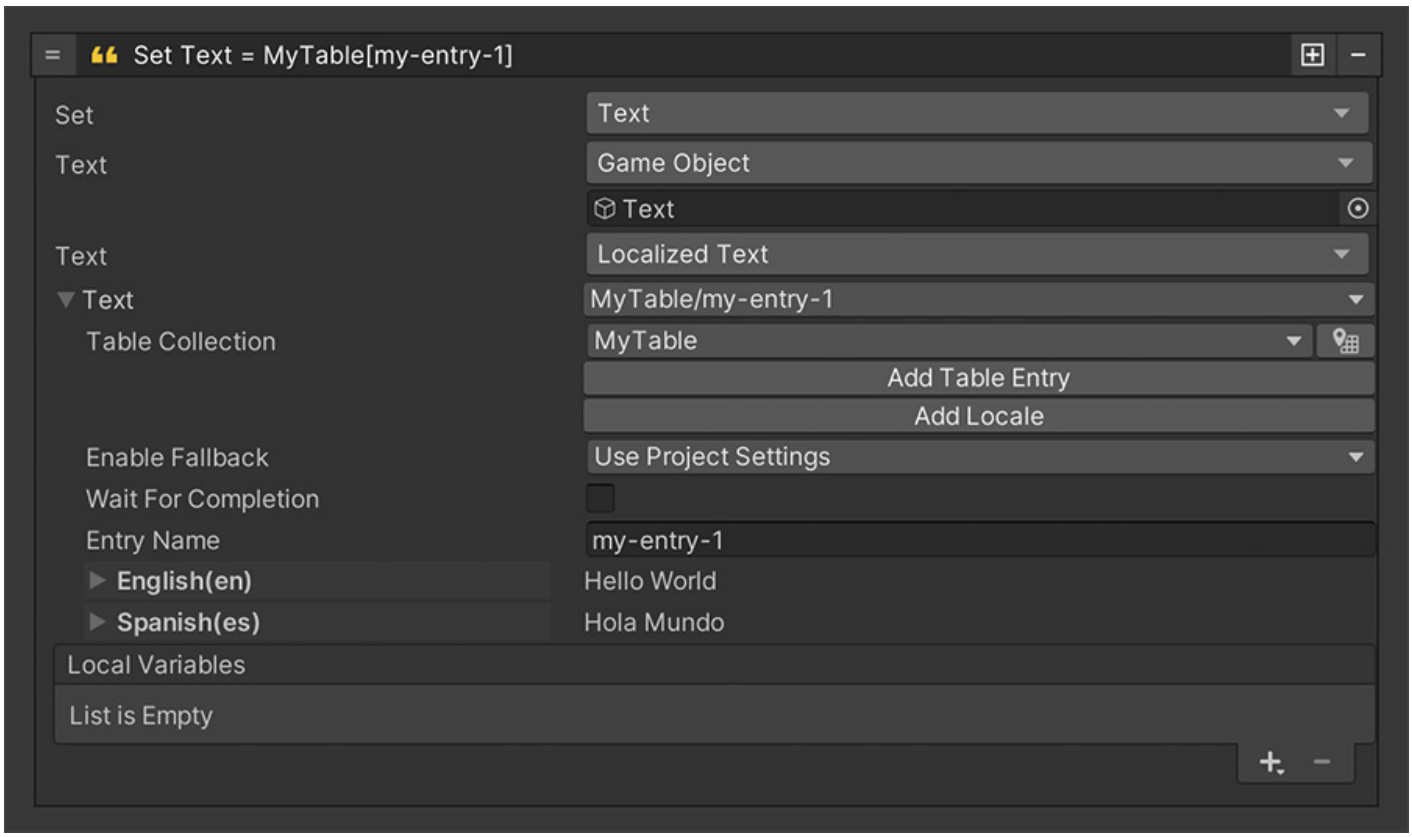
1131.1 Display translations

This integration allows to localize not only texts, but also *Sprites*, *Textures* and even entire *Game Objects*, and in all cases it's the exact same workflow.

To display a localized **Text** use the **Localized Text** option from any of the text properties dropdown.



Once the property is created, you can choose a text entry from the *Localization Table* or create a new entry.



Node Title

After selecting the table entry or creating a new entry, the **Instruction** node title might not update its text. This is because Unity 2022.3 and previous versions use *IMGUI* to render some sections of Unity Localization. You can simply collapse and expand the instruction again to manually refresh the title.

1131.2 Change the Language

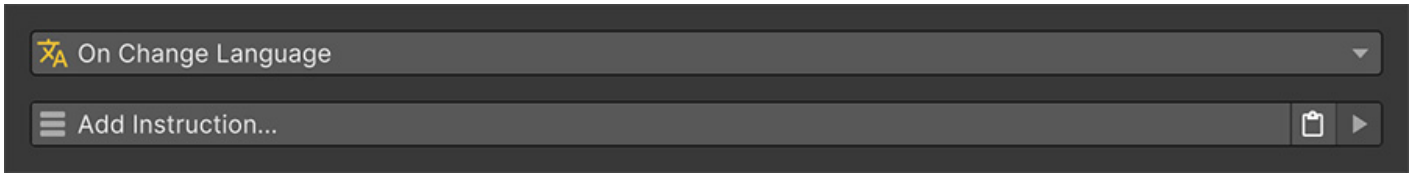
To change the language (also known as *Locale*), you can use the **Change Language** instruction. It allows to type in a string value with the locale of the language to display.

About Locales

Locales are short strings that represent a language. For example, English is usually typed as `en` and Spanish as `es` . There are also regional locales, such as `en-CA` for Canadian English or `en-US` for United States English.

1131.3 Detect Language Changes

To detect when the currently selected locale has changed, use the **On Change Language** event Trigger, which is executed every time a new language is selected.



Text Refresh

Depending on the scene, it might not be possible to update the texts displayed on screen to the new language. In these cases, it's best to simply reload the scene after changing the language, so all text and assets that are localized are re-constructed again with the new locale values.

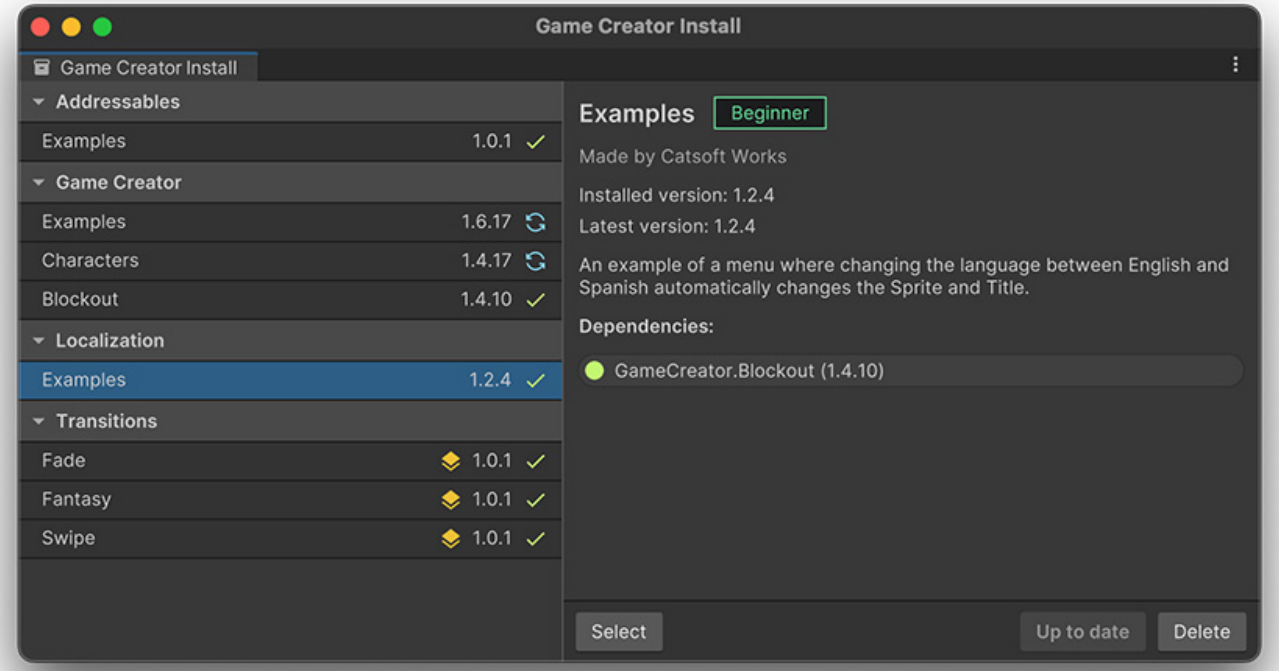
1132 Examples

The **Localization** integration kit comes with an example scene that shows how to change a *Sprite* and a text based on the currently selected language.

> **Example Setup**
>
> Because Unity Localization uses *Addressables* to load in the translation tables, there is unfortunately no way to install the example with everything set up. This page will guide you on how to properly configure it.

1132.1 Setup

Once the **Localization** package and integration kit have been installed, open the Game Creator's *Install* window and proceed to install the **Localization Examples**.

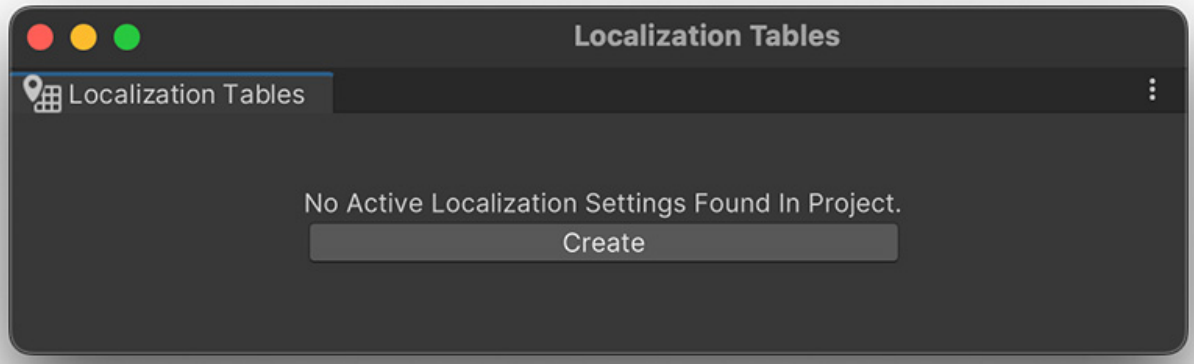


Select and open the example scene. The *Hierarchy* view shows a canvas with a white square, and two buttons that read *English* and *Spanish*. These buttons change the language of the game, using the **Change Language** instruction.

The **Trigger_Start** is called as soon as the game starts, and simply executes the instructions from the trigger below.

The **Trigger_Set_Language** is executed as soon as the game language is changed. This updates the *Image* component with a localized one, as well as the text of the *Title*.

Head to the top toolbar and open/create the **Localization Tables** by selecting *Window* → *Asset Management* → *Localization Tables*.



If you haven't created any tables yet, the window will prompt you to create a *Settings* asset and where you want to save it.

After that, you'll be able to create a new **Localization Table** by clicking on the left corner of the window, where it says "New Table Collection". This will create an asset that stores either string (texts) or asset translations.

Before creating any tables, the *Locales* need to be defined.

> **What are Locales**
>
> **Locales** are short texts that represent a language. For example `es` means *Spanish* and `en` represents *English*. There are also regional locales, such as `en-UK` which is the *English* spoken on the United Kingdom.

Click on *Locale Generator* and select *English* and *Spanish* (`en` and `es` respectively).

Let's create two **Table Collections**:

- **MyTexts**: Select the *String Table Collection* to store the localized texts of the game.
- **MyAssets**: Select the *Asset Table Collection* to store the localized assets of the game.

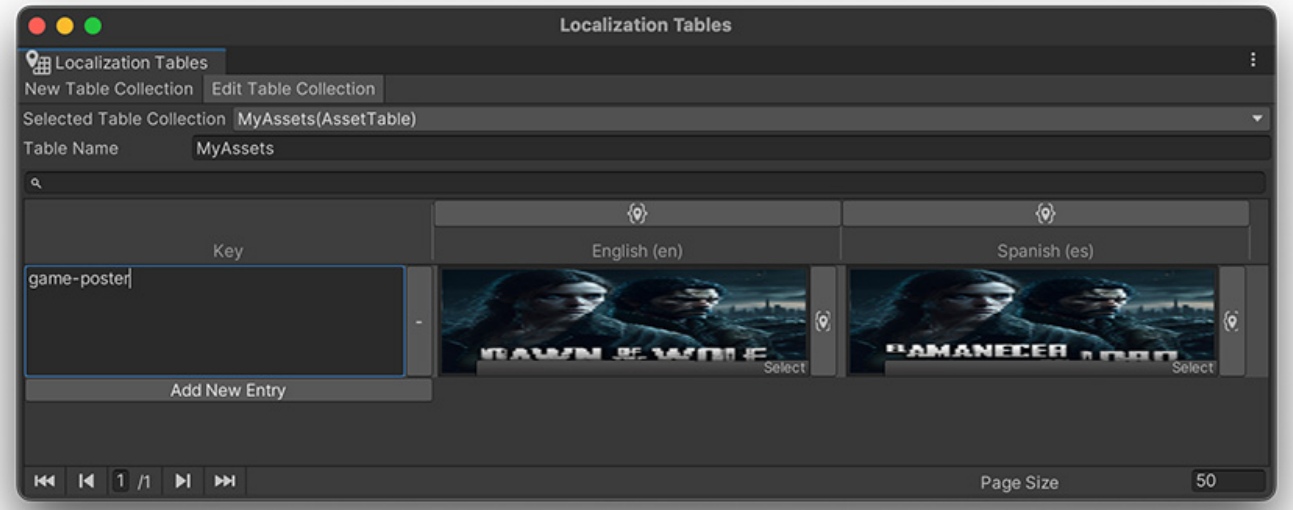
Select the **MyTexts** and add a new entry called `game-title` and set the following texts:

- `en` : Dawn of the Wolf
- `es` : El Amanecer del Lobo

Select the **MyAssets** and add also a new entry called `game-poster` with the following sprites:

- `en` : Poster_EN.png
- `es` : Poster_ES.png

You'll find these sprites inside the example folder at `Assets/Plugins/GameCreator/Installs/Localization.Examples/Localization/Sprites/`.



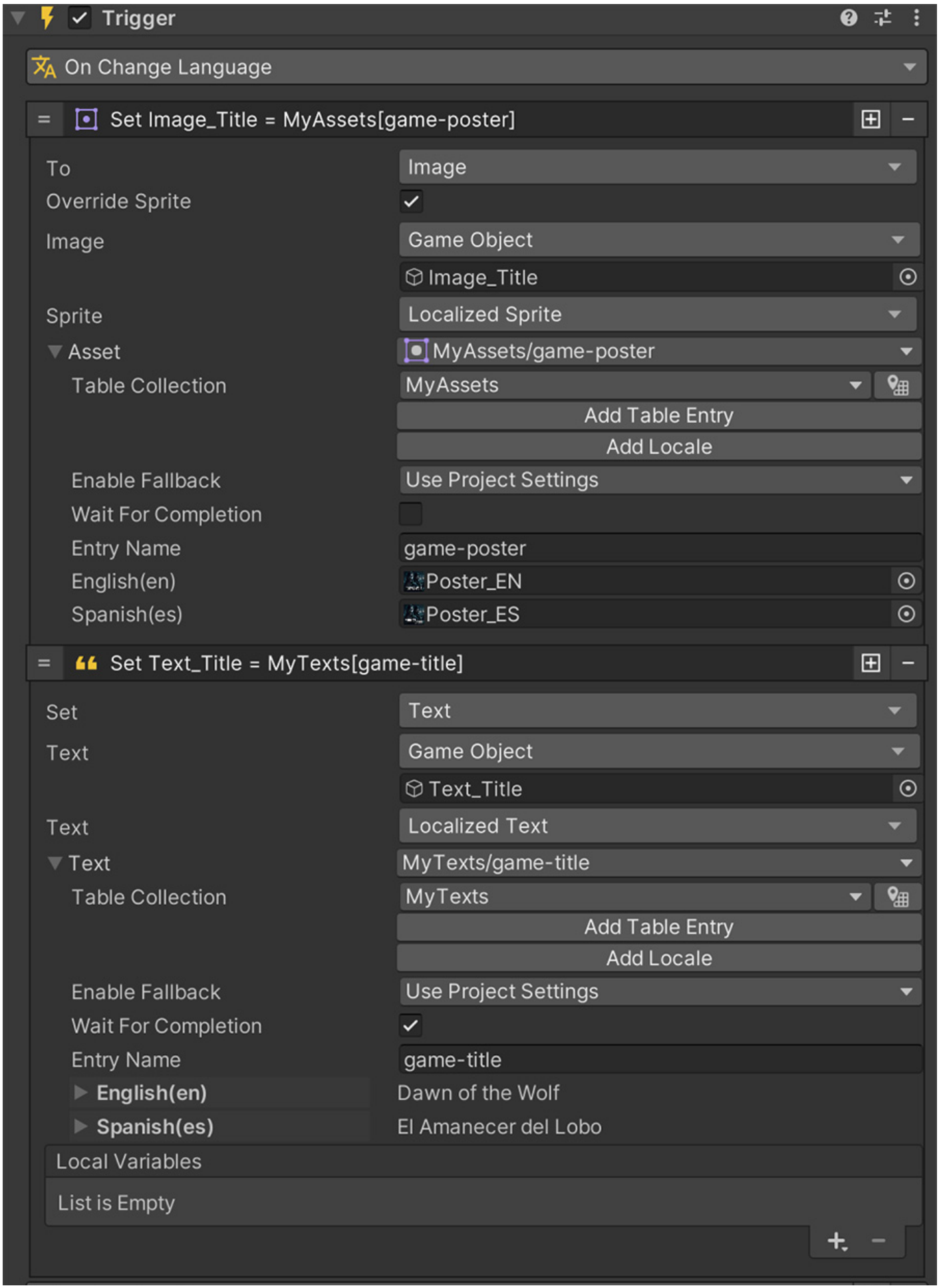
1132.2 Example

Now that the example is set up, all that needs to be done is to link the table collection data with the *Image* and *Text* components from the scene.

To do so, select the **Trigger_Set_Language** trigger and expand both instructions.

- On the **Set Sprite** instruction, change the *Sprite* field to *Localized* and select the key `game-poster` key.
- On the **Set Text** instruction, change the *Text* field to *Localized* and select the key `game-title` key.

> **Create a new Entry**
>
> Alternatively you can also set the entry from inside the **Property** of the **Instruction**.


Trigger
On Change Language
Set Image_Title = MyAssets[game-poster]
To
Image
Override Sprite
Image
Game Object
Image_Title
Sprite
Localized Sprite
Asset
MyAssets/game-poster
Table Collection
MyAssets
Add Table Entry
Add Locale
Enable Fallback
Use Project Settings
Wait For Completion
Entry Name
game-poster
English(en)
Poster_EN
Spanish(es)
Poster_ES
Set Text_Title = MyTexts[game-title]
Set
Text
Text
Game Object
Text_Title
Text
Localized Text
Text
MyTexts/game-title
Table Collection
MyTexts
Add Table Entry
Add Locale
Enable Fallback
Use Project Settings
Wait For Completion
Entry Name
game-title
English(en)
Dawn of the Wolf
Spanish(es)
El Amanecer del Lobo
Local Variables
List is Empty

Click play and see how clicking on the buttons changes the game's language as well as the *Image* and *Title* texts.

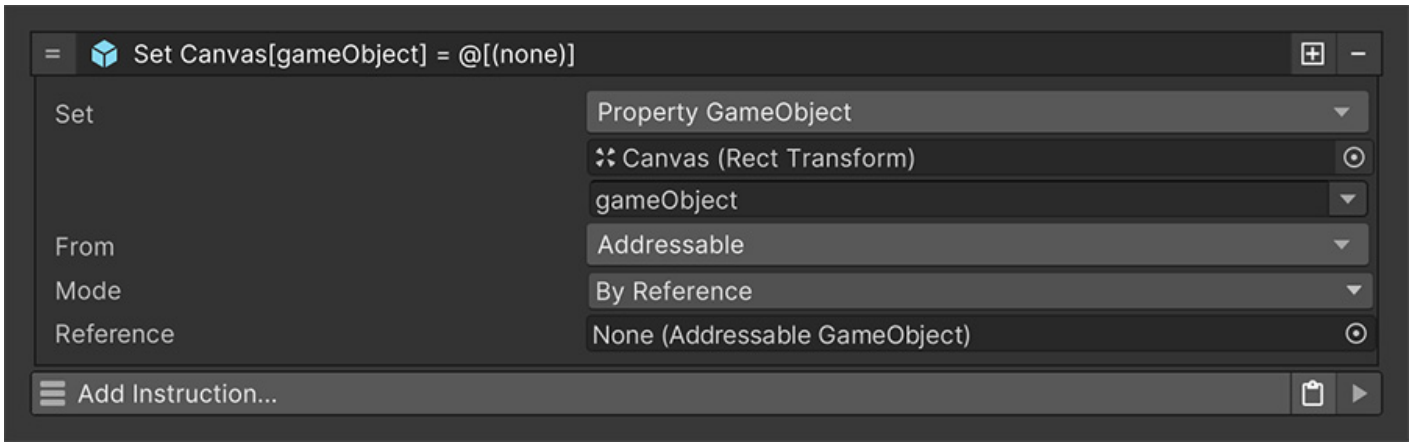
XI.III Addressables

1133 Addressables

The **Addressables** integration allows to better manage your game's memory footprint and have control over when objects are loaded on memory and when they are released.

About Addressables

This page assumes you are familiar with Unity's **Addressables** workflow. If not, check the official documentation on **Unity Addressables**.



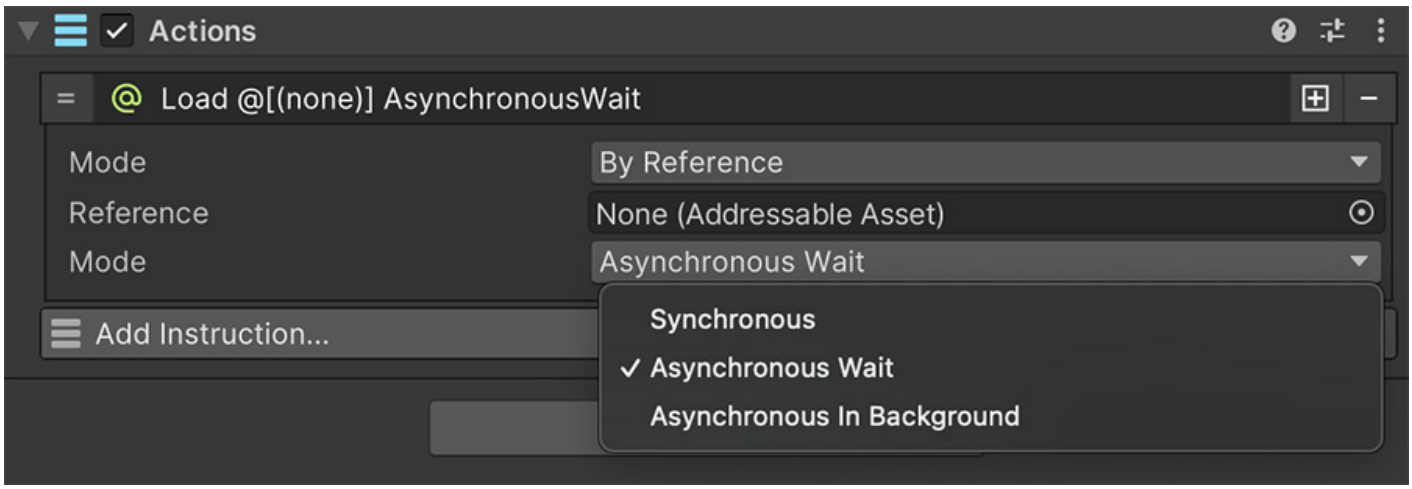
The easiest way to load an object from an **Addressable Group** is choosing the *Addressable* option from a property field, and dropping in either the **Addressable ID** or the **Asset Reference** object.

When attempting to retrieve this object, the main thread will be blocked until the object is loaded. This option is perfect for small objects that are found inside the executable and do not need to be downloaded through the internet.

Automatic Release

When using addressables via properties, the object loaded is automatically scheduled to be released on the next frame. If you want to keep the object in memory so it can be used without loading it back again, use the **Load Addressable** instruction.

If you prefer to decide when to load an addressed object and not unload it just afterwards, you can use the instruction **Load Addressable Asset**.

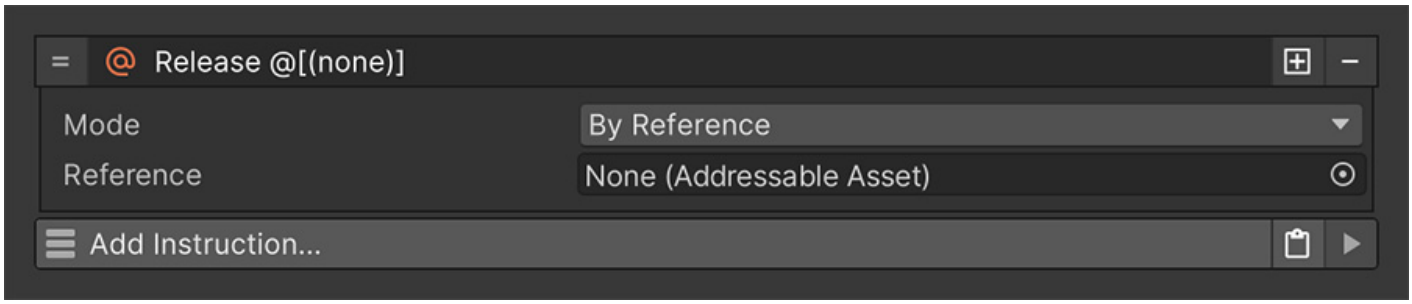


This instruction allows to load an addressable object using three mechanisms:

- **Synchronous**: Blocks the main thread and won't resume it until the object is loaded. This should not be used unless the object is very small and is bundled with the executable.
- **Asynchronous Wait**: Starts loading the asset in the background, and the instruction waits until it's completed. The next instruction will either have the asset loaded (unless it has failed, and the value is then null).
- **Asynchronous Forget**: Starts loading the asset in the background but does not wait until it has been completed. We do not recommend using this method unless you know what you're doing.

Once the asset is loaded it can be instantiated without worrying about bringing it from disk to memory (or server to memory).

To release an asset from memory, use the **Release Addressable Asset** instruction. This will automatically remove it from memory.



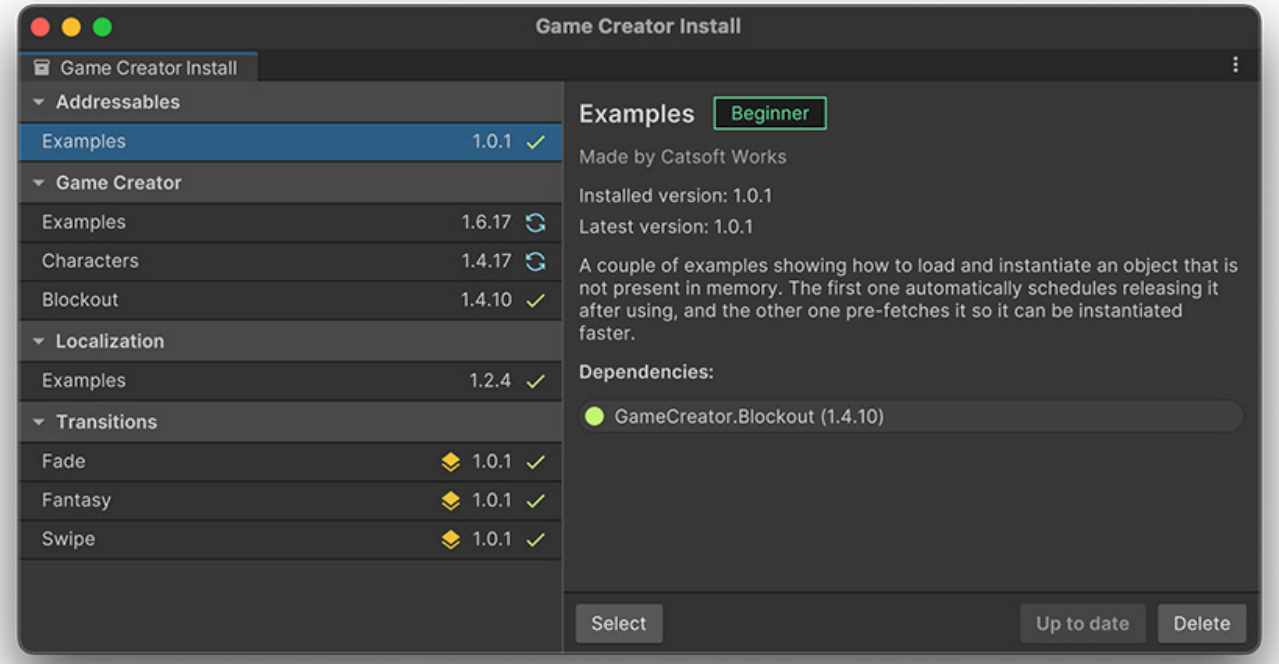
1134 Examples

The **Addressables** integration kit comes with an example scene that shows how to instantiate a game object from an addressable asset, as well as another one that pre-loads it in the background.

> **Example Setup**
>
> Due to how Unity *Addressables* is coded, it is not possible to share addressable groups, and thus the example scenes require some minor setup. This page explains the steps to do so.

1134.1 Setup

After installing the **Addressables** package as well as the **Addressables Integration** kit from the Downloads page, open the *Install* window and proceed with the installation of the **Addressables** Example.



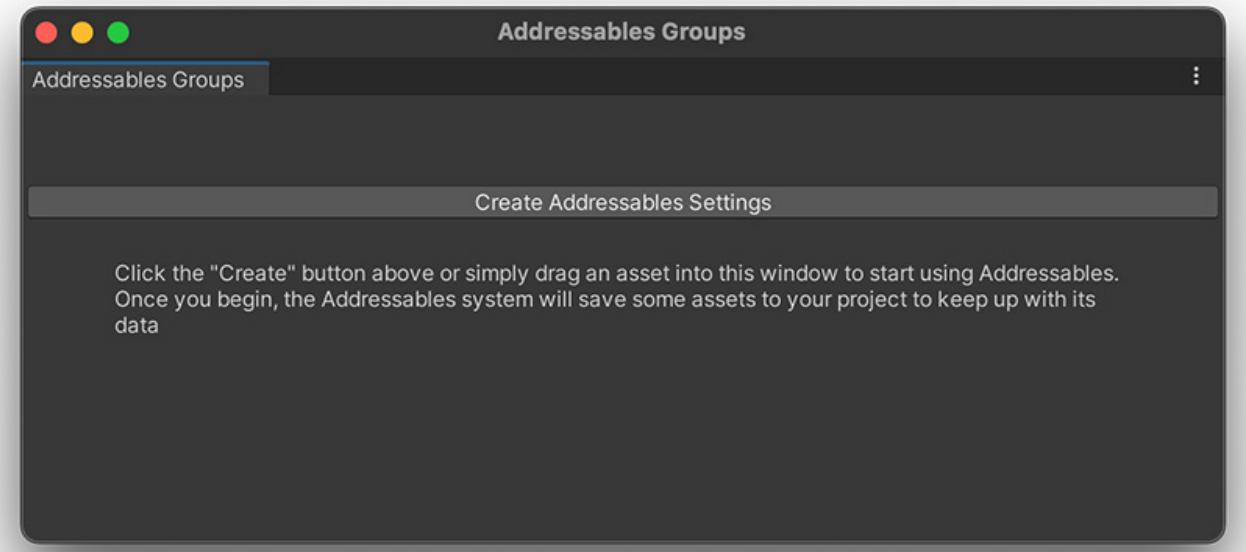
Once installed, click on the *Select* button or navigate to `Assets/Plugins/GameCreator/Installs/Addressables.Examples/`, where there are three items:

- The scene **1_Instantiate_GameObject**, which shows how to easily instantiate a game object using an addressable.
- The scene **2_Load_And_Instantiate**, which shows also how to instantiate a game object, but preloading it beforehand.

- The prefab **Cube_Prefab** that is used as an example object to be used in both examples.

Before opening any scene, the **Addressables** settings must be configured. To do so, open the *Addressables Group* window by selecting from the top toolbar *Window* → *Asset Management* → *Addressables* → *Groups*.

If you don't have any **Addressables** settings configured, the window will prompt you to create them. Click on the *Create Addressable Settings* and wait until it completes.



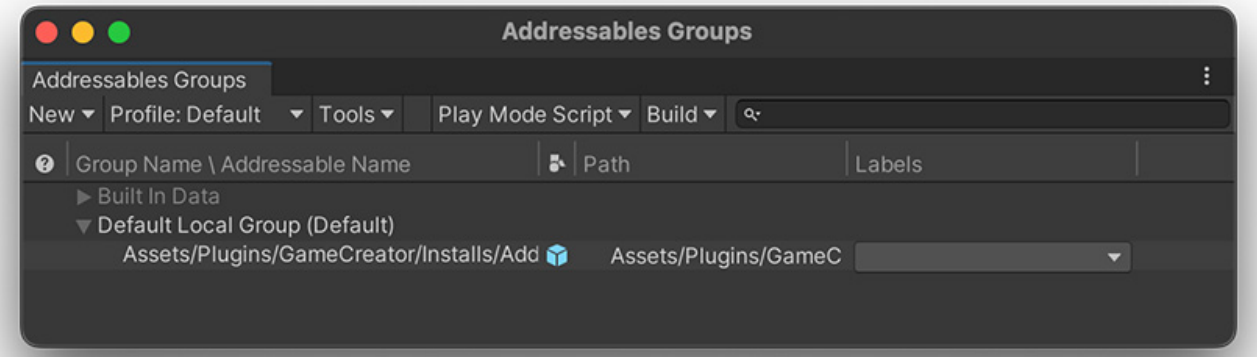
Now that the settings are complete, we can proceed to configure the examples.

1134.2 Examples

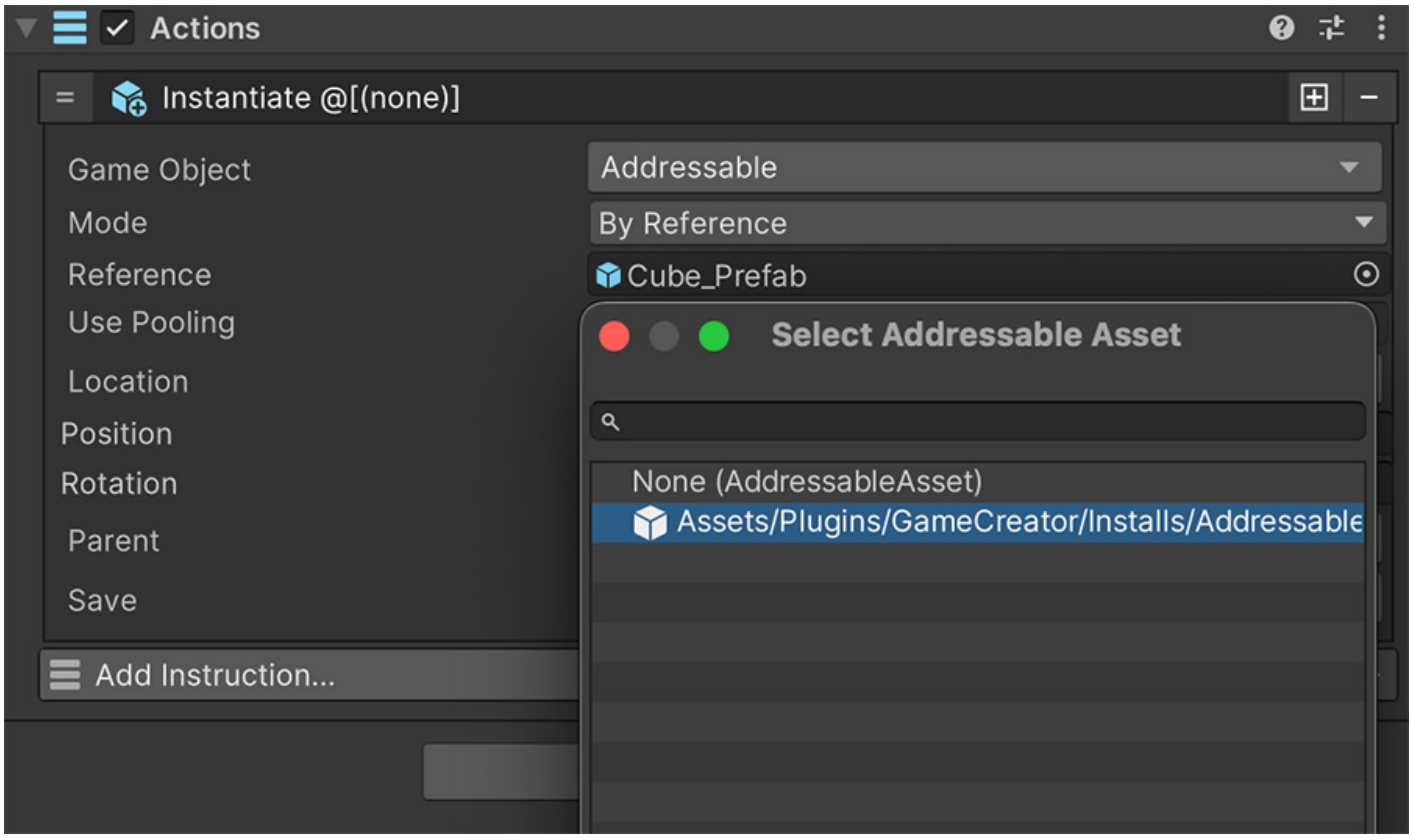
Open the first example scene **1_Instantiate_GameObject**. This scene has a UI that allows to instantiate a game object by clicking a button.

Select the **Actions** object at the bottom, which is responsible for instantiating the **Cube_Prefab** object. Before doing so, we need to register this asset as an **Addressable Asset**.

To do so, it's very easy. Simply open the **Addressables Group** window just like we did in the previous section, and drag and drop the **Cube_Prefab** prefab onto the window.

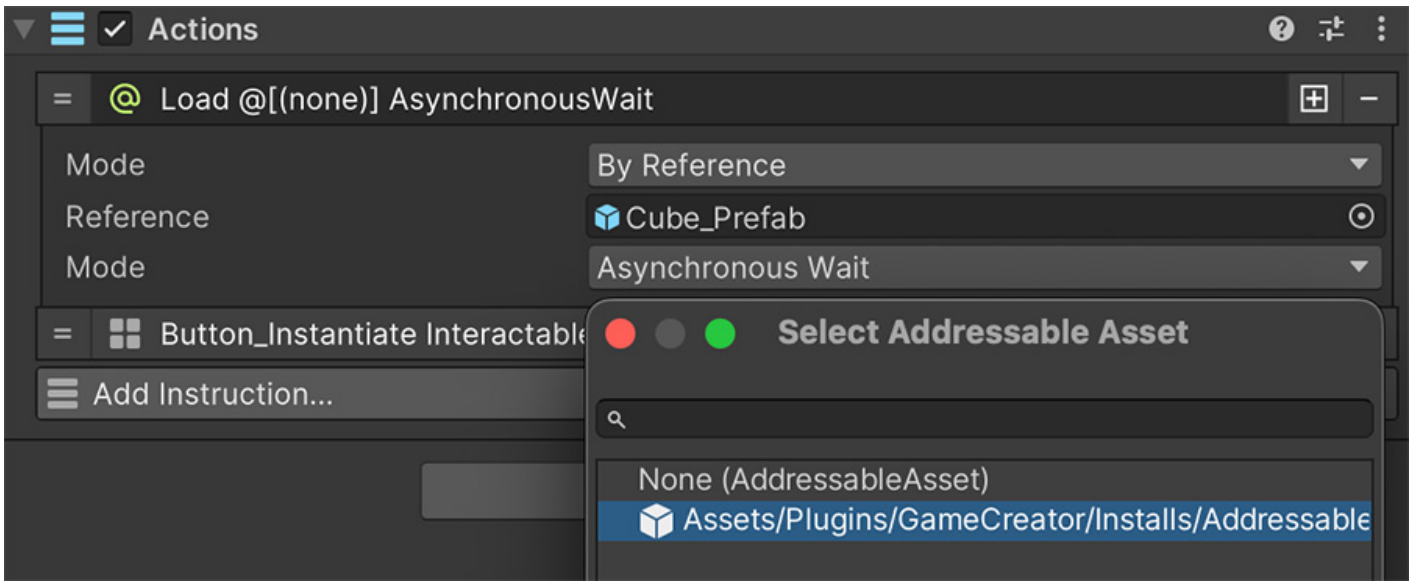


Now that the **Cube_Prefab** is marked as an addressable, head to the **Actions** object and click on the right-most object picker from the *Addressable Reference* field and choose the prefab we just set up.



That's it! Entering play-mode will allow to click onto the *Instantiate* button, which loads and instantiates the game object at the center of the screen.

The second example's configuration is pretty much the same, except there's another **Actions** component called *Actions_Load*, which preloads the prefab before instantiating it. All that requires is to choose the **Cube_Prefab** addressable reference from the object picker, just like in the previous example.



Entering play-mode will not allow to instantiate the object directly. Instead, the object must be loaded before hand. Once it's finished, the *Instantiate* button will become enabled and ready to be used.

XI.IV Footsteps

1135 Footsteps

The **Footsteps Generator** kit is an extension that allows to setup existing animations and turn them into Game Creator compatible clips with correct foot placement.

1135.1 How Footsteps work

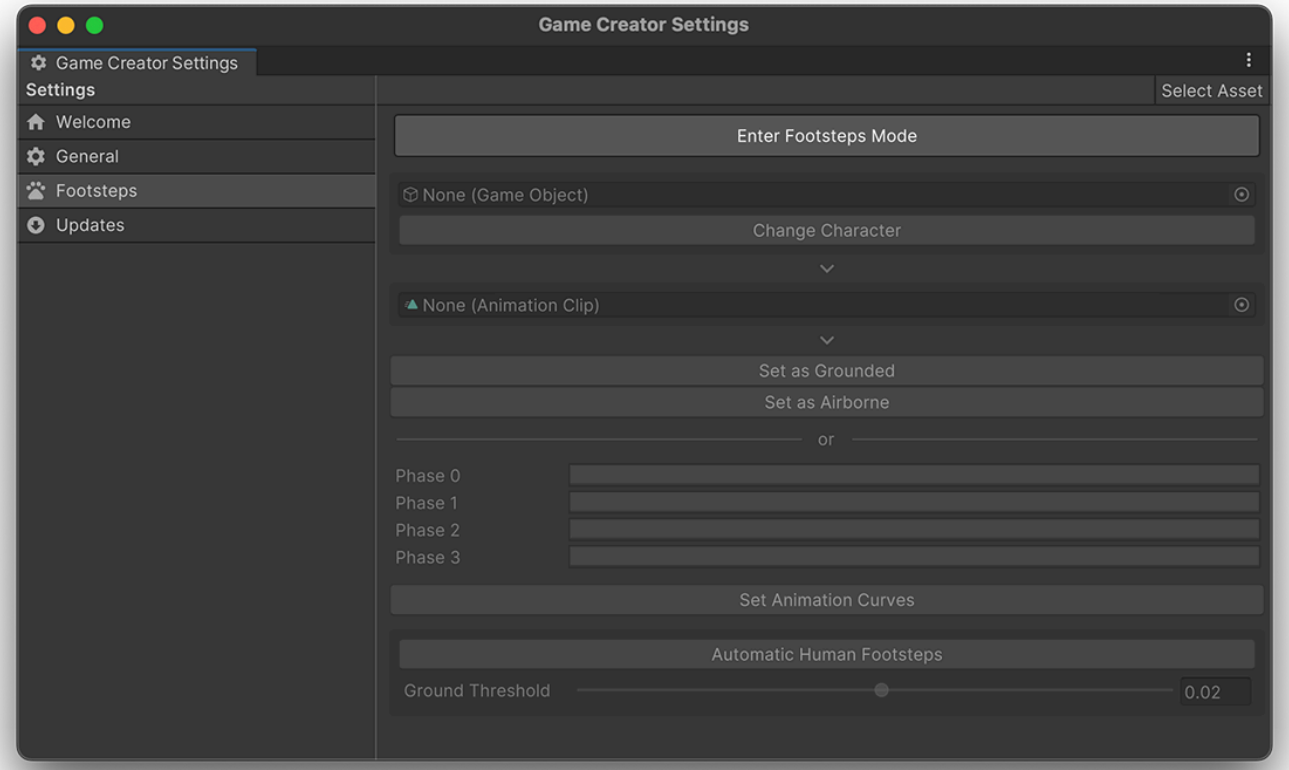
Game Creator uses the animation parameters `Phase-0`, `Phase-1`, `Phase-2` and `Phase-3` to detect which feet and when a foot is on ground.

> ✓ **Humanoids**
>
> Humanoid characters use `Phase-0` and `Phase-1` for their left and right leg respectively. Non-humanoids can use phases in any other order.

For example, when the `Phase-0` curve point has a value of 0 means the foot is on air. If a point has a value of 1 means the foot is in a grounded phase.

1135.2 Creating Phases

To add or modify an animation curve phase, open the **Settings** window by clicking on the top toolbar → Game Creator → Settings, and navigate to the **Footsteps** section.

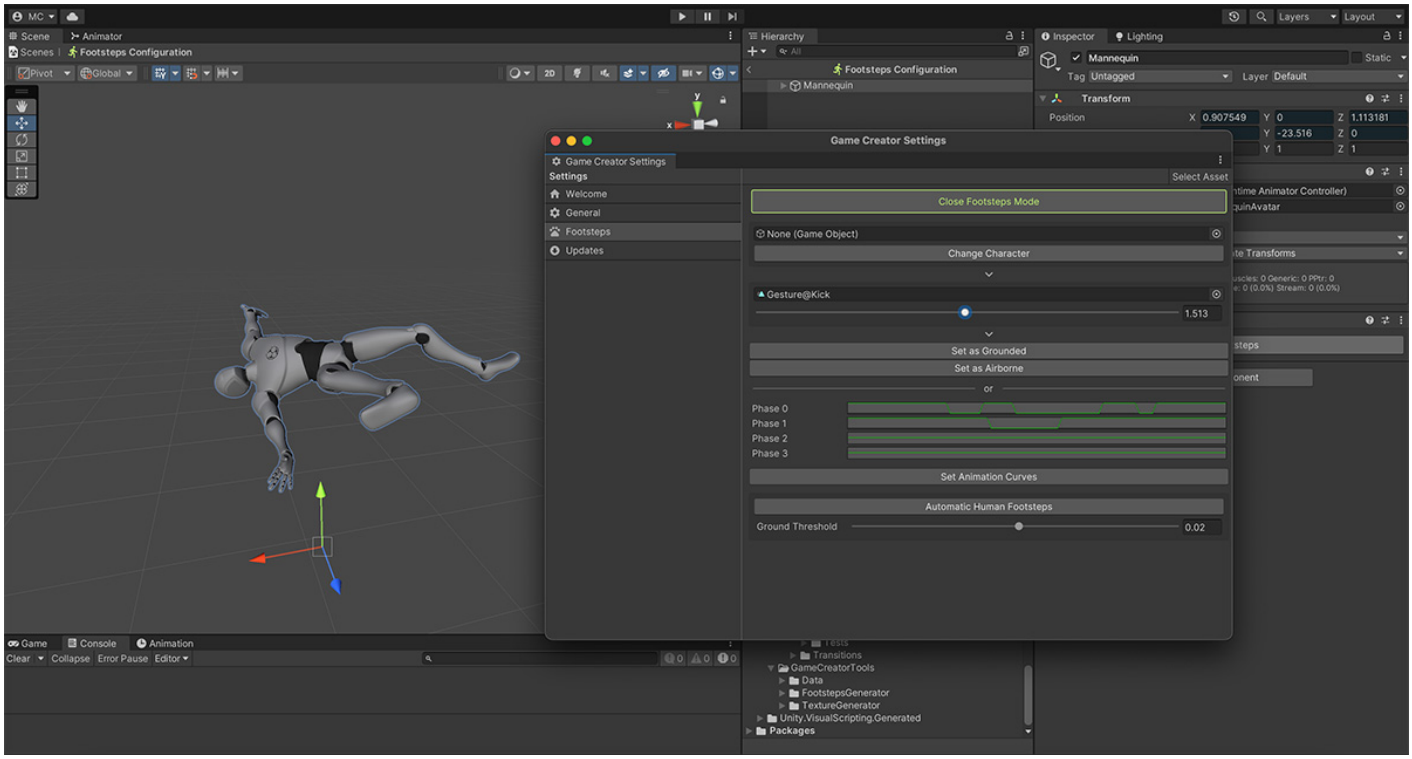


To start creating or modifying an **Animation Clip** phase group, click on the button *Enter Footsteps Mode*. The scene view and hierarchy panel will change into one similar to the ones when editing a prefab.

> **Change Character**
>
> If you're working on a non-humanoid or a different character than the default one, drag and drop your prefab model onto the field below the previous button and click the **Change Character** button. This will change the preview character.

Drag and drop the Animation Clip onto the animation field. After doing so, the rest of options will be available.

You can use the slider below to scrub through the animation in order to preview it in the scene view.



There are a few options below:

- **Set as Grounded** button allows to automatically set all 4 curves at a constant value of 1. This is meant for *idle* poses where the character doesn't lift its feet from the ground.
- **Set as Airborne** button does the opposite and sets all 4 curve phases to a constant value of 0. This is meant for any airborne animations, such as falling, jumping and such.

The 4 animation curves can also be manually edited below, and committing the changes by pressing the **Set Animation Curves**.

1135.3 Creating Humanoid Phases

To speed up the workflow, this tool also allows to detect when the feet are above or below ground level and set the curve values automatically. To do so, simply click the **Automatic Human Footsteps**.

The **Ground Threshold** value determines an offset vertical value where the ground would be. If the curves appear to be jittering, try playing with values between 0.01, 0.05 and 0.1.