# **Game Creator Documentation**

From Zero to Hero

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## 1. Game Creator

## 1.1 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.



Game Creator is sometimes informally abbreviated as GC.

## 1.1.1 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 pletora of tools that they can use and exploit to create intrincate game mechanics.

## 1.1.2 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.

## 1.1.3 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.



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.

#### 1.1.4 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 wih parries and combos.
- Traversal: Give characters the ability to climb and other traversing skills.

# Mdular 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.

## 1.1.5 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:

#### documentation structure

- 1. The top navigation shows a list of all the available <code>Modules</code> 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 rearchitctured. 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.

## 1.1.6 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.

## 1.2 Getting Started

## 1.2.1 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.
- $\boldsymbol{\cdot}$   $\boldsymbol{\mathsf{First}}$   $\boldsymbol{\mathsf{Steps:}}$  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.
- · Courses: A collection of courses you can take at your own pace.
- · 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.

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## 1.2.2 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.

## 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.

## Kendering 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 Pipelines Upgrade Project Materials* to *URP/HDRP Materials*.

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

Get Game Creator

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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.

#### Package Manager

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.

## 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.

## 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 will 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 <code>.gitignore</code> file:

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

## 1.2.3 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.

## 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.

Geometry Setup

## 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.

Player Setup

## 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.

Complete Setup



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

## 1.2.4 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.

Game Creator Toolbar

# Asplay Toolbar

If the Toolbar is not displayed by default, focus on the scene view and press the [Space] key. This will pop a vertical menu that allows to show/hide different toolbars. Click on **Game Creator** to enable its visibility.

Show Toolbar

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

## Holtips

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.

## 1.2.5 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*.

Install Window



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.



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/.

## 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.

## 1.3 Characters

## 1.3.1 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.

#### 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 chaving to configure anything, the Ragdoll system allows a character to seamlessly transition to (and from) a ragdoll state.
- Breathing & Twitching: Procedural animations that can be tweaked at runtime which change a character's perceived exertion and breathing rate and amount.

## **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.



## che 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.



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.

## 1.3.2 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.

Character Component

## **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.

Character Component



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.

## **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.



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

Character Component

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.



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.

#### 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.

#### 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.

## Angular 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.

#### Character Component

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.
- $\hbox{\bf \cdot Acceleration:} \ \hbox{How fast the character increases its velocity until it reaches its maximum speed.}$
- ullet Deceleration: How fast the character decreases its velocity until it stops.
- $\boldsymbol{\cdot}$   $\boldsymbol{\mathsf{Can}}$   $\boldsymbol{\mathsf{Jump:}}$  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.

#### 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 Unityis
   Physics Engine.

#### 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.

## 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.

## Character Component

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:

- 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.
- · Animator: The Animator component of the character's 3D or 2D model.

## Antime 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).

- Skeleton: The skeleton object field is a Game Creator asset that defines multiple bounding volumes of each major part of a model. It is primary used to automatically build a Ragdoll system, but can be used for other things, such as detecting head-shots and so on. For more information about how to use and setup a Skeleton head to the advanced Skeleton version.
- Start State: Optional field that allows to set an initial character State. The starting state is set to layer number -1.
- Breathing & Twitching: These two blocks of data allow to make humanoid character models feel more alive, by additively playing subtle animations on top of any others.
- Breathing: Allows to control the breathing rate and amount of exertion. The higher the Rate the faster and more often the character will breathe. The Exertion field controls how deep each breadth is.
- Twitching: This is a very subtle animation that is usually not noticed, but perceived. Twitching adds random limb and finger movement to all humanoid character. This allows to have a consistent animation being played between each animation and transition. The weight field controls how much of the twitching animation affects the character.

## 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.

## **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.

## 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.

## Character IK

**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.

#### 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.

Character Footsteps



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 **Ground Threshold** field determines the minimum height a character's foot must elevate in order to consider the movement as a *step*.
- 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.

# Mysically 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.

## 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.

Character Ragdoll



The **Ragdoll** system uses the <u>Skeleton</u> 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.

## eve 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.

## 1.3.3 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.

#### Character setup

How a  ${\bf Character}$  interacts with scene objects is specified in the  ${\bf Motion}$  unit.

Character Interaction

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.



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

## **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.

Trigger On Interact

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



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.

Hotspot Interactive has Focus

## 1.3.4 Animation

## **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 <u>Animator</u> section to know more about this.

#### Animation Flow

**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 caracter 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.

## 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.

#### 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.

Change Character Model



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

## 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 <u>Character Controller</u> section for more information.

#### 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.

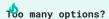
These animations are always played on top of any other animations.

Character Gesture Waving

#### **PARAMETERS**

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

Character Play Gesture instruction



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.

#### 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.

#### **Animation Clip**

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

#### 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.

## 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.

## 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.

## 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.

## 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.

## 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.

Animation Gesture Transition

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.

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.



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

#### 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.

Character Animation State Asset



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.

## 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.

#### **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.

Character Animation State Asset

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.

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**.

Character Animation State Asset

## 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 instructions 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 execute again the **On Refresh** instructions. However, this time, only the **Running** State instructions are called, and thus the player's speed will be 10.

#### 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.

Character Locomotion State Asset

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.

## 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.

## 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.

Character States Layer

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.

Animation Gesture Transition

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.

## destures 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.

#### 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.

## **ENTERING A STATE**

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

Instruction Enter State

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.

## kuntime 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.

### **EXITING A STATE**

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

Instruction Enter State

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.

## 1.3.5 Inverse Kinematics

## **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.

Character Feet IK

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

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.

Character Feet IK



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.

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.

## 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.

Character Feet IK



The Feet Align rig only works with Humanoid characters.

Character Feet Align

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
- Align Hips: If the character is perpendicularly aligned on a very steep ramp, oe feet will be much higher than the other, making the lower leg float above ground. Ticking this option allows the character's center to be lowered so both feet touch the ground.

## **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.

Character Feet IK



The Look at Target rig only works with Humanoid characters.

Character Look at Target

The  $\boldsymbol{Look}$  at  $\boldsymbol{Target}$  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.



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

## 1.3.6 Footstep Sounds

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

Character Footstep Sounds



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.

#### **Detecting Steps**

The Footstep System detects when any identified bone passes through an horizontal threshold called *Ground Threshold*. When this occurs, the Footstep System raises a signal informing that a step has been taken.

Character Foot Ground Threshold

## **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.

Character Footstep Reaction

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.

## Fseudo-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.

## Gadient 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.

## 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.

Character Footstep Reaction

## 1.3.7 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.

Character Ragdoll

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.

## dickly 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.

## 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.



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.

## **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.

Ragdoll Animations Setup

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.

### 1.3.8 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.

Marker Gizmo in Scene

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

Marker Gizmo in Scene

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.

## 1.3.9 Advanced

## Advanced

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

- Skeleton: What a Skeleton volume asset is and how to configure one.
- Character API: How to interact with the default Character system.
- $\bullet \ \, \textbf{Character Controller:} \ \, \textbf{How to customize or integrate other character controllers with the default one.} \\$
- Custom IK: How to construct new inverse kinematic character rigs.

#### 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.



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

Link Skeleton to Character

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.

Link Skeleton to Character

CONFIGURE SKELETON

The **Skeleton** asset is divided in to sections: The first one determines the Physical Material and collision detection mode of the rigidbody system stemmed from the volumes. The second one defines the properties of each of the character's volumetric bones.



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

Configure Skeleton

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.

Configure Skeleton

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. For example, a human right arm might be connected to the character's shoulder bone using a Fixed Character Joint, that allows it to rotate a certain amount of degrees.



For more information about character joints, visit this Unity documentation link.

### 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 drag and drop the 3D model from the Project or Scene view model onto the bottom-most window and it will auto-magically approximate a Skeleton for you. you can then go ahead and tweak it to your game needs.

Configure Skeleton

#### **Character API**

LOCOMOTION

This section covers the inners of the Character component and which tools are exposed for programmers to use.

To move a character to a certain location, you'll need to access the IMotion unit, which handles the response to locomotion signals. To know more about Kernel Units, visit the Character Controller page.

There are 3 movement types that a character can perform:

- Move to a position: Which is done using the MoveToLocation(...) method.
- ullet Move towards a direction: Which is done executing the <code>MoveToDirection(...)</code> method.
- Start/Stop following a target: Which is done using the StartFollowingTarget(...) and StopFollowingTarget(...)

For example, to force a character to move to a target's transform position, the following snipped should be used:

```
Location location = new Location(target.position); character.Motion.MoveToLocation(location, 0f, null);
```

#### RAGDOLL

As long as the character has a Skeleton, a ragdoll state can be triggered. To make a character enter the ragdoll state use the character.Ragdoll.StartRagdoll() method. To recover from a ragdoll state, execute the character.Ragdoll.StartRecover() method.

# Ragdoll and Death

We recommend setting the character as dead before entering the ragdoll state. Otherwise the ragdoll animation might want to perform actions only available to non-Ragdoll characters (such as running, shooting, jumping, ...).

#### ANIMATIONS

To play an animation **Gesture** you can access the Gestures property and trigger the CrossFade(...) method, which handles creating a new layer (if necessary) on top of Unity's Mecanim and play the desired animation.

To enter or exit an animation State you can access the SetState(...) and Stop(...) methods from the State property.

Note that all animation methods are *async*. This means that your code can yield until the animation has finished executing. For example, to play a gesture animation and print a console message right after the animation has finished you can use:

```
Debug.Log("Start playing a new animation gesture")
await character.Gestures.CrossFade(myAnimationClip, ...);
Debug.Log("The previous animation has finished")
```

#### CHANGE MODEL

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

- $\cdot$  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);
```

BUSY

Accessed from the Busy property, it 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.

# Busy and Available limbs

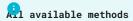
For example, if a character has both of its arms set as unavailable, trying to execute an action that involves the hands won't be possible, such as grabbing a ladder.

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.



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

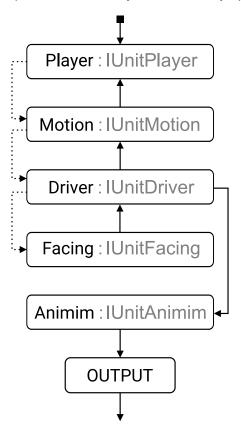
#### **Character Controller**

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.

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 <code>Update()</code> method. This takes the user's input and calls one of the <code>Motion</code>'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.

# Ndular 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 <code>IUnitAnimim</code> interface and still use the default <code>Player</code>, <code>Motion</code> and <code>Driver</code> systems.

#### 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.

#### 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 <code>Jump()</code> method will instruct a character to perform a jump (or air jump), if it's possible.

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.

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.



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);
}
```

# **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 <code>StartFacing()</code> method, the character will smoothly rotate towards the target defined until the <code>StopFacing()</code> 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:

#### ANIMIM

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

# Aimator 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.

#### **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.

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).

**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)
    { }
}
```

## 1.4 Cameras

### 1.4.1 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.

### 1.4.2 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.



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.

#### **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.

Main Camera

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.

#### 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.

Change Camera 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.

#### 1.4.3 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.

#### **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.



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.

#### Camera Shot

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.

### **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.

### Camera Shot

#### 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.

#### 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.

## 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.

### 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.

#### 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 accommodate to different situations, such as increasing the noise after sprinting and such.

#### 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.

#### 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.

#### ANCHOR PEFK

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.

## 1.5 Visual Scripting

#### 1.5.1 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.

# Usual 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.

#### **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** and each module comes packed with a unique set visual scripting tools. The <u>Game Creator Hub</u> 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!

#### 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.

#### 1.5.2 Actions

#### **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.

Actions



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

#### 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.

# beleting Actions

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

### 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.

Add a new Instruction

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.

### 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.

Instruction Documentation

### 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.

#### Disable Instruction

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

### Disable Instruction

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

### 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.

#### Breakpoint Instruction

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



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

## Instructions

# INSTRUCTIONS

## Sub Categories

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

## ANIMATOR

### Animator

## Instructions

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

### **Change Animator Float**

Animator » Change Animator Float

# Description

Changes the value of a 'Float' Animator parameter

## 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			

# Keywords

Parameter Number

### Change Animator Integer

Animator » Change Animator Integer

# Description

Changes the value of a 'Integer' Animator parameter

## 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					

# Keywords

Parameter Number

### Change Animator Layer

Animator » Change Animator Layer

# ${\tt Description}$

Changes the weight of an Animator Layer

# 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

# Keywords

Weight

## Change Blend Shape

Animator » Change Blend Shape

# Description

Changes the value of a Blend Shape parameter

## 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				

# Keywords

Morph Target

## Play Animation Clip

Animator » Play Animation Clip

# Description

Plays an Animation Clip on the chosen Animator

## Parameters

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

# Keywords

Animate Reproduce Sequence Cinematic

### Set Animator Boolean

Animator » Set Animator Boolean

# Description

Sets the value of a 'Bool' Animator parameter

## 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

# Keywords

Parameter Bool

### Set Animator Trigger

Animator » Set Animator Trigger

# Description

Sets the value of a 'Trigger' Animator parameter

## Parameters

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

# Keywords

Parameter Once Flag Notify

# APPLICATION

Application

# Sub Categories

• Cursor

## Instructions

- Open Web Page
- Quit Application

## Open Web Page

Application » Open Web Page

# Description

Opens the specified URL with the default web browser

## Parameters

Na	me	Descrip	tion	1											
UR	L	The rou	te l	ink	to	open.	Must	include	the	protocol	prepended	(http o	r h	ttps)	

# Keywords

Site Internet

### **Quit Application**

Application » Quit Application

# Description

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

# Keywords

Exit Close Shutdown Turn

### Cursor

# Cursor Instructions

- Cursor Texture
- Cursor Visibility
- Lock Cursor

# Cursor Texture

Application » Cursor » Cursor Texture

## Description

Changes the image of the hardware cursor

## 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

# Keywords

Mouse Crosshair Click

# Cursor Visibility

Application » Cursor » Cursor Visibility

## Description

Determines if the hardware cursor is visible or not

## Parameters

Name Description

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

## Keywords

Mouse FPS Crosshair

## Lock Cursor

Application » Cursor » Lock Cursor

## Description

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

## Parameters

Name Description

## Keywords

Mouse State FPS Center Confine

## AUDIO

#### Audio

### Instructions

- Audio Mixer Parameter
- Change Ambient Volume
- Change Master Volume
- Change Snapshot
- Change Sound Effects Volume
- Change Speech Volume
- Change Ui Volume
- Play Ambient
- Play Sound Effect
- Play Speech
- Play Ui Sound
- Stop Ambient
- Stop Sound Effect
- Stop Speech On Game Object

## Audio Mixer Parameter

Audio » Audio Mixer Parameter

# Description

Changes the value of an Audio Mixer exposed parameter

## 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

# Keywords

Float Exposed Effect Change

#### Change Ambient volume

Audio » Change Ambient volume

## Description

Change the Volume of Ambient music

## Parameters

Name Description

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

# Keywords

Audio Ambience Music Background Volume Level

#### Change Master volume

Audio » Change Master volume

## Description

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

## Parameters

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

# Keywords

Audio Sounds Volume Level

#### Change Snapshot

Audio » Change Snapshot

## Description

Smoothly transitions to a new snapshot over a period of time  $% \left\{ 1,2,\ldots ,n\right\}$ 

## Parameters

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

# Keywords

Effect Transition Effect Change

#### Change Sound Effects volume

Audio » Change Sound Effects volume

## Description

Change the Volume of Sound Effects

## Parameters

Name Description

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

# Keywords

Audio Sounds Volume Level

#### Change Speech volume

Audio » Change Speech volume

## Description

Change the Volume of character Speech

## Parameters

Name Description

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

# Keywords

Audio Character Voice Voices Volume Level

## Change UI volume

Audio » Change UI volume

## Description

Change the Volume of UI elements

## Parameters

Name Description

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

# Keywords

Audio User Interface Button Volume Level

## Play Ambient

Audio » Play Ambient

## Description

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

## 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	

# Keywords

Audio Music Ambience Background

## Play Sound Effect

Audio » Play Sound Effect

# ${\tt Description}$

Plays an Audio Clip sound effect just once

## 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

# Keywords

Audio Sounds

## Play Speech

Audio » Play Speech

## Description

Plays an Audio Clip speech over just once

## 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	

# Keywords

Audio Voice Voices Sounds Character

## Play UI sound

Audio » Play UI sound

## Description

Plays a non-diegetic user interface Audio Clip

## 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

# Keywords

Audio Sounds User Interface Beep Button

## Stop Ambient

Audio » Stop Ambient

# ${\tt Description}$

Stops a currently playing Ambient audio

## 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

## Keywords

Audio Music Ambience Background Fade Mute

## Stop Sound Effect

Audio » Stop Sound Effect

# ${\tt Description}$

Stops a currently playing Sound Effect

# Keywords

Audio Sounds Silence Fade Mute

#### Stop Speech on Game Object

Audio » Stop Speech on Game Object

## Description

Stops any Speech clips being played by a specific Game Object

## Parameters

Name	Description
Target	A game object that is set as the source of the speech
v avo a do	

# Keywords

Audio Voice Voices Sounds Character Silence Mute Fade

## CAMERAS

## Cameras

## Sub Categories

- Properties
- Shakes
- Shots

## Instructions

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

## Change to Shot

Cameras » Change to Shot

## Description

Changes the active Shot for a particular camera

## 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	

# Keywords

Cameras Render Switch Move

#### Revert to Previous Shot

Cameras » Revert to previous Shot

## Description

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

## Parameters

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

# Keywords

Cameras Render Switch Move

## Set Main Shot

Cameras » Set Main Shot

## Description

Assigns a Camera Shot as the new Main Shot

## Parameters

Name	Description

Shot The new main Camera Shot

## Properties

# Properties Instructions

- Change Culling Mask
- Change Field Of View
- Change Projection

# Change Culling Mask

Cameras » Properties » Change Culling Mask

## Description

Changes the camera culling mask

## Parameters

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

# Keywords

Cameras Render

# Change Field of View

Cameras » Properties » Change Field of View

## Description

Changes the camera field of view

## Parameters

Name	Description
Camera	The camera component whose property changes
FoV	The field of view of the camera, measured in degrees

# Keywords

Cameras Perspective FOV 3D

## Change Projection

Cameras » Properties » Change Projection

## Description

Changes the camera projection to either Perspective or Orthographic

## Parameters

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

# Keywords

Cameras Orthographic Perspective 3D 2D

## Shakes

# Shakes Instructions

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

# Shake Camera Burst

Cameras » Shakes » Shake Camera Burst

## Description

Shakes the camera for an amount of time

## 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

## Keywords

Cameras Animation Animate Shake Impact Play

## Shake Camera Sustain

Cameras » Shakes » Shake Camera Sustain

## Description

Starts shaking the camera until the effect is manually turned off

## 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

## Keywords

Cameras Animation Animate Shake Wave Play

## Stop Camera Sustain Shake

Cameras » Shakes » Stop Camera Sustain Shake

## Description

Stops a Sustain Shake camera effect in a particular layer layer

## 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	

## Keywords

Cameras Animation Animate Shake Wave Play

# Stop Camera Shake Bursts

Cameras » Shakes » Stop Shake Camera Bursts

## Description

Stops any ongoing camera Burst Shake effects

## 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	

# Keywords

Cameras Animation Animate Shake Impact Play

## Shots

# Shots Sub Categories

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

# Anchor

## Anchor Instructions

- Change Distance
- Change Offset
- Change Target
- Enable Anchor

# Change Distance

Cameras » Shots » Anchor » Change Distance

## Description

Changes the anchored position the Shot sits relative to the target

## Parameters

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

# Keywords

Cameras View Cameras Shot

# Change Offset

Cameras » Shots » Anchor » Change Offset

## Description

Changes the offset position of the targeted object

## Parameters

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

# Keywords

Cameras Track View Cameras Shot

# Change Target

Cameras » Shots » Anchor » Change Target

## Description

Changes the targeted game object

## Parameters

Name	Description
Target	The new target
Shot	The camera Shot targeted

# Keywords

Cameras Track View Cameras Shot

## Enable Anchor

Cameras » Shots » Anchor » Enable Anchor

## Description

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

## Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

# Keywords

Cameras Disable Activate Deactivate Bool Toggle Off On Cameras Shot

# Animation Animation Instructions

- Change Duration
- Enable Animation

# Change Duration

Cameras » Shots » Animation » Change Duration

## Description

Changes the duration it takes for the Animation shot to complete

## Parameters

Description
The new duration in seconds
The camera Shot targeted

# Keywords

Cameras Track View Cameras Shot

## Enable Animation

Cameras » Shots » Animation » Enable Animation

## Description

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

## Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

# Keywords

Cameras Disable Activate Deactivate Bool Toggle Off On Cameras Shot

# First person

## First Person Instructions

- Change Max Pitch
- Change Offset
- Change Sensitivity
- Change Smooth Time
- Change Target
- Enable First Person

# Change Max Pitch

Cameras » Shots » First Person » Change Max Pitch

### Description

Changes the maximum rotation (up and down) allowed

### Parameters

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

# Keywords

# Change Offset

Cameras » Shots » First Person » Change Offset

### Description

Changes the offset position of the targeted object

### Parameters

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

# Keywords

# Change Sensitivity

Cameras » Shots » First Person » Change Sensitivity

### Description

Changes how sensitive the Shot reacts to input

### Parameters

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

# Keywords

# Change Smooth Time

Cameras » Shots » First Person » Change Smooth Time

### Description

Changes the maximum rotation (up and down) allowed

### Parameters

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

# Keywords

# Change Target

Cameras » Shots » First Person » Change Target

### Description

Changes the targeted game object to view from

### Parameters

Name	Description
Target	The new target
Shot	The camera Shot targeted

# Keywords

### Enable First Person

Cameras » Shots » First Person » Enable First Person

### Description

Toggles the active state of a Camera Shot's First Person system

### Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

### Keywords

# Follow

### Follow Instructions

- Change Distance
- Change Target
- Enable Follow

# Change Distance

Cameras » Shots » Follow » Change Distance

### Description

Changes the offset distance between the Shot and the targeted object

### Parameters

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

# Keywords

# Change Target

Cameras » Shots » Follow » Change Target

### Description

Changes the targeted game object to Follow

### Parameters

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

# Keywords

### Enable Follow

Cameras » Shots » Follow » Enable Follow

### Description

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

### Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

# Keywords

Head bobbing Head Bobbing Instructions

• Enable Head Bobbing

# Enable Head Bobbing

Cameras » Shots » Head Bobbing » Enable Head Bobbing

### Description

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

### Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

### Keywords

Head leaning Head Leaning Instructions

• Enable Head Leaning

# Enable Head Leaning

Cameras » Shots » Head Leaning » Enable Head Leaning

### Description

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

### Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

### Keywords

# Lock on Lock On Instructions

- Change Anchor
- Change Distance
- Change Offset
- Enable Lock On

# Change Anchor

Cameras » Shots » Lock On » Change Anchor

### Description

Changes the targeted game object to Lock On

### Parameters

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

# Keywords

# Change Distance

Cameras » Shots » Lock On » Change Distance

### Description

Changes the distance from the anchor point

### Parameters

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

# Keywords

# Change Offset

Cameras » Shots » Lock On » Change Offset

### Description

Changes the offset position of the targeted object

### Parameters

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

# Keywords

### Enable Lock On

Cameras » Shots » Lock On » Enable Lock On

### Description

Toggles the active state of a Camera Shot's Lock On system

### Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

### Keywords

### Look

### Look Instructions

- Change Offset
- Change Target
- Enable Look

# Change Offset

Cameras » Shots » Look » Change Offset

### Description

Changes the offset position of the targeted object

### Parameters

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

# Keywords

# Change Target

Cameras » Shots » Look » Change Target

### Description

Changes the targeted game object to look

### Parameters

Name	Description
Target	The new target
Shot	The camera Shot targeted

# Keywords

### Enable Look

Cameras » Shots » Look » Enable Look

### Description

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

### Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

# Keywords

### Noise Noise Instructions

• Enable Noise

### Enable Noise

Cameras » Shots » Noise » Enable Noise

### Description

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

### Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

# Keywords

### Orbit

### Orbit Instructions

- Change Alignment
- Change Max Pitch
- Change Max Radius
- Change Offset
- Change Sensitivity
- Change Smooth Time
- Change Target
- Enable Orbit

# Change Alignment

Cameras » Shots » Orbit » Change Alignment

### Description

Changes whether and how the Shot aligns behind the targeted object

### 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	

# Keywords

# Change Max Pitch

Cameras » Shots » Orbit » Change Max Pitch

### Description

Changes the maximum rotation (up and down) allowed

### Parameters

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

# Keywords

# Change Max Radius

Cameras » Shots » Orbit » Change Max Radius

### Description

Changes the maximum rotation (up and down) allowed

### Parameters

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

# Keywords

# Change Offset

Cameras » Shots » Orbit » Change Offset

### Description

Changes the offset position of the targeted object to orbit

### Parameters

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

# Keywords

# Change Sensitivity

Cameras » Shots » Orbit » Change Sensitivity

### Description

Changes how sensitive the Shot reacts to input

### Parameters

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

# Keywords

# Change Smooth Time

Cameras » Shots » Orbit » Change Smooth Time

### Description

Changes how smooth the orbit responds to input

### Parameters

Name Description	
Smooth Time How smooth is the orbital tra	nslation
Shot The camera Shot targeted	

# Keywords

# Change Target

Cameras » Shots » Orbit » Change Target

### Description

Changes the targeted game object to orbit around

### Parameters

Name	Description
Target	The new target
Shot	The camera Shot targeted

# Keywords

### Enable Orbit

Cameras » Shots » Orbit » Enable Orbit

### Description

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

### Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

# Keywords

### Zoom

### Zoom Instructions

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

# Change Level Zoom

Cameras » Shots » Zoom » Change Level Zoom

### Description

Changes the targeted zoom level percentage

### Parameters

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

# Keywords

# Change Min Distance

Cameras » Shots » Zoom » Change Min Distance

### Description

Changes the targeted zoom level percentage

### Parameters

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

# Keywords

Cameras Shot

# Change Smooth Time

Cameras » Shots » Zoom » Change Smooth Time

### Description

Changes how smooth the zoom responds to input

### Parameters

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

# Keywords

Cameras Shot

### Enable Zoom

Cameras » Shots » Zoom » Enable Zoom

### Description

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

### Parameters

Name	Description
Active	The next state
Shot	The camera Shot targeted

# Keywords

Cameras Disable Activate Deactivate Bool Toggle Off On Cameras Shot

### CHARACTERS

#### Characters

### Sub Categories

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

#### Animation

# Animation Instructions

- Change Exertion
- Change Heart Rate
- Change Smooth Time
- Change State Weight
- Change Twitching
- Enter State
- Play Gesture
- Stop Gesture
- Stop State

### Change Exertion

Characters » Animation » Change Exertion

### Description

Changes the Exertion value of a Character over time

#### Parameters

Name	Description
Exertion	The target Exertion value between 0 and 1. Default is 0.25 $$
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 finishes
Character	The game object with the Character target
Duration Easing Wait to Complete	How long it takes to perform the transition  The change rate of the parameter over time  Whether to wait until the transition finishes

### Example 1

The Heart Rate value goes hand in hand with the Exertion. The Heart Rate controls the speed that the breathing animation plays. The Exertion controls the magnitude of the breathing animation.

### Keywords

Tire Effort Struggle Sweat Exercise

### Change Heart Rate

Characters » Animation » Change Heart Rate

### Description

Changes the Heart Rate value of a Character over time

#### Parameters

Name	Description
Heart Rate	The target Heart Rate value between 0 and 2. Default is 1 $$
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 finishes
Character	The game object with the Character target

### Example 1

The Heart Rate value goes hand in hand with the Exertion. The Heart Rate controls the speed that the breathing animation plays. The Exertion controls the magnitude of the breathing animation.

### Keywords

Breathe Pump Beat Pulse

### Change Smooth Time

Characters » Animation » Change Smooth Time

#### Description

Changes the average blend time between locomotion animations

#### 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

### 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.

#### Keywords

Fade Realistic Old School Reaction

### Change State Weight

Characters » Animation » Change State Weight

### Description

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

### 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

### Keywords

Characters Animation Blend State Opacity

### Change Twitching

Characters » Animation » Change Twitching

#### Description

Changes the magnitude of the subtle and random movement applied to each Character's bone

#### Parameters

Name	Description
Twitching	The target Twitching value between 0 and 1. Default is 1
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

### Example 1

The Twitching value allows a Character to express subtle random movement found in life beings. Paired with the Breathing animation, it allows to have a consistent rhythm even when blending between other animations. It can also be useful to create idle animations using a static pose.

### Keywords

Tire Effort Struggle Sweat Exercise

# Enter State

Characters » Animation » Enter State

### Description

Makes a Character start an animation State

### 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

# Keywords

Characters Animation Animate State Play

# Play Gesture

Characters » Animation » Play Gesture

### Description

Plays an Animation Clip on a Character once

### 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

# Keywords

Characters Animation Animate Gesture Play

### Stop Gestures

Characters » Animation » Stop Gesture

### Description

Stops any animation Gestures playing on the Character

### 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

# Keywords

Characters Animation Animate Gesture Play

# Stop State

Characters » Animation » Stop State

### Description

Stops an animation State from a Character

### Parameters

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

# Keywords

Characters Animation Animate State Exit Stop

#### Footsteps

# Footsteps Instructions

- Change Footstep Sounds
- Play Footstep

### Change Footstep Sounds

Characters » Footsteps » Change Footstep Sounds

### Description

Changes the sound table that links textures with footstep sounds

### 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

# Keywords

Character Foot Step Stomp Foliage Audio Run Walk Move

# Play Footstep

Characters » Footsteps » Play Footstep

### Description

Plays a Footstep sound from a Material Sound asset

### Parameters

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

# Keywords

Step Foot Impact Land Sound

П

# Ik Instructions

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

### Active Feet IK

Characters » IK » Active Feet IK

### Description

Changes the active state of the Character Feet IK

### Parameters

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

# Keywords

### Active Lean IK

Characters » IK » Active Lean IK

### Description

Changes the active state of the Character Lean IK

### Parameters

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

# Keywords

# Active Look IK

Characters » IK » Active Look IK

### Description

Changes the active state of the Character Look IK

### Parameters

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

# Keywords

# Start Looking At

Characters » IK » Start Looking At

### Description

Starts looking at a target using the Look At IK system

### 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

# Keywords

# Stop Looking At

Characters » IK » Stop Looking At

### Description

Stops looking at a target using the Look At  $\operatorname{IK}$  system

### 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

# Keywords

#### Interaction

# Interaction Instructions

• Interact

### Interact

Characters » Interaction » Interact

### Description

Changes how the Player Character reacts to input commands

### Parameters

Name Description

Character The Character that attempts to interact

### Keywords

Character Button Pick Do Use Pull Press Push Talk

### Navigation

# Navigation Instructions

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

#### Dash

Characters » Navigation » Dash

#### Description

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

#### Parameters

Name	Description
Direction	Vector oriented towards the desired direction
Speed	Velocity the Character moves throughout the whole movement
Damping	Defines the duration and gradually changes the rate of the movement over time
Wait to Finish	If true this Instruction waits until the dash is completed
Animation Forward	Animation played on the Character when dashing forward
Animation Backward	Animation played on the Character when dashing backwards
Animation Right	Animation played on the Character when dashing right
Animation Left	Animation played on the Character when dashing left
Character	The game object with the Character target

#### Example 1

The Damping value defines both the duration and the velocity rate at which the Character moves when performing the Dash. To change the duration of the dash open the animation curve window and move the last keyframe to the left to decrease the duration or to the right to increase it.

#### Example 2

The Damping value also defines the coefficient rate at which the Character moves while performing the Dash. By default the Character starts with a coefficient of  $\theta$ . After  $\theta$ .2 seconds it increases to 1 and goes back to  $\theta$  after  $\theta$ .8 seconds. This curve is evaluated while performing a Dash and the coefficient is extracted from the curve and multiplied by the Speed to gradually change the rate at which the Character moves. For this reason, it is recommended that the Damping stay between  $\theta$  and 1.

### Keywords

Leap Blink Roll Flash Character Player

### Jump

Characters » Navigation » Jump

### Description

Instructs the Character to jump

### Parameters

Name Description

Character The game object with the Character target

### Keywords

Hop Leap Reach Character Player

### Move Direction

Characters » Navigation » Move Direction

### Description

Attempts to move the Character towards the specified direction  $% \left( 1\right) =\left( 1\right) \left( 1\right) +\left( 1\right) \left( 1\right) \left( 1\right) +\left( 1\right) \left( 1\right) \left($ 

### 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

# Keywords

Constant Walk Run To Vector Character Player

# Move To

Characters » Navigation » Move To

#### Description

Instructs the Character to move to a new location

#### Parameters

Name	Description
Wait to Finish	If true this Instruction waits until the Character reaches its destination or it is canceled
Stop Distance	Distance to the destination that the Character considers it has reached the target
Character	The game object with the Character target

### 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

### Keywords

Walk Run Position Location Destination Character Player

### Set Character Driver

Characters » Navigation » Set Character Driver

### Description

Changes the driver behavior of the Character

### Parameters

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

# Keywords

Character Drive Controller Navmesh Agent Rigidbody

### Set Character Rotation

Characters » Navigation » Set Character Rotation

### Description

Changes the rotation behavior of the Character

### Parameters

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

# Keywords

Character Face Look Direction Pivot Lock

### Start Following

Characters » Navigation » Start Following

### Description

Instructs a Character to follow another game object

### 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

# Keywords

Lead Pursue Chase Walk Run Position Location Destination Character Player

### Stop Following

Characters » Navigation » Stop Following

### Description

Instructs a Character to stop following a game object

### Parameters

Name Description

Character The game object with the Character target

### Keywords

Cancel Lead Pursue Chase Character Player

# Stop Move

Characters » Navigation » Stop Move

### Description

Attempts to stop the character from moving

### Parameters

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

# Keywords

Constant Walk Run To Vector Character Player

# Teleport

Characters » Navigation » Teleport

### Description

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

### Parameters

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

# Keywords

Change Position Location Respawn Spawn Character Player

## Player

# Player Instructions

- Change Player
- Set Player Input

# Change Player

Characters » Player » Change Player

### Description

Changes the Character identified as the Player

### Parameters

Name Description

Character The Character becomes the new Player character

### Keywords

Character Is Control

# Set Player Input

Characters » Player » Set Player Input

## Description

Changes how the Player Character reacts to input commands

### Parameters

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

# Keywords

Character Button Control Keyboard Mouse Gamepad Joystick

### Properties

# Properties Instructions

- Can Jump
- · Change Angular Speed
- Change Gravity
- Change Height
- Change Jump Force
- Change Mass
- Change Movement Speed
- Change Radius
- Change Terminal Velocity
- Is Controllable
- Kill Character
- Revive Character

# Can Jump

Characters » Properties » Can Jump

## Description

Changes whether the Character is allowed to jump or not

### Parameters

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

# Keywords

Hop Elevate

# Change Angular Speed

Characters » Properties » Change Angular Speed

## Description

Changes the Character's angular speed over time

### 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

### Keywords

Rotation Euler Direction Face Look

# Change Gravity

Characters » Properties » Change Gravity

## Description

Changes the Character's gravity over time

### Parameters

Name	Description
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

## Keywords

Space

# Change Height

Characters » Properties » Change Height

## Description

Changes the Character's height over time

## 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

## Keywords

Length

# Change Jump Force

Characters » Properties » Change Jump Force

## Description

Changes the Character's jump force over time

### 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

## Keywords

Hop Build Wind Fly

# Change Mass

Characters » Properties » Change Mass

## Description

Changes the Character's mass over time

## 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

## Keywords

Weight

## Change Movement Speed

Characters » Properties » Change Movement Speed

### Description

Changes the Character's maximum speed over time

### 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

### Keywords

Linear Walk Run Jog Sprint Velocity Throttle

# Change Radius

Characters » Properties » Change Radius

## Description

Changes the Character's radius over time

### 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

## Keywords

Diameter Space Fat Thin

# Change Terminal Velocity

Characters » Properties » Change Terminal Velocity

### Description

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

### 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

## Keywords

Fall Glide Parachute Height

# Is Controllable

Characters » Properties » Is Controllable

### Description

Changes whether the Character (Player) responds using input commands

### Parameters

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

## Kill Character

Characters » Properties » Kill Character

### Description

Changes the state of the Character to dead

### Parameters

Name Description

Character The character target

### Keywords

Dead Die Murder

## Revive Character

Characters » Properties » Revive Character

### Description

Changes the state of the Character to alive

### Parameters

Name Description

Character The character target

### Keywords

Respawn Alive Resurrect

#### Ragdoll

# Ragdoll Instructions

- Recover Ragdoll
- Start Ragdoll

## Recover from Ragdoll

Characters » Ragdoll » Recover Ragdoll

### Description

Recovers a Character from the Ragdoll state and stands up

### Parameters

Name Description

### Keywords

Characters Ragdoll Recover Stand

## Start Ragdoll

Characters » Ragdoll » Start Ragdoll

### Description

Makes a Character enter a ragdoll state

### Parameters

Name Description

Character The Character game object that changes to a Ragdoll state

### Keywords

Characters Ragdoll Dead Kill Die

### Visuals

# Visuals Instructions

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

# Attach Prop

Characters » Visuals » Attach Prop

### Description

Attaches a prefab Prop onto a Character's bone

### Parameters

Name	Description
Character	The character target
Prop	The prefab 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

## Keywords

Characters Add Grab Draw Pull Take Object

# Change Model

Characters » Visuals » Change Model

## Description

Changes the Character current model

## 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

## Keywords

Characters Model

## Put on Skin Mesh

Characters » Visuals » Put on Skin Mesh

### Description

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

### 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	

# Keywords

Renderer New Game Object Armature

## Remove Prop

Characters » Visuals » Remove Prop

## Description

Removes a prefab Prop (if any) from a Character

### Parameters

Name	Description
Character	The character target
Prop	The prefab object prop that is removed to the character

# Keywords

Characters Detach Let Sheathe Put Holster Object

# Take off Skin Mesh

Characters » Visuals » Take off Skin Mesh

### Description

Removes an instance of a Skin Mesh from a Character

### 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

# Keywords

Renderer Game Object Armature

## DEBUG

Debug

### Instructions

- Beep
- Comment
- Frame Step
- Log Number
- Log Text
- Pause Editor

#### Веер

Debug » Beep

## Description

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

## Keywords

Debug

#### Comment

Debug » Comment

## Description

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

#### Parameters

Name	Description
Text	The text of the comment

## Keywords

Debug Note Annotation Explanation

### Frame Step

Debug » Frame Step

# ${\tt Description}$

Performs a single frame step. It requires the Editor to be paused  $% \left( 1\right) =\left( 1\right) \left( 1\right) \left$ 

# Keywords

Debug

#### Debug Number

Debug » Log Number

## Description

Prints a text from a numeric source to the Unity Console

### Parameters

Number Description

Number The number to log

Keywords

Debug Log Print Show Display Test Float Double Decimal Integer Message

### Debug Text

Debug » Log Text

## Description

Prints a message to the Unity Console

### Parameters

Name Description

Message The text message to  $\log$ 

# Keywords

Debug Log Print Show Display Name Test Message String

### Pause Editor

Debug » Pause Editor

# ${\tt Description}$

Pauses the Editor. This has no effect on standalone applications

# Keywords

Debug Break Pause Stop

## GAME OBJECTS

Game Objects

### Instructions

- Add Component
- Change Layer
- Change Name
- Change Tag
- Destroy
- Disable Component
- Enable Component
- Instantiate
- Remove Component
- Set Active
- Set Game Object
- Toggle Active

### Add Component

Game Objects » Add Component

## Description

Adds a component class to the game object

### Parameters

Name Description

Game Object Target game object

Keywords

Add Append MonoBehaviour Behaviour Script

### Change Layer

Game Objects » Change Layer

# ${\tt Description}$

Changes the layer value of a game object

### 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

## Keywords

MonoBehaviour Behaviour Script

### Change Name

Game Objects » Change Name

# ${\tt Description}$

Changes the name of a game object

### Parameters

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

# Keywords

MonoBehaviour Behaviour Script

### Change Tag

Game Objects » Change Tag

# ${\tt Description}$

Changes the Tag of a game object

### Parameters

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

# Keywords

MonoBehaviour Behaviour Script

#### Destroy

Game Objects » Destroy

## Description

Destroys a game object scene instance

### Parameters

Name Description

Game Object Target game object

Keywords

Remove Delete Flush MonoBehaviour Behaviour Script

### Disable Component

Game Objects » Disable Component

## Description

Disables a component class from the game object

### Parameters

Name Description

Game Object Target game object

Keywords

Deactivate Turn Off MonoBehaviour Behaviour Script

### Enable Component

Game Objects » Enable Component

## Description

Enables a component class from the game object

### Parameters

Name Description

Game Object Target game object

# Keywords

Active Turn On MonoBehaviour Behaviour Script

#### Instantiate

Game Objects » Instantiate

# ${\tt Description}$

Creates a new instance of a referenced game object

### Parameters

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

# Keywords

Create New Game Object

#### Remove Component

Game Objects » Remove Component

## Description

Removes an existing component from the game object

### Parameters

Name Description

Game Object Target game object

Keywords

Delete Destroy MonoBehaviour Behaviour Script

### Set Active

Game Objects » Set Active

## Description

Changes the state of a game object to active or inactive

### Parameters

Name Description

Game Object Target game object

# Keywords

Activate Deactivate Enable Disable MonoBehaviour Behaviour Script

### Set Game Object

Game Objects » Set Game Object

## Description

Sets a game object value equal to another one

### Parameters

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

# Keywords

Change Instance Variable Asset

### Toggle Active

Game Objects » Toggle Active

## Description

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

## Parameters

Name Description

Game Object Target game object

## Keywords

Activate Deactivate Enable Disable Switch Swap MonoBehaviour Behaviour Script

## INPUT

Input

### Instructions

- Display Touchstick Left
- Display Touchstick Right

### Display Touchstick Left

Input » Display Touchstick Left

## Description

Shows or hides the default Touchstick on the left side

### Parameters

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

# Keywords

Joystick

### Display Touchstick Right

Input » Display Touchstick Right

## Description

Shows or hides the default Touchstick on the right side

### Parameters

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

# Keywords

Joystick

## LIGHTS

Lights

### Instructions

- Change Color
- Change Intensity

### Change Color

Lights » Change Color

## Description

Smoothly changes the color of a Light component

### 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

# Keywords

Colour Hue Mood RGB Light Spot Sun Point Strength Burn Dark

#### Change Intensity

Lights » Change Intensity

## Description

Smoothly changes the intensity of a Light component

### 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

# Keywords

Light Spot Sun Point Strength Burn Dark

## LOGIC

Logic

### Instructions

- Broadcast Message
- Check Conditions
- Invoke Method
- Raise Signal
- Restart Instructions
- Run Actions
- Run Conditions
- Run Trigger
- Stop Actions
- Stop Conditions
- Stop Trigger

#### Broadcast Message

Logic » Broadcast Message

### Description

Invokes any method on any component found on the target game object

#### 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

### 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

### Keywords

Execute Call Invoke Function

## **Check Conditions**

Logic » Check Conditions

### Description

If any of the Conditions list is false it early exits and skips the execution of the rest of the Instructions below

#### Parameters

Name Description

Conditions List of Conditions that can evaluate to true or false

### Keywords

Execute Call Check Evaluate

### Invoke Method

Logic » Invoke Method

## Description

Invokes a method from any script attached to a game object

### Parameters

Name	Description
Method	The method/function that is called on a game object reference

# Keywords

Execute Call Invoke Function

### Raise Signal

Logic » Raise Signal

## Description

Raises a specific signal, which is captured by other listeners

### Parameters

Name Description
Signal The signal name risen

# Keywords

Event Command Fire Trigger Dispatch Execute

#### Restart Instructions

Logic » Restart Instructions

## Description

Stops executing the current list of Instructions and starts again from the top  $% \left\{ 1\right\} =\left\{ 1\right\} =\left\{$ 

# Keywords

Reset Call Again

### Run Actions

Logic » Run Actions

# ${\tt Description}$

Executes an Actions component object

### Parameters

Name	Description
Actions	The Actions object that is executed
Wait Until Complete	If true this instruction waits until the Actions object finishes running

# Keywords

Execute Call Instruction

### Run Conditions

Logic » Run Conditions

# ${\tt Description}$

Executes a Conditions component object

### Parameters

Name	Description
Conditions	The Conditions object that is executed
Wait Until Complete	If true this instruction waits until the Conditions object finishes running

# Keywords

Execute Call Check Evaluate

## Run Trigger

Logic » Run Trigger

# ${\tt Description}$

Executes a Trigger component object

### Parameters

Name	Description
Trigger	The Trigger object that is executed
Wait Until Complete	If true this instruction waits until the Trigger object finishes running

# Keywords

Execute Call

#### Stop Actions

Logic » Stop Actions

# ${\tt Description}$

Stops an Actions component object that is being executed

### Parameters

Name	Description
Actions	The Actions object that is stopped
aa m d a	

# Keywords

Cancel Pause

### Stop Conditions

Logic » Stop Conditions

# ${\tt Description}$

Stops a Conditions component object that is being executed

### Parameters

Name	Description
Conditions	The Conditions object that is stopped

# Keywords

Cancel Pause

### Stop Trigger

Logic » Stop Trigger

# ${\tt Description}$

Stops a Trigger component object that is being executed

### Parameters

Name	Description	
Trigger	The Trigger object that is stopped	

# Keywords

Cancel Pause

### MATH

Math

## Sub Categories

- Arithmetic
- Boolean
- Geometry
- Text

### Arithmetic

# Arithmetic Instructions

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

## Absolute Number

Math » Arithmetic » Absolute Number

### Description

Sets a value without its sign

### Parameters

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

# Keywords

Change Float Integer Variable Sign Positive Modulus Magnitude

## Add Numbers

Math » Arithmetic » Add Numbers

### Description

Add two values together

### 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

# Keywords

Sum Plus Float Integer Variable

## Clamp Number

Math » Arithmetic » Clamp Number

### Description

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

### 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

# Keywords

Min Max Negative Minus Float Integer Variable

# Cosine

Math » Arithmetic » Cosine

## Description

Sets a value equal the Cosine of a number

### Parameters

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

# Keywords

Change Float Integer Variable

## Divide Numbers

Math » Arithmetic » Divide Numbers

### Description

Performs a division between the first and the second values

### 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

# Keywords

Fraction Float Integer Variable

## Increment Number

Math » Arithmetic » Increment Number

### Description

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

### Parameters

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

# Keywords

Change Float Integer Variable

# Multiply Numbers

Math » Arithmetic » Multiply Numbers

### Description

Multiplies two values together

### 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

# Keywords

Product Float Integer Variable

## Set Number

Math » Arithmetic » Set Number

### Description

Sets a value equal to another value

### Parameters

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

## Keywords

Change Float Integer Variable

## Sign of Number

Math » Arithmetic » Sign of Number

### Description

Sets a value equal to  $\mbox{-1}$  if the input number is negative. 1 otherwise

### Parameters

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

## Keywords

Change Float Integer Variable Positive Negative

## Sine

Math » Arithmetic » Sine

### Description

Sets a value equal the Sine of a number

### Parameters

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

## Keywords

Change Float Integer Variable

### Subtract Numbers

Math » Arithmetic » Subtract Numbers

### Description

Subtracts the second value from the first one

### 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

## Keywords

Rest Negative Minus Float Integer Variable

## Tangent

Math » Arithmetic » Tangent

### Description

Sets a value equal the Tangent of a number

### Parameters

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

## Keywords

Change Float Integer Variable

### Boolean

## Boolean Instructions

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

### AND Bool

Math » Boolean » AND Bool

### Description

Executes an AND operation between to values and saves the result

### 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

## Keywords

Subtract Minus Variable Boolean

### NAND Bool

Math » Boolean » NAND Bool

### Description

Executes a NAND operation between to values and saves the result

### 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

## Keywords

Not Negative Subtract Minus Variable Boolean

## NOR Bool

Math » Boolean » NOR Bool

### Description

Executes a NOR operation between to values and saves the result

### 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	

## Keywords

Not Negative Sum Plus Variable Boolean

## OR Bool

Math » Boolean » OR Bool

### Description

Executes an OR operation between to values and saves the result

### 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

## Keywords

Sum Plus Variable Boolean

## Set Bool

Math » Boolean » Set Bool

### Description

Sets a boolean value equal to another value

### Parameters

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

## Keywords

Change Boolean Variable

## Toggle Bool

Math » Boolean » Toggle Bool

### Description

Toggles the value of a Boolean value

### Parameters

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

## Keywords

Change Boolean Variable Not Flip Switch

#### Geometry

## Geometry 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
- Subtract Directions
- Subtract Points
- Uniform Scale

### Add Directions

Math » Geometry » Add Directions

### Description

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

### 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

## Keywords

Sum Plus Position Location Variable

### Add Points

Math » Geometry » Add Points

### Description

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

### 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

## Keywords

Sum Plus Position Location Variable

## Clamp

Math » Geometry » Clamp

### Description

Clamps all components of a Vector3 between two values

### 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

## Keywords

Limit Vector3 Vector2 Constraint Variable

### Cross Product

Math » Geometry » Cross Product

### Description

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

### 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

## Keywords

Multiply Orthogonal Perpendicular Normal Position Location Variable

## Distance

Math » Geometry » Distance

### Description

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

### 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

## Keywords

Magnitude Position Location Variable

# Dot Product

Math » Geometry » Dot Product

### Description

Calculates the dot product between two directions and saves the result

### 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

## Keywords

Direction Parallel Perpendicular

## Normalize

Math » Geometry » Normalize

### Description

Makes the magnitude of a direction vector equal to  ${\bf 1}$ 

### Parameters

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

## Keywords

Change Vector3 Vector2 Unit Magnitude Variable

## Project on Plane

Math » Geometry » Project on Plane

### Description

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

### 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

## Keywords

Direction Surface Sway

### Reflect on Plane

Math » Geometry » Reflect on Plane

### Description

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

### 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

## Keywords

Direction Bounce Ricochet Snell

### Remap Coordinates

Math » Geometry » Remap Coordinates

### Description

Changes each of the components of a Vector3 value

### Parameters

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

## Keywords

Change Vector3 Vector2 Component Towards Look Variable Axis

## Scale Product

Math » Geometry » Scale Product

### Description

Multiplies two vectors component-wise

### 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

## Keywords

Multiply Uniform Component Axis Position Location Variable

### Set Direction

Math » Geometry » Set Direction

### Description

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

### Parameters

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

## Keywords

Change Vector3 Vector2 Towards Look Variable

## Set Point

Math » Geometry » Set Point

### Description

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

### Parameters

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

## Keywords

Change Vector3 Vector2 Position Location Variable

### Subtract Directions

Math » Geometry » Subtract Directions

### Description

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

### 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

## Keywords

Minus Rest Position Location Variable

### Subtract Points

Math » Geometry » Subtract Points

### Description

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

### 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

## Keywords

Rest Minus Position Location Variable

### Uniform Scale

Math » Geometry » Uniform Scale

### Description

Multiplies each component of a vector with a decimal

### 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

## Keywords

Direction Homogeneous Multiply Product

### Text

## Text Instructions

- Join
- Replace
- Set Text
- Substring

## Join

Math » Text » Join

### Description

Joins two string values and stores them

### 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

## Keywords

Concat Concatenate Together Mix String Text Character

## Replace

Math » Text » Replace

### Description

Replaces all occurrences of a string with another string

### 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

## Keywords

Substitute Change String Text Character

## Set Text

Math » Text » Set Text

### Description

Changes the value of a string

## Parameters

Name	Description
Text	The source of the text
Set	Where the resulting value is set

## Keywords

String Text Character

## Substring

Math » Text » Substring

### Description

Extracts a substring based on an index and length

### 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

## Keywords

String Text Character

### PHYSICS 2D

### Physics 2D

### Instructions

- Add Explosion Force 2D
- Add Force 2D
- Change Mass 2D
- Change Velocity 2D
- Gravity Scale 2D
- Is Kinematic 2D

### Add Explosion Force 2D

Physics 2D » Add Explosion Force 2D

### Description

Applies a force to a Rigidbody2D that simulates explosion effects

### Parameters

Description
The game object with a Rigidbody2D component that receives the force
The position where the explosion originates
How far the blast reaches
The force of the explosion, which its at its maximum at the origin
How the force is applied

## Keywords

Apply Velocity Impulse Propel Push Pull Boom Physics Rigidbody

## Add Force 2D

Physics 2D » Add Force 2D

## Description

Adds a force to a game object with a Rigidbody2D

### 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

# Keywords

Apply Velocity Impulse Propel Push Pull Physics Rigidbody

### Change Mass 2D

Physics 2D » Change Mass 2D

# ${\tt Description}$

Changes the mass of a Rigidbody2D

### 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

# Keywords

Weight Physics Rigidbody

## Change Velocity 2D

Physics 2D » Change Velocity 2D

## Description

Changes the current velocity of a Rigidbody2D

### 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

# Keywords

Speed Movement Physics Rigidbody

### Gravity Scale 2D

Physics 2D » Gravity Scale 2D

## Description

Controls whether how gravity affects the Rigidbody2D

### 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

# Keywords

Physics Rigidbody

### Is Kinematic 2D

Physics 2D » Is Kinematic 2D

# ${\tt Description}$

Controls whether physics affects the Rigidbody2D  $\,$ 

### 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

# Keywords

Physics Rigidbody

## PHYSICS 3D

#### Physics 3D

### 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

### Add Explosion Force 3D

Physics 3D » Add Explosion Force 3D

## Description

Applies a force to a Rigidbody that simulates explosion effects

### 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

# Keywords

Apply Velocity Impulse Propel Push Pull Boom Physics Rigidbody

## Add Force 3D

Physics 3D » Add Force 3D

## Description

Adds a force to a game object with a Rigidbody

### 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

# Keywords

Apply Velocity Impulse Propel Push Pull Physics Rigidbody

### Change Mass 3D

Physics 3D » Change Mass 3D

# ${\tt Description}$

Changes the mass of a Rigidbody

### Parameters

Name	Description
Rigidbody	The game object with a Rigidbody attached that changes its mass
Mass	The new mass the game object

# Keywords

Weight Physics Rigidbody

## Change Velocity 3D

Physics 3D » Change Velocity 3D

## Description

Changes the current velocity of a Rigidbody

### Parameters

Name	Description
Rigidbody	The game object with a Rigidbody attached that changes its velocity
Velocity	The velocity the game object changes to

# Keywords

Speed Movement Physics Rigidbody

### Is Kinematic 3D

Physics 3D » Is Kinematic 3D

# ${\tt Description}$

Controls whether physics affects the Rigidbody

### 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

# Keywords

Physics Rigidbody

### Overlap Box 2D

Physics 3D » Overlap Box 2D

## Description

Captures all colliders caught inside a box

## 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

# Keywords

Cube Cast Collect Physics Rigidbody

### Overlap Box 3D

Physics 3D » Overlap Box 3D

## Description

Captures all colliders caught inside a box

## 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

# Keywords

Cube Cast Collect Physics Rigidbody

### Overlap Circle 2D

Physics 3D » Overlap Circle 3D

## Description

Captures all colliders caught inside a Circle defined by a point and radius

### 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

# Keywords

Cast Collect Physics Rigidbody

### Overlap Sphere 3D

Physics 3D » Overlap Sphere 3D

## Description

Captures all colliders caught inside a sphere defined by a point and radius

### 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

# Keywords

Circle Cast Collect Physics Rigidbody

## Trace Line 3D

Physics 3D » Trace Line 3D

## Description

Captures all colliders caught inside a line between A and B  $\,$ 

## 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

# Keywords

Line Trace Raycast Cast Collect Physics Rigidbody

### Use Gravity 3D

Physics 3D » Use Gravity 3D

# ${\tt Description}$

Controls whether gravity affects the Rigidbody

### 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

# Keywords

Physics Rigidbody

## RENDERER

Renderer

### Instructions

- Change Material Color
- Change Material Float
- Change Material Texture
- Change Material

### Change Material Color

Renderer » Change Material Color

## Description

Changes over time the Color property of an instantiated material of a Renderer component

### 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

## Keywords

Set Shader Hue Change

### Change Material Float

Renderer » Change Material Float

## Description

Changes over time the Float property of an instantiated material of a Renderer component

### 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

## Keywords

Set Shader Hue Change

#### Change Material Texture

Renderer » Change Material Texture

## Description

Changes the main texture of an instantiated material of a Renderer component

### Parameters

Name	Description
Texture	Texture that replaces the Renderer's instantiated material
Renderer	The game object with a Renderer component attached

# Keywords

Set Shader Change

### Change Material

Renderer » Change Material

## Description

Changes instantiated material of a Renderer component

### Parameters

Name	Description
Material	Material that is set as the primary type of the Renderer
Renderer	The game object with a Renderer component attached

# Keywords

Set Shader Texture Change

## SCENES

Scenes

### Instructions

- Load Scene
- Unload Scene

### Load Scene

Scenes » Load Scene

# ${\tt Description}$

Loads a new Scene

### 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	

# Keywords

Change

### Unload Scene

Scenes » Unload Scene

## Description

Unloads an active scene

### Parameters

Name	Description
Scene	The scene to be unloaded

# Keywords

Change Remove

### STORAGE

### Storage

### Instructions

- Delete Game
- Load Game
- Load Latest Game
- Save Game

### Delete Game

Storage » Delete Game

## Description

Deletes a previously saved game state

### Parameters

Name Description

Save Slot Slot number that is erased. Default is 1

# Keywords

Load Save Delete Profile Slot Game Session

### Load Game

Storage » Load Game

## Description

Loads a previously saved state of a game

### Parameters

Name Description

# Keywords

Load Save Profile Slot Game Session

### Load Latest Game

Storage » Load Latest Game

## Description

Loads the latest previously saved state of a game  $\,$ 

# Keywords

Load Save Last Profile Game Session

#### Save Game

Storage » Save Game

## Description

Saves the current state of the game

### Parameters

Name Description

# Keywords

Load Save Profile Slot Game Session

TESTING

Testing

### Instructions

• Instruction Tester

#### Tester

Testing » Instruction Tester

#### Description

Appends a character to a static Chain field. For internal testing use only

#### Parameters

Name Description

Character A character that will be appended to InstructionTester.Chain

## 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.

TIME

Time

### Instructions

- Time Scale
- Wait Frames
- Wait Seconds

#### Time Scale

Time » Time Scale

### Description

Changes the Time Scale of the game

#### 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.	

#### Example 1

Setting a Time Scale of 0 will freeze the game. Useful for pausing the game

### 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

## Keywords

Slow Motion Bullet Time Matrix

#### Wait Frames

Time » Wait Frames

### Description

Waits a certain amount of frames

#### Parameters

Name	Description
Frames	The amount of frames to wait

### 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

#### Keywords

Wait Time Frames Yield

### Wait Seconds

Time » Wait Seconds

## Description

Waits a certain amount of seconds

### Parameters

Name Description
Seconds The amount of seconds to wait

# Keywords

Wait Time Seconds Minutes Cooldown Timeout Yield

# TRANSFORMS

Transforms

### Instructions

- Change Position
- Change Rotation
- Change Scale
- Clear Parent
- Look At
- Set Parent

### Change Position

Transforms » Change Position

# Description

Changes the position of a game object over time  $% \left( 1\right) =\left( 1\right) \left( 1\right$ 

# 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

# Keywords

Location Translate Move Displace

### Change Rotation

Transforms » Change Rotation

# Description

Changes the rotation of a game object over time

### 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

# Keywords

Rotate Angle Euler Tilt Pitch Yaw Roll

### Change Scale

Transforms » Change Scale

# Description

Changes the local scale of a game object over time

# 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

# Keywords

Size Resize Grow Reduce Small Big

### Clear Parent

Transforms » Clear Parent

# Description

Clears the parent of a game object

### Parameters

Name Description

Transform The Transform of the game object

# Keywords

Child Children Hierarchy Orphan

### Look At

Transforms » Look At

# Description

Rotates the transform towards the chosen target

### Parameters

Name	Description
Target	The desired targeted object to look at
Transform	The Transform of the game object

# Keywords

Rotate Rotation See

### Set Parent

Transforms » Set Parent

# ${\tt Description}$

Changes the parent of a game object

### Parameters

Name	Description
Parent	The game object that becomes the parent
Transform	The Transform of the game object

# Keywords

Child Children Hierarchy Hang Inherit

UI

U

### Instructions

- Canvas Group Alpha
- Canvas Group Block Raycasts
- Canvas Group Interactable
- Change Color
- Change Dropdown
- Change Font Size
- Change Height
- Change Image
- Change Slider
- Change Text
- Change Toggle
- Change Width
- Focus On

### Canvas Group Alpha

UI » Canvas Group Alpha

# Description

Changes the opacity of the Canvas Group and affects all of its children

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

### Canvas Group Block Raycasts

UI » Canvas Group Block Raycasts

# Description

Changes whether the Canvas Group blocks raycasts or not

Name	Description
Canvas Group	The Canvas Group component that changes its value
Block Raycasts	If true, the canvas group and its children block raycasts

#### Canvas Group Interactable

UI » Canvas Group Interactable

# Description

Changes the interactable value of a Canvas Group component

Name	Description
Canvas Group	The Canvas Group component that changes its value
Interactable	The on/off state value

### Change Color

UI » Change Color

# ${\tt Description}$

Changes the color of a Graphic component

Name	Description
Graphic	The Graphic component that changes its tint color
Color	The new Color

#### Change Dropdown

UI » Change Dropdown

# Description

Changes the value of a Dropdown or Text Mesh Pro Dropdown component

Name	Description
Text	The Text or Text Mesh Pro component that changes its value
Index	The new index value of the Dropdown

### Change Font Size

UI » Change Font Size

# Description

Changes the size of the Text or Text Mesh Pro component content

### Parameters

Name	Description
Text	The Text or Text Mesh Pro component that changes its font size
Size	The new text size, in pixels

# Keywords

Text

### Change Height

UI » Change Height

# ${\tt Description}$

Changes the Height of a Rect Transform

Name	Description
Rect Transform	The Rect Transform component to change
Height	The new height value. Also known as sizeDelta.y

#### Change Image

UI » Change Image

# ${\tt Description}$

Changes the Sprite of an Image component

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

# Change Slider

UI » Change Slider

# ${\tt Description}$

Changes the value of a Slider component

Name	Description
Slider	The Slider component that changes its value
Value	The new value set

### Change Text

UI » Change Text

# ${\tt Description}$

Changes the value of a Text or Text Mesh Pro component

Name	Description
Text	The Text or Text Mesh Pro component that changes its value
Value	The new value set

### Change Toggle

UI » Change Toggle

# ${\tt Description}$

Changes the value of a Toggle component

Name	Description
Toggle	The Toggle component that changes its value
Value	The new value set

# Change Width

UI » Change Width

# Description

Changes the Width of a Rect Transform

Name	Description
Rect Transform	The Rect Transform component to change
Width	The new width value. Also known as sizeDelta.x

### Focus On

UI » Focus On

# ${\tt Description}$

Focuses on a specific UI component

### Parameters

Name Description

Focus On The UI component that takes focus

# Keywords

Text

### VARIABLES

#### Variables

#### Instructions

- Clear List
- Collect Characters
- Collect Markers
- Filter List
- Loop List
- Remove From List
- Reverse List
- Shuffle List
- Sort List Alphabetically
- Sort List By Distance
- Swap List

### Clear List

Variables » Clear List

# Description

Removes all elements of a given Local or Global List Variables

#### Parameters

Name Description

 $\hbox{List Variable} \qquad \hbox{Local List or Global List which elements are removed} \\$ 

Keywords

Clean Remove Delete Destroy Size Array List Variables

#### **Collect Characters**

Variables » Collect Characters

### Description

Collects all Characters that within a certain radius of a position  $% \left( 1\right) =\left( 1\right) +\left( 1\right)$ 

#### 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

# 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

#### Keywords

Gather Get Set Array List Variables

#### Collect Markers

Variables » Collect Markers

### Description

Collects all Markers that within a certain radius of a position

#### 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

# 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

#### Keywords

Gather Get Set Array List Variables

#### Filter List

Variables » Filter List

### Description

Checks Conditions against each element of a list and removes it if the Condition is not true

#### 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

# 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

### Keywords

Remove Pick Select Array List Variables

### Loop List

Variables » Loop List

# Description

Loops a Game Object List Variables and executes an Actions component for each value

# Parameters

N	lame	Description
_	ist /ariable	Local List or Global List which elements are iterated
A	Actions	The Actions component executed for each element in the list. The Target argument of any Instruction contains the object inspected

# Keywords

Iterate Cycle Every All Stack

#### Remove from List

Variables » Remove from List

# Description

Deletes an elements from a given Local or Global List Variables

### Parameters

Name	Description
List Variable	Local List or Global List which elements are removed

# Keywords

Delete Destroy Size Array List Variables

#### Reverse List

Variables » Reverse List

# Description

Reorders the elements of a list so the first ones become the last ones

#### Parameters

Name Description

List Variable Local List or Global List which elements are reversed

Keywords

Invert Order Sort Array List Variables

### Shuffle List

Variables » Shuffle List

# Description

Randomly shuffles the position of each element on a List Variable

### Parameters

Name Description

List Variable Local List or Global List which elements are shuffled

# Keywords

Randomize Sort Array List Variables

### Sort List Alphabetically

Variables » Sort List Alphabetically

# Description

Sorts the List Variable elements based on their alphabet distance

### 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

### Keywords

Order Organize Array List Variables

### Sort List by Distance

Variables » Sort List by Distance

# Description

Sorts the List Variable elements based on their distance to a given position

### 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

### Keywords

Order Organize Array List Variables

### Swap List

Variables » Swap List

# Description

Swaps two positions of a list

### Parameters

Name Description

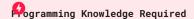
List Variable Local List or Global List which elements are swapped

# Keywords

Order Change Array List Variables

#### **Custom Instructions**

Game Creator allows to very easily create custom Instructions and use them along with the rest.



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.

#### 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;
    }
}
```

#### 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.

#### 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 execution. 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.



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)
{ }
```

#### 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();
}
```

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);
}
```

#### 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());
}
```

#### 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());
}
```

**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)
    {
        // ...
    }
}
```

#### 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")]
```

#### 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")]
```

#### 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)]
```

#### 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.

#### 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)]
```

#### 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")]
```

#### 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")]
```

#### 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)]



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.
)]
```

#### 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)]

### 1.5.3 Triggers

#### **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.

Triggers



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!"

#### 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.

# beleting Triggers

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

#### 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.

Change Trigger Event

#### 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.

### **Events**

## EVENTS

## Sub Categories

- Audio
- Characters
- Input
- Interactive
- Lifecycle
- Logic
- Physics
- Storage
- Ui
- Variables

## AUDIO

Audio

### Events

- On Change Ambient Volume
- On Change Master Volume
- On Change Sound Effects Volume
- On Change Speech Volume
- On Change Ui Volume

### On Change Ambient Volume

Audio » On Change Ambient Volume

## Description

Executed when the Ambient Volume is changed

# Keywords

### On Change Master Volume

Audio » On Change Master Volume

## Description

Executed when the Master Volume is changed

# Keywords

### On Change Sound Effects Volume

Audio » On Change Sound Effects Volume

## Description

Executed when the Sound Effects Volume is changed

# Keywords

### On Change Speech Volume

Audio » On Change Speech Volume

## Description

Executed when the Speech Volume is changed

# Keywords

## On Change UI Volume

Audio » On Change UI Volume

## Description

Executed when the UI Volume is changed

# Keywords

## CHARACTERS

#### Characters

## Sub Categories

- Navigation
- Ragdoll

### Events

- On Become Npc
- On Become Player
- On Change Model
- On Die
- On Revive

### On Become NPC

Characters » On Become NPC

## Description

Executed when a character that is a Player becomes an  $\ensuremath{\mathsf{NPC}}$ 

### On Become Player

Characters » On Become Player

## Description

Executed when a character becomes the Player

### On Change Model

Characters » On Change Model

## Description

Executed when a character changes its model

On Die

Characters » On Die

## Description

Executed when the character dies

### On Revive

Characters » On Revive

## Description

Executed when a dead character revives

# Keywords

Resurrect Respawn

### Navigation

# Navigation Events

- On Jump
- On Land
- On Navlink Enter
- On Navlink Exit
- On Step

# On Jump

Characters » Navigation » On Jump

## Description

Executed every time the character performs a jump

# On Land

Characters » Navigation » On Land

## Description

Executed every time the character lands on the ground

# On NavLink Enter

Characters » Navigation » On NavLink Enter

## Description

Executed when a character enters a navigation mesh Off Mesh Link

# On NavLink Exit

Characters » Navigation » On NavLink Exit

## Description

Executed when a character exists a navigation mesh Off Mesh Link

# On Step

Characters » Navigation » On Step

## Description

Executed every time the character takes a step

## Keywords

Footstep Foot Feet Ground

### Ragdoll

# Ragdoll Events

- On Recover Ragdoll
- On Start Ragdoll

# On Recover Ragdoll

Characters » Ragdoll » On Recover Ragdoll

## Description

Executed when the character recovers from the ragdoll mode

# On Start Ragdoll

Characters » Ragdoll » On Start Ragdoll

## Description

Executed when the character enters the ragdoll mode

## INPUT

Input

### Events

- On Cursor Click
- On Input
- On Touch

### On Cursor Click

Input » On Cursor Click

## Description

Detects when the cursor clicks this game object

### 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

# Keywords

Down Mouse Button Hover Left Middle Right

### On Input

Input » On Input

## Description

Detects when a button is interacted with

### 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

# Keywords

Down Up Press Release Keyboard Mouse Button Gamepad Controller Joystick

### On Touch

Input » On Touch

## Description

Detects when a finger touches this game object on a touchscreen

### 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

# Keywords

Down Finger Press Click Finger Press Click

## INTERACTIVE

Interactive

### Events

- On Blur
- On Focus
- On Interact

### On Blur

Interactive » On Blur

# ${\tt Description}$

Executed when the Character loses focus on this Interactive object

### On Focus

Interactive » On Focus

# ${\tt Description}$

Executed when the Character focuses on this Interactive object

#### On Interact

Interactive » On Interact

## Description

Executed when a Character interacts with this Trigger

## Parameters

Name	Description
Use Raycast	Checks if there is something between the character and the Trigger

## Example 1

The 'Use Raycast' option checks if there is no other collider between the Character and the Trigger

# LIFECYCLE

Lifecycle

### Events

- On Become Invisible
- On Become Visible
- On Disable
- On Enable
- On Interval
- On Invoke
- On Late Update
- On Start
- On Update

### On Become Invisible

Lifecycle » On Become Invisible

## Description

Executed when the game object it is attached to is no longer visible by any camera  ${\sf Executed}$ 

# Keywords

Hide Disappear

## On Become Visible

Lifecycle » On Become Visible

## Description

Executed when the game object it is attached to becomes visible to any camera

# Keywords

Show Render Appear

## On Disable

Lifecycle » On Disable

## Description

Executed when the game object it is attached to becomes disabled or inactive  ${\sf E}$ 

# Keywords

Inactive Active Enable

## On Enable

Lifecycle » On Enable

## Description

Executed when the game object it is attached to becomes enabled and active

# Keywords

Active Disable Inactive

#### On Interval

Lifecycle » On Interval

## Description

Executes after an amount of seconds have passed between each call

#### Parameters

Name	Description
Time Mode	The time scale in which the interval is calculated
Interval	Amount of seconds between each iteration

# Keywords

Loop Tick Continuous FPS

#### On Invoke

Lifecycle » On Invoke

# ${\tt Description}$

Executed only when calling its Invoke() method

# Keywords

Script Manual

#### On Late Update

Lifecycle » On Late Update

## Description

Executed every frame after all On Update events are fired, as long as the game object is enabled

# Keywords

Loop Tick Continuous

#### On Start

Lifecycle » On Start

# ${\tt Description}$

Executed on the frame when the game object is enabled for the first time  $% \left( \frac{\partial f}{\partial x}\right) =\frac{\partial f}{\partial x}$ 

# Keywords

Initialize

#### On Update

Lifecycle » On Update

# ${\tt Description}$

Executed every frame as long as the game object is enabled  $% \left( 1\right) =\left( 1\right) \left( 1\right) \left$ 

# Keywords

Loop Tick Continuous

LOGIC

Logic

#### Events

- On Hotspot Activate
- On Hotspot Deactivate
- On Receive Signal

#### On Hotspot Activate

Logic » On Hotspot Activate

## Description

Executed when its associated Hotspot is activated

# Keywords

Spot

#### On Hotspot Deactivate

Logic » On Hotspot Deactivate

## Description

Executed when its associated Hotspot is deactivated

# Keywords

Spot

#### On Receive Signal

Logic » On Receive Signal

## Description

Executed when receiving a specific signal name from the dispatcher

# Keywords

Event Command Fire Trigger Dispatch Execute

## PHYSICS

Physics

#### Events

- On Collide Exit
- On Collide
- On Trigger Enter Tag
- On Trigger Enter
- On Trigger Exit Tag
- On Trigger Exit
- On Trigger Stay

## On Collide Exit

Physics » On Collide Exit

## Description

Executed when the Trigger that collided with a game object, stops colliding

# Keywords

Crash Touch Bump Collision Stop

## On Collide

Physics » On Collide

## Description

Executed when the Trigger collides with a game object

# Keywords

Crash Touch Bump Collision

#### On Trigger Enter Tag

Physics » On Trigger Enter Tag

## Description

Executed when a game object with a Tag enters the Trigger collider

#### Parameters

Name	Description
Tag	A string that represents a group of game objects

# Keywords

#### On Trigger Enter

Physics » On Trigger Enter

## Description

Executed when a game object enters the Trigger collider

# Keywords

#### On Trigger Exit Tag

Physics » On Trigger Exit Tag

## Description

Executed when a game object with a Tag exists the Trigger collider

#### Parameters

Name	Description
Tag	A string that represents a group of game objects

# Keywords

#### On Trigger Exit

Physics » On Trigger Exit

## Description

Executed when a game object leaves the Trigger collider

# Keywords

#### On Trigger Stay

Physics » On Trigger Stay

## Description

Executed while a game object stays inside the Trigger collider

# Keywords

## STORAGE

Storage

#### Events

- On Delete
- On Load
- On Save

#### On Delete

Storage » On Delete

## Description

Executed when a previously saved game deleted

# Keywords

Load Save Delete Profile Slot Game Session

#### On Load

Storage » On Load

# ${\tt Description}$

Executed when a previously saved game is loaded

# Keywords

Load Save Profile Slot Game Session

#### On Save

Storage » On Save

# Description

Executed when the game is saved

# Keywords

Load Save Profile Slot Game Session

UI

Ui

#### Events

- On Deselect
- On Hover Enter
- On Hover Exit
- On Select

#### On Deselect

UI » On Deselect

## Description

Executed when the UI element is deselected

# Keywords

Mouse Choose Focus Pick Pointer

#### On Hover Enter

UI » On Hover Enter

# ${\tt Description}$

Executed when the pointer hovers the UI element

# Keywords

Mouse Over Pointer

## On Hover Exit

UI » On Hover Exit

# ${\tt Description}$

Executed when the pointer exits the hovered UI element

# Keywords

Mouse Over Pointer

## On Select

UI » On Select

## Description

Executed when the UI element is selected

# Keywords

Mouse Choose Focus Pick Pointer

## VARIABLES

Variables

#### Events

- On Global List Variable Change
- On Global Name Variable Change
- On Local List Variable Change
- On Local Name Variable Change

#### On Global List Variable Change

Variables » On Global List Variable Change

## Description

Executed when the Global List Variable is modified

On Global Name Variable Change

Variables » On Global Name Variable Change

## Description

Executed when the Global Name Variable is modified

#### On Local List Variable Change

Variables » On Local List Variable Change

## Description

Executed when the Local List Variable is modified

#### On Local Name Variable Change

Variables » On Local Name Variable Change

## Description

Executed when the Local Name Variable is modified

#### **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.

# **P**ogramming 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.

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);
    }
}
```

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 <code>OnAwake()</code> or the <code>OnStart()</code> methods. For a full list of all available methods to override, check the <code>Event.cs</code> script file.

All methods come with a trigger parameter, which references the Trigger component that owns this Event.

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);
```



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.

#### **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);
    }
}
```

#### 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")]
```

#### 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")]
```

#### 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)]
```

#### 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

#### 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)]
```

#### 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")]
```

#### 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")]
```

#### 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)]
```

# €1tiple 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.
)]
```

#### 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.
- $\boldsymbol{\cdot}$   $\boldsymbol{\mathsf{Major}}$   $\boldsymbol{\mathsf{Version}}\boldsymbol{\cdot}$  The minimum major version of the dependency module.
- $\boldsymbol{\cdot}$   $\boldsymbol{\mathsf{Minor}}$   $\boldsymbol{\mathsf{Version}}\boldsymbol{\cdot}$  The minimum minor version of the dependency module.
- ullet Patch Version: The minimum patch version of the dependency module.

[Dependency("gamecreator.inventory", 1, 5, 2)]

#### 1.5.4 Conditions

#### **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.

Conditions



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.

#### 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.

# beleting Conditions

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

#### 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.

#### 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.

# Regate 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.

Toggle Condition

# Empty Conditions List

An empty conditions list will always return success.

#### Conditions

# CONDITIONS

# Sub Categories

- Cameras
- Characters
- Game Objects
- Input
- Math
- Physics
- Platforms
- Scenes
- Storage
- Text
- Transforms

CAMERAS

Cameras

#### Conditions

• Is Shot Active

#### Is Shot Active

Cameras » Is Shot Active

# Description

Returns true if the Camera Shot is assigned to the Main Camera

#### Parameters

Name	Description
Shot	The camera shot

# Keywords

Camera Enabled Assigned Running

# CHARACTERS

#### Characters

# Sub Categories

- Animation
- Busy
- Interaction
- Navigation
- Properties
- Visuals

#### Animation

# Animation Conditions

• Has State In Layer

# Has State in Layer

Characters » Animation » Has State in Layer

#### Description

Returns true if the Character has a State running at the specified layer index

#### Parameters

Name	Description
Layer	The layer in which the Character may have a State running
Character	The Character instance referenced in the condition

# Keywords

Characters Animation Animate State Play Character Player

#### Busy

# Busy Conditions

- Are Arms Available
- Are Legs Available
- Is Available
- Is Busy
- Is Left Arm Available
- Is Left Leg Available
- Is Right Arm Available
- Is Right Leg Available

#### Are Arms Available

Characters » Busy » Are Arms Available

#### Description

Returns true if the Character's arms are available to start a new action

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Occupied Available Free Doing Hand Finger Character Player

# Are Legs Available

Characters » Busy » Are Legs Available

#### Description

Returns true if the Character's legs are available to start a new action

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Occupied Available Free Doing Foot Feet Character Player

# Is Available

Characters » Busy » Is Available

#### Description

Returns true if the Character is not doing any action and is free to start one

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Occupied Available Free Doing Character Player

# Is Busy

Characters » Busy » Is Busy

#### Description

Returns true if the Character doing an action that prevents from starting another one

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Occupied Available Free Doing Character Player

#### Is Left Arm Available

Characters » Busy » Is Left Arm Available

#### Description

Returns true if the Character's left arm is available to start a new action

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Occupied Available Free Doing Hand Finger Character Player

# Is Left Leg Available

Characters » Busy » Is Left Leg Available

#### Description

Returns true if the Character's left leg is available to start a new action

#### Parameters

Name Description

 ${\it Character} \qquad \qquad {\it The Character instance referenced in the condition}$ 

#### Keywords

Occupied Available Free Doing Foot Feet Character Player

# Is Right Arm Available

Characters » Busy » Is Right Arm Available

#### Description

Returns true if the Character's right arm is available to start a new action

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Occupied Available Free Doing Hand Finger Character Player

# Is Right Leg Available

Characters » Busy » Is Right Leg Available

#### Description

Returns true if the Character's right leg is available to start a new action

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Occupied Available Free Doing Foot Feet Character Player

#### Interaction

# Interaction Conditions

• Can Interact

#### Can Interact

Characters » Interaction » Can Interact

#### Description

Returns true if the Character has any interactive element available

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Character Button Pick Do Use Pull Press Push Talk Character Player

#### Navigation

# Navigation Conditions

- Is Airborne
- Is Grounded
- Is Idle
- Is Moving

# Is Airborne

Characters » Navigation » Is Airborne

#### Description

Returns true if the Character not touching the ground

#### Parameters

Name Description

 ${\it Character} \qquad \qquad {\it The Character instance referenced in the condition}$ 

#### Keywords

Fly Fall Flail Jump Float Suspend Character Player

# Is Grounded

Characters » Navigation » Is Grounded

#### Description

Returns true if the Character touching the floor

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Floor Stand Land Character Player

# Is Idle

Characters » Navigation » Is Idle

#### Description

Returns true if the Character is not moving

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Stay Quiet Still Character Player

# Is Moving

Characters » Navigation » Is Moving

#### Description

Returns true if the Character is currently in an active moving phase

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Translate Towards Destination Target Follow Walk Run Character Player

#### Properties

# Properties Conditions

- Can Jump
- Compare Gravity
- Compare Height
- Compare Mass
- Compare Radius
- Compare Speed
- Is Controllable
- Is Dead
- Is Player
- Jump Force
- Terminal Velocity

# Compare Mass

Characters » Properties » Can Jump

#### Description

Returns true if the character has the Can Jump property set to true

#### Parameters

Name Description

 ${\it Character} \qquad \qquad {\it The Character instance referenced in the condition}$ 

#### Keywords

Active Enabled Leap Hop Character Player

# Compare Gravity

Characters » Properties » Compare Gravity

#### Description

Returns true if the comparison between a number and the Character's gravity is satisfied

#### Parameters

Name Description

Character The Character instance referenced in the condition

### Keywords

Force Vertical Character Player

# Compare Height

Characters » Properties » Compare Height

#### Description

Returns true if the comparison between a number and the Character's height is satisfied

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Length Long Character Player

# Compare Mass

Characters » Properties » Compare Mass

#### Description

Returns true if the comparison between a number and the Character's mass is satisfied

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Weight Character Player

# Compare Radius

Characters » Properties » Compare Radius

#### Description

Returns true if the comparison between a number and the Character's radius is satisfied

#### Parameters

Name Description

Character The Character instance referenced in the condition

### Keywords

Diameter Width Fat Skin Space Character Player

# Compare Speed

Characters » Properties » Compare Speed

#### Description

Returns true if the comparison between a number and the Character's speed is satisfied

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Velocity Travel Movement Walk Run Step Character Player

# Is Controllable

Characters » Properties » Is Controllable

#### Description

Returns true if the Player unit of the Character is controllable

#### Parameters

Name Description

 ${\it Character} \qquad \qquad {\it The Character instance referenced in the condition}$ 

#### Keywords

Control Character Player Character Player

# Is Dead

Characters » Properties » Is Dead

#### Description

Returns true if the character has been killed

#### Parameters

Name Description

 ${\it Character} \qquad \qquad {\it The Character instance referenced in the condition}$ 

#### Keywords

Kill Kaput Character Player

# Is Player

Characters » Properties » Is Player

#### Description

Returns true if the Character is marked as a Player

#### Parameters

Name Description

 ${\it Character} \qquad \qquad {\it The Character instance referenced in the condition}$ 

#### Keywords

Control Character Character Player

# Compare Jump Force

Characters » Properties » Jump Force

#### Description

Returns true if the comparison between a number and the Character's jump force is satisfied

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Hop Leap Character Player

# Compare Terminal Velocity

Characters » Properties » Terminal Velocity

#### Description

Returns true if the comparison between a number and the Character's terminal velocity is satisfied

#### Parameters

Name Description

Character The Character instance referenced in the condition

#### Keywords

Max Fall Vertical Down Character Player

## Visuals

# Visuals Conditions

• Has Prop Attached

# Has Prop Attached

Characters » Visuals » Has Prop Attached

## Description

Returns true if the Character has a Prop attached to the specified bone

## Parameters

Name	Description	
Bone	The bone that has the prop attached to	
Character	The Character instance referenced in the condition	

# Keywords

Characters Holds Grab Draw Pull Take Object Character Player

# GAME OBJECTS

Game Objects

## Conditions

- Compare Game Objects
- Compare Layer
- Compare Tag
- Does Component Exist
- Does Game Object Exist
- Is Component Enabled
- Is Game Object Active

## Compare Game Objects

Game Objects » Compare Game Objects

# Description

Returns true if the game object is the same as another one

## Parameters

Name	Description	
Game Object	The game object instance used in the comparison	
Compare To	The game object instance that is compared against	

# Keywords

Same Equal Exact Instance

## Compare Layer

Game Objects » Compare Layer

# Description

Returns true if the game object belongs to any of the layer mask values

## Parameters

Name	Description	
Game Object	The game object instance used in the condition	
Layer Mask	A bitmask of Layer values	

# Keywords

Mask Physics Belong Has

## Compare Tag

Game Objects » Compare Tag

# ${\tt Description}$

Returns true if the game object is tagged with a concrete name  $% \left( 1\right) =\left( 1\right) \left( 1$ 

## Parameters

Name	Description
Game Object	The game object instance used in the condition
Tag	The Tag name checked against the game object

# Keywords

Belong Has Is

#### **Does Component Exist**

Game Objects » Does Component Exist

# Description

Returns true if the game object has the component attached  $% \left( 1\right) =\left( 1\right) \left( 1\right) \left$ 

## Parameters

Name	Description
Game Object	The game object instance used in the condition
Component	The component type that is searched

# Keywords

Null Scene Lives

## Does Game Object Exist

Game Objects » Does Game Object Exist

# Description

Returns true if the game object reference is not  $\ensuremath{\mathsf{null}}$ 

## Parameters

Name	Description				
Game Object	The game object instance used in the condition				

# Keywords

Null Scene Lives

## Is Component Enabled

Game Objects » Is Component Enabled

# Description

Returns true if the game object has the component enabled

## Parameters

Name	Description	
Game Object	The game object instance used in the condition	
Component	The component type checked	

# Keywords

Null Active

## Is Game Object Active

Game Objects » Is Game Object Active

# Description

Returns true if the game object reference exists and is active

## Parameters

Name Description

Game Object The game object instance used in the condition

# Keywords

Null Scene Enabled

# INPUT

Input

## 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

## Is Input Held Down

Input » Is Input Held Down

# Description

Returns true while the Input Action asset with a button behavior is being pressed

## Parameters

Name	Description
Input	A reference to the Input Action asset with map and action name

# Keywords

Unity Button While Hold Press Input Action System Map

## Is Input Pressed

Input » Is Input Pressed

# Description

Returns true if the Input Action asset with a button behavior is pressed during this frame

#### Parameters

Name	Description
Input	A reference to the Input Action asset with map and action name

# Keywords

Unity Button Down Input Action System Map

## Is Input Released

Input » Is Input Released

# Description

Returns true if the Input Action asset with a button behavior is released during this frame

## Parameters

Name	Description
Input	A reference to the Input Action asset with map and action name

# Keywords

Unity Button Up Input Action System Map

## Is Key Held Down

Input » Is Key Held Down

# Description

Returns true if the keyboard key is being held down this frame

## Parameters

Name	Description	
Key	The Keyboard key that is checked	

# Keywords

Button Active Down Press

# Is Key Pressed

Input » Is Key Pressed

# Description

Returns true if the keyboard key is pressed during this frame  $% \left( 1\right) =\left( 1\right) \left( 1\right$ 

## Parameters

Name	Description
Key	The Keyboard key that is checked

# Keywords

Button Down

## Is Key Released

Input » Is Key Released

# Description

Returns true if the keyboard key is released during this frame  $% \left( 1\right) =\left( 1\right) \left( 1$ 

## Parameters

Name	Description
Key	The Keyboard key that is checked

# Keywords

Button Up

#### Is Mouse Held Down

Input » Is Mouse Held Down

# Description

Returns true if the mouse button is being held down

#### Parameters

Name Description

Button The Mouse button that is checked

# Keywords

Key Up Click Cursor

#### Is Mouse Pressed

Input » Is Mouse Pressed

# Description

Returns true if the mouse button is pressed during this frame

## Parameters

Name Description

Button The Mouse button that is checked

# Keywords

Key Down Cursor

#### Is Mouse Released

Input » Is Mouse Released

# Description

Returns true if the mouse button is released during this frame

#### Parameters

Name Description

Button The Mouse button that is checked

# Keywords

Key Up Click Cursor

## MATH

Math

## Sub Categories

- Arithmetic
- Boolean
- Geometry

## Arithmetic

# Arithmetic Conditions

- Compare Decimal
- Compare Integer

# Compare Decimal

Math » Arithmetic » Compare Decimal

## Description

Returns true if a comparison between two decimal values is satisfied

## 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

# Keywords

Number Float Comma Equals Different Bigger Greater Larger Smaller

# Compare Integer

Math » Arithmetic » Compare Integer

## Description

Returns true if a comparison between two integer values is satisfied

## 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

# Keywords

Number Whole Equals Different Bigger Greater Larger Smaller

#### Boolean

# Boolean Conditions

• Compare Boolean

# Compare Bool

Math » Boolean » Compare Boolean

## Description

Returns true if a comparison between two boolean values is satisfied

## 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

# Keywords

Boolean

## Geometry

# Geometry Conditions

- Compare Direction
- Compare Distance
- Compare Point

# Compare Direction

Math » Geometry » Compare Direction

## Description

Returns true if a comparison between two direction values is satisfied

## 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

# Keywords

Towards Vector Magnitude Length Equals Different Greater Larger Smaller

# Compare Distance

Math » Geometry » Compare Distance

## Description

Returns true if a comparison of the distance between two points is satisfied

## 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

# Keywords

Position Vector Magnitude Length Equals Different Greater Larger Smaller

# Compare Point

Math » Geometry » Compare Point

## Description

Returns true if a comparison between two points in space is satisfied

## 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

# Keywords

Position Vector Magnitude Length Equals Different Greater Larger Smaller

# PHYSICS

Physics

## Conditions

- Check Box 2D
- Check Box 3D
- Check Circle
- Check Sphere
- Is Kinematic
- Is Sleeping
- Raycast 2D
- Raycast 3D

## Check Box 2D

Physics » Check Box 2D

# Description

Returns true if casting a 2D box at a position doesn't collide with anything

#### 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	Cloc-wise rotation measured in degrees
Layer Mask	A bitmask that skips any objects that don't belong to the list

# Example 1

Note that this Instruction uses Unity's 2D physics engine. It won't collide with any 3D objects

## Keywords

Check Collide Touch Suit Square Cube 2D

#### Check Box 3D

Physics » Check Box 3D

# Description

Returns true if casting a 3D box at a position doesn't collide with anything

#### 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

# Example 1

Note that this Instruction uses Unity's 3D physics engine. It won't collide with any 2D objects

## Keywords

Check Collide Touch Suit Square Cube 3D

## Check Circle

Physics » Check Circle

# Description

Returns true if casting a circle at a position doesn't collide with anything

## 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

## Example 1

Note that this Instruction uses Unity's 2D physics engine. It won't collide with any 3D objects

# Keywords

Check Collide Touch Suit Sphere Circumference Round 2D

## Check Sphere

Physics » Check Sphere

# Description

Returns true if casting a sphere at a position doesn't collide with anything

## 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

## Example 1

Note that this Instruction uses Unity's 3D physics engine. It won't collide with any 2D objects

# Keywords

Check Collide Touch Suit Circle Circumference Round 3D

## Is Kinematic

Physics » Is Kinematic

# Description

Returns true if the game object's Rigidbody or Rigidbody2D is marked as Kinematic

## Parameters

Name	Description
Game Object	The game object instance with a Rigidbody or Rigidbody2D

# Keywords

Affect Physics Force Rigidbody

### Is Sleeping

Physics » Is Sleeping

# Description

Returns true if the game object's Rigidbody or Rigidbody2D is sleeping

### Parameters

Name	Description
Game Object	The game object instance with a Rigidbody or Rigidbody2D

# Keywords

Affect Physics Force Rigidbody Awake

#### Raycast 2D

Physics » Raycast 2D

# Description

Returns true if there's a clear line of sight between two positions in 2D space

### 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

### Example 1

Note that this Instruction uses Unity's 2D physics engine. It won't collide with any 3D objects

# Keywords

Check Collide Linecast See 2D

#### Raycast 3D

Physics » Raycast 3D

# Description

Returns true if there's a clear line of sight between two positions

### 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

### Example 1

Note that this Instruction uses Unity's 3D physics engine. It won't collide with any 2D objects

# Keywords

Check Collide Linecast See 3D

# PLATFORMS

Platforms

### Conditions

- Check Platform
- Is Batch Mode
- Is Console
- Is Editor
- Is Mobile

### Check Platform

Platforms » Check Platform

# Description

Check if the running platform matches the selected one  $% \left( 1\right) =\left( 1\right) \left( 1\right$ 

### Is Batch mode

Platforms » Is Batch mode

# Description

# Keywords

Server

### Is Console

Platforms » Is Console

# Description

Returns true if the running platform is a console  $% \left\{ 1,2,\ldots ,n\right\}$ 

# Keywords

PS4 PS5 Switch XBox Deck

Is Editor

Platforms » Is Editor

# ${\tt Description}$

Returns true if the running platform is the Unity Editor  $\,$ 

# Keywords

Unity

Is Mobile

Platforms » Is Mobile

# Description

Returns true if the running platform is a smartphone or tablet

# Keywords

Smartphone Tablet iOS Android

SCENES

Scenes

### Conditions

• Is Scene Loaded

#### Is Scene Loaded

Scenes » Is Scene Loaded

# Description

Returns true if the scene has been loaded

### Parameters

Name	Description	
Scene	The Unity Scene reference used in the condition	

### STORAGE

Storage

### Conditions

- Has Save At Slot
- Has Save

### Has Save at Slot

Storage » Has Save at Slot

# Description

Returns true if there is a saved game at the specified slot

# Keywords

Game Load Continue Resume Can Is

### Has Save

Storage » Has Save

# Description

Returns true if there is at least one saved game  $% \left( 1\right) =\left( 1\right) \left( 1\right) +\left( 1\right) \left( 1\right) \left( 1\right) +\left( 1\right) \left( 1\right) \left($ 

# Keywords

Game Load Continue Resume Can Is

TEXT

Tex

### Conditions

- Text Contains
- Text Equals

### Text Contains

Text » Text Contains

# Description

Returns true if the second text string occurs in the first one

### Parameters

Name	Description
Text	The text string
Substring	The text string contained in Text

# Keywords

String Char Sub

# Text Equals

Text » Text Equals

# ${\tt Description}$

Returns true if two text Strings are equal

### Parameters

Name	Description
Text 1	The first text string to compare
Text 2	The second text string to compare

# Keywords

String Char

# TRANSFORMS

Transforms

### Conditions

- Child Count
- Is Child Of
- Is Sibling Of

# Child Count

Transforms » Child Count

# Description

Compares the amount of direct children of a game object

### 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

# Keywords

Transform Hierarchy Descendant Ancestor Parent Father Amount

# Is Child Of

Transforms » Is Child Of

# Description

Returns true if the game object is the parent of the other one

### 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	

# Keywords

Transform Hierarchy Descendant Ancestor Parent Father Mother

# Is Sibling Of

Transforms » Is Sibling Of

# Description

Returns true if the game object shares the same parent as the other one  $\ensuremath{\mathsf{R}}$ 

### Parameters

Name	Description
Sibling A	The game object instance compared
Sibling B	Another game object instance compared

# Keywords

Transform Hierarchy Ancestor Brother Sister

#### **Custom Conditions**

Game Creator allows to very easily create custom Conditions.

# Pogramming 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.

#### 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;
    }
}
```

#### 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.

#### **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;
    }
}
```

#### 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")]
```

#### 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")]
```

#### 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)]
```

#### Category

A sequence of sub-categories organized using the slash (7) 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.

#### 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)]
```

#### 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")]
```

#### 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")]
```

### 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.



It is recommended to use Markdown notation when writing examples

[Example("Sed posuere consectetur est at lobortis)]



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.
)]
```

#### 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.
- ${\boldsymbol{\cdot}}$   ${\boldsymbol{Major}}$   ${\boldsymbol{Version}} \colon$  The minimum major version of the dependency module.
- ${\boldsymbol{\cdot}}$   ${\boldsymbol{Minor}}$   ${\boldsymbol{Version}} \colon$  The minimum minor version of the dependency module.
- $\boldsymbol{\cdot}$   $\boldsymbol{Patch}$   $\boldsymbol{Version:}$  The minimum patch version of the dependency module.

[Dependency("gamecreator.inventory", 1, 5, 2)]

#### 1.5.5 Hotspots

#### 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.

Hotspots



**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.

#### HOW IT WORKS

A **Hotspot** consists of a *Target* field and a *Radius*, which are the position and distance relative to the Hotspot at which it's activated. When a hotspot is activated, it signals its **Spot** list the targeted game object is nearby. When the targeted object gets further away than the *Radius* field, the hotspot gets deactivated.

Hotspot Gizmo

Selecting a game object with a **Hotspot** component will display in the scene a visual representation of the distance at which the target is considered close enough to activate it.



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.

#### 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.

# beleting Actions

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

#### ADDING SPOTS

Spots are individual elements that highlight something specific and are evaluated from top to bottom.

Add new Spot

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.

# Spots

SPOTS

#### Spots

- Cursor
- Look At
- Look On Focus
- Object On Focus
- Object
- Text On Focus
- Text

# CURSOR

Cursor

### Description

Changes the cursor image when hovering the  $\ensuremath{\mathsf{Hotspot}}$ 

# LOOK AT

Look At

### Description

Makes the Character look at the center of the Hotspot when it's activated nd smoothly look away when it's deactivated

# LOOK ON FOCUS

Look on Focus

### Description

Makes the Character look at the center of the Hotspot when it's an interactive and is focused

# OBJECT ON FOCUS

Object on Focus

### Description

Creates or Activates a prefab game object when the Interactive object is focused and deactivates it when its unfocused

# OBJECT

Object

### Description

Creates or Activates a prefab game object when the Hotspot is enabled and deactivates it when the Hotspot is disabled

### TEXT ON FOCUS

Text on Focus

#### Description

Displays a text in a world-space canvas when the Hotspot is focused by the target and hides it when it is not. If no Prefab is provided, a default UI is displayed

TEXT

Text

### 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

#### 1.6 Variables

#### 1.6.1 Variables

**Variables** are data containers that allow to dynamically change their value and let the game keep track of the player's progress.



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.

#### Types of Variables

Game Creator has two types of variables:

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.

Name Variables

LIST VARIABLES

Are identified by their  $\theta$ -based index. Think of them as a collection of values, placed one after another. For example, to access the first value, use the index  $\theta$ . To access the second position, use the index 1, etc...

Note all values of a List Variable are of a particular type.

List Variables



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.

#### Scope of Variables

Variables can either be local or global.

LOCAL VARIABLES

Local Variables are bound to a particular scene and can't be used outside of it.

GLOBAL VARIABLES

On the other hand, Global Variables can be queried and modified from any scene.



Both Global Variables and Local Variables can be List or Name based.

#### 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.



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.

#### **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.

# 1.6.2 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.

## **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.

Global Name Variables



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.

# 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.



# 1.6.3 Global List Variables

**Global List Variables** are variables identified by their numberic index value and can be accessed from anywhere.

## 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.

Global List Variables



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.



# 1.6.4 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.

## 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.

Global Name Variables



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.

# 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

# 1.6.5 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.

## **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.

Local List Variables



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

# 1.7 Advanced

# 1.7.1 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.



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.

# 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

# 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.

# Signals

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.



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.

#### **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 dependencies 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 0 complexity of log(n).

## 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

# **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** 

# 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.

## 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** 

# **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

# **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.

Skip Domain Reload

# 1.7.2 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.

## **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.



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.

#### 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

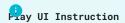
To avoid the jarring effect where the same sound effect is played over and over again in a small time window, sound effects can automatically randomly alter the *speed* and *pitch* of sounds. This allows to, for example, play a machine gun sound effect, where each shot is slightly different than the previous one.

# Ay 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.

# 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.



Use the **Play UI** Instruction to play an audio clip as a UI sound effect.

## 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.

# 1.7.3 Data Structures

## Index

#### 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 dependencies 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 0 complexity of log(n).

## **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.

#### 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.

## 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;
```



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.

#### 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.



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;
}
```

# 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);
   }
}
```

## **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"));
   }
}
```

## **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 objectC;

   public GameObject objectC;

   private void Awake()
   {
        // Add element:
        this.list.Add(this.objectA);
        this.list.AddGirst(this.objectB);
        this.list.AddGirst(this.objectC);

        // Print the first element:
        Debug.Log(this.list.First().name);
   }
}
```

## 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);
   }
}
```

## 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:

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;
```

# **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:

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 <code>Debug.Log()</code> method is applied to each one of them.

## **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.



For a full description of what a finite state machine is check this Wikipedia article.

#### **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!");
}
```

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)
   { }
}
```

# rst 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;
```

## **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.



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

#### 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.

## 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:

# Bost 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.

## 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 <code>ISpatialHash</code> interface tracked in this domain that are within the spherical region defined.

# 1.7.4 Variables API

## **Local Variables**

**Local Name Variables** and **Global Name 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.

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:

**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

Setting values

```
void Set(string name, object value)
```

Sets the value of a variable

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

LOCAL LIST VARIABLES

A Local List Variables component has the following methods for getting and manipulating its values:

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

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

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

#### **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.

GLOBAL NAME VARIABLES

The GlobalNameVariablesManager has the following methods available:

**Getting values** 

bool Exists(GlobalNameVariables asset, string name)

Returns true if the variable exists. False otherwise

 ${\tt object} \ {\tt Get}({\tt GlobalNameVariables} \ {\tt asset}, \ {\tt string} \ {\tt name})$ 

Returns the value of the variable. Requires to be casted to the correct value

Setting values

void Set(GlobalNameVariables asset, string name, object value)

Sets the value of a variable

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

#### GLOBAL LIST VARIABLES

The GlobalListVariablesManager has the following methods:

Gettings values

int Count(GlobalListVariables asset)

Returns the number of elements of the list

object Get(GlobalListVariables asset, IListGetPick pick)

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

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

# 1.7.5 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.

# Salymorphic Serialization

**Properties** take advantage of Unity's polymorphic serialization, 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.

# Angs 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.

# **Property Get Types**

There are a few default property types available:

- PropertyGetBool: A boolean value type
- PropertyGetColor: A representation of a Color
- PropertyGetDecimal: A decimal value
- PropertyGetDirection: A Vector3 representing a direction
- PropertyGetGameObject: References a game object
- PropertyGetInstantiate: Allows to reference an instance
- PropertyGetInteger: An integer value
- $\hbox{\bf \cdot} \ \ \, \text{PropertyGetLocation}: \ \, \text{A position and/or rotation}$
- PropertyGetOffset: A Vector3 that offsets from a position
- PropertyGetPosition: A Vector3 representing a point in space
- PropertyGetRotation: A Quaternion representing a rotation
- PropertyGetScale: A Vector3 representing a scalar value
- PropertyGetScene: Allows to select scene objects
- PropertyGetSprite: Returns Sprite assets
- PropertyGetString: Returns texts
- PropertyGetTexture: To retrieve Texture assets

# **Property Set Types**

• PropertySetBool: Sets a boolean value

- PropertySetColor: Sets a Color type value
- PropertySetGameObject: Sets a game object reference
- PropertySetNumber: Sets a numeric value
- PropertySetSprite: Sets a Sprite reference
- PropertySetString: Sets a text-based value
- PropertySetTexture: Sets a Texture asset reference
- PropertySetVector3: Sets a Vector3 type value

## **Using Properties**



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);
```



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);

## 1.7.6 Save & Load

# **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.

CHOOSING WHERE AND HOW TO SAVE DATA

**Game Creator** makes it very easy to choose how data is saved. By default it uses the *Player Prefs* system from Unity, which stores plain data in a very specific location which is determined by the platform running the game.

Since version **2.5.20** Game Creator allows to choose where to save data, by opening the **Settings** window (top toolbar Game Creator Settings) and opening the *General* tab.

Choosing the Save system

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, ...

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.



Notice that you can have up to 998 slots. The number 0 is reserved for shared settings.

SAVING

To save a game, it's as easy as calling the <code>Save(slot: integer)</code> method through the <code>SaveLoadManager</code> 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 <code>Save(slot: int)</code> method returns a <code>Task</code> that can be awaited. This is very useful if you plan on synchronizing the game save with an external database, such as <code>Steam</code>, <code>Firebase</code> 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");
}
```

## 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.

```
Save Load \verb|mManager.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);
}
```

#### **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.

# 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;
}
```

## 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
- Create a custom database communication service

#### **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).

## 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 importnat to highlight though, that it's up to the developer to implement how the state is restored. The <code>OnLoad(object value)</code> is called when a game is loaded, and the <code>value</code> parameter is the value from a previously saved game. It's the developer's responsability 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 <code>DontDestroyOnLoad()</code> method). Most commonly used with singleton patterns, this mode forces the load as soon as the event is triggered.

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 <code>OnEnable()</code> and <code>OnDisable()</code> 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 unsubscription.

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.Lazv:
    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.

#### **Custom Save Location**

By default, **Game Creator** saves games using the *PlayerPrefs* 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.

## IDATASTORAGE INTERFACE

To create a custom save location, one must create a class that implements the IDataStorage interface, which contains all the necessary methods to store game information.

To make things easier, we're going to create a very simple system that communicates with an online database and stores the game saves there using http requests.



Notice that there 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 ocurr.

Let's create our storage location class called MyOnlineDatabase.cs:

```
[Serializable]
public class MyOnlineDatabase: IDataStorage
    private const string URL_DB_SET = "https://database.mywebsite.com/set";
private const string URL_DB_GET = "https://database.mywebsite.com/get";
    private const string URL_DB_DEL = "https://database.mywebsite.com/del"
    string IDataStorage.Title => "My Online Database";
    string IDataStorage.Description => "Store data in online database";
    async Task IDataStorage.DeleteAll()
        // Create a web request to delete the content
        UnityWebRequest request = UnityWebRequest.Post(URL_DB_DEL, "");
        {\tt UnityWebRequestAsyncOperation\ handle\ =\ request.SendWebRequest();}
        while (!handle.isDone) await Task.Yield();
    async Task IDataStorage.DeleteKey(string key)
        // Create a web request to delete a key
        UnityWebRequest request = UnityWebRequest.Post(URL_DB_DEL, key);
        UnityWebRequestAsyncOperation handle = request.SendWebRequest();
        while (!handle.isDone) await Task.Yield();
    async Task<bool> IDataStorage.HasKey(string key)
        // Checks whether a key exists in the database (code 200)
        UnityWebRequest request = UnityWebRequest.Post(URL_DB_GET, key);
        UnityWebRequestAsyncOperation handle = request.SendWebRequest();
        while (!handle.isDone) await Task.Yield()
        return handle.webRequest.responseCode == 200;
    async Task<object> GetBlob(string key, Type type, object value)
        // Create a request to get the value identified by a key
        UnityWebRequest request = UnityWebRequest.Post(URL_DB_GET, key);
        UnityWebRequestAsyncOperation handle = request.SendWebRequest():
        while (!handle.isDone) await Task.Yield();
        return JsonUtility.FromJson(
            handle.webRequest.downloadHandler.text,
    async Task<string> IDataStorage.GetString(string key, string value)
    async Task<float> IDataStorage.GetFloat(string key, float value)
    async Task<int> IDataStorage.GetInt(string key, int value)
    async Task SetBlob(string key, object value)
```

```
{
    // Requests the creation or update of a value onto the database
    UnityWebRequest request = UnityWebRequest.Post(URL_DB_SET, new Data(){
        id = key,
        data = JsonUtility.ToJson(value)
    });
    UnityWebRequestAsyncOperation handle = request.SendWebRequest();
    while (!handle.isDone) await Task.Yield();
}

async Task IDataStorage.SetString(string key, string value)
{ /* ... */ }

async Task IDataStorage.SetFloat(string key, float value)
{ /* ... */ }

async Task IDataStorage.SetInt(string key, int value)
{ /* ... */ }
```

The first properties Title and Description allow to give a name to this system, which later can be selected from a dropdown menu in the Preferences window.

The following methods define how data is manipulated: retrieving data, setting data and deleting data. There are 3 URL we're using to exemplify how we can create an http request to send the information to our server, which can delete, create or retrieve the information depending on the endpoint used.

Some methods have been skipped because their implementation was very similar to other ones.

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.

## 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.

## Remember

To add a new element to be saved, click on the Add Memory button and select the type of data to save.

#### 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.

# Decorations

The custom Memory class instance can be decorated using any of the attributes found in the Instruction, Condition and Event classes.

### 1.7.7 Tween

Tweening is the process to define a starting position and an end position, and let it transition from one to the other over the course of a specified 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
);
```

# **†**ansition 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.

### 1.7.8 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".

### 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.

#### 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/

### 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/
...
```

### 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.



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
- **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.

# Laling 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.

# 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**.

### 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.

# 1.8 Releases

### 1.8.1 Releases



Game Creator 2 is in Beta and requires Unity 2021.3 or higher in order to work.

### 2.6.21

Release Pending

# (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

### CHANGED

• Scene Entries decoupled from Instruction

### (FIXED)

- 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

# 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

# (ENHANCED)

- Spatial Hash algorithm performance
- Tweaks on padding on Editor UI

# (FIXED)

- · Acceleration uses vertical speed
- States using wrong duration for entries

### 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

### (ENHANCED)

- 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

# (FIXED)

- Signals not initialized on AoT platforms
- Picking component from a Property reference
- Null check before playing Audio Clips
- States flicker before playing exit clip
- ${f \cdot}$  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

### 2.5.18

Released March 25, 2022

### (NEW)

• Condition: Is Character Controllable

### (ENHANCED)

• Scope for changing character rotation state

# (FIXED)

- Input: Holding contains release cycle
- Input: Renamed properties to follow standard
- Template character using incorrect height
- Template player checks if is controllable

# 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

#### CHANGED

· Character has a proxy object for model

### (FIXED)

- Orphan object destroying a ragdoll character
- Settings window elements not appearing
- · SceneReferene error when building a binary
- · Skeleton throw null reference exception

### 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

# CHANGED

- · Properties return editor references
- Smooth in/out landing compression

# (FIXED)

- 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
- $\boldsymbol{\cdot}$  Changing Is Controllable stops any motion
- Greedy systems automatically initialize
- Description of surface/volume properties
- · Instruction: Quit Application exits playmode

### 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

# (ENHANCED)

- 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

### (CHANGED)

· Tree class renamed to Trie

# FIXED

- · 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

### 2.2.14

Release 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

### (ENHANCED)

- ullet Spots: Disabled while interacting
- ullet 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

### (CHANGED)

· Instruction: Toggle Bool uses one single property

### (FIXED)

- $\cdot$  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

### 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

# (ENHANCED)

- · Leaning IK default values
- Character inspector UX
- Conditions have more friendly names

### (CHANGED)

- Name of Point and Click button
- Motion unit is more compartmentalized
- · Hide Character gizmos collapsing each unit

# (FIXED)

· Spatial Hash returning farther values

# 2.0.12

Released November 24, 2021

### (NEW)

- Driver: Skin width exposed in Inspector
- · Ragdoll animations

# **CHANGED**

 ${\boldsymbol{\cdot}}$  Save/Load format does not use special characters

### FIXED

- 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

### 2.0.11

Released November 16, 2021

### (NEW)

- · Paste button for Visual Scripting
- · Instruction: Sort List alphabetically

### (ENHANCED)

- · Conditions redesign
- · Focus on search fields automatically
- Event: Input distance has offset option
- Shot: Lock on includes better default values

#### CHANGED

· States: Weight uses a range control

### (FIXED)

- · Airborne animations did not loop correctly
- · Null check for characters Bone Rack

### 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

### (ENHANCED)

- Right click on Dropdown options to go back
- Virtualized TPolymorphicListTool methods

### (FIXED)

- · Missing scroll in Game Creator Hub
- · Regression: Point & Click on Player unit
- · Characters Props out of range access

### 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

### (ENHANCED)

- Rendering Pipeline in documentation
- · Visual Scripting search engine precision

# **CHANGED**

- Renamed Example Manager to Install window
- · Renamed execution events to lifecycle path

# (FIXED)

- · 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

# 2.0.8

Released October 6, 2021

### (NEW)

- New getters for each Vector3 component
- Instruction: Clamp Vector3

# (ENHANCED)

• Examples with higher contrasting textures

# FIXED

- Null check for gamepads and keyboards
- Null check for material \_MainTex
- Input for walking using crouch settings
- Character footstep bones incorrect instance

### 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

# **ENHANCED**

- · Handling on Character units
- Performance on Reflective properties

### (FIXED)

- Examples and improved their visuals
- · Physics engine methods being called every frame

### 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

# FIXED

- 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

### 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

### (FIXED)

- · Point & Click incorrect raycast order
- · Point & Click ignore over UI game objects
- Memories not drawing some properties
- · Date not parsing using system culture

### 2.0.4

Released September 16, 2021

# NEW

- NavMeshAgent avoidance quality
- · NavMeshAgent avoidance priority

# (FIXED)

- · Material Sound error when texture is null
- Player not moving without a Main Camera
- · Description of Usage Input buttons

# 2.0.3

Released September 14, 2021

### (NEW)

- · Mouse button modifier to Delta Mouse input
- · Youtube cover image to welcome screen

# (FIXED)

- Game Creator Hub paths on Windows
- Game Creator Hub package install hierarchy
- Examples Manager installer version check

### 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

# (FIXED)

- 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

### 2.0.1

Released September 10, 2021

· First release

# 2. Inventory

# 2.1 Inventory

# 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



The  ${\bf Inventory}$  module is an extension of  ${\bf Game\ Creator\ 2}$  and won't work without it

# 2.2 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.

# 2.2.1 Prepare your Project

Before installing the **Inventory** module, you'll need to either create a new Unity project or open an existing one.



It is important to note that Game Creator should be present before attempting to install any module.

### 2.2.2 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.

### 2.2.3 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.

Installer Inventory

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.



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/.

**Inventory Examples** 

### 2.3 Items

#### 2.3.1 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.

#### Creating an Item

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.

INHERITANCE

The Parent field allows an item to inherit values from another item, such as Properties and Sockets.

# Rem 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:

Item A inherits from Item B

- 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.

### INFORMATION

This section allows to define the Name. Description, Sprite representation and Color of the Item.

Item Information



All these fields use dynamic properties so their values can be localized.

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.

Item Information



If an **Item** has one or more **Sockets**, the **Max Stack** will be automatically restricted to 1, due to technical constraints.

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.

Item Price



Note that an item can only be traded using a single currency.



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).

### 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.

Item Properties

### 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.

Item Attack Property

See more information about this in the **Properties** page.

SOCKETS

Sockets allow to attach items onto other items. The type of item that can be attached is determined using item inheritance.

Item Sockets

# 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.

EOUIPPING

Some items can be equipped by the wearer (usually the Character with the Bag component).

Item Equipment

See more information about this in the Equipping page.

USAGE

This section allows to define the behavior of an utility Item which can be used at any given time.

Item Use

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.

CRAFTING

The **Crafting** section allows to define recipes to create new **Items** as well as dismantle them into multiple ingredients.

Item Crafting

See more information about this in the  ${\bf Crafting}\ {\bf page}\,.$ 

# 2.3.2 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*.

Item Properties

### **Creating a new Property**

To create a new **Property** all that needs to be done is to click on the Add Property button.

Item Attack Property

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.

### **Inheriting Properties**

Checking the **Inherit Properties** toggle found at the top will automatically inherit all properties from its parent(s).

Item Inherit Properties

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.

### **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.

Item UI Properties

# Suff 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.

### 2.3.3 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.

Item 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.

### 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**.

Item Sockets Prefab instance

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.

Item Sockets Prop component

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.

### **Configuration of Sockets**

To add a **Socket** to an item, simply click on the *Add Socket* button.

Item Sockets new Socket

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.



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.

# **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  $\frac{1}{2}$  attack value of 15 (10 + 5), but will ignore the defense Property because it is not present in the Sword.

### 2.3.4 Equipping

To define an equippable Item, the **Is Equippable** checkbox must be ticked, which enables the rest of the options.

Item Equipment

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.



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.



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.

# 2.3.5 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**.

Item Crafting

There are 3 distinct sections inside the Crafting tab.

### 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.

Item Crafting Ingredients

This will create a new ingredient entry with an Item field and the amount of those necessary.

# Afinite ingredients

There is no limit to the amount of  ${\bf Ingredients}$  you can create.

### 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.

# the 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.

### 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.

# 2.4 Bags

### 2.4.1 Bags

A Bag is a component that can be attached to any game object, and contains Items and Currencies.

Bac

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.



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.

### **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.



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.

### **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.

### 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.

Bag Stock and Wealth

- · Clicking on the Add Stock button creates a new Stock option that accepts an Item and a certain amount of it.
- ullet Clicking on the  $\emph{Add Wealth}$  button creates a new ullet option that accepts a ullet 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.

### 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.



To know more about designing custom skins, see the User Interface section.

### 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.

# 2.4.2 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.

### The Equipment Asset

To create an **Equipment** asset, right click on the *Project Panel* and select Create Game Creator Inventory Equipment.

Equipment

An **Equipment** initially has no equipment. Click on the *Add Equipment Slot* button to add a new slot.

Equipment 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.

### **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:

Equipment Example

We can assign this Equipment asset to a Bag and all available slots will appear below.

Equipment Example to Bag

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.

### 2.4.3 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.

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.



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.

Loot Table Instruction

### 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.

# Emest 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.

# 2.5 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.



Most games make use of a single **Currency**. However, some mobile games and hard-core resource management games use multiple ones.

### Currency

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.



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:

- $\cdot$  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.

# Currency In-Game

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**.

### 2.6 Merchants

The **Inventory** module comes with a built-in system that allows two **Bags** to trade their contents in exchange for a specified Currency.

Merchant

### 2.6.1 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.

Merchant Component

#### 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.



For example, having a merchant called *Herbologist* already gives a clue of the type of **Items** this merchant trades with.

### 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  ${\bf Bag}$  field is a reference to the Bag component from where the Merchant takes its stock.



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.

 $\mathbf{Skin}\ \mathbf{UI}$  is the user interface skin used by this merchant.

# 2.7 Tinkering

### Tinkering

The process of transforming items into other ones is called **Tinkering**, which includes:

- · Crafting: Creating a single item from multiple ones.
- ${\boldsymbol{\cdot}}$   ${\boldsymbol{Dismantling}}\colon$  Destroying an item in order to recover multiple ones.

To open a Crafting or Dismantle interface, use the Open Tinker UI instruction.

Open Tinkering UI

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.

# 2.8 Visual Scripting

### 2.8.1 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.

# 2.8.2 Conditions

#### Conditions

SUB CATEGORIES

• Inventory

### Inventory

### INVENTORY

### Sub Categories

- Equipment
- Merchant
- Tinker
- Ui
- Wealth

### Conditions

- Can Add
- Has Item
- Has Runtime Item
- Is Overloaded
- Is Type Of Item
- Is Usable

### CAN ADD

Inventory » Can Add

#### Description

Returns true if the item can be added to the  $\ensuremath{\mathsf{Bag}}$  component

#### Parameters

Name	Description
Item	The item type to add
To Bag	The target destination Bag

### Keywords

Inventory Give Put Set

### HAS ITEM

Inventory » Has Item

#### Description

Returns true if the Bag component contains, at least, the specified amount of an item

#### Parameters

Name	Description
Item	The item type to check
Amount	The minimum amount of a particular item
Bag	The targeted Bag

#### Keywords

Inventory Contains Includes Wears Amount

#### HAS RUNTIME ITEM

Inventory » Has Runtime Item

#### Description

Returns true if the Bag component contains the Item instance  $% \left( 1\right) =\left( 1\right) \left( 1\right)$ 

#### Parameters

Name	Description
Runtime Item	The item instance to check
Bag	The targeted Bag

### Keywords

Inventory Contains Includes Wears

### IS OVERLOADED

Inventory » Is Overloaded

Description

Returns true if the Bag's maximum weight is surpassed

Parameters

Name Description

Bag The Bag component

Keywords

Inventory Weight Amount

### IS TYPE OF ITEM

Inventory » Is Type of Item

#### Description

Returns true if the item is equal or a sub-type of another one  $% \left( 1\right) =\left( 1\right) \left( 1$ 

#### Parameters

Name	Description
Item	The item source
Compare To	The item compared to

### Keywords

Inventory Compare

### IS USABLE

Inventory » Is Usable

Description

Returns true if the chosen Item can be used

Parameters

Name Description

Item The item type to check

Keywords

Inventory Consume Drink

### EQUIPMENT

Equipment

### Conditions

- Can Equip
- Is Equippable
- Is Equipped

#### Can Equip

Inventory » Equipment » Can Equip

### Description

Returns true if the chosen Item can be equipped by the targeted Bag's wearer

#### Parameters

Name	Description
Item	The item type to check
Bag	The targeted Bag

# Keywords

Inventory Contains Includes Wears Amount

#### Is Equippable

Inventory » Equipment » Is Equippable

### Description

Returns true if the chosen Item can be equipped

#### Parameters

Name	Description
Item	The item type to check

# Keywords

Inventory Wear Equip

#### Is Equipped

Inventory » Equipment » Is Equipped

### Description

Returns true if the Bag's wearer has an Item of that type currently equipped

#### Parameters

Name	Description
Item	The item type to check
Bag	The targeted Bag

# Keywords

Inventory Wears

### MERCHANT

Merchant

#### Conditions

- Can Buy
- Can Sell

#### Can Buy

Inventory » Merchant » Can Buy

### Description

Returns true if the item can be bought from a Merchant

#### Parameters

Name	Description
From Merchant	The Merchant component
Item	The item type attempted to purchase
To Bag	The destination Bag for the item

### Keywords

Inventory Purchase Get Bargain Haggle

#### Can Sell

Inventory » Merchant » Can Sell

### Description

Returns true if the item can be sold to a Merchant

#### Parameters

Name	Description
From Bag	The Bag where the item is sold
Item	The item type attempted to sell
To Merchant	The Merchant target

### Keywords

Inventory Vend Trade Exchange Part Bargain Haggle

### TINKER

Tinker

#### Conditions

- Can Craft
- Can Dismantle
- Is Craftable
- Is Dismantable

#### Can Craft

Inventory » Tinker » Can Craft

### Description

Returns true if the item can be crafted

#### 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

### Keywords

Inventory Create Make Cook Smith Combine Assemble

#### Can Dismantle

Inventory » Tinker » Can Dismantle

### Description

Returns true if the item can be dismantled

#### 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

### Keywords

Inventory Apart Disassemble Deconstruct Tear Separate

### Is Craftable

Inventory » Tinker » Is Craftable

### Description

Returns true if the chosen Item can be crafted

#### Parameters

Name	Description
Item	The item type to check

# Keywords

Inventory Create Forge Alchemy Brew

#### Is Dismantable

Inventory » Tinker » Is Dismantable

### Description

Returns true if the chosen Item can be dismantled

#### Parameters

Name	Description
Item	The item type to check

# Keywords

Inventory Destroy Tear Break

UI

Ui

### Conditions

- Is Bag Ui Open
- Is Merchant Ui Open
- Is Tinker Ui Open

### Is Bag UI Open

Inventory » UI » Is Bag UI Open

# Description

Returns true if the there is a Bag UI open  $\,$ 

# Keywords

Inventory Close Stash Loot Container Chest

#### Is Merchant UI Open

Inventory » UI » Is Merchant UI Open

### Description

Returns true if the there is a Merchant UI open

# Keywords

Shop Exchange Trader

#### Is Tinker UI Open

Inventory » UI » Is Tinker UI Open

### Description

Returns true if the there is a  ${\tt Crafting/Dismantling}\ {\tt UI}\ {\tt open}$ 

# Keywords

Close Craft Dismantle Assemble Disassemble Smith Upgrade

### WEALTH

Wealth

#### Conditions

• Compare Wealth

#### Compare Wealth

Inventory » Wealth » Compare Wealth

### Description

Returns true if a comparison between the wealth and another integer is satisfied

#### 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	

# Keywords

Price Money Cash Currency Coin Gold

# 2.8.3 Events

#### **Events**

SUB CATEGORIES

• Inventory

### Inventory

### INVENTORY

### Sub Categories

- Equipment
- Merchant
- Sockets
- Tinker
- Ui

### Events

- On Add
- On Drop Item
- On Instantiate Item
- On Remove

ON ADD

Inventory » On Add

Description

Executes after adding an item to the specified  $\ensuremath{\mathsf{Bag}}$ 

Keywords

Bag Inventory Item Add

### ON DROP ITEM

Inventory » On Drop Item

#### Description

Detects when a Bag's item is dropped onto the Trigger

### ON INSTANTIATE ITEM

Inventory » On Instantiate Item

#### Description

Executes after dropping an item from a  $\operatorname{Bag}$  to the scene

### ON REMOVE

Inventory » On Remove

Description

Executes after removing an item from the specified  $\ensuremath{\mathsf{Bag}}$ 

Keywords

Bag Inventory Item Take

### EQUIPMENT

Equipment

#### Events

- On Equip
- On Unequip

#### On Equip

Inventory » Equipment » On Equip

### Description

Executes after equipping an item from the specified Bag

# Keywords

Bag Inventory Item Add Wear

#### On Unequip

Inventory » Equipment » On Unequip

### Description

Executes after unequipping an item from the specified Bag

# Keywords

Bag Inventory Item Remove Wear

# MERCHANT

Merchant

## Events

- On Buy
- On Sell

On Buy

Inventory » Merchant » On Buy

# ${\tt Description}$

Executes after successfully purchasing an item from any Merchant

## On Sell

Inventory » Merchant » On Sell

# Description

Executes after successfully selling an item to any Merchant

# SOCKETS

Sockets

## Events

- On Socket Attach
- On Socket Detach

#### On Socket Attach

Inventory » Sockets » On Socket Attach

# Description

Detects when an Item's Socket gets another Item attached

#### On Socket Detach

Inventory » Sockets » On Socket Detach

# Description

Detects when an Item is detached from another Item's Socket

# TINKER

Tinker

## Events

- On Craft
- On Dismantle

# On Craft

Inventory » Tinker » On Craft

# Description

Executes right after successfully crafting any item

## On Dismantle

Inventory » Tinker » On Dismantle

# Description

Executes right after successfully dismantling any item

UI

Ui

## 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

## On Close Bag UI

Inventory » UI » On Close Bag UI

# Description

Detects when a Bag UI is closed

## On Close Merchant UI

Inventory » UI » On Close Merchant UI

# Description

Detects when a Merchant UI is closed

## On Close Tinker UI

Inventory » UI » On Close Tinker UI

# Description

Detects when a Tinker UI is closed

## On Open Bag UI

Inventory » UI » On Open Bag UI

# Description

Detects when a Bag UI is opened

## On Open Merchant UI

Inventory » UI » On Open Merchant UI

# Description

Detects when a Merchant UI is opened

## On Open Tinker UI

Inventory » UI » On Open Tinker UI

# Description

Detects when a Tinker UI is opened

# 2.8.4 Instructions

## Instructions

SUB CATEGORIES

• Inventory

# Inventory

INVENTORY

# Sub Categories

- Bags
- Currency
- Equipment
- Loot
- Sockets
- Ui
- Variables

## BAGS

Bags

## Instructions

- Add Item
- Add Runtime Item
- Drop Item
- Drop Runtime Item
- Move Content To Bag
- Move Wealth To Bag
- Remove Item
- Remove Runtime Item

## Add Item

Inventory » Bags » Add Item

# Description

Creates a new item and adds it to the specified Bag

## Parameters

Name	Description
Item	The type of item created
Bag	The targeted Bag component

# Keywords

Bag Inventory Container Stash Give Take Borrow Lend Buy Purchase Sell Steal Rob

## Add Runtime Item

Inventory » Bags » Add Runtime Item

# Description

Adds an existing instance of an Item and adds it to the specified Bag

## Parameters

Name	Description
Runtime Item	The existing Item instance
Bag	The targeted Bag component

# Keywords

Bag Inventory Container Stash Give Take Borrow Lend Buy Purchase Sell Steal Rob

## Drop Item

Inventory » Bags » Drop Item

# ${\tt Description}$

Drops an Item type from a Bag onto the scene

# 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

# Keywords

Leave Eliminate Take

#### Drop Runtime Item

Inventory » Bags » Drop Runtime Item

# Description

Drops a Runtime Item from its Bag onto the scene

## Parameters

n dropped
Bag where the Item is dropped

# Keywords

Leave Eliminate Take

#### Move Content to Bag

Inventory » Bags » Move Content to Bag

# Description

Moves all the contents of a Bag to another Bag

## Parameters

Name	Description
From Bag	The Bag component where its contents are removed
To Bag	The targeted Bag component where the contents end up

# Keywords

Bag Inventory Container Stash Chest Take All Give Take Borrow Lend Buy Purchase Sell Steal Rob

## Move Wealth to Bag

Inventory » Bags » Move Wealth to Bag

# Description

Moves all wealth from one Bag to another one

#### 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

# Keywords

Bag Inventory Container Stash Chest Take All Give Take Borrow Lend Buy Purchase Sell Steal Rob Currency Cash Money Coins

#### Remove Item

Inventory » Bags » Remove Item

# Description

Removes an Item from the specified Bag

## Parameters

Name	Description
Item	The parent type of item to be removed
Bag	The targeted Bag component

# Keywords

Bag Inventory Container Stash Give Take Borrow Lend Buy Purchase Sell Steal Rob

#### Remove Runtime Item

Inventory » Bags » Remove Runtime Item

# Description

Removes an Item instance from its associated Bag

#### Parameters

Name Description

# Keywords

Bag Inventory Container Stash Give Take Borrow Lend Buy Purchase Sell Steal Rob

CURRENCY

Currency

## Instructions

• Change Currency

#### Change Currency

Inventory » Currency » Change Currency

# Description

Modifies the value of a Bag's currency

## Parameters

Name	Description
Currency	The currency type to modify
Amount	The value and operation performed
Bag	The targeted Bag component

## Keywords

Bag Inventory Container Stash Give Take Borrow Lend Buy Purchase Sell Steal Rob Coin Cash Bill Value Money

# EQUIPMENT

Equipment

# Instructions

- Equip Item
- Equip Runtime Item
- Unequip Item
- Unequip Runtime Item

## Equip Item

Inventory » Equipment » Equip Item

# Description

Equips an Item from the Bag that inherits from the specified type

## Parameters

Name	Description
Item	The parent type of item to equip
Bag	The targeted Bag component

# Keywords

Bag Inventory Equipment Put Wear Inventory Wield

#### Equip Runtime Item

Inventory » Equipment » Equip Runtime Item

# Description

Equips the specified Runtime Item

## Parameters

Name Description

# Keywords

Bag Inventory Equipment Put Wear Inventory Wield

## Unequip Item

Inventory » Equipment » Unequip Item

# Description

Unequip an Item from the Bag that inherits from the specified type

## Parameters

Name	Description
Item	The parent type of item to equip
Bag	The targeted Bag component

# Keywords

Bag Inventory Equipment Take Sheathe Inventory Remove

#### Unequip Runtime Item

Inventory » Equipment » Unequip Runtime Item

# Description

Unequip an Item instance that is currently equipped

## Parameters

Name Description

# Keywords

Bag Inventory Equipment Take Sheathe Inventory Remove

LOOT

Loo

## Instructions

- Instantiate Item
- Loot Table

#### Instantiate Item

Inventory » Loot » Instantiate Item

# Description

Instantiates the prefab of an item on the scene

## Parameters

Name	Description	
Item	The type of item created	
Location	The position and rotation where the item instance is placed	

# Keywords

Drop Inventory Instance

## Loot Table

Inventory » Loot » Loot Table

# Description

Picks a random choice from a Loot Table and sends it to the specified Bag

## Parameters

Name	Description
Loot Table	The Loot Table that generates the Item instance
Bag	The targeted Bag component

# Keywords

Bag Inventory Container Stash Give Take Borrow Lend Corpse Generate

# SOCKETS

Sockets

## Instructions

- Attach Runtime Item
- Detach Runtime Item

#### Attach Runtime Item

Inventory » Sockets » Attach Runtime Item

# Description

Attaches a Runtime Item onto the first available Runtime Item socket

## Parameters

Name	Description
Runtime Item	The item instance
Attach	The item instance attached to the other runtime item

# Keywords

Bag Inventory Sockets Attach Enchant Embed Imbue

#### Detach Runtime Item

Inventory » Sockets » Detach Runtime Item

# Description

Detaches a Runtime Item from another Runtime Item socket

## Parameters

Name	Description
Runtime Item	The item instance with an occupied socket
Detach	The item instance to detach from the other runtime item

# Keywords

Bag Inventory Sockets Detach Disenchant

UI

Ui

# Instructions

- Open Bag Ui
- Open Merchant Ui
- Open Tinker Ui
- Set Bag Ui

## Open Bag UI

Inventory » UI » Open Bag UI

# Description

Opens an inventory UI of a specific Bag

## Parameters

Name	Description
Bag	The Bag component
Wait to Close	If the Instruction waits until the UI closes

# Keywords

Item Inventory Catalogue Content Sort Equipment Hotbar Consume

## Open Merchant UI

Inventory » UI » Open Merchant UI

# Description

Opens a trading window for a specific Merchant

## 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

# Keywords

Trade Merchant Shop Buy Sell Junk

# Open Tinker UI

Inventory » UI » Open Tinker UI

# Description

Opens an Tinkering UI for a specific Bag

## 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

# Keywords

Craft Make Create Dismantle Disassemble Torn Alchemy Blacksmith

# Set Bag UI

Inventory » UI » Set Bag UI

# ${\tt Description}$

Changes the targeted Bag of a Bag UI component

# Parameters

Name	Description
Bag UI	The Bag UI that changes its target
Bag	The new Bag component

## VARIABLES

Variables

## Instructions

- Set Item
- Set Runtime Item

## Set Item

Inventory » Variables » Set Item

# Description

Saves an Item type on a Variable

## Parameters

Name	Description
Set	The Variable that saves the Item
Item	The type of item saved

# Keywords

Save Keep

#### Set Runtime Item

Inventory » Variables » Set Runtime Item

# Description

Saves a Runtime Item on a Variable

## Parameters

Name	Description
Set	The Variable that saves the Runtime Item
Runtime Item	The Item instance saved

# Keywords

Save Keep

## 2.9 User Interface

#### 2.9.1 User Interface

The **Inventory** module comes with a large collection of components so you have complete freedom to make your own game UI.



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.

#### **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.

#### Skins

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.



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.

## 2.9.2 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



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.

Bag List UI

**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 Baq.

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.



Note that only Items that have a Prefab object in their Item definition can be dropped.

#### Components

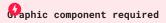
There are a few extra components that can synchronize a Bag's information with UI controls, which can either be linked to a Bag, or to the Bag linked to a Bag List/Grid UI component.

CELL UI

This component is automatically set up and refreshed by its **Bag List UI** or **Bag Grid UI** parent component.

Bag Cell UI

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.



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.

# elected 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.

**EOUIP UI** 

This component is used for equipping items and assigning consumables to hotbars.

Bag Equip UI

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.

WEALTH UI

The Bag Wealth UI component is used to display the selected Currency and how much of it the Bag carries.

Bag Wealth UI

This component requires a prefab that represents each coin's **Currency** value, and must contain the **Coin UI** component.

WEIGHT

This component displays the current and max weight of the selected Bag.

Bag Weight UI

## 2.9.3 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.

Merchant UI

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).



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.



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.

#### 2.9.4 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.

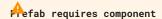
Tinker UI

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.



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.

## 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.

Crafting Item UI

This component is automatically refreshed with the correct information about the current Item.



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.

#### 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.

Dismantling Item UI

This component is automatically refreshed with the correct information about the current  ${\bf Item}$ .

**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**.

## 2.10 Releases

## 2.10.1 Releases



The Inventory 2 module is a Game Creator 2 extension and will not work without it.

#### 2.3.5

Release Pending



• Option to uninstall modules



· Serialization error during domain reloads

#### 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

## (ENHANCED)

Reorganized Inventory instructions

#### (FIXED)

- 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

#### 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

## (ENHANCED)

• Editor: Properties have scene refs

#### (CHANGED)

- Hide properties from within Item
- · Support Socketing from external sources

# (FIXED)

- · Fields alignment in Inspector
- Missing Price UI editor drawer
- · Incorrect dropped item in Example scenes

#### 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
- $\cdot$  UI: Properties with a value of 0 can be skipped
- Properties: Access to recent socketed Items

#### CHANGED

- Item price increments with socketed Items
- Compatibility with Game Creator 2.3.15

# 2.0.1

Released January 12, 2022

• First release

# 3. Dialogue

# 3.1 Dialogue

Dialogue



This module requires  $\mbox{{\bf Unity 2022.1}}$  in order to work

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



The **Dialogue** module is an extension of **Game Creator 2** and won't work without it

# 3.2 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.

## 3.2.1 Prepare your Project

Before installing the **Dialogue** module, you'll need to either create a new Unity project or open an existing one.



It is important to note that Game Creator should be present before attempting to install any module.

#### 3.2.2 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.

#### 3.2.3 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.

- ${f \cdot}$  **Examples**: A collection of scenes with different use-case scenarios
- ullet 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

Installer Dialogue

The Examples requires all the skins in order to work..



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/.

Dialogue Examples

# 3.3 Dialogues

#### 3.3.1 Dialogues

All conversations are written in a **Dialogue** component. To create one, right click on the *Hierarchy Panel* and select *Dialogue* Dialogue.



Alternatively, you can select any existing game object and click on the *Add Component* button and search for **Dialogue**.

Dialogue Component

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.

## 3.3.2 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.

Dialogue Sections

#### **Top Toolbar**

Dialogue 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.



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.

#### **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.

Dialogue Settings

#### 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.



Because opening and closing the <u>Inspector</u> sidebar is a very common operation, double clicking on any node will open (and focus on the current node) or hide the sidebar.

#### Inspector

The inspector sidebar allows to set and modify the currently selected node of a Dialogue.

Dialogue Inspector

Starting from the top, any node allows to change its type, which can either be a Text, Choice or Random.



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:

- $\boldsymbol{\cdot}$   $\boldsymbol{\text{None}}\colon$  No portrait is displayed. This is the default option.
- $\boldsymbol{\cdot}$   $\boldsymbol{Primary}\colon$  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).



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.

# Mre 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.

Dialogue Animation Timeline

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.

# 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.

#### 3.3.3 Nodes

A Dialogue is composed of nodes displayed from top to bottom, and can even be set as children of other nodes.

Dialogue Nodes Layout

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.

#### 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.

Dialogue Nodes Text

# 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=#FFFFF>James</color>



Read the official Unity documentation on Rich Text

## 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.

The available choices are picked from the direct children of the **Choices** node, which should usually be **Text** nodes.

Dialogue Nodes Choices

- **Hide Unavailable**: Determines whether unavailable choices (their Conditions return false) should be displayed (but greyed out) or hide them completely.
- $\bullet \ \, \textbf{Skip Choice} \colon \text{Allows to skip the execution of the } \ \, \textbf{Text} \ \, \text{choice selected, and skip to the next immediate one.}$
- · 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)

# Sipping 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.

# Angle Choice

If the **Choices** does only have a single choice available, it will be automatically selected without requiring the user to choose it.

#### 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.

Dialogue Nodes Random

The **Random** node also has the field **Allow Repeat** which determines whether the same choice can be picked in a row, or not.



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.

## 3.3.4 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.

#### **Local Dynamic Values**

Local dynamic values are set up inside the Dialogue component, right under the Text field of a node.

Dialogue Local Dynamic Values

Each value is assigned an index value, starting from  $\theta$  at the top. Using the index number between curly braces  $\{$  and  $\}$ .

# Piayer 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.

#### **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.

Dialogue Global Dynamic Values

**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**.

#### 3.3.5 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.

Dialogue Animation Timeline

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.

# **Recuting 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**.

## 3.3.6 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.

Dialogue 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.

Dialogue Tag Condition

#### 3.4 Actors

#### 3.4.1 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.

Dialogue Actor

#### **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.

#### **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.



For more information about Expressions, see the Expressions section.

#### **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.

Dialogue Actor

The  $\ensuremath{\textit{Frequency}}$  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.

#### **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.

#### 3.4.2 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.

Dialogue Actor Expression

# **√**efault 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.

# Larn 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.

## 3.5 Skins

#### 3.5.1 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...

Dialogue Skins 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.

#### **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

Dialogue Change Skin

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.

Dialogue Skin

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.

- $\cdot$  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.

#### **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.

Dialogue Speech Skin

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.

#### 3.6 User Interface

#### 3.6.1 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.

Dialogue custom Skin



Customizing the UI requires certain degree of expertise with Unity and its UI system.

#### **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.

Dialogue UI component

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.

# tional 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.

### 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.

#### **Custom Speech Skin**

A Speech Skin UI prefab must contain, at the root of the game object, the Speech UI component.

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.

# 3.7 Visual Scripting

### 3.7.1 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.

## 3.7.2 Conditions

### Conditions

SUB CATEGORIES

• Dialogue

### Dialogue

DIALOGUE

Conditions

- Dialogue Played
- Tag Visited

### DIALOGUE PLAYED

Dialogue » Dialogue Played

Description

Returns true if the Dialogue component has been played

Parameters

Name Description

Dialogue The Dialogue component

Keywords

Dialogue Text Line Choice

### TAG VISITED

Dialogue » Tag Visited

### Description

Returns true if the Tag of a particular Dialogue has ran

#### Parameters

Name	Description
Dialogue	The Dialogue component
Tag	The Tag name to check

### Keywords

Dialogue Text Line Choice

## 3.7.3 Events

### **Events**

SUB CATEGORIES

• Dialogue

### Dialogue

DIALOGUE

### Events

- On Finish Dialogue
- On Start Dialogue

### ON FINISH DIALOGUE

Dialogue » On Finish Dialogue

Description

Executed when a specific Dialogue component finishes playing

Keywords

Node Conversation Speech Text End Complete

### ON START DIALOGUE

Dialogue » On Start Dialogue

Description

Executed when a specific Dialogue component starts to play

Keywords

Node Conversation Speech Text Begin Play

### 3.7.4 Instructions

### Instructions

SUB CATEGORIES

• Dialogue

### Dialogue

DIALOGUE

Sub Categories

• Ui

### Instructions

- Play Dialogue
- Stop Dialogue

### PLAY DIALOGUE

Dialogue » Play Dialogue

Description

## Plays a dialogue

Parameters

Name	Description
Dialogue	The Dialogue component to play
Wait to Finish	Whether to wait until the Dialogue is finished or not

### Keywords

Dialogue Narration Speech Next Skip

### STOP DIALOGUE

Dialogue » Stop Dialogue

Description

Stop playing a dialogue

Parameters

Name Description

Dialogue The Dialogue component to stop playing

Keywords

Dialogue Narration Speech Next Skip

UI

Ui

### Instructions

• Skip Line

### Skip Line

Dialogue » UI » Skip Line

### Description

Finishes a dialogue UI line or skips to the next one

### Parameters

Name	Description
Speech UI	The Speech UI component associated

### Keywords

Dialogue Narration Speech Next Skip

### 3.8 Releases

### 3.8.1 Releases



The Dialogue 2 module is a Game Creator 2 extension and will not work without it.

#### 2.0.3

Release Pending



• Option to uninstall Dialogue



• Serialization error during domain reloads

### 2.0.2

Released June 8th, 2022

### FIXED

- Marketing images fit better
- $\cdot$  Conflicting meta files with other modules

#### 2.0.1

Released June 8th, 2022

• First release

# 4. Stats

# 4.1 Stats

#### 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



The Stats module is an extension of Game Creator 2 and won't work without it

### 4.2 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.

### 4.2.1 Prepare your Project

Before installing the Stats module, you'll need to either create a new Unity project or open an existing one.



It is important to note that Game Creator should be present before attempting to install any module.

#### 4.2.2 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.

#### 4.2.3 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
- $\cdot$  Classes: A template with Stats, Attributes and Classes to kickstart your game
- $\bullet$  UI: Samples for creating a HUD and a Character Stats menu

Installer Stats

The Examples requires both the Classes and UI extensions in order to work.



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/.

Stats Examples

### 4.3 Classes

### 4.3.1 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.

Stats Overview



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.

#### 4.3.2 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.

Stat Asset

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.



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  $\star$  1). At level 2, it would be 200 (100  $\star$  2), at level 3 it would be 300 (100  $\star$  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.

#### 4.3.3 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.

Attribute Asset

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.

Maming 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.

#### 4.3.4 Classes

Classes are objects that represent a type of character or object with RPG traits, and contains a list of Stats and Attributes.

### Ciasses 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.

#### 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**.

Class Asset



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.

#### 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.

Class Attributes

In this section, the selcted **Attribute**'s starting percent can be overriden, in case a particular **Class** has a different starting value than another.

#### 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.

Class Stats

In this section, the selected **Stat** base value and formula can be overriden.

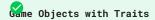
### Merride Stat Base and Formula

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.

#### 4.3.5 Traits

Traits are components that link a Class asset with a scene game object.



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.

#### **Traits in Editor**

Once the Player has the Traits component a message appears prompting to assign it a Class asset.

Traits missing Class asset

Drag and drop any **Class** asset onto the designated field and it will change its appearance to display the asset's information.

Traits with Class asset

Each Attribute and Stat can be expanded and their values can be overriden, just like in the Class asset.

#### **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 in Playmode

#### 4.4 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.



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.

#### 4.4.1 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.

Formula Asset

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.

Formula Help



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.

### 4.4.2 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]

#### 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.

### Surce 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.

## Arcular 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.

#### 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]

## **≜**cal Variables

For the moment, a Formula can only access **Local Variables** by name. In a future update, **List Variable** access will be supported.

#### 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.

#### 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.

#### **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.



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.

### 4.5 Tables

Commonly used for character progression, Tables are charts that map a range of values to an integer.

#### 4.5.1 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.

Table concepts

#### 4.5.2 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.

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.



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*.

### 4.5.3 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.

Tables Progression

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.



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).

### 4.6 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.

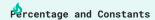
This is where **Stat Modifiers** come into play: They increase or decrease a **Stat** value by a certain amount, and can be added and removed at any time.

### 4.6.1 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.

Stat Modifiers in UI



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.

Add a Stat Modifier

### 4.6.2 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.

Remove a Stat Modifier

### 4.7 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 afliction.

#### 4.7.1 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.

Status Effects

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 removing, using the appropriate visual scripting instruction.

Status Effects UI section

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.

Status Effects Start End and While Active sections

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.



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.

## 4.7.2 Adding a Status Effect

To add a Status Effect onto a target you can use the visual scripting instruction Add Status Effect.

Add a 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**.

## 4.8 User Interface

## 4.8.1 User Interface

The Stats module makes it really easy to build flexible user interfaces (UI) using Unity UI.

Stat User Interface

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.

Stat UI example

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.

## 4.8.2 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.

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.

## 4.8.3 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.

#### 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.

Attribute UI Transitions

## Mansitions

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.

## 4.8.4 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.

#### 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.

#### 4.8.5 Status Effects UI

Status Effects have two components to display their information.

Status Effect List UI

- 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 afliction. It is spawned by the Status Effect List UI component.

#### 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.

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 afliction 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 afliction to display.

#### 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.

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 afliction.

All fields are optional and automatically update the values according to changes sent by the parent component.

## 4.9 Visual Scripting

## 4.9.1 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.

Properties

## 4.9.2 Conditions

## Conditions

SUB CATEGORIES

• Stats

## Stats

## STATS

## Conditions

- Check Formula
- Compare Attribute
- Compare Stat
- Has Status Effect

## CHECK FORMULA

Stats » Check Formula

#### Description

Returns the comparison between the result of a Formula against another value

#### 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

## Keywords

Skill Throw Check Dice Lock Pick Charisma Speech

## COMPARE ATTRIBUTE

Stats » Compare Attribute

## Description

Returns true if the Attribute comparison is  $\operatorname{successful}$ 

#### 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

## Keywords

Health Mana Stamina Magic Life HP MP

## COMPARE STAT

Stats » Compare Stat

#### Description

Returns true if the Stat comparison is successful

#### 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

## Keywords

Vitality Constitution Strength Dexterity Defense Armor Magic Wisdom Intelligence

## HAS STATUS EFFECT

Stats » Has Status Effect

#### Description

Returns true if the game object has a particular Status Effect active

#### 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

#### 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

## 4.9.3 Events

## **Events**

SUB CATEGORIES

• Stats

## Stats

STATS

#### Events

- On Attribute Change
- On Stat Change
- On Status Effect Change

## ON ATTRIBUTE CHANGE

Stats » On Attribute Change

## Description

Executed when the value of a specific game object's Attribute is modified

#### 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

#### Keywords

Health HP Mana MP Stamina

## ON STAT CHANGE

Stats » On Stat Change

#### Description

Executed when the value of a specific game object's Stat is modified. Including due to Stat Modifiers

#### 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

#### Keywords

Health HP Mana MP Stamina

#### ON STATUS EFFECT CHANGE

Stats » On Status Effect Change

#### Description

Executed when a Status Effect is added or removed from a Traits component

#### 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

## 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

## 4.9.4 Instructions

## Instructions

SUB CATEGORIES

• Stats

## Stats

## STATS

## Sub Categories

• Ui

## Instructions

- Add Stat Modifier
- Add Status Effect
- Change Attribute
- Change Stat
- Clear Status Effects Type
- Remove Stat Modifier
- Remove Status Effect

## ADD STAT MODIFIER

Stats » Add Stat Modifier

#### Description

Adds a value Modifier to the selected Stat on a game object's Traits component

#### Parameters

Name	Description
Target	The targeted game object with a Traits component
Stat	The Stat that removes the Modifier
Туре	If the Modifier changes the Stat by a constant value or by a percentage
Value	The constant or percentage-based value of the Modifier

#### Keywords

Slot Increase Equip Fortify Vitality Constitution Strength Dexterity Defense Armor Magic Wisdom Intelligence

## ADD STATUS EFFECT

Stats » Add Status Effect

#### Description

Adds a Status Effect to the selected game object's Traits component

#### Parameters

Name	Description
Target	The targeted game object with a Traits component
Status Effect	The type of Status Effect that is added

## 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

## CHANGE ATTRIBUTE

Stats » Change Attribute

## Description

Changes the current Attribute value of a game object's Traits component

#### Parameters

Name	Description
Target	The targeted game object with a Traits component
Attribute	The Attribute type that changes its value
Change	The value changed

## Keywords

Health HP Mana MP Stamina

## CHANGE STAT

Stats » Change Stat

#### Description

Changes the base Stat value of a game object's Traits component

#### Parameters

Name	Description
Target	The targeted game object with a Traits component
Stat	The Stat type that changes its value
Change	The value changed

#### Keywords

Vitality Constitution Strength Dexterity Defense Armor Magic Wisdom Intelligence

## CLEAR STATUS EFFECTS TYPE

Stats » Clear Status Effects Type

#### Description

Clears any Status Effects based on their type from the selected game object's Traits component

#### Parameters

Name	Description
Target	The targeted game object with a Traits component
Types	The type of Status Effects that are cleared

## 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

## REMOVE STAT MODIFIER

Stats » Remove Stat Modifier

#### Description

Removes an equivalent Modifier from the selected Stat on a game object's Traits component.

#### Parameters

Name	Description
Target	The targeted game object with a Traits component
Stat	The Stat that receives the Modifier
Туре	If the Modifier changes the Stat by a constant value or by a percentage
Value	The constant or percentage-based value of the Modifier

#### Keywords

Slot Decrease Unequip Weaken Vitality Constitution Strength Dexterity Defense Armor Magic Wisdom Intelligence

## REMOVE STATUS EFFECT

Stats » Remove Status Effect

#### Description

Removes a Status Effect from the selected game object's Traits component

#### 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

#### 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

UI

Ui

## Instructions

- Change Attributeui Attribute
- Change Attributeui Target
- Change Statui Stat
- Change Statui Target
- Change Status Effects List Ui Target

## Change AttributeUI Attribute

Stats » UI » Change AttributeUI Attribute

## Description

Changes the Attribute from a Attribute UI component

Name	Description
Attribute UI	The game object with the Attribute UI component
Attribute	The new Attribute asset

## Change AttributeUI Target

Stats » UI » Change AttributeUI Target

## Description

Changes the targeted game object of an Attribute UI component  $% \left( 1\right) =\left( 1\right) \left( 1\right) +\left( 1\right) \left( 1\right) \left( 1\right) +\left( 1\right) \left( 1\right) \left($ 

Name	Description
Attribute UI	The game object with the Attribute UI component
Target	The new targeted game object with a Traits component

## Change StatUI Stat

Stats » UI » Change StatUI Stat

## Description

Changes the Stat asset from a Stat UI component

Name	Description
Stat UI	The game object with the Stat UI component
Stat	The new Stat asset

## Change StatUI Target

Stats » UI » Change StatUI Target

## Description

Changes the targeted game object of an Stat UI component

Name	Description
Stat UI	The game object with the Stat UI component
Target	The new targeted game object with a Traits component

## Change Status Effects List UI Target

Stats » UI » Change Status Effects List UI Target

## Description

Changes the targeted game object of an Status Effects List UI component

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

## 4.10 Releases

## 4.10.1 Releases



The Stats 2 module is a Game Creator 2 extension and will not work without it.

#### 2.1.6

Release Pending



• Option to uninstall modules

## (FIXED)

• Serialization error during domain reloads

#### 2.1.5

Released May 12, 2022

## FIXED

- Incorrect Stat Modifiers application order
- · Crash when overriding Trait component values
- · Math expressions support line breaks
- Removed duplicate internal method

#### 2.1.4

Released 25 March, 2022

## (NEW)

• Property: Stat Modifiers value

## **ENHANCED**

- Formulas can have multiple lines
- Moved UI components to submenu

## CHANGED

• Example scenes compatibility

## (FIXED)

- Attribute UI: Scale options disappeared
- · Incorrect caching of Status Effects
- · Alignment of elements in Inspector

## 2.0.3

Released 28 January, 2022

## (ENHANCED)

• Easier to understand examples

## CHANGED

• Classes installer has no dependencies

## 2.0.2

Released November 22, 2021

## NEW

- Instruction: Change AttributeUI Attribute
- Instruction: Change StatUI Stat

## (CHANGED)

- UI instructions are now found under Stats/UI/
- Disallow multiple Traits component per object

## FIXED

• Event: Attribute Change not running

## 2.0.1

Released November 19, 2021

• First release

# 5. Quests

## 5.1 Quests



# 6. Behavior

# 6.1 Behavior



# 7. Perception

# 7.1 Perception



# 8. Shooter

## 8.1 Shooter



# 9. Melee

## 9.1 Melee



# 10. Traversal

## 10.1 Traversal

