HOUR 17

Construction Script: Building Dynamic Blueprint Actors

INTRODUCTION

In this lecture, you will learn how to use Blueprints to create dynamic Actor classes.

Blueprint Actors can use exposed parameters to drive the Construction Script—a special Event Graph that runs before the game starts, or even in Editor—allowing Actors to modify, add, or remove components.

LECTURE GOALS AND OUTCOMES

Goals

The goals of this lecture are to

- Demonstrate the Construction Script in Actor classes
- Show how Blueprint variables can be exposed as instance parameters
- Demonstrate how to use Parameters to drive creating, modifying and removing components from the Actor

Outcomes

By the end of this lecture you will be able to

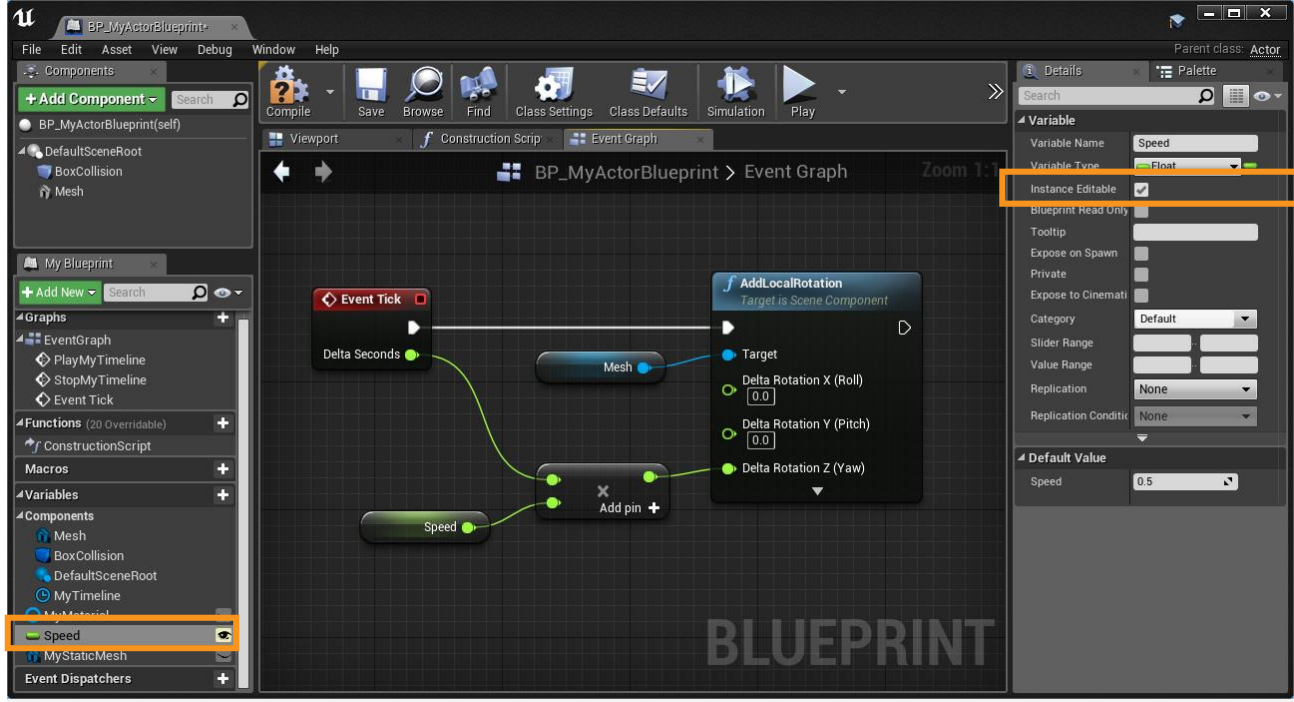
- Create variables that are exposed as parameters in Blueprint Actors
- Drive a Construction Script with parameters
- Understand when to use a Construction script vs the Event Graph

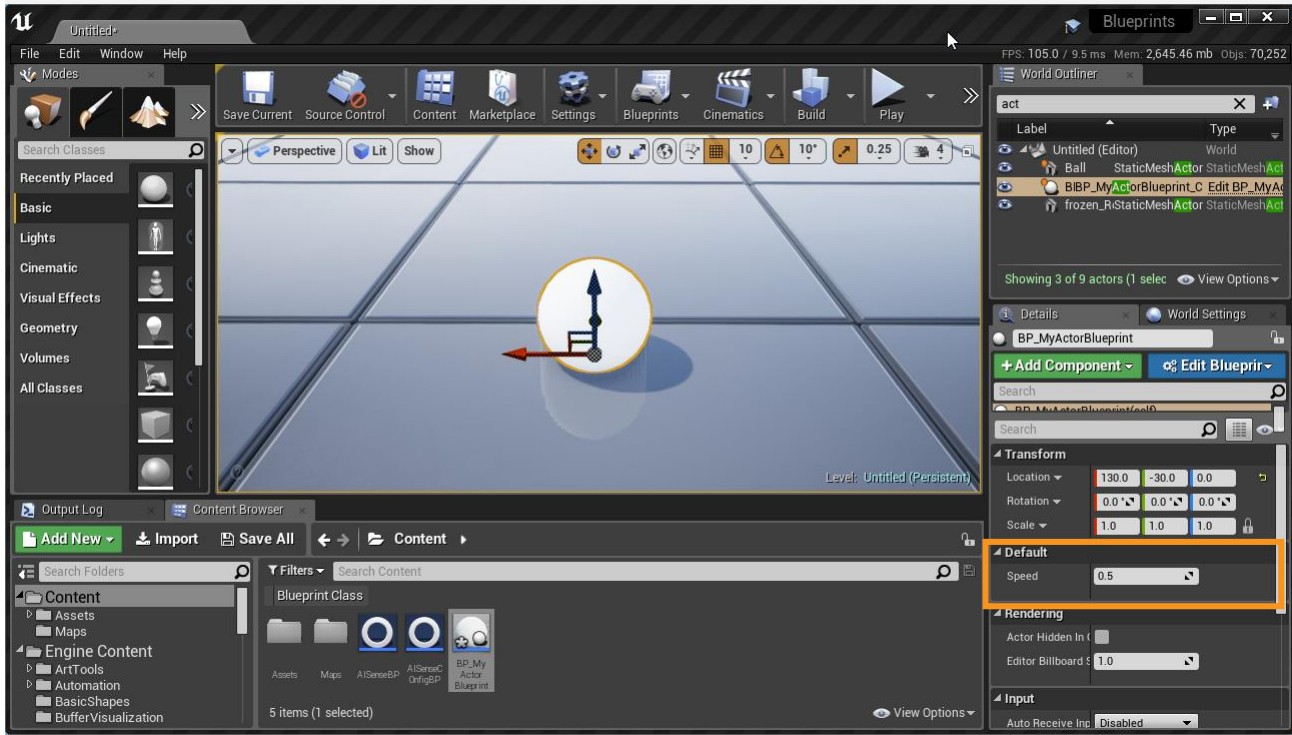
EDITABLE VARIABLES

You can specify variables to be editable in your Blueprint Actor classes. This allows the variables to be edited on a per-Actor basis in the Level Editor.

You can set a variable to be editable in one of two ways:

- Clicking the eye icon next to the variable name in the Variables section of the My Blueprint panel in the Blueprint Editor.
- Setting Instance Editable to True in the Details panel of the variable.

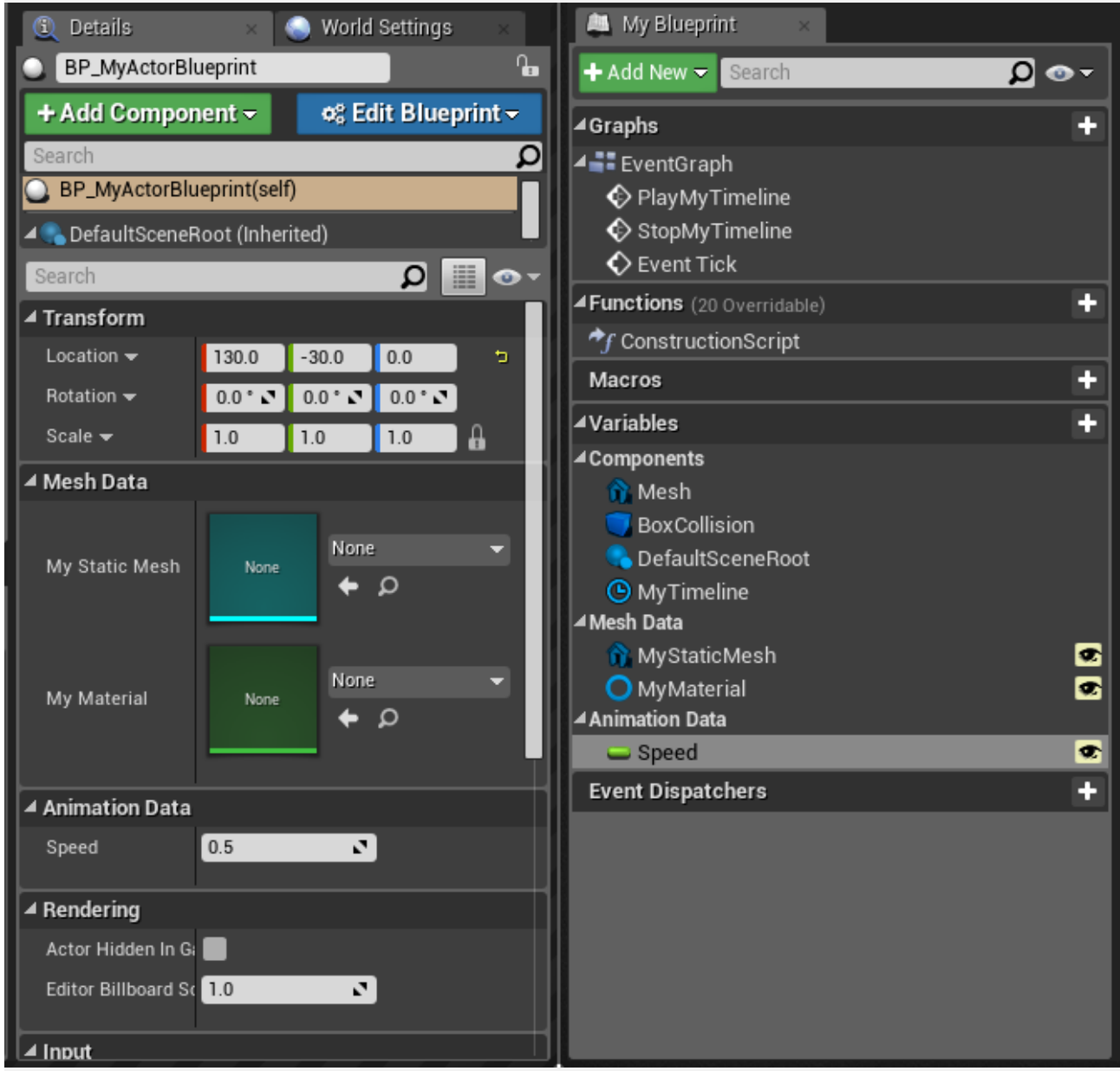




EDITABLE VARIABLES

Once editable, the variable appears in the Details panel of the selected Actor instance of your Blueprint class.

You can add many different *classes* of variables to be editable, including asset references.



EDITABLE VARIABLES

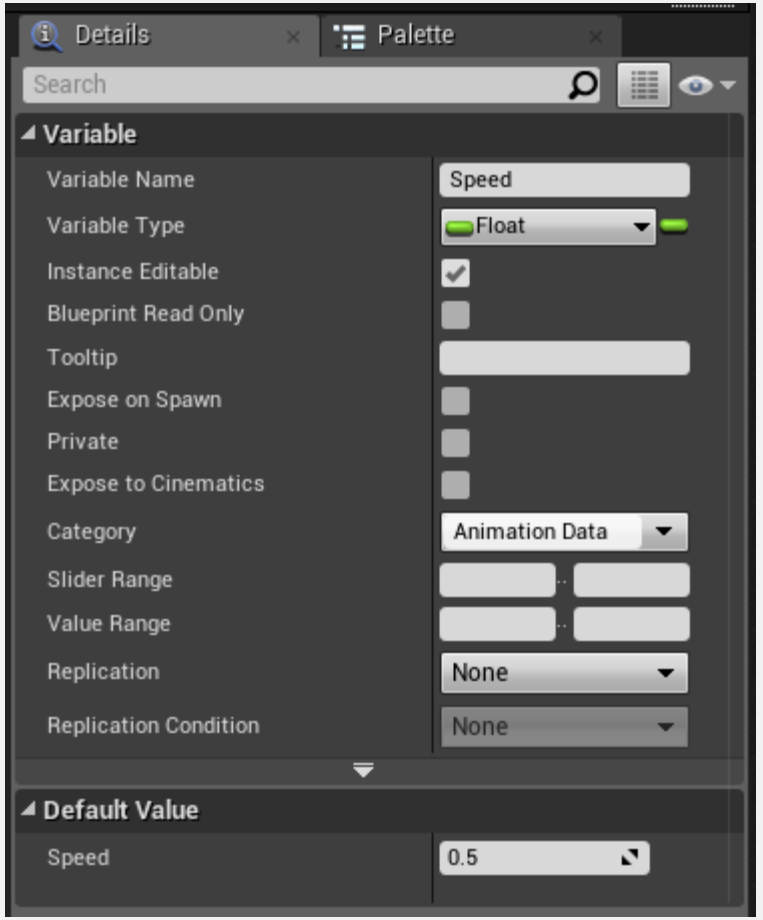
You can also set a category for your editable variables, making them appear more organized in the Level Editor Details panel.

It’s recommended that you add a tooltip to your variables.

You can set slider and value ranges to help make the exposed variables more user-friendly.

- **Slider ranges** are purely visual; you can manually enter values above or below the max and min.
- **Value ranges** are explicit; you cannot set the variable above or below the max and min.

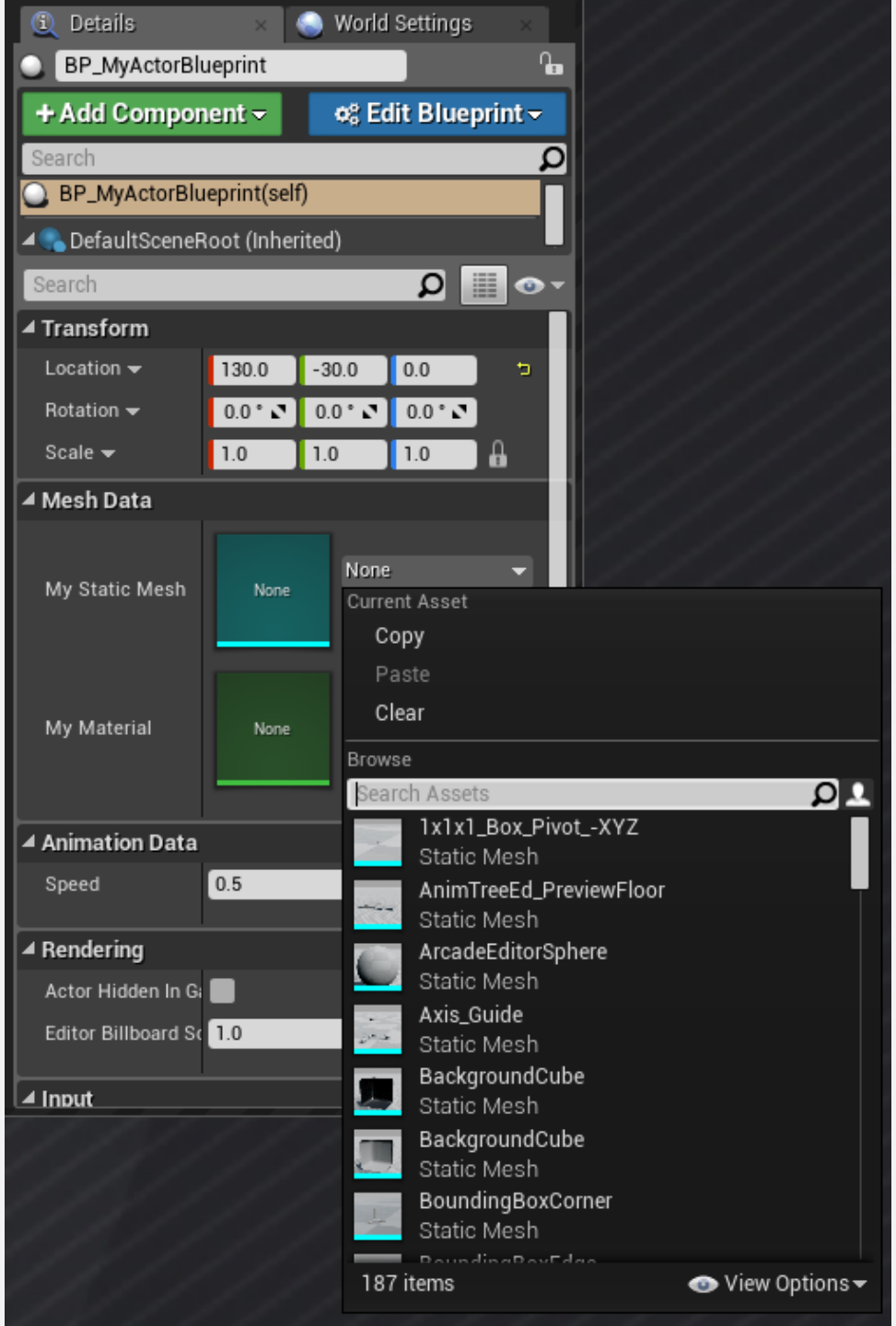
You can also reorder the variables in the Variables section of the My Blueprint panel in the Blueprint Editor by dragging and dropping them.



ASSET REFERENCES

Asset reference variables let you access assets in your project's Content Browser.

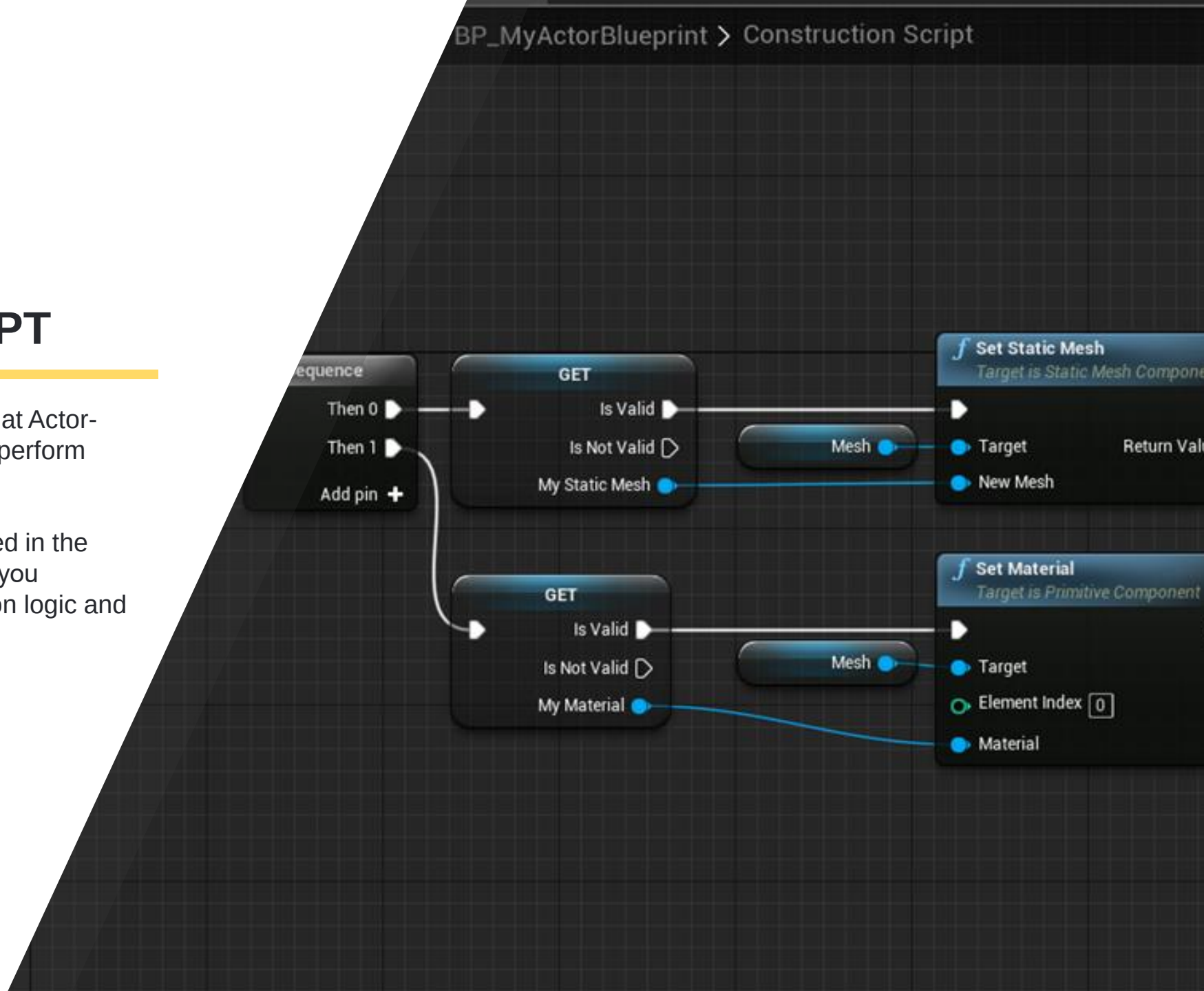
This lets you assign things like Materials and Static Meshes and use them to dynamically modify your Blueprint Actor classes.



CONSTRUCTION SCRIPT

The Construction Script is a special event that Actor-based Blueprints inherit that allows them to perform logic before being visible.

Editable variables can be exposed and edited in the Blueprint class's instanced Actors. This lets you dynamically modify Blueprint Actors based on logic and the exposed parameters.



Construction Script versus Event Graph

The **Event Graph** runs *during* gameplay, including PIE.

- Collision and damage
- Movement
- Player interaction
- Events
- Spawning Actors

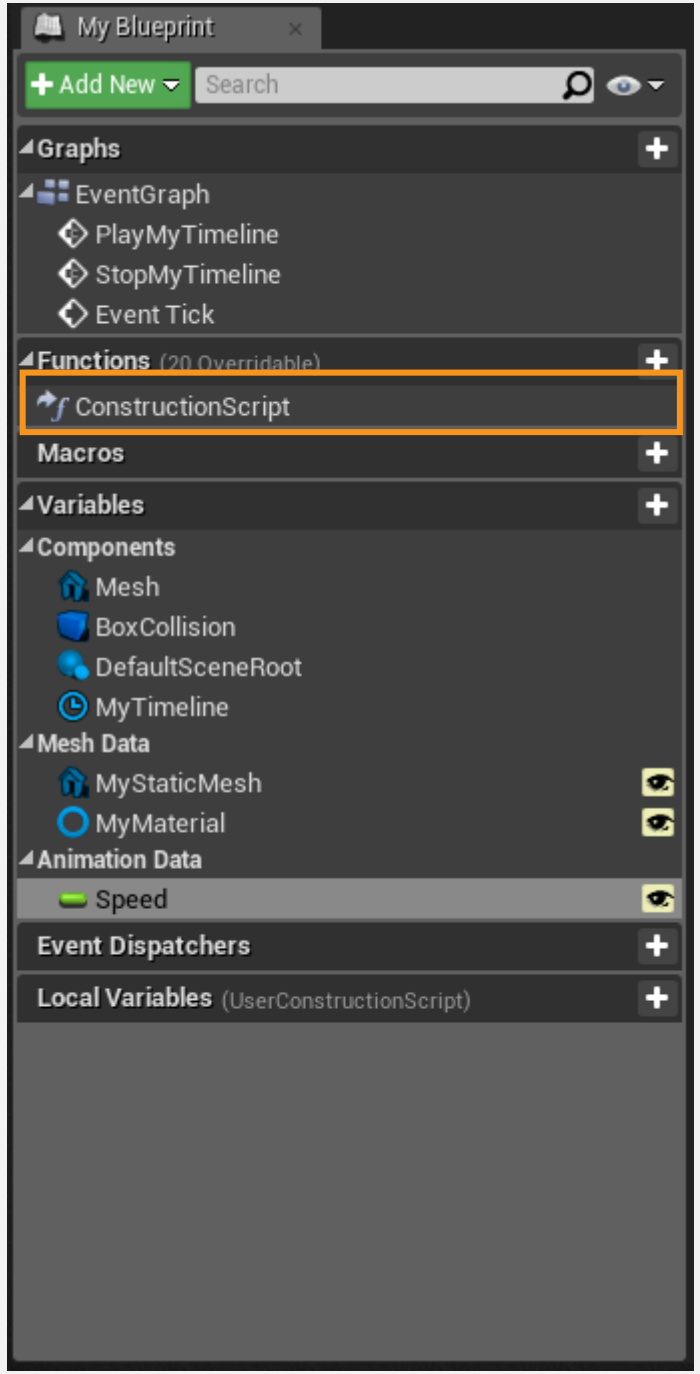
The **Construction Script** runs *before* the game is running, including in the Level Editor Viewport.

- Adding components
- Changing parameters
- Assigning asset references
- Building geometry and other components

CONSTRUCTION SCRIPT

The Construction Script allows you to create complex Actors that can be modified in the Level Editor.

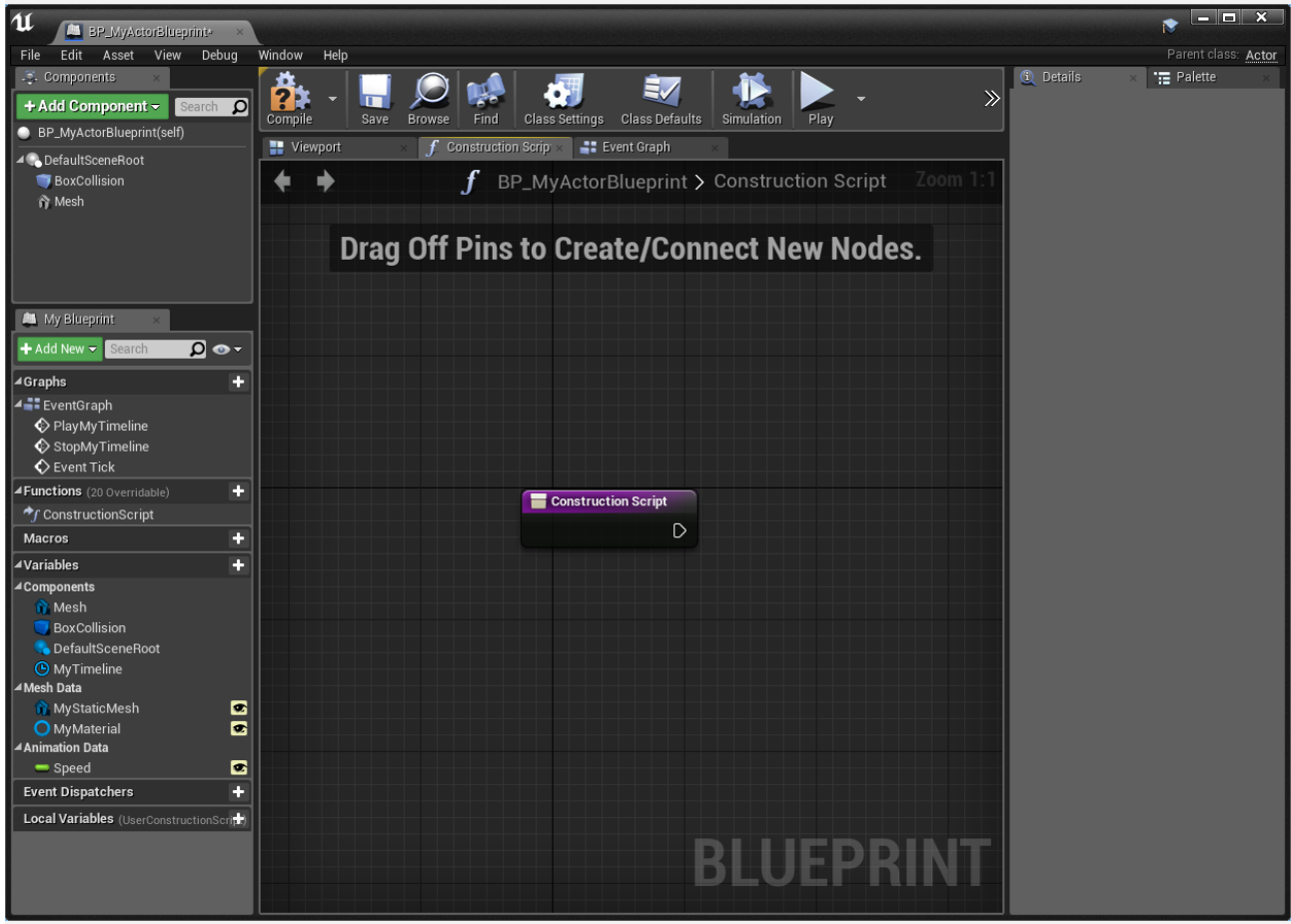
To open the Construction Script, double-click the Construction Script function in the Functions section of the My Blueprint panel in the Blueprint Editor.



CONSTRUCTION SCRIPT

The Construction Script appears as a new Graph tab alongside the Viewport and Event Graph panels.

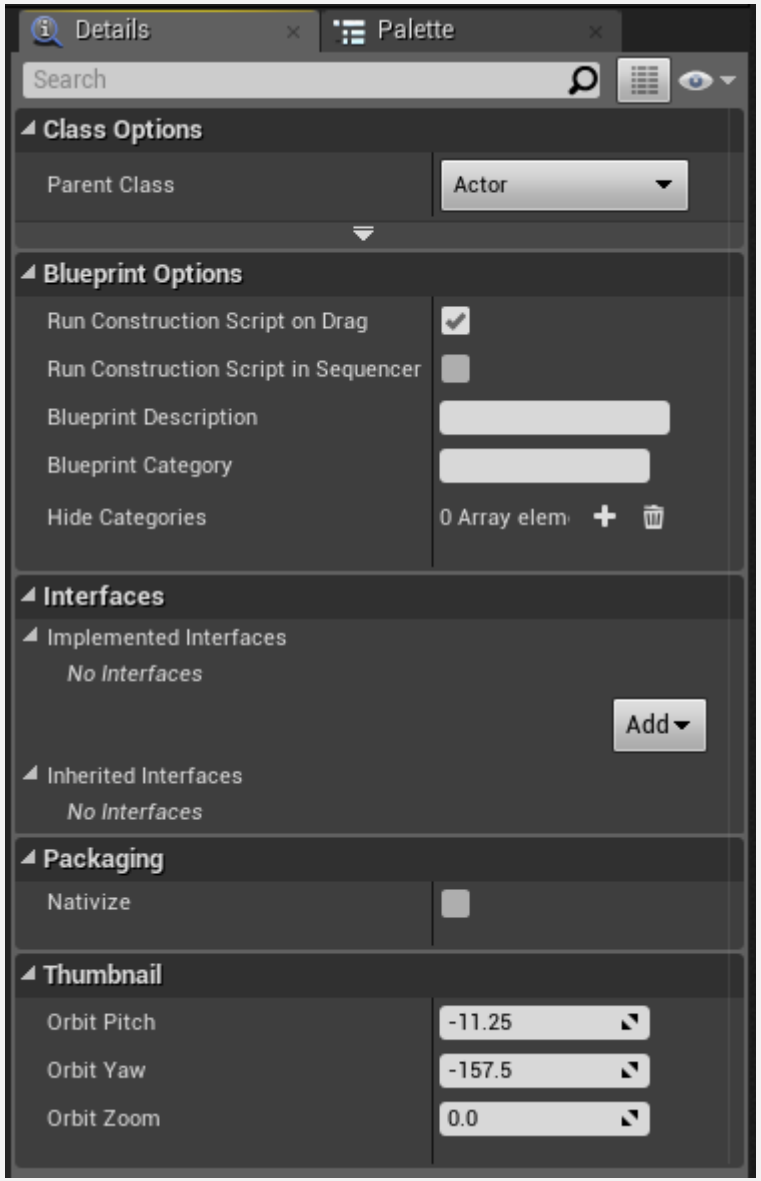
A single event, Construction Script, is added automatically. This is the only event that can be in the Construction Script, meaning you can only have a single execution flow.



CONSTRUCTION SCRIPT

By default, the Construction Script runs at the following times:

- When the Actor is first placed in a Level
  - ➢ This can be by dragging and dropping from the Content Browser or when being spawned by another Actor.
- When the Blueprint class is compiled
  - ➢ This will run the Construction Script on all the Actors in the Level and the asset in the Content Browser.
- When an instanced Actor is moved around the Level
  - ➢ You can avoid this by setting Run Construction Script on Drag to False in the class settings of your Blueprint class.
- When a Level is loaded with an instanced Actor in it

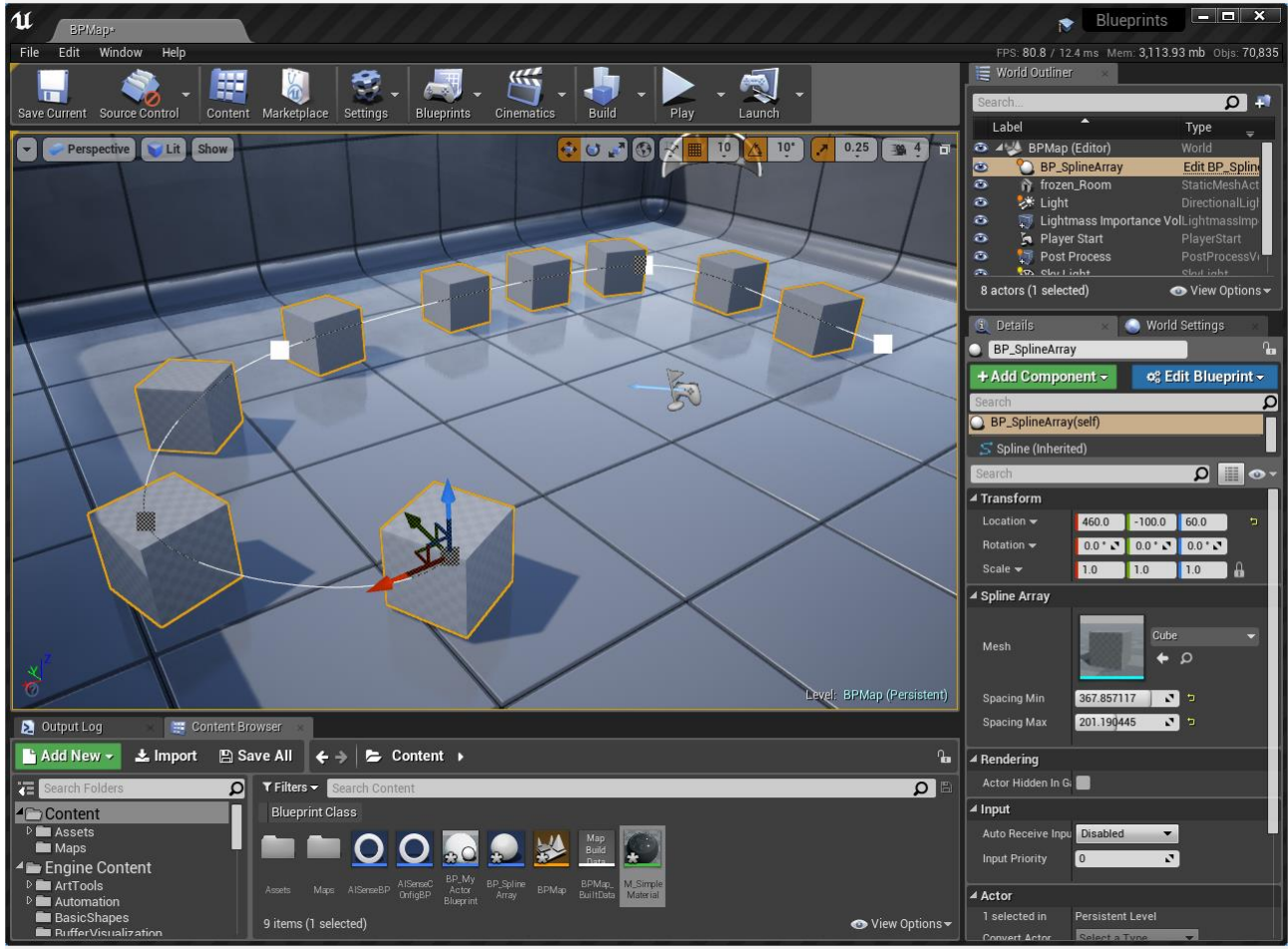


ADDING COMPONENTS

You cannot spawn Actors with the Construction Script, but you can add components to your Blueprint class.

This is very powerful and lets you construct complex, dynamic Actors based on the variables you've exposed.

The example on the right shows a Blueprint that places Static Meshes along a spline. The Blueprint uses a Spline component and a few exposed variables.



MODIFYING COMPONENTS

By exposing variables, you can modify components.

A common use case is to modify Material Instance parameters on a per-Actor basis. This avoids having to make lots of Material Instances for each variation.

Here, a single Material Instance is modified twelve times by the Construction Script to achieve very different looking surfaces.

MODIFYING COMPONENTS

Here is the Construction Script.

First, a Dynamic Material Instance is created and assigned to the mesh component.

- Dynamic Material Instances can be modified at runtime by Blueprints.

Then, two scalar and one vector parameter are set on the Material Instance.