Creating and Using Sublevels

Cesium needs to have a central location and origin defined in the CesiumGeoreference actor to function correctly. When working with cesium for our purposes, we will need to be able to use standard Unreal tools such as object placement and built-in physics at different locations on the geo referenced globe. This becomes an issue the further we go from the initial origin; Gravity will be incorrect, the physics will become jittery, and most importantly: object placement will not be accurate.

We have worked around this by implementing sublevels to set individual environments to build in instead of relying on a massive world centered around an origin.

We start by building a persistent level that will encompass the cesium geo references terrain. Bing Aerial Imagery was used to generate the terrain since it was both free and easy to implement. Cesium has support for both satellite imagery and point cloud information, we can even import highly detailed world data to overlay on top of our initial terrain layer.

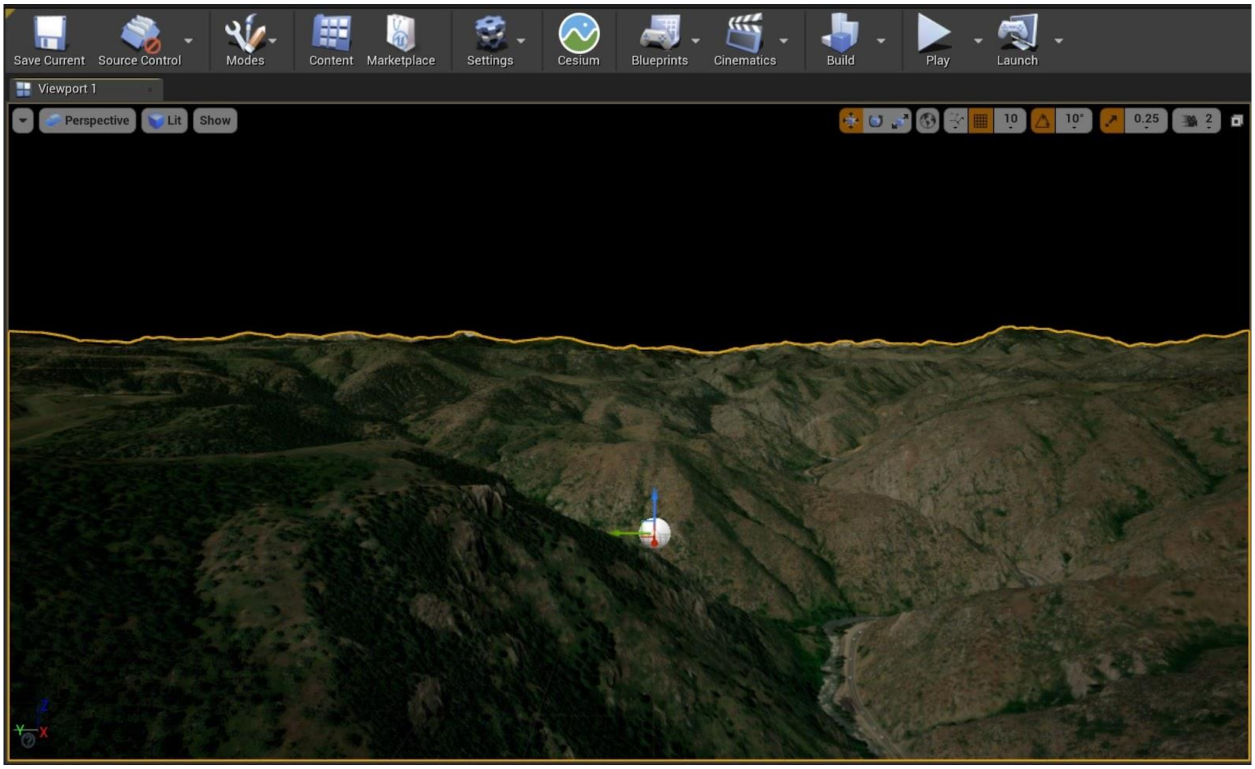
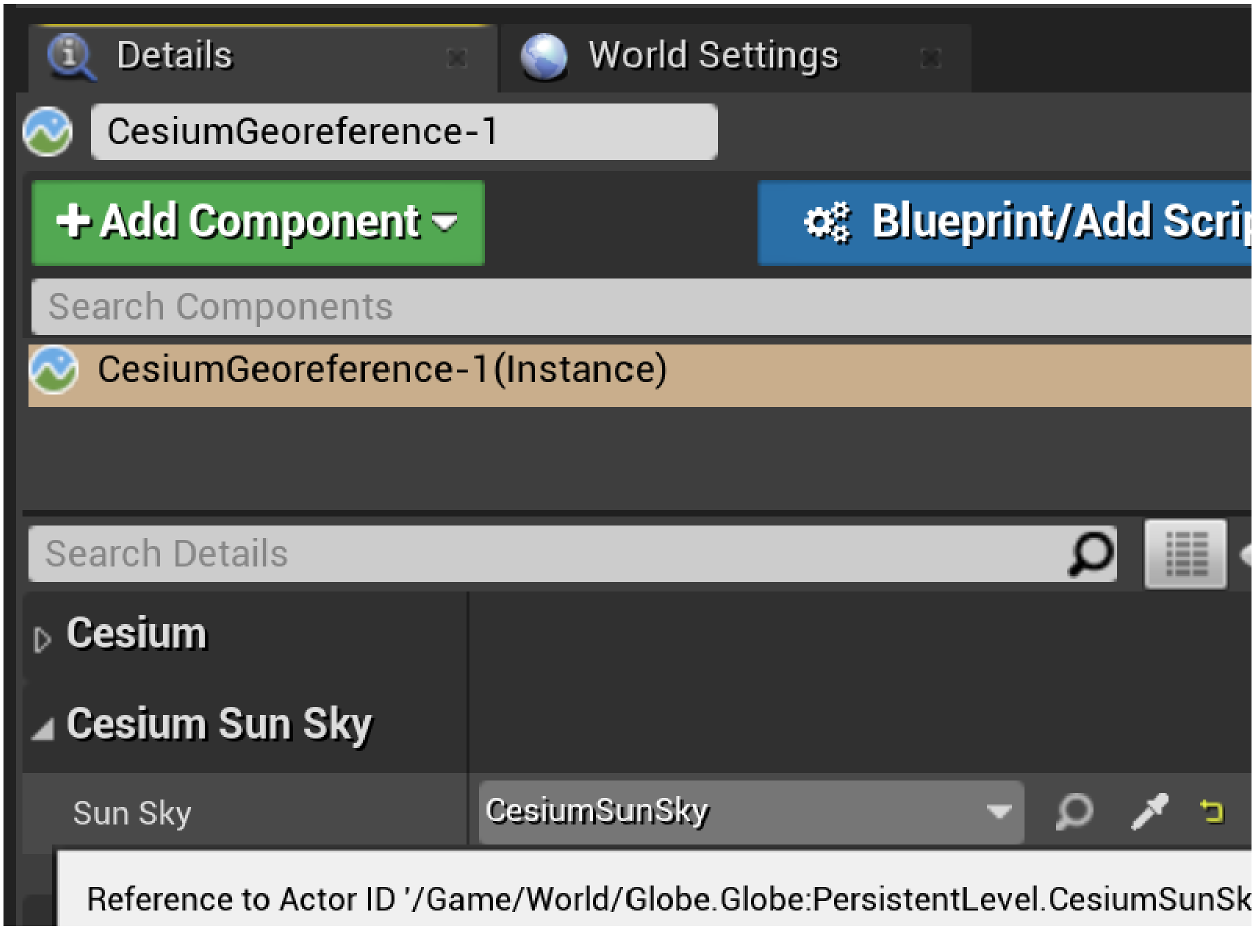


Figure 1: An initial layer of terrain generated using Bing Aerial Imagery.

We can use some actors at this persistent level that can be georeferenced to avoid any errors; The CesiumSunSky actor extends the default SunSky actor in Unreal to make it globe aware. By setting the new SunSky in the CesiumGeoreference actor we can correctly add accurate light to the environment on a global scale using time zones and solar time. The camera is the only other object that can be placed in this level, the FloatingPawn actor is also able to have it's georeference using the CesiumGeoreference actor. Any future additions into the level from this point, whether that be actors or high detail terrain will need to be wrapped in a sublevel.



Sun Sky CesiumSunSky

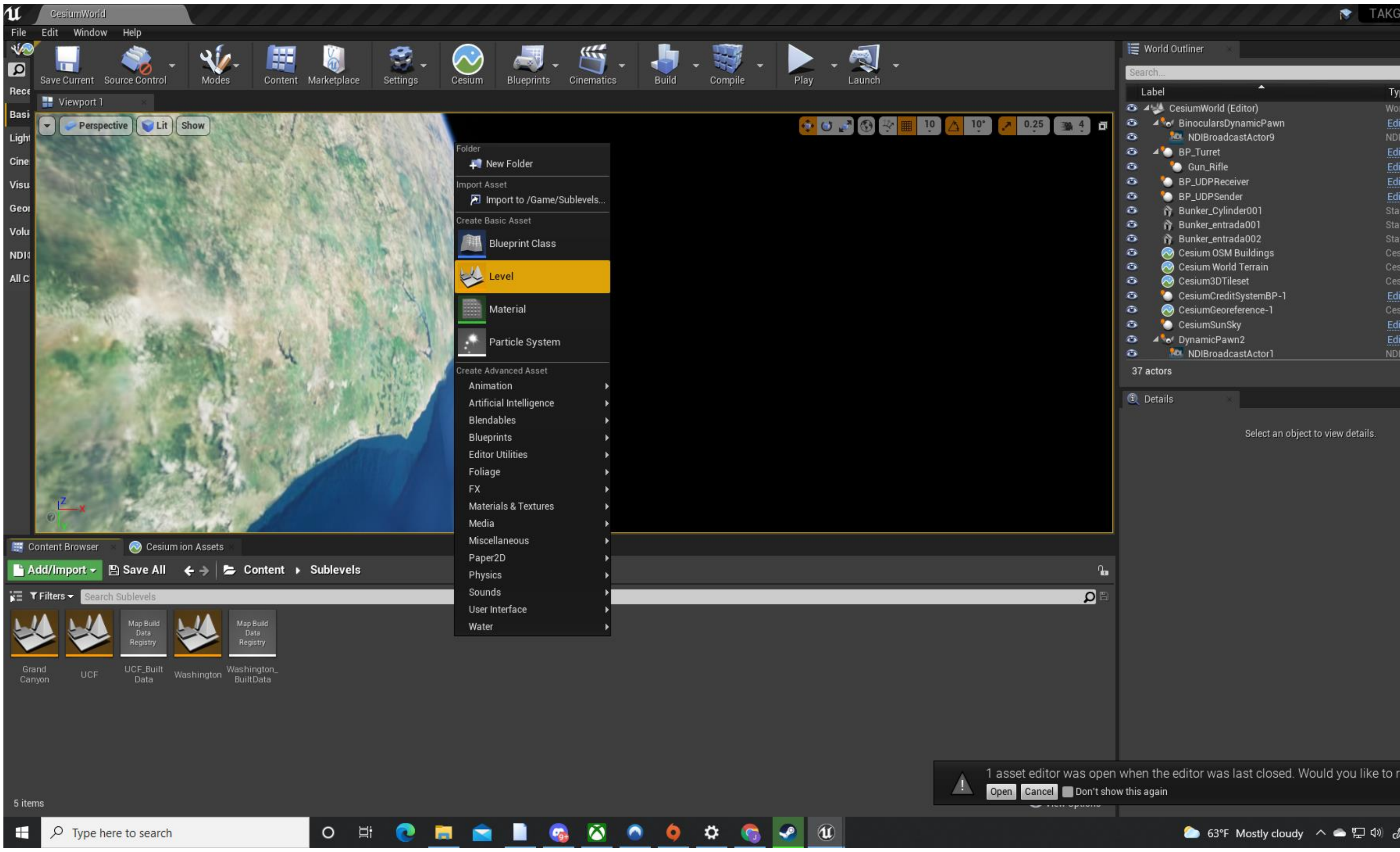
Reference to Actor ID '/Game/World/Globe.Globe:PersistentLevel.CesiumSunSk

Figure 2: Setting the Sun Sky to the new extended CesiumSunSky.

Once we have our lighting and our geospatial terrain, we can begin to segment our world. We will always have a persistent level that encompasses the globe, and inside of this level we can have one or more sublevels that are always loaded. These sublevel volumes are much easier to work in and allow us to develop like we would for any Unreal video game.

Unreal has an easy-to-use level window where we can define the structure of our levels; From setting the initial persistent level to connecting that with our sublevels. This is how we have structured our sublevels.

First we must add a new level into our content browser, once this is done we can then assign it to the cesium layer inside the levels window.



1 asset editor was open when the editor was last closed. Would you like to r

Figure 3: Adding new level to the content browser

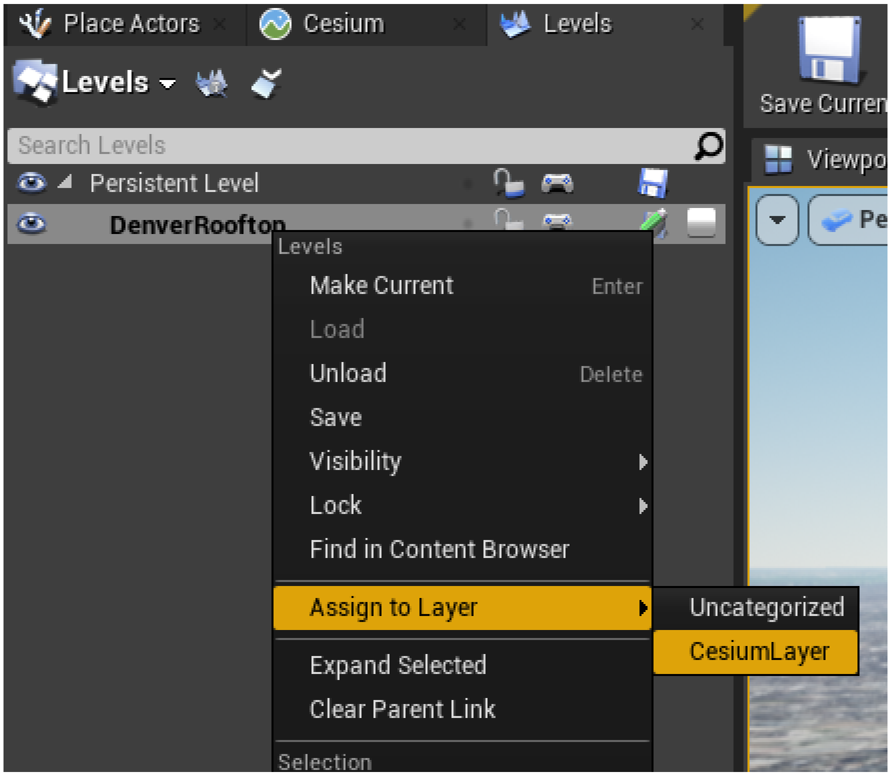
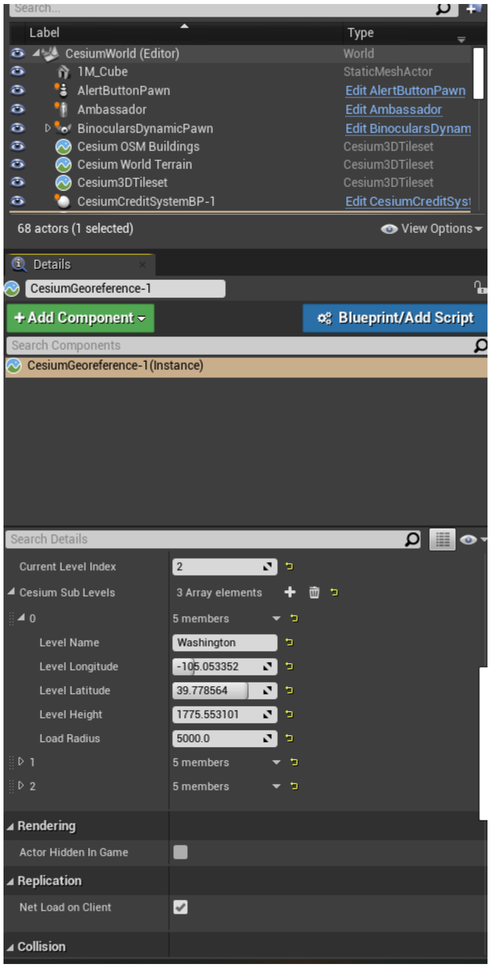


Figure 4: Using the level window to assign sublevels to the persistent level.

We can then add this sublevel to the cesium geo-reference. Select the cesium geo-reference actor in the world outliner and under the tab cesium sublevels, click the button “Check for new Sublevels”. Then find the sublevel in the array and set your desired radius size. The radius size will be the area in which the sublevel loads.



Label	Type
CesiumWorld (Editor)	World
1M_Cube	StaticMeshActor
AlertButtonPawn	Edit AlertButtonPawn
Ambassador	Edit Ambassador
BinocularsDynamicPawn	Edit BinocularsDynam
Cesium OSM Buildings	Cesium3DTileset
Cesium World Terrain	Cesium3DTileset
Cesium3DTileset	Cesium3DTileset
CesiumCreditSystemBP-1	Edit CesiumCreditSyst

68 actors (1 selected)

Details

CesiumGeoreference-1

CesiumGeoreference-1(Instance)

Current Level Index	2
Cesium Sub Levels	3 Array elements
0	5 members
Level Name	Washington
Level Longitude	-105.053352
Level Latitude	39.778564
Level Height	1775.553101
Load Radius	5000.0
1	5 members
2	5 members

Rendering

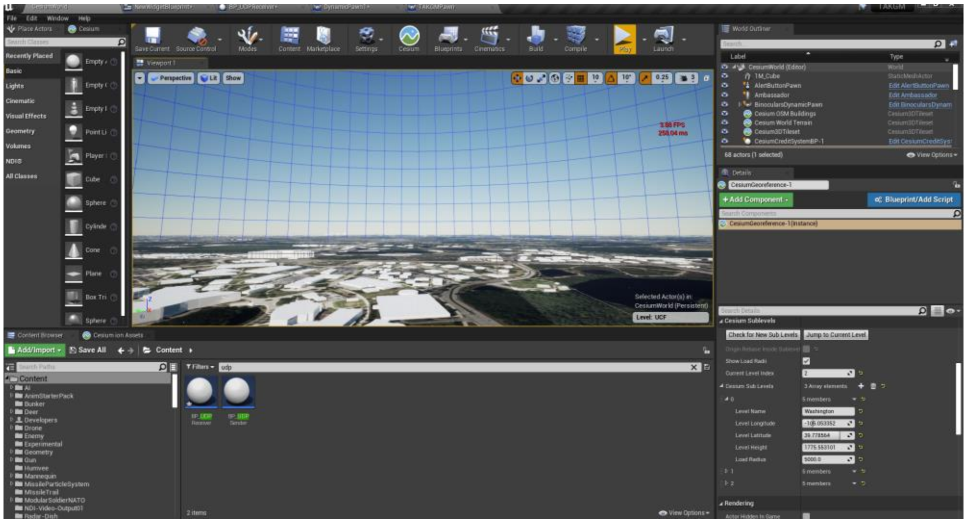
Actor Hidden In Game ☐

Replication

Net Load on Client ☑

Collision

Figure 5: The Sublevel Array Inside of Cesium Georeference



Cesium Sublevels

Check for New Sub Levels | Jump to Current Level

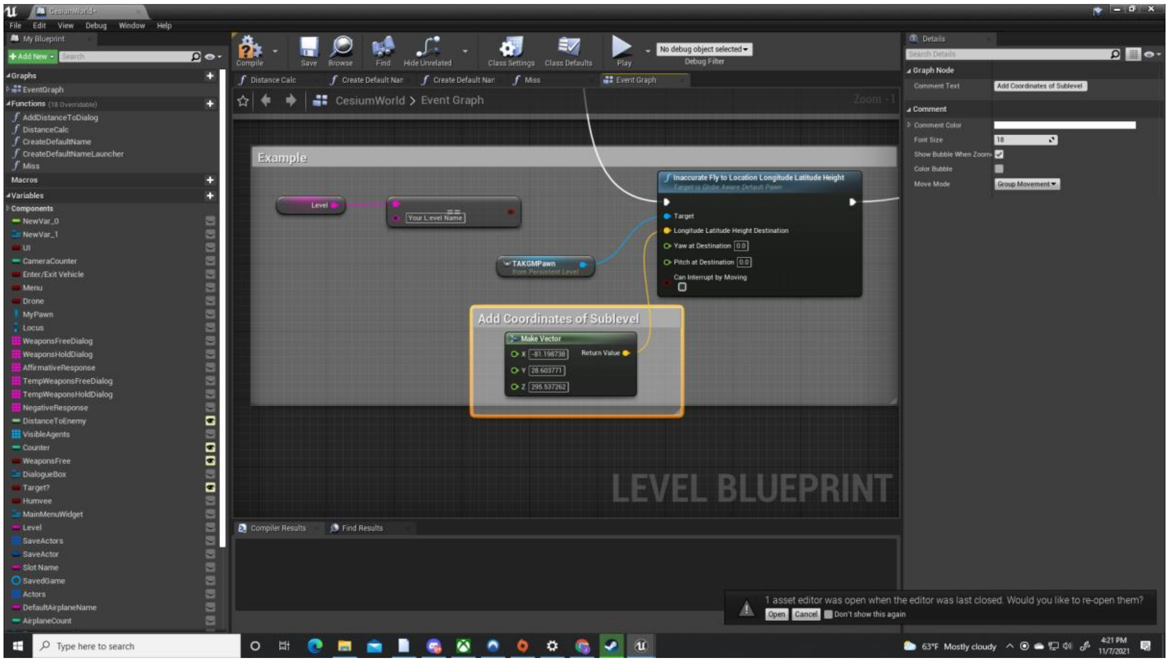
Origin Rebase Inside Sublevel	☐
Show Load Radii	☑
Current Level Index	2
Cesium Sub Levels	3 Array elements
0	5 members
Level Name	Washington
Level Longitude	-105.053352
Level Latitude	39.778564
Level Height	1775.553101
Load Radius	5000.0
1	5 members
2	5 members

Rendering

Actor Hidden In Game ☐

Figure 6: The Radius

Next we need to add a few nodes to the level blueprint to travel to the sublevel. In the string comparison, we are comparing the level selected to the name of our new sublevel (Add the name of the sublevel into this comparison exactly how it was named in the content browser) , then we (innacurate fly to) the coordinates of the sublevel. Fill that information out.



Yaw at Destination 0.0

Pitch at Destination 0.0

X -81.198738

Y 28.603771

Z 295.537262

Comment Text: Add Coordinates of Sublevel

Comment Color

Font Size: 18

Show Bubble When Zoom: ☑

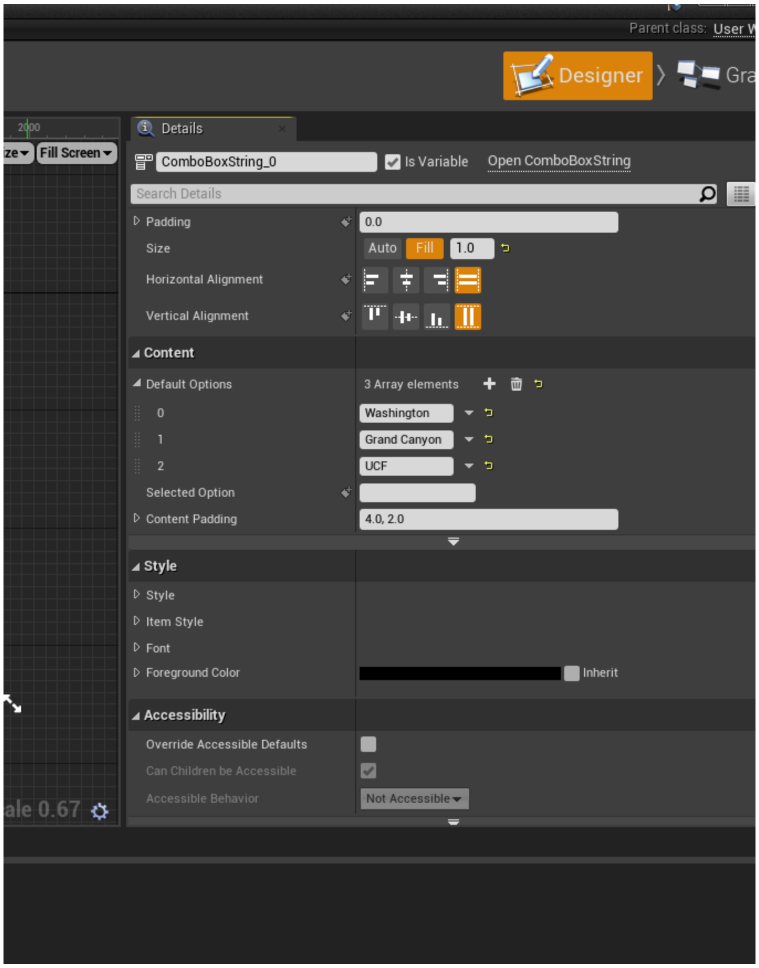
Color Bubble: □

Move Mode: Group Movement

1 asset editor was open when the editor was last closed. Would you like to re-open them?

Figure 7: Example of new sublevel in level blueprint

Finally, we open up the (sublevel select) blueprint and add into the only combo-box a new default value. This is the name we chose for our sublevel.



Parent class: User W

ComboBoxString_0 ☑ Is Variable Open ComboBoxString

Search Details

Padding 0.0

Size Auto Fill 1.0

Horizontal Alignment

Vertical Alignment

Content

Default Options 3 Array elements

0 Washington

1 Grand Canyon

2 UCF

Selected Option

Content Padding 4.0, 2.0

Style

Style

Item Style

Font

Foreground Color Inherit

Accessibility

Override Accessible Defaults □

Can Children be Accessible ☑

Accessible Behavior Not Accessible

Figure 8: Combo Box of the sublevel select blueprint.