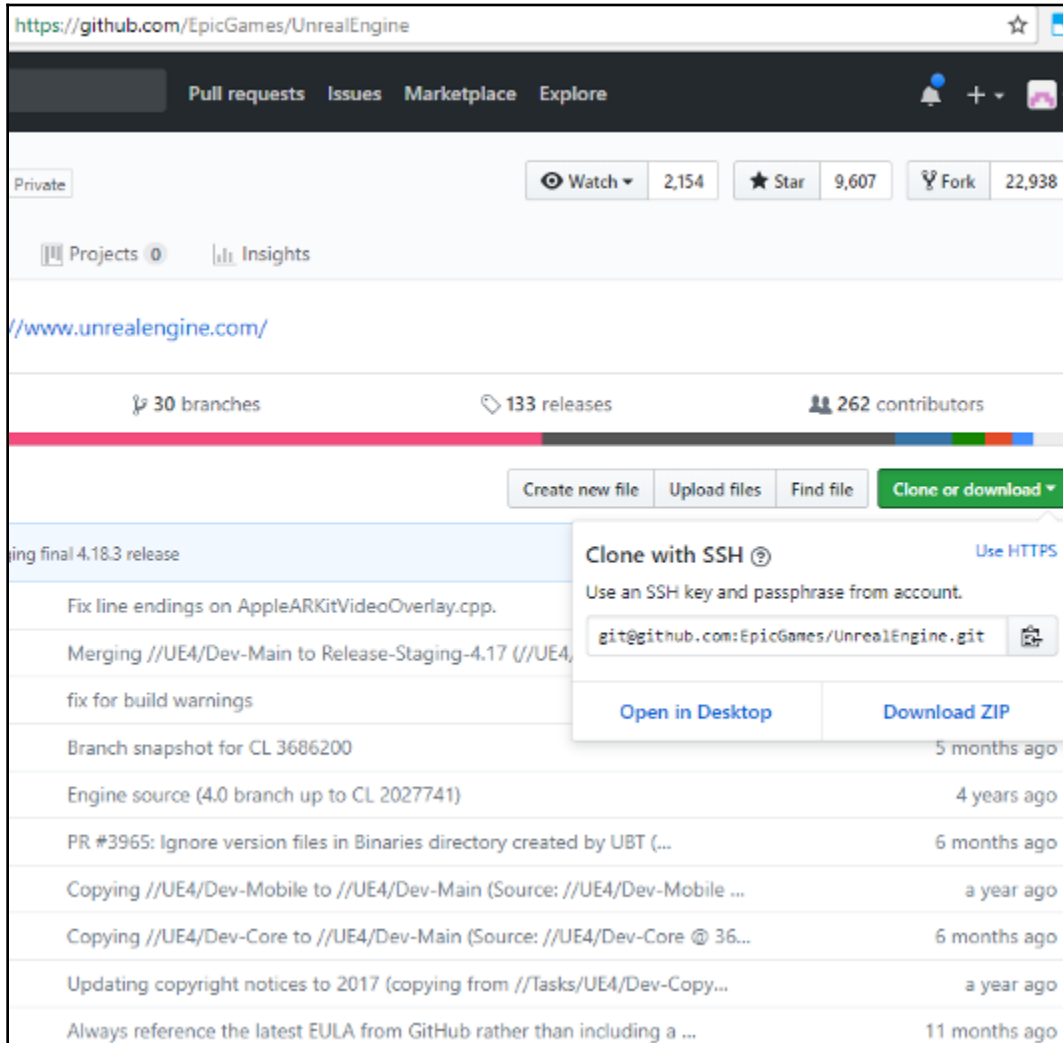
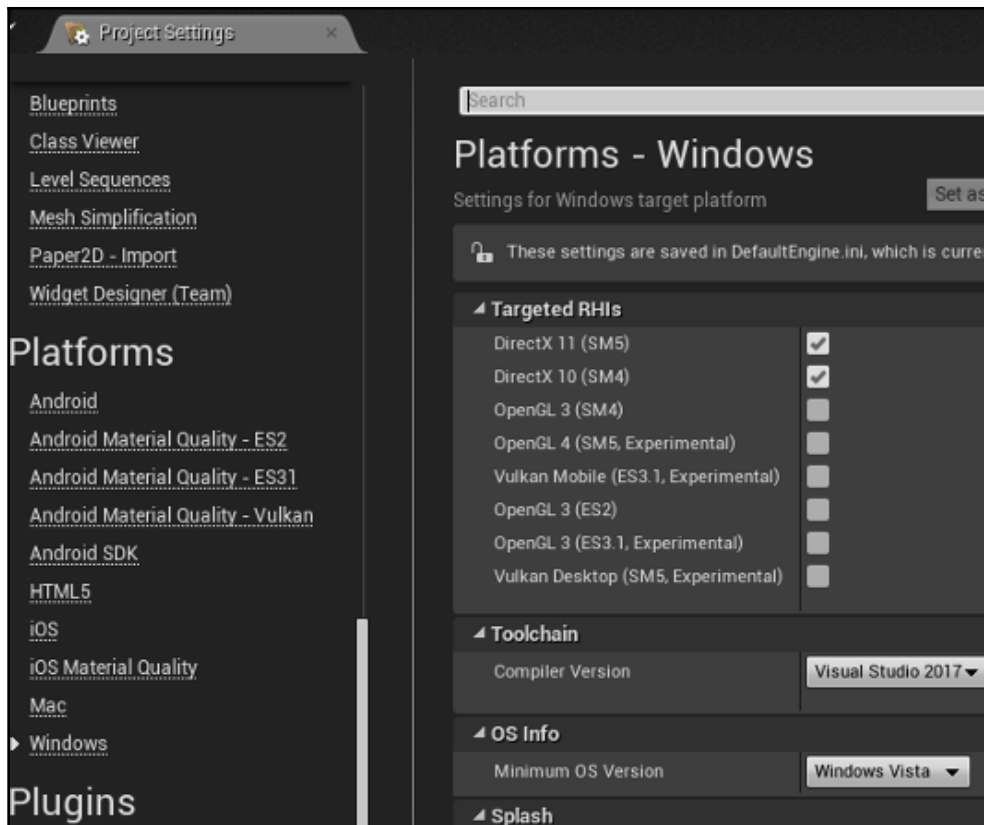


# Chapter 1: Making a C++ Project for a First-person Shooter







Target Hardware

## Game

[Asset Manager](#)

## Engine

[AI System](#)

[Animation](#)

[Audio](#)

[Collision](#)

[Console](#)

[Cooker](#)

[Crowd Manager](#)

[End-User Settings](#)

[Gameplay Debugger](#)

[Garbage Collection](#)

[General Settings](#)

[Hierarchical LOD](#)

### Input

[Navigation Mesh](#)

[Navigation System](#)

[Network](#)

[Physics](#)

[Rendering](#)

[Rendering Overrides \(Local\)](#)

Search

## Engine - Input

Input settings, including default input action and

[Set as Default](#)

[Export...](#)

[Import...](#)

[Reset to Defaults](#)

These settings are saved in DefaultInput.ini, which is currently writable.

### Bindings

Action and Axis Mappings provide a mechanism to conveniently map keys and axes to input behaviors by inserting a layer of indirection between the input behavior and the keys that invoke it. Action Mappings are for key presses and releases, while Axis Mappings allow for inputs that have a continuous range.

#### Action Mappings +

##### Stealth + X

Left Shift Shift  Ctrl  Alt  Cmd  X

##### Jump + X

##### Fire + X

##### ResetVR + X

##### NewActionMapping\_0 + X

None Shift  Ctrl  Alt  Cmd  X

#### Axis Mappings +

### Mouse Properties

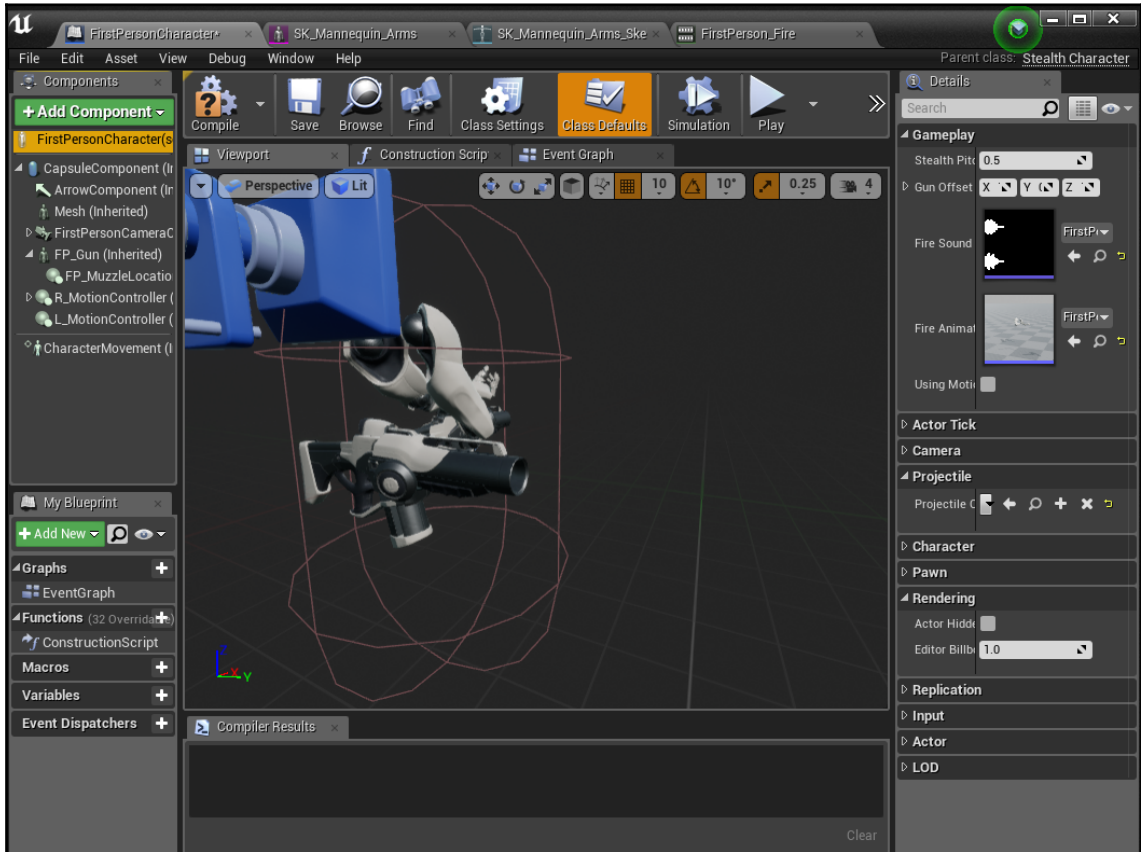
Use Mouse for Touch

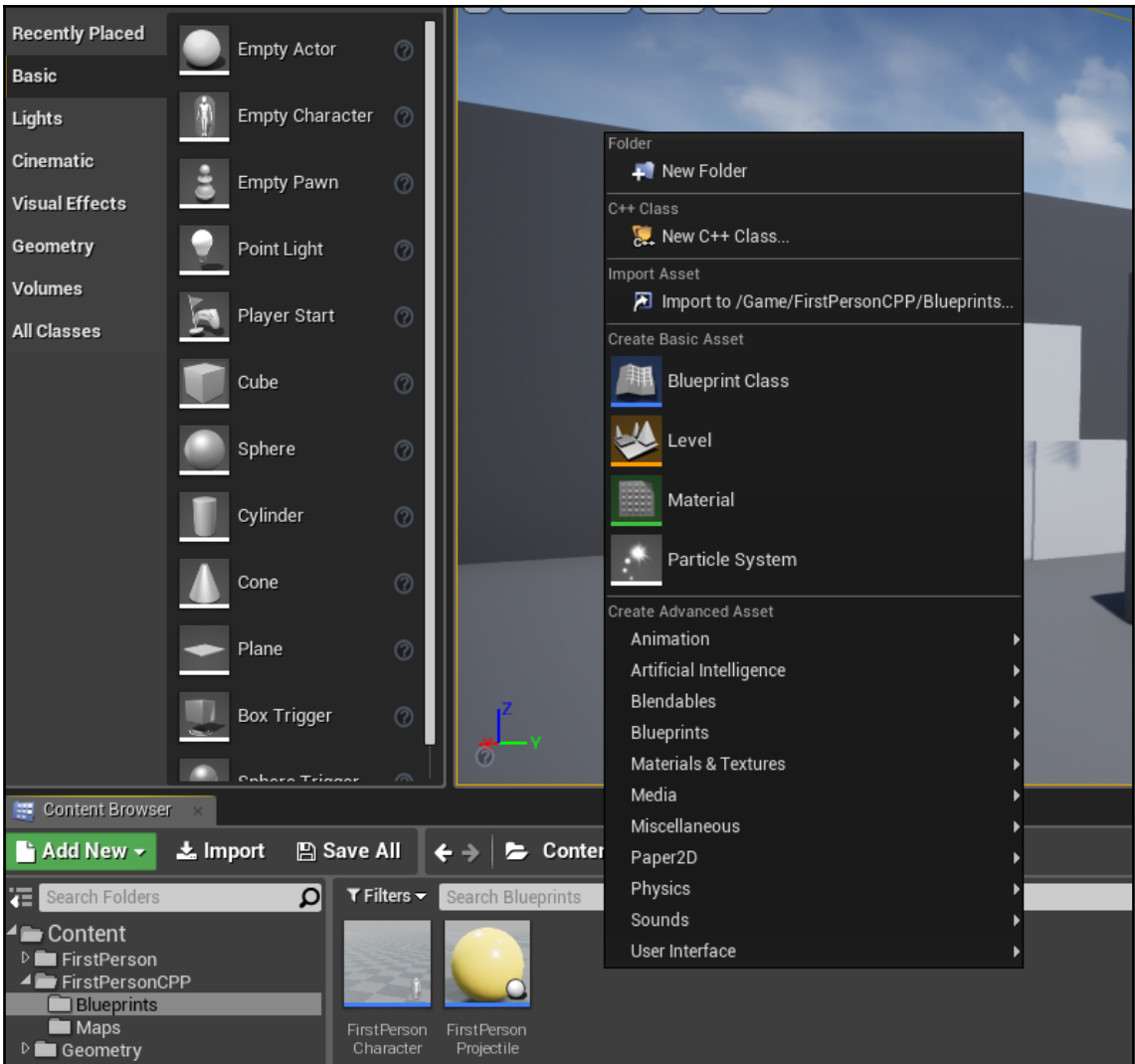
### Viewport Properties

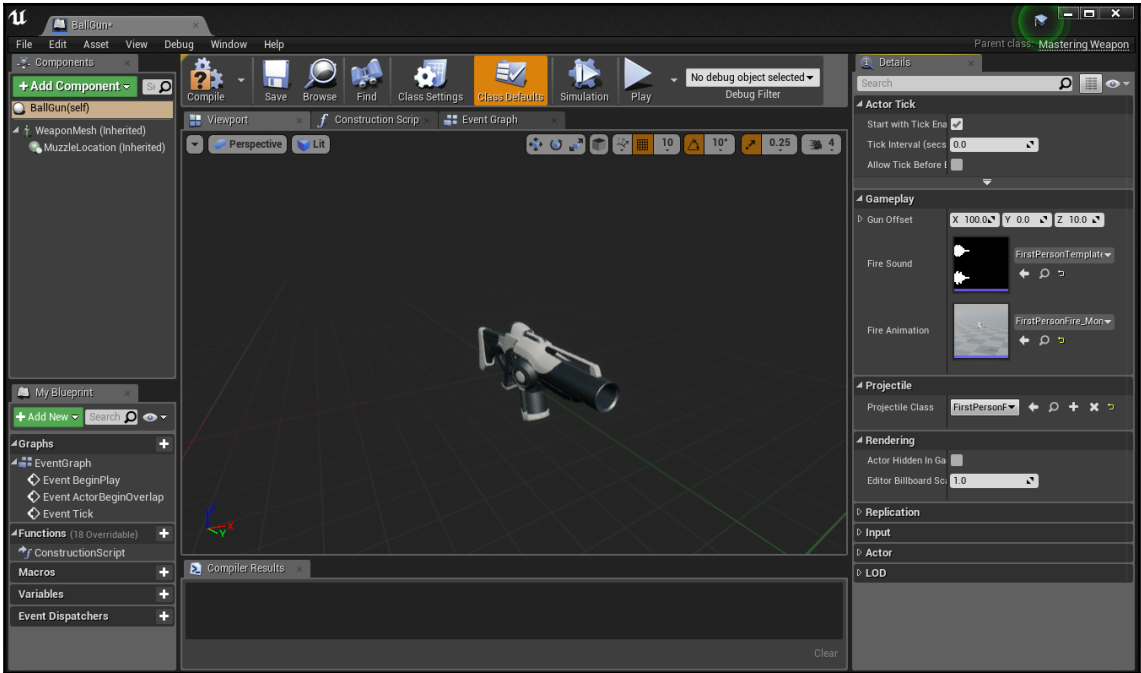
Capture Mouse on Launch

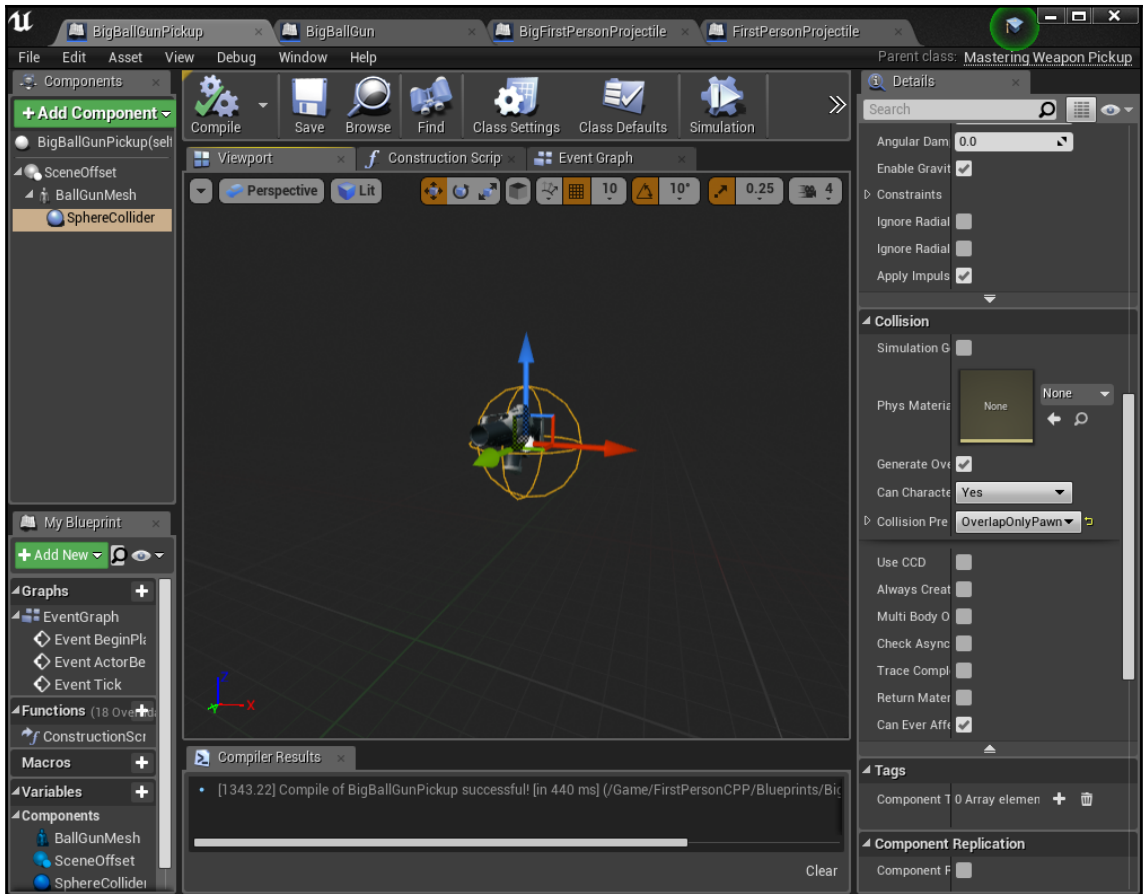
Default Viewport Mouse Capture Mod [Capture Permanently Including Initial Mouse Down](#)

# Chapter 2: Inventory and Weapons for the Player









# Chapter 3: Blueprint Review and When to Use BP Scripting

The screenshot displays the Unreal Engine Profiler interface. The main window shows a graph of the Game Thread's performance. A red box highlights a peak in the graph. Below the graph, a table lists the calling functions, current function, and called functions. The table is as follows:

Event Name	Inc Time (MS)	Inc Time (%)	Exc Time (MS)	Exc Time (%)	Calls
FDCCleanup [0x40d8]	100.251 ms	226.3 %	0.000 ms	0.0 %	1.0
GameThread [0x33f4]	44.303 ms	100.0 %	0.000 ms	0.0 %	1.0
FrameTime	38.881 ms	87.8 %	0.000 ms	0.0 %	2.0
FAudioThreadTask.AudioUpdateT	16.523 ms	42.5 %	0.000 ms	0.0 %	2.0
Pump Messages	9.045 ms	23.3 %	0.000 ms	0.0 %	1.0
Frame Time	5.994 ms	15.4 %	0.000 ms	0.0 %	1.0
Total Slate Tick Time	5.813 ms	14.9 %	0.000 ms	0.0 %	1.0



U
FirstPersonCharacter - Blueprint Diff
[-] [max] [x]

◀ ▶ 🔒  
Prev Next Lock/Unlock

▷ Defaults  
◀ Components  
NavAgentProps bCar  
▷ Construction Script  
▷ Event Graph

- Mesh1P (Inherited)
- R\_MotionController (Inherited)
- L\_MotionController (Inherited)
- CharacterMovement (Inherited)
- Inventory (Inherited)

◀ Movement Cap

- Nav Agent R -1.0
- Nav Agent H -1.0
- Nav Agent S -1.0
- Nav Walking 0.5
- Preferred Na None

- Mesh1P (Inherited)
- R\_MotionController (Inherited)
- L\_MotionController (Inherited)
- CharacterMovement (Inherited)
- Inventory (Inherited)

◀ Movement Cap

- Nav Agent R -1.0
- Nav Agent H -1.0
- Nav Agent S -1.0
- Nav Walking 0.5
- Preferred Na None

Revision 4d16201d - 03/21/2018
Revision 5a6faaed - 03/21/2018

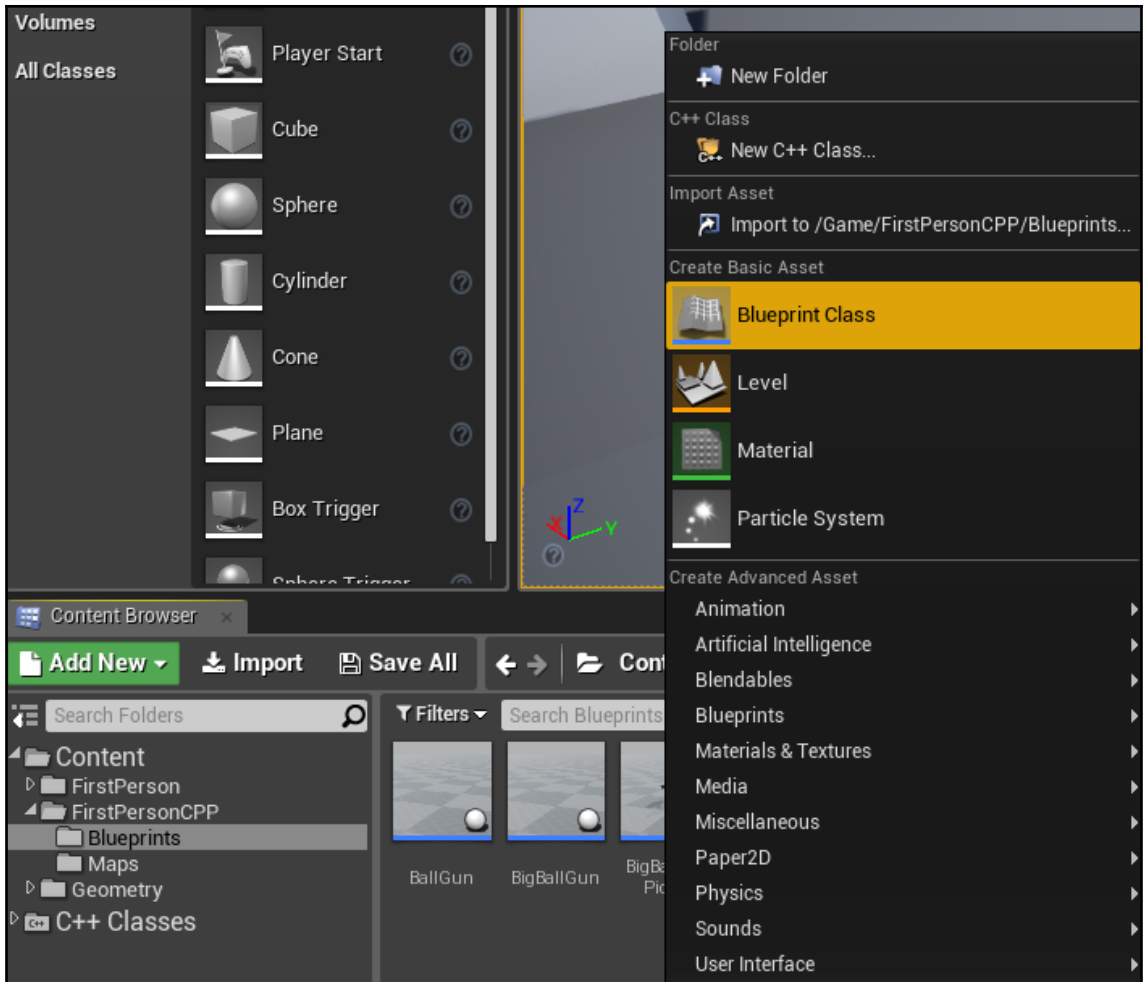
U
File History
[-] [max] [x]

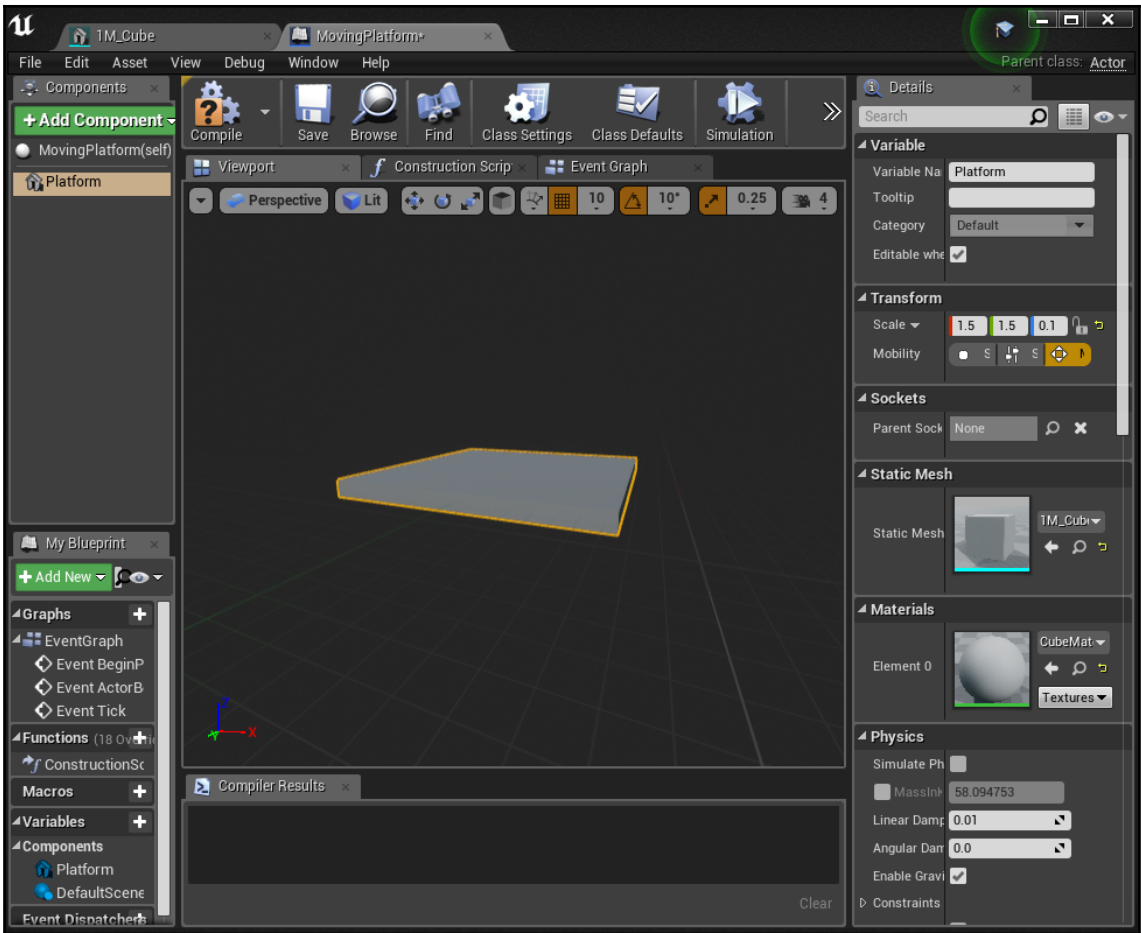
Revision	Date Submitted	Submitted By	Description
<b>▲ M:/HomeDev/Packt/Mastering/Content/FirstPersonCPP/Blueprints/FirstPersonCharacter.uasset</b>			
✓ 60a37b57	Mar 25, 2018, 11:38:52 PM	matt.edmonds	Added a first pass inventory class to h
✓ 5a6faaed	Mar 21, 2018, 1:39:02 PM	matt.edmonds	Added Stealth mechanic (including cro
✓ 29016ed7	Mar 21, 2018, 1:37:09 PM	matt.edmonds	Added StealthCharacter class and repa
± 4d16201d	Mar 21, 2018, 1:08:28 PM	matt.edmonds	Initial content add and readme.md setu

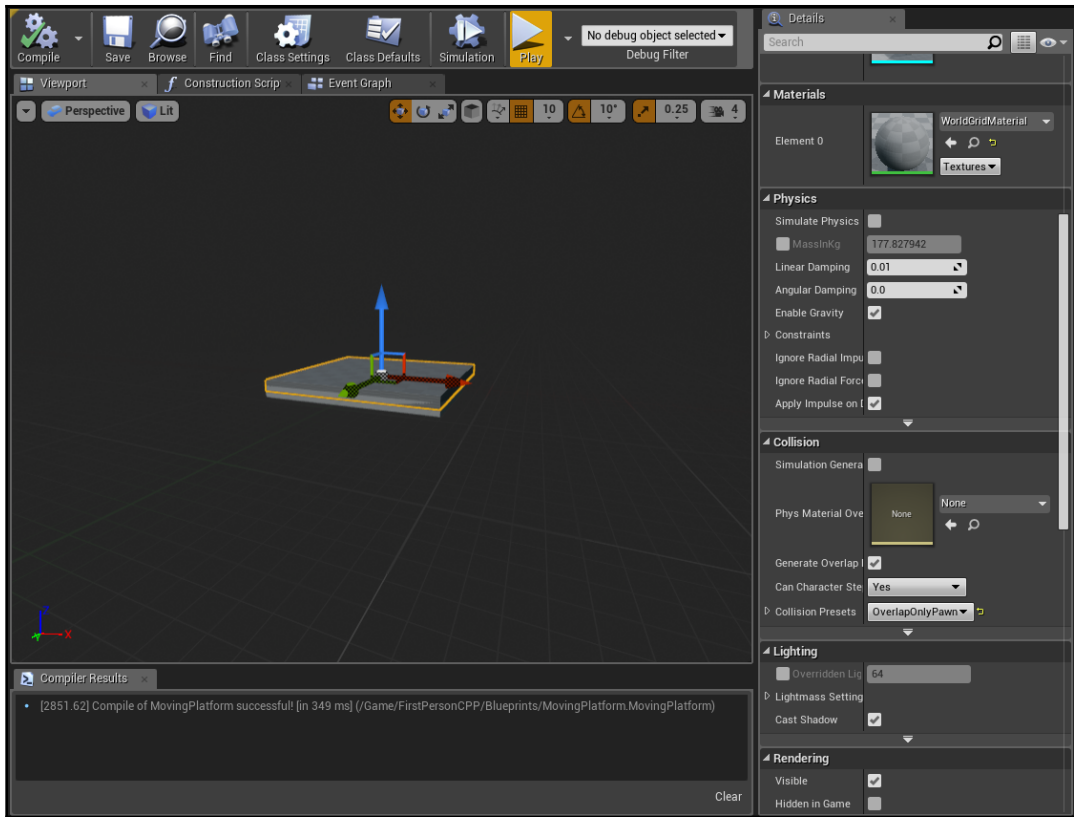
Revision:	5a6faaed	Changelist:	
Date Submitted:	Mar 21, 2018, 1:39:02 F	Workspace:	
Submitted By:	matt.edmonds	File Size:	0.1 MB
Action:	modified	Branched From:	

Description:

Added Stealth mechanic (including crouching) to the StealthCharacter and bound its input on PC to left-shift.







Viewport Construction Scrip Event Graph

MovingPlatform > Event Graph Zoom -3

Event ActorBeginOverlap

Other Actor

GetClass

Object Return Value

Class Is Child Of

Test Class Return Value

Parent Class Mastering Chara

Branch

Condition True False

Platform

Move Component To

Completed

Move

Stop

Return

Component

Target Relative Location

Target Relative Rotation

X 0.0 Y 0.0 Z 0.0

Ease Out

Ease In

Over Time 4.0

Force Shortest Rotation Path

GetActorLocation

Target is Actor

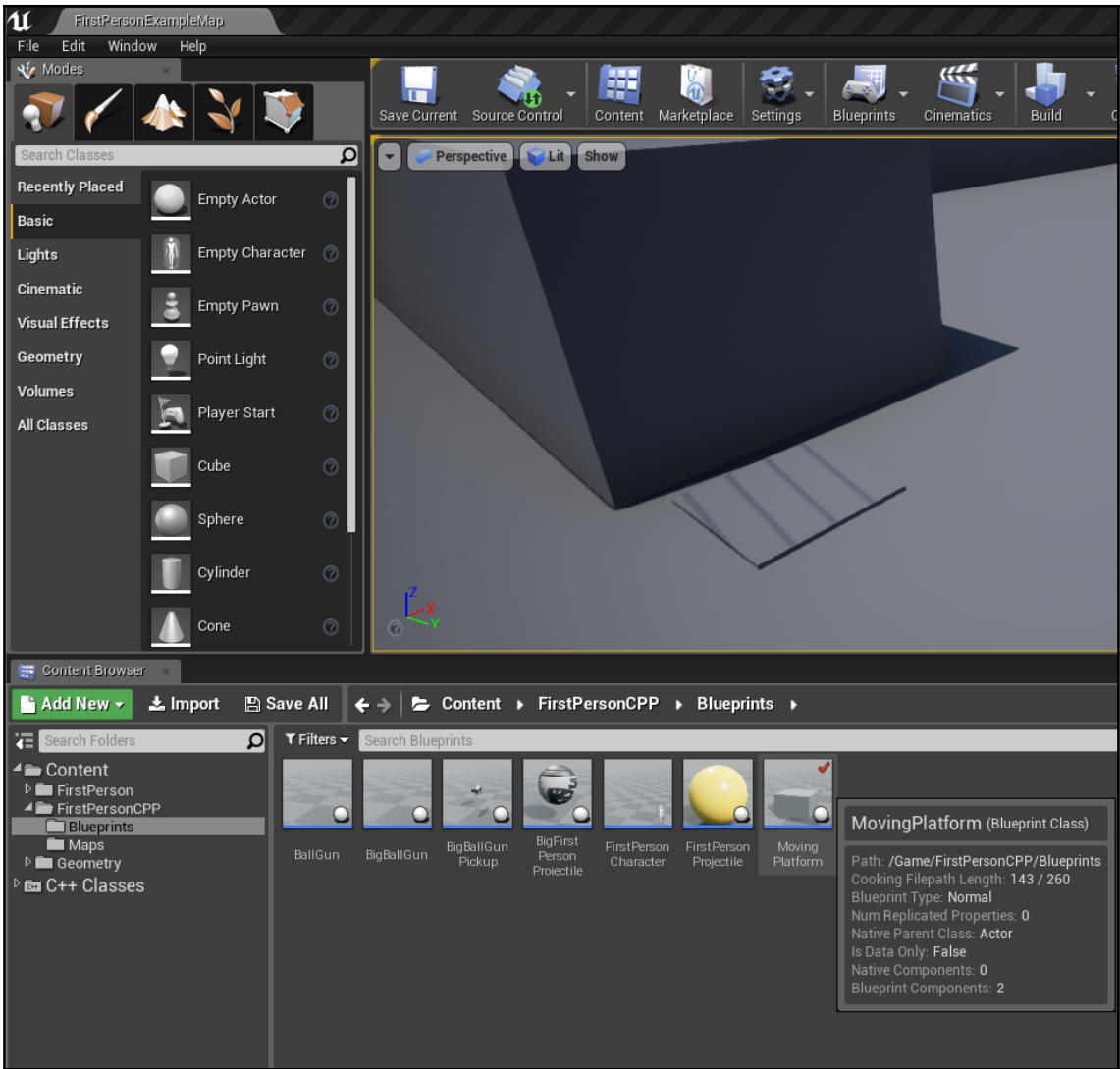
Target self Return Value

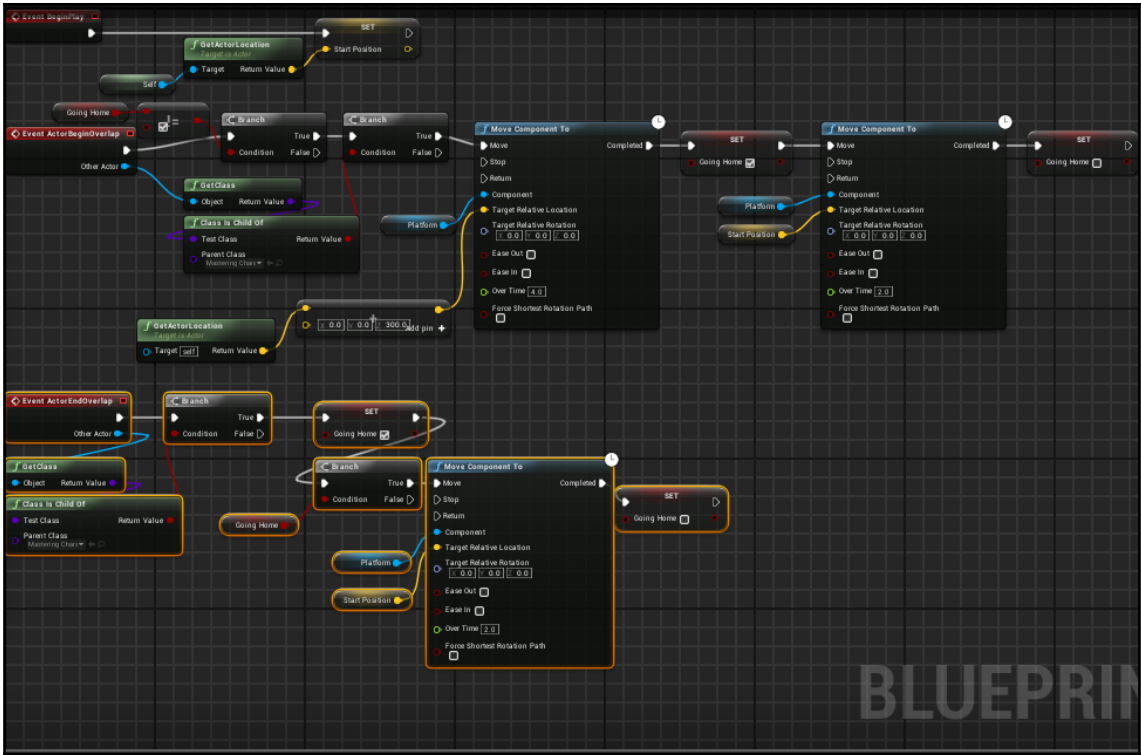
X 0.0 Y 0.0 Z 300.0 Add pin

BLUEPRINT

Compiler Results

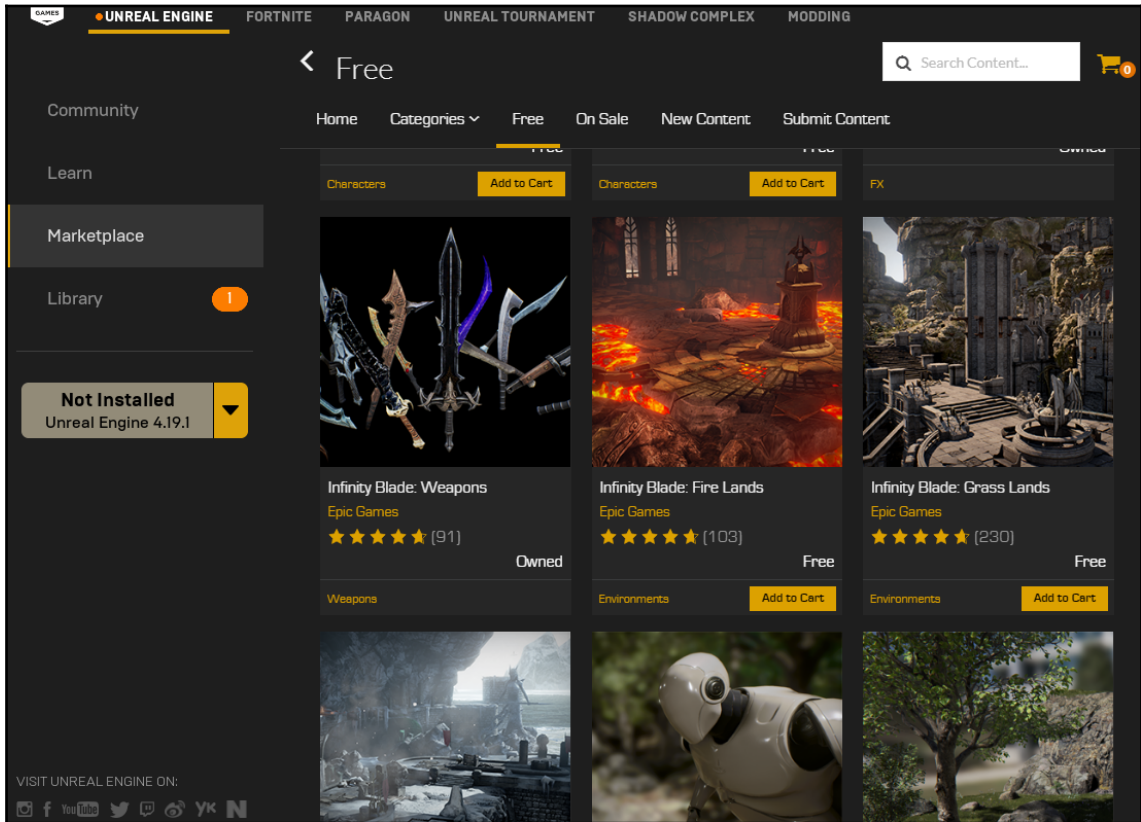
- [7845.17] Compile of MovingPlatform successful! [in 392 ms] (/Game/FirstPersonCPP/Blueprints/MovingPlatform.MovingPlatform)



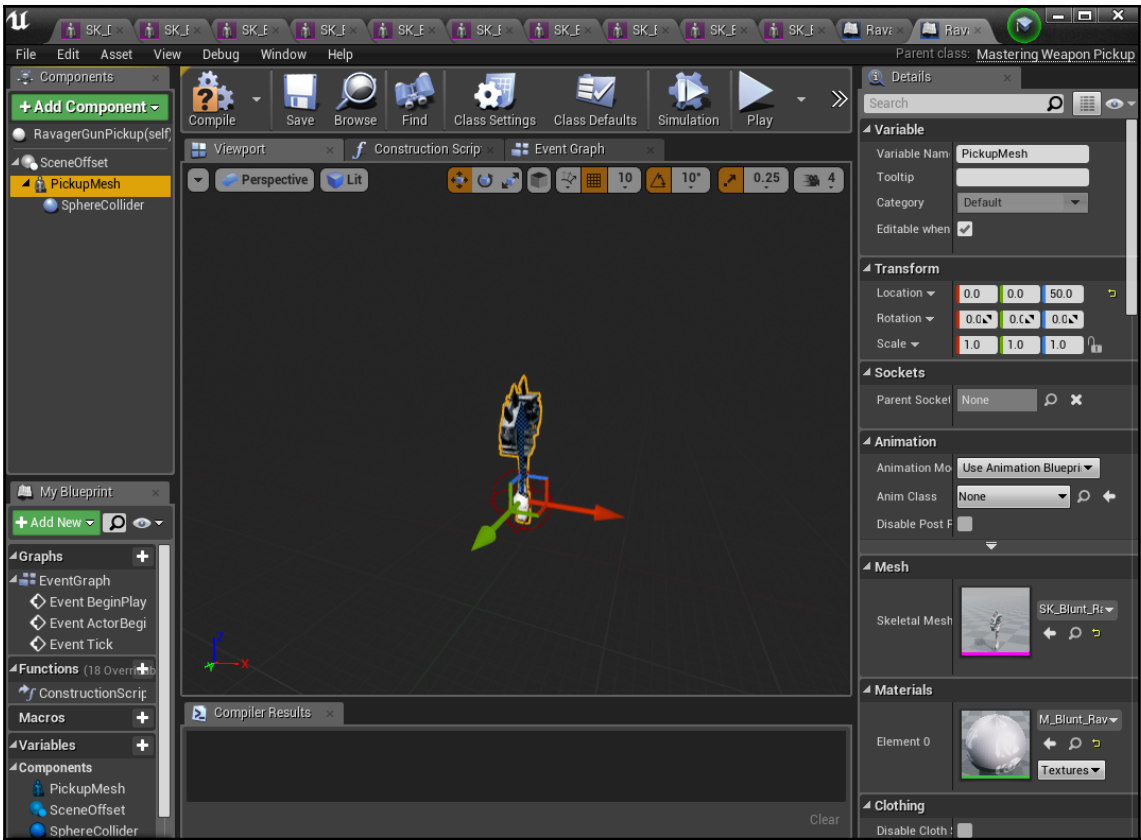


BLUEPRINT

# Chapter 4: U.I. Necessities, Menus, HUD, and Load/Save e







InventoryHUDBar

File Edit Asset View Debug Window Help Parent class: Mastering Inventory Display

Compile Save Browse Find Class Settings Class Defaults Play Designer Graph

My Blueprint Event Graph Set Selected Weapon Add Icon for Weapon Remove Icon for V Find Slot by Prop

InventoryHUDBar > Event Graph Zoom -3

+ Add New Search  
 f AddIconForWeapon  
 f SetSelectedWeapon  
 f FindSlotByProperties  
 f RemoveIconForWeapon  
 Macros +  
 Variables +  
 WeaponIcons  
 WeaponIconList  
 WeaponPropertiesList  
 InventoryScrollBar  
 Event Dispatchers  
 Details  
 Search  
 Category: Default  
 Keywords  
 Compact  
 Access S: Public  
 Pure  
 Call In Ed  
 Inputs +  
 Weapon Weapon Prop  
 Outputs +  
 Please press the + icon above to e

Event Graph

Event Weapon Selected

Weapon

Set Selected Weapon  
Target: InventoryHUDBar  
Selected Weapon

Event Weapon Added

Weapon

Add Icon for Weapon  
Target: InventoryHUDBar  
Weapon In

Event Weapon Removed

Weapon

Remove Icon for Weapon  
Target: InventoryHUDBar  
Weapon Properties

WIDGET BLUEPRINT

Compiler Results Find Results

erName="+cycle" && MemberGuid(A=912796673 && B=1191545636 && C=1216018086 && D=1131398234) || Name="(cycle)"

No Results found

InventoryHUDBar

File Edit Asset View Debug Window Help Parent class: Mastering Inventory Display

Compile Save Browse Find Class Settings Class Defaults Play Designer Graph

My Blueprint

- + Add New
- Search
- f AddIconForWeapon
- f SetSelectedWeapon
- f FindSlotByProperties
- f RemoveIconForWeapon

Macros

Variables

- WeaponIcons
- WeaponIconList
- WeaponPropertiesList
- InventoryScrollBox

Event Dispatchers

Details

Search

Category: Default

Keywords

Compact

Access S: Public

Pure

Call In Ed

Inputs

- Weapon
- Weapon Prop

Outputs

- SlotWid
- Inventory Item

Event Graph

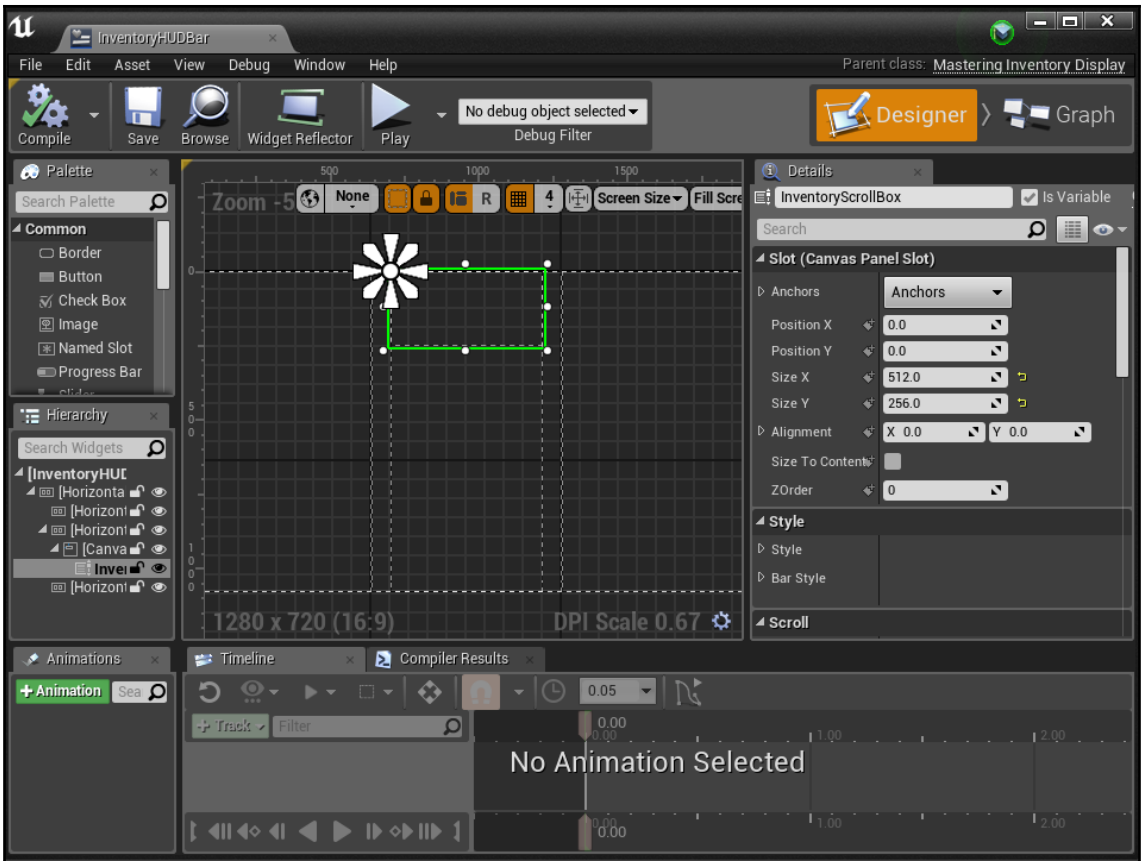
InventoryHUDBar > Find Slot by Properties Zoom -4

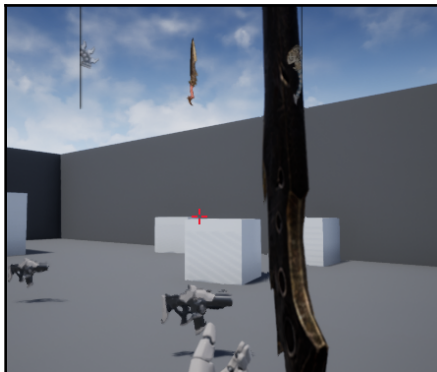
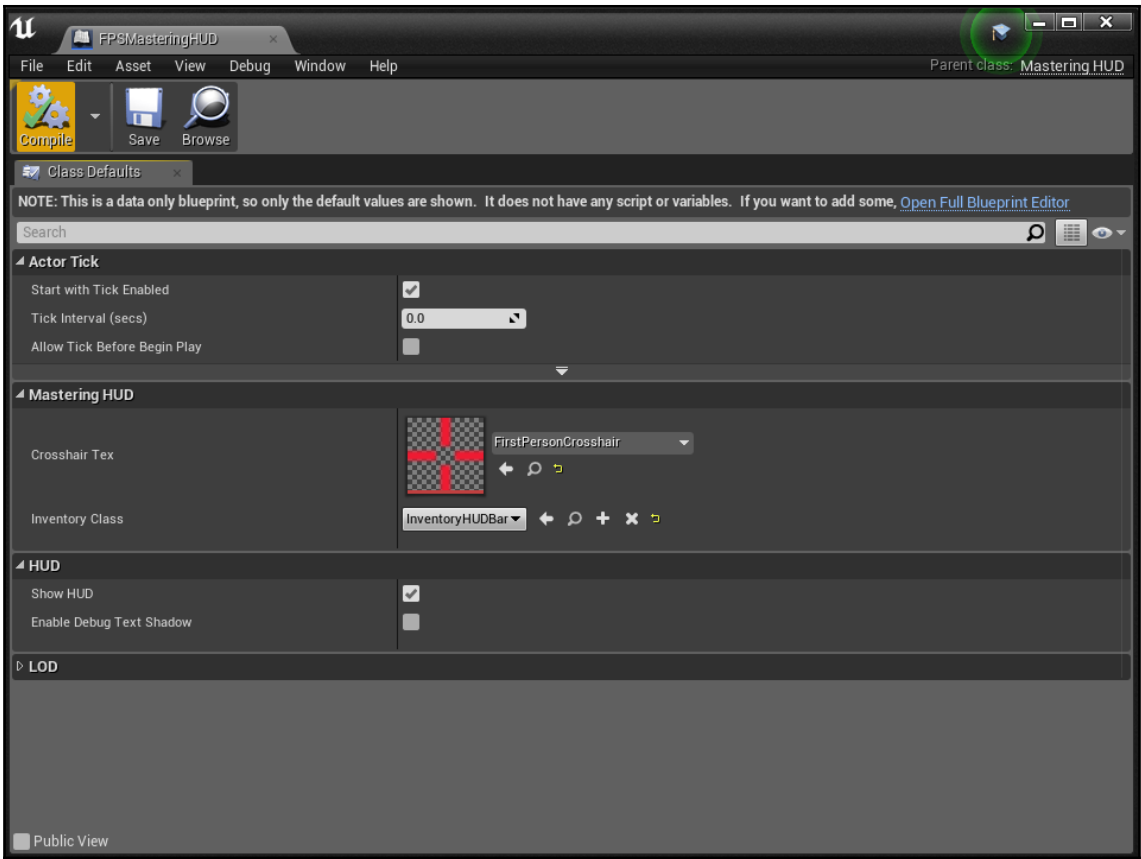
Compiler Results

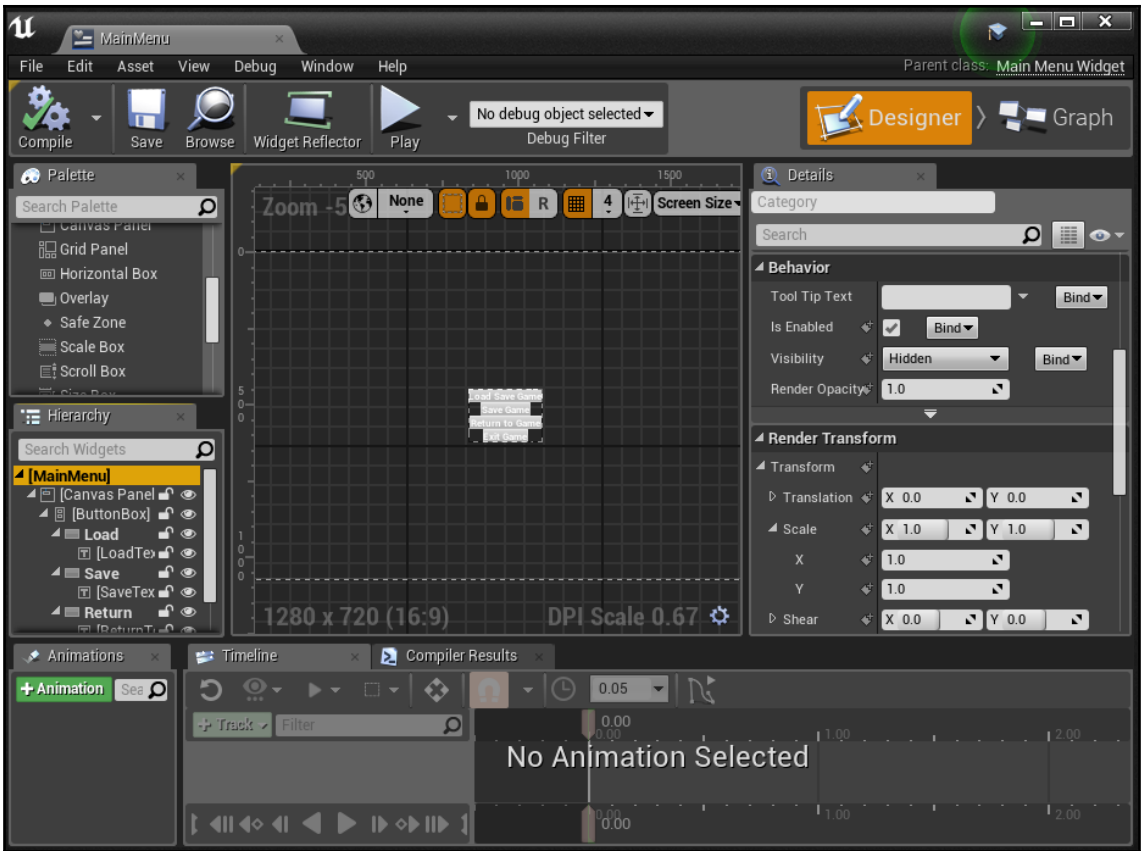
Find Results

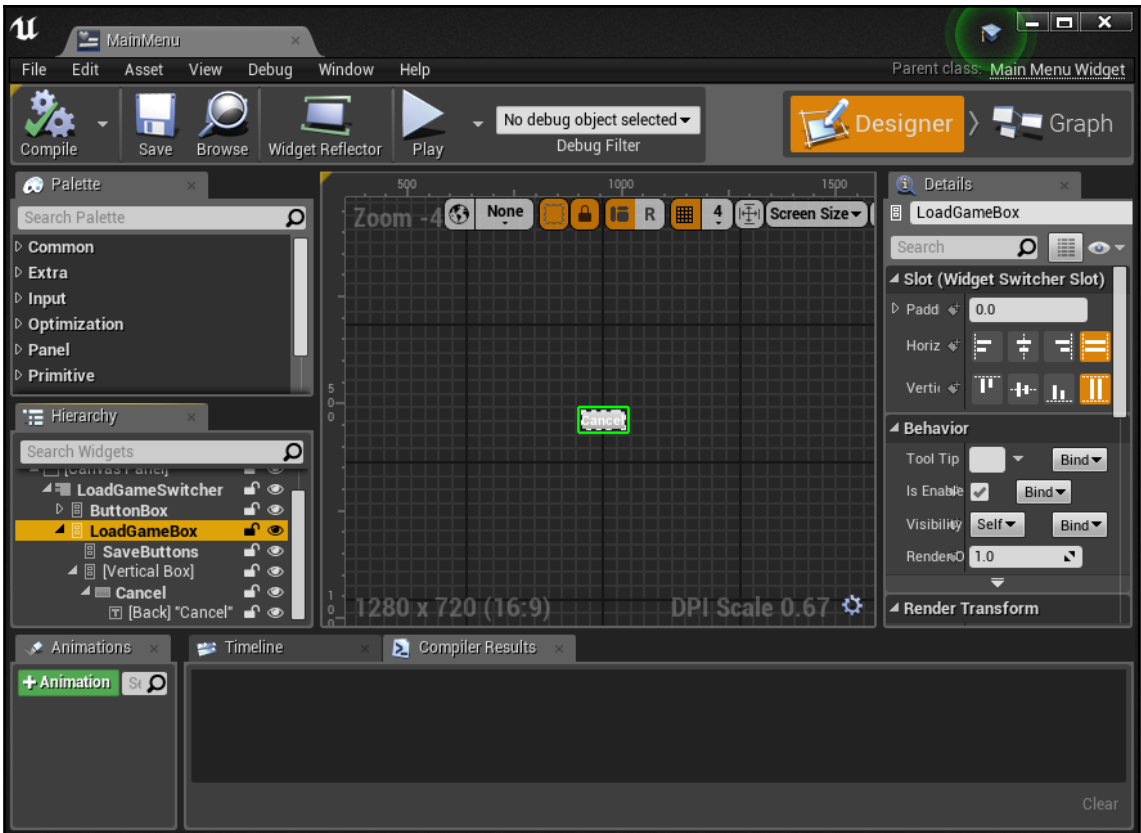
srName="+cycle" && MemberGuid(A=91279673 && B=1191545636 && C=1216018086 && D=1131398234)) || Name="(cycle)"

No Results found













The image shows a software interface for editing a widget blueprint. The main window is titled "SaveGameButton" and is part of a "User Widget" class. The interface includes a menu bar (File, Edit, Asset, View, Debug, Window, Help) and a toolbar with icons for Compile, Save, Browse, Find, Class Settings, Class Defaults, Play, Designer, and Graph. The left sidebar contains a "My Blueprint" section with an "Add New" button and a search field, and a "Graphs" section with a tree view showing "EventGraph" and its sub-events: "Event Pre Construct", "Event Construct", "Event Tick", and "On Clicked (LevelButt)". Below this are sections for "Functions (34 Overridable)", "Macros", and "Variables". The "Default" section shows a "Menu Ov" property set to "None". The "Appearance" section has options for "Color an", "Foregrou" (with a checked "Inherit" box), and "Padding" (set to "0.0").

The main workspace displays the "Event Graph" for the "SaveGameButton" widget. The graph is set to "Zoom -1" and contains the following nodes and connections:

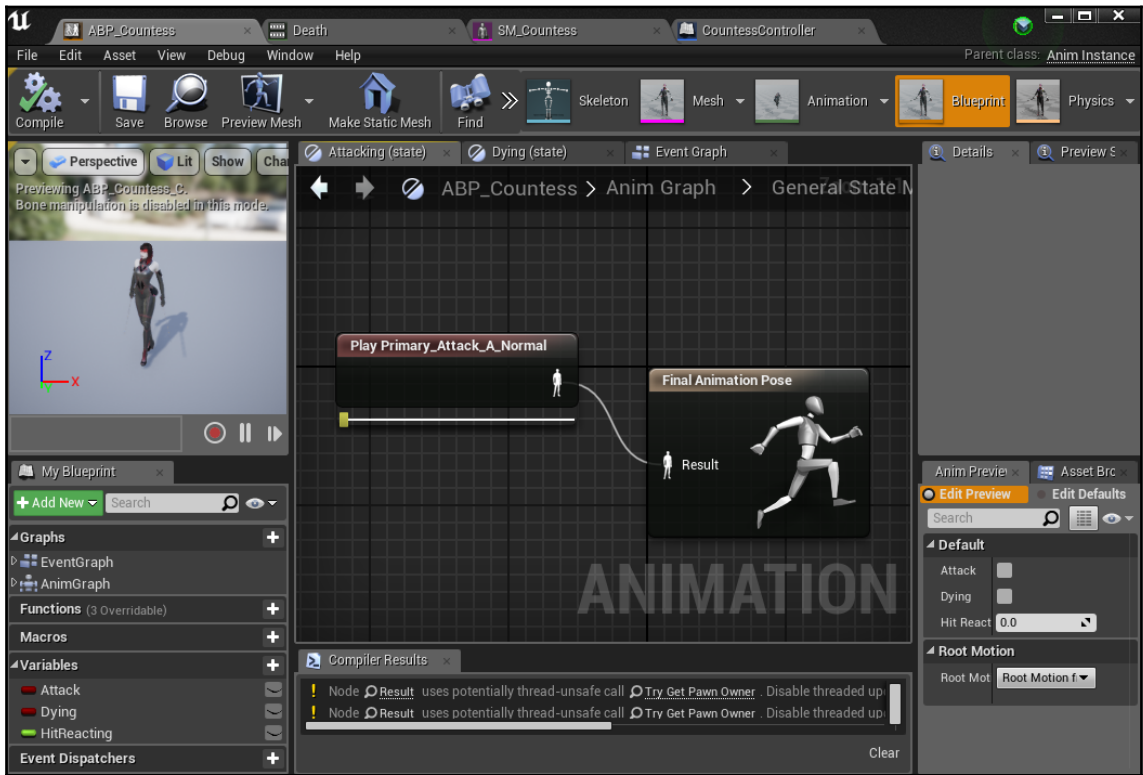
- On Clicked (LevelButton)**: A red event node with a play button icon.
- Menu Owner**: A blue variable node.
- Save Text**: A blue variable node.
- GetText (Text)**: A green function node with "Target is Text" and "Return Value" ports.
- Load Game**: A blue function node with "Target is Main Menu Widget" and "Save File" ports.

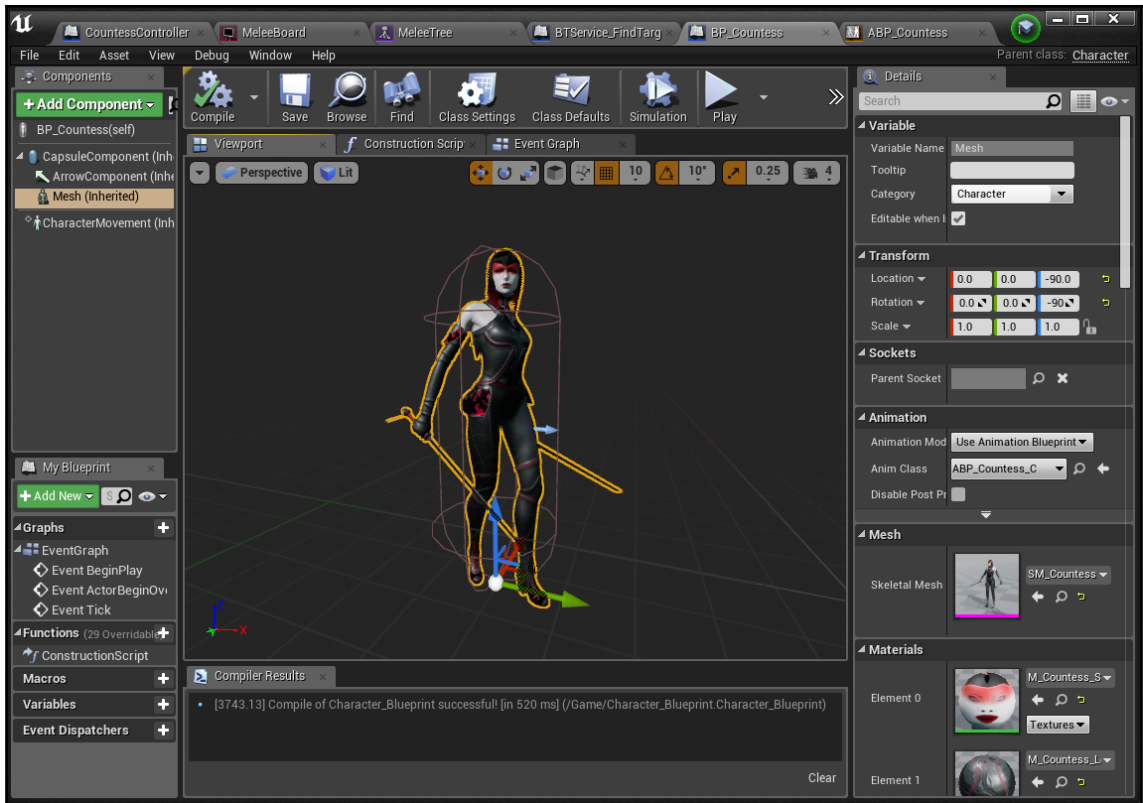
Connections in the graph:

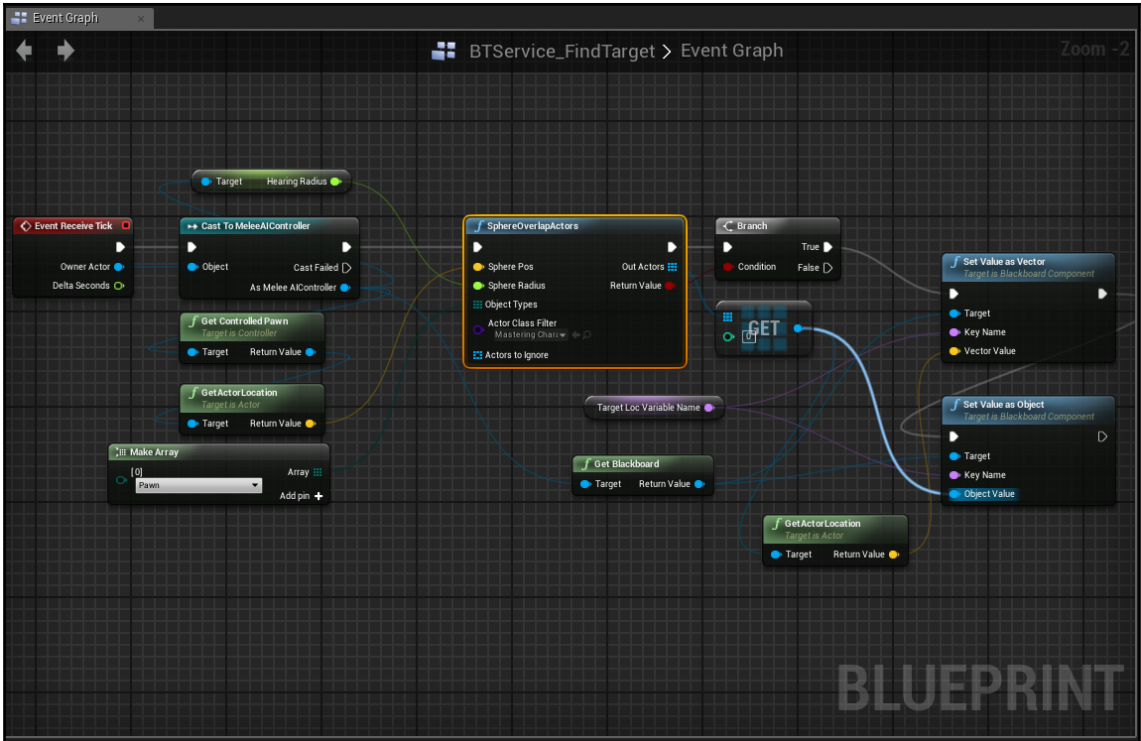
- The "On Clicked (LevelButton)" node is connected to the "Load Game" node.
- The "Menu Owner" node is connected to the "Load Game" node.
- The "Save Text" node is connected to the "GetText (Text)" node.
- The "GetText (Text)" node's "Return Value" port is connected to the "Load Game" node's "Save File" port.

At the bottom of the interface, there are tabs for "Compiler Results" and "Find Results", and a search bar with the text "Enter function or event name to find references..."

# Chapter 5: Adding Enemies!







The screenshot displays the Unreal Engine 4 Behavior Tree editor. The main workspace shows a Behavior Tree on a grid background. The tree starts with a **ROOT** node (MeleeBoard) which points to a **Selector** node. Inside the Selector node is a **BTService\_FindTarget** node, configured with the text "BTService\_FindTarget; tick every 0.50s". This service node is connected to a **Move To** node, which is set to "MoveTo: TargetLocation".

The interface includes a menu bar (File, Edit, Asset, Window, Help) and a toolbar with icons for Save, Browse, New Blackboard, New Task, New Decorator, and New Service. On the right side, there are two panels: "Behavior Tree" and "Blackboard". The "Behavior Tree" panel shows a search bar and a tree view with the current tree structure. The "Blackboard" panel shows a search bar and a "Keys" section with two entries: "Target" (blue) and "TargetLocation" (yellow).

At the bottom of the grid, the text "BEHAVIOR TREE" is displayed in large, semi-transparent letters.

U... BTService\_FindTarget x MeleeTree x

File Edit Asset View Debug Window Help

My Blueprint

+ Add New

Compile Save Browse Find Class Settings Class Defaults Play

Graphs

EventGraph

Event Receive Tick

Functions (7 Overridable)

Macros

Variables

TargetLocVariable

TargetVariableNan

Event Dispatchers

Event Graph

BTService\_FindTarget > Event Graph Zoom -4

Event Receive Tick

Cast To MeleeAIController

Cast Failed

As Melee Actor

Get Target

Return Value

Cast To MasteringCharacter

Cast Failed

As Mastering Character

Set Value as Vector

Target

Key Name

Vector Value

Get My Agent Location

Target

Return Value

Get Blackboard

Target

Return Value

Target Loc Variable Name

Details

Parent class: BTService Blueprint Base

Search

Default

Target Loc Var TargetLocation

Target Variable Target

Description

Node Name

Service

Interval 0.5

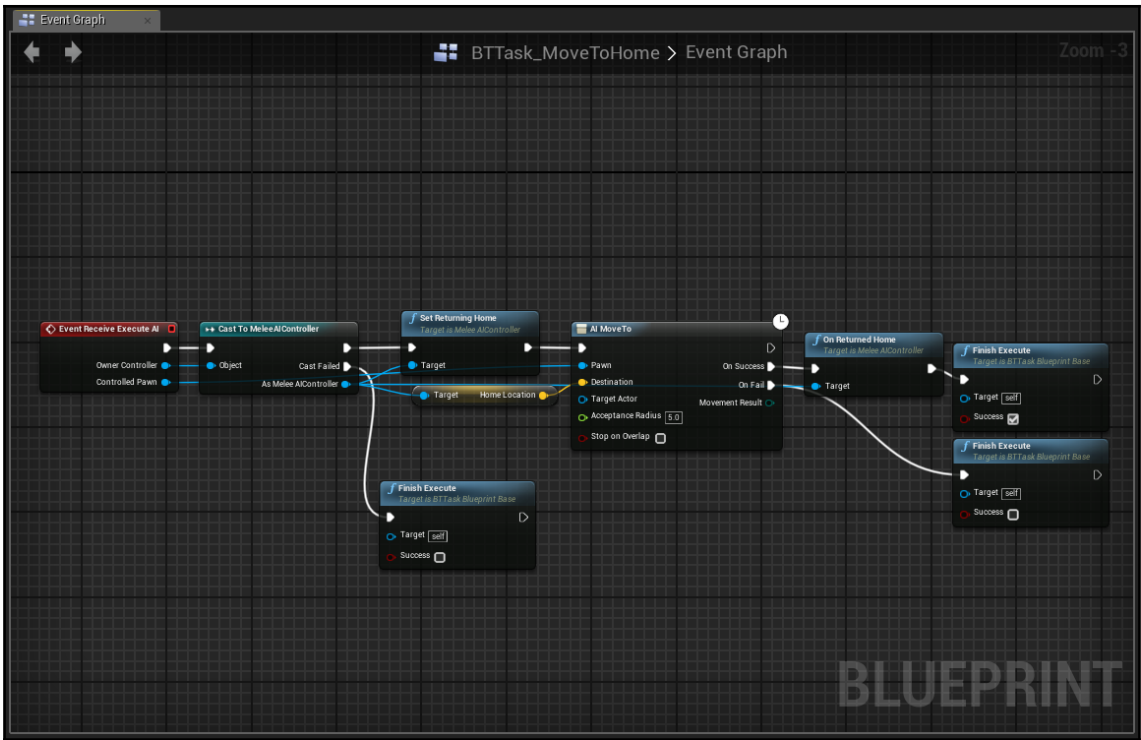
Random Deviat 0.1

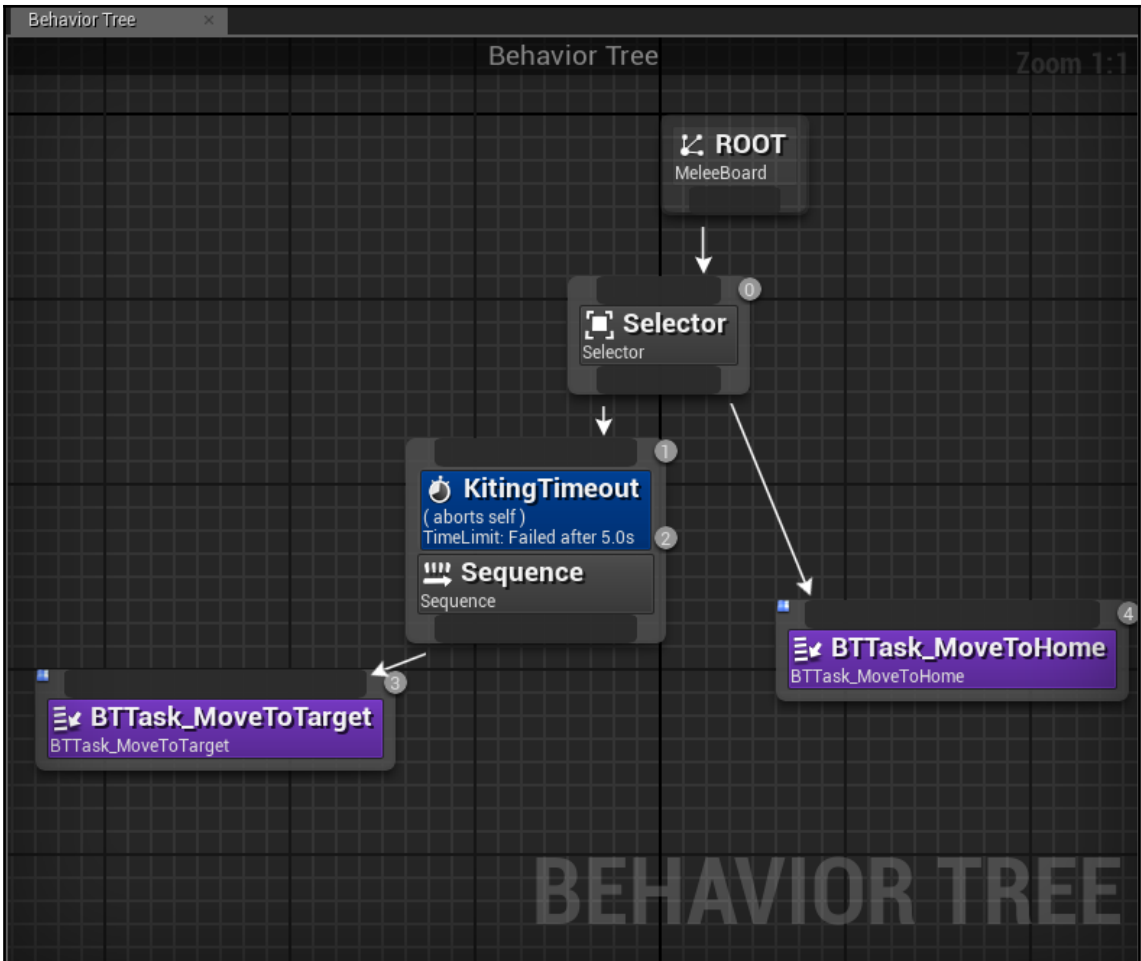
BLUEPRINT

Compiler Results

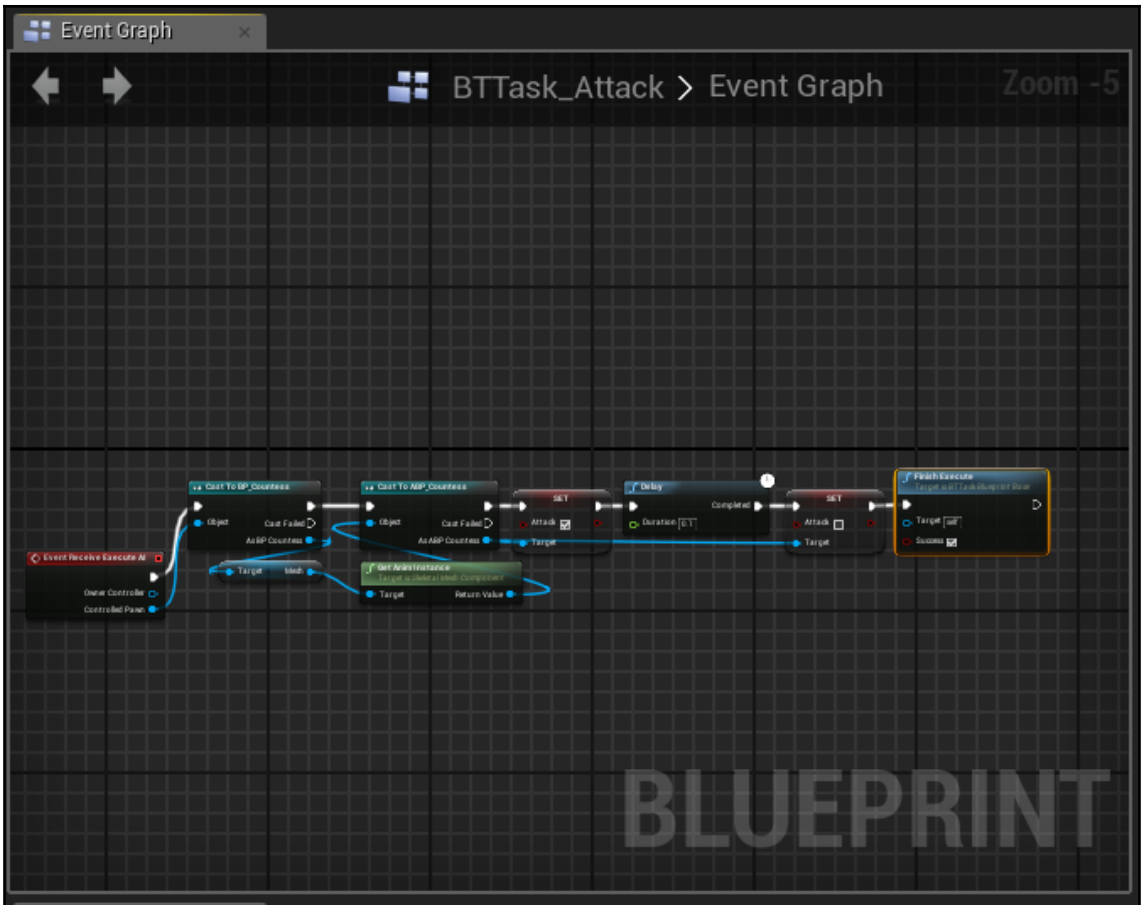
- 'ReturnValue' is already a 'Mastering Character', you don't need Cast To MasteringCharacter.

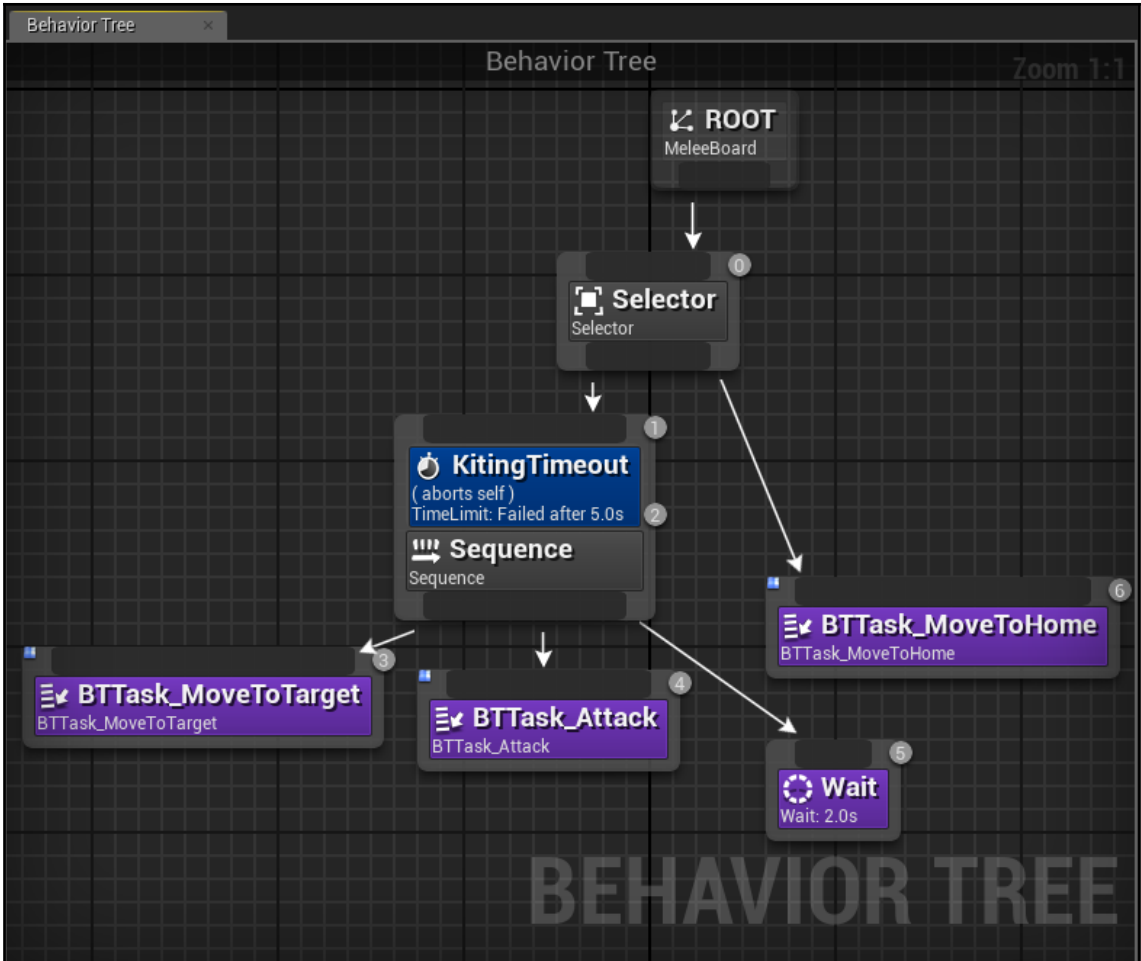
Clear

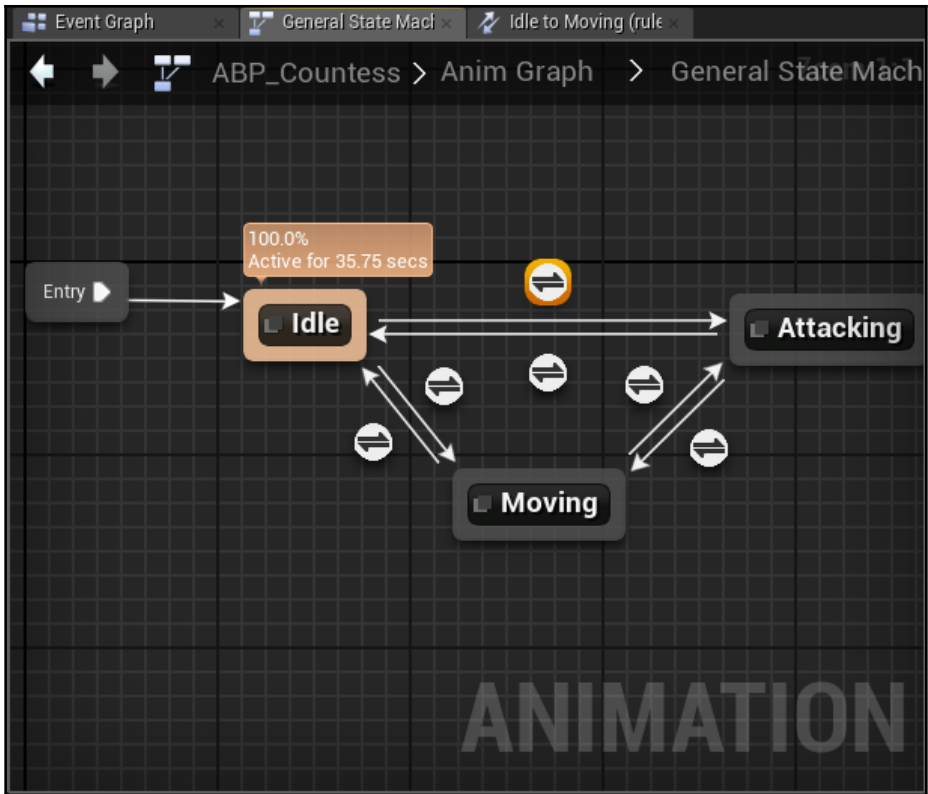


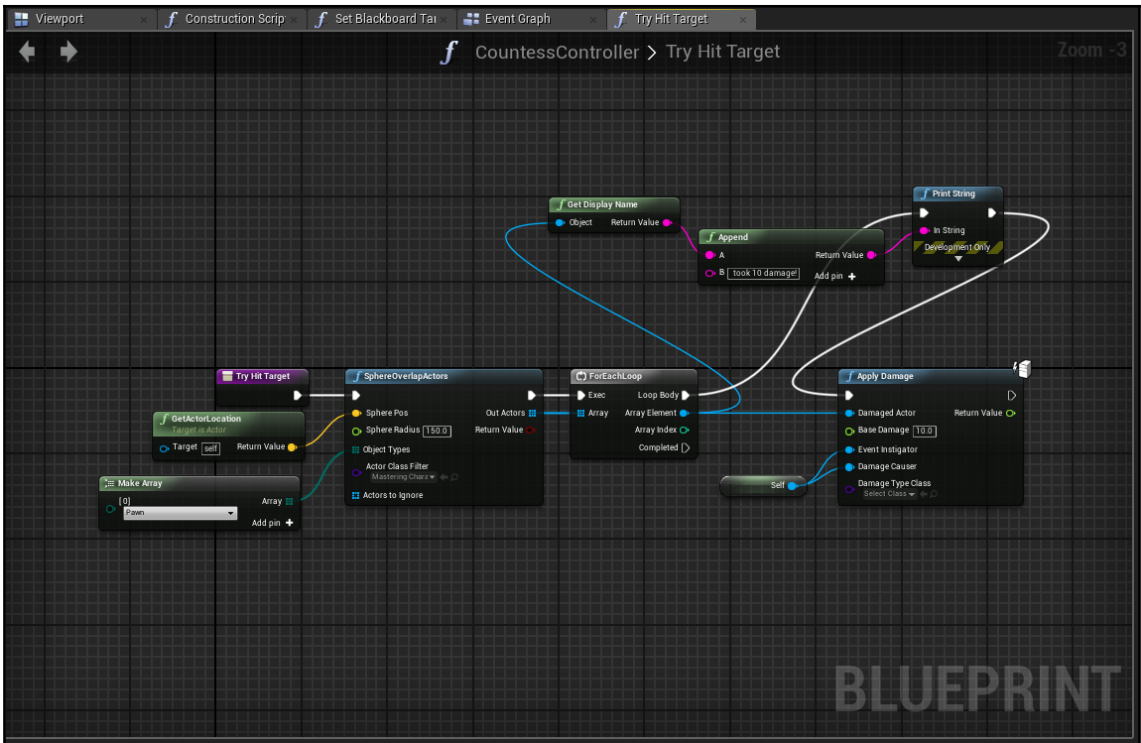




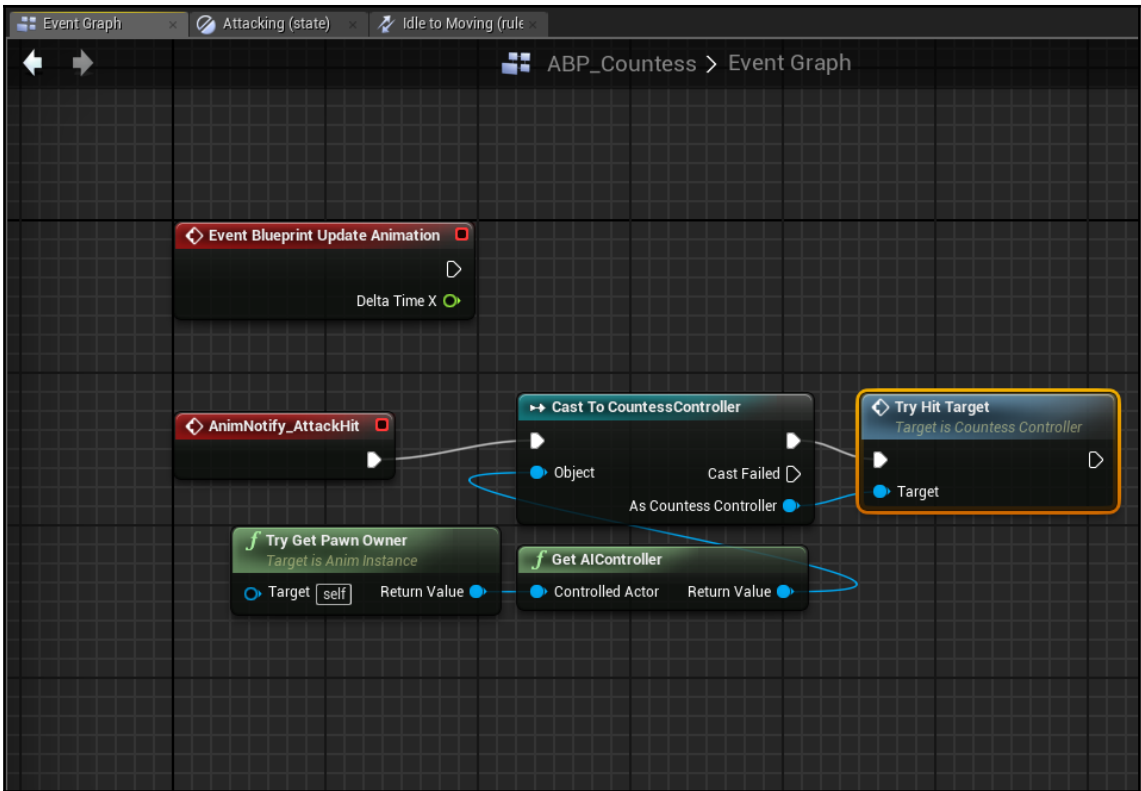












CountessSpawner

File Edit Asset View Debug Window Help

Components

- + Add Component
- CountessSpawner(self)
- CollisionComponent (In
- SpriteComponent (In
- SpawnLocation
- Billboard

Compile Save Browse Find Class Settings Class Defaults Simulation Play

Viewports Construction Scrip Event Graph

CountessSpawner > Event Graph Zoom -4

Event Graph

Event BeginPlay

- Spawned Enemies II
- LENGTH
- Condition
- Cast To MasteringCharacter
- Max Concurrent Enemies
- Other Actor
- Object
- Cast Failed
- As Mastering Character
- Spawn Actor BP Countess
- Class
- BP Countess
- Return Value
- ADDUNIQUE
- Bind Event to OnDestroyed
- Target
- Event
- Event Task
- GetWorldTransform
- Spawn Location
- Target
- Return Value
- Spawn Location
- Die
- Destroyed Actor
- REMOVE
- Spawned Enemies II

BLUEPRINT

Compiler Results

Parent class: Trigger Box

Details

Sockets

Parent Socket None

Sprite

Sprite S\_Trigger

Is Screen Size

Screen Size 0.0025

U 0.0

UL 0.0

V 0.0

VL 0.0

Use in Editor S

Rendering

Visible

Hidden in Gam

Tags

Component Ta 0 Array elements

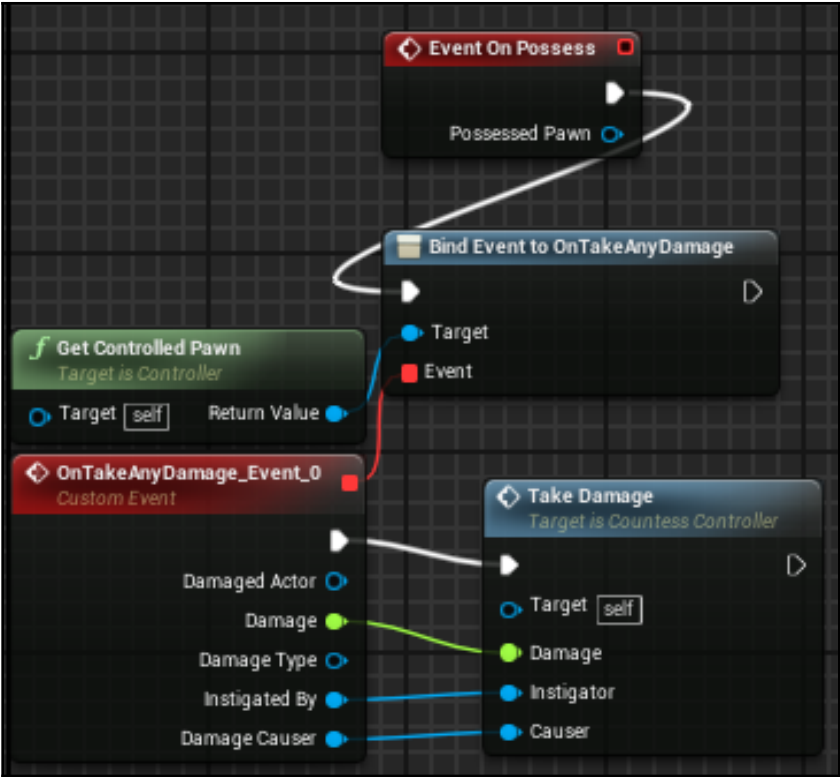
Component Replication

Component Re

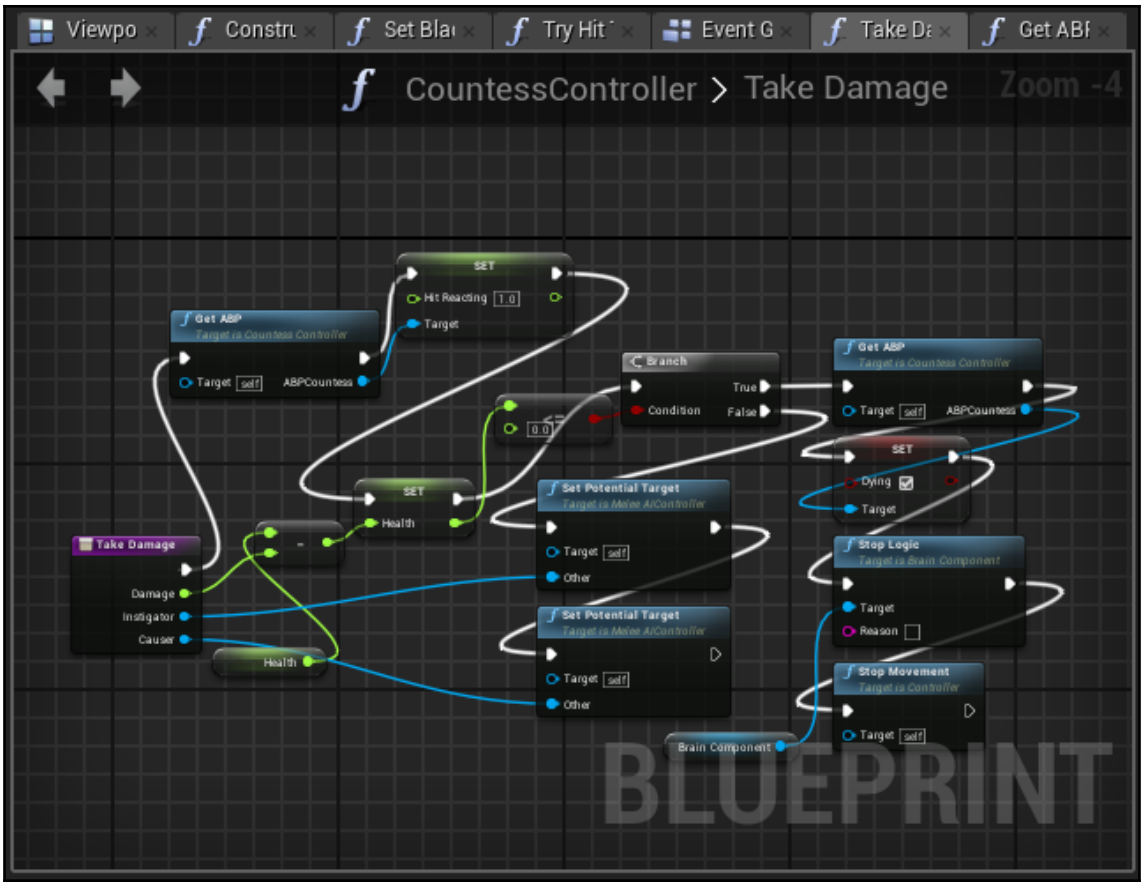
Cooking

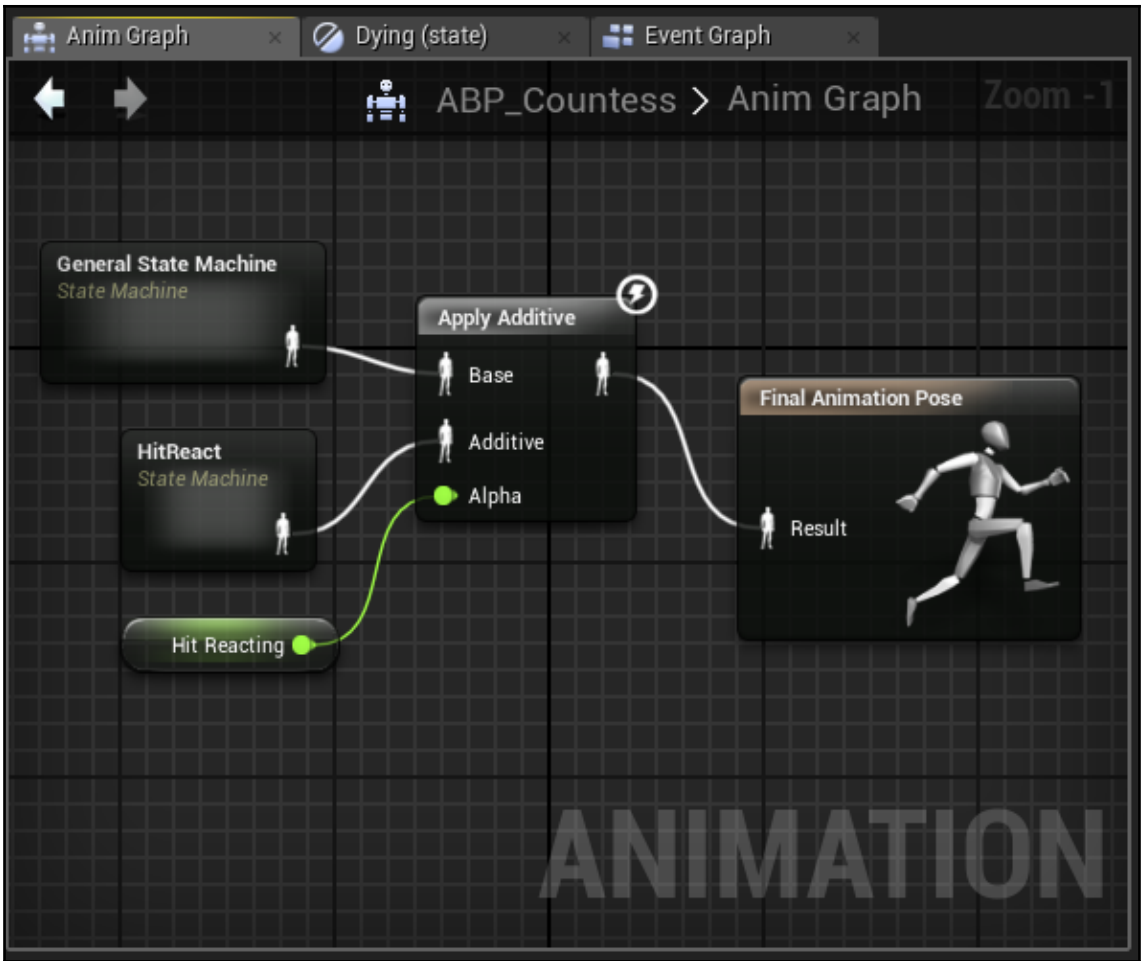
Is Editor Only

Events









General State Maci x Dying (state) x Event Graph x

ABP\_Countess > Anim Graph > General State Ma

```
graph TD; Entry --> Idle; Idle --> Attacking; Attacking --> Idle; Idle --> Moving; Moving --> Idle; Moving --> Attacking; Attacking --> Moving; Moving --> Dying; Dying --> Idle;
```

ANIMATION

Compiler Results x

- ! Node [Result](#) uses potentially thread-unsafe call [Try Get Pawn Owner](#). Disable threaded updat
- ! Node [Result](#) uses potentially thread-unsafe call [Try Get Pawn Owner](#). Disable threaded updat

Clear

Details x Preview S x

Search

Transition

- Priority Or 1
- Bidirection
- Blend Log Standard Blend
- Transition Use Shared Promote
- Dying
- Automatic

Blend Settings

- Transition Use Shared Promote
- Duration 0.2

Anim Preview x Asset Bro x

Edit Preview Edit Defaults

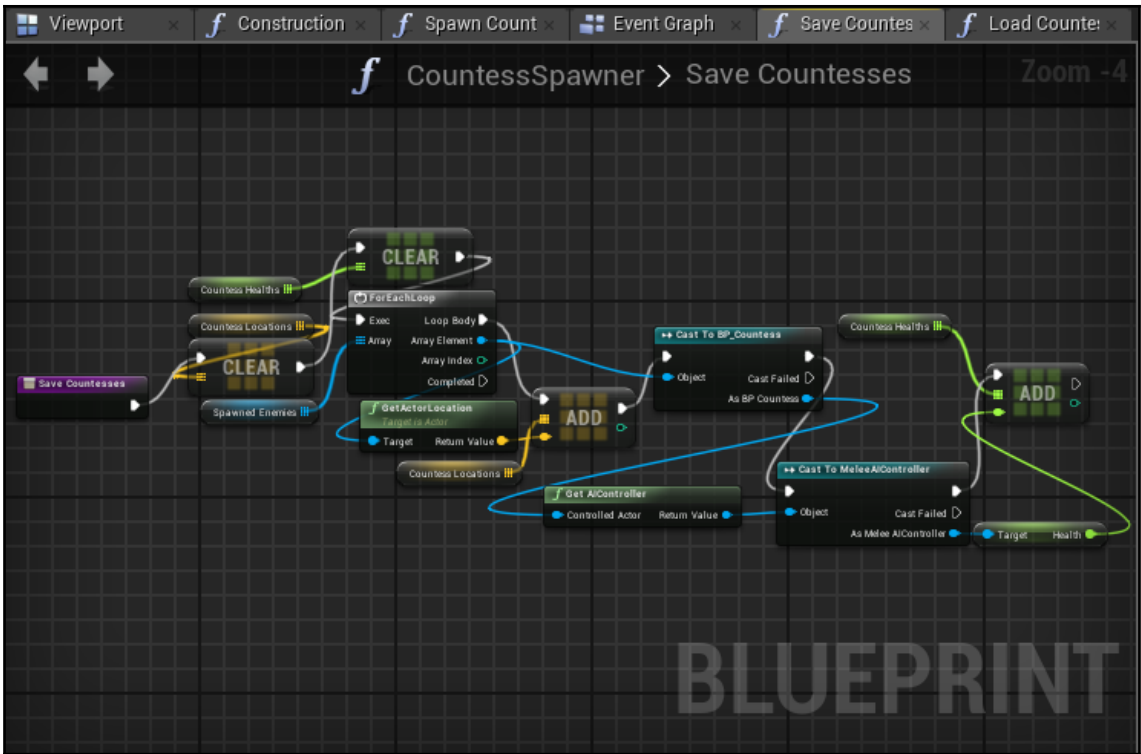
Search

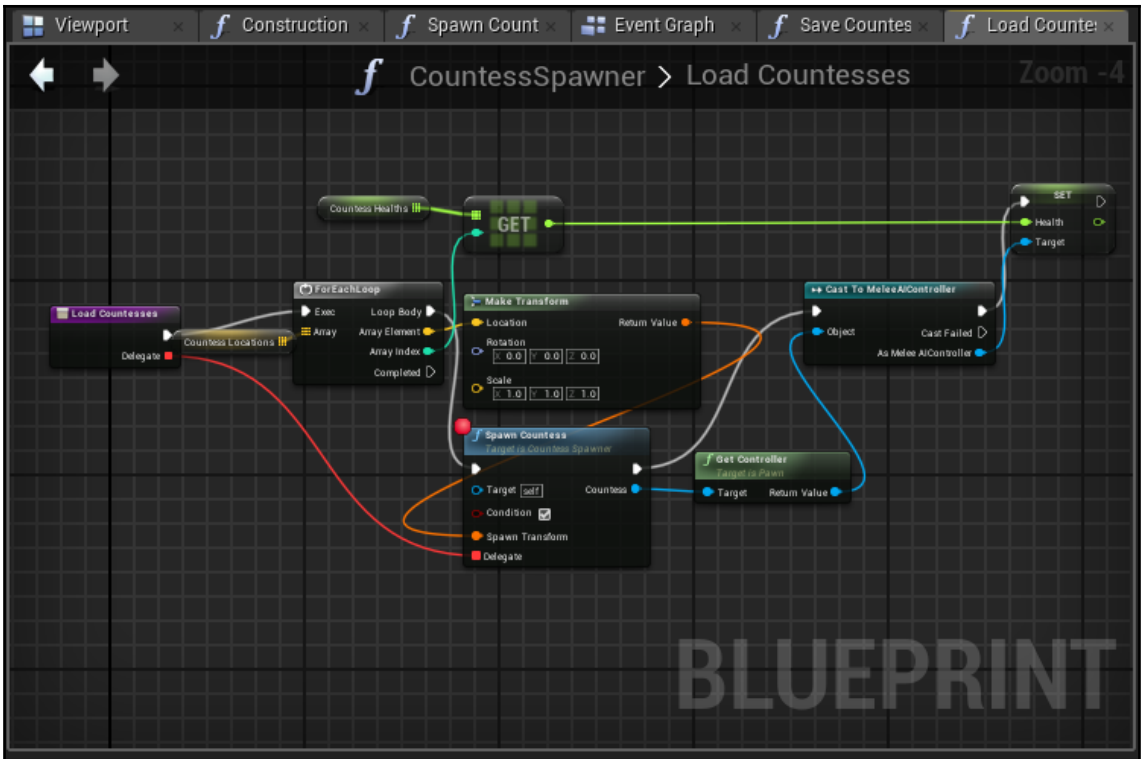
Default

- Attack
- Dying
- Hit Reacti 0.0

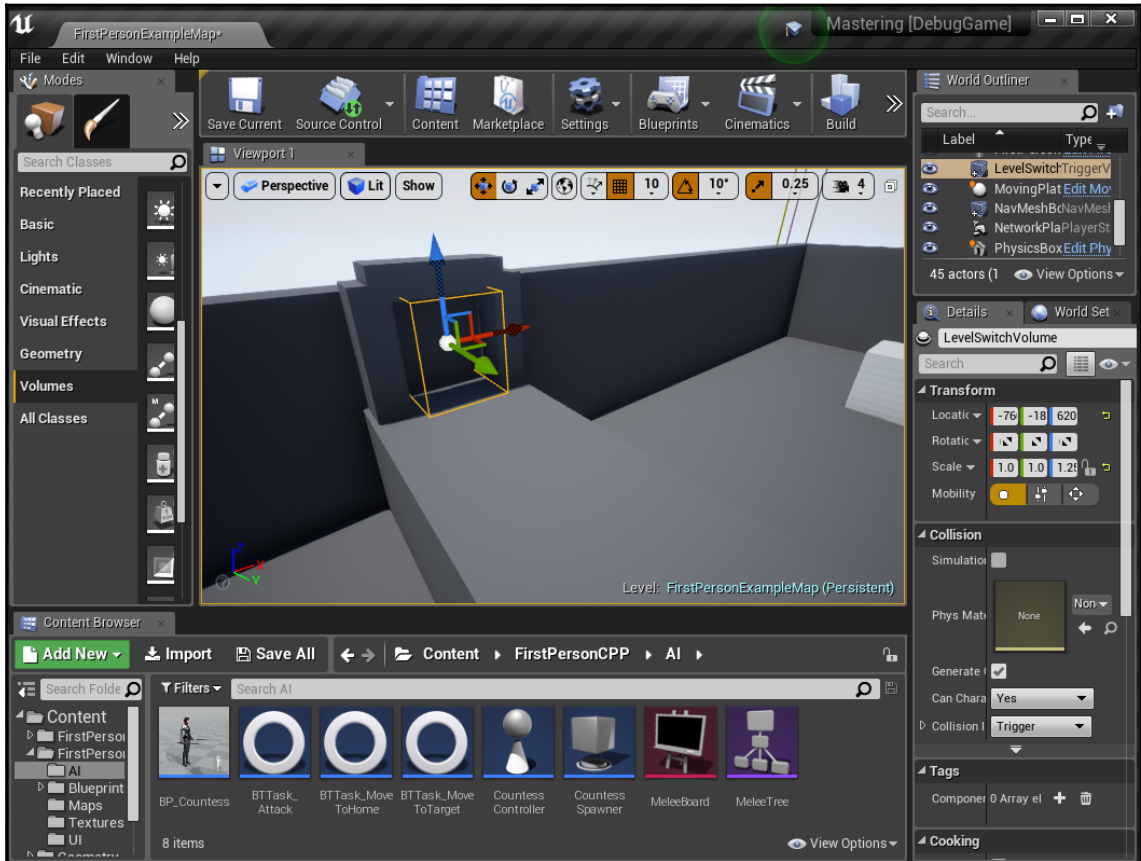
Root Motion

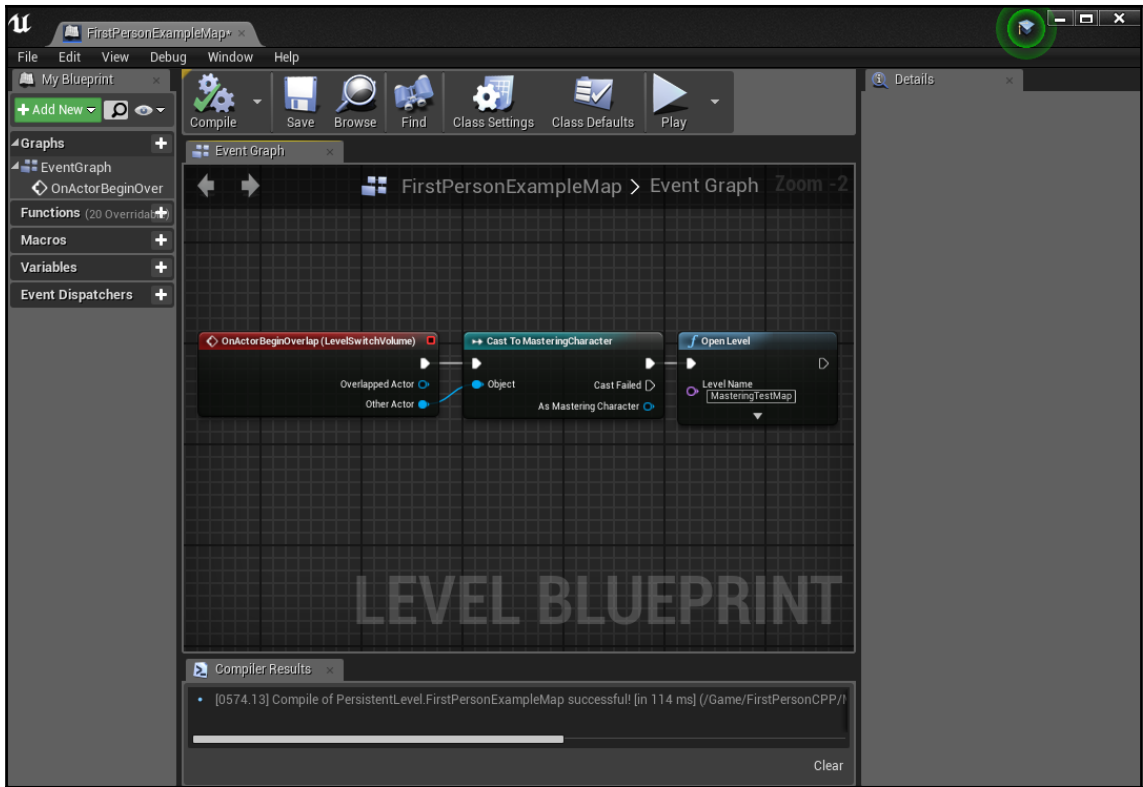
- Root Moti Root Motion fr





# Chapter 6: Levels, Streaming, and Retaining Data





The image displays the Unreal Engine 4 interface for editing a Blueprint named `BP_LevelTransitionVolume`. The parent class is `LevelTransitionVolume`.

**Component Panel (Left):** Shows the components of the blueprint, including `CollisionComponent`, `SpriteComponent`, `PlayerSafePosition`, and `Billboard`.

**Graphs Panel (Left):** Lists the graphs used in the blueprint, including `EventGraph`, `Event BeginPlay`, `Event Actor Beg`, and `Event Tick`.

**Functions Panel (Left):** Lists available functions, including `ConstructionScri` and `DelayToCollision`.

**Viewports (Center):** The main workspace shows an `Event Graph` with the following nodes and connections:

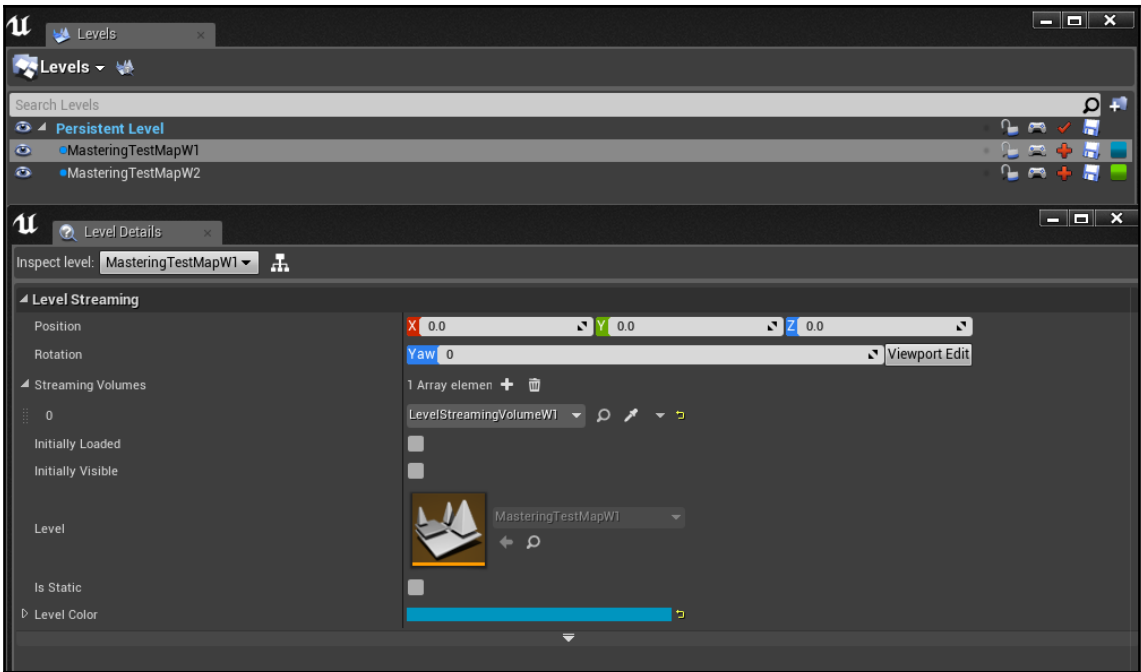
- `Event BeginPlay` (Trigger) connects to a `GetWorldLocation` node (Target: `Player Safe Position`).
- The `GetWorldLocation` node connects to a `SET` node (Target: `Player Safe Location`).
- The `SET` node connects to a `Set Timer by Function Name` node (Function Name: `DelayToCollisions`).
- A `Event Actor BeginOverlap` node is also present, connected to `Other Actor`.
- A `Event Tick` node is connected to `Delta Seconds`.

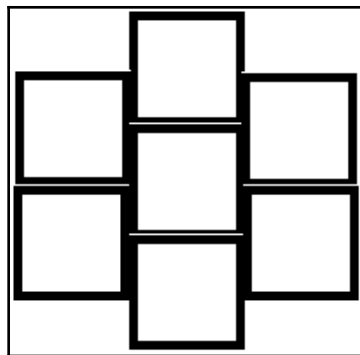
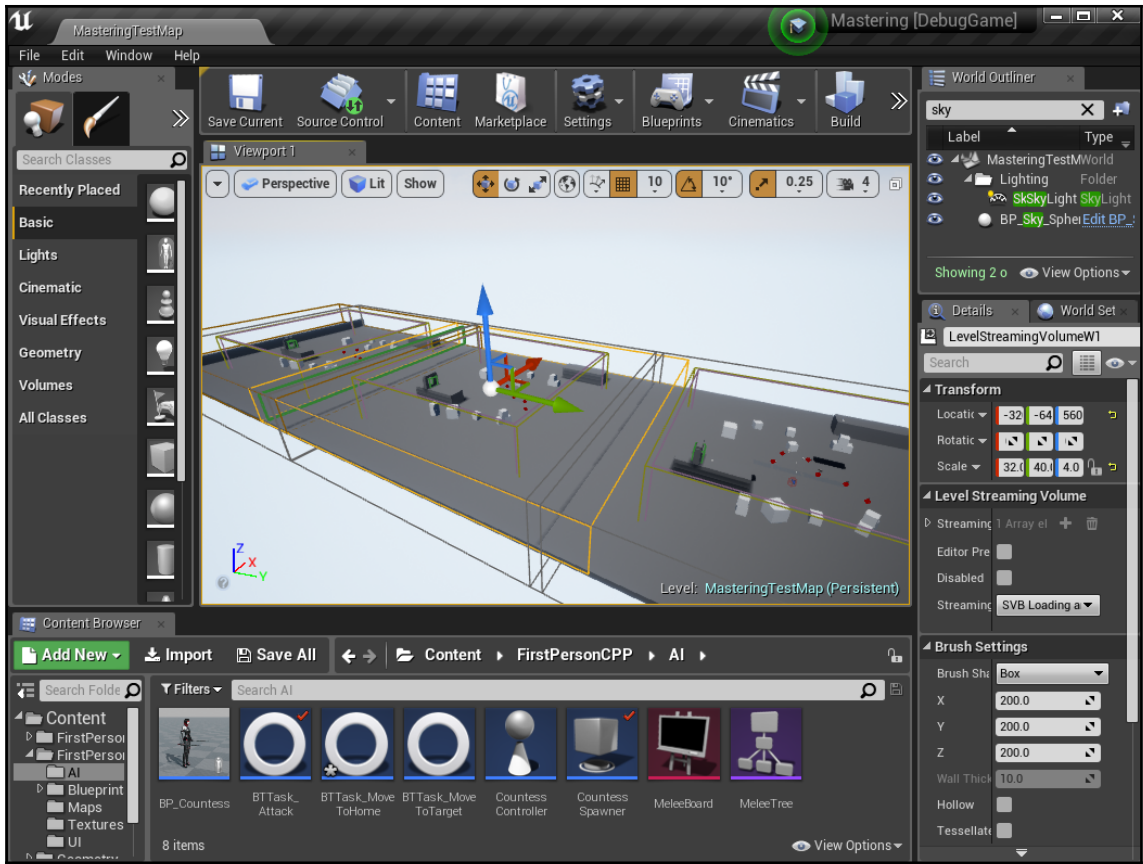
**Details Panel (Right):** Shows the properties of the `Level Transition Volume` component:

- Actor Tick:** Start with Tick (checked), Tick Interval (0.0), Allow Tick Be (unchecked).
- Level Transition Volume:** Transition Level (MasteringTestMap), Player Safe L (X 0.0, Y 0.0, Z 0.0).
- Rendering:** Actor Hidden (checked), Editor Billboard (1.0).
- Replication:** Only Relevant (unchecked), Always Relev (unchecked), Replicate Mo (unchecked), Net Load on C (checked), Net Use Owne (unchecked), Replicates (unchecked), Net Dormancy (Awake), Net Cull Dista (225000000.0), Net Update Fr (100.0), Min Net Upda (2.0), Net Priority (1.0).

**Compiler Results (Bottom):** Shows a successful compile message: `[0102.85] Compile of BP_LevelTransitionVolume successful! [in 342 ms] (/Game/FirstPersonCPP/Blueprints/`





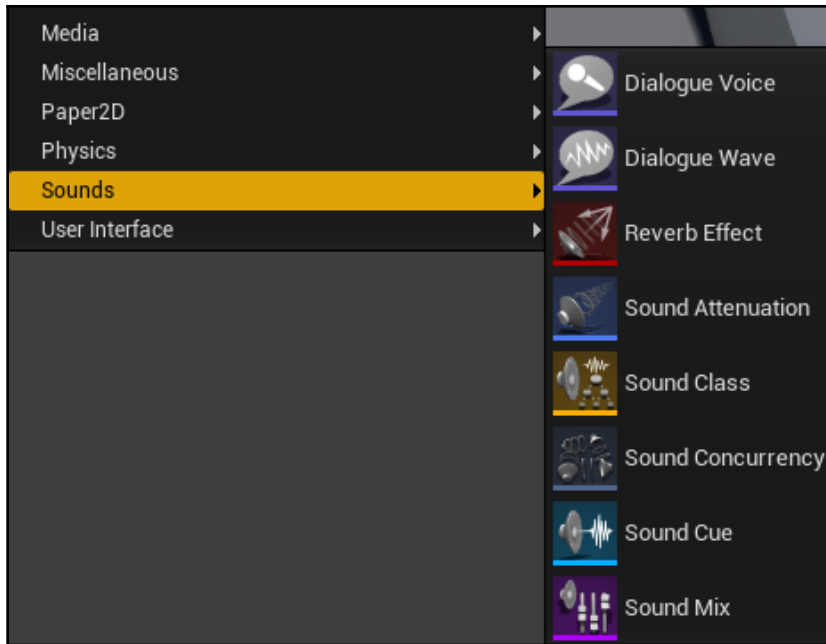


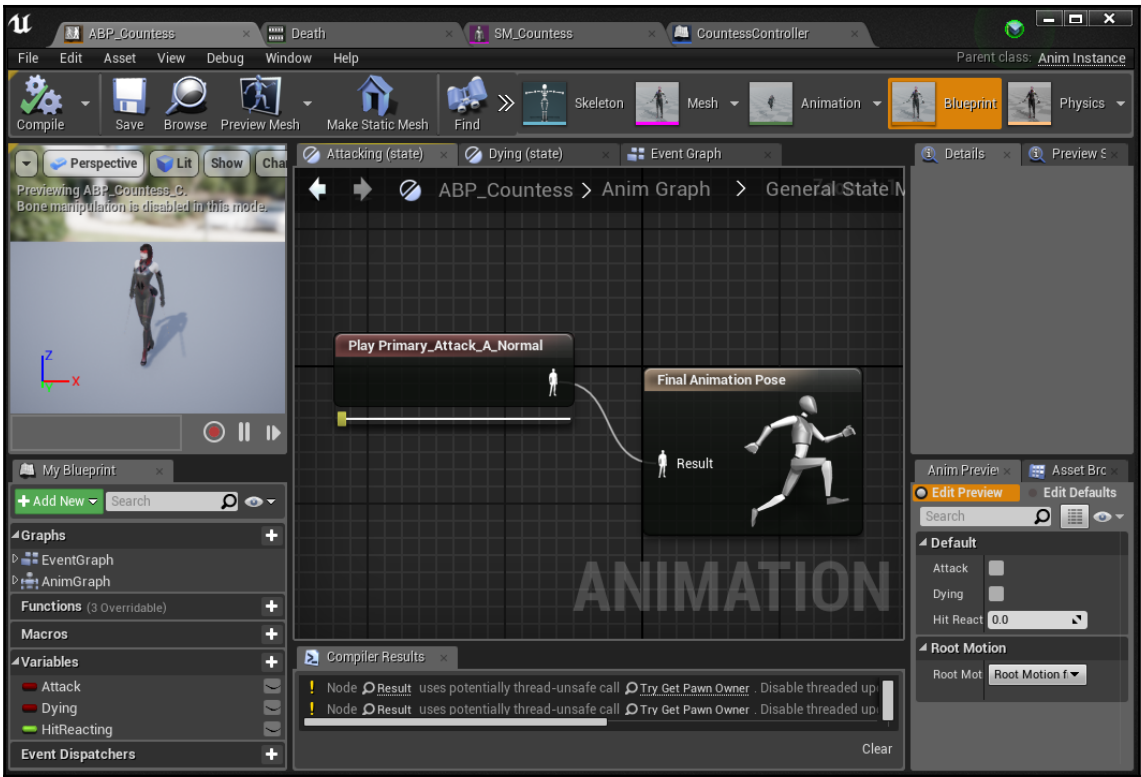
# Chapter 7: Getting Audio in Your Game

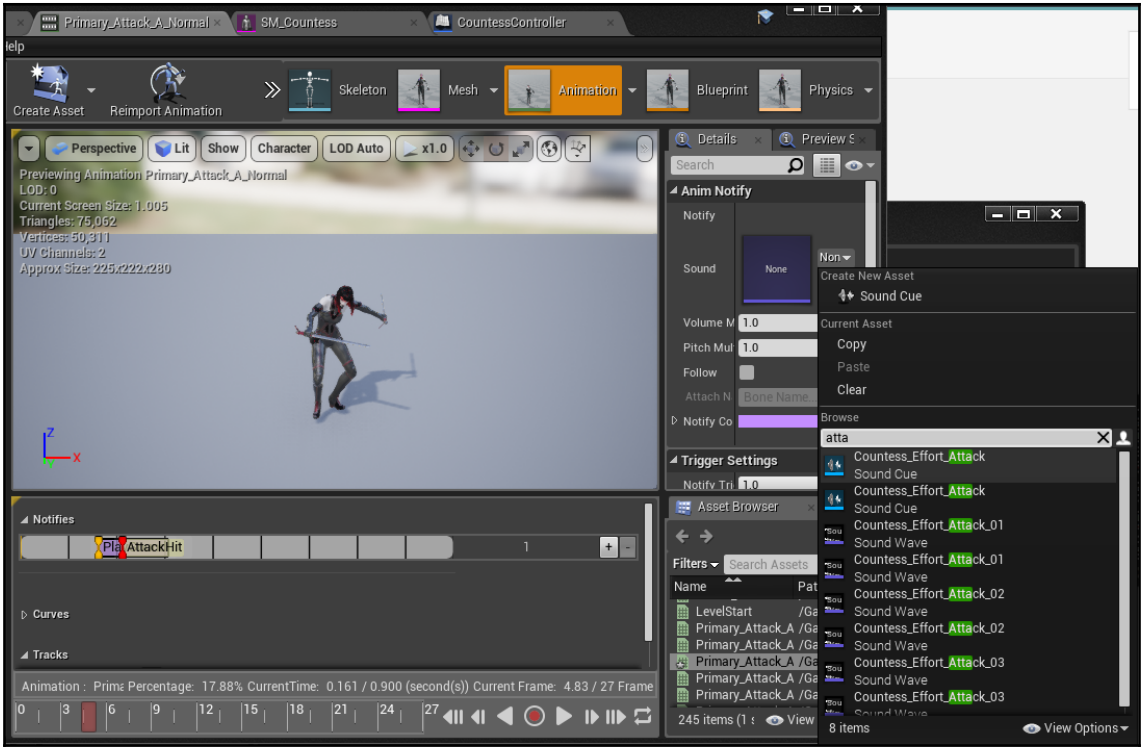
The screenshot displays the Epic Games Store interface. At the top, the user's account is logged in as 'cleaver404' with a balance of \$30.00. The navigation bar includes 'UNREAL ENGINE', 'FORTNITE', 'PARAGON', 'UNREAL TOURNAMENT', 'SHADOW COMPLEX', and 'MODDING'. The main content area is titled 'Free' and features a search bar and a shopping cart icon. A left sidebar contains navigation options: 'Community', 'Learn', 'Marketplace', 'Library', and a 'Not Installed' section for 'Unreal Engine 4.19.2'. The main grid shows six content items:

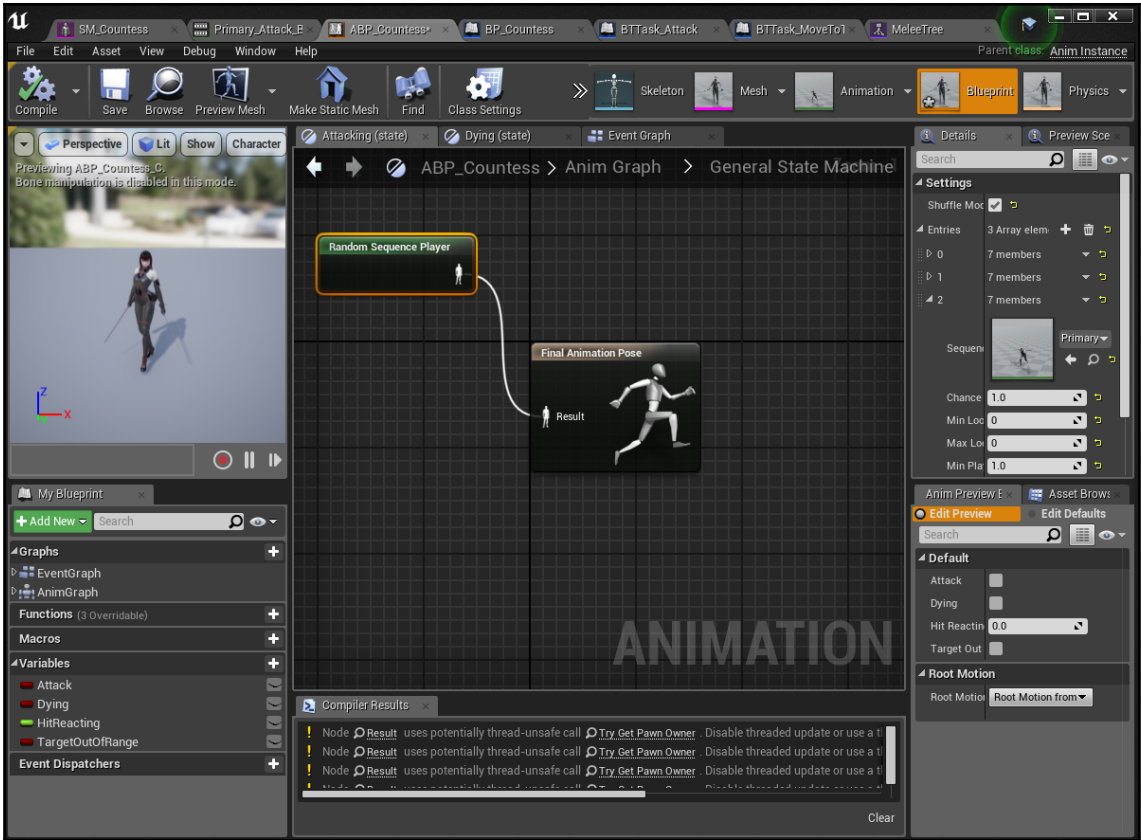
- Infinity Blade: Weapons** (Epic Games, 4.5 stars, 115 reviews, Owned, Weapons category)
- Infinity Blade: Fire Lands** (Epic Games, 4.5 stars, 121 reviews, Free, Environments category, Add to Cart button)
- Infinity Blade: Grass Lands** (Epic Games, 4.5 stars, 265 reviews, Free, Environments category, Add to Cart button)
- Infinity Blade: Ice Lands** (Epic Games, 4.5 stars, 113 reviews, Owned, Environments category)
- UE4 Mannequin: Mobile** (Epic Games, 4.5 stars, 67 reviews, Owned, Characters category)
- Open World Demo Collection** (Epic Games, 4.5 stars, 1353 reviews, Owned, Environments category)

At the bottom left, there are social media links for 'VISIT UNREAL ENGINE ON:' including icons for Instagram, Facebook, YouTube, Twitter, Twitch, and YouTube Gaming.









The screenshot displays the Unreal Engine 4 interface for editing an Animation Blueprint (ABP). The main window shows the Anim Graph with three states: Idle, Moving, and Attacking. A transition rule from Attacking to Moving is highlighted, showing a 'TargetOutOfRange' condition. The right panel shows the transition settings, including Priority, Blend, and Blend Settings. The bottom panel shows the Compiler Results with a warning: 'Node Result uses potentially thread-unsafe call Try Get Pawn Owner. Disable thread...'.

Parent class: Anim Instance

File Edit Asset View Debug Window Help

Compile Save Browse Preview Mesh Make Static Mesh Skeleton Mesh Animation Blueprint Physics

Perspective Lit Show

Previewing ABP\_Countess\_C. Bone manipulation is disabled in this mode.

General State Mach Dying (state) Event Graph

ABP\_Countess > Anim Graph > General State

Idle Attacking Moving

Attacking to Moving  
Transition Rule (in words)  
TargetOutOfRange

Documentation  
hold (Ctrl + Alt) for more

Compiler Results

! Node Result uses potentially thread-unsafe call Try Get Pawn Owner. Disable thread...

Clear

Details Preview

Search

Transition

Priority C 1

Bidirectic

Blend Lo Standard Blend

Transitic Use Shared Promot

TargetOutOfRange

Automati

Blend Settings

Transitic Use Shared Promot

Anim Previc Asset Br

Edit Preview Edit Defaults

Search

Default

Attack

Dying

Hit Reac 0.0

Target O

Root Motion

Root Mot Root Motion



U... SM\_Countes Primary\_Att ABP\_Counte BP\_Countes BTTask\_Attr BTTask\_Mov MeleeTree

File Edit Asset View Debug Window Help Parent class: BTTask Blueprint Base

My Blueprint + Add New

Compile Save Browse Find Class Settings Class Defaults Play

Graphs + EventGraph Event Receive Ex Functions (5 Overrides) TargetInRange SetTargetNotInRar Macros + Variables + Event Dispatchers +

Event Graph Target in Range Set Target Not in R

BTTask\_MoveToTarget > Event GraphZoom -3

AI MoveTo  
Pawn  
Destination: 0.0, 0.0, 0.0  
Target Actor  
Acceptance Radius  
Stop on Overlap  
On Success  
On Fail  
Movement Result

Set Target Not in Range  
Target: self  
Not in Range  
Self Pawn  
Target: self  
Success

Finish Execute  
Target: self  
Success

Finish Execute  
Target: self  
Success

Compiler Results  
[2796.60] Compile of BTTask\_MoveToTarget successful! [in 154 ms] (//Game/FirstPersonCPP/AI/BTTas  
Clear

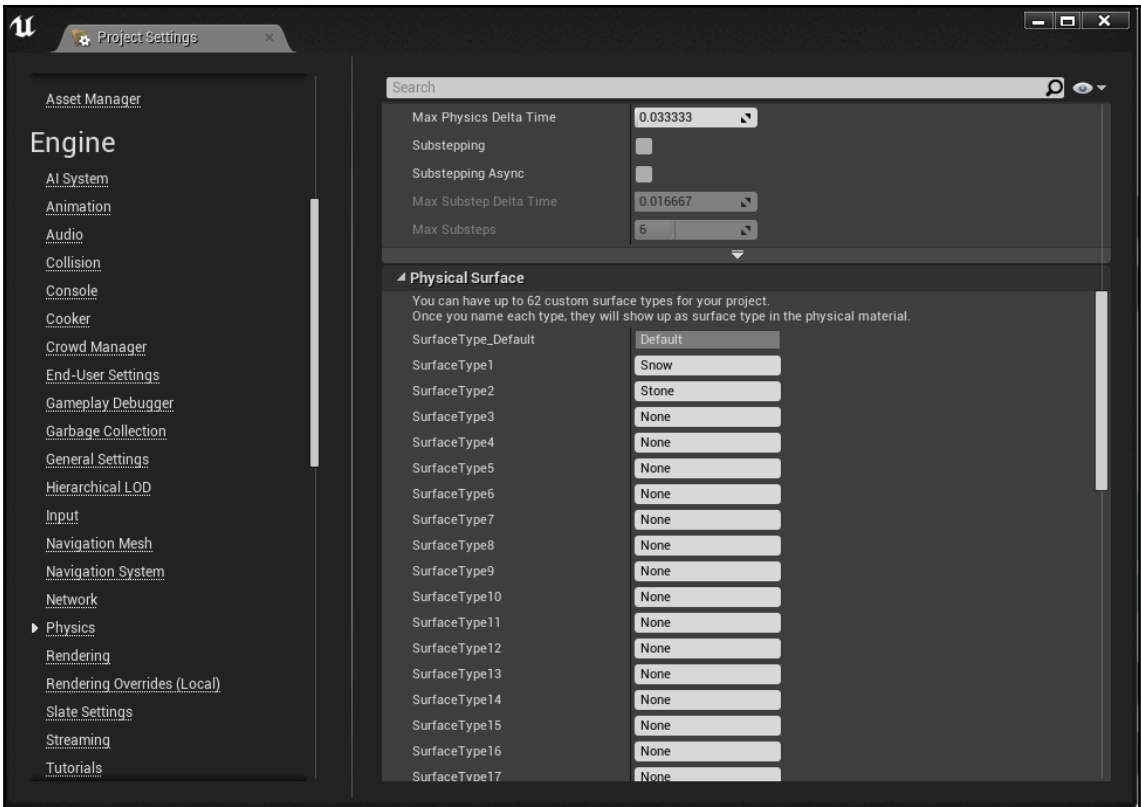
The image displays the Unreal Engine 4 interface for editing a Behavior Tree (BT) named "BTTask\_Attack". The parent class is "BTTask Blueprint Base". The graph consists of the following nodes and connections:

- SET**: A node with two pins: "Attack" (red) and "Target" (blue).
- Random Float in Range**: A node with "Min" (0.0) and "Max" (100.0) pins, and a "Return Value" pin.
- Branch**: A node with a "Condition" pin (connected to the "Return Value" of the Random Float node) and two output pins: "True" and "False".
- Play Dialogue at Location**: A node with "Dialogue" (connected to "Countess\_Emote"), "Context" (connected to "DialogueContext"), and "Location" pins.
- Make DialogueContext**: A node with "Speaker" (connected to "Countess"), "Dialogue Context" (connected to "Context" of the Play Dialogue node), and "Targets" pins.
- Make Array**: A node with an "Array" pin (connected to "Targets" of the Make DialogueContext node) and an "Add pin" button.
- Finish Execute**: A node with "Target" (connected to "Target" of the SET node) and "Success" pins.

The flow is: SET (Attack) → Random Float in Range → Branch (Condition) → Play Dialogue at Location → Finish Execute (Target).

At the bottom, the "Compiler Results" window shows a successful compilation:

```
[0434.43] Compile of BTTask_Attack successful! [in 122 ms] (/Game/FirstPersonCPP/AI/BTTask_Attack.BTTas
```



u

BigFirstPersonProjectile x DragonSwordGunProjectil x DualAxeGunProjectile x BulletStoneImpact x

File Edit Asset Window Help

Save Browse Play Cue Play Node Stop

Details

Search

Modulation

Pitch Min 1.5

Pitch Max 1.5

Volume Min 0.95

Volume Ma 1.05

Zoom -3

Palette

Search

- Sound Node
- Attenuation
- Branch
- Concatenator
- Continuous Modul
- Crossfade by Dist
- Crossfade by Par
- Delay
- Dialogue Player
- Doppler
- Envelope
- Group Control
- Looping
- Mature
- Mixer
- Modulator
- Oscillator
- Quality Level
- Random
- SoundClass
- Switch
- Wave Param
- Wave Player
- Add Comment...

Wave Player - Countess\_Effort\_Ability\_0\_01

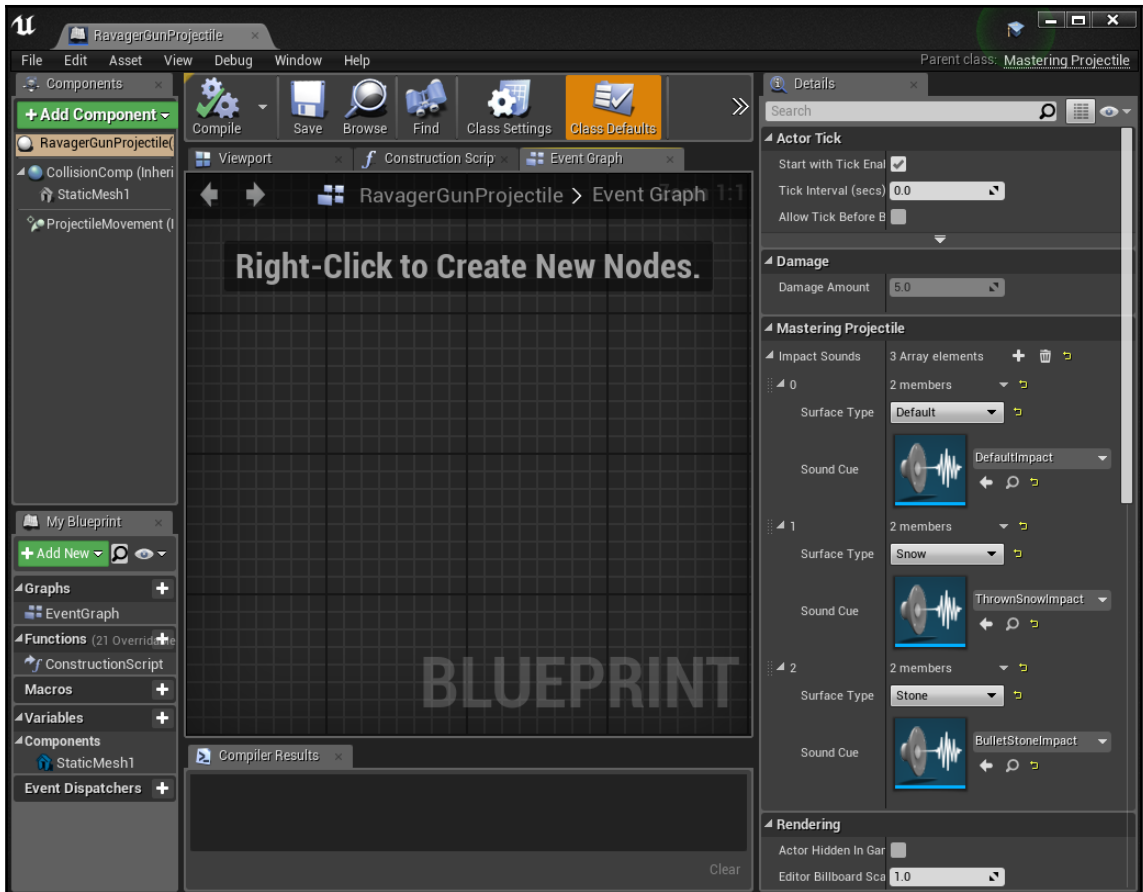
Output

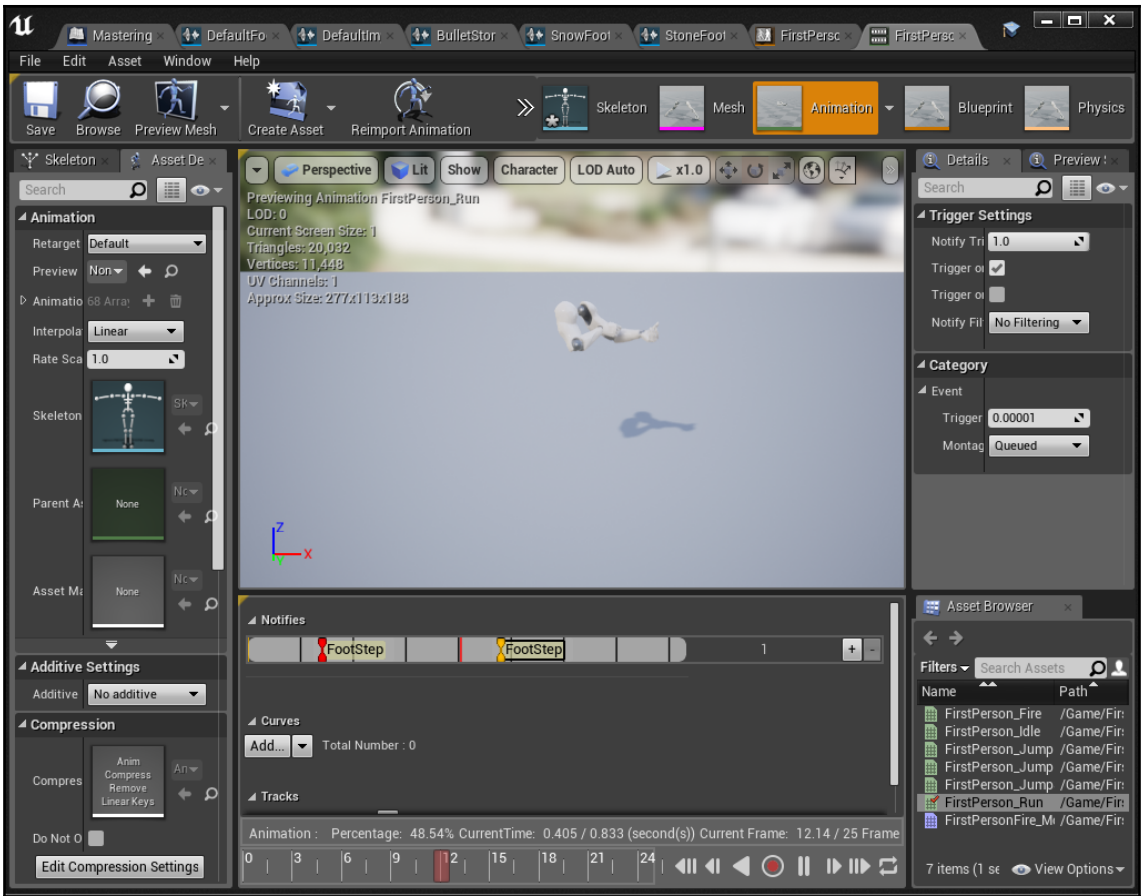
Modulator

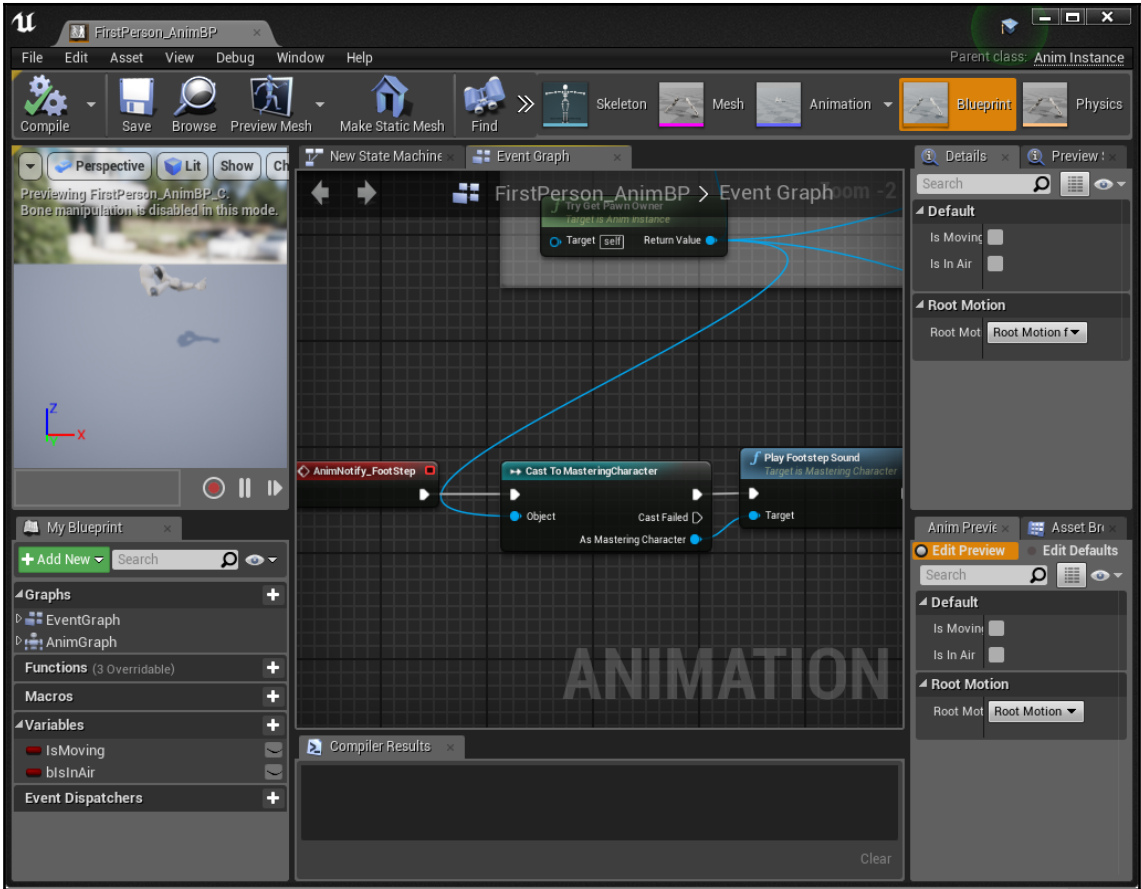
Output

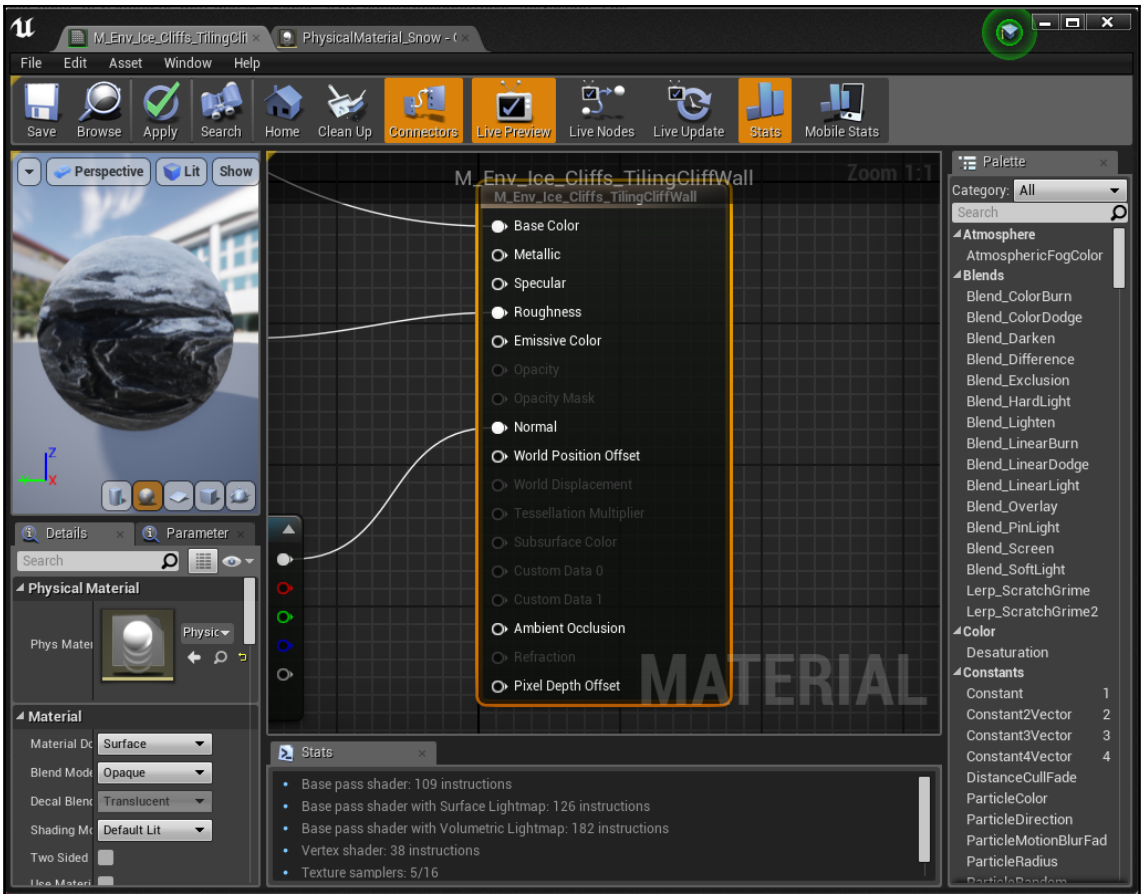
Output

SOUND CUE

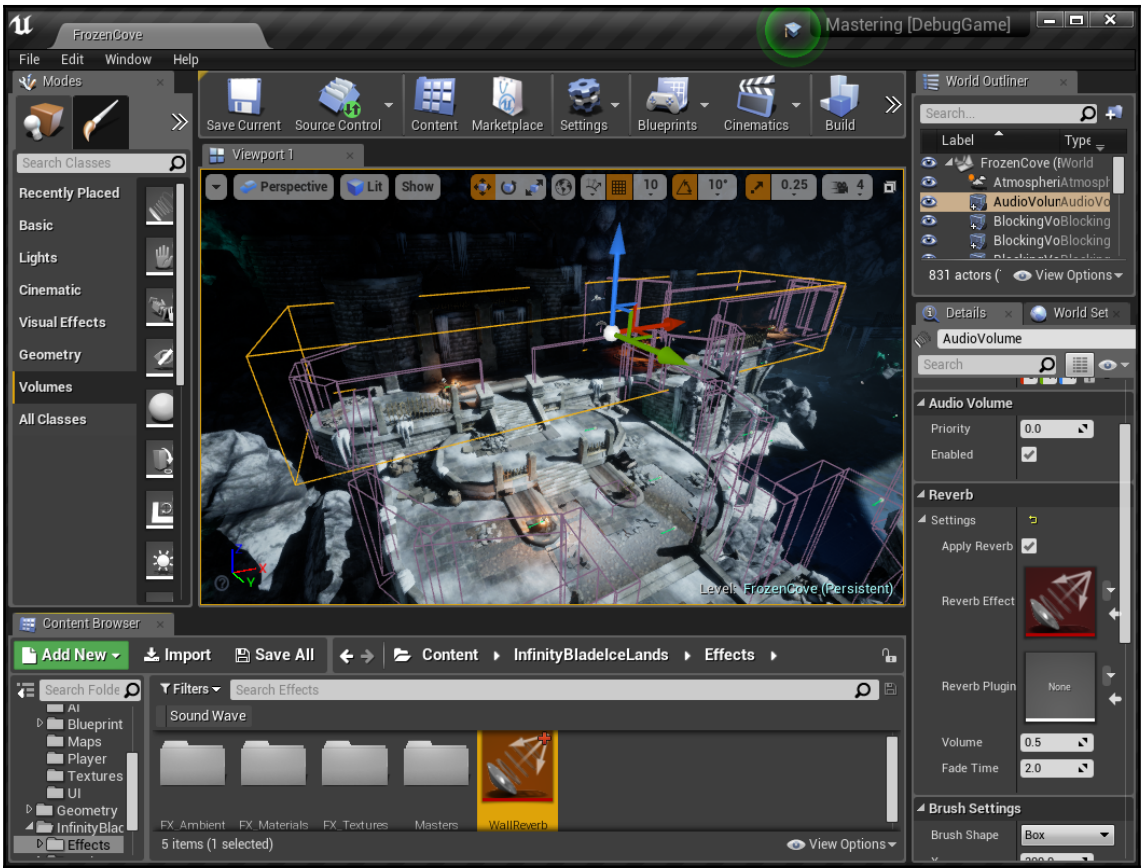




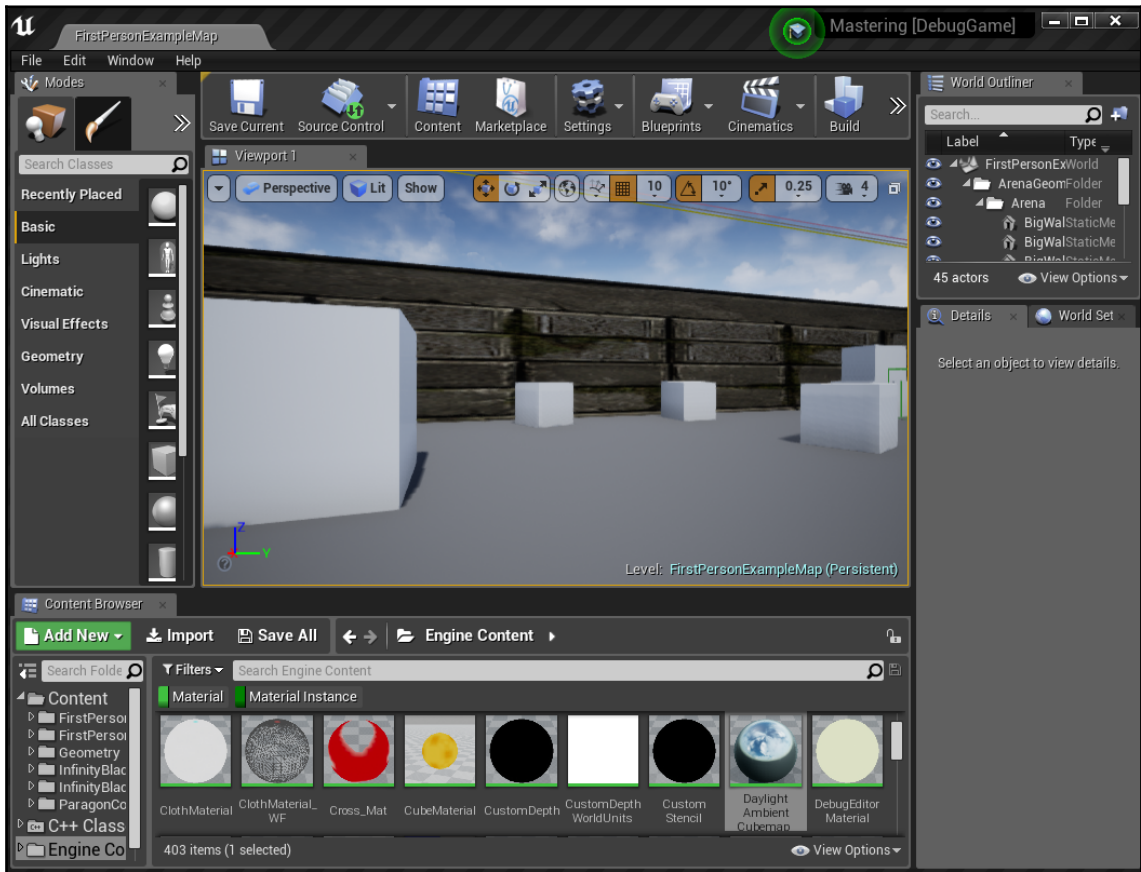


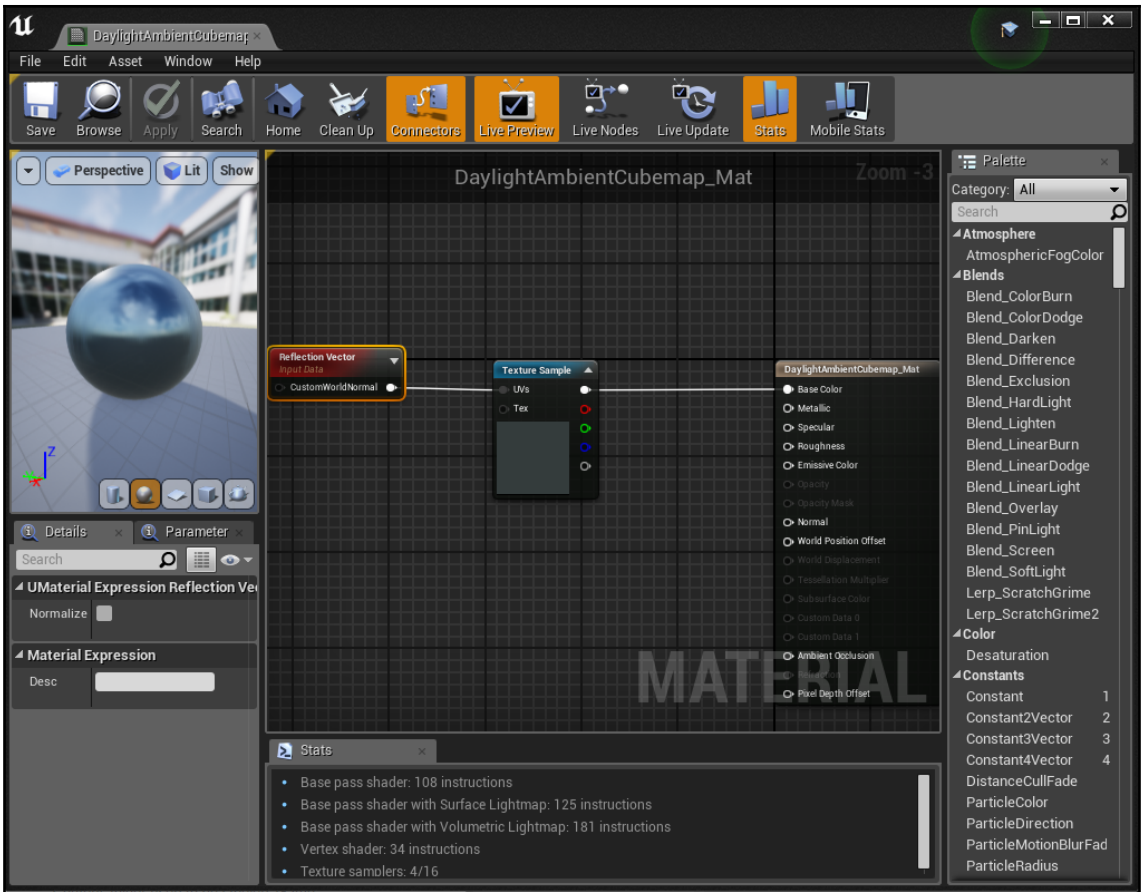


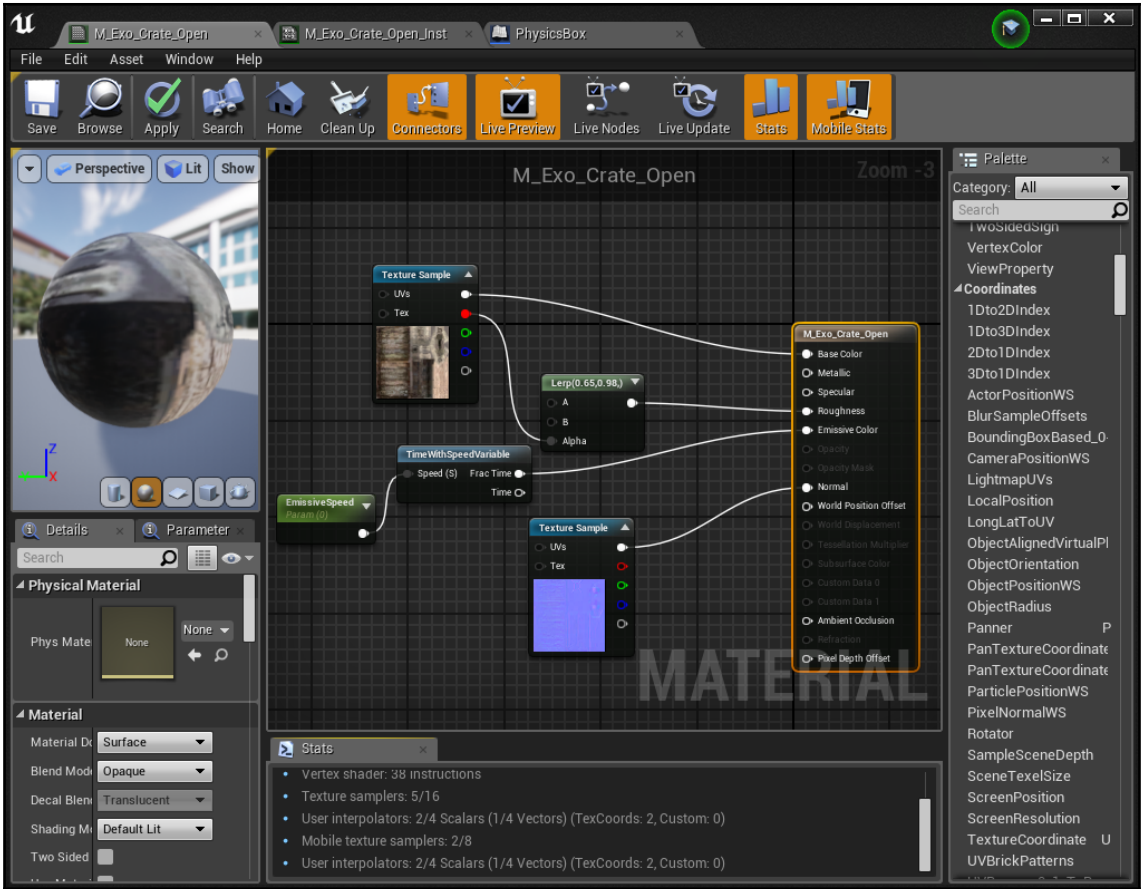


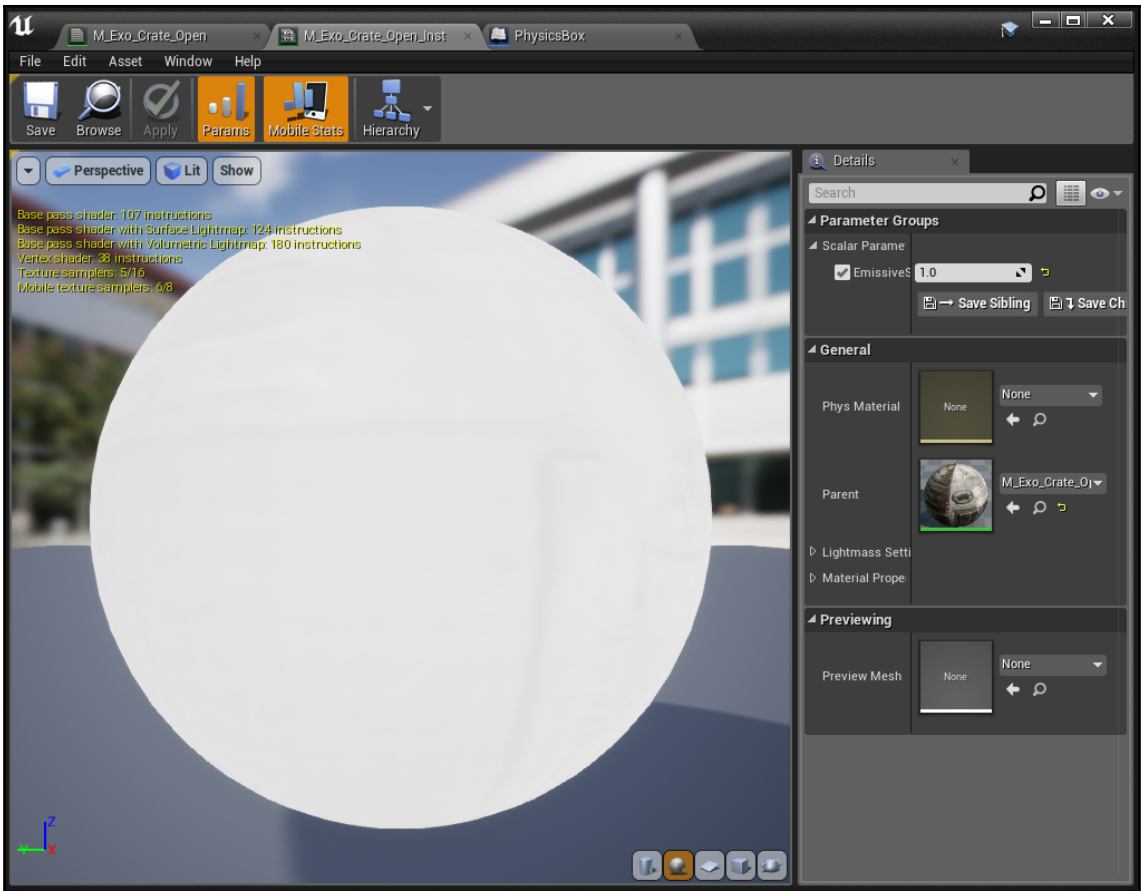


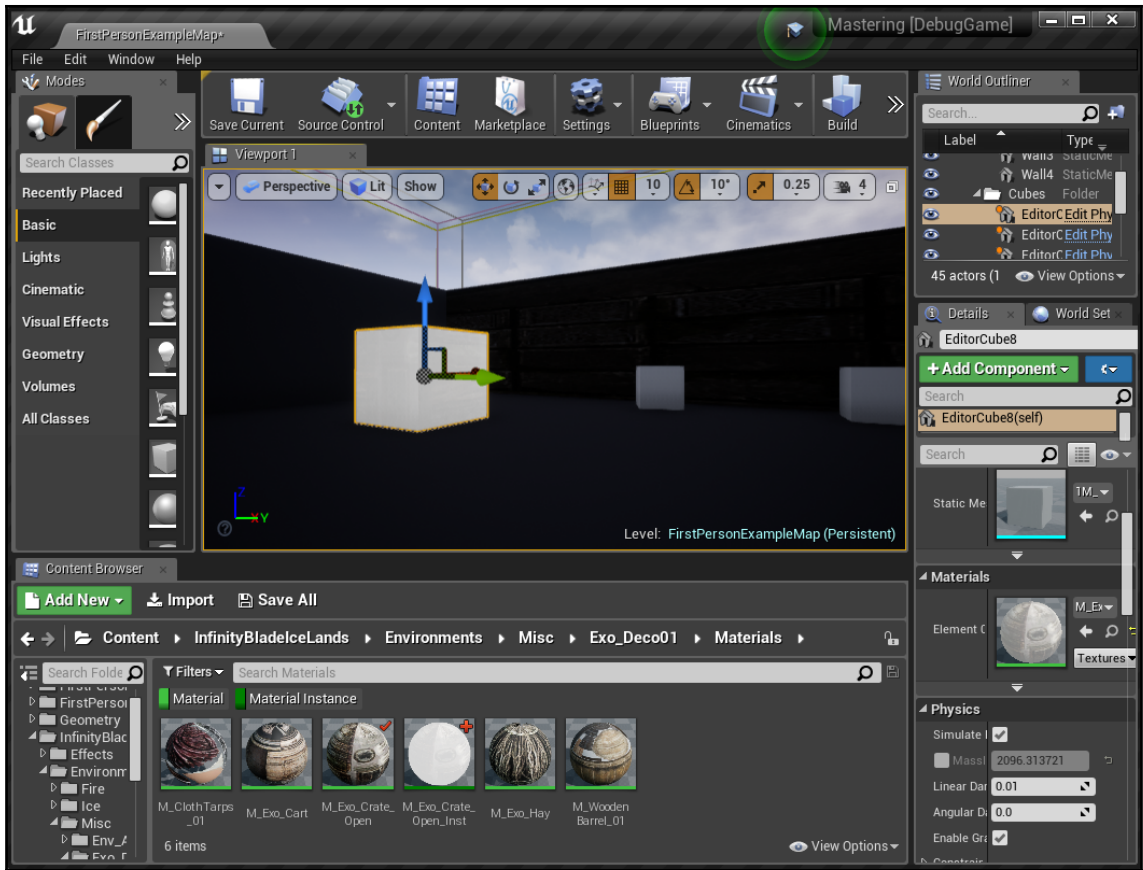
# Chapter 8: Shader Editing and Optimization Tips

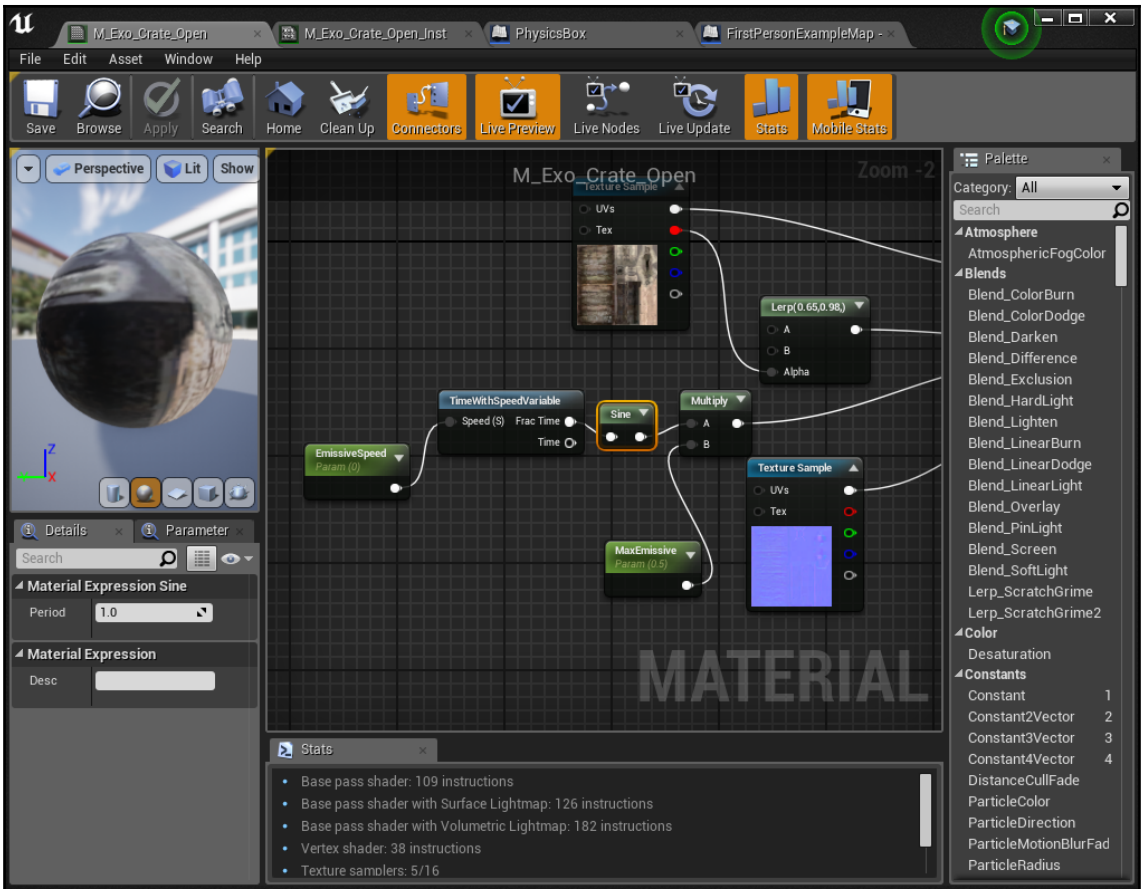












The image shows the Unreal Engine 4 interface with a Blueprint for a class named **PhysicsBox**, which inherits from **Static Mesh Actor**. The Blueprint is an **Event Graph** with the following nodes and connections:

- Event BeginPlay**: The starting node of the graph.
- Create Dynamic Material Instance**: Receives input from **Event BeginPlay**. Its **Parent** is set to **M\_Exo\_Crate\_Open**. It has a **Return Value** pin.
- Set Material**: Receives the **Return Value** from **Create Dynamic Material Instance**. Its **Target** is **Static Mesh Component**. Its **Element Index** is set to **0**.
- Set Scalar Parameter Value**: Receives input from **Set Material**. Its **Target** is **Material Instance Dynamic**. Its **Parameter Name** is **EmissiveSpeed** and its **Value** is **2.0**.

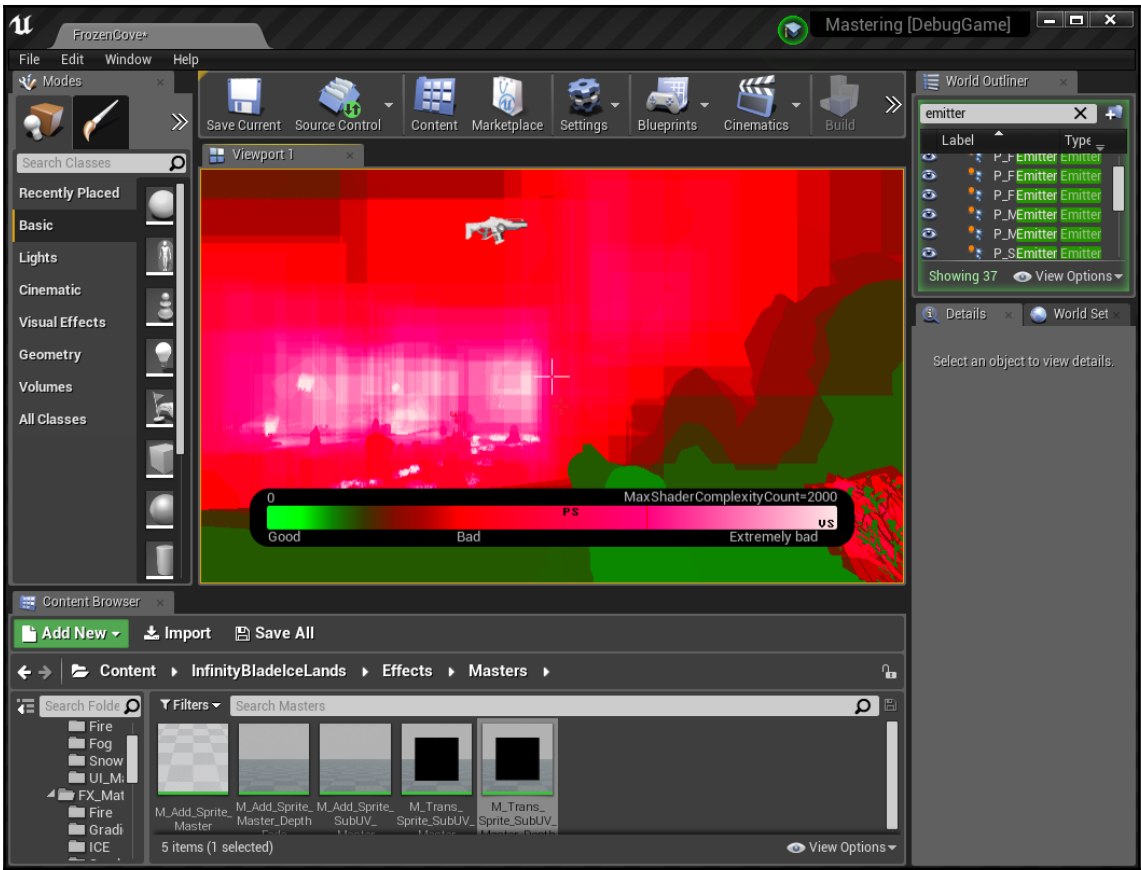
Below the graph, there are two disabled nodes with the message: "This node is disabled and will not be called. Drag off pins to build functionality."

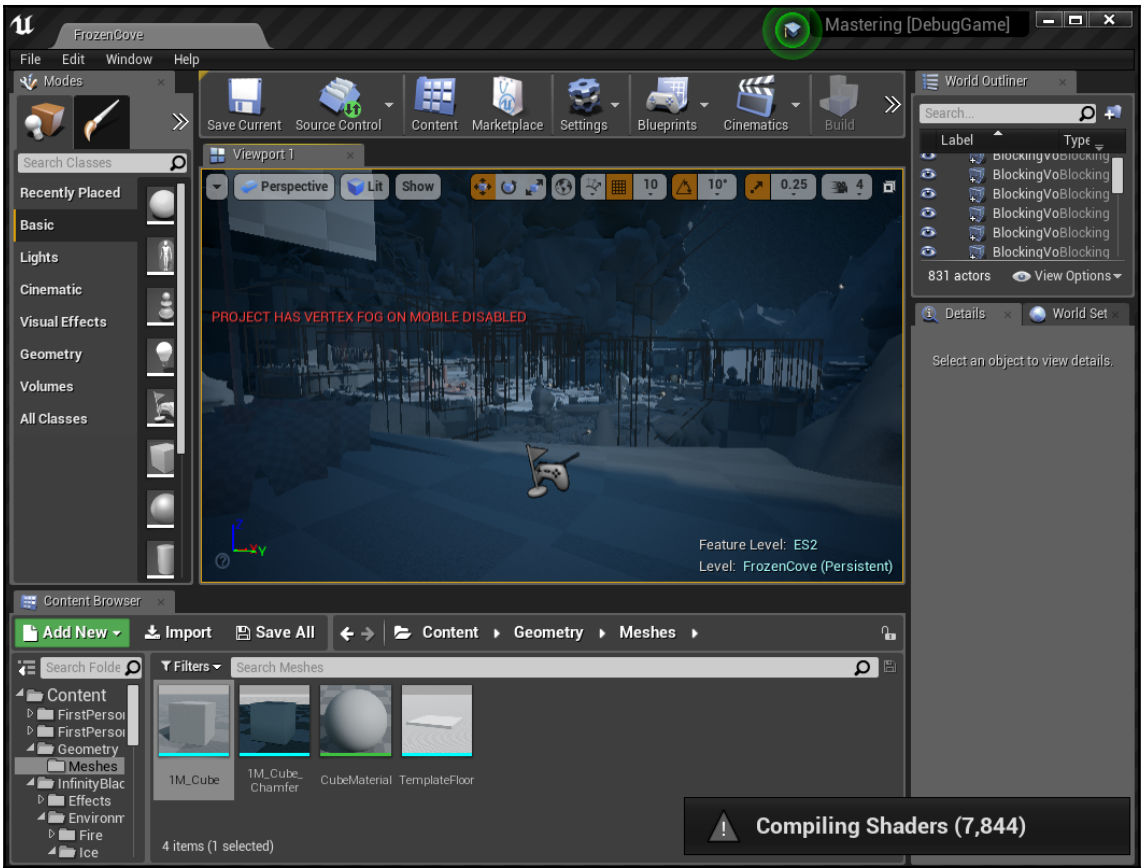
The **Compiler Results** window at the bottom shows a successful compilation:

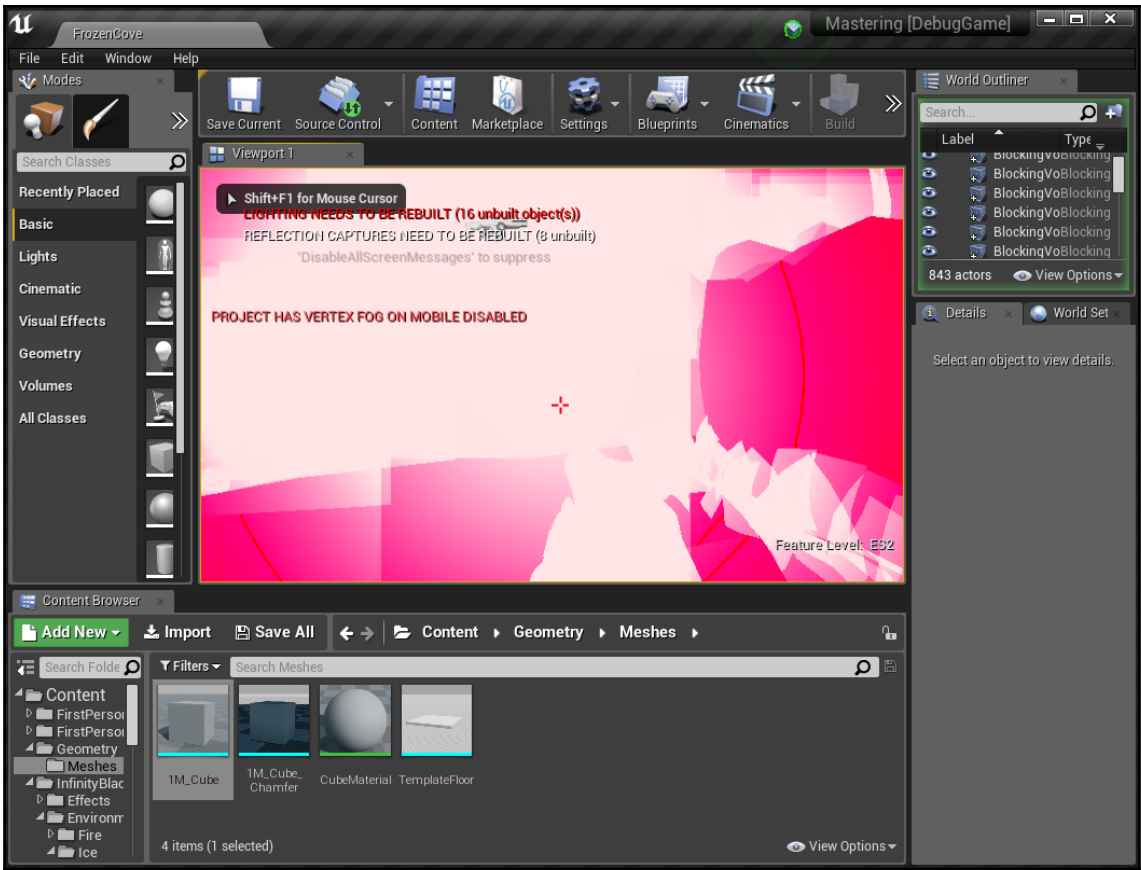
- [0411.63] Compile of PhysicsBox successful! [in 1,411 ms] (/Game/FirstPersonCPP/Blueprints/PhysicsBox.PhysicsBox)

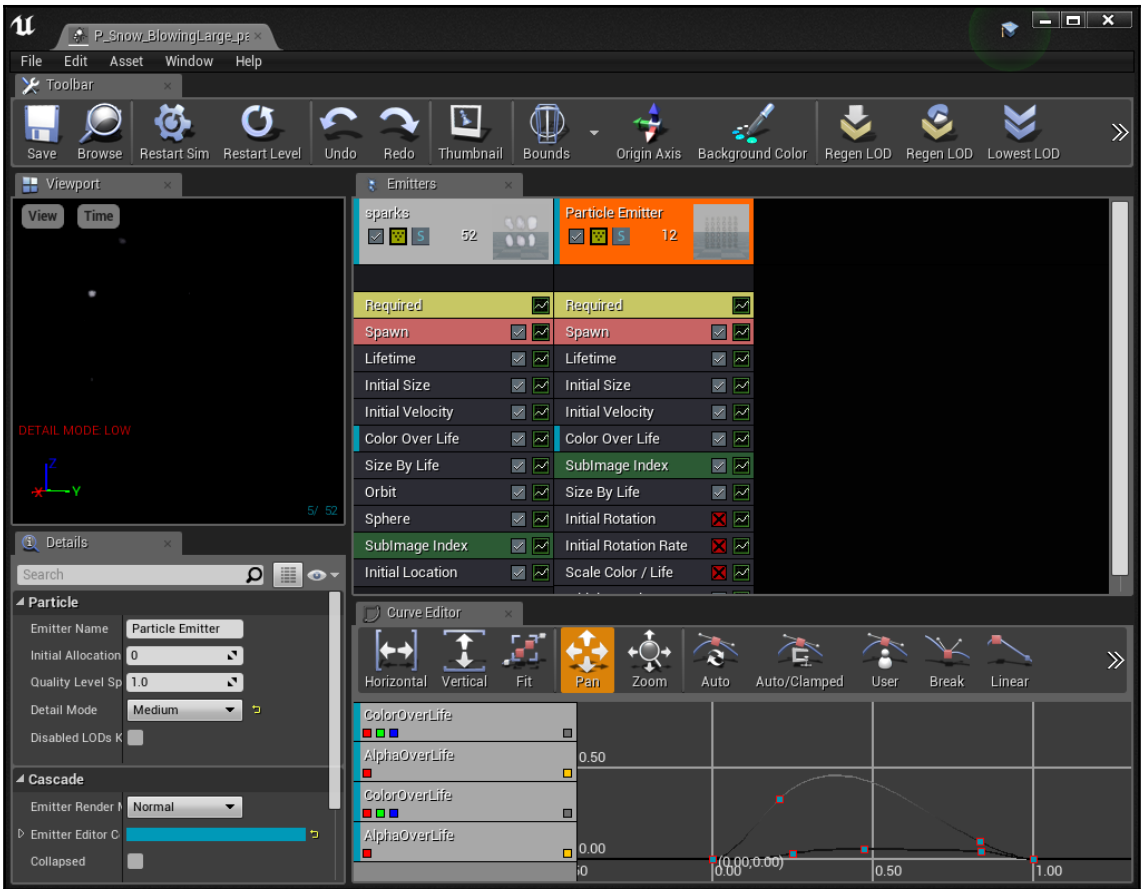
A large "BLUEPRINT" watermark is visible in the background of the graph area.

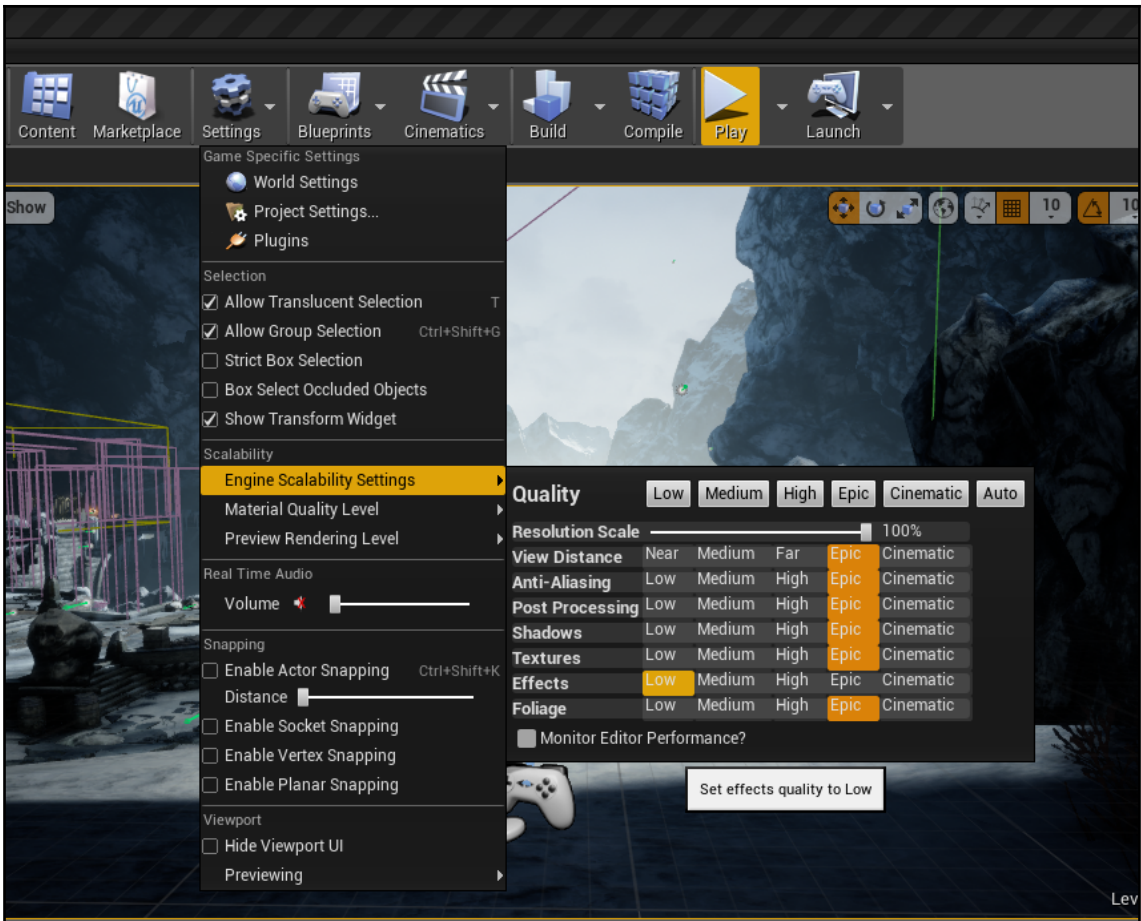


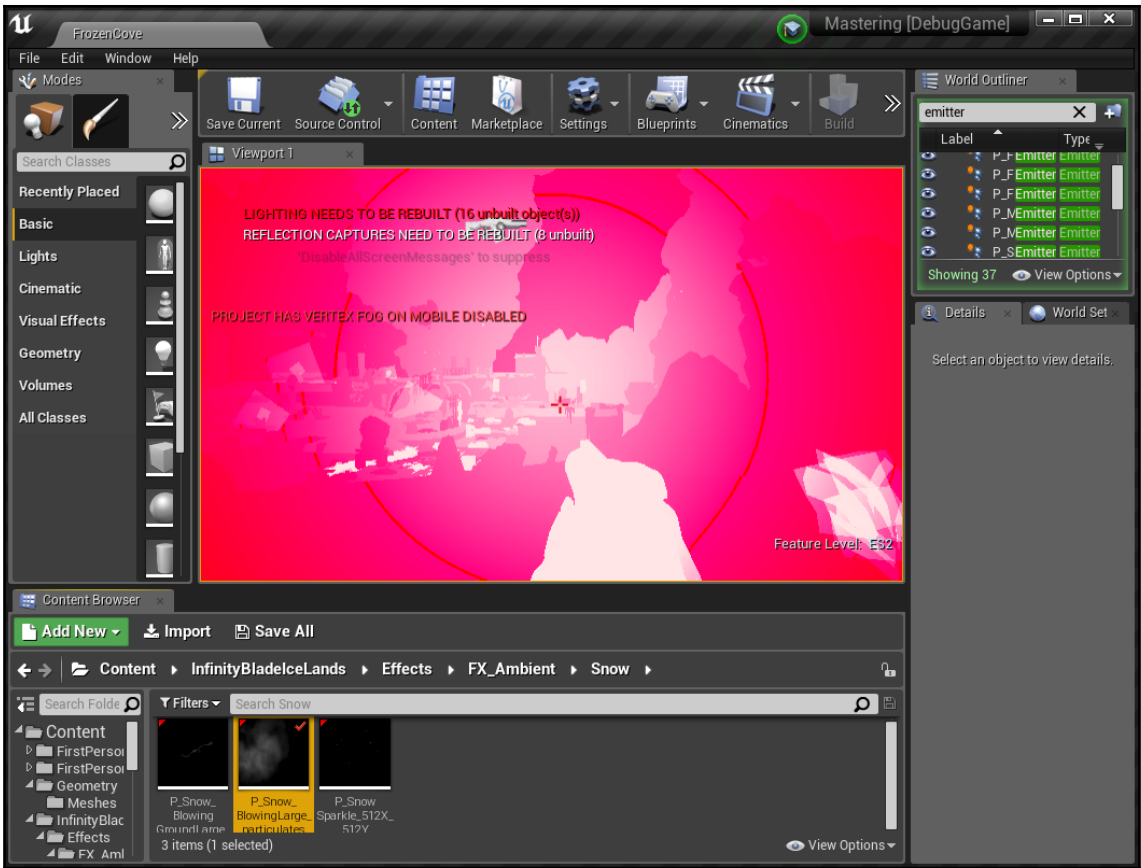


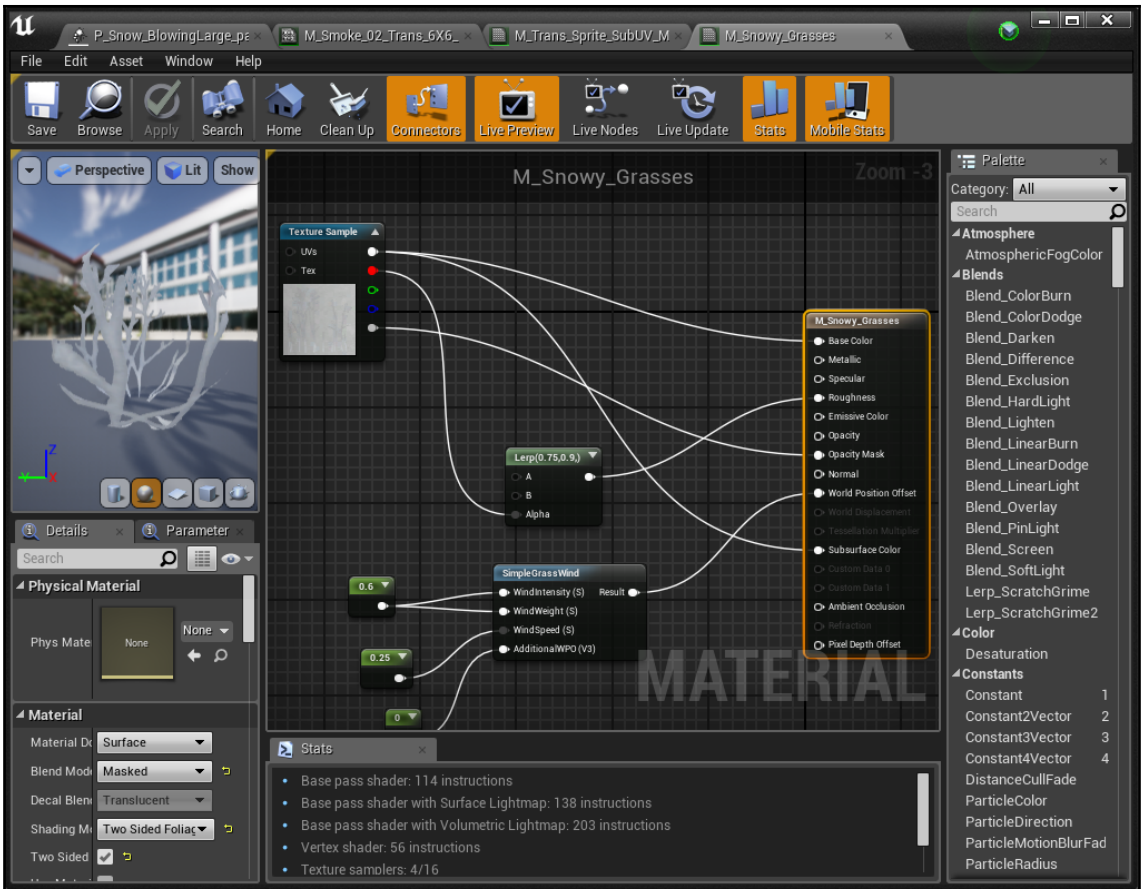


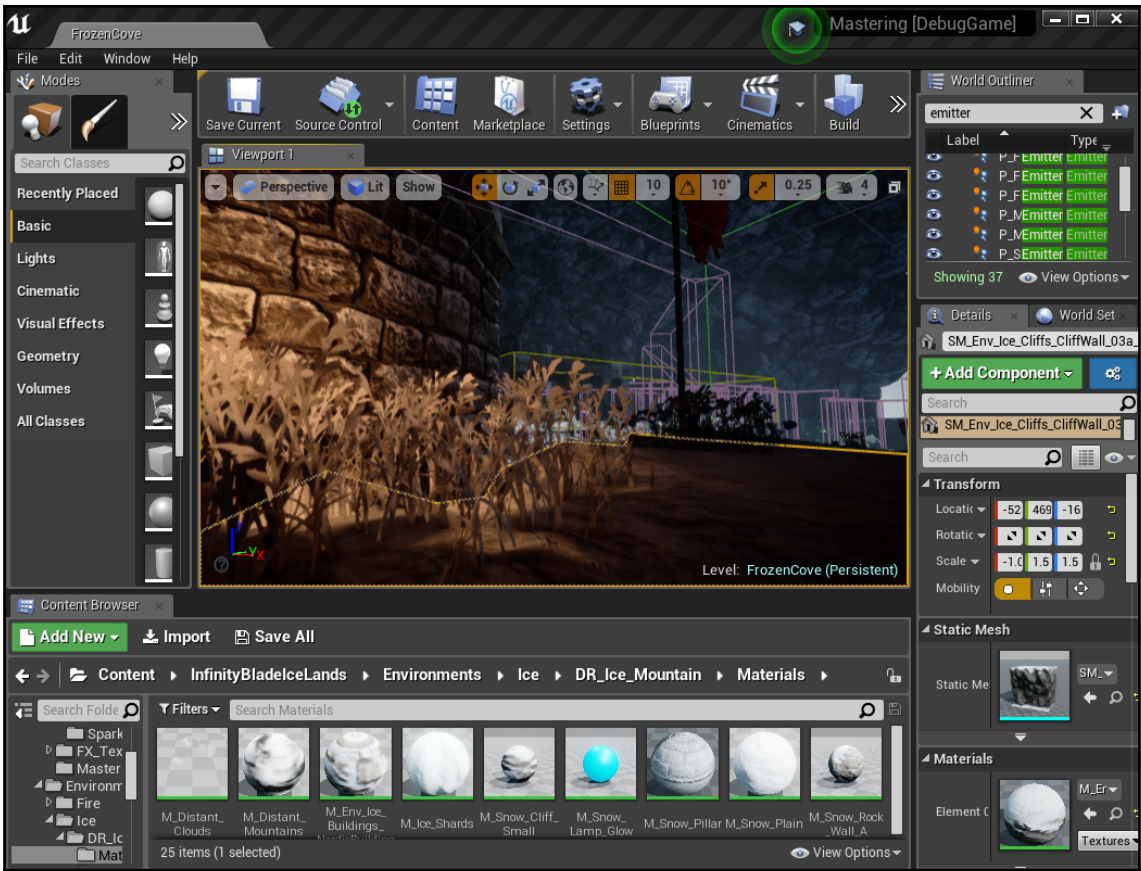




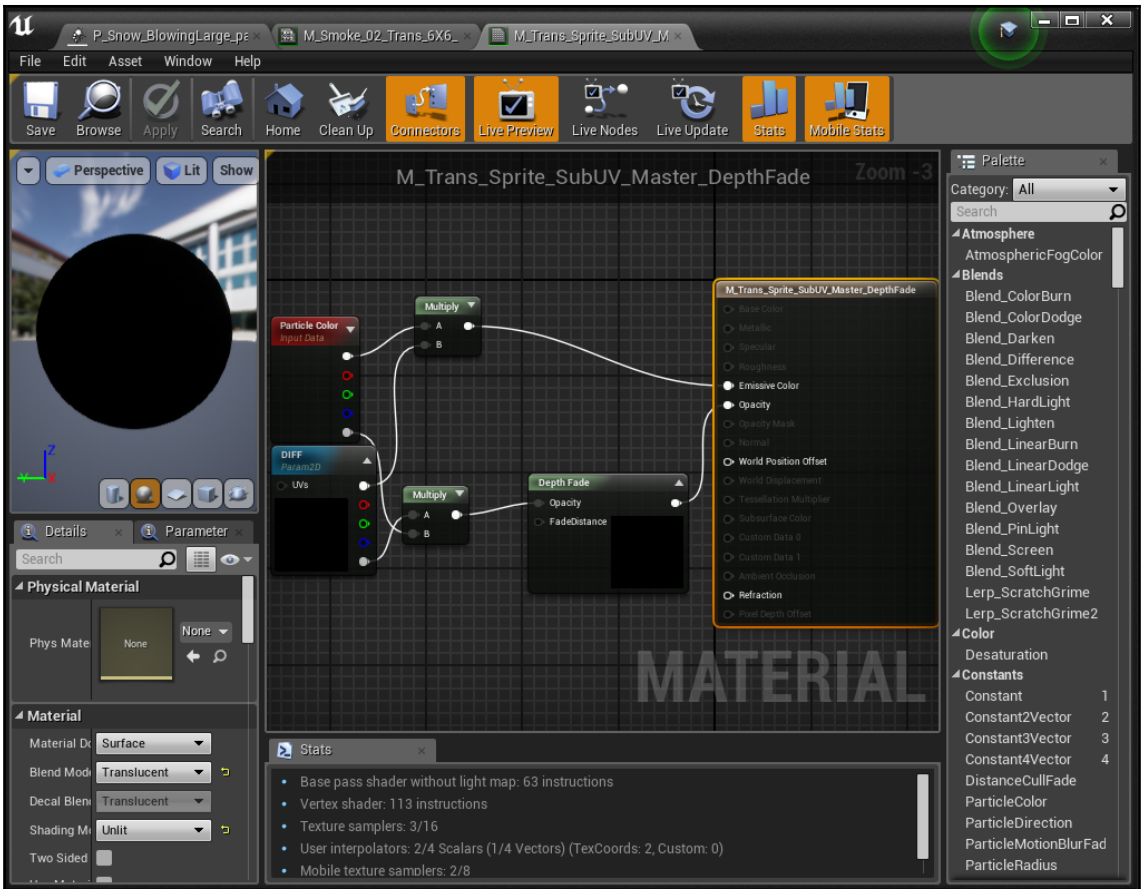


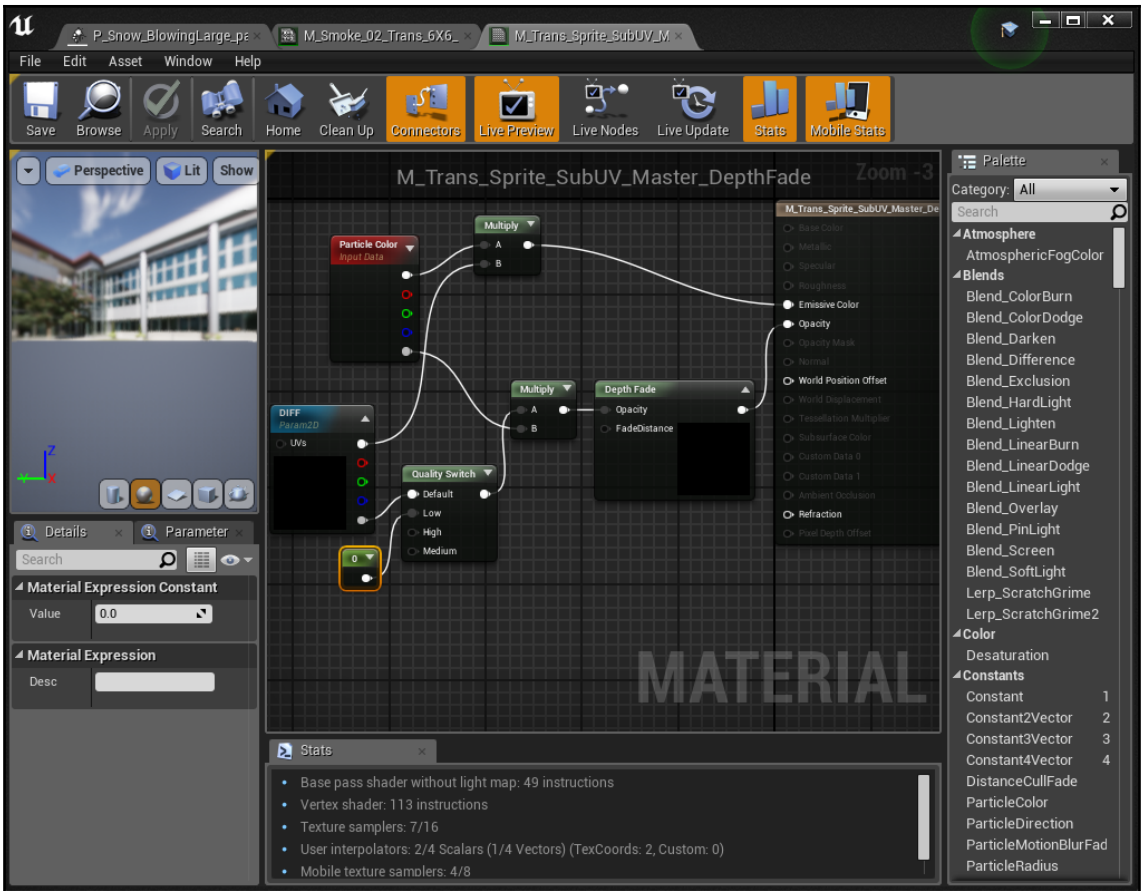




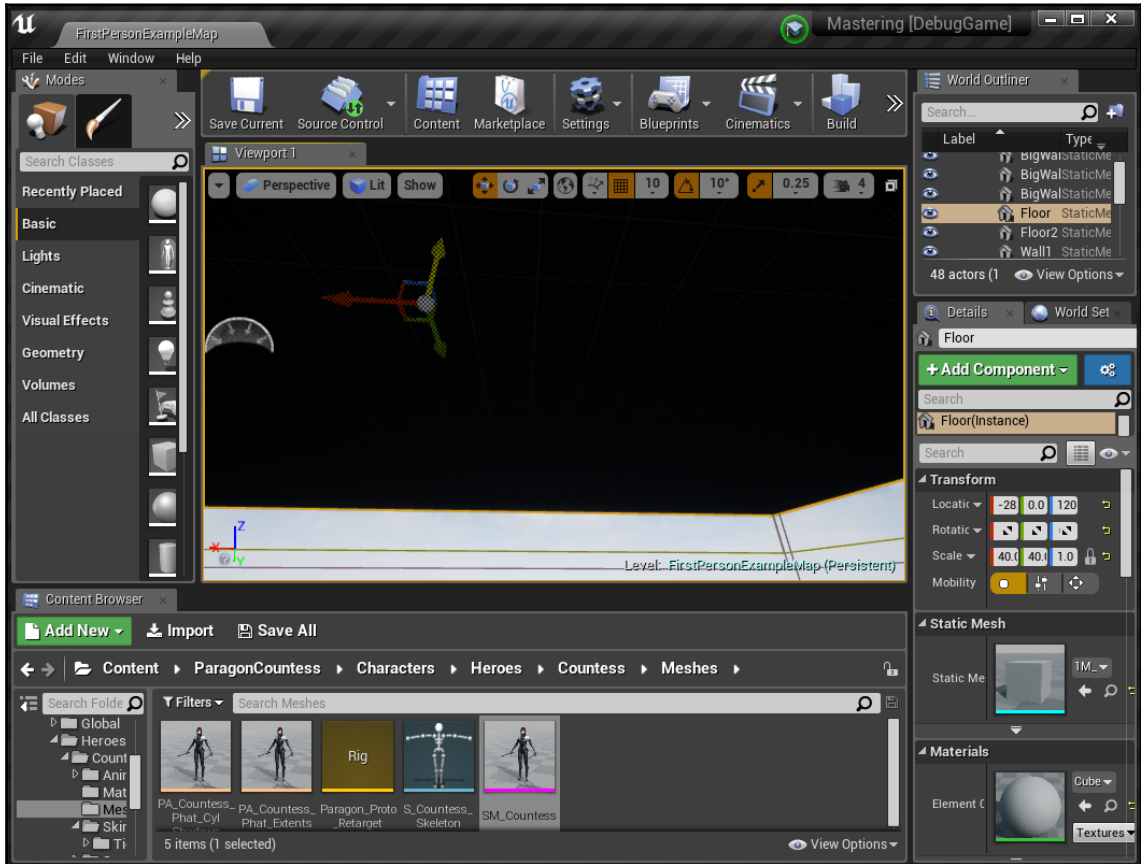


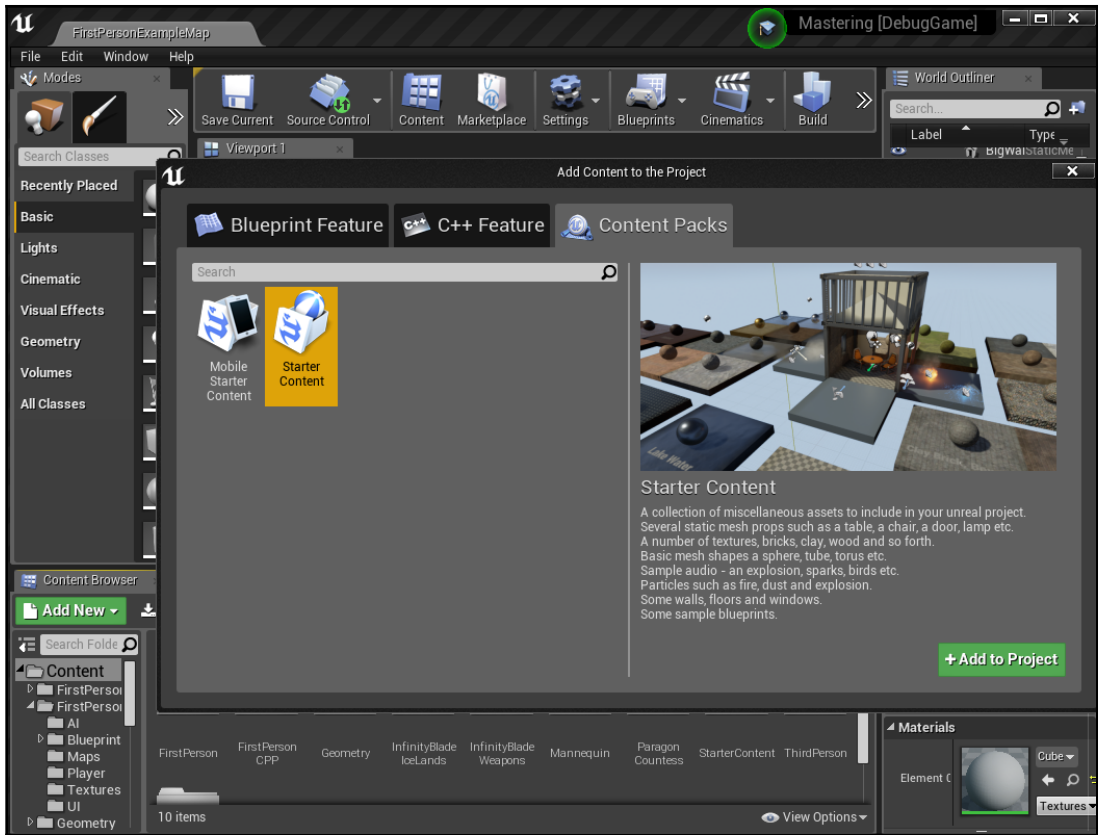


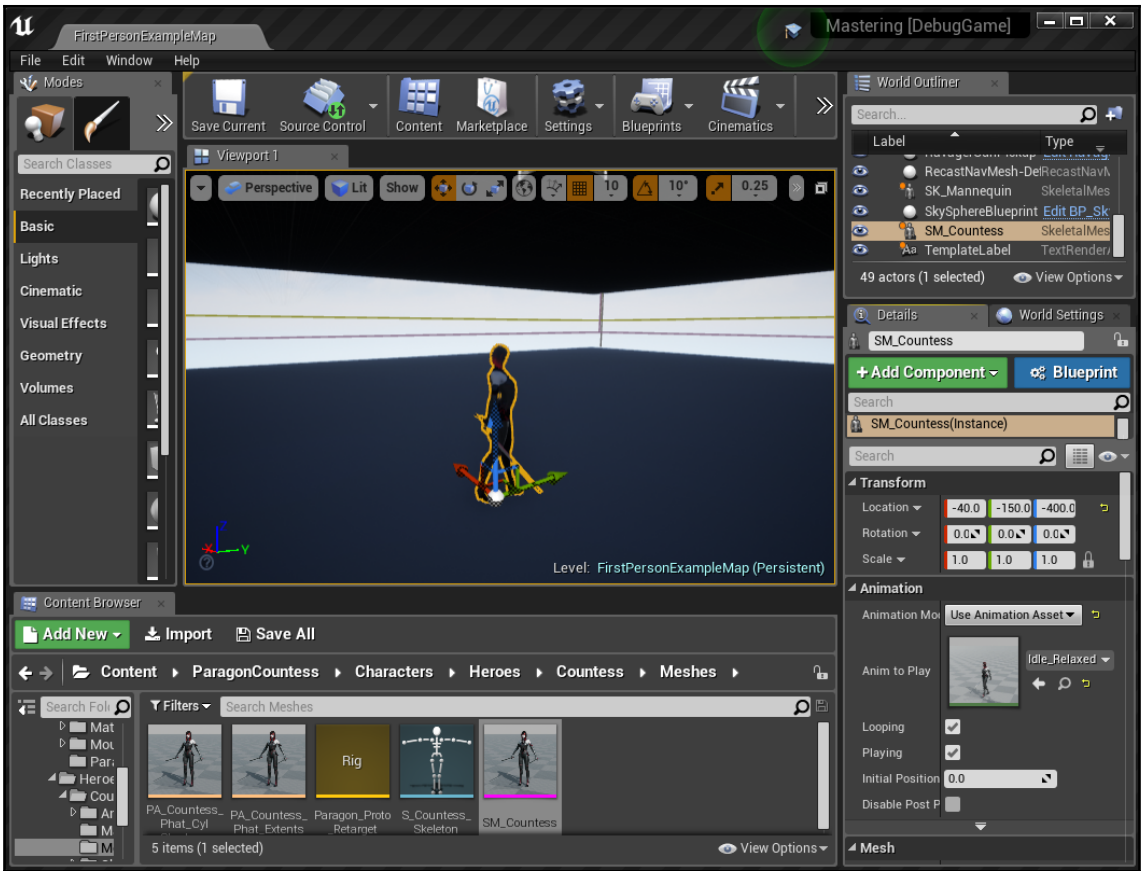


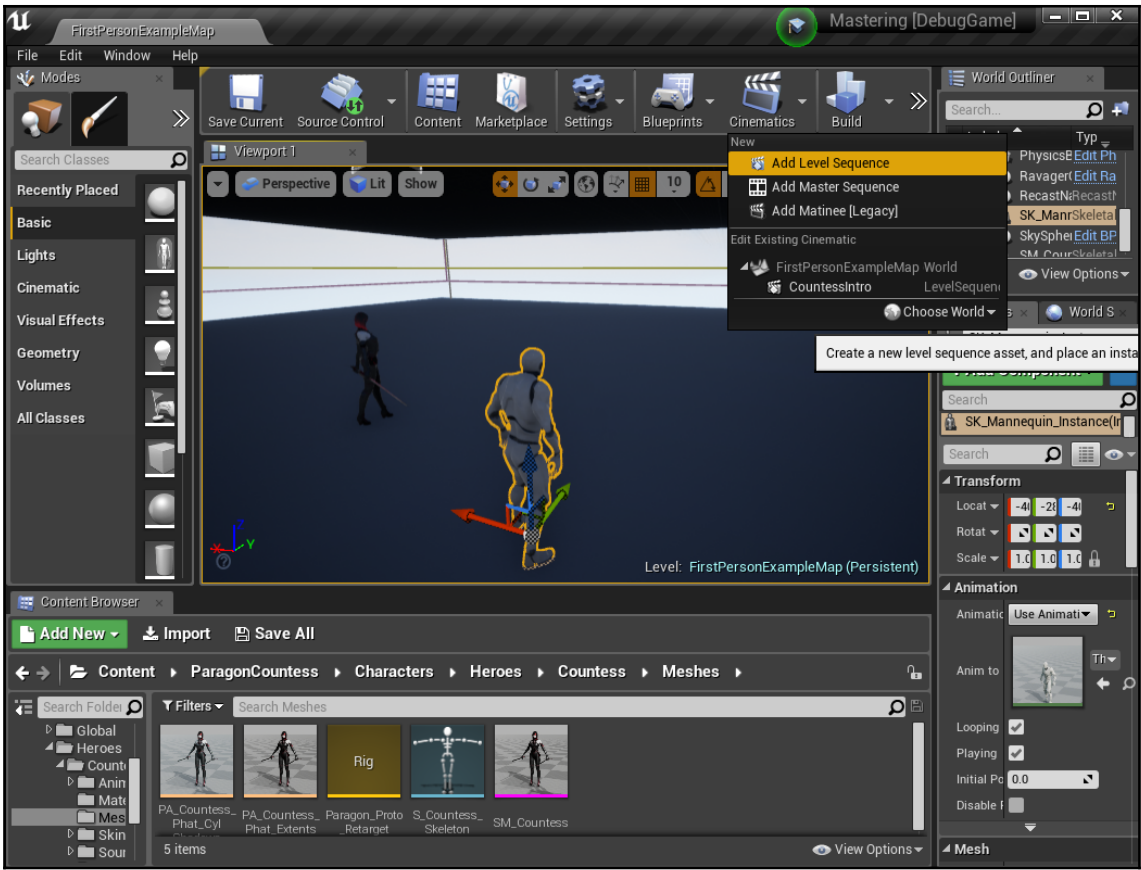


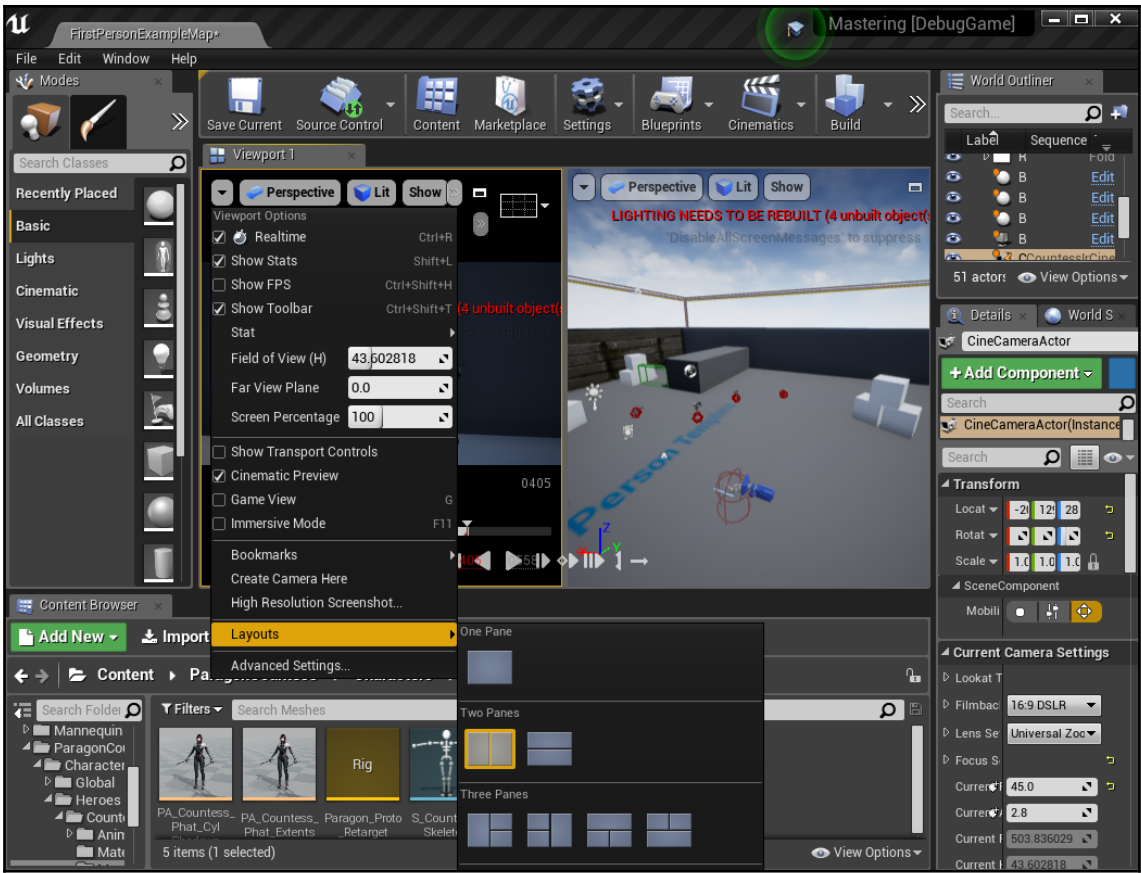
# Chapter 9: Adding an In-game Cutscene with Sequencer

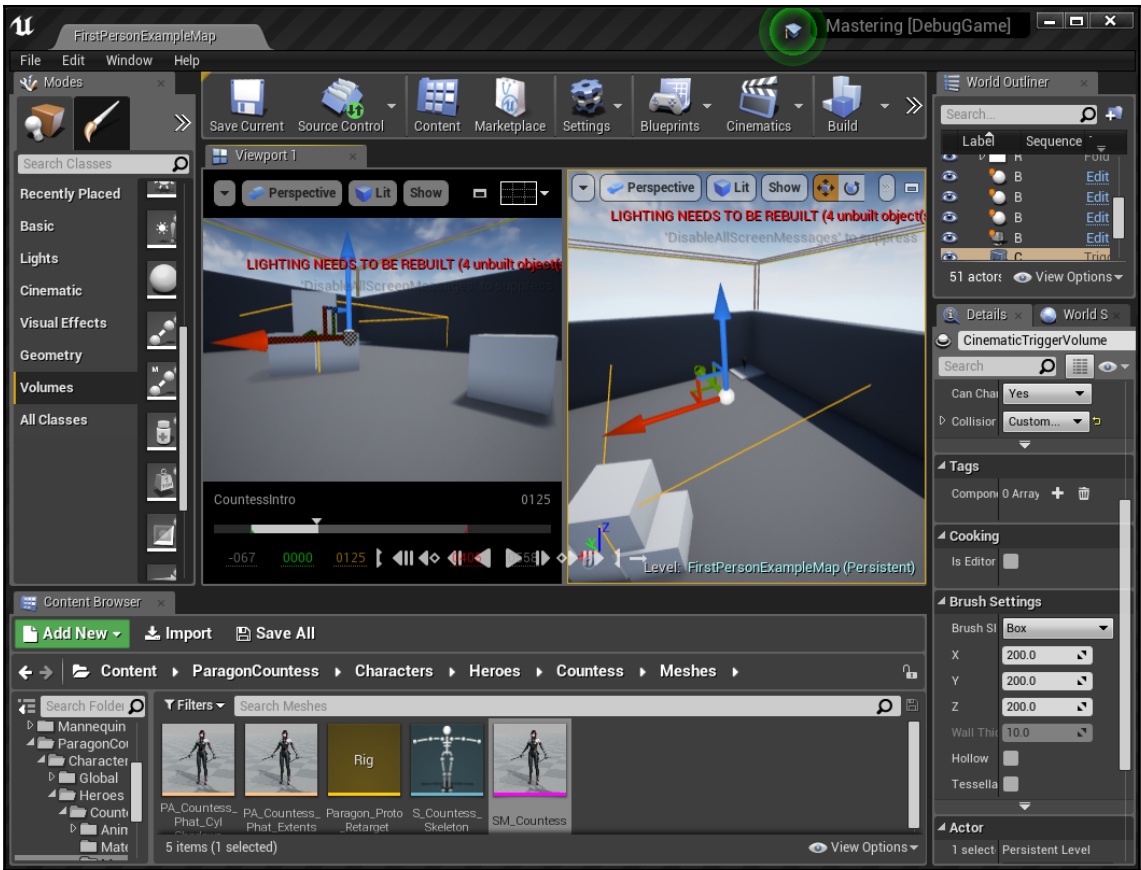




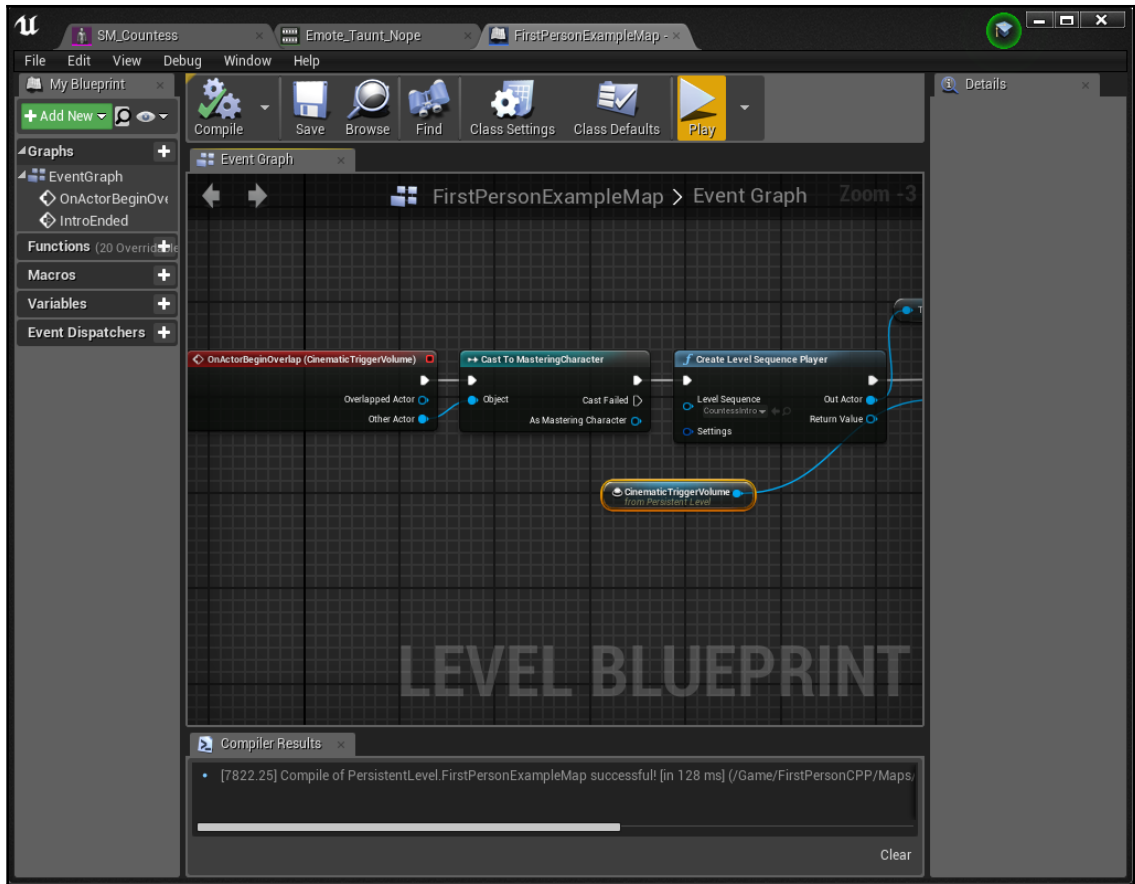


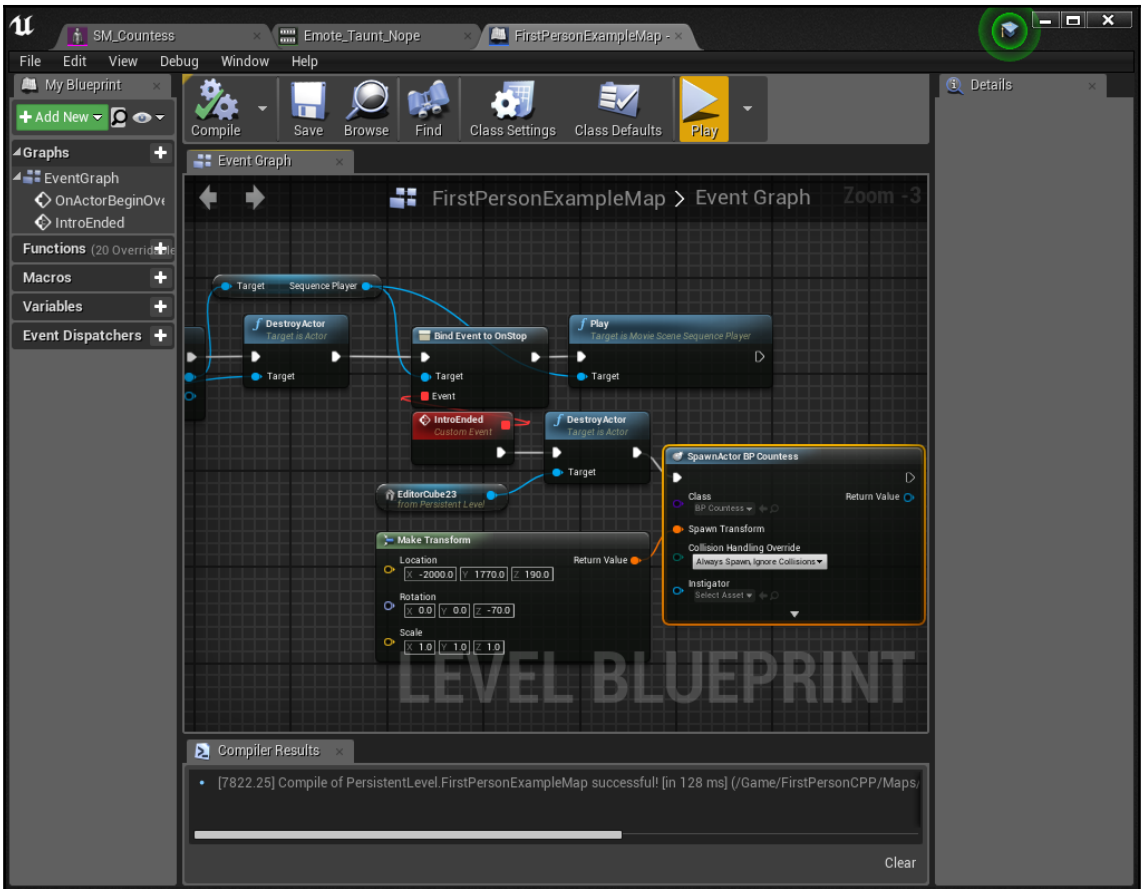












U Sequencer

CountessIntro

30 fps

Track Filter

EditorCube23

- Transform
  - Location
    - X
    - Y
    - Z
  - Rotation
  - Scale

SM\_Countess\_Instance

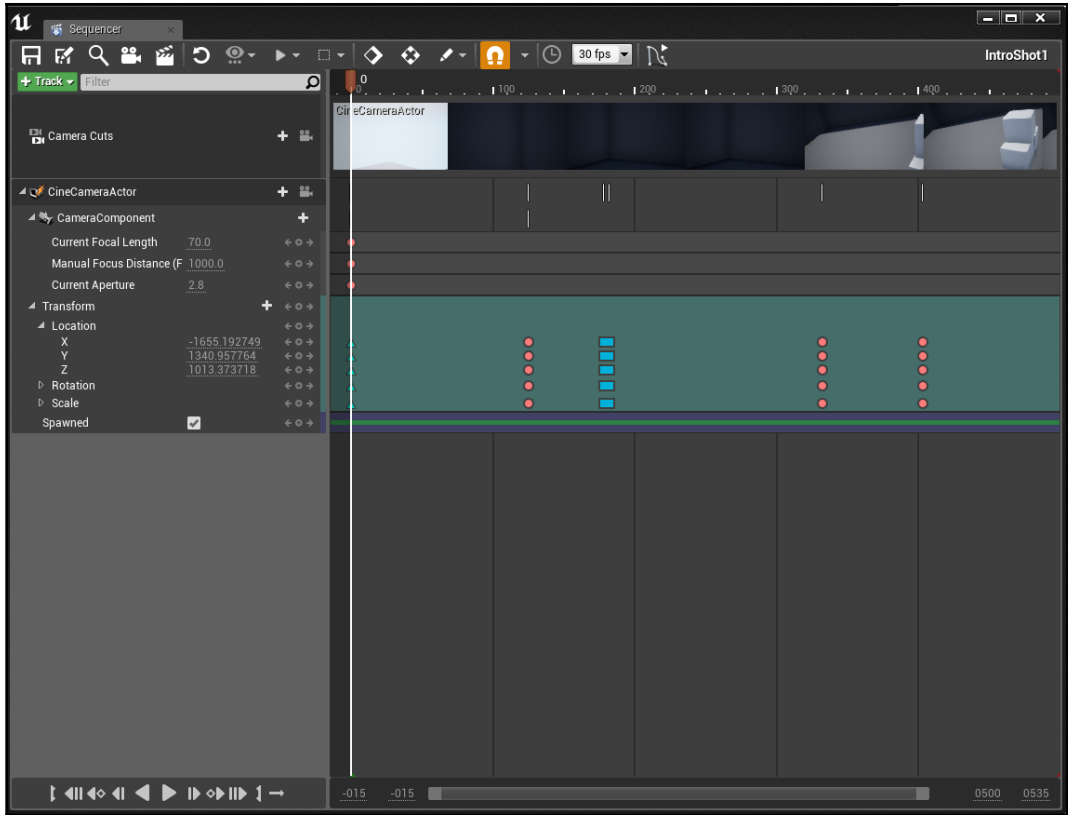
- Transform
  - Location
    - X: -2000.0
    - Y: 1770.0
    - Z: 190.0
  - Rotation
    - X: 0.0
    - Y: 0.0
    - Z: -160.000107
  - Scale
  - Animation
    - Animation
      - Weight: 1.0
    - Animation
      - Weight: 1.0
    - Animation
      - Weight: 1.0
    - Spawned:

Timeline (0 to 200):

- TurnInPlace\_Fast (0 to ~100)
- Idle\_Relaxed (~100 to ~125)
- Emote-Taunt\_Nope (~125 to ~180)

Timeline markers: 0, 50, 100, 125, 150, 200

Timeline playback controls: -067, -005, 0211, 0558



U... FirstPersonExampleMap - x

File Edit View Debug Window Help

My Blueprint + Add New

Compile Save Browse Find Class Settings Class Defaults Play

Details

Graphs +

EventGraph

OnActorBeginOvr

IntroEnded

Functions (20 Overrides)

Macros +

Variables +

Event Dispatchers +

Event Graph

FirstPersonExampleMap > Event Graph Zoom -3

Play  
Target is Movie Sequence Player

Destroy Actor  
Target is Actor

Get Player Controller  
Player Index 0 Return Value

Get HUD  
Target is Player Controller

Spawn Actor BP Countess  
Class BP Countess  
Spawn Transform  
Collision Handling Override Always Spawns, Ignore Collisions  
Instigator Select Asset

SET  
Show HUD

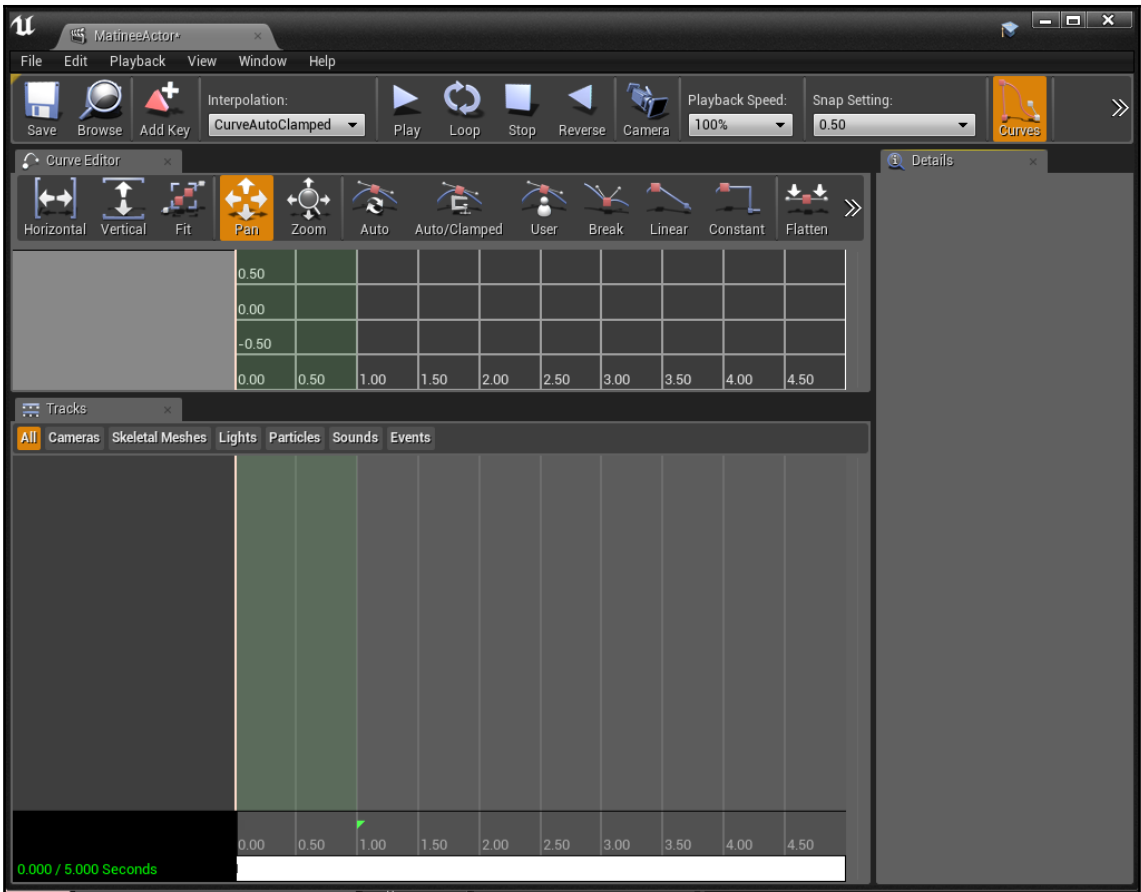
SET  
Show HUD

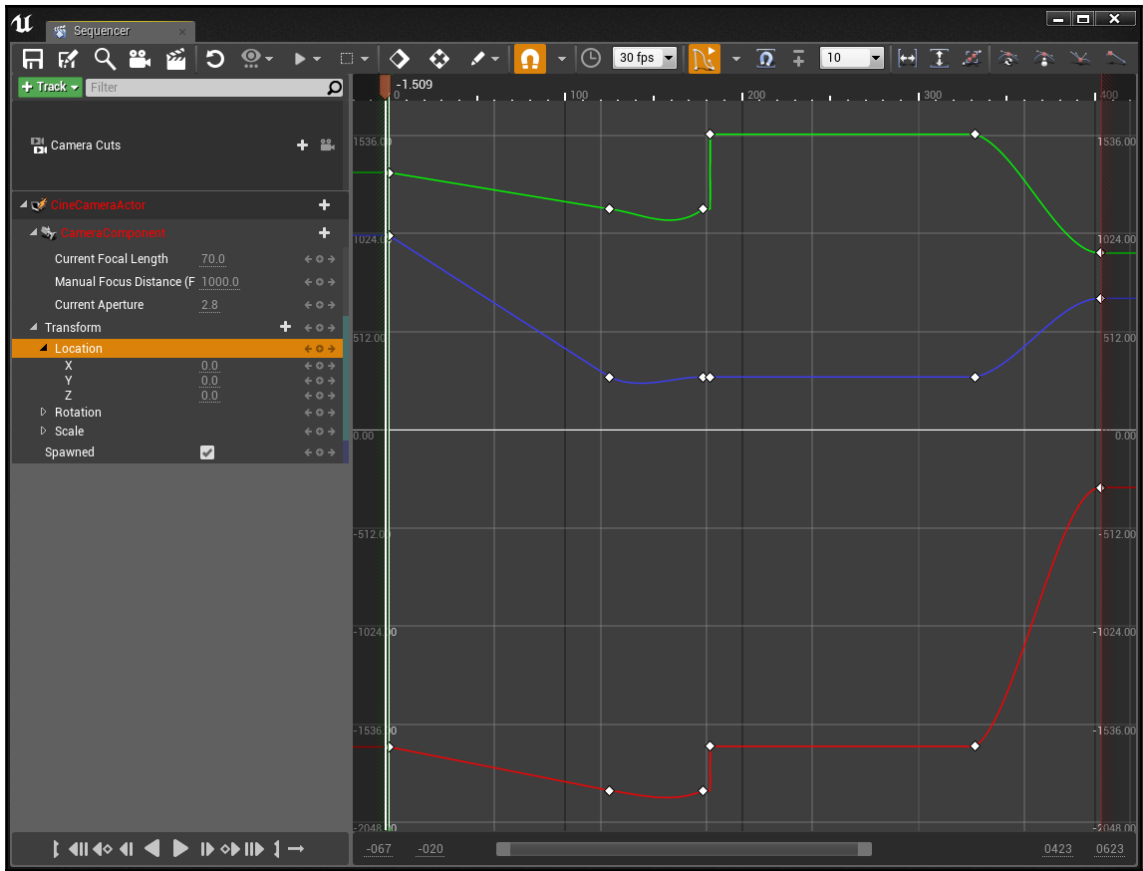
LEVEL BLUEPRINT

Compiler Results

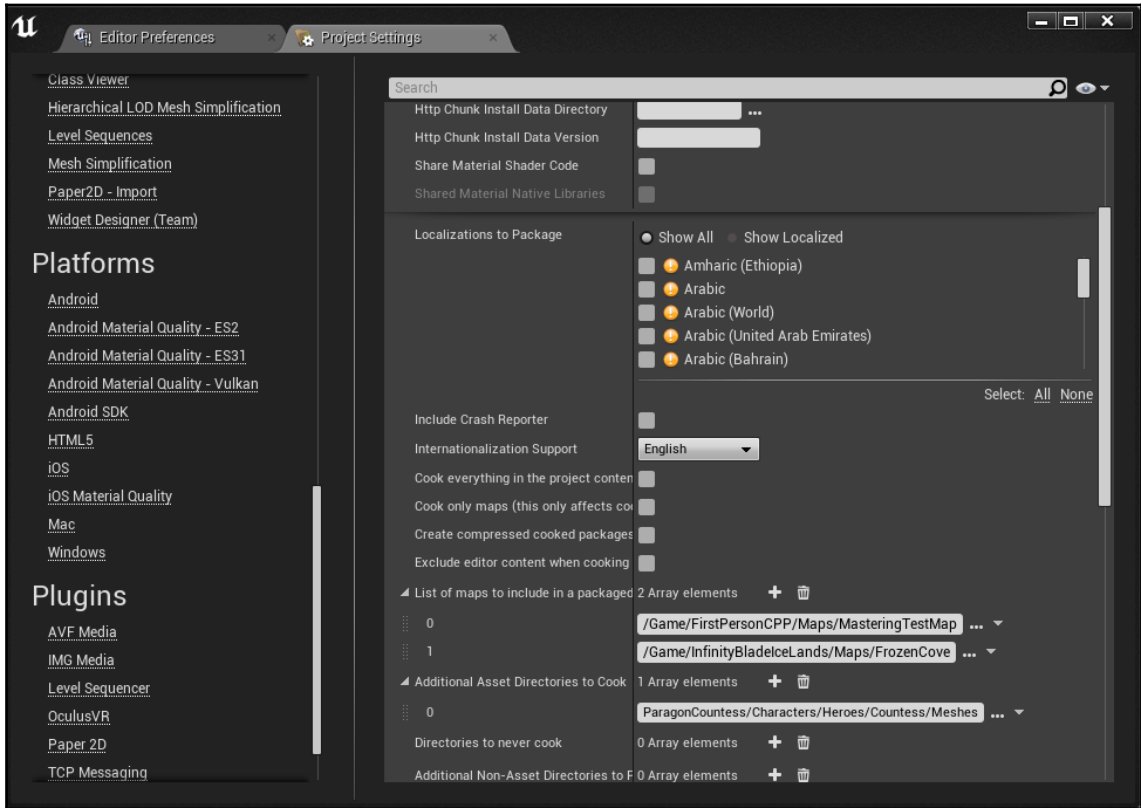
- [6145.17] Compile of PersistentLevel.FirstPersonExampleMap successful! [in 144 ms] (/Game/FirstPersonCPP/Maps/

Clear

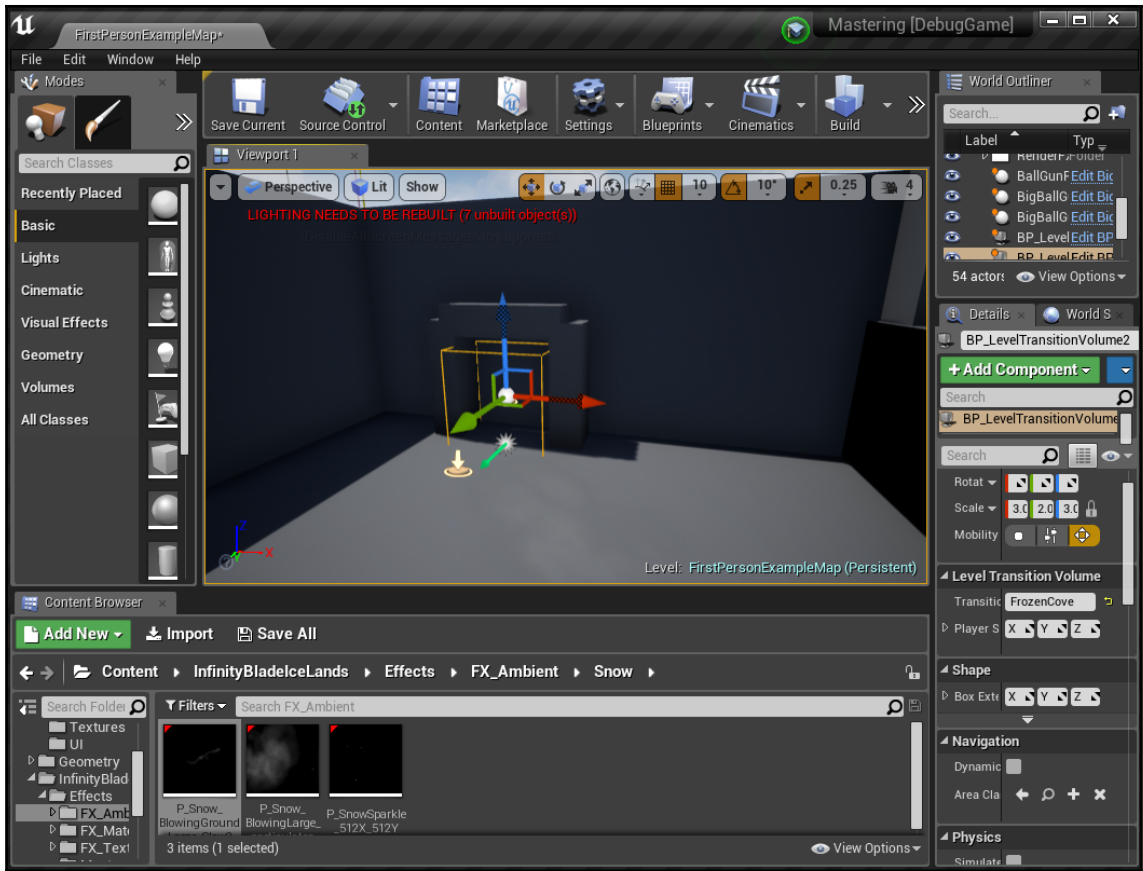


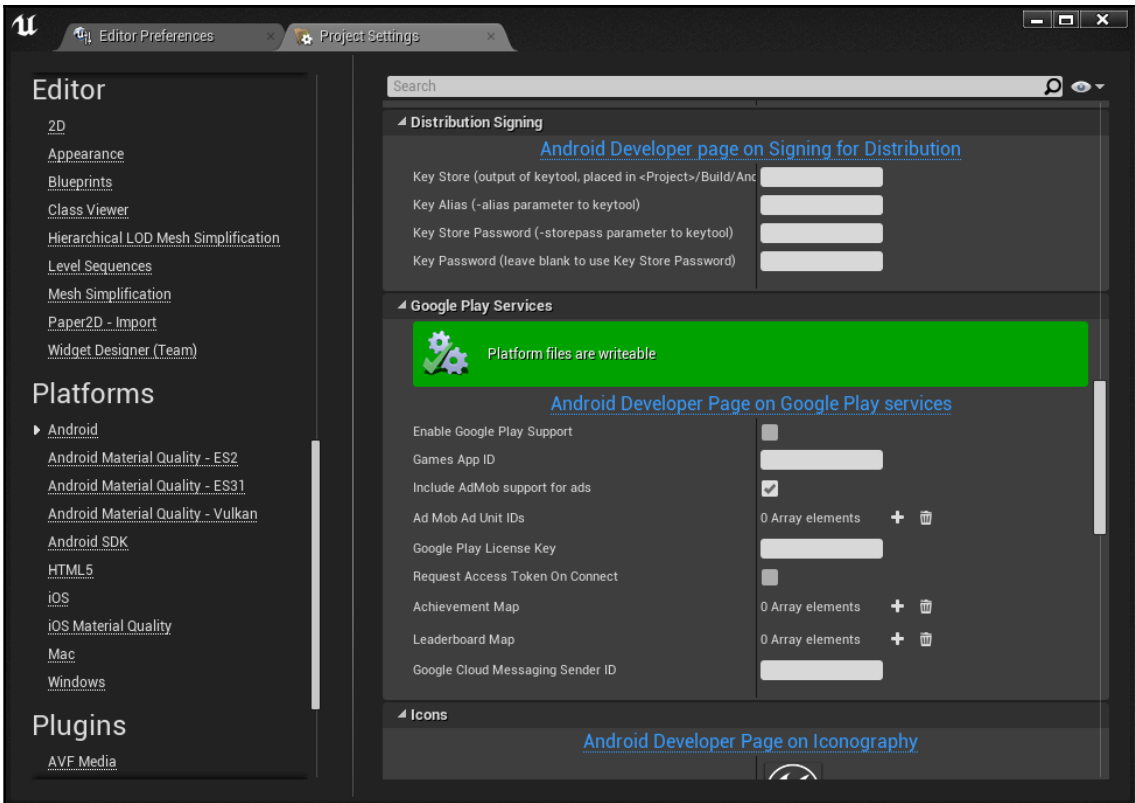


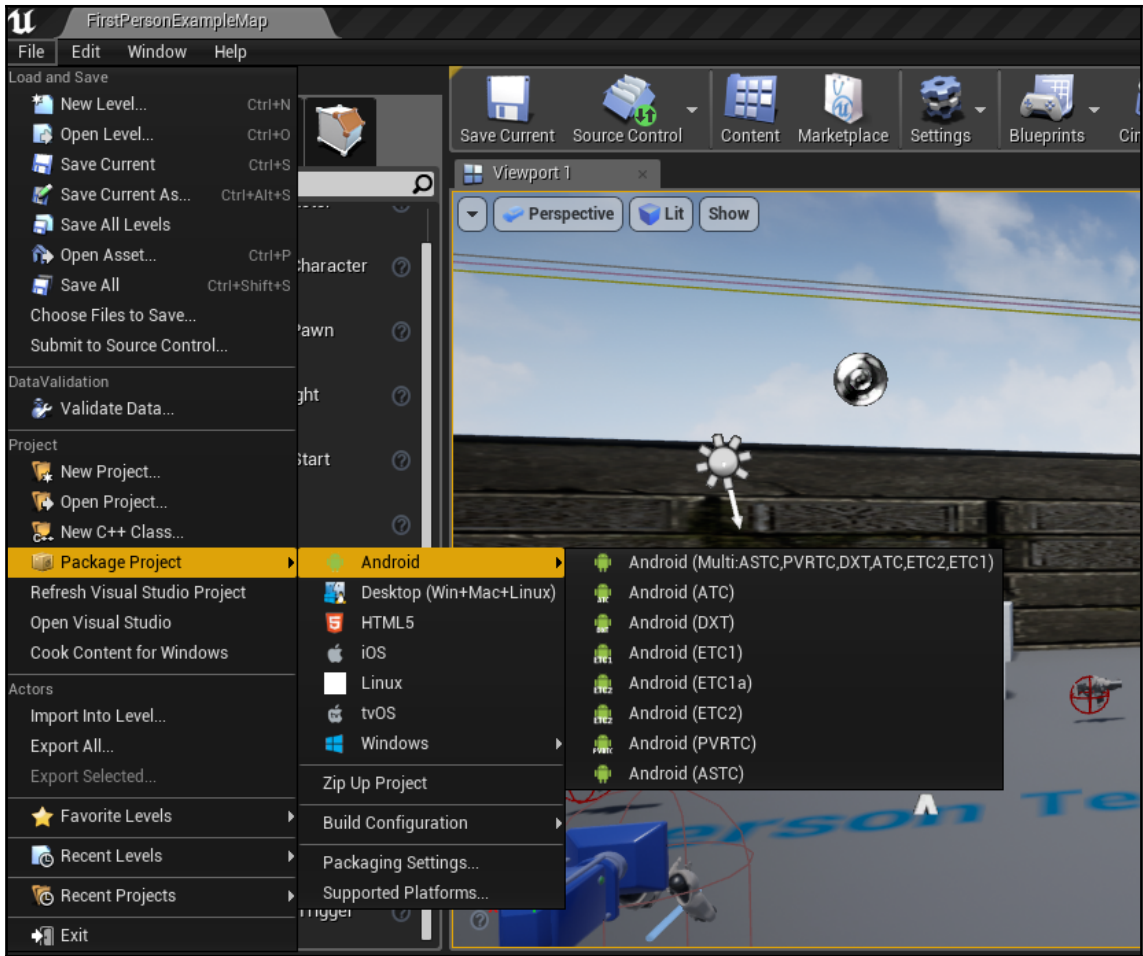
# Chapter 10: Packaging the Game (PC, Mobile)

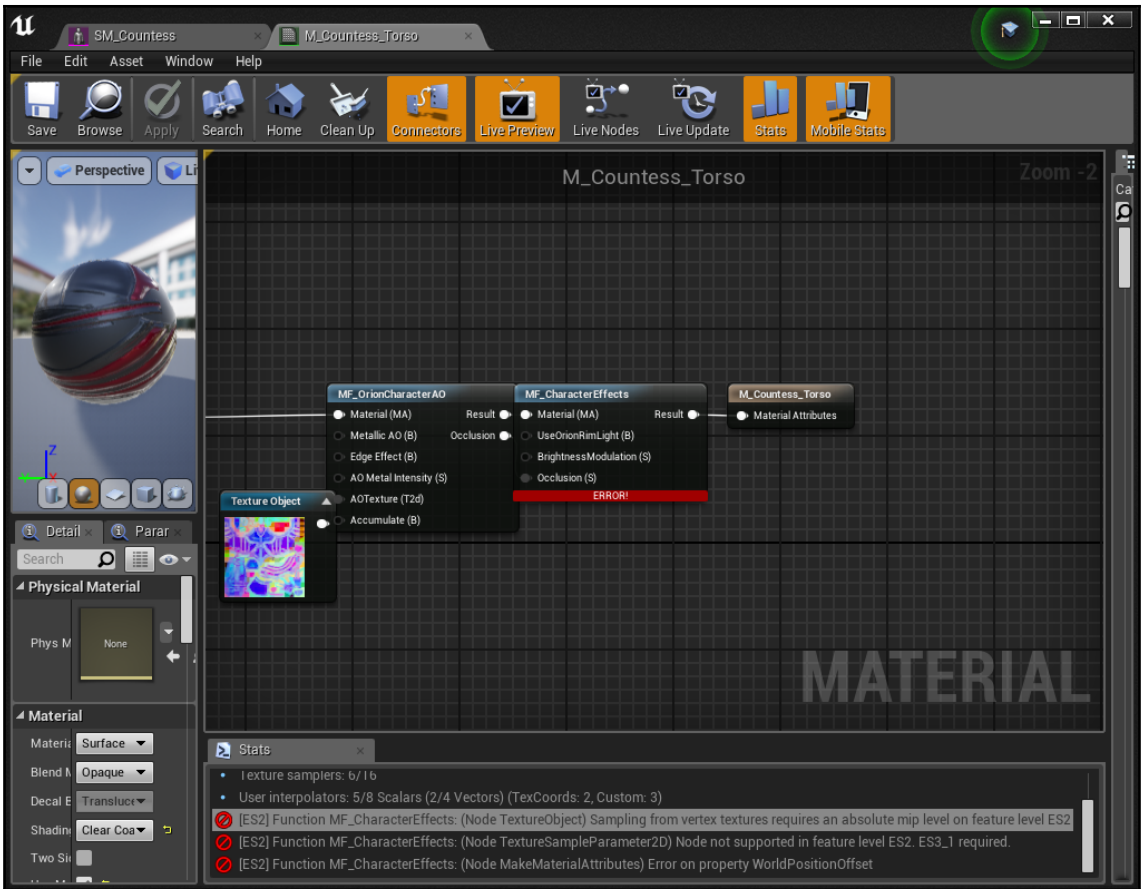


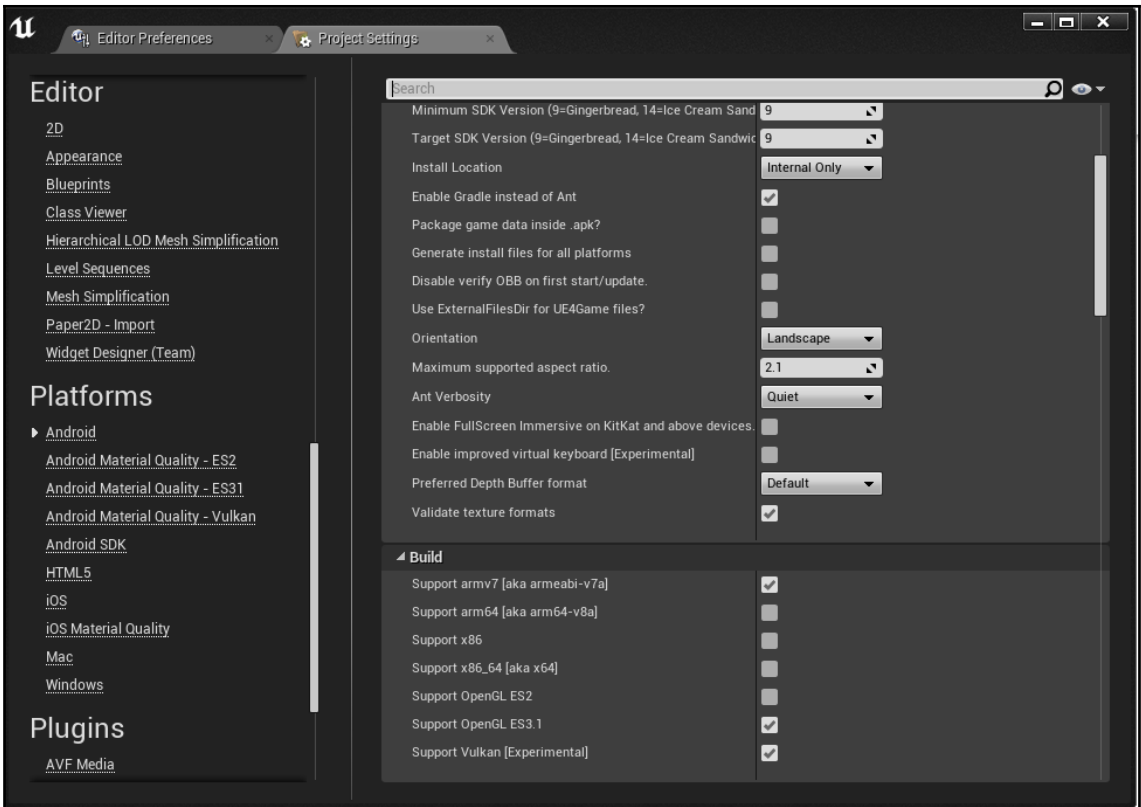


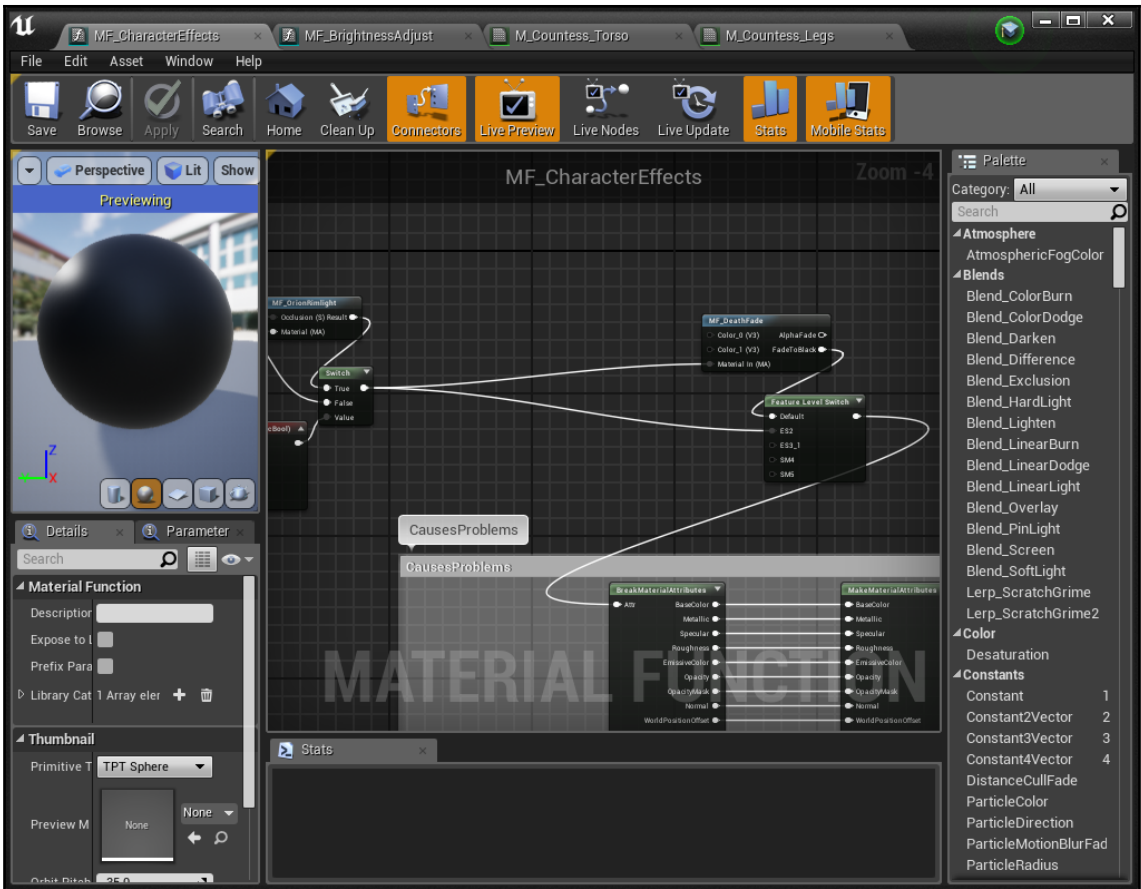












u Editor Preferences x Project Settings x

Mesh Simplification  
Paper2D - Import  
Widget Designer (Team)

## Platforms

[Android](#)  
[Android Material Quality - ES2](#)  
[Android Material Quality - ES31](#)  
[Android Material Quality - Vulkan](#)  
[Android SDK](#)  
[HTML5](#)  
▶ [iOS](#)  
[iOS Material Quality](#)  
[Mac](#)  
[Windows](#)

## Plugins

[AVF Media](#)  
[IMG Media](#)  
[Level Sequencer](#)  
[OculusVR](#)  
[Paper 2D](#)  
[TCP Messaging](#)  
[UDP Messaging](#)  
[WMF Media](#)

Search

# Platforms - iOS

Settings and resources for the iOS platform [Set as Default](#) [Export...](#) [Import...](#) [Reset to Defaults](#)

These settings are saved in DefaultEngine.ini, which is currently checked out.

### Mobile Provision

Provision	File	Status	Distribution
<input type="checkbox"/>	MasteringDev	Mastering.mobileprovision	Valid
<input checked="" type="checkbox"/>	MasteringDev	MasteringDev.mobileprovis	Valid

Note: If no provision is selected the one in green will be used to provision the IPA. View: [All](#) [Valid Only](#)

[Import Provision](#)

Certificate	Status	Expires
<input checked="" type="checkbox"/> iPhone Developer: Matthew Edmonds (DK4KNJ6CNC)	Valid	2019-08-08
<input type="checkbox"/> iPhone Distribution: Matthew Edmonds (36F9G9N5X8)	Valid	2019-08-08

Note: If no certificate is selected then the one in green will be used to sign the IPA. View: [All](#) [Valid Only](#)

[Import Certificate](#)

### Bundle Information

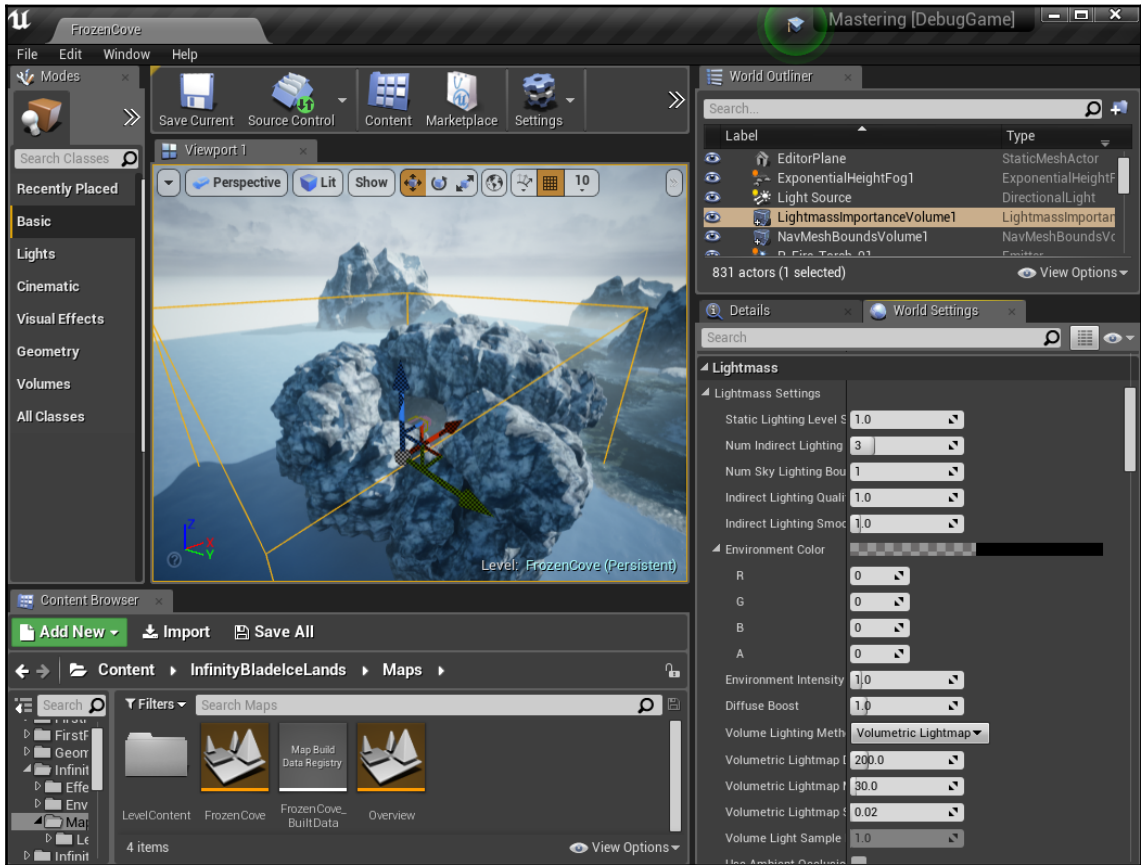
Note to users from 4.6 or earlier: We now GENERATE an Info.plist when building, so if you have customized your .plist file, you will need to put all of your changes into the below settings. Note that we don't touch the .plist file that is in your project directory, so you can use it as reference.

Bundle Display Name

Bundle Name

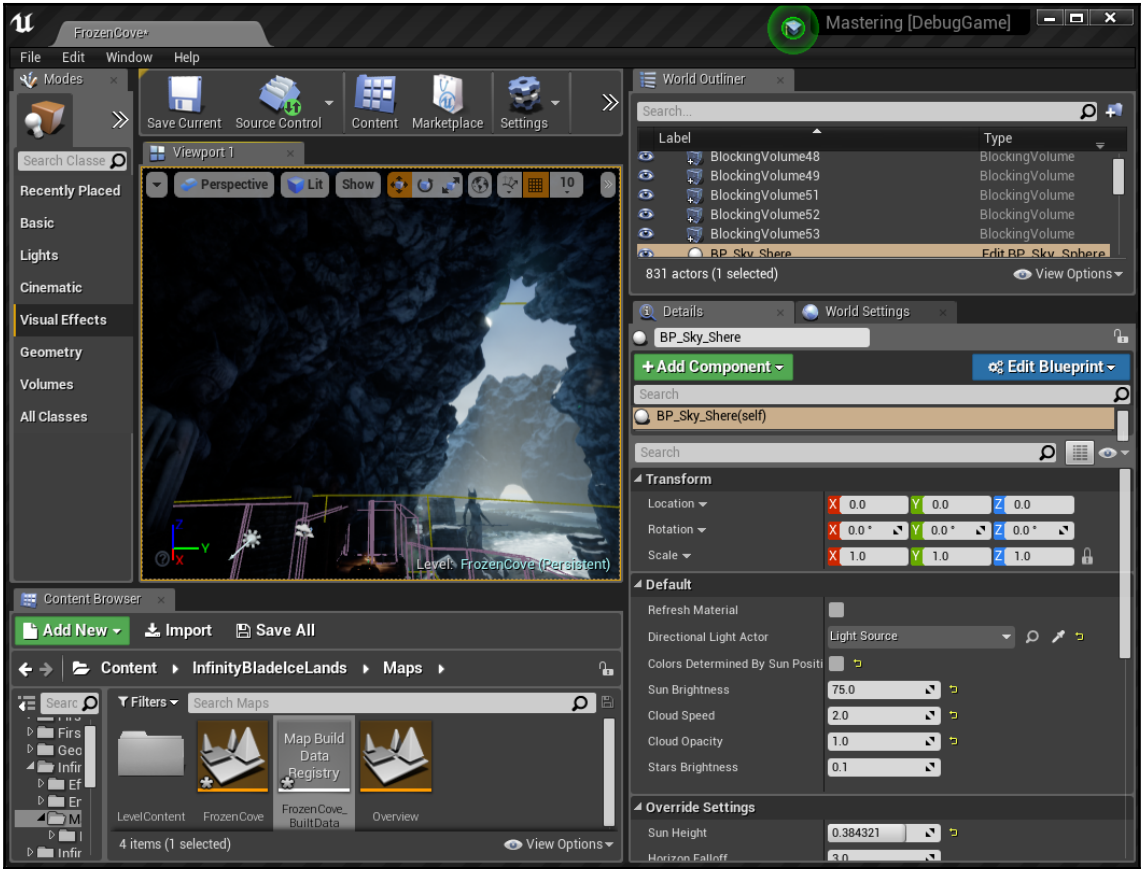
Bundle Identifier

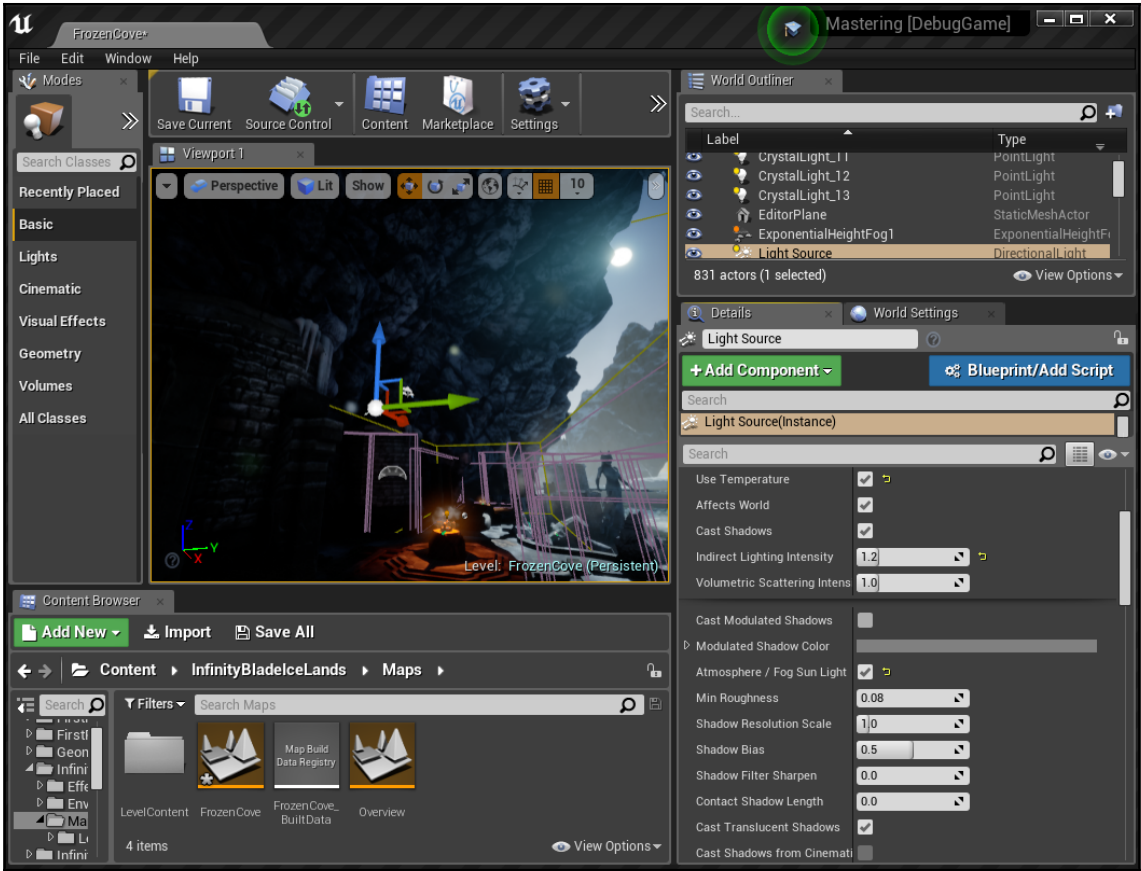
# Chapter 11: Volumetric Lightmaps, Fog, and Precomputing

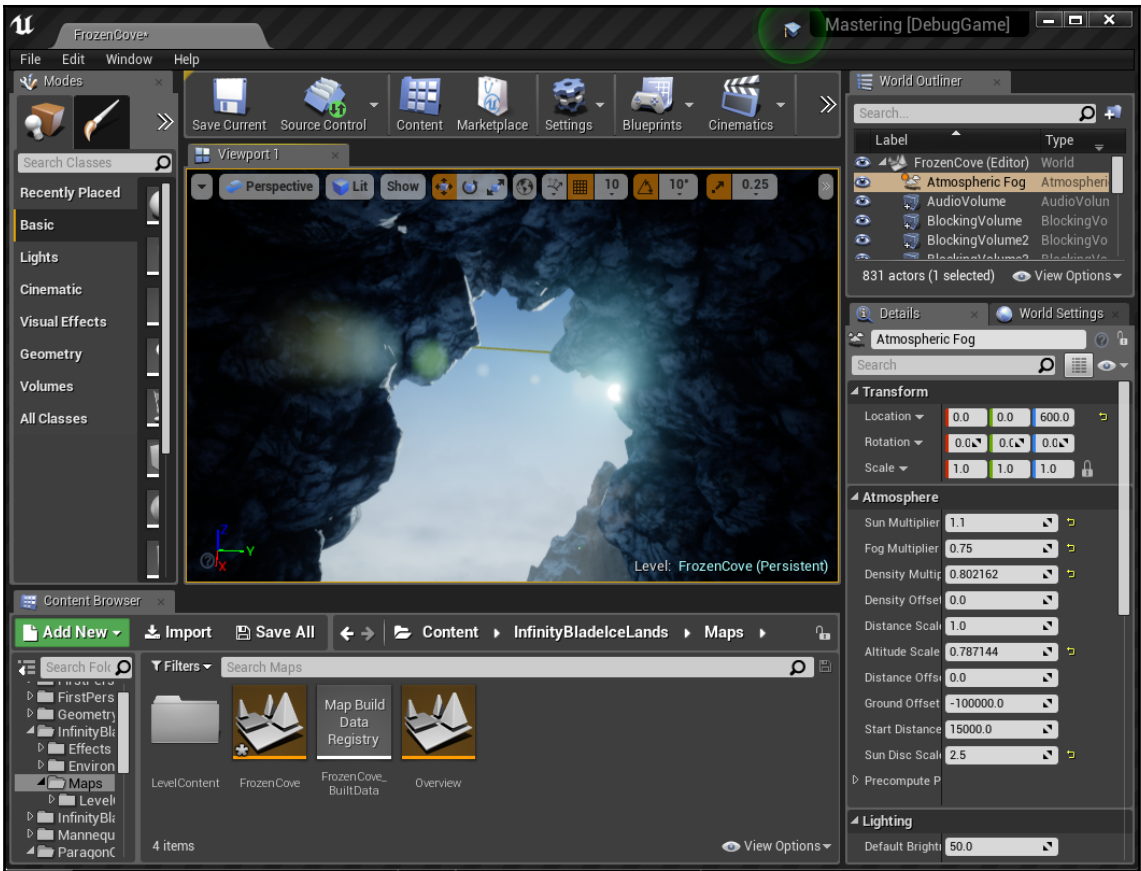


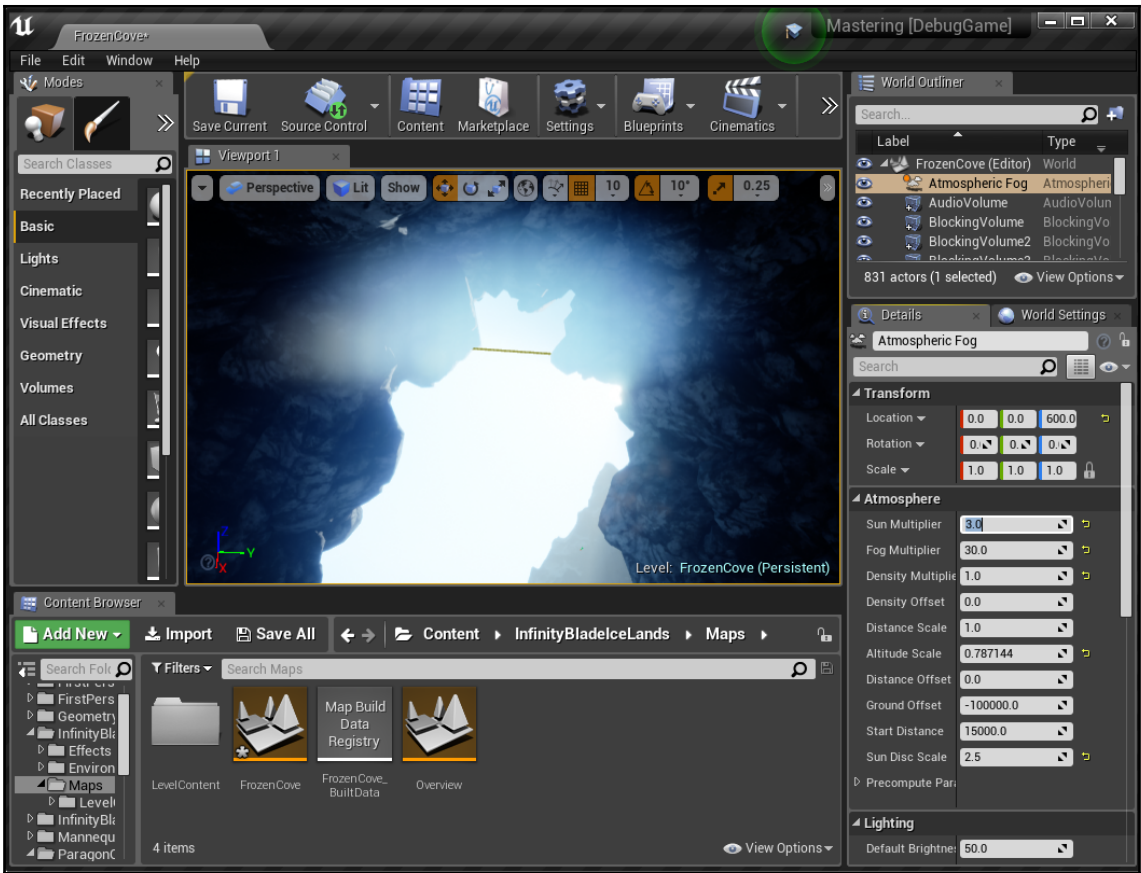




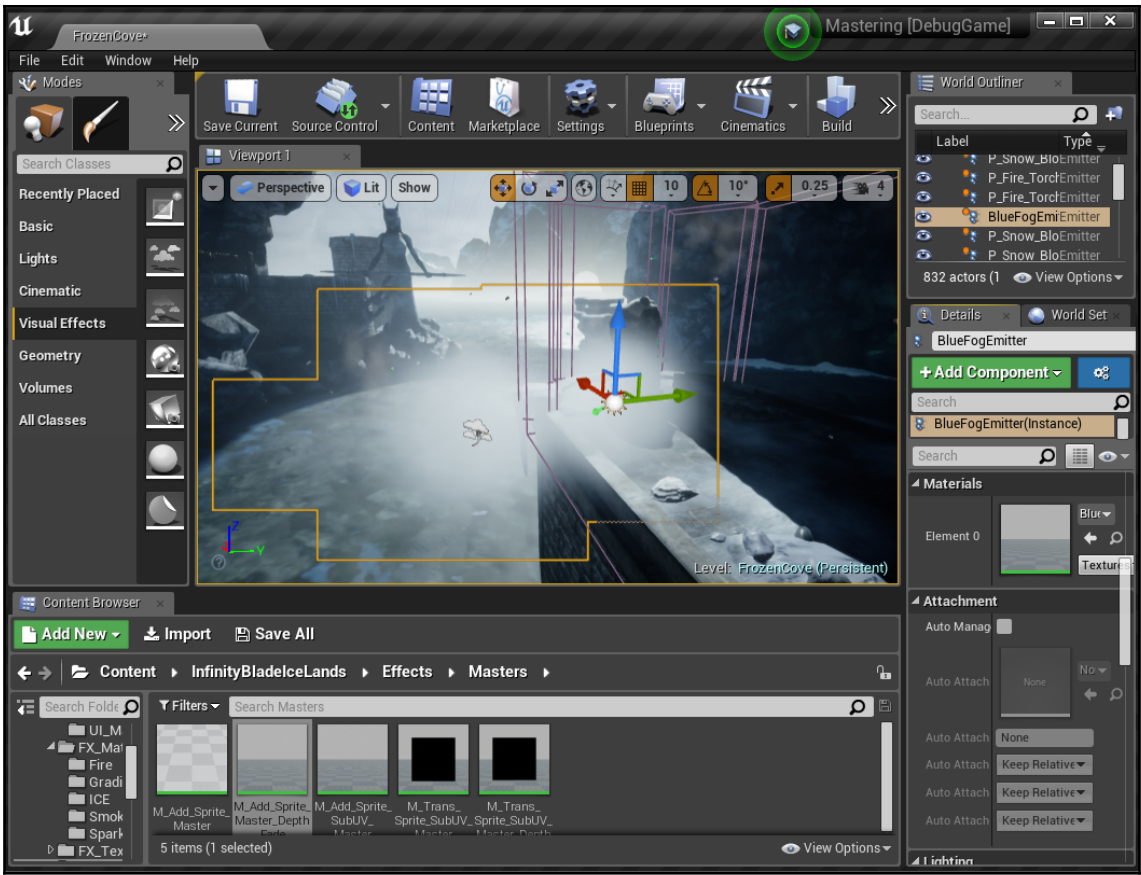












U BlueFogEmitter+ BlueFog

File Edit Asset Window Help

Save Browse Apply Search Home Clean Up Connectors Live Preview Live Nodes Live Update Stats Mobile Stats

Perspective Lit Show

BlueFog Zoom -4

Particle Color (Input Data)

Albedo (Material 2)

BlueFog

Texture Sample

Multiply

Absolute World Position (Input Data)

Particle Position (Input Data)

Particle Radius (Input Data)

SphereMask

Multiply

Material Palette

Category: All

Search

Atmosphere

- AtmosphericFogColor

Blends

- Blend\_ColorBurn
- Blend\_ColorDodge
- Blend\_Darken
- Blend\_Difference
- Blend\_Exclusion
- Blend\_HardLight
- Blend\_Lighten
- Blend\_LinearBurn
- Blend\_LinearDodge
- Blend\_LinearLight
- Blend\_Overlay
- Blend\_PinLight
- Blend\_Screen
- Blend\_SoftLight
- Lerp\_ScratchGrime
- Lerp\_ScratchGrime2

Color

- Desaturation

Constants

- Constant 1
- Constant2Vector 2
- Constant3Vector 3
- Constant4Vector 4
- DistanceCullFade
- ParticleColor
- ParticleDirection
- ParticleMotionBlurFad
- ParticleRadius

Details Parameter

Search

Material Expression

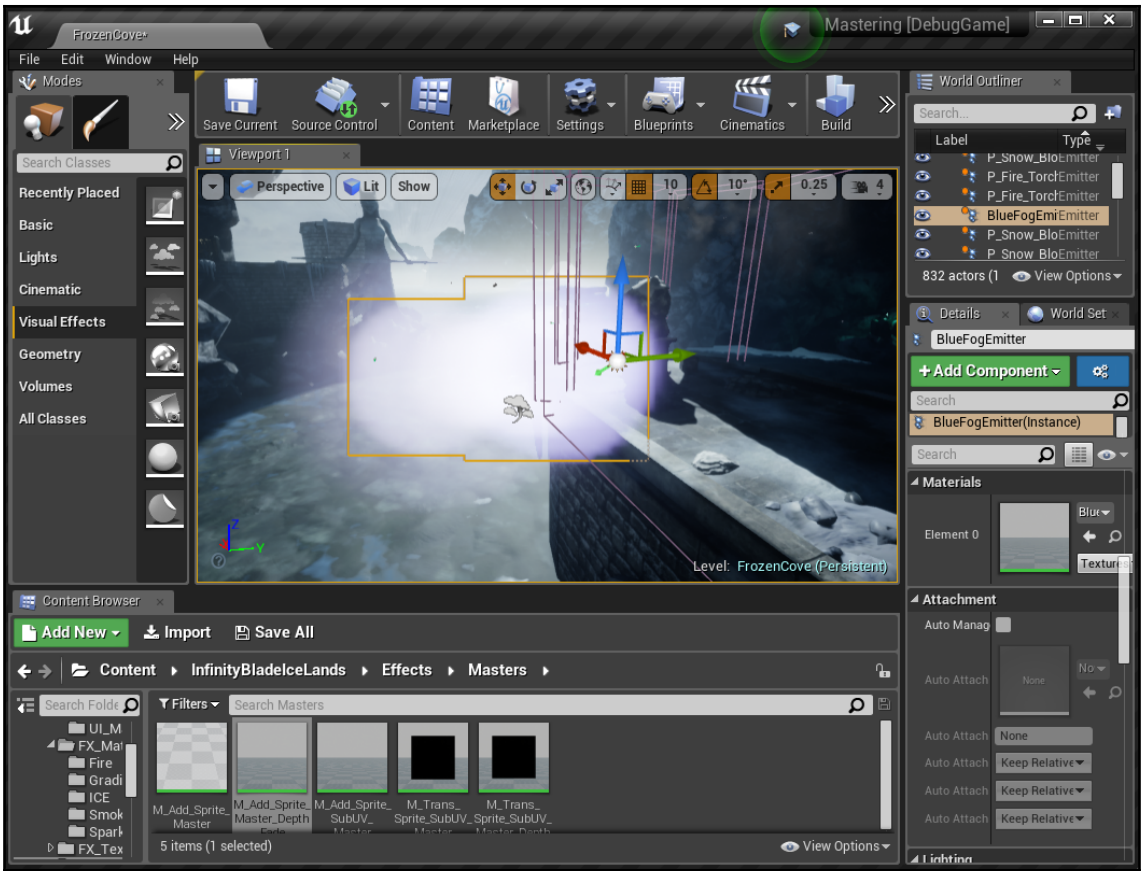
Desc

Stats

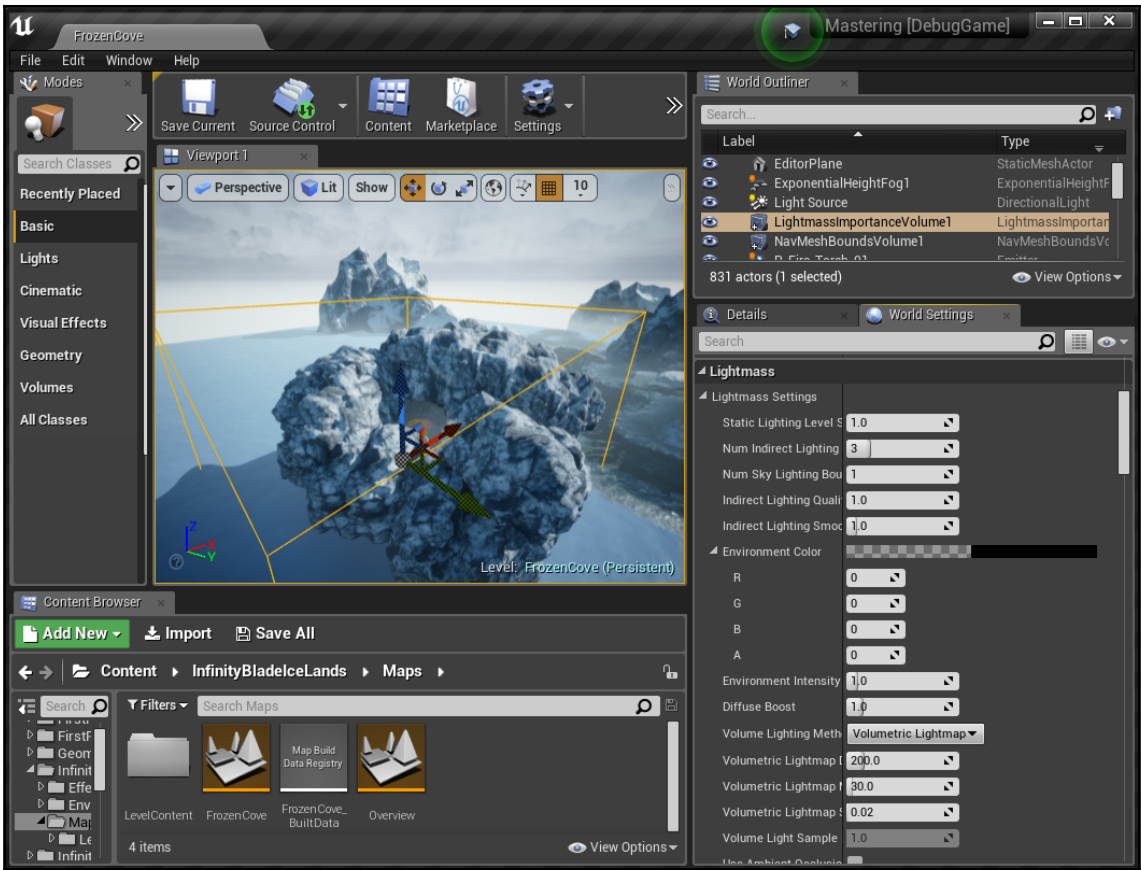
- Base pass shader: 75 instructions
- Base pass shader with Volumetric Lightmap: 102 instructions
- Vertex shader: 113 instructions
- Texture samplers: 7/16
- User interpolators: 2/4 Scalars (1/4 Vectors) (TexCoords: 2, Custom: 0)

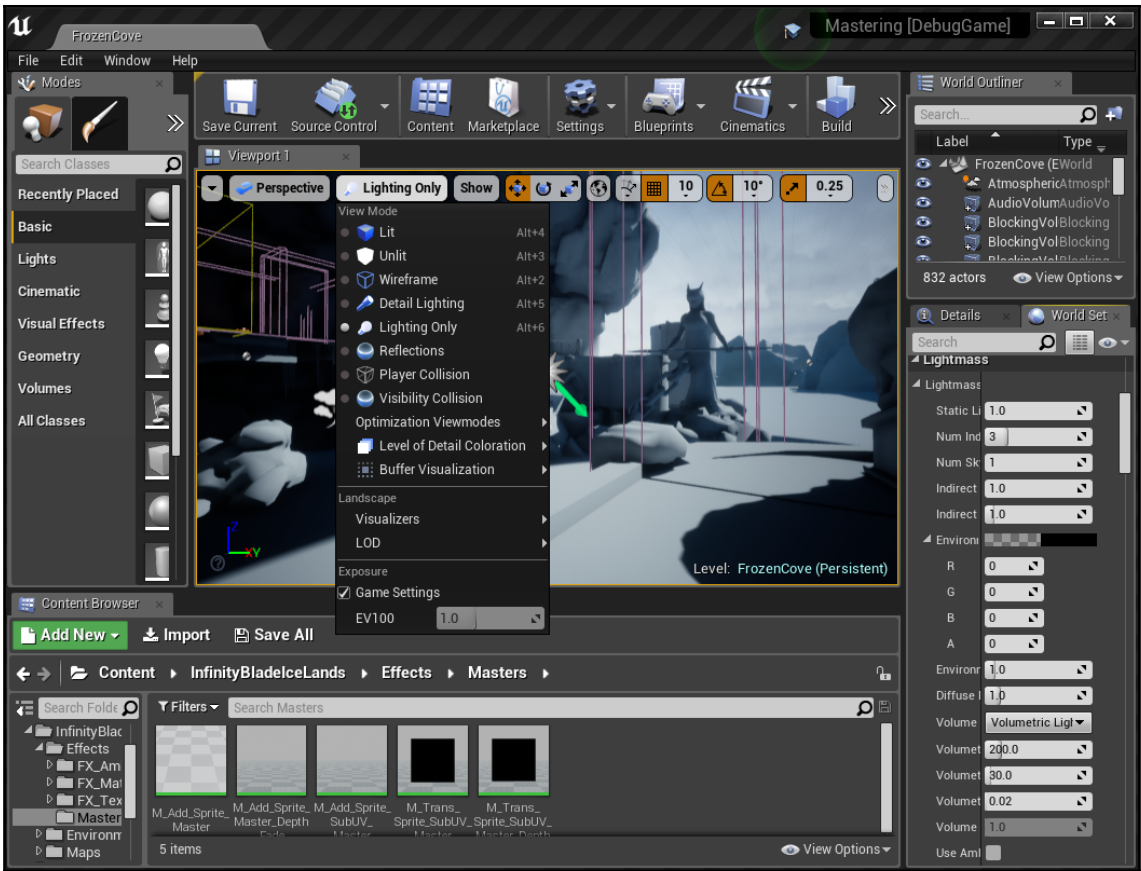
MATERIAL

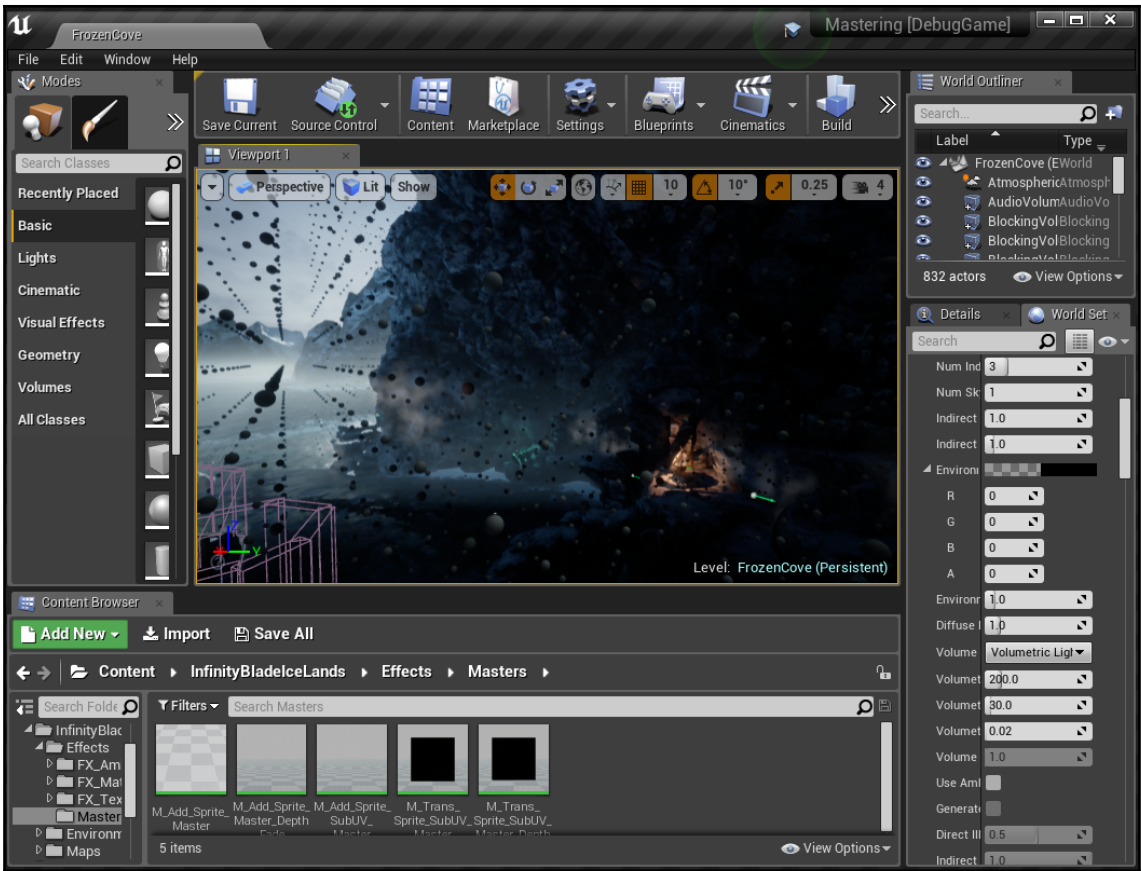


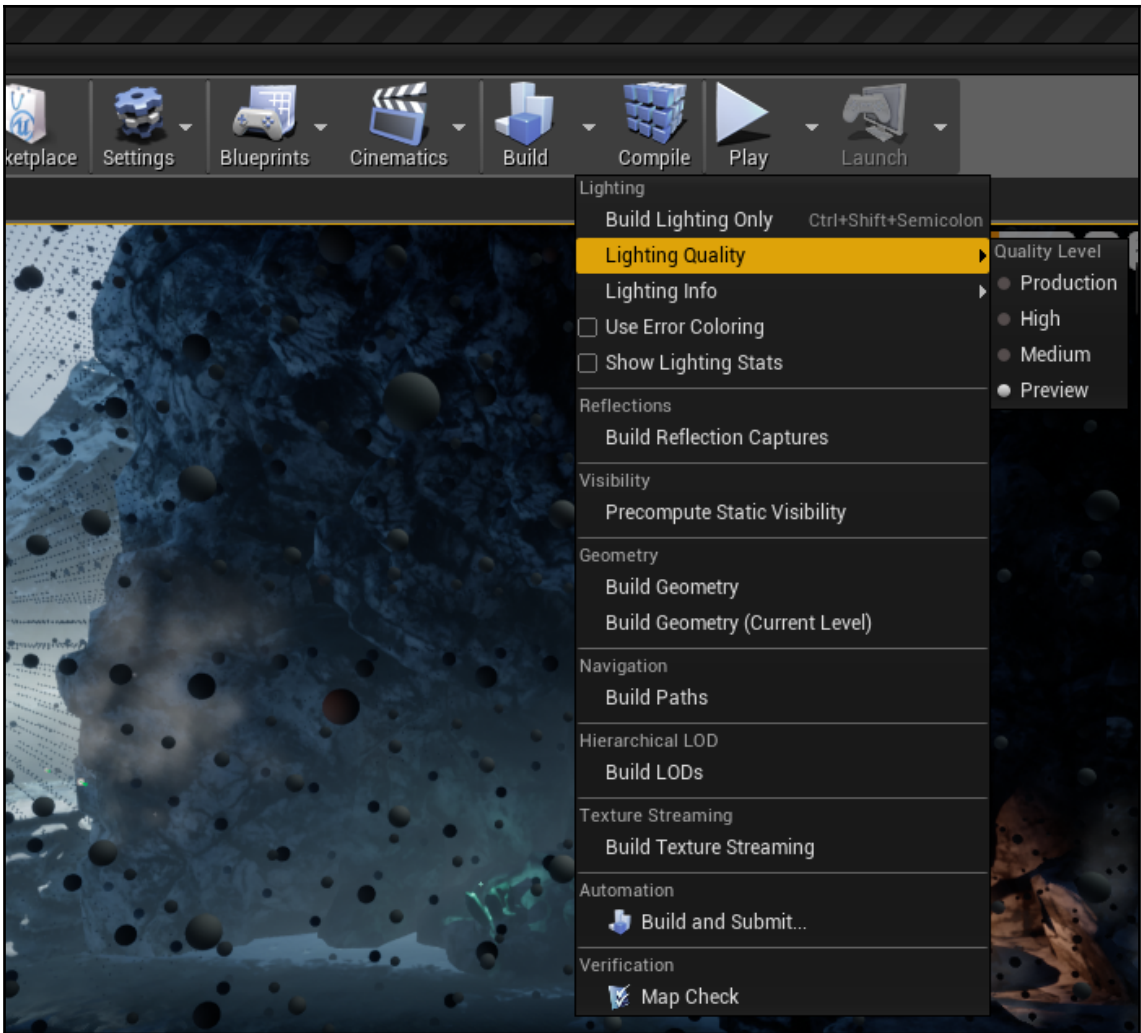


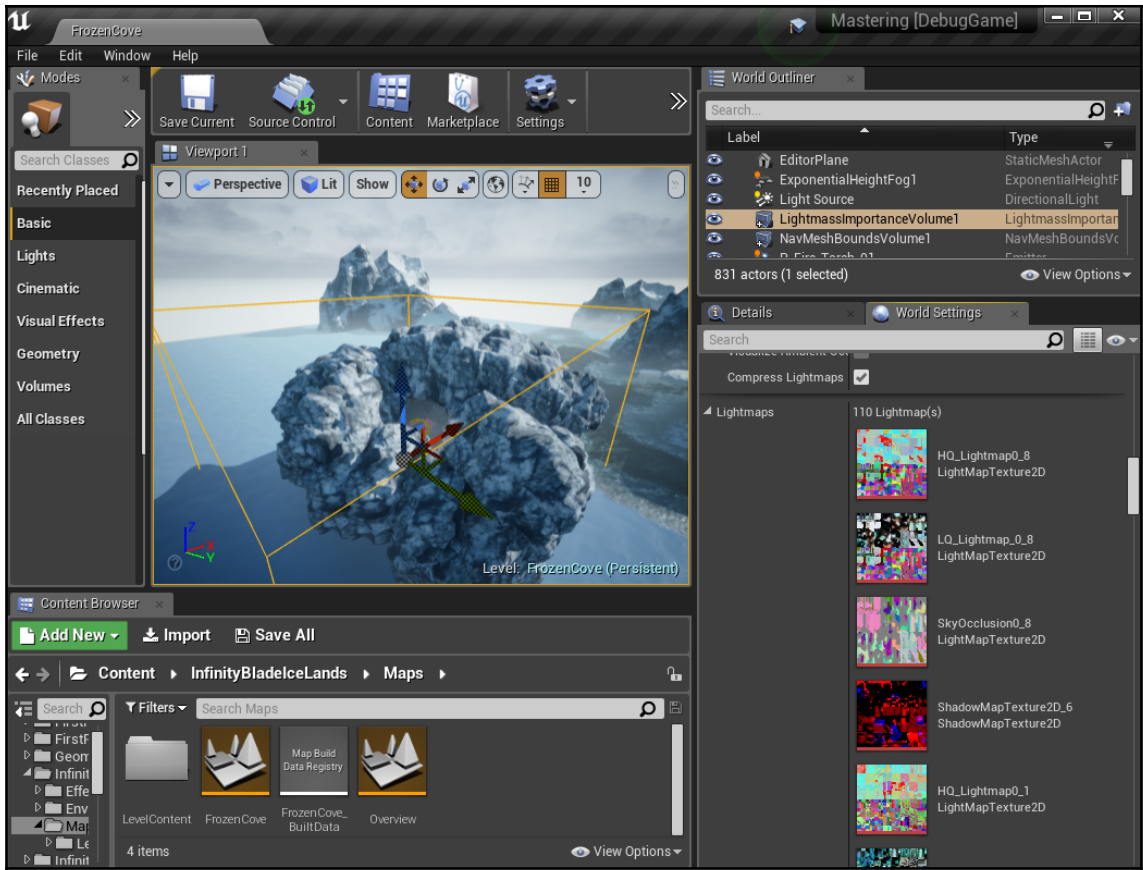


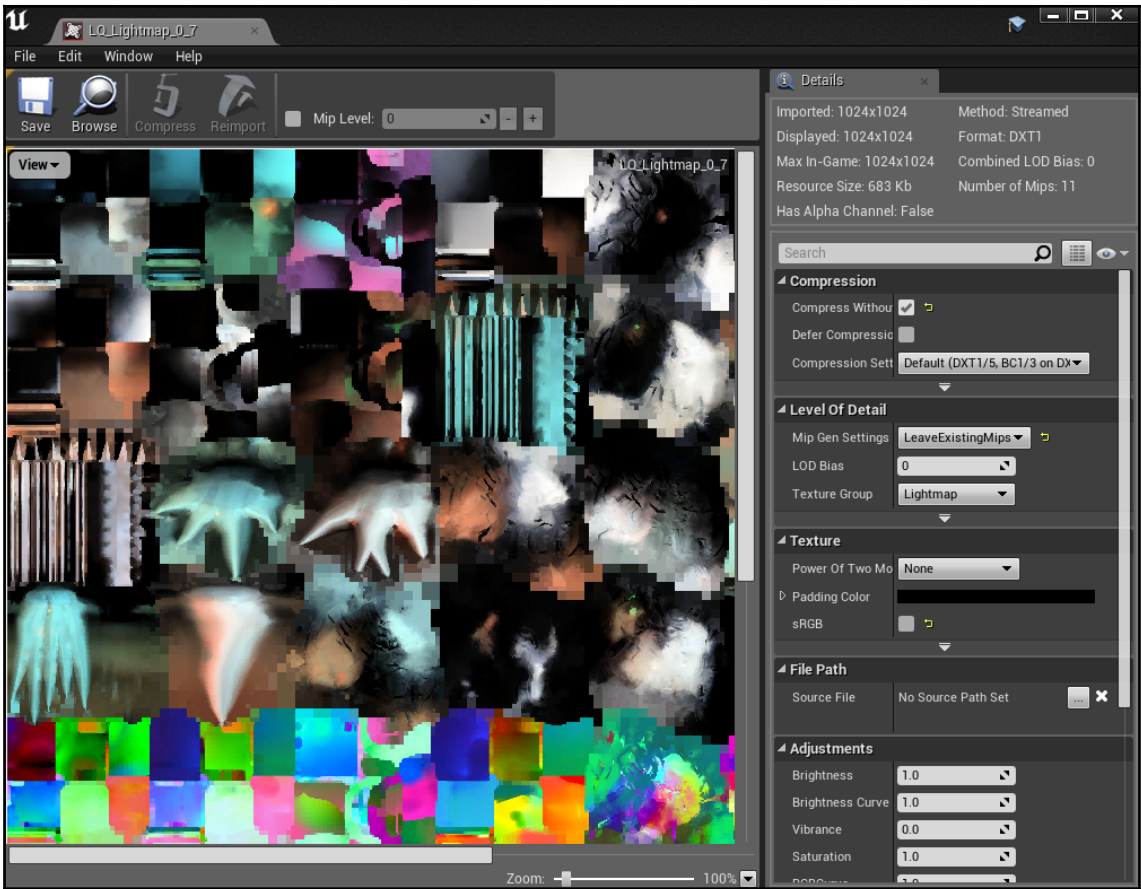




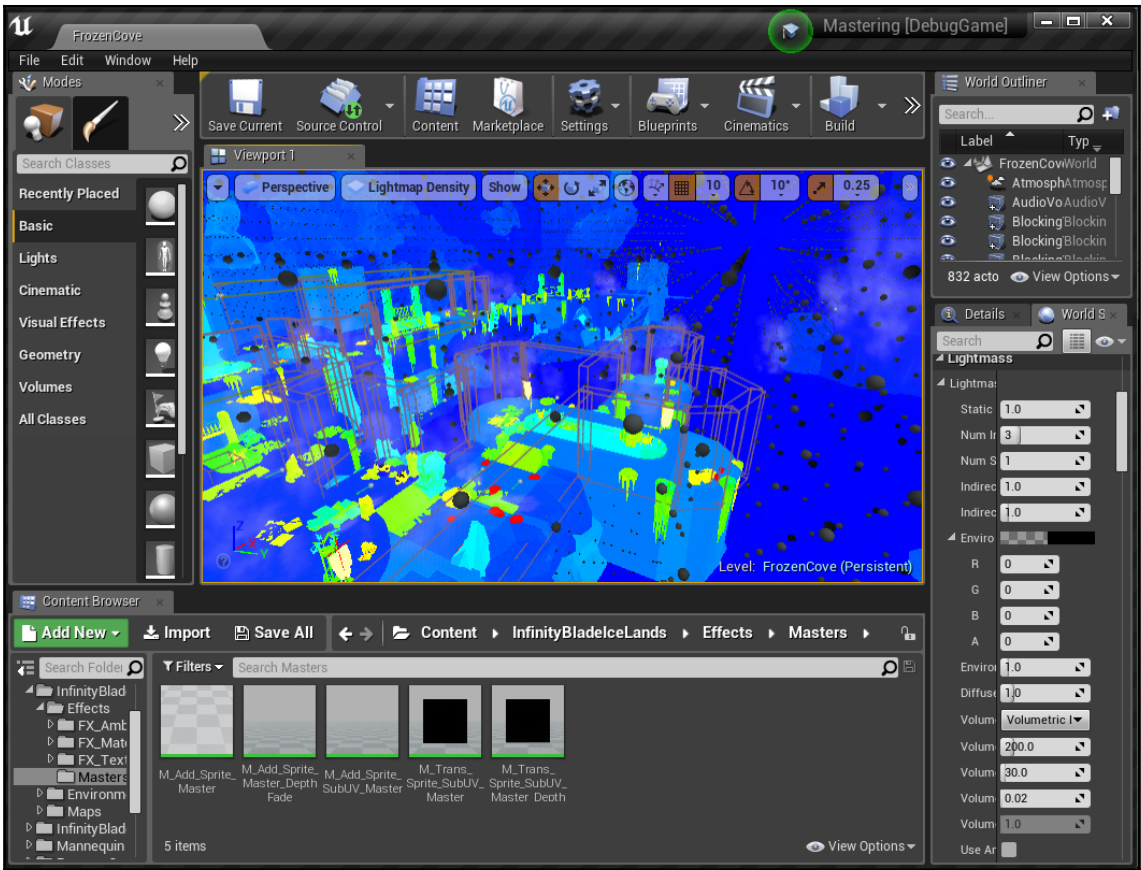




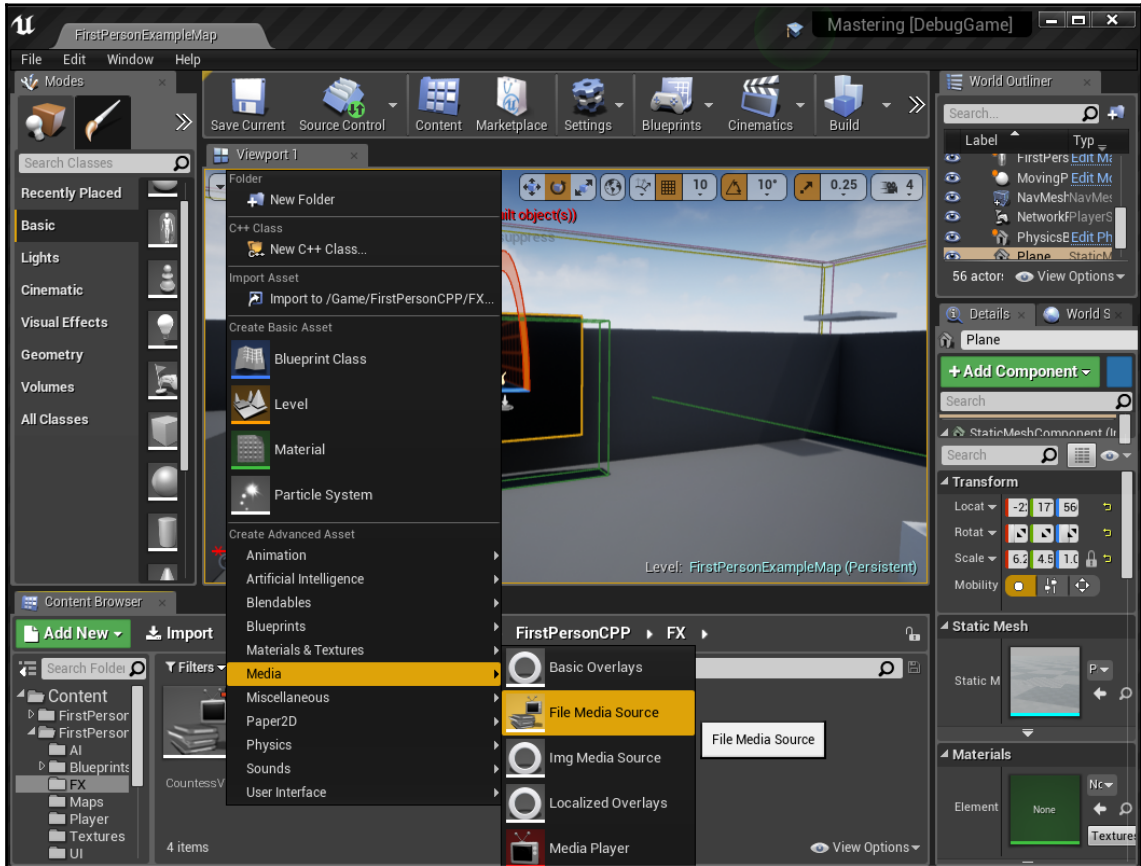


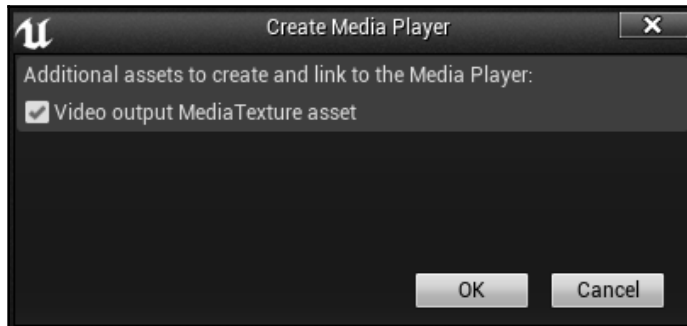
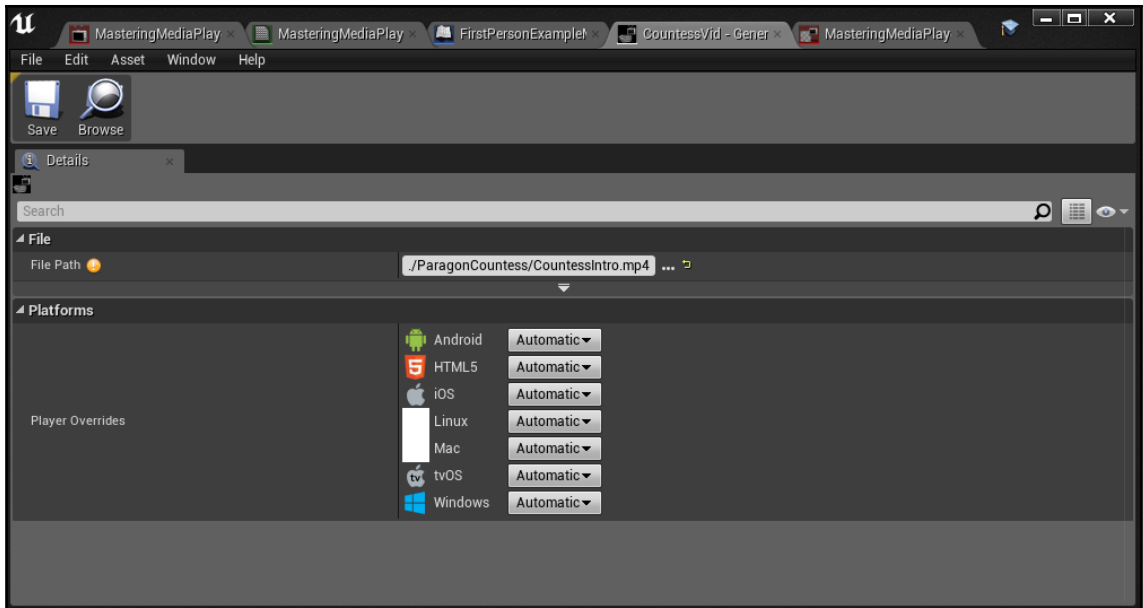


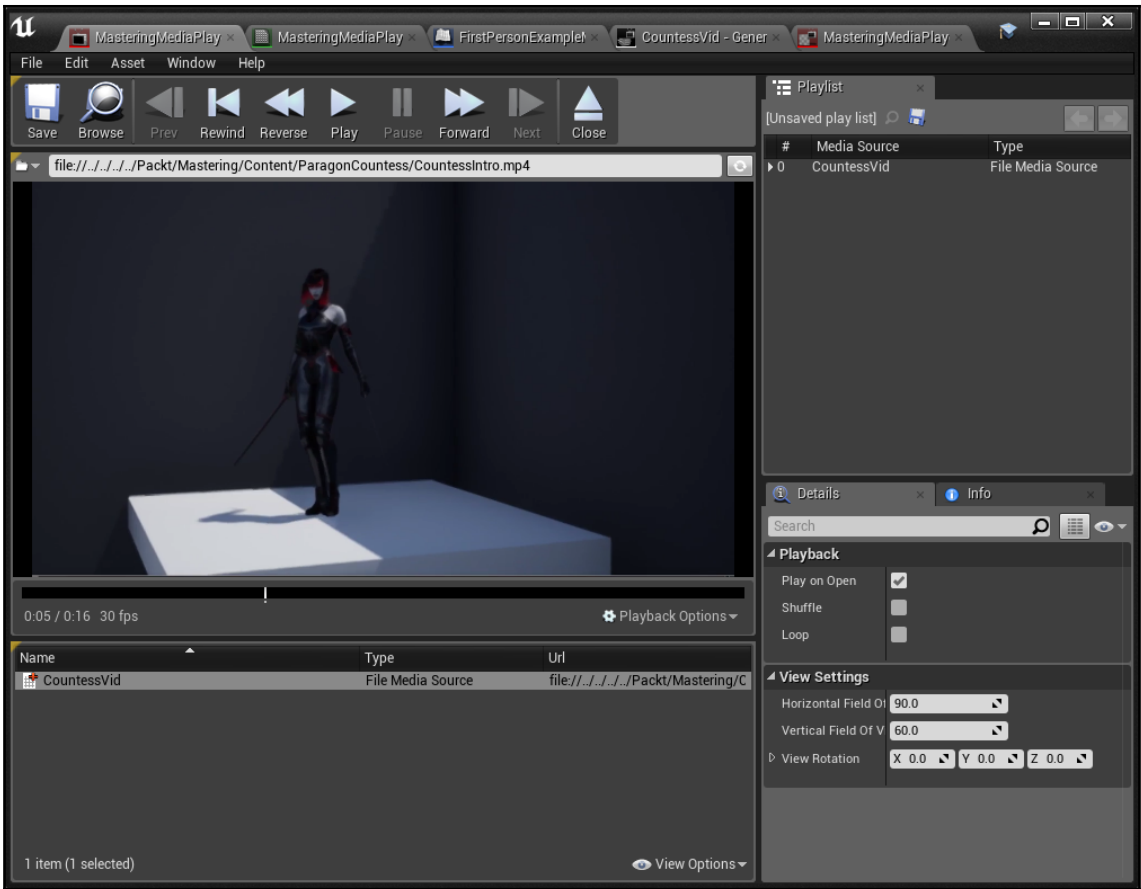


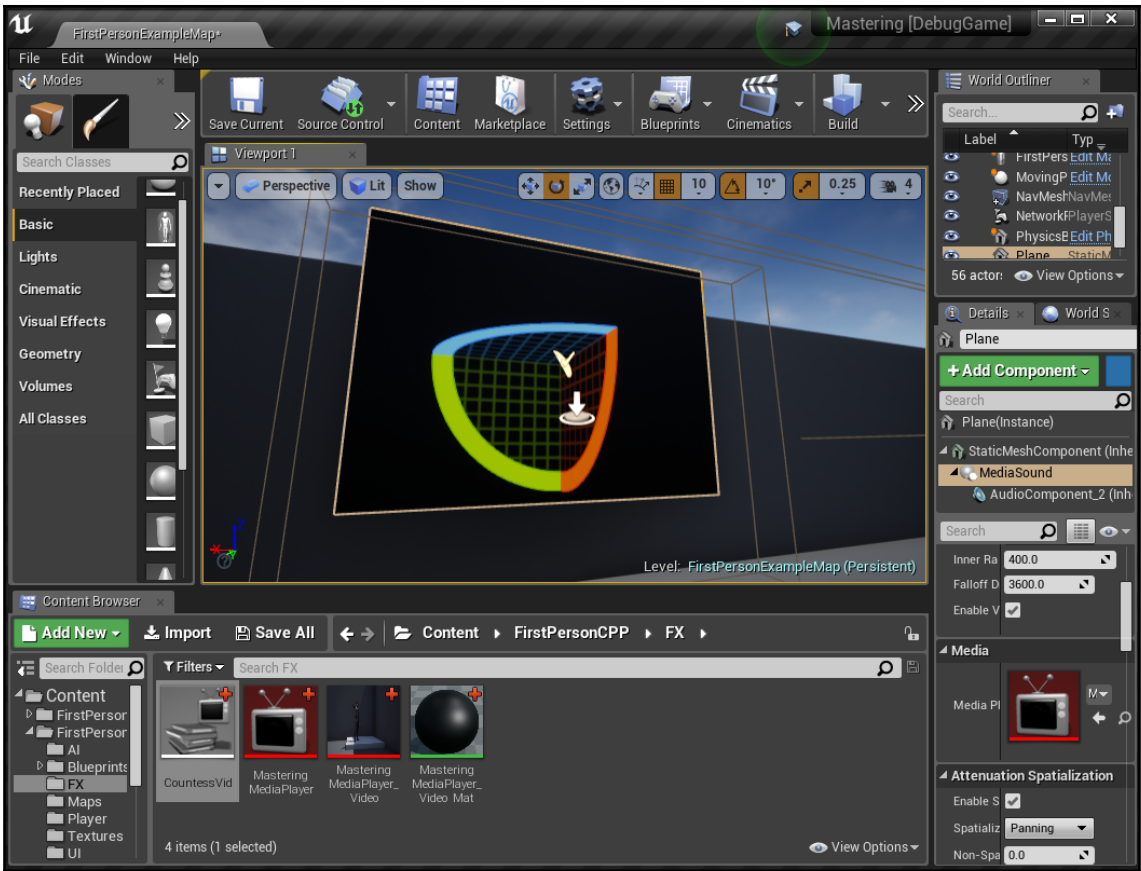


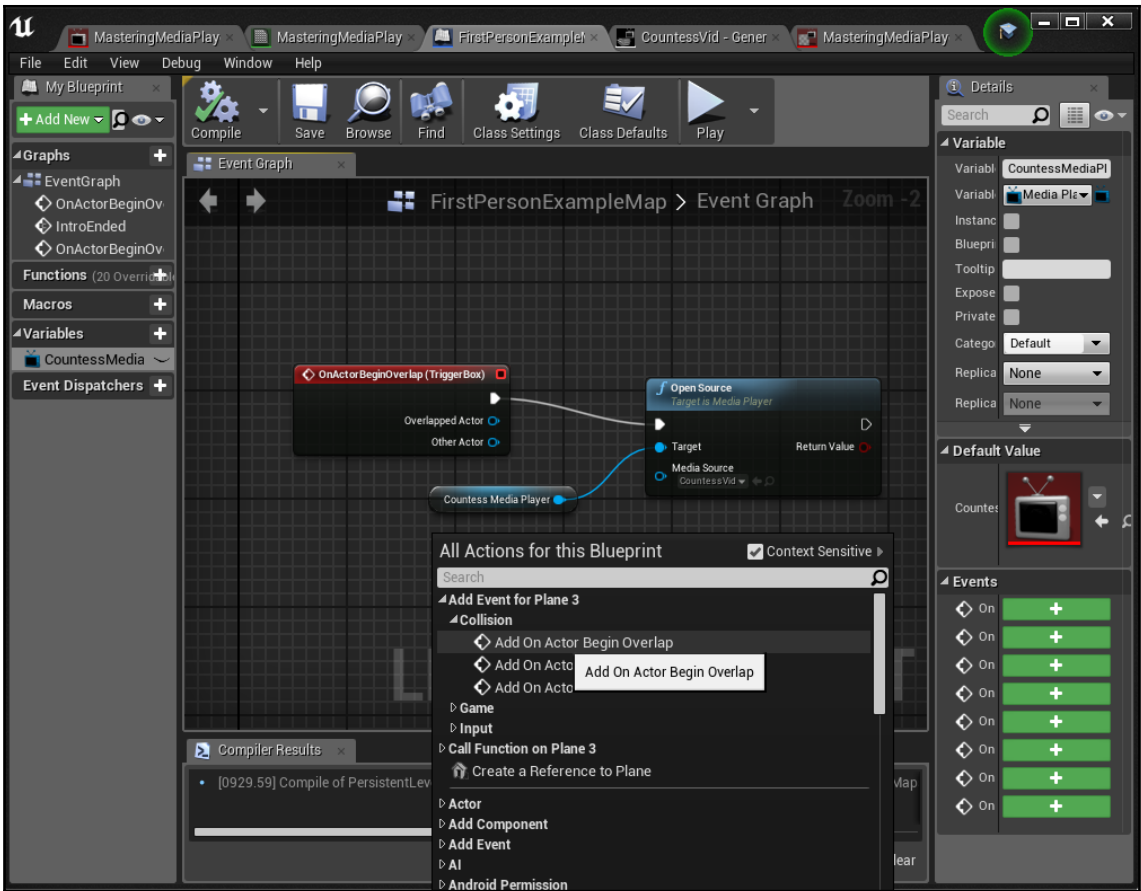
# Chapter 12: In-scene Video and Visual Effects



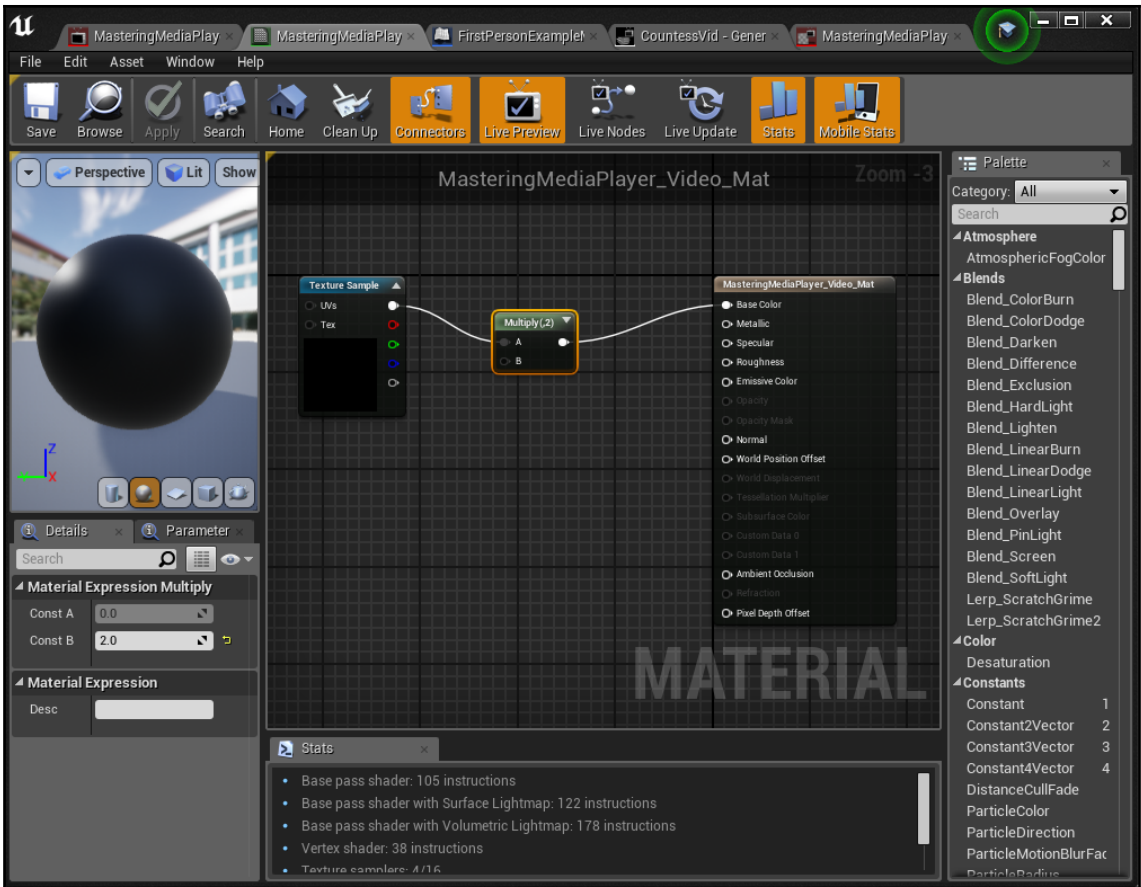














MasteringMedia MasteringMedia FirstPersonExar CountessVid - C MasteringMedia P\_Sparks

File Edit Asset Window Help

Toolbar

Save Browse Restart Sim Restart Level Undo Redo Thumbnail Bounds Origin Axis Background Color Regen LOD Regen LOD Lowest LOD

Viewport

View Time

DETAIL MODE LOW

07/4  
96/659  
16/32

Emitters

PU Sprites	GPU Sprites	GPU Sprites
smoke 32	Sparks 659	Spark burst 4
Required	Required	Required
spawn	Spawn	Spawn
lifetime	Lifetime	Lifetime
initial Size	Initial Size	Initial Size
ubImage Index	Sphere	Size By Life
initial Rotation	Const Acceleration	Initial Rotation
size By Life	Color Over Life	Color Over Life
color Over Life	Collision (Scene Depth)	Light
initial Velocity	Size By Life	
inherit Parent Velocity		

Details

Search

Particle System

System Update: Real-Time

Update Time FP: 60.0

Warmup Time: 0.0

Warmup Tick Ra: 0.0

Orient ZAxis To:

Seconds Before: 0.0

Thumbnail

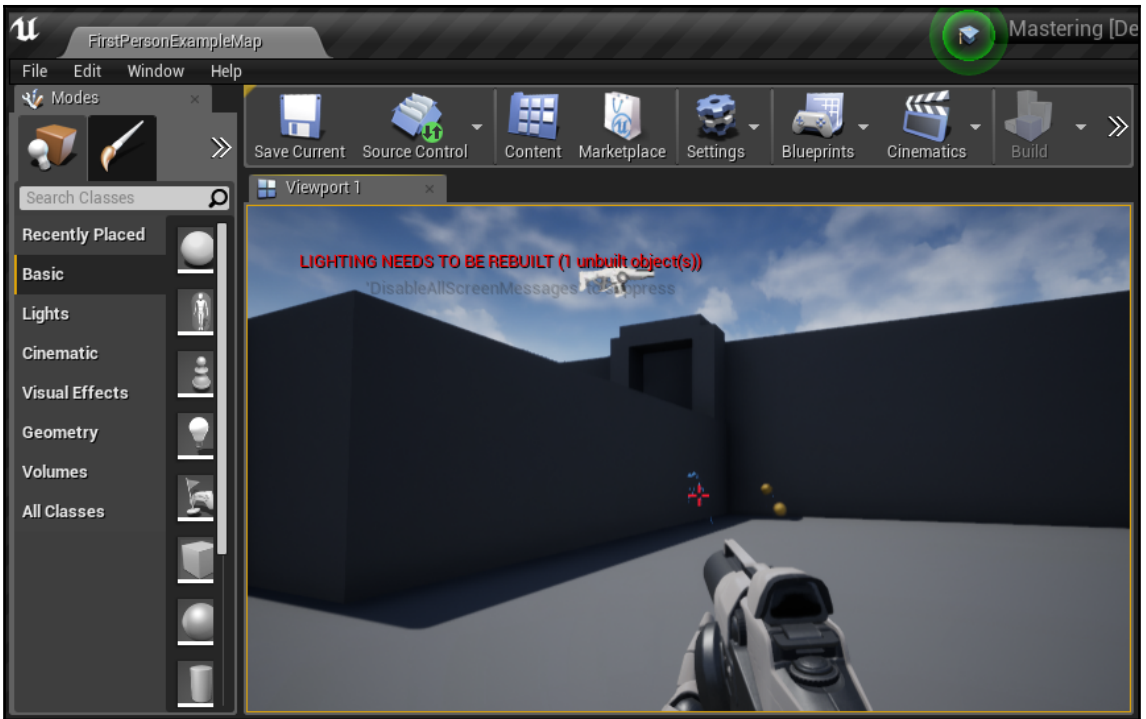
Thumbnail Warn: 1.0

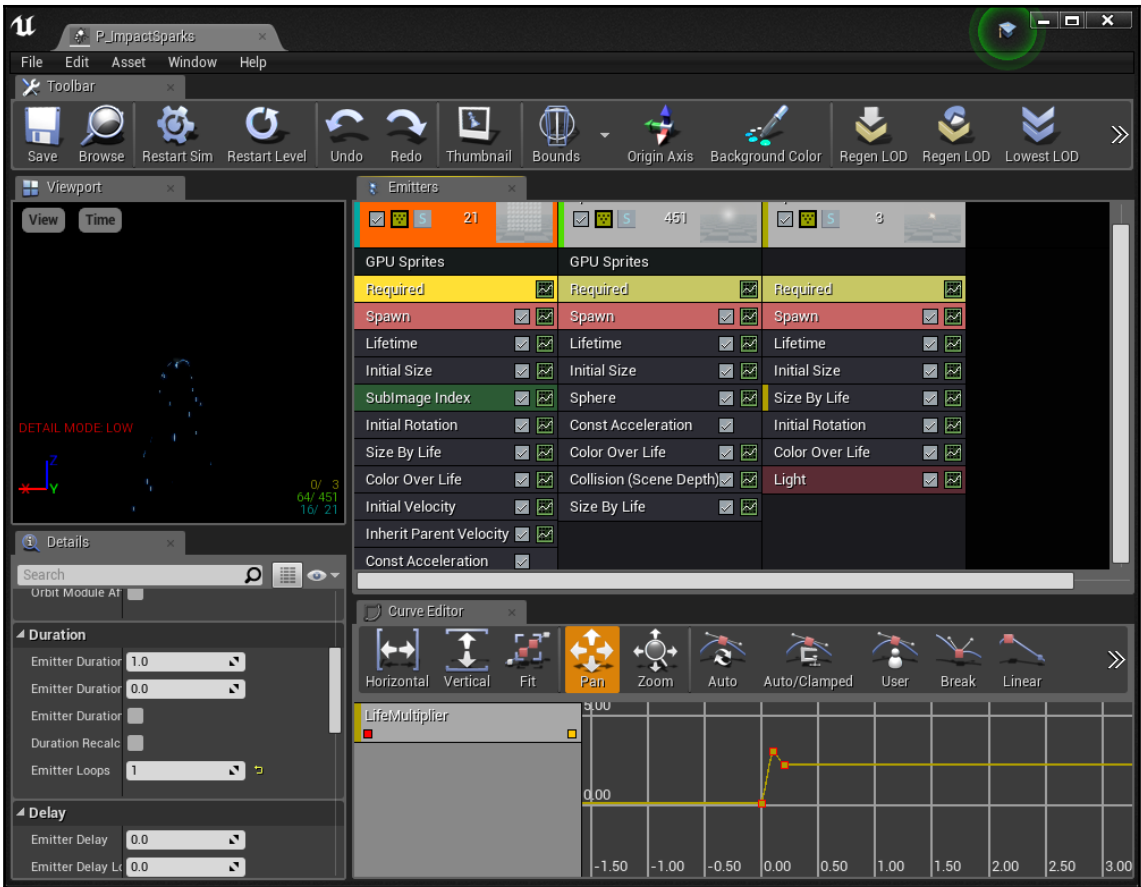
Use Realtime Tr:

Curve Editor

Horizontal Vertical Fit Pan Zoom Auto Auto/Clamped User Break Linear

LifeMultiplier





**U P\_ImpactSparks**

File Edit Asset Window Help

Toolbar

Save Browse Restart Sim Restart Level Undo Redo Thumbnail Bounds Origin Axis Background Color Regen LOD Regen LOD Lowest LOD

Viewport

View Time

DETAIL MODE LOW

0 / 3  
64 / 451  
16 / 21

Emitters

GPU Sprites	GPU Sprites	GPU Sprites
Required <input checked="" type="checkbox"/>	Required <input checked="" type="checkbox"/>	Required <input checked="" type="checkbox"/>
Spawn <input checked="" type="checkbox"/>	Spawn <input checked="" type="checkbox"/>	Spawn <input checked="" type="checkbox"/>
Lifetime <input checked="" type="checkbox"/>	Lifetime <input checked="" type="checkbox"/>	Lifetime <input checked="" type="checkbox"/>
Initial Size <input checked="" type="checkbox"/>	Initial Size <input checked="" type="checkbox"/>	Initial Size <input checked="" type="checkbox"/>
SubImage Index <input checked="" type="checkbox"/>	Sphere <input checked="" type="checkbox"/>	Size By Life <input checked="" type="checkbox"/>
Initial Rotation <input checked="" type="checkbox"/>	Const Acceleration <input checked="" type="checkbox"/>	Initial Rotation <input checked="" type="checkbox"/>
Size By Life <input checked="" type="checkbox"/>	Color Over Life <input checked="" type="checkbox"/>	Color Over Life <input checked="" type="checkbox"/>
Color Over Life <input checked="" type="checkbox"/>	Collision (Scene Depth) <input checked="" type="checkbox"/>	Light <input checked="" type="checkbox"/>
Initial Velocity <input checked="" type="checkbox"/>	Size By Life <input checked="" type="checkbox"/>	Inherit Parent Velocity <input checked="" type="checkbox"/>
Inherit Parent Velocity <input checked="" type="checkbox"/>	Inherit Parent Velocity <input checked="" type="checkbox"/>	
Const Acceleration <input checked="" type="checkbox"/>		

Curve Editor

Horizontal Vertical Fit Pan Zoom Auto Auto/Clamped User Break Linear

LifeMultiplier

Duration

Emitter Duration 0.5

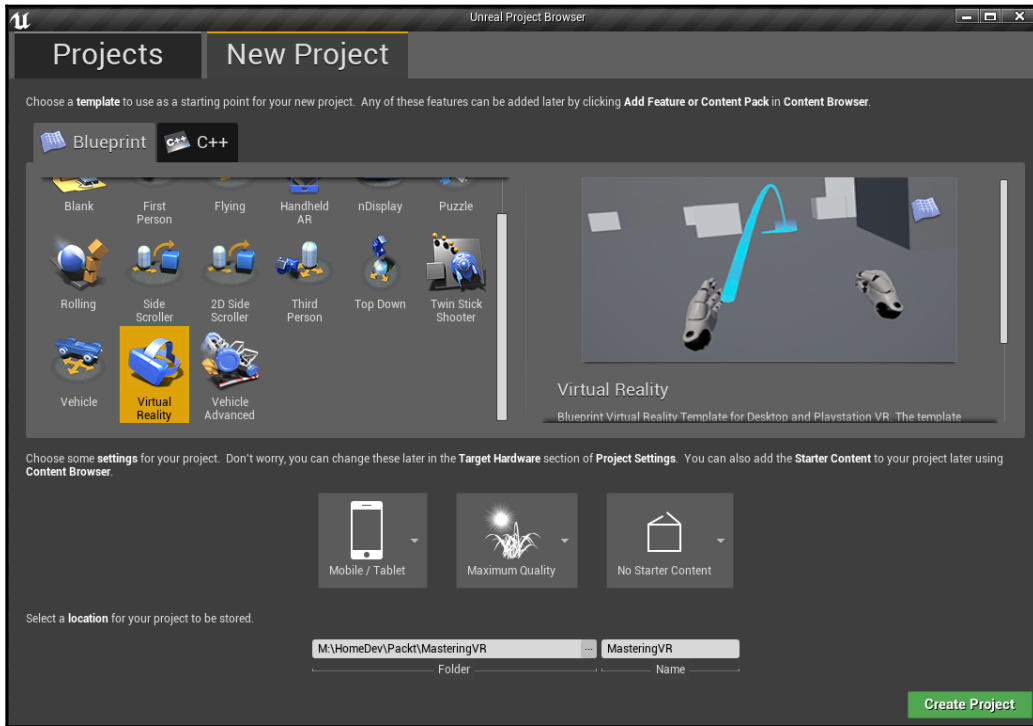
Emitter Duration 0.0

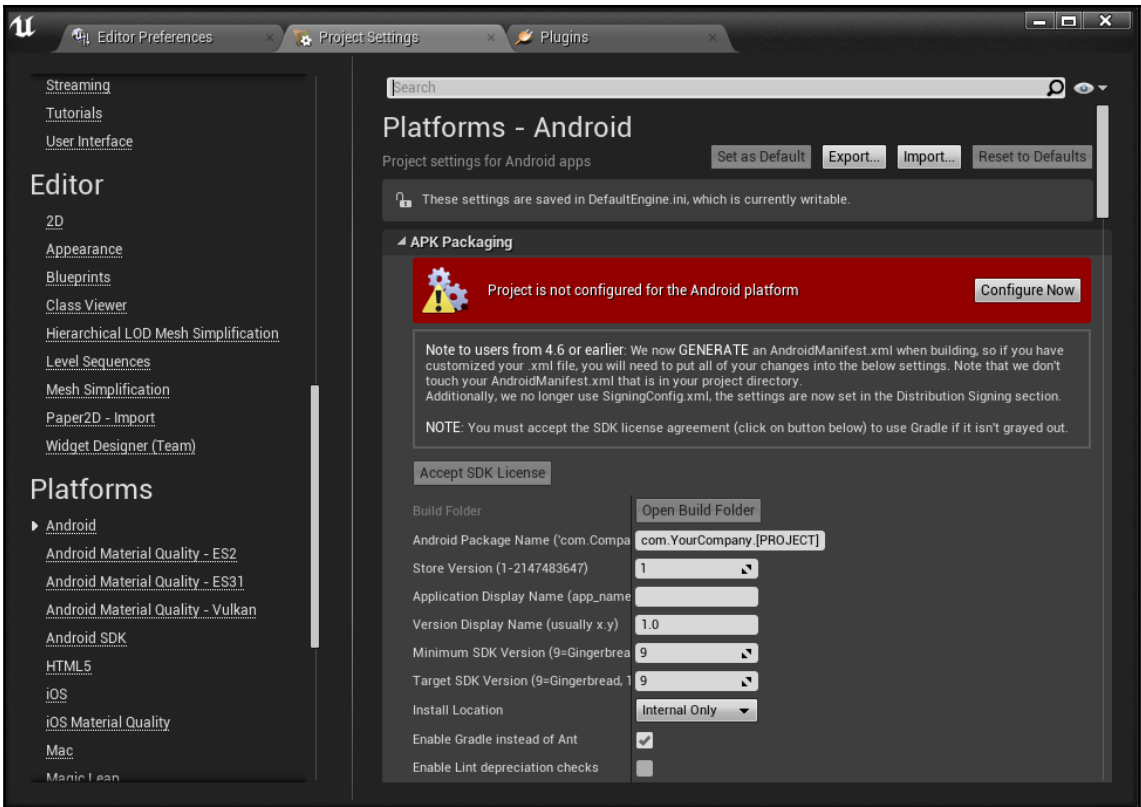
Emitter Duration

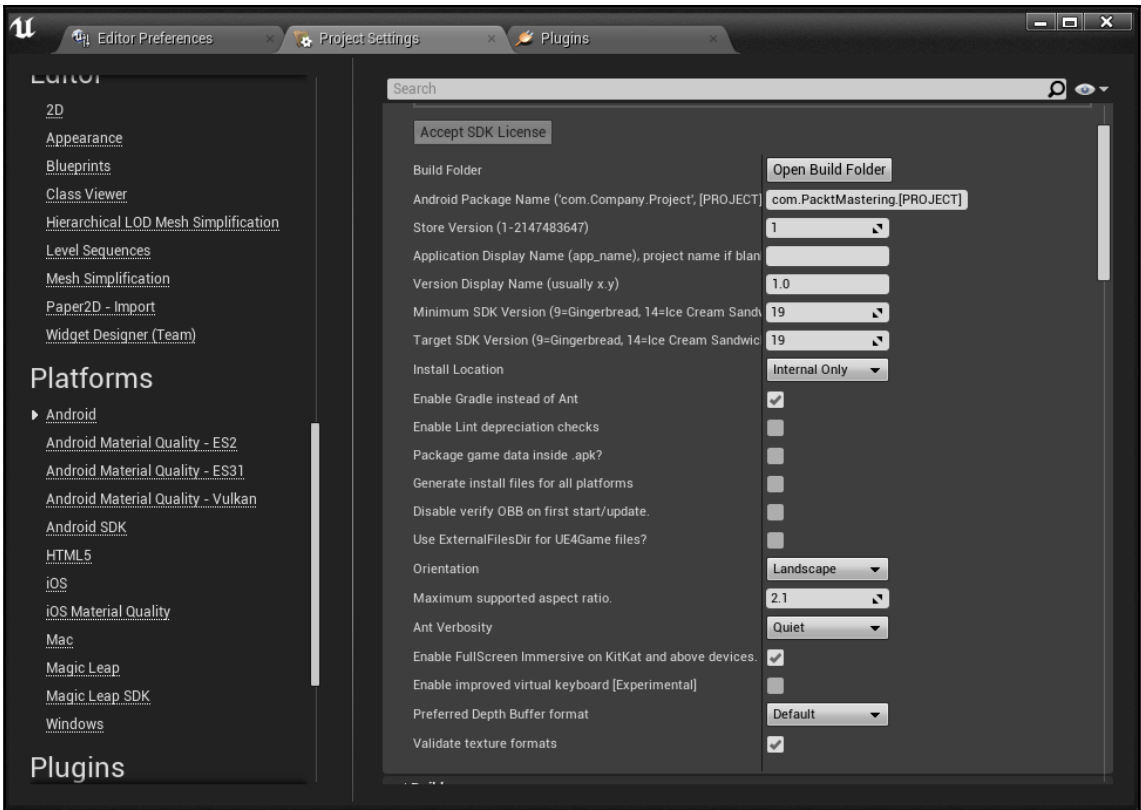
Duration Recalc

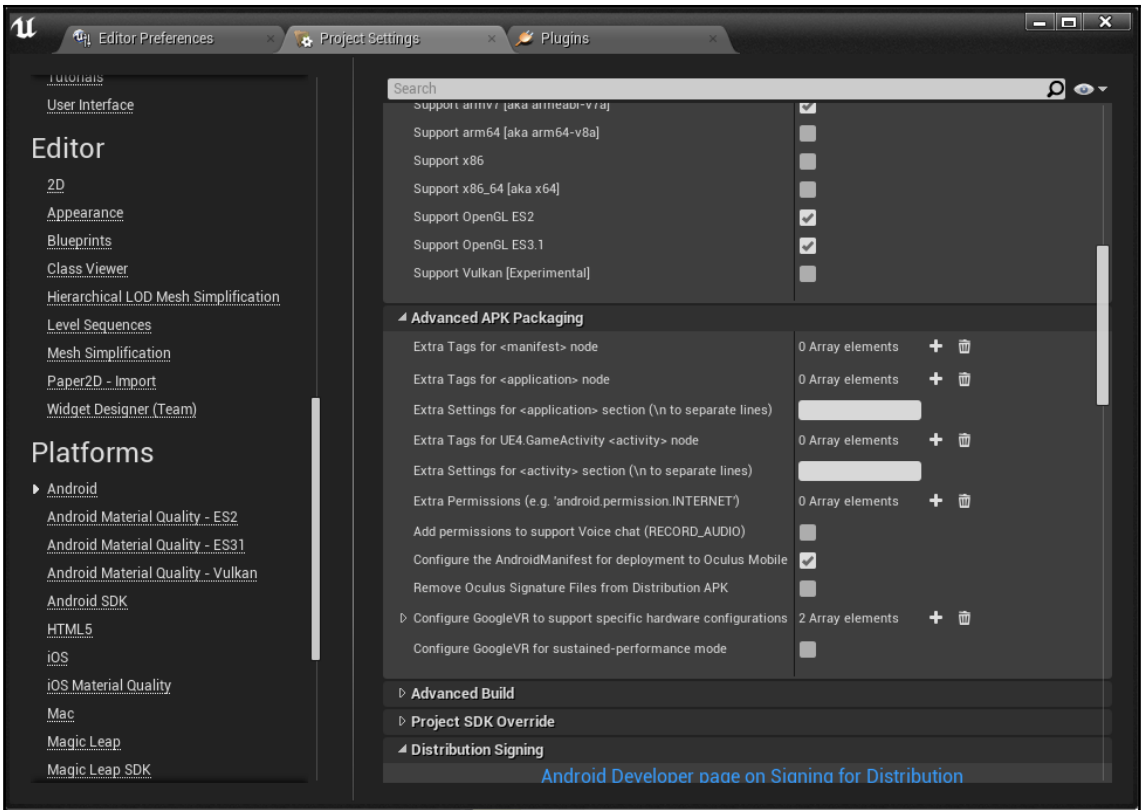
Emitter Loops 1

# Chapter 13: Virtual Reality and Augmented Reality in UE 4

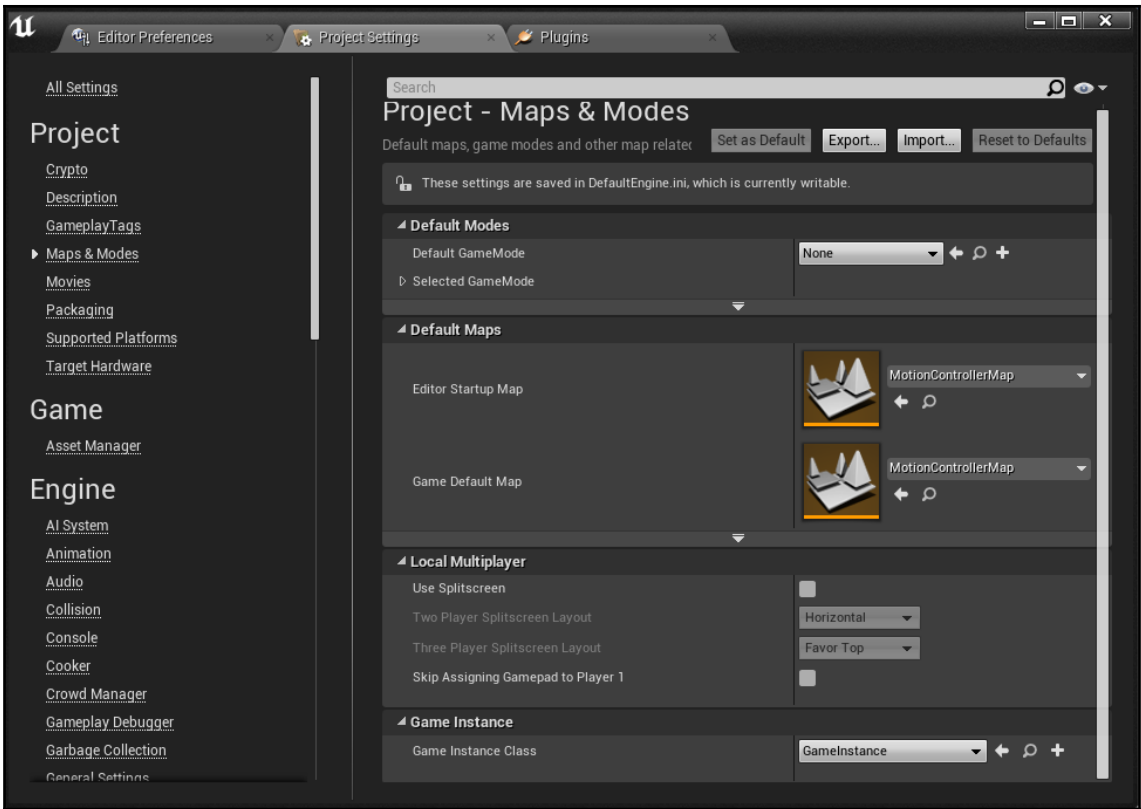


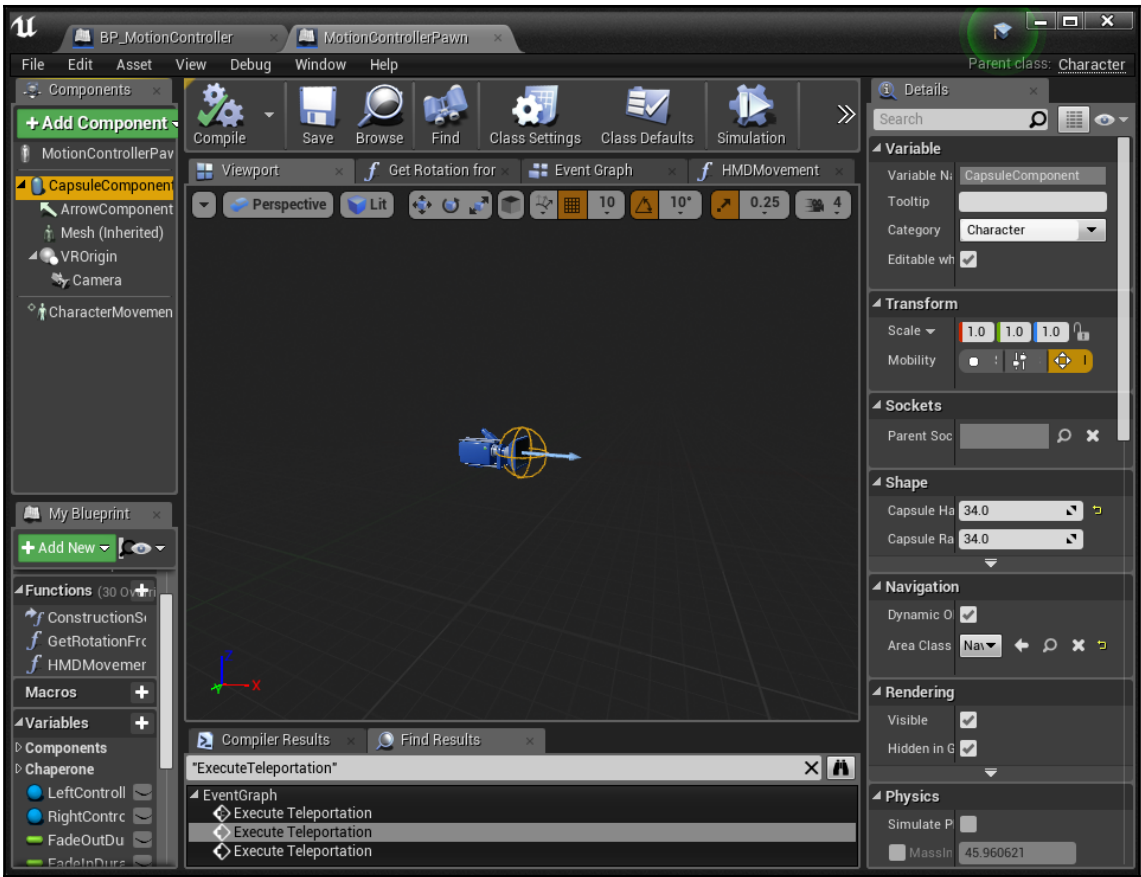


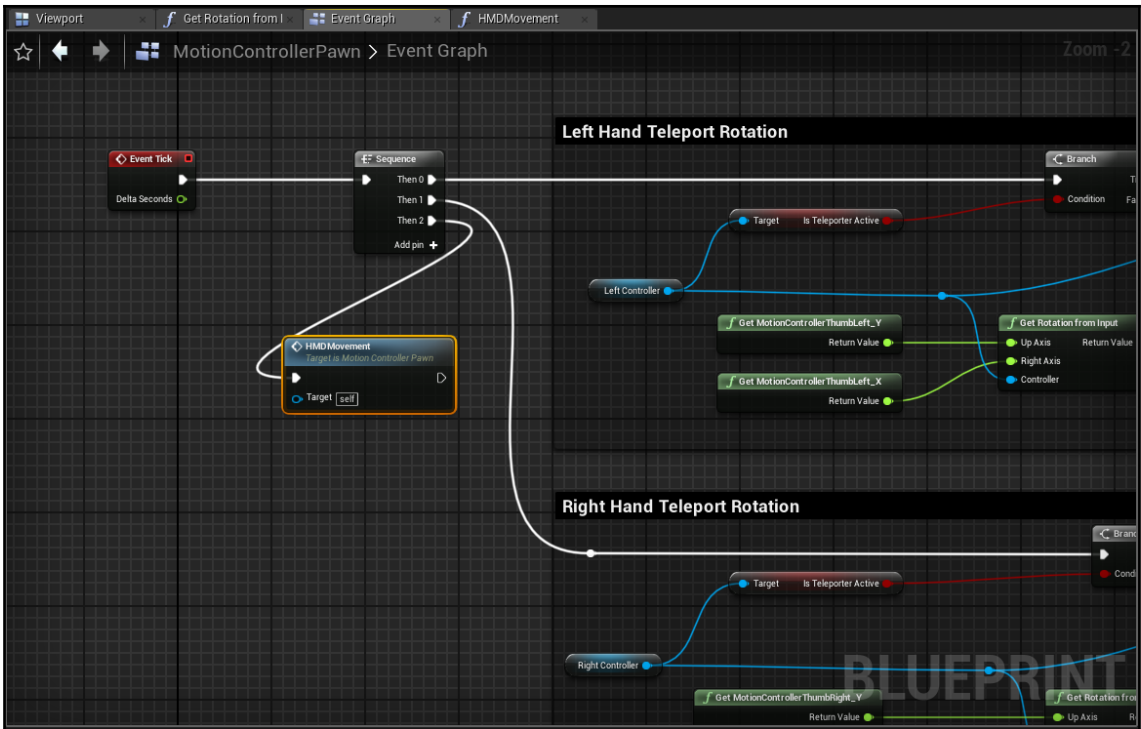


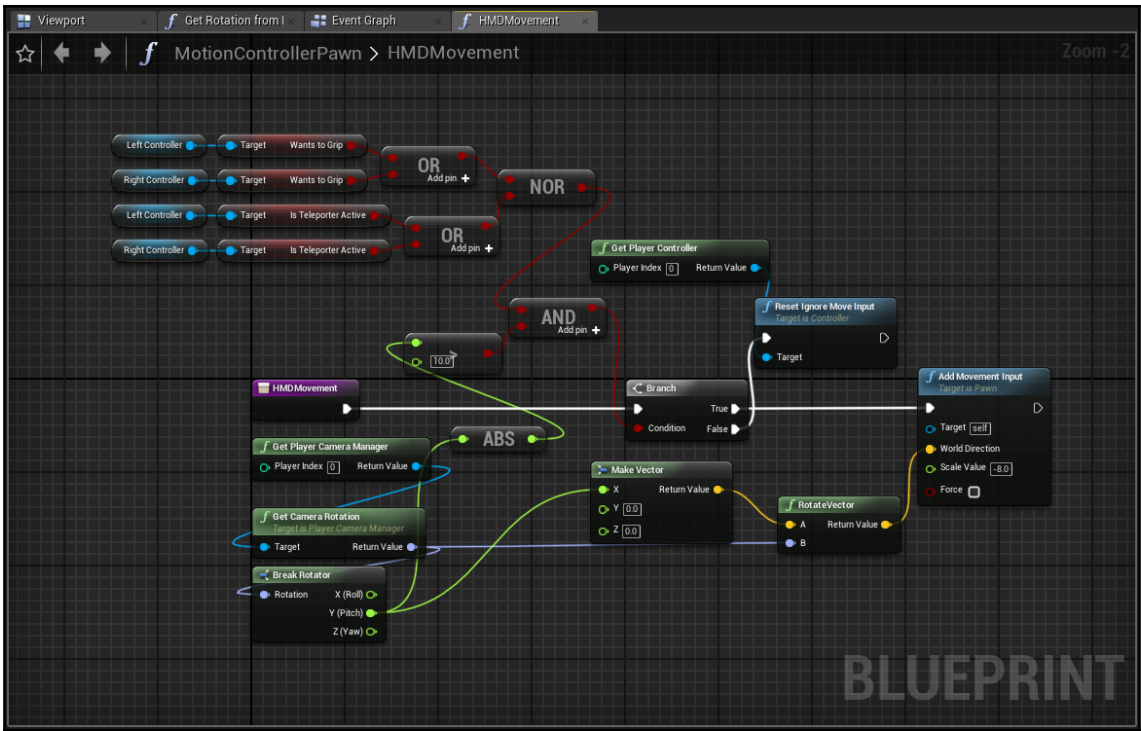


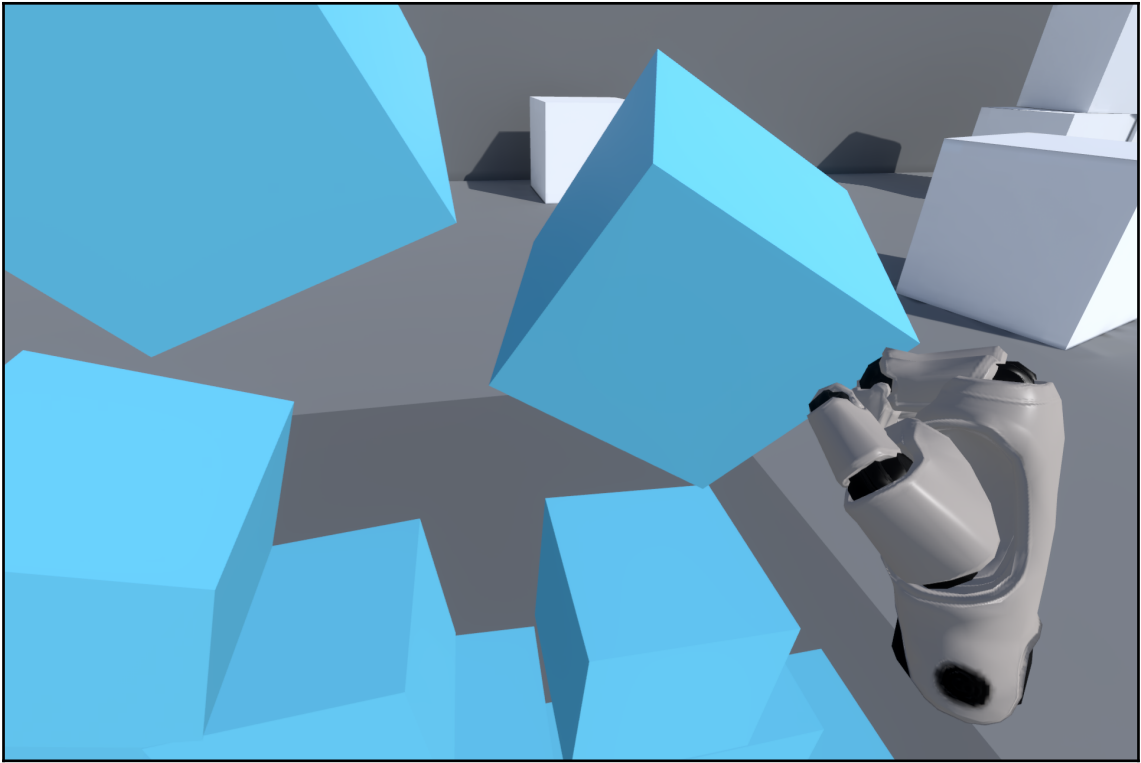














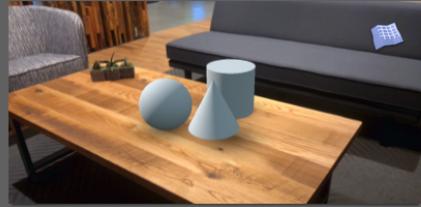
# Projects

## New Project

Choose a **template** to use as a starting point for your new project. Any of these features can be added later by clicking **Add Feature or Content Pack** in **Content Browser**.

Blueprint C++

- Blank
- First Person
- Flying
- Handheld AR**
- nDisplay
- Puzzle
- Rolling
- Side Scroller
- 2D Side Scroller
- Third Person
- Top Down
- Twin Stick Shooter



### Handheld AR

A starting point for building Augmented Reality applications for Android and iOS

Choose some **settings** for your project. Don't worry, you can change these later in the **Target Hardware** section of **Project Settings**. You can also add the **Starter Content** to your project later using **Content Browser**.

- Mobile / Tablet
- Maximum Quality
- No Starter Content

Select a **location** for your project to be stored.

M:\HomeDev\Packt\ ... MasteringAR  
Folder Name

Create Project

