

DRG Mods: Blueprint Modding

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Introduction

Tools

Before you can even get started with your mod, you need to install a few tools:

- DRGPacker
- A parser such as DRGParser, AssetEditor or UAssetGUI
- EmptyContentHeirachy (not really a tool but very useful)
- Unreal Engine 4.25.X (or whatever version DRG is currently using)
- An IDE (such as Visual Studio, Rider for Unreal Engine or CLion)
- The most up-to-date game dumps, available [here](#) (if you are using the dummy method explained later)

By the time you are reading this guide, you should already have these tools and have at least the minimum required knowledge to use them (more on UE4 later). If not, I refer you to Rauliken's more general (but heavily outdated) [guide](#).

You should know the basics of Blueprinting in Unreal Engine. There are plenty of tutorials on YouTube. You should also know how Blueprinting associates with C++; [here is a really good video](#) on that. **If you haven't already, watching this video is basically a requirement to understand much of what is going on here.**

If you are into other forms of UE modding, please don't hesitate to join the [UE modding Discord](#) server.

Reading this guide

Make sure that you read through every detail of this guide thoroughly as missing something may result in many problems down the line. Of course, you can always refer to this if you need assistance on anything. Critically important details are highlighted in red, and optional but useful information is highlighted in blue (I'm sorry this may be confusing if you are colourblind).

Final note

Please be aware that as BP modding becomes increasingly advanced, this guide may become out of date until I update it. Since I'm really busy all the time this may not happen for a few days or weeks.

How blueprints work

Methods of loading mods into DRG

There are two methods of loading a blueprint into DRG:

- Native spawning. This is something that was added by the developers when the modding update dropped. This allows you to load your blueprint from the BeginPlay event node. If you want your BP mod to have a UI, you will have to interface it with BPMM or DRGLib – this is explained later.
- Using ArcticEcho's Blueprint Mod Manager's old loading method. The upside of this over using native spawning is that your mod loads earlier which can be important for specific cases. All of the example mods shown in this guide uses this method, as it was written before native spawning existed.

Blueprint Mod Manager (BPMM)

When BP modding first started out, ArcticEcho created the BPMM. This is a nice tool for modders to utilise as a UI container and gives them some events to start with, like OnInitialise, OnUIOpened, etc. This makes control over when your mod runs in the game's loading process, a lot easier to manage. Users also have the ability to enable/disable your mod from the in-game mod menu.

DRGLib

Samamster, the guy who first worked out how to use dummy C++ functions to unlock a LOT of new BP modding possibilities, developed a new BP modding library that replaces the BPMM. **If you previously developed any mods using the BPMM and wish to switch to DRGLib, you can use Samamster's Legacy BPMod Loader (LBPM) mod which bridges the gap between BPMM and DRGLib.** If not, you don't need legacy BPMM and you can start with just DRGLib. The great thing about this library, is that it provides helper functions and DRG-like UI objects that makes BP modding just that little bit easier.

Methods of BP modding

There are two methods, in a way that you can use both at the same time or not if you wish:

- No-dummy method. This doesn't require any knowledge in C++ to use. You also won't need the game dumps. This is limited to functions and events available from BPMM if you are using that, and built-in UE functions and events. You can still achieve a fair bit from this but are still heavily limited.
- Dummy method. You can manipulate the functions, variables and events that are running in the game. You can figure out what you need from looking at the game's dumps files. You can find the most up-to-date dumps versions [here](#) (be aware that GitHub only displays the first couple hundred classes on its website version). This can be achieved in two sub-methods:
 - a. Writing dummy C++
 - b. Creating dummy blueprints

Useful acronyms to know for BP modding

- ABP – Animated BluePrint
- BP – BluePrint
- GD – Game Data
- GM – GaMe
- ID – IDentifier
- ITM – ITeM
- LIB – LIBrary
- LVL – LeVeL
- MUT – MUTators
- OC – OverClocks
- PRJ – PRojectile
- UI – User Interface
- UPC – UPgrade Category
- UPG – UPgrade Group
- W – Widget
- WND – WiNdow Widget
- WPN - WeaPoN

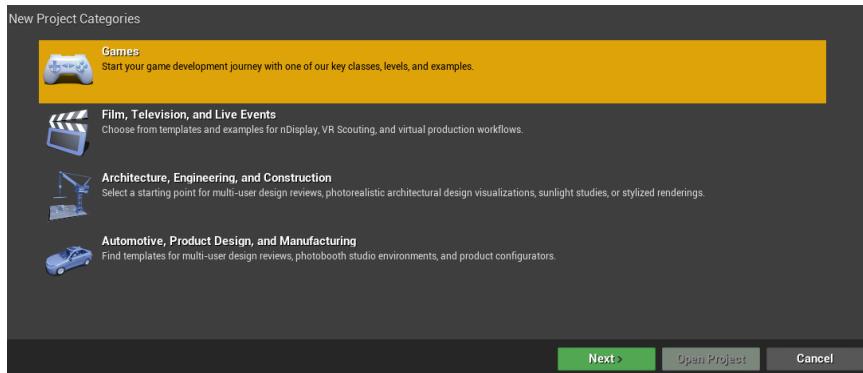
Blueprint Modding

Setting up your UEE workspace

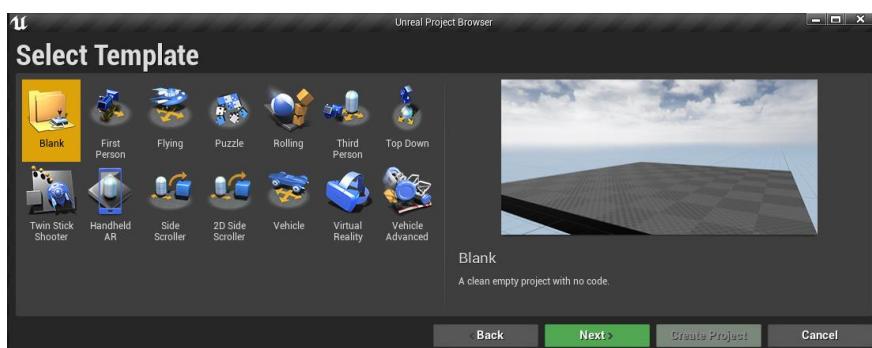
For ANY Blueprint mods, you MUST name your project FSD. Therefore, I make all my mods inside the same project and then delete the mods I don't want to pak before I pak them. The reason the name must be FSD, is because that is what the original game's UE project is called. "FSD" is probably the code-word for DRG (most games have these for various reasons).

If you haven't created your FSD project yet and are unsure of what settings you should make your project with, do the following.

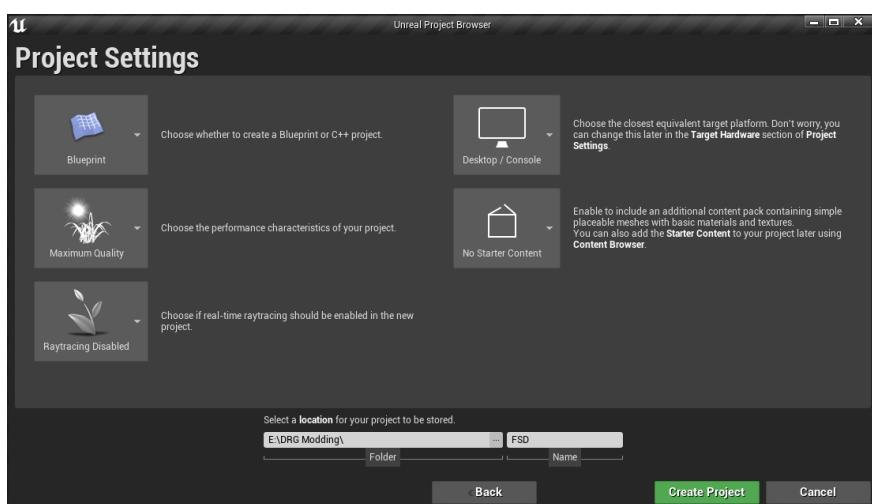
First, select the games category, then click next:



Then click on blank and click next:



Select the following options on the project settings:



Native spawning

To natively spawn a blueprint into the game, first you need to create a folder with the same name as your mod inside the Content folder. Then create a blueprint inside of that called one of two things:

- InitSpacerig – this will load your blueprint when the player is spawned in the spacerig
- InitCave – this will load your blueprint right **after** the drop pod has landed in a cave

For these BPs to be registered in the game you need to pack the AssetRegistry.bin file into the pak as well. If you are using the DRGPacker you simply paste the AssetRegistry.bin file of your mod next to the Content folder inside the input folder of the DRGPacker.

And that's it!

Using BPMM

If you wish to use the BPMM, use ArcticEcho's guide on both methods [here](#).

Using DRGLib

Samamstar has a guide on how to interface your native BP too, [here](#).

A really important note for this guide: I wrote most of the guide pre-native spawning back when BPMM was the only mod manager and some UI events existed that do not now, even using the BPMM's "alternate method". Despite this, the example mods still work completely fine – but be aware that sometimes you may see a node that you can't get. That's fine, just ignore them and apply your knowledge for BPMM or DRGLib to work around any potential mishaps.

No-dummy example

I'm going to run through creating a small but cool mod that does uses the no-dummy method. If you've never seen nor used my *Better Time Control* mod, it allows the user to move a slider that changes the global time dilation of the game. We're going to make this, step by step.

So, the mod will teach you how to make basic widgets, how to change widget values from Blueprints and how basic DRG BP Modding works.

I'm going to go through this mod in two stages:

1. Basic functionality
2. Additional functionality (requires basic functionality)

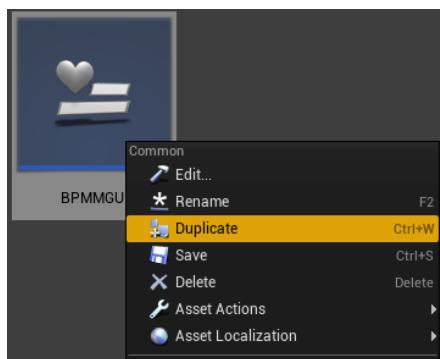
Basic functionality

Setting up the mod widget

First, if you haven't done so already, create a widget for your mod somewhere sensible.

To make your widget for the BPMM, you need some specific parameters in your canvas to be 1:1 ratio of size (UE : in-game menu). So, what I suggest you do, is download this [BPMMGUI](#) file and put it into your Widgets folder.

Then, when you make a new GUI widget, just right click it in content browser and hit duplicate:



Then rename that duplicated widget to something appropriate. E.g. in this example, let's call this TimeControlUI.

So, for this mod widget, we will need 3 main components:

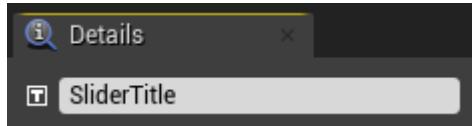
1. Slider title text box. This basically "explains" what the slider does
2. Slider
3. Slider value text box. This shows what the current value of the slider is.

First, change the top text box that says "Sample text" to an appropriate message.

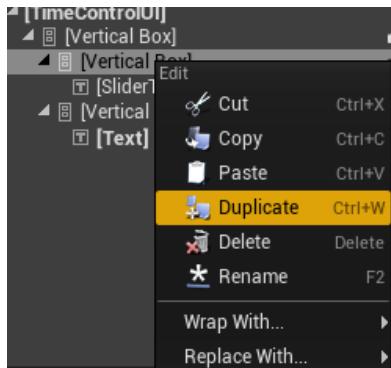


Blueprint Modding

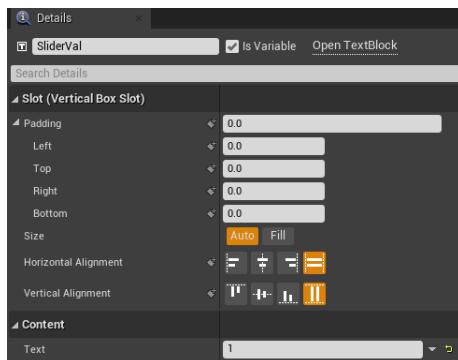
You should also make a habit of renaming your widget objects as although you will never need to access some as variables, you will for others so it's good to get into that.



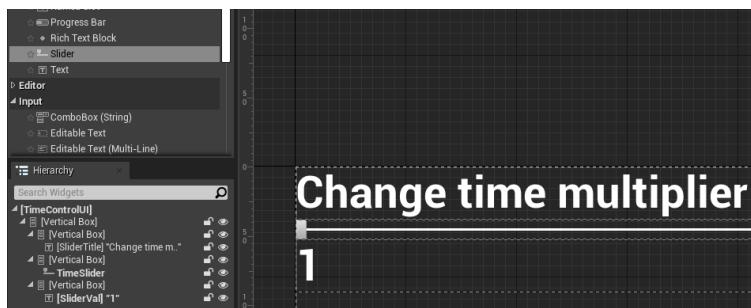
Next, in the hierarchy, right click this vertical box and duplicate it. [The vertical boxes here are used to constrain elements so that they are much easier to pad and such.](#)



Rename the newly created SliderTitle_1 to something like SliderVal and set its text to 1. [Setting default text is still important because when you first load up the mod UI it will show these values.](#) You also need to check the “Is Variable” checkbox next to the widget object name, as we will need to change this from BPs later.



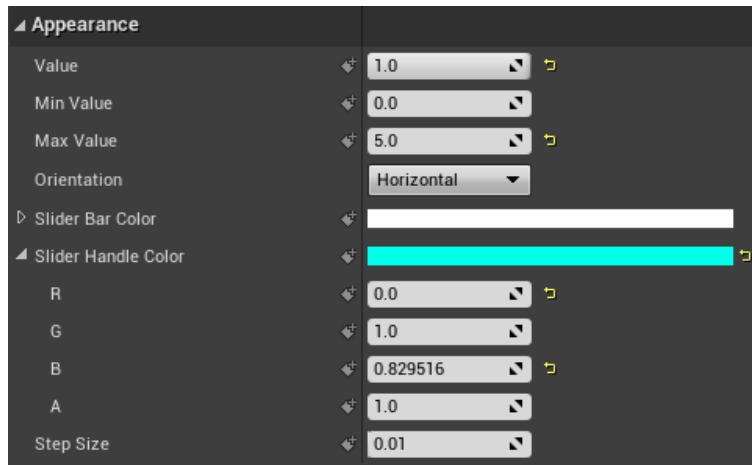
Delete the “text block” text box in the middle vertical box, as we will be replacing it with the slider. Then go into the palette and drag the slider into the now empty vertical box, either in the hierarchy or the editor. Like this:



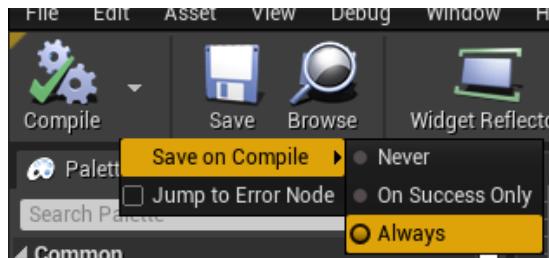
Now rename the slider to TimeSlider [and make sure that the Is Variable is checked \(it should be by default\).](#) Inside the appearance category for the slider, change the value to 1.0 (this is its default

Blueprint Modding

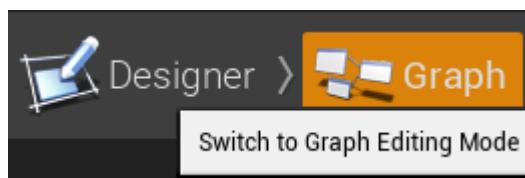
value), min value to 0 and max value to 5.0. Step size should be 0.01 as we want fine control over our time dilation values. I also like to set my handle colour to something other than just plain gray, but you can change any styles to whatever you want.



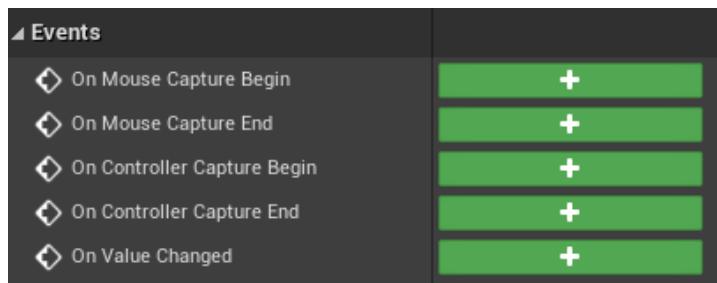
Remember to compile and save your project every now and again. Tip: you can compile and save at the same time when you click compile, by clicking the little arrow dropdown to the right of compile button and setting save to “always”:



Now, go into the graph view of the widget, accessed from the top right corner of UE:

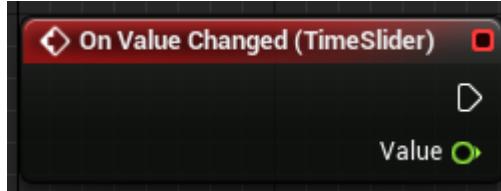


Now, you may be wondering, how do we get the current value of the slider? Well, widget objects have different events depending on what they do. You can then hook up something from that event so that it does something every time it is run. So, if you click on TimeSlider on the left pane, you will see that in details there are a list of events.



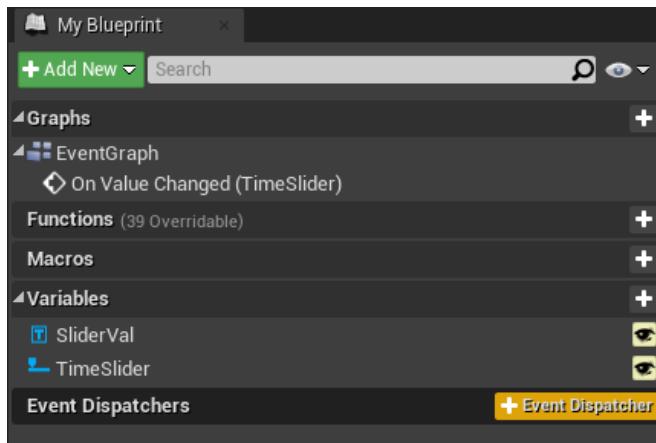
Blueprint Modding

The one we want, is On Value Changed. So, press the green + button next to it to bring in the event.

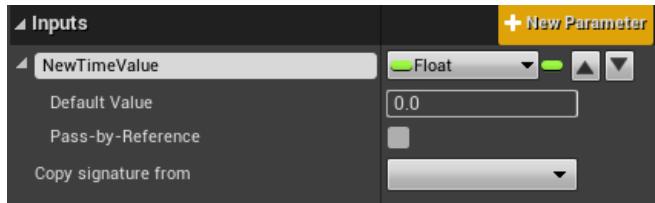


You can see that it is outputting a float called Value.

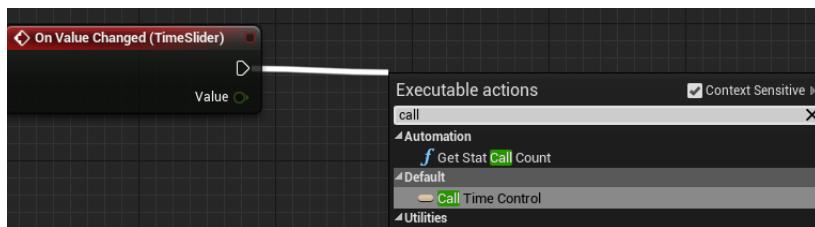
But, you may now be wondering, how will we bring this value into our mod blueprint? Well, you can create then call a new event! To do this, click create event dispatcher (in the event dispatchers section) to make one, and name it something sensible like TimeControl.



Now click on this new event in this panel, so that it comes up in the details panel. We need to create an input variable for this so that we can pass through the slider value. Click the + next to inputs and create a float variable called something appropriate such as NewTimeValue. The default value does not matter.

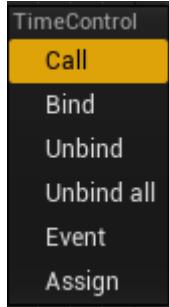


Now, drag off the On Value Changed event, type “call” and select to call the event TimeControl.

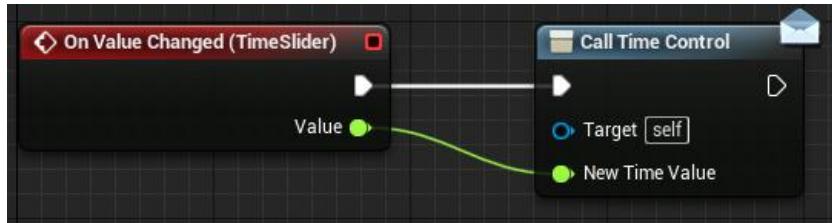


Blueprint Modding

Alternately, you could drag out from TimeControl in the event dispatchers panel and click “call”.



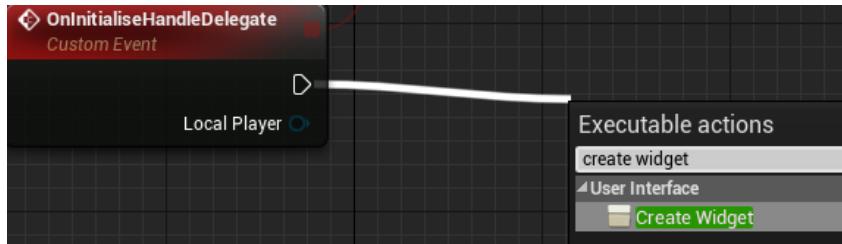
Then simply just plug it in like this:



And you're done for this widget for now! Remember to compile and save!

Accessing and manipulating the widget objects from BP

Now go back into your mod blueprint. First, we need to create the time control UI widget from the mod. You can do this by dragging off the oninitialisehandle event and typing “create widget”.



In the purple “Class” pin select class dropdown, select your TimeControlUI widget class. When you do that, your create widget node should not look like this:



Next, we need to create a reference variable, inside our mod BP, that is of the TimeControlUI widget object type. So, go to the side, click + on the variables and call it something like TimeUIRef. Click on it, and change its type from (typically Boolean is default) to the right type.



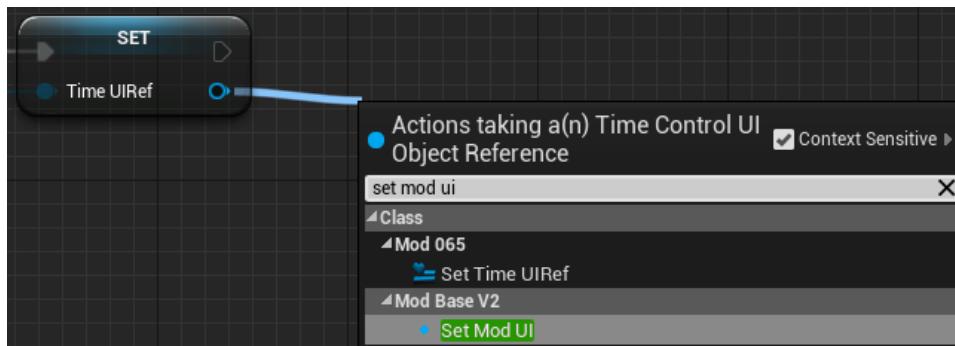
Blueprint Modding

Now, you need to use the return value from the create time control UI widget node to set the value of the TimeUIRef variable. To do this, drag out the TimeUIRef variable from the variables panel and click “set”. Then just connect the nodes, like this:

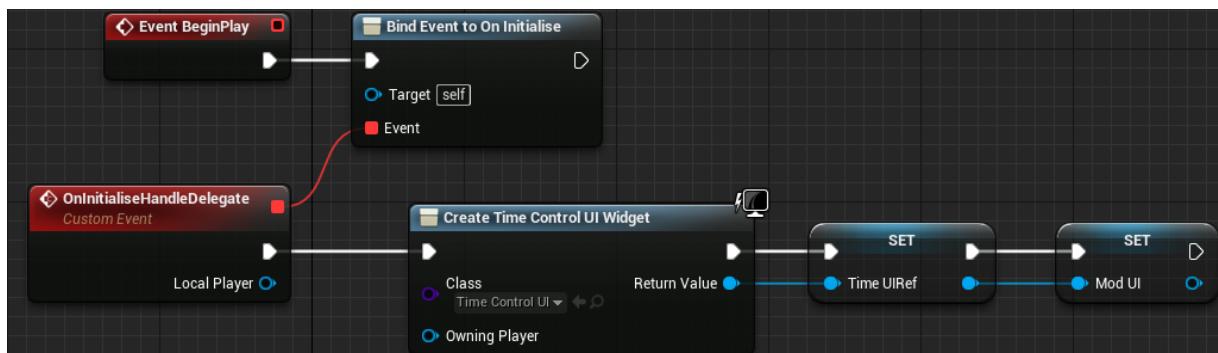


Tip: when you drag out your variables to get or set them, you can hold alt whilst dragging it out to instantly create a set, and ctrl whilst dragging it out to create a get.

If you are using the BPMM “alternate method” like I am, you need to set the mod UI variable to the same value, as this tells the BPMM that this UI is for loading into the menu. The ModUI variable is from ModBase.



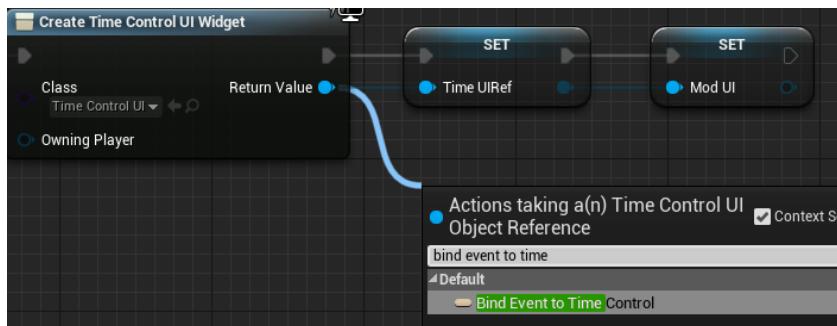
Connect the execution node and your entire BP should look a bit like this:



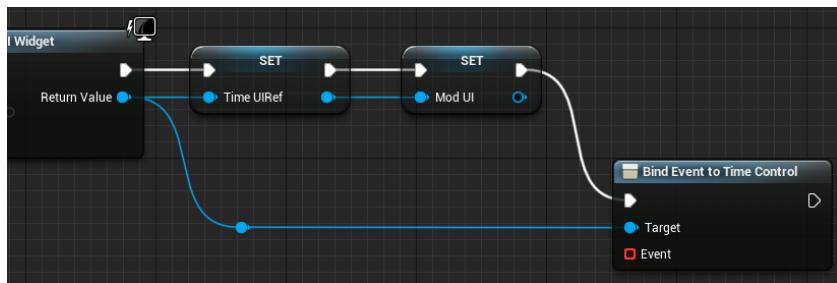
Now that you have got the widget into your mod BP, you can go about actually calling your Time Control event.

Blueprint Modding

First, drag off the return value for the create time control UI widget node and type “bind event to” and select the time control one:



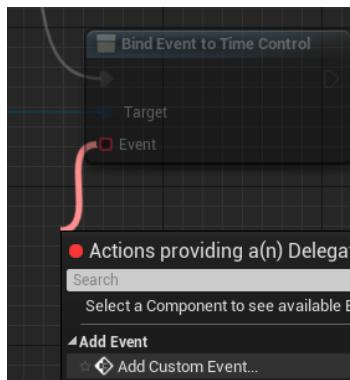
Connect the node up like this:



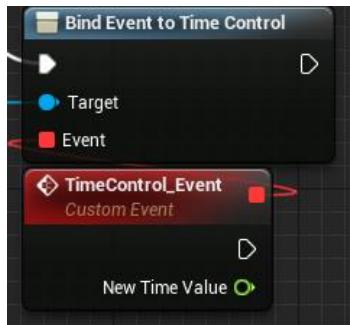
Tip: to create a reroute node, double click anywhere on the line.

Tip: to align all the nodes onto the same level, hold ctrl and select the nodes you want to align, then press ‘Q’

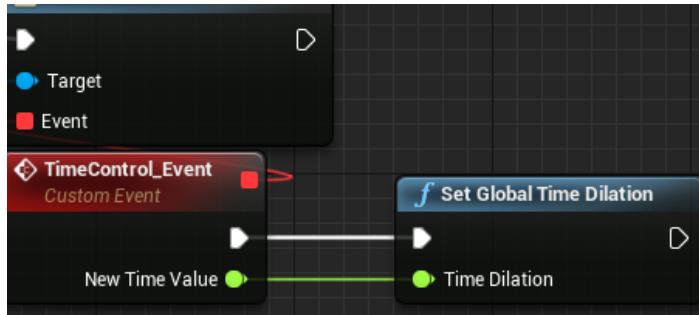
Next, drag off the red event pin and click “Add Custom Event”.



Name it something sensible like TimeControl_Event.



You will see that the new time value variable is passed through here! Now, all you need to do is drag off the **execution node on this custom event** and get the set global time dilation node. Hook up the output new time value pin to the input time dilation pin:



Now, the most basic of basic functionalities of this mod is done! **Compile and save**. There are still a few more basic features to add in this section, but let's test it in-game first. **Refer to the packaging your mod section to do this. Then come back here**.

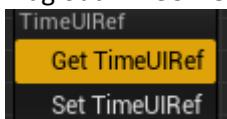
Assuming that you have followed this correctly, changing the slider should change the game's time dilation. So, setting the bar to maximum increases it to 5x speed, and minimum to 0x speed, or frozen in time.

However, you may notice a couple of things:

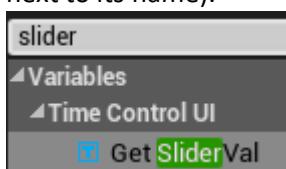
- If you close the UI then reopen it, the slider's value resets to 1 (but does not call the on value changed event as your dilation should remain the same, at least until you move the slider again)
- The text box underneath the slider doesn't do anything.

First, let's get the slider value text box to show the slider value. To do this, we need to be able to access the SliderVal text box object in our mod BP. Remember we had to set this text box to "Is Variable" earlier? This option allows us to get and set parameters for this object. There are two steps needed to get the reference for the text box object:

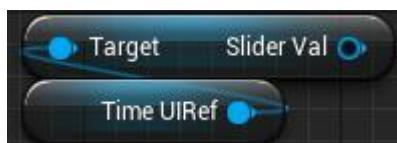
1. Drag out TimeUIRef and click get.



2. Then, drag off that pin and type "slider". Click get sliderVal (it should have a T in a box icon next to its name).

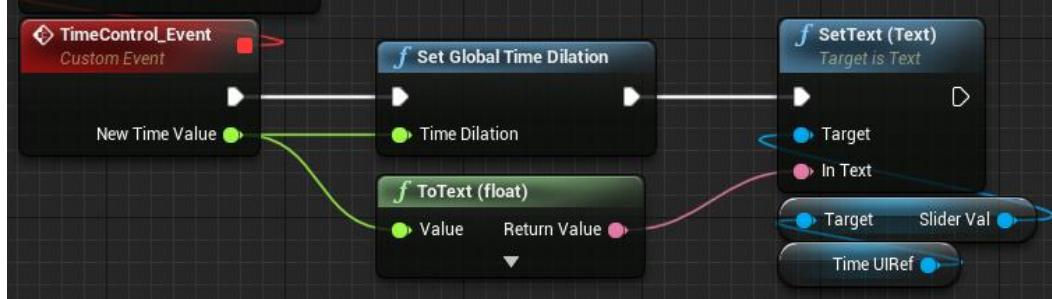


So you should have two nodes like this:



Blueprint Modding

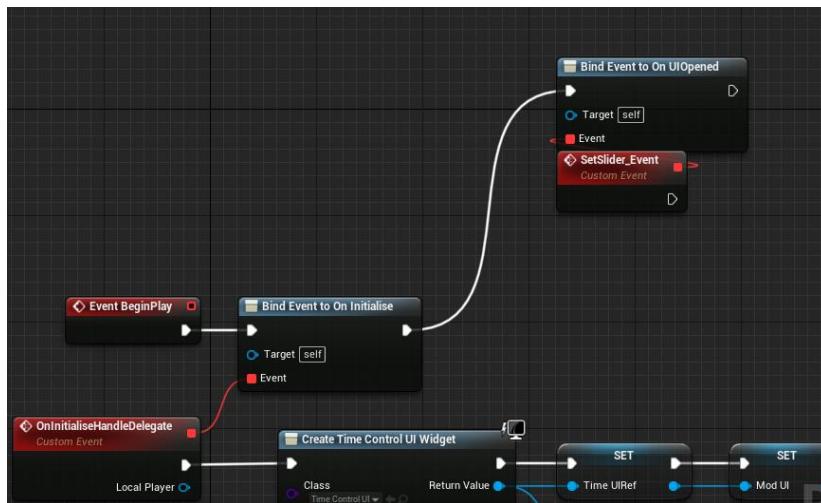
Now drag off Slider Val and type “set text” and click the one that says “Set Text (Text)”. **Don’t get mixed up with the other one.** Then, drag the execution node from set global time dilation to the set text (text) function. To put in the value, just drag from the TimeControl_Event New Time Value pin into the In Text pin. This should automagically create a ToText (float) node that converts float to a string. So your nodes should look like this:



Now, everytime you change the slider value, the text box under it will show its value!

ONLY DO THE FOLLOWING ONUIOPENED EVENT IF YOU ARE USING LEGACY BPMM AS THIS IS NOW REDUNDANT.

Next, we need to solve the bug. To help us with this issue, the BPMM gives us a handy event called OnUIOpened. Bind a new custom event to this and call it something like SetSlider_Event. **Make sure the bind event execution node is connected from the bind event on initialise.**

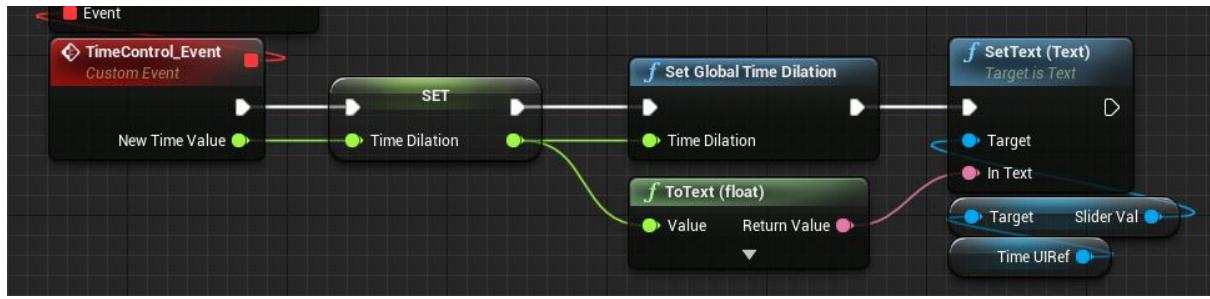


What we want here, is to set the value of the slider to whatever it was when you closed the UI. The problem, is that we don’t have any variable that is locally storing this value. So, we need to create a variable called something like TimeDilation, that is a float. Also set its default value to 1, as that is what we want our starting value to be.

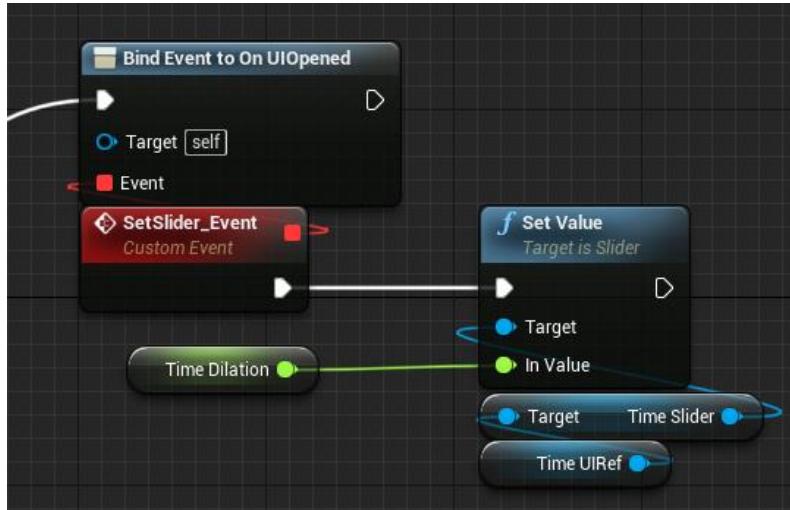
Variable	
Variable Name	TimeDilation
Variable Type	Float

We also now need to set this variable whenever the slider value is changed. So let’s set the variable in the TimeControl_Event execution flow. So now your nodes should look a bit like this:

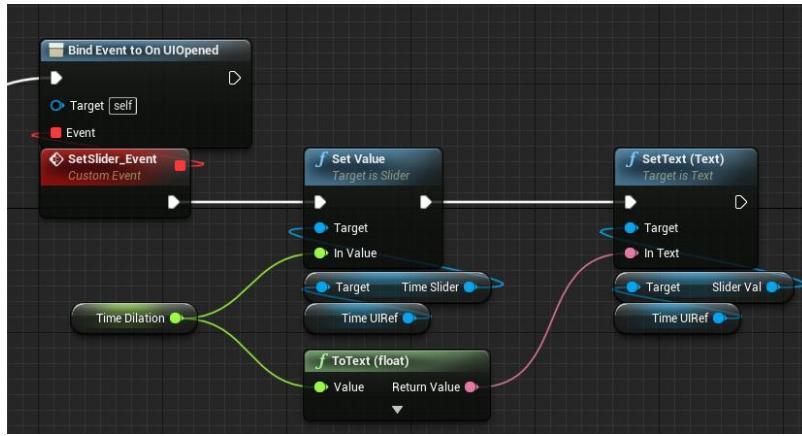
Blueprint Modding



Now, back in your SetSlider_Event execution flow, you can get the value from this TimeDilation variable and set your slider value to it. To do this, you need to get reference from TimeUIRef and TimeSlider like you did with the set text (text) for the Slider Val. Then drag out of Time Slider and type “set value”. Then just plugin that node’s execution and time dilation. It should look like this:



Now, you may realise that we are also forgetting to set the SliderVal text to the right value when the UI is opened too. Just copy and paste this node group from where you do that in TimeControl_Event, into SetSlider_Event, plug the nodes up and you are done! It should look like this:



You can finish there if you want for this basic functionality and go onto packing you mod, but I will also explain how to display values to your player’s HUD which is very useful when debugging your mods or even just giving the player info about the mod.

So, what we will do, is display the time control value to the HUD, which will change as you change the slider.

Blueprint Modding

First, create a new widget and call it something like “TimeHUD”. This doesn’t need to be duplicated from the BPMMGUI file as the default canvas will be scaled to whatever your game’s resolution is set to.

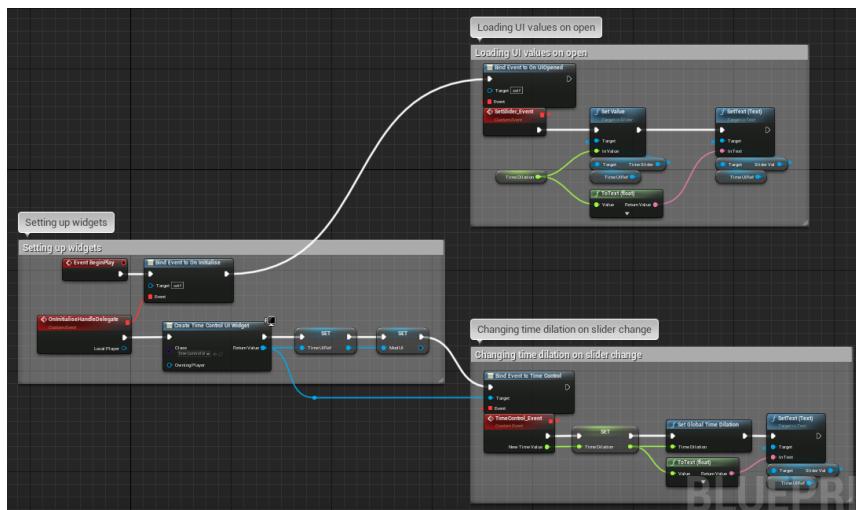
Now, you will want to make a text box which says “Time Dilation:”. This won’t do anything – it just displays the label for the actual time dilation output. Now, you can put this wherever you want, although remember where your game’s other HUD elements will be, i.e. all the corners are taken up by something or other so you probably want to put them on one of the sides. I just put it about 2/3 up the left side.

You will also want to make another text box just to the right of the label box which will actually display the time dilation. **Make sure you tick the Is Variable box if it isn’t already.** Also you can set the default text to “1” or whatever your default slider value is. This way the player knows exactly where it is from the get-go, and it won’t just appear when you first change the slider.

So, your TimeHUD widget should look like this:



Before we get into this little part, I just want to clean up the blueprint a bit. If you highlight a bunch of nodes and press ‘C’, a comment box appears around the highlighted nodes. Then you can edit what the comment says. So now my BP looks like this:



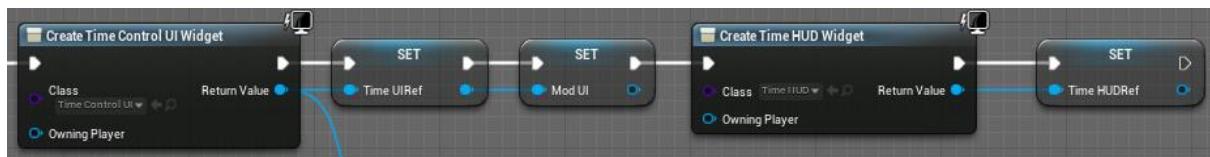
Blueprint Modding

You can also put comment boxes inside comment boxes, as recursively as you want! Although at some point it may get a bit silly so you should probably be making functions for some of your stuff, although don't worry about that now.

Now, just like before when you created the TimeControlUI widget in your mod blueprint, you need to make the reference variable and set it in blueprint.



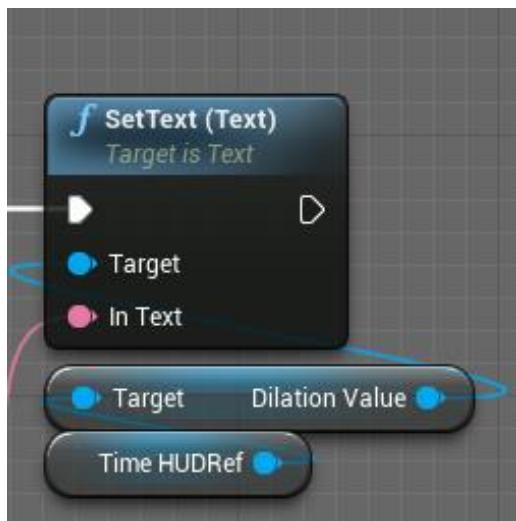
Drag it off the set Mod UI node from the previous widget creation:



Now, since you aren't making this widget part of the BPMM mod UI, you don't want to set the variable here. Instead, you need to add this to viewport. Conveniently, there is a node called Add to Viewport!

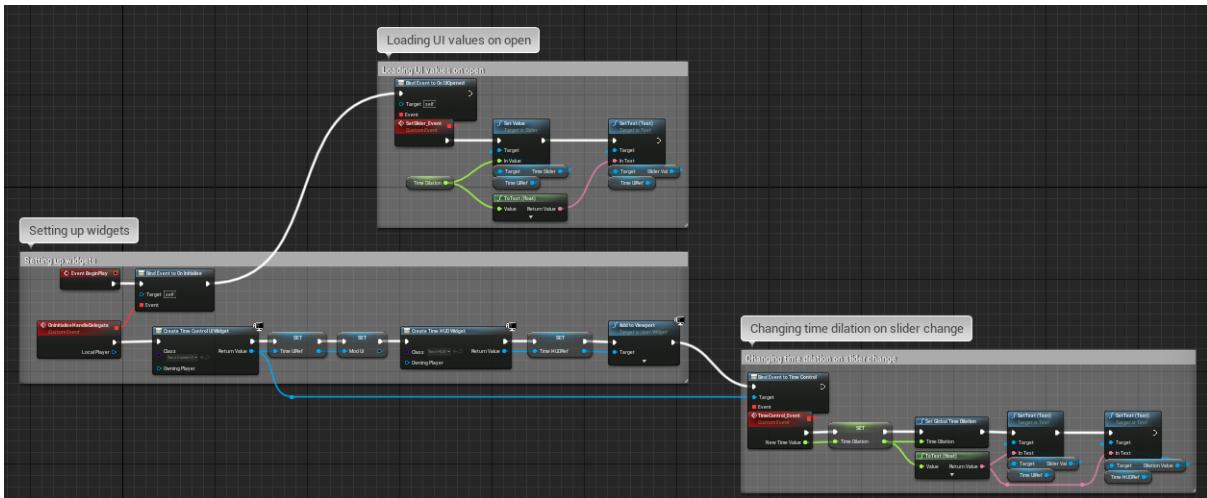


To change the text of the dilation text box, again we use the SetText (Text) node, in the exact same way we did it for the other widget. You will of course want to use TimeHUDRef instead, but it's the same thing. So, since I called my time dilation value text box "DilationValue", I just need to add this on the end of the slider change event:



Blueprint Modding

So that overall, your mod blueprint should look like this:



And you should be done with the basic functionalities! Check this by packaging your mod and loading it into the game.

Now, we are ready to build upon this with much more advanced stuff. From this point onwards I won't hold your hand so much (as that is supposed to be your mothers' job) and mostly just explain what we are doing instead of showing lots of screenshots for every small action.

Advanced functionalities

For advanced functionality, what I will show you to do, is:

1. Create your own input action mappings
2. Use those input action mappings to add changeable key-binds for your mod
3. Use these key-binds to change the slider value (so that user doesn't have to open the menu when they want to change the time dilation)

Setting up input action mappings

So, let's say that you want to use Numpad + and Numpad - as your mod's default keybinds. You can change this to whatever you want to use (although make sure it doesn't conflict with any of the game's default controls). First, you need to create these bindings as action mappings in your UE project.

Action mappings allow you to map keys to input behaviours by inserting a layer between the input behaviour and the keys that invoke it. Action mappings are fired for key presses and releases. Axis mappings also exist; however these only allow for inputs that have continuous range, sort of like analog controls like the thumb stick on a controller.

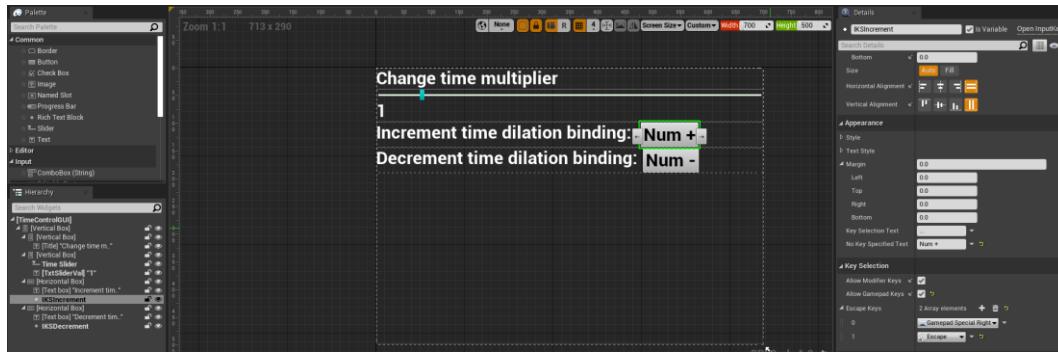
Go to your project settings and type "bindings" in the search bar to more easily find them. Under bindings you should see a plus next to Action Mappings. Click this, name it something like "IncreaseTimeControl" and set key to None (or just don't change it). Make another called

Blueprint Modding

“DecreaseTimeControl” for the other way. The reason we don’t set the key value here is because you’ll set your defaults somewhere else.

Adding keybind inputs to the mod widget

Now, we need to add the option to increment and decrement the time dilation keys in your mod UI. Inside TimeControlUI, use text boxes as labels and the nice widget object called Input Key Selector, to make add this feature. Like is what mine looks like:



Inside my IKSIncrement (IKS stands for Input Key Selector), I set No Key Specified Text to the default keys I will be using, Num +. I also added tool tip text to them in the behaviour section. You can do whatever you want here, my widgets are put together quickly so look awful.

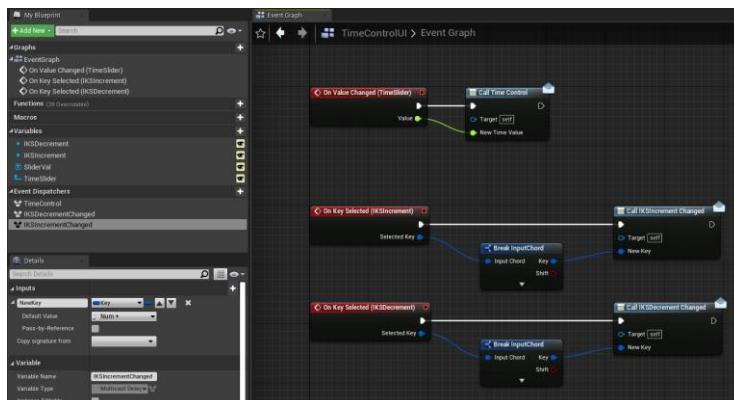
Again, remember to set your IKS’ Is Variable checkboxes to true (ticked).

Compile and save, and now, in your graph, click on IKSIncrement and IKSDecrement or whatever you called them, and click the green plus signs next to “On Key Selected”. Now you should have two more events in your graph (as On Value Changed should of course still be there).

Now, to take these selected keys and pass them into your mod, you need to create two new event dispatchers, called something like “IKSDecrementChanged” and “IKSIncrementChanged”. Inside them, create an input variable called something like “NewKey” and set its type to Key. It should have a default value of whatever your default keybindings you want to be, so in my case increment one should be Num + and decrement one should be Num -.

You will notice that you can’t just take selected key output and drag it right into your new key variable. What you need to do, is break the selected key input chord up, and get the key output from that.

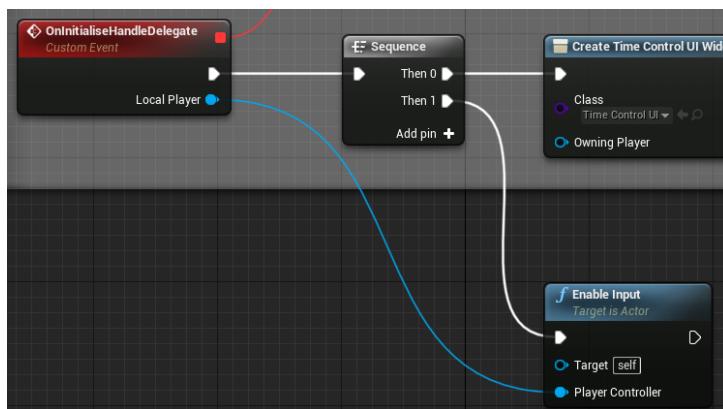
So your TimeControlUI graph should look something like this:



Now that we have done this, we need to work on the hardest part – creating the input action mapping in your mod.

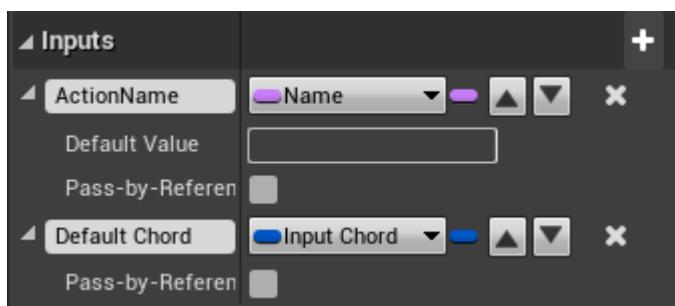
Creating input action maps from keybinding in the widget

When your mod starts up in the game, you need to create two new action maps – one for increasing and one for decreasing. We will initialise all of this before we start the widgets and everything. So, using a sequence node (very useful) between `OnInitialiseHandleDelegate` and `Create Time Control UI Widget` nodes, connect the “Then 0” node to a new node called “Enable Input”. This simply turns on the ability to take inputs. The important thing is that you need to plug in local player from `oninitialise` to enable input. My explanation is probably terrible so here is what you should do:



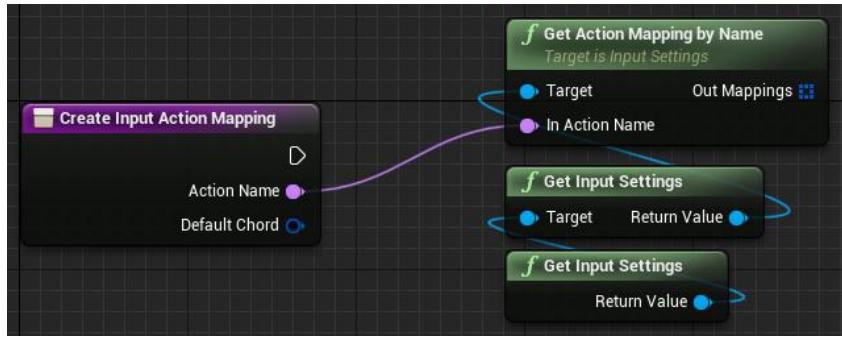
Okay, now we get super complicated. We need to create a function called something like “Create Input Action Mapping”. What this will do, is take a custom named action mapping and a default key and save the action mapping to the game’s key mappings. Luckily, there is nothing custom to DRG required here, so we can just use everything from UE.

Still, the function is quite complicated, so I will go through step-by-step how to create it. Click on your newly created function and add two new inputs. One called “ActionName” of type Name. Another called “DefaultChord” of type Input Chord.

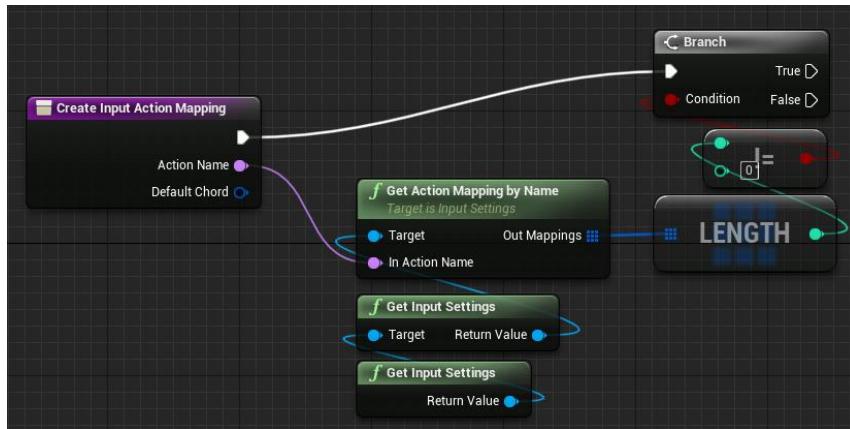


Inside this function, we first need to get your project input settings, and from that, getting the action mapping by name, which in this case would be by `ActionName`. To do this, we call a node “Get Input Settings”, then from the return value, another node of the same name (I have no clue why, but this is the only way I got this to work haha), then from that return value, into a node “Get Action Mapping by Name”. It asks for action name input, so use your function’s input for that. [If you hover over the nodes, some tooltip will show explaining generally what these nodes do](#). So now your function should look like this:

Blueprint Modding

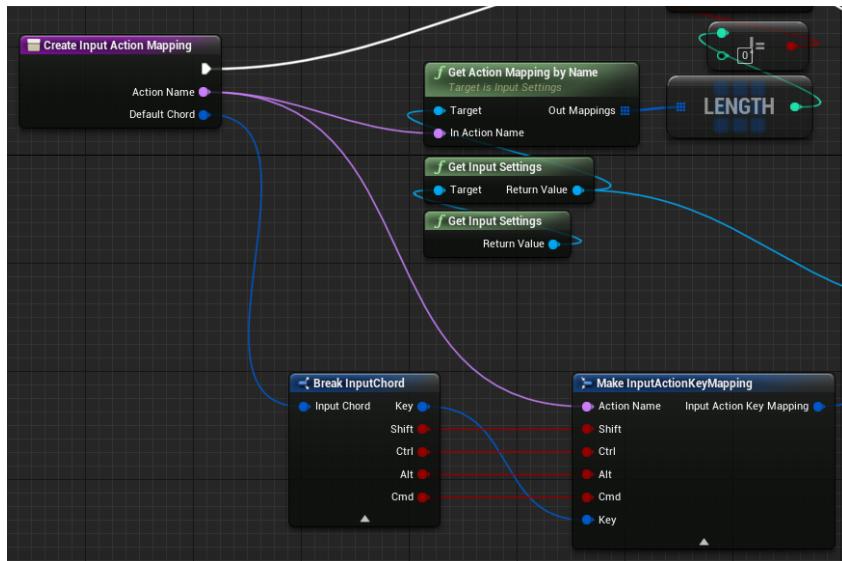


Now, we need to check that the out mappings well, has anything inside of it. This is basically just a sanity check that you haven't skipped making your input mappings inside your project settings. So quickly, we get the length of the array, check that it isn't equal to 0, and then go on from there:



Now, drag off the return value from the second (highest here) Get Input Settings node and make an "Add Action Mapping" node. So the target will be your input settings. Connect the false branch execution path to this new node. If you try to compile your function now, it will throw an error, saying that you need to input a key mapping.

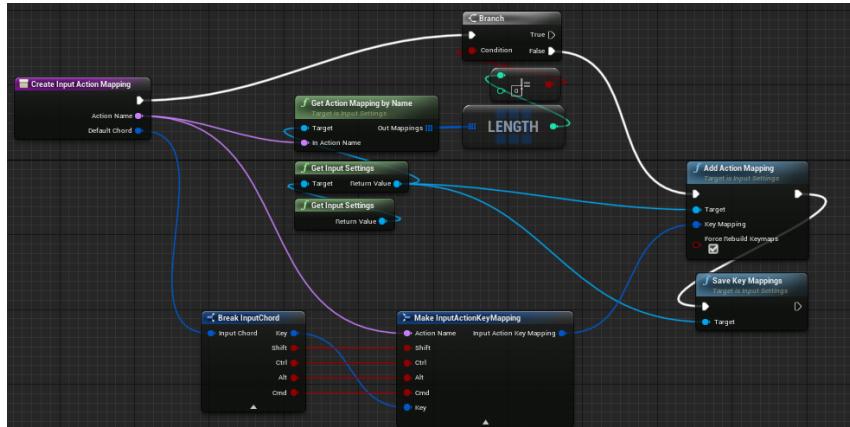
To get this, drag off default chord input and type break and create a "Break InputChord" node. Then drag off key and create a node "Make InputActionKeyMapping". Click the dropdown arrows on these and connect Shift to Shift, Ctrl to Ctrl, etc. Also take another line from action name input to the new make mapping node input. Like this:



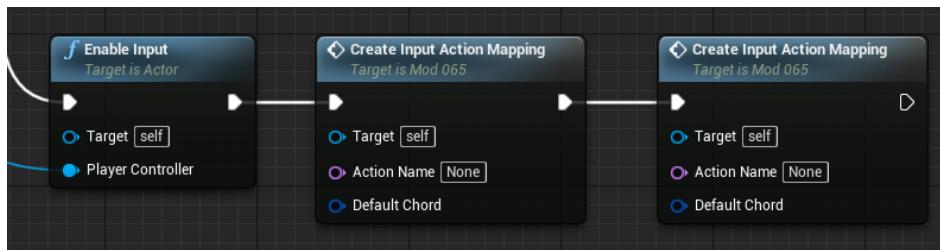
Blueprint Modding

You are probably wondering, “but why can’t I just input a key into the function and avoid all this breaking and making rubbish?”. Well, the problem is that some action mappings may use multiple keys for their key bindings, so you need to take a chord, break it into its member fields, then take those and build up a new action key mapping, using your action name.

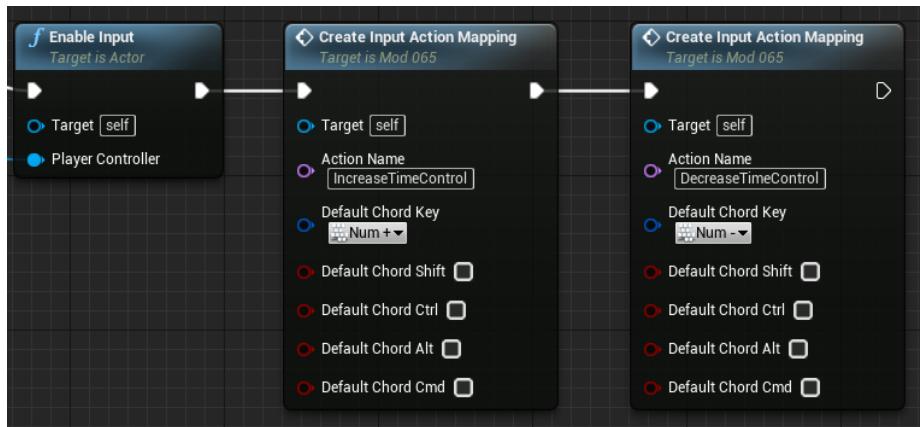
Now connect the output of the make node to the key mapping input on Add Action Mapping. To finish off the function, make a node along the execution line, called “Save Key Mappings”. The target for this, again, is from the second Get Input Settings node. So now, your entire function, should look like this:



Compile and go back into event graph. Drag off Enable Input node and call your Create Input Action Mapping function by typing its name. Then drag off that, and call it again.



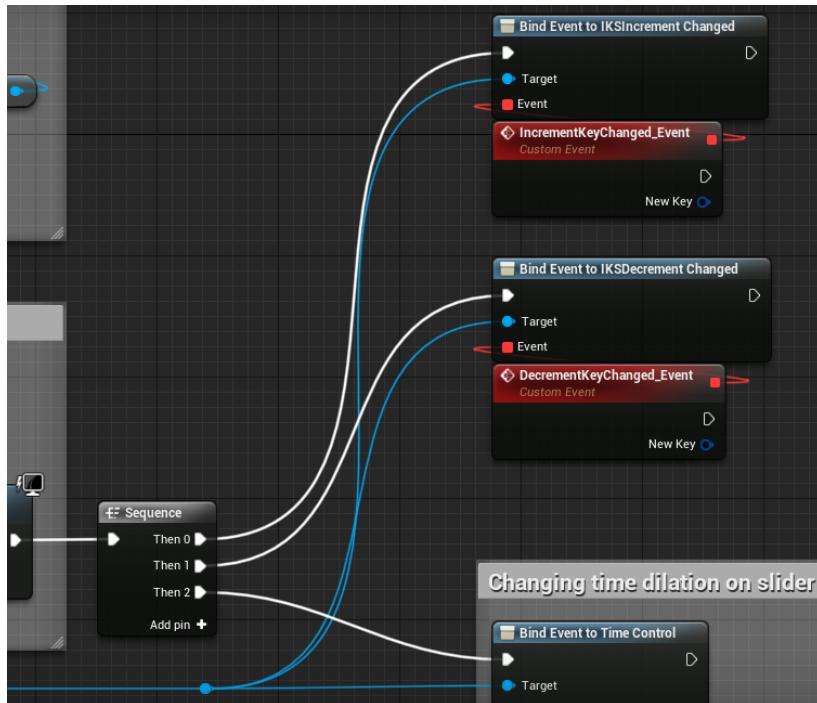
Now, right click Default Chord inputs on both and hit “split struct pin”. This will make the nodes deeper. But now, you can set your default chord key to what you want. So, the first one, set it to your increment chord key. For the second, set it to your decrement chord key. Also, your action names need to be set. **You need to set them to the same names as those in your project settings.** So, they should now look like this:



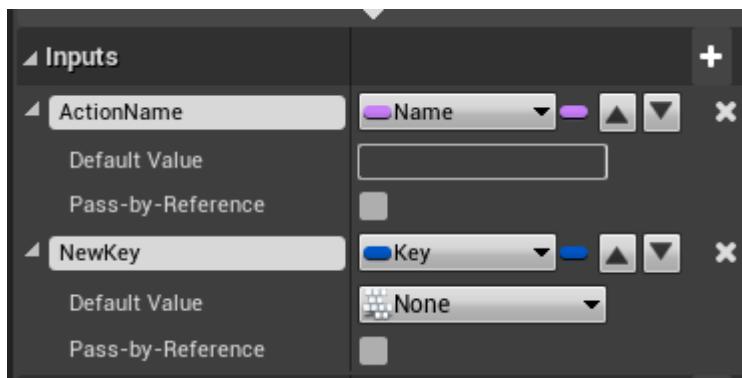
Editing input action maps

The complicated parts aren't over yet. You need to create *another* function for editing your key binds. First though, let's call those IKSIncrement and IKSDecrement Changed events that we created from the UI. We'll sequence execution so that these are called first, then the changing time dilation on slider change, but really it doesn't matter. The sequence nodes mostly keep your project well organised.

Do what we've done before with binding custom events – remember to drag off the time control UI widget return value line (remember you can double click on it to create a branch), then type in your event name. So my BP looks like this:



Now comes the second hard part – creating that edit input action mapping we discussed earlier. Make a function called “Edit Input Action Mapping” with two inputs. One called “ActionName” of type Name, the other “NewKey” of type Key. Default value can just be None.

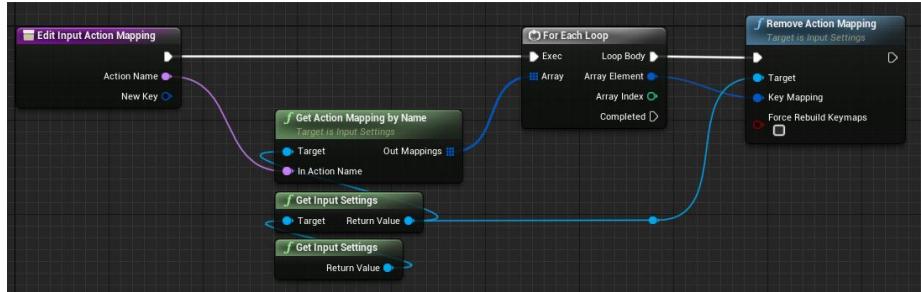


First off, we need to make that group of nodes that leads to Get Action Mapping by Name node, so that we can get those Out Mappings array. [What we need to do with this array, is loop through the elements \(mappings in the specified action name\), and then remove all the action mappings. This then sets us up to add a new action mapping with our key of choice. There are no edit action mapping nodes so we have to do this, and of course we don't want to keep adding new action](#)

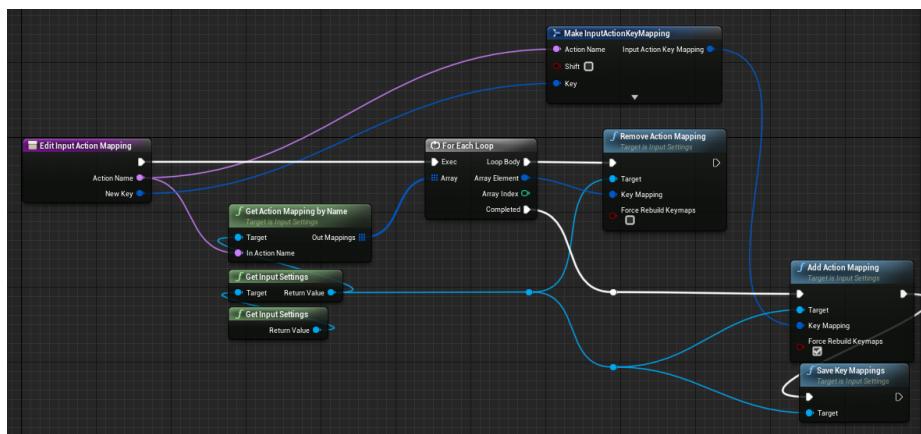
Blueprint Modding

mappings on top of each other otherwise we'd have a bunch of keys after many key changes that would all do the same things – this would be an absolute pain.

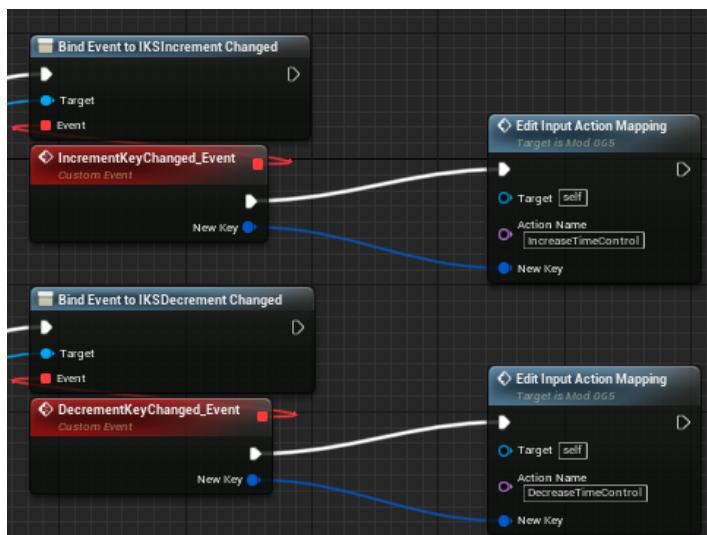
So, drag off Out Mappings and create a for each loop. Inside the loop body, run the Remove Action Mapping node, with target as the return value from the second Get Input Settings node and the Key Mapping the Array Element from the loop. So, your function should currently look like this:



When the for loop has completed, we just add the Add Action Mapping and Save Key Mappings nodes like last time. And since our input key into the function is just a key and not a chord, we can just Make the InputActionKeyMapping from the key and action name and plug that into our key mapping. And so, this is all your function should look like:

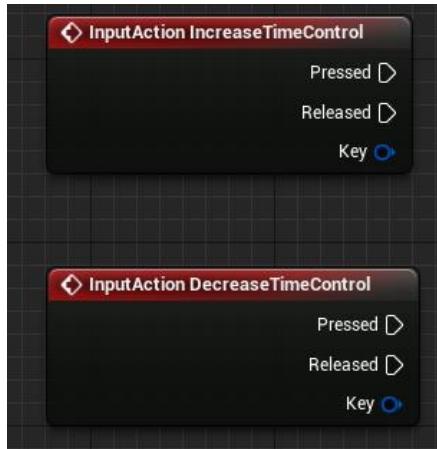


So, back inside your event graph, call this function once for your increment key changed event and another for your decrement key changed event, **again using the same action names as your project settings**.



Calling input actions and manipulating time dilation from those events

Now we can *finally* get onto the actual editing the time dilation based on when your input keys are pressed, regardless of what the key is mapped to. We can do this easily, as there are nodes categories called Input Actions. And inside there, should be your custom input actions. So right click somewhere and create these two nodes from this, which should look like this:



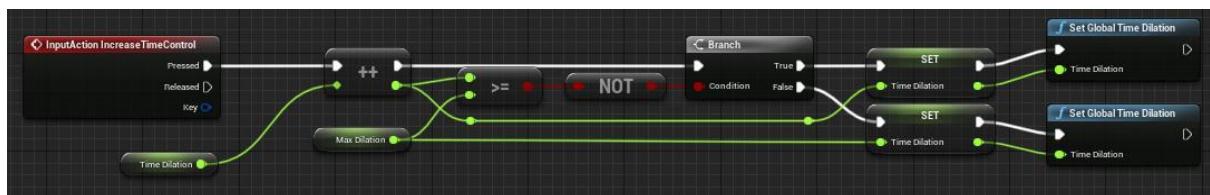
We want to execute our instructions when the key is pressed, so we will be dragging off those. Now, we will be doing some fun maths! (Totally not completely overcomplicated by the pain that is BPs). There are a couple of things to think about first:

- We need to limit the dilation to a maximum (as any higher than like, 8, *really* lags out the game)
- We need to limit the dilation to a minimum (any lower than 0 is like... why???)
- We need to update the slider value, the text box under the slider and the text box on the HUD as we press the buttons, otherwise there will be number inconsistencies.

So taking in these considerations, let's make a float variables called MaxDilation and MinDilation.

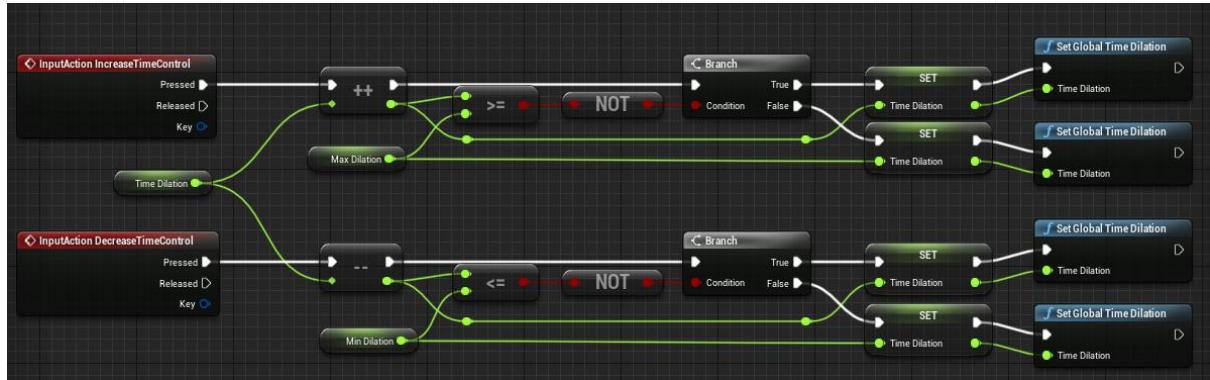
This will have our maximum/minimum dilation in a variable, which removes magic numbers and allows us to change this maximum/minimum with user input or whatever much more easily later. Although no idea why you would want to do that, this is just good programming practice.

Let's just work on the increment part first, then we can work on decrement, as it will just be a copy and paste but the other way around. So, we start off by getting the value of Time Dilation and incrementing it, with the “++” node. Then, we want to check if the newly incremented value is larger than or equal to max dilation. If it is, we want to set time dilation to max dilation. If not, we set it to our newly incremented value. E.g., if we increment 3.5, we get 4.5, which is smaller than 8, so we keep it at 4.5. If we increment 7.8, we get 8.8, which is greater than 8, so we set it at 8. This way it never gets higher than 8. Then we just set the global time dilation from that same value. The logic for this is then simple:

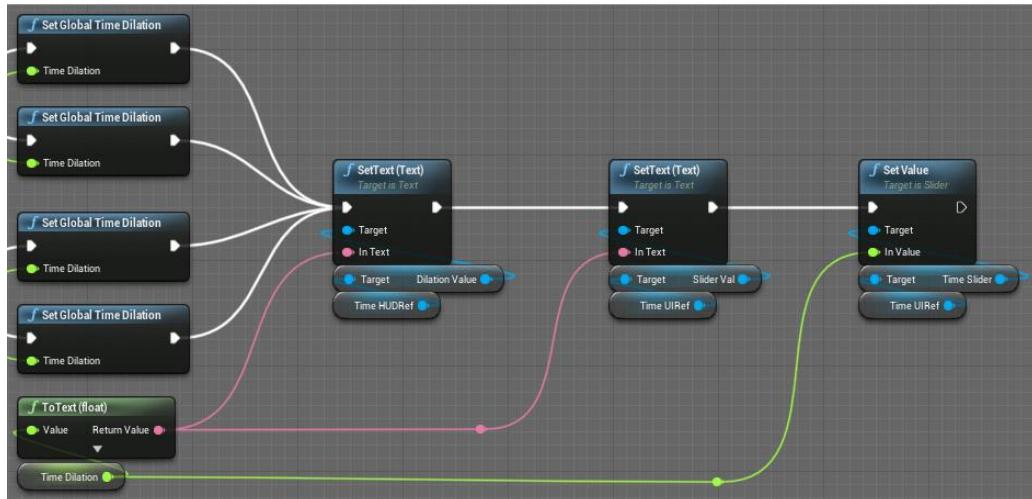


Blueprint Modding

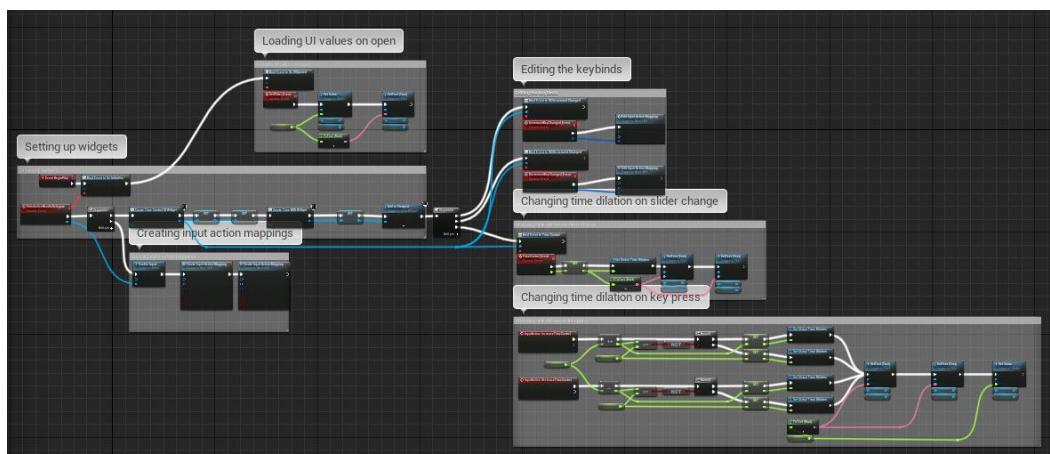
Now for decrement, we do the same thing, but we decrement, then check that it is smaller than or equal to min dilation:



Now, all we need to do is update the various slider/text box values to keep consistency across the mod. Just use the same normal SetText (Text) nodes and the Time Dilation float to string as their text. For setting a slider value, it is just a Set Value node. Then add a comment box over it and it should look like this:



And that should be it! The mod is done! Clean everything up so it is all commented up and readable and you should have something that looks a bit like this:



And that's your mod finished! Feel free to add as many new features as you want to this tutorial mod, although please do not publish your mod to mod.io or the modding repo.

Dummy examples

I'm going to run through making a couple of mods which utilise some of the C++ and dummy methods. Once you know how the basics work, you are then set to much more easily be able to experiment, test, and implement any of your own features that use any of the game's functions and BPs for your mods. The possibilities here are endless. Overview of the two example mods I will step-through in this tutorial:

1. Kill player on button press. This demos the most basic of C++ you will need.
2. Self-destruct Bosco from a button press. This demos the dummy BP part, which requires no C++ writing, but is limited to the BP that you are dummying.

Both examples will still feature info on how to look at the C++ header dumps.

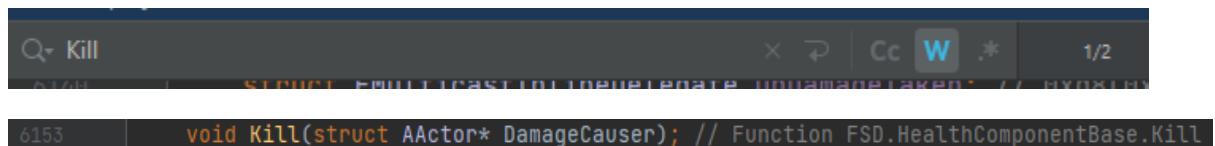
Kill player on button press

Scouting the C++ header dumps

The very first thing you need to do is download the latest version's dumps from [here](#). You will also need to download Visual Studio, Rider for Unreal Engine or CLion to edit your code, and an editor or code viewer such as Visual Studio Code or any of these IDEs listed above, to view and navigate the dumps. I use Rider for Unreal Engine as my IDE and CLion to view the dumps, just so you know why yours may look different to my screenshots.

Now, you will notice that there are a LOT of C++ classes in the dumps. Don't be overwhelmed – most of the main functions you will need are in FSD_classes.h (although saying that, the file alone is 20k lines). If you need CPP from another class you know at the time what you are looking for – and if you don't, you can always search for key words that you are looking for and look through those files. You will be doing a lot of searching through files anyway, so you'll get good at this pretty quickly. Don't hesitate to ask in #mod-chat in the Discord where stuff might be located though.

So, back to this mod example. We need to find the function in the game that deals with killing the player. As you should always do, start by looking in FSD_classes.h as it is most likely to be there. Do Ctrl + F to open the search function (this is the same for all IDEs and code editors), and type Kill. You may see about 100 results. You could look through these manually, OR, you could try toggling on "match by word" option that most IDEs and code editors have. In CLion, it is a square button with a "W" on it. There should be 2 results, one being the line you want and the other being the comment of the function (this is an artefact of the dumper).



```
Q: Kill
void Kill(struct AActor* DamageCauser); // Function FSD.HealthComponentBase.Kill
```

So, here is a function that just kills the player when it is called. An AActor struct is passed through but you can just ignore that. **The important thing to do here is to check what struct (class) this function is inside. This is again relevant for any other functions you will find for your mods.** So here, Kill() is inside struct UHealthComponentBase, which is a child class of UActorComponent, as denoted by the ::

```

6134 // Class FSD.HealthComponentBase
6135 // Size: 0x148 (Inherited: 0xb0)
6136 struct UHealthComponentBase : UActorComponent {
6137     char UnknownData_B0[0x8]; // 0xb0(0x08)
6138     struct FMulticastInlineDelegate OnHealthChanged; // 0xb8(0x10)
6139     struct FMulticastInlineDelegate OnDamageHealed; // 0xc8(0x10)
6140     struct FMulticastInlineDelegate OnDamageTaken; // 0xd8(0x10)
6141     struct FMulticastInlineDelegate OnHit; // 0xe8(0x10)
6142     struct FMulticastInlineDelegate OnBodypartHit; // 0xf8(0x10)
6143     struct FMulticastInlineDelegate OnDeath; // 0x108(0x10)
6144     struct FMulticastInlineDelegate OnRadialDamage; // 0x118(0x10)
6145     struct FMulticastInlineDelegate OnCanTakeDamageChanged; // 0x128(0x10)
6146     bool ShowLaserPointMarkerWhenDead; // 0x138(0x01)
6147     char UnknownData_139[0xf]; // 0x139(0x0f)
6148
6149     float TakeRadialDamage(float damageAmount, struct FVector BlastCenter, float Blast
6150 void TakeDamageSimple(float damageAmount, struct AActor* DamageCauser, struct UDa
6151 void SetHealthDirectly(float newHealthValue); // Function FSD.HealthComponentBase
6152 void SetCanTakeDamage(bool canTakeDamage); // Function FSD.HealthComponentBase.Se
6153 void Kill(struct AActor* DamageCauser); // Function FSD.HealthComponentBase.Kill
6154 bool IsDead(); // Function FSD.HealthComponentBase.IsDead
6155 bool IsAlive(); // Function FSD.HealthComponentBase.IsAlive
6156 float Heal(float amount); // Function FSD.HealthComponentBase.Heal
6157 bool GetShowHealthBar(); // Function FSD.HealthComponentBase.GetShowHealthBar
6158 float GetHealthPct(); // Function FSD.HealthComponentBase.GetHealthPct
6159 struct TScriptInterface<None> GetHealthComponentForCollider(struct UPrimitiveComp
6160 struct FVector GetHealthBarWorldOffset(); // Function FSD.HealthComponentBase.GetH
6161 float GetHealth(); // Function FSD.HealthComponentBase.GetHealth
6162 struct UParticleSystem* GetGenericImpactParticles(); // Function FSD.HealthComponent
6163 bool GetCanTakeDamage(); // Function FSD.HealthComponentBase.GetCanTakeDamage
6164 bool CanTakeDamageFrom(struct UDamageClass* DamageClass); // Function FSD.HealthCo
6165 void CanTakeDamageDelegate__DelegateSignature(bool OutCanTakeDamage); // Delegate
6166 };

```

When you are looking for functions and variables for your mod, you will come across some really interesting looking functions and variables. I have regularly come up with entire mod ideas just from being distracted when looking through the code. Every single function and variable in all these header files can be dummed... which is a lot of possibilities. Feel free to go wild!

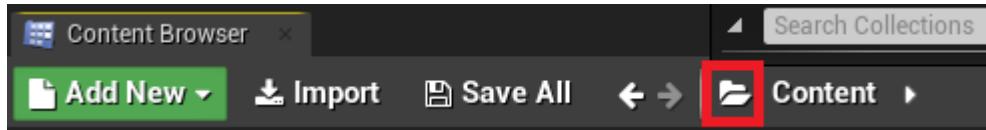
Now, luckily, UActorComponent is a base UE class, which means that we don't have to look any deeper for extra classes. Sometimes, as I will show in a later example, the class that a function/variable you want is a child of, is sometimes a child of another DRG class, which is a child of another DRG class, etc. You will have to learn to follow these chains and work out what the base UE class is, as we need to know this when creating our dummy C++ class.

Dummying the C++ class into the project

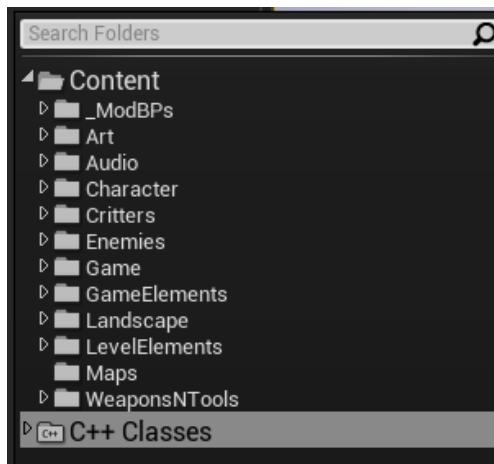
So, now go into your UE project. Remember that your project must be called **FSD**. Anywhere inside your content browser, right click and click "New C++ class". Now, it will ask you to choose a parent class. Because our Kill function was in a class that is a child of UActorComponent, you need to select **Actor Component** as your C++ parent class. If you don't do this, your dummy class won't work.

You now must name your C++ class the same name as the struct in the header dumps, minus the ‘U’ on the front. You will have to do the same with the ‘A’ on the front of Actor classes – these letters UE append onto the end during runtime which is why they are in the dumps. So, in our case we name it “HealthComponentBase”. Don’t change the default path that it creates – it should be in /FSD/Source/FSD/.

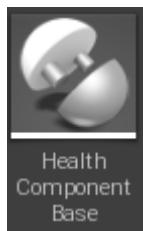
Now, to get to your file, click this folder highlighted in red:



Now you should see a folder called C++ Classes:

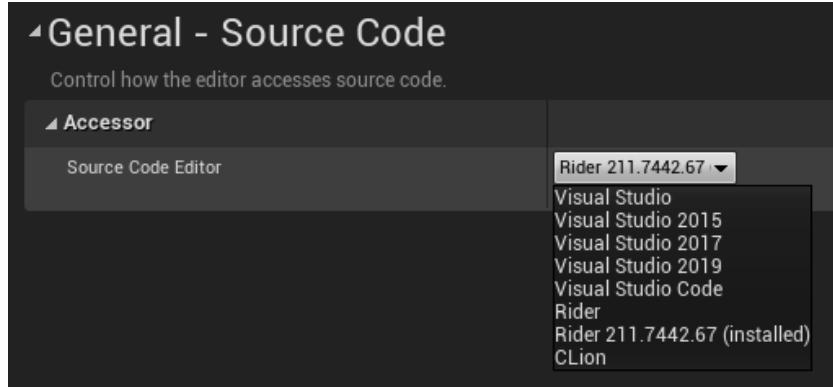


Click on this, navigate into FSD, and your class HealthComponentBase should be there. The icon should look like this:



Double-click this and it will open in your editor.

By default, UE will use Visual Studio as your default editor. To change the editor that it will open, open Editor Preferences, navigate to the Source Code category under General, and there should be an Accessor tab. In that is the dropdown to select your source code editor. At the time of writing, I am using “Rider 211.7442.67” which is Rider for Unreal Engine.



The code you open should be called “HealthComponentBase.h” and should look like this:

```

1 // Fill out your copyright notice in the Description page of Project Settings.
2
3 #pragma once
4
5 #include "CoreMinimal.h"
6 #include "Components/ActorComponent.h"
7 #include "HealthComponentBase.generated.h"
8
9
10 UCLASS( ClassGroup=(Custom), meta=(BlueprintSpawnableComponent) )
11 ^o class FSD_API UHealthComponentBase : public UActorComponent
12 {
13     GENERATED_BODY()
14
15     public:
16         // Sets default values for this component's properties
17     ^o     UHealthComponentBase();
18
19     protected:
20         // Called when the game starts
21     ^o     virtual void BeginPlay() override;
22
23     public:
24         // Called every frame
25     ^o     virtual void TickComponent(float DeltaTime, ELevelTick TickType, FActorComponentTickFunction* ThisTickFunction) override;

```

Although of course the syntax highlighting will differ based on what IDE you are in. **Some IDEs (Visual Studio for example, as far as I am aware), do not automatically generate this line:**

UCLASS(ClassGroup=(Custom), meta=(BlueprintSpawnableComponent))

If it doesn't, write in this line yourself, in the same place as the screenshot above.

Now, to actually write your dummy C++ function – in our case the Kill() function – navigate to the line under line 25 (virtual void TickComponent...) and type “UFUNCTION(BlueprintCallable)”. Note the lack of semi-colon on this line. This is because we aren't done with this line yet, however I want to explain what UFUNCTION and BlueprintCallable mean.

UFUNCTION is a C++ function that is recognised by the UE4 reflection system. This means that you can expose any function specified by UFUNCTION to blueprinting, which is what we will want. You can read more about UFUNCTIONs [here](#). BlueprintCallable is a function specifier (which controls how the function will behave inside blueprints), that allows the specified function to be executed in a blueprint. There are other function specifiers, like BlueprintPure, which you may use in the future. You can read more about these function specifiers [here](#).

Now that I have explained what they mean, finish the line by copying in the exact dummy function from the dumps from earlier. However, since we don't want to provide any parameters into our

dummy function, we can ignore the parameter (struct AActor* DamageCauser). So now your line should look like this:

```
UFUNCTION(BlueprintCallable) void Kill();
```

Completely optionally, some people like to format their UFUNCTION specifiers so that the line above actually looks like this:

```
UFUNCTION(BlueprintCallable)
void Kill();
```

This is completely up to personal choice how you lay out your code here, and it has no change on function.

Now, inside “HealthComponentBase.cpp”, the file created alongside, all you have to do is generate the definition of the Kill() function inside of it. Visual Studio and Rider give the option to do this automatically, but this is how it should look:

```
void UHealthComponentBase::Kill()
{
}
```

Make sure you don't delete anything already in the file.

Now for the painful part, if you haven't setup your IDE properly or whatever. This tends to go wrong a lot for many people, I guess it's just sod's law. **But you need to click “Run FSD”, or whatever the run button is in your IDE.** This will take a bit, as it is building UE from your C++. If any errors are thrown and you are certain you did exactly what I showed here, please do not hesitate to ask for help in #mod-chat as this can be painful without an extra set of eyes. **When writing this tutorial, I got a bunch of dumb errors I didn't understand, which ended up being due to some weird memory issues because I had multiple UE projects called FSD open at once. Whoops.**

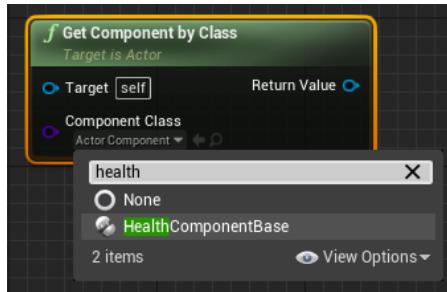
When your build is successful, immediately click the stop button, **if your UE is still open. It will then just hot reload UE with the new build. Alternatively, before you build, you can close UE and when you build, it will open UE, running off that build.** If you're confused from reading this terrible explanation, you'll work it out eventually :)

Accessing the dummiied C++ class

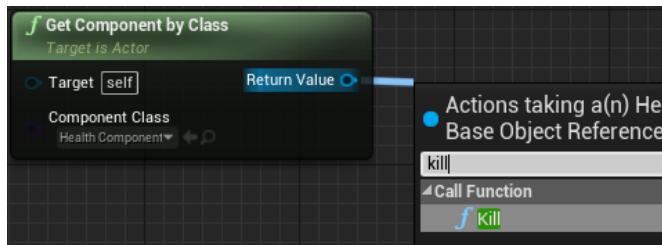
Now we can get onto making the actual mod. Same as before, create your mod with ModBaseV2 as your parent class and setting up the class defaults as appropriate.

Inside your mod, before we do anything, right click and get a node called “Get Component by Class”. In the dropdown, you should be able to find your HealthComponentBase class:

Blueprint Modding

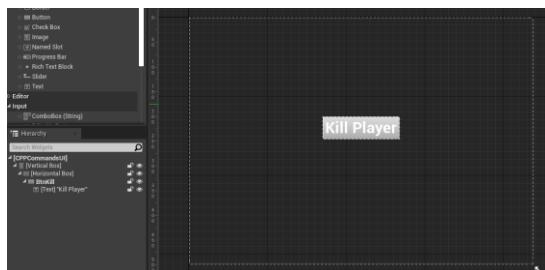


Then if you drag off the return value pin and type Kill, you should see a function that pops up called Kill. This is your function that you created inside the HealthComponentBase C++.

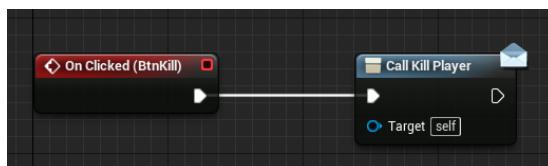


If you don't see any of these, then you've done something wrong in the C++, so go back and try again.

Let's create the mod UI which will have the button in, which kills the player. Name your widget something like KillPlayerUI. Now setup your UI with a button that has text inside that says something like "Kill Player". Since this is a tutorial mod, as usual my widgets look like rubbish but here's how I have mine setup:

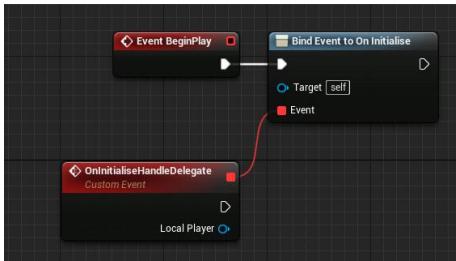


Then inside UI graph, click on the BtnKill variable and click the green plus next to OnClicked event so to create the event. Then create an event dispatcher and call it something sensible, then call it from the On Clicked event. This is nice and easy, but this is what mine looks like:

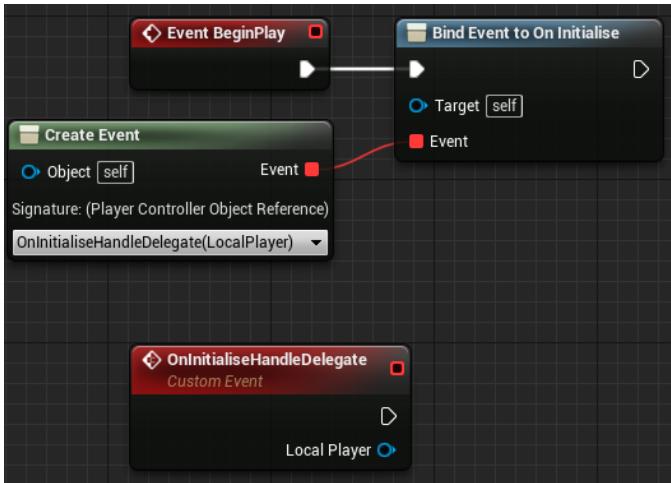


Now back in your mod, I'm going to show you a slightly neater way of binding events. Instead of binding a new custom event directly onto the bind like this:

Blueprint Modding



You can also drag off the red pin and type “Create Event”. Note that you should first create the event by dragging off the red pin and typing “Add Custom Event”, naming your custom event, disconnecting the red pin and then moving your custom event node somewhere else. So, the above image will now look like this:



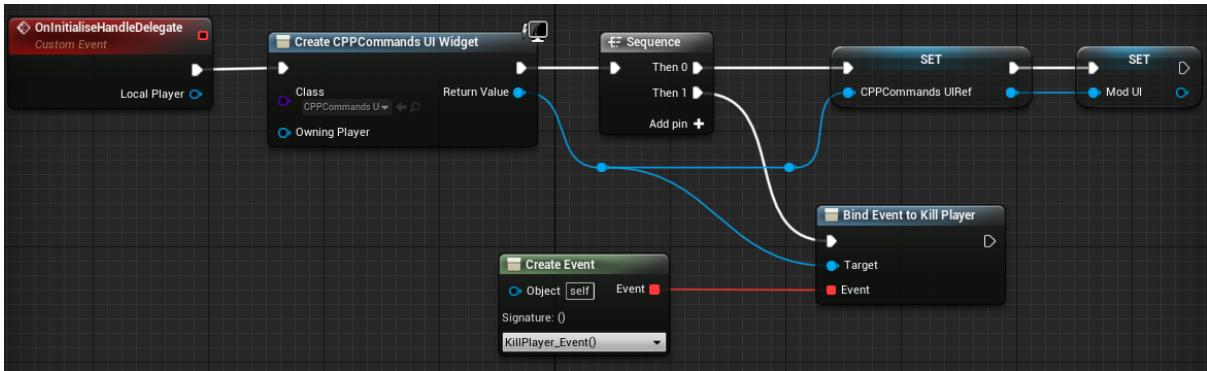
The point of doing this, is that now your custom event execution line can be anywhere in your BP, not just from that bind event node. So, when you get to making more complex mods, this will be super useful for organisation.

Now from your custom event, whether or not you used the optional tip above, create your KillPlayerUI widget, its reference variable, just like you should have done before. I called my UI “CPPCommandsUI” for some reason, but just to check you should be doing this for your UI name:



Now we want to bind event on that KillPlayer event dispatcher from your UI. I used the tip above again to create an event and have the event execution graph somewhere else, but here's what it looks like now:

Blueprint Modding

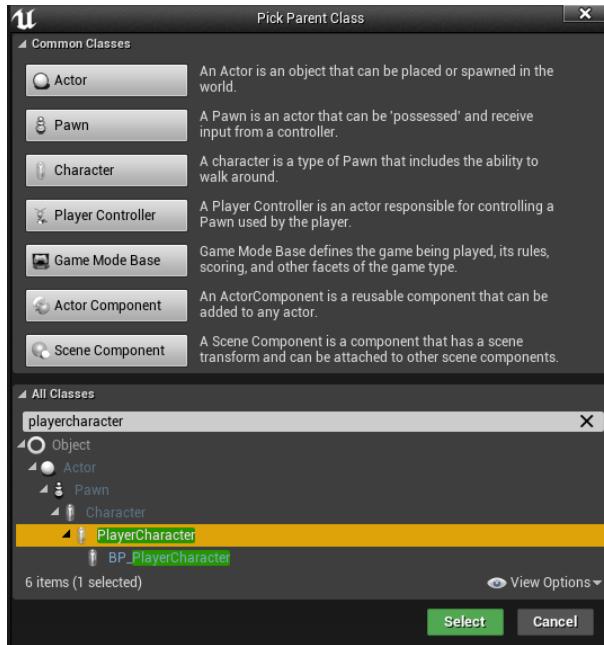


Now we can kill the player when the button is pressed. But you cannot just call the Kill player function, as you will notice that the component by class node requires a target, which will be the player to kill.

To get the player you want to kill, we need to get the game state player array, loop through that player array then cast the array elements to BP_PlayerCharacter pawns, which you can then use as the targets.

Dummying player character BP

But what is BP_PlayerCharacer? This is another important part. Inside Content/Character/, you need to create a new blueprint class called BP_PlayerCharacter. Click the All Classes drop down and type in “PlayerCharacter”, then inherit from that class.



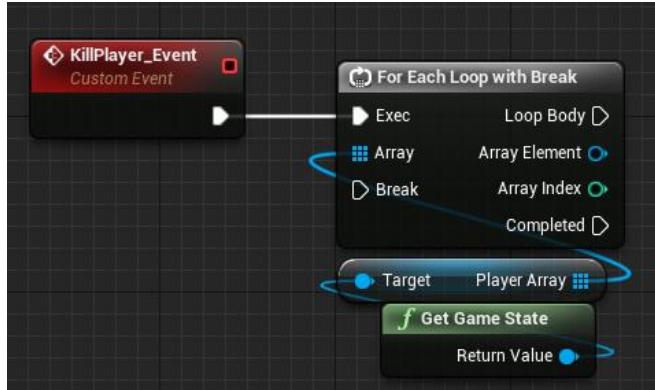
Once you create this blueprint, you don't need to do anything with it. Since we aren't dummying (if that is a word) this file, we don't want to overwrite anything in the game with it so that is why we don't change any values. All we are doing is accessing the blueprint for the mod.

Now, back in your mod, let's get to work on this logic.

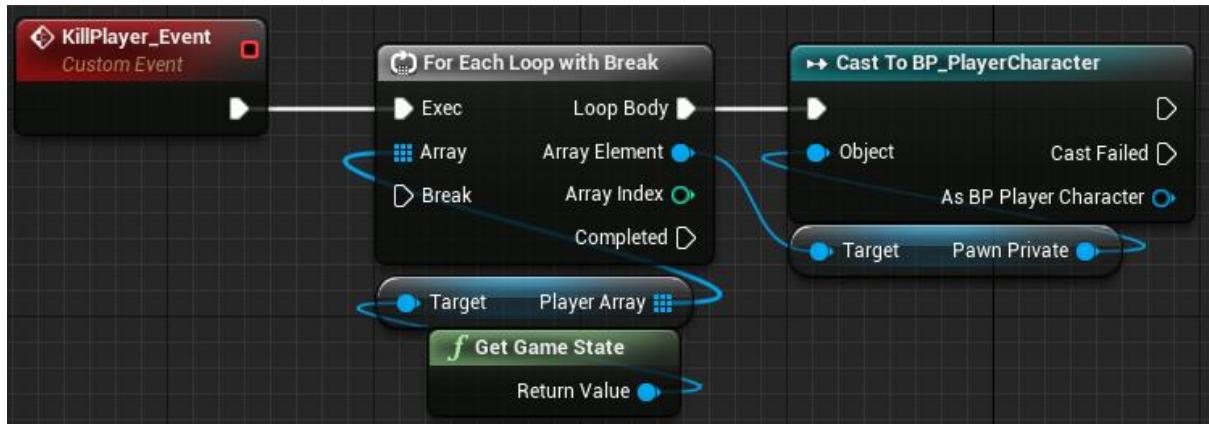
First, there is a node from the UE base Gameplay Statistics library called “Get Game State”. Drag off the return value and type “Player Array”, we want to get that. Then drag off player array and create

Blueprint Modding

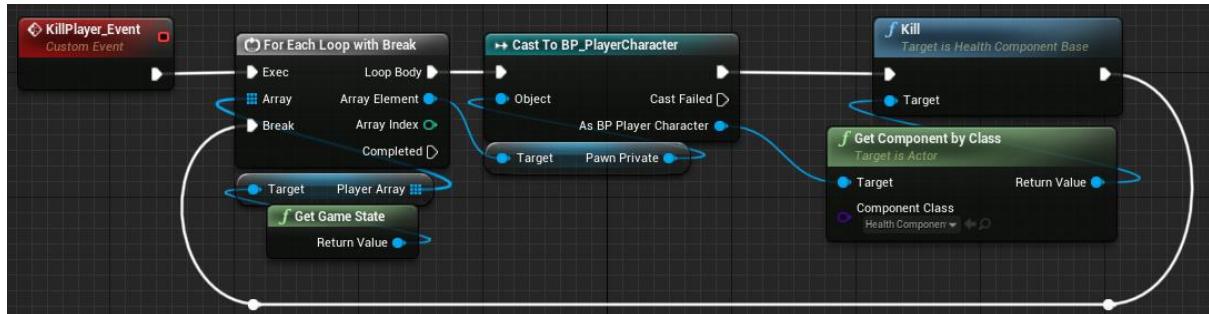
“For Each Loop with Break” node. This will loop through all players in the player array and stop when it receives the break call. If you are in a multiplayer server, all the players in the game will be registered in this player array. So, if you just use a for each without a break, you could kill all the players in the game, if you wanted. This cluster of nodes will be very useful for your mods.



Now drag off the loop’s array element and type “Pawn Private”. Then from the output of that read node, type “Cast To BP_PlayerCharacter”. Connect the execution node for that cast into the loop body.



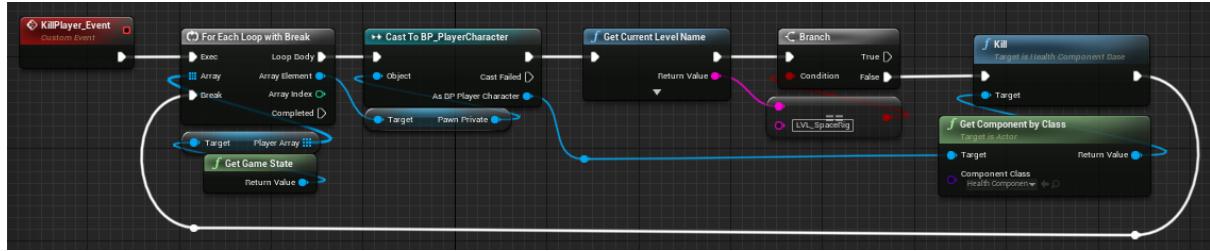
Now plug in your Kill function execution node, and your target from As BP Player Character from the cast. Then, if you want to kill just the first player in the player array, hook up the end of the kill function execution to the break for the for each loop with break node. You don’t have to do that though, as mentioned above.



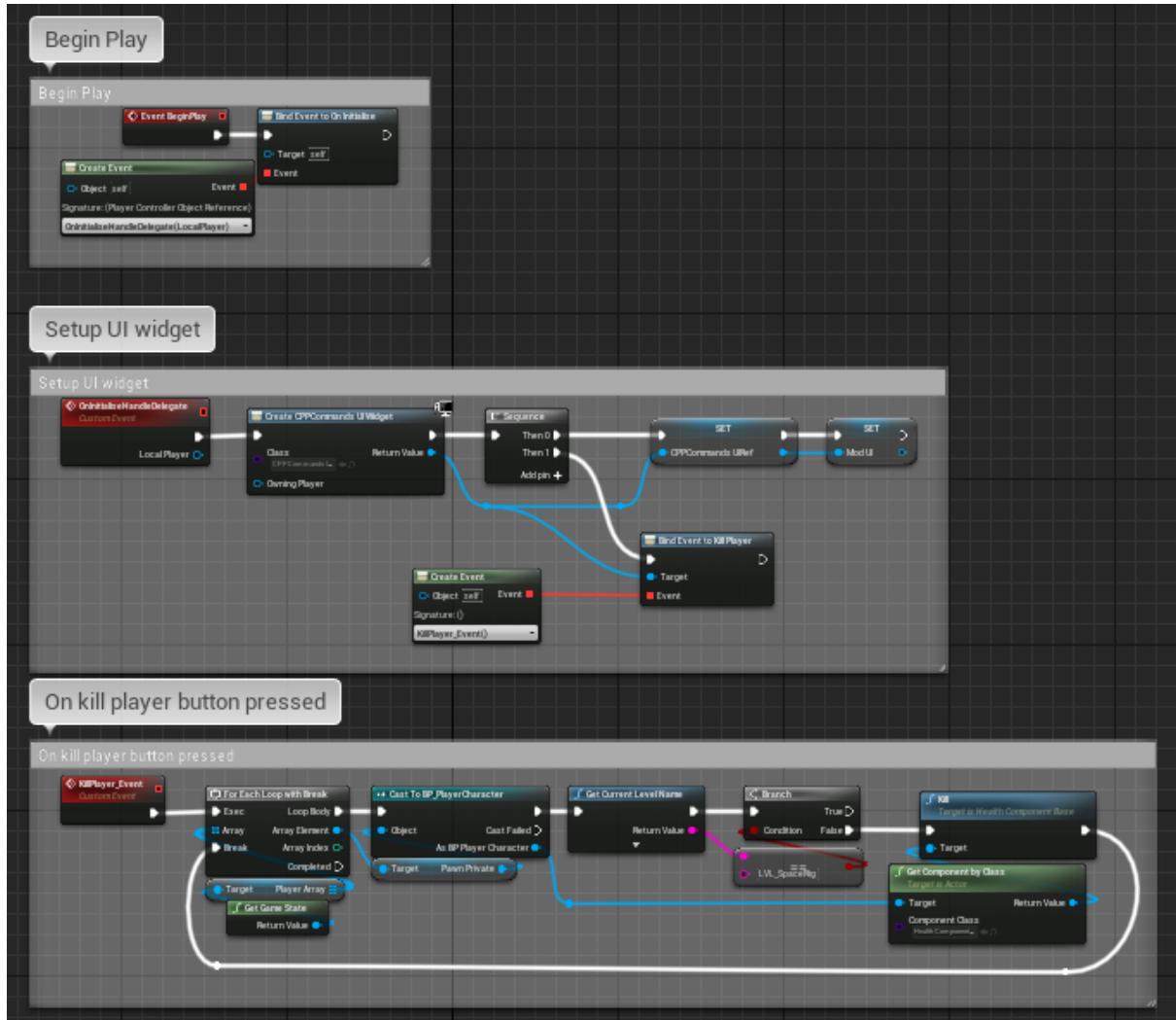
Now, you can package and test this mod, however, let’s add just a tiny new feature that will be useful for your future mods. Let’s say that we don’t want the kill player button to work inside the spacerig.

Blueprint Modding

There is a handy base function (again, from Gameplay Statistics), called “Get Current Level Name”. Use a “==” node from that return value and check it against the string “LVL_SpaceRig”, which is the spacerig’s level name. Plug it into a branch and then if the condition is false, kill the player. So now your event looks like this:



Your mod should be very simple, with a bit of tidy up:



And that's it done! Test it in-game, and if it works, congratulations on making your first C++ mod!

Blueprint Modding

Self-destruct Bosco on button press

Scouting the C++ header dumps

First off, we want to find BP_Bosco in the header dumps. It is actually called "BP_Bosco_classes.h". You will see a function called SelfDestruct() inside of it.

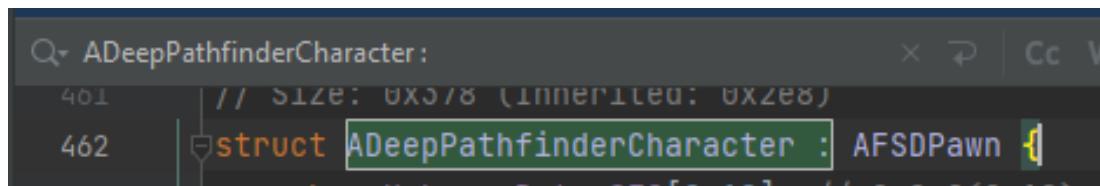
```
1 // BlueprintGeneratedClass BP_Bosco.BP_Bosco_C
2 // Size: 0x73c (Inherited: 0x6c8)
3 struct ABP_Bosco_C : ABosco {
4     struct FPointerToUberGraphFrame UberGraphFrame; // 0x6c8(0x08)
5     struct UStaticMeshComponent* TerrainScannerMesh; // 0x6d0(0x08)
6     struct UChildActorComponent* StateDisplay; // 0x6d8(0x08)
7     struct UActorTrackingComponent* ActorTracking; // 0x6e0(0x08)
8     struct UBoxComponent* Box; // 0x6e8(0x08)
9     struct UStaticMeshComponent* StaticMesh; // 0x6f0(0x08)
10    struct UWWidgetComponent* ReviveWidget; // 0x6f8(0x08)
11    struct UStaticMeshComponent* LightConeMesh; // 0x700(0x08)
12    struct USimpleObjectInfoComponent* SimpleObjectInfo; // 0x708(0x08)
13    struct UPlayerResourceComponent* PlayerResource; // 0x710(0x08)
14    struct UOutlineComponent* outline; // 0x718(0x08)
15    bool FoundEnemies; // 0x720(0x01)
16    char UnknownData_721[0x7]; // 0x721(0x07)
17    struct UParticleSystem* ScareParticles; // 0x728(0x08)
18    struct USoundCue* ScareSound; // 0x730(0x08)
19    float ScareDuration; // 0x738(0x04)
20
21    void Handle Projectile_diffs(struct FGearStatEntry Gear stat, enum class
22        void GetGearStatEntry(struct AFSDPlayerState* PlayerState, struct TArray<FGearStatEntry> GearEntries);
23        void ScareEffect(); // Function BP_Bosco.BP_Bosco_C.ScareEffect
24        bool OnTriggerAI(struct FName TriggerName); // Function BP_Bosco.BP_Bosco_C.OnTriggerAI
25        void ReceiveBeginPlay(); // Function BP_Bosco.BP_Bosco_C.ReceiveBeginPlay
26        void OnMessageAI(struct FName TriggerName); // Function BP_Bosco.BP_Bosco_C.OnMessageAI
27        void SelfDestruct(); // Function BP_Bosco.BP_Bosco_C(SelfDestruct)
28        void StateChanged(enum class EDroneAIState aCurrentState); // Function BP_Bosco.BP_Bosco_C.StateChanged
29        void ReceivePossessed(struct AController* NewController); // Function BP_Bosco.BP_Bosco_C.ReceivePossessed
30        void ExecuteUbergraph_BP_Bosco(int32_t EntryPoint); // Function BP_Bosco.BP_Bosco_C.ExecuteUbergraph_BP_Bosco
31};
```

If you go into FSD_classes.h, and search for "ABosco" (which is what this class inherits from), you will also see SelfDestruct and a bunch of other functions. Let's say that I also want Bosco to salute before he self-destructs. [When writing this tutorial I was just planning on him self-destructing but saw that PlaySalute\(\) function and just knew I had to include it. That'll happen a lot when you are looking through the dumps :\)](#)

Before we make the dummy blueprint, we need to figure out what class it needs to inherit from. So, if you look at the "struct ABosco..." line, you will see a ':' which means "inherits from", then the class it inherits from to the right. So here we see that ABosco inherits from ADeepPathfinderCharacter.

```
1822 struct ABosco : ADeepPathfinderCharacter {
```

If your IDE has the feature, you should be able to just hover over the name and it will tell you what that class inherits from and click to go to the location of it. If not, don't worry, as you can just search the file for that classname manually.



So you will see now that this class is inherited from AFSDPawn. Now we search for what AFSDPawn is inherited from, and we will see APawn.

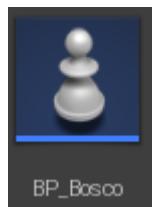


APawn is a base UE class so that's as far as we need to go – but now we know, that ABosco is a child class of APawn, even though it is a bit down the inheritance tree.

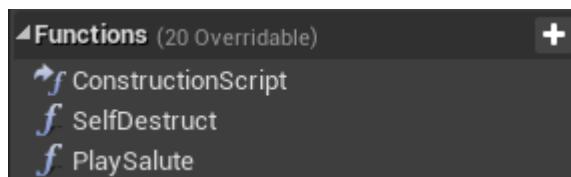
Creating the dummy BP

Now, we need to recreate a dummy blueprint in the same location where this guy is in the game files, like we do for hex mods. So in your unpacked files, search for BP_Bosco. It should be inside Content\GameElements\Drone.

Inside your project files, navigate to that file location and create a new blueprint class. Since we discovered that ABosco is a child class of Pawn, we can select Pawn class to inherit from. We name the blueprint BP_Bosco. It should look like this:

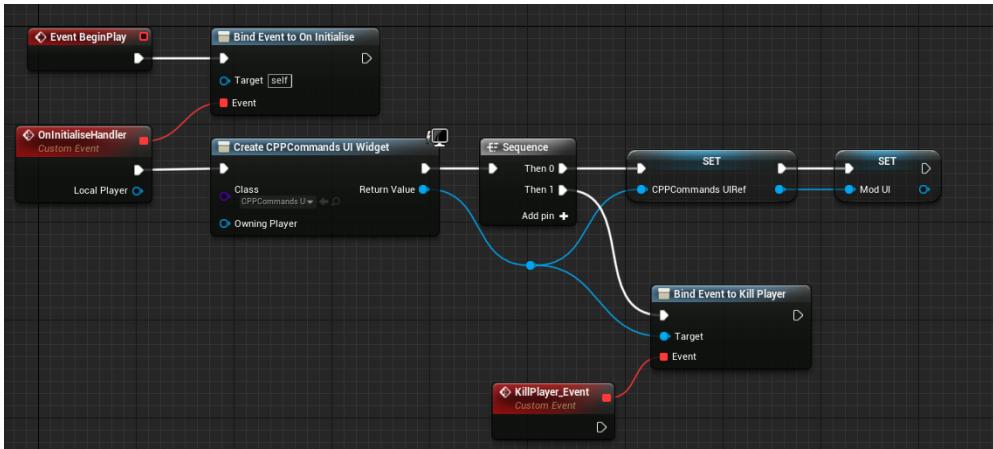


Inside of this, all we have to do, is create two functions, one called “SelfDestruct”, and another called “PlaySalute”. That is literally all you have to do. This now allows us to call these functions without having to touch any C++.

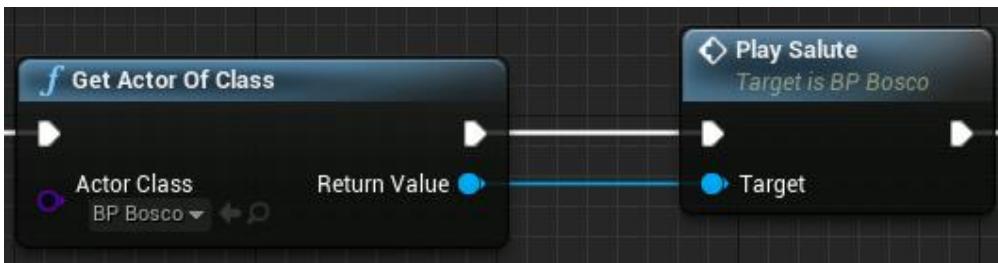


Now, let's create the mod. Make a mod in the same way you have before. If you followed the kill player on button press tutorial, you could just use that same KillPlayerUI widget as it is already setup for the same mod. So basically, copy and paste what you had done before inside the other tutorial mod (remember that I called my KillPlayer widget “CPPCommandsUI” for some reason).

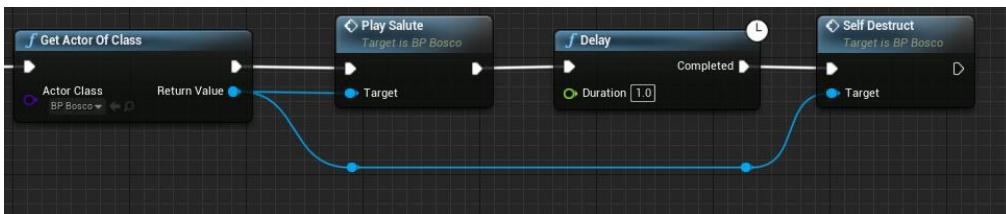
Blueprint Modding



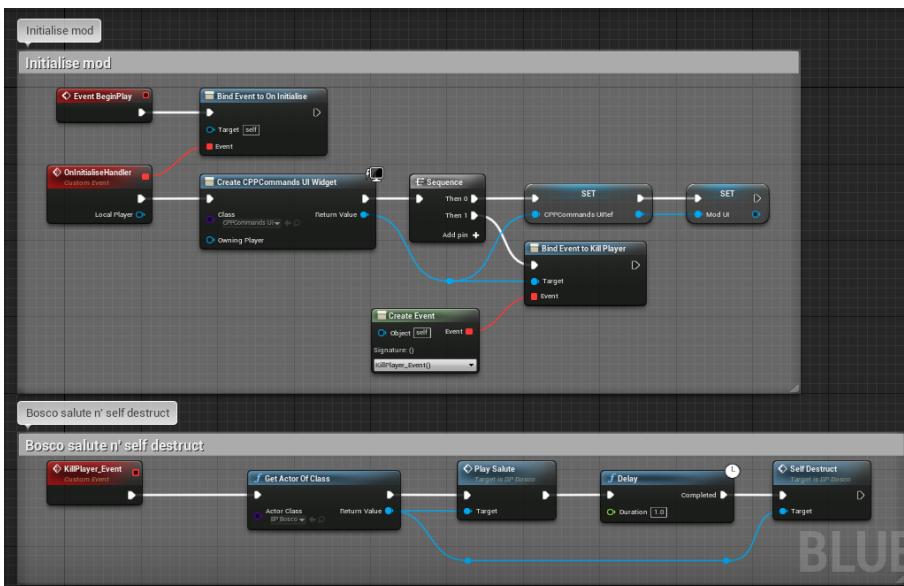
Now, to call on our blueprint, all we have to do is create a node "Get Actor of Class" and select BP_Bosco in the little dropdown. Then drag off the return value and type "Play Salute".



Now, let's put a short delay between saluting and self-destructing, and then call the self-destruct function.



And that's it! A bit of tidy up and your mod should look like this:



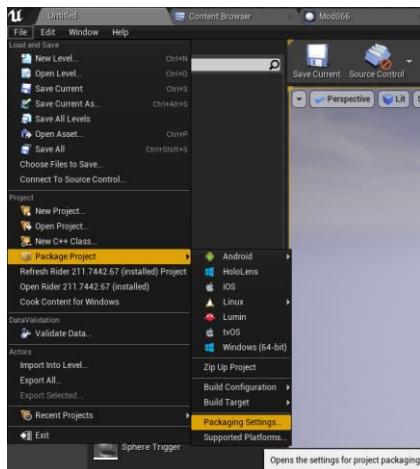
Packaging your mod

When you want to test your mod, **you need to package it twice:**

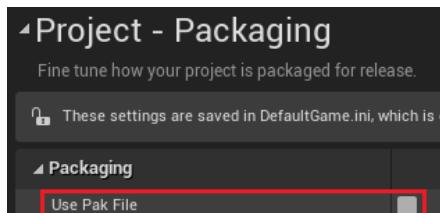
1. From UE. This will turn your assets and classes into the packaged format of .uasset and .uexp files.
2. Then, using the DRGPacker.

From UE

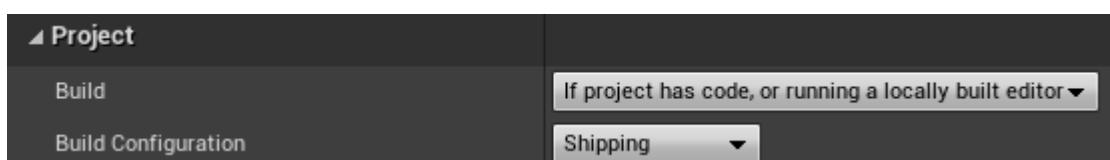
Go into the Untitled tab. Click File -> Package Project -> Packaging Settings.



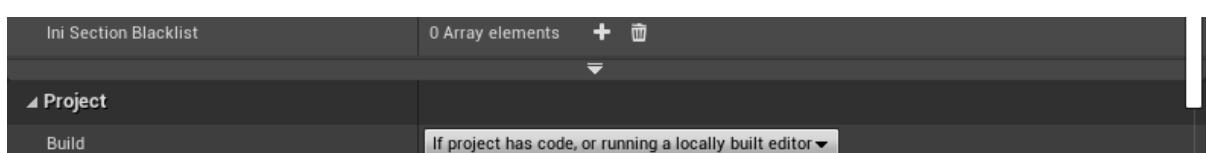
Make sure that this “Use Pak File” option is **off**.



Also make sure that build configuration is set to “**Shipping**”.

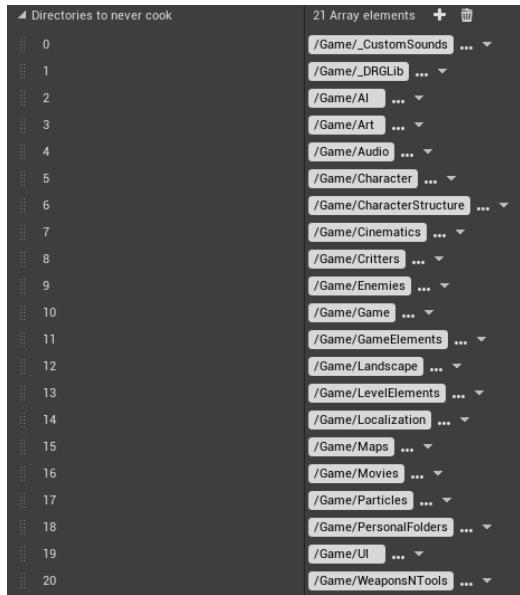


Tip: you can set directories to never package, which is useful when you don't want to pack say, your _CustomSounds, _DRGLib or any of the dummy BP folders for whatever reason. Although you don't have to do this, it does mean that you don't have to delete these files manually within the cooked files, every time. To do this, click the little dropdown arrow in package settings, just above the Project tab

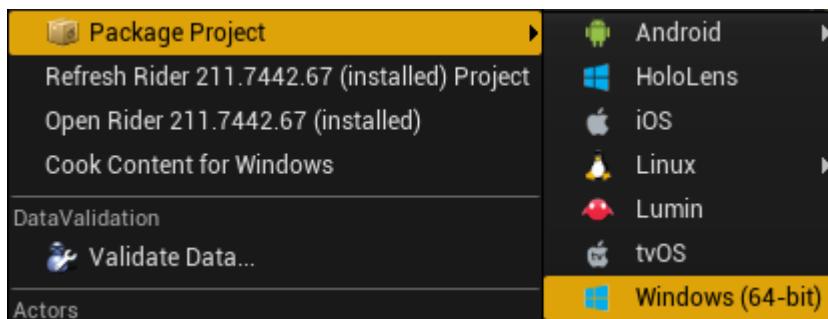


Blueprint Modding

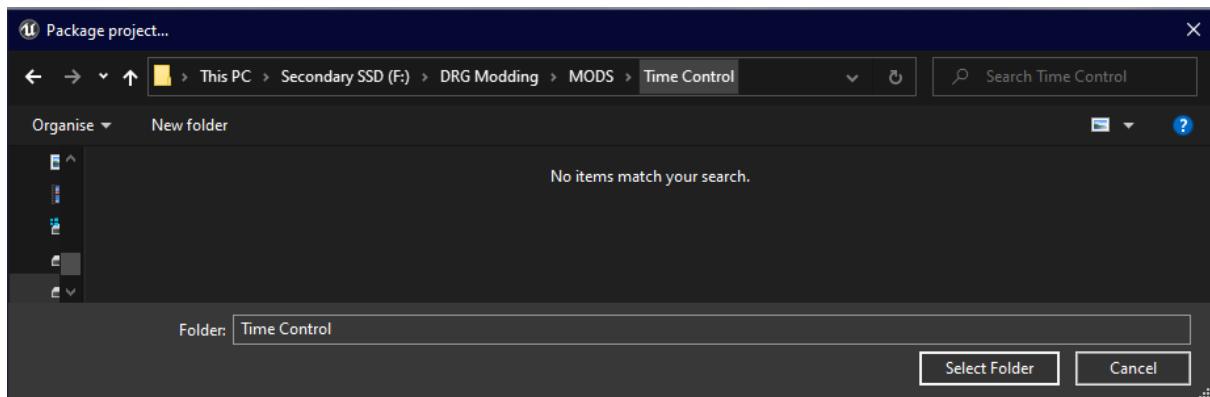
Then in directories to never cook, press the + button to add directories to the array. This is what mine currently looks like:



Now, package your project by clicking File -> Package Project -> Windows (64-bit).



Then selecting a folder to package to:



Tip: if you already have an old cooked folder in there, delete it then click on the parent folder again in the top bar. Because otherwise, since you selected the old folder, it will cook into WindowsNoEditor again, even though you deleted the old one. This sounds confusing so if you just try it yourself you'll understand what I mean.

Assuming you didn't do anything wrong, your project should package after about 30 seconds (differs on how large your project is).

Blueprint Modding

Now, navigate to the packaged files and delete any stuff you don't want to pak. E.g. here, I want to pak Mod065, so I delete Mods066-Mod071. **You can also delete ModbaseV2.**

Modding > MODS > Time Control > WindowsNoEditor > FSD > Content > _ModBPs >			
Name	Date modified	Type	Size
Widgets	17/07/2021 17:02	File folder	
Mod065.usasset	17/07/2021 17:01	UASSET File	5 KB
Mod065	17/07/2021 17:01	UEXP File	2 KB
Mod066.usasset	17/07/2021 17:01	UASSET File	11 KB
Mod066	17/07/2021 17:01	UEXP File	12 KB
Mod067.usasset	17/07/2021 17:01	UASSET File	12 KB
Mod067	17/07/2021 17:01	UEXP File	15 KB
Mod068.usasset	17/07/2021 17:01	UASSET File	4 KB
Mod068	17/07/2021 17:01	UEXP File	2 KB
Mod069.usasset	17/07/2021 17:01	UASSET File	8 KB
Mod069	17/07/2021 17:01	UEXP File	6 KB
Mod070.usasset	17/07/2021 17:01	UASSET File	5 KB
Mod070	17/07/2021 17:01	UEXP File	2 KB
Mod071.usasset	17/07/2021 17:01	UASSET File	5 KB
Mod071	17/07/2021 17:01	UEXP File	3 KB
ModBaseV2.usasset	17/07/2021 17:01	UASSET File	4 KB
ModBaseV2	17/07/2021 17:01	UEXP File	2 KB

Modding > MODS > Time Control > WindowsNoEditor > FSD > Content > _ModBPs			
Name	Date modified	Type	Size
Widgets	17/07/2021 17:02	File folder	
Mod065.usasset	17/07/2021 17:01	UASSET File	5 KB
Mod065	17/07/2021 17:01	UEXP File	2 KB
ModBaseV2.usasset	17/07/2021 17:01	UASSET File	4 KB
ModBaseV2	17/07/2021 17:01	UEXP File	2 KB

You could also delete the widgets you aren't using, but since they aren't loaded anywhere (since you deleted the mods that do), it doesn't really matter. I tend not to because it's faster not having to delete them. Although if you are packing a release version of your mod, do delete unused widgets to keep down file-size.

Using DRGPacker

Now, copy the **Content** folder from your cooked files, and put it into the **input** folder inside your DRGPacker.

> Secondary SSD (F:) > DRG Modding > MODS > Time Control > WindowsNoEditor > FSD >			
Name	Date modified	Type	Size
Binaries	17/07/2021 17:02	File folder	
Config	17/07/2021 17:02	File folder	
Content	17/07/2021 17:02	File folder	
AssetRegistry.bin	17/07/2021 17:01	BIN File	82 KB
FSD	07/07/2021 16:10	Unreal Engine Proj...	1 KB

> Secondary SSD (F:) > DRG Modding > DRGPacker > input >	
Name	Date modified
Content	17/07/2021 17:11

Then run **Pack.bat**. Put the new _P.pak into DRG's Paks folder.

Feedback

Hello modder! If you found this guide useful, I invite you to rate it in this [form](#). Feedback is optional, but very welcome.