# Tutorial for Generating VR Scene with UE5

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My Homepage

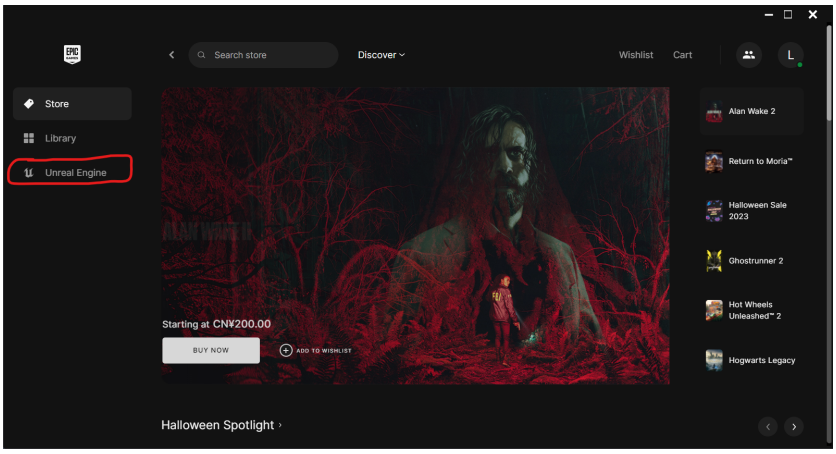
## 1 Introduction

This tutorial is summarized from my personal experience of developing VR scenes with Unreal Engine (UE) 5.3. In this tutorial, I would like to show how to generate a VR scene of a virtual residence step by step from the beginning. I must apologize that this tutorial is merely from my perspective, thus it may not cover all the details of the usage of UE 5.3. I strongly recommend you to refer the official document of UE 5.3 if you come across any problem or difficulty when developing your own project with UE 5.3.

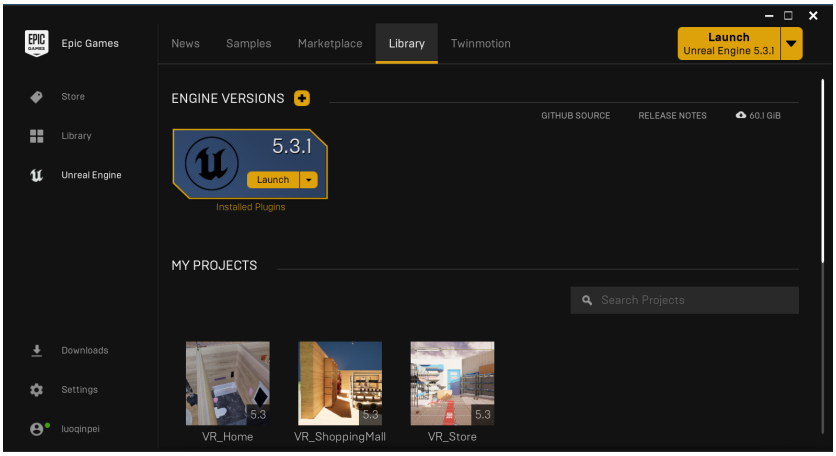
## 2 How to set up for your first project

As UE is a platform developed by EPIC, before implementing it, you should first download the EPIC GAMES LAUNCHER with this link.

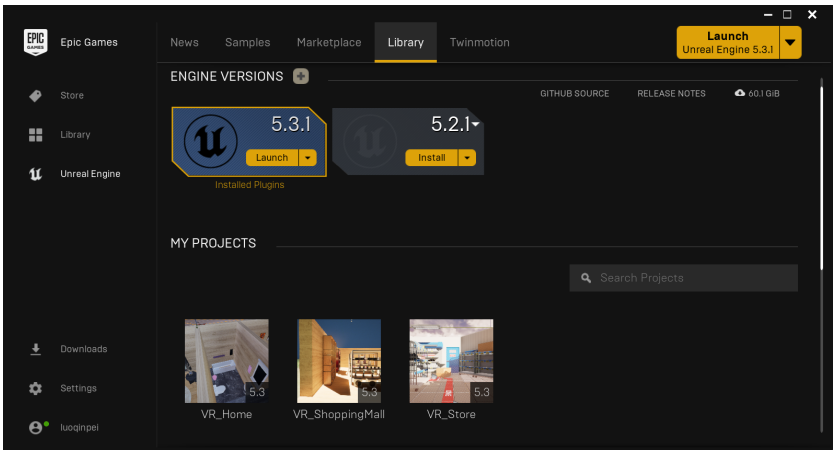
Once you have downloaded the launcher, open it and you will see the following interface.




Click on the button of Unreal Engine, you will enter the new interface as below,

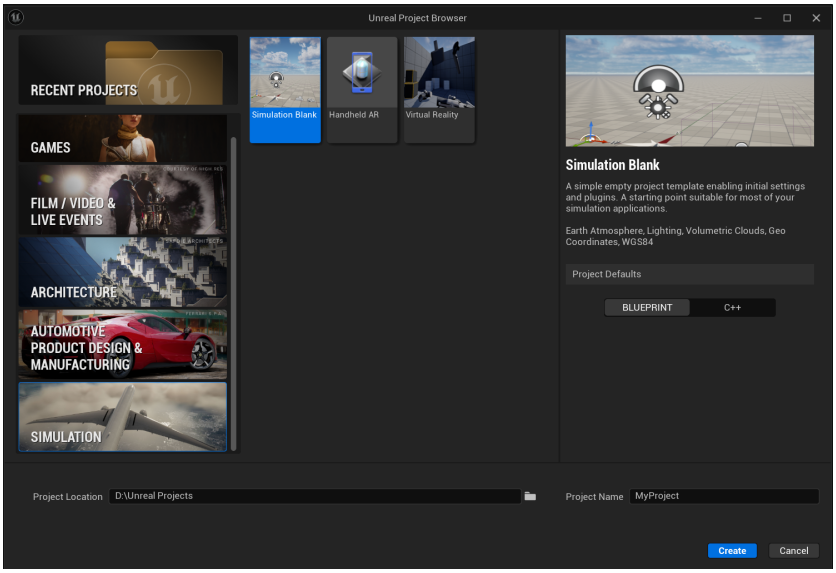


Here I choose the LIBRARY options from the bar above. It will show the currently installed engine with its version, the projects you have created and the vault, which includes all the materials and packages you have downloaded. If you haven't downloaded any UE plugin, just click the "+" beside the ENGINE VERSION, then it will directly show a new control colored by grey.



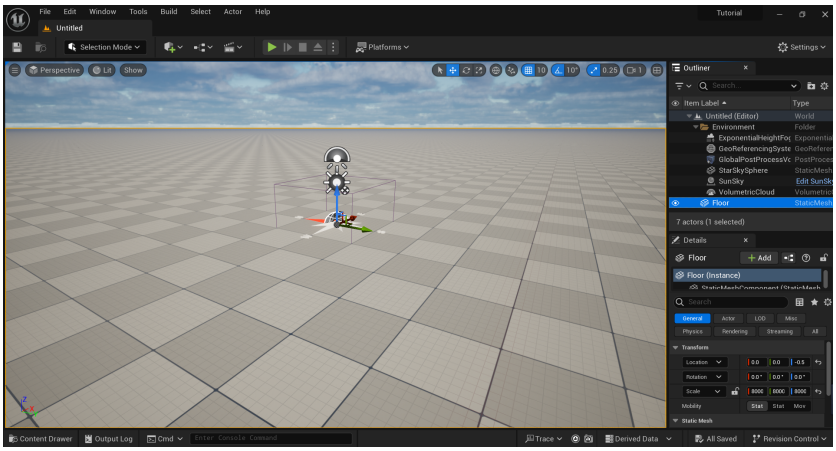

Automatically, the default version is the newest version (up to the date of this tutorial it is UE 5.3). As I've already downloaded the newest one, it will show the most recent sub-version. Of course, you can use the drop-down menu by clicking on the ∇ button next to the version number to choose other versions. (*Remember, some external packages or properties may only be compatible with specific versions. So if you need to design your projects with some essential external properties, make sure the version is supported.*)

After determining the right version, click the INSTALL button. The total file size is typically around 20 gigabytes and it may take a few hours for the platform to settle down depending on your internet speed. Once the button of LAUNCH shows up, click on it to enter the workspace.




The above interface is the content browser, in which the left bar displays RECENT PROJECTS and other templates categorized by the scenario. These different templates share the same editor with different initial properties and default settings. You can choose whatever you want to develop with these templates to start your own projects in a much easier way. Here, for a clearer illustration, I choose the SIMULATION BLANK as an example. Just select the option and determine the location and name of your project name with the bottom columns, then click the blue button of CREATE.

It may take a while for the initialization and loading of the new project. You will see the following interface of the whole UE editor. It may seem a little complicated and confusing at the beginning. Please do not worry, in the next section, I will briefly introduce each component and their corresponding functions.



# 3 Brief introduction for Components and Functions of UE Editor

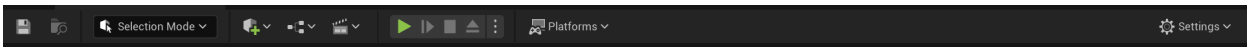
*Announcement:* This tutorial is for a starter. From my perspective, it is often more confusing to tell a starter about a complicated tool with too many details. So in this section, I will only introduce each component and its functions in a very brief way. If you want to know more, I still recommend you to read the official document of UE 5.3.

## 3.1 Menu Bar

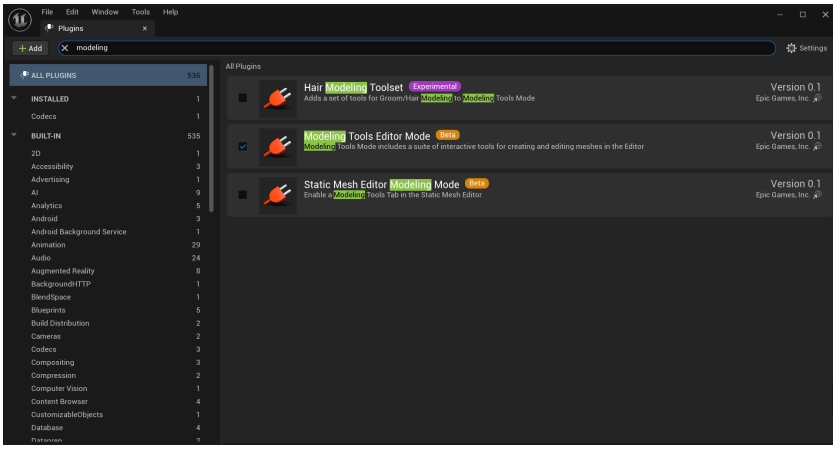

- **File:** It is very similar to the menu with the same name in other editors like WORD or POWER POINT. You can use this to create new projects or levels or just load them from your files.
- **Edit:** You can use this menu to undo or redo whatever change you make to the whole project or a specific object. It also provides basic editing functions of copy, paste, duplicate, cut and delete.
- **Window:** You can use this menu to get some extra windows that show the content, details of the property, other viewports, and so on.
- **Tools:** It offers a bunch of useful tools like transferring CSV files to SVG, cache statistics and other interesting things you can explore by yourself.
- **Build:** This menu is for giving the command of building the whole environment by synthesizing all properties, background and light conditions.
- **Select:** You can use it to select specific properties in the environment. For example, by clicking “Select all lights" you can select all the light sources in your project.
- **Actor:** This menu can only be activated once you select one property from the environment. You can use it to copy the file path of the property, browse it in the content browser, and other functions related to the object.

- **Help:** Use this menu to find documents, instructions, and references. You can also use it to enter the community and forum of UE.

## 3.2 Toolbar



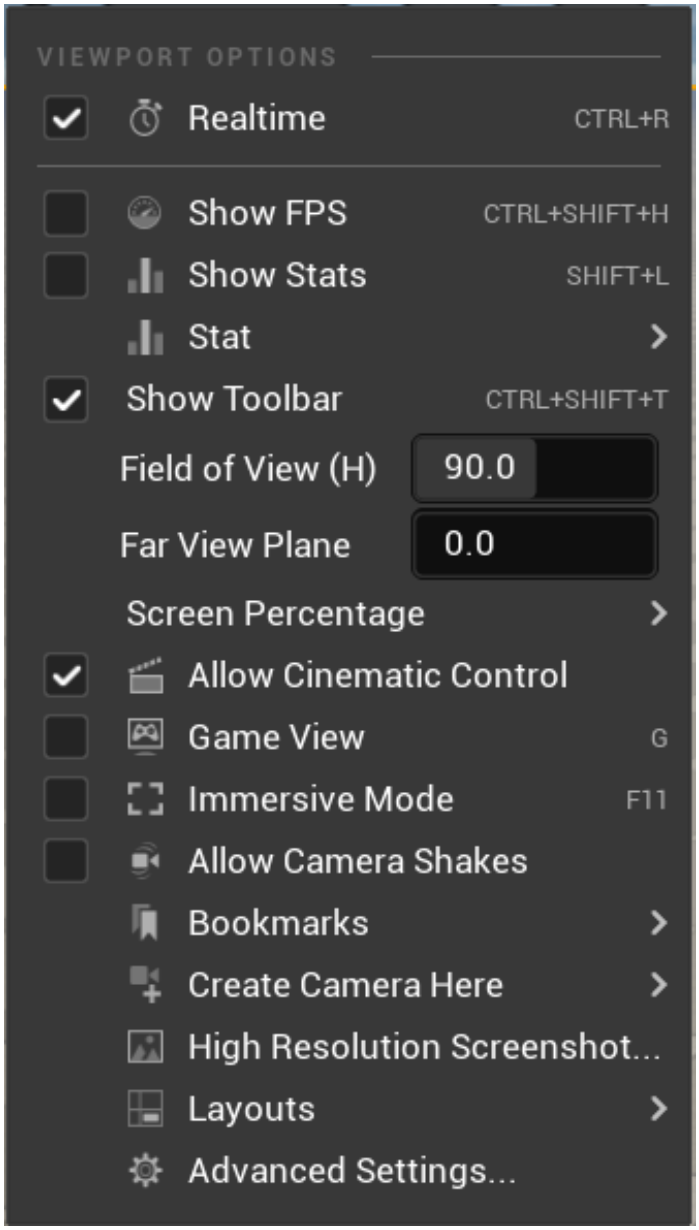

- The most left is the save icon, you can save the current level to the disk by clicking it.
- Next the save icon is the search icon, it can be activated when you have multiple levels in your project, which will not be used in this tutorial.
- Mode selector. Currently, it shows “Selection Mode", which means that we can select all the properties in the environment and modify them. Other modes are for some specific designs like landscape, foliage, etc. The most frequently used mode is “Modeling Mode", which I often use to modify meshes like making a hole in the middle of the cube. By default, this mode is not activated. You need to click the SETTINGS at the end of this toolbar and choose “plugins". Then search the plugin of the name “Modeling Tools Editor Mode", tick the left square, restart the engine and this mode is activated.




- Quickly add to the project. Click it and you can choose to quickly put a shape, light, actor, camera and other objects to your project.
- The available blueprints in your project. The blueprint is used for designing advanced functions of the actor. If you are interested, please refer to the official documents.
- Add level sequence. This is for the generation of animation with the environment you create. By adding an actor of camera with a sequence, you can generate continuous frames by moving the camera, which can be later formed into a video.
- Playing control bar. Click on the green play button, you can enter the environment you create with the default viewport, then you can move as if in the 3D game with a keyboard. To leave the window, simultaneously press “shift" and “F1". Then you can click the red stop button to stop the playing.
- Platforms. You can use it to choose the platform you want to develop your project on like Android, IOS, Linux, and so on.
- Settings. Open the settings of the whole editor with the current project.

## 3.3 Viewport Bar

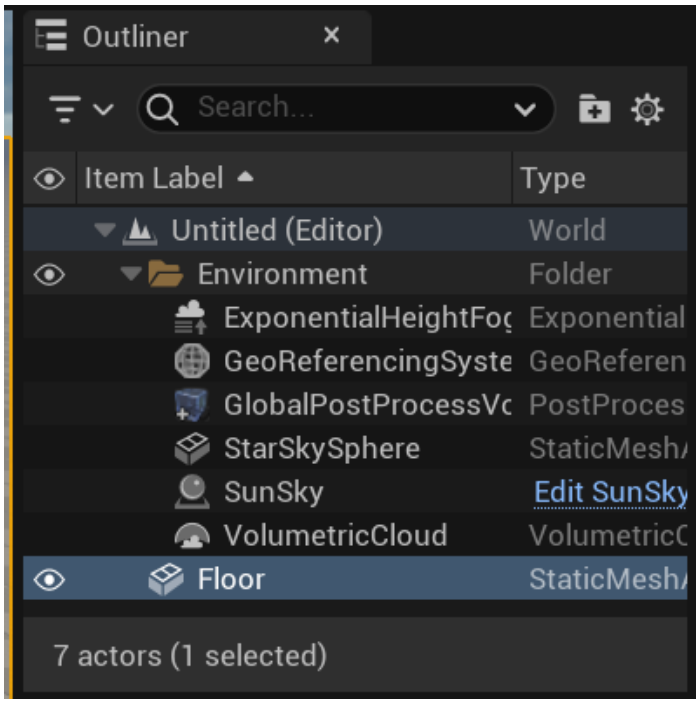

- The most left is the menu button, which offers viewport options. You can choose whether to show FPS, stats, and toolbar. You can also select “Game Mode" or “Immersive Mode" to ignore some objects in the viewport and get a more immersive experience.




- Viewport Select. Here it shows that I chose the “Selection Mode". You can also choose the basic six views when designing.
- Light Select. If you want to test the light conditions with different settings of light sources, use it to modify the activation of light.

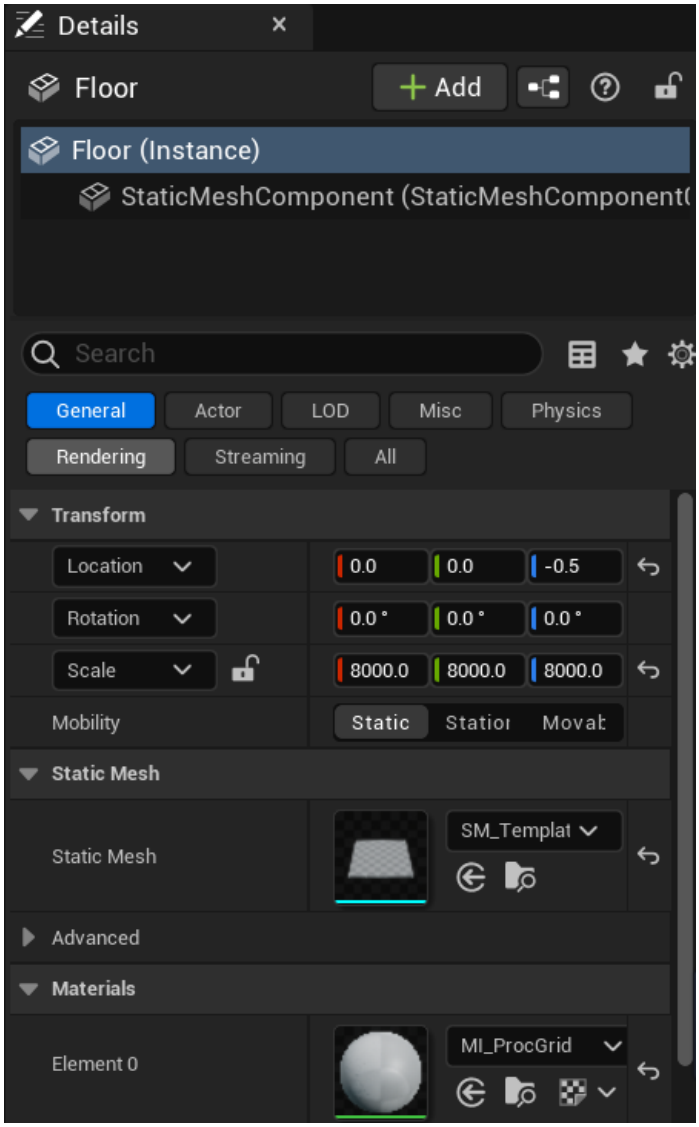
- Show select. You can use it to control the visibility of specific properties in the viewport.
- Control Mode Select. From left to right, the functions are
  1. Select objects;
  2. Select and translate objects;
  3. Select and rotate objects;
  4. Select and scale objects;
- Reference coordinates. Here we choose the global mode, which means that when we modify the object, the referred coordinate is the world coordinate. If you select the local mode, it will refer to its own coordinate.
- Surface snapping. Activate this mode, once you move one object very close to another, their surface will be automatically aligned, leaving out no gap between each other.
- Control whether to snap the object to the grid of the environment and the snap value.
- Control whether to snap the object to a rotation grid.
- Control whether to snap the object to a scale grid.
- Control of the camera speed.
- Control the number of viewports. Click on it the current window will be of a quarter size, with three newly generated windows.

## 3.4 Outliner




This component provides a summary of all objects in the environment. You can view specific types of properties, search for a property by its name, and create a new folder with the above bar. All the properties can be sorted by their names, types, and visibility. You can also click the “eye" button at the left of each object to control its visibility.

## 3.5 Details

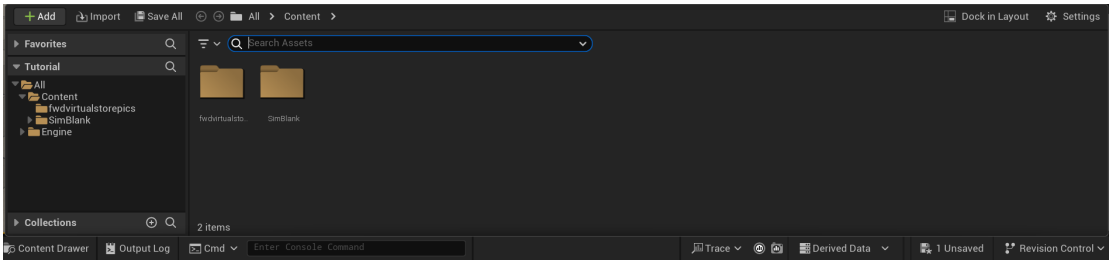



The details show all the possible settings of an object. Here I would like to introduce the most frequently used functions.

- **Transform:** It offers three functions location, rotation, and scale. The functions are the same as those in the viewport bar, while here you can modify the value more accurately than using a mouse.
- **Mesh:** It shows the mesh of the object, which you can view as the body or shape of the object. By the interface at the right, you can change the mesh to another or find the current mesh in the content browser.
- **Material:** It shows the material of the object, which you can view as the skin or surface of the object. By the interface at the right, you can change the material to another or find the current material in the content browser.

## 3.6 Bottom Bar

- **Content Drawer:** It displays all the files in your current project files, including all the external packages loaded to this project. You can also import your own properties with the “import" button above and save them to the project files by clicking “save all". All the materials and meshes can be searched in the drawer and you can directly drag them to the viewport window to add a mesh or change the material of the mesh.




- **Output Log:** It shows all the modifications made to the current project.
- **Trace:** Tracing the data of the current project.
- **Derived Data:** View the cache settings and resource usage.
- **Save status:** Report the current save status, here it shows I have one file left unsaved.
- **Revision Control:** Trace all the changes made to the current project.

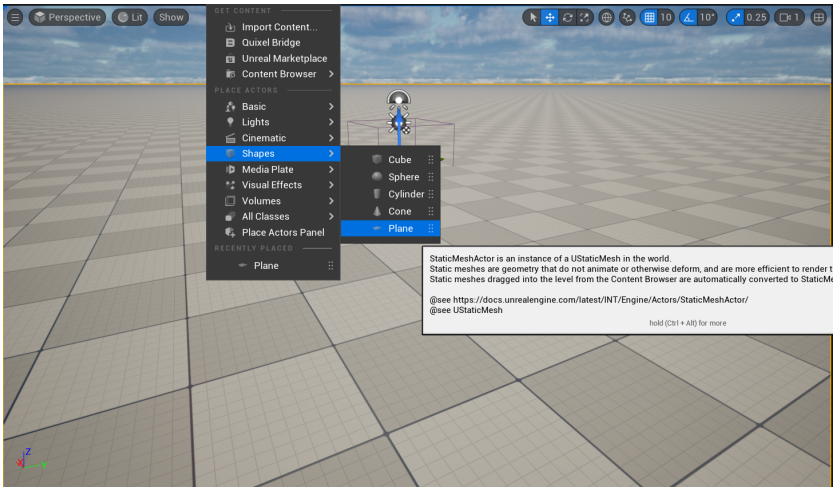
# 4 Create a VR Residence Step by Step

In this section, I would like to take the creation of a VR residence as an example to give you a more intuitive view of how to use UE to build your own projects.

## 4.1 Control your viewport

Before we start, I would like to introduce some basic control of the viewport, thus you can get a better view of both the whole project and its details.

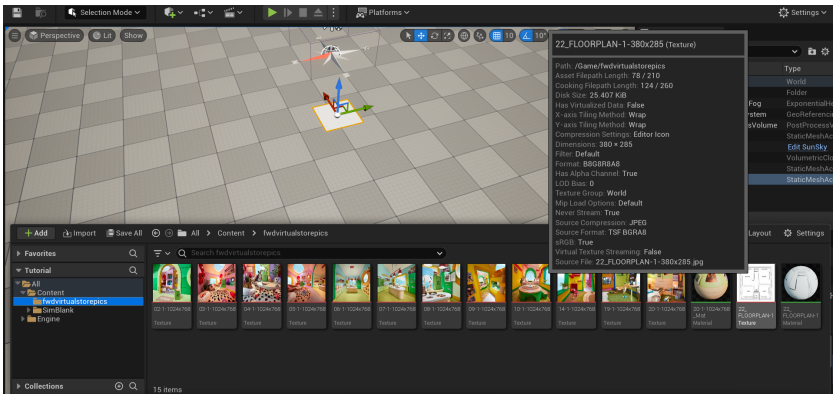
- Press and hold the left mouse button to move up and down, and the viewpoint will move parallel to the front and back. Press and hold the left mouse button to move left and right, and the viewpoint will rotate in the X-Y plane.
- Holding down the right mouse button and moving up and down will rotate the viewpoint in the Y-Z plane. Holding down the right mouse button and moving left and right will rotate the viewpoint in the X-Y plane.
- Simultaneously holding down the left and right mouse buttons or holding down the middle button while moving up and down will move the viewpoint along the Z-axis, while moving left and right will move the viewpoint parallel to the left and right.
- Holding the Alt key and then moving the left mouse button will rotate the viewpoint in the direction of movement.
- Holding the Alt key and then moving the right mouse button will move the viewpoint along the Z-axis.
- Holding the Alt key and then moving the middle mouse button will translate the viewpoint within the X-Y plane.




## 4.2 Import Blueprint

To rebuild a residence in the virtual world, it is often hard to start from scratch. Thus, we first need to import a blueprint before adding the properties we want.

For this object, there is already one floor as the base for us to put more objects on. We first add a new floor as the foundation of the residence by clicking Quickly add to the project→Shapes→Plane. Then a new plane will be shown in the viewport, and we adjust its location be align with the base.

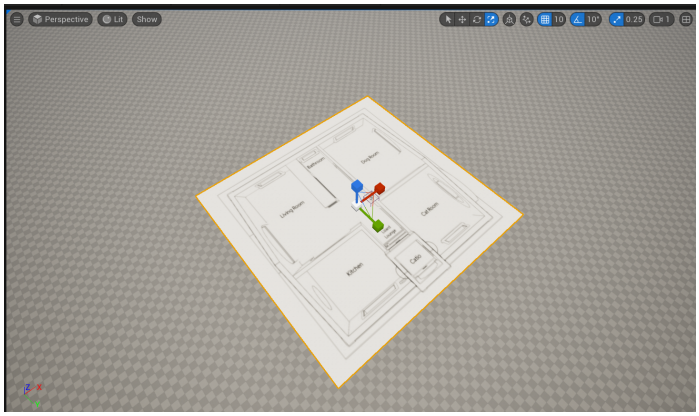



To add a new blueprint to the environment, we need to find a house plan in the form of an image. You can search for it with google. Here I just import one as shown in the content drawer. Notice that the dimension of this image is $380 \times 285$, and before adding it to the environment, we first adjust the size of the plane that we just added to the same proportion by scaling it.

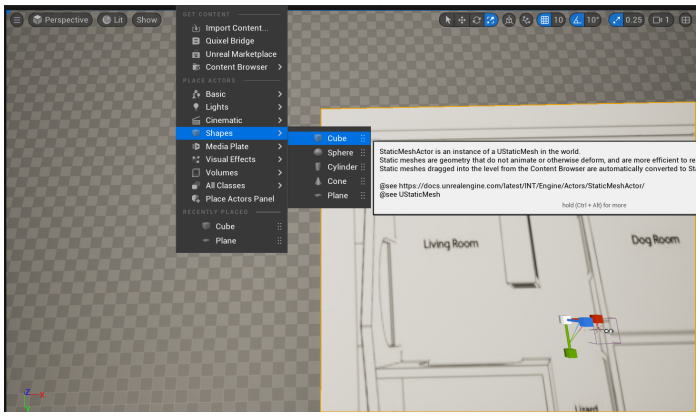
We directly drag the image of the house plan and attach it to the plane by simply moving the mouse. The powerful UE will automatically generate the material using the house plan. As shown in the graph, the plane displays the floor plan of the house. Here I scaled the plane on the x-y plane to make it compatible with the size of other properties we will add later.

## 4.3 Add a shape to your project

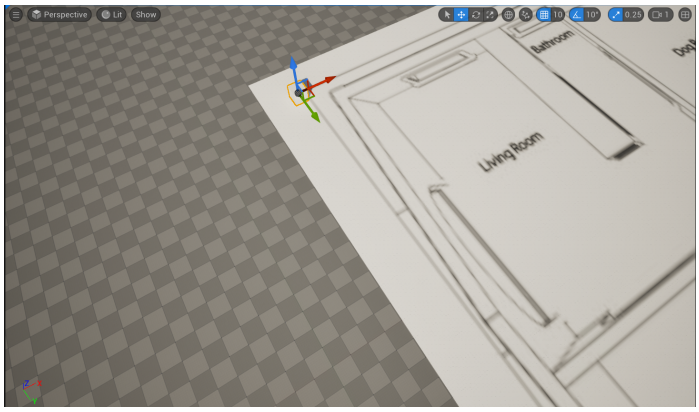
Here I would like to introduce how to add a shape and modify it in your project. After adding the blueprint, the next thing we want to do is to build the walls and ceilings of this new residence. To realize such a goal, we will start by adding some cubes in the environment.



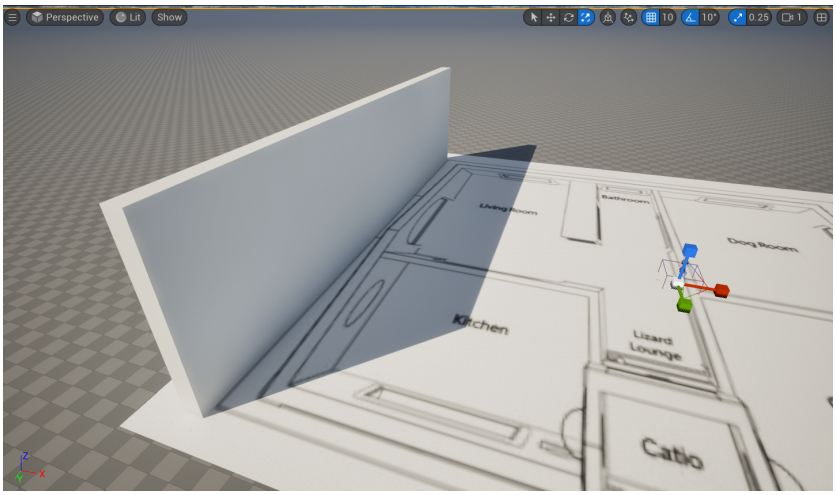
Zoom in and find the best position of the viewport to start the design. Then click QUICKLY ADD TO THE PROJECT→SHAPES→CUBE and adjust its location.




Then you can find a new cube added to the environment as below.

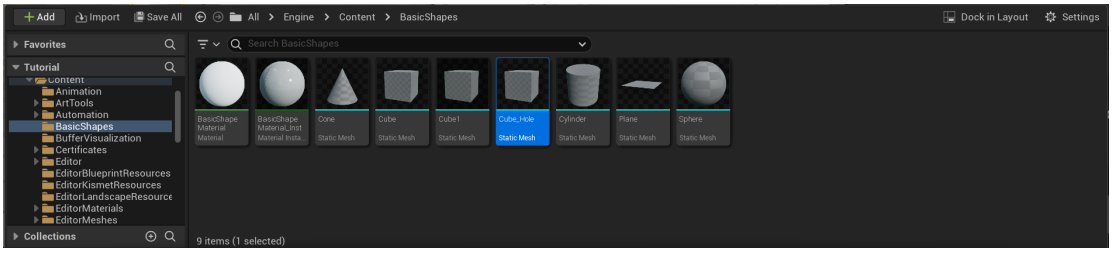


This cube can be scaled and moved, then we can build a wall on the left side of the plane.



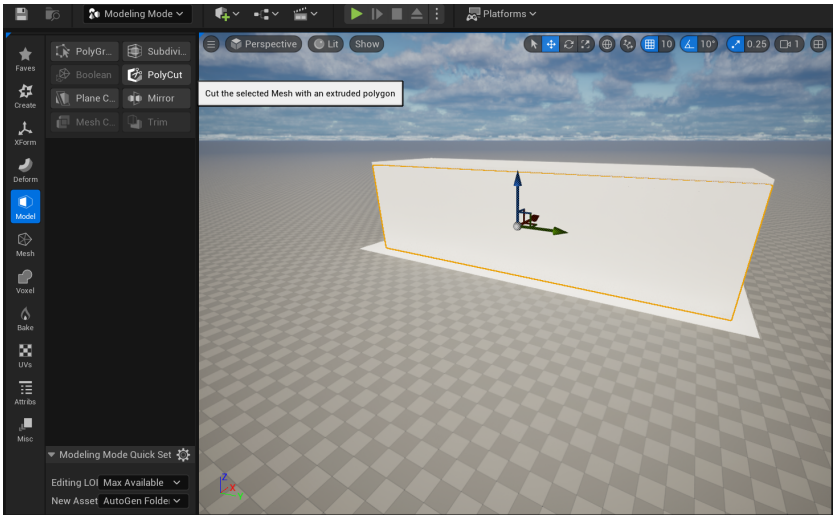

Following the same process, you can build all the walls of this residence. As for the ceiling, you just need to rotate the cube on any axis, and make it align with the walls built, just as follows.


Here comes the question, if we want to build a window on the wall, how to make a hole on the cube? This process needs the modeling tool mentioned in Section 3. First, we select the cube and find its mesh in the DETAIL panel. By clicking the button “Browse the Cube in Content Browser", we find the static mesh of cube, duplicate and rename it as “Cube_Hole".

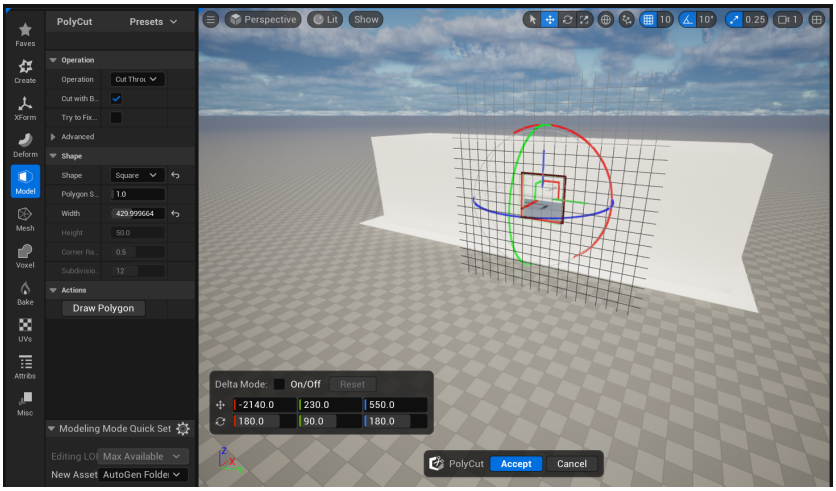



Change the mesh of the selected cube from “Cube" to “Cube_Hole", then we can change the mode to “Modeling Mode" and find MODEL→POLYCUT.

Click on it and you can find a plane of cutting shows in the environment, which can be rotated and translated. After aligning it to the shape you want to cut, you can choose the cut shape and its size. Here we choose “Square". Click on “Accept", and there will be a new square hole on the cube we select. Notice that sometimes the modification



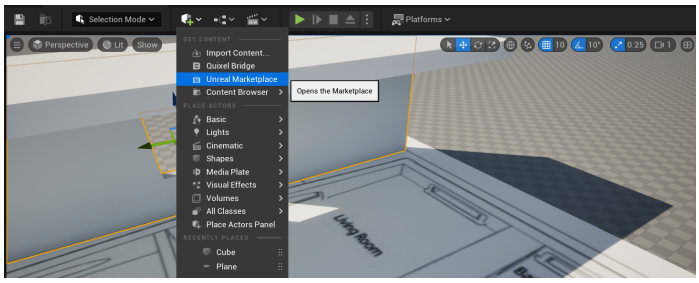

can not be implemented if the mesh is protected, you can easily fix this problem by moving it to another folder other than the built-in sources.




## 4.4 Add external sources to your project

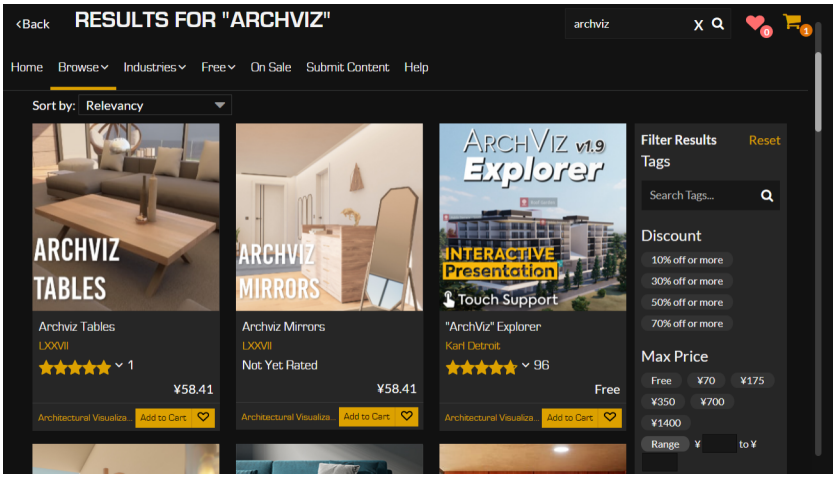
If your project is complicated with many details, one thing you are likely to encounter is that the built-in sources are far from enough. Then you will need to find some external sources to add them to your project.

Click on the Quickly add to the project→Unreal Marketplace to enter the market of UE.

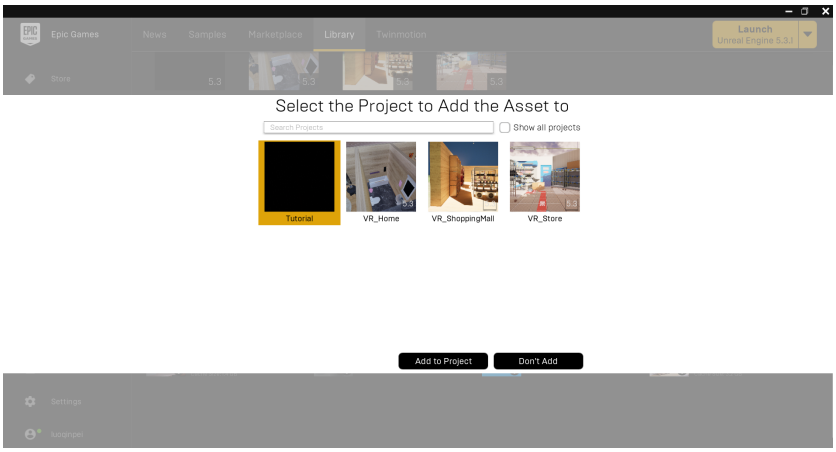



Here you can search for anything you want and add it to your cart to buy. All the packages you bought will be

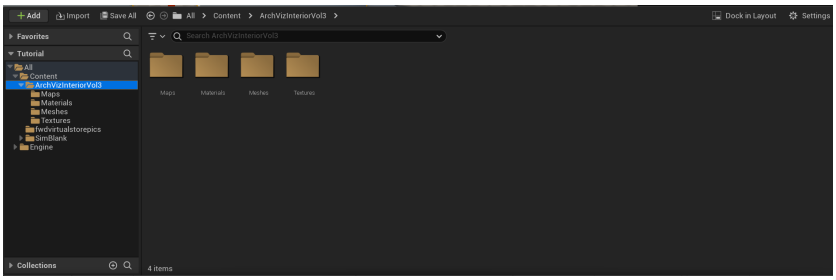
shown in the LIBRARY→VAULT. Before purchasing, make sure what you are going to buy supports the current version of UE.




Find the properties you bought in the vault and click “Add To Project", then select the project you want to be added and click the button with the same name again.

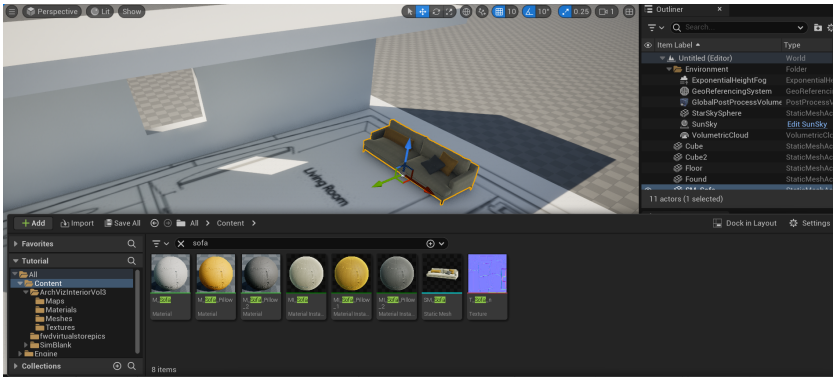



Now go back to the project, and you can find a new folder that appears in the content browser as “ArchVizInteriorVol3". It includes new materials and meshes you need to build a virtual residence.




Now let us add a sofa in the living room. We directly search with the name “sofa" in the folder named “Content". You can find multiple results showing up, but remember to find the object with the type of “Static Mesh", here the name is “SM_Sofa". Then we directly drag it to the environment and adjust its location and scale, you can find a sofa appearing in your project.

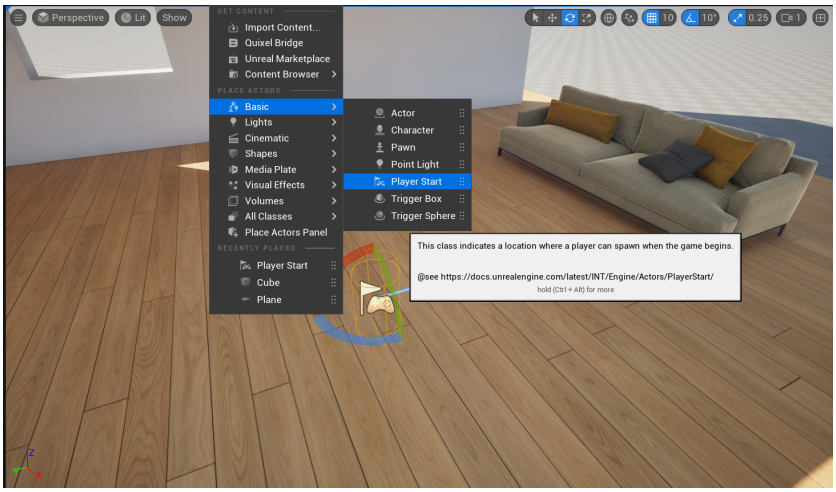
Besides, the package includes some materials that you can use to change the appearance of your object. Let’s say



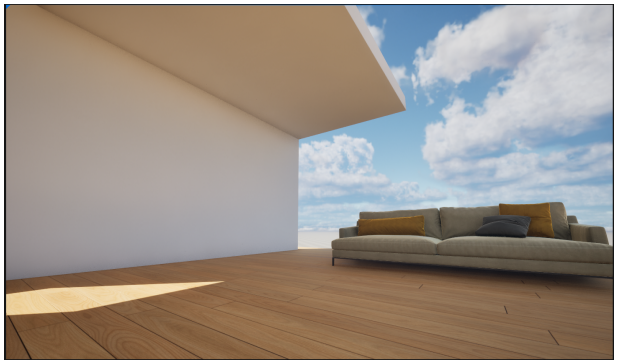
after adding all the furniture you want the floor to be like wood other than the house plan, how to realize that? It is simple. Just search with the name “floor" in the content browser and find the material you like, drag it, and attach it to the mesh, you will find the appearance changes.

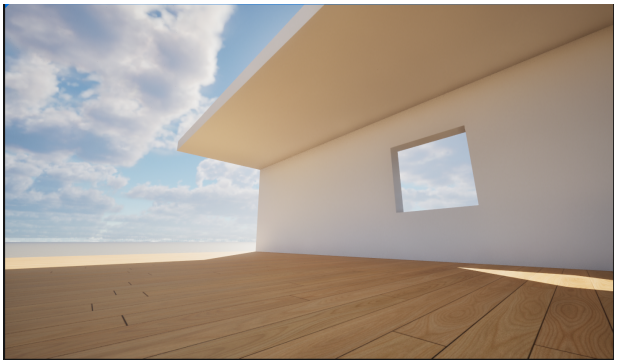
# 5 Touring in your environment

After completing the whole environment, you may want to tour in it to get an immersive experience. It is really simple with the template we choose. First, click on Quickly add to the project→Basic→Player Start.




Second, adjust the location of the player start. Third, just click the green play button on the toolbar, then you can enjoy your tour in the virtual environment with the control alike any 3D game.





# 6 The End

At this point, I hope you can catch a glimpse of how UE works and know how to create your own project. I must apologize that this tutorial is coarse and it may not fully cover all the essential functions within UE. I strongly recommend you read the official document of UE 5.3 to be a real expert on it. Good luck!