

World Building with Multiverse

This tutorial addresses the task of creating a robust 3D environment using the Multiverse MMOG development tools.

Generating Terrain

Creating terrain is a rather simple undertaking. There are two methods for generating terrain – algorithmic generation, which uses mathematical equations to rapidly build a terrain model; and manual generation via a seed heightmap, which allows the designer greater control over terrain features.

Both methods require the use of TerrainGenerator.exe, a program bundled with Multiverse’s development tools. To begin, open the TerrainGenerator program. By default, an algorithmically generated terrain will appear. You can navigate the terrain by pressing the W, A, S, and D keys on your keyboard to move forward, left, back, and down, respectively. You can also click and drag on the terrain viewport to rotate the scene. Finally, a button exists in the top-left corner of the window (it looks like a line with an arrow encircling it) – clicking on this button will set the scene to rotating automatically.

It should be noted that Multiverse’s terrains are much larger than is probably necessary for most homebrew MMOGs. In actuality, you will probably only use a small portion of the entire map. By default, Multiverse characters cannot jump, so simply fencing in an area is sufficient for keeping players out of the wilds of your world.

Algorithmic Generation

The easiest way to generate terrain is algorithmically – in fact, the sample terrain that loads when you begin the TerrainGenerator program is an example of algorithmic generation. To alter the look of the terrain, simply adjust the slide controls on the left-hand side of the window. The most basic controls are:

General Terrain Parameter	Explanation
Height Scale	Adjusts the extreme positions on the terrain up or down, to create flat planes or sharp mountains
Height Floor	Shifts the bottom of the terrain up or down
Height Offset	Shifts the entire terrain up or down
Feature Spacing	Controls whether features are numerous and tight, or few and sparse

In addition, there are extended controls in the Fractal Parameters panel, also located on the left-hand side of the window. These options center more on the underlying math involved in the generation of the terrain, and can produce results both striking and subtle. These extended parameters are:

Fractal Parameter	Explanation
Seed X	Value used to generate randomness along the x-axis
Seed Y	Value used to generate randomness along the y-axis
Seed Z	Value used to generate randomness along the z-axis
H	Smooths the terrain
Lacunarity	Controls the “gapiness” of the terrain – less lacunarity equals bigger jumps in the algorithm and smoother terrain; more equals smaller jumps and a more chaotic landscape
Iterations	Controls how many times the algorithm is applied to the terrain – the more applications, the more specific the features; this control suffers from diminishing returns after about ten iterations
Fractal Offset	Adjusts the application of the algorithm up or down

Creating a good looking terrain is merely an exercise in adjusting these slide controls. Experiment with the settings and see if you can create something interesting! You may notice that the terrain looks very natural; however, it is difficult to create specific features which may be required for your particular MMOG. For that kind of precision, we need to explore heightmaps.

Generation Via Heightmap

Generating a terrain via a seed heightmap allows the designer greater control over the look of the world. To begin working with heightmaps, select Create Seed Heightmap... from the Edit menu. A popup window will appear with a few options for the new heightmap. Click the Create button. Then, click on the Height Map Editor tab on the left-hand side of the window. Your terrain will become a grid of red lines.

At this point, we can adjust the height of each vertex to create our own features. To do so, check the Adjust Height radio button under the Options tab. Now, you can click and drag on the red grid to adjust the height of each vertex. You can also change the size, shape, and speed of your terrain brush by affecting the settings under the Options tab. Once you’ve created a sizable feature, switch back to the Terrain Properties tab. The features you edited will be imposed onto the algorithmically generated terrain. In this way, you can easily craft custom environments for your MMOG.

Saving Your Terrain

Once you are happy with the look of your terrain, choose Save Terrain... from the File menu. This option saves your work in an .MVT file, which we will use in conjunction

with the Multiverse World Editor to further develop the map. Save the terrain in a dedicated folder – someplace created specifically for your MMOG project.

World Building

Now we'll turn our attention to another application in the Multiverse toolset – the Multiverse World Editor. This program allows us to load our custom terrain, add objects, and designate roads, among other things. The functionality inherent in Multiverse becomes apparent when using this tool. The remainder of this tutorial will cover the most common tasks.

Loading Terrain

Once you've started the World Editor application, the first thing to do is begin a new project. You can do this by selecting New World from the File menu. In the popup window that appears, give the world a name, and click the OK button.

In the panel on the right-hand side of the screen, you will see a hierarchy that begins with the label World: *title*, where *title* is the name you gave your new project. Expand that hierarchy by clicking the plus button the left of the word World. The first item under World is Terrain. Right click on this item and select the option for Load Terrain. Navigate to the location of the terrain you saved earlier, and click the Open button.

You can fly through the terrain by using the W, A, S, and D keys on your keyboard. Additionally, you can click and drag with the right mouse button to rotate the scene.

Adding Objects

What kind of successful MMOG is based entirely on terrain? None, really. So our next step is to begin adding assets to the map. To add objects to your world, begin by right clicking on the World node in our hierarchy at the right, and select Create Object Collection. Give the collection a name and press the OK button. A new node, Collection: *name*, will appear as a child of the World node in the hierarchy.

Right-click on the Collection. A context menu will appear which displays a number of options for adding assets (and other things) to the map. Select Add Object. This will cause a popup window to appear. This window has a number of options we need to explore.

First, the Category dropdown list box contains a number of default types of objects to add. You can leave this set to All, or you can narrow down your choices by selecting something else (such as Buildings or Characters). Either way, the second dropdown list box, the one labeled Object, contains a list of assets that already exist in our repository. Go ahead and select an object from that list. You also need to give the object a name. Do so by typing the name into the Name textbox below. Finally, click the Add button.

Now, move your mouse over the scene. You'll notice that the object follows the slope of the terrain under your cursor. Pick a nice spot for your asset, and left-click to place it. You can always click and drag to replace it if you change your mind on its location.

Once the object is placed, you'll see that it has been added as a child of the Collection node in the hierarchy. Clicking on its name will give you a number of options in the properties panel in the bottom-right corner of the application window. Most important are the Position, Rotation, and Scale tabs, which will allow you to translate the object more to your wishes.

Congratulations, you've just added your first asset to your MMOG world! By the way, don't worry if the model is imported without a texture – this is normal. From this point on, all objects you add to the collection are handled the same way, so have fun populating your level!

Adding Roads

Next, let's look at adding roads onto the terrain. Roads are a special type of asset that we can add to our existing Collection. Roads are comprised of individual locations that connect; along those connections, the terrain's texture changes to seem more "road-like."

Creating these roads is easy. Right-click on the Collection item in the hierarchy, and select Add Road from the context menu that appears. A popup window will appear. Give the road a new name and then click the Add button. This adds a Road object as a child of the Collection node in the hierarchy.

Now, when you move your mouse over the terrain, you'll notice a signpost moving with it. Left-clicking will set the signpost onto the terrain (although, it will be made invisible once the game is running). You may continue adding signposts anywhere you want on the terrain by left-clicking. When you are finished building your road, right-click. Like normal Objects, you can always go back and change the location of a signpost by left-clicking and dragging on it.

Because the roads tend to start and end rather abruptly, there are two good methods for hiding their endpoints. First, try to place the first and last nodes of a road under a large object, such as a building. This is, after all, how footpaths tend to start and stop. Additionally, you can place the last few nodes in a tight circle, which gives a more pleasant, cul-de-sac look to the end of your road.

Saving and Testing

Finally, we're ready to save and test our level. The good news is we can test out the world without having to upload it onto a server – the Multiverse client comes with a built-in testing mode that we can access. But before we do that, we need to save our work.

To do so, select Save World As from the File menu. Navigate to the same location as your terrain. Give a name to your world, and click the Save button. This will create several files. Assuming the name of your world was "temp," these are the files that should have been created:

File	Explanation
temp.mvw	Contains general information about the world, including terrain, oceans, lighting, and a list of collections
temp.worldassets	Lists meshes, textures, and other assets necessary to display the world
temp- <i>name</i> .mwc	Each collection generates a .MWC file, where <i>name</i> is the name of the collection; contains a list of all objects in the collection, as well as their properties

All of these files will need to be uploaded onto your server. The default location for these files is:

```
root/config/worldname/
```

where *root* is the root directory for Multiverse on your server, and *worldname* is the name of the project you are building. Once the files have been uploaded, you can connect to the server as usual, and enjoy traipsing around your newly created world!