Tutorial
Basic Scene Construction
with
Object & Image usage
By
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An Overview

Welcome! The purpose of this tutorial is to provide a quick start into the world of Terragen 2. I hope that you find this useful. Terragen 2 is being developed by Planetside Software and at the time of this writing is being released as Tech Preview. It is expected that over time this Tutorial will require updating! Terragen 2 is a fractal based landscape generator. The scope of its abilities is enormous. You can develop planetary scale features as viewed from space down to elements measured in millimeters. For the purpose of this tutorial I have provided the basic landscape without surfacing to provide a starting spot. Also provided are 3 – 3D objects in the .obj format, as well as, their necessary image maps. These objects were created by me in Lightwave 9, and Zbrush 2.

I do not have a formal License Agreement for the use of these objects, however if they are used for commercial purposes I would ask that you contact me at hyperpoole@yahoo.com and/or please acknowledge the author. Other than that they are public in nature.

Now lets get started!

The Terrain

The first steps:

Place the Un-Zipped Object folder into the location of your choice.

1. Open up Terragen 2 and familiarize yourself with the interface.
2. At the upper left corner is the "File" entry. Highlight and select to open.
3. In the Object folder you will find a TGD file named "EmptyTerrain"
4. Double click that file.
5. TG2 will generate the included heightfield.

I would encourage you to use this heightfield as all of the positioning coordinates for the objects will based on this landscape.

Surfacing

I find it useful when setting up surfaces to choose bright contrasting colours to help me define surfaces, so in the next few steps you can certainly choose other colours for that purpose.

1. Click the Shaders button.
2. You will note that the first level is the "Base colours". Highlight that icon which opens up it's dialog window.
3. In the open tab labeled "Scale" we're going to change a few entries to help us deal with our scene. All measurements are in meters and some of our elements will be quite small so we will change the "Smallest scale" field to .01. You'll notice that by doing this the number of "Noise octaves" increases to 19. So, there is a computational penalty for this level of detail.
4. Now click the "Color" tab. In the line "Apply high color" leave the defaults, but

click the light gray color icon which will bring up the color palette.

5. For the Base Color I have chosen a brown RGB of 104,79,53. and clicked OK. This gives me a nice dark contrasting color to which I can add lighter colours.
6. In the upper left side left click the "Add layer" button. Lets add a "Surface Layer". In doing this the scene has received a bright gray colour, because we have not applied any constraints.
7. Let's do that now. Highlight the Surface layer 01 and lets change its name.
8. In the window below find the word "Name" and change that field to Grass_Land.
9. Now in the "Colour" tab click the light gray icon and lets change its colour. In the colour palette I've selected an RGB of 0,128,0.

    We will be coming back to this area just a little while.

10. Click the "Slope constraints" tab. In that window tick the check box "Limit maximum slope" and lets change those values. "Maximum slope angle" to 20 and "Max slope fuzzy zone" to 8.

    We have now defined the grassy area. As you familiarize yourself with Terragen2 you'll be able to add populations of various trees, bushes, grasses, and rocks to this area as they become available to you. Using this node "Grass_Lands" to define where those populations will be placed. It would be wise to **Save** this file giving it a **NEW NAME** at this time.

    In the next set of instructions we will begin to use the files included in the "Object" folder supplied with this tutorial.

1. We are now going to add a little more detail to our ground. However, instead of working with the layers as we have in Terragen .9xx I'm going to ask you to move to the right lower quadrant of the TG2 workspace where I can show you a little about working with the nodes.
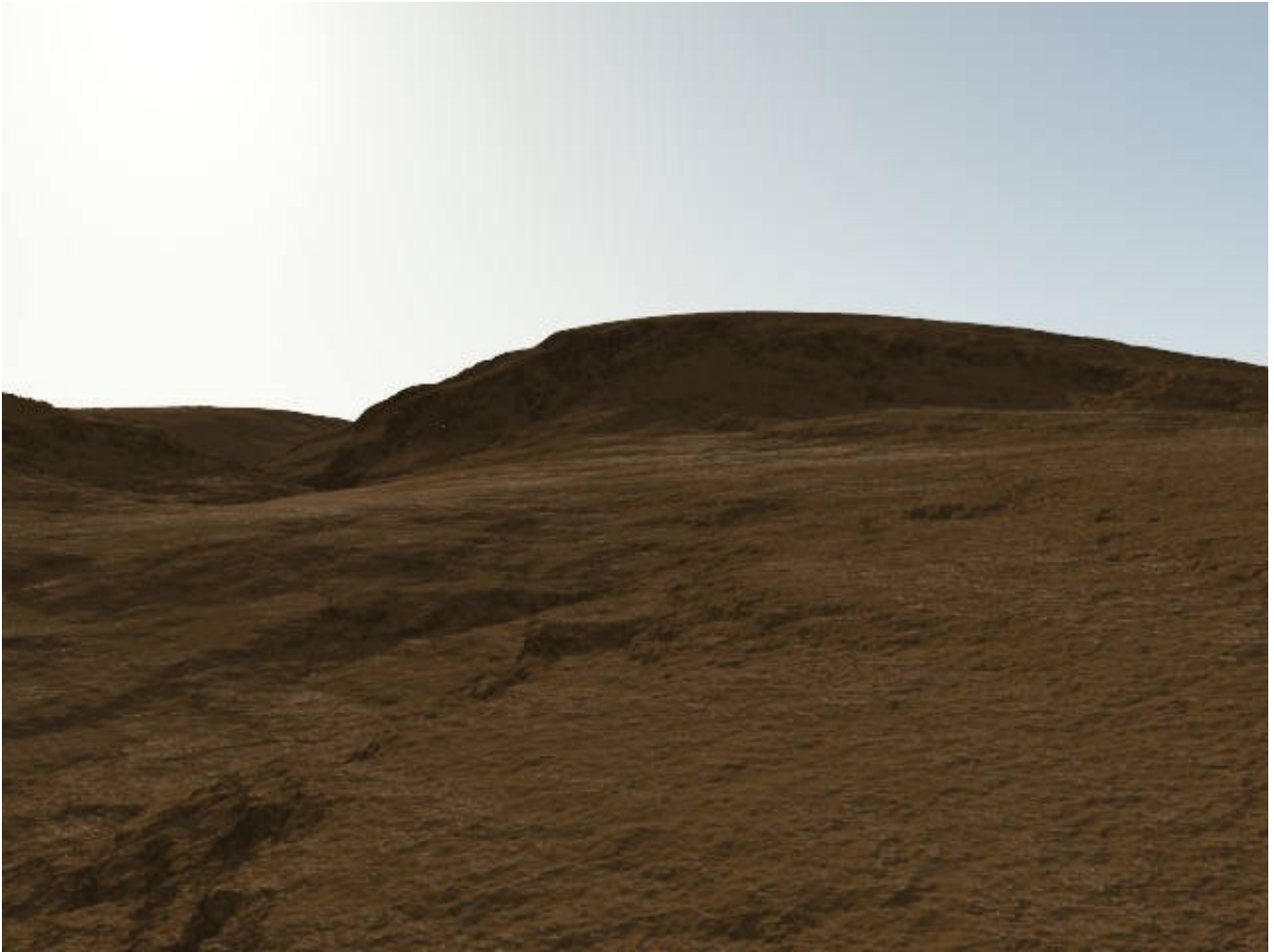
    Note: all new information added to the nodes is automatically updated left half of the workspace.
2. Left click the "Shader" button in the node window. This action enlarges the area of the Shaders.
3. Right click in the Shader area this will bring up a menu. Go down to "Create Shader". This brings up a sub menu. Select "Surface Shader". A second sub menu is brought up. Select "Power fractal shader V3" and Left click it.
4. You will notice that this node is not attached to anything. High light that node and right click. Left click on "Settings" which brings up a new floating window.
5. The first thing we're going to do is rename this node to "Soil Bumps".
6. Because our scene is going to be very close we have to make the surface of the ground look more realistic. This requires very small scale, so make the following

adjustments under the "Scale" tab.
1. Feature scale = 0.01
2. Lead-in scale = 0.1
3. Smallest scale = 0.001
7. Click open the "Color" tab to insure that the check box "Apply high color" is checked. We'll change that colour from white to RGB 216, 190,188.
8. Next, click open the "Displacement" tab. Make sure that the "Apply displacement check box is ticked.
1. Displacement amplitude = 0.05
2. Displacement roughness = 1
9. On the "SoilBumps" node is a single arrow pointing down on the bottom. Left click and HOLD Down. This drags out a line. Bring that line to the second arrow from the right which is on Top of the "Grass_Land" node. This is the "Child layer".
10. You can now close the opened window.

If you would like you can do a preview render now. If you allow the Open GL to do its finish render you will have a rough idea of what the surface will look like. However, a rendered preview shows a little more detail, but requires more patients (especially on slower machines). There are two rendering modes "Quick and Final". Along with these settings comes a huge list of available options, some of which we will use later in this tutorial. For our current purposes your welcome to use either, although you'll find that the default on "Final" will take 3 to 6 times longer unless you render at very small sizes such as 180 x 120. If you do render on "Final" you will see that the "Power fractal" has provided some dimpling and some color that may suggest small stones along with an irregular surface. The finished image should look something like this:

Completed Soil

If your image is dissimilar from the one above, you might repeat the steps above.

Location, Location, Location (as the directors say)

We have generated some nice rolling hills and furrows, so I've chosen a spot on this landscape where we will set up the rest of the elements for the scene. Let's get to it!

1. Click on the "Camera" button at the top of the screen.
2. On the left side you will see an icon of the available camera which is our render camera.
3. Left click that icon to bring up its field window.
4. Enter the following values in the fields to the right of "Position"
   1. First 82.3447, second 1.84871, third 16.0899
5. Enter the second set of values in the fields to the right of "Rotation"
   1. First 4.47931, second -35.9876, third leave at 0

Objects & Populations

In this next section we are going to add our various objects and populations! This is where Terragen 2 is so much different than with the previous version of Terragen (well that and the degree of detail it is capable of, and.... just about everything else!), you can import objects and populations. This opens a whole worlds of possibilities! The first object we will place is the tree stump. It can be found in its folder in the Object folder.

A quick Note: You will be asked whether the Object is XFrog compatible; none of the objects in this tutorial are from Xfrog, so when asked by Terragen 2 **always click the no button**.

 XFrog is the name of products from:

http://www.xfrogdownloads.com/greenwebNew/news/newStart.htm

The orientation of the products differ from the x,y,z axis and the format of their images is somewhat unique. The libraries of plants and trees make a wonderful companion to Terragen 2.

1. Go to the button at the top of the screen and locate the button "Objects" and left click it.
2. This will open the icon window where you will see the "Add Object" button left click that button.
3. A sub menu will appear select object and another sub menu will open giving you the various object options.
4. Select "Obj reader" which open the browser window. Locate and open your folder named "Stump".
5. Select "StumpHighRes". NOTE: you will see nothing! THIS IS NOT AN ERROR. The stump was loaded a the position 0, 0, 0.
6. To bring it to our location so that we can see it we will have to "Translate" it in front of your camera. Enter these values to the right of "Translate".
    1. First 81.5079, second 1.95, third 17.5177
7. To "Rotate" the object to the best advantage (in my opinion) enter this value.
    1. First leave 0, second 60, and third leave 0.

If you want to, you can render again to see the stump instead of it's bounding box representation in the Open GL preview. That was fairly easy wasn't it? You can see all of the possibilities of bring in objects or characters into the world of Terragen!

Now we need add the stumps companion, all of the decaying wood that falls to the

base of the tree. I've named this object the "CompostPile.obj". I've intentionally left out some of the detail which is present in the stump to delve a little deeper into the materials of the object by adding some interesting details to the materials already present upon loading this object.

1. Lets begin by following the process we did above with the stump. Go to your "Object folder" then to the folder labeled "Soil" within that folder is the "CompostPile.obj". Select it.
2. Once again this object is located at position 0, 0, 0, so we need to re-position it to be at the base of the stump. Additionally, we need to adjust its rotation values to more closely match that of the ground on which it will be resting.
3. For the "Translate" value enter these numerals
   1. First 81.5498, second 1.51, third 17.7236
4. For the "Rotate" value enter these numerals
   1. First 5.7, second leave at 0, third -2.2
      Note: these values will partially submerge the CompostPile.obj and it is meant to do so.
5. Now Left click the tab "Surface Shaders".
6. Go to the button on the right side of the field titled "Multi shader 02" and Left click it. This brings up a sub-menu.
7. Select Go to "Multi-shader 02" and Left click that selection.
8. This action brings up a new window. There is only one shader "Compost_.001", Left click the button to the right of the field. This brings up a sub menu. Select Go to "Compost_.001" and Left click.
9. In this new window find and Left click the "Displacement" tab.
10. In the field to the right of "Displacement image" there is a button with a folder on it Left click that button.
11. This action brings up your browser. This should be the same folder that the image covering the Compost.jpg. Below that should be Compost_b.jpg.   Open that file.
12. In the field titled "Displacement multiplier". Change the value in that field to .001.

Some of you may be familiar with bump and displacement of images. Bump maps use a false appearance of "bumps". Displacement images, however, actually move the geometry of the mesh underneath.
If you would like to see the displacement action you can press the "Stay Open" button and move the window out of your way and make a "Quick" render. After rendering it save it to a temporary location. Go back to the "Displacement multiplier" and bring it back to "0". Do another "Quick" render and save the results. Now you can compare the rendered results. When your finished BE SURE TO change the "Displacement multiplier" back to ".001".

1. Now lets add the fern. Remember all objects load at location 0,0,0 which is the bottom left corner of your terrain, so if you want to just work there a handy camera setting might be -3,2,-3, with a rotation of -20, 45,0 then you can adjust the camera to the size of your object. Go to the "Objects" button and select it.
2. First lets translate the fern to the left and slightly behind the stump.
3. In the "Translate" fields enter these values: First 80.6066, second 1.49244, third 17.4601
4. Now Left click the "Surface Shader" tab, and go to the menu button to the right of the field "Multi shader 04" and Left click to pop up the menu.
5. Select and Left click "Go to Multi Shader 04"
6. Go to the menu button at the right field "Frond_.001". Left click and select "Go to Frond _.001".
7. We need to make some changes here. Select the "Opacity" tab and go to the file button and open your browser. In the "Fern" folder select "FrondFade.tif" Warning do not select "FrondFade_a.tif".
8. Tick the check box "Use alpha channel".
9. Go back and select the "Colour" tab.
10. Most all leaves or fronds have a degree of translucency, so we need to add that quality to our fern. To the right of the blank field for "Translucency image" Left click the folder to bring up the browser. We are now going to uses the image "FrondFade_a.tif"
11. Enter in the "Translucency" field 0.45, and close the "Default shader" window.

Populations

It time to put your computer through its paces. I will warn everyone trying this tutorial, Terragen 2 will utilize all of the memory available to it, at least at the time of this writing. This poses a problem for this tutorial I'm not sure how much memory this file will consume. I've tried to limit the populations to what is visible to the camera. Although the areas being populated are quite small. This brings up a practical consideration. Plan ahead! If your system has limited memory resources you will have to be clever about using Populations within Terragen 2. Use small areas by limiting your camera's point of view.

All right lets get to it.

1. Open the "Object" button at the top menu bar once again if you have closed it.
2. Go to the "Add Object" button. This time select the Population menu and scroll down to the "Grass clump" and Left Click to select that choice.
3. This time two associated additions will appear in the window. The top should

read "/Pop Grass clump 01".   Left click this entry.
4. This opens it's window below. We will make some changes here. In the "Unique variations enter 4 in that field.
5. Below that is the open "Distribution" tab make these changes.
    1. In the "Area center" fields enter First 60.5511, second leave at 0, third 36.7504 Note: Zero "0" is usually left in the second field UNLESS the terrain is highly displaced.
    2. In the "Area length a" enter 50
    3. In the "Area length b" enter 50
    4. "Object spacing" enter .15
    5. Place a check in the box "Use density shader" and there are two different ways to enter the information into it's field. You can enter it manually; in this case "SoilBumps" (the area where we made more detail for the ground), or you can go to the button at the right of the blank field and high light the "Assign shader" and select the "/SoilBumps".
    6. Click the "Terrain" tab. Tick the check box and again you can either type the terrain's name in the field or use the menu button to the right. This time type or assign "Grass_Land." in the open field.
        Note: when your using the node map your population always occurs at or above the Shader representing the Terrain.
    7. Next, we move back to the top of the object list and Left click "/Pop Grass clump 01/Grass Clump 01".
    8. This action brings up a new set of tabs and fields. We are interested in the bottom three fields make these entries
        1. "Number of blades" = 1000
        2. "Clump diameter" = 2
        3. "Blade length" = 0.04
        4. Now go back to the "/Pop Grass clump 01" and select it to re-open it's   tabs and fields.
    9. It is necessary to change some of the parameters of the "Grass" itself and we do this by Left clicking the button to the Right of the field "Grass clump 01"and selecting "Go to Grass clump 01" Which opens a new window.
    10. Select the tab "Surface Shaders" and Left click it. Press the button to the Right of the field "Default shader 01" and Left click. This brings up the choice "Go to Default shader 01. Select that choice.
    11. Right now your "Grass" is simply gray lets change that by clicking on the color tab and choosing the RGB 57, 70, 36 which is a rich forest green. Left click OK.
    12. Go down to the "Translucency field and change it to 0.25. Close the "Default Shader 01" window.
    13. You can now preview the population you have created by pressing the "Populate" button. After the computer generates the population you tick the

check box "Preview instances". Your Open GL preview will practically turn white with the number of bounding boxes which represent the "Grass clumps"!

14. Turning off the "Preview instances" check box will not affect your population but it will allow you to see your landscape once again!

15. This would be a good time to Save once again and also to Render your work to see its progress!

Just for accuracy, lets add some debris, in this case some of last years Sycamore leaves. At the time of this writing Terragen doesn't have collision detection with its objects or populations, so the finish image will need some minor touch-up where the blades of grass penetrate the leaves in the foreground.

1. Click the "Object" button at the top to open its windows, and Left click the "Add Object" button. Highlight the "Population" and from it's sub-menu select "Obj reader".
2. In the browser open the "Leaf" folder, and select "SycamoreLeaf.obj"
3. For convenience lets rename "Population.obj" to "SycamoreLeaf".
4. Down below the "Distribution" tab enter the following values:
    1. "Area center" = First 79.5, second leave 0, third 18.5.
    2. "Area length a" = 10
    3. "Area length b" = 10
    4. "Object spacing" = 0.4
5. Tick the check boxes beside and below; "Use density shader", "Invert density shader", and go to the menu button at the right of the blank field and highlight "Assign shader". From that sub menu select "SoilBumps". The dead leaves will now appear more frequently on the bare ground.
6. Go back up now and Left click "SycamoreLeaf/SycamoreLeaf.obj".
7. Under the "Transform" tab enter these values
    1. "Translate" = First leave 0, second 0.1, third leave 0
    2. "Rotate" = First 10, second leave 0, third leave 0
    3. "Scale" leave defaults
8. Now Click the "Surface Shaders" tab.
9. Go to the menu button to the right of the field "Multi shader 03" and Left click it. This brings up the menu. Select Go to "Multi shader 03".
10. Click the menu button to the right of SycamoreLeaf_001.
11. A new window will appear. Select the "Opacity" tab.
12. Find "Opacity image" and click the file browser button to the right of the empty field.
13. From the browser window go to the "Leaf" folder and open it.
14. Open the image SycamoreLeaf.tif Warning! Do not Select "SycamoreLeaf_a.tif"
15. Tick the check box "Use alpha channel"
16. You can now close the "SycamoreLeaf.001" window.

Now that I see what the scene looks like with its populations and objects in place I can see the lighting is not quite right, so lets make some changes there.

Lighting

Lighting can make all the difference to the ambiance and mood of a picture, animation, or movie. While studios may set up various lighting to take their pictures there are some defaults that make Terragen 2 really shine. The first is Global Illumination and the second is Ambient Occlusion! Each of these methods offers lighting conditions that closely match the natural world. You can adjust the settings lighten or darken the shadows of objects, or the overall scene. Lets make those adjustments now.

1. Left click the "Lighting" button. On the left top quadrant you'll see the two different lights that are; "Enviro light" and the Sunlight 01. Select the "Enviro light".
   Note: you're not limited to earthly conditions if your world has 3 suns great TG2 can accommodate you.
2. Make sure the check box titled "Enable" is ticked, and in the field that is titled "Mode" use the drop down menu and select "Ambient Occlusion".
3. Below that is a field titled "Strength on surfaces", enter 1.25. All other fields are left at their defaults.
4. Go back up now and select Sunlight 01.
5. As the scene is set up now the stump is being back lit. I want the side of the trunk to be lit, so change the sun's "Heading" field to 270.
6. Our sun has a yellow cast, so I'm changing the colour with the "Colour" button. Left click that button to bring up the palette. Change the RGB to 255, 255, 222.
7. Also I want to introduce a little more contrast. In the field labeled "Strength" increase that field to 3.75.

Here is a comparison of the two lighting conditions.

Sun Heading 300

A Little Atmosphere

A blue sky is fine, but I think just a little atmospherics would liven up the sky. I don't want to increase the render times too much, as the focus of this tutorial is Objects and images, so I'm just going to add some 2D clouds.

1. Left Click the "Atmosphere" button at the top of the TG2 window.
2. A new button appears on the left top of the screen "Add Cloud Layer. Left click this menu button.
3. Your cloud options are now listed. Highlight and select "High-level Cirrus (2d).
4. Leave all of the defaults and lets add a second cloud layer
5. Repeat steps 1 and 2, but this time select "Mid-Level Altocumulus (2d).
6. Now in the list of atmospherics select "/Altocumulus layer 01.
7. In the setting window listed in the tab "Main" go down to the "Density shader" and Left click the menu button to the Right of "Density fractal 02".
8. You may have noticed in the preview window that the scene has become very dark. This is because of the shadow from the clouds. Left click "Go to "Density

fractal 02".

9. The only field that I wish to change is the "Seed" field. Enter 23130 and then close the window.
10. The last detail is to darken the color of the "Altocumulus" just a little. Go down to the field for "Cloud colour" and change the colour to 0.35. Thats it! A little ambiance in the sky.

I would urge you to experiment! Just save your scene frequently, because as of this writing, there is not an undo button!

Tips on "Final render settings": For your "true" final render you will want to bump up the "Quality" settings. I have found I can get reasonably good renders by simply bumping up the "Detail" to 0.8, and the Anti-aliasing to 8. However, if you have a lot of patients you can also bump up the "GI relative detail" to 4 or more, and the "GI sample quality" to 4 or more. If you tick the check box for "GI surface details" this also increases render times.

Well, this raps up this tutorial. I hope you found this helpful. Of course play the other controls like 3d atmosphere. Add some 3d clouds or more objects to your scene. Get familiar with the controls of the Open GL window. There is just so much you can do with Terragen 2 even at this early stage. Good luck and good rendering!