Natural landscape
Mountain, Forest, Rivers and Sea

Created by
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Introduction

This project contains an Unreal engine level which showcases the Auto-landscape material, water shader, Foliage placements and other features of unreal engine used for creation of a realistic looking environment for games. It can be used as a base template for any type of game creation for generating a realistic looking environment. All the materials are set up with different parameters in a way that they can be tweaked to fit the needs of any project. As a demo level there is a map called Desert Oasis which showcases the usage of the auto material for the landscape which is used to paint all the different layers of the landscape used to create this environment.

Landscape material

Landscape material is the material called M_AutoMaterial. This material controls the texturing of the entire landscape including the placement of the foliage. The material is created to be flexible enough to fit to the needs of any type of environment. It consists of a total of six layers. One of the main layers is the Auto layer which is the most basic layer created to paint the landscape in two base textures of ground and stone based on the landscape coordinates, slopes and heights. Once the base layer is placed the other layers can be painted according to the need of the project. These layers include Grass, River, Flow, Sea and Snow. The Grass layer controls where the foliage such as grass and trees will be placed. The river layer controls the texture of the ground at the bottom of the river, **not the water placement.** Water placement is covered under the water shader section. Flow layer is a layer that is used to show the debris of the rocks and sand from the effect of environmental events such as rain, snow and wind on the landscape. This layer can be removed or changed to fit the needs of any other project. The sea layer is to paint the texture of the bottom of the sea and again **not the water placement**. And the snow layer is to paint the snow on the landscape. All these layers can be utilized for different purposes to work with any type of environment creation. All the textures used in the creation of these layers can also be replaced with other textures that fit the needs of other environments.

The main feature of this particular landscape material is that it handles the tessellation and world displacement for each layer texture separately through separately defined parameters and these parameters can be experimented with to get the desired results of tessellation and world displacement on any selected texture. These parameters can be easily modified through the M_AutoMaterial_Inst instant of the material. For the particular example all the layers were set with the best resulting values of the Strength, height, contrast and offset of the displacement, near and far tessellation and fade distance.

Unreal engine provides a very useful feature of importing a layer mask from a .png file to paint the landscape. The demo level uses those layer masks to place the different textures on different parts of the landscape. All these masks can be found in the Content/Landscap/Materials/Textures/Layermasks folder. These are the masks used for this particular landscape. These are generated from the landscaping tool gaea which is not a part of unreal engine but a standalone tool that is useful in creating large scale realistic landscapes. The material called M_Layer_debug is a very simple layered material that can be used to visualize the different parts of the landscape layers without texture painting.

Foliage

The foliage used in the demo level are from the epic games unreal engine demos and quixell bridge assets. The placement is done through the unreal engine feature grass layer; it is a part of the M_AutoMaterial where two different grass functions are fed into it and it places the foliage on the landscape. One of the main reasons behind not doing it with procedural foliage was that procedural foliage volumes don't provide the flexibility needed in this particular case where the placement of the grass is imported from a .png texture. The grass layer node can easily take one of the layers of the landscape material and place grass on it while the grass layer is painted through the texture or manually through the texture painting tools of unreal engine. All these foliage meshes can also be changed simply by changing them in the grass functions located at Content/Landscap/Materials/GrassFunctions. There are two grass functions, one for the placement of small foliage objects such as grass, different flowers and small plants. The other grass function is used for the placement of larger foliage such as trees or big rocks.

Water shader

Water shader is one of the most performance heavy components of this project so use it wisely and carefully. It can be modified in a lot of different ways such as color of the water, the wave heights and direction, reflection, foam, distortion effects etc. Generally a water shader is put on a plane and then the plane is positioned on the waterbody area in a way that it seems like a water surface. But with realistic landscape landscape and larger, uneven and hard to track water bodies such as the rivers in the demo level it is tedious manual work to put lots of different planes to cover all the rivers and make sure that the gaps in the planes are not visible. This problem is overcome by a very simple solution. For the placement of the water bodies in this demo level there are actually two landscape

objects. But they are identical and sit exactly on top of each other with a little bit of height difference. So the landscape object which is on the top can act as a surface level for the water in the entire landscape. With that placement done. The water layer is painted through the river mask, used to paint the bottom of the river on the original landscape object, is used to paint the water shader on the second landscape object and all the other parts of that landscape object are made invisible with a simple invisible material layer. All the collisions from the second landscape layer are removed hence the player would not notice the existence of a whole separate landscape object and all the water area would act as the water surface for the entire landscape. This way eliminates the task of placing lots and lots of plains in order to create the water surface and also eliminates the breaks between two different planes due to the continuity it has for being one single object.

Lighting

All the lights in the demo scene are dynamic and support ray tracing to get the most realistic results from the landscape at the cost of a bit of performance. The sky is created through the BP_Sky_Sphere which is provided by the unreal engine and the direct light paired with the sphere creates the effects of different times of the day based on the rotation of the direct light. The sky light, Exponential height fog and Sky atmosphere help create the most realistic looking lighting for the environment.

Play mode

This project is compatible with any play mode provided by unreal engine. All that needs to be done is to import the package and then get it setup like any other project to play on the environment in any mode of liking including VR. Although it does support VR and the demo scene has all the things that are needed for enabling the play mode for VR such as the navigation generation and navigation blocking, the lighting may flicker a bit in the VR mode which is an issue that will be fixed in upcoming versions of the project. If one does try the play mode in VR make sure to try standing in the water.

Assets and Presets

All the textures and foliage assets are from quixell bridge and unreal engine demos from epic games respectively. As a single person project I did not have the capability to do the creation of all the assets on my own so I have used the assets that are freely available for any unreal engine user to demonstrate my materials and landscape creation.
Some of the code for diffusion and tessellation consist of the legacy Mega scan presets used by mega scan assets to create world displacement and tessellation. Also the texture macro and micro variation are the unreal engine preset material codes which are used to counter tiling of the textures.

I created this project to be a portfolio piece as I am a student of M.S. in Game design and development to show my environment creation skills. But as I kept working on it I realized that I had made it flexible enough to work on any other landscape and in almost any other type of environment creation, hence I have published it on epic games marketplace for everyone to use as a base template for their projects.

*I know the name of the map is Desert Oasis which is what I set out to create as a small project but as I kept creating my passion towards the project took me to create something much more complex with many different elements hence the old name for the map which got me started in the first place.

Thank you for using my base project. If you have any questions feel free to reach out to me at :- pruthvirajsolanki131998@gmail.com