Procedural Terrain Generation UE4

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Introduction

The purpose of this project is to create a Procedural Terrain Generator with the focus on a tool or plugin for UE4.
The study will involve research into the implementation and organisation of algorithms for a procedural terrain with high level of customization.
I intend to also create Biomes generated procedurally that should be scalable and flexible and to customize assets and textures for each biome.

Aims and Objectives

Design and create a customizable procedural terrain tool that can:
- Option between pre-bake the terrain or at runtime.
- Variety of algorithms for the generation of the terrain.
- Customize the material for the terrain and the scale.
- Level of the water.
- Customizable Biomes.
- Assets and the probability to populate the terrain.

I plan to explore the easiest way to facilitate the personalization of all the terrain generation options.
The end goal should show a realistic terrain generated procedurally selected, with the differentiation of each biome as the assets for each one. With the pre-bake option or with the runtime generation for an infinite terrain.
I will demonstrate both a pre-bake and runtime terrain and it should look high quality and professional and the easy and understood customization for the generation.

Software Used

UNREAL ENGINE · GitHub · Visual Studio

Project Progress

Jobs Finished	Description
Research and Planning	Studied the algorithms and the correct way to implement to this project.
UE4 Terrain vs URMC	Efficiency comparison between the UE4 options and the URuntimeMeshComponent plugin.
Create a custom Quad	Create a quad using the URuntimeMeshComponent with custom vertices value.
Perlin Noise	Implement Perlin Noise as one of the algorithms.
Tiled Terrain	Using Perlin Noise create a tiled terrain and the customizable options.

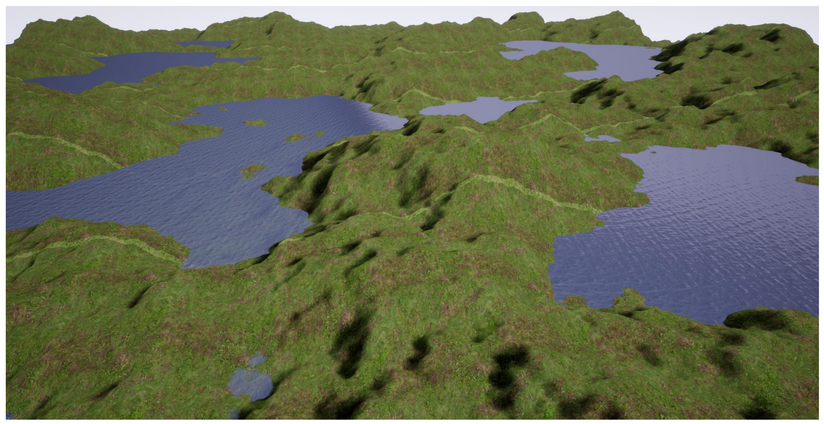
Next Steps

- Separate the pre-bake option and the runtime option.
- Develop the LOD optimization with the distance.
- In the runtime option add the infinite terrain.
- In pre-bake option add customizable terrains like Islands.
- Add more algorithms.
- Create the system to distribute assets around the terrain.
- Biomes System with the customization parameters and materials.

Methodology

The project is split into 2 layers; Both has more less the same customizable options but focused on different parts.
- The pre-bake part has more customizable options because is more easy to do that. And it's more useful with more algorithms. And more options to make a cool map.
- The runtime part has a little bit less options but has the infinite for a procedural terrain. Both will have the assets distribution and the biomes option.

Current Project Review



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Legal, Social and Ethical Issues

- With the development of this project no sensitive information nor the aid of test subjects is required.
- There are not deal with any sensitive data so there will be no ethical issues.
- Is a tool for terrain generation, with the aim of it being used by other programmers, so there will be no social problems
- The license of Unreal Engine for this project not deal with any legal problem.
- The assets used for the demo of this project are obtained legally from the Unreal Engine 4 marketplace taking advantage of the offers that Epic Games makes every month for free.
- The final product will not be sold or used commercially in any other way.

Professional Skills

Programming:
From the programming perspective I will advance in deep with Unreal Engine and C++. Which is something core for an game programmer. Also the different ways to use procedural algorithms to improve the games creating a tool to facilitate the creation of terrains with a variety of customizable options. This combination allows working with an improvement of velocity when developing games. Affecting to a saving time on the level or map design.

Soft Skills:
My project requires a lot of research in how works the procedural algorithms, how can I use this algorithms to create a procedural terrain with assets distribution and biomes generation. Searching for information is one of the core skills as achieving my goals requires a lot of reading and the Testing is as well very important to find the most efficient way to implement this.

Other Skills:
Other skills I expect to improve are the verbal presentation, the academic writing, and the self-learning. All of the above is essential in this industry and my future career.

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