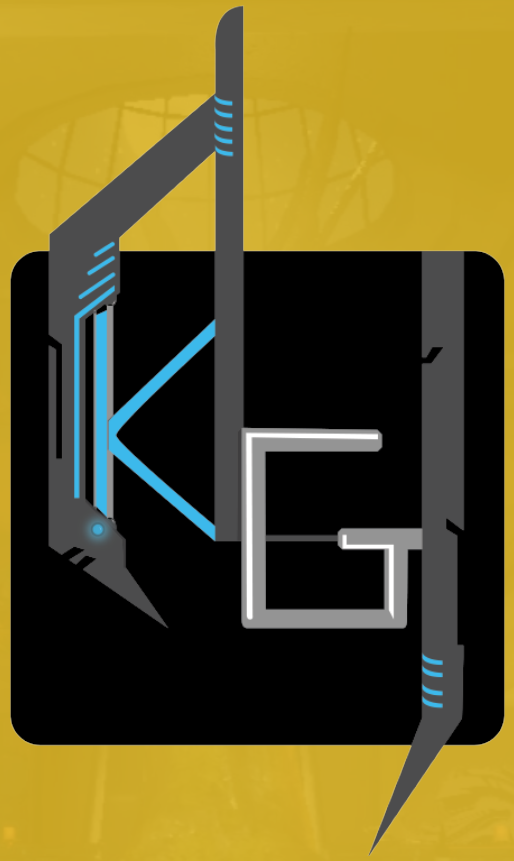

Kevin H Gordon

Process Book

Project Title : Abandoned Mall

Software

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The Project

What is Abandoned Mall?

This was the final project for Professor Shami's Environment for Games class during the Winter of 2019. In conceptualizing this project, I approached it with two goals in mind. The first goal being the desire to have the scene to contain elements of a desolate feel, much like The Last of Us. While the second goal was to have a nature element be the centerpiece of the project.

The piece served as an exercise in designing real-time Environments in Unreal Engine 4. Main goal was making sure the game was functional, and that all game mechanics worked as expected. In a deconstruction, it could be said that this project have three core objectives before this project was marked complete. They are as follows:

- Emulate abandoned feeling of The Last of Us
- Have natural elements be a centerpiece
- Implement Crepuscular Rays

Though there were many hardships when it came to designing this piece, at the end of the day the project was a success. In this book, I will break down the journey of this project, and show what went into it at each stage.

Project Inspiration

As stated in the last page, this project is heavily inspired by one of my favorite games of all time “The Last of Us”. In designing this piece, I wanted to emulate the vibe of a place that’d been abandoned and closed to the public for a long time. In my planning I also had the idea of how nature reclaiming the earth, like how moss and vines form on old structures after years of unuse. Those two guiding thoughts shaped the direction of this project

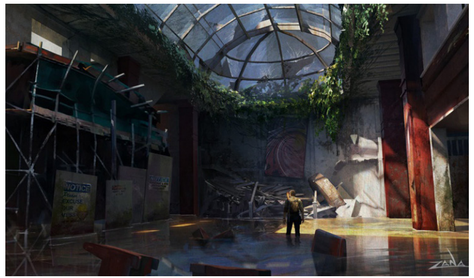
- Inspiration : The Last of Us
- Theme : Nature reclaimation

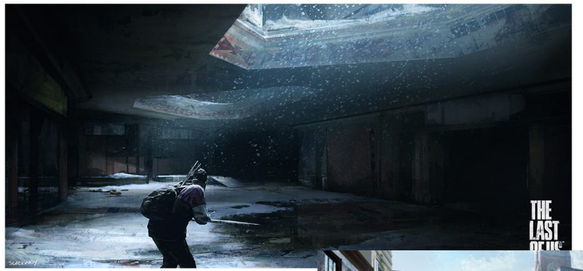
The next couple of pages will breakdown my thought process for each of the elements listed.

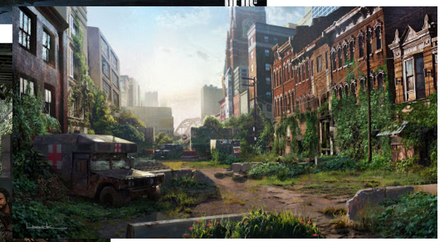
Inspiration - The Last of Us

The Last of Us by Naughty Dogs is a masterpiece. Not just in terms of story, everything from the environment to sound helps to sell the story of the world that exists within. It’s in playing this game after it’s initial release that I decided that I’d commit to becoming an Environment Artist. The abandoned, desolate and also reclaimed nature of the environments in this game is the main reason this piece was used as inspiration.

Inspiration images below







Theme
Nature Reclaimation

There’s something claiming or even ethereal about the fact that all things, left untouched, return to nature. It is not uncommon a thing to see flowers, grass and especially moss growing from buildings that have been abandoned. This phenomenon has always been intriguing to me, perhaps that’s why I chose that as a theme for this project. It’s a great element to add to most projects, and one which I’m proud to include now.

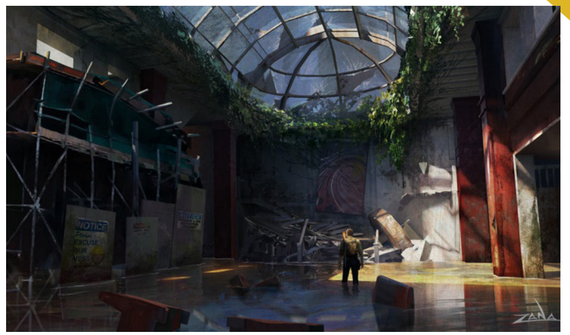
Inspiration images to the right.

First Steps

Gathering References

I set out and gathered a plethora of reference images of desolate scenes, primarily from The Last of Us as well as pictures of abandoned malls. In my research I stumbled upon an amazing shot from the game where crepuscular rays, otherwise known as god rays, were seeping into the environment below. Once I saw that image, I knew that my final goal for the piece would be to somehow incorporate god rays into my final render.

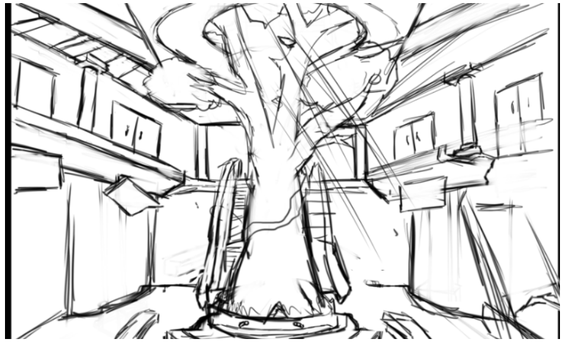
See the reference images to the right to get an idea of my design influences.

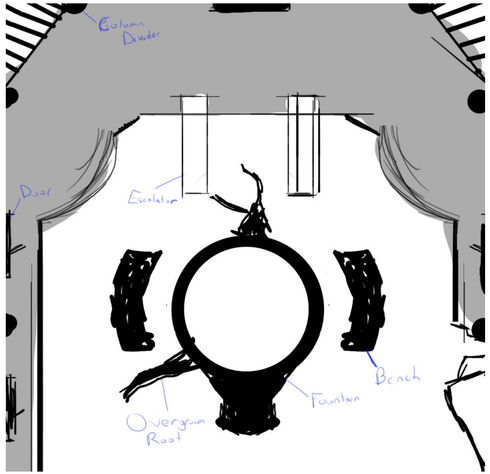


Reference Images

Initial Designs

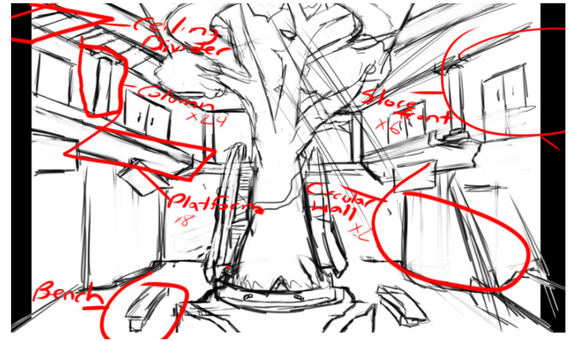
So I started out drawing a couple of different sketches based off the reference images I had. I eventually settled this as a final design sketch, making sure that I included just enough details to work off of. From reading of Tito's essay, "Where's the Design in Level Design", I became intrigued with the idea of using circular windows as a portal to another world. Using that imagery in mind, I settled on the image of a tree "breaking" the skylight revealing the world outside. Other considerations I made when designing the initial sketch, was the inclusion of broken elements in the world. I figured that with enough broken elements, the piece would begin to mimic the visual style of The Last of Us.

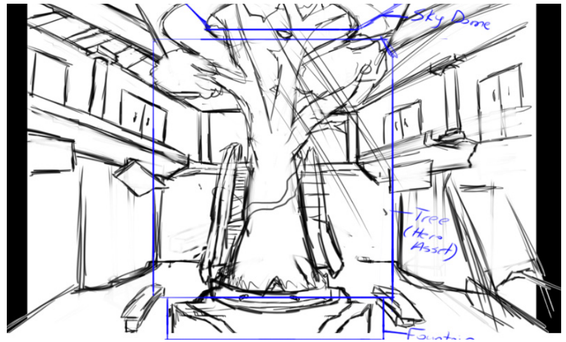




Modular Modeling

The next step in the design process was to isolate what components of the piece could be made modular. I chose to create modular pieces as those pieces are the most time/memory-effective assets to create when designing environments. The image on the top-right is a markup of all the modular pieces I planed on designing initially, while the bottom-right as the 3 key focal assets for my piece.



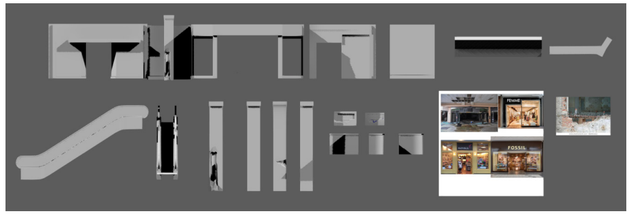


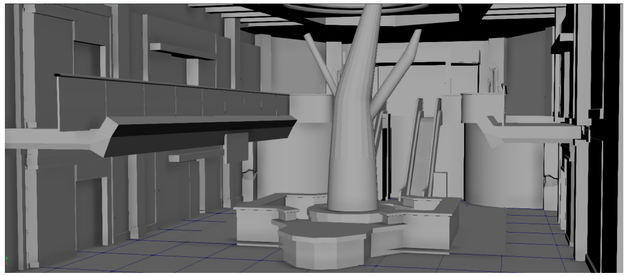
Scene Blockout Shots

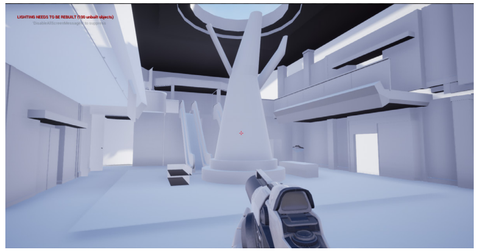
Stage 1
Blocking the Scene

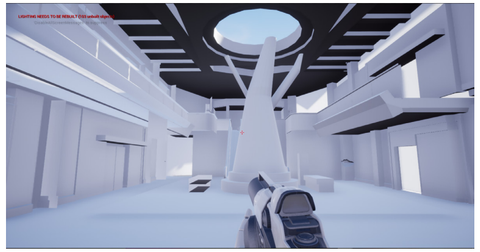
Once the sketches were finished and the modular pieces identified, I set out to create the modular pieces. To start out I kept all of the modular pieces very simple, focusing only on the basic shape of each asset. The key assets received a bit more detail at this phase, but that was primarily used to get a greater feel for how the overall product would look. Once this was completed, I laid out all of the assets in Maya to get a feel for the space, while later translating it to Unreal Engine. In Unreal Engine, I paid close attention to how large/small the assets looked in relation to the player and each other.

Images of the model block-out phase to the right -->

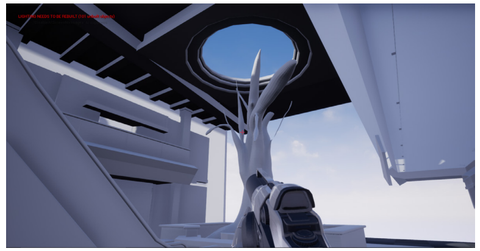


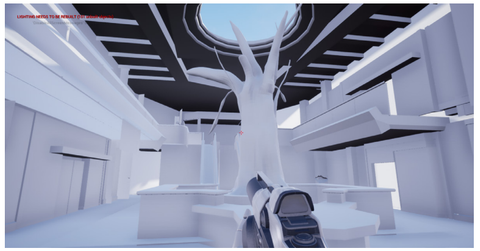






Placement and size testing within Unreal Engine





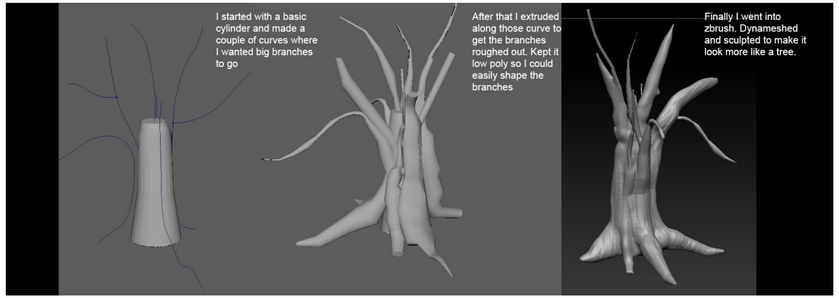
Revised size and placement test, after the creation of tree asset.

Design Process
Hero Asset - Tree

As stated previously, one of the goals of the piece was to have the hero asset be a nature element. From the initial design phase, I decided for that element to be a tree. Though I knew how to make trees in theory, I'd never practically made them. I first started this process by downloading a trail version of Speedtree and doing a trail run of the program. However I encountered limitations, technical and personal, that would prevent me from proceeding with using this software. As a whole, I felt like I wouldn't have been able to get the free I was looking for using the procedural trees in Speedtree. I decided to refocus my time on the software I knew well for any 3D project, Maya and Zbrush.

On the next page I go in-depth and discuss my process for creating this tree. The final version of this tree asset is also featured to the right.

Tree Breakdown



The figure to the left is a break down of my tree modeling process. Started the block out of the tree first in Maya, before bringing it into Zbrush.

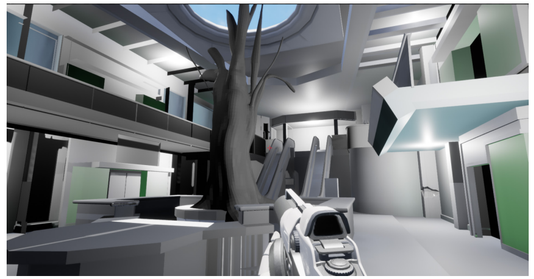
Above was my process for adding leaves to the tree. Though I ultimately decided against having leaves in the final version, it was great using zfibers to create instanced leaves in Zbrush.

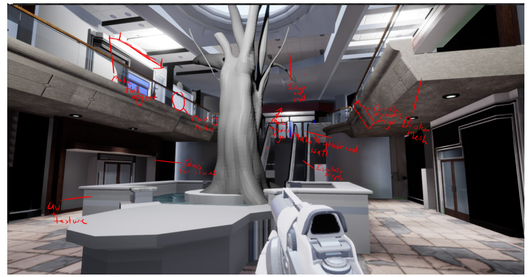
Stage 2
Initial Lighting & Color

With the placement and scale of assets secured in Engine, I proceeded to tackle the initial lighting and texturing for this project. Whenever I begin the lighting process, I tend to place key light in the spots where I know lighting will appear in the scene. In this case I know I would have some lights appear underneath the 1st floor ceilings, with scattered lights on the second floor.

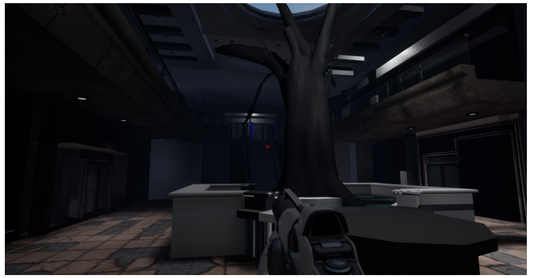
[See image 1 and 2 to the right for reference]

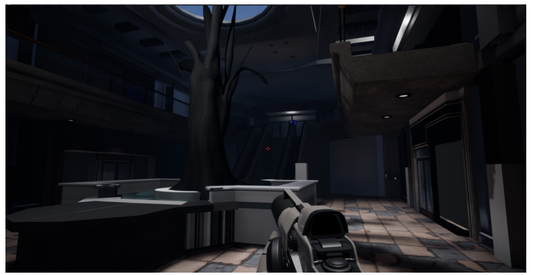
The placement and color started out fairly decent, but the issue that occurred was everything had a uniform brightness to it. This is something that simply wouldn't work in the real-world. In addition, adding texture alongside the lighting reveal several modeling quirks that needed to be revisited. Though this stage had a couple of misses, it did prove me with valuable insight on what to change for the next version. After taking a screenshot of the current scene and redlining it, I was back to the drawing board to fix the lighting and modeling issues.

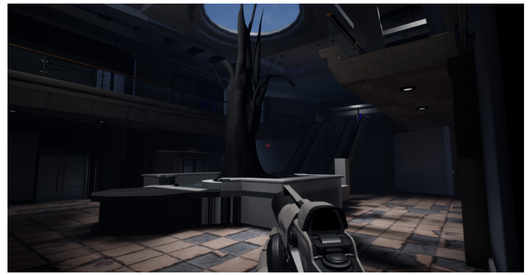




After going back to fix and create more 3D assets, I brought everything back into Unreal. To address the issue of flat lighting that I had originally, I put blocking volumes around all of the walls to ensure no outside light accidentally bleeds in. This process allows me to control the light source of my scene more throughly. From there I repeated my key lighting setup that I started in the first scene, and produced the images to the right. Though the scene is pretty dark, the key lights help to establish a baseline lighting scheme for the project.



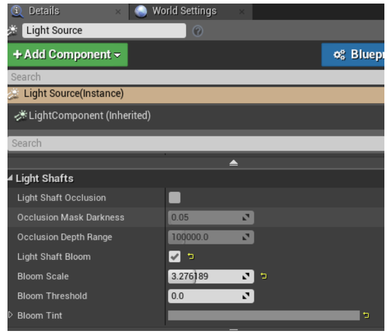




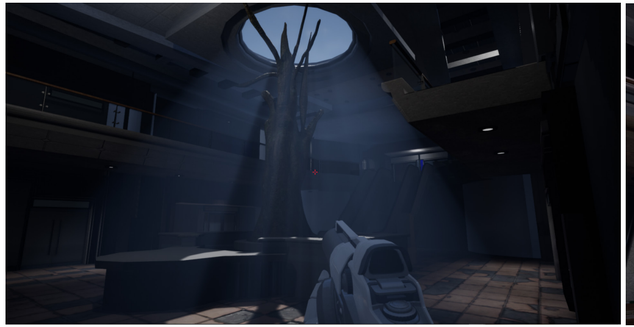
Design Process
Crepuscular [God] Rays

Since the base lighting for the scene had been established, I turned my attention to creating God Ray's in Unreal. When I first tackled this problem, I started off by making opacque light textures inside of Photoshop. These textures would have a faint emissive on it to simulate the look of a god ray. However when I implemented this technique inside of the engine, I was unable to get the kind of effect I was looking for. This prompted me to look into other methods of creating God Rays in engine. From my research I stumbled across [Light Shafts], a system that allows God Rays to be emitted from directional lights in Unreal Engine. I quickly turned on this setting and began playing around with it's settings.

Pictures of the result and breakdowns to the right.



God Rays Implemented

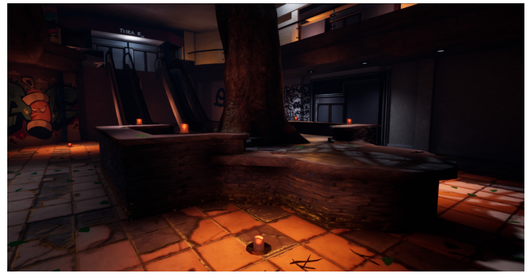


Stage 3
Lighting the Story

With the final major technical hurdle passed, it was time to refocus on the lighting. Now my gut instant was to just add lights to illuminate the dark spots, but adding random lights without a source has never sat right with me. To solve this issue, I thoughts about how I can use the lights in my scene to tell a story. From there I had a conclusion about this environment.

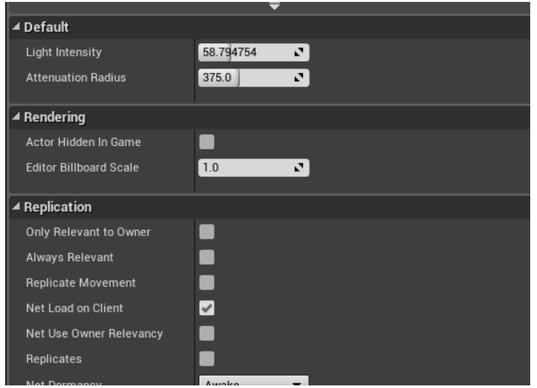
In real life, even when places are abandoned, it's not uncommon to find squaters occupying a building or residence. The idea for this environment is that this building has a few squaters of it's own, and the squaters in the area use an assortment of candles and glowsticks to illuminate their path.

Images of the final result to the right



Since I knew there'd be many candles, glowsticks and other object that could illuminate the scene, I had to be crafty with how I designed those assets. The easy thing to do for assets like this was to make the piece modular, as to turn it into a blueprint that can be reused.

The light intensity and attenuation is adjustable in-game, so different candles can have a varied degree of brightness.

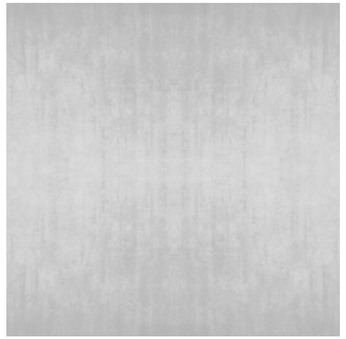


Design Process
Decals and Grunge

The grunge and dirty up this scene, I implemented the use of decal textures in Unreal. Decal textures are great, as you can add a great deal of detail to be piece without having to model or texture. Since each decal is a 2D texture, the process of quick iteration and design changes is relatively straightforward

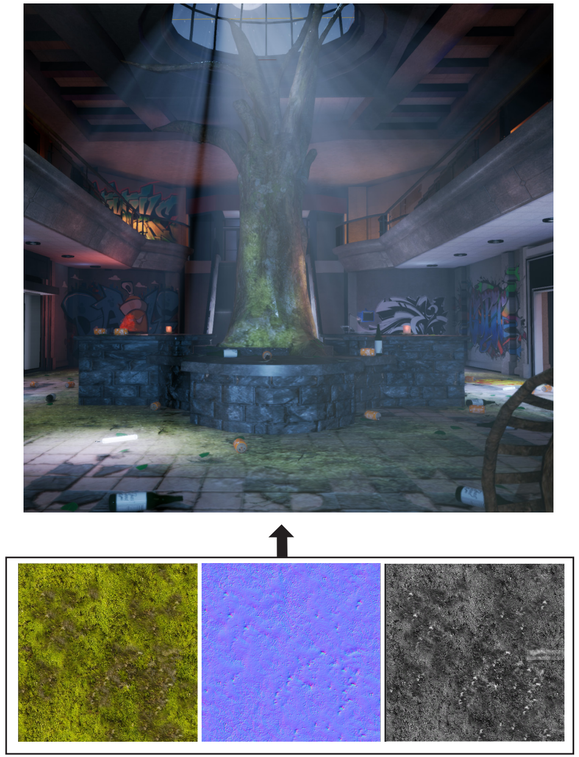
Examples of this implementation in game is to the right. Snapshots of some game decals featured on the next page.

Decal Textures

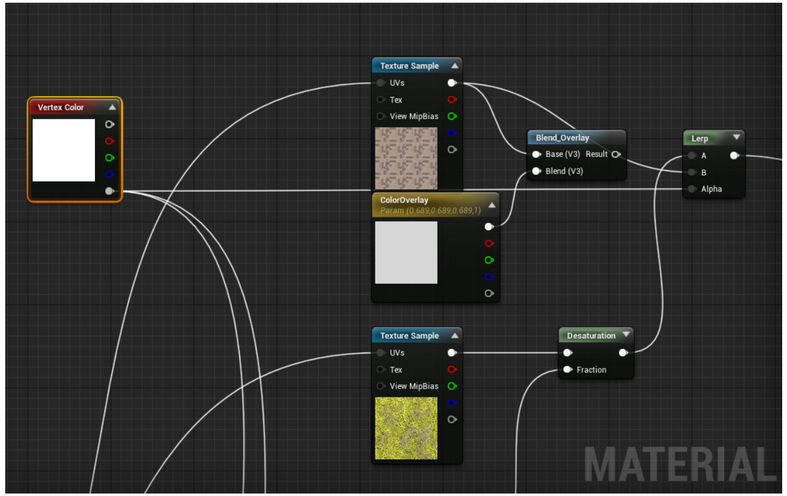


Design Process
Vertex Painting

One of the last method I employed to add details and grunge to this project was the use of vertex painting. With vertex painting, one could have two different materials applied to the same object. Those materials can then be combined and brushed on to create interesting effects. For this project, I primarily used this feature to add moss and leaves to the floor. This was done to add to the theme of natural reclaimation with this project. To create the moss for the ground, I found color texture of moss and created both a roughness and normal map from it. From there I used a couple of settings in Unreal Engine to blend these textures with other materials in the piece.



To set up an object for vertex painting is actually pretty simple. Think of it like a switch for your material, on what colors you want shown. First, you need to add a vertex color node to your material editor. This will control which texutre is in focus. From there you attach that to the [alpha] of the lerp node as seen to the right. Once all of the other nodes are connected as normal, vertex painting should be available to the user.



Stage 4
Putting it All Together

With all of that said and done, the only that that was left for this project was adding the various pieces together to reveal the final project. The biggest challenge of this project had to be illuminating the scene. As with interior scenes, it can be hard to get corners and other AO spots brighten up a bit. Overall I'm thrilled with how this project came out. Was able to learn several new environment techniques while creating a nice portfolio piece.

Final Shots

Special Thanks

Special thanks to all of my friends, family and professors who've supported me throughout the years. Without them, none of the work featured in this book would be possible!