AA4S10: Technology and Engine

Dead can Dance

Challenge 4: Now That's What I Call Game Dev 2020

Personal Journal

Cole Underwood

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MODULE INTRODUCTION

his module allows the student to explore the practical aspects of games production using existing engine software.

Responding to a series of focused brief, students identify a suitable games technologies to implement their design proposal. Evaluating the technical and practical constraints of the software.

An appreciation of the differences between competing technologies, their support networks, and the practicalities of the student's own abilities to use them should be evaluated.

During the module students will undertakes a series of game challenges producing functional prototypes within engine, demonstrating key aspects of the game mechanic and/or aesthetic intent.

Module Aims
Individual: Produce a portfolio of work, evidencing the contribution towards each game jam (visual journal). This should include research undertook (visual, design & process) as well as evidence of the work undertaken. A written critical evaluation (approx. 1500 words, 500 words per challenge) which evaluates the strengths and weaknesses of the challenge outputs, as well as the justification of actions, decisions and contributions taken in support of the groups game challenges.

Module Aims

- To complement and build on the students existing skills as designers and makers of digital games

- To support and encourage the student's continuing exploration of game design, specifically the software 'engines' used to produce them.

- To enable the student to research and critically evaluate an ongoing process of games production, demonstrating relevant techniques and selection of tools

- To enable the student to develop their games production skills within a constrained brief.

Module Challenge

Now That's What I Call Game Dev 2020

Inspiration comes from anywhere and at any time. We've explored TV, Film, Animation, Podcasts, Books, games, and the past. But now we turn to something different: music. In teams you will look to create a game that's main creative inspiration and foundation is a song. The songs to choose from have been hand-picked and curated by the Games team, whose initials accompany each track, largely because of their lyrical richness, but their sound, texture, tone, and theme are all things to take note when building your game. We will not accept work inspired by the music videos of these songs, the focus is on the music and music alone.

There is a small catch, however. You will also have three random mechanics generated for you, of which you must use at least one of them in your game.

The Brief

In teams you form yourselves you must build a game using one of the songs below as its spiritual and inspirational basis. As most of your focus will be on building on the game, the deliverables will be slightly different. No GDDs or Art Bibles, but the game must be a finished playable demo (not a vertical slice) with the core gameplay experience lasting as long as the duration of your chosen song though the song itself doesn't have to be a part of the game. If you wish to make documentation to aid development then you can just ensure that the research for this jam is thoroughly documented in your development journals. You will have a 15-minute slot to demo the game at the end of the jam.

Group Assembly

Group Members: Cole Underwood, Kieran Pope and Alistair Bennett

We took part in a Blackboard Collaborate meeting where we placed ourselves into groups to be able to research the potential game concepts. We also used this time to get to know each-others preferred roles within a group setting and our strengths and weaknesses.
Our assigned roles.

- Cole Underwood – Level Design
- Kieran Pope – Environmental Art
- Alistair Bennett – Game/Sound Design

Group Analysis

Strengths

- Each person from the team has skills and experience in different areas.
- A vast opportunity for communication from different sources.
- Organised and informed on the brief.

Weaknesses

- Newly introduced to each other.
- Figuring out what our strengths and weaknesses are

Resolve

- We to get to know each other more by working on the concept together.

Group Coordination

After assembling into groups, we had a choice of selected songs to choose from Spotify, being a musician, I had a general knowledge of most of the tracks. We selected “The host of seraphim” by “Dead can Dance” the reason for this choice as I am a fan of the band and I thought it was the most interesting concept for making a project. We created a discord channel that we use as a
the main form of communication and created a shared folder on OneDrive to access uploaded documentation that each of us can edit.

Overview

From the song list, we selected “The host of seraphim” by “Dead can Dance” the reason why this song was chosen as I believed it was interesting having a world/art form genre of music influenced into a video game. The thought process was to make something interesting and out world experience using the genre’s take of the art form and experimental sounds into a visual format.

the set of random mechanics that were generated were –

- Cut Off One Head, Two Grow Back - Like "Push Mole Down, Mole Pops Up" except that making some necessary progress also causes the game to become more difficult. (Example: Asteroids)
- Race - The player must reach a place before the opponent does. Like "Timed" except the enemy as a "timer" can be slowed down by the player's actions, or there may be multiple enemies being raced against.
- Hidden Image / Where's Waldo? - Like "Information Overload", but the player is looking at a complex scene for a particular item, clue, or pattern. (Example: Many point-and-click adventure games)

We had a discussion online via discord about the mechanics and I suggested a walking simulator from examples like dear ester where the environment tells a story and beautiful looking visuals that represent the tracks.

I suggested focusing purely on one of the mechanics as I think using all for the sake would hinder the project rather than focus on one concept into fine detail. I wanted to keep the scope small and concise but of high quality.

After a few discussions we settled on the Hidden Image / Where's Waldo mechanic as this was a simple mechanic and we can focus on sound design and visuals.

RESEARCH

The host of seraphim

The host of seraphim by “Dead can dance” from the album “The serpent’s Egg” is in the genre of Neoclassical, Darkwave and world music. Brendan Perry from the group discussed the album's title: "In a lot of aerial photographs of the Earth, if you look upon it as a giant organism—a macro cosmos—you can see that the nature of the life force, water, travels in a serpentine way".

I the track “The host of seraphim” I feel has a sad, emotional, atmospheric and eerier sound throughout start to finish where you hear the loud drumbeats echo from the beginning, entering the haunting vocals. The song itself is at a tempo of 57bmp which is slow-paced with layered vocals and instruments with a lot of reverb that sounds massive.

Lyrics

I thought that you knew it all
Well, you've seen it ten times before.
I thought that you had it down
With both your feet on the ground.
I love slow ... slow but deep.
Feigned affections wash over me.
Dream on my dear
And renounce temporal obligations.
Dream on my dear
It's asleep from which you may not awaken.
You build me up then you knock me down.
You play the fool while I play the clown.
We keep time to the beat of an old slave drum.
You raise my hopes then you raise the odds
You tell me that I dream too much
Now I'm serving time in disillusionment.
I don't believe you anymore ... I don't believe you.
I thought that I knew it all
I'd seen all the signs before.
I thought that you were the one
In darkness, my heart was won.
You build me up then you knock me down.
You play the fool while I play the clown.
We keep time to the beat of an old slave drum.
You raise my hopes then you raise the odds
You tell me that I dream too much
Now I'm serving time in a domestic graveyard.
I don't believe you anymore ... I don't believe you.
Never let it be said I was untrue
I never found a home inside of you.
Never let it be said I was untrue
I gave you all my time.

The song lyrics express a sad love song but even though the song has lyrics, Lisa Gerrard of the band is known to speak in tongue and creates her language and sings in ranges such as dramatic contralto and the mezzo-soprano.

Design process

After gathering research on the song and after listening through emotion my thought process is to use keywords gathered –

- Atmospheric
- Eerier
- Sad
- Emotional
- Organism
- Dark
- Giant/Large
- Flow/slow/pace

Uses these as key elements to the word expression and more importantly sound to create something strange, artistic and out of this world. As the song is spoken in tongue, I think it can relate to something alien/strange which can focus on the artistic style of the scene.

Relating these art styles into a mechanics which was chosen randomly by a generator I think having something hidden for the player to find in an unknown world sounds fitting to the song. I feel racing would not fit the theme as its rushing the player in a song that is already slow-paced and does not fit feel like a mechanic. Cut off one head, two grow back sounded interested I could see it being used for a purpose relating to a creature or something organic. Having spoken to the team and the abilities they require I thought sticking to one mechanic would be more focus orientated to each role is such a small time frame by keeping the scope small.

Hidden Image / Where's Waldo? (finding something) felt more fitting to the theme by keeping a slow pace and focus on environmental art. We decided a walking simulator would be a good idea after a discussion due to the reasons previously mentioned. I focused my research into games such as Dear Esther, Everybody's Gone to the Rapture and What Remains of Edith Finch to see how the games were made and takeaway elements used to make a walking simulator. Walking simulators have a lot in common where the environment tells the story to the player also sound plays a huge part in the design process.

The walking simulator

While walking simulators are short and lack gameplay, having certain elements is what keeps the player engaged. A lot of games revolve around killing, high-speed action and focus heavily on game mechanics, walking simulators are very limited and rely heavily on story driven-narrative and the environment to tell the story, having very little mechanics should be easier for the group to focus on other tasks such as sound design, level design and simple mechanics. Games such as “Dear Esther” and “Everybody's Gone to the Rapture” focus on story-narrative and the environment with very little mechanics, both games have very similar concepts where the further the player explores the environment more of the story unfolds. Both games also are abandoned/uninhabited which the player is the only person around and is finding clues through story-driven elements to unlock/untold parts of the story by exploring the environment.

Walking simulators use the environment and level design to tell the story, for example, Everybody's Gone to the Rapture if you enter if you go into the pub you can see bottles on the bar and tables indicating that people use to live here setting up a story on premises of –

- Where is everyone gone?
- why am I the only person here?
- Who am I?

This sets up a story in motion-based of these three premises. Sound also plays a huge factor in games, Dear Esther you can hear the sea and wind blowing giving the player a sense of realism in the environment.

Art style

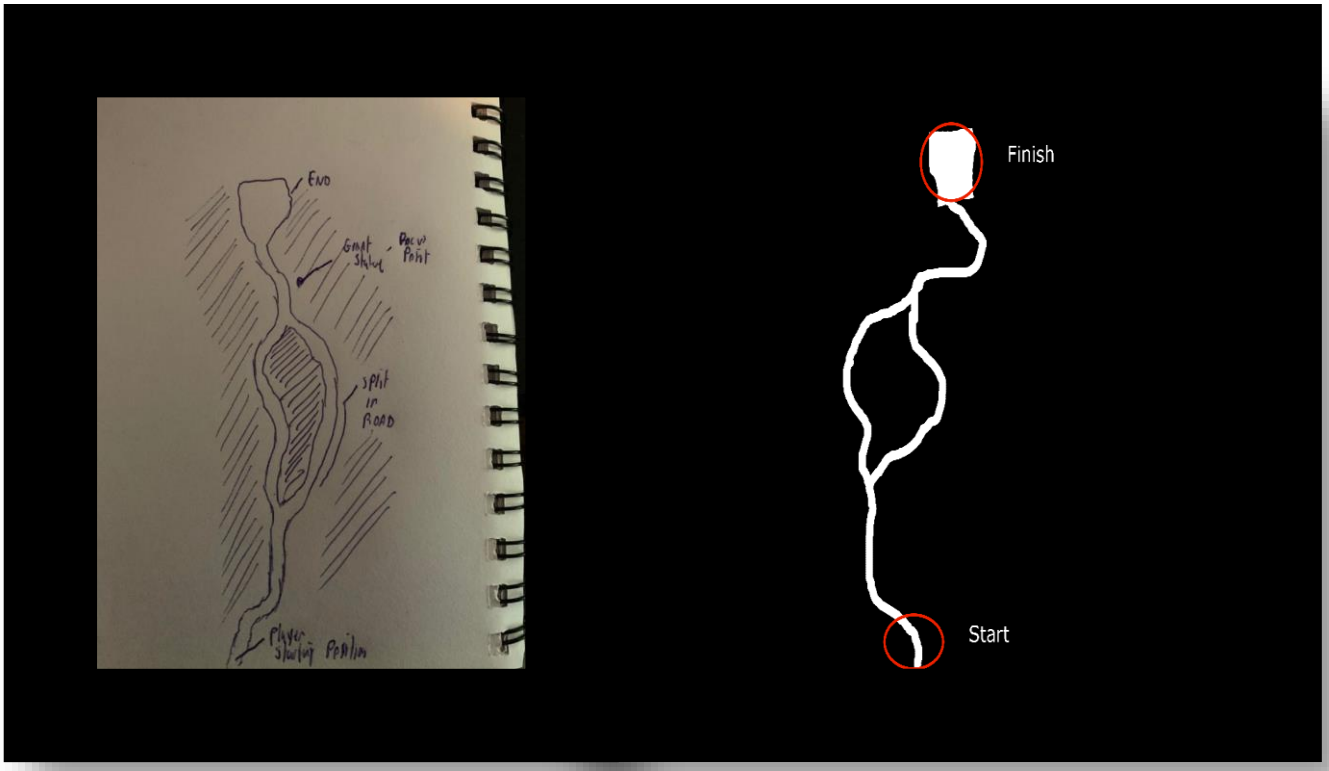
I put together a mood board of different images to get the sense and feel of the art style and environment that reflects the song choice. The song has an atmospheric tone and theme such as forests and desert landscapes with strange and mysterious monuments such as huge statues and sci-fi type settings. My thought process of having something that felt grounded to earth then the player progressing through realising that this is another planet or something supernatural occurring would be an interesting premise for the player to explore. I took image references from a project on unity called “Book of the Dead” and Dune as they both have some real-world grounding and elements of sci-fiction.

LEVEL DESIGN

Level design: Paper Prototype

The design started as a simple sketch in the prototype phase of how the level will look on paper and set out the pathway for the player to explore is set in the level. When discussed with the group we thought a split in the road could be interesting for the player to see two different scenes but leading back to the linear pathway, by keeping the path linear this can focus on the storytelling through the environment.

Although the level design is an iterative process and the final versions of these levels often differ greatly to what was conceived at the time of making these initial designs, however paper level designs give you a good idea of space, scale, focal points, signposting and the overall feel of what the final level could be.



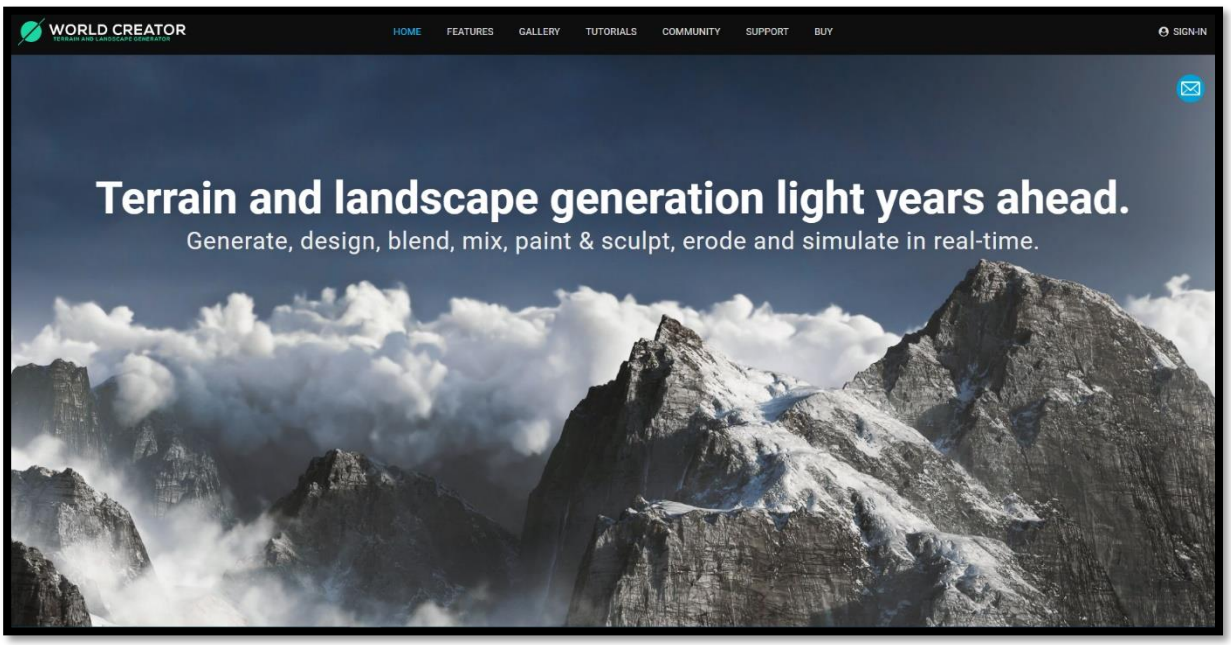
World Creator 2

World creator 2 is a real-time terrain and landscape generator, although Ue4 has a sculpting tool built into the engine, World creator is a far more intuitive process with far more realism than you could sculpt as the toolset has a limit in terms of feature, with world creator your able to get generate in real-time and have a realistic amount of detail in a short space of time.

Features world creator has to offer –

- Terrain Sculpting - Sculpt and edit the terrain with brushes just like in Photoshop, but in real-time.
- Terrain Stamping - Import custom height-maps and use them as stamps - fast and intuitive.
- Terrain Shape Designer - Simply drag nodes to raise and lower the terrain at any location.
- Transform Filters - Canyons, Mountains, Hills, Alien, Terraces, Plateaus, Ridged, Rocky, Dunes etc.
- Effect Filters - Crater, Balloon, Rugged, Inflate, Deflate, Swirl, Distort, Magnify, Pixelate
- Curve Filter - Create and adjust a curve that is used to create canyons, terraces and more.
- Path Filter - Create paths, rivers, raise mountains, plateaus, terraces and more.
- Shape Filter - Create flat areas, plateaus, mountains, lakes and more.
- Level Step System - This new technique allows you to control the entire generation per resolution step.
- Erosion Filters - Apply erosions of different kinds to create a stunning and realistic look.
- Sediment Filters - Apply different sediment filters and make your terrain look real.
- General / Pattern Filters - Smooth, Perlin Noise, Voronoi, Zero Edge, Smooth Ridges, Invert Height
- Seamless Terrain - It's just one click and the terrain becomes seamless and tileable.
- L-Tree Filter- Easily create great-looking mountain ranges and rivers in no time.
- Offset Tool - Offset the terrain generation area, giving you even more initial randomness.

Although I will not be delving into all these features world creator has to offer, I will be using some of these techniques to create the level design process.



World Creator - Process

I converted the photoshop level PNG file into world creator by uploading the layout as a material. Having the material visually on the canvas I can sculpt the pathways for the player to walk and build the landscape terrain with visual reference in mind. I set the terrain size at 4033x4033 as unreal has certain mathematical inputs in the engine for the terrain to export correctly.

Table content

Overall size (vertices)	Quads / section	Sections / component	Component size	Total Components
8129x8129	127	4 (2x2)	254x254	1024 (32x32)
4033x4033	63	4 (2x2)	126x126	1024 (32x32)
2017x2017	63	4 (2x2)	126x126	256 (16x16)
1009x1009	63	4 (2x2)	126x126	64 (8x8)
1009x1009	63	1	63x63	256 (16x16)
505x505	63	4 (2x2)	126x126	16 (4x4)
505x505	63	1	63x63	64 (8x8)
253x253	63	4 (2x2)	126x126	4 (2x2)
253x253	63	1	63x63	16 (4x4)
127x127	63	4 (2x2)	126x126	1
127x127	63	1	63x63	4 (2x2)

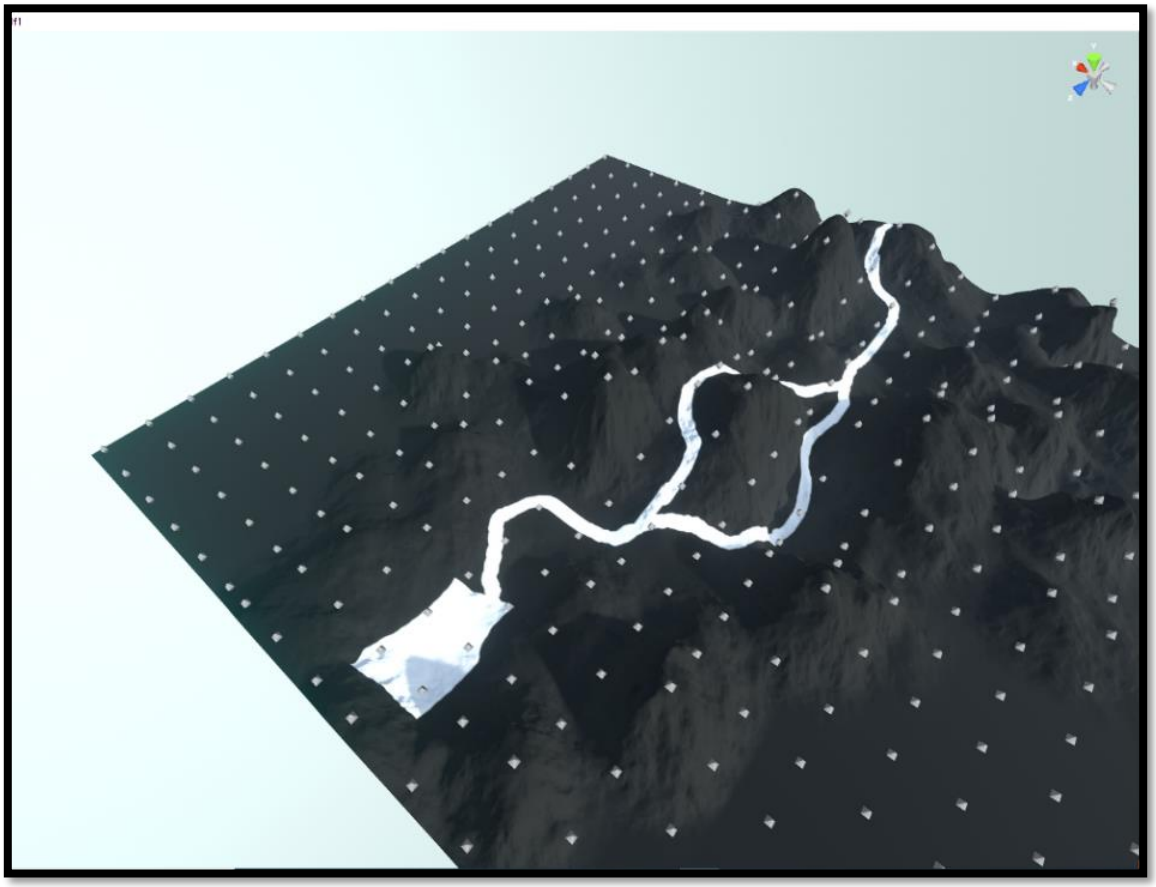
Valid dimensions for Landscape heightmaps are not always immediately obvious when getting started. Being able to determine what dimensions for heightmaps are valid and, beyond that, which are optimal requires a thorough understanding of the underlying architecture of the Landscape. To create a system that allows for huge terrains while still being efficient in terms of memory and performance, the architecture implicitly applies restrictions on the dimensions of the heightmap, meaning certain dimensions are valid and others that are not. In previous terrain systems in Unreal Engine, there were either no restrictions (i.e., any dimensions were valid and would work) or the restrictions were simple (i.e., only square power of two heightmaps were allowed). The restrictions on heightmaps for Landscapes are much more complex and rigid.

For more information see documentation: https://docs.unrealengine.com/en-US/BuildingWorlds/Landscape/TechnicalGuide/index.html

Using the Terrain Shape Designer, in world creator I able to create the shape of the terrain quickly in real-time by adding fractal noise levels I was able to fine detail the sculping design process, this, in turn, increases fine precision and detail in the terrain. the pathways were created using a path filter which works like spines in ue4 and added large mountains around the surrounding area to set a linear path for the player but also adding the illusion of a large open world.

Once I had a general sculpt of the terrain, I applied a filter a transform filter to get the detail into the mesh which will represent rocky terrain.

For more information see documentation: https://www.world-creator.com/mt-content/uploads/2019/03/documentation_en.pdf

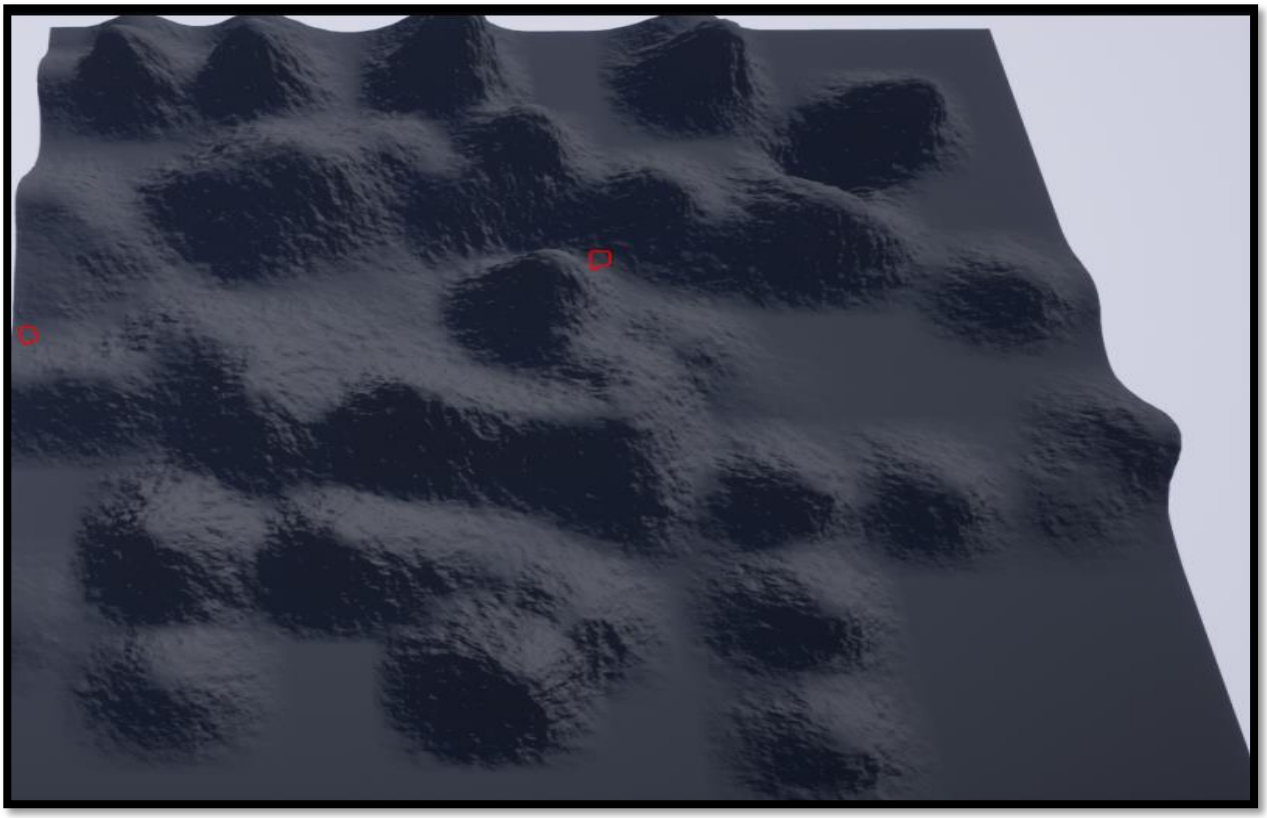


Exporting to Unreal

In world creator I exported the terrain to a heightmap and imported the heightmap into unreal engine, I needed to adjust the Z-axis inside unreal matching the mathematical equation in world creator as the terrain heightmap generated does not detect the right information which was found in the world created.

Playtesting

Now I had the heightmap in engine I was able to run around in a first person template and test the terrain. After play testing I needed to smooth out areas and used the sculpting tool inside unreal engine to adjust any issues where the player could get stuck. I also tested the length of the map as the song we selected was 6.02 seconds. I ran through the terrain and set a stopwatch and marked on the map (Below) to pinpoint the distance. After pinpointing I was able to set out the design of the initial sketch, I had by sculpting with in unreal any adjustments. I sculpted accordantly as I play tested multiple times throughout the project, later on in the project I decided to get rid of the split into the road as I did not have enough time and made a decisions of taking it out and focus on a straight linear pathway.



Heightmaps, blending/weighted materials

I applied procedural materials to the heightmap to get the ground textures by applying a mix of materials with a layer blend setup using blend weight to the heightmap. Using height blending it automatically applies stone to the mountain material and ground to lower materials using mathematical formulas to calculate the heightmap and blending materials this was applied by using a master material setup from the assets pack.

*See Appendix. A - - Redwood Forest Biome

For more information on MTL material is setup you can refer to the documentation in Appendix A.

Vertex Painting

Heightmaps, blending/weighted materials all setup I could paint onto the landscape using vertex painting. I can paint with a set of material pallets in unreal engine such as - Foliage, Stones, Dirt Pathways and Puddle. Vertex Painting Video Clip: https://youtu.be/aLp2K9we2iE

Volumetric Fog

Volumetric Fog is essentially an offshoot of this technique, creating dense fog in a scene which, when combined with Volumetric Lighting, can lead to deeply atmospheric visuals. This technique is used for fog, clouds, dust, smoke, or any airborne material capable of partial occlusion. It's particularly useful when combined with Volumetric Lighting, amplifying the effects. I added this to the scene to improve visual context and adding a sense of real-world setting.

Referencing – Woodland Scene

When designing the environmental scene, I always reference from a source image. Collecting reference is very important to create something that looks real, authentic and high quality. Using reference for your level designs is the key to create real, authentic environments.

One thing that I notice is that most people do not use reference material in their environment creation. That is a huge mistake. Reference is something that should always be used at every step along the mapping process.

I gathered a bunch of images from google and set them up into a PowerPoint mood board for reference material. The one that stood out to me was (image below) which was taken from a scene from a project used in unity called “Book of the Dead”. Even though I like to reference normally from real-life sources this looked so realistic and what I was aiming towards, having a beautifully lit forest and having a sense of mystery beyond the tree.

Using this reference image, I will set up a scene that looks somewhat similar to the assets which can be found in *Appendix A

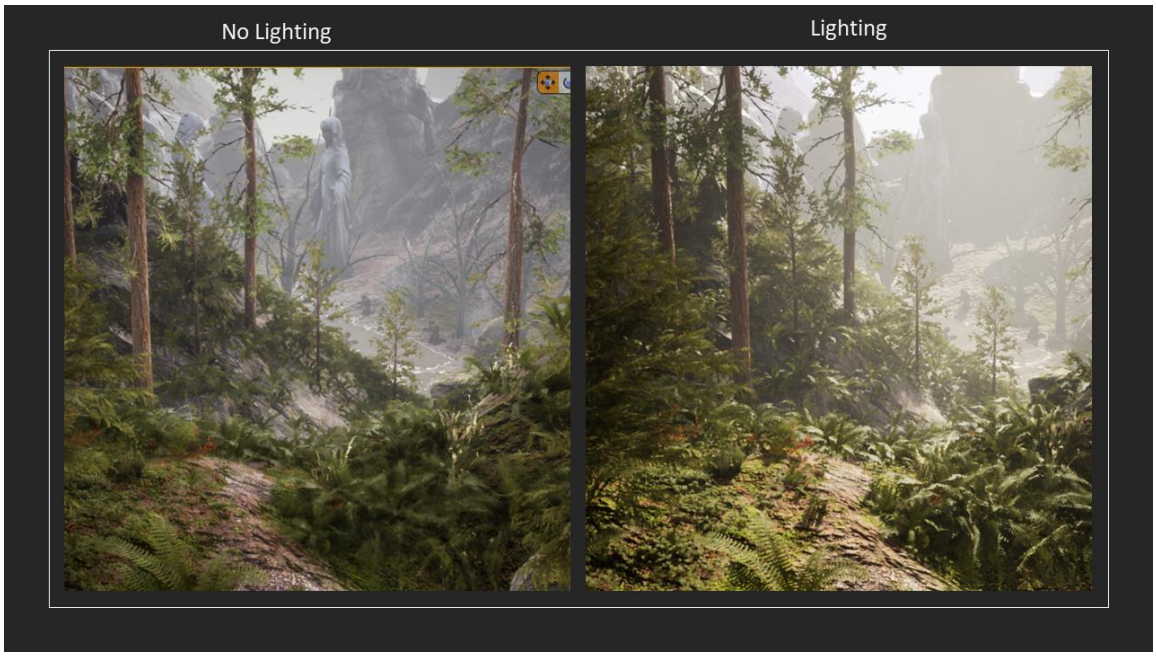
I will also focus on the lighting on this reference image where the rays shine through the trees and the way the lighting is bouncing.

Setting up the Scene

I set up the scene by adding assets purchased from the marketplace see *Appendix A and Quixel Megascans, this saved time as modelling was not an option in a short amount of time. When devolving the scene, I set a fixed cinematic camera in place so I can see it from the player's view, this can help see from different perspectives when building. I hand placed every asset and used reference images of forests to get ideas of how to place them and have a real-world feel for the experience for the player/viewer.

Lighting

Using referencing I experimented with the lighting pass to try and match the image, by adjusting parameters of the directional world lighting using Light shafts, Lightmass, Light functionalities and cascaded shadow maps I was able to bring the environment to life as the lighting plays a huge part of making a beautiful environment.



Post Processing

Unreal Engine provides Post Process Effects to allow to tweak the overall look and feel of the scene. I used effects include bloom (HDR blooming effect on bright objects), ambient occlusion, and tone mapping to get the overall setting in the scene and using the reference image get the subtle tones.

Finished Scene – The Woodlands

This is the finished scene from the start of the level I will be using the techniques discussed prior uses fixed cameras and hand place assets using referencing images. I will do this in sections like a jigsaw puzzle and piecing them together to make a unique experience for the player through level design.

Reference

Another reference I came across from the same project from “Book of the Dead” was this interesting scene I wanted something that would be a point of interest in the level where the player would turn a corner and reveal an interesting scene. I liked the human figures in this scene where they look lie they are made from ash or burned and are in pain and suffering which relates to the song choice. Words that describe the scene represents would be tragic, devastating, shattering which matches the words I would use for Dead Can Dance - The Host of Seraphim.

An American painter “Norman Rockwell” would use techniques to his illustrations by telling a story by a single image also known as the French word “Tableau “where the viewer can tell Where, When, Who, What, Why and How in a single image. Using these methods, I will engage an image piece through visual storytelling in my level design and use interesting points throughout this stage starting with this reference image below.

Setting up the Scene: Part 2

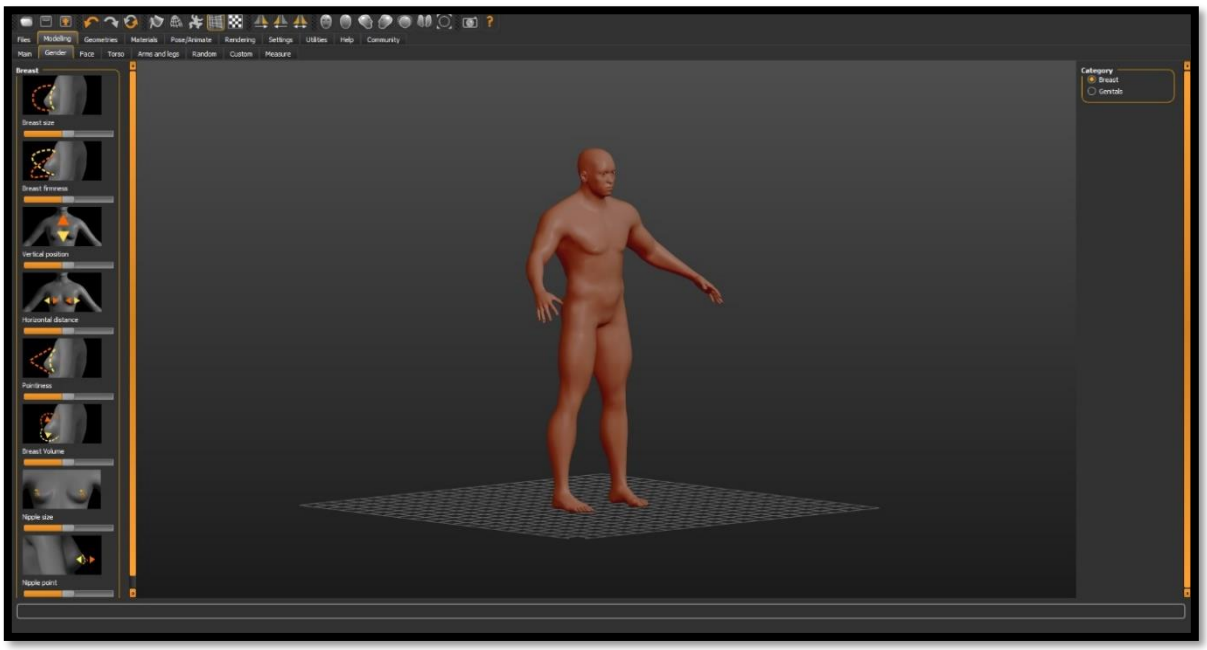
I took a part of the landscape which was most fitting and where the player would go around a corner revealing this part of the scene. This flat surface leading a view of the mountain landscape in the background and setting the scene in the foreground was a perfect spot, I vertex painted a stone layer and puddle layer through the centre of the scene using the same camera setup by pinning for my scene setup while I layout the scene using the reference image.

I added dead trees to the scene using an asset pack found here - https://www.unrealengine.com/marketplace/en-US/product/dark-forest

MakeHuman

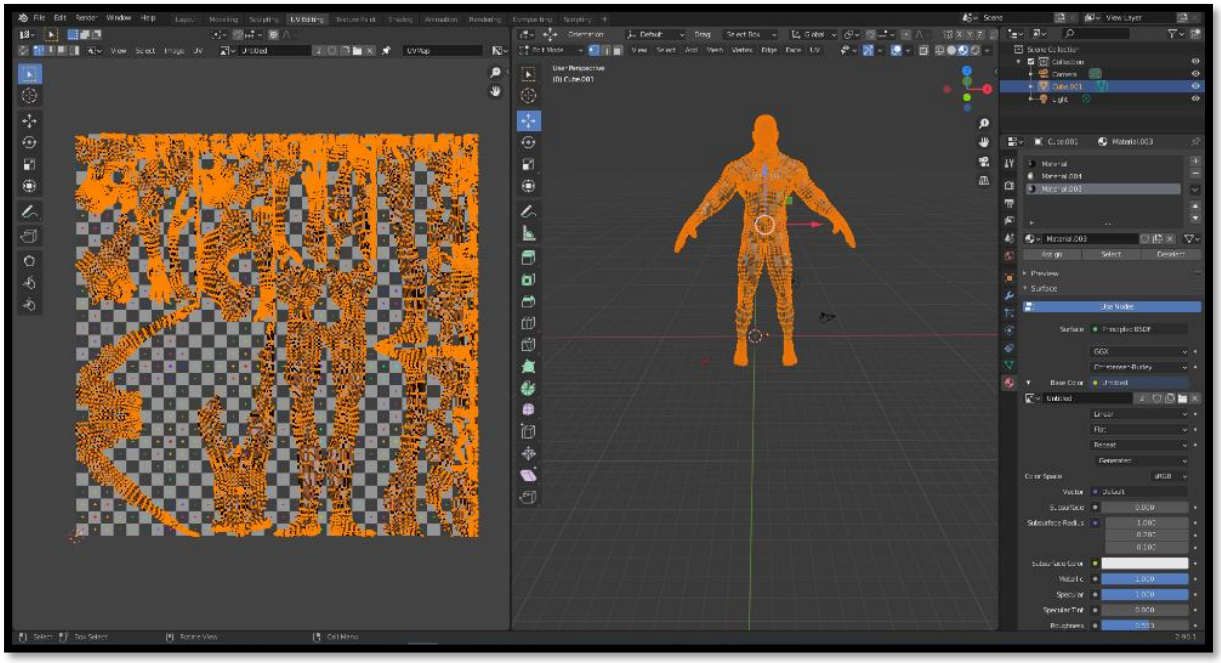
I wanted to add human-like figures to the scene based on my reference material and researched programmes that would be most beneficial for a quick fast easy solution as modelling a human from scratch would take to much time and was not necessary and realistic in the time frame. I found a programme called “MakeHuman”

MakeHuman is an open-source tool designed to simplify the creation of virtual humans using a Graphical User Interface. This is a specialized branch of the more general subject of 3D modelling. MakeHuman is to be able to quickly produce a wide array of realistic virtual humans with only a few clicks of the mouse and be able to render or export them for use in other projects. Humans are created through the manipulation of controls that allow for the blending of different human attributes to create unique 3D human characters. The controls are intended to provide the user with a simple way to create characters that give expression to the widest possible range of human forms. The controllable attributes are broken into two groups: macro and detail. The macro targets deal with overall human characteristics like gender, age, height, weight and ethnicity. The detail targets allow for the character to be further refined by focusing on the low-level details of such things as the eye's shape or finger's length.



UV Unwrapping

Once I created the model I wanted I exported the FBX file to blender which I used a bit of the sculpting tool to adjust some parameters with the model to shape it better as this was not going to be a standard human more of a bodybuilder type physique adding a strong overall upper body. I needed to apply texture so I UV unwrapped the model into sections as seen in the image below. I used UV maps to determine if thee was any overlapping so the textures do have any issues as the player will be able to see the models up close.

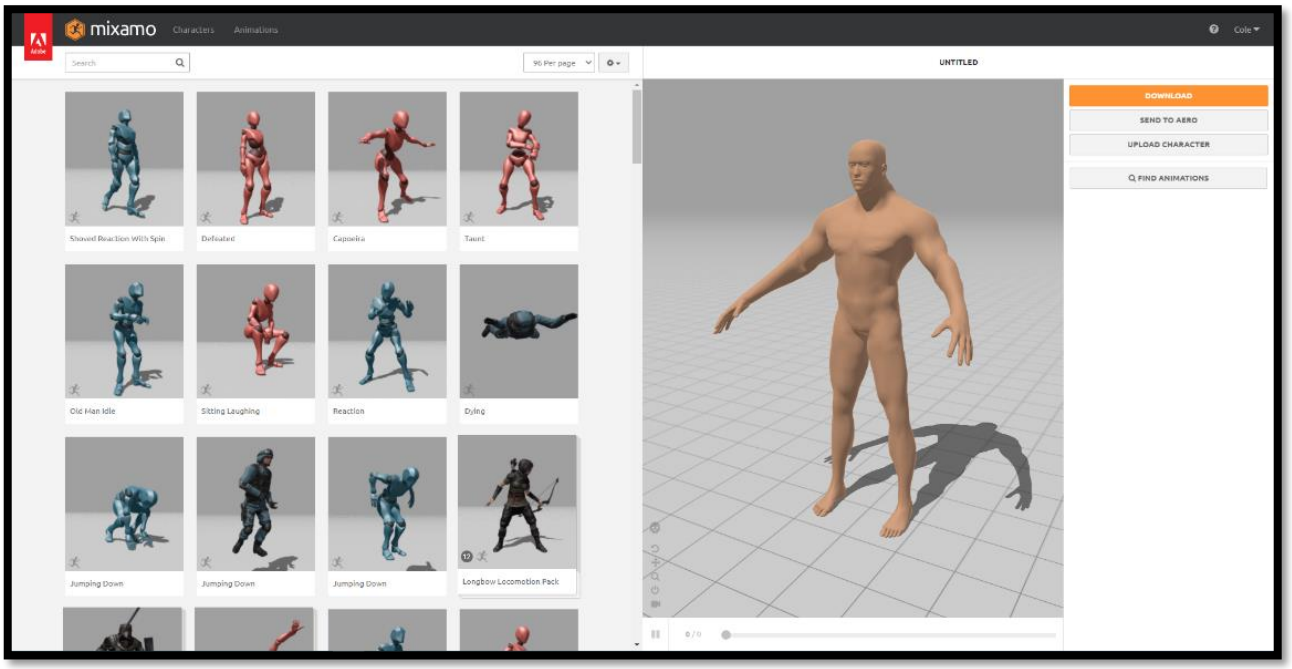


Mixamo

I needed to get the character into a pose that referenced the material I to sense dread and emotion through the expression of body language I needed to use a simple approach similar to Makehuman where I can quickly and quick and easy results and Mixamo was just that.

Mixamo is a free online service for automatically rigging and animating 3-D characters. Mixamo allows users to upload FBX, OBJ, or Zip files, and then the website attempts to automatically rig the character in under two minutes. The rigging process works best with humanoid characters which work perfectly for my needs.

I important my FBX model from blender into Mixamo which automatically rigs a full human skeleton ready to animate. I then found an animated pose found in Mixamo's library of animations.

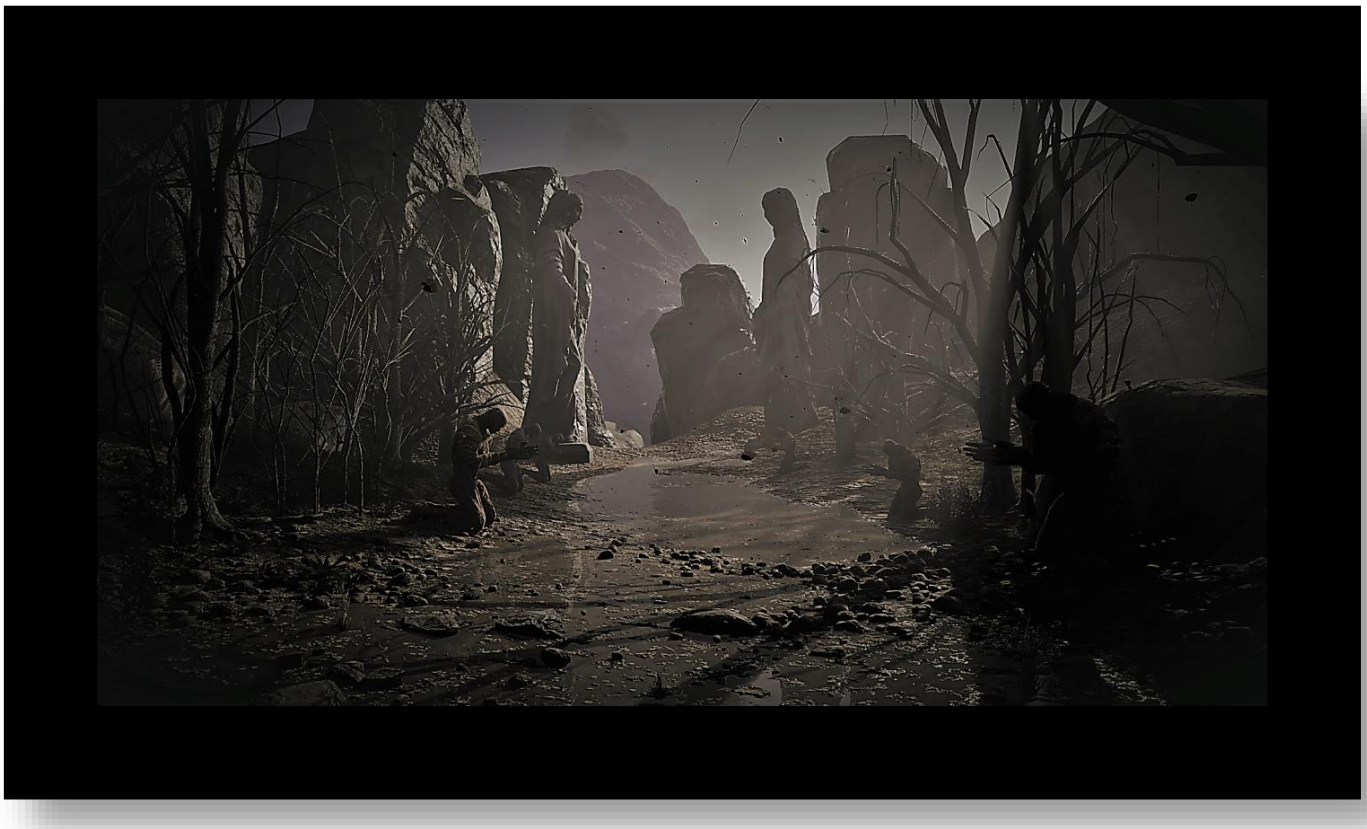


Animation UE4

With the skeleton and animation data now exported from Mixamo, I imported the data into unreal engine, by setting up blend space 1D in unreal and the animations and setting up the animation values. I then created an animation blueprint inside the engine and set up a state machine.

Finished Scene – The Woodlands

This is the finished scene I added some particle effects added from the marketplace of dead leaves blowing to add some story and more interest into the scene, of what looks like burned/dying trees and showing the sadness to the viewer. I added statues and cliffs to direct the focus using the rules of thirds.



Points of Interests

I added subtle points of interests through the level (example image below) adding these key elements makes the environment tell a story to the player. Even though this is a linear level design having “Points of Interests” helps tell the story along the path.

Final Scene

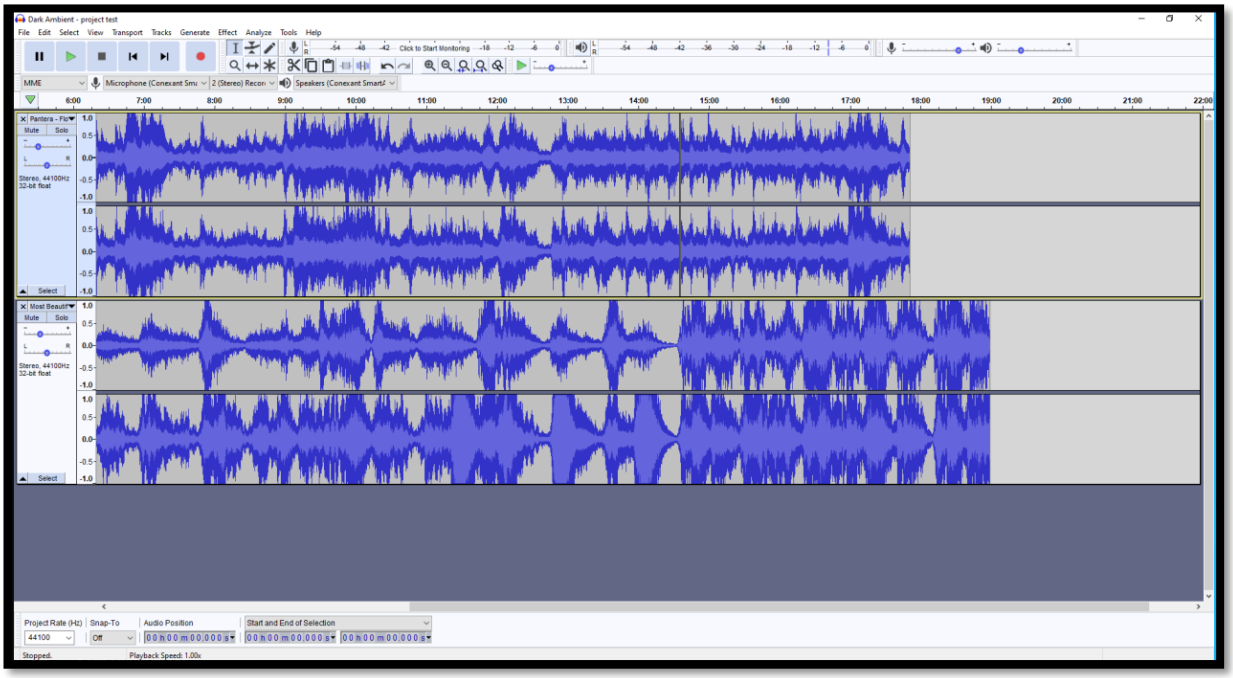
This is the finished scene when the player reaches the end of the level. As you go through the last part of the forest area and go through the last part of trees and foliage the level opens and you see a giant statue. The statue was made with the same Makehuman model same as the statue head using the same resources over and over in different ways speeds up the process by reusing assets throughout the design. I added to large spheres and textured them and place them far away in the world setting to achieve the planet effects.

SOUND

I created the soundtrack for the game using Audacity which is a Digital Audio Workstation also known as a DAW, I wanted to create something dark and eerier but also mysterious-sounding to match Dead can Dance – The host of Seraphim in terms of keeping to the task in hand. To create the sound, I used an interesting method of using a soundtrack of the band and changing it completely which the listener would never be able to tell it is the same song. I used was Pantera – Floods as the track as a low bass frequency and would fit well for what I was trying to achieve.

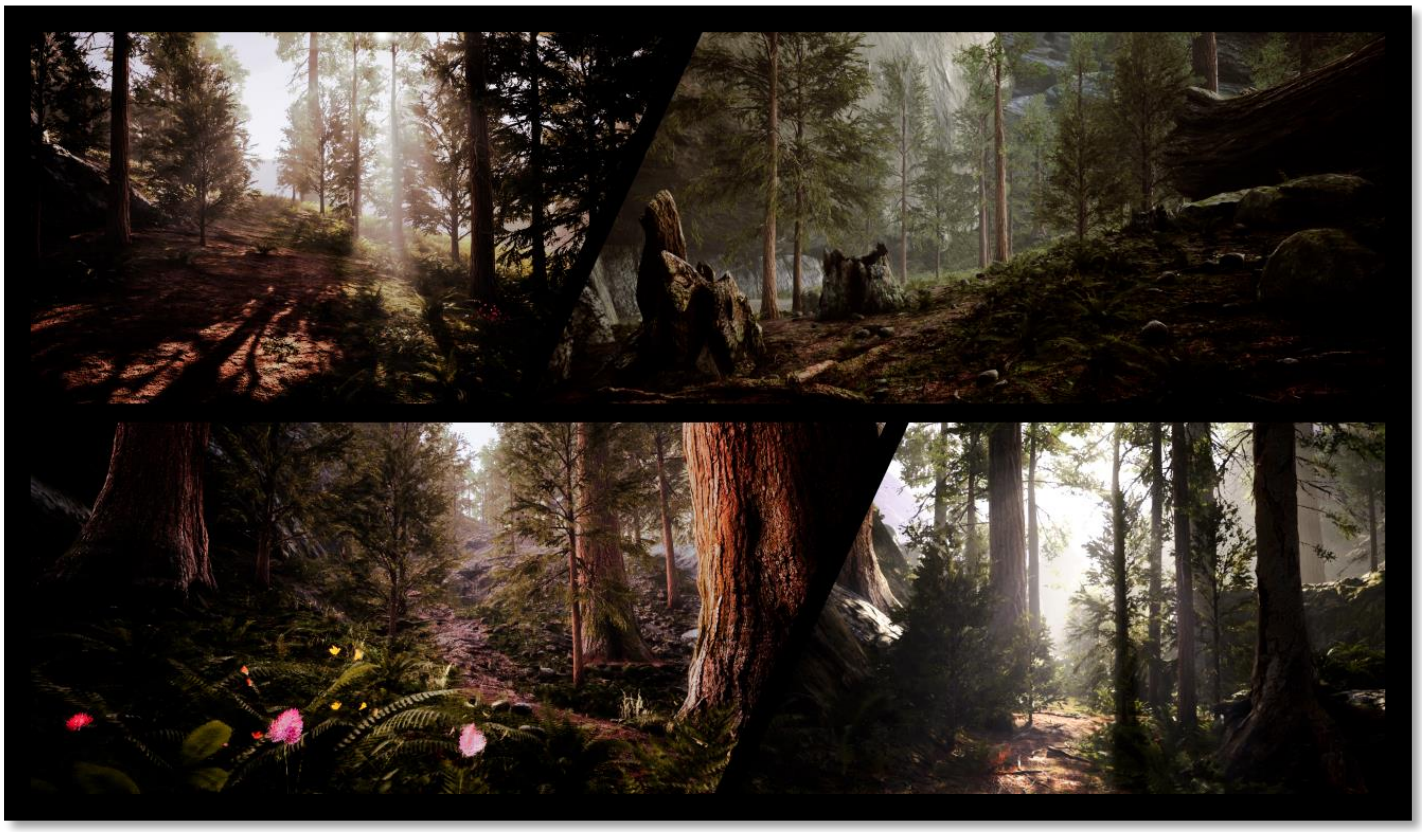
To achieve this I used effects settings inside Audacity by changing the speed of the track, changing the pitch, changing the tempo and using Paulstretch which stretches out the soundwaves. I used some vocal choir sounds and raindrops layered in the overall effect.

Soundtrack - https://www.youtube.com/watch?v=wc7ygc7XwKE&t=169s



FINAL RENDITION

I did some more testing using post-processing and editing the Gamma and shadows to come up with some effective results which I think was visually appealing I put together a mood board of the final scenes.



APPENDIX. A: REDWOOD FOREST

Complete biome solution to build a **photorealistic giant sequoia forest.** Full **procedural forest generation** or **painting** with **interactive foliage**. High-resolution photogrammetry models and textures of redwood trees, rocks, debris, plants and more. All assets with full sets of LODs tweaked for maximum performance at the highest photo-realistic quality. All asset setup for painting or full procedural forest generation. Build incredibly detailed forests with a few clicks. There is a large variety of foliage actors and other assets. An advanced ground material with 4 different surface types and auto slopes. Also included, a dynamic water material to create rivers/streams as well as a material wind system and procedural snow shader system. Powerful materials and landscape shader, highly tweakable.

FEATURES:

- Procedural forest generation
- Procedural snow/winter shader system
- Interactive Foliage
- 4 paintable landscape layers
- Paintable procedural water puddles
- Procedural slope material
- Procedural ground cover
- Dynamic river and stream material with particles
- Procedural moss material function
- Material wind system
- Full set of LODs + billboards
- 1qkm example map (showcase)

Technical Details

ASSET LIST:

- Large Trees: 8
- Medium Trees: 2
- Small Trees: 2
- Ferns: 10
- Var. Plants: 14
- Hanging Plants: 5
- Ground Cover: 29
- Rocks: 9
- Slopes: 12 (4x3)
- Debris: 7
- Background: 2
- Ground Materials: 9
- Particles Systems: 6
- Blueprints: 1

Online Marketplace: https://www.unrealengine.com/marketplace/en-US/product/redwood-forest-collection

Online Documentation: https://www.mawiunited.com/docs/doc_mawi_product_ue4_online.html