A background image of a snowy mountain landscape. In the foreground, a wooden torch with a bright orange flame is held upright. The background shows snow-covered peaks and a blue sky with falling snowflakes.

level design case study

While creating the *Frigid Mountain* level for my personal portfolio, I took the time to research and develop an effective design workflow. Hopefully, this article will illustrate what it took to create the piece from start to finish.

By Ryan Hoss

Introduction

Much like a commercial game project is handled, I broke up the development of my level into three phases: preproduction, production, and post-production. Doing this allowed me to plan my project out, and enabled me to focus on specific tasks in a logical order.

The Unreal Development Kit was my level editor of choice, due to its flexibility and capabilities.

Preproduction

The first thing I did was ask myself a few questions. What did I want to achieve with this level? What was my desired outcome? I

determined that I wanted to create a project that covered as many aspects of level and environment design as possible, so I could gain an overview of the entire production process.

With that goal in mind, I began to sketch out a rough layout of my level on paper. The environment I chose to create was a mysterious, snowy mountain. The main reason for this was because I could think of a lot of different level design aspects I could explore, such as terrain modeling, advanced material creation, particle effects, lighting, weather effects, post-production effects, and sound.

After completing my top-down level layout, I deconstructed it and made a list of the materials and assets I would need in the level--this proved extremely helpful later in the production stages to gauge my progress (see Figure 1).

The last thing I did in the preproduction phase was to create a concept statement, encapsulating the purpose, mood, and goal of my level in a short paragraph. This is what I came up with:

“My goal for this level was to create an environment that gives the player a sense of loneliness and despair. After being left at the base of the frigid mountain, the torches reveal the only path forward--towards the mysterious stone gateway ahead. My technical goals for this level included exploring the terrain system, fire particle effects, skyboxes, cutscene creation using Unreal Cascade, and the creation of snow effects.”

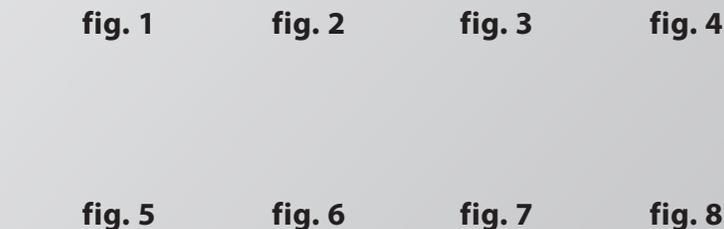
Production

Since the base of the level consists of the ground plane, I began in the UDK editor with the terrain tools. I didn't get too crazy with the complexity of the tessalations, but I did try to define an area based off my initial sketch for the player to run around in.

Then, I constructed a second terrain and placed it around the initial terrain in order to give the level some added depth and scale.

I then started thinking about the different layers of texture that would go on the terrain. I started with a base material for the mountain peaks, since most of the level would be covered by it. Then, I added the snow itself, mainly to the ground areas. For this material, I experimented with anti-tiling techniques and detail normal maps in order to produce a more realistic, detailed result (see Figure 3). The last addition I made to the terrain layers was a stone pathway leading from the coast to the doorway.

After finishing the terrain, I went to work on the other essential elements in the level. First, I placed a large plane at the very bottom of the level and added a dirt material to it to simulate the ocean floor. I then tackled one of the most complicated elements of the level--the water. I combined some of the techniques that I learned online to create an



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ocean with waves, highlights, and movement. Then, I created a skybox and placed it over the entire level, giving the illusion of the sky with moving clouds.

When I completed the base objects for the level, I started working on individual static meshes, using Maya. The first thing I constructed was a stone door. Before I started modeling, I set up the grid spacing to match the UDK's grid. This ensured that my assets were modeled to the scale I intended, and prevented me from having to perform additional manipulation in the editor. Then, I modeled the initial form of the door in Maya, checked to make sure

I had a clean topology, unwrapped the UVs, and used the ActorX plugin to export the object for use in the editor. I repeated the same steps for the ground torches (see Figure 4), and then imported the assets into the editor and put them into place (see Figure 5).

To really flesh out the rest of the environment, I started to work on the small, finer details of the level. The first thing I needed was fire for the torches. The particle fire effect I created has many elements: outside flames (using the sub UV system), an inside core that is a different color, sparks/embers, smoke, and heat

distortion (see Figure 6).

One major goal for this level was to have a working snow effect. Instead of using a graphics-intensive particle effect, I chose to go a different route. I modeled some simple planes that intersected with one another. I then created a moving snowflake material, applied it to the planes, and distributed them across the level to create the final effect (see Figure 7).

I then began lighting the level, using UDK's lightmass global illumination system. While playing around with some of the settings, I discovered that I could add more depth and believability to the level by matching the environment color to some of the colors in my skybox.

To add even more detail and enhance the mood of the level, I added height fog and postprocessing effects. The height fog made my water the icy blue I was looking for, and faded the ocean into the distance. With the postprocessing effects, I gave the level an overall bluish tone, and I adjusted the depth of field slightly, giving the level a film-like quality (see Figure 8).

Post production

One final, crucial element in the level was sound. I used the SoundCue editor to create an ominous, ambient sound effect used across the entire level. I then placed individual AmbientSoundSimple actors at the tops of the torches to simulate the roaring flames; the frequency increases the closer you are to them.

Finally, I used Matinee sequences in Unreal Kismet to create a cutscene of the level, showing off the final presentation. After seeing other level design videos where the camera flies by extremely fast, I tried to find a decent balance to where you have enough time to really examine the level as a whole.