Technical Design Document

GDV5001, WRIT1

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# Introduction

This document will investigate the design and implementation of various methods used in the creation of a clone version of Bullfrog’s *Dungeon Keeper 2* title (Bullfrog, 1999). For each of the key elements, research and analyse has been carried out looking into how the original title has achieved them and then comparing these to other related titles. Then looking into how each of these elements have been implemented into the clone version created for this project and if/how they can be used as part of the wider project.

# 3D Model Rendering

The Dungeon Keeper 2 title used the Graphics API Direct3D (PCGamingWiki, 2024) as they wanted to make a 3D game that utilised hardware acceleration. The lead of the development team is quoted saying *“We developed a custom engine that could render the entire dungeon environment and its inhabitants in 3D, which meant bringing in a much larger team—3D modelers, riggers, animators, the works,”*,(Lane, 2024) this upgrade was introduced to replace the original titles pre-rendered sprites with polygonal models allowing the game world and its inhabitants to be a 3D (PCZone, 1999). The OpenGL graphics API (KhronosGroup, 2025) was used to achieve this, a collection of OBJ files were loaded through a manifest via a model factory, where an ASSIMP (Open Asset Import Library) library parses the file and extracts all the relevant information such as vertex positions and normal etc and this data is then uploaded to OpenGL via vertex buffer objects (VBOs), vertex array objects (VAOs) and an index buffer to improve render speed. Once all objects are loaded a render function is called which iterates over all the game objects that have been loaded from the manifest and draws the objects to screen.

# Texture Mapping

Dungeon Keeper 2 makes use of many textures, including varying textures across walls and terrain. An assumption is made that each terrain/wall type has its associated predefined group of textures and during generation the game randomly selects from the appropriate group for each instance to avoid repetition. There was also the addition of bump mapping (Autodesk, 2024), a texture mapping technique, in the 1.7 update for the game, this added extra visual effects to the water and lava (Wiki, 2024). For this clone, each ExampleGO during its initialisation gets the texture and normal if needed from the manifest. Then before rendering , within the PreRender function it is assigned its appropriate texture units in the Initialisation, the main texture (GL\_TEXTURE0) and it if has the shader for doing so attach the normal map too (GL\_TEXTURE1). Render is then called where the objects model is drawn and the selected textures applied.

# Lighting

# Transparency

# Cameras

# Interaction

# Other Aspects

# Referencing

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