**Project Title:** 2.5D Tile based game with Procedurally Generated Content and engine

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**Abstract.**

This project aims to explore procedural content generation methods and common subsystems within game engines.

Using C++ as the main language, a suite of routines have been made to facilitate game creation, including a low-level OpenGL renderer, window context, input event system utilizing publisher/subscriber design pattern, font renderer, texture caching, and a logging system.

A basic 2.5D tile-based game has been developed using those routines, with the floor of the virtual world being rendered flat on a 3D plane and all sprite objects with height in 2D whilst existing at a location within the 3D world. Diamond Square and Perlin noise algorithms have been implemented and used to procedurally generate worlds . They are then filled with vegetation such as trees, shrubs, grass, rocks, etc. utilizing a Poisson disc sampling algorithm with noise as a density factor to cluster the objects. An object picker has been created which encodes all object IDs to identify their rendering locations such that the object under the mouse can be detected by the edges of their texture pattern. Ray plane intersection has been used to determine the position of 2D mouse screen coordinates within the 3D rendered floor.