Team Digging Ultimate Final Summary

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Project Overview

Team Digging Ultimate is a two-player, educational video game that can be incorporated within a school's curriculum. Players will be able to choose between two roles: a miner and a driller. The miner has a pickaxe that allows them to dig only the minerals found within a randomly generated cave map. The second player is a driller who can attack monsters that spawn in the caves to defend the team. With the minerals they find, the driller's attacks can be upgraded to deal more damage to specific mobs or to have greater resistances against hits. The powers of minerals will be based on their real-life counterparts, and in-game events such as cave-ins or gas leaks will add a level of realism. Our goal is to foster cooperation between young students while also introducing them to topics such as Geology and Earth Sciences.

Development and Testing

A crucial aspect of developing this game is consulting mining professionals, school districts, and students. The mining professionals will ensure that the game's content is accurate to real life and provides educational value. School districts will decide which content may be added or removed from the game to best fit their curricula. Students will test the game to ensure it is intuitive to play, engaging, and at an appropriate reading level so that students from a wide range of grade levels can enjoy and learn from it.

Throughout the game's development, a sample of students from the same grade will be tested on their knowledge of scientific concepts. Afterward, the students will be split into groups: some will play the game, and others will not. After some time, the students will be retested to see whether the game is helping them learn science. This test should be conducted across different grade levels to tweak any material that may be too advanced/unhelpful.

Requirements

We want our game to be accessible across a variety of different platforms and to perform smoothly across various hardware. School districts may have access to different devices and varying levels of network connectivity, so our game must be optimized in a way that would not take up more than 20 GB of storage on a student's device, handle 100 monsters on-screen without dropping frame rate, and have no more than 1 second of lag between inputs. Since cooperation is a key part of our game, crossplay should, at a minimum, allow students on current-generation consoles and mobile devices to connect and play with each other. To accommodate our young target demographic, our game will be rated "E for Everyone" by the Entertainment Software Rating Board (ESRB) and comply with the Children's Online Privacy Protection Act (COPPA).

Design Goals

Playful, colorful fonts should be used throughout the game to attract students and keep them engaged. Animations and monster designs should exclude gore or extreme violence to maintain an "E" rating from the ESRB. Game controls should be simple and intuitive so that a child can play the game with little guidance. Additionally, gameplay difficulty should offer multiple options to accommodate a wide range of ages.

Proposed System Architecture

The application will use a Client-Server architecture to handle two-player online co-op mode, alongside a local Model-View-Controller responsible for in-game logic. The Client layer will contain a Presentation tier to handle UI and model rendering as well as input handling. It will also contain a Logic tier that manages in-game physics, mob AI, and the game loop. A Data tier will also be used to store save files and the player's settings. The Server layer will enable online play and crossplay between players through peer-to-peer connections.

Subsystem Decomposition

We propose decomposing the system into 4 primary subsystems. The Game Core subsystem handles the game state and is responsible for triggering in-game events, map randomization, mob spawning, and biome generation. The Inventory/Item subsystem is responsible for handling continuously updating values, such as items collected, health, item durability, activated status effects, and equipment upgrades. The Networking subsystem is responsible for online or local-area network matchmaking, player state synchronization, and the direct friend-invite flow. The UI/Presentation subsystem will render views such as the main menu, HUD, ore journal, completion screen, and paused screen.

UML Class Diagram

Figure 3a.1 – Initial Class Diagram

(Team Digging Ultimate — core classes, no internal details)