**Analysis**

**Project Overview**

In this project, I will be exploring a Solution to a problem, to fulfil the needs of my client. Video game, since their creating have been a means of socialising, connecting and relaxing. A recent boom in popularity, owing to people spending more time gaming since the recent Covid-19 pandemic and lockdowns, has resulted in games becoming a staple in many people’s lives. This ever-growing popularity creates a strong demand for new and unique games to enjoy.

**Project Outline**

My client is an avid video game enjoyer, who like many enjoy the social aspect of video games. They require a multiplayer game in the “Creative Sandbox” genre, so that they can play and create with their friends.

While this may be available through other games, their requirements for a game that runs well on very low powered hardware so that they can run the game on their laptops in a LAN configuration, vastly limits the choices of game. This excludes games such as terraria or Minecraft.

With all this in mind, the client has made it clear that they want a complicated and optimised map generation algorithm as well as multiplayer capability, as connecting on the same session is the most core component, and the most decorated feature.

**My Client**

My client in question is an avid video game fan. They particularly like retro style games, with simple and well executed features.

**An Interview with Elliot - My Client**

1. How would you like the game to be played?

A1: The Game needs to be playable on PC, as my friends and I all have laptops which we play our games on. Therefore, the controls need to be suited to a keyboard and mouse, and with a trackpad friendly control scheme.

1. How would you like the game to be used and by who?

A2: The game will be played by me and my friends using multiplayer. In either a LAN with all players on my Wi-Fi, or over a WAN hosted by me as I know how to set my router up for Port-Forwarding.

1. Which aspects of a “Creative Sandbox” do you find most enjoyable?

A3: For me I find the building aspect of the game most enjoyable. Coming up with an idea for a build. then creating it in ‘reality’ most appeals to me. I also enjoy exploring the game world, as I can often find inspiration of new builds in the landscape.

1. Which features would you most associated with a “Creative Sandbox”?

A4: In my opinion, gathering recourses for a build through mining is a key feature of a creative game. As it rewards the player with a real sense of achievement and satisfaction, knowing the work it takes to complete their build. I also enjoy the sense of progression, as getting new tools makes once difficult tasks seem trivial.

1. Which areas of a “Creative Sandbox” map are you most interested in?

A5: Of course, the landscape of a map is important, as the majority of the gameplay occurs there. However, I find exploring the thrill of exploring cave systems in games to be the most enjoyable.

**Objectives**

1. Have functioning game element, which:
   1. Allows the player to move around the world,
   2. Contains hostile Mobile-Entities (mobs) in the world,
   3. Has some form of combat between the player and the mobs,
   4. Has a unique procedurally generated terrain and cave system,
   5. Has a destructible world where blocks can be mined by the player,
   6. Has a building system where the player can build structures,
2. Have a functioning Menu System, which:
   1. Allows for new games to be created,
   2. Allows for players to connect online,
   3. Displays the game title,
   4. Allows the user to close the program,
3. Have a functioning Multiplayer System, which:
   1. Allows multiple players to play in the same world,
   2. Allows the world to be synced across each player,
   3. Allows interactions between players,
   4. Allow players to connect through LAN or WAN
4. Satisfy the clients brief by:
   1. Have a save-able and load-able world,
   2. Have a Day / Night cycle,
   3. Include fantasy mobs such as skeletons, or zombies,
   4. Be playable on PC,
   5. Be playable on a mouse and keyboard or trackpad,
   6. Have a tunnelling cave generation algorithm,
5. Be appealing to my End-Users by:
   1. Having a consistent art style throughout,
   2. Using a consistent pixel by pixel tile size throughout,

**Similar Games**

In order to create my program and explore possible features, I have researched into 2 existing “Creative Sandbox” games. Minecraft and Terraria.

|  |  |
| --- | --- |
| Minecraft | Terraria |
| * Made for PC and other platforms.= * 3D * Able to create LAN multiplayer games, however there’s no inbuilt way to play WAN multiplayer for free. * Uses 16x16 pixel art style. * Procedurally generated map with cave system. | * Made of PC and other platforms * 2D * Can create free multiplayer games * Uses pixel art textures. * Side Scroller * Items to enhance your character. |

**Research**

From these nots I have devised that me “Creative Sandbox” game will:

* Be a side-scrolling 2D game, to reduce computational load on a system.
* Use Keyboard and Mouse/Trackpad controls.
* Feature pixel art graphics (8p8px).
* Have free WAN multiplayer capability.
* Include a uniquely generating map and cave system.
* Include crafting/progression to enhance a player’s character.
* Include game saving where the world can be saved and loaded from the server.

My solution will require two applications, a server and client. My client will run the server application and then, they can connect using client applications.

**Outline of Solution**

Random Map Generation

To meet the clients brief, I will be making use of random map generation, meaning that a uniquely generated map can be made for each new game. In order to do this, I will need to find a way to randomly generate a map.

Although, Minecraft is a 3D game its’ early beta methods for world generation are great to analyse. As it is made for 3D, an altered 2D version of its’ system producing a single slice would be highly efficient. For my research of Procedural generation therefore, I will have researched the solution used by beta versions of Minecraft. Minecraft uses a Perlin noise function to give the height at each given coordinate, in addition to many other functions to add trees and caves when creating a map. As my game will be 2D I will have to research other methods of generation of cave systems and other world features. For cave generation I will produce a prototype, to explore different methods; giving me a chance to analyse and evaluate each solution. In this I will explore both a Perlin noise approach and an iterative cellular automata approach.

**World Generation Prototype**

**Entity Relationship & Scene Diagram**

**Asset Requirements**

**Data Sources**