**CS 3307 Group Project - Stage 1**

**Project R.E.M.**

**Group 15**

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**Description**

We are creating a single player 2D video game in C++ that will run on the Raspberry Pi. Our game will be a shooter from the top down perspective, with an 8-bit art style. It will feature waves in which the player must defeat all the enemies to traverse through. Each wave will get progressively more difficult, with an increasing number of enemies, enemy health, and enemy speed until the player reaches the end. Killing an enemy will grant the player currency, which varies depending on how difficult it is to defeat the enemy. After each wave, the player has the option to purchase health and weapons with the currency they acquire. The shop will be randomized each wave. It will be playable with a mouse and keyboard. The game will be created using the Godot game engine, and any other C++ programming will be coded in Eclipse.

**Required Features**

* Main menu featuring the title of the game and the creators.
* Currency that the player acquires through defeating enemies. The player can buy additional weapons and health with this currency.
* Shop which contains three weapon slots that are randomized each wave as well as a health station.
* Health system where health regenerates upon the completion of each wave. The player can buy health at the shop.
* A map the player can traverse,
* Three various enemy types.
* Each enemy type will have varying A.I. behaviours.
* Five different weapons including a pistol, submachine gun, shotgun, rifle, and rocket launcher.
* The game must end after ten waves.

**Optional Features**

* Upon completion of the game, the player will unlock additional characters to play as.
* Additional weapons.
* Additional enemy types.
* Boss fight at the end of the tenth wave.
* The shop will have a G.U.I.
* A storyline the player can follow.

**Wish-list Features**

* Perks the player can buy from the shop such as speed boosts, resurrection, temporary invincibility, etc.
* Challenges the player can complete to unlock characters.
* Additional maps.
* Boss fight at the end of every third wave.
* Dynamic level changes such as parts of map catching fire, being submerged in water, and traps the player must avoid.

**Risks**

* Hardware limitations including a risk of frame lagging/freezing
* A.I. - varying behaviours for each enemy type
* Physics - bullet particles, rendering, animation
* Game engine - ensuring Godot can run on Pi

**Other Notes**

* Game development will primarily be done in Godot. If any issues arise, the rest of the game will be programmed in Eclipse.
* Artificial intelligence, primarily graph traversal, will be tentatively handled by simple reflex agents in order to minimize the computational footprint of our bots. If more surplus CPU time is found than expected, tree search algorithms that implement things such as alpha-beta pruning may be tried.

