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Abstract

This document presents the collaborative efforts of our team's contribution to the project. Preliminary design of our project includes:

- Artificial Intelligence
- Player Characters
- Menu and Interface Logic

Module: Artificial Intelligence

I have found three interesting AI archetypes on the internet: The "Guard Dog", the "Patroller", and the "predator", which are common AI types found in many games nowadays. These archetypes can each be divided into a ranged or melee flavour.

I believe that it is in the best interest of the game to implement a few different AI modes, to make the minions that populate the map a little more interesting, and also to keep all players engaged.

The Guard Dog:

The guard dog is an enemy archetype which will be in a WAITING state at its spawn point. It will be aware of entities in cells of a given radius from its spawn point (a guard area). When a PC enters its guard area, the guard dog goes into a MOVING state and @ for the offending PC. When the guard dog is in combat range of the PC, it will go into the ATTACKING state. If the guard dog hit points are reduced to zero, it goes into a DEAD state, and is removed from the game. If the offending PC is killed, the guard dog will check for another PC to engage. If it fails to find a PC, it will go into a MOVING state to return to its spawn point. Upon arrival, it enters a WAITING state.

The Patroller:

The patroller is an enemy archetype, which will be in a MOVING state normally. It will have n nodes, and will travel from node to node, in some circuit. The patroller searches for a PC and is aware of the cells nearby it as it moves around the map. When a patroller becomes aware of a PC, it will break from its patrol to pursue any PC that it sees, until the PC leaves the cells that the patroller can see, or until either the PC or the patroller die. If the PC is killed, the patroller will return to its patrol, which involves checking its nearby cells for new PC targets.

The Hunter:

The hunter is an enemy archetype which will at the beginning of a game, select a PC as a target, and immediately move towards the PC, with the intent to engage them relentlessly. The hunter will have a WAITING state, for target selection purposes, but then should spend the majority of its time in a MOVING or ATTACKING state. Upon killing its target, the predator will go into a WAITING state and select a new PC to attack, at which point it will go into a MOVING state once more.

The Sentinel:

The sentinel enemy archetype is a more specialized version of the “Guard dog” mentioned above. It begins in a WAITING state, and monitors the cells surrounding its spawn point. Should a PC enter this guard area, the sentinel will enter the ATTACKING phase and take action against the NPC (spawning smaller minions, like a beehive spawning bees). If the PC leaves its guard area or is destroyed, the sentinel will reset to a WAITING state.

Module: Player Characters

Controls

- Movement
  - WASD keys
  - Collision detection, i.e. can't move into an occupied cell
  - No moving off the map
- Attack
  - L Mouse = normal attack
  - Mouse wheel = toggle between melee and long-range normal attack
  - R Mouse = special ability: short cooldown
  - L Shift + R Mouse = special ability: medium cooldown
  - Spacebar + R Mouse = special ability: long cooldown
  - Cooldowns

State

- x,y position on map
- HP
  - Dead @ 0 HP
- EXP/Level
- Stat boosts
- Status effects, i.e. blessings & curses from deities
- Game points
  - Variable bonuses depending on task completion, examples inclue:
    - Beat a minion
    - Beat a mini-boss
    - Beat a boss
    - Beat a champion
    - Last survivor
  - Recording points

Module: Menu and Interface Logic

States:

Initialization

- The game's initial loading when the user first launches the game
- Loading screen/Splash screen

Main Menu

- This is where all the initial ui elements will be, the main menu will consist of:
    - Quit option
    - Find/Join game option
    - Create game option
    - Settings option

Quit

- Game will terminate normally.

Finding/Joining Game

- This will be a simple menu where a user will specify the IP and port of a server they wish to join

Game Lobby

- This is where all the players will go after they have successfully joined a game and wait until everyone is ready.

Settings

- This will be a simple menu that will contain any settings options regarding the game.
- Graphics options? Resolution? Sound on/off? Windowed vs Fullscreen?

Pre-game loading

- This state will occur when everyone in the lobby is ready.
- This state will initialize the game world and will wait till every player is connected and ready before officially starting the game

Game Mode

- Pre-game loading has finished, here is where the game will be played and in progress.
- Upon finishing a round/match, players will be moved back to game lobby.

State Diagrams

General AI State Diagram

INIT: In this state, the NPC is initialized and added to the game world. Once this has been accomplished and the NPC object has been added to the game world, it enters a WAITING state.

WAITING/IDLE: In this state, the minion will be carrying out its default behaviour (moving from node to node, or holding at a location), while checking the cells in it can see for any PCs. When a PC is detected, the minion changes to the MOVE state. If a minion is killed (set to 0 HP) without detecting a PC, it changes to the DEAD state.

If a minion is not at its start location/spawn point, and there are no PCs in range, it will go into the MOVE state and return to its start location.

If a minion is attacked it will go to the MOVE state, towards its attacker.

MOVE: In this state, the minion will move towards a PC until they are in range of their primary attack and enter into the ATTACK state.

If a minion is not at its starting location, and there are no valid targets in its guard area, it will reset to the WAITING state.

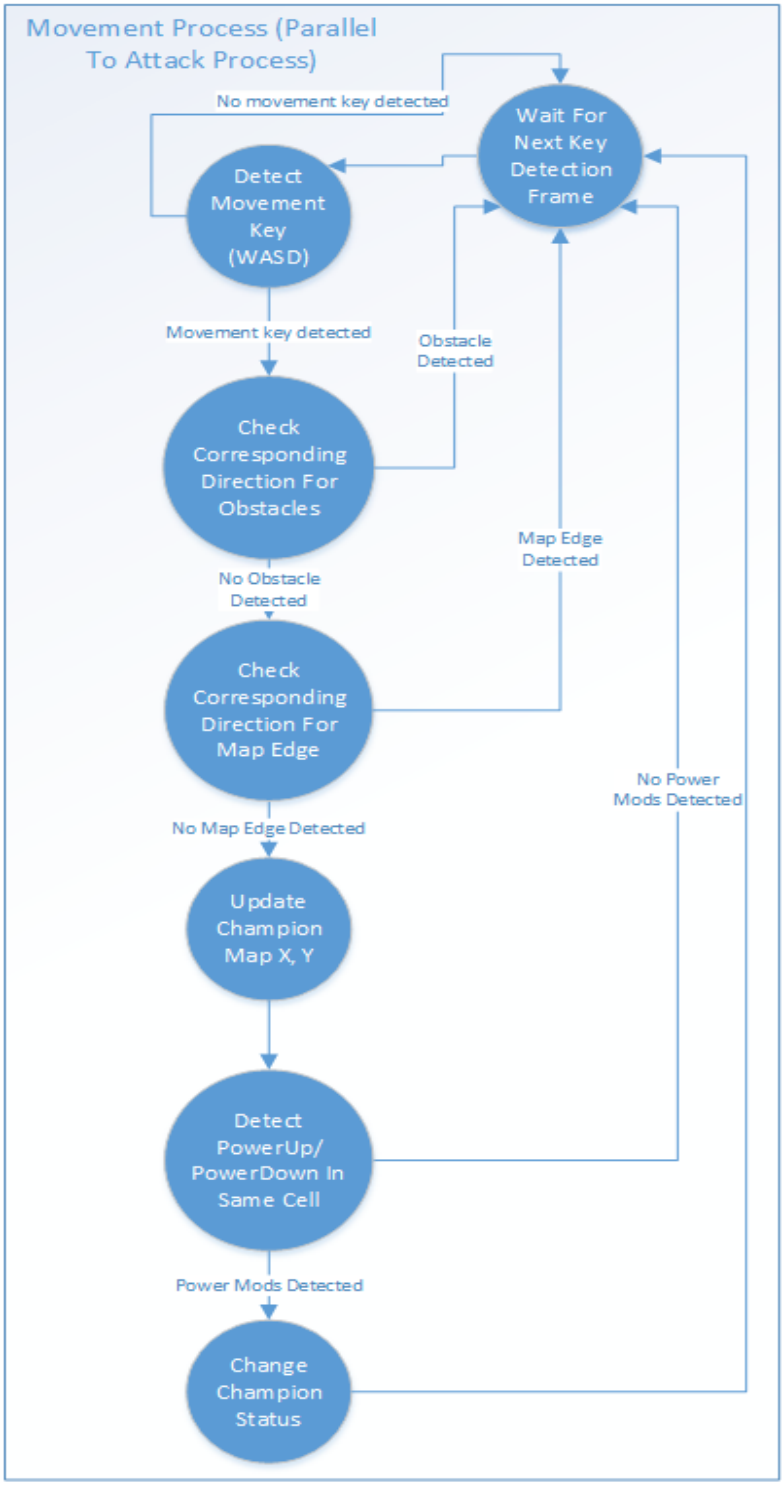
If a minion hit points are set to 0 or less while in this state, it changes to the DEAD state.

ATTACK: When a minion is within its weapon's firing range, it will begin attacking the PC until

- the PC moves out of range of the attack, at which point the minion will go to a MOVE state.
- The minion is set to 0 or less HP, in which case it goes to the DEAD state.
- The PC is killed, in which case the minion goes to the WAITING state.
- the PC leaves the guard area, in which case the minion goes to the WAITING state.

DEAD: When the minion is in this state, its data is removed from the game. (whatever that might mean; I'm not sure myself.).

Champion Movement State Diagram



Wait For Next Key Detection Frame: Assume that there's a small delay until the game would take in keyboard input so users can't use bots to spam control input.

Detect Movement Key: A time frame in which the game will take *one* key from WASD as a valid movement input

Check Corresponding Direction For Obstacles: self-explanatory, can't move in a direction with solid obstacles

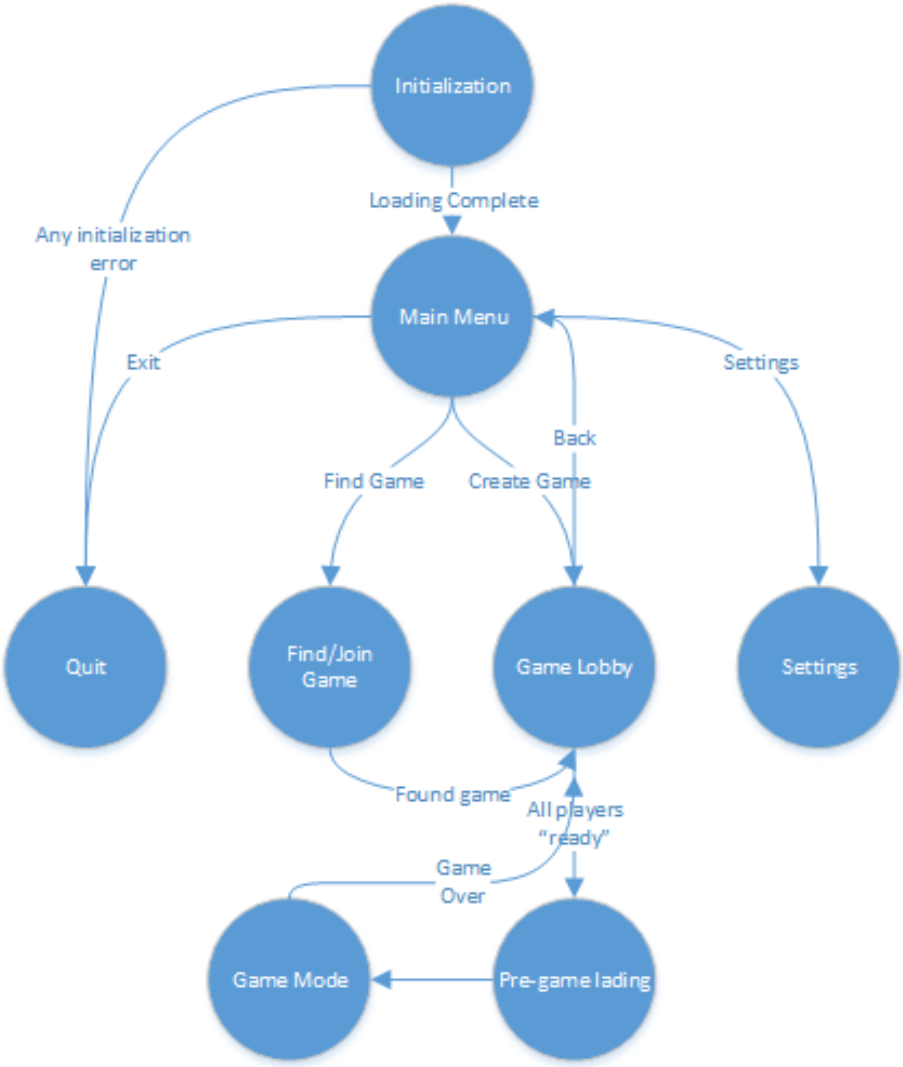
Check Corresponding Direction For Map Edge: can't move off the edge of the map

Update Champion Map X, Y: if there are no problems, move champion into the corresponding map tile

Detect PowerUp/PowerDown In Same Cell: see if there are champion upgrades/downgrades in the cell the champion just moved into and absorb it

Change Champion Status: change champion status according to the upgrade/downgrade detected, we have no idea what these could be at this point in time

Main Menu & UI State diagram



Initialization: Game is initializing

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