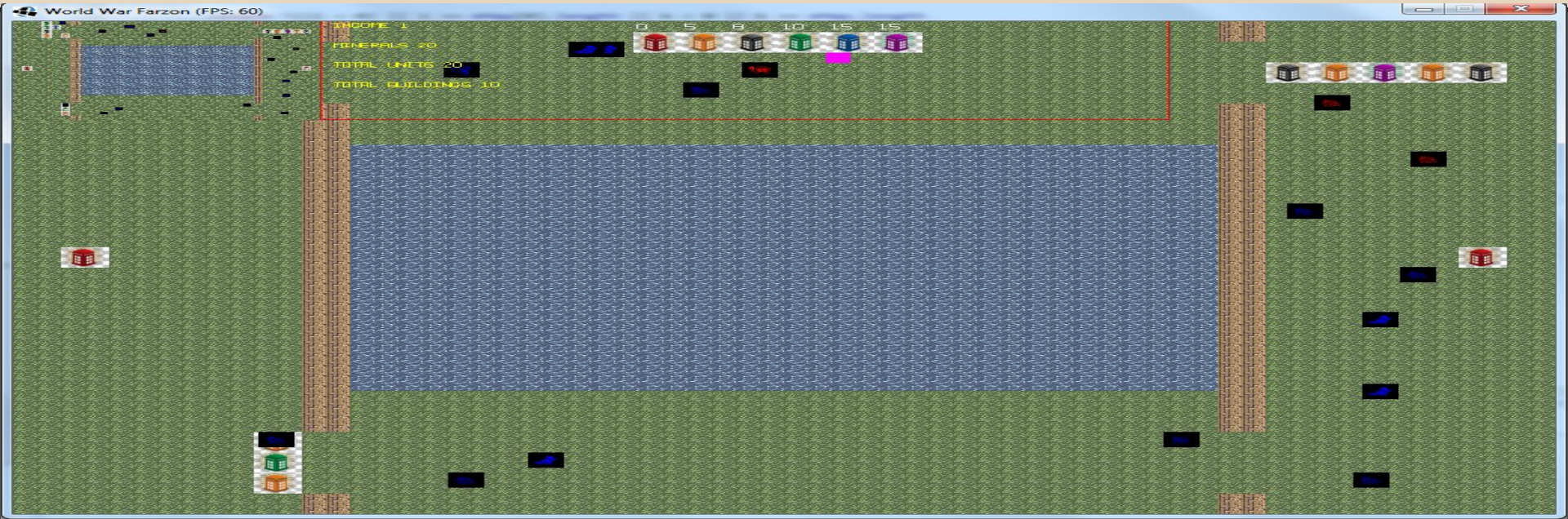
Nexus Wars

By Kyle Davis, Kevin Johnstone, Farzon Lotfi, and Josh Zeder



Game Description

- The goal of the project was to create a tug-of-war style game where a player must compete against a computer opponent that has a high level of intelligence.
- Our game, Nexus Wars, is a tug-of-war style game where a human player competes with an AI to be the first to destroy the opponents Nexus. In order to accomplish this, players build buildings that spawn units corresponding to each building type.
- Every unit has strengths and weaknesses

Artificial Intelligence

- Our project required the implementation of two different artificial intelligences.
- The first AI, called the internal game AI, is responsible for unit interaction in the game including path finding and combat simulation.
- The second AI is limited to the same rule set as the player and acts as an opponent to the human player.

The Internal Game AI

- The internal game AI utilizes influence maps for path finding
- Influence Maps result in emergent movement and combat behavior
- Whether an enemy engages with another is dependent upon unit attack range and the amount of enemy influence seen on the map
- Movement between the top and bottom lames are highly self contained due to the analyzing the type of terrain on the map when spreading diffusing influence values

Opponent Artificial Intelligence

- Makes game decisions with the only the information the player receives.
- Uses a rule based system to make decisions including what type of buildings to build, where to build them, and when they should be built.
- The rules allow for the opponent AI to dynamically adapt to any game situation by using all available in game data to make probabilistic decisions.
- An example is the opponent AI enumerating the human players unit composition in a map lane by overall attack speed, health, and armor types and comparing against its own composition in the same lane. If the computer finds it is at a disadvantage, it will calculate the best way to counter the human given its current resources.

Game Engine

- Graphics Written in OpenGL
- Extended many LWjGL features
  - load textures
  - custom game loop without callbacks
- Smart Map generation by eliminating overlapping drawings
- Dynamically placed Menu system that follows users as they scroll and zoom
- Extensive use of established software design patterns
  - Builder pattern implemented for units and buildings
  - Singleton pattern for GameMap class
- Sprite reuse to reduce memory and draw operations

Nexus Wars Game Demo

Video 1

https://youtu.be/sN7NKILIIlY

Video 2

https://youtu.be/0CYrthHQbIg

Questions?