

Name of the game

War of Heroes

Team members

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The idea of the game: theme, setting, and goals.

Theme: War Game - Players will command their armies to fight a war against other player armies.

Setting: The battlefield will be Modern Day, the basic map will be a mountain land with large open areas. There will be a bit of science fiction but that will mostly affect Hero Units rather than the setting.

Goal: Collect resources, Build an army, and Destroy the other enemy's main base.

The game objects: player's units, enemy units, and environment.

Player units (dynamic - humanoid):

- Workers
 - These units main role will be to build different types of buildings and collect resources
 - For resources, they go to resource buildings that spawn in the world map to claim the resource buildings, which will then automatically start producing more resources for the player.
- Military units
 - The army, these units controlled by the player, will move out to attack against enemy units and enemy buildings. There are different types of military units that share a majority (if not all) types of actions, but they will have different stats and resource costs to create them.
 - Types of Military Units:
 - Infantry
 - Cheap to make and they are generally fast, but have low firepower
 - Can unclaim enemy player's claimed resource buildings. However, they cannot claim resource buildings like workers
 - Marksman
 - Semi-expensive to make and slow, but have stronger firepower than infantry units

- Tank (Articulated)
 - The most expensive unit, but are the strongest and fastest
- Hero
 - An enhance version of a Military unit with a unique special ability
 - For example, the ability to convert an enemy unit

Enemy units (dynamic - humanoid):

- Enemy AI will have access to the same units and buildings as Player units. The units and buildings will also function exactly as the player's.

Buildings/Environment (static):

- Main Base
 - The starting and most important base
 - If destroyed, the player is out of the game (loses)
 - Military units are created through the main base as long as they have the required resources to make the unit
 - Turrets and Routes are bought through the main base as long as they have the required resources to buy said building. (We have the model for these but they were not implemented.)
- Quarries (Gold)
 - Type of resource used to buy military units
 - Requires workers to claim this building to start producing more gold
 - Numerous spawns in the world
 - Can be reclaimed by the enemy
- Mines (Iron)
 - Type of resource used to make buildings and to a lesser extent, military units
 - Requires workers to claim this building to start producing more iron
 - Numerous spawns in the world
 - Can be reclaimed by the enemy

Collectible items:

- Health Packs
 - Will heal the unit(s) that picks it up
 - Numerous spawns in the world
- Construction Material
 - Will provide extra iron resources to the player when picked up
 - Numerous spawns in the world
- Money Resource
 - Will provide extra gold resources to the player when picked up

- Numerous spawns in the world

The actions of the military units and buildings

Ally/Enemy units:

Worker:

- Move
 - Moves to a location
 - Not found in the ActionList in game but will be performed automatically when the conditions are filled in game
- Convert
 - Claims a resource building

Infantry:

- Move
 - Moves to a location
 - Fast move speed
 - Not found in the ActionList in game but will be performed automatically when the conditions are filled in game
- Attack
 - Attack an enemy unit or base in range
 - Short range
 - Low firepower
 - Not found in the ActionList in game but will be performed automatically when the conditions are filled in game
- Collect resource
 - Collects resource found in the world
 - Not found in the ActionList in game but will be performed automatically when the conditions are filled in game
- Attack Nearest
 - Auto find closest enemy to attack
- Rest
 - Regenerate hp overtime while resting
 - Stops moving/attacking
- Guard
 - Stand in place and attack anyone within range
- Convert
 - Unclaim enemy claimed resource building

Marksman:

- Move
 - Moves to a location
 - Slow move speed
 - Not found in the ActionList in game but will be performed automatically when the conditions are filled in game
- Attack
 - Attack an enemy unit or base in range
 - Long range
 - Medium firepower
 - Not found in the ActionList in game but will be performed automatically when the conditions are filled in game
- Attack Nearest
 - Auto find closest enemy to attack
- Rest till healed
 - Regenerate hp overtime while resting
 - Stops moving/attacking
- Guard
 - Stand in place and attack anyone within range

Tank:

- Move
 - Moves to a location
 - Fastest speed in the game
 - Not found in the ActionList in game but will be performed automatically when the conditions are filled in game
- Attack
 - Attack an enemy unit or base in range
 - Longest Range - Range of 15
 - High firepower
 - Not found in the ActionList in game but will be performed automatically when the conditions are filled in game
- Attack Nearest
 - Auto find closest enemy to attack
- Rest till healed
 - Regenerate hp overtime while resting
 - Stops moving/attacking
- Guard
 - Auto attack units that are within the guard range

Hero:

- Move

- Moves to a location
- Different speed depending on the country's hero
- Not found in the ActionList in game but will be performed automatically when the conditions are filled in game
- Attack
 - Attack an enemy unit or base in range
 - Different attack range and firepower depending on the country's hero
 - Not found in the ActionList in game but will be performed automatically when the conditions are filled in game
- Attack Nearest
 - Auto find closest enemy to attack
- Ability
 - Doubles speed and damage for short duration of time
 - Ability Stacks: Unique ability can only be used a certain amount of times
 - If the hero's HP drops to 0 before completing using its ability, the ability is canceled and then the hero dies
 - If the last charge is used up, the hero then dies
- Rest till healed
 - Regenerate hp overtime while resting
 - Stops moving/attacking
- Guard
 - Auto attack units that are within the guard range

Buildings:

HQ base:

- Create Units (press "p" to pull up the unit menu)
 - Can only create unit if they have the required resource amount
 - Create Worker
 - Create Infantry
 - Create Marksman
 - Create Tank

Architecture of the game

Classes:

Unit.gd:

- The main unit class of the game, for all types of units
- Handles movement, attack, animations
- manages states like guard, attack
- Worker specific functionality

EnemyAI.gd

- Similar to Unit class
- Handles pathfinding and ai decision making for enemy units
- Decides what targets to prioritize, when to retreat etc
- As well as all enemy actions

InputHandler.gd

- Handles mouse and keyboard input for the game
- Uses raycasting to control where player clicks, to control selection and movement
- Communicates with unit.gd to interact/attack different units and buildings when clicked

GameResources.gd

- Manages the resource development and management
- Keeps track of both teams resources
- Updates hud
- Spends resources

Other minor classes for specific objects include:

- Purchase menu
- Actions panel
- Ui
- Factory
- Health bar
- Main menu
- RTS camera

Technical requirements

Camera:

- 3D rendering based on an isometric projection.
- DirectionalLight3D near the center of the map for lighting and shadows.
- Moving the mouse past the edge of screen will also move the camera

Physics:

- 3D models for the terrain, units, buildings, and collectibles have the appropriate textures assigned to them
- Collision detection between the terrain, models, and objects
 - All static and character bodies have collision shapes attached to them

Animation:

- The Worker, Infantry, Marksman, and Hero, all have animations when moving, idling, and attacking. We also had one for dying, but wasn't fully implemented.

AI:

- Encoded with the Sense-Think-Act Paradigm and Rule-Based System
 - For all units, their first option is to retreat a certain amount of distance if there are enemies within their detection range and the enemies strength is higher than the AI strength within the area.
 - if the enemies within detection range are not stronger than the AI, for all units except Workers, attack nearby enemies and prioritize targets based on each unit's priority.
 - If there are no enemies within detection range but an enemy is within range of the AI's controlled factory and the unit is within range of the factory's detection range, move the unit to the factory to defend it
 - Otherwise, and the default option if all other options are not fulfilled, move to the player HQ to attack it.
 - For the Worker unit, if there are empty factories, locate and convert the closest factory available. Otherwise, return back to the AI base and wait.

Missing requirements

Workers do not have at least five actions. They can currently only move, collect resources, rest, and convert factories. All other units including the AI versions can at least: move, attack, attack nearest, guard, rest, and collect resources.

We also don't have a mini HUD.

Additional features

- Logic for the creation of new units
 - The HQ Building allows the purchasing of units (press p)
- A start-up screen
- Health bar above the unit
- Menu for purchasing units
- GUI displaying selected unit actions and the total resources the player has
- Music

Implementation details

All player units use the Unit.gd file which contains the methods for all unit types.

All the AI units use the EnemyAI.gd which contains the methods for all unit types.

The enemy HQ base has the EnemyAIHQ.gd script attached to it to spawn units.
Each unit has a health bar which has a Healthbar3D.gd script attached.
Factories have Factory.gd attached to them.
Camera has rt_scamera.gd attached to them (deals with mouse, and inputs).
ResourcesUI.gd updates the player's current resource total.
Action_panel.gd updates what actions the unit can do
Purchase_menu.gd allows the purchasing of units
Main_menu.gd displays the main menu and then starts the game once selected.

Here are some examples implementation details and what methods were used, which you can find within the scripts above:

Attack Action:

The unit, if able to attack, first checks if the target is in range. If so, it deals damage by reducing the enemy's HP. If the HP reaches zero, the target unit is destroyed.

Methods used

- attack(location/target)
- move_to(target position)
- take_damage(attack damage)

Target will then use these methods:

- update_health(health, max health)
- die() //if no more HP

Worker Convert Action:

The worker will move to the location and if the factory is empty, the worker can convert it to the player's factory. If it's an enemy factory, infantry will first need to use its own convert action.

Methods used

- move_to(target position)
- convert_factory(factory)
- _complete_conversion()

Please see README_BEFORE_RUNNING.txt before downloading the files and see Playability_Readme.txt for controls to the game (note: turn down master volume to about 20, music gets loud).