

CSE 528 Final Project Report

Dungeons of Abberoth

Developer: Ryan Twohey

## Executive Summary

Dungeons of Abberoth (DoA) is a 2D dungeon crawler inspired by old 2D RPGs and by ARPGs such as Diablo, Path of Exile, Last Epoch, Torchlight, etc. The gameplay is pared down from other games in the ARPG genre, and the focus is on exploring handcrafted dungeons and slaying enemies in real time combat. Movement is click-to-move like it is in other games within the ARPG genre. Combat is melee based and performed by clicking enemies. There is simple loot and levels to upgrade your character and become stronger.

## Genre

DoA is a 2D dungeon crawler ARPG (Action Role Playing Game).

## Target Audience

DoA will target PC gamers who are a fan of dungeon crawlers and ARPGs. This is a sizable playerbase. Diablo 4 was a notable entry in the genre in June of 2023 selling over 10 million copies since its release.

Anyone who enjoys exploring dungeons, leveling up, collecting loot, and hack-n-slash gameplay should enjoy Dungeons of Abberoth.

## Platforms

DoA will be a PC based game. The nature of gameplay with click-to-move and click-to-attack makes a mouse necessary to play the game and is therefore most likely to be enjoyed by PC players.

## Public Availability

DoA is an open source game with its source code and releases located on Github

- Source Code: <https://github.com/rjtwoh01/dungeons-of-abberoth>
- Releases: <https://github.com/rjtwoh01/dungeons-of-abberoth/releases>
  - This includes early development builds as well as the final official release of the game

## Description of the Game

As a 2D dungeon crawler, DoA starts in a small dungeon called “Starting Tomb.” In it the player must defeat the enemies and boss within, and escape into the Graveyard. The Graveyard is filled with many dangerous skeletons and the player must fight through them in order to reach safety at an area called “Town.”

The town features two shops, a regular one for buying and selling items and a potion shop that allows the player to buy either individual potions or buy in bulk.

After arriving at the Town, the player embarks on a journey to the Fallen Temple by taking the Road of Ruin. Upon reaching the Fallen Temple the player must descend further and further into it until reaching a portal to Hell. After taking the portal, the player must navigate different areas of Hell until they find and defeat the Demon Lord residing there.

Once the Demon Lord is defeated, the Player can take a portal back to Town and a new area unlocks called “The Field.” The Field is a grassy area that spawns 100 different enemies and 1 to 5 bosses. These enemies and bosses can be of any enemy type in the game.

Throughout the game the player will collect loot. This consists of health potions, armor, and weapons. Armor increases the player’s defenses and weapons increase the player’s damage. When collected (either through enemy drops, treasure chests, or the shop) the items go to the player’s inventory, where they can choose to equip it or not. Unwanted items can be sold to the shop for gold which is used to either buy new items or health potions.

As the player defeats enemies they gain xp. As they accumulate xp and reach xp thresholds they level up and increase in power that way.

## Play Mechanic

DoA has simple movement and combat.

The game features health for the player and enemies, and mana as a resource for the player to manage.

The player character has access to two different attacks - a basic attack performed by left clicking an enemy, and a special attack performed by right clicking an enemy. The basic attack does a modest amount of damage and can also be used to generate mana. The special attack costs a moderate amount of mana and does more damage than the basic attack does.

Switching between the two is vital to success in defeating enemies.

The game features different types of enemies - regular ones, and bosses. Each one is harder than the last. Additionally, each enemy will grant different amounts of experience for defeating, with regular enemies granting the lowest amount and bosses granting the highest amount.

The game features a safe town for the player to heal up and sell loot. The town is first accessed from the Graveyard. It also leads to the Road of Ruin which leads to a multi floored dungeon which the player will have to explore to defeat the evil within. The multi floored dungeon is called the Fallen Temple and leads to a portal that takes the player to Hell. Like the dungeon before it, Hell has multiple areas which must be explored before finding and defeating the Demon Lord.

There are 10 zones or areas in the game that feature enemies and combat. There are two safe zones for a total of 12 zones. The zones vary in size, but the main theme of the combat zones is exploration and fighting enemies to gain xp and loot. The zones are in order of when the player accesses them:

- Starting Tomb
- Graveyard
- Town (non combat)
- Road of Ruin
- Fallen Temple (non combat)
- Fallen Temple Level 1
- Fallen Temple Level 2
- Fallen Temple Level 3 (boss only zone)
- Hell 1
- Hell 2
- Hell 3 (boss only zone)
- The Field

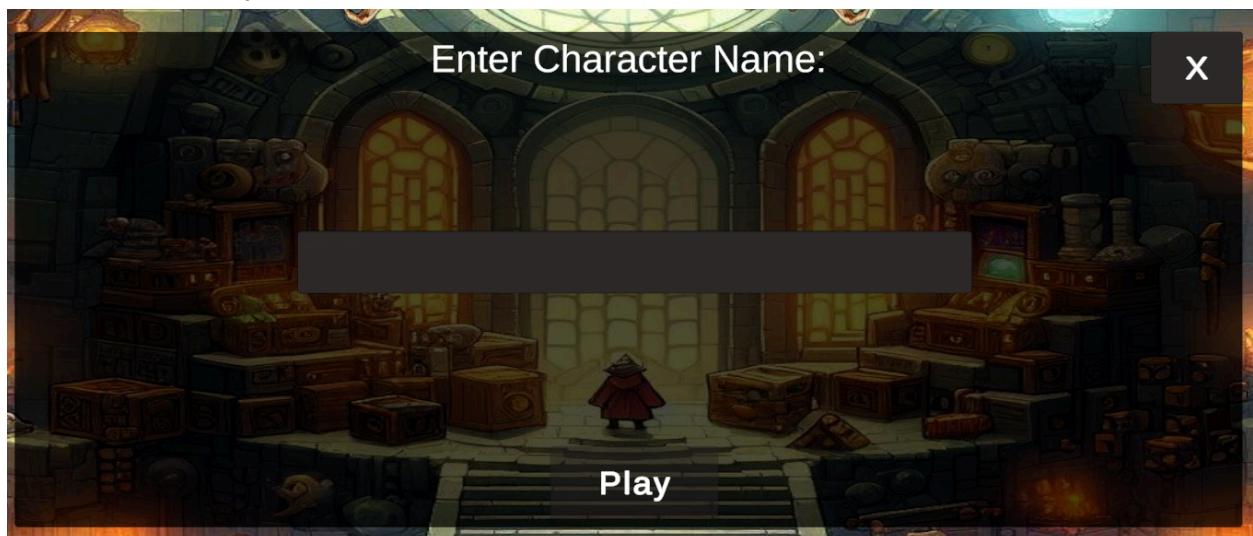
When the player first opens the game, they are greeted with the main menu scene. This displays the name of the game, a background image (that was AI generated for the game via Bing Create), 4 buttons on the top left side, and the version that their game is on in the bottom right corner.

As can be seen in this screenshot, the version of the game that the screenshots in this report are taken from is Version 1.0.0 Release Candidate 2. Once the game has been thoroughly tested and as many bugs as possible are fixed up, Version 1.0.0 will be officially released on the project's Github.



The player can create a new character, load an existing one, click info to see information on how to play the game, or quit the game.

When the player creates a new character they enter the character's name and then click play. The play button is disabled until there is text in the text input field. The character creation process verifies there is not already a character with that name. If there is, a “- 1” is appended to it. If there is already one with a “- 1” instead a “- 2” is appended to it. This is true from 1 to n.



When loading an existing character, the player can see all characters included in the save file. Each character's name and level is displayed. The list can show up to 5 characters at a time, and that list can be cycled through with the prev and next buttons.



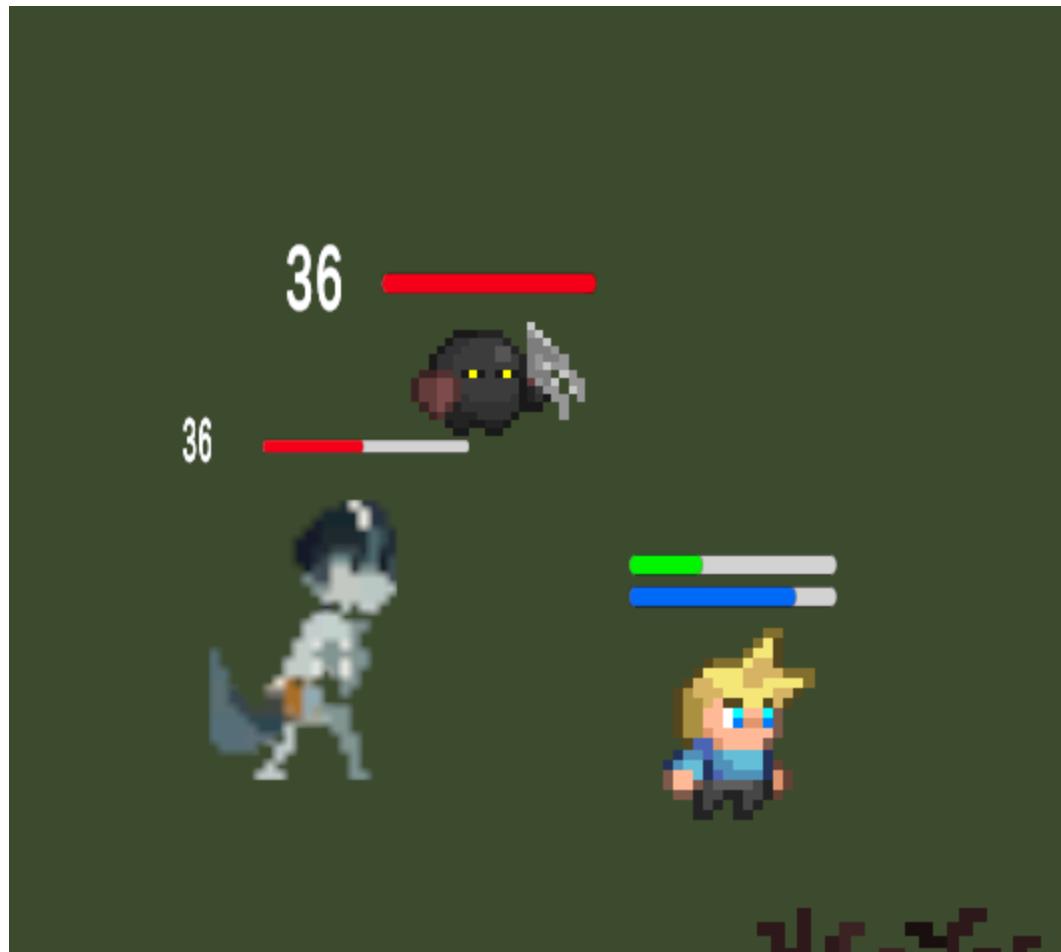
The Info Panel displays basic information on how to play the game



The Field is a unique zone compared to the rest. All previous zones have enemies manually placed in the Unity Editor throughout the zones at strategic points for the player to fight. The zone has an Enemy Spawner within it that generates 100 different enemies that are pulled from a list of different enemies. This list is composed of every enemy type the player has encountered in the game previously. Of those 100 enemies, 1 to 5 of them will be bosses. The UI will display how many of these enemies and bosses remain.

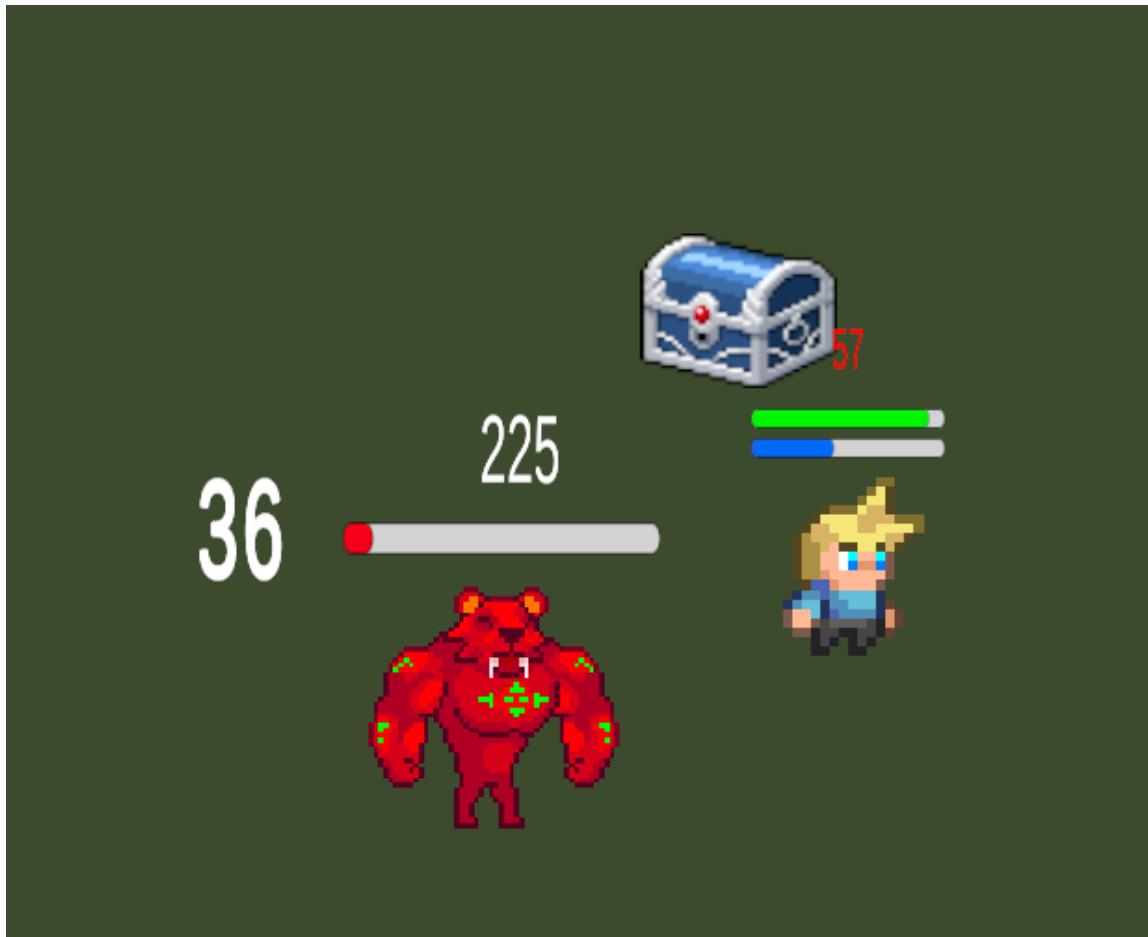
The enemies are randomly placed across the zone by setting a box collider on the enemy spawner and spawning the enemies within the bounds of that collider.





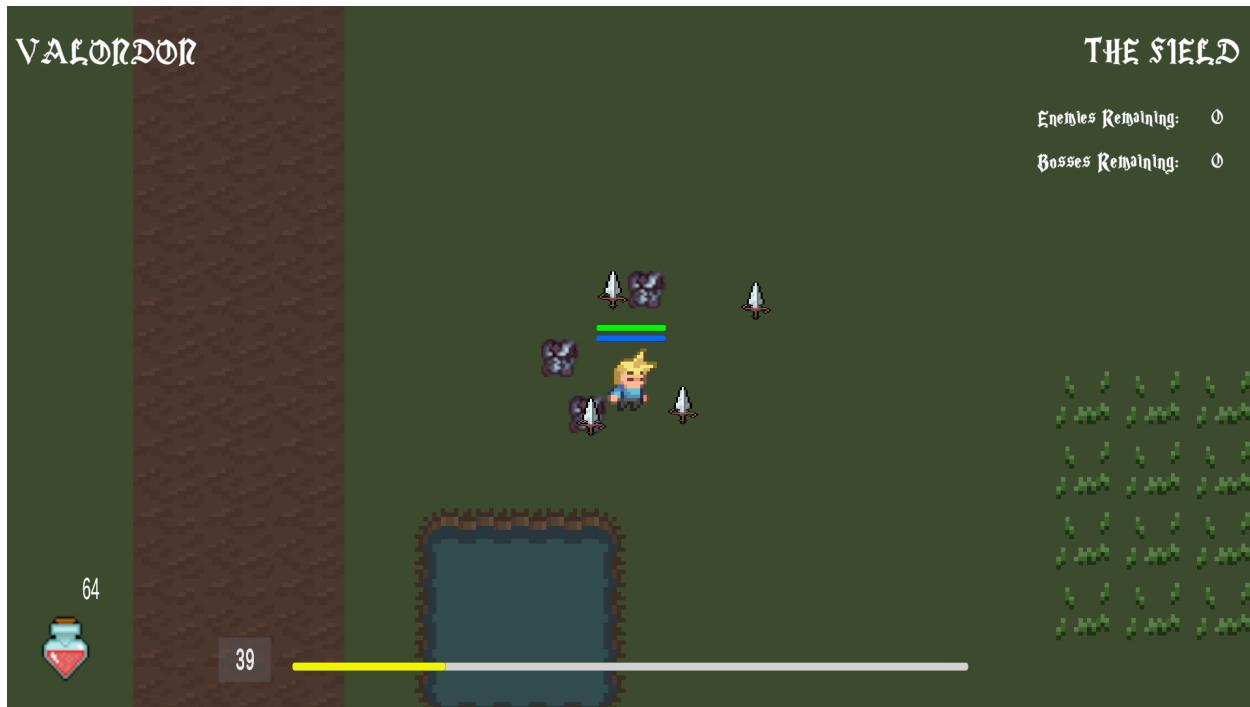


The Field also contains 5 randomly placed treasure chests.

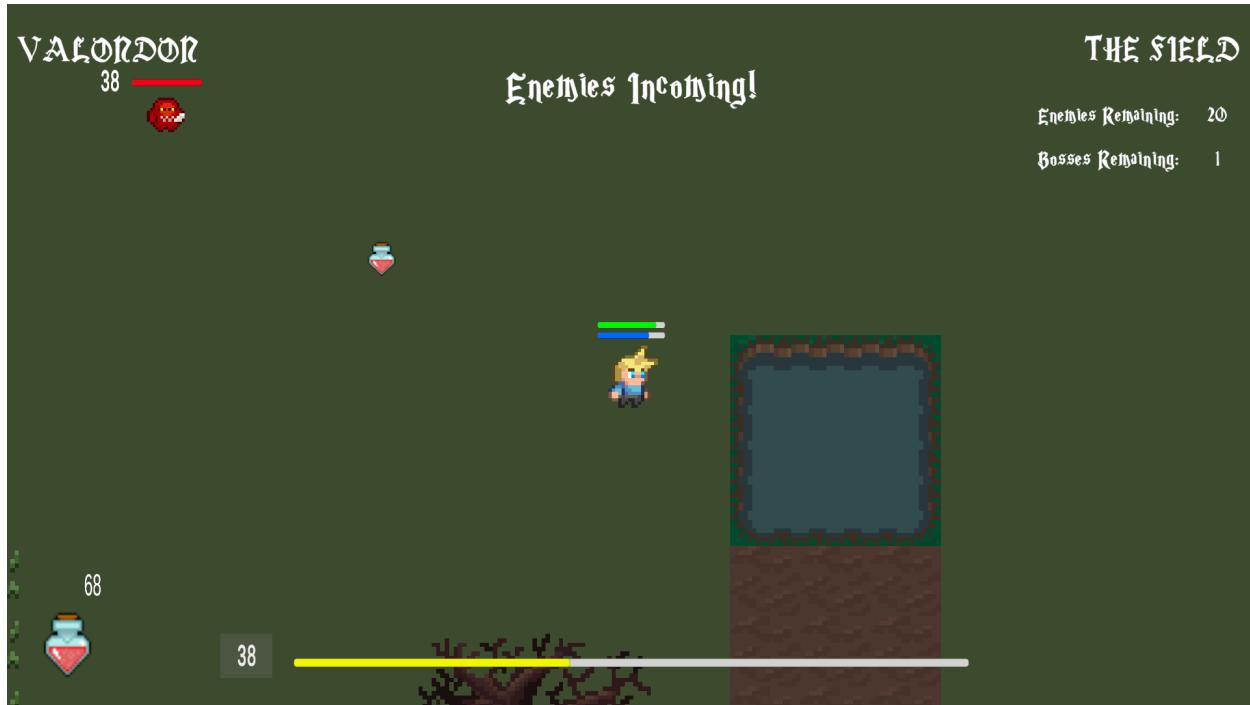




Upon defeating all enemies 5 pieces of loot are generated and spawn around the player and the player gains 25% of a level. This incentivizes the player to clear the whole zone.



Additionally, as the player defeats enemies it becomes harder to find more. To counteract this, when 20 enemies remain they move in toward the player, getting placed at a distance of 20 from the player in whatever direction they were in. When there are 10 enemies remaining, this happens again but at a distance of 10. When 5 enemies remain, this happens for the last time placing them at a distance of 5 from the player. This combined with the incentives to clear the whole zone ensure that it is a worthwhile activity to level up and gear your character after completing the main story.



The “endgame” will consist of a large premade field with enemies that have their levels dynamically set to that of the player. This will allow the player to keep improving their character after the main story is completed. The loot dropped from enemies will also dynamically scale with the players level. The level of loot and enemies is determined by the player's level as they enter the field.

When the player dies a death screen comes up with a button to respawn. Clicking it heals the player, restores their mana, and takes them back to the start of the zone



The Town's shop has two menus - Buy and Sell. The buy menu randomly generates 5 items and the list can be refreshed with the refresh button. This will generate 5 new items. The sell menu displays all the items in the player's inventory (that are not equipped) and only displays 5 at a time. These can be cycled through with the Prev and Next buttons.



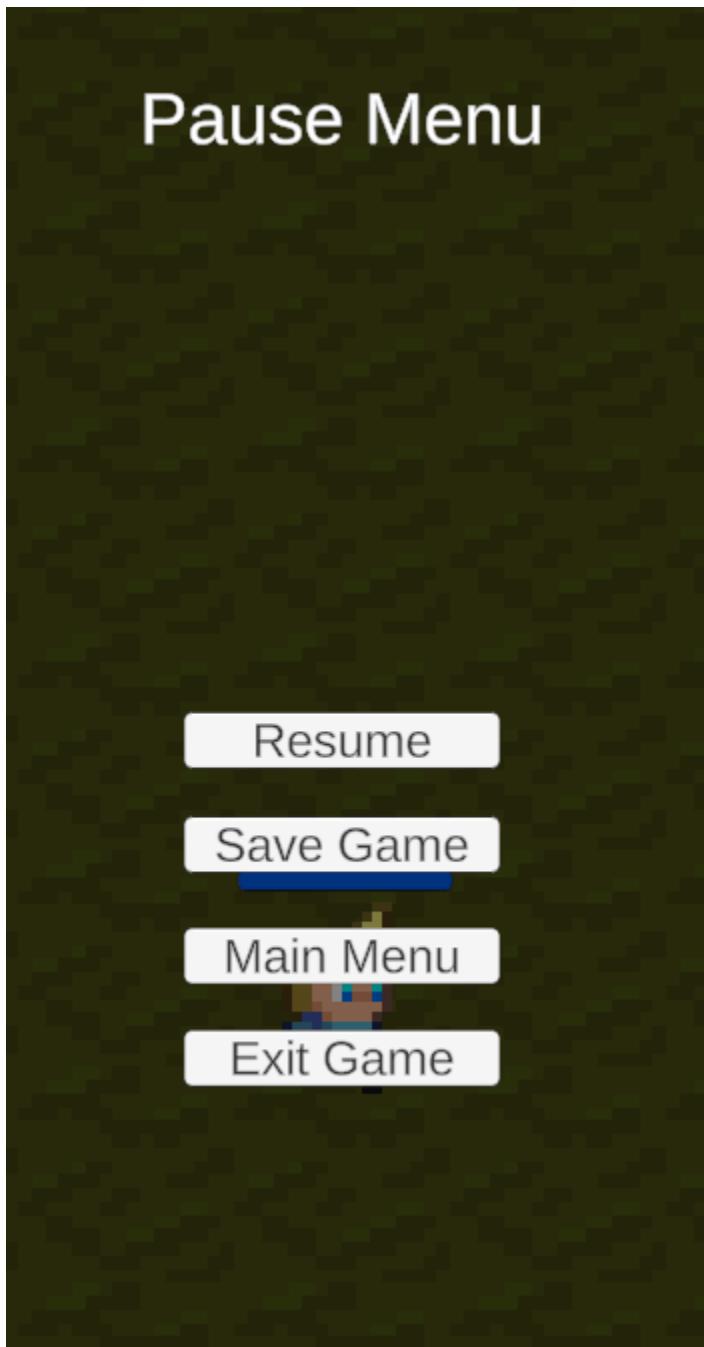


If a player buys an item from the shop, its gold price is decreased by 25%. That way when the player eventually sells it back to the shop they don't get all of the money back.

As seen in the above screenshots, the UI contains several elements. In the top left corner is the character's name. In the top right is the name of the zone the player is currently in. In the bottom left is a potion icon and the amount of potions the player currently has. At the bottom is the player's level and xp bar showing their progress toward the next level. The field has additional UI elements such as "Enemies Remaining," "Bosses Remaining," and "Enemies Incoming" which are not present in other zones. When the player levels up text appears informing them.



By pressing the Escape key, the player opens up a pause menu. This allows them to resume, save their character, go back to the main menu, or exit the game.



The max level is 100 and the amount of xp it takes to level up per level grows exponentially. The formula used is  $xpNeededToLevel = 100 + (\text{level} * \text{xpCurve})$  where  $\text{xpCurve}$  is 1.25 for levels 1-90 and from 90 to 100  $\text{xpCurve}$  is 1.50. This allows the player to gain levels at a reasonably quick rate and then slows down a little for the last 10 levels.

Loot is divided into two categories for simplicity - armor and weapon. Armor will increase the character's defenses while the weapon will increase their offensive rating. Defense on armor is directly added to the player's defense stat (which starts at 0 and only increases with armor). Defense will reduce incoming damage by 125% of the defense stat. Damage will increase maximum damage by that damage amount and minimum damage by half the damage amount on the weapon.

Loot has a 1/1000 chance of being legendary quality. A legendary item will roll with 2 to 5 times as strong defense or damage. There is also boss quality loot, which is 2 times as powerful. An item can be both legendary and boss quality, resulting in 4 to 10 times as powerful defense or damage. A boss has a 50% chance to drop a boss level item and the legendary chance increases to 1/100. A treasure chest and the shop has a 20% chance to roll a boss level item and the legendary chance increases to 1/500. The end result is that legendaries are exceedingly rare and hard to obtain. But they still have a decent enough chance of happening that a player who levels up to 100 and wants to max out their gear can do so.

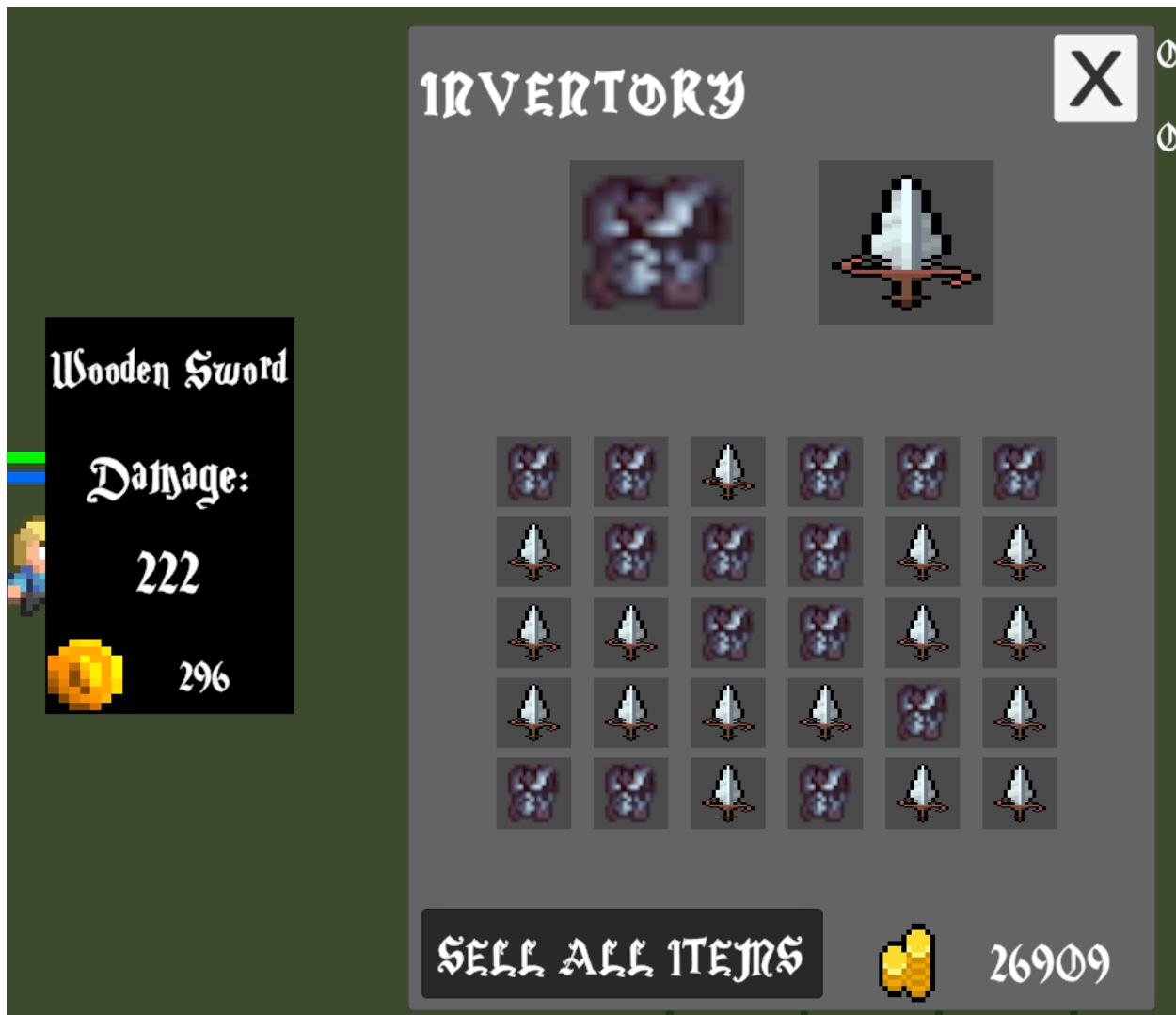
Treasure chests generate a list of 1 to 5 items using the item generator. The items are then instantiated around the chest location and the chest is destroyed. Chests are randomly placed throughout the map for the zones they are available in. Each zone has a treasure chest generator which looks for available floor tiles that do not have object tiles on them and will randomly place a chest on one of these tiles. The amount of chests placed depends on what the chest generator is set to spawn in the inspector for that zone. For example, the Road of Ruin has 3 chests and The Field has 5. Two zones have manually placed chests which are Fallen Temple 3 and Hell 3, behind the bosses.



When the player's inventory fills up there is a sell all items button that will remove all the items from the player's inventory and add their gold price to the player's gold.



Hovering over an item displays a tooltip with the items name, damage or defense (depending on if a weapon or armor) and its gold cost

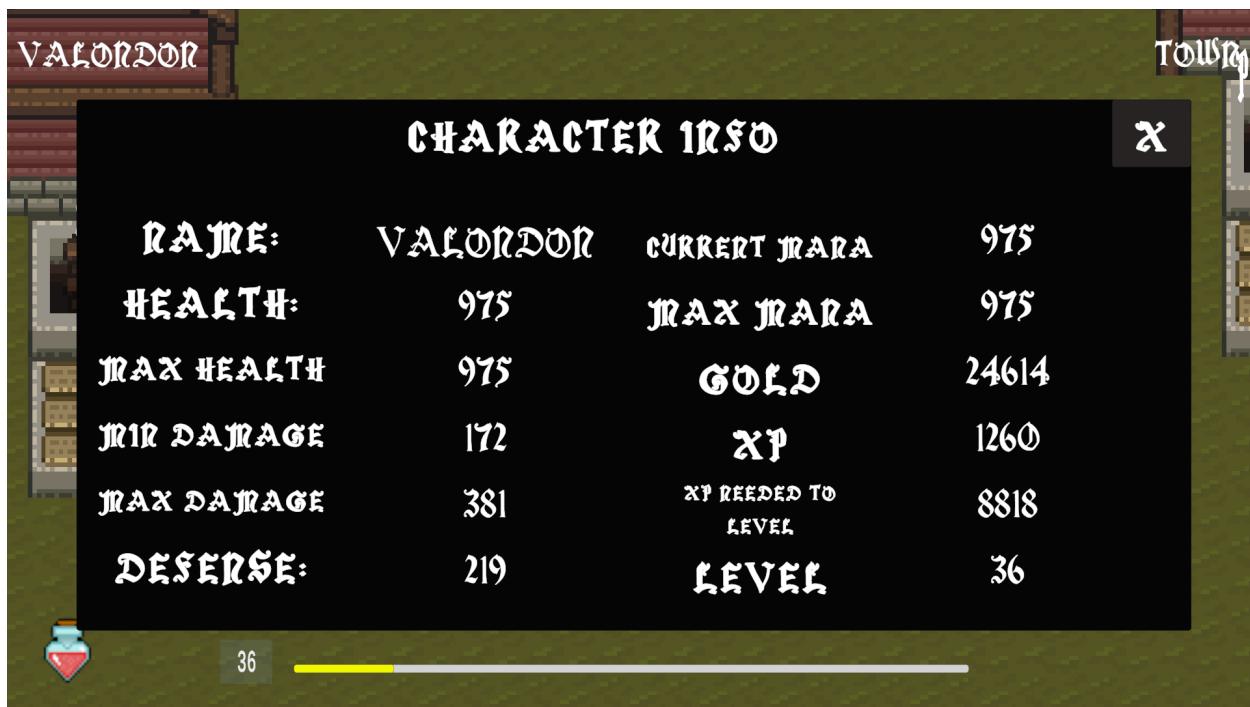


The top two items that are larger than the others in the inventory screen are the player's equipped items. This is an armor piece and a weapon piece. The player can equip a new one by either double clicking or right clicking the item in their inventory.

The player can teleport to zones they've already been to. To do this, press the "T" button to bring up the teleport panel and select the location to teleport to. The panel displays 5 locations at once and they can be cycled through with the Prev and Next buttons



By pressing “C” the player can open their character panel to view information about their character



When the player levels up, the following things are increased:

- XP needed per level - based on the above formula
- Minimum damage - increased by 2
- Maximum damage - increased by 5
- Maximum health- increased by 25
- Maximum mana - increased by 25
- Mana per hit (regular attack increase) - Increased by 15

And then the players current health is set to their max health and their current mana is set to their max mana.

When the player travels to a new zone or teleports to one they've been to, they spawn in at the start of the zone where the player spawn point is located. This is the same location they move to when they die. This is true even if the player goes back to a previous zone from their current one. This was an intentional design choice so the player would have to progress through the zone again.

Starting in the Road of Ruin and every zone after, all enemies are scaled to the player's level. The Starting Tomb and The Graveyard have enemies with levels manually set. Bosses in the Road of Ruin and every zone following will be 3 levels higher than the player.

Enemies scale with the following logic:

- Either dynamically scale to the player's level or scale to a manually set level
  - Their level is set accordingly
- Their base minimum damage, maximum damage, and maximum health is set to base stat \* level \* scale factor. Their scale factor is set to 1.2 if it's a regular enemy and 1.4 if it is a boss.
- XP is scaled with the following formula:  $xp = \text{base xp} + (\text{base xp} * 0.25 * \text{level})$
- Bosses are scaled additionally based off the already scaled stats
  - Maximum health is multiplied by 4
  - Minimum damage = minimum damage + minimum damage (0.5)
    - Rounded up to the nearest whole number
  - Maximum damage = maximum damage + maximum damage (0.5)
    - Rounded up to the nearest whole number
  - $XP = xp + (\text{base xp} * 0.5)$

This ensures that enemies get stronger as they scale up but not to a degree that feels impossible to beat. Their stats are scaled to where a well geared player can feel powerful but a less geared one will have more of a challenge. This achieves one of the core goals of the ARPG genre where the player wishes to increase their power against their enemies and they want to feel powerful when they have good gear. In order to do that though, enemies need to be more dangerous to those players with less good gear.

An enemy either drops predetermined loot with base stats if they are not scaled. This loot can be manually changed in the inspector if their level is scaled manually from the inspector as well. If it is an enemy scaled to the player's level or to a manually set level then it drops loot scaled to whatever that level is as well. It will use the same item generator that the shop and treasure chests use.

One character in the Road of Ruin with the enemies set to level 39



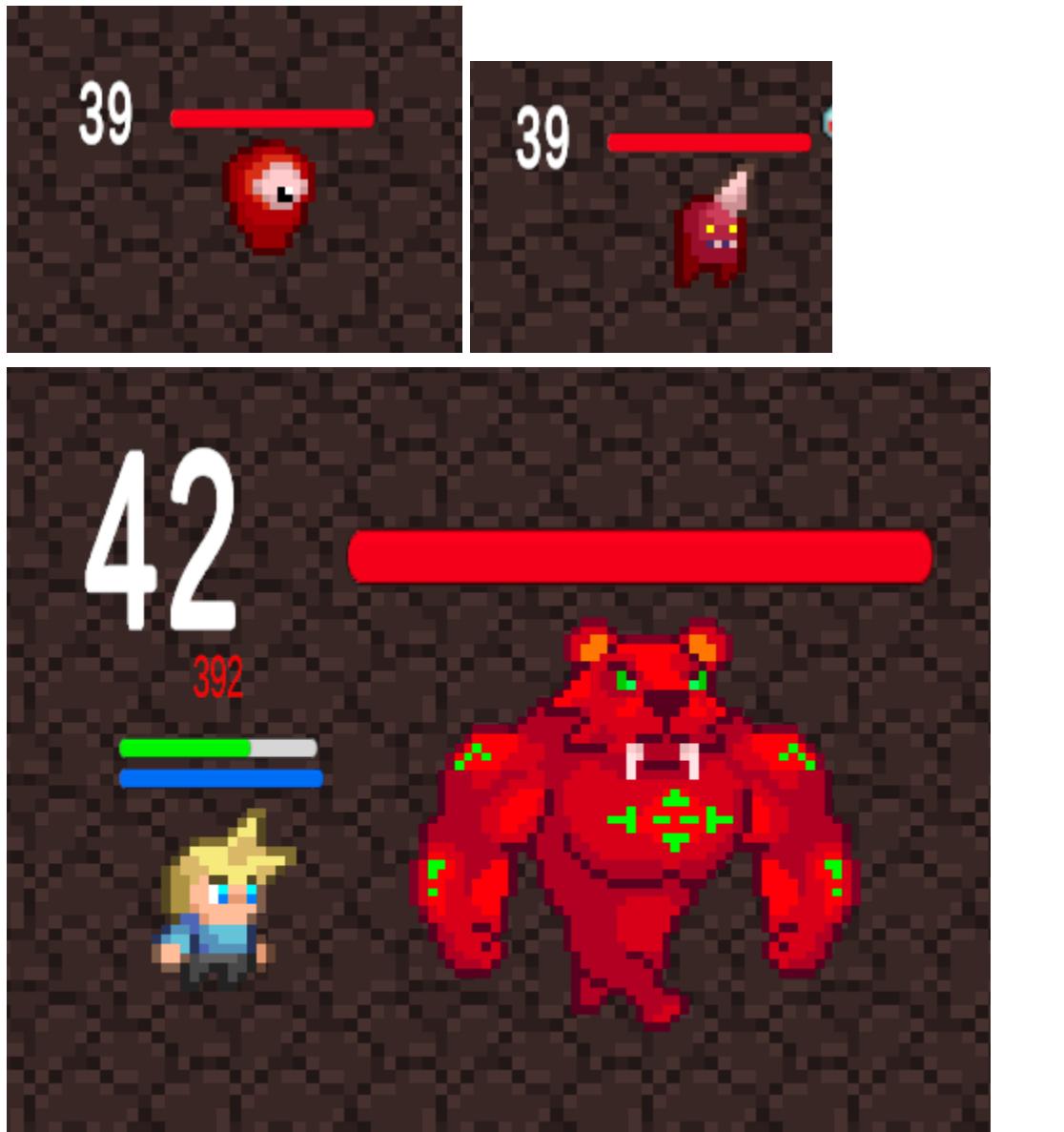
Another character in the Road of Ruin with the enemies set to level 5



## Enemy types:

- Cat
- Skeleton
- Hupie
- Demon
- Horned Demon
- Demon Eye
- Demon Lord





To travel to the next zone, there are areas marked “To [area name]...” and the player just has to run into it



Health potions are manually placed in the Starting Tomb and the Graveyard, but are otherwise spawned randomly in every other zone using the same logic that the chest generators have. The amount of potions spawned depends on what the value is set to in the potion spawner inspector. The only exception to this is The Field which spawns health potions with its enemies using the same logic as placing the enemies.

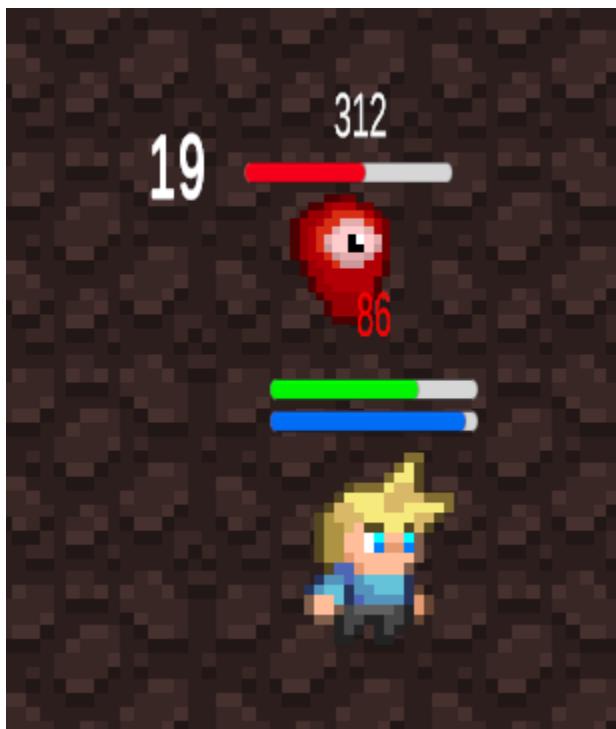
Health potions are used by pressing the letter “Q” and heal the player for 75% of their maximum life. Potions have a cooldown period of 1 second.

The player has several actions they can take at any one time:

- Move
- Attack an enemy, dealing a normal amount of damage and building mana
- Special attack an enemy, dealing double damage and spending mana
- Loot an item
- Equip an item
- Look at the inventory
- Teleport
- Sell items
- Buy items
- Use a potion
- Look at character info
- Sell all items

All of this is managed through a series of flags that check if the player is moving, attacking, has their inventory open, has the shop open, has the character info panel open. Some of these actions can execute at any time such as open the inventory, but the player cannot attack while moving. This is managed through setting flags to the appropriate values and interrupting certain actions. If a player is running to a location and sees an enemy, they can click the enemy to attack it and stop moving. However if they want to keep attacking it they have to wait for their attack to come off cooldown, which is 2 seconds long. This is managed through Coroutines to reset flags. Sell all items has a minute long cooldown, and potions has a 1 second cooldown.

When in combat, floating numbers can appear over the players health bar and the enemies health bar. These numbers represent the amount of damage they take. Both players and enemies can deal critical damage. Each has a 10% chance of any attack being a critical hit. Enemies critical hit damage is 120% and the players critical hit damage is 200%.



The potion shop sells potions with 5 different options:

- 1 potion
- 5 potions
- 10 potions
- 50 potions
- 100 potions

The price of a potion is set to 5 multiplied by the player level. This is again multiplied by the amount of potions the player wants to buy. This way the costs of potions never becomes irrelevant as the player levels up and sells items that are worth more gold.



Both the potion shop and the items shop show the player's gold amount in the top left under the shop name which updates in real time as the player buys and sells items.

To access either shop, there is a box collider on an empty game object at the entrance of the area that says "Shop" or "Potion Shop." This collider is set to a Trigger. When that trigger collider event happens, the shop is opened. When the shop is closed the player gets moved to an empty game object which is set at the shop's exit location.

## Key Features

### DoA features

- Dungeon Crawling
- Levels
- Loot
- Hack-n-Slash gameplay
- Dynamically scaling endgame

## Future Updates

There are a lot of features that can be added to the game over time after the initial 1.0.0 version is officially released. Some of the features I am looking at potentially adding are:

- A way to set the level of the enemies the player will fight in The Field
- Elite enemies
  - Their strength level would be between a regular enemy and a boss
- A wider variety of loot
  - Chest, helmet, gloves, shoulders, pants, boots, etc.
- A procedurally generated dungeon that can be of different themes
  - i.e. caves, temples, forests, Hell, etc.
- Classes
- Ability to select the player avatar for a character
- More abilities
  - Such as AoE (area of effect) abilities to hit multiple enemies at once

## Team Coordination

Since I am the sole developer of the game I did all of the work including level design, programming, and asset acquisition.

## Assets

- Environment, player character, gold, & enemies (excluding skeleton)  
<https://assetstore.unity.com/packages/2d/environments/2d-topdown-tilesets-bundle-rogue-adventure-world-238463>
  - This was paid asset I purchased at the start of the semester when I decided I wanted to make a 2D dungeon crawler
- Skeleton enemies: <https://pimen.itch.io/fantasy-skeleton-enemies>
- Health Potion: <https://lornent.itch.io/heart-shaped-potion-bottle>
- Background music:  
<https://assetstore.unity.com/packages/audio/music/free-25-fantasy-rpg-tracks-vol-3-275552>

- I used Audacity to raise the decibels on the Dark Theme because they were inaudible even at very high volumes
- Sound effects:  
<https://assetstore.unity.com/packages/audio/sound-fx/rpg-essentials-sound-effects-free-27708>
- Armor: <https://ssugmi.itch.io/16x16-rpg-assets>
- Weapon: <https://assetstore.unity.com/packages/2d/2d-pixel-medieval-weapons-275774>

Game Icon:

This game icon was AI generated using Bing Create

