CS 467
Spring 2019
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Tejat: Final Report

I. Introduction

Team Tejat built a 3D Diablo-style game using the Unity game engine and purchased assets. When we began this project, only one member (Brian) had any experience in Unity. The other two of us were rank “noobs”, but each had a strong interest in learning Unity and building a game. All team members love Diablo. Our professional interests in the project varied, but at least one of us will be tasked at work with developing in Unity in the coming year, and all plan to use this project for their development portfolios.

The game itself (which we’re calling “Tejat”) is a 3-map, isometric, click-to-move and attack real-time action game (just like Diablo). Players can choose from among three different character types (Wizard, Archer, and Warrior), each with different abilities and attributes. Within each map, players must find the teleport platform that will take them to the next map. Maps are populated with seven different enemy models and a number of traps and dynamic environment elements (like opening doors).

We divided the project tasks into three domains, and each of us took responsibility for one of the domains: Character/Monster Development, UI Development, and Environment Development. Throughout the project we met weekly using video chat and kept in touch between meetings with text chat. Communication was key, because even though the code and Unity models for each of the domains were fairly siloed (we rarely had version control conflicts) we had to coordinate closely in order to actually build a game from these parts.

II. Setup & Usage

Executable

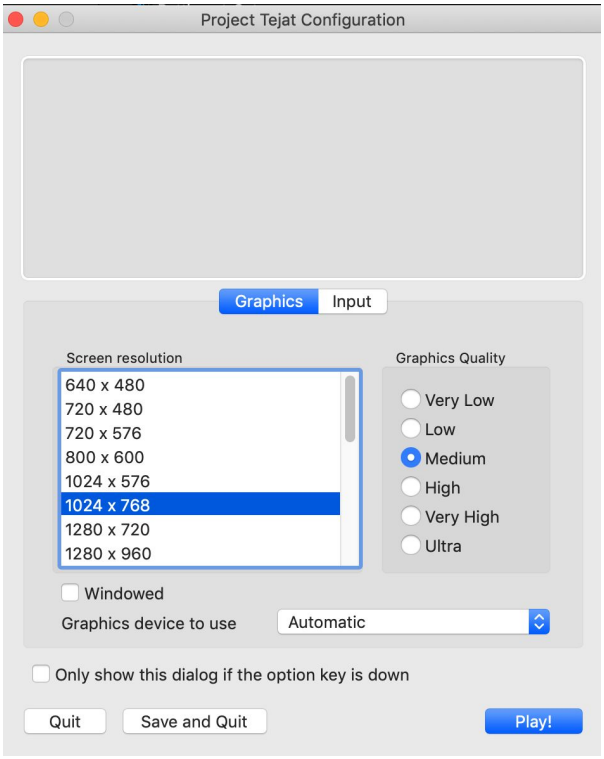
Before downloading the game and playing through it, it is important to turn off your antivirus protection because it can cause problems while running this game. You can download the Windows executable from
https://drive.google.com/open?id=1DQBU0wAHaM9Mtr-VvSyrID4If9x-lOoJ

and the Mac executable from

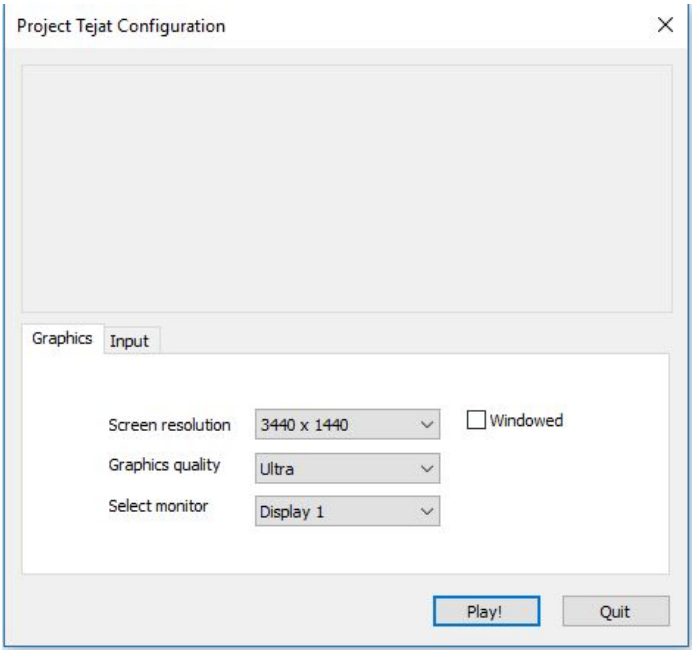
https://drive.google.com/open?id=1ykjV7Ja9pqLR1QknnweQR8MD4lAp4ZOt

Once downloaded and unzipped, open the executable to begin play. You will see a configuration window like the one pictured below. Select modest performance settings for the first playthrough. If in doubt, select a screen resolution of 1024 x 768 and “Medium” for Graphics Quality. Click the “Play!” button to begin the game.

OSX:



Windows:



III. Controls

In-Game Player Controls:

Left Mouse Button (LMB): Click on the ground to move the character around on the screen. Click and hold the left mouse button to make the character follow the mouse pointer. Hover over an enemy and left click to activate the primary skill. The primary skill does not cost mana.

Shift + Left Mouse Button: Activate the primary skill in the direction of the mouse pointer. Works without having an enemy under the mouse pointer.

Right Mouse Button (RMB): Position the mouse over an enemy or an area on the ground and press the right button to perform a stronger skill that costs mana and hits for more damage.

Number Key #1: Activate the 3rd mana-based skill that has different behavior depending upon character selected.

Number Key #2: Activate the 4th mana-based skill that has different behavior depending upon character selected.

Q: Activate the Health potion that has a cooldown.

Escape: Game menu and pause control.

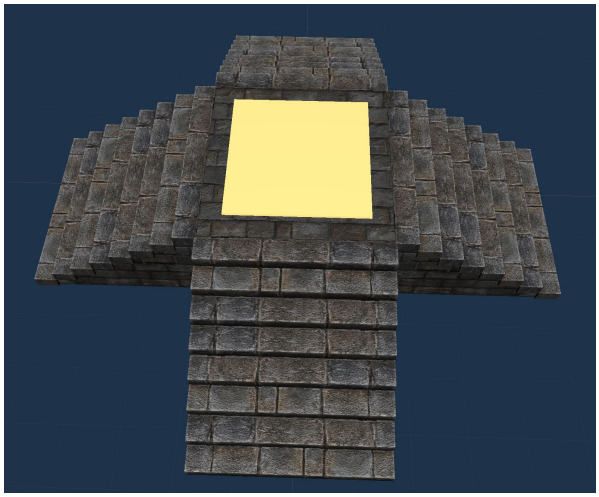
Game Navigation/Screen Descriptions:

Start Game: When first loading the game, the player will see the Start Game screen. This has two options: Start Game and Exit Game, which do exactly what they say. Pressing Start Game takes the player to the Character Selection screen.

Character Selection: Three characters are playable: Wizard, Archer and Warrior. These can be seen and are selectable via clicking on their respective names in the list on the right. The character the player picks can also be named via the input field at the bottom, and this name

will show up on the upper left character portrait in the game. Finally, the player can then press “Play” to begin the game in the first map or press Escape to display the game menu.

Level 1: The player moves through the level at will, killing enemies encountered, avoiding obstacles, and collecting items. This is the shortest of all the levels and is intended as an introduction to the game. When the player finds the teleportation platform, they must climb to the top and stand on the yellow square to move to the next scene.



Level 2: Level 2 is a little larger than Level 1. Once again, the player should explore the scene and try to find the teleportation platform.

Level 3: Level 3 has the largest map. Once the player finds the teleportation platform, they must first kill the boss who guards the platform before activating it (by standing on the yellow square). Once activated, the game has been beaten and the win scene is displayed!

Game Menu: Accessed by pressing Escape in all screens except Start Game. This will pause the game while it’s visible and allow the player to resume the game, start a new one, or exit the application. The player can press Escape a second time to dismiss this menu. This is also effectively the Pause game screen.

Death Screen: This will appear when the character dies and gives options to restart the map, start a new game or quit the game.

Win Scene: Once the player has killed the final boss in Level 3 and activated the teleportation platform, this scene is displayed.

In-Game HUD UI: Health/mana bars and corresponding globes are functional. Skill icons are visible with requisite key bindings that display each character's abilities and show disabled icons depending upon mana availability.

Characters, Monsters and Items

Playable Characters

1. Wizard: Ranged
    - Health: 100
    - Mana: 100
    - Speed: Medium
    - Mana regen: 8 per second
    - Health potion healing amount: 50
    - Health potion cooldown: 5 seconds
    - Skill 1: A ball of arcane energy shoots out of the wizard's staff and travels towards the targeted location
        - Damage: 50
    - Skill 2: A frost blast that damages enemies in a large area of effect
        - Damage: 100
        - Mana Cost: 50
    - Skill 3: Teleports the wizard towards the mouse location
        - Mana Cost: 10
        - Cooldown: 5 seconds
    - Skill 4: Shields the wizard from damage
        - Mana Cost: 20
        - Cooldown: 10 seconds
        - Skill Uptime: 5 seconds
        - Damage Mitigated: 30

2. Archer: Ranged
    - Health: 100
    - Mana: 100
    - Speed: Fast
    - Mana regen: 4 per second
    - Health potion healing amount: 50
    - Health potion cooldown: 5 seconds
    - Skill 1: A basic bow and arrow attack that shoots an arrow towards the targeted location
        - Damage: 25
    - Skill 2: A flaming arrow shot that pierces through targets in a straight line
        - Damage: 50
        - Mana Cost: 10
    - Skill 3: Three arrows fly out of the archer's bow in a cone formation
        - Damage: 100 per arrow
        - Mana Cost: 25
    - Skill 4: A turret is summoned at the targeted location and fires arrows in eight directions every half a second
        - Damage: 50 per arrow
        - Mana Cost: 75
        - Turret Uptime: 7 seconds

3. Warrior: Melee
    - Health: 100
    - Mana: 100
    - Speed: Medium
    - Mana regen: 4 per second
    - Health potion healing amount: 100
    - Health potion cooldown: 2.5 seconds
    - Note: The warrior does not flinch upon taking damage
    - Skill 1: A basic sword swing
        - Damage: 50

- Skill 2: A cleave style attack that does area of effect damage in a cone shape
    - Damage: 50
    - Mana Cost: 10
- Skill 3: A strong attack consisting of three swings
    - Damage: 75 per swing
    - Mana Cost: 20
- Skill 4: A massive ground slam that deals area of effect damage in a line
    - Damage: 150
    - Mana Cost: 50

Monsters

1. Regular Monsters
    - Monsters will relentlessly attack the player until the monster is killed or the player walks out of the look radius of the monster.
    - All regular monsters have 100 health and deal 10 damage per attack on a 3 second cooldown
    - Monsters have either ranged or melee attacks.
    - Six regular monsters:
        - Ratkin Berserker - Melee (level 1)
        - Ratkin Marksman - Ranged (level 1)
        - Skeleton Fighter - Melee (level 2)
        - Skeleton Archer - Ranged (level 2)
        - Demon Beast - Melee (level 3)
        - Demon Imp - Ranged (level 3)

2. Boss
    - There is one boss in the game on the last level that has to be defeated before finishing the game.
    - Demon Lord: Ranged (level 3)
        - Health: 500
        - Damage: 20

- Attack: A large ranged attack that deals fire damage in a straight line
  - Largest attack range of all the monsters.
  - Attack does not rely on a projectile so the attack is instant. It cannot be dodged unless the player moves before the attack goes off.

Items

1. Blue Scrolls: A temporary speed buff. Blue scrolls can be picked up by having the player walk over them. The buff increases speed by 50%. An icon will indicate the buff is active.
2. Red Scrolls: A temporary damage buff. Red scrolls can be picked up by having the player walk over them. The buff increases damage by 20. An icon will indicate the buff is active.

Playthrough Instructions

Video: https://media.oregonstate.edu/media/0_vit2kb9f

After installing and launching the game per the above instructions, start a new game, select a character and optionally give them a name. We recommend using the Wizard as this walkthrough will assume you are using the Wizard. The main objective in the game is to progress through the maps by locating the yellow transportation platform and killing as many monsters as you can on the way.

In the first map, there are fewer monsters and obstacles. The purple orbs and fireballs will damage the character, so avoid being hit by them. In this map, the teleportation platform is located in the upper left corner of the map. Proceed through the map avoiding the environmental obstacles and pick up the blue speed scroll in the middle of the first room. If you get hurt, remember to use the health potion (Q). Upon picking up the red damage scroll, a group of 6 ratkin marksmen will spawn. Use your shield (Wizard #2 key) to avoid getting killed while dodging their attacks. The best strategy is to avoid their attacks and group them up, then AoE attack (Wizard RMB) on top of them to wipe them out. Then proceed to the left

(northwest), and open the door on the front side of the room. Stepping through the door will result in 3 ratkin berserkers spawning that will need to be killed to reach the platform. A similar strategy to that employed on the first group of monsters will work here.

After teleporting into the second map, open the door on the left and be prepared for two skeleton fighters. These have relatively low health and can be killed with the primary attack (LMB) or for excessive overkill, the AoE attack. Pick up the blue speed scroll to zoom through the map. Proceed north-northwest and open the next door on the left. Two more skeleton fighters will spawn and can be dispatched easily. Pick up the damage scroll in this room and proceed to the stairs in a southeastern direction. At the top of these stairs, 6 skeleton archers will spawn. It's not recommended to take these on all at once. Utilize a shield (Wizard #2 key) and pull them down the stairs. Once they are grouped up, the same AoE strategy will dispatch them quickly. Proceed down the ramp to the southwest. In the next room, avoid the purple orbs and head towards the left side of the room to the next ramp. Utilize the teleport spell here (Wizard #1 key) to easily avoid the orbs. If you happen to get hit by the purple orbs, two skeleton fighters will spawn. You can kill them the same as before and proceed. Head down the stairs to the final room, and kill the lone skeleton fighter. Step on the teleportation platform to load the next map.

In the third map, there are more obstacles to avoid and harder hitting monsters. Sidestep the fireball in the first hallway, and carefully proceed to the next room. This room is a bit tricky as there are both ranged monsters and two fireball traps to avoid. Be prepared for the 3 flying demon imps, their fireball attacks hurt! Stepping into the center of the room will activate the fireball traps. Dodge these or teleport away from them. Use a shield and either AoE or use the basic attack to kill the imps, while dodging their fireballs. Proceed down the corridor to the fast-moving orb traps. One you avoid the first one, step to the other side of the hallway and use the teleport spell to avoid the second one. You can also run between them if timed correctly. At the hallway junction, take the left southwestern hallway and kill the two demon beasts. Pick up the speed scroll. You can either proceed straight ahead through the two orb traps, or turn right to head south toward the final boss.

If you go straight ahead, avoid the orb traps the same as before, and follow the hallway as it curves around. The next room features 3 more demon imps. Utilize the same strategy as before to defeat them. Head down the hallway further to the dead-end room with 4 demon beasts. Dodge their attacks and wait for them to group up. A well-placed AoE attack will kill all

of them in one blast. Pick up the damage scroll as it will help on the final boss. Run and teleport your way back to the final hallway.

Head down the southern hallway and open the door to the demon lord. His ranged fire whip attack does moderate damage and can be avoided by sidestepping or teleporting around the room. Liberally utilize the Wizard's shield and AoE to attack the boss when he stands still. After 5-6 well-placed AoE attacks, he will die and you can proceed to the final teleportation platform to win!

III. Software Systems

We used Unity for development. Unity is available under a free license unless revenue or funding for a project exceeds an amount far in excess of what most students or hobbyists would ever receive.

Unity projects are built upon a core unit known as a scene. Scenes, in game parlance, are similar to their cinematic analogues: discrete game blocks that have a core theme or aesthetic, time and place, and/or function. A single scene could be a particular level in a game, a character selection screen or even a still-image splash screen.

Scenes are populated with game objects that represent the constituent elements of all scenes. Games objects include everything from the players and monsters to the individual components that make up the game environments as well as cameras and lights.

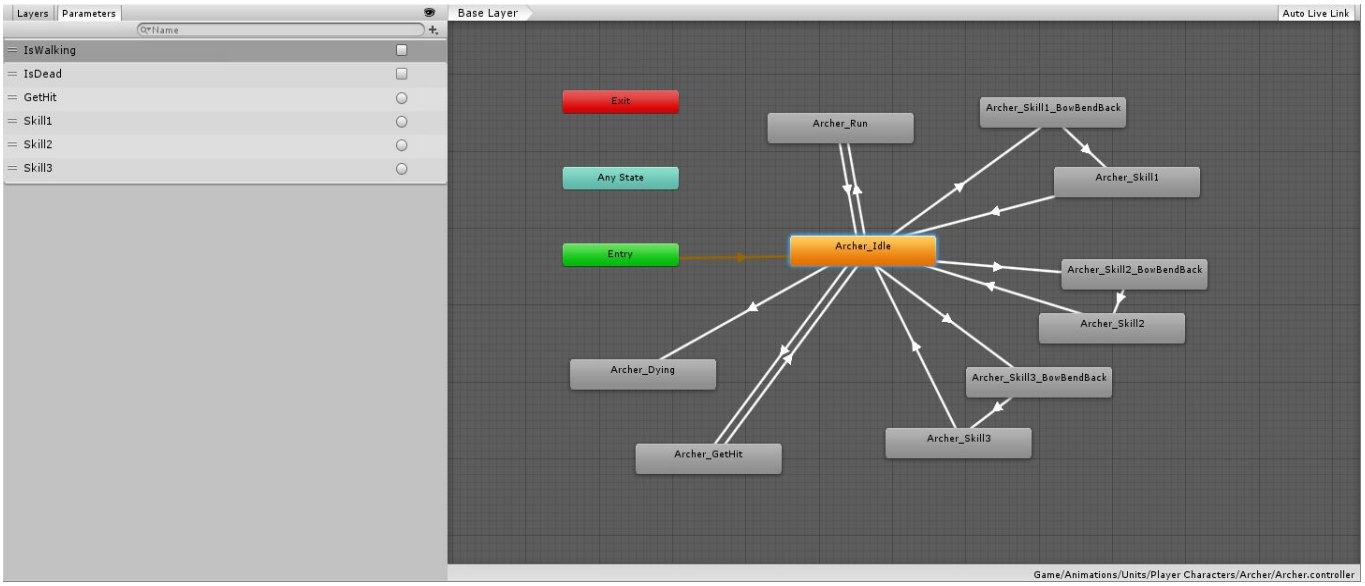
Each game object is composed of one or more components. Each component on a game object and its associated properties can be configured in the inspector window. The C# scripts that underlie the logic of Unity games take the form of components that are attached to game objects. These script components in the inspector (each representing a C# object) are the place where the game's code can be configured to interact with the scene under development. Public variables in the objects appear as fields in the script components. These fields can be populated in the Unity editor with different data types, including Unity game objects.

Once the scene under development contains the minimum of a camera and a game object at which to point, the scene can be played. In this runtime environment, the scripts attached to game objects will be executed and any error, warning and debug log information will be shown in the console. Also, game object attributes (such as player speed, if this

variable has been serialized) can be adjusted during runtime in order to tune the gameplay experience.

IV. Graphical Examples

Graphic Example 1 - Archer's Animator Controller



Graphic Example 2A - Playable Characters

Wizard (Left), Archer (Middle), and Warrior (Right)

Graphic Example 2B - Ratkin

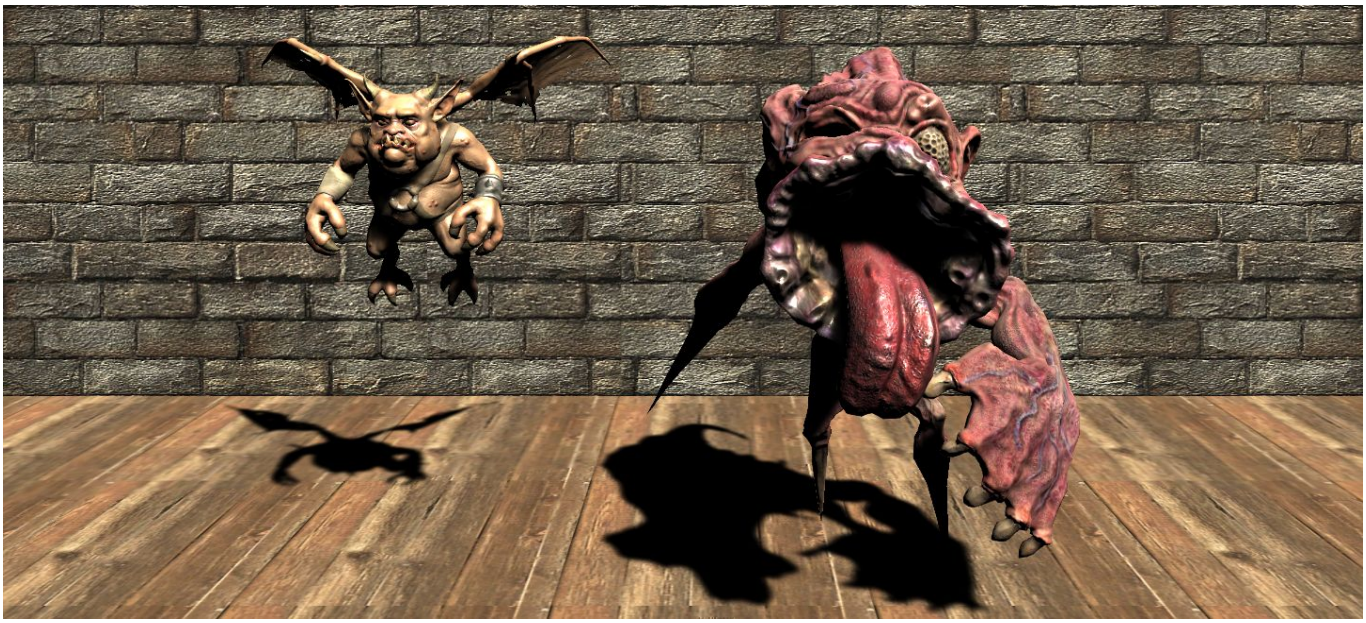
Ratkin Marksman (Left) and Ratkin Berserker (Right)

Graphic Example 2C - Skeletons

Skeleton Archer (Left) and Skeleton Fighter (Right)

Graphic Example 2D - Demons

Demon Imp (Left) and Demon Beast (Right)



Graphic Example 2E - Boss

Demon Lord

V. Additional Tools, APIs, and Libraries

Gimp was utilized to modify graphical assets to create the game's logo and some of the in-game UI HUD elements such as icons and mana bar.

VI. Teammate Contributions

Brian Laccone had the most experience in Unity, and as such, he was the go-to person for any questions and issues. He was adept at assisting the other team members with bug fixes and any other project issues. Most of the graphical assets, including characters, monsters, textures and graphical elements came from packages that he had already acquired. He was primarily responsible for creating both the player character and monster stats, movement, skills, hitboxes, particle collisions, and animation controllers. He was also responsible for monster AI and player controls.

Emily McAlister took on designing the UI and overall game menu control flow. She modified many of Brian's aforementioned graphical assets to better fit the game and also created the game logo. She created the main menu system and UI manager responsible for loading scenes. She created the start game scene, the character selection scene, and death scene. She made the in-game HUD overlay which included the character portrait, health and mana bars/orbs, skill bars for each character, and individual skill icons with gray overlays to indicate low mana or cooldowns. She also tweaked the character scripts to allow UI elements to interact with player behaviors such as dying, taking damage and losing mana.

Russell Moon was responsible for building and populating the level maps and creating the dynamic environmental interactions. He built enemy spawn triggers that would cause enemies to be instantiated when the player walked through a particular map section. Likewise, he built door activation / light activation triggers that would cause doors to swing open and rooms to light up, a platform trigger that would load the next scene (or the win scene once the final boss had been killed), and a trigger-operated fireball trap. The oscillating energy spheres were inspired by a Unity tutorial and then heavily modified. He implemented the collectible scrolls, an activity which tested the limits of his asset model manipulation skills. Further, he created the camera transparency effect which hides objects (and then unhides) that obstruct the player from view.

VII. Deviations from Original Plan

Like many game projects, we started out very ambitious with what we thought we'd be able to accomplish in a short amount of time. We quickly discovered that implementing any database-backed systems such as inventory or item drops would be very time-consuming and out of scope for a 10 week project. The same was true of an experience-based leveling-up mechanism. This is because damage modifiers, health and other character stats (such as intellect, stamina) would have to be implemented to make the character feel stronger after leveling up. Since many of these systems work together to make the character feel like they are progressing in the game beyond just killing the monsters, we decided it was better to not implement one without the others. Character-specific talents were also not implemented, as we instead decided to give each character four unique abilities. We also nixed specific objectives in favor of having a simpler objective for each map which was to find the teleport platform. Lastly, most of the assets we had did not come with sound effects, so the ones that did are the only elements that have audio included.

VIII. Conclusion

This has been one of the most rewarding experiences during our time in the Post Bacc CS program. For those of us who were new to Unity and C#, the challenge of of building a game with new tools and a new language in a relatively short period of time honed our development skills and our ability to learn new technologies on the fly. Also, in learning how such a sophisticated editor interacts with an object-oriented language (for example, by creating fields in the editor for variables declared as public in the scripts), we are better prepared for future work in both Unity and other platforms that rely on similar principles of interaction.

This project also represented a creative challenge. It was not enough to merely implement software that was efficient and bug free. We also had to consider design elements, art, player interaction and the gameplay experience itself. Is the game fun to play? We think it is, brief though it may be. We all came away with a deeper appreciation of the time and effort that go into published games. Even the humblest indie games require a colossal effort to build and polish.

IX. References

Code References

https://www.youtube.com/watch?v=oa6kW5HhRd4
https://www.youtube.com/watch?v=wWyx7_cIxP8
https://www.youtube.com/watch?v=xHjwGJIbW60
https://www.udemy.com/unitycourse2/learn/v4/content
https://www.udemy.com/unityrpg/learn/v4/content
https://unity3d.com/learn/tutorials/s/survival-shooter-tutorial
https://www.sitepoint.com/adding-pause-main-menu-and-game-over-screens-in-unity/
https://forum.unity.com/threads/slider-finding-gameobjects-for-instantiated-prefabs-cant-drag-drop-in-editor.469800/
https://answers.unity.com/questions/965823/set-image-fill-amount.html

Assets

https://assetstore.unity.com/packages/2d/gui/rpg-mmo-ui-5-95223
https://assetstore.unity.com/packages/2d/gui/icons/skill-icon-pack-44828
https://assetstore.unity.com/packages/3d/characters/humanoids/warlock-playable-character-3791
https://assetstore.unity.com/packages/3d/characters/humanoids/elven-girls-family-7123
https://assetstore.unity.com/packages/3d/characters/humanoids/adam-knight-horseman-84712
https://assetstore.unity.com/packages/3d/characters/ratkin-s-army-pack-89743
https://assetstore.unity.com/packages/3d/characters/humanoids/army-of-skeletons-7110
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