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<div align="center">Project Ascent</div>

Project Ascent is a music-driven fantasy tower defence game. In a typical tower defence game, enemies move along a path towards one or several exits, and the players' goal is to prevent the enemies from reaching those exits by placing turrets or 'towers' along the side of the path, which will attack or otherwise hinder the enemies. The strategy comes in placing towers where they will be most effective, and in positions where they overlap with different types of towers so that their abilities can play off of each other. In Project Ascent, the movements of the enemies and the attacks of the towers all occur in sync with the music that is playing, which I find makes the game more engaging and fun.

I created Project Ascent primarily using the p5.js library for javascript, along with a small amount of HTML. Everything is built around foundational grid-space objects. These grid spaces, generally referred to as tiles or nodes in the program itself, provide a larger scale grid on which dictates where the enemies move and the player places their towers. However, their most important role is in the implementation of the pathfinding algorithm. I used an A* algorithm for Project Ascent, which takes a starting node and a destination node, and begins checking nodes adjacent to the starting node to see which has the lowest combined distance (F) from the start and end nodes. It repeats a process of choosing the node with the lowest F value of all those checked so far, checking its neighboring nodes to calculate their F values, and then choosing the node with the lowest F out of the updated list until it reaches the destination node. This requires the grid-space objects to store their clearly defined places in the grid, their distances from the

starting and end nodes, their F values, and which node they were searched from, so that the path can be reverse engineered once the destination node has been reached.

The rest of the program is comparatively simple, and is generally composed of three types of objects: enemies, which store their destination node and their current node and can move along a path given to them by the pathfinding algorithm, towers which check to see if an enemy is within range before creating the third type of object: projectiles, which have varying abilities depending on the type of tower that created them. Currently only arrows (which target and follow an enemy until it is hit) and pulses (which hit all enemies in an area) have been implemented. The remainder of the code is for various menus, such as pause, help, and credits. I created a button object to make the process of creating buttons and checking if they had been clicked much easier. All the objects, from the grid spaces to the enemies to the menu buttons draw their appearances from a few different sprite sheets. An image instance is created that takes the coordinates of the specific image on the sprite sheet, and places that image on the p5.js canvas in a location specified by a second set of coordinates. These sprites are what give the game a polished and clean style, and they really bring the disparate parts of the program together.

Project Ascent took the form that it did out of a combination of inspiration and practical restrictions. On the one hand, my main area of study is actual Medieval and earlier history and I have long been a fan of medieval fantasy from Lord of the Rings to Le Morte D'Arthur, so I wanted to create a game in a fantasy setting. On the other hand, I wanted to make sure I created a project that could be easily distributed virtually due to the restrictions of the current pandemic. Tower defence seemed like the perfect genre of game to combine these two requirements, as it is commonly found on mobile devices and it can easily be adapted to a fantasy setting. Further, I

have some pervious experience attempted to create a tower-defence game, and because I was taking this semester entirely virtually and I was going to be learning a new language (p5.js) to allow for the internet distribution, I wanted to choose a topic with which I had a bit more familiarity to mitigate those challenges. My first attempt at a tower defence game, using a breadth-first pathfinding algorithm and a more convoluted grid system, was not usable in its own right, but it from that experience, I had a better idea of what I needed to plan out in advance, allowing me to make more informed decisions in creating my pathfinding algorithm and establishing the grid-space system early.

One awesome tangential aspect of the project was the near-weekly development log I created on my website, Facebook, and Twitter. As the game was fully in-browser, I had a unique opportunity to learn how to present a project like this online, to engage with an audience, and to post project updates with which people could directly interact. Though the game expectedly has very little following, the process of keeping a dev-log has helped me to keep on a more consistent schedule and to become comfortable doing outreach for projects on social media platforms.