

CISC 226
Project Progress Report: Frostfall
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Group 25

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Executive Summary

"Frostfall" is a 2D vertical platformer where players control a rugged mountaineer navigating a challenging winter mountain and castle environment. The game's design, as laid out in the proposal and in the design section of this report, leverages a grappling mechanic and an ice pickaxe for vertical movement, offering players novel experiences. The environment features castle elements, platforms, and treacherous terrain, necessitating the use of the game's different movement mechanics. The gameplay is designed to be challenging yet rewarding as players defeat enemies, earning currency to purchase checkpoints and health. Enemies are very similar in their attack patterns; the ranged yeti hurls large snowballs while the flying bat dives at the player and seeks cover when being attacked. The development of Frostfall is well underway, with almost all core and optional features already successfully implemented. These include both the grappling, climbing, and movement mechanics as well as the initial environment creation and enemy attack mechanics. The checkpoint system, which allows the players to save in-game progress and spend in-game currency, as well as numerous interactive UI's, have also been developed. As different parts of the game's development merge together, our team has faced challenges in asynchronous development and merging of different scene components. Despite this and the narrowing deadline for completion, our team has managed to continually advance progress and use the mostly positive feedback from playtesters as motivation to overcome the remaining hurdles. The feedback from playtesters not only affirmed the success of the robust movement mechanics but also highlighted areas for improvement in map layout and the need for more checkpoints, which we are actively addressing. The resolution of minor bugs and the fine-tuning of the movement mechanic's sensitivities are aimed at refining the gameplay experience for our players. This report also outlines milestones for completing the remaining features, like the damage and health systems, currency, and respawn system. These milestones also highlight the need for more player testing after the development of these features. In conclusion, as we approach the final stages of development, our focus remains on polishing the game to ensure it embodies the initial vision we outlined during the proposal stage.

Game Design

Our vision for Frostfall is to create a platform with a unique physics movement system combined with dynamic, fast-paced combat. The game's grappling and vertical movement mechanics provide a unique experience different from other games that typically utilize grappling hooks merely as a means to pull towards a point. Our implementation of the grappling hook involves creating a link between the grapple point and the player that acts under swinging motion and physics. Players can generate boosts, giving them the momentum needed to swing and launch while in the air, complemented by an aerial dash. Additionally, the pickaxe mechanic introduces a second novel element, allowing players to climb and navigate vertical surfaces enriching exploration and the game's possible movement mechanic.

Frostfall follows the story of a lone mountaineer who has embarked on a journey to uncover the secrets hidden within an ancient castle atop the icy mountain. However, the hero has

encountered harsh conditions and enemies, making the journey to the top of the mountain extremely difficult. Equipped with only an ice pickaxe and a grappling hook, the hero must navigate to the summit of the mountain. While playing the game, players will feel a sense of heroism as they swing between platforms and defeat enemies. Targeted towards those aged 13 and older, as Frostfall's complex grappling mechanic may prove too challenging for younger children, potentially making the game less enjoyable and more difficult for this age group. These novel mechanics, while difficult to fully appreciate and grasp at first, ultimately reward players, leaving them with a sense of satisfaction once fully mastered.

Players aim to find the castle by reaching the top of the mountain. They achieve this by exploring the map and defeating enemies. By defeating enemies, the player gains currency that they can use to buy checkpoints and health making further advances less challenging. The level structure features primarily vertical movement, pits the player can fall into, as well as hiding enemies.

These varying enemies will be ranged or flying. Flying enemies fly directly at the player and charge towards them, with a brief period afterward where they stop. To defeat the flying enemies, players must avoid the initial attack, and take advantage of the opening afterwards to deal damage. Ranged enemies fire projectiles at the player, and must be defeated by avoiding initial projectiles and getting close enough to deal damage. The player will encounter both types of enemies in different environments while traversing the map. The base grappling mechanic allows the player to hang from platforms and grapple points to stay in the air. The boost provides swinging momentum to move between points. The aerial dash provides a quick force in any direction which can be useful for dodging attacks and making quick adjustments. The pickaxe mechanic allows the player to scale walls and avoid free fall when close to walls or cliffs. It can also be used for a quick direction change by jumping off a wall. Both mechanics combined offer the player different ways of traversing the varying terrain encountered.

Controls

A & D	Horizontal Movement/Boost Direction
W	Jump/Wall Jump
Space	Boost
Right Click	Swap between Pickaxe and Grapple
Left Click	Shoot Rope/Climb with pickaxe
E	Interact
ESC	Menu
F	Combat Attack

Frostfall is a straightforward yet immersive game: enemies seek to attack the player, who must navigate within the map's boundaries. Players have the option to evade enemies but risk not earning currency which can be used to purchase checkpoints and health upgrades. Upon losing all their health players will respawn and lose all their money earned since their last death. Ultimately the player's objective is to advance as far through the map as possible with the assistance of the grappling hook and ice pickaxe.

Game characters

The game consists of a single main character and two enemies, a grounded yeti, and a flying bat. The main character is a rugged mountaineer, wearing a large beige coat with a hood. Their mouth is covered by a ski mask, leaving only their eyes visible. They are wearing boots and equipped with a pickaxe and grappling hook for navigating terrain, swinging from platform to platform, and fending off enemies.

The yetis are a snow beast that patrols the grounds of the mountain, throwing large snowballs at any nearby adventurers. The bats patrol the skies of the mountain, periodically attacking the player and flying away for safety.



Media List

→ Sprites:

- ◆ Player
 - Pickaxe
- ◆ Yeti Enemy (*Mageker, spriters-resources*)
 - Snowball
- ◆ Bat Enemy (*ome6a1717, itch.io*)
- ◆ Checkpoint Chest
- ◆ Background Mountain Landscape (*vnitti, itch.io*)

→ Fonts & Icons

- ◆ Old english gothic pixel (*ColorSwitchFan25, Fontstruct*)
- ◆ Menu Icons (*flaticon*)

→ Animations

- ◆ Bat Enemy: Attack, Death, Hit, Idle
- ◆ Yeti Enemy: Attack, Snowball Throw, Death, Idle, Rest, Walk
- ◆ Player: Run, Pickaxe Slide, Pickaxe Climb, Landing, Jump, Idle, Grapple, Freefall
- ◆ Main Menu Background (*gifer*)
- ◆ Credits Scroller

→ Sounds

- ◆ Button Hover sound
- ◆ Soundtrack "Unholy Knight" (*Kevin Mackleod, 2018*)

Core Design:

Currently, the game already has a variety of features that contribute to its core design implemented, such as movement and enemies, as well as novelties such as the grappling and pickaxe mechanic. Several features that we are currently working on that are essential to the vision of our game will also be described in detail below.

- **Working combat system:** At the moment we have multiple enemy sprites designed and animated (detailed by the Completed Features -> Enemies section). For the completion of the combat system, we need to implement a health bar for the player and make the attacks from the enemies deal damage to the player. Similarly, we will have to model the player attacks and make them deal the appropriate damage to the enemy sprites.
- **Complete checkpoint + currency system** - Currently at each checkpoint on the map the player has the option to interact with a checkpoint UI. In the complete game, the player will be able to purchase and unlock health and respawns using the in-game currency. This adds an element of risk/reward gameplay: should I play safe and unlock this checkpoint with the currency I have, or should I play a bit more risky and save up for the next checkpoint, or do other things such as unlock more health with the money? After the health bar is implemented, we then have to implement the option to buy health or respawns at each checkpoint. To make the above features work, we would also have to implement the coin currency system. Coins are awarded to the player upon defeating enemies and are retained up until the last checkpoint even if players die. This mechanic ensures that the players who are struggling with the game can accumulate enough coins, which can then be used for buying checkpoints and health points, ensuring that the game does not get too difficult for them.
- **Ending scene:** For a complete game, we would have to implement an ending scene that displays upon the player reaching the top. It congratulates the player and brings up the button to return to the main menu.

Optional Features:

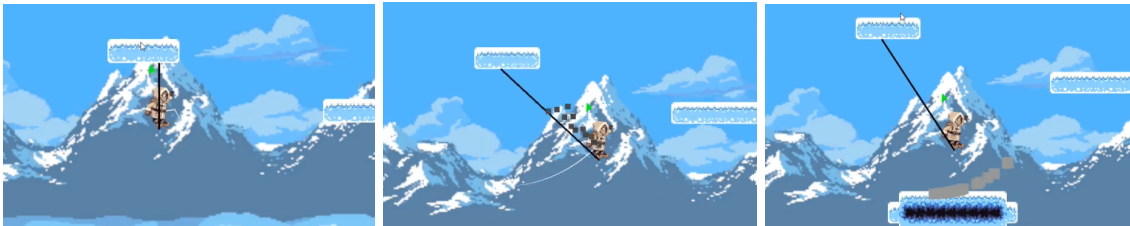
- **Player power-ups:** At checkpoints, players could also be given options to buy upgrades that boost the player attributes, such as longer grappling range, or higher attack damage. This would further diversify the possibility of gameplay, where the player could choose between “safer” options such as buying checkpoints and health, or more “aggressive” options such as boost and combat upgrades.
- **Story cutscenes:** While this game is not story-driven by design, having small cutscenes or artworks at the beginning before the game starts, and perhaps an ending scene would help the player be immersed in the experience of the character's main objective.

Development Status

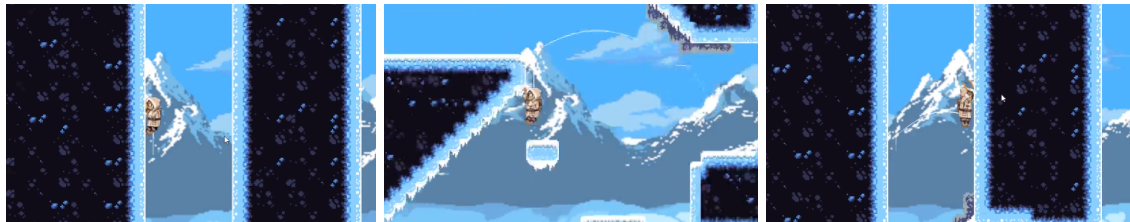
FrostFall has evolved into a playable game equipped with the essential features for playtesting and additional optional features. Continuing updates aim to add more interactivity and player engagement, while the majority of functional requirements and several non-functional requirements have already been developed and incorporated. By the end of the term, we anticipate having all functional requirements outlined in our project proposal implemented while also adding several new and non-functional components.

Completed Features

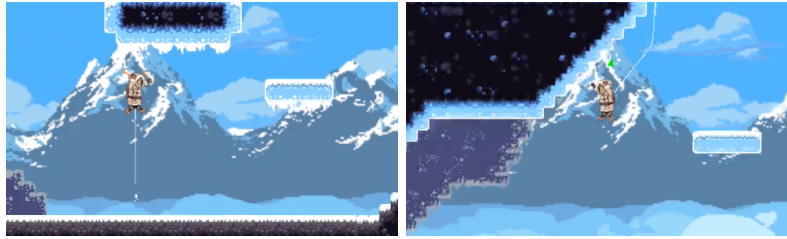
Grappling Mechanic: The implementation of the grappling mechanic allows players to traverse the environment by grappling on terrain. The mechanic adds abilities like swinging, boosting, and dashing to make navigation of the complex environment more dynamic and strategic. The included cooldowns for both dashes and directional boosts, as well as the variable release velocities, add a level of realism to the mechanic. The grappling mechanic features the grapple, which can be toggled by left-clicking over grappable terrain, i.e., platforms. The boost, which can be toggled using the space key along with "W," "A," and "D" for directional awareness, and the dash, which can be consumed by pressing the "Q" key.



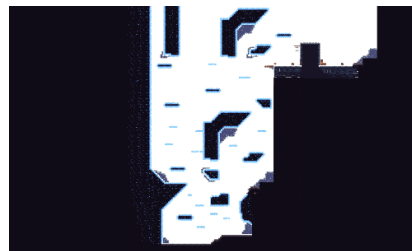
Pickaxe Mechanic: The Ice Pickaxe provides a secondary mechanic that allows the player to interact with walls, when navigation of platforms may be deemed too difficult. The pickaxe can be equipped by right-clicking the mouse; this allows cycling between the pickaxe and the grappling hook. Using the left-click the player can vertically climb walls and jump between walls using the "W" key. The wall sliding ability is automatically engaged when the player is within proximity to a wall and is free-falling.



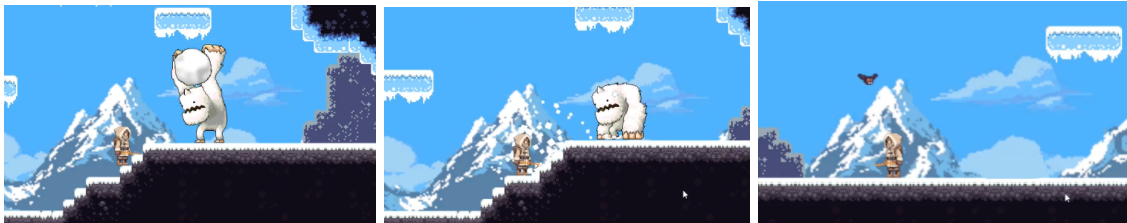
General Movement: Enhanced movement mechanics, such as running, variable jump height, and free fall movement, have also been fully implemented, offering more control over the player character. The implementation of coyote time and jump buffering improves the responsiveness and forgiveness of the jump mechanic. Particle trails, movement feedback, varying friction, and realistic gravity make the movement as realistic as possible.



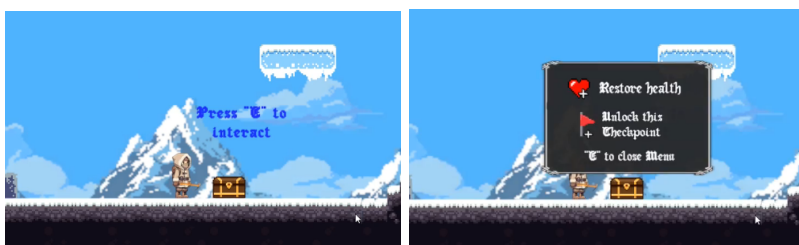
Initial Environment Creation: The game environment features checkpoints after difficult sections, castle elements, platforms, coves, and caves, designed to challenge the player. The realism of the game's environment allows for the strategic placement of enemies within caves and coves, while platforms and walls force the use of different movement mechanics. Blending functional design with the theme of the game.



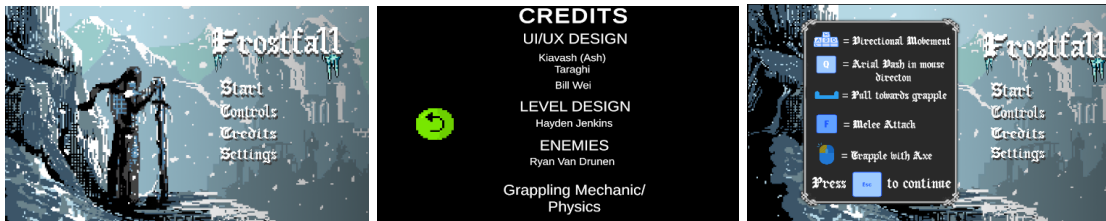
Enemies: The flying enemies, each with unique behaviors, add a challenging combat mechanic to our game. The flying bat attacks players by following them within a defined range, pecking to deal damage, and then flying upwards to avoid player retaliation. The yeti throws giant snowballs at the player which explodes on impact. Adding cooldowns to both enemies provides an opportunity for the player to defeat them earning in-game currency.



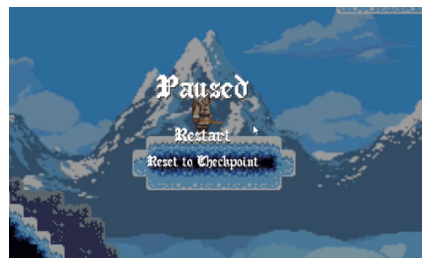
Checkpoints: The checkpoint system serves as a progress-saving feature but also as an integration into the gameplay, where players can use in-game currency to restore their health and purchase checkpoints.



Start Screen: Upon loading into the game a start screen with multiple options including credit scroller, settings, and play button are presented.



Pause Screen: The pause screen is toggled through the “ESC” key and allows the player to respawn at the most recent checkpoint, useful for when the players fall and lose progress.



Soundtrack: The inclusion of the soundtrack, "Unholy Knight" by Kevin MacLeod, throughout the game adds to the immersion of the game, providing an auditory experience that complements the game's environment.

Features to be implemented

Enemy combat: Implementing the combat system will allow players to properly engage with enemies using a variety of attack strategies. Specific implementation includes the detection of player hits, damage calculation, and enemy damage so that the player's health reflects attacks from the enemies.

Monetary system: This system will track the in-game currency earned by players through their defeat of enemies. The implementation will also track purchases such as health upgrades or checkpoints. Implementing this feature involves creating a currency counter that can be easily updated as players earn or spend currency, as well as a UI in the upper right-hand corner that will display the player's current balance.

Purchasing of checkpoints: Players will be able to use the in-game currency to buy checkpoints, allowing them to save progress as well as health upgrades. Through interaction with chests scattered across the map, players will be able to make purchases through an interactive UI. The UI and chest interactions have already been implemented; all that remains is linking specific UI interactions to the correct functions within the monetary system, health, and checkpoint systems.

Checkpoint spawning: The last feature allows players to respawn at saved checkpoints that have been purchased. If a user has purchased a checkpoint, they will have the option to respawn at this checkpoint in the pause menu or automatically if they die. Implementing this feature requires linking with the game's pause menu as well as with the checkpoint and respawn systems.

Barriers to Completion of Project

1. Asynchronous Completion: Given the strict timeline, our group is on track for the completion date, but we still have a few features to implement. Many of the features that are still to be implemented require the completion of other features, which limits us to synchronous development. For example, the checkpoint system still needs to be finalized and fully functional before the coin system can be fully and correctly implemented. The coin or monetary system will then allow the development of in-game purchases at these checkpoints.
2. Merge Errors: As we start to merge all the individual scenes (or what we have referred to as components) into the main scene, the development process becomes much more complicated and restrictive. Having multiple developers working on a single Unity scene implementing features that overlap has complicated matters and created difficult-to-handle merge conflicts. Even though developers are making changes in their own branches, working within a single Unity scene leads to a version control system that's more susceptible to errors. To combat this, we have begun iteratively committing to the repository so that changes are regularly pushed, and by doing so we minimize the scope of changes making conflicts easier to resolve. We have also begun creating prefabs for all game objects, forcing changes to be applied to the prefab rather than the scene.
3. Implementation of New Assets: As our timeline for completion narrows our group has become limited to only using existing assets and sprite packs. Creating custom assets as we had at the beginning of development is very time-consuming and thus not the best use of our little remaining time. This has made the search for sprites and other assets more difficult as Forstfall has a unique aesthetic making it harder to cohesively incorporate generic free assets.
4. Compatibility: Currently, Frostfall is being developed with hopes of being an online platformer game to be released on development platforms such as itch.io. In preparation for its release, we must consider how the game performs and looks on multiple different devices. Factors such as optimization, aspect ratio, screen resolution, and input methods need to be considered before game build to ensure a seamless experience for all users across all supported devices.

Fallback Positions

The most substantial barriers we face until completion are challenges relating to merge errors and the implementation of various interdependent features. If iterative and regular commits don't reduce or solve our issues regarding complicated merge errors our contingency plan involves establishing a checkout process where only one developer will actively work on changes to the main scene at any given time. Once changes are committed to the repository other developers will then be able to pull changes and update/ add features. While this position allows us to continue development, it will greatly slow our progress, so we are hopeful that our current strategies are effective at reducing complex merge errors. The synchronous implementation of the few remaining features also presents a challenge given the time crunch. Our group is very confident that by following the outlined milestones all critical features will be implemented with the possibility of other optional features. However, if significant challenges present themselves, we plan to reduce the implementations to only barebone features. For example, only implementing checkpoint respawning without the need for purchasing checkpoints. Secondly, the combat system could be reduced to focus only on enemy delt damage, where rather than the player attacking enemies the player would need to avoid enemies entirely rather than dealing damage. Not implementing health upgrades at checkpoints is also another possibility if time is limited. While the interdependence of remaining features and complex merge errors represent our most significant hurdles to completion, we are extremely confident that by following our outlined milestones we will be more than capable of accomplishing our vision of Frostfall.

Playtesting Results

Several members of our group conducted playtesting with individuals in our target audience, resulting in 5 total playtesters for our first playtesting round. Our playtesting strategy involved players receiving a high-level overview of the game concept, its objective, and controls. Play testers were told to vocalize their thoughts and reactions live as they played. Group members then took note of any aspects of the game that players found particularly frustrating or difficult, aswell as positive aspects such as engaging or useful features. The "think aloud" method of playtesting provided us with valuable insights into the mind of the player, highlighting needed improvements and any areas of success. As players progressed through the game and began to master basic controls they were given more controls for the more advanced and strategic mechanics. This part of our strategy ensured a linear progression throughout the game without overwhelming or confusing the player at the start of gameplay. After 10 minutes of gameplay or once the game was beaten, 1 on 1 interviews were conducted with players to collect more feedback. These 1 on 1's allowed the player to provide their overall experience and outline what they thought were the biggest drawbacks or issues with the game, as well as the most important and best features of the game. During these playtests, several consistencies were evident.

1. Positive feedback:

- a. Game Aesthetics: Playtesters stated that upon viewing the game for the first time they admired the aesthetics and unique theme of the icy castle and mountain landscape.

- b. Grapple/Axe Mechanism: Players also loved being able to have two different methods of traversing the challenging landscape. During the interview players restressed how useful and important they found these methods to be. Stating that the pickaxe was always a must when they found it too hard to jump between platforms or that the grappling hook combined with the boost made easy work of vertical challenges when it wasn't possible to use the pickaxes.
- c. Checkpoints: Although the monetary system was not developed at this point, and respawning had not yet been implemented, playtesters did express frustration when they lost progress and fell back down to the start of the map. When further development plans were outlined in the post-play conversation, players stated that such a mechanism would be extremely important in maintaining player engagement. This was a known concern for us and was why we decided to implement checkpoints in our game concept from its initial proposal. The reiteration of this fact from playtesters emphasized the need to keep users in the “flow state” in regards to Mihaly Csikszentmihalyi's theory of flow, allowing players to purchase checkpoints and respawn and thus adjusting the overall difficulty of the game.

2. Feedback For Improvement:

- a. Animation Bug: Two of the playtesters noticed a bug where the running animation was triggered while grappling. This will be an easy fix requiring another boolean condition within the animator graph.
- b. Reduce Sensitivity of Input Controls: A common concern among playtesters was that the sensitivity of the player character was too high and too sensitive, especially regarding the movement and sliding/friction on icy surfaces. This excessive responsiveness made jumping to some platforms almost impossible, as they found that the player would easily slide off. Fixing this will require adjusting the sensitivity within the player controller and incorporating further playtesting to ensure frustrations are reduced.
- c. More checkpoints: Given that checkpoints are marked on the map, and just not functional, some players expressed concern regarding their location, stating that they should be placed after what they deemed to be more difficult aspects of the game's environment. We plan on taking into account everyone's feedback regarding the best placement for checkpoints to ensure that players who complete the more challenging aspects of the map are presented with an opportunity to save their progress.

Milestones Till Completion

Below is the list of milestones we have collectively decided upon before April 7th. We have prioritized the completion of the most important features first while also taking into consideration the dependencies of each feature.

<u>ID</u>	<u>Date</u>	<u>Milestone</u>	<u>Description</u>
M1	March 17-23rd	Design UI stats on screen space	A small UI container that contains the stats such as health, coins (top right, center) of the screen.
M2	March 17-23rd	Enemy Combat System	Allow the player to deal damage towards enemies through the creation of custom attack animations, utilizing the character's pickaxe. Once defeated, the player will be rewarded with currency.
M3	March 17-23rd	Sound Effects Slider	Assign all SFX in the game to have their volume changed with the slider in the main menu (currently, the slider only affects some SFX)
M4	March 23rd-30th	Add different Music for when the game starts	Have another background song play when we are in the main menu scene
M5	March 17th - 22nd	Design Poster	Create a poster for the Creative Computing Showcase, feature in-game elements
M6	March 17th - 30th	In Game Purchases	Allow the player to buy more health, and respawns. The menu currently exists but button functionality needs to be added
M7	March 23rd	Test UI	Some tests will be held after initial UI playtesting to get more feedback on improvements and anything to be done in further iterations. Users will give a second round of feedback so we can finetune in last bugs/improve gameplay before the completion
M8	March 17 - 23rd	Multiple checkpoints	Implement multiple checkpoints so that when the player is killed / press the respawn button in the menu, the player is respawned at the latest unlocked checkpoint
M9	March 23rd - March 27	Coin system	Spawn prefab coins and collect mechanism are needed in order to be able to "buy" checkpoints
M10	April 1st - 7th	Prepare for Creative Computing showcase	Have a fully playable game, with all playtesting feedback implemented. Have a built version uploaded to itch.io for easy player interaction
M11	April 1st - April 4th	Deployment of Game	Test Game on different platforms to ensure everything is working as intended

Works Cited

Background mountains

<https://vnitti.itch.io/glacial-mountains-parallax-background>

Yeti Enemy

https://www.sprisers-resource.com/pc_computer/maplestory/sheet/22969/

Bat Enemy

<https://ome6a1717.itch.io/simple-enemies-bat>

Music

https://www.youtube.com/watch?v=vvPNcGeXWyk&ab_channel=KevinMacLeod

Splat SFX

https://www.zapsplat.com/?s=splat&post_type=music&sound-effect-category-id=

Level Completion SFX

<https://mixkit.co/free-sound-effects/game/>

Icons

<https://www.flaticon.com/free-icons>

old english gothic pixel font

<https://fontstruct.com/fontstructions/show/1535174/old-english-gothic-pixel>

Castle tile set

<https://incolgames.itch.io/dungeon-platformer-tile-set-pixel-art>

Ice/Snow tile set

<https://assetstore.unity.com/packages/2d/environments/platformer-tileset-pixelart-snow-mountain-220095>

Main Menu Background

<https://gifer.com/en/bAU>