Requirement Specifications

To The Sky

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Executive Summary

To the Sky is a tile puzzle game that focuses on player movement and puzzles.This game will often make the player think about how to approach obstacles in order to progress to the next area. The game will be mainly focused on PC and not on console or mobile.

Tile puzzle games have been absent for many years. The most notable tile puzzle game is the Frogger series which had its last tile game back in 2005, which was 17 years ago. With this project, we hope to bring back this old genre of games so people can relive what we consider our childhood games. This game also serves as a way to get ourselves our foot in the door to game development and game design.

This document will be an overview that will first cover the stakeholder model. The stakeholder model involves the groups that the application will have an impact on. The team will assess the effect it will have on each group as well as consider the competition that it has. Next, it will focus on the goals that the team aims to accomplish in a business, usage, systematic, and overall sense. The diagram will depict the partitioned priorities of these goals and the key features that will be needed in order to accomplish them. It will reflect the team's shared vision of success for this game. Following the system vision, will be the use case models which explain each feature's flow of action with the user's interaction. A usage model will also be included to visualize how the application's features will be split up among the users, the merchant and customer, and the developers. Lastly, the functional and nonfunctional requirements will be provided for further clarification of what needs to be done

Overall, this game will be our first step into game development and game design. We aim to hope to please a new generation of gamers into the tile puzzle genre that has been absent for nearly 17 years.

Stakeholder Model
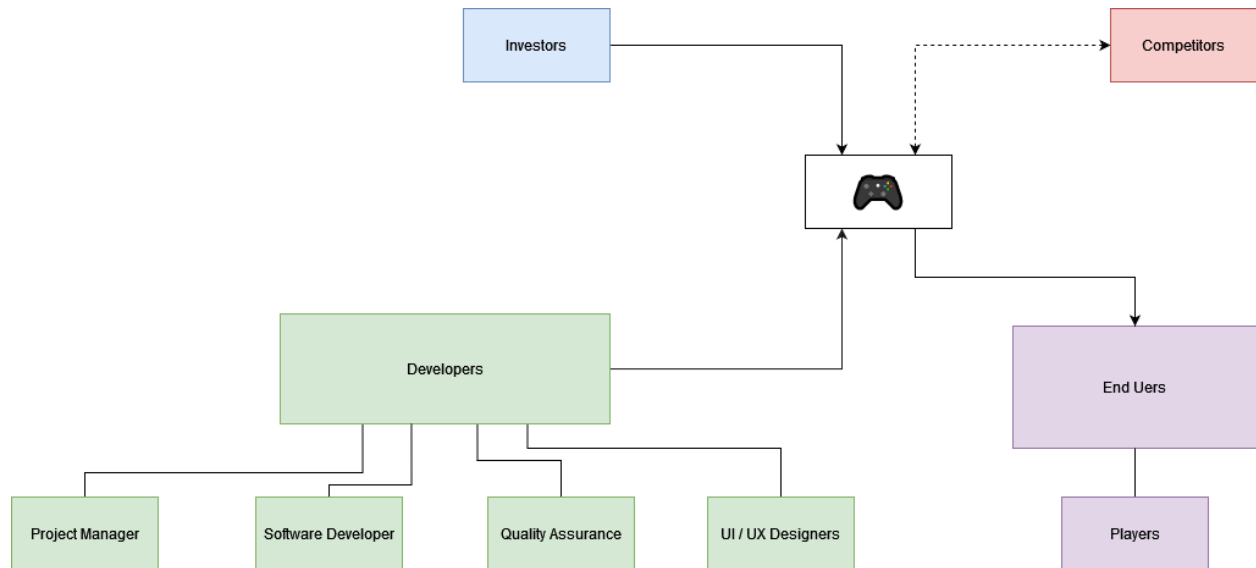
Stakeholder Roles

Role	Project manager
Role Description	Manages all aspects of the team and fulfills the vision and requirements to deliver the product
Expertise	Resource planning, organization, supervision, monitoring and controlling, prioritizing
Responsibilities	Planning, organizing and directing team members to ensure tasks are completed on time
Deliverables	Plans and schedules for the team to follow

Role	Software Developer
Role Description	Specializing in programming to make the game work and function
Expertise	Problem solving, following trends, mastering and learning skills quickly, ability to work in various environments
Responsibilities	Implementing code and estimating time of completion

Deliverables	Successful working code

Role	**UX and UI Designer**
Role Description	Designs the interface which users see when playing the game
Expertise	Knowledge of popular UIs in gaming, creativity
Responsibilities	Design docs and making mockups
Deliverables	Mockups of designs of the UI and UX

Role	**Quality Assurance Engineer**
Role Description	Interacts with the working products to find flaws and issues
Expertise	Attention to detail and problem finding
Responsibilities	Finding and providing solution to problems found
Deliverables	Solutions to help the development team write faster and better code

Role	**Investor**
Role Description	People who show interest in the product and offer assistance in some way
Responsibilities	Funding for the project
Deliverables	Funds to allow initiation of the project

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Role	**Player**
Role Description	The person who will interact with our product
Responsibilities	Interacts with the product
Deliverables	Enjoys the product we made

Role	**Competitor**

Role Description	Companies that provide a similar product to ours
Expertise	Provide methods for end users to have the best experience
Deliverables	Any methods that could be improved on that can possibly be implemented into our product

Goal Model

This diagram will help our team focus on the important aspects that will determine the success of our game. What this does is that it visualizes our goals to better understand and serve as a quick reference for us to look at through the process of development to make sure we stay on track. The primary goal is split into three separate goals: Usage, Business, and System.

1. Usage: This goal is focused on ensuring that the game is being utilized for its intended purpose and its features usability
2. Business: This goal directly drives the success of our game..
3. System: This goal is focused on the design and software of the game for the best user experience among players.
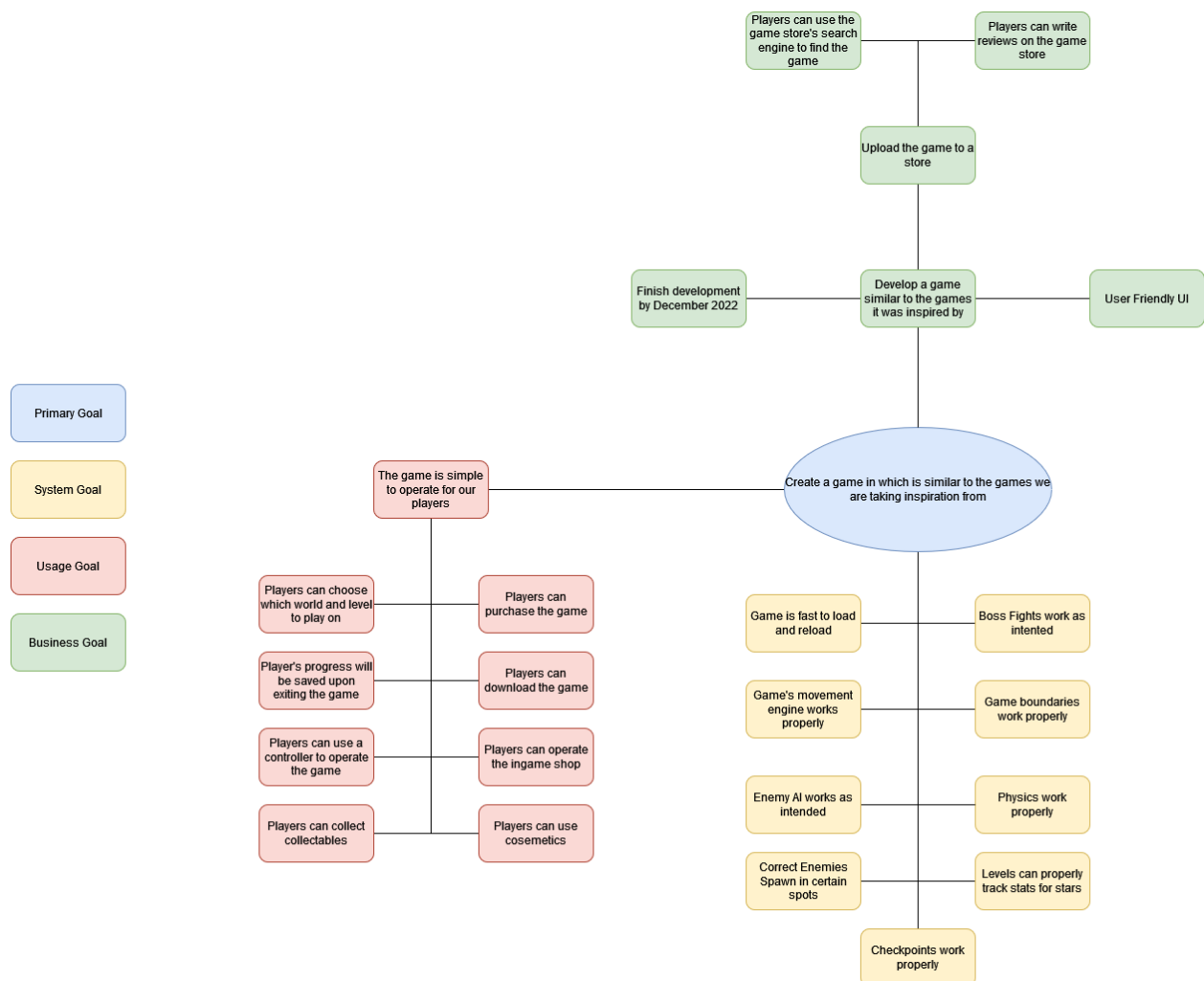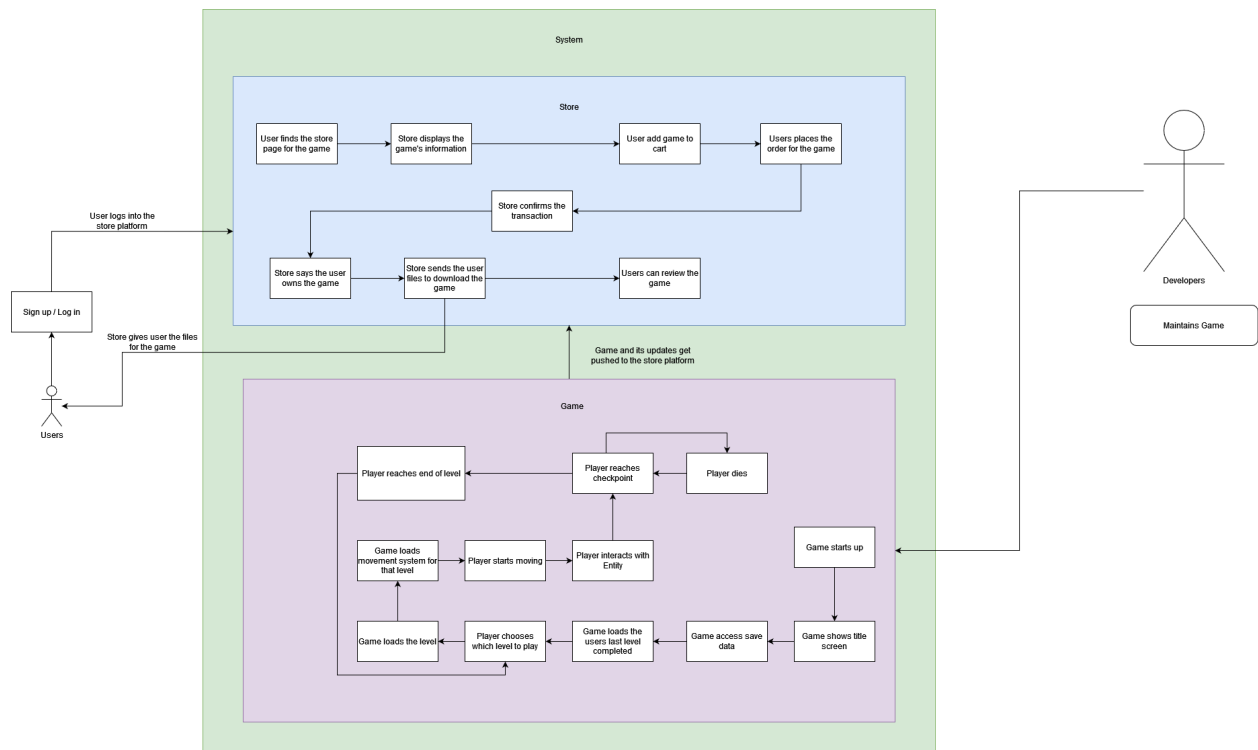
System Vision

The system vision details the relationship between the developers, the store, and the users. Below, you will see how the model demonstrates the interaction in which users download our product. The customers will use the store platform of our choice to download that game. The store platform will handle the download distribution as well as a page in which reviews will be held. As well as trailers, summary, etc. All user login information will be handled by the store platform.
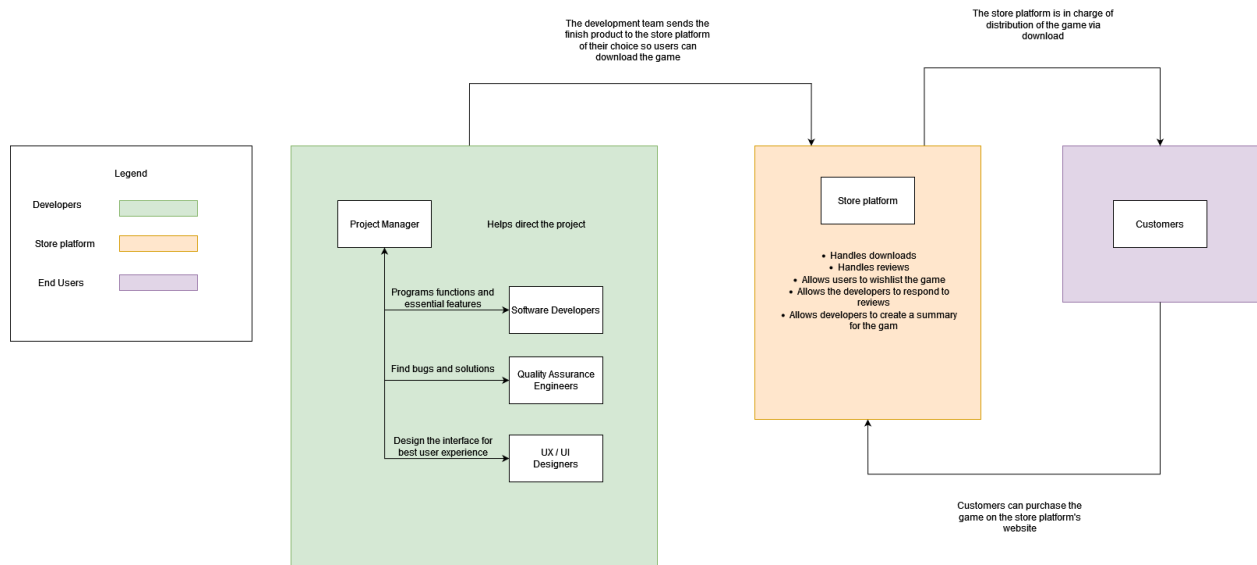
Usage Model

The usage model below is a visual demonstration of how users will access the game and the game's loop. Users have to sign up for the store platform and login. Then they will need to find the game's store page via a search. Once they find the game's store page, users can add it to their cart and pay for their game. Afterwards, users can leave a review to be displayed on the store page. Now the game loop starts by the player booting up the game in which it will display the title screen. Afterwards, the game will return the last level they played or the starting one if its a new playthrough. Then the player can choose which level to play. Once selected, the game loads the level and the appropriate movement system for that level. Once the user starts playing the level, they can interact with enemies either by defeating them or dying by them. If a player dies by an enemy, they will return to the last checkpoint until they beat the level. Once a player reaches the end of a level, they will return the level selection screen and repeat the process.

Use Cases

Use Case # 1	4 Worlds (3 levels per World)
Goal in context	A total of 12 playable levels
Scope & Level	Primary Task
Preconditions	Game engine start up
Success End Condition	12 completed and playable levels
Failure End Condition	Game Crash, In-game Bugs
Primary, Secondary Actors	Primary Actor: Player Secondary Actor: Game Engine
Trigger	Player starting up game
Description	

Step	Action
1.	Player starts up game
2.	Player can then press play to access levels

| **Extensions** | |

Step	Branching Action
1.	Player is already in the game, they can choose to start a previous level

Exceptions	A player cannot access levels they have not completed
Related Information	Priority - High Priority
Open Issues	What if the game doesn't track what levels a player has already completed?
Schedule	November 2022

Use Case # 2	Full Controller Support
Goal in context	Allows the player to control movements via a controller (Playstation, Xbox, X-Input, etc.)
Scope & Level	Primary Task
Preconditions	System and game is on and started up
Success End Condition	The player is able to control the game via the controller
Failure End Condition	The player is unable to control the game via the controller
Primary, Secondary Actors	Primary actor: Controller Secondary actor: Engine
Trigger	Player plugs the controller into an input
Description	<table><tr><th>Step</th><th>Action</th></tr><tr><td>1.</td><td>Player plugs in controller</td></tr><tr><td>2.</td><td>Game detects controller to detect movement</td></tr></table>
Extensions	N/A
Exceptions	N/A
Related Information	Priority - Medium Priority
Open Issues	What if the game engine does not detect the controller input?
Schedule	November 2022

Use Case # 3	Tile Based Movement
Goal in context	Move the player exactly 1 tile per button press
Scope & Level	Primary Task
Preconditions	Game boots up the level
Success End Condition	Player moves exactly 1 tile
Failure End Condition	Player doesn't move exactly 1 tile
Primary, Secondary Actors	Primary actor: Controller Secondary actor: Engine
Trigger	Button press
Description	

Step	Action
1.	Game loads level
2.	Player presses a button
3.	Player move 1 tile

Extensions	N/A
Exceptions	N/A
Related Information	Movement System
Open Issues	N/A
Schedule	November 2022

Use Case # 4	Turned Based Puzzles and Combat
Goal in context	Design the game around puzzles and simple combat
Scope & Level	Primary Task
Preconditions	N/A
Success End Condition	Game is designed around puzzles and simple combat
Failure End Condition	Game is not designed around puzzles and simple combat
Primary, Secondary Actors	Primary actor: Game Designers
Trigger	N/A
Description	Game Designers will design the game based around puzzles and simple combat
Extensions	N/A
Exceptions	N/A
Related Information	Game Design
Open Issues	N/A
Schedule	November 2022

Use Case # 5	Puzzle Focused Gameplay
Goal in context	Design the game around puzzles which the player must think about to overcome the level
Scope & Level	Primary Task
Preconditions	N/A
Success End Condition	Game is designed around puzzles
Failure End Condition	Game is not designed around puzzles
Primary, Secondary Actors	Primary Actor: Game Designers
Trigger	N/A
Description	Game Designers will design around puzzles which the player must think about to overcome the level
Extensions	N/A
Exceptions	N/A
Related Information	Game Design
Open Issues	N/A
Schedule	November 2022

Use Case # 6	Instant Respawn
Goal in context	When a player dies, they will respawn fairly fast and the level will also reset fairly fast
Scope & Level	Primary Task
Preconditions	The level is built and designed
Success End Condition	Player respawns fairly fast and level is reset fairly fast
Failure End Condition	Player does not respawn fairly fast and/or level is not reset fairly fast
Primary, Secondary Actors	Primary Actor: Game engine
Trigger	Player dies
Description	

Step	Action
1.	Game loads level
2.	Player moves
3.	Player Die
4.	Game respawns player and reload level

Extensions	N/A
Exceptions	N/A
Related Information	Game Engine
Open Issues	N/A
Schedule	November 2022

Use Case # 7	Multiple Level Formats
Goal in context	Have 3 different types of level formats
Scope & Level	Primary Task
Preconditions	N/A
Success End Condition	Game is developed to support multiple level formats
Failure End Condition	Game is not developed to support multiple level formats
Primary, Secondary Actors	Primary actor: Game engine
Trigger	N/A
Description	We will have 3 level formats: Turn Based, Free Roam, and Bonus. **Turn Based:** For each action the player does, the enemy will do one movement action. "**Free**" Roam: The player is allowed to move freely without affecting the enemy's actions **Bonus:** Deviates from turn based and free roams. They can be minigame styled levels and are optional.
Extensions	N/A
Exceptions	N/A
Related Information	Level Design
Open Issues	N/A
Schedule	November 2022

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Use Case # 8	World/Level Selection System
Goal in context	Allow player to choose specific level or world to play
Scope & Level	Primary Task
Preconditions	Player has completed prior worlds and/or levels
Success End Condition	Player gets to play chosen world/level
Failure End Condition	Player does not get to play in chosen world/level
Primary, Secondary Actors	Primary Actor: Player Secondary Actor: Game Engine
Trigger	Player clicks on world/level

Description

Step	Action
1.	Game prompts user to choose world
2.	Game prompts player to choose level from chosen world

Extensions

Step	Branching Action
2	Bonus levels can be unlocked when player collects correct keys

Related Information	Priority - High Performance Target - Frequency - Channel to primary actor -
Open Issues	How many keys will be needed to unlock bonus level?
Schedule	December 2022

Use Case # 9	4 Element World Theme
Goal in context	Incorporate one of the 4 elements (fire, water, earth, air) into each world
Scope & Level	Primary Task
Preconditions	System is on and game is started
Success End Condition	Each world clearly conveys their specific theme to the player
Failure End Condition	The specific theme of a world is not made clear to the player
Primary, Secondary Actors	Primary actor: Player Secondary actor: game engine
Trigger	Player chooses world
Description	
Extensions	

Description:

Step	Action
1	Player chooses one world out of the four to play in

Extensions:

Step	Branching Action
1a	Water world is chosen - Levels will include a beach theme, underwater theme, and ice theme
1b	Fire world is chosen - Levels will include a volcanic debris theme, volcano theme, and lava theme
1c	Earth world is chosen - Levels will include a cave theme, forest theme, and mountain theme
1d	Air world is chosen

		- Levels will include a lightning storm theme, tornado theme, and sky theme
Exceptions		Graphics have not finished loading
Related Information		Priority - High
Open Issues		What kinds of graphics should be included to successfully express each worlds theme?
Schedule		December 2022

Use Case # 10	Boss Fights
Goal in context	A player needs to defeat the boss of each level in order to continue on to the next level
Scope & Level	Primary Task
Preconditions	All the stages before the boss stage is completed
Success End Condition	Boss HP hits 0
Failure End Condition	Player HP hits 0
Primary, Secondary Actors	Primary: Player Secondary: Boss
Trigger	Player enters the gate that leads to the boss stage
Description	

Step	Action
1.	The player enters the boss stage
2.	Boss will either be in turn based or free roam format
3.	Player moves around to deplete boss HP
4.	Player wins as soon as the HP of the boss hits 0

Extensions	N/A
Exceptions	The player has not completed all the other stages prior to the boss stage
Related Information	N/A
Open Issues	N/A
Schedule	November 2022

Use Case # 11	Unique tiles
Goal in context	Each stage from each world will have different tiles based on the element of the world
Scope & Level	Primary Task
Preconditions	N/A
Success End Condition	Level has unique tiles
Failure End Condition	Level does not have unique tiles
Primary, Secondary Actors	Primary Actor: Game Level
Trigger	N/A
Description	Worlds will focus and the element aspect and have unique tiles/blocks which interact uniquely within the level
Extensions	N/A
Exceptions	N/A
Related Information	Level Design
Open Issues	N/A
Schedule	November 2022

Use Case # 12	Basic Physics Implemented
Goal in context	Tiles/Blocks and player will have a basic physics system implemented
Scope & Level	Subfunction
Preconditions	N/A
Success End Condition	Basic physics system implemented
Failure End Condition	Basic physics system not implemented
Primary, Secondary Actors	Primary Actor: Game Engine
Trigger	N/A
Description	Some tiles or blocks will have gravity or have some interaction with the world.
Extensions	N/A
Exceptions	N/A
Related Information	Game Engine
Open Issues	N/A
Schedule	November 2022

Use Case # 13	Unique Enemy Types per World
Goal in context	Enemy types will all be related to the theme of the world they are in.
Scope & Level	Primary Task
Preconditions	Player will be located in a specific world
Success End Condition	Spawned enemy AI in world are unique to that world
Failure End Condition	Spawned enemy AI are not in the correct unique world
Primary, Secondary Actors	Primary: Game Engine
Trigger	Player
Description	<table><tr><td>**Step**</td><td>**Action**</td></tr><tr><td>1.</td><td>Player is located in unique world</td></tr><tr><td>2.</td><td>Game engine spawns the enemy AI in their predetermined locations</td></tr></table>
Extensions	N/A
Exceptions	The final boss only exists in the boss stage. They cannot be spawned outside of it.
Related Information	There are 4 total worlds, so 4 unique types of enemy designs
Open Issues	How will the game engine determine what enemy design belongs to each unique world
Schedule	October 2022

Use Case # 14	Enemy AI
Goal in context	Create AIs that determine how they interact in turn based and free roam levels
Scope & Level	Primary Task
Preconditions	Player is in level that should have enemy AIs
Success End Condition	Enemy AI that determine their move or attack and complete that determined action
Failure End Condition	Enemy AI fail to determine their move or attack and fail to complete an action
Primary, Secondary Actors	Primary: Enemy AI Secondary: Game Engine
Trigger	Player comes into range/contact with spawned Enemy AI
Description	<table><tr><td>**Step**</td><td>**Action**</td></tr><tr><td>1.</td><td>Spawn Enemy AI</td></tr><tr><td>2.</td><td>Enemy AI determines action based on distance from player</td></tr></table>
Extensions	<table><tr><td>Step</td><td>Action</td></tr><tr><td>1.</td><td>Enemy AI waits until player comes into distance/contact</td></tr><tr><td>2.</td><td>If player leaves the range of the of action of the Enemy AI, the Enemy AI will standby</td></tr></table>
Exceptions	N/A
Related Information	Each world/level has a variety of different AI. Some which only exist in the turn based,

	some which only exist in free roam.
Open Issues	What if the enemy AI is unable to correctly determine player location or distance? What if the Enemy AI becomes stuck in location or action? What if the enemy AI attack does not register to the player?
Schedule	November 2022

Use Case # 15	Trader/shop system
Goal in context	Allows the player to purchase helpful items to help them complete levels
Scope & Level	Subfunction
Preconditions	Player must have collected coins that can be found in levels
Success End Condition	Player is able to trade coins for chosen items
Failure End Condition	Player is not able to trade coins for chosen items
Primary, Secondary Actors	Primary Actor: Player Secondary Actor:
Trigger	Player clicks on button that takes them to the shop

Description	

Step	Action
1	On the main menu, the player clicks a button that will take them to the shop.
2	In the shop, items such as health and shields will appear for the player to choose from
3	Player chooses item to buy
4	Item will be made available for player to use

Extensions	

Step	Branching action
2	Player can see how many coins an item costs

Exceptions	Item will not become available for player to use if they have an insufficient amount of coins
Related Information	Priority - Medium
Open Issues	How will the game keep track of the amount of coins the player collects and spends?
Schedule	December 2022

Use Case # 16	Lots of Collectibles
Goal in context	Each level will contain different items (including keys, coins, and powerups) for the player to collect
Scope & Level	Primary Task
Preconditions	Player has started playing in a level
Success End Condition	Player will be able to collect items that will either allow them to unlock bonus levels, help them solve puzzles, or trade for other items
Failure End Condition	Player will not be able to collect items
Primary, Secondary Actors	Primary actor: Player Secondary Actor: game engine
Trigger	Game level is started
Description	
Extensions	

Description

Step	Action
1.	Player starts level
2.	Player moves around to explore world and solve puzzles
3.	Player finds tile with a collectable item
4.	Player collects items to use later

Extensions

Step	Branching Action
4a	Player finds key - Key can be used to unlock bonus levels
4b	Player finds coin - Coins can be used to buy other items in shop
4c	Player finds power-up

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	- Power-ups can be used to help solve puzzles
Exceptions	Bonus levels will not have key collectables that unlock other levels
Related Information	Priority - High
Open Issues	How will powerups be used?
Schedule	December 2022

Use Case # 17	Bonus Levels
Goal in context	Optional levels that can be unlocked if the player collects the necessary items
Scope & Level	Subfunction
Preconditions	Player has collected the hidden keys from the regular levels
Success End Condition	Player can unlock and play extra level
Failure End Condition	Player cannot unlock and play extra level
Primary, Secondary Actors	Primary actor: player Secondary actor: game engine
Trigger	All necessary keys are collected by player
Description	

Step	Action
1.	Player collects hidden keys from regular levels
2.	Player is given the option to unlock new level

Exceptions	Player cannot access bonus levels if they do not collect the necessary keys first
Related Information	Priority - Medium
Open Issues	How will we determine which items open which level?
Schedule	December 2022

Use Case # 18	Power ups gained from boss fights
Goal in context	Once a player has defeated a world boss, they receive a power up that affects their base stats
Scope & Level	Primary Task
Preconditions	Player successfully defeats world boss (Boss HP is less than or equal to zero)
Success End Condition	Player receives power up
Failure End Condition	Player does not receive power up
Primary, Secondary Actors	Primary: Secondary:
Trigger	World boss is defeated
Description	

Step	Action
1.	Player successfully defeats boss
2.	Defeated boss drop a power up
3.	Player picks up power up

Extensions	N/A
Exceptions	N/A
Related Information	Progressional Mechanics
Open Issues	What if the player has collected the power up, it does not affect their base stats?
Schedule	November 2022

Use Case # 19	Branching paths in levels
Goal in context	Each world will have a bonus area in one of the levels that is locked until an unlock requirement is met. These areas are meant to offer variety and rewards to curious players.
Scope & Level	Subfunction
Preconditions	The player discovers the bonus area within the level.
Success End Condition	Bonus area is discovered and able to be unlocked.
Failure End Condition	Bonus area is unreachable. Bonus area fails to unlock after requirements are met.
Primary, Secondary Actors	Primary: Player Secondary: Game Engine
Trigger	Player locates branching path
Description	

Step	Action
1.	Player finds the branching path
2.	Player meets unlock requirements
3.	Player returns to area and unlocks it

Extensions	N/A
Exceptions	N/A
Related Information	Additional content
Open Issues	-How to incorporate a cleverly hidden, but not impossible to find path? -Unknown unlock requirements
Schedule	November 2022

Use Case # 20	Customizable player cosmetics
Goal in context	Give the player different aesthetic options to customize their avatar
Scope & Level	Subfunction
Preconditions	Player unlocks cosmetic option
Success End Condition	Player changes their appearance and it reflects the change in game
Failure End Condition	-Cosmetic changes are buggy -Cosmetic changes are not reflected in game
Primary, Secondary Actors	Primary: Player Secondary: Game Engine
Trigger	Player equips the cosmetic change
Description	
Extensions	N/A
Exceptions	Cosmetic fails to apply properly or has meshing or textural issues.
Related Information	Player choice
Open Issues	Clipping issues
Schedule	November 2022

Description table:

Step	Action
1.	Player equips cosmetic from a menu
2.	The cosmetic is applied to their avatar

Use Case # 21	Star rating based on level/stage objectives
Goal in context	Create a star rating that determine how skillfully a player completed a level
Scope & Level	Primary Task
Preconditions	Player has completed the level.
Success End Condition	The player receives a star rating that will be displayed.
Failure End Condition	The star rating does not compute or does not display to the player
Primary, Secondary Actors	Primary: Game Engine Secondary: Player
Trigger	Player completes level
Description	

Step	Action
1.	Player completes level, display completion screen
2.	Engine computes star rating based on: 1. Timed completion 2. Mobs Destroyed 3. Amount of Collectibles
3.	Displays the star rating to the player

Extensions	N/A
Exceptions	N/A
Related Information	The player can gain 0-3 stars. The game saves the highest received star rating.
Open Issues	How will each criteria weigh for star rating?
Schedule	December 2022

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Use Case # 22	Optional checkpoints
Goal in context	Create checkpoints for the player.
Scope & Level	Subfunction
Preconditions	Player has reached a certain point in the stage
Success End Condition	The player can choose to save at sed checkpoint, saving their progress
Failure End Condition	The player chooses to save at the checkpoint, but the game does not save their progress correctly
Primary, Secondary Actors	Primary: Player Secondary: Game Engine
Trigger	Player reaches the middle of the stage, interacts with checkpoint and chooses to save their progress
Description	

Step	Action
1.	Player reaches the mid way point in the stage
2.	Player locates checkpoint
3.	Player interacts with checkpoint
4.	Player chooses to save their current progress

Extensions	N/A
Exceptions	N/A
Related Information	A player saving at a checkpoint affects their star rating received
Open Issues	How will we override the previous saved checkpoint?

Schedule	December 2022

Use Case # 23	Background music/Sound effects
Goal in context	Add sound layers to game
Scope & Level	Subfunction
Preconditions	Functioning game
Success End Condition	Sound will occur based on player location, action, etc.
Failure End Condition	No sound will occur
Primary, Secondary Actors	Primary: Game Engine Secondary: Player
Trigger	Enters location, performs action, is within distance of an enemy AI, enemy AI performs action, picks up power up, player dies, etc.
Description	

Step	Action
1.	Player performs action/ Player is range of Enemy AI performing action/Player enters an area
2.	Sound/music is is output to

Extensions	
Exceptions	Player has muted a sound layer. Such as background music, mob sounds, player sounds, etc.
Related Information	Low priority
Open Issues	How will we determine the range of sounds that should be heard to the player?
Schedule	December 2022

Functional Requirements

- World Selection Screen
  - Maintain the ability to select any level or world when booting up the game or finishing a level
  - Lock the player from future levels they have not completed
- Level format
  - Maintaining the 4 world element theme through the game
  - Water, Fire, Earth, Air worlds in that order
  - Maintaining unique level elements such as unique tiles or mechanics
- Movement system
  - Have both versions of the movements system working and operational
- Save data
  - Maintain and save the player's completion data
  - Save the last level played after exiting game

Non-Functional Requirements

- Quality
  - Make the game easily playable and accessible
  - Practice good game design and level design
- Constraints
  - Availability for development
    - The time constraint to complete this project is due by December 2022 which may be challenging since the developers have to take more classes during development time
  - Learning new skills
    - Most of the developers have little game dev experience so learning game dev may be challenging and may take more time than anticipated
- Development process
  - Complete documentation
  - Research to how to program with Unity
  - Set up a coding environment
  - Developing the game
  - Testing the game
  - Create and distribute the game
  - Maintain the game for future releases updates and bug fixes