Project:	Mystic RiddleScape
Team No.:	2
Class:	CSE 3310; Fall 2023
Module:	Mystic RiddleScape Application
Deliverable:	System Requirements Analysis (SRA), Test Cases, Source Codes
Members:	Carl Nguyen, Darshan Bastola, Insaf Mohamed Umar, Abhisek Kumar Jha

Binder Table of Contents

ReadMe

1. **Contact Information:**
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2. **Missing Information:**
    a. No ending screen
    b. No save file (so no proper resets)
    c. No info option on selected items from inventory
    d. No additional levels besides level 1
        i. Scoring bonus per level not applied
        ii. Backgrounds and puzzles for levels outside of level 1 not applied

3. **Issues:**
    a. Maze puzzle and scene stopped working properly last night
    b. Graphics not adjusted to fit on most general phones (so slightly off screen)

Project:	Mystic RiddleScape
Team No.:	Team 2
Class:	CSE 3310; Fall 2023
Module:	System Requirements Analysis (SRA)
Deliverable:	SRA Document

Version: [1.0] **Date: [11/2/2023]**

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Revision History

Version number	*Date*	*Originator*	*Reason for change*	*High-level description of changes*
1.0	11/2/2023	Team 2	Initial draft	

TABLE OF CONTENTS

1. Introduction and Project Overview

Game Concept: A 2D RPG single player mobile adventure game requiring the player to solve a series of interactive puzzles in order to traverse through three distinct environments and complete a quest.

Game Story: The main character/player is on a quest to find their brother after waking up in an unknown place without their memories. They will end up indirectly assisting someone solve a mystery as a side quest while traveling to where they believe their brother is located. During the journey, they end up making new friends as well as learn more about themselves, the past, the present, and the people they used to know.

Game Environment: The game's environment is divided into 3 different subcategories of meadow, cabin, and forest to correspond with an outdoors adventurous mood.

Game Structure: The game is divided into several levels with unique locations and corresponding puzzle sets. Levels will get progressively harder in terms of puzzle category and quantity. Each puzzle will be solved by either connecting specific interactive objects to their corresponding puzzles or repositioning an interactive object on the main puzzle frame.

Game Objective: The goal of the game is completing the puzzles. Finishing a certain set of puzzles will allow the players to move up a level and traverse to a different area of the game's environment. Players will end up collecting additional items as they traverse through more of the game, which will provide more information about the game lore as well as help them solve other puzzles later in the game.

Player Interaction: Players will be able to interact with the game and solve the game's puzzles through clicking or swiping at game objects on the screen and pairing them off with their corresponding puzzle. They can also traverse through their current environment in their game by pressing on the edges of their screens.

Game Setup: The game will provide the player's several setup options in the game's settings page to personalize their user experience.

Included Components:

- Settings/Setup
- Graphics
  - Backgrounds
  - Interactive Game Objects
  - Inventory
- AI:
  - Levels/Sections (3 categories)
  - Puzzles
- Scoring/Progress

2. Objectives

2.1 BUSINESS OBJECTIVES

The following is a list of business objectives:

Objective 1: Settings: Players are allowed to adjust certain playing conditions when starting up the game to meet their preferences. Allowed adjustable playing conditions includes:

- Turning background music on/off
- Turning interactive sounds on/off
- Resetting the current progress of the game

Objective 2: Graphics: A set of images/visuals corresponding to the current progress of the player will be shown on the player's screens for the players to interact with. Each image/visual in the set can be divided into 2 categories:

- Backgrounds images
- Clickable items

Objective 3: Background: Background images will be shown on the player's screens throughout the game, and players can adjust which image will be shown by pressing on the edges of the screen as well as clickable environmental items in the game.

Objective 4: Interactive Object: The game will include items which the players can click on to either move around in the game, collect and solve puzzles with, to gain clues on how to solve a puzzle, or to gain more information about the game lore.

Objective 5: Inventory: An inventory is provided to store the clickable items that the player can collect throughout the game until the player has found the proper use for said items. These collectable items include:

- Puzzle pieces
- Documents
- Other collectable items

Objective 6: Puzzle: A series of puzzles will be given to the players that they must solve in order for them to be able to progress through the game.

Objective 7: AI: Three levels with their own corresponding puzzle set must be completed in ascending order by the player to complete the game.

Objective 8: Scoring: Players will have a viewable score/progress value that will be increased for every time a player solves a puzzle to know how far they are in the game.

2.2 SYSTEM OBJECTIVES

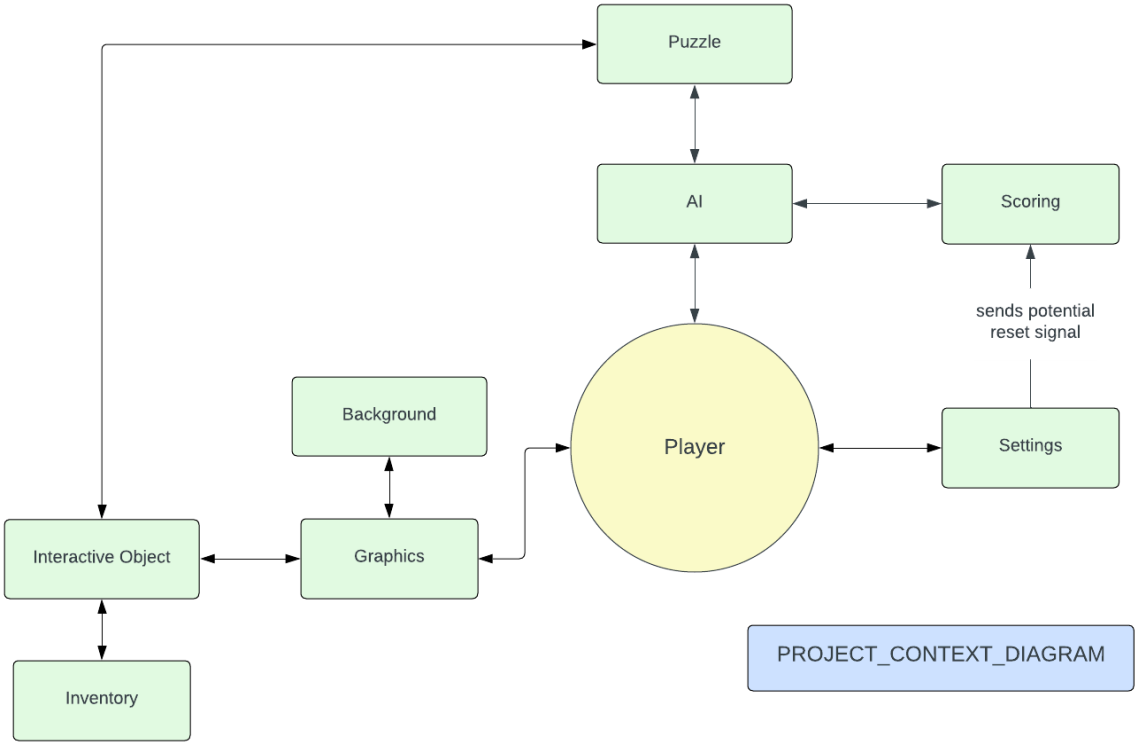
The following is a list of system objectives:

Objective 1: System will be an Android based Mobile system.

Objective 2: Google search will be utilized to assist in the development of the game.

Objective 3: A saved text file containing current progress data will be used to determine the player's current progress status.

3. Project Context Diagram



4. Systems Requirements

The following 8 sections will include all requirements for our game application:

4.1 "Settings" Requirements

Requirement Title: (*required)	Settings
Sequence No: (*required)	001
Short description: (*required)	Update Current Game Settings
Detailed Description: (*required)	Players can access the game settings by pressing a provided "Settings" button. Players will then be allowed to adjust certain game options to fit with their preference. These options include background music and interactive sounds that they can toggle on/off as well as a reset option to restart the game's progress. Players can press: - Music - Sound - Reset - Return (to return back to main screen)
Pre-Conditions: (optional)	Game must be already loaded
Post Conditions: (optional)	All saved changes will be kept permanently even when game is resetted
Other attributes: (optional)	Default settings for a new game is background music on and interactive sounds on.

Requirement Title: (*required)	Settings
Sequence No: (*required)	002
Short description: (*required)	Turning Background Music On/Off
Detailed Description: (*required)	Players can click a "Background Music" button to turn the game's background music to the opposite condition it was originally at. For example, if the background music was originally set to on, the background music will now be turned off after the button is clicked. Players can also press the button again to reverse the effect.
Pre-Conditions: (optional)	- Game must be already loaded - Settings page must be loaded
Post Conditions: (optional)	All saved changes will be kept permanently even when game is resetted
Other attributes: (optional)	Default settings for a new game is background music on.

Requirement Title: (*required)	Settings
Sequence No: (*required)	003
Short description: (*required)	Turning Interactive Sounds On/Off
Detailed Description: (*required)	Players can click a “Interactive Sound” button to turn the game’s interactive sounds to the opposite condition it was originally at. Ex: if interactive sound was originally set to on, the interactive sound will now be muted for every scoring and game object interaction after the button is clicked. If players change their minds, they can press the button again to reverse the effect.
Pre-Conditions: (optional)	- Game must be already loaded - Settings page must be loaded
Post Conditions: (optional)	All saved changes will be kept permanently even when game is resetted
Other attributes: (optional)	Default settings for a new game is interactive sound on.

Requirement Title: (*required)	Settings
Sequence No: (*required)	004
Short description: (*required)	Trigger Game Reset
Detailed Description: (*required)	Players can click a “Reset” button to initialize restarting the game. Pressing the button will result in a pop up that reconfirms the player’s selection for resetting.
Pre-Conditions: (optional)	Game progress must be greater than 1 (cannot be a new game/just restarted game)
Post Conditions: (optional)	A pop up will appear to reconfirm the player’s selection
Other attributes: (optional)	None

Requirement Title: (*required)	Settings
Sequence No: (*required)	005
Short description: (*required)	Confirm and Finalize Reset
Detailed Description: (*required)	A pop up appears that reconfirms the player's selection for resetting. Selecting yes will set progress value and current score back to 0 as well as restore all puzzle sets, restore interactive object positionings, empty out the inventory, and return players back to the main menu. Any existing save file will also be deleted. Selecting no will return players back to the settings page. Players can press: - Yes - No
Pre-Conditions: (optional)	- Game progress must be greater than 1 (cannot be a new game/just restarted game) - Players have pressed the "reset" button
Post Conditions: (optional)	All previously set changes besides changes to background music and interactive sounds in settings are returned back to default conditions
Other attributes: (optional)	None

4.2 "Graphics" Requirements

Requirement Title: (*required)	Graphics
Sequence No: (*required)	001
Short description: (*required)	Gather Necessary Graphics Information
Detailed Description: (*required)	All necessary graphic elements, including images, textures, animations, and visual effects that will be utilized in the game are loaded during game initialization beforehand to reduce waiting time that would have occurred between different levels.Current progress value information is also retrieved from an existing save file and analyzed to determine the graphic set to display on the player.
Pre-Conditions: (optional)	None
Post Conditions: (optional)	All required graphics assets are collected and ready for implementation in the game
Other attributes: (optional)	In the case that there is no save file existing yet, progress value is assumed to be 0.

Requirement Title: (*required)	Graphics
Sequence No: (*required)	002
Short description: (*required)	Initialize Corresponding Graphics Set
Detailed Description: (*required)	The appropriate graphic set correlating with the progress value analyzed when gathering necessary graphic information will be provided for the player to interact with on their screens. Each graphic set contains two kinds of graphics: - Backgrounds (which users can adjust to move around in the game environment) - Interactive Objects (which users can activate and use to progress through the game)
Pre-Conditions: (optional)	Game is loaded and the current progress status is known
Post Conditions: (optional)	The corresponding graphics set is successfully initialized and displayed on the screen
Other attributes: (optional)	None

Requirement Title: (*required)	Graphics
Sequence No: (*required)	003
Short description: (*required)	Specifying Background Group
Detailed Description: (*required)	The game specifies the background graphics from the current graphics set and places them in a matrix based on their positioning from one another for easy traversal later on using some matrix algorithms. Each background set brings unique visual elements like landscapes, architectural styles, and environmental features that aligns with the intended distinct theme for each level. Players can transition between different backgrounds in each background group by interacting with trigger mechanisms located on the edges of the screen.
Pre-Conditions: (optional)	Graphic set must be loaded.
Post Conditions: (optional)	Background group is specified and organized into a matrix for easy traversal.
Other attributes: (optional)	Themes for background sets include meadow for level 1, cabin for level2, and forest for level 3.

Requirement Title: (*required)	Graphics
Sequence No: (*required)	004
Short description: (*required)	Specifying Interactive Object Group
Detailed Description: (*required)	The game specifies the interactable object graphics from the current graphic set and positions them in their assigned background based on the location and position attributes that each interactive object has. Interactive objects encompasses clickable items that can be further categorized into specific types that will each perform their own kind of functionality. The interactive object group will be distinctive for the level it belongs to and allows the game to recognize and respond to player interactions effectively.
Pre-Conditions: (optional)	Graphic set must be loaded.
Post Conditions: (optional)	Interactive object group is specified, allowing for proper interaction handling during gameplay.
Other attributes: (optional)	None

4.3 “Background” Requirements

Requirement Title: (*required)	Background
Sequence No: (*required)	001
Short description: (*required)	Initialize Graphics Set
Detailed Description: (*required)	During the game's initialization and progression, the system evaluates the current game level and status. It determines the appropriate background set for the given game state. The background changes depending on the level and interactions made by the user. The system ensures that the current background matches the given matrix indices if they exist, and checks if the current level is completed. Players can also traverse through backgrounds using specified controls, moving up, down, left, or right.
Pre-Conditions: (optional)	- Game must be initialized - Progress value must be known
Post Conditions: (optional)	- Appropriate background set for the current game state is displayed - System is ready to adjust the background based on player's progression and interactions
Other attributes: (optional)	Background sets are defined for each game level or state

Requirement Title: (*required)	Background
Sequence No: (*required)	002
Short description: (*required)	Specifying Background Group/Set
Detailed Description: (*required)	This requirement involves specifying the specific background group or set to be used for a particular game level or scenario. Each background group/set might have multiple variations to add diversity to the game environment. Specifying this information ensures that the correct background visuals are displayed during gameplay.Players can traverse between different background sets by clicking the edges of the screen corresponding to the desired direction, enabling a seamless transition between different environments.
Pre-Conditions: (optional)	None
Post Conditions: (optional)	Background set is loaded and displayed in the game scene
Other attributes: (optional)	Players can traverse to different background sets by clicking the edges of the screen corresponding to the desired direction.

Requirement Title: (*required)	Background
Sequence No: (*required)	003
Short description: (*required)	Applying Static Background
Detailed Description: (*required)	It involves applying a static background image to a specific game scene. Static backgrounds do not change or animate, providing a stable backdrop for the gameplay. The static background enhances the visual aesthetics of the game and sets the mood for the players.Players can switch between different static backgrounds by clicking the edges of the screen corresponding to the desired direction, allowing for different visual experiences based on players preferences.
Pre-Conditions: (optional)	None
Post Conditions: (optional)	Image is applied and displayed in the game scene
Other attributes: (optional)	Players can switch to a different static background by clicking on the trigger mechanism on the edge of the screen.

Requirement Title: (*required)	Background
Sequence No: (*required)	004
Short description: (*required)	Applying Dynamic Background
Detailed Description: (*required)	It involves applying a dynamic background to a specific game scene. Dynamic backgrounds can include animations, parallax effects, or other interactive elements that create a sense of movement and depth. Dynamic backgrounds enhance the immersive quality of the game environment, making it more engaging for players. Players can interact with the dynamic background elements by clicking the edges of the screen, triggering specific animations or effects based on their actions.
Pre-Conditions: (optional)	None
Post Conditions: (optional)	Elements are applied and displayed in the game scene providing interactive and visually appealing experience
Other attributes: (optional)	Players can trigger a specific animation by clicking on the trigger mechanism on the upper edge of the screen.

Requirement Title: (*required)	Background
Sequence No: (*required)	005
Short description: (*required)	Traversing Up
Detailed Description: (*required)	Players can traverse upwards/north in the game environment by pressing a trigger mechanism located at the top edge of their screen. Pressing the trigger mechanism will update the current background to the background stored at the row index above the current background if it exists in the background matrix used to store all backgrounds for the current level.
Pre-Conditions: (optional)	None
Post Conditions: (optional)	Players can successfully move upwards with the game environment encountering new challenges
Other attributes: (optional)	None

Requirement Title: (*required)	Background
Sequence No: (*required)	006
Short description: (*required)	Traversing Down
Detailed Description: (*required)	Players can traverse downwards/south in the game environment by pressing a trigger mechanism located at the bottom edge of their screen. Pressing the trigger mechanism will update the current background to the background stored at the row index below the current background if it exists in the background matrix used to store all backgrounds for the current level.
Pre-Conditions: (optional)	None
Post Conditions: (optional)	Players can transverse downward within the environment and encounter new challenges
Other attributes: (optional)	None

Requirement Title: (*required)	Background
Sequence No: (*required)	007
Short description: (*required)	Traversing Left
Detailed Description: (*required)	Players can traverse left in the game environment by pressing a trigger mechanism located at the left edge of their screen. Pressing the trigger mechanism will update the current background to the background stored at the column index to the left of the current background if it exists in the background matrix used to store all backgrounds for the current level.
Pre-Conditions: (optional)	None
Post Conditions: (optional)	Player successfully moved right within the game environment
Other attributes: (optional)	None

Requirement Title: (*required)	Background
Sequence No: (*required)	008
Short description: (*required)	Traversing Right
Detailed Description: (*required)	Players can traverse right in the game environment by pressing a trigger mechanism located at the right edge of their screen. Pressing the trigger mechanism will update the current background to the background stored at the column index to the right of the current background if it exists in the background matrix used to store all backgrounds for the current level.
Pre-Conditions: (optional)	None
Post Conditions: (optional)	Player successfully moved right within the game environment
Other attributes: (optional)	None

Requirement Title: (*required)	Background
Sequence No: (*required)	009
Short description: (*required)	Traversing Closer
Detailed Description: (*required)	This requirement enables players to move closer to specific in-game elements or objects within their vicinity. Traversing closer can be used for detailed examination, interaction with specific objects, or solving puzzles that require a close-up perspective. This action enhances the player's ability to inspect and manipulate objects within the game world. When it is triggered, the game zooms in, providing players with a detailed view of the selected object.
Pre-Conditions: (optional)	None
Post Conditions: (optional)	Players successfully move closer to the targeted in-game element.
Other attributes: (optional)	It triggers the zoom-in effect by clicking the trigger mechanism.

Requirement Title: (*required)	Background
Sequence No: (*required)	010
Short description: (*required)	Traversing Away
Detailed Description: (*required)	This allows players to move away from specific in-game elements or objects, adjusting their distance. Traversing away can be essential for strategic gameplay, creating distance from threats, or gaining a broader view of the surroundings. This action enhances the player's spatial awareness and tactical decision-making. When it is triggered, the game zooms out and provides the player with a broader view of the game environment.
Pre-Conditions: (optional)	None
Post Conditions: (optional)	Players successfully move away from the targeted in-game element, altering distance and gaining a wider range of perspective of the game.
Other attributes: (optional)	None

4.4 “Inventory” Requirements

Requirement Title: (*required)	Inventory
Sequence No: (*required)	001
Short description: (*required)	Alter Inventory State
Detailed Description: (*required)	The Inventory state can be altered based on certain game actions. Players can: 1. Check if object corresponds w/ a certain puzzle ID 2. Remove objects from the inventory. 3. Check if an object in the inventory has been selected. 4. Receive descriptions for objects within the inventory These operations ensure players can manage and utilize their in-game items effectively.
Pre-Conditions: (optional)	Player is in a game state that allows inventory access.
Post Conditions: (optional)	Inventory state reflects the action performed, whether it's removal or selection of an item.
Other attributes: (optional)	Inventory size might be limited based on game parameters. Some objects might have unique interactions not defined in the general inventory state.

Requirement Title: (*required)	Inventory
Sequence No: (*required)	002
Short description: (*required)	Puzzle Piece Placement in Inventory
Detailed Description: (*required)	The Inventory system allows players to place puzzle pieces. When a puzzle piece is identified in the game, the player can store it in their inventory for future use. Each piece can be cross-referenced to ensure it corresponds to a particular puzzle.
Pre-Conditions: (optional)	Player has identified a puzzle piece in the game. There's available space in the inventory.
Post Conditions: (optional)	Puzzle pieces are stored in the inventory and available for future use. The system validates the association between the stored piece and its corresponding puzzle.
Other attributes: (optional)	Puzzle pieces might have a unique identifier or visual representation. The maximum number of puzzle pieces a player can store might be predefined.

Requirement Title: (*required)	Inventory
Sequence No: (*required)	003
Short description: (*required)	Document Placement in Inventory
Detailed Description: (*required)	The Inventory system facilitates players to store documents. Once a document is discovered within the game, it can be saved to the player's inventory for reference or future actions. The system ensures the document's authenticity and relevance to the game's storyline.
Pre-Conditions: (optional)	Player has come across a document in the game scenario. Inventory has available space for storing the document.
Post Conditions: (optional)	Document is saved in the inventory, ready for player's reference. The system confirms the document's connection to the game narrative or tasks.
Other attributes: (optional)	Documents may contain clues, story elements, or tasks. Each document may possess a distinct identifier or visual mark. There may be a set limit on the number of documents a player can save in their inventory.

Requirement Title: (*required)	Inventory
Sequence No: (*required)	004
Short description: (*required)	Collectable Placement in Inventory
Detailed Description: (*required)	The Inventory system supports players to store and manage collectable items encountered during gameplay. These collectables, unique to the game world, can be gathered and viewed in the inventory, reflecting progress or unlocking special content or narratives.
Pre-Conditions: (optional)	Player has discovered a collectable item within the game. Inventory has space to accommodate the new collectable.
Post Conditions: (optional)	Collectable is successfully stored in the inventory. Inventory systems may display unique information or lore pertaining to the collectable.
Other attributes: (optional)	Each collectable may come with its own backstory or significance in the game world. Collectables can vary in rarity and may be part of a larger set. Inventory interface might highlight missing or yet-to-be-found collectables in a series.

4.5 “Interactive Objects” Requirements

Requirement Title: (*required)	Interactive Objects
Sequence No: (*required)	001
Short description: (*required)	Activating Interactive Objects
Detailed Description: (*required)	Players can activate interactive objects by pressing or tapping on them on their screens. Activating interactive objects will trigger specific responses, events, or animations based on the interactive object's type and ID number for the players to experience. Objects can be one of 4 types: - Environment components - NPCs/Character sprites - Puzzle pieces - Props
Pre-Conditions: (optional)	Graphic set for the level must be loaded.
Post Conditions: (optional)	None
Other attributes: (optional)	None

Requirement Title: (*required)	Interactive Objects
Sequence No: (*required)	002
Short description: (*required)	Specifying Environment Components
Detailed Description: (*required)	Interactive objects that can alter/adjust the current background of the game will be identified as environment components. Interactive objects specified as environment components will be given 2 additional location attributes that will be used for proper traversal. These location attributes include: - Current background indexes (to later return to) - New background indexes (to adjust/change to)
Pre-Conditions: (optional)	Interactive object is activated.
Post Conditions: (optional)	None
Other attributes: (optional)	None

Requirement Title: (*required)	Interactive Objects
Sequence No: (*required)	003
Short description: (*required)	Applying Background Traversal from Environment Component
Detailed Description: (*required)	Players can toggle between a distanced view and close up view of the environment component and the background it is located in, by pressing on the object for a close up view and the lower edge of the screen to return to a distanced view. Close up view will allow players to see more details of the environment component and associated background behind it, which may contain puzzle pieces to be collected or a puzzle board/mechanism that the players will have to solve.
Pre-Conditions: (optional)	- Interactive object is activated - Interactive object is specified as an environment component
Post Conditions: (optional)	Traversal is successfully triggered based on the interaction with the interactive object.
Other attributes: (optional)	All environment components have a distanced view as a default view.

Requirement Title: (*required)	Interactive Objects
Sequence No: (*required)	004
Short description: (*required)	Specifying NPCs/Other Characters
Detailed Description: (*required)	Interactive objects that are other human characters in the game will be identified as NPCs/character sprites. Interactive objects specified as character sprites will be given a dialogue list (a list of strings) corresponding to what character they are, which they will have to speak/perform.
Pre-Conditions: (optional)	Interactive objects must be activated.
Post Conditions: (optional)	None
Other attributes: (optional)	None

Requirement Title: (*required)	Interactive Objects
Sequence No: (*required)	005
Short description: (*required)	Applying Dialogue Sequence of NPCs/Other Characters
Detailed Description: (*required)	Dialogue from interacting with NPCs/character sprites will be shown in a pop up at the bottom of the screen. Players can tap on the pop up box to move on to the next dialogue text if additional dialogue text exists. After all dialogue text in the current dialogue list is spoken by the NPCs/character sprites, the pop up box will automatically close. Players can reread dialogue by pressing on the NPCs/character sprites again to reactivate them.
Pre-Conditions: (optional)	- Interactive object is active - Interactive object is specified as an NPC/character sprite
Post Conditions: (optional)	Dialogue sequences are successfully triggered based on player interactions with NPCs/Other characters
Other attributes: (optional)	None

Requirement Title: (*required)	Interactive Objects
Sequence No: (*required)	006
Short description: (*required)	Specifying Inventory Pieces
Detailed Description: (*required)	Interactive objects that are required to solve a puzzle with or are collectable will be identified as inventory pieces. Interactive objects specified as inventory pieces will be able to be stored in the game's inventory. Inventory pieces can be categorized as 3 different types: - Puzzle pieces (used to solve puzzles) - Documents (provide clues for solving puzzles as well as game lore information) - Collectables (for progress checking and user interaction)
Pre-Conditions: (optional)	Interactive objects must be activated.
Post Conditions: (optional)	None
Other attributes: (optional)	None

Requirement Title: (*required)	Interactive Objects
Sequence No: (*required)	007
Short description: (*required)	Placement of Inventory Objects in Inventory
Detailed Description: (*required)	Inventory objects that have been activated for the first time by the players will be removed from their original locations in the game's environment and collected in the game's inventory. Puzzle pieces not activated for the first time will continue staying in the inventory until a matching algorithm validates that they have matched with their corresponding puzzle board/mechanism. Documents and collectables will stay indefinitely within the inventory.
Pre-Conditions: (optional)	- Interactive object must be activated - Interactive object must be identified as an inventory object
Post Conditions: (optional)	Inventory objects will be relocated to the game's inventory.
Other attributes: (optional)	None

Requirement Title: (*required)	Interactive Objects
Sequence No: (*required)	008
Short description: (*required)	Matching Puzzle Pieces to Corresponding Puzzle
Detailed Description: (*required)	ObjectIDs of inventory objects that are puzzle piece are compared to the puzzleID of the puzzle board/ mechanism selected after the puzzle piece object is activated from the game's inventory. Two potential outcomes result from the matching algorithm: - If the objectID matches the value of the puzzleID, the puzzle piece is removed from the inventory and relocated to the location of the matching puzzle board/mechanism. It cannot be activated again by the players. A short sound clip will be played to indicate a solved status to the winner as long as the interactive sound option is not turned off by the player in game settings. - If the objectID does not match with the puzzleID of the selected puzzle board/mechanism, the puzzle piece object remains in the inventory but stays activated until it is clicked on again or a different puzzle piece is pressed.
Pre-Conditions: (optional)	Puzzle pieces must be located in the game's inventory
Post Conditions: (optional)	Puzzle pieces will either be removed from the inventory if it is successfully used to solve its matching puzzle or will continue existing in the inventory.
Other attributes: (optional)	None.

Requirement Title: (*required)	Interactive Objects
Sequence No: (*required)	009
Short description: (*required)	Specifying Prop Elements
Detailed Description: (*required)	Interactive objects that do not alter the background of the game, does not have dialogue, and is not used to solve a puzzle will be identified as a prop object. After being specified as a prop object, the interactive object will perform its corresponding animation sequence, which will be repeated every time the prop object is activated.
Pre-Conditions: (optional)	Prop objects must be activated first through clicking
Post Conditions: (optional)	None
Other attributes: (optional)	None

Requirement Title: (*required)	Interactive Objects
Sequence No: (*required)	010
Short description: (*required)	Object Animation
Detailed Description: (*required)	Prop objects will perform a short, less than 5 second, animation sequence that is distinctive to its objectID in order to increase user interaction as well as provide assistance in solving puzzles by garnering the player's attention to specific details. Animation sequences include: - Growing in size before shrinking to original size - Rotating 360° - Translating away from the original location (generally in the positive y direction)
Pre-Conditions: (optional)	- Interactive object must be activated - Interactive object must be identified as a prop object
Post Conditions: (optional)	Prop object returns to its original location and positioning before being activated
Other attributes: (optional)	None

4.6 “Puzzle” Requirements

Requirement Title: (*required)	Puzzle
Sequence No: (*required)	001
Short description: (*required)	Puzzle Initialization and Development
Detailed Description: (*required)	A new puzzle from the puzzle set applied for the current level is performed for the players to solve. The puzzle must be solved first before solving the next puzzle, with the exception if the next consecutive puzzle is of the same type, which can be solved in any order of each other similar to how order of operations work for mathematics. Puzzles will be performed in the following order unless an obstacle from another unsolved puzzle stands in the way: - Scavenger Hunt puzzles - Logic puzzles - Combination puzzles - Maze puzzles
Pre-Conditions: (optional)	Game must be in progress The puzzle set must not be empty
Post Conditions: (optional)	Puzzle is either solved or remains unsolved Next puzzle in the set is loaded if available
Other attributes: (optional)	Depending on the puzzle type, corresponding actions or algorithms will be initiated.

Requirement Title: (*required)	Puzzle
Sequence No: (*required)	002
Short description: (*required)	Implementing a Scavenger Hunt Puzzle
Detailed Description: (*required)	Implement a scavenger hunt puzzle where the player solves and completes challenges to find hidden items. Players will need to locate and collect specific items as a part of the hunt. Found items will be stored in the inventory.
Pre-Conditions: (optional)	- Game must be loaded and running - Items are predefined and set up
Post Conditions: (optional)	- Player progress is recorded - Puzzle can be restarted or paused
Other attributes: (optional)	None

Requirement Title: (*required)	Puzzle
Sequence No: (*required)	003
Short description: (*required)	Implementing a Logic Puzzle
Detailed Description: (*required)	Implement a logic puzzle where the player will solve from a collection of logical challenges which can include riddles, problems, or pattern recognition.
Pre-Conditions: (optional)	- Game must be loaded and running - logic puzzles must be predefined
Post Conditions: (optional)	- Player progress is recorded - Puzzle can be restarted or paused
Other attributes: (optional)	None

Requirement Title: (*required)	Puzzle
Sequence No: (*required)	004
Short description: (*required)	Implementing a Combination Puzzle
Detailed Description: (*required)	Implement a combination puzzle where the player can manipulate the puzzle elements to reach the solution given an initial state of the puzzle.
Pre-Conditions: (optional)	- Game must be loaded and running - Combination puzzles must be predefined
Post Conditions: (optional)	- Player progress is recorded - Puzzle can be restarted or paused
Other attributes: (optional)	None

Requirement Title: (*required)	Puzzle
Sequence No: (*required)	005
Short description: (*required)	Implementing a Maze Puzzle
Detailed Description: (*required)	Implement a maze puzzle where the player can navigate through mazes, solve challenges, and reach the destination with varying difficulty.
Pre-Conditions: (optional)	- Game must be loaded and running - Maze layout must be predefined
Post Conditions: (optional)	- Player progress is recorded - Puzzle can be restarted or paused
Other attributes: (optional)	None

Requirement Title: (*required)	Puzzle
Sequence No: (*required)	006
Short description: (*required)	Compiling a Puzzle Set
Detailed Description: (*required)	Compiling the puzzle set which may include a variety of puzzles with varying difficulty and type. It involves organizing the puzzle in a structured manner and also testing each puzzle to ensure it functions properly.
Pre-Conditions: (optional)	- Game environment is setup and operational - Puzzle ready for compilation
Post Conditions: (optional)	- Players can access and play the puzzles - Puzzle progress is recorded
Other attributes: (optional)	None

4.7 “AI” Requirements

Requirement Title: (*required)	AI
Sequence No: (*required)	001
Short description: (*required)	Game Initialization
Detailed Description: (*required)	After players have clicked on the game app, game initialization will occur. Game initialization involves loading up all graphics sets and all puzzle sets that will be present in the game and verifying that they work properly with no corrupted files. Progress value from a save file is retrieved and evaluated if it exists to be used later on in determining which graphic and puzzle set to display on the player’s screens. Players are also provided an option to update settings before starting the game, or can start the game immediately by pressing the “start” button. Users can press: - Settings (To update settings before starting game) - Start (To immediately start the game)
Pre-Conditions: (optional)	Player launches the game.
Post Conditions: (optional)	Game has been initialized and is ready to start.
Other attributes: (optional)	If no save file is present, progress value is assumed to be 0.

Requirement Title: (*required)	AI
Sequence No: (*required)	002
Short description: (*required)	Updating Settings
Detailed Description: (*required)	Players can update certain game settings involving turning on/off background music, turning on/off interactive sounds, and resetting based on their preferences after selecting the “Settings” button. Players can press: - Music - Sound - Reset - Return (to return back to main screen)
Pre-Conditions: (optional)	Game is initialized.
Post Conditions: (optional)	Settings are updated based on the player's preferences.
Other attributes: (optional)	Resetting the game will set progress value to 0 and delete any existing save file.

Requirement Title: (*required)	AI
Sequence No: (*required)	003
Short description: (*required)	AI Initialization
Detailed Description: (*required)	After the “start” button is pressed by the player, AI initialization will occur. AI initialization involves selecting the appropriate graphic set and puzzle set based on the progress value evaluated in game initialization, which the players will then interact with. Completion status sent after each level completion will be sent to the AI initializer to trigger it into updating the current graphic set and puzzle set for the next level.
Pre-Conditions: (optional)	Game Initialization is completed.
Post Conditions: (optional)	AI is initialized and level status is checked.
Other attributes: (optional)	None

Requirement Title: (*required)	AI
Sequence No: (*required)	004
Short description: (*required)	Implementing Level 1
Detailed Description: (*required)	Puzzle set 1 and graphic set 1 will be provided to the player to interact with on their screens. Players must solve all puzzles in puzzle set 1 to move onto the next level. A completion status message will be sent to the AI initializer to update the current puzzle and graphic set to set 2. Players can also choose to quit or pause the game while currently playing level 1. Players can: - Traverse through Level 1 Background Set - Activate Level 1 Interactive Objects - Solve Level 1 Puzzles - Quit (Exits the game app) - Pause (Suspends game state)
Pre-Conditions: (optional)	AI Initialization completed
Post Conditions: (optional)	Player completes, leaves, or quits Level 1
Other attributes: (optional)	- Level 1 is the default starting level for all new players as well as for players that have just reseted the game. - Puzzle set 1 consists only of scavenger hunt and logic puzzles.

Requirement Title: (*required)	AI
Sequence No: (*required)	005
Short description: (*required)	Implementing Level 2
Detailed Description: (*required)	Puzzle set 2 and graphic set 2 will be provided to the player to interact with on their screens. Players must solve all puzzles in puzzle set 2 to move onto the next level. A completion status message will be sent to the AI initializer to update the current puzzle and graphic set to set 3. Players can also choose to quit or pause the game while currently playing level 2. Players can: - Traverse through Level 2 Background Set - Activate Level 2 Interactive Objects - Solve Level 2 Puzzles - Quit (Exits the game app) - Pause (Suspends game state)
Pre-Conditions: (optional)	Level 1 completed
Post Conditions: (optional)	Player completes, quits, or pauses Level 2
Other attributes: (optional)	Puzzle set 2 consists of scavenger hunt, logic, and combination puzzles.

Requirement Title: (*required)	AI
Sequence No: (*required)	006
Short description: (*required)	Implementing Level 3
Detailed Description: (*required)	Puzzle set 3 and graphic set 3 will be provided to the player to interact with on their screens. Players must solve all puzzles in puzzle set 3 to finish. A completion status message will be sent to the AI initializer to send a message back to players that they have won the game. Players can also choose to quit or pause the game while currently playing level 3. Players can: - Traverse through Level 3 Background Set - Activate Level 3 Interactive Objects - Solve Level 3 Puzzles - Quit (Exits the game app) - Pause (Suspends game state)
Pre-Conditions: (optional)	Level 2 completed
Post Conditions: (optional)	Player completes, quits, or pauses Level 3.
Other attributes: (optional)	Puzzle set 3 consists of scavenger hunt, logic, combination, and maze puzzles.

4.8 “Scoring” Requirements

Requirement Title: (*required)	Scoring
Sequence No: (*required)	001
Short description: (*required)	Game Initialization
Detailed Description: (*required)	After players have clicked on the game app, game initialization will occur. Progress value from a save file is retrieved and evaluated if it exists to be used later on in determining which graphic and puzzle set to display on the player’s screens. Players are also provided an option to update settings before starting the game, where they can reset the progress value.
Pre-Conditions: (optional)	None
Post Conditions: (optional)	Game is initialized to start/continue at current progress value
Other attributes: (optional)	If no save file is present, progress value is assumed to be 0.

Requirement Title: (*required)	Scoring
Sequence No: (*required)	002
Short description: (*required)	Adjusting Settings
Detailed Description: (*required)	Players have the ability to select and modify certain game settings. This could include turning on and off background music and interactive sound. One key setting is the option to reset progress which sets the number of solved puzzles to 0, resets the progress display, destroys the current save file, and sets score and progress value back to 0.
Pre-Conditions: (optional)	The game is initialized and is either in pause mode or main menu.
Post Conditions: (optional)	New settings are applied and will influence the gameplay or interface based on the player's choice. If "reset scoring" is selected, all progress related to scoring is reset.
Other attributes: (optional)	none

Requirement Title: (*required)	Scoring
Sequence No: (*required)	003
Short description: (*required)	Resetting Progress
Detailed Description: (*required)	Allows the player to reset all game progress,which includes setting the number of solved puzzles to 0, resetting the progress display, destroying the current save file, and setting score and progress value back to 0. Once the progress is reset, the player starts the game from the beginning, as if playing for the first time.
Pre-Conditions: (optional)	The game is either in pause mode or main menu and has some progress (levels completed, scores achieved).
Post Conditions: (optional)	The game's progress is entirely reset, and the player starts from the beginning. All previously achieved scores and levels are cleared.
Other attributes: (optional)	None

Requirement Title: (*required)	Scoring
Sequence No: (*required)	004
Short description: (*required)	AI Initialization
Detailed Description: (*required)	The AI initializer sets up the corresponding level based on the progress value evaluated during game initialization. In the case that a reset was performed in settings, the progress value used in selecting current level will be 0.
Pre-Conditions: (optional)	The game has been launched and requires the AI initializer to determine the current level to perform.
Post Conditions: (optional)	An appropriate level is provided to the players to play based on their current progress value.
Other attributes: (optional)	Level 1 must be performed level 2 and level 2 must be performed before level 3.

Requirement Title: (*required)	Scoring
Sequence No: (*required)	005
Short description: (*required)	Applying Corresponding Puzzle Set
Detailed Description: (*required)	The puzzle set corresponding to the current level setted up by the AI initializer is provided to the players to solve. All puzzles within the puzzle set must be solved to progress to the next level. Each puzzle set is worth a specific scoring value listed below: Level 1: x1 scoring Level 2: x2 scoring Level 3: x3 scoring
Pre-Conditions: (optional)	The AI initializer has finished determining the current level.
Post Conditions: (optional)	A new set of puzzles is presented to the player, tailored to their current progress and scoring.
Other attributes: (optional)	None

Requirement Title: (*required)	Scoring
Sequence No: (*required)	006
Short description: (*required)	Implementing Puzzles
Detailed Description: (*required)	A new puzzle from the puzzle set applied for the current level is performed for the players to solve. Each puzzle in the puzzle set has a predefined scoring value based on its type: Scavenger Hunt puzzle: +1 pts Logic puzzle: +3 pts Combination puzzle: +5 pts Maze puzzle: +7 pts
Pre-Conditions: (optional)	The puzzle must exist in the currently loaded puzzle set and has not been solved.
Post Conditions: (optional)	The puzzle is solved and removed from the puzzle set
Other attributes: (optional)	None

Requirement Title: (*required)	Scoring
Sequence No: (*required)	007
Short description: (*required)	Adjust Current Score
Detailed Description: (*required)	The current score/progress value is increased for every time a puzzle is completed. This current score/progress value will be displayed in the upper left corner of the player's screen to help players keep track of their progress and motivate them into continuing. The magnitude of increase for the scoring/progress value is based on the type of puzzle solved and the puzzle set that the puzzle comes from. The point distribution is as follows: Level 1: x1 scoring Level 2: x2 scoring Level 3: x3 scoring Scavenger Hunt puzzle: +1 pts Logic puzzle: +3 pts Combination puzzle: +5 pts Maze puzzle: +7 pts
Pre-Conditions: (optional)	The game is in progress.
Post Conditions: (optional)	The player's score/progress is increased.
Other attributes: (optional)	Nome

Requirement Title: (*required)	Scoring
Sequence No: (*required)	008
Short description: (*required)	Checking Completion Status
Detailed Description: (*required)	Current score value is compared with the final max scoring possible from solving all the puzzles in the game. A matching score will result in a message sent to the player that they have completed the game. A lower current score value will result in the AI initializer to initiate the next level to be loaded and provided to the player to play.
Pre-Conditions: (optional)	Game initialization has been completed.
Post Conditions: (optional)	The next level is loaded for the player to begin or the player will receive a message that they have completed the game.
Other attributes: (optional)	None

Requirement Title: (*required)	Scoring
Sequence No: (*required)	009
Short description: (*required)	Saving Score When Quitting Game
Detailed Description: (*required)	The game system will save the game progress in a save file before exiting if the player decides to quit the game. Players will be able to resume gameplay at a later time without losing their progress.
Pre-Conditions: (optional)	The game is in progress, and the player has accrued a score.
Post Conditions: (optional)	The player's score is saved in a save file that the game can access. The next time the player starts the game, the saved score is available for resumption.
Other attributes: (optional)	None

Requirement Title: (*required)	Scoring
Sequence No: (*required)	010
Short description: (*required)	Handling Score When Pausing Game
Detailed Description: (*required)	If the player decides to pause the game, the current score remains static and will not change. Current score will not be updated in the save file.The game will resume from the same score once the player chooses to continue.
Pre-Conditions: (optional)	The game is initialized and currently active.
Post Conditions: (optional)	The score remains unchanged during the pause period. On resuming, gameplay continues from the same score.
Other attributes: (optional)	None

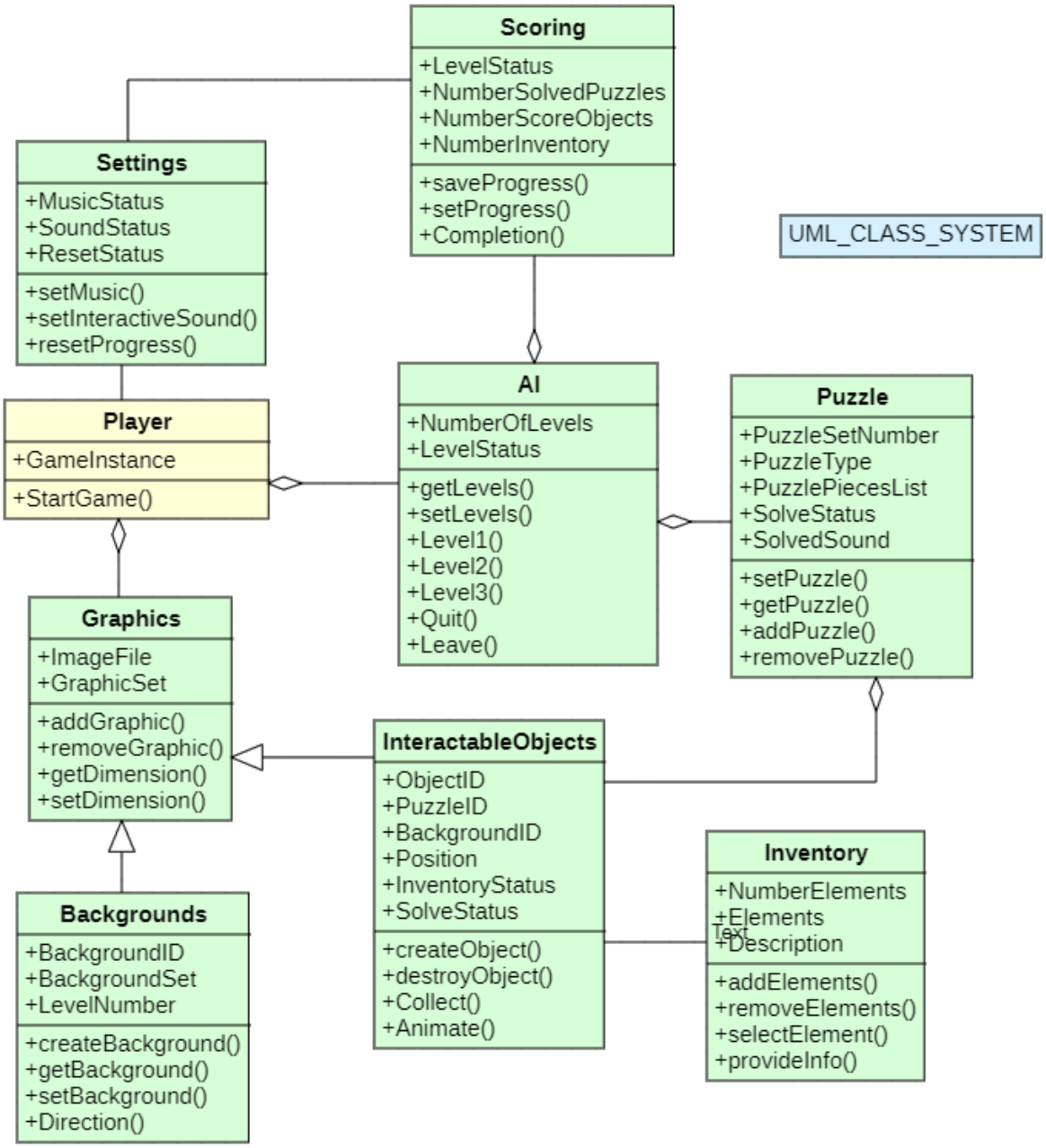
5. Software Processes and Infrastructure

5.1 Hardware and Infrastructure

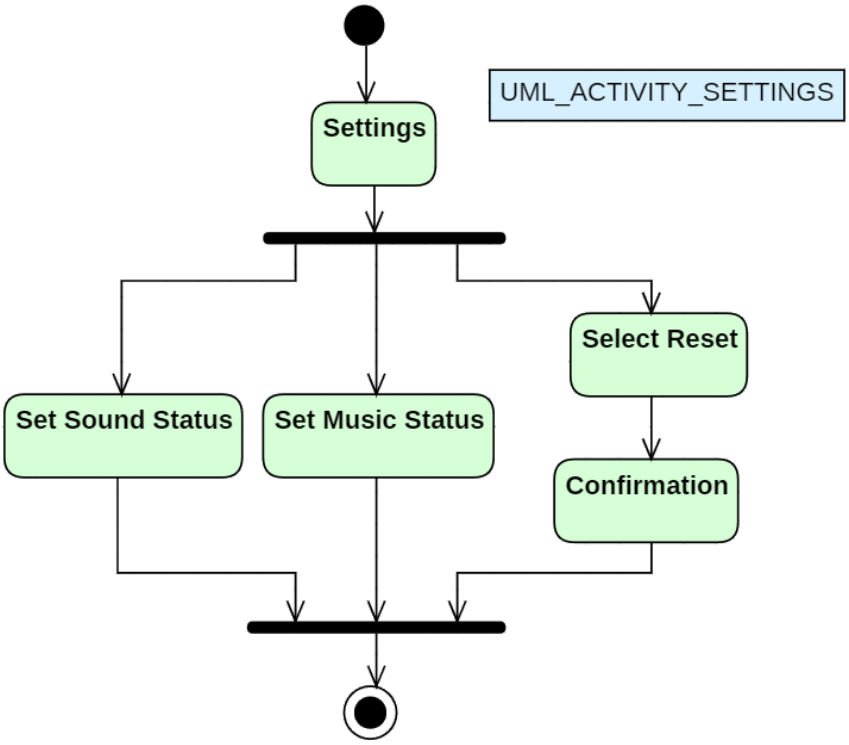
- Game Design/Planning: StarUML
- Game Mechanisms: Unity
- Graphics: ibis Paint, Luna Pic, IMAGE ONLINE.CO
- Target Android Version: Android 14 (API Lvl. 34) “Upside Down Cake”

5.2 UML Diagrams

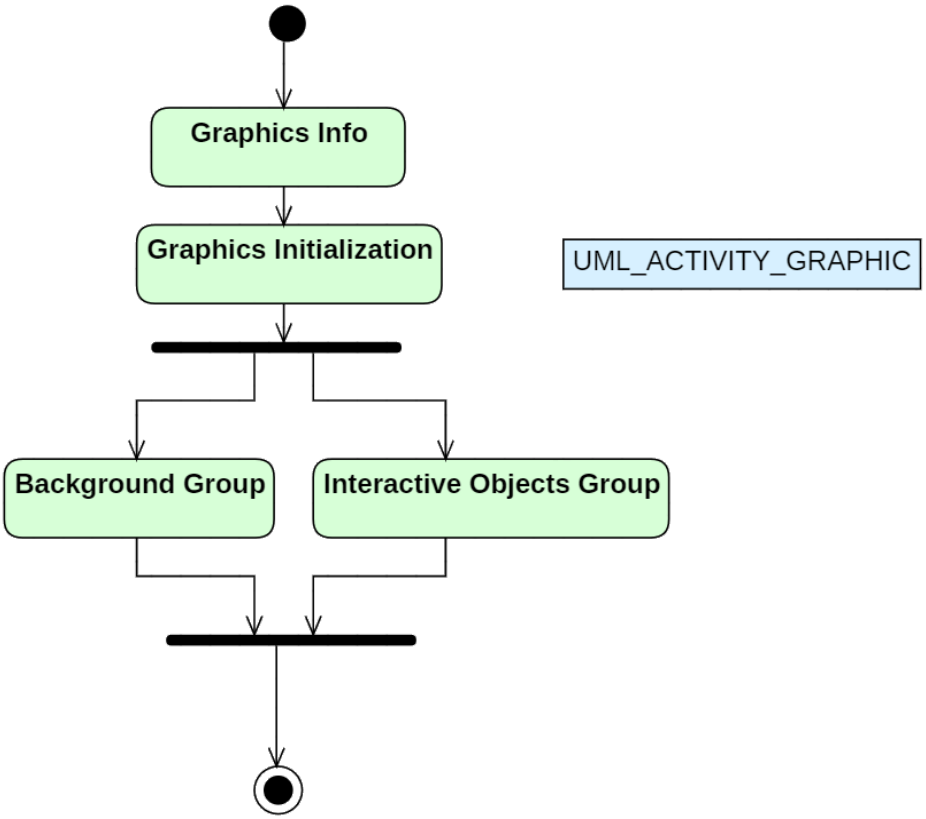
UML_Class_System:



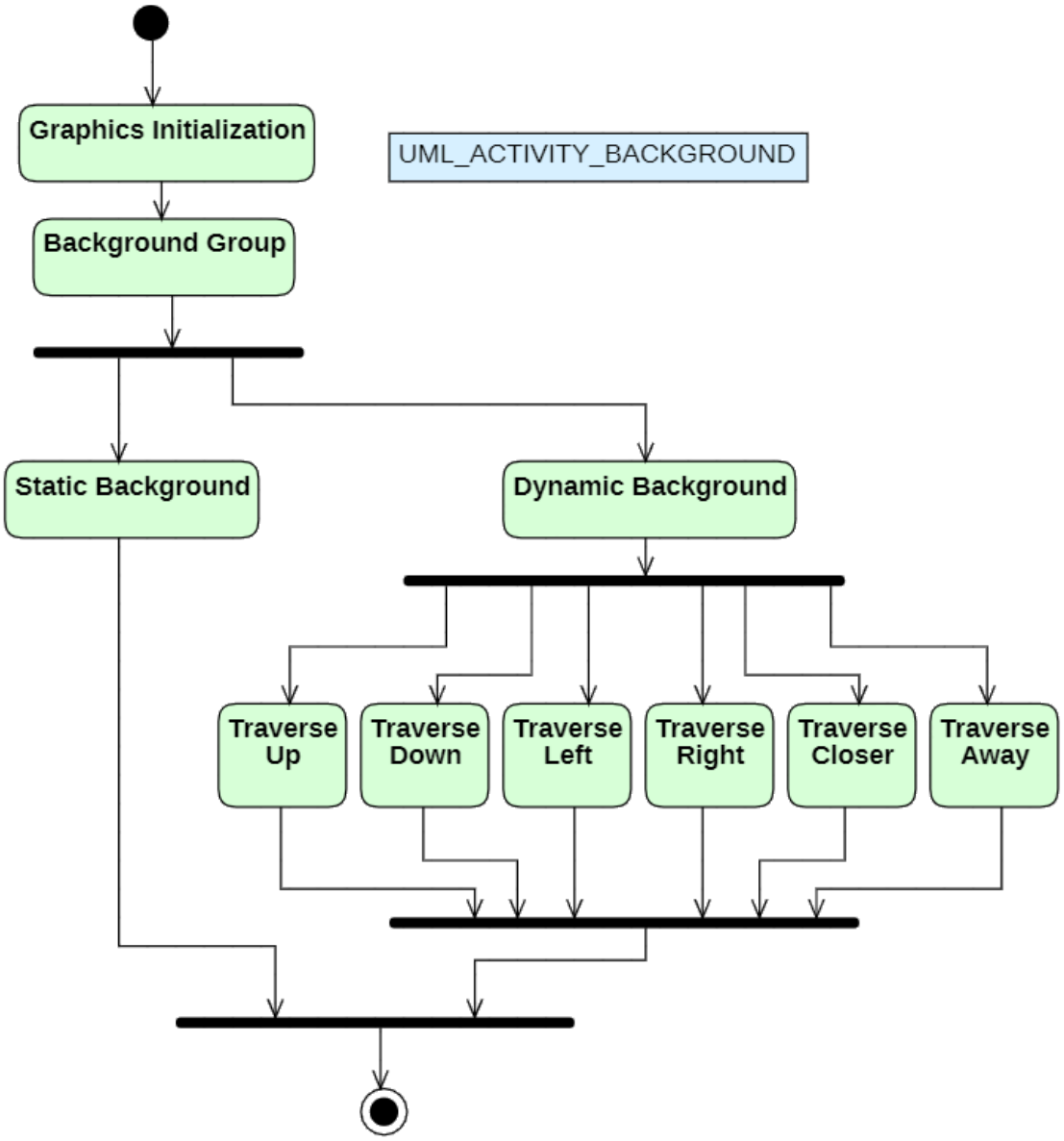
UML_Activity_Settings:



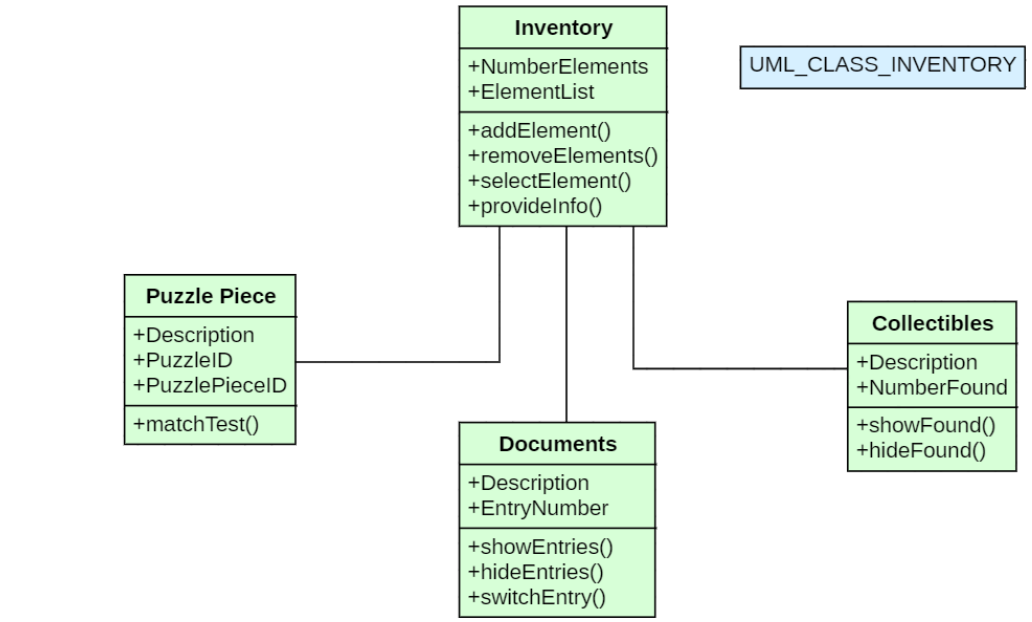
UML_Activity_Graphics:



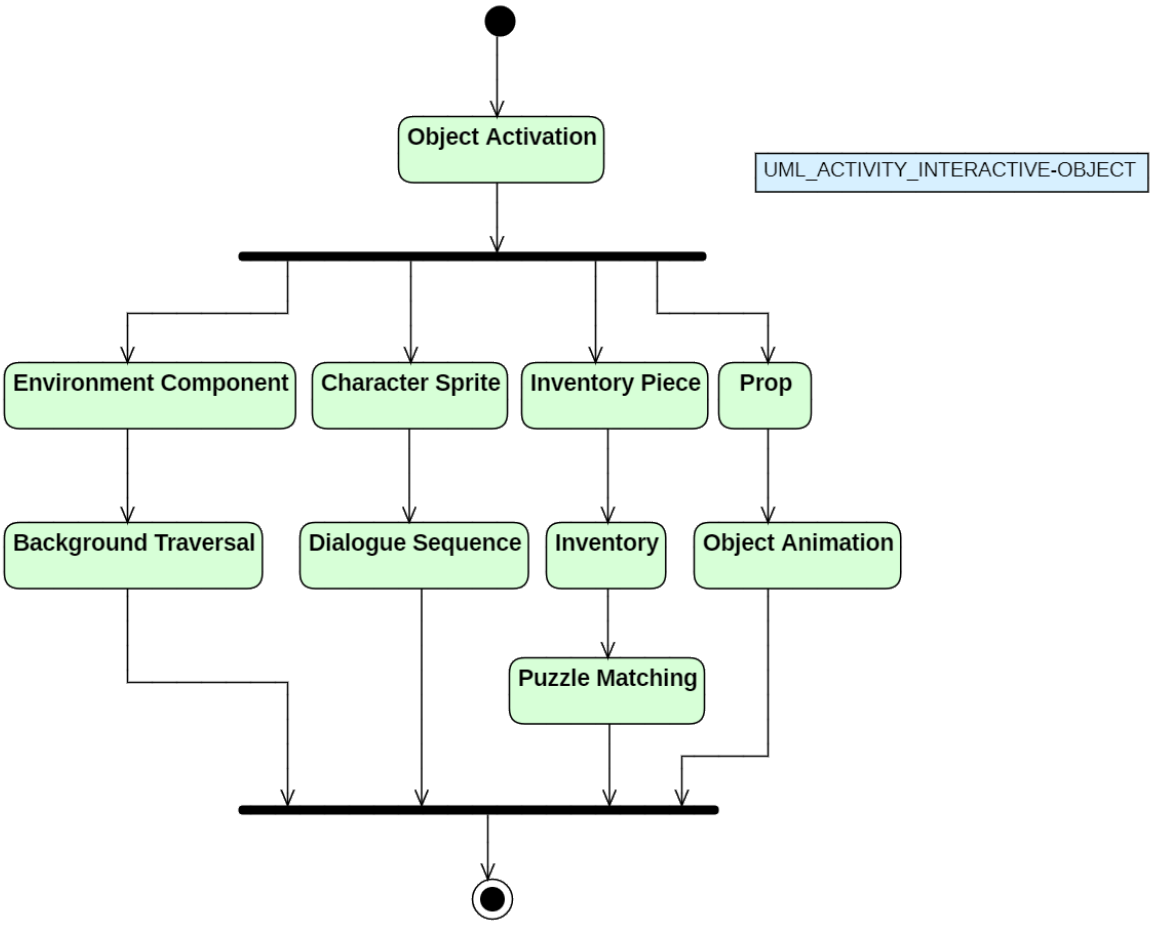
UML_Activity_Background:



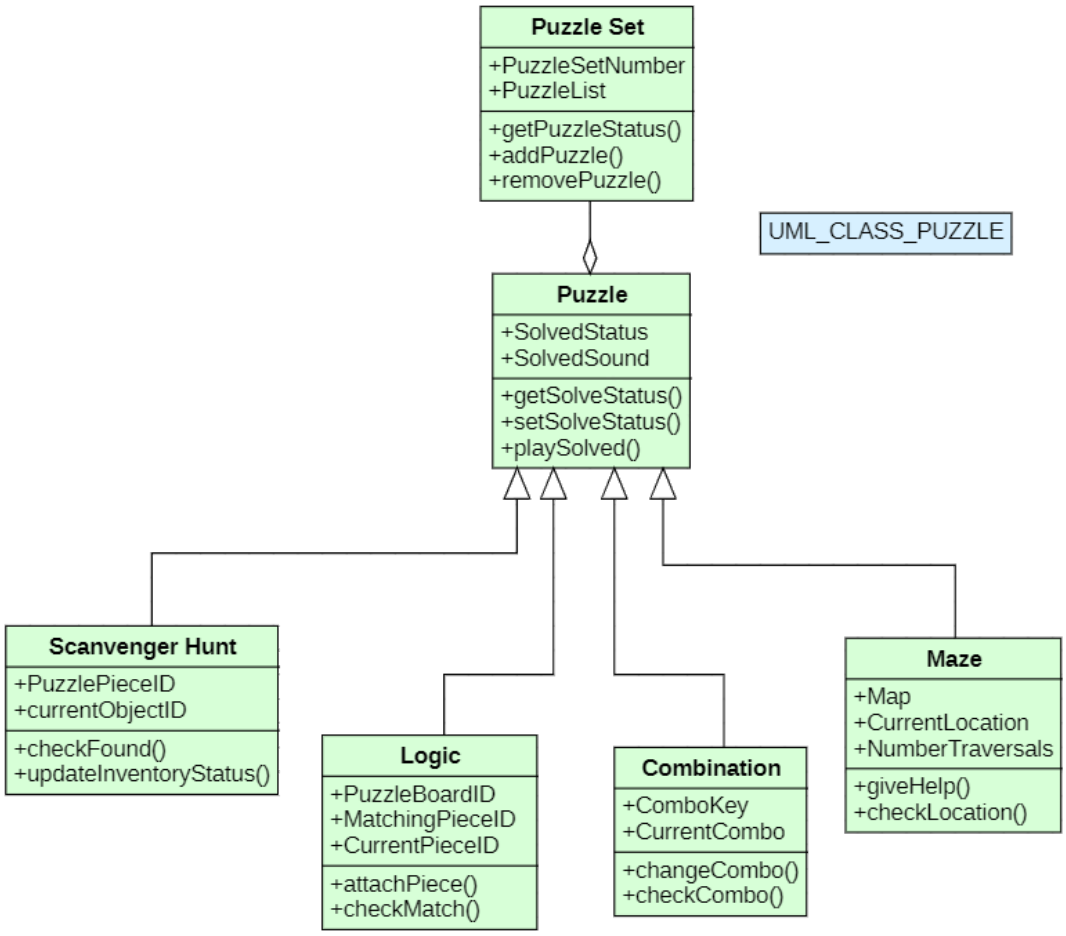
UML_Class_Inventory:



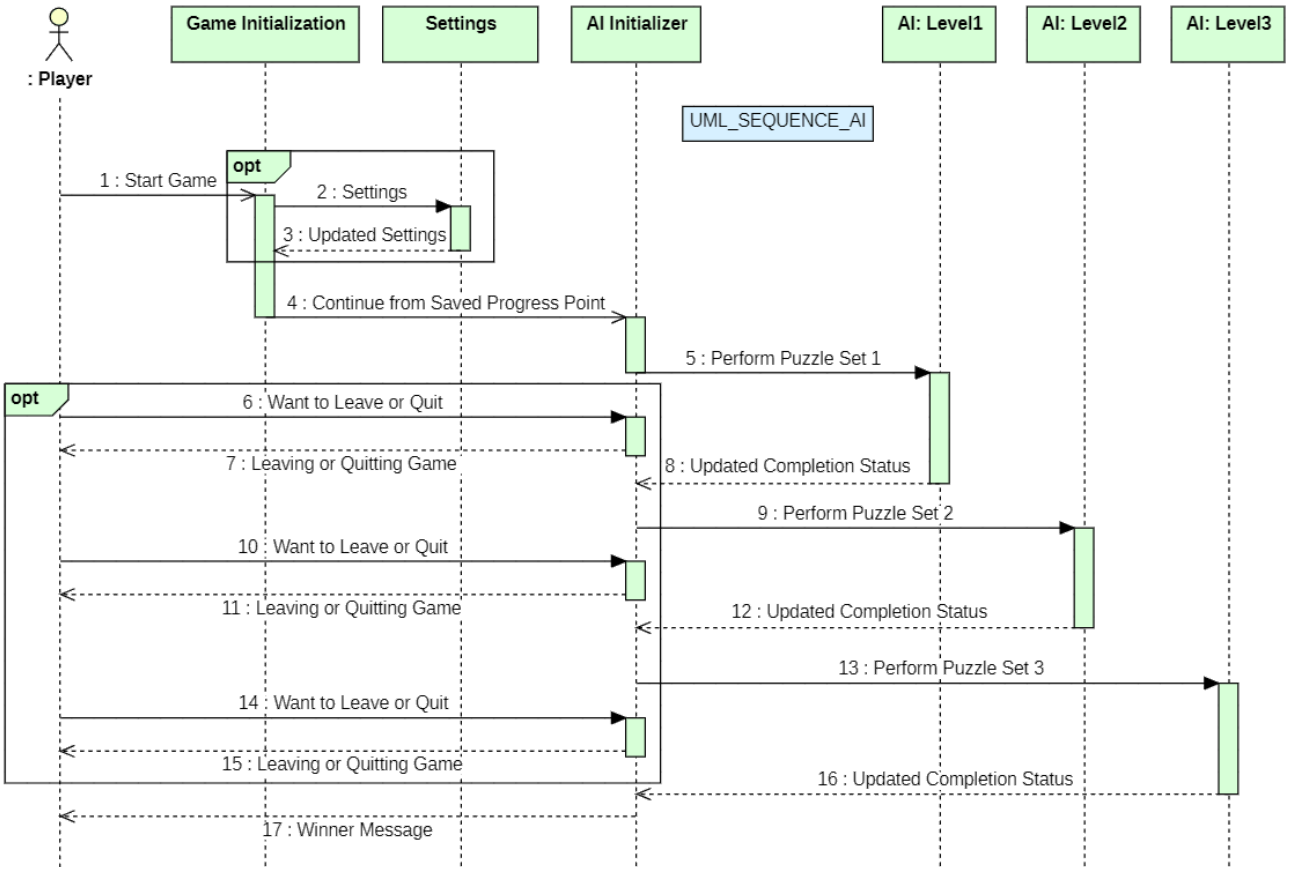
UML_Activity_Interactive_Object:



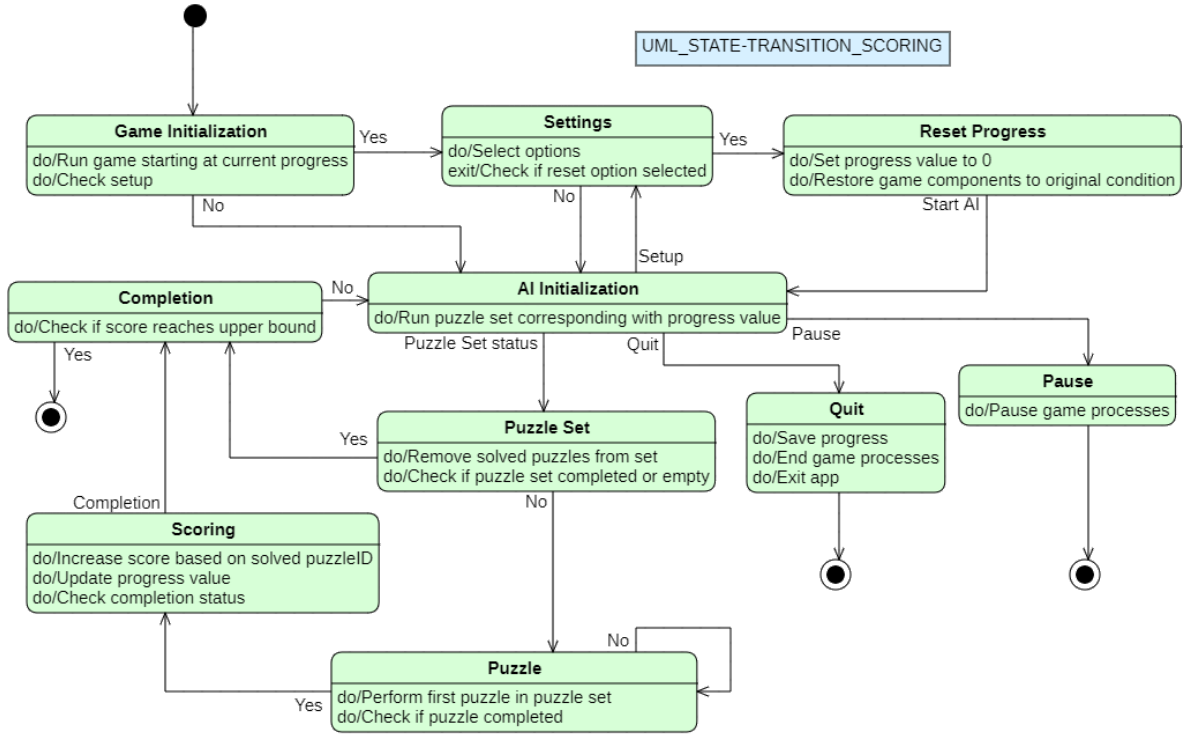
UML_Class_Puzzle:



UML_Sequence_AI:



UML_State-Transition_Scoring:



5.3 Conceptual Data Model

N/a

5.4 Screen Shots

None available..

5.5 Test Plan

6. Assumptions and Constraints

6.1 ASSUMPTIONS

The following is a list of assumptions:

- Assumes only 1 player will ever play on the game application stored on their specific owned device.
- Assumes players will not force exit the game application and will leave based on the leaving method provided in the game
- Assumes that game will be played on a phone with horizontal positioning/landscape view
- Ignores compliance issues

6.2 CONSTRAINTS

The following is a list of constraints:

- Team lacks Android development skills
- Team is new to using a game development tool such as Unity
- Schedule very aggressive

6.3 Out of Scope material

The following is a list of “out of scope” material:

- Post Project maintenance is not covered
- Walkthrough not provided
- Integration with external systems/an app store will not be implemented

7. Delivery and Schedule

Task/Milestone Description	Anticipated Start Date	Anticipated End Date	Status {Complete, In Progress, To Be Completed-TBC}	Comments
Prepare UML diagrams	9/10/2023	10/5/2023	Complete	Deliverable UML document
SRA document (Includes project objectives, Requirements and UML diagrams)	10/19/2023	11/2/2023	Complete	Deliverable will be the SRA document. All stakeholders agree on the content of the SRA by signing in section 8.
Settings	11/2/2023	11/8/2023	In progress	
Graphics	11/2/2023	11/20/2023	In progress	
Background	11/2/2023	11/8/2023	In progress	Will be implemented first using default images until game graphics completed
Interactive Object	11/2/2023	11/8/2023	In progress	Will be implemented first using default images until game graphics completed
Inventory	11/9/2023	11/14/2023	In progress	
Puzzle	11/9/2023	11/16/2023	In progress	
AI	11/9/2023	11/20/2023	In progress	Team
Scoring	11/20/2023	11/23/2023	In progress	
Test Plan Delivery	11/2/2023	11/16/2023	Complete	Deliverable will be the Test plan document.
External Documentation (i.e. User Manual)	11/28/23	11/30/2023	Complete	Team
Final Milestone: project delivery	11/26/2023	12/5/2023	Complete	Deliverable will be the final project binder plus product demo

8. Stakeholder Approval Form

Stakeholder Name	Stakeholder Role	Stakeholder Comments	Stakeholder Approval Signature and Date
Bahram Khalili	Client		
Retty George	Client Project Manager		
Abhisek Kumar Jha	Developer		Abhisek Kumar Jha 11/2/2023
Carl Nguyen	Developer		Carl Nguyen 11/2/2023
Darshan Bastola	Developer		Darshan Bastola 11/2/2023
Insaf Mohamed Umar	Developer		Insaf Mohamed Umar 11/2/2023

Appendix: