Rogue AI

Final Year Project – Final Report

Session 2017-2021

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COMSATS University Islamabad, Lahore Campus
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of
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Project Detail

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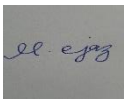
(ii)	FA17-BSE-071	Maha Muzammil Ejaz		
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*The candidates confirm that the work submitted is their own and appropriate credit has been given where reference has been made to work of others.

Plagiarism Free Certificate

This is to certify that, I am **Muhammad Humza Butt** S/D/o group leader of FYP under registration no **CIIT/FA17-BSE-011/LHR** at Computer Science Department, COMSATS Institute of Information Technology, Lahore. I declare that my FYP proposal is checked by my supervisor and the similarity index is 5 % that is less than 20%, an acceptable limit by HEC. Report is attached herewith as Appendix A.

Date: **14/6/2021** Name of Group Leader: **Muhammad Humza Butt**

Supervisor Name: **Asmara Safdar** Supervisor Signature: _____

Co-Supervisor Name: **Mohsin Mehdi** Supervisor Signature: _____

Remarks (if any):

_____

In the Name of Allāh, the Most Gracious, the Most Merciful

Abstract

Rogue AI will be a mix between FPS and a logical riddle-solving game in which players are required to solve the different logic puzzles to move forward and defeat robotic enemies. It is designed to test player's intelligence and logic-building skills by solving puzzles all while fighting robotic enemies in a challenging environment.

Acknowledgment:

By the grace of Allah, I was able to start, work on and complete this project on time.

I would like to thank my friends and family for their support and their incredible ideas for making this game more fun.

I would also like to thank my supervisors, Asmara Safdar and Mohsin Mehdi for their help, guidance, and motivation, without which this project would never be completed.

Thanks to Abdullah Khalid and Osama Akhtar who supported me throughout the development cycle in every way.

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CHAPTER # 1
INTRODUCTION

1. Introduction

1.1 Introduction

Rogue AI aims to be the warfare of humans vs robots with the chain of puzzles to be solved to achieve the goal and a sci-fi storyline. The game will help the player to make warfare strategies by intelligent decisions against the enemy and solving logical puzzles.

It will be a level-based game where the difficulty increases after each level. At the end level, the player has to compete with a robotic army and boss to recover the chip that can cause the end of the human race.

Such games are played by the vast majority of people in recent years regardless of age, gender, or profession. Intense games like ***Quantum Conundrum, Half-life 2,*** and ***Portal*** are huge successes.

Character Types:

1) **Player** The player has to solve puzzles set by robots and fight with them to recover the microchip.
2) **Enemy** Enemies are AI robots who can follow and attack.
3) **Alien Animals** These are alien life forms that can be dangerous or healthy. Killing the right one can provide the player with health ups and vice versa.
4) **Boss** It will be found on the last level. The player has to fight and kill the boss to get the chip.

1.2 Objectives

1.2.1 Main Goals

- To improve the logical skills of the player
- A deployable product to be launched in the market
- Develop a game with high player involvement
- To defeat the enemies and to recover the chip
- To make the logical skills of the person a part of his survival instincts by making he/her undergo various challenges.

1.2.2 Objectives

- Develop a Desktop Game for entertainment

- Implementation through different tools and techniques of design, model, and development

1.3 Problem Statement

In today's world, games have become the mode of only having fun, due to which a person wastes lots of time playing such games. People tend to play games when they feel like they mentally have to relax which becomes an addiction in the future.

Moreover, in today's world, people tend to shift more towards casual and battle games, which isn't of any help to the user. Our game is designed in such a way that would be beneficial to the player. Our game is a mix of fun and learning. The game is specifically designed in a way that a user will be able to build his logical sense by solving logical puzzles along with having fun.

1.4 Assumptions and Constraints

1.4.1 Assumptions

1.4.1.1 Product Delivery

The product shall meet all deadlines and shall deliver what is intended to.

1.4.2 Constraints

1.4.2.1 Performance

As desktop has boundless performance in terms of processing and graphics memory, Rogue AI! Will be kept performance insensitive and will be able to run on the majority sort of desktop devices.

1.5 Motivation and Scope

The core motivation for this game is to persuade the user to think logically in adrenaline conditions. It will put the user in a situation to make faster and logical decisions for his survival. In a nutshell, this game will serve the purpose of providing fun along with polishing the spatial skills of the user.

We are developing this game as our Final Year Project along with considering the industry demand to hit the game market. The specifications are mentioned in the goals and objectives section.

1.6 Game Scope

According to J. Schell, in his work "The Art of Game Design: A Book of Lenses" the scope of a game is defined by splitting into four categories: Mechanics, Story Line, Aesthetics, and Technology.

Rogue AI consists of a moderate level of Mechanical needs as it is a puzzle-solving game along with being an FPS game. The right answer to the logical puzzles shall decide whether or not the

player shall be promoted to the next phase or not. The Mechanical aspect is only required for all levels i.e. when the player has to fight and kill the robots.

In terms of storyline, such games need a very minimal storyline which is enough to support the character's look and personality. Rogue AI has a mixed timeline as it has a Player, enemy, Alien Animals, and Boss to play with as your character. The goal for each player is quite different in our game.

Aesthetics for the game matters as proper feedback is to be provided to the user concerning visuals and sounds. Character and level design are useful elements in providing an engaging feel to the game and can contribute to the feel of the game. Rogue AI, however, uses a medium level of game aesthetics and has a moderate need of mechanical needs.

Rogue AI will use the 3D technique to visualize characters and environment and it will be a 3D game.

Therefore, Rogue AI Scores following in terms of game scope

- Mechanical Needs = Medium
- Story Needs = Low
- Aesthetics = Medium
- Technology = Medium

CHAPTER # 2
REQUIREMENT ANALYSIS

2. Requirement Analysis

2.1 Literature Review

Many FPS puzzle games have been a huge success. An example is a very famous game Portal.

2.1.1 Portal

This is a 2007 game that was developed by Valve. It contains puzzles that the player has to solve by teleporting the character and then by simplifying the objects by using “Aperture Science Handled Device”, which is a device that creates intermediate parts in between two planes. Chell, who is a character has been challenged by AI known as GLaDOS (Genetic Life from and Disk Operating System) to complete the puzzle in Science Centre. This is done by using a gun, in return when the puzzles will be completed a cake is then offered. (1)

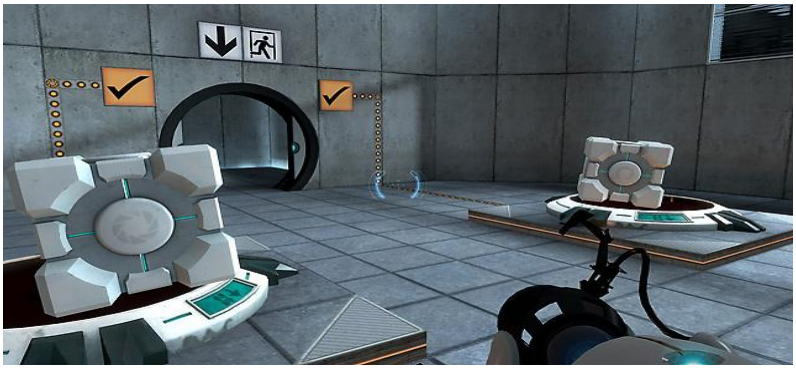

Figure 1

2.1.2 Quantum Conundrum

Quantum Conundrum is a puzzle-plat that has been viewed from a first-person perspective. As an opposing boy, the athlete can run and jump, participate in various modes, and raise light objects. A player may die by falling into a toxic liquid, endless holes, or falling from a very high altitude, and if he is attacked by harmful lasers; this will restart the player at the beginning of the puzzle. The purpose of each room is to reach its exit door, or it may be necessary to activate some switch or other devices before exiting. (2)

Figure 2

2.1.3 Portal 2

This game is a puzzle game. The player is to be replaced by Chell in single-player, as one of the two robots which are Atlas and P-Body either in a collaborative campaign or as an icon of humans in the community-developed puzzles. The characters explore nature. The characters suffer moderate damage but will eventually die if they suffer from the injury again. No penalty is faced when falling on a solid surface, but if he falls into endless holes, it will kill the character at that very moment. The motive of the campaign is to explore the Science Laboratory, which is a complex, flexible mechanized mechanics. The majority of the game takes place in modular test rooms with well-defined entrance and exit doors while a certain amount takes place behind the scenes where the purpose is less clear. (3)

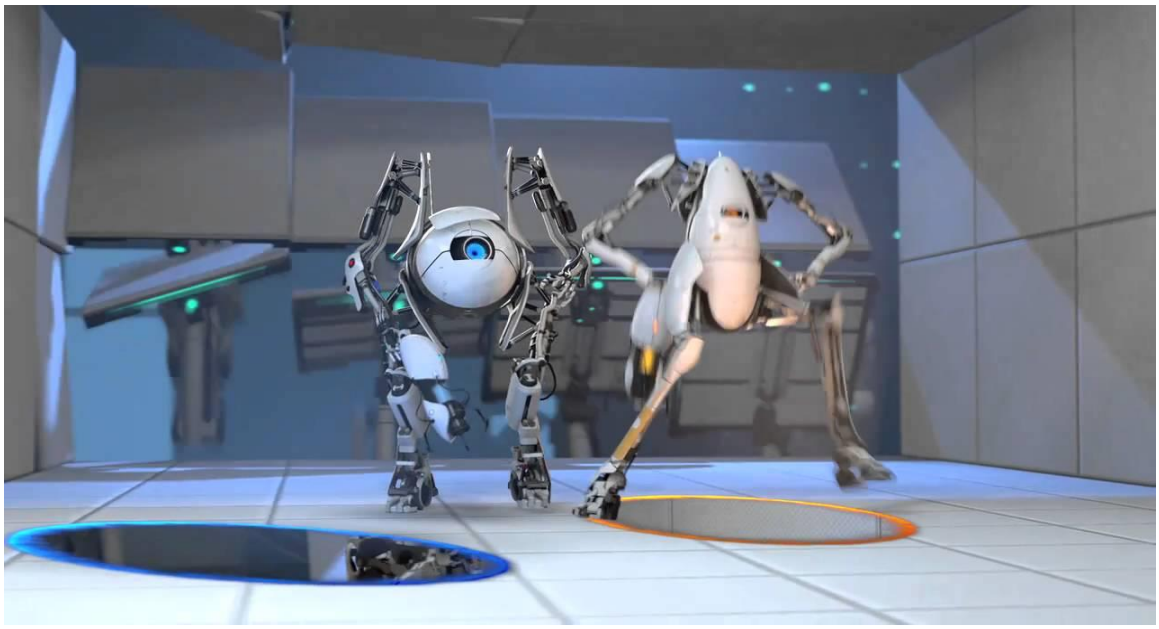

Figure 3

2.1.4 Half-Life 2

It is a single-player FPS game in which players control Gordon Freeman. It is similar to half-life, especially the health systems, weapons, and periodic physics puzzles. The new source engine and advanced graphics are an exception though. The game is initiated without any particular thing, but slowly and steadily the player builds up his arsenal during the game. Great effort is made to make exploration rewarding and enjoyable even though the game is linear.

Detailed Simulations of physics have been used as part of the new features. A few parts of the game involve driving cars. Environmental puzzles are also introduced with temporary mechanical devices which revolve around the player's ability to pick, move and place objects. The solution to this is to include the physical properties of objects for instance shape, weight, and strength. For example, “Route Kanal”, who is a player is required to place cinder blocks on a temporary ramp so that he could proceed to the wall. The player can also build stairs with blocks, so this proves that puzzles can be solved in different ways.

(4)

Figure 4

2.2 Stakeholders (Actors)

Following is a list of actors who would be interacting with the game:

1. Players who play the game
2. Parents who buy the game for their kids
3. Game Developers and Designers who create the game
4. Marketers who sell it

2.3 Requirement Elicitation

2.3.1 Functional Requirements

The functional requirements provide a comprehensive design of the game specifications. These demands will assent to a full knowledge of what this scheme expects. These demands can also offer stakeholders an idea of how the system works and they can decide whether or not the system is per their circumstances

FR-01: Scripting requirement

Requirement No.	Description
FR01-01	The game must be implemented in C#
FR01-02	The game must be developed in Unity Game Engine

Table 1

FR-02: Display, control, and Audio.

Requirement No.	Description
FR02-01	The game must be controlled with a keyboard and mouse
FR02-02	The game must be played on desktop with support for dynamic resolutions
FR02-03	The game must feature music and sound effects needed for gameplay

Table 2

FR-03: Operating System

Requirement No.	Description
FR03-01	The game must be playable on Windows

Table 3

FR-04: Levels and content

Requirement No.	Description
FR04-01	The game must provide hints to the user for solving logical puzzles
FR04-02	The game must have a new map for each level

Table 4

FR-05: 3-Dimensional platformer

Requirement No.	Description
FR05-01	The game must be viewed from a 1st personal perspective
FR05-02	The environment and characters shall be 3-dimensional
FR05-03	Character's Health shall be visible within the game

Table 5

FR-06: Main Menu

Requirement No.	Description
FR06-01	The game must provide options to view controls
FR06-02	The game must provide options to select the game level

Table 6

FR-07: Single-player

Requirement No.	Description
FR07-01	The game shall be single player
FR07-02	The game shall be FPS

Table 7

FR-08: Logical Puzzle

Requirement No.	Description
FR08-01	Solving logical puzzles must be sub-objective of game

FR08-02	The game shall provide a few hints to solve the puzzle
FR08-03	Puzzle difficulty shall increase with each level
FR08-04	Logical points must be added w.r.t time taken to solve the puzzle
FR08-06	Solving optional logical puzzles must be optional
FR08-05	Logical points for optional puzzles must be added if completed on time

Table 8

FR-09: Hunt Animals

Requirement No.	Description
FR09-01	The player must gain health after hunting energy providing alien animals
FR09-02	The player must lose health after hunting energy reducing alien animals

Table 9

FR-10: Fight Robots

Requirement No.	Description
FR09-01	The player shall be able to shoot robotic enemies.
R09-02	The killing score must be increased if the player kills a robotic enemy.
FR09-03	Killing robotic enemies must be sub-objective of the game.

Table 10

FR-11: Game Objectives

Requirement No.	Description
FR10-01	All sub-objectives must be completed to reach the main objective

FR10-02	Objectives must be do-able and achievable

Table 11

2.3.2 Non-Functional Requirements

NFR01: Performance

Requirement No.	Description
NFR01-01	Normal game response time should be less than 1 second during gameplay
NFR01-02	The minimum frame rate should be at least 30 frames per second. Smoother gameplay will lead to higher frames per second

Table 12

NFR02: Usability

Requirement No.	Description
NFR02-01	The average user should be able to get familiar with all the controls easily within 3 minutes
NFR02-02	Novice user should be able to get familiar with combat controls easily in less than 5 minutes

Table 13

NFR03: Maintainability

Requirement No.	Description
NFR03-01	The source code of the game must be readable and maintainable

Table 14

NFR04: Platform

Requirement No.	Description
NFR04-01	The game has to run on a window's-based platform

Table 15

NFR05: Resource Required

Requirement No.	Description
NFR05-01	The user must have a window's desktop with 4 GB of ram, 128 GB of storage, and a Core i5 processor

Table 16

NFR06: Quality Graphics

Requirement No.	Description
NFR06-01	The game must have good quality 3D graphics

Table 17

NFR07: User Interface

Requirement No.	Description
NFR06-01	User Interface has to be clean and compatible with desktop screens

Table 18

2.4 Use Case Description

2.4.1 Launch Game

Use case ID: 001	**Use case Name: Main Menu**
Priority **High**	
Actors: User	
Use Case Summary	It will enable the user to select different options from the main menu
Pre-condition:	The game is launched

Normal Course of Events	**Alternate Path**
1. The use-case begins when the user first launches the game	
2. The Main menu shall be exhibited	

3. Users can choose many options from the menu.	
Post Conditions	
Main menu options are available and selectable.	

Table 19

2.4.2 Design

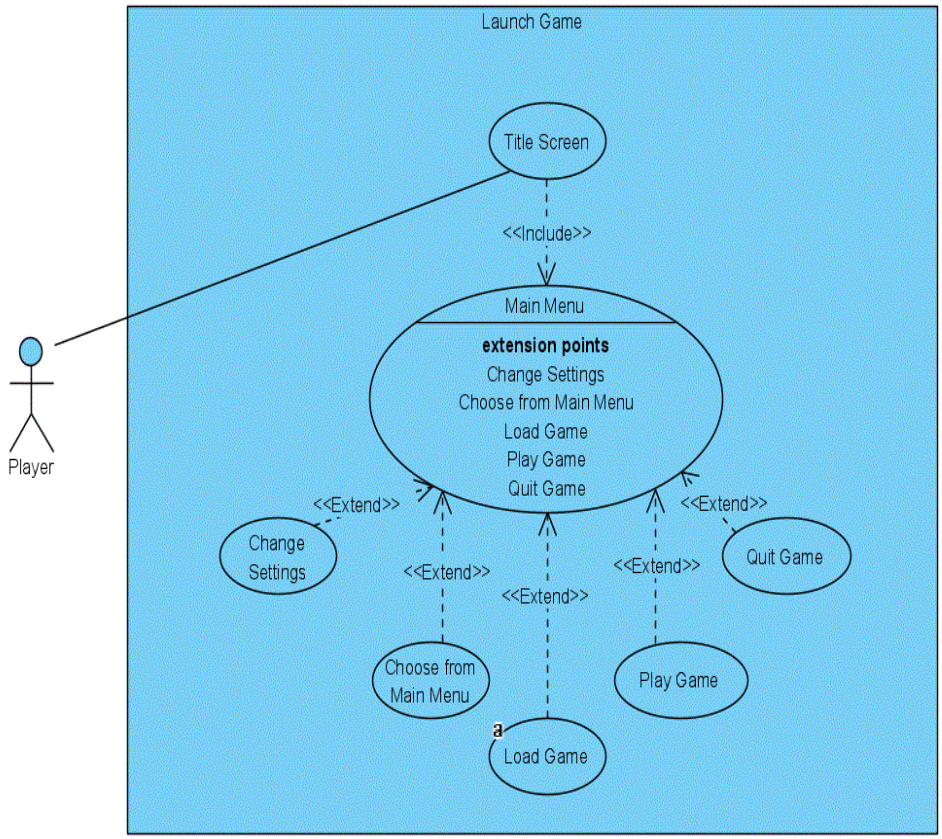

Figure 5

2.4.3 Play Match

Use case ID: 001	**Use case Name: Playable Match**
Priority	**High**
Actors:	User
Use Case Summary	It shall enable the User to control the playable character
Pre-condition:	The User has to first select the play-game option

Normal Course of Events	**Alternate Path**
1. The use-case begins when the user chooses the start game	
2. Map loads	
3. User solves puzzle	**3(a)** User may enter the wrong answer for the puzzle
4. Kills the boss	

Post Conditions
The user solves the puzzle until the level is completed.

Table 20

2.4.4 Design

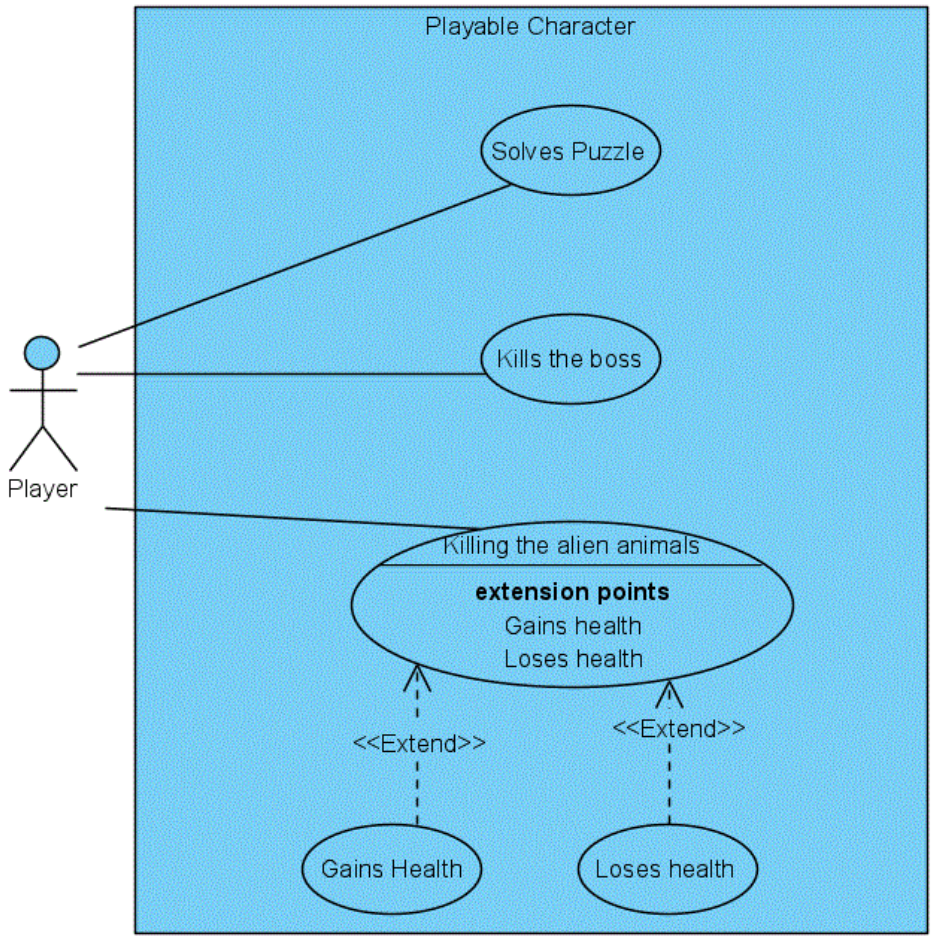

Figure 6

2.5 Game / Software Development Life Cycle (SDLC)

For the development basis of Rogue AI! I have selected the Agile Development model as there are no defined requirements for me to follow other than the baseline of the Game Design. It is natural for developers to experiment with the game and come up with the most workable output. Following are the main principles that have shown to be beneficial and viable for our development.

- Giving Less Importance to documentation and more on developing the actual product by giving high priority to quality
- We have to work on contemporaneous parts of the game to make them fit together.
- This model shall enable to create of prototypes with primitive shapes and test the feasibility of the game system
- In Agile, success isn't measured through milestones and deadlines, but it is measure through product quality and stakeholder satisfaction.
- As Agile can respond to changes, we were able to adapt to the frequently changing modules due to experimentation of improvisation.

CHAPTER #3
SYSTEM DESIGN

3. System Design

Chapter 3 shows all the designs that were created for this project:

3.1 Work Break down Structure

The work breakdown structure is as follows:

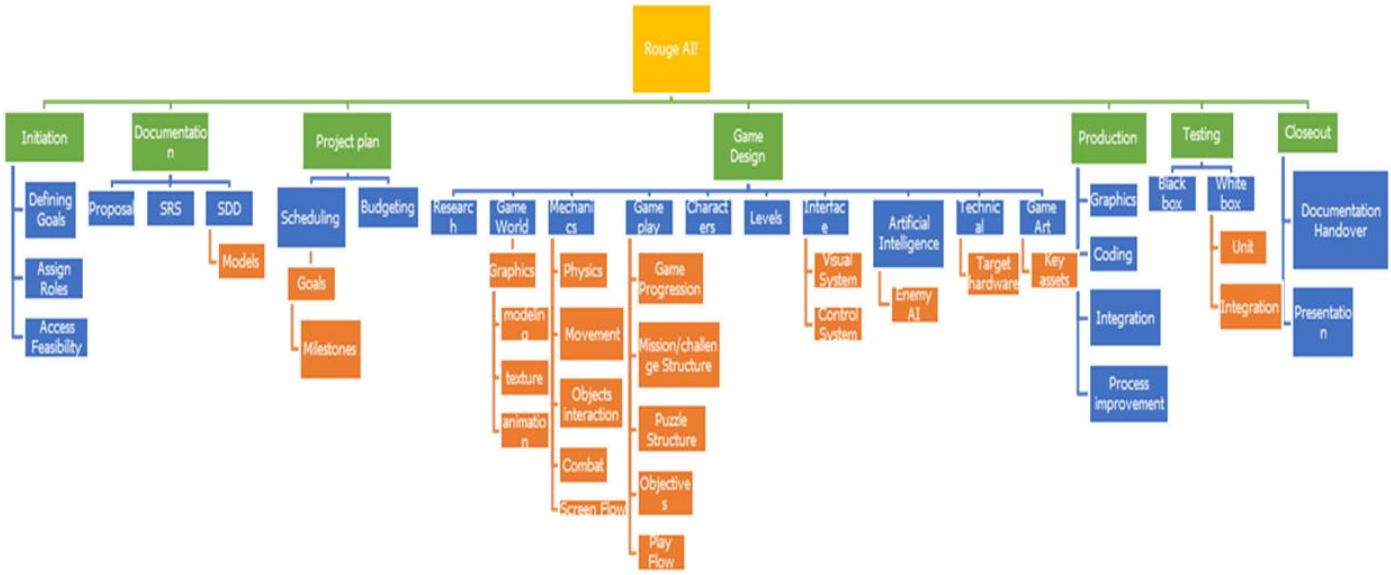

Figure 7

3.2 Activity Diagram

3.2.1 Launch Game Activity Diagram

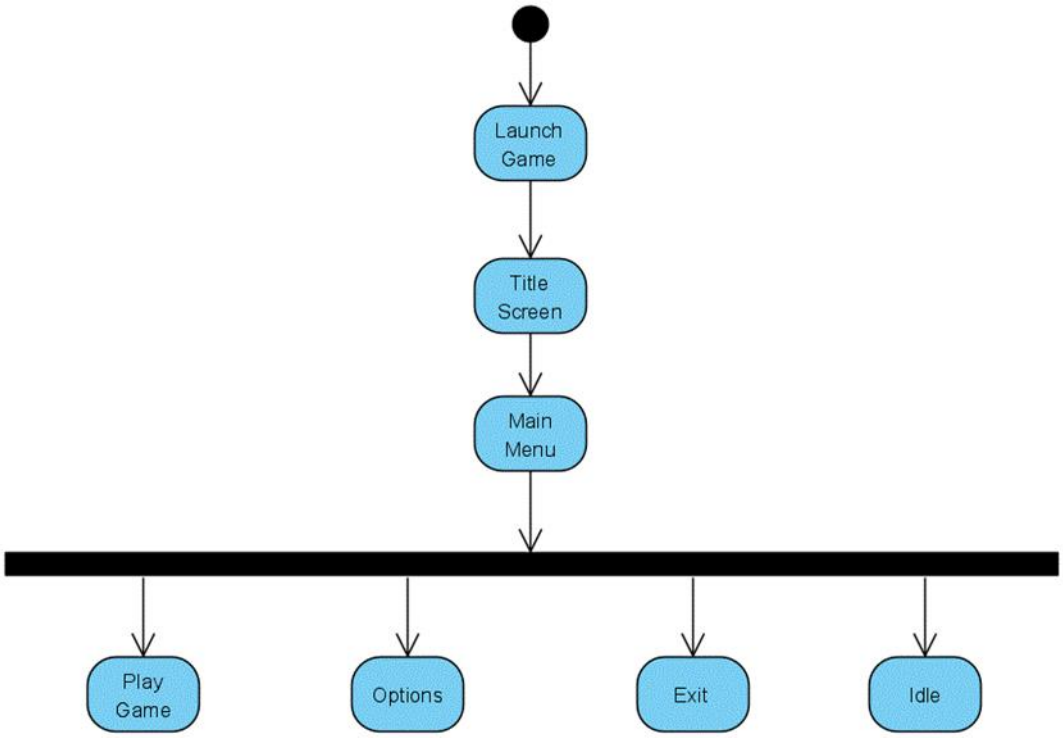

Figure 8

3.2.2 In Game Activity Diagram

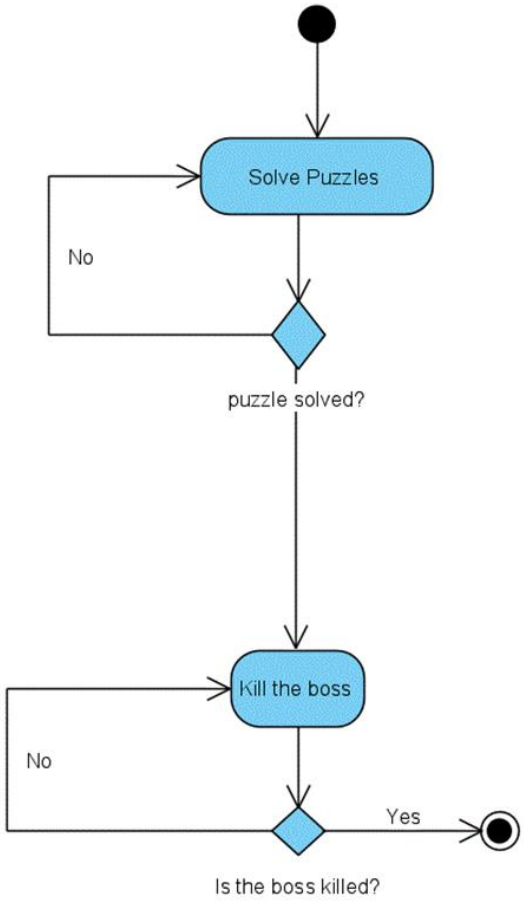

Figure 9

3.2.3 Game Update Activity Diagram

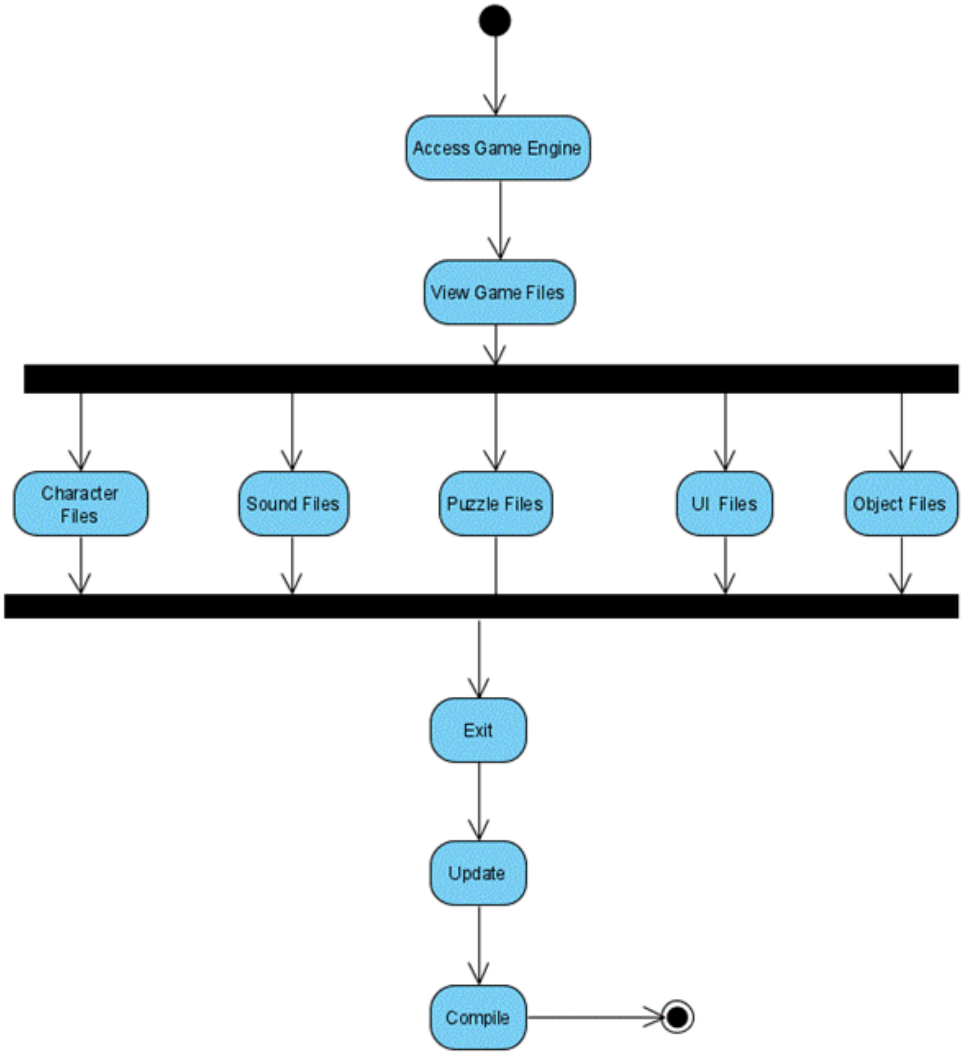

Figure 10

3.3 Class diagram

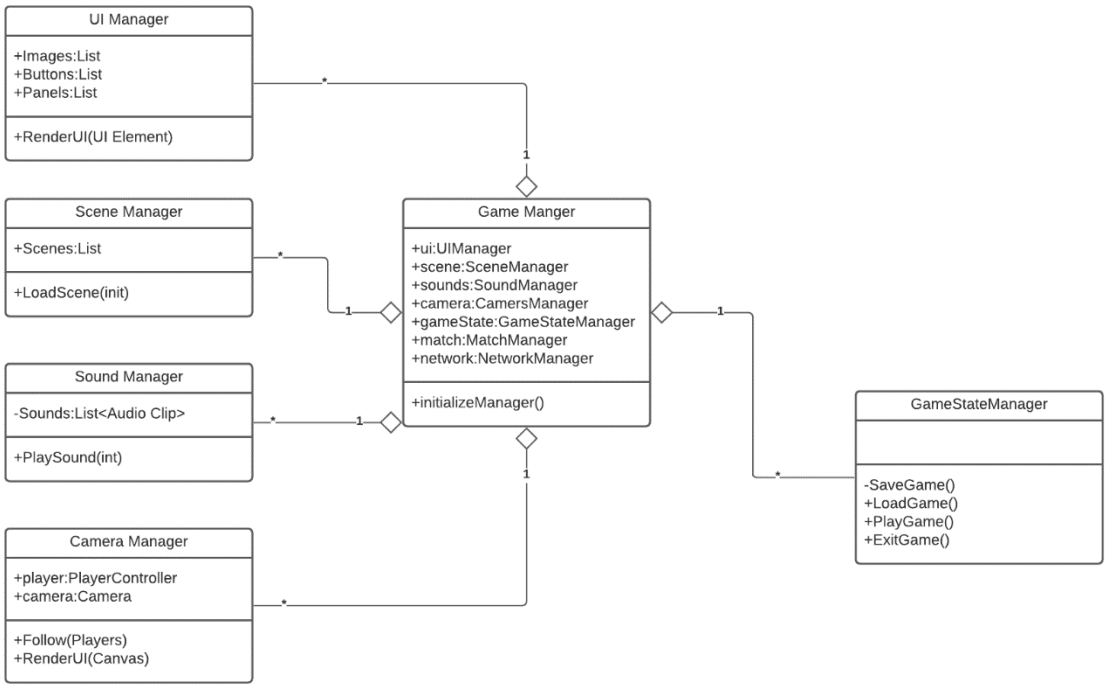

Figure 11

3.4 Sequence Diagram

3.4.1 Sequence Diagram – Main Menu & In Game Activity

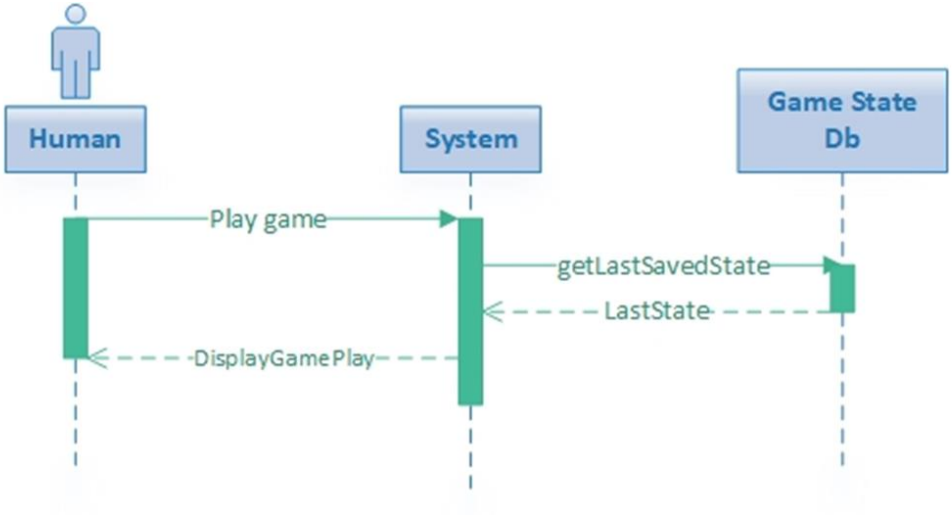

Figure 112

3.4.2 Sequence Diagram – Update Game

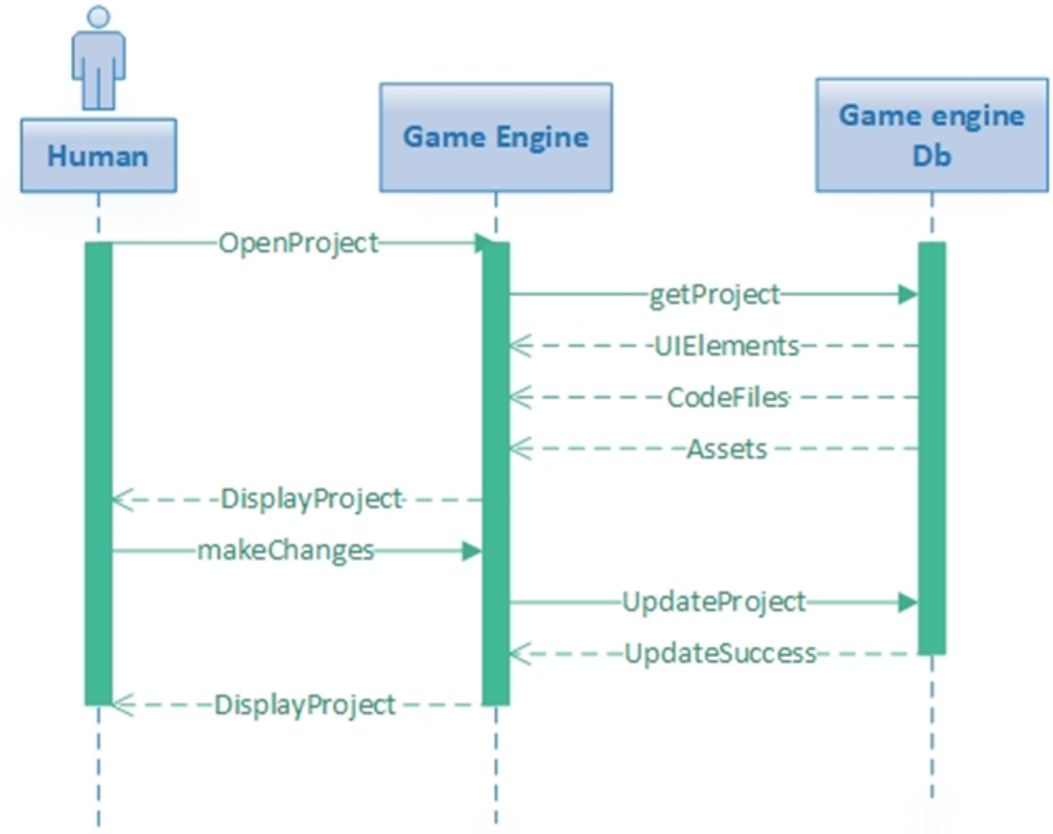

Figure 13

3.5 Game Flow Chart

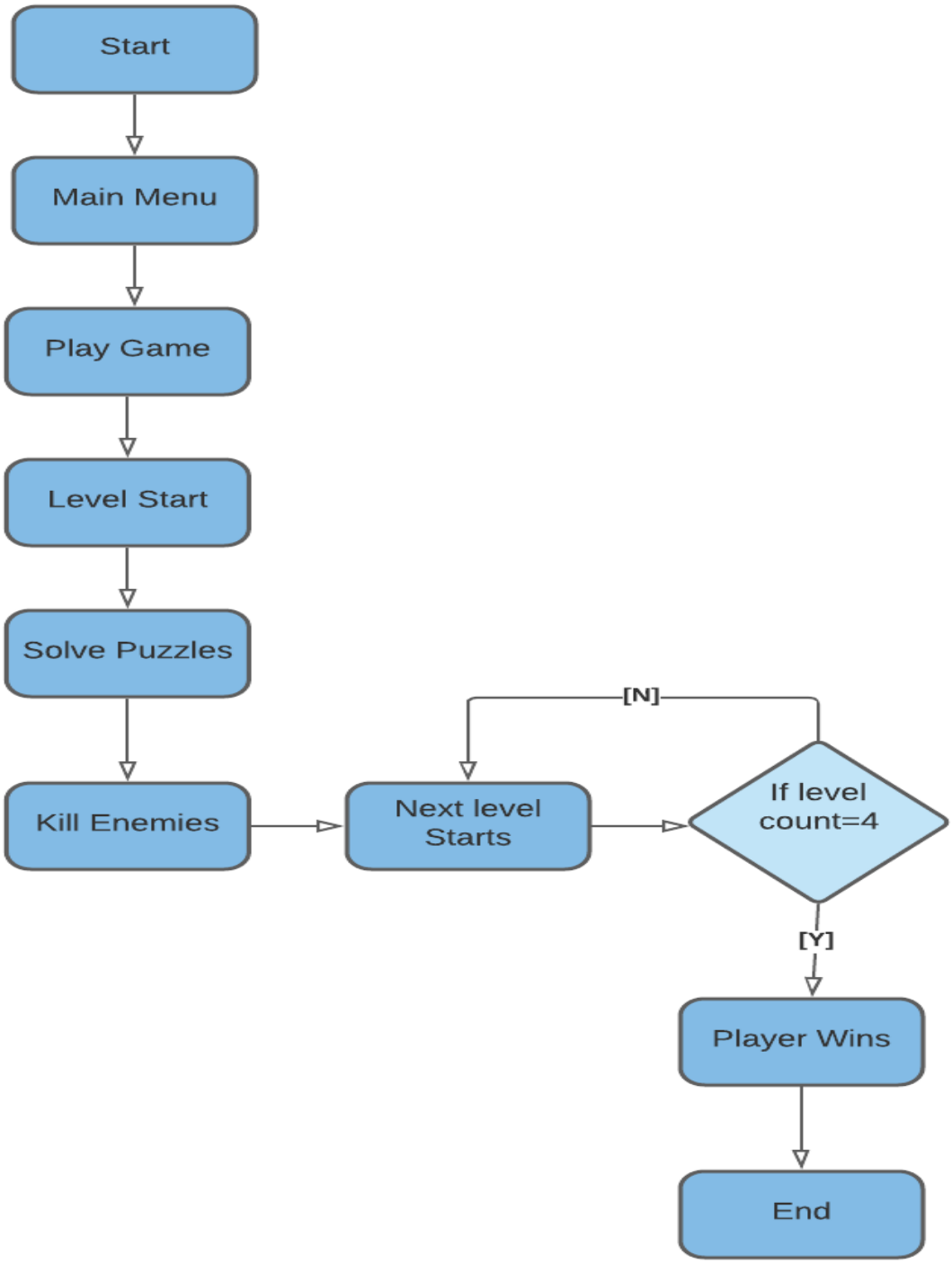

Figure 14

3.6 System Architecture

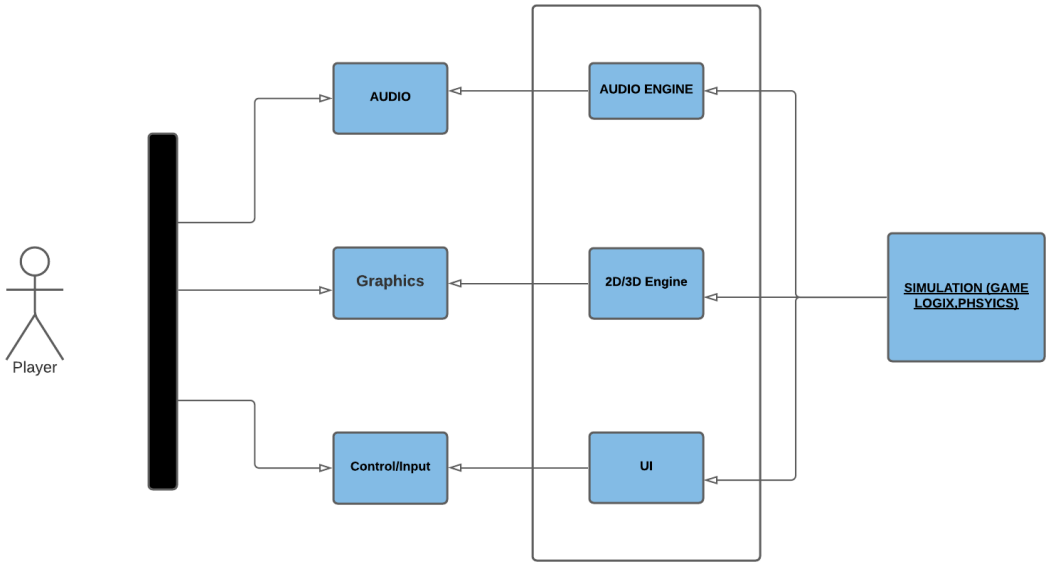

Figure 15

3.7 Collaboration Diagram

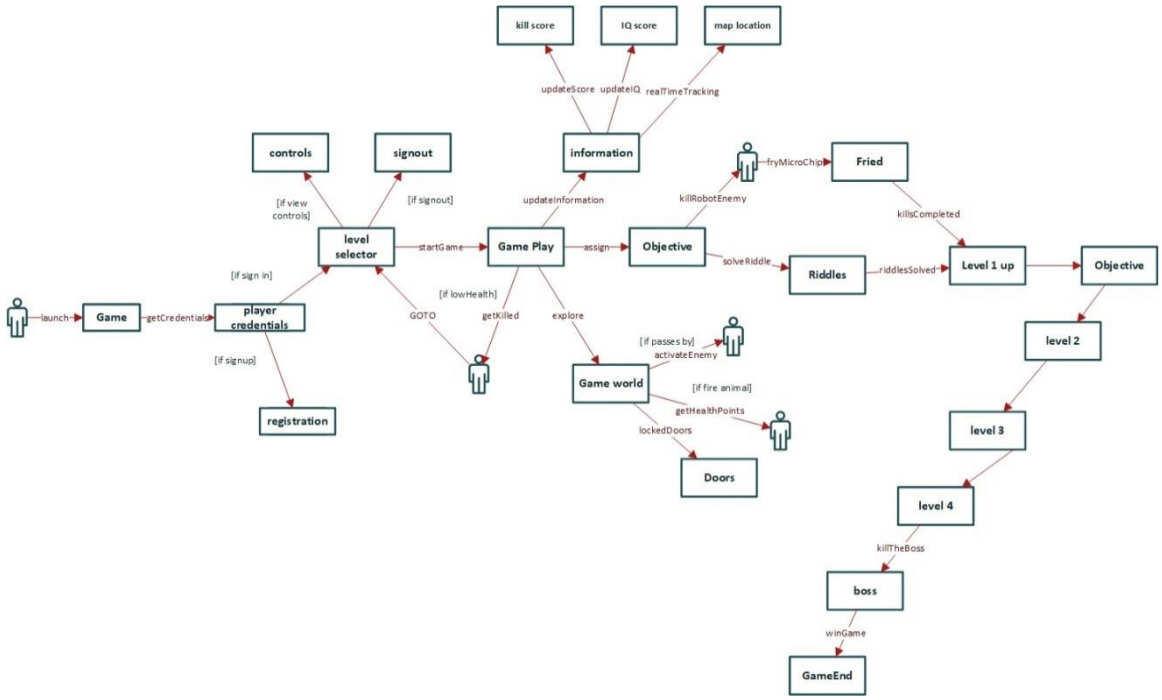

Figure 16

3.8 Game Design and Implementation

3.8.1 Enemies

The game consists of three types of enemies:

Guard Bots: These bots can move and follow the players and can fire. However, they have less health therefore they die easily.

Figure 17

Defender: These are immobile; however, they have more health along with more power.

Figure 18

Figure 19

Boss Enemy: They have incredible amounts of health and power and can move as well.

3.8.2 Animals

The game consists of two types of Animals:

Healthy: By shooting the healthy animals, the user gets a health upgrade.

Figure 20

Figure 21

Unhealthy: By shooting the unhealthy animals, the user's health decreases.

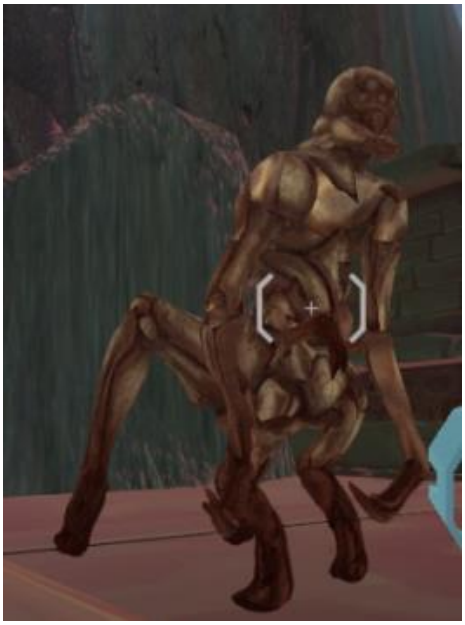

Figure 22

Figure 23

3.8.3 Player

It is a first-person shooter controller that can solve riddles and can move around

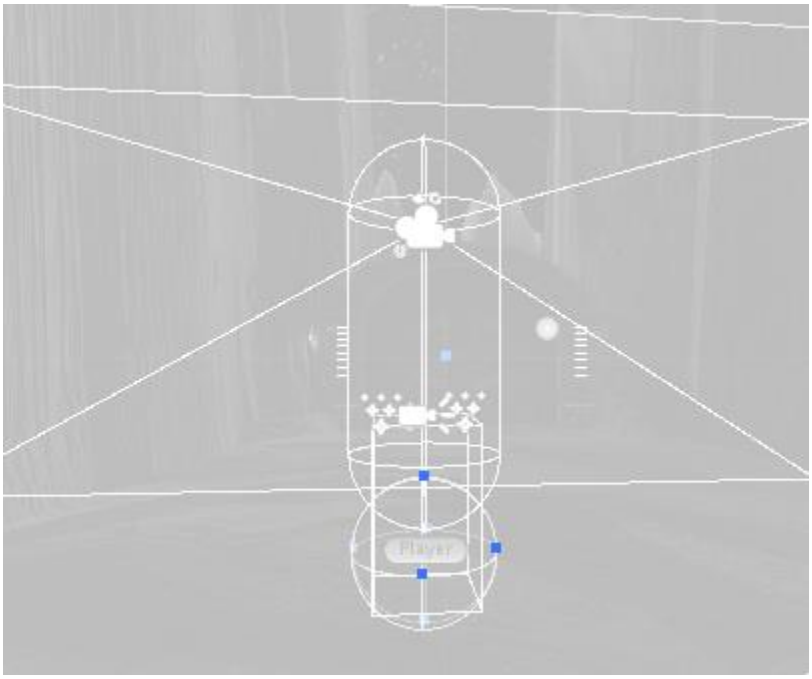

Figure 24

3.8.4 User Interface

3.8.4.1 Login

Figure 25

3.8.4.2 Sign up

Figure 26

3.8.4.3 Map

Figure 27

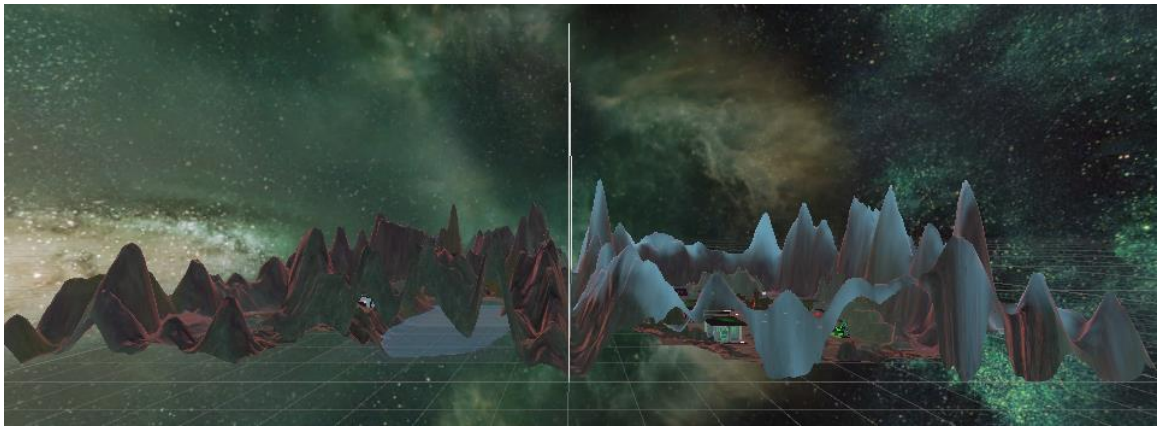

Figure 28

Figure 29

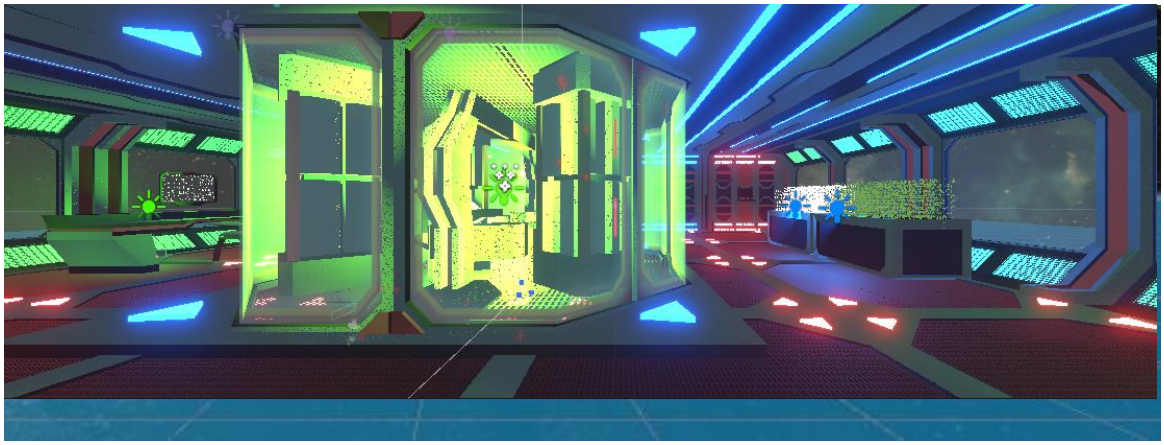

Figure 30

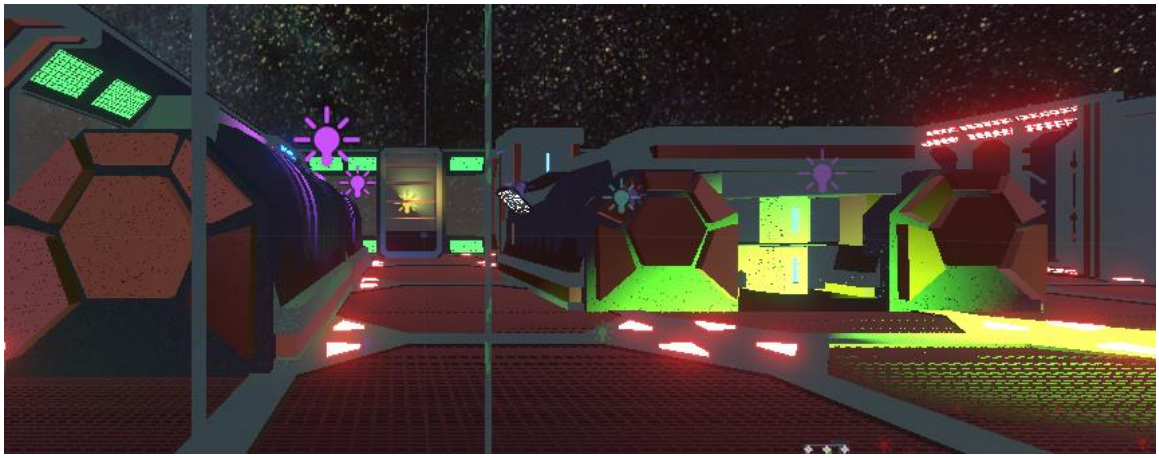

Figure 31

Figure 32

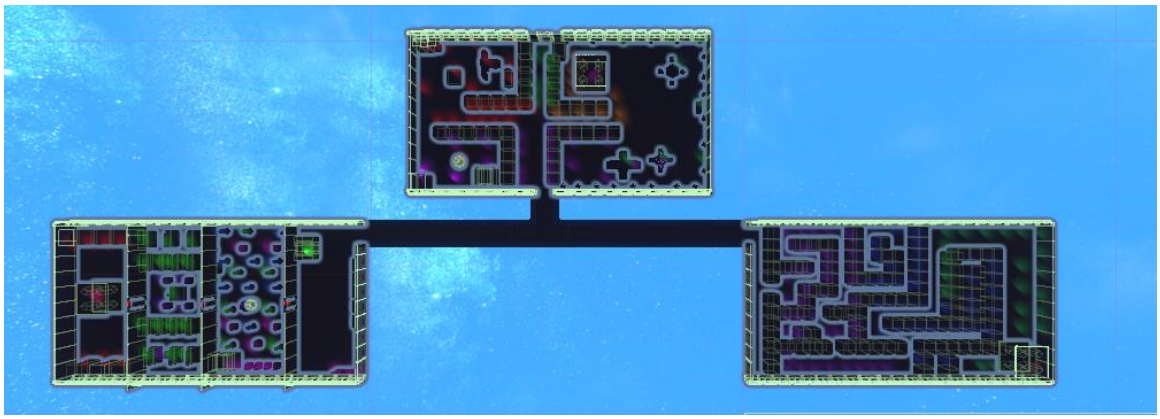

Figure 33

Figure 34

3.8.4.4 Level screen

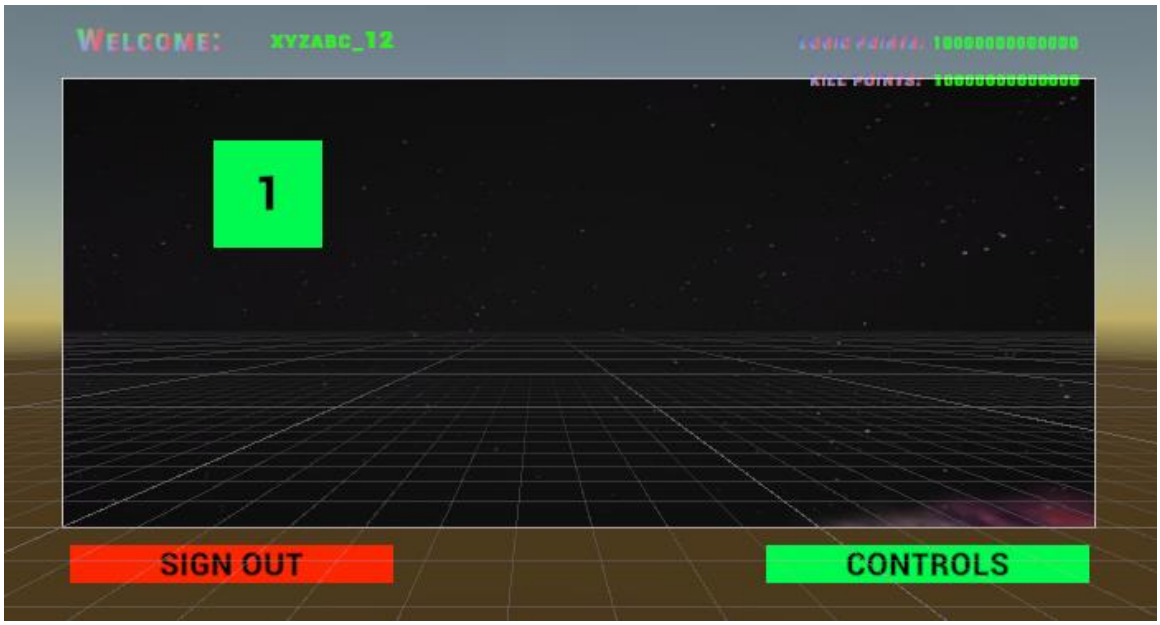

Figure 35

3.9 Riddles/Logical Puzzles

Riddles are the main focus of our game as they will improve the logical thinking of the users who will play this game.

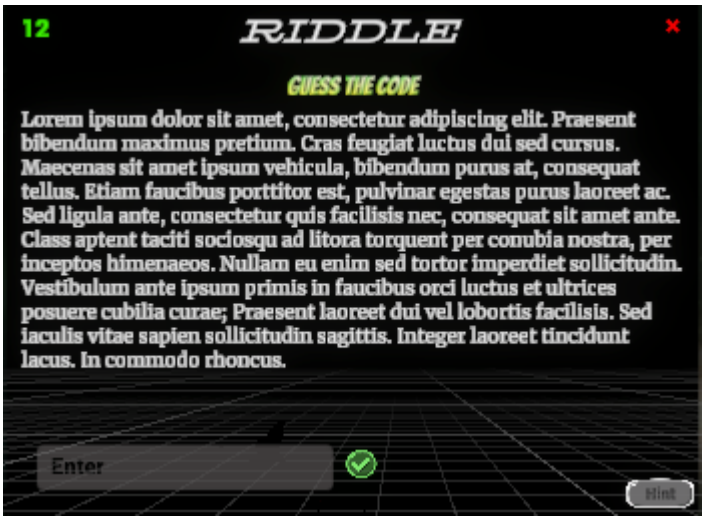

Figure 36

The game consists of **two** types of riddles:

- **Compulsory Riddles**

  These are time-based riddles which means that the score will be reduced if the time spent on a riddle is more and without completing this riddle, a player cannot complete a level.

- **Non-Compulsory Riddles**

  These are time-bounded which means that if the player solves them in a limited time he will get an extra score, but if he doesn't he will still be able to play the game.

1. 1+1 =2, 2+3 = 13, 3+3=18
1-Assess the above-mentioned mathematical statement
2-Find the value of 4+3.
Hints:
Square the numbers
Answer: 25

2. DCF=BAD

1-Evaluate the above statement

3. Find the value of ECV?

Hints:

1-Evaluating the strings letter by letter

2-Find a sequence within the alphabets

Answer: CAT

4. ETHYL (HERO)FROWN=UNTIL(?)ABEAM

1-Examine the above statement

2-Find the word that shall replace the question mark?

Hints:

1-Compare the two strings letter by letter e.g.: E=U and T=B

2-Replace the letters with the word HERO

Answer: TUBE

5. SHELLS=251442

1-Examine the above statement

2-What is LESS equal to?

Hint:

1-Evaluate the letters of the statement one at a time e.g.: S=2

2-Replace the evaluated letters with the word LESS.

Answer: 4122

6. MEDICAL=5132768

1-Examine the above statement

2-What is DECIMAL equal to?

Hint:

1-Evaluate the letters of the statement one at a time e.g.: M=5

2-Replace the evaluated letters with the word DECIMAL.

Answer: 3172568

7. LOCAL=51325

1-Examine the above statement

2-What is CALL equal to?

Hint:

1-Evaluate the letters of the statement one at a time e.g.: L=5

2-Replace the evaluated letters with the word CALL

Answer: 3255

8. 0,2,6,12,20, * ,42

1-Examine the above sequence

2-What will the digit that shall replace the asterisk (*)?

Hint:
Find a sequence between the first few numbers
Answer: 30

9. TRAVEL=451936
1-Examine the above statement
2-What is LATER equal to?
Hint:
1-Evaluate the letters of the statement one at a time e.g.: T=4
2-Replace the evaluated letters with the word LATER.
Answer: 61435

10. 12,2,27,11,7
1-Arrange the following numbers from smallest to largest
2-Identify the middle number
Answer: 11

11. 8,13,21,32,47,63,83
1-Consider the following sequence
2-Identify the wrong term
Hint:
1-Find a sequence between the first few numbers
2-Compare it with the rest of the sequence
Answer: 47

12. DEAL=7345
1-Examine the above statement
2-What is LEAD equal to?
Hint:
1-Evaluate the letters of the statement one at a time e.g: D=7
2-Replace the evaluated letters with the word LEAD.
Answer: 5347

13. BOX=CDPQYZ
1-Examine the above statement
2-What is COAT equal to?
Hint:
1-Evaluate the letters of statement one at a time
2-Equate a single letter against two letters of the other side e.g.: B=CD.
Answer: DEPQBCUV

14. 1=0, 2=4, 3=12, 4=32
1-Assess the above-mentioned mathematical statement
2-What is 5=?
Hint:

Double the number each time when multiplying
Answer: 80

15. Twelve years ago, John was half of the present age.
1-Examine the above statement
2-What will be john's age after 12 years
Hint:
1-Find out John's age today
2-Add 12 years to that number.
Answer: 36

16. Sunday dawned three days before Yesterday.
1-Examine the above statement
2- What day will dawn two days after tomorrow?
Hint:
1-Add three days to Sunday
2-Find out what day it is today after yesterday
3-Find what day it is Tomorrow
4-Add two more days to it
5-Finally, the next day will dawn
Answer: Tuesday

17. CENTRALISATION
1-Examine the word mentioned above by finding the 3rd, 5th, 6th, 11th and 12th letter of it.
2-Write the middle letter of the word
Hints:
1-Make a word using 3rd, 5th, 6th, 11th, and 12th
2-The word will be a five-letter word
3-Find the middle letter of the word found
Answer: A

18. 196(25)324
1- Analyse the above-mentioned statement
2- What number will the * replace in 329(*)137
Hint:
Add the numbers before and after the bracket in the statement given above
Answer: 25

19. 16(27)43
1-Analyse the above-mentioned statement
2- What number will the * replace in 29(*)56
Hint:
Subtract the numbers after and before the bracket in the statement given above
Answer: 27

20. 12(56)16

1-Analyse the above-mentioned statement

2- What number will the * replace in 17(*) 21

Hint:

1-Add the numbers before and after the bracket in the statement given above

2-Multiply the value by 2

Answer: 76

21. 10(56)18

1-Analyse the above-mentioned statement

2- What number will the * replace in 15(*)23

Hint:

1-Add the numbers before and after the bracket in the statement given above

2-Multiply the value by 2

Answer: 76

22. 143(56)255

1-Analyse the above-mentioned statement

2- What number will the * replace in 218(*)114

Hint:

1-Subtract the number before and after the bracket

2-Divide the value by 2.

Answer: 52

23. 188(118)424

1-Analyse the above-mentioned statement

2- What number will the * replace in 214(*)320

Hints:

1-Subtract the number before and after the bracket

2-Divide the value by 2.

Answer: 52

24. The price of a duck is $9

A spider costs Rs.36

A bee costs Rs.27

1-Analyse the above statements

2-What will be the cost of the cat

Hints:

1-Duck has 2 legs, Spider has 8 legs, and Bee has 6

2-Find out a single value by dividing the price by the no. of legs

Answer: 18

25. A class has a total of 12 kids

6 kids are wearing socks
4 are wearing shoes
3 are wearing both
1-Examine the above statements
2-How many students are bare feet
Hints:
1-Find the number of kids that are only wearing socks
2-Find the number of kids that are wearing only shoes
3-subtract the total no of kids from no. of kids wearing only socks, shoes and both
Answer: 5

26. There are 2 ducks in front of 2 other ducks
There are 2 ducks behind 2 other ducks
There are 2 ducks beside 2 other ducks
1- Analyse the above statement
2- How many ducks are there in total?
Hints:
1-Imagine the shape to be a square
2-Answer is an even number
Answer: 4

27. BME=DOG
1-Examine the above statement
2-What is MLC equal to?
Hints:
1-Evaluate the letters of the statement one at a time by skipping a letter between them e.g.: B=D (skipping C)
2-Replace the evaluated letters with the word MLC.
Answer: ONE

28. 2413,2420,2434,2462,2518
1-Examine the above sequence
2-Find the last digit after 2518.
Hints:
Find a pattern amongst them by subtracting the numbers given above
Double the number for the last digit
Answer: 2630

29. 17,35,72,147
1-Examine the above statement
2-Find the last digit after 147
Hints:
1-Find a pattern amongst them by doubling the numbers each time
2-Then add a number each consecutively i.e., 1,2,3,4
Answer: 298

30. 4,12,36,108
1-Examine the above statement
2-Find the last digit after 108
Hint:
Find a number such that it will be multiplied by the previous number
Answer: 324

31. 10,50,250,1250
1-Examine the above statement
2-Find the last digit after 1250
Hint:
Find a number such that it will be multiplied by the previous number
Answer: 6250

32. 62,31,34,17,20
1-Examine the above statement
2-Find the last digit after 20
Hints:
1-The second number is half of the 1st number
2-Then the 3rd number is found by adding 3
3-Follow the sequence
Answer: 10

33. 120,108,97,87,78
1-Examine the above statement
2-Find the last digit after 78
Hints:
1-Find the difference between the first two numbers
2-Consecutively reduce the number by 1
Answer: 70

34. 17,23,30,58
1-Examine the above statement
2-Find the last digit after 58
Hints:
1-Find the difference between the first two numbers
2-Consecutively increase the number by 1 each time
Answer: 47

35. 11,8,16,17,14,28
1-Examine the above statement
2-Find the last digit after 28
Hints:
1-Find the difference between the first and second number
2-Multiply the second number with a value that shall give the third value
3-Add 1 to the third value

4-Follow the sequence
Answer: 29

36. 49,48,45,40,33,24
1-Examine the above statement
2-Find the last digit after 24
Hints:
1-Find the difference between the first and second number
2-Find the difference between the second and third number
3-Follow the sequence
Answer: 13

37. 5,9,17,33
1-Examine the above statement
2-Find the last digit after 33
Hints:
1-Find a number by subtracting the first and second number
2-Double the value to find the next number
Answer: 65

38. 30,25,19,12
1-Examine the above statement
2-Find the last digit after 12
Hints:
1-Find the difference between the first and second number
2-Subtract one number at a time when finding the next number
Answer: 4

39. 48,24,12,6
1-Examine the above statement
2-Find the digit after 6
Hints:
Find a value that will give us the next value in the sequence by dividing that value
Answer: 3

40. 81,64,49,36,25
1-Examine the above statement
2-Find the digit after 25
Hints:
1-Take the square root of the number
2-Subtract one each time
Answer: 25

41. 3,9,4,16,5
1-Examine the above statement

2-Find the digit after 25
Hints:
1-Divide the sequence into two parts
2-One part will consist of the 1st, 3rd, 5th value
3- Second part will consist of 2nd and 4th value
4-Find a pattern within the second part
Answer: 25

42. 0,3,8,15
1-Examine the above statement
2-Find the digit after 15
Hints:
1-Find the difference between the first and second number
2-Find the difference between the second and third number
3-Follow the pattern
Answer: 24

43. 4,8,11,22,25,50,53
1-Examine the above statement
2-Find the digit after 53
Hints:
1-Divide the sequence in a pair of three
2-Identify the value that is used to multiply the first number to get the second number
3-Identify the value that is used to add the second number to get the third number
4-Follow the sequence
Answer: 106

44. 6,10,18,34
1-Examine the above statement
2-Find the digit after 34
Hints:
1-Subtract the second number from the first number
2-Subtract the third number from the second number
3-Identify the pattern
4-Follow the sequence
Answer: 66

45. 1,8,27
1-Examine the above statement
2-Find the digit after 27
Hint:
Square the value by adding one each time
Answer: 64

46. 6,9,18,21,42,45,90
1-Examine the above statement

2-Find the digit after 90
Hints:
1-Identify the value that is used to add the first number to get the second number
2-Identify the value that is used to multiply the second number to get the third number
3-Follow the sequence
Answer: 93

47. A, H, N, S, W
1-Examine the above statement
2-Find the alphabet after "W"
Hints:
1-Identify the number of alphabets that were skipped between the first and the second alphabet
2-Identify the number of alphabets that were skipped between the second and the third alphabet
3-Identify the sequence
4-Follow the sequence
Answer: Z

48. C, E, H, L
1-Examine the above statement
2-Find the alphabet after L
Hints:
1-Identify the number of alphabets that were skipped between the first and the second alphabet
2-Identify the number of alphabets that were skipped between the second and the third alphabet
3-Identify the sequence
4-Follow the sequence
Answer: Q

49. A, E, I, M, Q
1-Examine the above statement
2-Find the alphabet after Q
Hints:
1-Identify the number of alphabets that were skipped between the first and the second alphabet
2-Identify the sequence
3-Follow the sequence
Answer: U

50. D, G, K, N, R
1-Examine the above statement
2-Find the alphabet after R
Hints:

1-Identify the number of alphabets that were skipped between the first and the second alphabet
2-Identify the number of alphabets that were skipped between the second and the third alphabet
3-Identify the sequence
4-Follow the sequence
Answer:
U

51. A, E, I, O
1-Examine the above statement
2-Find the alphabet after O
Hint:
Vowels
Answer: U

52. A, C, F, J
1-Examine the above statement
2-Find the alphabet after J
Hints:
1-Identify the number of alphabets that were skipped between the first and the second alphabet
2-Identify the number of alphabets that were skipped between the second and the third alphabet
3-Identify the sequence
4-Follow the sequence
Answer: O

53. R, T, P, R, N, P
1-Examine the above statement
2-Find the alphabet after P
Hints:
1-Identify the number of alphabets that were added to the first alphabet to achieve the second alphabet
2-Identify the number of alphabets that were reduced from the second alphabet to achieve the third alphabet
3-Identify the sequence
4-Follow the sequence
Answer: L

54. W, T, P, M, I
1-Examine the above statement
2-Find the alphabet after I
Hints:
1-Identify the number of alphabets that were reduced from the first alphabet to achieve the second alphabet

2-Identify the number of alphabets that were reduced from the second alphabet to achieve the third alphabet
3-Identify the sequence
4-Follow the sequence
Answer: F

55. E, H, L, O, S
1-Examine the above statement
2-Find the alphabet after S
Hints:
1-Identify the number of alphabets that were added to the first alphabet to achieve the second alphabet
2-Identify the number of alphabets that were added to the second alphabet to achieve the third alphabet
3-Identify the sequence
4-Follow the sequence
Answer: V

56. A, D, H, M, S
1-Examine the above statement
2-Find the alphabet after S
Hints:
1-Identify the number of alphabets that were added to the first alphabet to achieve the second alphabet
2-Identify the number of alphabets that were added to the second alphabet to achieve the third alphabet
3-Identify the sequence
4-Follow the sequence
Answer: Z

57. N, Q, L, S, J, U
1-Examine the above statement
2-Find the alphabet after U
Hints:
1-Identify the number of alphabets that were added to the first alphabet to achieve the second alphabet
2-Identify the number of alphabets that were reduced from the second alphabet to achieve the third alphabet
3-Identify the sequence
4-Follow the sequence
Answer: H

58. A, D, G, J
1-Examine the above statement
2-Find the alphabet after J

Hints:
1-Identify the number of alphabets that were skipped to achieve the next alphabet
2-Follow the sequence
Answer: M

CHAPTER # 4
TESTING

1. Unity Engine Testing

4.1 Test Case

4.1.1 Test Case Game Installation

Purpose	**Test "Game Installation"**
Setup	Desktop
Step 1	Unity Setup is to be Downloaded
Step 2	Install Unity
Step 3	Installer file installed successfully
Result	**Installed**

Table 21

4.1.2 Test Case Game Launching

Purpose	**Test "Game Launching"**
Setup	Desktop

Steps	• Does the game launch as it's supposed to be?
	• Game displays menu
	  ○ Play Game
	  ○ Weapon Select
	  ○ Settings
	  ○ Exit

Result	**The game launched and menu displayed**

Table 22

4.1.3 Test Case Sounds

Purpose	**Test "Sounds"**
Setup	Desktop
Verification	• Check ON/OFF Sound and Music • If the sound effects are synchronized with actions in the game.
Result	**All sounds and music work as supposed to be.**

Table 23

4.1.4 Test Case User Interface

Purpose	**Test "User Interface"**
Setup	Desktop
Verification	• Check-in Landscape orientation • Check for screen title • Font displayed properly (color, size, etc.) • Check if buttons are displayed properly • Check If the camera follows the player as it should be.
Result	**The user interface works as it should be**

Table 24

4.1.5 Test case Performance

Purpose	**Test "Performance"**
Setup	Desktop
Verification	• Make sure that any action is not taking a considerable amount of time. • Check if the gameplay is smooth

	• Check if the loading time is satisfactory. • Check if all assets are loading properly.
Result	**Game performance is optimized**

Table 25

4.1.6 Test Case Puzzle Solving

Purpose	**Test "Puzzle Solving"**
Setup	Desktop
Verification	• Check if the player solves all the puzzle or not • Check if the player is rewarded accordingly.
Result	**Puzzle count registered properly**

Table 26

4.1.7 Test Case Settings

Purpose	**Test "Settings"**
Setup	Desktop
Verification	• Check Settings menu is displayed properly. • Check if the settings menu is working properly. • Check if the settings menu is displaying all the changeable content.
Result	**The settings menu is displayed and functions properly**

Table 27

4.1.8 Test Case Competition with the boss

Purpose	**Test "Play Match"**
Setup	Desktop
Verification	• Check if the player attacks the boss properly or not. • Check if the player is rewarded accordingly.
Result	**The Player competes with the boss.**

Table 28

4.2 Unity Engine Testing:

4.2.1 Game Installer Files

- Make installable builds with no errors.
- The game does not misbehave according to the design.
- Resource files of the game are installed.

4.2.2 Models and their Animation

- Character Models are displayed as made.
- Character Animations plays animated.
- Textures render as made.

- HUD showed as designed.

4.2.3 Player Game Object

- Can solve puzzles.
- Can kill the enemy.
- Can kill the right Alien Animal and improve its health.

4.2.4 Game Menu and Interfaces

5 Level selection is ensured
6 Look Sensitivity can be changed in Game Menu
7 An overview of control is possible in Game Menu
8 The screenshot has been enabled in Game Menu as well

CHAPTER # 5
CONCLUSION

5. Conclusion

5.1 Problem Faced and Lessons Learned

Game development is teamwork. Every person has their role when it comes to the development process but as per the current situation, we weren't able to clear out our details for a long time. Though we had several meetings, it takes time for an individual to understand the entire concept through online sessions. Face-to-face interaction easily solves a lot of ambiguities that rose for us this Semester. Documentation, Research, Planning, Implementation, and Testing together make a game. So, it indeed was difficult for us somehow.

Lessons learned is that we need to invest ourselves in Game development as it helps to learn concurrency as well as it helps to learn about performance and user experience.

5.2 Project Summary

Rogue AI! is a game that is developed on Unity Engine for Desktop. It is being developed by keeping the constraints and limitations of the devices in view. It is developed to improve the logical thinking of the player as the player is to solve logical puzzles. The first four levels are crossed by solving the logic puzzle. The last level is to be solved by killing the boss's enemy. In between the game, the player has the option of regaining his health by killing the right Alien Animal, this shall boost his health.

5.3 Future Work

We have some plans of taking this game to new levels by adding some secret assets after achieving the currently planned milestone. We are looking forward to adding wonders to it.

Future extension of this work may include:

- New designs
- Puzzle scenarios
- More players and enemies
- More Levels
- Interplanetary
- Reward schemes
- Daily Login Bonuses
- Different techniques of gaining health

5.4 GitHub Repository Links

https://github.com/humza-13/Rogue-AI

CHAPTER # 6
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