



University of Dhaka
Department of Computer Science and Engineering

*Project Report:
Fundamentals of Programming Lab(CSE-1211)*

*Project Name:
Invade The Maze*

Team Members:

1.

Name:Lubna Zahan Lamia

Roll:SK-25

*Department of Computer Science and Engineering
University of Dhaka.*

2.

Name:Mabsur Fatin Bin Hossain

Roll:FH-26

*Department of Computer Science and Engineering
University of Dhaka.*

1.INTRODUCTION:

In the rapidly growing field of software and technology, the sector of game development is one of the fastest growing field. It takes tremendous efforts of a single person or a united team to develop a game which may quench the thirst of the players for entertainment as well as educational purposes. With the learnings we got in our classes and labs along with the guidance of the teachers, we were able to complete the development of a 2D video game. "Invade The Maze" is an arcade game which requires planned steps to achieve the goal set for the players while avoiding collisions with ghosts and disguised obstacles. The game is developed in order to provide amusement to the player as well as to increase their strategic skills. The features and environment of the game were made keeping in mind the interest of all ages of players. It is hoped that the game would interest people irrespective of their ages and provide quality entertainment that it aims for.

2.OBJECTIVES:

- 'Invade The Maze' is developed with the purpose of providing amusement as well as increasing some real world skills of the player. We hope that the game would be able to increase the sense of alertness and strategic skills of the player as he/she has to keep in mind the presence of enemies (disguised as ghosts) and obstacles (disguised as elements of nature) while achieving his/her goal.
- The overall environment of the game including the visuals and audio effects was developed keeping in mind the taste of people of all ages so we hope the game would be able to provide entertainment to users irrespective of their age.
- The game does not include any sort of killing or misdeeds so it can be classified as a non-vicious game providing healthy refreshment.
- The user interface and controlling of the game is kept user friendly for trouble free gaming experience.

3.PROJECT FEATURES:

We tried to equip 'Invade the Maze' with all the features needed for a full-fledged gaming experience. The features are described below along with some images of the visual representation.

a)START SCREEN:

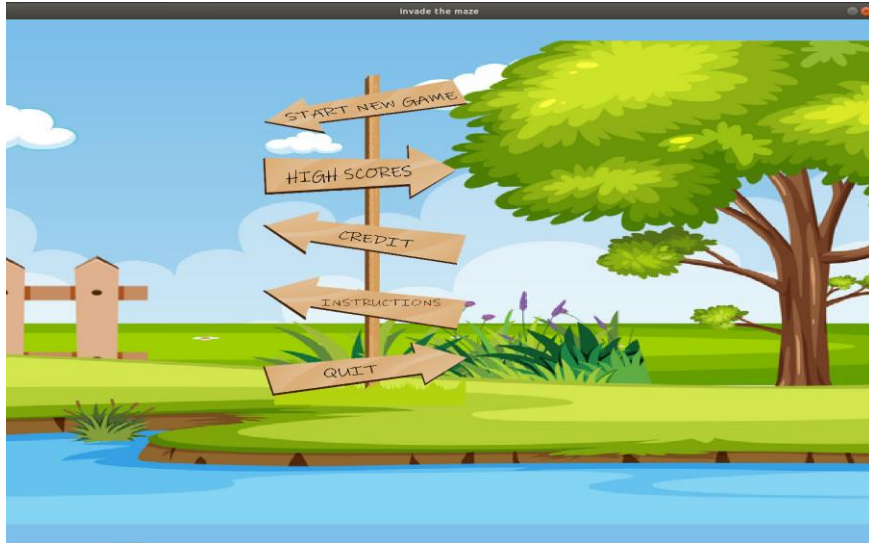
An introductory start screen. The player can proceed further in the by pressing on the escape key of his/her keyboard [KEYBOARD EVENT] and the direction is written on the screen.



Start Screen

b)MAIN MENU:

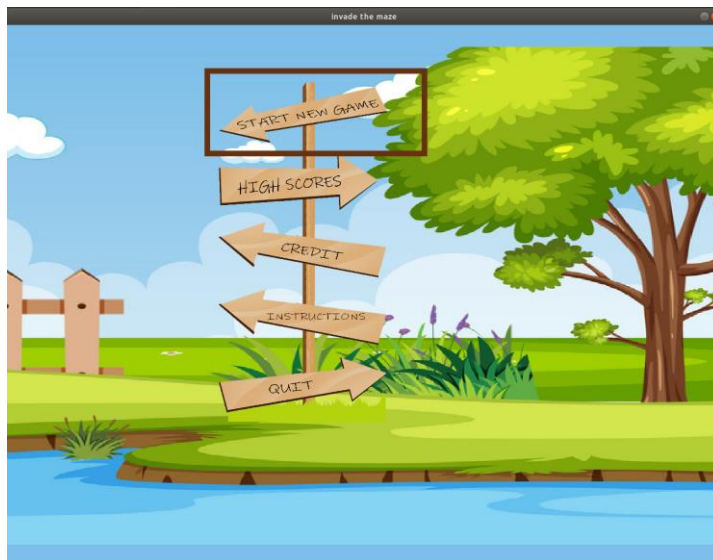
A main menu that appears after the start screen having the following options:



Main Menu

i)START NEW GAME:

A new game will be started if the option is clicked with right button of the mouse/touchpad.[MOUSE EVENT]



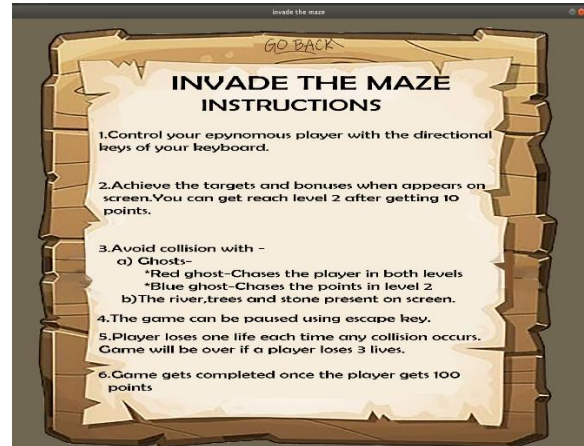
Start new game

ii)INSTRUCTIONS:

A page of instruction will appear if clicked on this option containing all necessary instructions to correctly play the game. [MOUSE EVENT]



Instruction option



Instructions

iii)LEADERBOARD:

A leader board will appear if clicked on the 'HIGHSCORES' option. The points of top 5 highest points along with the players name will be shown on the leaderboard. [MOUSE EVENT][FILE READING]



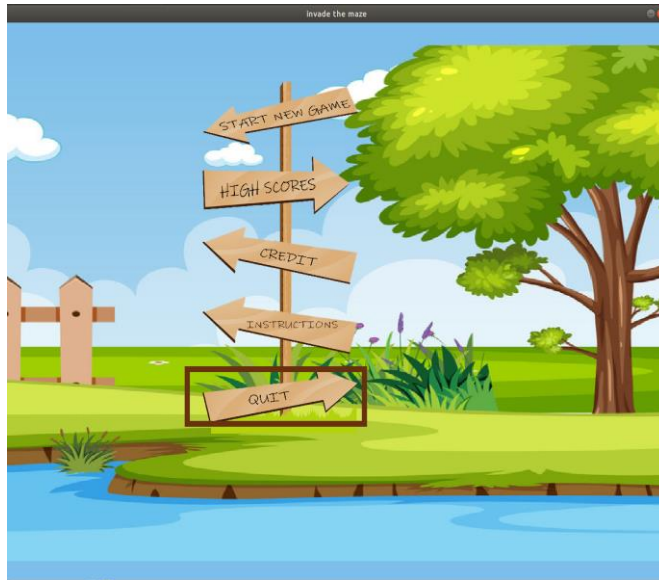
High scores Option



High Scores

iv)QUIT:

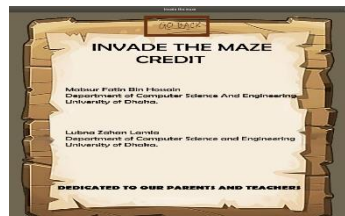
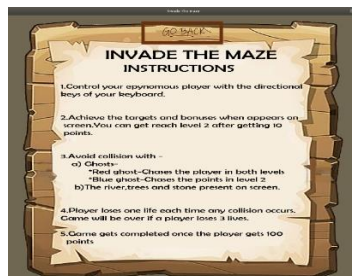
Player can quit the game clicking on this option[MOUSE EVENT]



Quit Option

v)GO BACK:

A 'Go Back' option is set on the 'Instructions' and 'Highscores' screen .Player can go back to the main menu clicking here[MOUSE EVENT]

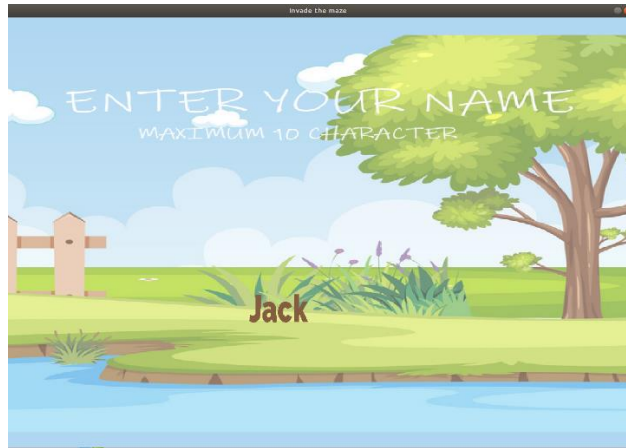


Go Back Options

c)TAKING NAME INPUT OF THE PLAYER:

When the player will click on the 'Start New Game' option ,the player will have to set their name.The player is suggested to keep the length at most 10 alphabets for visual purpose.[FILE READING & ARRAY]

After setting the name,the player can proceed towards the main game clicking on the enter key.[KEYBOARD EVENT]



Name Input

d)MAIN GAME SCREEN:

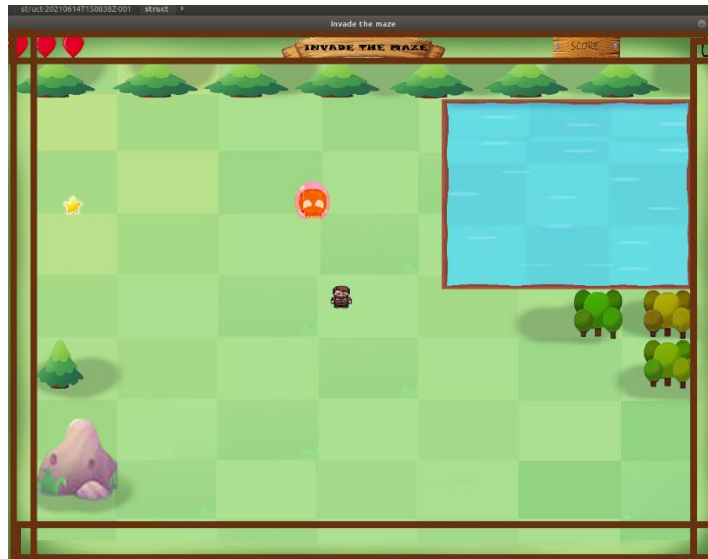
The game screen is equipped with several features that constitutes the core of this game.They are described below:



Main Game Screen

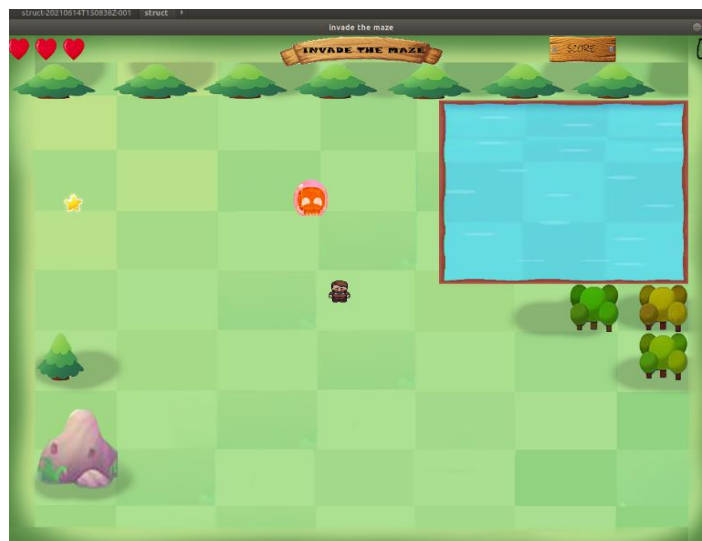
i) BOUNDARY:

There is a boundary set up around the maze .The player has to move inside these boundaries and can not move on or outside those. Also no points/bonuses appear in that area neither no ghosts are able to move there. The boundary on the main game screen is marked below :



Boundary

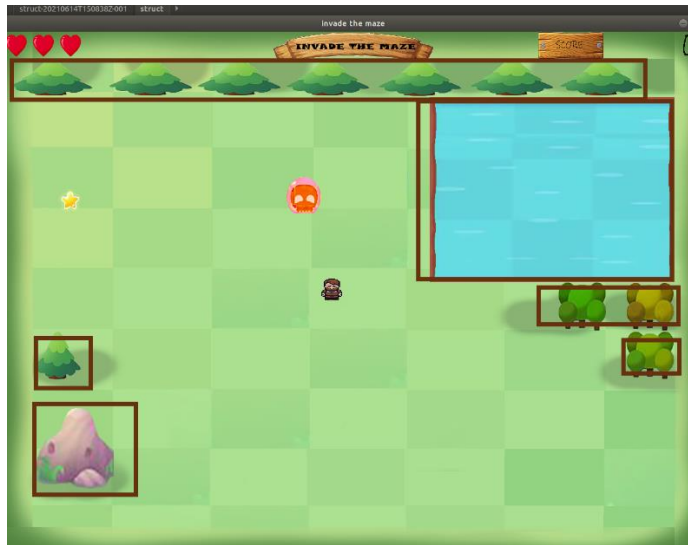
ii) MOVEMENT OF THE PLAYER: The player can move inside the boundary area. The player's movements are controlled by directional keys of keyboard. Left, right, top and bottom buttons move the player accordingly.



Movement of the player

iii)OBSTACLES:

There are several obstacles on the screen which are disguised as natural elements. The trees, stones and river are the obstacles. The main function of the obstacle is to decrease the player's life by 1 point as one collision with any of the obstacles means losing 1 life and starting from the initial position of the player on the maze.



Obstacles

iv)GHOSTS AND GHOST'S FEATURE- PLAYER AND POINTS CHASE:

Level 1 –A red ghost chases the player. If the ghost is able to catch the player, the player loses one life.

Level 2-A ghost in color blue appears along with the red ghost which devours the points and bonuses (when appears) reducing the chances of the player getting the points. Colliding with this ghost also makes the player lose one life.



Ghost and player chase



Ghost and points chase

v)TARGET GENERATION:

Stars appear on the maze randomly and gaining one star means the player gets 1 point. On the second level, a ghost tries to devour the stars before the player can.

vi) BONUS GENERATION:

A bonus appears on screen frequently on random positions and each bonus is equal to 4 points. If a bonus appears on screen on the second level, a ghost tries to devour it before the player if there is no bonus present on screen.



1) Target Generation 2) Bonus Generation

vii)LIFE OPTIONS:

A player gets 3 initial lives while starting the game. Each collision with the obstacles or the ghosts costs the player 1 life. If a player loses all the 3 lives at any point, the game will be over and a game over screen appears.

viii)SCORE:

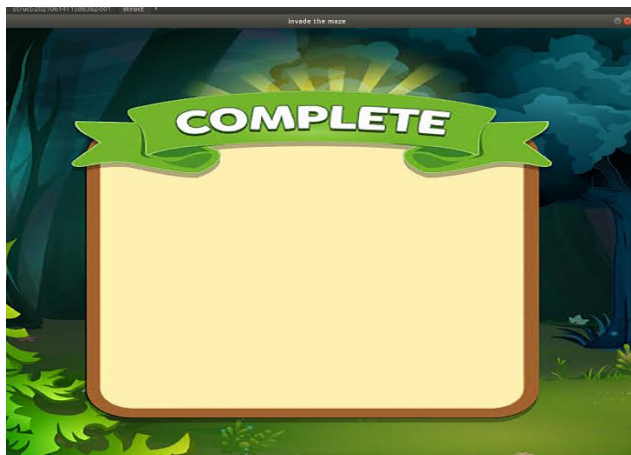
The score earned by the player will be shown on the right side of the screen. The game will be completed if a player is able to earn 100 points having at least one life.



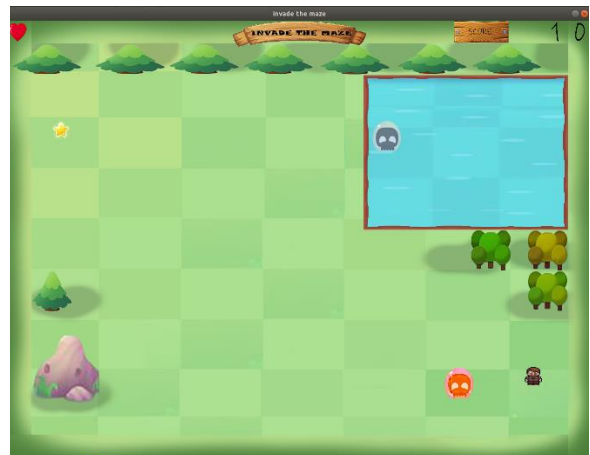
1)Life Options 2)Score

e)LEVEL 2:

When a player gets at least 10 points ,the player will be upgraded to level 2.In level 2,the difficulty of the game increases as another ghost colored in blue appears which devours the points before the player gets them.



Level 1 Completed Screen



Level 2

f)GAME OVER SCREEN:

A game over screen appears if a player loses all 3 lives during the game.The game over screen includes the following options:

i)PLAY AGAIN:

A player can start the game again if he/she clicks on this option[MOUSE EVENT]

ii)MAIN MENU:

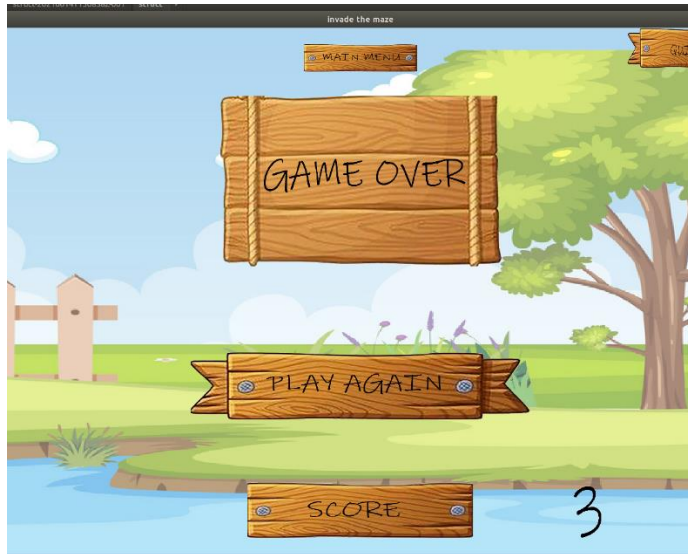
A player can go back to the main menu clicking on this option.

iii)QUIT:

A player can quit the game clicking on this option.

iv)SCORE:

The score of the player will be shown on the screen as well.The score will automatically be saved in the leaderboard if it exceeds one of the top 5 scores.



Game over screen options

g.PAUSE SCREEN:

A player can pause the game at any point pressing the escape key on his/her keyboard which is mentioned in the game instructions[KEYBOARD EVENT].A

screen appears if a player pauses the game.the screen includes the following features:

i)RESUME:

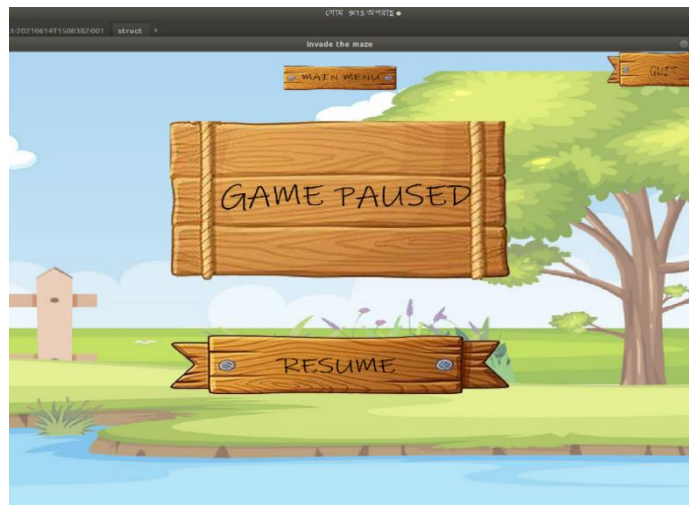
A player can start the game again from where he/she left if he/she clicks on this option[MOUSE EVENT]

ii)MAIN MENU:

A player can go back to the main menu clicking on this option.

iii)QUIT:

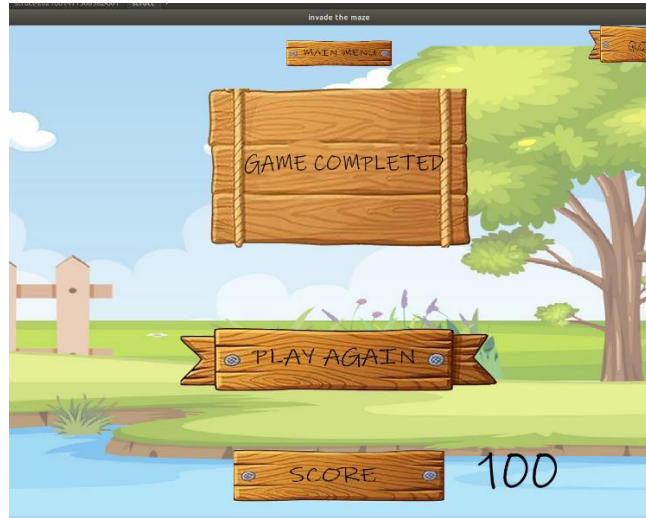
A player can quit the game clicking on this option.



Game Paused Screen Options

h.GAME COMPLETED SCREEN:

A game completed screen appears after the player is successful in gaining 100 points.



Game completed screen

4.PROJECT MODULES:

Custom Header files:

#include "object.h" : All preprocessors and structures defined here

#include "loadMedia.h" : Load all images

#include "setObject.h" : Set all objects

#include "invademaze.h" : Intro of the game

#include "loading.h" : Load all images

#include "instruction.h" : Setting the instruction screen

#include "hero.h" : Setting the hero

```
#include "background.h" : Setting the background
#include "wall.h" : Setting the wall
#include "pause.h" : Setting the pausescreen
#include "resume.h" : Setting the resume screen
#include "playagain.h" : Setting playagain screen
#include "quit.h" : Setting the quit button
#include "ghost.h" : Setting the ghost
#include "ghost2.h" : Setting the ghost2
#include "gameover.h" : Setting the gameover screen
#include "target.h" : Setting the target
#include "overbackground.h" : Setting the background screen after gameover
#include "digit.h" : Setting the digits
#include "maingame.h" : Sperating maingame
#include "river.h" : Setting the river
#include "forest.h" : Setting the forest
#include "oranget.h" : Setting the oranget
#include "greent.h" : Setting the greent
#include "olivet.h" : Setting the olivet
#include "stone.h" : Setting the stone
#include "treesin.h" : Setting the treesin
#include "score.h" : Setting the score
#include "overscore.h" : Setting the overscore
#include "title.h" : Setting the title
#include "levelcompleted.h" : Setting the level complete screen
#include "heart1.h" : Setting heart1
```

```
#include "heart2.h" : Setting heart2
#include "heart3.h" : Setting heart3
#include "bonus.h" : Setting bonus
#include "fileini.h" : Initializing score and name of the highscores
#include "assignscore.h" : Assigning the scores to the structure
#include "startscreen.h" : Setting the startscreen
#include "sgscore.h" : Setting the count of points in the game
#include "newgame.h" : Setting the newgame button
#include "quitsg.h" : Setting the quit button
#include "sginstruct.h" : Setting the instruction button
#include "credit.h" : Setting the credit button
#include "stand.h" : Setting the stand
#include "goback.h" : Setting the goback button
#include "operatestartscreen.h" : Operating the start screen
#include "mainmenu.h" : Setting mainmenu button
```

Operating the start screen:

```
#include "preparestartscreen.h" : Preparing the startscreen
#include "showstartscreen.h" : Showing the startscreen
#include "showhighscore.h" : Showing the highscore buttton
#include "startscreencheck.h" : Checking the interaction of user in the start
screen
#include "showcredit.h" : Showing the credit button
#include "showinstruct.h" : Showing the instruction button
```

#include "givenname.h" : Setting up the screen that takes name of the user.

Highscore ,credit , Instruction screen:

#include "checkgoback.h" : Go back to the main menu.

Givenname screen:

#include "rendertext.h" : Rendering text

Maingame screen:

#include "gameControl.h" : For controlling the hero

#include "points.h" : Verify acquiring points and bonus as well as increasing the count

#include "heroposition.h" : Setting position of hero

#include "ghostposition.h" : Setting position of ghosts

#include "collision.h" : Detecting collision with ghosts

#include "showcount.h" : Showing the count

#include "prepare.h" : Preparing the textures

#include "show.h" : Showing the textures

#include "prepareover.h" : Preparing the gameover screen

#include "showcountover.h" : Showing total points when gameover

#include "mouseeventover.h" : Handling mouse events when gameover

#include "preparepaused.h" : Preparing the pause screen

#include "mouseeventpaused.h" : Handling mouse events when gameover

#include "checklevel.h" : Checking level

#include "showbonus.h" : Showing bonus on specific points

#include "bonustime.h" : Handling the bonus time and render the texture according to it

#include "checkhighscore.h" : Check if the score is one of the highscores when game over

#include "checkgoback.h" : Check if the user presses go back button from the pause and gameover screen.

#include "gamecompleted.h" : Set the game completed box when game is completed

5.TEAM MEMBER RESPONSIBILITIES:

Module:

implemented by:

#include "object.h"

Mabsur Fatin Bin Hossain

#include "loadMedia.h"

Mabsur Fatin Bin Hossain

#include "setObject.h"

Mabsur Fatin Bin Hossain

#include "invademaze.h"

Mabsur Fatin Bin Hossain

#include "loading.h"

Mabsur Fatin Bin Hossain

#include "instruction.h"

Mabsur Fatin Bin Hossain

#include "hero.h"

Lubna Zahan Lamia

#include "background.h"

Lubna Zahan Lamia

#include "wall.h"

Lubna Zahan Lamia

#include "pause.h"	Lubna Zahan Lamia
#include "resume.h"	Lubna Zahan Lamia
#include "playagain.h"	Lubna Zahan Lamia
#include "quit.h"	Lubna Zahan Lamia
#include "ghost.h"	Lubna Zahan Lamia
#include "ghost2.h"	Lubna Zahan Lamia
#include "gameover.h"	Lubna Zahan Lamia
#include "target.h"	Lubna Zahan Lamia
#include "overbackground.h"	Lubna Zahan Lamia
#include "digit.h"	Mabsur Fatin Bin Hossain
#include "maingame.h"	Lubna Zahan Lamia
#include "river.h"	Lubna Zahan Lamia
#include "forest.h"	Lubna Zahan Lamia
#include "oranget.h"	Lubna Zahan Lamia
#include "greent.h"	Lubna Zahan Lamia
#include "olivet.h"	Lubna Zahan Lamia
#include "stone.h"	Lubna Zahan Lamia
#include "treesin.h"	Mabsur Fatin Bin Hossain
#include "score.h"	Mabsur Fatin Bin Hossain
#include "overscore.h"	Mabsur Fatin Bin Hossain
#include "title.h"	Lubna Zahan Lamia
#include "levelcompleted.h"	Lubna Zahan Lamia
#include "heart1.h"	Lubna Zahan Lamia
#include "heart2.h"	Lubna Zahan Lamia
#include "heart3.h"	Lubna Zahan Lamia
#include "bonus.h"	Lubna Zahan Lamia
#include "fileini.h"	Mabsur Fatin Bin Hossain
#include "assignscore.h"	Mabsur Fatin Bin Hossain
#include "startscreen.h"	Mabsur Fatin Bin Hossain

#include "sgscore.h"	Lubna Zahan Lamia
#include "newgame.h"	Lubna Zahan Lamia
#include "quitsg.h"	Lubna Zahan Lamia
#include "sginstruct.h"	Lubna Zahan Lamia
#include "credit.h"	Lubna Zahan Lamia
#include "stand.h"	Lubna Zahan Lamia
#include "goback.h"	Lubna Zahan Lamia
#include "operatestartscreen.h"	Lubna Zahan Lamia
#include "mainmenu.h"	Lubna Zahan Lamia

Operating the start screen:

#include "preparestartscreen.h"	Mabsur Fatin Bin Hossain
#include "showstartscreen.h"	Mabsur Fatin Bin Hossain
#include "showhighscore.h"	Mabsur Fatin Bin Hossain
#include "startscreencheck.h"	Mabsur Fatin Bin Hossain
#include "showcredit.h"	Mabsur Fatin Bin Hossain
#include "showinstruct.h"	Mabsur Fatin Bin Hossain
#include "givename.h"	Mabsur Fatin Bin Hossain

Highscore ,credit , Instruction screen:

#include "checkgoback.h"	Mabsur Fatin Bin Hossain
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Givename screen:

#include "rendertext.h"	Mabsur Fatin Bin Hossain
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Maingame screen:

#include "gameControl.h"
#include "points.h"
#include "heroposition.h"
#include "ghostposition.h"
#include "collision.h"
#include "showcount.h"
#include "prepare.h"
#include "show.h"
#include "prepareover.h"
#include "showcountover.h"
#include "mouseeventover.h"
#include "preparepaused.h"
#include "mouseeventpaused.h"
#include "checklevel.h"
#include "showbonus.h"
#include "bonustime.h"
#include "checkhighscore.h"
#include "checkgoback.h"
#include "gamecompleted.h"

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6.PLATFORM,LIBRARY AND TOOLS:

Language:

C has been used mainly. C++ also has been used in trivial cases.

Supporting Libraries:

*C Standard Header files:

1. #include <stdio.h> - for input and output
2. #include<stdlib.h> - for memory management, random number generation,string conversions and other algorithms
3. #include<time.h> -to get and manipulate time and date information

*C++ standard header file :

1. #include <iostream > - for input and output

*SDL Library Header files:

- 1.#include <SDL2/SDL.h> - for initializing functions.
- 2.#include <SDL2/SDL_image.h> - for rendering images and graphics.
- 3.#include <SDL2/SDL_timer.h> - for using SDL_Delay() functions.
- 4.#include <SDL2/SDL_mixer.h> -for sound effects.
- 5.#include<SDL2/SDL_ttf.h> -for writing text on screen from file.

Note :After installing the necessary libraries on ubuntu terminal using commands, -w -lSDL2 -lSDL2_image -lSDL2_mixer -lSDL2_ttf extension needs to be added during compilation to use the above header files.

7.LIMITATIONS:

- 1.The movement of the player and ghosts is confined on a plane as the game is a 2D model.
- 2.The player has no special abilities.

8.CONCLUSIONS:

With no other prior knowledge of using software development libraries, implementing a full-fledged 2D game was not an easy task for us. The first and foremost difficulty we faced in our project was getting used to a new library. We had to watch a series of tutorials, go through articles and learning materials to learn the basics of the new library we were going to use. Also, implementing every feature flawlessly was also quite complicated as we faced several errors while executing them. Also, making the visuals eye catching enough to attract players also required patience and time.

Now on the positive side, we are now well aware about the work process of a cross platform development library. We also learnt the process of successfully planning, designing , developing and testing a project. Among some real life skills, we learnt through this process, the significant ones are co-operation between team members, communicative skills, creative thinking and capability of imagination.

9.FUTURE PLAN:

1. Developing more features and levels.
- 2 .Improving visuals and graphical representations.
3. Creating a 3D model.
4. Making accessible to a broad audience and taking feedbacks from them.

REPOSITORIES:

GitHub Repository : <https://github.com/mansif08/Invade-The-Maze>

Youtube Video: <https://youtu.be/sW-4-fmA5rU>

REFERENCES:

<https://lazyfoo.net/tutorials/SDL/>

<https://www.libsdl.org/>