University of Dhaka

Department of Computer Science & Engineering

Project Report

Fundamentals of Programming Lab (CSE-1211)

Project Name

Lost Valley

SUBMITTED BY

Group ID: 2021CSE1211014

22 - Samiya Sultana Riya

62 - Tasrifa Sarker

Introduction

“Lost Valley” is an epic endless adventurous running game containing two modes i.e., “Forest Mode” and “Enemy Mode” where the player takes the role of a young man who has to run through the forest or a place full of enemies, collecting coins and weapons, and dodging obstacles by jumping unless he collides with the obstacles. It is a single player 2D game where the obstacles can be still or animated. The player also can kill the animated obstacles or enemies by shooting knives at them. Collecting coins and killing enemies will score points for the player. The goal is to survive as long as possible in the game and score as much as possible. For graphical interference, SDL2 libraries have been used and code has been written in C/C++ language.

Objectives

- The main objective of the game is to implement the C/C++ language in some practical field and develop an application or game with it.
- By making the game, to expand the knowledge of C/C++ language is also intended.
- The game is developed using SDL2 library functions to improve our thinking ability and game development. So, the application of SDL2 library is also another objective.
- Developing a project using custom header files in a modular way is a goal of the project too.
- Moreover, this game can engage people in an entertaining way.
- So, giving people thrilling experiences through the gameplay is also a motive of the game.

Project Features

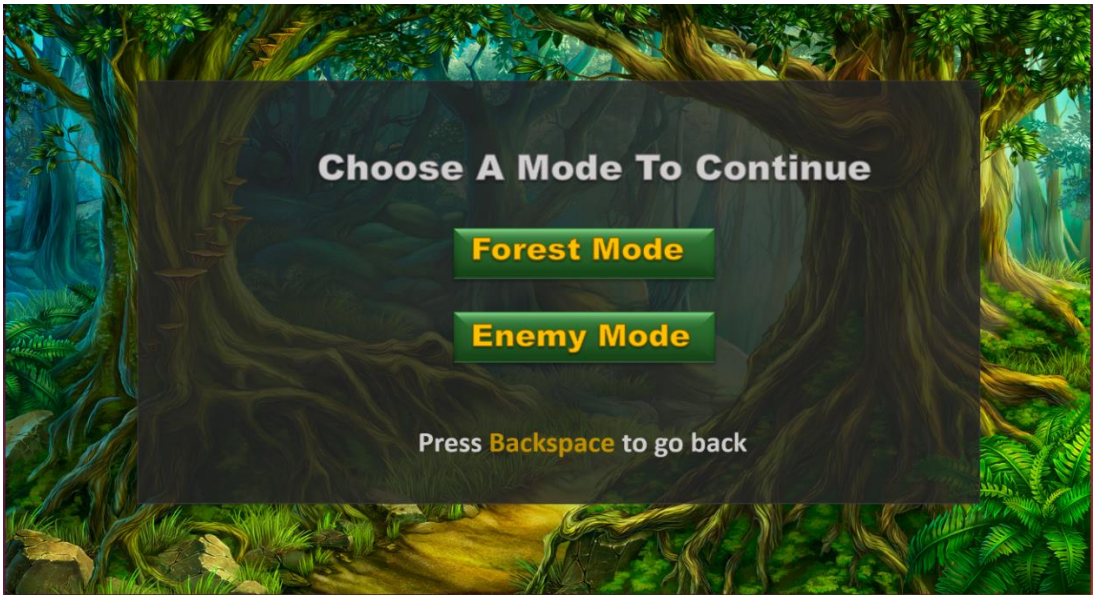
The project contains general game features like menu page, instruction page, sound, pause and basic running game features like jumping, colliding with the obstacles and collecting coins. The game also contains special features like allowing the player to play the game in two different modes, showing sorted high score of two different modes. The features of the game are described step by step below:

Main Page

The first page of the game shows four options to the player. New game, Help, High score and Exit.

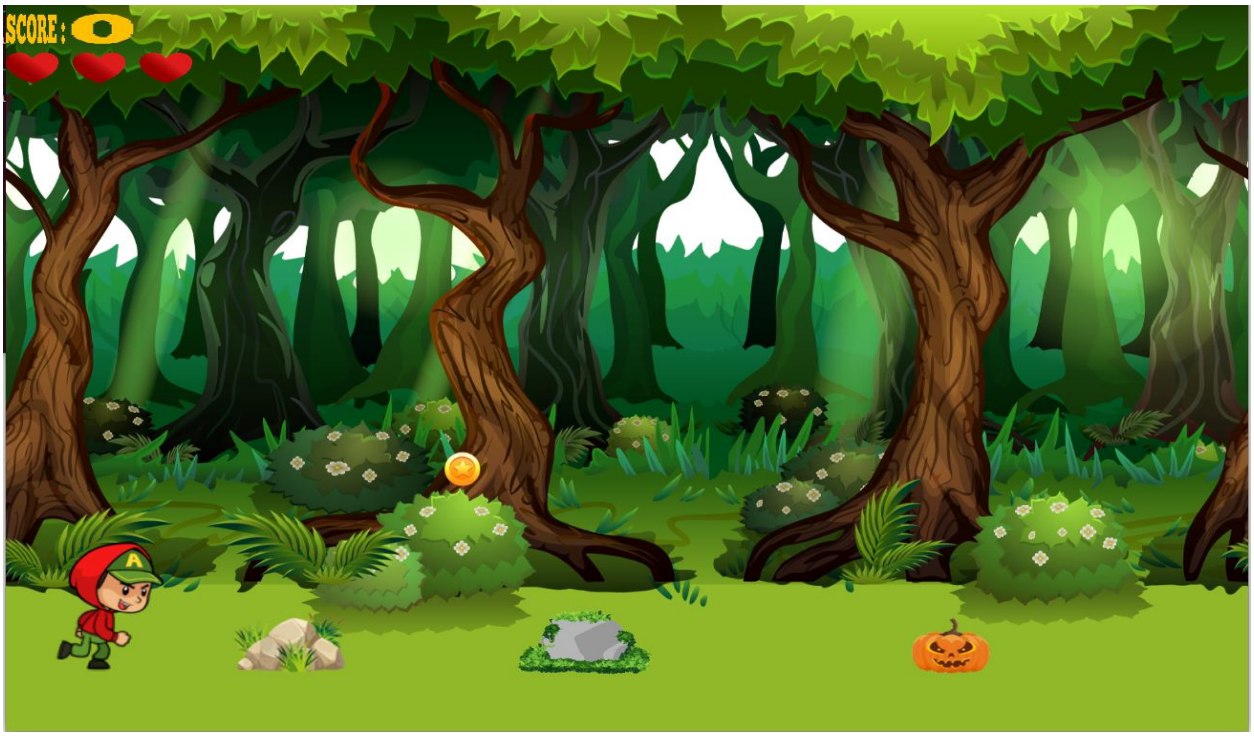
New Game Features

If the player clicks the new game option, he encounters two options named “Forest Mode” and “Enemy Mode”. These are the two modes to play the game. The player can choose either option to proceed.



- **Forest Mode**

The Forest Mode brings the player to an adventurous green forest where there are three different kinds of obstacles which come randomly in the path of the player. The player has to jump over the obstacle to save himself. The player can jump by pressing the spacebar. There are also coins in the path of the player as well as above the path. The player can collect the coins by just running or jumping.



- **Enemy Mode**

The Enemy Mode brings the player to a dark road where the player meets some animated obstacles. Here the obstacles are also of three types and they move towards the player. The player can jump over them just like in the forest mode. But in the Enemy mode there is a big obstacle which the player cannot avoid just by jumping. Here the player has to shoot knives towards the enemy three times by pressing the “S" key. For small enemies one knife is enough but two knives are needed for big enemies. By killing the small and big enemies the player can gain some extra points. The player can collect the knives by jumping. Each collected knife is equivalent to five knives. The number of knives appears on the right corner of the screen. The game starts with three knives and each time the player shoots knives the number of knives will decrease.

- **Pause Mode**

The player can also pause the game anytime he wants. The player has to press the key “P” to pause the game and “C” to resume it. The player also can press “Backspace” to go back to the menu. Going back to the menu will automatically pause the game. From the menu, the player can either choose to continue the game or start the game from the very beginning.

- **Score Features**

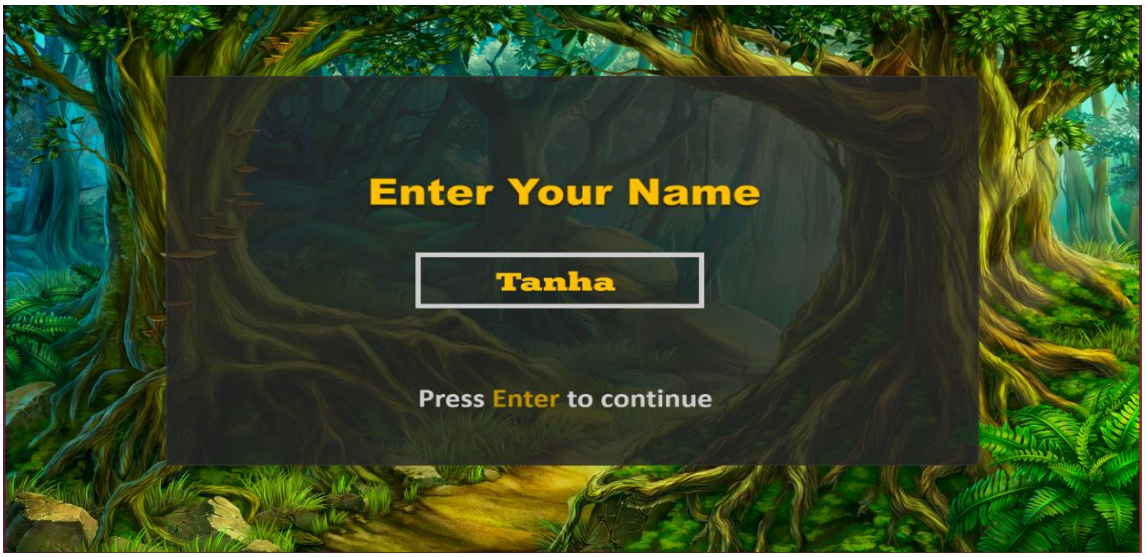
The player can score by collecting coins in the forest mode. Each coin increases the score by ten. The enemy mode also has the same feature. Along with that, a player can score points by killing the animated enemies in this mode. The smaller enemies will bring fifteen and twenty points each. And the larger will bring thirty points. The score appears in the left corner of the screen in each mode. There is also a decrease in the score. Each time the player collides with an enemy the score will decrease likewise. After the end of the game, the score will appear on the screen.

- **Game Over**

The game starts with three heart signs depicting three lives of the player. Each time the player collides with the obstacles the life decreases by one. After colliding three times, the game gets over. After the game, the game over writing and the score appears on the screen.

- **Name Input Feature**

The player gets to input his name after the game. The character limit of the name is six words. If the score of the player is within the range of the high score, then the name and score of the player gets saved in a file and the page of high score of that particular mode also appears. A player cannot leave the game without entering his name. After entering the name, the game takes the player back to its first page.



Sound Effects

The game has three different sounds in the menu and two different modes respectively. Different sounds also can be heard when a player clicks the mouse, collects coins, collects knives, shoots knives, collides with the obstacles or enemies, when the enemy dies and finally when the game gets over. A player can turn off the music anytime by pressing the "M" key and can turn it on again by pressing the key again. But the player has to press the button separately to turn on or off each separate music.

Help Feature

If the player clicks on help, the instructions regarding the gameplay appear on the screen. The player can leave the page by simply pressing the backspace key.

Highscore Feature

If the player clicks on the Highscore, the option for two modes appears. The player can choose Forest Mode or Enemy Mode to see the highscore of the respective modes. Each mode has different sets of highscore. The first five scores appear on the screen in the descending order.

Exit Feature

The player can quit the game by going to the menu and clicking on the exit button. The player can also quit the game anytime by clicking the cross on the left corner of the game window. Only after gameover, a player cannot quit the game without entering the name.

Project Modules

The Project code is divided into five separate header files and fifteen cpp files. The header files are divided as firstmode, second mode, UI, lostvalley and all the four header files are put together into another header file. The header files are described separately below:

- **firstmode.h**

In this header file, functions and variables related to the first mode or forest mode of the game are declared. The variables like background texture, obstacle texture etc. are present in this header file.

- **secondmode.h**

The functions and variables necessary for second mode or enemy mode are declared in this header file. The textures of background, texture obstacle, coin, knives etc. are present in this header file.

- **lostvalley.h**

The texture and music related to the whole game are declared in this header file. The basic window of the game, coin texture, man texture and the functions which are used in both modes are declared here. Score texture, life texture, highscore texture are also included here. The functions for initialization, loading, rendering, animating background, animating and jumping of the man, gameover, converting score, showing score on the screen, sorting highscore, saving highscore and showing highscore are also included here. The variables necessary to use these functions are also declared here.

- **UI.h**

In this header file, the variables and functions related to user interfaces, like, starting and middle menu, mouse handling, keyboard handling, getting instructions and name input functions are included for the interactions of the user with the game. The flags necessary for the pause features are also included here. The textures and functions to render the menu and handle the game are included. Anyone can use this header file and its functions to make a user interface for any game by changing the variables accordingly.

- **header.h**

All the custom header files are combined here into one header file.

- **main.cpp**

In this cpp file firstmode(), secondmode(), gameover(), render() function is called. Functions for showing highscores, mouse handling, instructions etc. are called in this file.

- **init.cpp**

init file is used for initialization. In this file all the necessary code has been written for initializing the game's surface and other things.

- **load.cpp**

This cpp file is used for loading all the images and music and text files which has been used to make this game.

- **free.cpp**

  free.cpp file is used for calling SDL_DestroyTexture(), Mix_FreeMusic(), TTF_CloseFont() and other function for quitting the files.

- **coin.cpp**

This file is used for positioning the coin of the forest mode and enemy mode.

- **highscore.cpp**

It is used to show the top five score with the name of the player in the descending order.

- **score.cpp**

This file is used for showing the score when the game is over.

- **firstMode.cpp**

This file is used for scrolling background, rendering obstacle, coin, background, updating life, score, screen of the forest mode.

- **man.cpp**

This cpp file is used for character moving of the forest mode and enemy mode.

- **obstacle_firstmode.cpp**

This file is used for positioning different types of obstacles and the condition of being alive, increasing score etc of the forest mode.

- **2ndmode.cpp**

It is used for scrolling and rendering background, rendering enemies, coin, knifes, updating life, score, knife, screen of the enemy mode.

- **enemy_2ndmode.cpp**

This file is used for positioning different types of enemies and the condition of being alive, killing enemies, increasing/decreasing score of the enemy mode by calling functions.

- **knifes_2ndmode.cpp**

It is used for positioning knifes, counting the number of knifes etc. of the enemy mode by calling functions.

- **rendermenu.cpp**

This file is used for rendering menu and the basic render functions.

- **UI(pollvent,mousehandlling,nameprint).cpp**

In this file mouse and keyboard related code is written for operating the game.

Team Members' Responsibilities

Samiya Sultana Riya, Roll-22

- The "Main Menu" of the game which includes both graphics and coding part.
- "Mode Selection" part for both playing a new game and showing highscore.
- Rendering "Help" page on the screen and its graphics design.

- Rendering and saving name of the player in the files and showing them on the screen.
- Whole graphics design for the forest mode and rendering them on screen.
- Detecting collisions for the forest mode and increasing player's score.
- User interfaces related work for the forest mode like mouse handling and input name along with necessary flaggings.
- Adding music to the forest mode and lastly saving score and showing it on the screen.

Tasrifa Sarker, Roll-62

- Whole graphics design and background related work for the enemy mode.
- Animating the enemies of the enemy mode and detecting collisions of this mode.
- Collecting the coins and knives and updating scores according to it.
- User interfaces related work for the enemy mode which is mouse and keyboard handling.
- Lastly saving score and showing it on the screen and adding music to the enemy mode.
- ttf related work for the enemy mode

Platform, Library & Tools

Platform

The game is developed on Ubuntu 22.04.1 LTS. The game can be played all Linux platforms as well as on Windows 10.

Library

The game is built using the C/C++ language and SDL2 supporting library.

Tools

Online image converter and resizer, pics art photo editor, online music cutter, online music converter.

Limitations

- There is limited control over the character of the game.
- The player has to press the "M" key separately to turn on/off separate music.
- The name of the player which he has to input at the end of the game has to be within only six words.
- After a new starting, there will be no records of the previous games except the high score.

Conclusions

This is the first time we have developed any kind of game and written a modular code with a custom header file. At first, we had thought to make a full role-playing game. But as we never had built a game before, we failed to achieve this fully and also experienced many hurdles. We had no idea about animation or building up an application. So we did not have any idea about where or how to start. We had to learn things from the very beginning. Even after learning things we found it difficult to apply our ideas fully because of the lack of necessary images on the internet. Even for some technical parts, we could not find any proper directions on the internet which was difficult.

However, we have learned a great deal through this project. We have learned to use SDL header libraries and write our own custom header files. We have gained experience about basic game development. Our problem solving skills also increased. Moreover, we also learnt to handle problems and find solutions ourselves. We worked as a team so our communication and coordination skills were also enhanced. We learnt to write proper modular codes. As developing a game is quite different from regular C/C++ problems, we had to imply the C/C++ knowledge in a different way. Though it seemed hard at first, it definitely improved our coding skills and we learnt new and effective things from it. We will surely make use of them in our future projects.

Future plan

The graphics and the controlling elements in this game were quite limited. We want to develop better graphics and animation skills and use them in our game. We want to make more user interactive game. We hope to achieve a greater difficulty level for the player in the game. We would also like to give the options of surprise gift and add more levels to the game. Beside all these, we would also like to improve the basic knowledge achieved in this project and make a better and stronger project in the future.

Repositories

GitHub Repository: https://github.com/samiyariya/Lost_Valley

Youtube Video: https://youtu.be/4Q2ZfVXwD5I

References

- https://lazyfoo.net/tutorials/SDL/
- https://www.libsdl.org/
- https://www.geeksforgeeks.org/write-header-file-c/