



University of Dhaka

Department of Computer Science and Engineering

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

Project Name:
Aventuras de Cottontail

Team Members

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1. Introduction

This is essentially a game about Cottontail, a rabbit with a little bit of back story. In our game, the rabbit has to go through all the obstacles crossing his path and find the treasure to defeat the evil ruler to end his evil rule. The ruler is a bad influence on society. The rabbit has to go through roads and jungles and a maze to acquire the ultimate treasure. Each level is connected; like you can't pass level 1 without collecting level 2's map. The rabbit has to collect some items in this journey without which he can not pass a level. So this is a game to pass obstacles and collect items that can't be done without breaking a sweat.

2. Objectives

- ★ To create a challenging scenario for the user in the game.
- ★ To make the game as exciting as possible while keeping the UI feasible. The user has to use the mouse and the keyboard collaboratively from the starting level till the very end.
- ★ The end goal is to give the user a friendly experience and a challenging time completing each level.

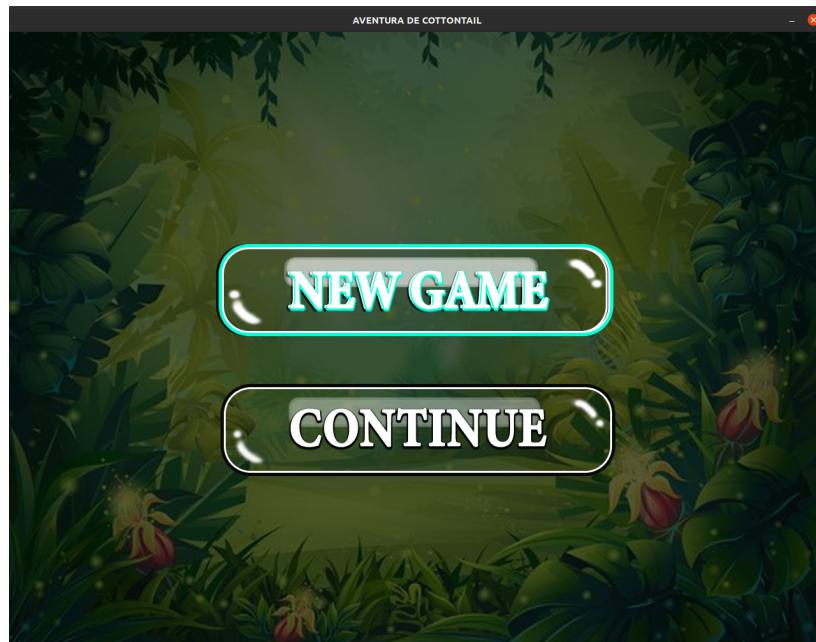
3. Project Features

Game UI:

- **Main Menu:** The game starts with an easy-to-use main menu. There are 5 options on the menu.



- 1) **Play button:** If we click on the Play button, we jump to the play options:



- New game:* Begin a new game from level 1.
- Continue:* Continue the previously saved game.



2) **Instructions button:** Clicking on this button, directs us to the Instructions

A) **Instructions:** Gives us a fleeting summary of the levels

B) **Game controls:** How to play the game

We can find 3 types of buttons here:

a) **Menu button**(Top left corner on the Instructions page)

b) **Next button**(Bottom left corner on the Instructions page)

c) **Previous Button**(Bottom left corner on the Game controls page)

3) **Highest score button:** Leads to the Leaderboard. Here we can find the top 8 scores of every level on 3 different pages:

A) Level 1 Placeholders

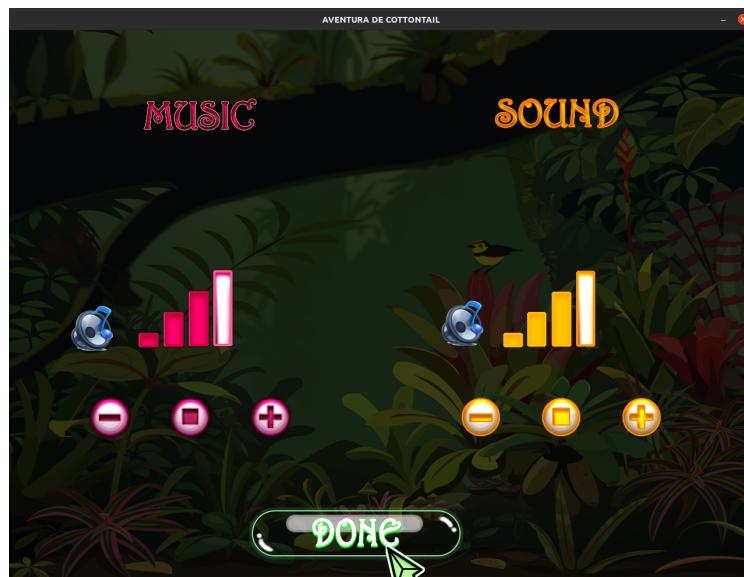
B) Level 2 Placeholders

C) Level 3 Placeholders



We can find 3 types of buttons here:

- a) Menu button(Top left corner on the Level 1 page)
 - b) Next button(Bottom left corner on the Level 1 & Level 2 pages)
 - c) Previous Button(Top left corner on the Level 2 & Level 3 page)
- 4) **Quit Button:** Exits the game.
- 5) **Settings Button:** Another important button on the main menu. It directs to the settings option. Here we can find two things:
A) Music B) Sounds



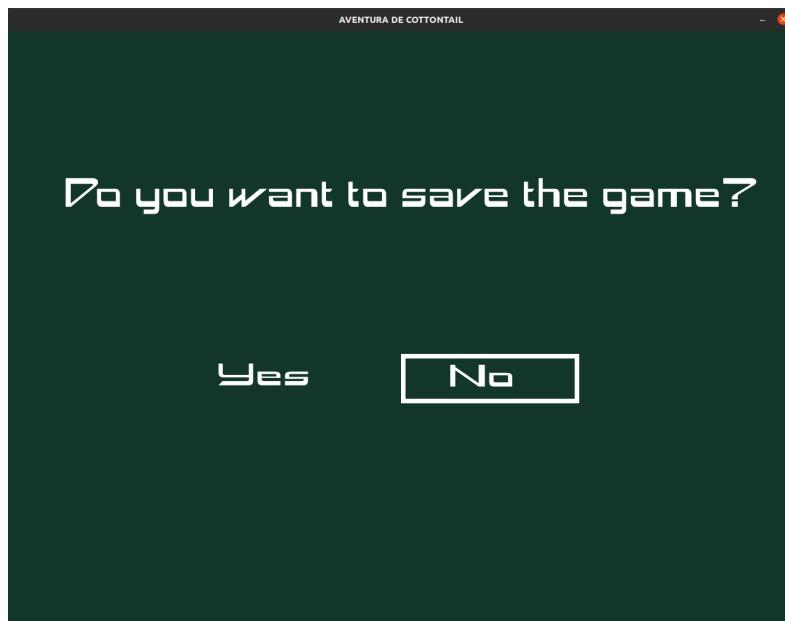
We can find some buttons here:

- a) Decrease Volume(-)
- b) Increase Volume(+)
- c) Play/pause: Turn the music/sound on/off.

- **Game pause:** One can pause the game by pressing the ESC key on the keyboard while playing.
This has a few buttons:

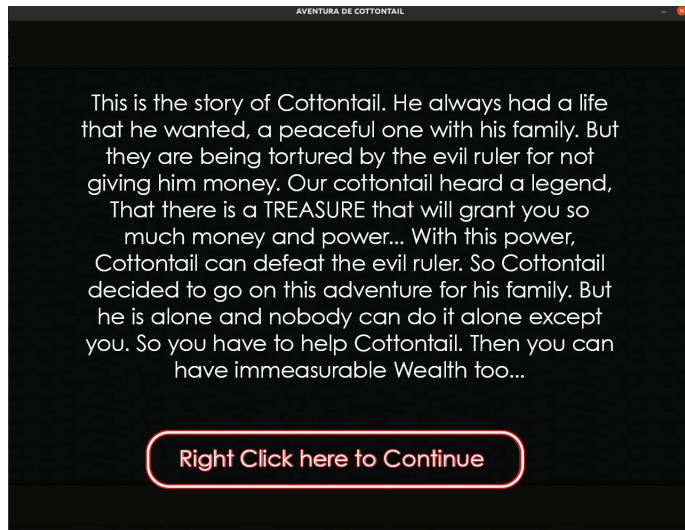


- 1) **Menu button:** Takes back to the main menu. But it has 3 options:
 - a) Save the game.
 - b) Go to the menu without saving the game.
 - c) Press the ESC key to just go back to the game pause option.

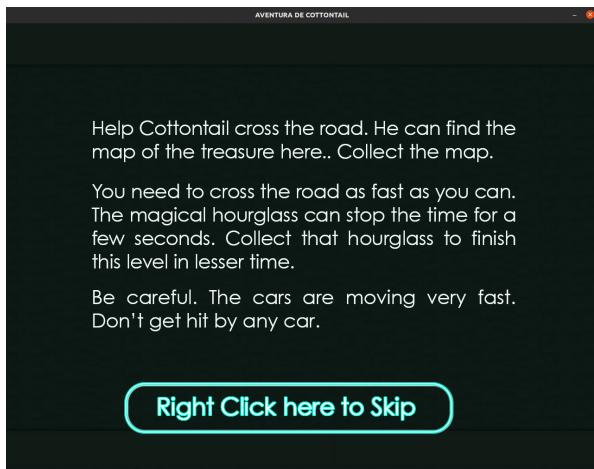


- 2) **Play:** Unpause the game and play from where you paused it.
- 3) **Music:** Turn the music on/off
- 4) **Sound:** Turn the sound on/off

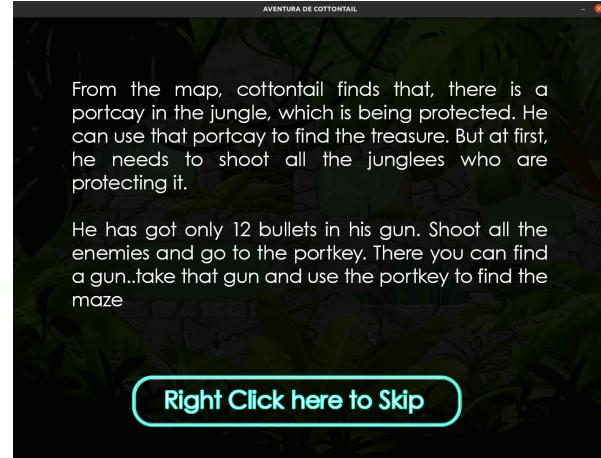
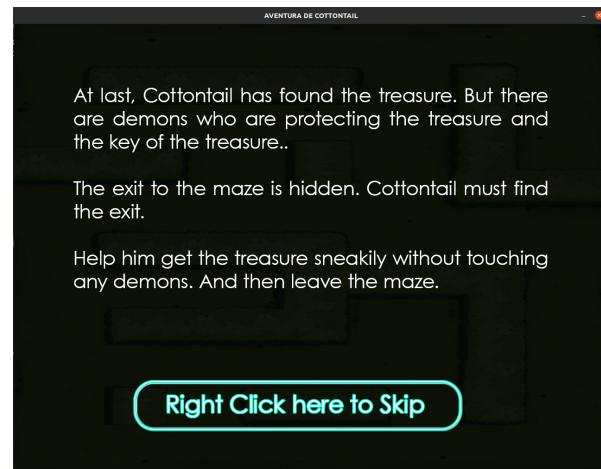
- **Game Story:** If you are starting from New game from level 1, you can find the story of the game. Right-click on the bottom of the story to proceed with the game.



- **Game Objectives:** Right-click the mouse on the highlighted area after you've finished reading them.



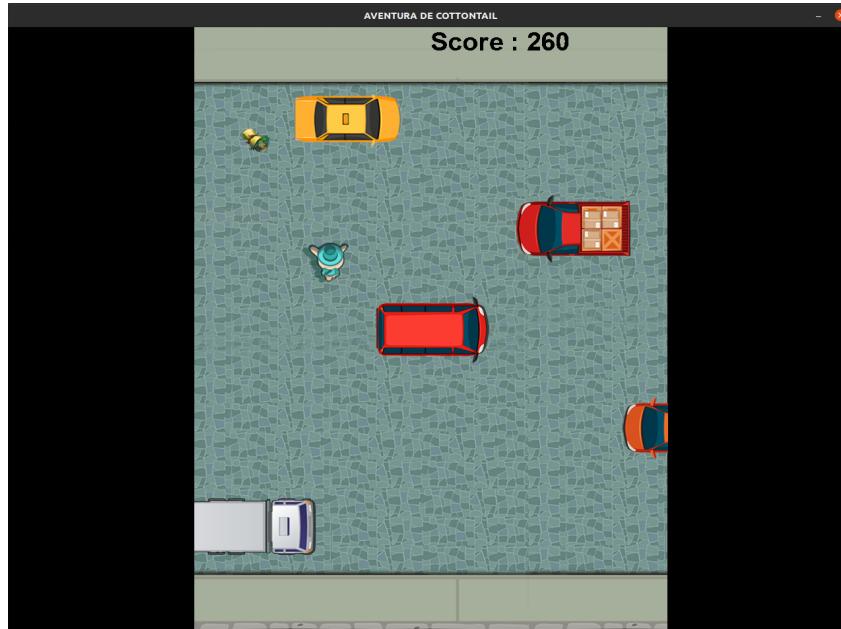
1. Game objectives are briefly explained at the beginning of each level.
2. While playing the game, you can press the F1 key to show the level objectives.



Gameplay:

- **LEVELS:** The game contains 3 different levels.

- I. **Level 1 - The Road:** Top-down view



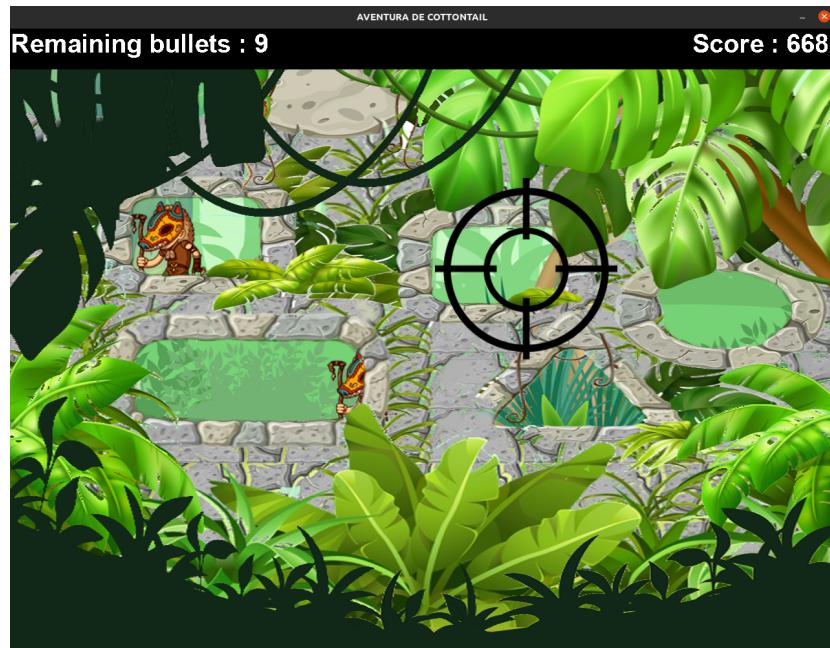
- ★ The road is full of moving cars with different speeds.
- ★ Collect the items:
 - ❖ Map: Mandatory to complete the level
 - ❖ Hourglass: Can Increase the score
- ★ Completing the level Condition:
 - Collecting the map
 - Reaching the other side of the road
- ★ Gameover Condition:
 - Getting hit by any car
- ★ Scoring:

The score depends on the time and efficiency of the player

 - The score of this level is 300 points at the beginning(after the countdown)
 - Then it gradually decreases by 10 points for every second
 - Collecting the hourglass can give a bonus of 5 seconds or 50 points. But beware, the position of the bonus changes.
 - When the score reaches 0 points, it stops decreasing.
 - The score of this level will also affect the score of the next levels.

II. *Level 2 - The Jungle:*

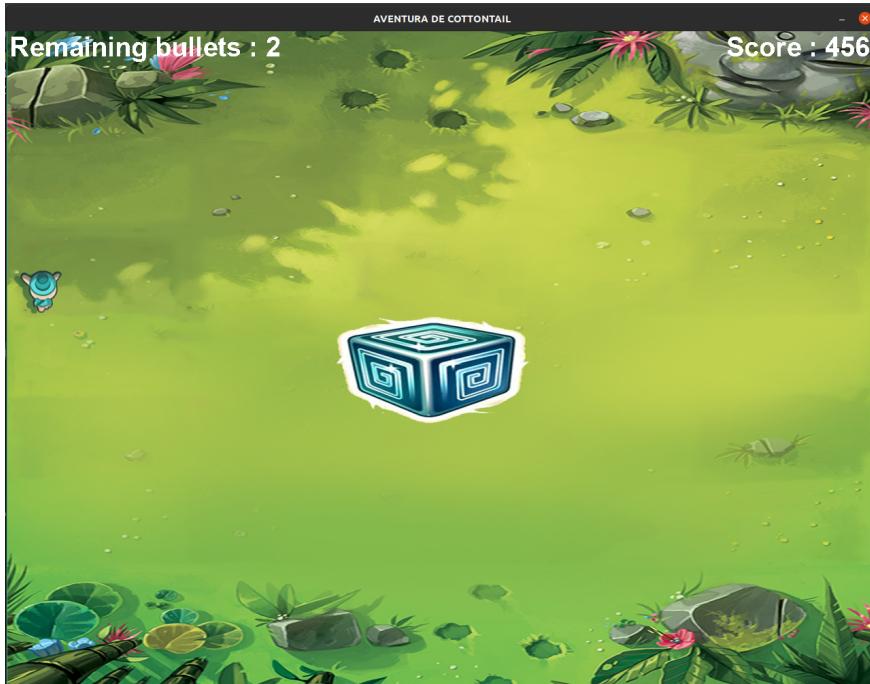
Part 1: First-person view.



- ★ You can see the five moving men through the windows.
- ★ The player has got only 12 bullets in his gun.
- ★ **Level Complete Condition:**
 - Killing all the enemies
- ★ **Gameover Condition:**
 - Running out of bullets
- ★ **Scoring:**

The score depends on the time and efficiency of the player

 - ➔ The score of this level is 600 points + the score of the previous level, at the beginning(after the countdown)
 - ➔ Then it gradually decreases by 2 points for every second
 - ➔ For each bullet shot 50 points are deducted from the score.
 - ➔ When the score reaches 0 points, it stops decreasing.
 - ➔ The score of this level will also affect the score of the next level.

Part 2: Top-down view

★ Get to the blue rectangle in the center

★ **Level Complete Condition:**

Exiting the maze finder

★ **Scoring:**

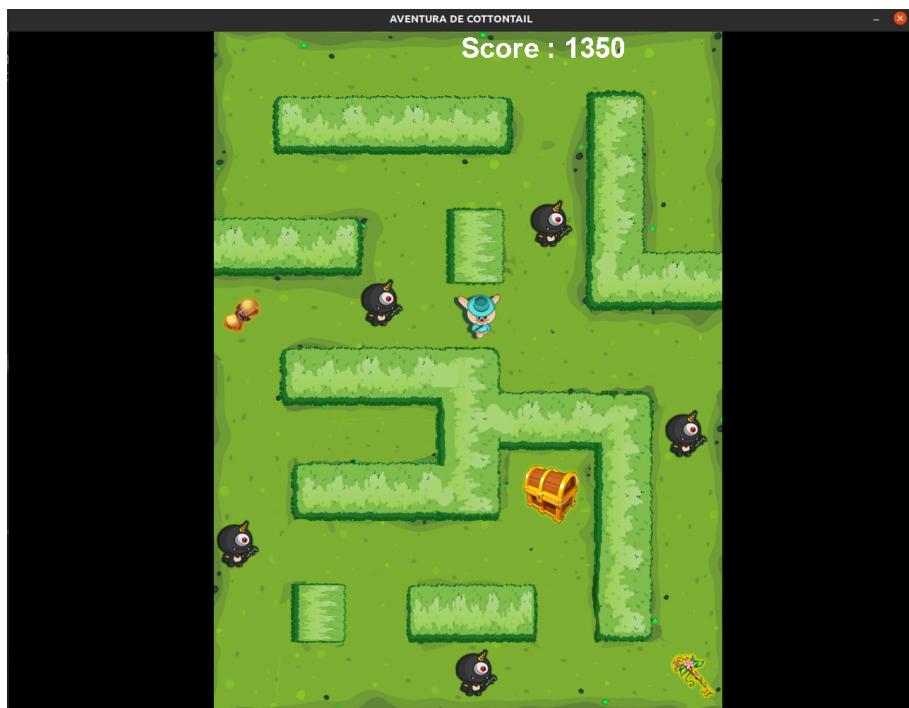
The score depends on the time and efficiency of the player

→ The score gradually decreases by 2 points for every second

→ When the score reaches 0 points, it stops decreasing.

→ The score of this level will also affect the score of the next level.

III. Level 3 - The Maze: Top-down view.



- ★ Demons are moving across the maze
- ★ Go through the shortest possible way to complete this level as FAST as possible.
- ★ Collect all the items in chronological order, first the keys, then the treasure, then the map
- ★ After collecting the map, the exit will reveal itself
- ★ **Level Complete Condition:**
 - Collecting all the items
 - Exiting the maze with the rabbit hole(the exit)
- ★ **Gameover Condition:**
 - Getting touched by any demon
- ★ **Scoring:**

The score depends on the time and efficiency of the player

 - ➔ The score of this level is 900 points + the score of the previous level, at the beginning(after the countdown)
 - ➔ Then it gradually decreases by 3 points for every second
 - ➔ When the score reaches 0 points, it stops decreasing.

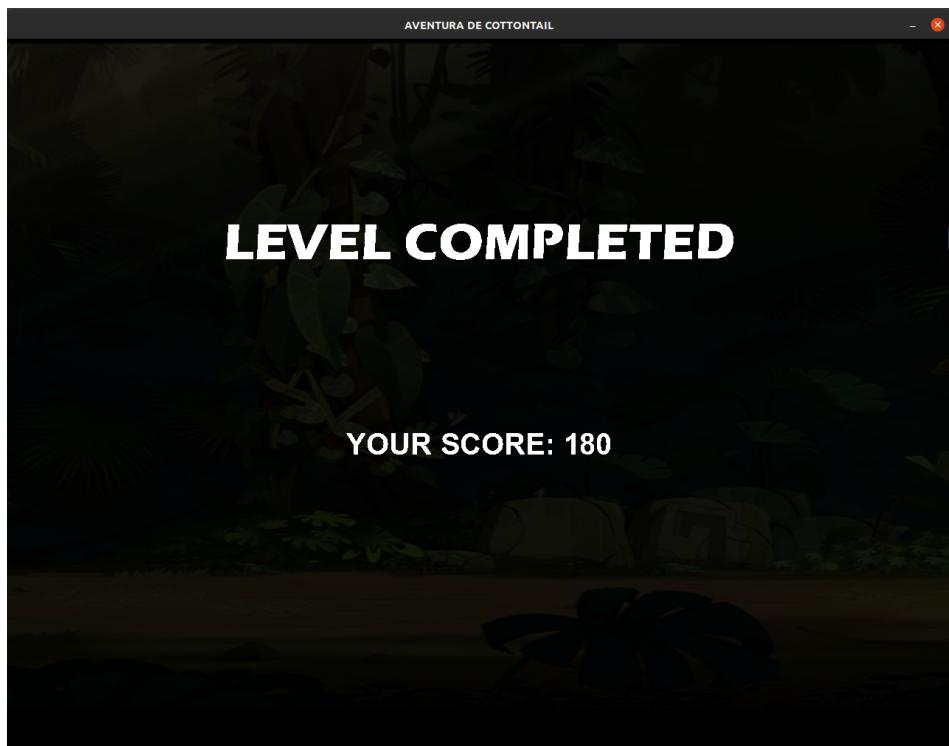
- ***Gameover***



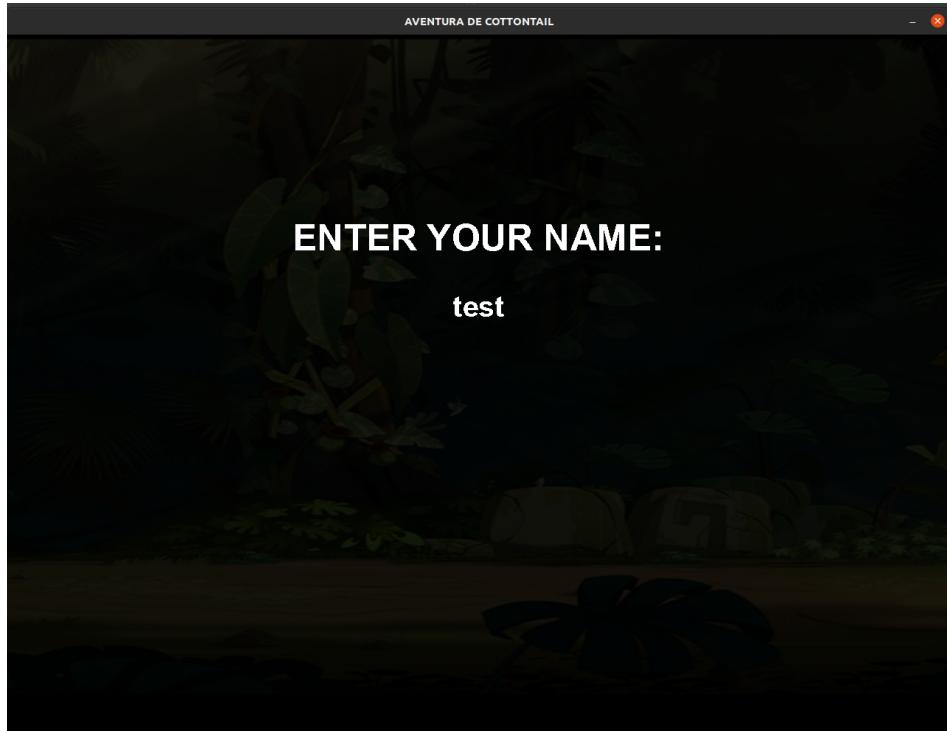
Pressing the space key on the keyboard will start the game from level 1.

- ***Level Complete***

After completing the level, the level complete screen will show up:



★ **Naming:** Enter the name of the player



★ **Score:** If the player has managed to score more than the placeholders of the current level, then the player's position will show up.

Pressing the Enter key on the keyboard directs you to the next level.



4. Project Modules

Our code is divided into many cpp files and header files:

Cpp files:

These files are separated into different folders :

Initialization:

- **init.cpp:** initialize the game.
- **close.cpp:** close the game when clicked on exit.
- **input.cpp:** takes mouse and keyboard inputs.
- **sfx.cpp:** loads and plays sounds and music.
- **time.cpp:** counts time which is the basis of scoring, shows scores, and countdown.

Gameplay:

- **player.cpp:** determines the movement of the player.
- **enemies.cpp:** determines the movement of enemies.
- **gameover.cpp:** deals with the game over conditions.
- **gamepause.cpp:** works on game pause conditions.
- **levelcompleted.cpp:** works on the level completed conditions; takes a player name as input, shows the score, and sets up the stage for next level.
- **play.cpp:** starts a new game or loads saved one.

These are the cpp files that determine the gameplay by managing the players and enemies.

Menu:

- **buttons.cpp:** 4 main buttons of the main menu are dealt here.
- **instructions.cpp:** works on the instructions menu.
- **leaderboardbutton.cpp:** works on the leaderboard menu & also loads scores after completing a level.
- **music&sounbutton.cpp:** works on the settings button on main menu.

These are the cpp files that were used in creating the menu.

Other cpp files:

These are the cpp files that have separate header files and are used in different aspects of the game.

- **main.cpp:** Most important cpp file. Connects all the other cpp files and header files.
- **menu.cpp:** Connects all the things related to the main menu and works on the main menu.
- **level1.cpp:** Everything related to the 1st level is done here.
- **level2.cpp:** Everything related to the 2nd level is done here.
- **level3.cpp:** Everything related to the 3rd level is done here.
- **draw.cpp:** Draws the player, enemies, items, cursor, and also some level backgrounds.
- **stage.cpp:** Builds the stage for each level and determines the position of the items as well as collisions.
- **texture.cpp:** Loads all the sprites and renders them when needed.

Header files:

- **defs.hpp:** Contains all the definitions of different variables used in all cpp files.
- **structs.hpp:** Contains all the structures used in all cpp files.
- **texture.hpp:** Contains all the headers used in the texture.cpp
- **all.hpp:** Contains all the other functions' declaration of all cpp files.

Other Header files:

- **main.hpp:** Contains all the header files used in main.cpp
- **menu.hpp:** Contains all the header files used in menu.cpp
- **stage.hpp:** Contains all the header files used in stage.cpp

Files for storing information:**Highscores:**

These are the text files that store the username and score of that specific user.

Names:

- Name1.txt: Stores level 1 placeholder names.
- Name2.txt: Stores level 2 placeholder names
- Name3.txt: Stores level 3 placeholder names

Scores:

- Scores1.txt: Stores level 1 placeholder scores
- Scores2.txt: Stores level 2 placeholder scores
- scores3.txt: Stores level 3 placeholder scores

Save:

- save.txt: stores which level is saved
- saveLevel1.txt: stores game save information of level 1
- saveLevel2.txt: stores game save information of level 1
- saveLevel3.txt: stores game save information of level 1

5. Team Member Responsibilities

Rayhan Akash:

- *Game UI:*
 - Game Objectives
 - Sound and Music
 - Game Story
- *Gameplay:*
 - Adding level items
 - Collision detection
 - Scoring

Noushin Tasnim:

- *Game UI:*
 - Main Menu
 - Game Pause
- *Gameplay:*
 - Level designs
 - Player & enemy movements
 - Gameover
 - Level Complete
 - Game Saving
 - Highscore files

6. Platform, Library & Tools

Platform: Linux (Ubuntu)

Library: SDL2 Library

Tools: Adobe Photoshop, Krita, online video trimmer, online audio cutter, online mp3 converter

7. Limitations

- ❖ We could have added more levels if we had more time and then it would be greater.
- ❖ In level 1, only one car is moving at a time in each lane.
- ❖ In level 2, it would've been better and more interesting with more enemies.
- ❖ In highscores if there is a space input in username, It doesn't show so in highscores.

8. Conclusions

To be honest, We did not expect much. Still, we wanted to make a decent game that's fun and challenging to play. And we had a slow start but eventually, it all came around.

At first, we just thought of making a game where our player would have to cross the road full of obstacles. Then we only made level 1 where the player has to cross the road full of cars. Our next plan was to make some really difficult maze where one would have to think before moving the player. But as our plans changed and we found it really difficult to make the current maze in level 3, we couldn't even think of making something more difficult than this. So, we ended up adding some really fast-moving demons in that level and that actually made the game quite interesting. Then our plan was to add another level. At first, we thought of adding some level, where the player would have to cross a river using some moving woods in the river. But then we thought of adding something more interesting like shooting as we had previously thought about it, so we added level 2, the jungle where the player has to shoot the enemies. Then we added the items and thus ended up making up this adventurous game.

In conclusion, we would like to say that we have learned a lot of things from this project. Like, using structures to make the code easier to understand and manageable, using files to store information, dividing code into different files and headers. And commenting. We often forgot to use comments in our codes which made our code really messy. So we finally ended up using lots of comments in our codes.

9. Future plan

We plan to make this game even more attractive and fun to play. We would like to add

- ❖ More advanced graphics & improve what we have made now.
- ❖ Some more interesting levels.

10. Repositories

GitHub Repository:

https://github.com/n0ush1n/Aventuras_de_Cottontail

Youtube Video:

<https://www.youtube.com/watch?v=nAeEXjCtdUY>

11. References

Pictures:

[Vecteezy](#)

[Freepik](#)

Music and sounds:

[Mixkit](#)

[Melody Loops](#)

SDL2 codes:

[SDL Wiki: FrontPage](#)

[SDL2 Game Tutorials - parallelrealities.co.uk](#)

[Beginning Game Programming v2.0](#)

