MINESWEEPER

J Sri Harshith – 22ee01046

L Abhigna– 22cs01023

M Lohitha– 22cs01034

CONTENTS

- Introduction
- Methodology
    - Requirements Gathering
    - Implementation
    - Testing
    - Documentation
- Features
- Motivation
- Highlights of the project
- Stepping out of comfort zone
- Areas of improvement
- Future Scope
- Contribution

INTRODUCTION

The Minesweeper Game project is aimed at designing and implementing a digital version of the classic puzzle game. The primary objective of this project was to gain experience in software development, problem solving, algorithmic thinking while recreating a popular and challenging game.

Objectives:

- Develop a function and visually appealing Minesweeper game
- Implement game mechanics that adhere to the original rules and gameplay of Minesweeper.
- Create an intuitive user interface with appropriate controls and interactive elements.
- Apply efficient algorithms for grid generation, mine placement and cell revealing.
- Ensure a responsive and enjoyable gaming experience.

METHODOLOGY

⬇

Requirements Gathering: The project team analyzed the requirements of the Minesweeper game, including its core mechanics, grid size, mine placement logic.

⬇

Implementation: The game was implemented using C programming language, taking into consideration all the necessities. Key components included grid generation, cell revealing, flag marking.

⬇

Testing: Rigorous testing was conducted to identify and fix bugs, ensure correct gameplay mechanics and to validate the game's functionality.

⬇

5.Documentation: A comprehensive documentation was prepared, including the project requirements, design decisions, implementation details.
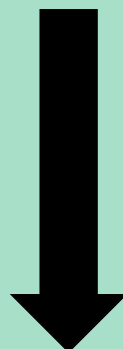
FEATURES

- Mine Placement
- Flag Marking
- Grid Generation
- Timer
- Sound Effects
- Cell Revealing

MOTIVATION

1) When we first started thinking about a project to do,it had to be something we'd all enjoy, we took a look at popular games around us, and that's when we felt like Minesweeper would definitely be a challenging one and working together as a team would be a very exciting opportunity for us. We as a team, share a common interest on game development. This project can act as a foundation and open up many more doors to pursue our interest.

2) Personal Interest: Minesweeper is a classic puzzle game that has been enjoyed by many people for decades. Developing a project based on it, especially while having a personal interest in puzzle games is a fun and engaging way to explore our passion.

3) Skill Development: Creating a minesweeper game involves various programming concepts and techniques such as logic, algorithms and data structures. It will provide an opportunity to exercise our problem solving skills and creativity while developing an interactive and enjoyable application.

4) Personal Development: Taking on a project like this can be a journey of personal growth. It requires planning, perseverance and attention to detail. As you encounter obstacles and work through them, you gain confidence in your abilities, and cultivate asense of accomplishment upon completing the project.

IMPORTANT HIGHLIGHTS

The journey of this game was definitely a challenging one, as we progressed we faced different challenges at every stage but extreme joy when we struggled but overcame the difficulties. One important thing was to be able to place the text, the emoji all at the right places, without a change in pattern in the interface at the end of the game . It took us a good amount of time to be able to write an efficient logic for placing random mines which was indeed important.

Another challenge was , being able to display all the mines and the status of every block when the player lost the game. Being able to keep altering the states according to the situation was indeed challenging, considering the number of cases and number of variables that we had to keep track off.

Tracking the position of the mouseclick by the user was interesting, and being able to actually extract the tile that the user has clicked was an interesting and infact important thing for our project.

STEPPING OUT OF COMFORT ZONE

This very game Minesweeper took us through a journey of a lot of new and exciting programming concepts and techniques, logics , algorithms, data structures. We came across a completely new library Raylib , which opened up a wide range of methods to create a user interface with a well defined set of functions. Raylib, a new tool took us a couple of days to understand its methods, to set it up without errors. Working on a project offers opportunities to enhance debugging skills by identifying and fixing logical errors ,runtime issues and edge cases.Implementing the game logic involves designing and implementing algorithms for tasks such as generating the mine field, calculating the numbers, indicating adjacent mines, revealing cells and determining game over conditions.

We have used structures(also called structs) which we've realized are a way to group several related variables in one place. We have used raylib to create an effective grid for the Minesweeper game resembling all the features of the original game. Another challenge was learning to set up a timer to show the player how long it took them to complete the game.

We have learnt methods to add images, sound effects. We have also been able to produce an efficient algorithm to be able to place mines in random tiles. Methods to access the position of the mouse, giving us the index also proved useful. Being able to change gamestate according to the situation of the game, and using that to produce various conditions in the game has helped us.

AREAS OF IMPROVEMENT

As we progressed through the making of the game, there were several challenges and plenty of new things that we wanted to keep creating at every stage. We succeeded in most of them but there were certain things we needed more time and resources in order to understand them to a better extent in order to actually utilize and implement them into our game.

As we explored Raylib, we came across Raygui- a library to create simple interfaces using raylib graphic style. This can actually open up a whole lot of opportunities like creating buttons, text boxes, event handling. Raygui also offers a range of customization options , including different themes and styles.

We also wanted to add difficulty levels to the project. The issue here was that the variables had to be declared as constants globally and hence we couldn't modify them locally according to the situation. This is something we need to work on.

Another improvement would be able to include multiplayer capabilities.

FUTURE SCOPE

Creating minesweeper game can lead to critical thinking and creation of many new games, through new methods which with game development can create wonders.

It will help students to gain cognitive asset of " making inference and hypothetical thinking". Minesweeper can be used as a tool for experimenting on probability. Thus the probability of determining the location guessed by the computer can be calculated.

Consoles such as PlayStation, Xbox and Nintendo often use C or C++ for game development, we can hence target these platforms and work on console game development. The game development industry is highly competitive and staying updated with current trends, technologies and tools is crucial for future success.

CONTRIBUTION

At the beginning, after deciding to take up the Minesweeper project, we as a team took out some time to think about the various variables and constants and decided their scope, some of them had to be declared globally, for implementation in the code. This included structures, and an overall layout of the whole project. After a thorough discussion of everything required to be done in the project, we have divided it into 3 parts.

Lohitha has taken care of all the work related to the grid formation and design. She has imported all the pictures and audio files required in the program. The function "Draw Block" has been written and executed by her. Going through various cases such as flag, tile , mine she has produced the grid. She has also taken care of the design segment of the game, the colors and other highlighted features.

Abhigna has written the logics for placing the mines in random locations in the grid. She has mentioned the initial states of the game, and the change in state as the game progressed. She has also written the logic for counting the number of mines present around a tile to be able to produce the number to be mentioned on the tile.She has also written the code to make sure the position clicked by the user is a valid index. also written the conditions to be able to place the flag , on removing the tile.

Harshith has then noted the position of the cursor, and added code for various positions, when left clicked and right clicked. He has written the "Block Reveal" function, noting down the various states in the game and necessary conditions required. He has also written the code to be able to display all the mines on the interface when the player has lost the game. He has also written the code to be able to display the numbers on the surrounding tiles, when a mine clicked has no mines surrounding it.