Green University of Bangladesh

Department of Computer Science and Engineering (CSE)
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My Assistant

Course Title: Operating System Lab
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Project Status	
Marks:	**Signature:**
Comments:	**Date:**

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Chapter 1

Introduction

1.1 Overview

The "My Assistant" project is a shell script-based application designed to provide various functionalities related to operating system tasks. It offers multiple features including file management. interactive games. This project aims to enhance user experience by providing a centralized tool for performing diverse operating system-related tasks directly from the command line interface. This system is like having a smart assistant that keeps everything organized and makes sure things run smoothly.

1.2 Motivation

Day by day we are becoming dependent on technology because technology has made our life easier and simpler also it saves time. The motivation behind developing the Assistant is to simplify common operating system tasks for users who prefer not to write shell commands. By adding multiple functionalities into a single application, users can efficiently manage files, and play games without the need for separate tools or applications.

1.3 Problem Definition

1.3.1 Problem Statement

The user may face some issues, and we need to figure out how to make things better. Some problems are written below:

- People often have to use different tools or commands for different tasks on their computers, like managing files, playing games, etc.
- This switching between tools or commands can be annoying and make things slower because we have to remember commands.

- The way you interact with a computer using a command line has some limits, so the new tool needs to work well within those limits.
- There are already some tools for doing some of these things, but none of them do everything, so we need to make something new.
- Some things are going to be tricky to make work smoothly, like designing an easy way for people to use the tool or writing code that solves computer problems quickly.
- We want new tools to be easy and helpful for people to use.

1.3.2 Complex Engineering Problem

I wanted to make things run better and be less confusing. It wass not easy, but we tried to find a smart way to fix the problems and make everyone happy.

Table 1.1: Summary of the attributes touched by this project

Name of the Attributess	**Explain how to address**
P1: Depth of knowledge required	I needed to learn about shell script language, computer system and how they work, but it is not very hard.
P2: Depth of analysis required	I needed to analyze what users want, what issues can arise, and how a program should work
P3: Familiarity with issues	I needed to know the computer task handling related problems well so that I could find the best ways to make things better.
P4: Extent of applicable codes	I needed to write a lot of code to make the Assistant work. So, I had to use existing code libraries to speed up development.
P5: Extent of stakeholder involvement and conflicting requirements	Everyone who cares about the operating system service might have different thoughts, so I needed to consider what each person wants.
P6: Interdependence	The program is interconnected, so if we change one thing, it might affect another thing. So, I needed to make sure everything worked well together.

1.4 Design Goals/Objectives

1.4.1 Objectives

The main objectives of this project were:

- To develop a shell script-based program that can manage files, and offers a gaming environment.
- To implement interactive game features to provide entertainment and engagement for users.
- To implement efficient algorithms for generating the sudoku board.
- To provide a good environment for managing files and playing game..
- To ensure a user-friendly interface that is easy to navigate and understand within the command line environment.

1.5 Application

Some applications of this system are given below:

1. **Programming Practice:** It can provide a practical example of how to implement file operations and interactive games in a single application.
2. **File Organization:** It can help professionals keep their work directories organized by providing quick and efficient file management commands.
3. **Productivity Tool:** Users can take a quick mental break with the Sudoku game to refresh their minds before returning to work tasks.
4. **Personal F̄ile Management:** It can be used to assist users in managing personal documents, photos, and media files effectively.
5. **Entertainment:** It can be used for entertainment purposes. The integrated Sudoku game provides an enjoyable way to pass time and exercise the brain.

Chapter 2

Design/Development/Implementation of the Project

2.1 Introduction

The design, development, and implementation of My Assistant is a comprehensive approach to building a versatile file management tool integrated with an engaging Sudoku game. By detailing the design choices, development methodologies, and implementation strategies, I aimed to provide a smooth environment, ensuring it meets the needs of both file management and casual gaming.

2.2 Project Details

2.2.1 File Management:

- Create: This system allows users to create new directories.
- Delete: It provides the capability to delete directories.
- Search: This system allows to search a file or directory in the current location.
- View content: It allows to view the content that exists inside the file.
- Insert content: It allows to insertion of content to a file.
- Change path: It enables users to change the current directory location.
- Copy and Cut: It allows to copy and cut (move) files within the file system.
- This system also includes a Sudoku game for users to play and enjoy.
- The game provides functionality to validate moves and ensure the game rules are followed.

2.3 Implementation

2.3.1 The workflow

The development of My Assistant followed a straightforward process to ensure everything worked well. Here are the steps I took:

- Understanding Requirements: At first I figured out what features were needed, like file management (creating, deleting, navigating, copying, cutting files) and the Sudoku game.
- Designing: Then I planned how the different parts of the application would work together.
- Developing: After that I wrote Bash scripts to handle file management tasks and developed the Sudoku game logic and interface.
- Testing: I tested each feature to make sure it worked correctly.
- Fixing Issues: I found and fixed any bugs or problems during testing and improved performance
- Deploying: I prepared the program for use on Unix/Linux systems.

2.3.2 Tools and libraries

- Bash: To implement file management functions and the Sudoku game.
- Git: To manage and track changes in the project codebase.
- VS Code: As development environment.

2.4 Algorithms

2.4.1 File management algorithm

- Create File or Directory Algorithm:
    1. Display the current directory.
    2. Ask the user to choose between creating files or directories.
    3. If files, ask for the file name with extension and create the file.
    4. If directories, ask for the directory name and create a directory.
    5. Handle errors if the creation fails due to existing files/directories with the same name.
- Delete File or Directory Algorithm:

1. Display the current directory.
2. Display list of files.
3. Ask the user to select a file to delete.
4. If a file is selected, delete the file.
5. Handle errors if the deletion fails due to the file/directory does not exist.

- Copy/Move File Algorithm:

1. Display the current directory.
2. Ask the user to choose the source file.
3. Ask the user to choose the destination directory.
4. Copy/Move the file from source to destination.
5. Handle errors if the source file does not exist.

- Search Item Algorithm:

1. Display the current directory.
2. Ask the user for the name or substring to search.
3. Display the results.

- View Content Algorithm:

1. Display current directory.
2. Ask if the user wants to change the directory.
3. If Yes, call the ChangeDirectory function.
4. Display list of files.
5. Ask the user to select a file to view.
6. If file selected, display content.
7. Show the content inside the file.

- Insert Content Algorithm:

1. Display current directory.
2. Ask if the user wants to change the directory.
3. If Yes, call the ChangeDirectory function.
4. Display list of files.
5. Ask the user to select a file to insert content.
6. Take input the content.
7. Update the file.

2.4.2 Sudoku Game algorithm

- Sudoku board generator:
    1. Input: A filled board with the initial values.
    2. Swap rows randomly.
    3. Swap columns randomly.
    4. Remove random cells for preparing to play.
- Sudoku Validation Algorithm:
    1. Input: Sudoku board.
    2. Validate each row to ensure all numbers from 1 to 9 are unique.
    3. Validate each column to ensure all numbers from 1 to 9 are unique.
    4. Validate each 3x3 blocks to ensure all numbers from 1 to 9 are unique.
    5. If any validation fails, generate a new board.
- Sudoku Solvable checker Algorithm:
    1. Input: Incomplete Sudoku grid.
    2. Implement backtracking algorithms to fill in the grid.
    3. Use recursion to explore possible solutions by trying different numbers in empty cells.
    4. Check constraints (row, column, and block) to ensure numbers are unique.
    5. If a solution is found (all cells filled according to Sudoku rules), return "This board is solvable"
    6. If no solution exists, backtrack to previous choices and try alternative numbers..
- PlayGame:
    1. Input: Row number, column number and value.
    2. Check if the cell is ready to set value or already has value.
    3. Check the validation for the value that no duplicate value exists in that row, column or block.
    4. If validation true then set the value to that cell.
    5. If no empty cells are left the player will win the match.

Chapter 3

Performance Evaluation

3.1 Simulation Environment

The performance evaluation of My Assistant was conducted in a controlled environment using a Unix/Linux system. Various scenarios were tested to ensure the functionality and reliability of both the file management features and the Sudoku game.

3.2 Results Analysis

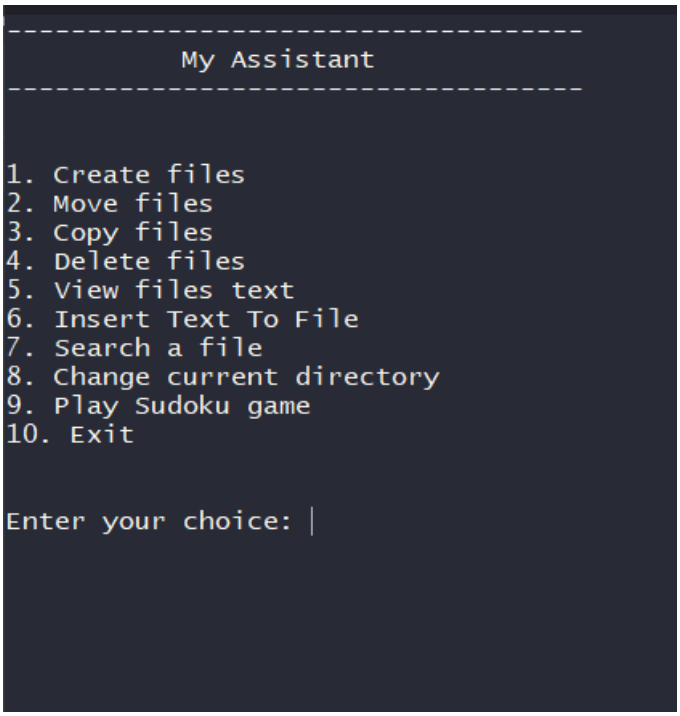

Figure 3.1: Home menu

```
-------------------------
       Create Files
-------------------------

Your current directory is: /d/OS-Project

Do you want to change directory? (y/n):
```

Figure 3.2: Taking input if user wants to change directory or not

```
-------------------------
       Change Directory
-------------------------

Folders and text files in the current directory:
-------------------------------------------
1. [File] a.exe
2. [File] arr.sh
3. [File] array.sh
4. [File] cd.sh
5. [File] copy.sh
6. [File] createFile.sh
7. [File] delete.sh
8. [File] find.sh
9. [Folder] Folder1
10. [Folder] Folder3
11. [File] main.sh
12. [File] mainTest.sh
13. [File] sort.sh
14. [File] sudoko.cpp
15. [File] sudokoTest.sh
16. [File] test.txt
17. [File] test1.sh
18. [File] test1.txt
19. [File] test3.txt
20. Back ..
21. Stop browsing
-------------------------------------------

Enter the number of the folder you want to enter:
```

Figure 3.3: Change directory page

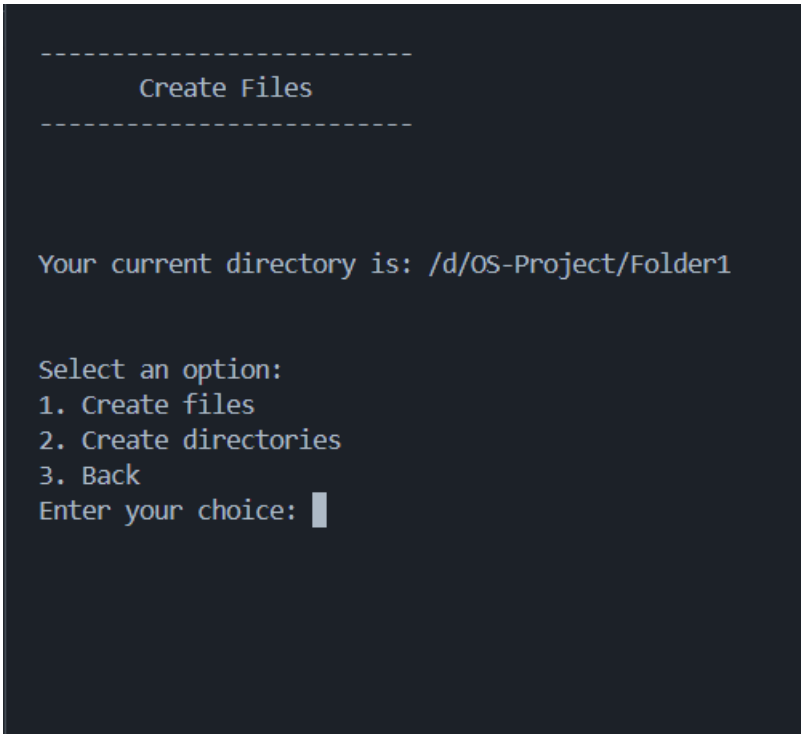

Figure 3.4: Create files option

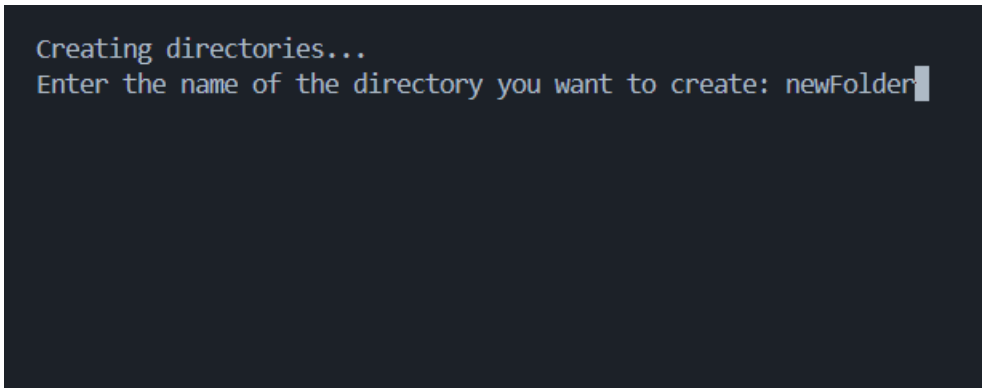

Figure 3.5: Taking input for creating file

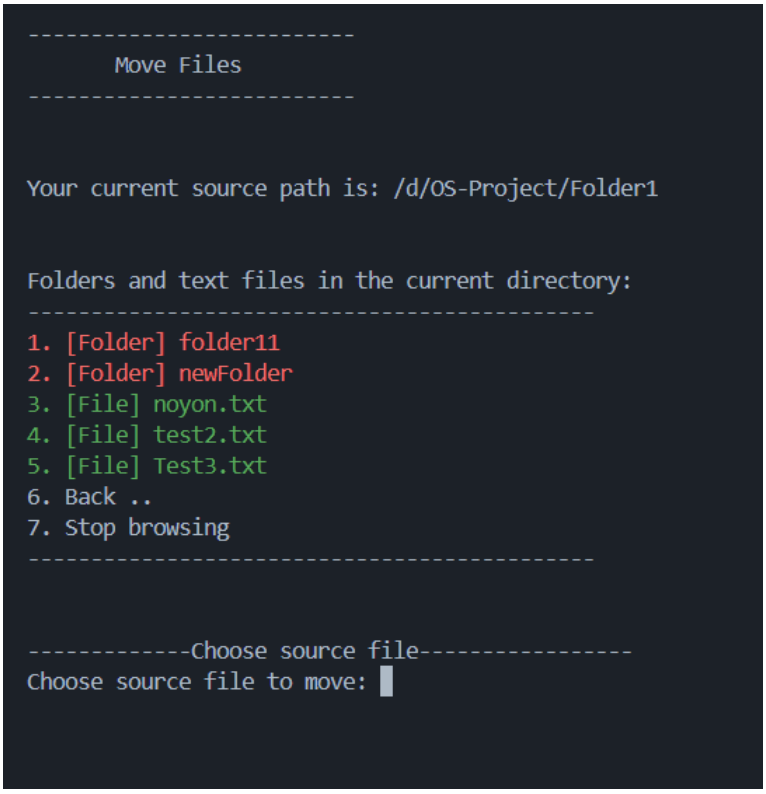

Figure 3.6: Move item page

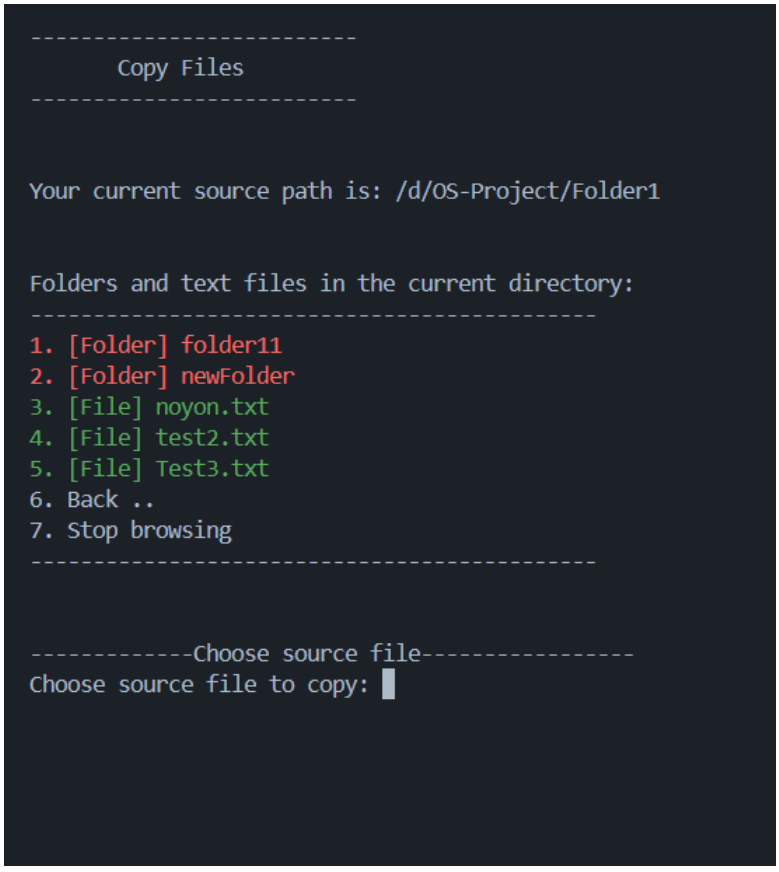

Figure 3.7: Copy item page

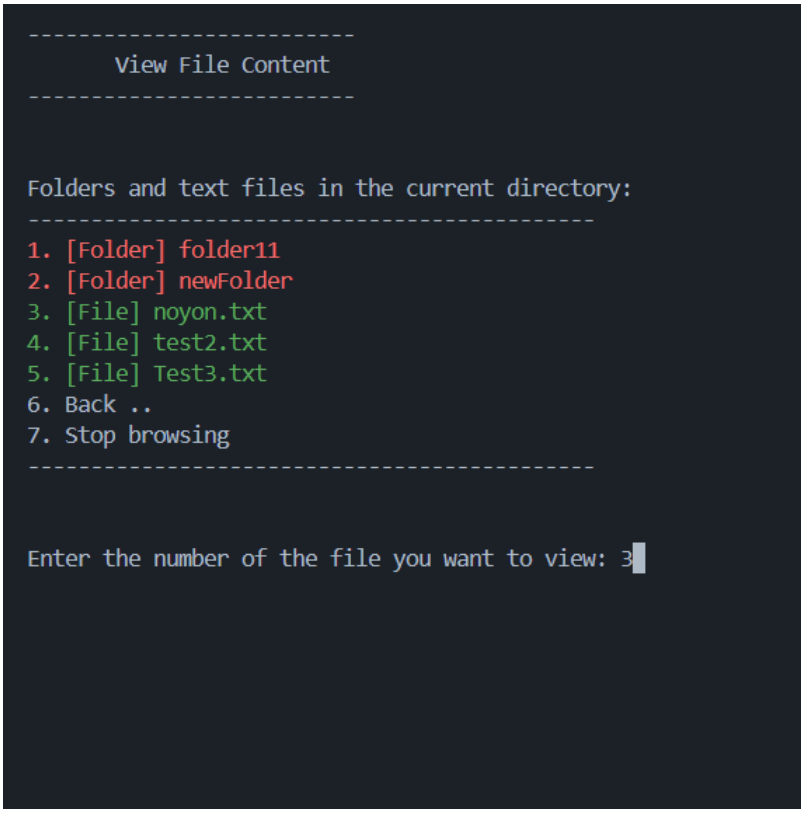

Figure 3.8: View file content

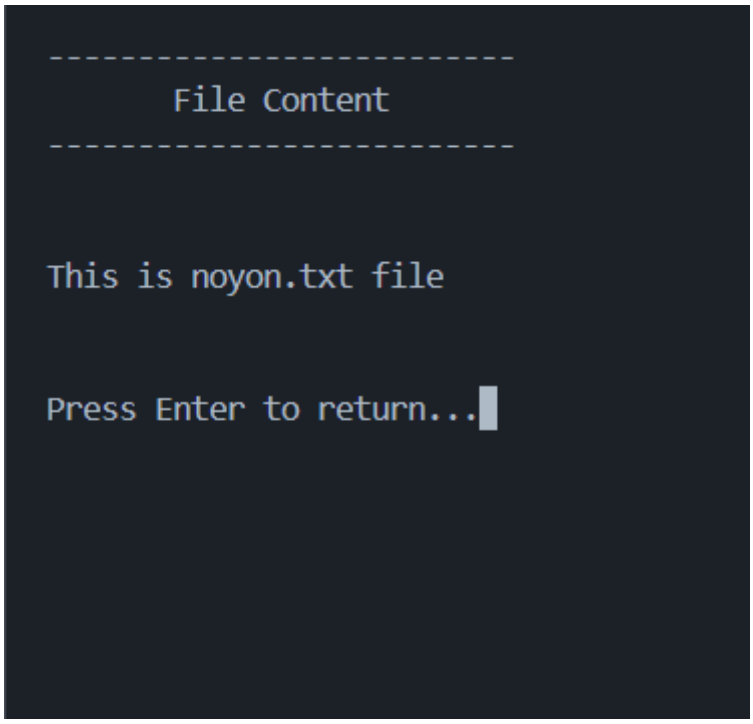

Figure 3.9: Showing content in item

```
Folders and text files in the current directory:
-----------------------------------------------
1. [Folder] Folder1
2. [Folder] Folder3
3. [File] arr.sh
4. [File] array.sh
5. [File] cd.sh
6. [File] copy.sh
7. [File] createFile.sh
8. [File] delete.sh
9. [File] find.sh
10. [File] main.sh
11. [File] mainTest.sh
12. [File] sort.sh
13. [File] sudokoTest.sh
14. [File] test.txt
15. [File] test1.sh
16. [File] test1.txt
17. [File] test3.txt
18. Back ..
19. Stop browsing
-----------------------------------------------


Enter the name of the file you want to insert text into: test1.txt


Old text:



Enter the text to insert. Press Ctrl+D when finished:
This is the content to add into That file!


Text inserted successfully into file test1.txt.
Refreshing in 3...
Refreshing in 2...
```

Figure 3.10: Inserting content to item

```
-------------------------
       Search Files/Folders
-------------------------


Folders and text files in the current directory:
-----------------------------------------------
1. [Folder] folder11
2. [Folder] newFolder
3. [File] noyon.txt
4. [File] test2.txt
5. [File] Test3.txt
6. Back ..
7. Stop browsing
-----------------------------------------------


Enter the name or substring of the file or folder you want to search: test2



File 'test2.txt' found in the current directory.


Press Enter to continue...
```

Figure 3.11: Search item page

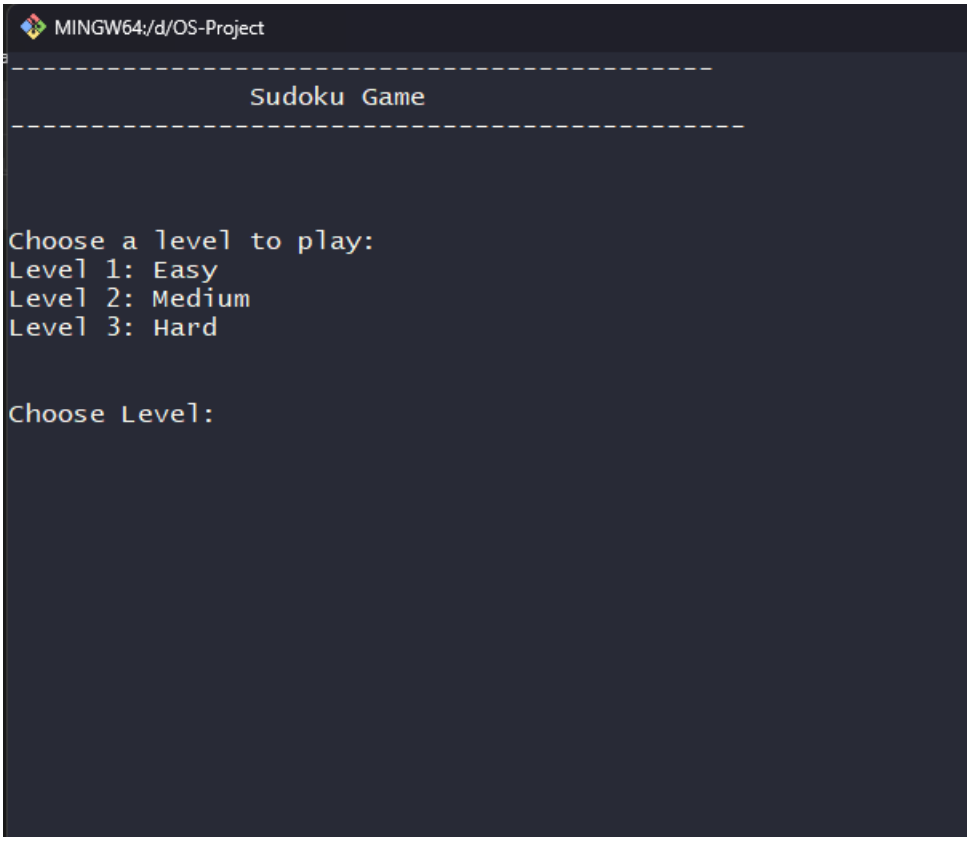

Figure 3.13: Sudoku Game level

Figure 3.13: Sudoku board generating page

Figure 3.14: Taking input row and column number

Figure 3.15: Taking input the value to set

Figure 3.16: Game end interface

3.3 Results Overall Discussion

- File Creation and Deletion: Users can successfully create and delete files and directories.
- Directory Navigation: Users can change the current working directory smoothly.

- File Copy and Cut: Efficiently copy and move files from one directory to another.
- View and Insert content: Users can easily view the content in file and add content.
- Gameplay: Users can play a fully functional Sudoku game.
- Validation: The game includes validation to check for correct inputs and prevent duplicate numbers in rows, columns, and blocks.
- The testing results indicate that My Assistant performs well under various scenarios, providing a reliable and efficient tool for file management and an enjoyable Sudoku game experience.
- The command-line interfaces are straightforward and it ensures a seamless experience for all users.

Chapter 4

Conclusion

4.1 Discussion

My Assistant is a tool that helps with managing files and playing Sudoku. It lets you create, delete, and move files and folders easily. You can also enjoy a Sudoku game when you need a break. Think of My Assistant as a helpful friend who organizes your files and provides fun with Sudoku. The testing shows that My Assistant works well and is reliable for everyday file management tasks and gameplay.

4.2 Limitations

This program has some limitations.

- It only works on Unix/Linux systems.
- The interface is command-line-based, which might be hard for users who prefer graphical interfaces.
- It relies on Bash scripting, which might be difficult for those unfamiliar with Bash to modify.
- It includes basic file operations but lacks advanced features found in other file management tools.
- In the game there are no "undo", and "redo" features.
- Users who prefer graphical interfaces might find the command-line interface limiting.
- Performance can vary based on your computer's resources, especially with large files.

4.3 Scope of Future Work

We can add more features to this system in the upcoming days such as:

- Creating a graphical user interface (GUI) to make it easier to use.
- Making it work on other operating systems like Windows and macOS.
- Adding more advanced file management features like file search in the whole file system.
- Adding real-time notifications for file operations and game updates.
- Optimizing the system to handle larger volumes of files and folders more efficiently.
- Including feedback options so users can suggest improvements.
- Including "undo", and "redo" features.
- Ensuring strong security measures to protect user data and file operations.

References

[1] StackOverflow: https://stackoverflow.com/

[2] Unix & Linux: https://unix.stackexchange.com/

[3] GeeksforGeeks https://www.geeksforgeeks.org/