## "Employee Management System (EMS) using C program"

**A Project Report**
by
**Farhad Ali**
ID: 0322310105101011
**Mst. Farjana Kona**
ID: 0322310205101036
**Jahangir Alam**
ID: 0322310105101010

**Approved as to style and content by**

…………………………………..
**Sahela Rahman**
**(Supervisor)**



**Department of Computer Science and Engineering**
**Pundra University of Science & Technology**
**Rangpur Road, Gokul, Bogura, Bangladesh.**

**May, 2025**

# DEDICATION

We, the members of this project team, would like to wholeheartedly dedicate this work to our loving parents, our respected supervisor **Sahela Rahman** (Lecturer CSE) , and all our teachers who have continuously believed in us and supported us through every challenge. Their unwavering encouragement and guidance have been instrumental in our journey.

# ACKNOWLEDGEMENT

First and foremost, all praises and thanks to Almighty Allah for His countless blessings and grace, which enabled us to complete this project successfully.

We would like to express our sincere and heartfelt gratitude to our respected project supervisor, **Shahela Rahman**, Lecturer, Department of Computer Science and Engineering, Pundra University of Science & Technology, Bogura. Her valuable guidance, continuous support, and insightful feedback throughout the course of this project have been instrumental in shaping our work. Her dedication, encouragement, and scholarly advice have greatly enriched our research experience. It has been a true privilege to learn and work under her supervision.

We are also profoundly grateful to **Polash Tai**, Head of the Department of Computer Science and Engineering, for his kind support and for fostering an academic environment conducive to learning and research. Our sincere thanks also extend to all faculty members and staff of the Department of CSE at Pundra University of Science & Technology for their assistance and encouragement during this journey.

We would like to acknowledge the support and camaraderie of all our coursemates, whose collaboration and shared discussions have helped in many ways during the completion of this project.

Finally, our deepest gratitude goes to our beloved parents and everyone who directly or indirectly contributed their time, support, and encouragement in helping us accomplish this research work.

**Farhad Ali**
**Jahangir Alam**
**Farjana Kona**

# ABSTRACT

Traditional methods of managing employee data in small organizations are often manual, error-prone, and inefficient. As organizations grow, the need for an organized, automated system to manage employee details, attendance, and performance becomes critical. This project aims to develop a simple yet effective Employee Management System (EMS) using the C programming language, enabling users to manage employee information such as adding, editing, or deleting records, tracking daily attendance, and generating reports. The system uses text-based files for persistent storage, making it suitable for deployment in resource-constrained environments. It explores file handling techniques in C and demonstrates how structured data like employee profiles and attendance logs can be efficiently organized, stored, and retrieved using text files. The software component includes separate modules for managing employee data, logging attendance, and generating reports, contributing to practical knowledge of building small-scale management tools using low-level programming principles and user interaction in C.

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# Chapter 1

# INTRODUCTION

## 1.1 Introduction

Employee Management System is a C-based console application that helps manage employee data like name, ID, position, salary, and attendance. In many small organizations, managing employee records manually is time-consuming and error-prone. This system offers a basic yet effective solution to store, update, and view employee information easily. It uses file handling in C to save and retrieve data, making it lightweight and accessible without the need for an internet connection or database. This system is helpful for HR staff or managers to handle employee records more efficiently and accurately.of the most important aspects of a project is feasibility study. If we want to finish a project properly, we need to know about the problems of feasibility studies. Related or not related topics and research articles we need to read more about. In this chapter, we will discuss the existing system of "Email Extractor Web Application" which helps users to get emails, phone numbers and URLS.

## 1.2 Project Background

To manage employee information effectively is a challenging part for the success of any organization. Many businesses in Bangladesh still depend on manual processes or expensive software for HR management. While manual methods are low-cost, they are often slow, time consuming, and difficult to handle as the business grows. On the other hand, popular HR software like BambooHR and Zoho People offer advanced features but are too expensive and complicated for small and medium-sized enterprises (SMEs).

There is a growing need for affordable and easy HR solutions for small and medium-sized businesses (SMEs). A 2024 survey on HR Technology Trends found that 45% of SMEs still use manual systems or Excel to manage employee data. These businesses face issues like lost records, repeated data entry, and no central system to access employee information. Experts also noted that tracking employee performance is often ignored, even though it is very important for managing a workforce.

The proposed Employee Management System aims to solve these problems by providing an affordable and easy-to-use platform specifically designed for SMEs. It will use a simple file-based storage system and offer only the core features needed for efficient workforce management. This solution will help businesses in Bangladesh manage their employees more effectively without high costs or unnecessary complications.

My knowledge of this field at the start of the project was casual. I knew generally about bitmaps without knowing anything specific about the formats, compression techniques and overall structure of the graphic images I was using. As this is a subject I am interested in making my career in, measuring the 'quality' of images and how this can be affected by the right or wrong choice of a file format seemed a natural choice of study which I knew would be both challenging and interesting.

## 1.3 Existing Motivation

The motivation behind this project comes from the problems in current HR management, especially for small and medium-sized businesses (SMEs). Several challenges have been identified:

**Time-Consuming on Manual System:** Manual record-keeping takes a lot of time and is higher chance to mistakes. Even small errors, like wrong salary or performance data, can cause big issues in the business.

**Complicated Existing Solutions:** Many HR tools are too complex, with too many features and high subscription costs as mentioned above Zoho HRMS or BambooHR, making them difficult for smaller businesses to afford and use.

**Lack of Scalability:** Manual systems or Excel files cannot grow with the business. As the number of employees increases, these methods become harder to manage.

**Need for Centralized Access:** Without a central system, HR staff struggle to quickly and accurately access or update employee information.
This project specially designed for small businesses, no matter their size, should have easy-to-use and affordable tools to manage their employees. By focusing on simplicity, cost-effectiveness, and scalable essential features, this project aims to solve these problems while also preparing for future improvements.

## 1.4 Objectives of the Project

The primary objective of the Employee Management System (EMS) is to provide a reliable, efficient, and user-friendly solution for managing employee data. The system enables users to perform core HR tasks such as adding, editing, and deleting employee records, significantly reducing paperwork and ensuring data accuracy. It also includes a basic attendance tracking feature to record sign-in and sign-out times, which helps calculate daily working hours and monitor punctuality. Additionally, the EMS supports the generation of reports related to performance, salary, and attendance, allowing decision-makers to analyze employee trends with ease. By using text-based storage, the system maintains data consistency while remaining lightweight and accessible for small organizations with limited resources.

- Provide a structured system to store, manage, and retrieve employee information.
- Enable users to add, edit, and delete employee records efficiently.
- Reduce manual paperwork and improve accuracy in employee data handling.
- Implement attendance tracking with automatic working hour calculation.
- Generate reports on employee performance, attendance, and salary.
- Ensure a simple, lightweight, and accessible solution using text-based file storage.

# Chapter 2

# FEASIBILITY STUDY

## 2.1 Introduction

One of the most important aspects of any project is the feasibility study. To complete a project successfully, it is essential to understand the possible limitations and evaluate the practicality of the proposed solution. A feasibility study helps determine whether the project is technically achievable, economically viable, and operationally suitable for its intended purpose.

In this chapter, we examine the feasibility of the Employee Management System (EMS) developed using the C programming language. The existing manual methods for managing employee records, attendance, and performance are often inefficient, time-consuming, and prone to human error. This EMS aims to provide a lightweight and effective alternative that simplifies employee data management. To achieve this, related topics such as file handling, data structures, and user interaction in C were explored, along with studies on similar basic HR systems. The feasibility study confirms that a simple text-based EMS is both practical and beneficial, especially for small organizations with limited resources.

## 2.2 Related Work

There are some applications we found which are created on the basis of our project but not same as ours. Some examples are Connecteam [2], Zoho Workspace [3], Getsling [4] .Here are the front views of their websites.
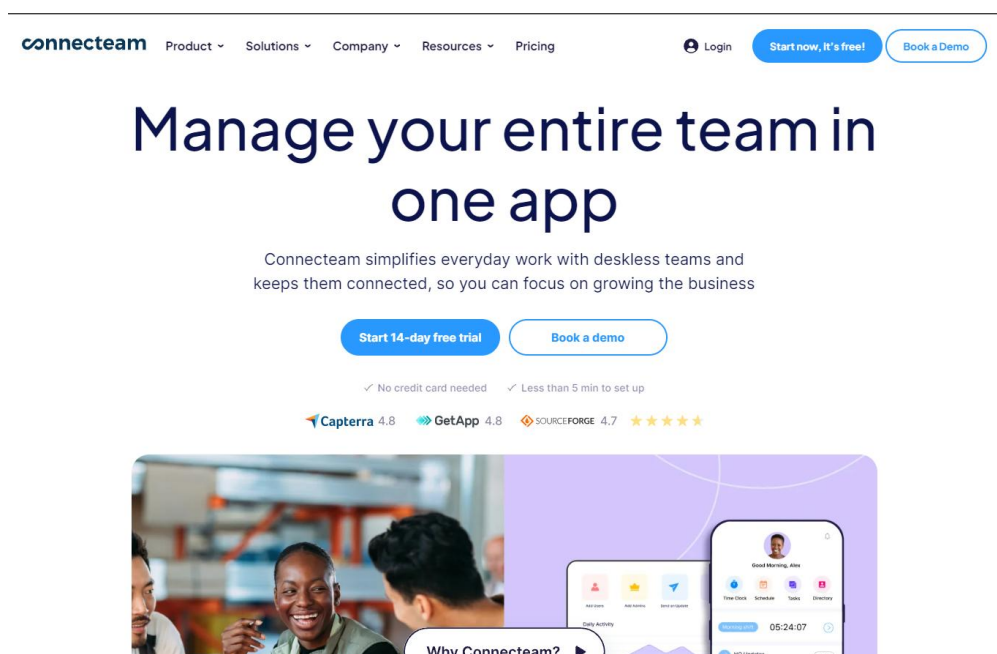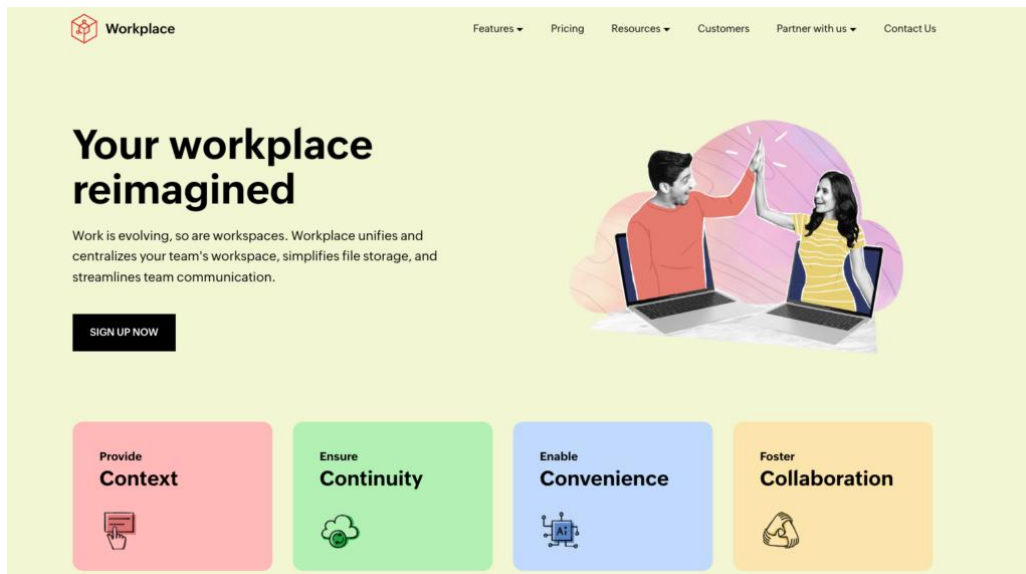


Figure 2.2.1: Connecteam [2]
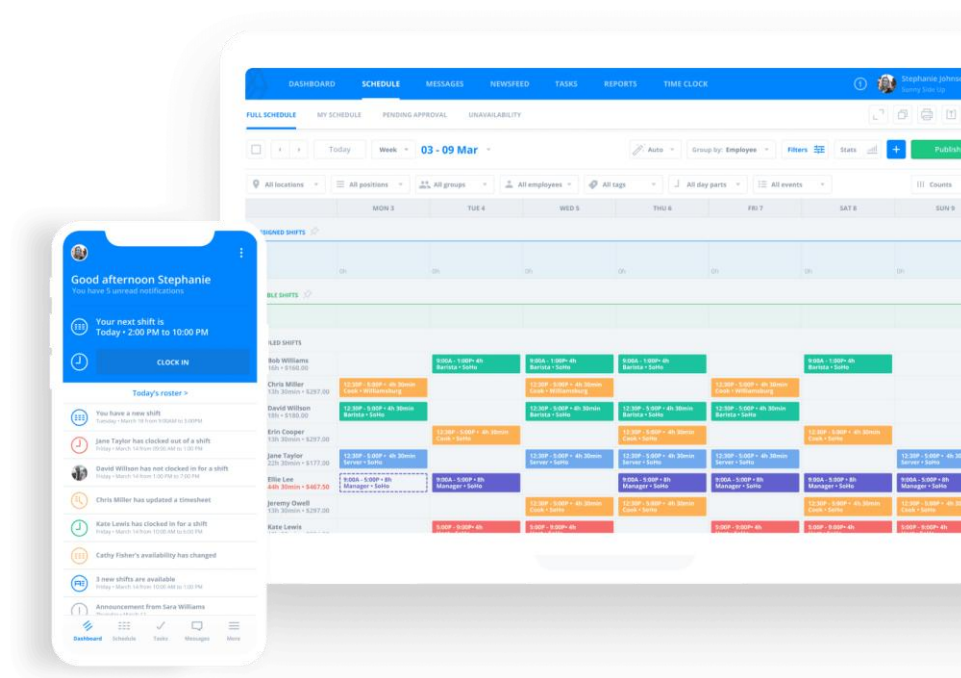
Figure 2.2.2: Zoho Workplace [3]



Figure 2.2.3: Getsling [4]

## 2.3 Comparative Study

| Real World Live (EMS) | EMS with C |
|---|---|
| Technology: Full-stack (Web-based: HTML/CSS, JS, PHP/Python/Java, MySQL, Cloud APIs) | Technology: C language with console-based UI and text file storage |
| Multi-user roles, encrypted login, two-factor authentication | Basic file-based login (planned) |
| Cloud databases (MySQL/PostgreSQL), scalable and secure | Local .txt files or binary files |
| Advanced: payroll, leave management, shift planning, performance analytics | Core: Add/Edit/Delete Employees, Attendance, Report generation |
| Multi-user, accessible anywhere with internet | Single-user, runs locally |
| Professionally maintained, regular updates | Manual maintenance and bug fixing by developer |
| High Cost (Cloud Server required) | Free of Cost (Locally runs) |

## 2.5 Scope of the Problem

When we started developing the Employee Management System (EMS) using C, our goal was to create a basic yet functional system that would be free of cost and easy to use, especially for small organizations or institutions. While keeping the system lightweight and efficient, we faced several challenges during the initial stages of the project:

- Identifying user requirements and understanding how employee data is managed in small organizations.
- Designing a simple structure to store and retrieve employee records using text files.
- Implementing attendance tracking using basic file handling without the help of a database.
- Making the system modular and maintainable while using only core C programming features.

## 2.6 Challenges

While developing the Employee Management System (EMS) using C, we encountered several challenges in creating a reliable and efficient solution for managing employee data. Some of the key challenges we faced are listed below:

- Designing features and a simple UI within a command-line environment.
- Ensuring a user-friendly process for inputting, editing, and viewing employee records.
- Implementing attendance tracking using basic file handling without the help of a database.
- Making the system modular and maintainable while using only core C programming features.
- Preventing data loss and handling file corruption or improper user input

# Chapter 3

## REQUIREMENT ANALYSIS

### 3.1 Functional Requirements

• **User Login:** The system must allow an admin or authorized user to register and log in using a username and password stored securely in a text file.

• **Employee Data Management:** Admins should be able to add, view, update, and delete employee records, including ID, name, position, salary, and performance.

• **Attendance Tracking:** The system should support marking sign-in and sign-out times for each employee, calculating total hours worked.

• **Report Generation:** Generate summary reports based on attendance, salary, or performance data.

### 3.2 Non-Functional Requirements

• **Usability:** The interface should be simple and intuitive, using menus and prompts in the console.

• **Reliability:** Data input and output operations must be validated to avoid corrupting records.

• **Performance:** The system should handle basic file operations efficiently, even with larger datasets.

• **Portability:** Since it's built in C, the EMS should be compatible with any operating system that supports a C compiler.

• **Security:** Basic credential protection must be ensured, though advanced encryption is out of scope for a text-based C application.

### 3.3 Tools and Technology

• **Programming Language:** C – used for procedural logic and file handling.

• **Compiler:** GCC – compiles the C code efficiently with cross-platform support.

• **Data Storage:** `.txt` files – for storing user data, employee info, and attendance.

• **IDE/Editor:** bCode::Blocks, Dev-C++, or VS Code – for writing and debugging code.

• **Operating System:** Compatible with both Windows and Linux environments.

# Chapter 4

## SYSTEM DESIGN

### 4.1 System Architecture

The proposed system basically included following functionalities:

- User authentication to login
- Manage Employee (Add, Display, Edit and Delete)
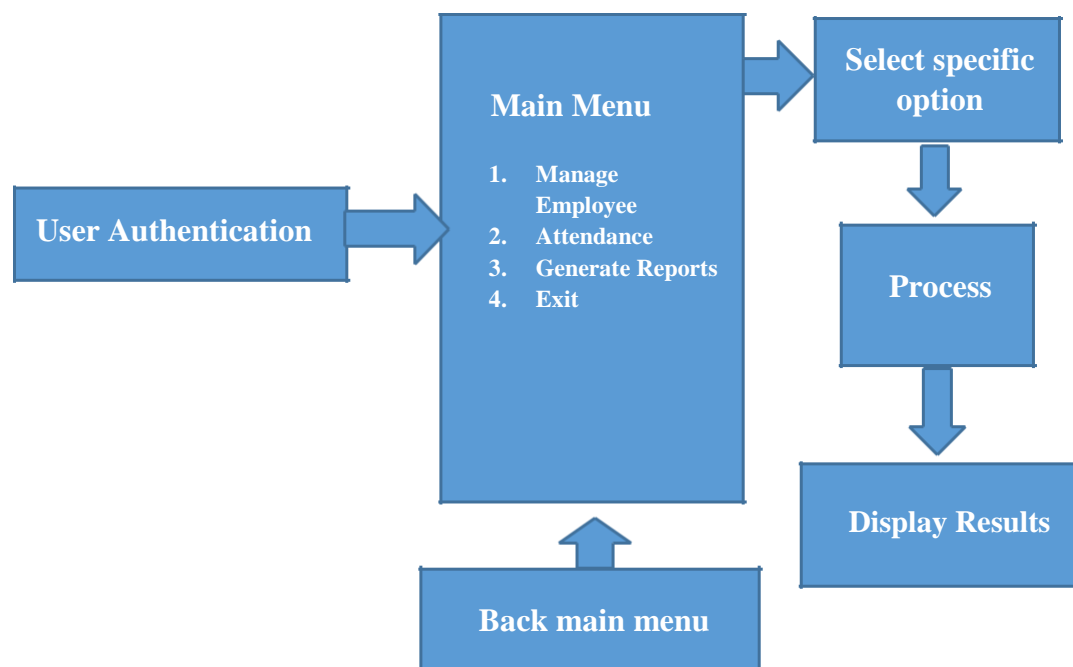- Employee Attendance (Sign in, Sing Off)



Figure 4.1.1: Block Diagram of EMS Architecture

This diagram represents the system architecture of an Employee Management System. It consists of key components and their interactions:

**User Authentication**: This is the starting point where users log in to access the system. Once authenticated, users proceed to the Main Menu.

**Main Menu**: The central hub of the system. It provides users with four primary options:
- **Manage Employee**: For adding, editing, or deleting employee details.
- **Attendance**: To manage employee attendance records.
- **Generate Reports**: To create reports based on employee data.
- **Exit**: To leave the system.

**Option Selection**: Users select one of the options from the Main Menu. This choice determines the next process.
**Processing**: The system processes the selected task. For example, it might fetch data, update records, or generate a report based on the user's selection.
**Display Results**: After processing, the results are displayed to the user. This could include updated records, attendance summaries, or reports.
**Back to Main Menu**: After viewing results, users can return to the Main Menu to perform additional tasks or exit the system.

The flow of interaction is indicated by arrows connecting the components, ensuring clear navigation throughout the system. The design emphasizes simplicity, making it user-friendly and efficient for managing employee data.

## 4.2 Detailed flowchart view
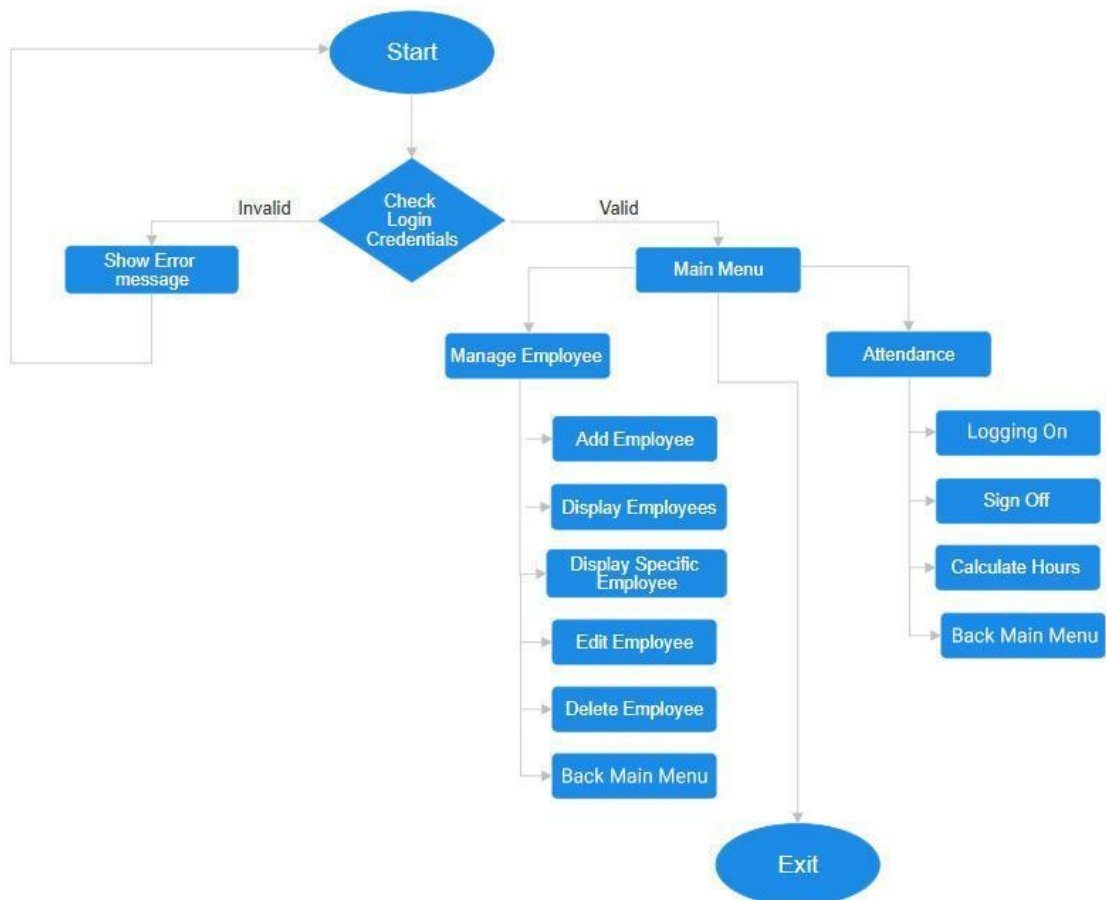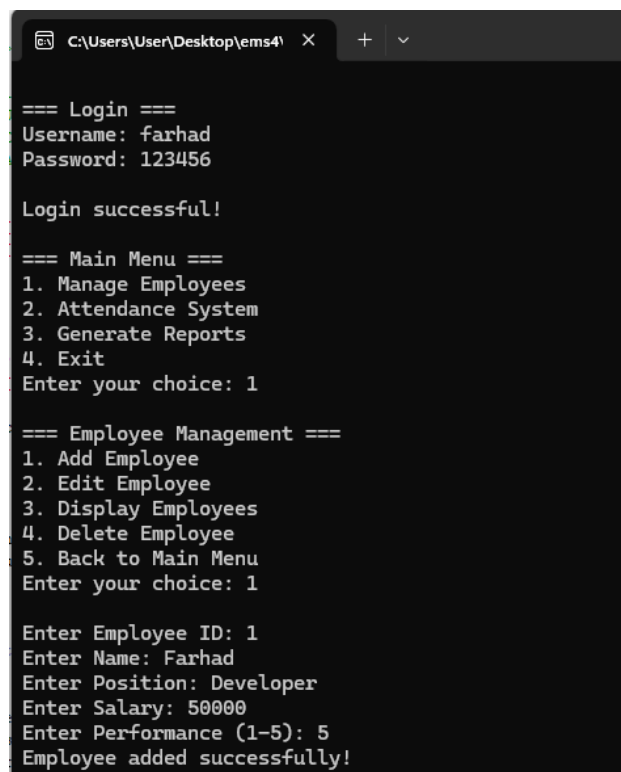


Figure 4.1.2: Flowchart of EMS software

# Chapter 5

## IMPLEMENTATION

### 5.1 Project Outcome

• Successfully developed a C-based Employee Management System with key features like employee registration, attendance tracking, and report generation.

• Implemented file handling using `.txt` files to store and retrieve user credentials, employee records, and attendance logs without requiring a database.

• Created a simple command-line interface that allows users to interact with the system, making it lightweight and easily portable.

• Enhanced understanding of modular programming, structured data management, and system design principles through practical application.

• Provided a foundation for future upgrades, such as integration with databases (e.g., MySQL), GUI support, or web-based interfaces.

### 5.2 Implemented Result



Figure 4.2.1: Add, Edit, Delete Employee Output.

Figure 4.2.2: Attendance System Output.

## 5.3 System Testing

System testing is an essential phase in software development where the complete and integrated application is tested to ensure that it meets the specified requirements. For our **Employee Management System (EMS)**, we conducted several tests to verify the correctness, reliability, and usability of the system.

The testing process focused on the following areas:

**Functionality Testing**:
Each core feature was tested to confirm that it performs as expected. This included adding, editing, deleting employee records, and generating reports.

**Input Validation Testing**:
The system was tested to handle invalid inputs (e.g., missing fields, incorrect formats) to ensure robustness.

**File Handling Testing**:
As the system uses `.txt` files for data storage, file read/write operations were thoroughly tested to ensure data integrity and persistence.

**Attendance Module Testing**:
The sign-in and sign-out functions were tested to verify accurate tracking of attendance and calculation of working hours.

**User Interface Testing**:
The text-based interface was evaluated for clarity, navigation ease, and overall user experience in a command-line environment.

# Chapter 6

## CONCLUSION AND FUTURE WORK

### 6.1 Conclusion

The Employee Management System (EMS) solves a big problem for small and medium sized businesses (SMEs) by providing a solution that is both affordable and easy to use. Many SMEs struggle with costly and complicated HR software, but EMS offers a simple alternative. This system is designed to be easy for businesses to adopt, even if they don't have a large HR team or technical skills.

The EMS helps businesses by automating key HR processes. Manual HR tasks, like tracking employee performance or managing payroll, can be time-consuming and prone to mistakes. The EMS reduces these issues by automating these tasks, which saves time and ensures that the data is accurate. With fewer manual processes, HR staff can focus on other important tasks, and businesses can run more smoothly.

### 6.2 Limitation of the System

While the Employee Management System (EMS) developed using C fulfills basic HR functionalities, there are several limitations due to the simplicity of the programming language and project constraints:

**No Database Integration**:
The system relies entirely on `.txt` files for data storage, which limits scalability, data integrity, and advanced querying capabilities.

**No User Authentication**:
There is no login or user-level access control, which reduces the security of sensitive employee data.

**Limited UI**:
The system operates through a command-line interface, which may not be user-friendly for non-technical users.

**No Real-Time Clock Integration**:
Attendance is manually recorded; the system does not fetch real-time system clock values for automation.

**Lack of Error Recovery**:
If the data file is deleted or corrupted, the system cannot recover or back up the lost information.

**Not Suitable for Large Organizations**:
Due to limited storage and lack of optimization, the system is best suited for small organizations with minimal data.

## 6.3 Future Plan

To enhance the functionality and scalability of the Employee Management System (EMS), several future improvements are planned. One major enhancement is integrating a relational database system such as MySQL or SQLite to replace text-based file storage, ensuring more efficient and secure data handling. Implementing a user authentication system will help protect sensitive employee information and allow role-based access control. Transitioning the system to a graphical user interface (GUI) using frameworks like GTK or moving to high-level languages like Python or Java can improve user experience. Additionally, automating attendance tracking by integrating real-time clocks or biometric systems will reduce manual input errors. Data backup and recovery features will be added to prevent data loss, while advanced reporting tools like chart generation and export to PDF or Excel will support better analysis. Finally, incorporating cloud support will enable remote access and collaboration, making the system more flexible and accessible.

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