**Restaurant Management System**

### Submitted By

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**LAB PROJECT REPORT**

This Report Presented in Partial Fulfillment of the course **CSE124: Data Structure Lab, Computer Science and Engineering Department**

### DAFFODIL INTERNATIONAL UNIVERSITY

**Dhaka, Bangladesh**

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## **DECLARATION**

We hereby declare that this lab project has been done by us under the supervision of **Md. Rasel Sarker**, **Lecturer**, Department of Computer Science and Engineering, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere as lab projects.

**Submitted To:**

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## **COURSE & PROGRAM OUTCOME**

The following course have course outcomes as following:.

Table 1: Course Outcome Statements

|  |  |
| --- | --- |
| **CO’s** | **Statements** |
| CO1 | **Define** and **Relate** classes, objects, members of the class, and relationships among  them needed for solving specific problems |
| CO2 | **Formulate** knowledge of object-oriented programming and C in problem solving |
| CO3 | **Analyze** Unified Modeling Language (UML) models to **Present** a specific problem |
| CO4 | **Develop** solutions for real-world complex problems **applying** OOP concepts while  evaluating their effectiveness based on project standards. |

Table 2: Mapping of CO, PO, Blooms, KP and CEP

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **CO** | **PO** | **Blooms** | **KP** | **CEP** |
| CO1 | PO1 | C1, C2 | KP3 | EP1, EP3 |
| CO2 | PO2 | C2 | KP3 | EP1, EP3 |
| CO3 | PO3 | C4, A1 | KP3 | EP1, EP2 |
| CO4 | PO3 | C3, C6, A3,  P3 | KP4 | EP1, EP3 |

# The mapping justification of this table is provided in section 4.3.1, 4.3.2 and 4.3.

Course & Program Outcome [ii](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark1)

1. Introduction [1](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark2)
   1. Introduction [1](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark3)
   2. Motivation [1](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark4)
   3. Objectives [1](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark5)
   4. Feasibility Study [1](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark6)
   5. Gap Analysis [1](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark7)
   6. Project Outcome [1](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark8)
2. Proposed Methodology/Architecture [2](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark9)
   1. Requirement Analysis & Design Specification [2](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark10)
      1. Overview [2](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark11)
      2. UI Design [2](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark13)
   2. Overall Project Plan [2](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark14)
3. Implementation and Results [3](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark15)
   1. Implementation [3](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark16)
   2. Performance Analysis [3](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark17)
   3. Results and Discussion [3](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark18)
4. Engineering Standards and Mapping [4](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark19)
   1. Impact on Society, Environment and Sustainability [4](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark20)
      1. Impact on Life [4](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark21)
      2. Impact on Society & Environment [4](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark22)
      3. Ethical Aspects [4](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark23)
      4. Sustainability Plan [4](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark24)
   2. Project Management and Team Work [4](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark25)
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      1. Mapping of Program Outcome [4](file:///E:\Downloads\Telegram%20Desktop\5_6210647448751183336.docx#_bookmark27)
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**Chapter 1**

This chapter outlines the purpose, motivation, and objectives of the Restaurant Management System. It also discusses the feasibility study, gap analysis, and the potential outcomes of the project.

### Introduction

Manual restaurant operations are prone to errors and not efficient. This project aims to automate processes like billing and inventory management to enhance operational efficiency.

### Motivation

The project was inspired by the need for a simple yet efficient tool to manage restaurant operations. This project provides a solution that improves efficiency and offers a hands-on opportunity to enhance programming skills. The system is designed to benefit small restaurants by addressing common management challenges.

### Objectives

1. Automate core restaurant operations like billing and inventory management.

2. Minimize manual errors and improve accuracy.

3. Create a user-friendly system that is easy to implement.

### 1.4 Feasibility Study

Managing restaurant operations manually is common but often leads to errors and inefficiencies. While some advanced solutions exist, they are not always accessible or suitable for small businesses. This project explores creating a simple, easy-to-use system that can address these issues effectively. By focusing on basic features like billing and inventory management, the system ensures practicality and accessibility for smaller restaurants.

### Gap Analysis

Current solutions lack affordability and simplicity for small-scale restaurants. This project fills this gap by developing a straightforward, efficient system.

### Project Outcome

The project will deliver a functional Restaurant Management System capable of managing orders, billing, and inventory with ease.

**Chapter 2**

**Proposed Methodology/Architecture**

This chapter discusses the requirements, design specifications, system architecture, UI design, and overall project plan for the Restaurant Management System.

### Requirement Analysis & Design Specification

#### **Overview** The Restaurant Management System requires a structured approach to ensure functionality and efficiency. This section outlines the necessary components, including software requirements, user needs, and system functionalities.

#### **UI Design** The user interface is text-based, designed for simplicity and ease of use. It provides clear menus and prompts, enabling the user to navigate through different operations like placing orders, viewing bills, or checking inventory.

**2.2** **Overall Project Plan**  
  
The project is divided into key phases:

1. **Requirement Gathering:** Identifying user needs and defining system functionalities.
2. **Design and Development:** Building the core modules, including order management, billing, and inventory tracking.
3. **Testing and Debugging:** Ensuring system reliability and addressing any errors.
4. **Final Deployment:** Delivering a fully functional system ready for use.

### 

**Chapter 3**

# **Implementation and Results**

This chapter presents the implementation details, analyzes the system's performance, and discusses the results achieved during the project.

### Implementation The Restaurant Management System was implemented using C programming. It employs a modular structure with separate functions for order management, billing, and inventory tracking. Data structures like arrays and linked lists were used to manage orders and inventory efficiently. The system is designed to handle basic restaurant operations interactively through a text-based interface.

### Performance Analysis The system was tested for functionality, accuracy, and efficiency in handling operations. It successfully reduced the time required for tasks like billing and inventory updates compared to manual methods. The program demonstrated stability during testing with multiple users and scenarios, ensuring its reliability for small-scale restaurant operations.

### Results and Discussion The project achieved its goal of creating an efficient and user-friendly system. The system automates core operations, reducing manual errors and improving productivity. While the current design meets basic requirements, future enhancements could include a graphical user interface (GUI) or integration with online ordering systems for greater usability and scalability.

**Chapter 4**

# **Engineering Standards and Mapping**

This chapter discusses the integration of engineering standards into the project and evaluates its societal, environmental, and sustainability impact. It also addresses project management, complex problem-solving, and engineering activities with appropriate mappings and justifications.

### Impact on Society, Environment and Sustainability

#### **Impact on Life** The project enhances dining experiences by providing efficient restaurant management, improving convenience and accessibility for users.

#### **Impact on Society & Environment** The system promotes digital transformation, reducing paperwork and resource wastage, thereby contributing to a greener environment and improved societal efficiency.

#### **Ethical Aspects** Ethical considerations include data privacy, equitable access, and the integrity of financial transactions processed by the system.

#### **Sustainability Plan** The project adopts scalable technology to ensure long-term usability and minimal environmental footprint while fostering economic and social sustainability.

### Project Management and Team Work

This section outlines the project’s budget, alternative budget plans, revenue models, and rationale behind financial decisions. It emphasizes collaborative efforts to manage resources effectively.

### Complex Engineering Problem

#### **Mapping of Program Outcome**

This section outlines the alignment of the project’s problem and solution with targeted Program Outcomes (POs), demonstrating how the project fulfills the specified objectives.

Table 4.1: Justification of Program Outcomes

|  |  |
| --- | --- |
| **PO’s** | **Justification** |
| PO1 | **Engineering Knowledge**: The system employs software engineering principles, database management, and UI/UX design to solve real-world restaurant management challenges. |
| PO2 | |  | | --- | |  |  |  | | --- | | **Problem Analysis**: A thorough needs analysis was conducted to detect inefficiencies in traditional restaurant, which guided the solution design. | |
| PO3 | **Modern Tool Usage**: Utilizes advanced programming languages, database systems, and software tools to implement the solution efficiently. |

#### **Complex Problem Solving**

This section evaluates the project's challenges and aligns them with complex problem-solving categories, providing a detailed rationale for each. Table 4.2 highlights these mappings and the rationale for addressing each category effectively.  
  
  
 Table 4.2: Mapping with complex problem solving.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **EP1**  Dept of Knowledge | **EP2**  Range of Conflicting Requirements | **EP3**  Depth of Analysis | **EP4**  Familiarity of Issues | **EP5**  Extent of Applicable Codes | **EP6**  Extent  Of Stakeholder Involvement | **EP7**  Inter- dependence |
| The project leverages advanced programming concepts and database management techniques, ensuring robust functionality. | Balances user-friendliness with performance efficiency while meeting technical constraints. | Conducts a thorough analysis of restaurant operations to optimize workflows and resource allocation. | Addresses common challenges in restaurant management, such as order tracking and inventory management, with proven solutions. | Adheres to industry standards for software design and cybersecurity to ensure compliance and safety. | Actively considers feedback from restaurant owners and staff to refine system functionalities. | Ensures seamless integration of modules like billing, inventory, and order management for holistic performance. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **EA1**  Range of resources | **EA2**  Level of Interaction | **EA3**  Innovation | **EA4**  Consequences for society and  environment | **EA5**  Familiarity |
| The project uses programming languages, databases, and frameworks, ensuring a broad technological base. | Engages with users and stakeholders to identify requirements and refine the system. | |  | | --- | |  |  |  | | --- | | Introduces features  like real-time order  tracking and  automated inventory  updates. | | Reduces reliance on paper, streamlining restaurant management operations. | Addresses commonly encountered challenges in restaurant management. |

#### **Engineering Activities**

This section maps the project’s scope to key engineering activities, emphasizing the range of resources, innovation, and societal impact. Table 4.3 presents these mappings along with rationales for their inclusion.

Table 4.3: Mapping with complex engineering activities.

**Chapter 5**

# **Conclusion**

### Summary The Restaurant Management System successfully addresses key operational challenges by integrating features such as order management, inventory tracking, and automated billing. It enhances efficiency, reduces resource wastage, and provides a scalable solution tailored to restaurant needs.

### Limitation While the system performs effectively, it has limitations such as reliance on internet connectivity for cloud-based features and limited multi-language support, which could restrict usability in diverse regions.

### Future Work Future enhancements include introducing AI-powered features for demand forecasting, improving offline functionality, and expanding language options to make the system more inclusive and adaptable to a global audience.