PROJECT
DATA STRUCTURE

Submitted by:

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Submitted to:

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Proposal for Bakery Management System

1. Project Title

Areemal Cafe and Bakery Management System

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2. Objective

The goal of this project is to design and implement a Bakery Management System using C++ with various data structures. This system will allow efficient management of bakery operations such as order processing, inventory tracking, and task management. Customers will be able to place orders, while only the owners will have the ability to add, modify, or delete bakery items. This will ensure secure access control for sensitive operations related to product management.

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3. Project Scope

The Bakery Management System will provide the following functionalities:

- **Customer Order Management**: Customers can place orders, which are processed using a queue system to ensure First-In-First-Out (FIFO) processing.
- **Menu Management**: The owners (Areeba Tahir and Malyika Riasat) will have exclusive access to dynamically add, delete, and modify bakery items.
- **Inventory Tracking**: The inventory will be efficiently managed using hash maps to allow fast lookups and updates.
- **Task Management**: Tasks associated with order preparation will be managed using stacks to ensure that tasks are completed in Last-In-First-Out (LIFO) order.
- **Owner Authentication**: A password authentication feature will be implemented, allowing only the owners to perform actions like adding, modifying, or deleting bakery items.

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4. Relation to Data Structures

This project demonstrates the practical application of various data structures to enhance system performance and ensure modularity:

- **Vector/List for Menu Items**: These structures allow dynamic resizing, which is ideal for managing a growing menu.

- **Queue for Order Processing**: Ensures that customer orders are processed in the correct order, mimicking real-world FIFO operations.
- **Hash Map for Inventory Tracking**: Facilitates quick lookups and updates for stock management, ensuring constant time complexity.
- **Stack for Task Management**: Uses a LIFO structure to handle order preparation tasks, ensuring they are completed in the correct order.

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5. Why This Project Was Chosen

- **Practical Application**: The project simulates real-world bakery operations, which makes it both relevant and insightful for learning and business purposes.
- **Data Structures Integration**: The project integrates various key data structures in C++, demonstrating their utility and efficiency in solving real-world problems.
- **Educational Value**: Provides hands-on experience in designing algorithms and implementing data structures in C++, reinforcing theoretical knowledge with practical skills.
- **Prior Experience**: This project was chosen because I have previously completed the same project using Object-Oriented Programming (OOP) in Java. This experience helps me understand the differences between OOP and Data Structures and makes it easier to draw comparisons between the two.

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6. System Design Overview

The system will be divided into several modules to ensure smooth functionality:

- **Customer Order Management Module**: Allows customers to place orders that are processed in a FIFO manner.
- **Menu Management Module**: Allows the owners to add, remove, or modify items in the menu.
- **Inventory Management Module**: Tracks and updates bakery stock efficiently using hash maps.
- **Task Management Module**: Manages tasks related to order preparation using a stack data structure.
- **Owner Authentication Module**: Ensures that only the owners can perform product-related operations such as adding, modifying, or deleting bakery items.

Data Flow: Each module interacts through well-defined data structures, ensuring efficient and cohesive operation.

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7. Tools and Technologies

- **Programming Language**: C++
- **Development Environment**: Any C++ IDE (e.g., Code::Blocks, Visual Studio, or Dev-C++)

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8. Expected Outcomes

Upon successful implementation, the Bakery Management System will:

- Provide a secure, user-friendly console interface.
- Efficiently handle bakery operations using optimized data structures.
- Allow customers to place orders that are processed using FIFO.
- Ensure secure and restricted access for owners to modify products (add, delete, modify).
- Serve as a demonstration of the practical applications of data structures in a real-world business context.

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9. Timeline

The project is expected to be completed within 4 weeks:

- **Week 1**: Requirement analysis, system design, and planning.
- **Week 2**: Development of the menu and inventory management modules.
- **Week 3**: Development of the order and task management modules, and implementation of owner authentication.
- **Week 4**: Testing, optimization, and final deployment.

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10. Conclusion

The Areemal Cafe and Bakery Management System offers a comprehensive solution for managing bakery operations efficiently. It ensures secure access for owners to modify product data while allowing customers to place orders. This project serves as a practical demonstration of how data structures can be utilized to improve the efficiency

and effectiveness of a real-world business system. My previous experience with this project in Java (using Object-Oriented Programming) helps me understand the differences between OOP and Data Structures, adding valuable insights for this implementation in C++.

Team Members

- **Areeba Tahir**
- **Malyika Riasat**
