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### Abstract:

This paper presents the design and development of a console-based Restaurant Billing Management System implemented in the C programming language. The project aims to streamline the ordering and billing processes in a restaurant, providing functionalities such as menu management, order handling, billing generation, and table tracking. Designed for simplicity and efficiency, the system offers a practical solution for restaurant staff to manage multiple tables simultaneously without requiring persistent storage. The project demonstrates foundational skills in structured programming, memory management, and real-time input handling.

### **Keywords**: Restaurant management, C programming, billing system, menu handling, table tracking, console application

1. Introduction:

Restaurants often rely on manual processes for managing orders and generating bills, leading to inefficiencies and errors. This project addresses those issues by automating billing tasks through a user-friendly command-line interface. Implemented entirely in C, the system maintains in-memory data structures for real-time processing, enabling efficient table and order management for up to 50 tables.

2. Objectives:

* To design a menu-driven billing management system using C.
* To allow real-time addition of menu items and customer orders.
* To generate bills for individual tables with a total cost breakdown.
* To monitor the status of all active tables.

3. Methodology:

#### 3.1 System Components:

* Menu Management: Allows admins to add/view food items. Each item has a unique ID, name, and price.
* Order Handling: Associates orders with tables. A table can have multiple orders with item ID and quantity.
* Billing Module: Computes the bill using quantity and price per item, presenting a readable format for printing.
* Table Tracking: Maintains table numbers, order status, and occupancy.

#### 3.2 Data Structures:

* MenuItem struct: Represents an item in the menu.
* OrderItem struct: Captures item ID and quantity.
* Table struct: Maintains table number, list of orders, and occupancy status.

#### 3.3 Flow of Execution:

1. The system initializes with predefined menu items.
2. User navigates a menu to:  
   * Add new menu items
   * Place orders by specifying the table number, item ID, and quantity
   * Generate detailed bills
   * View all table statuses
3. Input validation and constraints ensure program stability.

#### 3.4 Development Tools:

* Language: C (GCC compiler)
* IDE: Code::Blocks / VS Code
* Platform: Linux/Windows terminal

4. Results:

The implemented system allows users to:

* Seamlessly add and view menu items.
* Take multiple orders per table with quantity inputs.
* Print accurate, itemized bills.
* Track active and free tables effectively.

The system is robust for small to medium-sized restaurants, ensuring smooth restaurant operations.

### 5. Limitations:

* No persistent storage (all data is lost on program termination).
* No concurrency or multi-user access.
* Basic text-based UI without a graphical interface.

### 6. Future Enhancements:

* Integration with a database (e.g., SQLite or MySQL) for persistence.
* Addition of discounts, taxes, and service charges.
* Development of a graphical or web-based UI.
* Features like user login and role-based access.

### 7. Conclusion:

The Restaurant Billing Management System provides a foundational tool for managing food orders and billing in real-time. Despite its simplicity, it demonstrates the effective use of structured programming in C for building practical applications. It is an excellent base for further expansion into full-fledged POS systems.

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