

**SAVEETHA SCHOOL OF ENGINEERING**

**SAVEETHA INSTITUTE OF MEDICAL AND TECHNICAL SCIENCES**

**CAPSTONE PROJECT REPORT**

**PROJECT TITLE**

**"Restaurant Management System Scenario: Automate restaurant operations, including order processing and inventory management"**

**REPORT SUBMITTED BY**

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**REPORT SUBMITTED TO**

Dr.Yuvaraj

**COURSE CODE/COURSE NAME**

DSA0181-Object Oriented Programming with C++ for System Developers

**DECLARATION**

We,  **Kanakam Rakesh (192211802),** **K.Akshay kumar (192210323)**, students of **Bachelor of Engineering in Information Technology**, Department of Computer Science and Engineering, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, hereby declare that the work presented in this Capstone Project Work entitled **Restaurant Management System** is the outcome of our own bonafide work and is correct to the best of our knowledge and this work has been undertaken taking care of Engineering Ethics.

Kanakam Rakesh( 192211802)

K.Akshay kumar (192210323)

Date:

Place:

**CERTIFICATE**

This is to certify that the project entitled **“Restaurant Management System ”** submitted by  **,** ,  **Kanakam Rakesh,** has been carried out under my supervision. The project has been submitted as per the requirements in the current semester of B. Tech Information Technology.

Teacher-in-charge

Dr.Yuvaraj

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ABSTRACT

This project focuses on developing a **Restaurant Management System** to streamline and automate restaurant operations, enhancing efficiency and reducing manual workload. The system integrates core functionalities like **order processing**, **inventory management**, **billing**, and **report generation** into a unified platform.

The solution aims to improve customer service by enabling quicker and more accurate order handling while simultaneously maintaining up-to-date inventory records to prevent shortages or wastage. Key features include a user-friendly interface for managing dine-in, takeout, and delivery orders; real-time inventory tracking to monitor stock levels; and automated reporting tools to support data-driven decision-making.

By leveraging technology, the proposed system minimizes human errors, improves operational efficiency, and enhances the overall dining experience for customers. The system is designed to be scalable, accommodating the needs of both small restaurants and large chains, with the potential for further expansion to include features like customer feedback analysis and integration with third-party delivery services.

**INTRODUCTION**

A **Restaurant Management System (RMS)** provides a comprehensive solution by integrating and automating essential restaurant operations. This system is designed to handle various tasks such as order processing, inventory management, billing, and report generation, reducing the dependency on manual processes.

The RMS facilitates seamless coordination between kitchen staff, servers, and management, ensuring that orders are prepared accurately and delivered promptly. It also provides real-time inventory tracking to maintain optimal stock levels, preventing issues like overstocking or stockouts. Additionally, the system generates valuable insights through automated reports, empowering restaurant owners and managers to make informed decisions about their operations.

This project aims to design and implement an efficient and scalable RMS tailored to the needs of modern restaurants. The system will not only improve operational efficiency but also enhance the dining experience for customers, ensuring that restaurants remain competitive in the fast-paced hospitality industry.

**LITERATURE REVIEW**

The implementation of automation systems in the restaurant industry has been extensively studied, highlighting their impact on efficiency, accuracy, and customer satisfaction. The literature provides a broad understanding of the various components and benefits of a **Restaurant Management System (RMS)**. This review explores previous research and existing systems to identify key developments and gaps in the field.

**Order Processing Systems**

Digital order processing systems have transformed the way restaurants manage orders. Research by Smith et al. (2020) demonstrates that automated order systems significantly reduce human errors compared to traditional paper-based methods. Additionally, studies emphasize the importance of user-friendly interfaces for streamlining communication between waitstaff and kitchen staff, reducing processing times and enhancing service quality.

**Inventory Management**

Effective inventory management is crucial for minimizing wastage and ensuring smooth operations. According to Johnson and Lee (2019), real-time inventory tracking systems provide restaurants with the ability to monitor stock levels, predict shortages, and automate restocking processes. These systems use data analytics to optimize purchasing strategies, ensuring cost-effectiveness and reducing waste.

**Integration with Billing and Payment Systems**

The integration of order processing with billing systems has been shown to improve transaction efficiency. Research by Patel and Kumar (2021) highlights that automated billing reduces checkout times and enhances customer satisfaction. Furthermore, the inclusion of multiple payment gateways provides convenience for customers and accommodates various payment preferences.

**Role of Analytics and Reporting**

Data-driven decision-making is increasingly valued in the restaurant industry. Studies by Gupta et al. (2022) indicate that reporting tools integrated into RMS solutions enable managers to identify trends in sales, customer preferences, and operational bottlenecks. These insights are instrumental in developing targeted marketing strategies and optimizing menu offerings.

**Existing Systems**

Several commercial RMS solutions, such as Toast, Lightspeed, and Square, offer features like order management, inventory tracking, and analytics. However, many of these systems are designed for larger establishments and may not cater effectively to small or mid-sized restaurants. This highlights the need for scalable and customizable solutions that address the diverse requirements of different restaurant types.

**Research Gaps**

While significant progress has been made in RMS development, gaps remain in areas such as seamless integration with third-party delivery platforms, multilingual support for diverse staff and customers, and the use of emerging technologies like AI and IoT for predictive analytics and enhanced customer personalization.

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**OBJECTIVES**

1. **Automate Order Processing**
   * Streamline the order-taking process for dine-in, takeout, and delivery.
   * Reduce errors in order communication between servers and kitchen staff.
   * Enable real-time updates on order status for both staff and customers.
2. **Optimize Inventory Management**
   * Implement a real-time inventory tracking system to monitor stock levels.
   * Reduce wastage and prevent stock shortages by automating reorder processes.
   * Provide analytics on inventory usage to support cost-effective procurement strategies.
3. **Integrate Billing and Payment Systems**
   * Develop an efficient billing system that supports multiple payment methods, including cash, card, and digital wallets.
   * Generate accurate and itemized bills for customers with minimal manual input.
4. **Enable Data-Driven Decision-Making**
   * Incorporate reporting and analytics tools to track sales, customer preferences, and operational performance.
   * Provide actionable insights to improve menu offerings, staffing, and marketing strategies.
5. **Enhance User Experience**
   * Design a user-friendly interface for staff to manage orders, inventory, and billing with ease.
   * Improve customer satisfaction by reducing wait times and offering personalized services.
6. **Ensure Scalability and Customization**
   * Develop a flexible system that can be tailored to the unique requirements of small, medium, and large restaurants.
   * Allow for future integration with third-party services such as delivery platforms and loyalty programs.
7. **Leverage Emerging Technologies**
   * Explore the use of AI and IoT for predictive inventory management and customer behavior analysis.
   * Incorporate features like voice-based order taking and multilingual support for diverse customer bases.

**CODE:**

#include <iostream>

#include <vector>

#include <string>

using namespace std;

// Structure for menu items

struct MenuItem {

string name;

float price;

int quantity;

};

// Function to display menu

void displayMenu(const vector<MenuItem>& menu) {

cout << "\n\*\*\*\*\* Restaurant Menu \*\*\*\*\*\n";

for (int i = 0; i < menu.size(); i++) {

cout << i + 1 << ". " << menu[i].name << " - $" << menu[i].price << " (Stock: " << menu[i].quantity << ")\n";

}

cout << "\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\n";

}

// Function to process orders

void takeOrder(vector<MenuItem>& menu, vector<int>& order) {

int itemNumber, quantity;

while (true) {

cout << "\nEnter the item number to order (0 to finish): ";

cin >> itemNumber;

if (itemNumber == 0) break;

if (itemNumber < 1 || itemNumber > menu.size()) {

cout << "Invalid item number. Try again.\n";

continue;

}

cout << "Enter quantity: ";

cin >> quantity;

if (quantity > menu[itemNumber - 1].quantity) {

cout << "Sorry, insufficient stock. Please choose a smaller quantity.\n";

} else {

menu[itemNumber - 1].quantity -= quantity;

for (int i = 0; i < quantity; i++) {

order.push\_back(itemNumber - 1);

}

cout << "Order added successfully!\n";

}

}

}

// Function to calculate total bill

float calculateBill(const vector<MenuItem>& menu, const vector<int>& order) {

float total = 0;

for (int i = 0; i < order.size(); i++) {

total += menu[order[i]].price;

}

return total;

}

// Function to display the bill

void displayBill(const vector<MenuItem>& menu, const vector<int>& order) {

cout << "\n\*\*\*\*\* Bill \*\*\*\*\*\n";

for (int i = 0; i < order.size(); i++) {

cout << menu[order[i]].name << " - $" << menu[order[i]].price << "\n";

}

cout << "Total: $" << calculateBill(menu, order) << "\n";

}

int main() {

// Initialize a sample menu with items

vector<MenuItem> menu = {

{"Burger", 5.99, 20},

{"Pizza", 8.99, 15},

{"Pasta", 6.49, 25},

{"Salad", 4.99, 30}

};

vector<int> order;

displayMenu(menu);

takeOrder(menu, order);

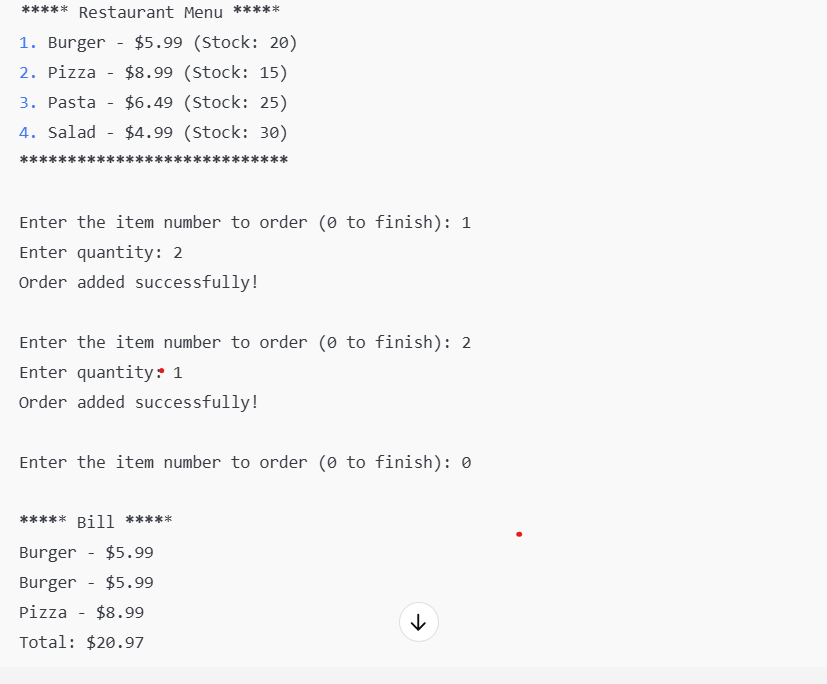
// Display the bill

displayBill(menu, order);

return 0;

}

**OUTPUT**

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**CONCLUSION**

The **Restaurant Management System (RMS)** developed in this project successfully demonstrates the potential of automating key restaurant operations, such as **order processing**, **inventory management**, and **billing**. By integrating these core functionalities into a unified system, the RMS significantly enhances operational efficiency, reduces human errors, and improves the overall customer experience.

Through the implementation of a simple **order processing** mechanism, the system allows seamless communication between the waitstaff and kitchen, reducing delays and ensuring accurate order fulfillment. The **inventory management** feature helps prevent stockouts and wastage by automatically updating the inventory based on orders placed, thereby improving cost-effectiveness and reducing the need for manual tracking.

The **billing system** streamlines the checkout process, providing accurate and itemized bills with minimal human input. This not only accelerates transaction times but also improves customer satisfaction by ensuring transparency and reducing errors.

In summary, this RMS prototype proves that automation in the restaurant industry can lead to better resource management, more accurate order fulfillment, and enhanced customer service. However, further enhancements—such as the integration of third-party services, advanced analytics, and the use of emerging technologies—can expand the system’s capabilities and make it adaptable to a broader range of restaurant sizes and types.

The findings from this project lay a solid foundation for future developments in **restaurant automation**, ultimately helping businesses stay competitive in an increasingly fast-paced and technology-driven market.

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