ABSTRACT
The Restaurant Management System is a web application for managing restaurant activities. This is the procedure of ordering food from a restaurant through an online system. Customers are served by this system. The system offers functions for managing and placing food orders. Customers and employees can manage reports andmenus with this system. The primary goal of the system's construction is to offer order services. Managing a traditional restaurant is not an easy task. Ordering at a traditional restaurant takes longer. It gives the company a lively feel. Without restaurant management system, we cannot manage the activities of restaurant functionalities effectively and efficiently. There are much functionality exists in restaurant management system like dynamic reports, dynamic invoice, employee information, client information, order information.

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INTRODUCTION

1.1 OVERVIEW

A Restaurant Management System (RMS) is a comprehensive software solution designed to streamline and automate the operations of a restaurant or a chain of restaurants, enhancing efficiency, customer service, and profitability. It encompasses a range of functionalities that cover various aspects of restaurant operations, from order taking and billing to inventory management and customer relationship management. Here's an overview of the key components and functionalities typically included in a Restaurant Management System:

- 1. Point of Sale (POS) System: The heart of an RMS, the POS system, facilitates order taking, billing, and payment processing. Modern POS systems are touchscreen-based, making them user-friendly for staff. They can process various payment methods, track sales in real time, and integrate with other systems for seamless operations.
- 2. Inventory Management: Effective inventory management is crucial for controlling costs and minimizing waste. This module helps in managing suppliers, purchase orders, and analysing consumption patterns. An effective Restaurant Management System is customizable to fit the unique needs of a restaurant, scalable to grow with the business, and user-friendly to ensure quick adoption by staff. By an RMS, we can significantly contribute to a restaurant's success.

1.2 PROBLEM STATEMENT

Develop a web based application to maintain and manipulate the data to be stored in Restaurant Management System .

Objectives of the project:

The main objective of the project is to manage the details of the customers orders, orders taken, accepted orders, payments. The project is totally built at theadmin end and thus only the admin is guaranteed the access. It tracks the details about the customer, staff, payments, invoices.

- Provides searching facilities based on various factors such as payments, orders.
- It tracks all the details about the sales taken place.
- Manage the customer information.
- Shows the information and costs of the products provided.
- It deals with monitoring information and invoices of the customer.
- Editing, Adding and Updating of information is improved which results in proper resource management of services data.

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1.3 DATABASEMANAGEMENTSYSTEM:

Database is a collection of related data. DBMS came into existence in 1960 by Charles. Again in 1960 IBM brought IMS-Information management system. In 1970 Edgor Codd at IBM came with new database called RDBMS. In 1980 then came SQL Architecture Structure Query Language. In 1980 to 1990 there were advances in DBMS e.g. DB2, ORACLE. A database has the following implicit properties:

- A database represents some aspect of the real world, sometimes called the mini world or the universe of discourse. Changes to the mini world are reflected in the database.
- A database is a logically coherent collection of data with some inherent meaning. A random assortment of data cannot correctly be referred to as a database.
- A database is designed, built, and populated with data for a specific purpose. It has an intended group of users and some preconceived applications in which these users are interested.

In other words, a database has some source from which data is derived, some degree of interaction with events in the real world, and an audience that is actively interested in its contents.

Metadata (meta data, or sometimes meta information) is "data about data", of any sort in any media. An item of metadata may describe a collection of data including multiple content items and hierarchical levels, for example a database schema. In data processing, metadata is definitional data that provides information about or documentation of other data managed within an application or environment. The term should be used with caution as all data is about something, and is therefore metadata.

1.4 SQL:

SQL (Structured Query Language) is a standardized programming language used for managing and manipulating relational databases. In the context of a restaurant management system, SQL serves as the primary tool for interacting with the underlying database. It allows for the retrieval of crucial information such as customer payment details, customer profiles, and receipts. SQL statements are used to insert new records, update existing data, and delete unnecessary information from the database. Additionally, SQL enables the enforcement of data integrity constraints, ensuring that only valid and consistent data is stored. It also plays a vital role in maintaining database security by managing user access permissions and defining roles within the system. SQL queries can be utilized to analyze number of quantities, calculate the total cost and generate receipts. Overall, SQL is indispensable for effectively managing and maintaining the integrity of data within a restaurant management system.

1.5 HTML/PHP:

HTML stands for Hypertext Markup Language. It is the standard markup language for creating web pages and web applications. HTML provides the structure and content of a web page by using a system of tags and attributes to define elements such as headings, paragraphs, links, images, and forms. In a restaurant management system, HTML is used to create the user interface that allows customers to make order through a web browser. HTML forms are particularly important in this context, as they enable users to make order, do payments and submit them securely to the server for processing. Additionally, HTML can be used to display information about admin, cashier, customers, products, payments and receipts. Overall, HTML is essential for creating the web-based platform that facilitates the ordering process.

Chapter2

REQUIREMENTS SPECIFICATION

2.1 OVERALL DESCRIPTION:

The Restaurant Management System is conceived as a comprehensive and user-friendly platform designed to streamline restaurant operations efficiently. It encompasses functionalities such as order placement, menu management, billing processes, and user management. With a focus on intuitive design, scalability, and accessibility features, the system aims to enhance the overall dining experience forcustomers and optimize operational work flows for restaurant staff.

2.2 SPECIFIC REQUIREMENTS:

Introduction

Provide an overview of the Restaurant Management System, outlining its purpose, scope, and the benefits it brings to restaurant operations.

System Architecture

Detail the architectural components, illustrating how they interact to facilitate seamless restaurant management.

User Authentication

Define the procedures and mechanisms for user authentication, ensuring secure access to the system for authorized personnel.

Admin Management

Specify administrative tools and functions available for system administrators, facilitating efficient management of the restaurant's digital infrastructure.

Order Processing

Detail the system's capabilities for order placement, modification, and cancellation, ensuring accuracy and efficiency in handling customer requests.

Menu Management

Outline features related to menu creation, modification, and presentation, enabling easy adaptation to changing culinary offerings.

Billing Processes

Specify features related to invoicing, payment processing, and generating receipts, ensuring a seamless transaction experience for both customers and staff.

Inventory Management

Detail the system's capacity to track and manage inventory, facilitating efficient stock control and minimizing wastage.

Accessibility

Address accessibility considerations, making the system usable for individuals with disabilities, including staff and customers.

Verification and Validation

Detail mechanisms for verifying and validating inputs, ensuring data accuracy and consistency in restaurant operations.

System Maintenance and Updates

Define procedures for routine maintenance and updates, including version control and backup strategies.

Scalability

Outline the system's capacity to scale, accommodating varying workloads during peak hours or as the restaurant expands.

Conclusion

Summarize the specific requirements, emphasizing their role in achieving the overall objectives of the Restaurant Management System.

2.3 SOFTWARE REQUIREMENTS:

Operating System: Windows 10 or higher.

Database Management System:

MySQL (Version 5.7 or higher).

Programming Languages and Frameworks:

PHP (for application logic, if applicable).

HTML, CSS (for web-based systems).

Web Browser: Google Chrome or Microsoft edge.

Development Tools: Integrated Development Environment

(IDE) such as Visual Studio Code.

Database management tools compatible with MySQL.

2.4 HARDWARE REQUIREMENTS:

CPU: Multi-core processors (e.g., Intel Xeon, AMD Ryzen) to handle parallel query processing and multiple connections.

RAM: Sufficient RAM to hold the database indexes and frequently accessed data in memory, reducing disk I/O. A good starting point is 16GB, but this can vary widely based on the size of your database and workload.

Storage: Fast and reliable storage (e.g., SSDs) to ensure quick access to data. RAID configurations can provide both performance and redundancy.

Network: High-speed network connectivity to handle the incoming queries and data transfer between the database server and clients.

Backup and Redundancy: Implementing backup solutions and redundancy measures (like failover clustering) to ensure data integrity and availability.

Monitoring and Management: Tools for monitoring the database performance and health, as well as managing backups, updates, and security.

2.5 TECHNOLOGY:

The technology requirements encompass features such as secure user authentication, intuitive menu management interfaces, reliable order processing, seamless reservation handling, efficient billing processes, and robust inventory management capabilities. These technological aspects contribute to the overall effectiveness and success of the Restaurant Management System in optimizing restaurant operations.

Chapter 3

DETAILED DESIGN

3.1 SYSTEM DESIGN:

Frontend:

1. User Interface (UI):

Homepage and Navigation:

Develop a welcoming home page with easy navigation to different sections such as Admin, Cashier andCustomer Log in.

2. Authentication:

HTML Forms for Authentication:

Implement HTML forms for user registration and login to facilitate a personalized experience like viewing past orders.

3. Menu Display and Ordering System:

Product Listing:

Use HTML and PHP to render the menu, listing food items and including details like name, price, ingredients, and photos.

Backend:

- 1. Server Architecture:
 - Set up a server to host the backend application.
 - Use a web server like Apache or Nginx to handle HTTP requests.
- 2. Database Design (SQL):
 - Choose a SQL database like MySQL or PostgreSQL for data storage.
 - Design the database schema to include tables for users, candidates, and votes.
 - Use primary and foreign key constraints to maintain data integrity.

3. Server-side Scripting:

- Write server-side scripts in a language like PHP or Python to handle requests from the frontend.
- Use SQL queries to interact with the database and perform operations such as user authentication, fetching candidates, and recording votes.

4. Security Measures:

- Sanitize user inputs to prevent SQL injection attacks.
- Implement session management to track user sessions and prevent unauthorized access.

5. Scalability and Performance:

- Optimize SQL queries and database indexes for efficient data retrieval.
- Use connection pooling to handle multiple concurrent database connections and improve performance.

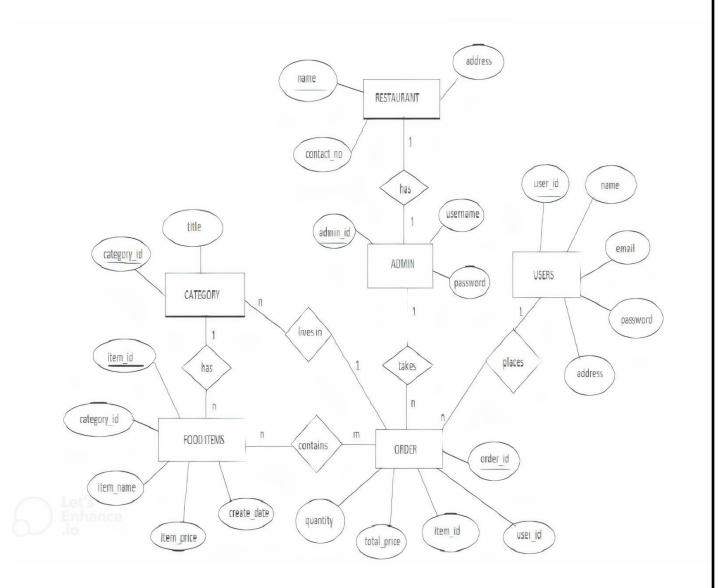
6. Logging and Monitoring:

- Implement logging to record system activities and errors.
- Monitor server and database performance to identify bottlenecks and optimize resource usage.

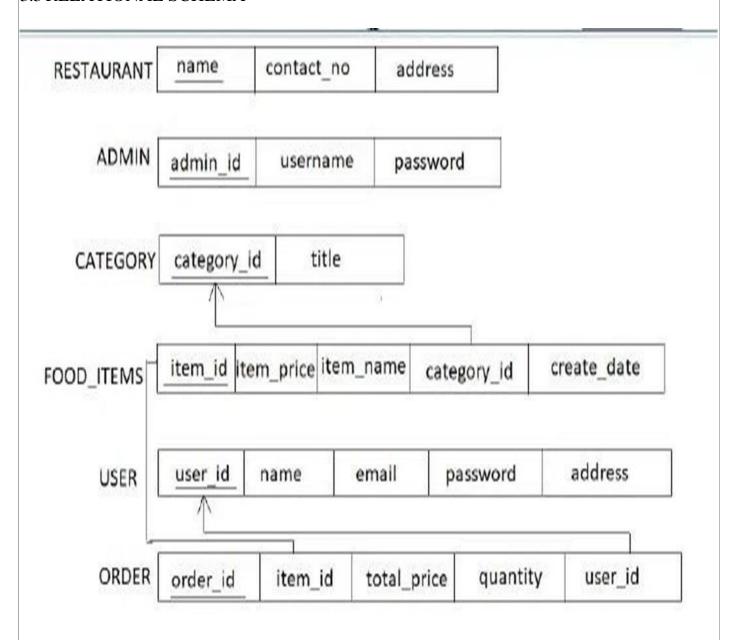
7. Backup and Disaster Recovery:

- Regularly back up the database to prevent data loss in case of system failures.
- Implement disaster recovery procedures to restore the system to a functional state in case of emergencies.

3.2 ENTITY RELATIONSHIP DIAGRAM



3.3 RELATIONAL SCHEMA



3.4 DESCRIPTION OF TABLES

Field	Туре	Null	Key	Default	Extra
admin_id	varchar(200)	NO	PRI	NULL	
admin_name	varchar(200)	NO		NULL	
admin_email	varchar(200)	NO		NULL	
admin_password	varchar(200)	NO		NULL	

3.4.1 rpos_admin

Field	Туре	Null	Key	Default	Extra	
customer_id	varchar(200)	NO	PRI	NULL	11	
customer_name	varchar(200)	NO		NULL		
customer_phoneno	varchar(200)	NO		NULL		
customer_email	varchar(200)	NO		NULL		
customer_password	varchar(200)	NO		NULL		

3.4.2 rpos_customers

Field	Туре	Null	Key	Default	Extra
order_id	varchar(200)	NO	PRI	NULL	
order_code	varchar(200)	NO		NULL	
customer_id	varchar(200)	NO	MUL	NULL	
customer_name	varchar(200)	NO		NULL	
prod_id	varchar(200)	NO	MUL	NULL	
prod_name	varchar(200)	NO		NULL	
prod_price	varchar(200)	NO		NULL	
prod_qty	varchar(200)	NO		NULL	
order_status	varchar(200)	NO		NULL	

3.4.3 rpos_orders

Field	Туре	Null	Key	Default	Extra
reset_id	int(20)	NO	PRI	NULL	auto_increment
reset_code	varchar(200)	NO		NULL	
reset_token	varchar(200)	NO		NULL	
reset_email	varchar(200)	NO		NULL	
reset status	varchar(200)	NO		NULL	

3.4.4 rpos_pass_resets

Field	Туре	Null	Key	Default	Extra
pay_id	varchar(200)	NO	PRI	NULL	
pay_code	varchar(200)	NO		NULL	
order_code	varchar(200)	NO	MUL	NULL	
customer_id	varchar(200)	NO		NULL	
pay_amt	varchar(200)	NO		NULL	
pay_method	varchar(200)	NO		NULL	

3.4.5 rpos_paymentss

Field	Туре	Null	Key	Default	Extra
prod_id	varchar(200)	NO	PRI	NULL	
prod_code	varchar(200)	NO		NULL	
prod_name	varchar(200)	NO		NULL	
prod_img	varchar(200)	NO		NULL	
prod_desc	longtext	NO		NULL	
prod_price	varchar(200)	NO		NULL	

3.4.6 rpos_products

Field	Туре	Null	Key	Default	Extra
staff_id	int(20)	NO	PRI	NULL	auto_increment
staff_name	varchar(200)	NO		NULL	
staff_number	varchar(200)	NO		NULL	
staff_email	varchar(200)	NO		NULL	
staff password	varchar(200)	NO		NULL	

3.4.7 rpos_staff

IMPLEMENTATION

4.1 MODULES AND THEIR ROLES:

• Admin Module:

Role: Manages overall operations, like Create new categories, products update and delete related operations, including registration, profile management, menu and order.

• Cashier Management Module:

Role: Manages customer-related operations, including registration, profile management, and order history.

• Menu Management Module:

Role: Handles the addition, modification, and deletion of menu items. Manages categories and pricing.

• Order Processing Module:

Role: Facilitates the placement and processing of customer orders. Interacts with the menu and customer profiles.

• Inventory Management Module:

Role: Tracks and updates inventory based on menu item orders to ensure stock availability.

• Billing and Payment Module:

Role: Generates bills based on orders, calculates totals, and handles various payment methods.

4.2 TRIGGERS AND STORED PROCEDURES:

Database Design:

Create tables for customers, menu items, orders, reservations, inventory, billing, and staff. Establish relationships between entities.

• Stored Procedures:

Develop procedures for customer registration, menu item management, order processing, reservation handling, inventory updates, billing, and staff management.

Triggers:

Implement triggers for enforcing constraints and automating actions. For example, update inventory levels upon order placement or trigger alerts for low stock.

• Security:

Implement authentication and authorization mechanisms to control access to sensitive information. Define roles for staff members based on responsibilities.

Testing and Optimization:

Conduct extensive testing to ensure the correct and efficient functioning of modules. Optimize database queries and system processes for improved performance.

4.3 RESULT:

A restaurant management system streamlines operations, encompassing order management, inventory tracking, customer management, and employee management. It enhances efficiency by performing tasks, reduces errors in order taking, and speeds up service. The system provides data analytics, helping in making informed decisions about menu adjustments. It improves customer experience through faster service and personalized engagement. Inventory management becomes more accurate, reducing waste and controlling costs. The integration of ordering and expands customer reach and increases revenue. Employee management become more efficient. Overall, it elevates operational efficiency, boosts profitability, and enhances customer satisfaction in the competitive restaurant industry.

TESTING

5.1 Software Testing:

• Functionality Testing:

Verify that all buttons, links, and forms in the Restaurant Management System work as expected. Test the system's ability to handle multiple users managing restaurant operations simultaneously. Ensure that users can place orders, manage menus, handle reservations, and process billing successfully.

• Usability Testing:

Evaluate the system's user interface for clarity, intuitiveness, and ease of use in restaurant management tasks. Check the instructions for managing restaurant operations, ensuring they are clear and understandable. Test accessibility features to ensure users with disabilities can efficiently manage restaurant processes

• Security Testing:

Conduct penetration testing to identify potential vulnerabilities, such as SQL injection or cross-site scripting (XSS).

Verify the robustness of user authentication mechanisms to prevent unauthorized access.

Ensure sensitive data, such as customer and business information, is encrypted to maintain security.

Compatibility Testing:

Test the Restaurant Management System on various web browsers (Chrome, Firefox, Safari, Edge, etc.) to ensure consistent behavior across platforms.

Check compatibility with different devices, including desktops, laptops, tablets, and smartphones.

• Performance Testing:

Measure the system's response time under different loads to ensure it can handle peak restaurant operations periods efficiently.

• Reliability Testing:

Verify that the system maintains data integrity and consistency, even under unexpected conditions like network interruptions or server failures.

Test the system's ability to recover gracefully from errors or crashes without losing any critical restaurant management data.

• Localization Testing:

Ensure that the system supports multiple languages, with all text and labels correctly translated and displayed in each supported language.

5.2 Module Testing and Integration:

Implementation testing for the Restaurant Management System involves a thorough evaluation of the entire system to ensure seamless functionality and adherence to specified requirements. This testing phase encompasses critical aspects of the system's functionality, ensuring that all integrated components work cohesively.

Firstly, the user authentication and authorization mechanisms are rigorously examined to confirm that legitimate users can log in securely, while unauthorized access is appropriately restricted. This involves validating user credentials, role-based access control, and ensuring the confidentiality of sensitive information.

The end-to-end process of managing restaurant operations is tested comprehensively. This includes functionalities such as order placement, menu management, reservation handling, and billing processes. Special attention is given to the seamless flow of tasks, ensuring users can efficiently navigate through the system.

Displaying real-time updates and accurate representations of restaurant activities are scrutinized. This involves testing the responsiveness of the system under various scenarios, including high user engagement during peak hours.

Security measures are a focal point of implementation testing, encompassing encryption for sensitive data, resilience against common cyber threats like SQL injection and cross-site scripting. Strict adherence to robust communication protocols is ensured to safeguard against data breaches and unauthorized access.

Concurrency and performance testing are conducted to assess the system's ability to handle multiple users simultaneously. This ensures that the system remains responsive and efficient even during peak hours of restaurant operations.

5.3 Limitations:

While the Restaurant Management System brings significant improvements to restaurant operations, certain limitations need consideration. These include:

Security Concerns: Potential vulnerabilities in the system may pose security risks, and measures should be continually taken to address and mitigate these concerns.

Accessibility Challenges: Certain demographics may face challenges in using the system, particularly those without internet access or digital literacy. Efforts should be made to enhance accessibility for all users.

Privacy Risks: The system must address privacy concerns related to the handling of customer and business data, ensuring compliance with relevant regulations.

Technological Barriers: Issues such as network connectivity problems and compatibility with different devices and platforms can hinder widespread adoption. Continuous efforts are required to overcome these technological barriers.

Addressing these limitations necessitates ongoing improvements, user feedback considerations, and the implementation of robust security measures to ensure the effective and secure management of restaurant processes.

SNAPSHOTS

Fig 6.1 LOGIN PAGE:

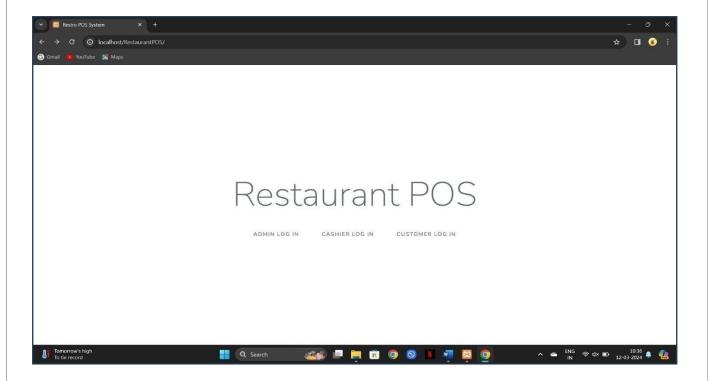


Fig 6.2 ADMIN/CASHIER LOGIN:

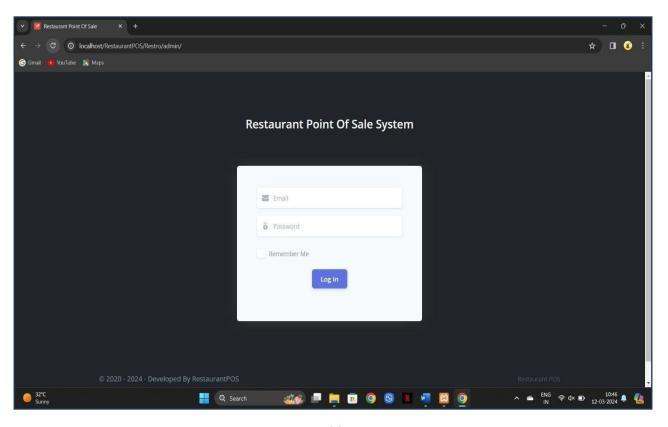


Fig 6.3 ADMIN DASHBOARD

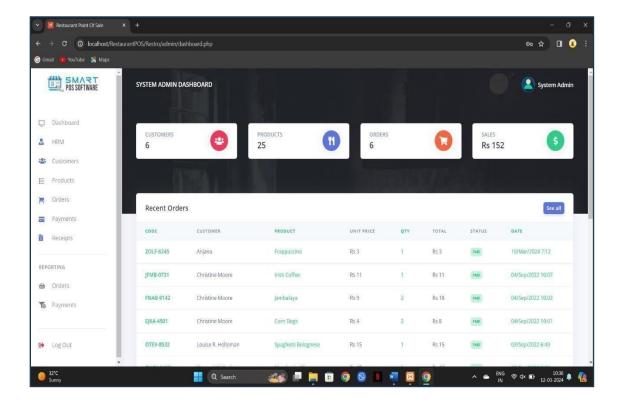


Fig 6.4 CASHIER DASHBOARD

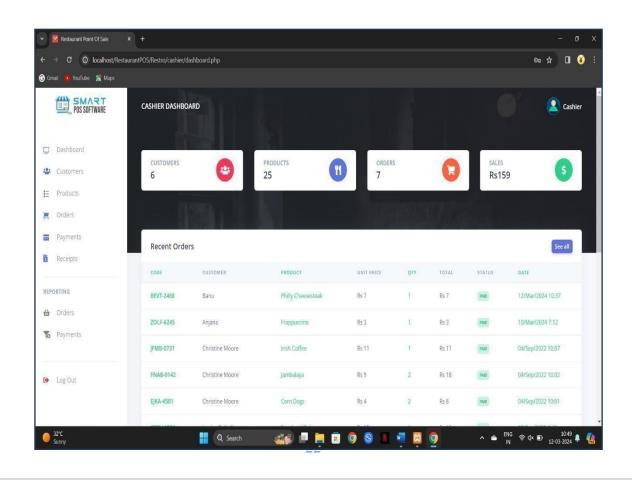


Fig 6.5 CUSTOMER LOGIN

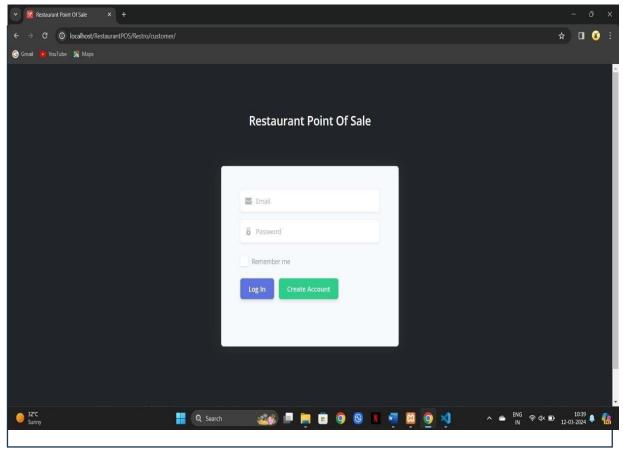


Fig 6.6 CUSTOMER DASHBOARD

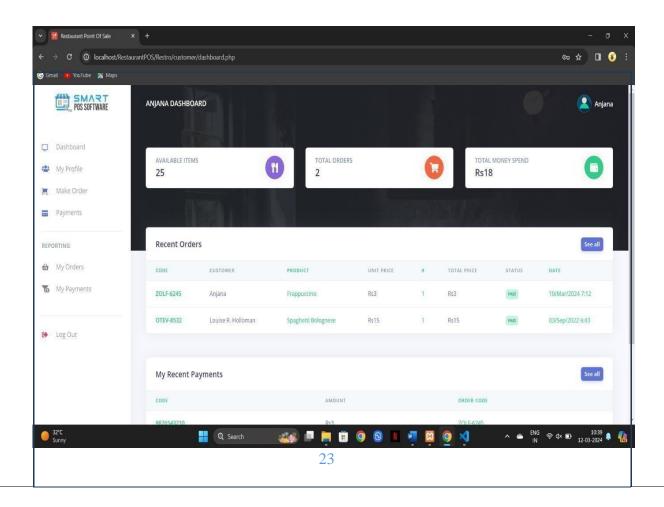


Fig 6.7 CUSTOMERS

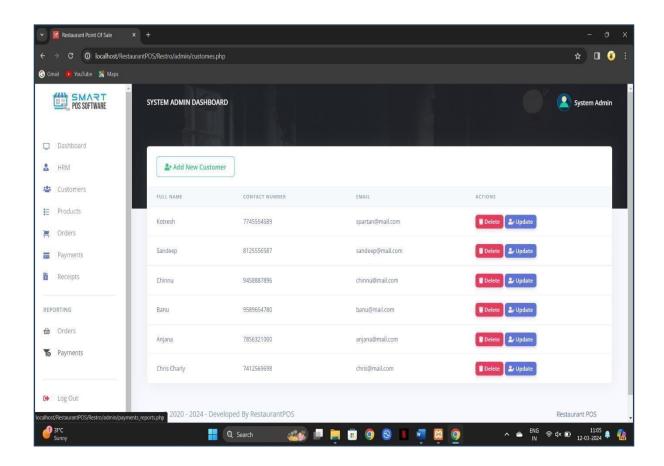


Fig 6.8 PRODUCTS(MENU)

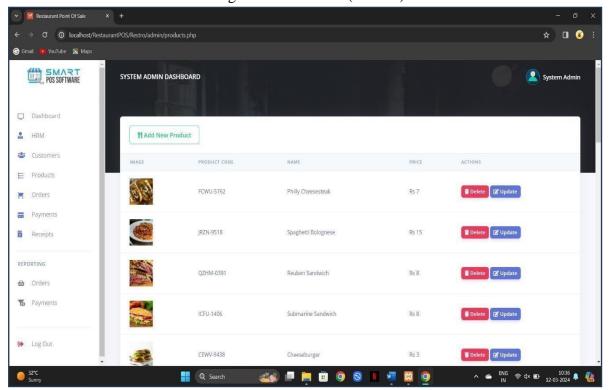


Fig 6.9 ORDER PLACING

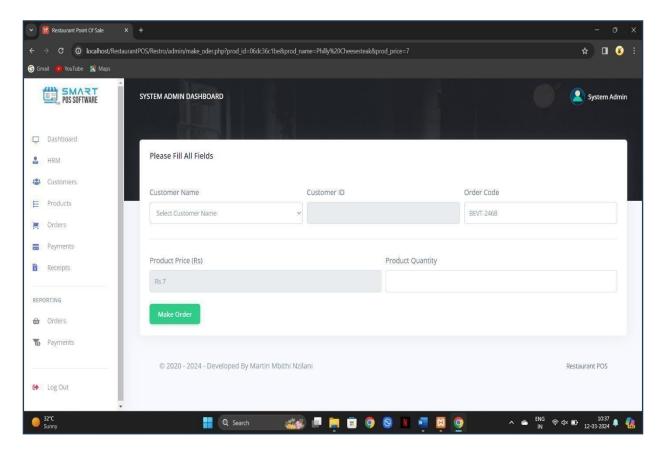


Fig 6.10 ORDER PAYMENT

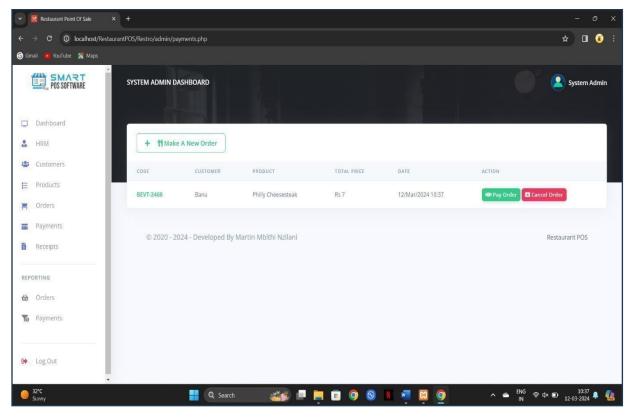


Fig 6.11 PAYMENT INTERFACE

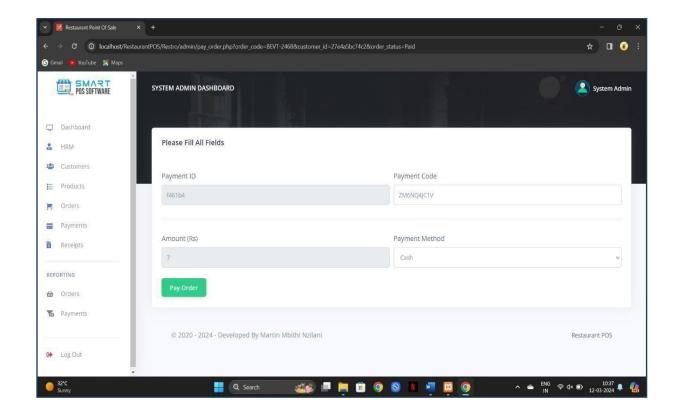
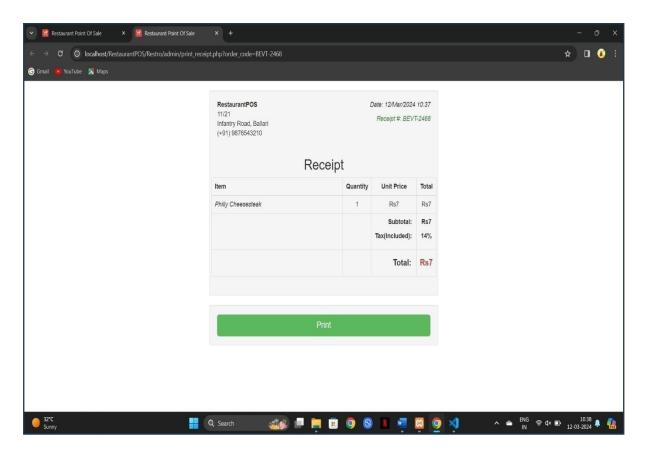


Fig 6.12 RECEIPT



CONCLUSION

In conclusion, the development and implementation of the Restaurant Management System represent a significant leap in streamlining restaurant operations, providing efficiency and enhanced customer service. The success of the system hinges on meticulous design, rigorous testing, and adherence to robust security measures. Through a thorough examination of individual modules and comprehensive implementation testing, the system functions seamlessly, covering tasks such as user authentication, order processing, and billing with precision.

The incorporation of robust security measures is paramount, safeguarding against potential threats and ensuring the integrity of customer data and sensitive business information. As technology continues to shape modern business practices, ongoing refinement and enhancement of Restaurant Management Systems become imperative. Continuous monitoring, user feedback mechanisms, and updates are essential to address emerging challenges and evolving security concerns, ensuring the system's sustained effectiveness.

Ultimately, a well-designed and thoroughly tested Restaurant Management System has the potential to revolutionize the hospitality industry by optimizing operations, improving customer satisfaction, and fostering sustainable business growth.

FUTURE ENHANCEMENTS

Several future enhancements could be implemented to further improve the functionality and user experience of the Restaurant Management System:

Blockchain Integration:

Integrate blockchain technology to enhance the security and transparency of the system. This ensures an immutable and tamper-proof ledger for transaction records, providing an additional layer of trust and integrity to restaurant operations.

Biometric Authentication:

Implement biometric authentication methods such as fingerprint or facial recognition to enhance the security of user access, particularly for managerial roles. This ensures a more reliable authentication process, safeguarding sensitive managerial functionalities.

Mobile Applications for Staff:

Develop dedicated mobile applications for restaurant staff to facilitate order management, table reservations, and real-time communication. This enhances accessibility, improves staff coordination, and contributes to overall operational efficiency.

Integration with Point-of-Sale (POS) Systems:

Integrate the Restaurant Management System with POS systems to streamline the ordering and billing process further. This ensures seamless communication between the front-end and back-end systems, reducing manual data entry and minimizing errors.

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