

CERTIFICATE

This to certify that the Mini Project report on **Orderflow: Efficient Restaurant Order/Invoicing** has been submitted by Abhimanyu Pankaj Deshmukh - 22107036, Gauri Sasikumar Iyer - 22107030, Kisan Kumar Jena - 22107049 and Ganesh S Patil - 22107045 who are bonafide students of A. P. Shah Institute of Technology, Thane as a partial fulfillment of the requirement for the degree in **Computer Science and Engineering Data Science**, during the academic year **2023-2024** in the satisfactory manner as per the curriculum laid down by University of Mumbai.

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ACKNOWLEDGEMENT

This project would not have come to fruition without the invaluable help of our guide **Prof. Sheetal Jadhav**. Expressing gratitude towards our HOD, **Prof. Anagha Aher**, and the Department of CSE Data Science for providing us with the opportunity as well as the support required to pursue this project. We would also like to thank our project coordinators **Prof. Vaibhav S. Yavalkar** and **Prof. Avani Nair** who gave us valuable suggestions and ideas when we needed them. We would also like to thank our peers for their helpful suggestions.

TABLE OF CONTENTS

Abstract

1. Introduction.....	1
1.1.Purpose.....	1
1.2.Problem Statement.....	2
1.3.Objectives.....	2
1.4.Scope.....	3
2. Literature Review.....	4
3. Proposed System.....	7
3.1. Features and Functionality.....	7
4. Requirements Analysis.....	8
5. Project Design.....	9
5.1.System Architecture	9
5.2.Implementation	10
6. Technical Specification.....	13
7. Project Scheduling.....	14
8. Results.....	17
9. Conclusion.....	18
10. Future Scope.....	19

References

Abstract

In this project we experimentally studied the effect of a Restaurant Ordering and Invoicing System by creating an application that can help various restaurants immensely. This need is generated as the restaurant industry is getting more and more competitive day-by-day. Every customer wants a full fledged experience of their dining experience which sometimes gets spoiled by errors and inconveniences caused to the waiters and staff. This app aims to make the job hassle free and easy for the staff so that they could provide a good experience to their customers.

Furthermore, we looked into the practical implications of implementing the Restaurant Ordering and Invoicing System across diverse food business. Through that, we explored its efficacy in streamlining operations, enhancing customer satisfaction, and optimizing the overall experience. By making the work simple our application seeks to help traditional restaurant management practices, offering a seamless integration of ordering, billing, and order management. With a focus on efficiency and functionality, our system aims to empower restaurant staff to deliver the best dining experiences while efficiently managing time and resources.

Chapter 1

Introduction

“Orderflow” is a restaurant ordering software designed to simplify order management, improve communication between front and back of house, and elevate the dining experience to new heights.

The restaurant industry is characterized by its dynamic and fast-paced nature, where seamless coordination between various departments is paramount. However, conventional methods of order management and invoicing often entail cumbersome procedures, leading to delays, inaccuracies, and ultimately, dissatisfied customers. Manual order taking and paper-based invoicing not only impede operational efficiency but also hinder the potential for growth and profitability. The primary objective of this project is to develop a robust and efficient billing system.

1.1. Purpose

In a restaurant, servers play a crucial role in ensuring that customers get the right food they ordered. This means they have to remember each customer's order accurately and tell the kitchen exactly what to cook. It's kind of like being a human notepad! Servers need to pay close attention to detail and have a good memory to make sure everything goes smoothly. If they forget or mix up orders, it can lead to unhappy customers and a lot of confusion in the kitchen.

If a server doesn't explain the order properly to the kitchen, or if the kitchen staff don't understand, mistakes can happen. Maybe someone gets the wrong dish or forgets an important ingredient. Good communication is like the secret sauce that keeps everything running smoothly and ensures everyone gets what they ordered.

When people working at a restaurant don't get enough training or there aren't enough of them, it can cause problems. Imagine if someone who's new or doesn't know much about their job has to take orders. They might take longer or make mistakes because they're not sure what to do.

1.2. Problem Statement

Many inefficiencies and challenges are faced by restaurants in managing orders and invoicing. Other issues like miscommunication, poor order handling, absence of order records, late serving service are faced. Sometimes, there's confusion or mistakes because people aren't talking to each other clearly. This can lead to delays in serving food, mix-ups in orders, or even forgetting to record what was ordered. And when things get really busy, it's easy for the service to slow down, making customers wait longer than they should. All these problems make it tough for restaurants to keep customers happy and things running smoothly.

1.3. Objectives

To create an application that will help make the process of ordering, serving and billing quick, easy and efficient. Therefore, dining out becomes quick, easy, and efficient, enhancing both customer satisfaction and restaurant operations.

To design an easy-to-use interface, so that the staff would only need minimal guidance before using the application. Creating an app with a super simple interface that anyone can use without much training. The design will be straightforward and intuitive, with big buttons and clear instructions. Staff will be able to navigate through the app easily, requiring only minimal guidance to get started.

To keep a record of orders and for future reference and analysis, the order and bill amount will be saved in the database. Setting up a system to keep track of all the orders and how much they cost. Every time someone places an order, we'll save that information in a database. This helps us keep a record of what was ordered and how much it cost, so we can look back on it later if we need to. It's like having a digital notebook that stores all the important details about each order, making it easy to analyze trends and keep track of expenses.

1.4 Scope

The scope of the project "Efficient Restaurant Order/Invoicing" involves several key components:

- **Order Management:** Implementing a system for streamlined order taking, processing, and communication between front-end interfaces and the back-end kitchen display or order management system. Training staff on system usage and providing ongoing support ensures successful adoption. Continuous feedback gathering and iterative improvements refine the system over time, enhancing efficiency and customer satisfaction.
- **Invoicing and Billing:** Developing an integrated invoicing system that generates and updates invoices in real-time based on the orders placed. This includes automated calculations, tax handling, and payment processing capabilities to streamline the billing process for both customers and restaurant staff.
- **Data Management:** Establishing a database infrastructure to store order and billing information for future reference, analysis, and reporting purposes. This includes maintaining records of orders and bill amounts to facilitate business insights and decision-making.
- **User Interface Design:** Designing user-friendly interfaces for restaurant staff to interact with the ordering and invoicing system efficiently. This involves creating intuitive layouts, clear navigation pathways, and responsive design elements to enhance usability and accessibility.

Overall, the project aims to improve operational efficiency, accuracy, and customer satisfaction within restaurants by leveraging web socket technology to optimize the order and invoicing process.

Chapter 2

Literature Review

A literature review is a critical evaluation and synthesis of existing research and literature on a particular topic or subject. It involves examining a wide range of sources such as academic papers, books, articles, and other scholarly materials that are relevant to the topic of interest. The purpose of a literature review is to provide a comprehensive understanding of the current state of knowledge on the subject, identify gaps or areas for further research, and establish the theoretical framework or context for the research project or study.

[1] The study by Vindya Liyanage, Achini Ekanayake, Hiranthi Premasiri, Prabhashi Munasinghe, Samantha Thelijjagoda worked on “Foody – Smart Restaurant Management and Ordering System”(2018) . They solved issues like checking availability of tables before entering the restaurants, increase the accuracy of the food ordering process, maintain the customer feedback provided for each food item. Incorporating features for customers to check table availability before arriving at the restaurant is a great way to enhance their dining experience. By integrating this functionality into the restaurant's website or mobile app, customers can view real-time information about table availability, allowing them to plan their visit accordingly and avoid long wait times. By allowing customers to provide feedback and ratings for specific dishes directly within the app, restaurants can collect valuable data to improve menu offerings, recipe formulations, and overall quality. This feedback loop fosters a sense of engagement and transparency, empowering customers to voice their opinions and contribute to the continuous improvement of the dining experience. They used methodologies like Google maps, sensor and Signal handling, graph API, 3D max and Natural Language Processing. They aimed to handle all the reservations properly as well as the orders. Because of the use of latest and the most relevant technologies the time wastage is reduced and the accuracy and confidentiality is maximized.

[2] The study by Nikhil Soni, Eeshan Gupta, Santosh Kumar, they worked on “Food Order Management System” (2023). They worked on mainly system's user-friendly interface, seamless order entry and tracking, integration with payment gateways and delivery services, and data analytics capabilities will contribute to the success and growth of online grocery ordering. Integration with payment gateways enables secure and convenient online payments, accommodating diverse customer preferences and boosting order completion rates. They used methodologies like Kitchen Order Ticket (KOT), billing, customer relationship management (CRM)Order Location and Tracking.

As a result it helps customers to make orders easily. Provides customers with the information needed to create orders. The Food web application built for restaurants and canteen can help the restaurant and mess to take orders and edit its data, and it is also built for administrators to help administrators control the entire Food system. A wide range of people can use it if they know how to operate an Android smartphone, so the implementation of an Online Food Ordering system is done to help and solve one of the important problems of people.

[3] The project conducted by Soon Nyeon Cheong, Wei Wing Chiew, Wen Jiun Yap of “Design and Development of Multi-Touchable E-Restaurant Management System” in 2010 was a multi-touch technology app for food ordering which was way ahead of its time. With a simple touch of their fingers, they can browse through various food items displayed on the table and select their desired dishes. Each touch triggers an interactive response, providing detailed descriptions, images, and prices of the chosen items. Customers can customize their orders, specify preferences, and even make special requests directly on the interactive surface. This interactive dining menu not only simplifies the ordering process but also adds an element of novelty and excitement to the dining experience. It encourages exploration, fosters interaction among diners, and creates memorable moments that customers are likely to share and remember. They used methodologies like PHP, MySQL and Adobe Flash AS3 scripting on top of Zend framework. It solved some of the limitations encountered by the PDA-based food ordering system. The MEMS provides a proper workflow for restaurant staffs to manage restaurant operations digitally, from ordering to billing systematically.

Chapter 3

Proposed System

The proposed system refers to the system that is being suggested or recommended to address a specific problem or set of challenges. It outlines the features, functionalities, and potential benefits of the system that is being proposed as a solution. It integrates various features to enhance the efficiency and convenience of restaurant operations.

3.1 Features and Functionality

Customer Readiness and Waiter Interaction: When customers are ready to place their order, they signal to the waiter, indicating that they're prepared to make their selections. The waiter, equipped with a handheld device or tablet, accesses the restaurant's ordering system through the front-end interface, which could be built using Tkinter. This interface allows the waiter to add items to the order.

Item Selection and Adding Items: Using the Tkinter interface, the waiter navigates through the menu options available in the system. Each menu item is displayed with its corresponding description and price, providing the waiter with essential information to accurately convey to the customer. Upon selecting an item from the menu, the waiter adds it to the order within the system.

Confirmation and Additional Order: Once all desired items have been added to the order, the waiter confirms the order within the system. This finalizes the selection process. If later the customer needs to add more items to the menu, the waiter can then add the respective item into the menu through live order and hence will be updated into the database system.

Table Order Status and Delivery : The restaurant's ordering system keeps track of the status of each table's order in real-time. This information is stored in the system's database and is accessible to the waiter through their handheld device. This includes information such as which tables have orders in progress and which tables are still waiting for their orders to be prepared. Based on the information displayed on the device, the waiter can prioritize which tables to attend to first. They can identify tables where orders are ready to be served and deliver the food to those tables promptly.

Chapter 4

Requirements Analysis

Some key technologies and concepts commonly used in building a restaurant billing and management system:

1. **Web Technologies:** Many modern systems are web-based, utilizing technologies like HTML, CSS, and JavaScript for the user interface. Frameworks such as React, Angular, or Vue.js are often employed to create responsive and interactive interfaces.
2. **Databases:** Structured data storage is crucial for managing menus, orders, customer information, and more. Relational databases like MySQL, PostgreSQL, or SQL Server are frequently used. NoSQL databases like MongoDB might also be employed, especially for handling unstructured or semi-structured data.
3. **RESTful APIs:** Representational State Transfer (REST) APIs are commonly used for communication between different components of the system, allowing the frontend to interact with the backend. RESTful principles help maintain scalability, flexibility, and ease of integration with other systems.
4. **Real-time Communication:** Technologies like WebSockets or Server-Sent Events (SSE) can be used for real-time updates in the system. For instance, notifying the kitchen staff when a new order is placed or updating the billing interface as items are added.
5. **Security Measures:** Implementing security measures such as HTTPS for secure communication, data encryption for sensitive information, and access controls to prevent unauthorized access to the system.
6. **Payment Gateway Integration:** Integration with payment gateways like PayPal, Stripe, or Square for processing various payment methods securely.
7. **Mobile Integration:** Developing companion mobile applications for staff or customers to manage orders, reservations, payments, and loyalty programs.
8. **Data Analytics and Reporting:** Utilizing tools and technologies for data analytics, visualization, and reporting to derive insights from sales data, customer behavior, and operational metrics.
9. **Machine Learning and AI:** Advanced technologies like machine learning and artificial intelligence can be employed for tasks such as

Chapter 5

Project Design

The project design is like a blueprint for the project. It's a plan that shows how the project works with the different components throughout. It shows how various parts of the project are connected with each other. It primarily tells about how every other component is connected to the database, the main work frame and the output user.

In our project it has various user components like:

- The Waiters
- The Restaurant Owner
- The Database

5.1 System Architecture

This is the architecture of our project where the various components of our project can be seen. This shows the connectivity of these components with each other like the owner can only access the database. The waiters login and add the orders according to the tables.

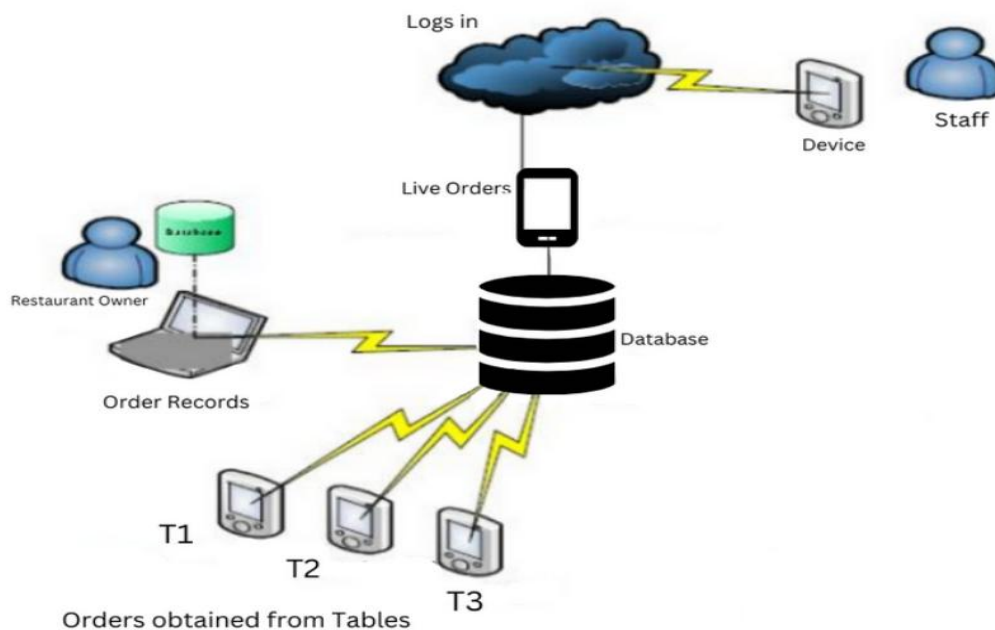


Figure 5.1 : System Architecture

5.2 Implementation

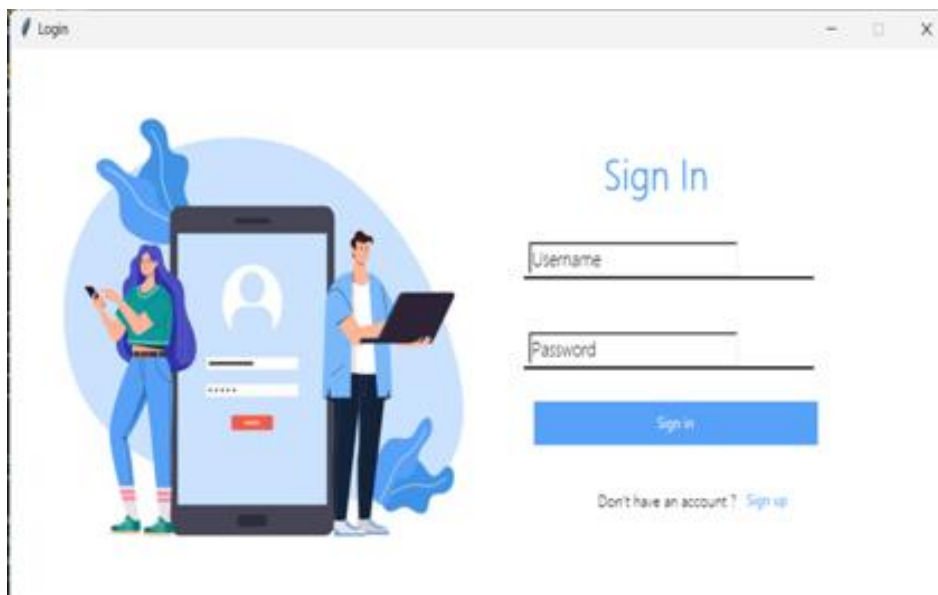


Figure 5.2.1 : Login Page

Waiters can login to get started with adding items and creating an order.

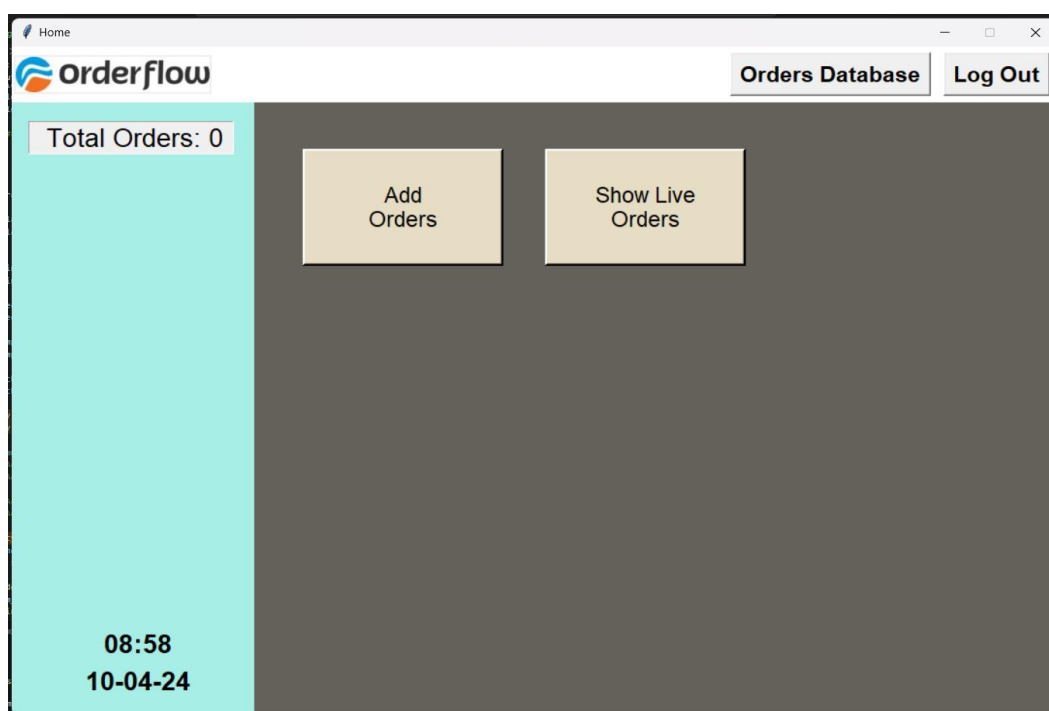


Figure 5.2.2 : Home Page

Home page has primarily two options either to add or make a new order or to show the added or running orders. If needed the log-out can be done from this page.

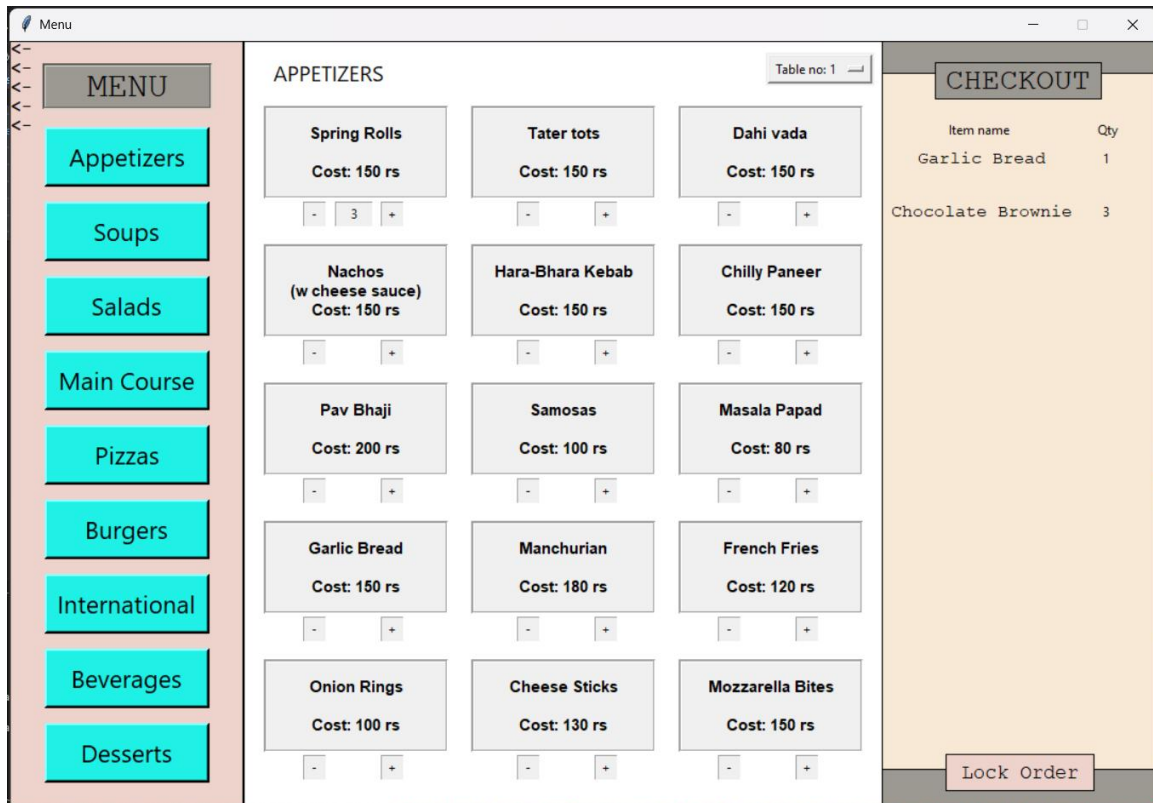


Figure 5.2.3 : Menu Selection Page

The waiter can select the table number for which the order is being taken and add the food items as per the customers requirement. Items are classified making items easy to add. After adding the items the waiter can lock the order which means the order is locked and running and will be show in ‘green’ in the live orders page.

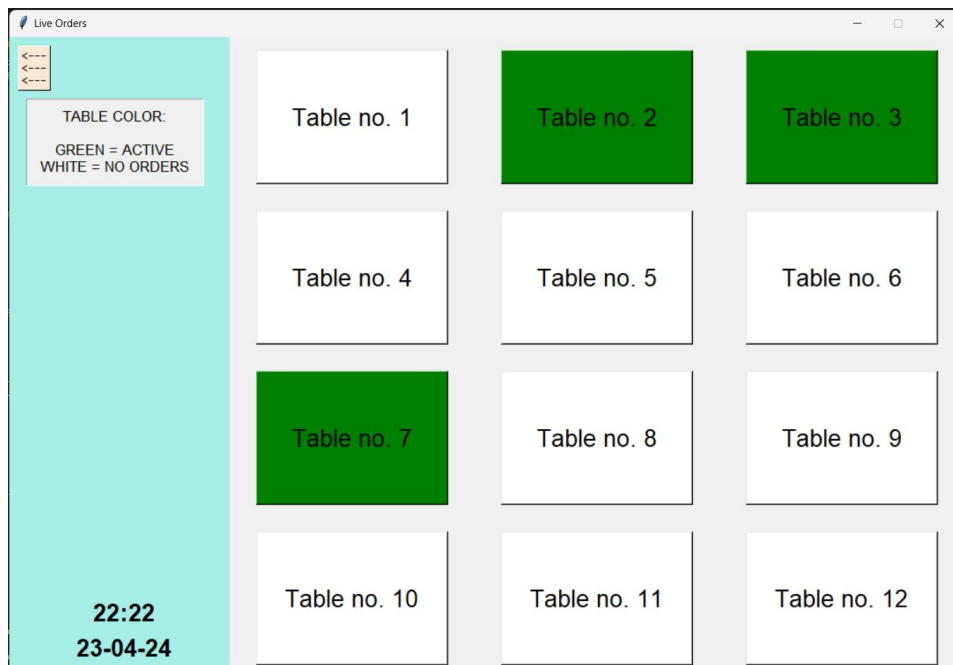


Figure 5.2.4 : Live Table Orders

The live tables turn green implying that those tables are still being served.

Live Orders

CHECKOUT

Table no: 2

Item name	Qty
Margherita	3
Spring Rolls	1
Farm House	1
Peking Duck	1
Chocolate Brownie	2
Lemon Blast	2

Show Order Complete Order

Figure 5.2.5 : Table Order

The waiter can select any table from the live orders page and then click on show order on this page which will show the added items to that respective table.

Restaurant Invoice

Item	Qty	Rate	Total
Margherita	3	100.00	300.00
Spring Rolls	1	100.00	100.00
Farm House	1	100.00	100.00
Peking Duck	1	100.00	100.00
Chocolate Brownie	2	100.00	200.00
Lemon Blast	2	100.00	200.00
Total Amount:	1000.00		

Save as PDF

Figure 5.2.6 : Bill

The invoice respective to the table will be generated once the “complete order” button is clicked.

Chapter 6

Technical Specification

Front-End:

- Tkinter (version 8.6.14)
- Python (version 3.12.2)

Tkinter is a library in Python that helps create user interfaces for desktop applications. It's like the visual part of the application that users interact with. Think of it as the face of the application, where you see buttons, menus, and input fields.

Back-End:

- MySQL (version 8.1.0)
- Python (version 3.12.2)

MySQL is a type of database software used to store and manage data. It's like a digital filing cabinet where information is stored in organized tables. In this case, it's used to store things like orders, customer details, and menu items. Python is used on the back-end to interact with the database and handle things like processing orders and generating invoices.

So, in simple terms, Tkinter creates the visual part of the application, web sockets help with real-time communication between the front-end and back-end, MySQL stores and manages data, and Python handles the logic and processing behind the scenes. Together, they form a system for efficiently managing restaurant orders and invoicing.

Chapter 7

Project Scheduling

Project Scheduling refers to the process of planning and organizing the tasks and activities required to complete a project within a specified time frame. This section outlines the timeline, topics to be covered and members involved in the project, detailing when each task will be performed and by whom.

Sr. No	Group Member	Time duration	Work to be done
1	Abhimanyu Gauri Iyer Kisan Jena	1 st and 2 nd week of January.	Group Formation, Topic finalization and Identify Objectives.
	Ganesh Patil	3 rd and 4 th week of January.	Identify Functionalities and discuss the project with paper prototype.
2	Abhimanyu Gauri Iyer Kisan Jena	1 st and 2 nd week of February.	Implementation of Graphical User Interface (GUI).
	Ganesh Patil	3 rd and 4 th week of February.	Connections of all the GUI pages and Presentation I.
3	Abhimanyu Gauri Iyer	1 st and 2 nd week of March.	Database Design and Database Connectivity.
		3 rd and 4 th week of March.	Integration of modules.
4	Abhimanyu Gauri Iyer	1 st week of April.	Report Writing.
	Abhimanyu Gauri Iyer Kisan Jena Ganesh Patil	2 nd week of April.	Presentation II

GANTT CHART :

A Gantt chart is a visual timeline that shows all the tasks needed for a project and when they need to be done. It's like a to-do list, but it helps you see everything at once. Each task is shown as a bar on the chart, with the length of the bar representing how long it will take. This chart helps everyone involved in the project understand what needs to be done and when, making it easier to plan and keep track of progress.

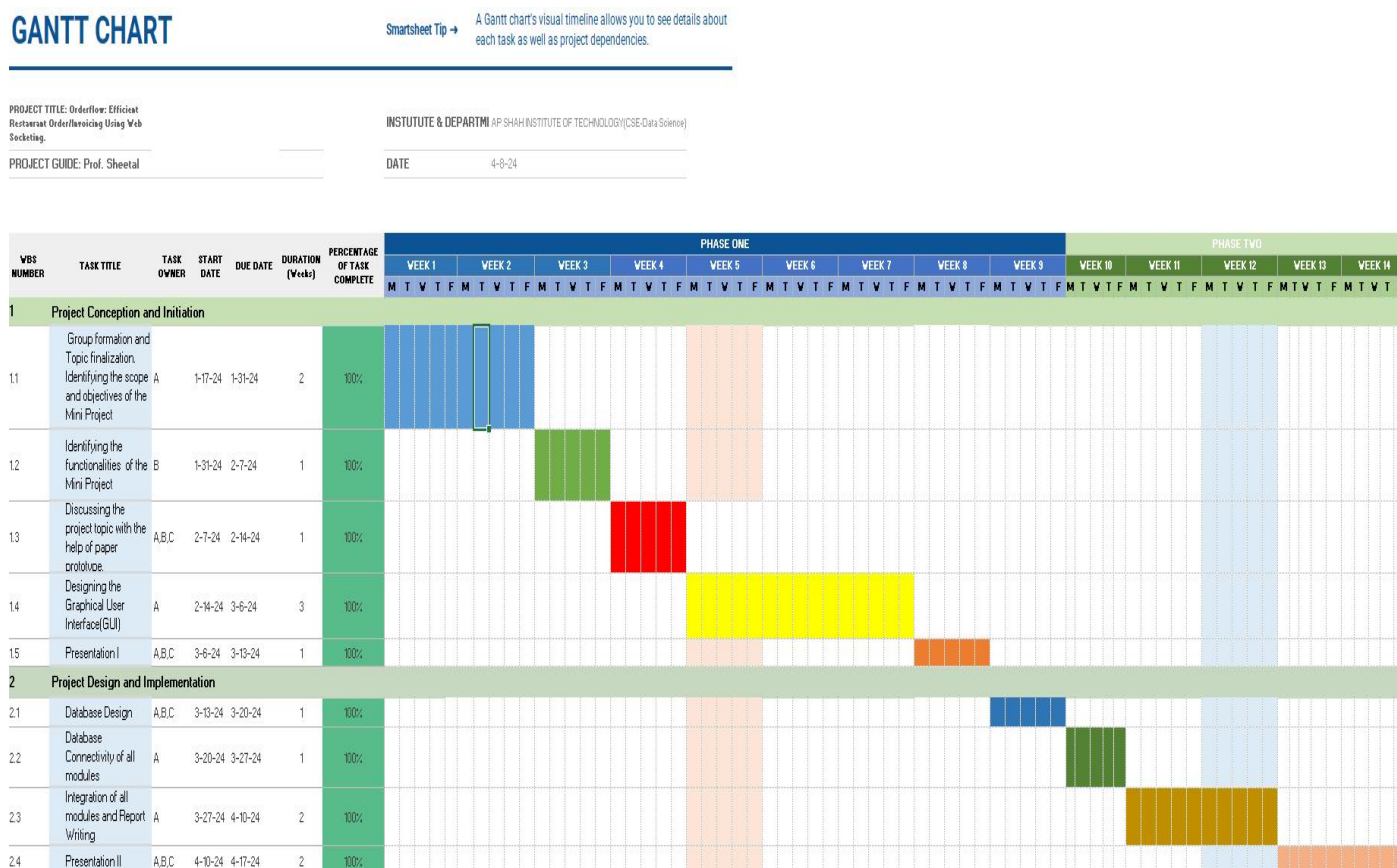


Figure 7.1 : Gantt Chart

Following is the detail of the Gantt chart – In the third week of January, Abhimanyu Deshmukh, Gauri Iyer, Ganesh Patil and Kisan Jena formed a group for their mini project. They discussed and finalized the project's topic, scope, and objectives during this meeting. In the following weeks, Gauri Iyer Abhimanyu Deshmukh and Kisan Jena used a paper prototype to explore and refine project ideas, completing this phase by the 2nd week of February.

In late February, Abhimanyu Deshmukh, Gauri Iyer and Ganesh Patil executed the design and integration of the graphical user interface (GUI). Afterwards, on 15th March, the first project review took place, and the faculty suggested some changes to the GUI, which were subsequently approved. Following this, Abhimanyu Deshmukh and Gauri Iyer collaborated to create a structured database system, facilitating the systematic storage of information.

This, in turn, made it easier for Gauri Iyer, Abhimanyu Dehmukh and Kisan Jena to connect the database to the project. This database work was completed by end of March. Finally, the team integrated all modules and completed the report writing, resulting in their final presentation on 10th April, which was approved by the faculty.

Chapter 8

Results

Implementing “Orderflow: Efficient Restaurant Order and Invoicing” can yield several positive outcomes. We saw numerous changes which were brought to the overall system and process of managing the orders and customers in any restaurant.

1.Live Order Updates: Once an order is taken from the customer, Live Orders are shown of the respective tables with its order menu. If needed more items can be added into the order and hence will be updated into the database. This brings flexibility to the customer needs and increases efficiency of the Restaurant ordering system.

2.Improved Customer Experience: The access to live orders to the waiters lead them to work more efficiently which further leads to faster order processing and enhancing the overall dining experience for customers, leading to higher satisfaction levels and potentially increased repeat business.

3.Efficient Invoicing: With the help of the system software, proper orders are then converted into bills, which result in efficient Invoicing. The bills generated are errorless and are generated table wise everytime. On every order completion the orders on that table become null which means it is further ready for new orders.

4.Reduced Errors: By providing instantaneous feedback on order status and billing information, it helps minimize errors in order processing and invoicing, leading to improved accuracy. Each order has an unique table number which represents the unique order for each set of customers. This avoids mismatch and shuffling of orders among different tables.

5.Cost Savings: By streamlining order processing and reducing errors, implementing efficient restaurant order and invoicing can lead to cost savings associated with labor, materials, and potential loss due to order inaccuracies. Overall, implementing efficient restaurant order and invoicing using web sockets can significantly improve operational efficiency, customer satisfaction, and profitability for restaurants.

Chapter 9

Conclusion

In conclusion, the development of an Efficient Restaurant Order and Invoicing system is crucial for streamlining operations, enhancing customer satisfaction, and driving business success in the competitive restaurant industry. It helps them run more smoothly, makes customers happier, and ultimately helps the restaurant do better in a tough industry. When things are efficient, customers get their food faster and with fewer mistakes. Plus, it makes it easier for the restaurant to keep track of everything and make smart decisions to grow their business.

Additionally, methodologies such as agile development, user experience design enables improvement, seamless user experiences, and data-driven decision-making. Furthermore, using methods like agile development and user experience design helps make things even better. With agile development, teams can work quickly and adapt to changes easily, which means improvements happen faster. User experience design focuses on making sure the app or system is easy and enjoyable to use, so customers have a smooth experience. And by using data to make decisions, restaurants can understand what works best and keep making things even better for their customers. So, these methods help restaurants keep improving, making things easier for everyone involved.

Ultimately, a well-designed and implemented order and invoicing system empowers restaurants to deliver exceptional service, maximize efficiency, and foster long-term customer loyalty. In the end, having a really good system for taking orders and managing invoices helps restaurants give great service, work more efficiently, and keep customers coming back again and again. When everything runs smoothly, customers feel happy and satisfied with their experience. Plus, it makes it easier for the restaurant to keep doing a great job and build strong relationships with their customers over time. So, having a top-notch order and invoicing system is key to making sure a restaurant can thrive and keep its customers happy in the long run.

Chapter 10

Future Scope

The future scope of the project could involve several potential areas of expansion and enhancement. These are the various scopes in which involvement or collaboration with this project can lead to even more helpful tech-application.

1. **Integration with Emerging Technologies:** As technology continues to evolve, there may be opportunities to integrate emerging technologies such as artificial intelligence (AI), machine learning, or augmented reality (AR) into the system. This could enable more personalized recommendations, predictive ordering, or immersive dining experiences.
2. **Expansion to Additional Features:** The project could explore adding new features to further enhance the dining experience, such as loyalty programs, digital menu boards, or tableside ordering and payment through mobile devices.
3. **Scaling to Multiple Locations:** If successful, the project could be scaled up to serve multiple restaurant locations, offering a centralized platform for order and invoicing management across a restaurant chain.
4. **Enhanced Analytics and Insights:** Increasing the focus on data analytics and business intelligence capabilities could provide deeper insights into customer behaviour, menu performance, and operational efficiency, enabling more informed decision-making and strategic planning.
5. **Accessibility and Inclusivity:** Future iterations of the project could prioritize accessibility and inclusivity, ensuring that the system is usable by all customers, including those with disabilities or special requirements.
6. **Partnerships and Integrations:** Collaborating with third-party vendors or integrating with other platforms (such as delivery services or reservation systems) could further extend the functionality and reach of the system, offering added convenience and value to both restaurants and customers.

Overall, the future scope of the project is broad and dynamic, offering numerous opportunities for growth, innovation, and adaptation to meet the evolving needs and expectations of the restaurant industry and its customers.

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