IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

BookEat a Restaurant Preorder & Booking System

[1]Omkar Kadam, [2]Pranav Bhosale, [3]Pravin Tiwade, [4]Shital Suryawanshi

Students at Padmabhooshan Vasantraodada Patil Institute of Technology, Budhgaon

Department Of Computer Science and Engineering

Abstract: In this project, we propose the development of an innovative pre-ordering system for hotel restaurants to address the prevalent issue of extended wait times for travelers. The system will be implemented as a mobile application, allowing hotel guests to customize and pre-order their meals in advance. This proactive approach aims to minimize wait times, streamline the dining process, and enhance overall guest satisfaction.[4] The system's functionality includes a user-friendly interface that enables guests to browse restaurant menus, customize their orders, and specify dietary preferences. The order is placed, and payment is processed in advance, with meal preparation initiated as the user approaches the hotel. Upon check-in, the freshly prepared food is ready for quick pickup or delivery to the guest's room. Key benefits of the proposed system include time savings, reduced frustration, and a more flexible and convenient dining experience for guests. Additionally, the system is expected to drive increased revenue to hotel restaurants, enhance guest loyalty, and improve overall satisfaction.[3] The implementation plan involves the incorporation of advanced features such as real-time maps and push notifications. To ensure a successful rollout, the project recommends starting with large hotel chains in major markets before expanding globally. The anticipated impact of this project aligns with the growing trend of digitalization in the restaurant industry, offering a modern solution to enhance the dining experience for travelers.[2]

I. INTRODUCTION

1.1. Background:

In 20th century, when cities became more urbanized and connected globally, restaurants and eateries started growing in size in major Indian cities. People who like to start a restaurant business often choose it because it's an easy business especially for those with small budget. Restaurants, even the small ones, started serving many types of taste buds. In the time before digital advancements, when people wished to book a table at a restaurant in India, they would typically accomplish this by calling the establishment directly.[1] The booking details that need to be provided often consist of how many individuals will be coming for dinner, along with their contact information and preferred date and time for their visit. Some restaurants continue to write down all the bookings made by customers on paper or note them in their mobile phones.[1] The rise of internet and mobile advancements during the end of 20th century and start of 21st century greatly transformed the dining scenario in India. This digital revolution led to an increase in online food ordering, as well as table booking platforms becoming more popular. Businesses such as Zomato, Swiggy and Dineout were key innovators who first introduced online food delivery along with restaurant finding services into Indian market.[2] These platforms permitted users to look through restaurant menus, read evaluations on them and place food orders over the internet. When smartphones became more popular, people started using mobile applications for food ordering and discovering restaurants. These kinds of apps gave users an easy way to find nearby places to eat, check out what's on their menu and order from there too.[3] A large number of restaurants in India joined forces with online food ordering platforms to increase their potential clientele and visibility. They often collaborated by providing distinct offers, discounts and promotions for those who made bookings via these systems.[4]

1.2. Application in General Form in different areas:

The concept and capabilities underpinning advanced pre-ordering have become widely adopted across many industries beyond just food delivery. The ability to customize orders in advance, accurately predict readiness times, smoothly handle payments, and coordinate timely pickup or handoff of goods provides value across sectors.[5]

1.2.1. Starbucks Mobile Ordering

- Customers can order and pay for drinks in advance through the app.
- Drinks are queued when customer is geographically near so ready upon arrival.
- Users can save custom drink recipes and link payment accounts.
- Avoids standing in line which improves customer experience.

1.2.2. Walmart Grocery Pickup

- Customers select delivery windows and specify if curbside or in-store pickup preferred.
- Whole grocery order is shopped by Walmart staff according to list.

• Dynamic etas account for warehouse busyness and delivery route.
• Notifications alert customers when order is ready for pickup.

1.2.3. Uber Scheduled Rides
• Riders can book a specific pickup time and location in the future.
• Useful for rides to airport, events, appointments.
• Integration with calendar helps schedule easily.
• Price estimates provided prior to booking.

1.2.4. Transit Arrival Notifications
• Apps access real-time location data of buses and trains.
• Machine learning algorithms estimate arrival times at each stop.
• Riders get alerts if vehicles delayed so they can adjust plans.
• Greatly improves predictability of public transportation.

1.3. Challenges in Existing System:

1.3.1. Delivery Time and Quality:
Keeping fast delivery times at par with food quality might be a struggle. Platforms for ordering food could concentrate on enhancing the logistics of deliveries, such as planning routes and assigning drivers, to lessen distribution duration and enhance the complete service quality. [6]

1.3.2. Long Wait Times:
If someone cannot pre-order, they will probably need to wait for their food after finding a seat. This could make the total time spent dining longer, which might not be good for people who are in a hurry or those who don't like waiting much.

1.3.3. Coordination Challenges:
When the delivery platform is mainly for making table reservations, it might be difficult to coordinate well with restaurant staff. This could result in slow food preparation and service.

1.3.4. Resource Allocation:
Restaurants might be assigning table space and servers beforehand for booked reservations, even if the diners have not yet placed their orders. This sort of resource allocation could cause higher operational expenses due to inefficiency in utilizing resources available to them. [8]

II. LITERATURE SURVEY

2.1. Existing Work

Sr. No	Title	Author	Publication	Publication year	Limitation	Proposed Solution
1.	Introduction to Recommender Systems Handbook	Ricci et al.	Springer	2021	Computational complexity for some techniques	Use lightweight algorithms tailored for food
2.	Restaurant Table reservation using time-series prediction	Fahim Rarh, Dastgir Pojee, Sajjad Zulphekari	IEEE	2017	Only used for table reservation	Using time-series prediction and deliver order to restaurant.
3.	Intelligent Agent Systems for Restaurant Reservation and Ordering	Kuo et al.	IEEE Intelligent Systems	2019	Narrow AI capabilities and risk of bots failing	Robust conversational interfaces and seamless handoffs
4.	A Reservation-Based Smart Restaurant Management System	Son et al.	IEEE Transactions on Consumer Electronics	2011	Limited customizability and reliance on manual efforts	Enable flexible self-service management
5.	Impact of Tabletop Technology on Restaurant Performance	Tan and Netessine	Harvard Business Review	2017	Does not address implementation challenges	Include restaurant change management processes

6.	Restaurant Management Website	Akhil Sai Gollapudi	CBUSB Scholer Works	2023	Only for one restaurant	All partner restaurants are on website .
7.	The Future of Restaurant Management	Kimes	Journal of Revenue & Pricing Management	2014	Revenue maximization risks alienating customers	Blend revenue and service quality goals

Literature Review

2.1.1. Zomato Dining:

Zomato, a well-known food ordering and restaurant finding platform, is widely recognized. It lets people look for places to eat in their local area or where they are traveling to. You can search for restaurants based on the location, type of cuisine offered there, range of prices and ratings given by users. The platform gives thorough restaurant details like food lists, pictures, comments and contact information. But you can't reserve food through Zomato directly. When you are there in person but cannot pre-order your food, it may be necessary to wait for it to be ready after getting a seat. This kind of dining might not suit people who have limited time or those seeking fast meal options because the process could turn out less efficient than expected.

2.1.2. Dineout:

Dineout, mainly known for reserving tables at restaurants and its dining experiences, doesn't concentrate on food ordering or delivery. Dineout is a common restaurant reservation and discovery platform that gives various services connected to the activity of dining out. Users can use Dineout to find and check out many different types of restaurants in their location or place they are traveling to. People might look for restaurants using filters like location, cuisine type, ambiance and user ratings. People may review real-time table availability at several restaurants which could help in getting a reservation for their preferred dining time easier. If people make reservations through Dineout but cannot pre-order food, they may still have to wait at the restaurant, especially when it is busy during high dining times. This can lead to longer dining durations and potential inconvenience.

2.1.3. Eatigo:

Eatigo offers people the chance to look at and make restaurant bookings in many different kinds of places for eating, such as cafés, restaurants, and eateries. You can pick a time you like to dine and how many guests are coming with you when making a reservation through this platform. It shows you the current availability status of restaurant seats. Eatigo is mainly centered on providing discounts for reservations at restaurants during non-peak hours; it does not offer services related to ordering or delivering food from these places.

2.1.4 Opentable:

Opentable, a well-known and frequently used platform for booking tables at restaurants, offers services that let people find, reserve and handle their restaurant visits in an organized manner. Opentable aids users in discovering diverse types of restaurants including casual eateries as well as sophisticated dining spots. Users can search for restaurants based on location, cuisine type, availability, and user ratings.

Opentable is mostly used for making restaurant reservations and handling dining situations, not for booking food or ordering it. Sometimes, there could be waiting periods at the restaurant that you are trying to reserve a table at. The time you need to wait might change depending on how many people can be seated in the place and how long it takes to prepare orders (which may affect those who want an immediate dining experience)

2.1.5 Easydiner:

Easydiner offers the chance to find many types of restaurants, such as fancy dining places, casual eateries, cafes and more. You can look for these restaurants by their location or what kind of food they serve among other things. But keep in mind that the availability and coverage of Easydiner can change depending on the region or city you are in. In places that are not very urban or more distant, users could see less number of restaurants and booking slots on the platform.

2.2. Theory of Work

This project aims to address key challenges in the restaurant dining experience, like long wait times, inadequate table availability, and lack of menu transparency, by developing an online reservation and pre-order platform. Customers can discover dining options, book tables in advance, and order upcoming meals for either delivery or timed dine-in. Restaurants gain tools to manage variable demand, plan inventory, and smooth operations.[9]

The system design is influenced by research on recommendation algorithms, which can suggests personalized options by learning from customer history and context. Queueing theory principles on arrival rates and process capacity inform the reservation feature. The platform architecture follows a distributed services pattern, decomposing the domain into logical layers like presentation, business logic, and data.

A user-centered design philosophy will inform interfaces and experiences. Assumptions include eager marketplace adoption of pre-ordering, sufficient restaurant tech savviness, and growing diner preference for digitized dining.[9]

Core differentiators lie in integrating reservations, pre-ordering, and intelligent recommendations into a single platform tailored for food service. By blending these capabilities with strong operational features for restaurants, an innovative product can emerge.[10]

III. REQUIREMENT ANALYSIS

3.1. Introduction

We have a plan to change how travellers eat in hotel restaurants by creating an inventive online booking and pre-order system. This will let users use easy app features for selecting their meals beforehand, which reduces waiting times significantly while giving more convenience to them. Our solution is also beneficial for hotel restaurants because it saves time, increases customer satisfaction, boosts revenue and builds loyalty among guests.

3.1.1. Purpose:

The purpose of our project, centered around the development of an online restaurant reservation and pre-order platform, is to address the prevalent challenges faced by travelers and diners. The primary goal is to enhance the dining experience for hotel guests by offering a streamlined solution that allows them to pre-order meals from hotel restaurants in advance. This innovation aims to eliminate the frustration caused by long wait times and delays in getting seated after a day of travel. The project intends to introduce an intuitive app that empowers users to browse hotel restaurant menus, customize their meals, and place orders with specified dietary preferences. The key focus is on saving guests time, reducing frustration, and providing a convenient way for them to have freshly prepared food ready upon check-in. Moreover, the project seeks to drive additional revenue to hotel restaurants, foster guest loyalty, and improve overall satisfaction.

3.2. Project Scope

3.2.1. Inclusion

a. User Authentication and Authorization:
Implementing secure user authentication mechanisms using Django's built-in libraries, and Twillio OTP services API.

b. Intuitive User Interface:
Developing a user-friendly interface using Javascript and Bootstrap for seamless navigation and interaction.

c. Restaurant Discovery:
Allowing users to browse and discover various hotel restaurants. Displaying detailed restaurant information, including menus and images.

d. Pre-order Functionality:
Enabling users to pre-order meals in advance from the hotel restaurant of their choice. Customizing orders with options for dishes, sides, and beverages.

e. Payment Processing Integration :
Integrating the RAZORPAY payment API for secure and convenient payment

3.2.2. Exclusion

a. Native mobile application development:
The project will focus on web-based platforms initially, and the development of native mobile applications for ios and android is excluded from the current scope.

b. Advanced analytics and reporting:
Detailed analytics and reporting features, such as customer behavior analysis or sales trends, are excluded from the initial phase.

c. Hotel inventory management:
In-depth hotel inventory management, including tracking and managing stock levels of ingredients and supplies, is excluded from the current scope.

d. Staff roster and shift management:
Detailed staff rostering functionalities, including shift planning and management, are excluded from the initial phase.

e. Non-registered customer feedback:
feedback and survey features will be limited to registered customers.

3.3. External Interface requirements

3.3.1. Hardware Interface

The online restaurant reservation and pre-order platform operatse on standard hardware commonly used by end-users.

a. User Devices: Desktops and laptops with modern web browsers for accessing the platform. Smartphones and tablets for mobile access through a responsive web design.

b. Servers: Deployment on dedicated VPS for server infrastructure.

3.3.2. Software Interface

a. Database Management System (DBMS): The system utilizes a robust DBMS to store and manage extensive datasets related to Menu, User Account, Order, Reservation, User Authentication and other dependant entities.
b. Web Development Frameworks: The system's user-friendly web interface is developed using frameworks like Django to ensure smooth navigation and interaction for end-users.

3.3.3. Communication Interface

a. Internet Connectivity: Seamless and reliable internet connectivity is a fundamental requirement to facilitate real-time data updates and communication between the user interface and the back-end systems.
b. RESTful APIs: Utilizing the REST architecture, RESTful APIs enable stateless communication over standard HTTP methods like GET and POST, emphasizing simplicity and scalability through resource-based endpoints.
c. Third-Party APIs: Third-party APIs are external service interfaces, offering diverse functionalities such as payment processing and communication. They streamline development by providing pre-built, customizable features, though considerations for authentication and potential costs are essential.

3.4. Non-Functional Requirements

a. Security Measures:
User Authentication: Secure user authentication using Django libraries, ensuring encrypted storage of user credentials.
b. API Integrations:
External Payment API Integration: Secure integration with RAZORPAY payment API and Twillio API for User authentication and authorization following industry standards for transaction confidentiality and integrity.
c. Infrastructure and Scalability:
Cloud Infrastructure: Utilization of dedicated VPS services to securely deploy the system for open public access.
d. User Experience:
Performance: Platform optimization for swift response times, efficient data processing, and caching mechanisms for an enhanced user experience.
e. Compatibility:
Cross-Browser Compatibility: Ensured compatibility with major web browsers (Google Chrome, Mozilla Firefox, Safari, Microsoft Edge) for a consistent user experience.

IV. DESIGN METHODOLOGY

4.1. Introduction to design methodology:

The pre-order platform is built using a modern tech stack designed for scalability, reliability, and efficient development. The frontend leverages Javascript and Bootstrap for responsive and adaptive UI components tailored to both web and mobile experiences. Django and Python power the backend REST APIs and integration layers. PostgreSQL hosted on SupaBase provides robust relational data storage.

4.2. Model Approach:

a. Entity Identification:
The first step in our model approach involved identifying the core entities that represent the primary components of our system. These entities include, but are not limited to, 'User,' 'Reservation,' 'Table,' and 'Menu Item.'
b. Attribute Definition:
For each identified entity, we meticulously defined the attributes that encapsulate the relevant information. For instance, the 'User' entity may include attributes such as 'UserID,' 'Username,' and 'Password,' while the 'Reservation' entity may encompass attributes like 'ReservationID,' 'Date,' and 'Status.'
c. Relationship Mapping:
Once the entities and attributes were established, we delved into mapping the relationships between them. For example, a 'User' can be associated with multiple 'Reservations,' indicating a one-to-many relationship. The 'Table' entity, on the other hand, is related to 'Reservation' in a many-to-one relationship.
d. Database Schema Design:
With a clear understanding of entities and relationships, we proceeded to design the database schema. Our schema adheres to the principles of normalization to eliminate redundancy and maintain data integrity. Tables were created for each entity, and appropriate foreign keys were introduced to enforce referential integrity.
e. Key Constraints:
Primary keys and foreign keys were carefully assigned to each table to ensure uniqueness and establish connections between related entities. These key constraints play a crucial role in preserving data integrity throughout the system.

f. Data Integrity Measures:

In addition to key constraints, we implemented various measures to ensure data integrity, including unique constraints and check constraints. These mechanisms safeguard the consistency and validity of the data stored in the system.

g. Scalability Considerations:

Anticipating the potential growth of data, our data model is designed with scalability in mind. We considered factors such as indexing, partitioning, and efficient query design to support the system's scalability as usage increases.

h. Handling Time-sensitive Data:

Given the nature of our system, which involves reservations and food orders with specific timeframes, special attention was paid to handling time-sensitive data. The data model accommodates temporal constraints to accurately represent and manage time-related information.

i. Indexing Strategy:

To optimize database query performance, we carefully selected fields for indexing based on the expected usage patterns. This indexing strategy contributes to efficient data retrieval, especially in scenarios where rapid access to specific data subsets is crucial.

j. Data Migration and Seeding:

We outlined a strategy for data migration and seeding to initialize the database. This involves a systematic process for inserting initial data and maintaining consistency as the system evolves.

k. Version Control for Database Schema:

Recognizing the dynamic nature of software development, we implemented a version control system for the database schema. This allows for systematic management of schema changes, ensuring a seamless evolution of the database structure while preserving data integrity.

In summary, our model approach encompasses a meticulous process of entity identification, attribute definition, relationship mapping, and database schema design. The resulting data model is crafted to uphold data integrity, support scalability, and efficiently handle the temporal and relational complexities inherent in our Restaurant Pre Booking and Ordering System.

V. System Design

5.1. System Architecture:

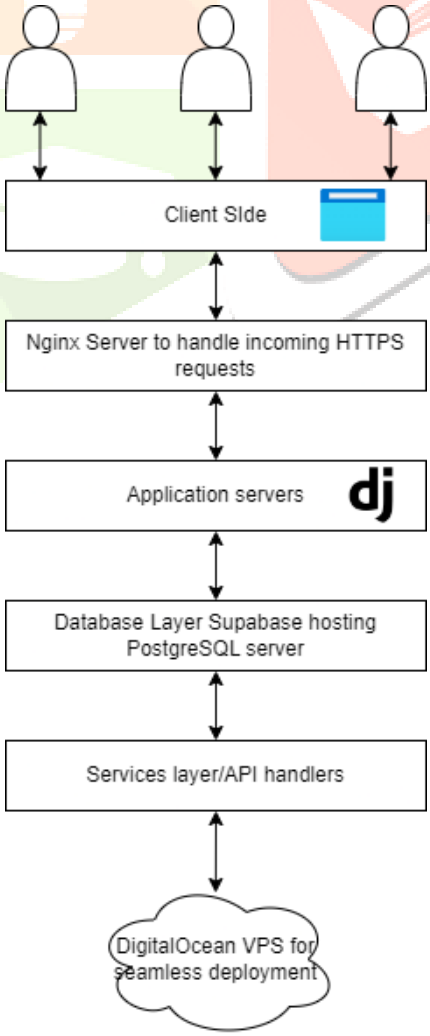

Fig. Developmental Architecture of Proposed System

The system consists of several layers and components that work together to provide a seamless user experience.

a. The Top Layer:
It is the user interface layer, which includes a web browser.

b. The Second Layer:
It is the client-side layer, which handles incoming HTTP requests from the users.

c. The Third Layer:
It is the application servers layer, which consists of a Django app for Python and environtment to host javascript files.

d. The Fourth Layer:
It is the database layer, which consists of a PostgreSQL database for storing data and an API server for handling requests from the application servers.

e. The Fifth Layer:
It is the services layer, consisting event handlers and api request handler within the web application to manage the incoming and outgoing API calls to the staged server or third party services.

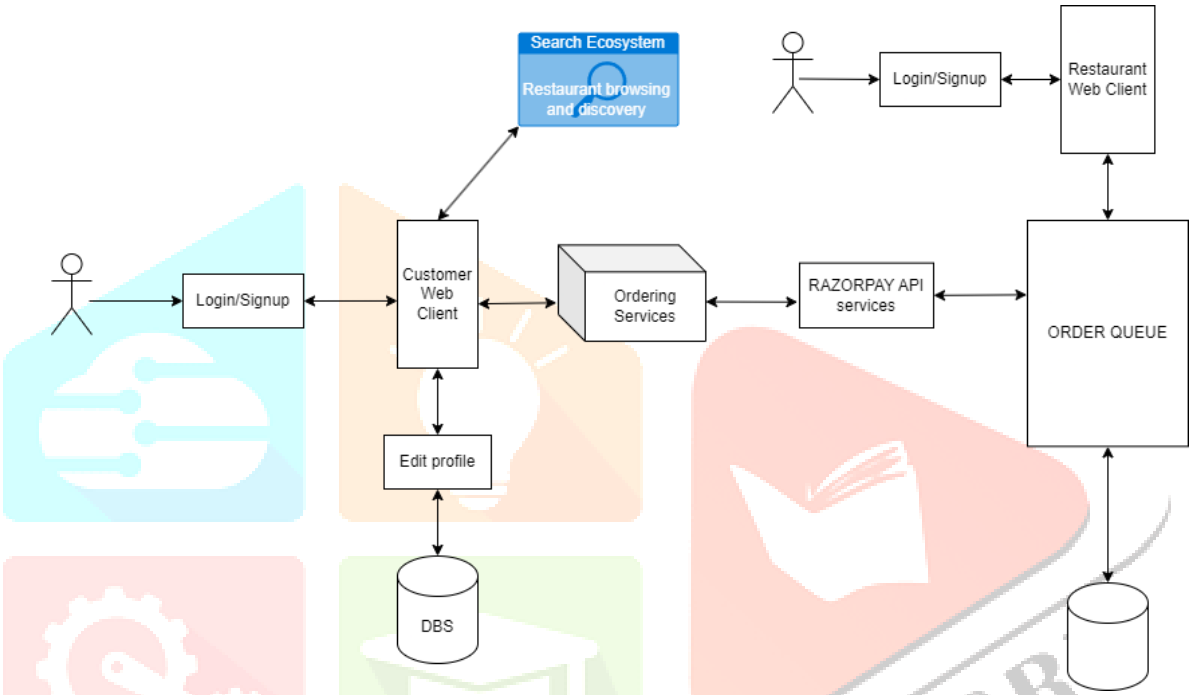

Fig. User Dataflow Diagram

a. User Interaction:

Accessing Customer Web Client Server:

- Users interact with the system through a Customer Web Client Server.
- This server serves as the entry point for users to explore the ecosystem.

Searching Ecosystem:

- Users can search for restaurants within the ecosystem using the Customer Web Client Server.

b. Order Placement:

Placing an Order:

- Users initiate the order placement process through the Customer Web Client Server.

Payment Processing:

- The Ordering Service Process handles payment processing through a 3rd Party Payment Gateway.
- Ensures secure and efficient transaction processing.

Order Publication:

- After payment processing, the order is published in the Order Queue.

c. Restaurant Interaction:

Accessing Restaurant Web Client Server:

- Restaurant representatives have access to the Restaurant Web Client Server.
- The updated order status is reflected in the Restaurant Web Client Server, providing information to the restaurant.

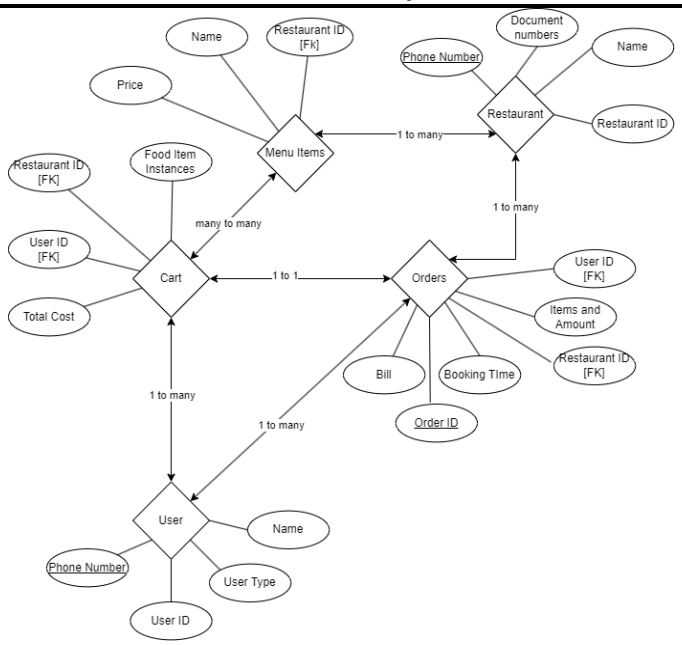

Fig. Database ER diagram

a. Menu Entity:

- Represents various food items available for ordering.
- Attributes include: restaurant-ID, price, name, and description.

b. Restaurant Entity:

- Represents individual restaurants.
- Attributes include: name, description, geographic location, category, and restaurant-ID.

c. User Entity:

- Represents users of the system.
- Attributes include: email, name, phone number, and account type.

e. Cart Entity:

- Represents shopping carts containing selected food items for purchase.
- Attributes include: total cost, quantity, restaurant-ID (foreign key), purchase status, and a reference to the Food Item instance.
- Connected to the Order Entity in a one-to-one relationship, indicating that each cart corresponds to a single order.

f. Order Entity:

- Represents customer orders placed through the system.
- Attributes include: order-ID, order status, user instance as a foreign key, cart instance, total price, and booking time.
- Connected to the Cart Entity in a one-to-one relationship, indicating that each order is associated with a specific cart.

VI. IMPLEMENTATION DETAILS:

a. Integrated Development Environments (IDEs):

Visual Studio Code:

- Utilized as the primary integrated development environment for software development.

b. Version Control System:

Git:

- Employed for version control, allowing collaborative development and code management.

c. Programming Languages/Tech Stack:

Frontend:

HTML/CSS/JS:

- Utilized for building responsive and dynamic user interfaces.

Backend:

Python (Django):

- Served as the primary programming language for backend development.

Database:

SQL (PostgreSQL):

- Chosen for its relational database management capabilities.

Development Frameworks and Libraries:

Javascript:

- Used for building the frontend, providing a component-based architecture.

Django:

- Employed as the backend framework for its Model-View-Controller (MVC) architecture.

Bootstrap:

- Applied for styling and ensuring a responsive design.

Database Management System:
PostgreSQL:

- Selected as the relational database management system for its robust features and ACID compliance.

Deployment Servers:
DigitalOcean VPS servcies:

- Selected for deployment, ensuring reliable and scalable infrastructure.

Software Architecture:
Frontend:

- Component-based architecture using Javascipt
- Adopted for the frontend development, facilitating modular and reusable code.

Backend

- MVC (Model-View-Controller) architecture with Django
- Followed for organized and maintainable backend development.

Communication Protocols:
RESTful APIs:

- Implemented for data exchange between the frontend and the database.

Security Measures:

- User Authentication using Django Libraries and Twillio API for 2FA.
- Ensured secure user authentication.

API Integrations:
External RAZORPAY Payment API:

- Implemented secure payment channel within the web application.

VII. Future Prospects:

10.1. Enhanced Personalization:
Future iterations can leverage advanced machine learning algorithms to provide even more personalized recommendations for users. By analyzing user preferences, behaviors, and contextual data, the system can refine its suggestions.

10.2. Smart Kitchen Integration:
Collaborating with restaurants to integrate smart kitchen technologies can streamline order preparation, reduce waiting times, and further optimize the overall dining experience.

10.3. Expansion to Other Verticals:
The system's framework can be adapted for use in other verticals beyond the hospitality industry. Exploring partnerships with various businesses, such as cafes, food trucks, and catering services, can diversify the platform's offerings.

10.4. Incorporating Sustainability Practices:
Future updates could include features that promote sustainable and eco-friendly practices, such as highlighting restaurants with environmentally conscious initiatives or providing information about locally sourced ingredients.

10.5. Real-Time Collaborative Dining:
Enabling users to invite friends to join their dining experience, share orders, and collectively contribute to a shared dining event could be a unique feature to explore.

10.6. User Engagement:
Implementing loyalty programs, exclusive offers, and interactive challenges can maintain user engagement and encourage ongoing usage of the platform.

VIII. Conclusion:

The pre-ordering system for hotel restaurants represents a groundbreaking initiative, addressing dining challenges by offering a user-friendly solution to customize and pre-order meals, saving time and enhancing satisfaction. The strategic rollout plan focuses on major hotel chains in key markets to validate effectiveness before potential global expansion. Rooted in a thorough analysis of industry challenges, this project aligns with the growing global restaurant digitalization market, providing a scalable, secure, and modern solution that not only tackles current issues but also sets the stage for future innovations in digital dining services.

IX. References:

1. Ricci, F., Rokach, L., & Shapira, B. (2021). Introduction to recommender systems handbook. Springer.
2. Restaurant Table reservation using time-series prediction(2017). Fahim Rarh, Dastgir Pojee, Sajjad Zulphekari IEEE Xplore Compliant.
3. Kuo, T., Akoglu, H.T., & Faltings, B. (2019). Foodbot: An intelligent agent for restaurant recommendation and meal ordering. IEEE Intelligent Systems, 34(2), 2-8.
4. Son, J., Thomas, P., Alelaiwi, A., & El Saddik, A. (2017). A reservation-based smart restaurant management system using multiple centralized servers. IEEE Transactions on Consumer Electronics, 63(2), 178-185.
5. Tan, E. & Netessine S. (2019). When you should wait for restaurant technology to catch up. Harvard Business Review, 97(4), 128-133.

6. Hu, M.M. and Yu, S., 2019. Restaurant table reservation using time-dependent demand forecasts. Journal of the Operational Research Society, 70(1), pp.21-31
7. Global Restaurant Digitization Market by Component [Report ID- 101122. Market.us] May 2023
8. Kimes, S.E. (2011). The future of restaurant revenue management. Journal of Revenue & Pricing Management, 10(5), 480-485.
9. Restaurant Table reservation using time-series prediction, Proceedings of the 2nd International Conference on Communication and Electronics Systems (ICCES 2017) IEEE Xplore Compliant - Part Number:CFP17AWO-ART, ISBN:978-1-5090-5013-0
10. Foody - Smart Restaurant Management and Ordering System, Vindya Liyanage; Achini Ekanayake; Hiranthi Premasiri; Prabhashi Munasinghe; Samantha Thelijjagoda; 2018 IEEE Region 10 Humanitarian Technology Conference (R10-HTC)