

Restaurant Reservation System: "Book Your Meal"

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Abstract—

Restaurant reservation system aims at developing an android based application that will allow the users to book a restaurant and pre-order foods where-ever applicable. The objectives are set very simple and user friendly to meet the requirements of all age groups. This will allow the restaurant managers to manage their booking effectively and efficiently. Further, the clients will also be benefited since they will be able to book their meal along with space that will save their time. Restaurants will offer their space (as available) to the clients. Clients will set their requirements with few taps. Once the requirements are met, clients booking will be 'Confirmed' right away. If the requirements are not met, request will be shown as 'Pending' or upon all booked, 'Unavailable space' will be prompted. The entire procedure will take less than thirty seconds. The primary goal is set on the option of reserving tables while ordering food will be considered as secondary. Initially, restaurants located at Sagufa Area (Near DOHS Mirpur), Army Golf Club, Kurmitola Golf Club and Captains World will be included in the list. Customer Registration, Customer Login, Book Table, Order Food are few basic modules that will be implemented using Android Studio, Firebase (Database support). This will provide complete flexibility and guaranteed service to the client/customers and will also expedite restaurant services at a larger scale.

Index Terms—Book Your Meal, Restaurant Reservation, Order Your Food, Online Reservation, Book Your Seats

I. INTRODUCTION

The wave of Restaurant Business in Bangladesh, is changing very frequently and emerging with greater scope and customer oriented facilities. Under the umbrella of B2C (Business to Customer) presently a good number of brand food courts are competing to please their customer/clients with variety of options in regards to food and functions. Since the world is moving its direction towards automation therefore, it plays a very vital role in business as well. To achieve Business goals, every stakeholders in the circle needs to reach its clients for advertisements, offers, information and latest developments to keep pace with the changing world. Basing on the best available service offers, client chooses accordingly. Since, time plays important role for every decisions of the client thereby, primary objective of the business today is to provide the best service within the minimum possible time, which generate clients for their organization.

To attain these objectives, restaurants must optimize their services to handle good number of customers effectively with limited manpower. And thereby the need for internet within the business is crucial. 'Book Your Meal' will be the right choice for those who believes in expedite working environment

with greater profit margin and best time management activities. Today's generation loves the world of internet. They are motivated to internet marketing (e-commerce), social media campaign etc. Focusing on those issues our application is designed to provide quickest service delivery from clients point of view.

'Book Your Meal' is the first Restaurant Reservation Application in Bangladeshi market which will allow its customers/clients to access and book restaurants of their choice prior visiting the place including the order of the foods if required. It provides the option to schedule the booking for a fixed time. All these functionalities are very simply defined for better understanding of the clients and to complete the process within minimum possible time. Practically it eliminates the system loss e.g you are visiting a restaurant on a busy day and found their entire space is occupied. So, it allows you to save your time, helps the restaurant authority to schedule their food order, automates the client management thereby ensures hassle free services from all corners. Book Your Meal have a very simple interface and is connected through Firebase database in the back-end.

The rest of the paper is organized as follows: Section II presents the related works in the relevant field, section III demonstrates the present scenario while IV describes the features, conceptual design and implementation along with the work flow of our proposed approach. The overall discussion has been added in Section V. Section VI discusses the limitation and future expansion of our system. Finally, Section VII concludes the paper.

II. LITERATURE REVIEW

It was only a matter of time before someone found a way to make money in the restaurant business without actually owning one or working in one, another disruptive technology changing the way we live. We can give the example of Uber (<https://www.uber.com>), which is in the taxi business but they are not committed to assets because Uber owns no taxis. And in the sector of restaurant reservation OpenTable (<https://www.opentable.com/>) is one example of a technology we can use to enhance our pursuit of enriching experiences. It also doesn't have any restaurants. Questions can come to mind why this sector is going to hit the community? Or is it really necessary? Well, we can represent a scenario for you here, For example, lets say you have forgotten your an important family get together or loved ones birthday or a scheduled meeting. So

now you are in a panic to make amends by going out for dinner, but your watch is now kept on ticking fast reminding you very less time is now in hand. What are the odds you going to face of getting a table reservation this late? Now you can travel to restaurants and wait for a table. Many people are not willing to take this kind of risks. In this situation, one must put a price on the value of the commitments and relationship. This restaurant reservation technology can help you in this kinds of troublesome and embarrassing situation. Getting a customer in the seat at the table is part of how a restaurant is evaluated during the overall experience. Especially in the perspective of Bangladesh customers would arrive at the restaurant, an operator will be ready to serve them food and drink, has not yet started. Almost everyone wants that cozy table in the back at 8 pm on weekend. So now the question arrives who gets it? The person who booked a month in advance? Or the person who just walked in the restaurant A restaurant operator must make this decision and live with the potential fall-out, loss of revenue or loss of a customer. reservation policies can affect the brand of the restaurant. Now wouldn't it be beautiful if the restaurant manager can do it with a help of a simple mobile application?

The Culinary Institute of America (2014) also known as the CIA provides a comprehensive guide for reservation practices in their book Remarkable Service' that begins with a self-evaluation of the restaurant, beginning with the style of restaurant like formal or casual. The number of seats and projected covers (guests) is a deterrent factor as a restaurant with a high volume of tables that turn over quickly may not need a reservation policy and the same for a popular place that is high in demand [1].

The primary objective of this study is to investigate if there are differences in spending (revenue) between restaurant guests who make reservations and those who walk-in. Restaurant guests who make reservations are equally important comparing to the guests who show up as walk-ins. A research took place where many of the restaurants agreed to participate in the research study, each one is independently owned and operated in the city of Thunder Bay, Ontario, Canada, and all have a seating capacity between 75100 people. The restaurants are rated within the top 30 restaurants in Thunder Bay on TripAdvisor [2] all offer table service and accept 12 reservations and walk-ins.

The unique and novel, mobile and online based ordering and reservation platform and system, for such time-sensitive services, provides the mobile phone and Internet users and various types of business owners with comprehensive sets of options, including the mobile phones installed with the open source Android software platform developed by the Open Handset Alliance (OHA), such as the gPhone released by Google, to deliver the requests and responses automatically and instantly through means of synchronization between mobile and Internet communications.

TABLE I: Summary of Restaurant walk in and reservation guest count and total profit from Thunder Bay, ON, Canada City

Title	Restaurant 1	Restaurant 2	Restaurant 3	Restaurant 4
Walk-in guests	157	152	169	43
Check mean in DOLLAR (\$)	58.98	42.35	47.48	60.44
Reservation guests	172	113	167	266
Check mean in DOLLAR (\$)	63.58	49.85	63.04	43
Variance	4.60	7.50	15.56	17.44

In recent and past years, several initiatives were taken to modernize the system of restaurant reservation and ordering food online. In Bangladesh though ordering online food has started rapidly but revenue reservation online is still now a long distance call whereas in European countries its already running in a great speed. The focus of most of them was to give a new infrastructure to the system.

- 1) According to Dhore et al [3] his research work aims at designing and implementation of a remote food ordering system. Through such framework, one can arrange sustenance before going to a restaurant book table and furthermore make installment a recommendation engine is used that prescribes menu to a client while setting request and a pressure calculation packs the measure of pictures utilized all through the application is a unique feature of the system. Implementing this framework gives a cost-effective chance to give clients a customized service understanding from eating to requesting to installment.
- 2) An extensive work has done by Kvamme et al in, a system and method for offering and managing reservations for the restaurant [4]. This method includes receiving reservation data regarding available reservations for restaurants and receiving a search request and payment information from the user. The method also includes receiving data regarding items ordered during fulfillment of the reservation, and display all information's to the consumer on a mobile device during fulfillment of the reservation.
- 3) Another related work in this sector on ordering food digitally, which is called Digital Ordering System for Restaurant Using Android (DOSRUA) represented by Bhargave et al [5]. There will be a tablet on each table. This will allow the customers to browse the food items for the time and anyway they wish. Then they will give the order in the tablet and Kitchen Order Ticket (KOT) will be received in the kitchen. Thus they will get their foods served there will be no hassle of paper.
- 4) An Automated Food Ordering System came up by Tanpure Shweta et al with Real-Time Customer Feedback [6]. Their aim was to make the food ordering system digital. Along with making a digital order system, they will also take the feedback of the customers just after their dining to make the dining experience better. They have encouraged not to use PDA (small and portable

TABLE II: Summary of Online Restaurant Reservation Proposals

Paper Title	Proposal	Platform
Digital Table Booking and Food Ordering System Using Android Application	Emphasis on making such a framework one can arrange sustenance before going to an restaurant book table and order food	Mobile
Restaurant management and reservation systems and methods	This plan includes receiving reservation data regarding available reservations for restaurants and receiving a search request and payment information from the user	Mobile
Automated Food Ordering System with Real-Time Customer Feedback	Creating a digital order system, they will also take the feedback of the customers just after their dining to make the dining experience better	Mobile
Intelligent e-Restaurant using Android OS	Providing the restaurants with a tablet menu that would recommend dishes based on a recommendation algorithm	Mobile
Advanced Ordering System for Restaurant	Came up with concept of improving the quality of business of the hospitality industry and services by incorporating technology	Mobile

devices. By using wireless technology it gives the order) which is given to customers to take orders and after finishing ordering waiters take it to give other customers to make their order. To overcome the limitation in PDA based system they proposed an automated food ordering system for restaurants with real-time customer feedback (AOS-RTF) which is a wireless food ordering system using android devices.

- 5) Bharadi et al proposed an approach for, intelligent e-Restaurant using Android OS[7]. This paper is about providing the restaurants with a tablet menu that would recommend dishes based on a recommendation algorithm. Proposed framework utilizes a cloud-based server for storing the database which makes it economical and secure. This system can help in providing better recommendations to the customers who will regularly use this application by analyzing their choice of taste.
- 6) Satyam Goel et al proposed Advanced Ordering System for Restaurant [8]. This research is for improving the quality of business of the hospitality industry and services by incorporating technology. Nowadays restaurant advanced multi-touch menu cards and different structures are supplanting out-dated administrations like waiters taking request from clients and serving them. This remote application is easy to use enhances precision and productivity for restaurants by sparing time gives client criticism and diminishes human errors. This system is less expensive as it requires a one-time investment for gadgets.
- 7) Aniket Sahani et al proposed Online Hotel Parcel and Payment System Using GPS and Android[9]. Their main focus is to provide a location-based food ordering and parcel system which will help the user to place an order from its location and save his/her time.
- 8) The suggestions include a list of restaurants in a given area, their ratings based on users reviews, and available reservation time. You can search for a specific place, city, neighborhood, and filter suggestions by location, cuisine, price, rating, etc. Also, you will have to choose the time and number of people attending a restaurant with you. If we think from the perspective of Bangladesh, still this is a very new concept. Restaurant reservation is

not yet implemented here but some websites provide details information of many renowned restaurants of Bangladesh. One of the most visited websites is foodiez (<http://www.foodiez.com.bd>).

Many other online web and mobile based applications are providing home delivery such as foodpanda - Local Food Delivery (<https://www.foodpanda.com.bd>) but it's not related to booking a seat in a restaurant.

The most problematic part of this restaurant reservation process is if somehow the person who booked for the seat wasn't able to make it in time. We all know unavoidable situations may happen. Im not suggesting there be some large and huge amount fee but something to prompt people to let the restaurant know they cant make it. For small, independent places, in particular, it can make the difference between a profit and potential closure.[10]

III. PRESENT SYSTEM

- At present we are using applications for food ordering which are also available in web format. Their concept is very simple and straight forward. You are allowed to choose your meal online and order them. You may either pay online or avail home delivery (Pay on delivery). Mostly used ones' are:
 - Foodpanda: They have both web and application for their business. At first, users (clients) have to find a restaurant to order food. Next, they choose meals of their choice, then proceed to checkout with only available option 'cash on delivery'. Finally the food is delivered. Foodpanda charges for home delivery at this moment. It has user registration, user login, user log and user review modules. They are presently operating at Dhaka, Chittagong and Sylhet.
 - HungryNaki: Similar to Foodpanda. They also provide user registration facility along with user login, history and user review module. They are presently operating at Dhaka, Chittagong, Sylhet and Narayanganj.
 - Foodmart: It is also of similar kind. But online payment option is available. It has live chat on web version. It has 'make reservation' option but mostly ineffective. They operates at Dhaka only.

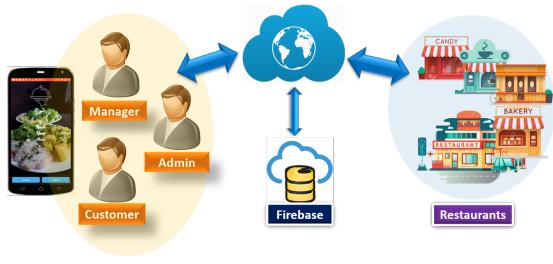


Fig. 1: System Architecture

- The difficulties of the present system are:

A. Limited Option

Almost all the stakeholders are providing only home delivery facility. The listed menu is also very limited.

B. No Reservation Facility

The organizations listed does not provide any kind of reservation facility.

C. Data Security

Manual file organization and management does not have enough security. Paper files can be lost in fires and floods, but electronic data is easy to backup in multiple locations, reducing the potential for permanent data loss. At the same time accessibility to data can be restricted in automated system which is difficult to implement in a manual system.

IV. PROPOSED APPROACH

- A mobile-based restaurant ordering method and system wherein the customer can have the access to the restaurant website, can read the online menu, and may make dining reservations or place an online order by clicking on the desired menu items, verifying the order. The system monitors the order to ensure that no order is lost. The customer can place the order in a few minutes and the order is always correct, and therefore, satisfying to the customer. Moreover, the restaurant receives consistent up-to-date orders and thus can save money while providing better customer service.

A. System Architecture

The application is developed basing on the system architecture as shown in figure ???. Users will be connected through internet for registering/signing in into the server. The database used in the backend is Firebase. Our registered firebase account is utilised for developing user database and food database. Which is basically the hub of all orders and responses sent from the server.

Any request sent from the front end is processed through firebase. We have catered customer response and manager response differently. Since, manager will get scope to edit their listing e.g menu addition, deletion, accepting requests etc. Therefore based on the authentication managers are driven

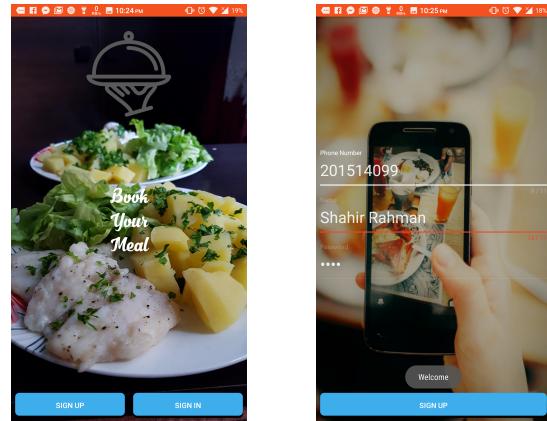


Fig. 2: Prototype for Sign in

to different android activity. Where as customers are driven to user activity which ultimately starts with location selection and so on.

Restaurant specific options are provided in the database. So it will help users to book accordingly. Say there are few restaurants who do not have sitting arrangements. So for them they will only accept food orders.

B. Description of the framework

- On the very first approach when a customer will download this application and open it he/she needs to sign up with sufficient information's as shown in figure ?? Afterward, he/she will sign in and a home screen will appear in front of him. From the home screen, the user may select one of a plurality of tabs including Home (the home page) , Search for specific areas and Restaurants, Locations (for restaurant locations), Take a Tour, Make reservations , Order process (Instructions), Online Ordering, Discount Offers, and Promotions, About Us (description). All of these tabs are available from the home page as well as each of the other windows in the system.
- In the home page, the user will have certain areas of Dhaka city, Bangladesh, e.g. DOHS Mirpur, Jahangir Gate, Golf Garden located inside Dhaka Cantonments etc as shown in figure ??.

User need to select any of these area to see the restaurants located there as shown in figure ?? Selecting any specific area will lead him to the restaurants located on that area. Now the only job left to do is to select his/her favourite restaurants. Point to be noted user can also search for the area along with restaurant name to find the restaurant. Through this mobile application, the customer can also access the restaurants own website (if the restaurant provide one) by any common access method, such as keying in a URL, selecting from search results, etc.

- As we can see from the framework, it gives online menu requesting and reservation making capacities along with a menu suggestion benefit. A special feature will be on this application that is this application enables to



Fig. 3: Prototype for Selecting Location and Restaurant

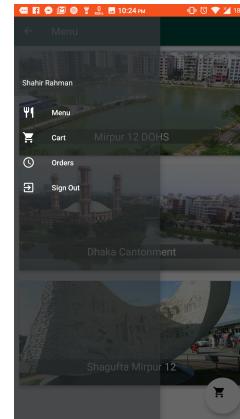
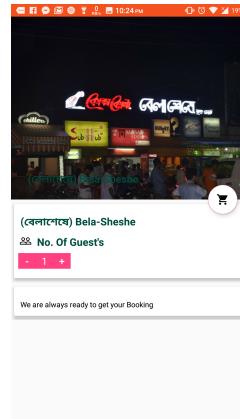
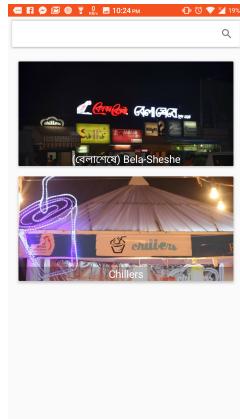


Fig. 4: Prototype for Sign in

immediately identify customers via GPS-based location and then actively recommend the appropriate menu for the customer according to their consumption records. For the new customers it will offer the foods which have better reviews of a specific restaurant.

If the customer selects Restaurant Locations at Step a window with the restaurant's name, address, phone number, hours of operation and other identifying information will be displayed with a "Get Directions' feature. The customer keys in their address or point of origin and directions to the restaurant are displayed.

Take a tour feature will allow better user experience by giving him a short description about using this application. The interactive UI will be user-friendly enough to operate this mobile application with much comfort.

When a customer will select any of the restaurants, this app will show the rating of the restaurant. It will show the regular review of the customers recently visited the restaurant.

- It will provide information of the menu's of that restaurant on that particular day along with its price and photo's. Most importantly it will separately give the photos of the popular dishes of that restaurant and public reviews on that. Now here comes the part of reservation of your seat. There will be multiple times there to reserve your seat. All you need to do is a simple click on your preferred time, give the number of people (two/three/four or a big party). User can order the food along with it or order it in real time which is completely user's choice. There will be always a notification bar on whether this restaurant is available or not at this moment. If the restaurant is full it will encourage the customer to look for a future time.
- It also will provide the information about Hours of the restaurants opening and closing, Payment methods, Parking facilities, and a short description. The customer may choose to go to offers and promotions on food and also will get discounts if they are the regular customer. This system, therefore, helps the restaurant owners and the service providers by increasing customer interaction with

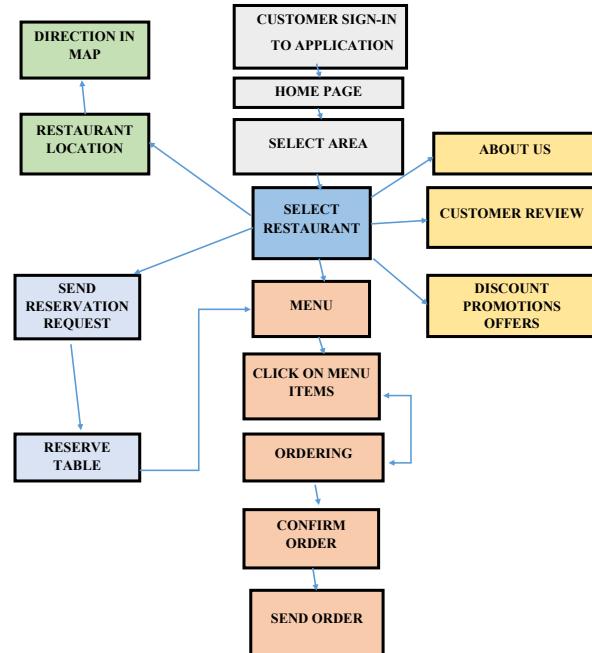


Fig. 5: Work Flow

them without making any hassle. It is also fast, precise and thoughtful services. Anyone can visit any restaurants online, compare the menu's, check seating availability, compare price among restaurants. Thus this will make this sector more competitive and in order to keep the business in nice figure restaurant owners will surely give the best services to their customers.

C. Actors of the framework

We have divided the users in to three different groups.

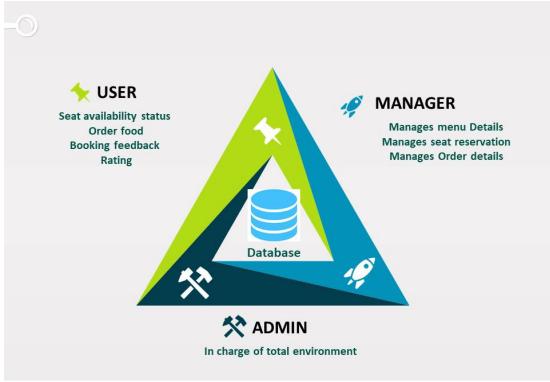


Fig. 6: Actors of the Framework

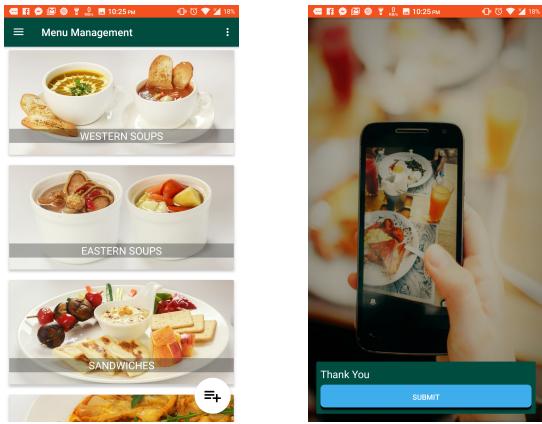


Fig. 7: Prototype for Manager

1) *Admin*: A designated person will work as the overall admin of the application. He is just like superuser. He will have all level of permission to customize the application from back-end and front-end.

2) *Manager*: Basically it is for the restaurant owner or manager shown in Figure 6. They will have access to add menu items, assign tables, confirm (accept or decline or keep them pending) any orders and other responsibilities adhered to him by the restaurant owners as shown in ??.

3) *Customers*: Its basically applies to everyone willing to use the software. At first customer has to confirm his account. Only then they will be allowed to proceed for other functionalities. Customers will visit restaurants, order food, book seats through this application. On the other hand restaurant managers will receive their restaurant's reservation requests,

V. DISCUSSION

The advancement of technology is a pre-requisite for flourishing business goals and reaching the customers at the earliest time. Our present app is capable of handling large traffic to identify their needs and provide services to the users by ensuring booking/reservation, online menu confirmation, customization and feedback system.

The initial goal for the project is well achieved by implementing notification system for the user upon confirmation by the restaurant authority. Two different app is prepared, one for customers and another for restaurant owners. Owners will get complete freedom to include their listings as per their choice of foods or table reservation. Customer also gets the scope to choose restaurant and place order. With the present system, users need not to pay any amount for reserving their seats or foods.

VI. LIMITATIONS AND FUTURE EXPANSION

Though we broadened our scope while designing the system, however with few limitations we could complete almost all the available functions for smooth running of the apps. The primary focus was to incorporate restaurants located near MIST campus and Dhaka Cantonment area. However, addition of more restaurants will provide versatility and help customers with greater options to choose from. Few activities need massive improvement since we found random crashes due to inappropriate inputs from the user end. Due to higher resolution pictures often it is observed that the loading time is more than usual, resizing the pictures may accelerate activity loading and may improve the overall performance.

Following recommendations may be implemented to overcome the present limitations.

- Inclusion of online database subscription for better user bandwidth handling.
- Modules for restaurant owners should be reconstructed for better accessibility to their services and customization according to individual requirements.

Future Expansion:

- With the existing features few new features can be added for better assimilation with the user requirements and for providing one stop services. Our initial set out plan was to keep it as a reservation system. Later on with the upcoming user requirements we looked forward to merge e-transaction management system which may include bkash, nexus pay, payza or services available in most of the android apps. In the later versions UI will be more interactive with light design to provide faster access to resources. Our present system is based on firebase, which may be localized along with paid subscription. User management and authorization technique will be integrated to sms based service and will authorize users with one time codes/passwords only.

VII. CONCLUSION

To build up an uniform restaurant booking and service system for any effective organization proper understanding of need and focusing on the requirements are very important. To accelerate the effectiveness of android applications, one must implement an automation for resource management, performing basic roles, collaborating among the stake holders, real-time transaction management, managing assets, data sharing and securing the information. We have tried to make interactive user interface to ease the process of reserving

restaurants and ordering foods online. The success of the project highly depends on the timely execution, proper utilization and enriching the restaurant database with updated data. Restaurant owners will be able to interact with their customers in a more vivid way and can ensure business expansion in the long run.

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