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Customer Time Saving Automated Restaurant System

Bachelor of Science in Computer Science

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Certificate

We accept the work contained in the report titled "Customer Time Saving Automated Restaurant System", written by Mr. Shamis Asghar AND Mr.Hashim as a confirmation to the required standard for the partial fulfillment of the degree of Bachelor of Science in Computer Science.

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Abstract

The aim of the project is to automate manually maintained Restaurant system. The automation of the system will improve the efficiency in overall process which will introduce betterment in the services and will provide a structure that will be good in keeping customer records, and will provide quick retrieval of queried data and result in a paper-less environment. The main concern of this project is to Automate Restaurant environment for customer so that he can save his time and avail maximum benefit and improve his life style. The project will also cater another main function which is location system to give exact location of the customer and show route of restaurant from customer location. The resultant product will introduce an automated mechanism in restaurant industry which will lead the industry participate in modern era of technology.

Acknowledgments

All praises to Allah Almighty Who helped us not only to avail this great opportunity to increase our expertise, but also gave us Devotion and wisdom to work and plan with full enthusiasm. We pay gratitude and thanks to our supervisor Mr Umar Khattak for guidance, support, patience and understanding throughout the research period. He is an inspiration for us and we are honored to be in his supervision. No words in any dictionary can acknowledge the sacrifices, love and moral support given to us by our beloved families. Their prayers had never left us alone in any circumstances.

SHAMIS ASGHAR / HASHIM AYUB
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Acronyms and Abbreviations

GPS	Global Positioning System
API	Application programming interface
LBS	Location Based Services
PDA	Portable Digital Displays
SQL	Structured Query Language
HTTP	Hypertext Transfer Protocol
ASP	Active Server Pages
HTML	HyperText Markup Language
XML	Extensible Markup Language

Chapter 1

Introduction

1.1 Overview

With the recent advancements in Computer and Information Technology, automated systems have become a significant requirement to meet the challenges faced in different fields Restaurant is business that serves people globally with ready made food. Presently this business is going on with lot of bright side. People feel more relaxed with lot of variety and comfort in the selection and consumption of their food in their busy life. One can see lot more restaurant in the global world. Even in Pakistan one can view thousands of restaurants with menu from all over the world like from India, China, Iran, USA, Russia etc. fulfilling the needs of people with healthy nutrient and taste. To automate the traditional food ordering system is one of the major requirement in different Restaurant environment where traditional mechanism is used for ordering food. Usually, Customers are not satisfied with this mechanism as customer need quick attention and want food to be ready when they arrive at restaurant due to their busy schedule. So, Sometime customer satisfactory response is not obtained which, therefore, can cause damage to business and to the market position of Restaurant. Maintaining related data of a customers and tracking customer order has also got very much importance in current scenario so that customer could also get benefit in return. To Eliminate the traditional system there exist a wide scope for an automated Restaurant system which will help in saving customer time and help restaurant achieving High rank in market. Use of an automated system will also help in keeping records of customers, taking care of generated order, making customer involvement by mean of reminders and notifications, customer relations will also be increased (i.e. by feedback) which will benefit the company by upsurge in business and strengthen market position in more effective ways.

1.2 Objective

Goal of this project is to make an Automated Restaurant System that follows a systematic approach by taking orders from customers from anywhere and give appropriate time for order to be ready. The project will also focus on developing management, tracking system for same domain so what we could have exact position of customer.

1.3 Problem Description

These days, numerous Restaurant deal with their business by manual ordering particularly taking customer order by hand on paper. This is issue for Restaurant management that they copies one customer order to another. Furthermore, it would influence the market place of Restaurant in working industry. The Restaurant waiter takes order by manual method which utilizes paper and this is troublesome for Restaurant Management to track Customer Record as sometimes, customer data is essential to Restaurant executives for referencing later on.
Moreover, Restaurant needs more workers to deal with the clients order which result in high payment to workers. As client won't have the menu list with him, it would be harder for him to recollect the whole menu (with cost as well...!) and come upon a choice, i.e. customer is required with less time to make a choice.
There could be few communication barriers of language. As a result, the current system (manual) is not reliable and up to date to use in future. As whole ordering has to be done manually at the restaurant side, the chances of error is high as well. The present method could not store, manage and analyze the restaurant waiter information, menu information, customer ordering information and issue report as well. Even assigning orders to a specific cook can be troublesome if it is done parallel with the bookings of the order.
The suggested system will eliminate all these manual errors and increase the speed of the whole system and make it reliable for customer to get satisfy about their orders.

1.4 Project Scope

The intended application will mainly focus on facilitating customer for ordering food and giving appropriate time according to the order after customer's order. The system will work as a desktop application as well as mobile application. The application will only work for registered customer. It also maintains customer information and will generate various reports needs restaurant business. The main users of the project are customer and restaurant administration.

1.5 Tools Used

There are many techniques which are being used in this Automated Restaurant system. Some of them are defined below.

1.5.1 Android

Android operating system runs on smart phones and is developed by Google. It is based on the Linux kernel and it is designed basically for touchscreen mobile devices such as smart phones and tablets.[1].

1.5.2 Microsoft Visual Studio

Microsoft Visual Studio is integrated development environment (IDE), which is developed from Microsoft. Visual Studio is used to develop computer programs for Microsoft Windows, as well as web sites, web applications and web services. Microsoft Visual Studio is used to make the Web Portal and WCF service of the system.Visual Studio supports different programming languages and allows the code editor and debugger to support nearly any programming language, provided a language-specific service exists[2].

1.5.3 SQL Server

Microsoft SQL Server is relational database management system which is developed by Microsoft Corporation. As SQL is database server, so it is software application with the key function of saving and retrieving information as requested by other software products which may runs either on the same computer or on another computer across a network which also include across the Internet. It is popular database application which is used for web applications as well for storing and maintaining their database information[3].

1.5.4 Android Studio

Android Studio is official IDE for developing Android application based on IntelliJ idea. IntelliJ idea makes work independent. We can easily develop android applications on it.Android Studio is most popular software for mobile application development[4].

1.5.5 Web API

Web API is used for the back-end functionality of the mobile. It has all the functionality that includes log in, sign-up, users friend list etc. Json is sent to the Android and is received to the Web API and does all its functionality. It is directly connected by the SQL Server database to get all the data and insert into the database. It is deployed separated on the Azure Cloud[5].

1.5.6 Global Positioning System

The Global Positioning System (GPS), is also known as Navistar GPS. GPS is a worldwide route satellite framework that gives Geo area and time data to a GPS beneficiary in every single climate condition, anyplace on or close to the Earth where there is an unhampered viewable pathway to at least four GPS satellites.GPS system does not need user to transmit any kind of data, and it operates lonely of any telephonic or internet access, though these technologies can enhance the usefulness of the GPS positioning information[6].

1.5.7 Google Map API

Google maps has an application protocol interface which has many versions and being used in android smart phones in order to detect location and experience to locate users on Google map[7].

1.5.8 ASP.NET Signal R

ASP.NET Signal R is a new library for ASP.NET developers that makes it simple to add real-time web functionality to applications. When ever a user refreshes a web page to see new data, or the page implements Ajax long polling to retrieve new data, user is a candidate for using SignalR services[8].

1.5.9 Firebase

Firebase is Formerly known as Google Cloud Messaging (GCM). Firebase Cloud Messaging (FCM) is a cross-platform Android, iOS, and Web solution that lets you safely send and receive messages and notifications at zero cost.

- Using Firebase we can send unlimited upstream/downstream messages
- Using Firebase we can send messages to individual devices or a user segment
- Using Firebase we can Handle all aspects of queuing and delivery
- Using Firebase we can Optimize for battery efficiency[9].

1.5.10 Azure

Microsoft Azure is a cloud computing platform and its infrastructure is created by Microsoft for building, deploying and managing applications services through a global network of Microsoft-managed data centers. Azure provides different services i.e. software as a service, platform as a service and infrastructure as a service and supports different programming languages, tools and frameworks, including both Microsoft-specific and third-party software and systems[10].

Chapter 2

Literature Review

2.1 Existing Systems

Some of the existing systems of online food ordering/delivery are:

2.1.1 Food panda

The food Panda Restaurant is international mobile food delivery application. The service permits users to pick out from native restaurants and place orders via its mobile applications moreover as its websites. Food panda processes and sends orders on to restaurants available on their network, and then deliver to their customers. The service is obtainable via its websites and mobile applications. Customers order food by coming into their postcodes on the positioning and browsing for food from an inventory of restaurants. Restaurants receive these orders from foodPanda and when order is ready foodpanda delivers order to customers. Food panda sends out notification SMS to substantiate orders and their approximate delivery time [11].

2.1.2 Eatoye

EatOye is an online food delivery application. Eatoye platform allows customers to look for their favorite local take away restaurants and place orders online, customers choose from pick-up or delivery options. which then deliver food to customer on sms confirmation [12].

2.1.3 McDelivery Pakistan

McDelivery is a McDonald's official service application that delivers food to the customer's located place. The mobile service was first introduced in certain parts of the United States

starting in 1993 and is now running in many Asian, Middle Eastern, and Latin American countries using motorcycle delivery guys. In some countries, delivery is available 24 hours a day, and in at least one location, the service is free with a minimum order up to some specific price and kilometers [13].

2.2 Limitation or Drawbacks

All of the mentioned system are only used for food delivery function. In our system customer can reserve his favorite table online so that he can enjoy his meal with all the comfort and luxury he wants. Customer also order his food in the restaurant as well but all of the above system customer can only order food outside the restaurant only as no restaurant is their for the customer.

SNO	Previous System	Author	Problem Statement	Solution
1.	FoodPanda	Ralf Wenzel	Only Home Delivery available. No Online Reservation or Ordering features Available	Intended,application will solve all such problems and will allow user to order food,and reserve table from home and then user can visit restaurant on given time.
2.	Eatoye	Nauman Sikandar, Rai Umair		
3.	McPakistan	Ray Kroc		

Table 2.1: Limitation / Drawbacks

2.3 Problem Description

Problem with all the previously build system is that they are home delivery systems which means if customer want to have his order at his door step than they are okay but if customer want to order food and reserve table and want to have lunch in restaurant than their is no such system for that.As mentioned these previous build system are delivery systems.our intended system will reserve table and will also take order from customer from home and in return will give certain time limit for food preparation and after that time customer can visit restaurant and enjoy his food with his loved ones without wasting any time of ordering and reserving table.

Chapter 3

Requirement Specifications

3.1 Application Overview

The intended application is an automated application using web based and mobile based application. The application will be designed to introduce new approach in the restaurant's of Pakistan. The application will eliminate the manual procedures in restaurant environment. The application will present the customer a mobile application through which they can see menus and order their required food from it and notification will be sent to the restaurant management about the order given by the customer. Restaurant management will have web portal through which they will see all the current customers sitting on the tables and orders of customers. Web portal will collect all the data of the customers and orders of customers and will give some discounts to the regular customers. Customers can also reserve their seats online to get their favorite seats outside of the restaurant. Location of restaurant will be seen in the application on the Google map and the distance from their location either on foot or by transport is seen in the application and different menus and prices of the nearby restaurant is also visible on the application in Google map.

3.2 General Description

3.2.1 Product Functions

Customer will interact with the mobile application which will allow it to log into the Application and place order. First, Customer will install the application and then location of the customer will be detected by using Global Positioning System(GPS) so that exact location of customer could be known and exact distance and time could be shown from customer location to the restaurant. After wards menu will be visible to him from where customer will order the desired food items. After placing order the bill be displayed and

customer will be asked to confirm the order. On confirmation, Record will be send to desktop application for reviewing of the order and for confirmation of order which would be done by a call from restaurant management to customer. After that food would be ready and served according to the time given to customer for preparation of order which he has placed. Now bill will be payed and confirmation will be sent to the mobile application so that after leaving the restaurant customer will show that he has payed the bill to the security officer. Restaurant management will interact on the web portal with customer. They can see all the current customers sitting on the tables and their orders which customer has given. Previous record of the customer is also displayed so that discount could be given by the restaurant management to the regular customer.

3.2.2 User Characteristics

The mobile application does not need any special characteristics from the customers. The customers are expected to be familiar with android based mobile application. The web portal does require some knowledge of the portal and will be used by technical person. The application will provide simple and easy method to use interface which would not require any specialized knowledge or expertise.

3.3 Proposed System

The proposed Restaurant system will eliminate all the manual interventions and will increase the speed of the whole process and make it reliable for customer to get satisfy about their orders. The automation will be completely adaptable as system will take orders from customers through mobile application and then transfer order details to desktop application. The system will work as a desktop application and mobile application as well. For ordering food, first customer must register himself and make his profile from the mobile application so that for future restaurant can have record of him. Automated system will work as an online system for registered customer this will also help in maintaining the records of the customer, tracking their orders, notify the customers about their order (i.e. giving the reminders to the customer). All of the above customer can reserve his favorite table from the mobile through online so that he can enjoy his meal with all the comfort and luxury he wants. There will also be a discount system which will benefit the customer in billing as per criteria defined by the management. Above mentioned local system being mainly manual in nature have their inherent demerits which include human error, time consuming, Costly, and unreliable. To overcome all the disadvantages of the traditional systems,a new automated dynamic and efficient restaurant system is being proposed.

3.4 Requirement Specification

3.4.1 Functional Requirement

Functional Requirements elaborates all the requirements that were gathered while keeping all the stakeholders in focus.Few of them are mentioned below.

i. **Customer Log-in**
In order to make use of the mobile application, customer must need to log in to a mobile application then the application will start its working.

ii. **Scan Bar-Code**
After logged into the application customer will scan the bar-code which is placed on the table which tells the restaurant management on web portal that customer has sit on the table and menu will be shown on the application.

iii. **Show Menu**
Application will show all the current foods in the menu bar which are added by the management. Customer will then select the menu of his own choice.

iv. **Food Ordering**
After deciding all the desired food items customer will simply check that food items and then order from the mobile application. Notification will be generated on the web portal and management will confirm the order and estimated time will be given. After the order is ready waiter will serve to that customer.

v. **Reserve Table and Food**
If customer wants to reserve the food or his desired table it will log into the application and then select table or food and reserve outside the restaurant and estimated time will be given to the customer.

vi. **Show Location of Restaurant**
Location of the restaurant is shown on the application using the Google map. The distance is also shown on it either by foot or by transport to facilitate the customer.

vii. **Admin Log-in**
In order to make use of the web portal, Restaurant management must need to log in to a portal then it will start its working.

viii. **View Customer Orders**
After logging into the web portal admin will see all the orders which customer has placed so that he could know what has been served or what order is on pending. On generation of new order admin will confirm the order and then the customer will be serve by the waiter.

ix. Checkout Bill
When customer has eaten its food then customer will pay the bill using cash and then admin will check out the bill after getting the cash and confirmation notification will be sent to the customer mobile application that the bill has been paid.

x. Confirm Food Order and Reserve Table
When customer has given food order and he must also have to reserve table from anywhere outside the restaurant, so that notification will be sent to the admin web portal. Then admin will send confirmation of the food order and table from the web portal, and notification will be sent to the customer on mobile application.

xi. Discount Generation
Customers which Satisfy the criteria of rank based discount algorithm, will be given discount and data base will be updated.

3.4.2 Non Functional Requirement

Some of the Non-functional Requirements required by the system are listed below.

i. Performance
System should perform accordingly to the use cases and other flow diagrams, as the system will generate notifications to admin when a customer give order.

ii. Reliability
If in some state a failure occur the system should handle it without the user getting to know about it.

iii. Operability
The system should be easy, feasible. And the user could use it without any difficulty.

iv. Robustness
System must handle crashes and recover from them.

v. Maintainability
The system must have the capability to enhance or improve the system.

vi. Security
The data which is being used in this application must be secured. And the data of the user could only be updated by the customer himself only.

3.5 Use Cases

The use cases and the actors of the system are as under

1. **Actors:**
   - Restaurant Management
   - Customers
2. **Use Cases:**
   - Main Mobile Application
   - View Menu
   - Order Food
   - Reserve Table and Food
   - View Customers Details
   - View Customers Orders
   - Confirm Order and Table
   - Check Out Bills
   - Give Discount

3.5.1 Mobile Application Use Cases

- **Mobile Application Main Use Case**

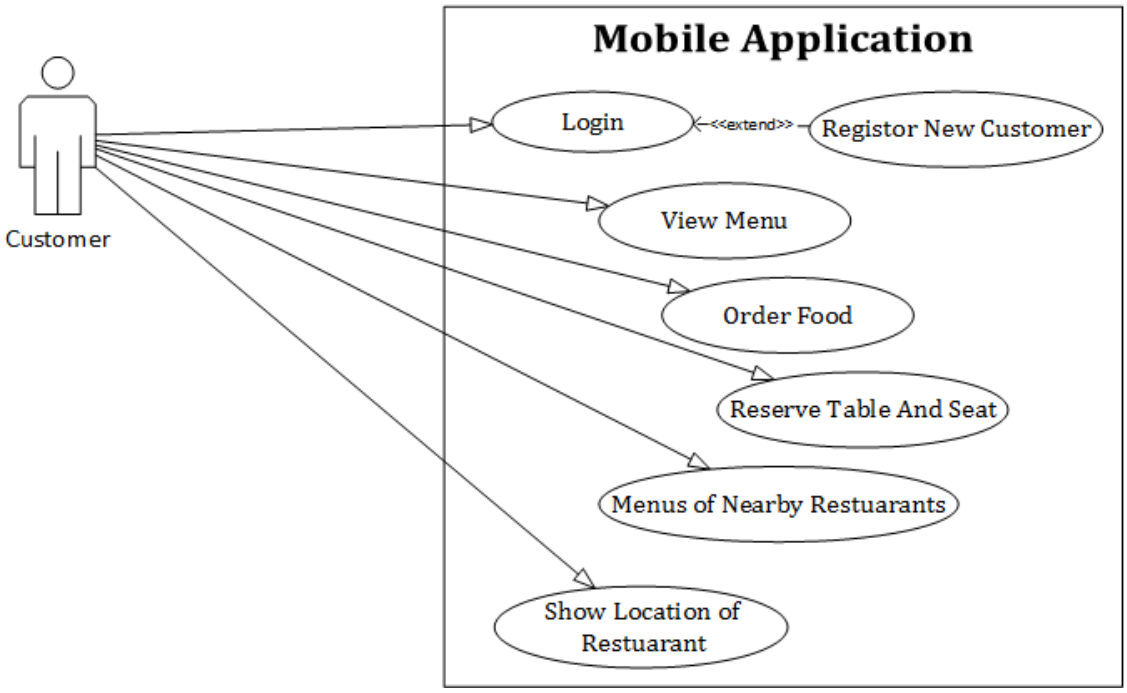

Figure 3.1: Mobile Application Main Use Case Diagram

Use Case ID	1
Title	Main Mobile Application.
Description	Customer will use Mobile Application to log-in, Order, Reserve Table, View Menu, locate Restaurant.
Primary Actor	Customer.
Pre-Condition	Account must be created (Sign Up).
Post-Condition	Customer can use the system.

Table 3.1: Mobile Application Main Use Case

- **View Menu Use Case**

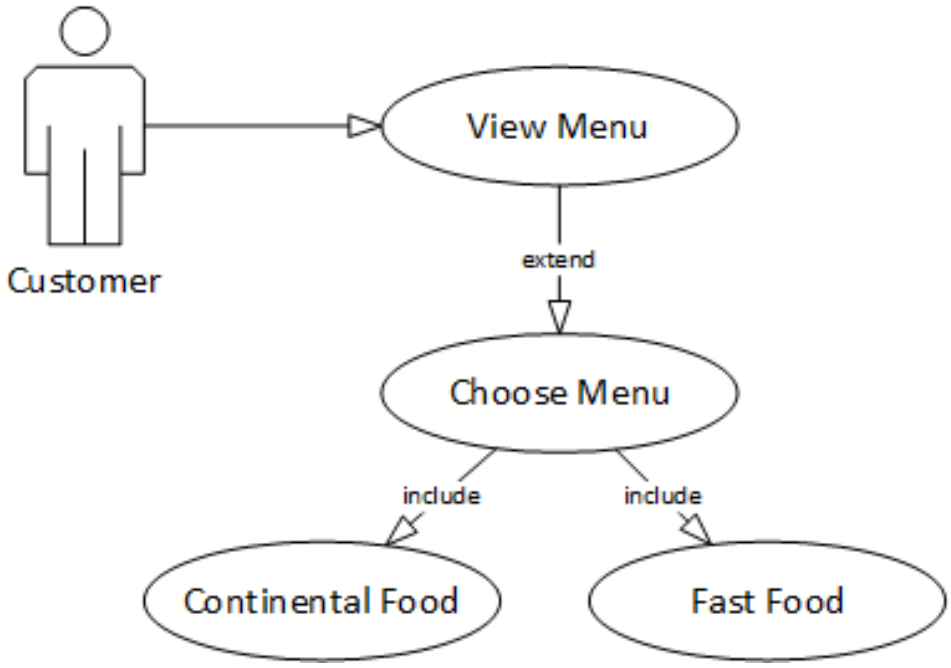

Figure 3.2: View Menu Use Case Diagram

Use Case ID	2
Title	View Menu
Description	Customer will see all the food items in menu list on the mobile application.
Primary Actor	Customer
Pre-Condition	Customer must login.
Post-Condition	Customer will order the food items.

Table 3.2: View Menu Use Case

- **Order Food Use Case**

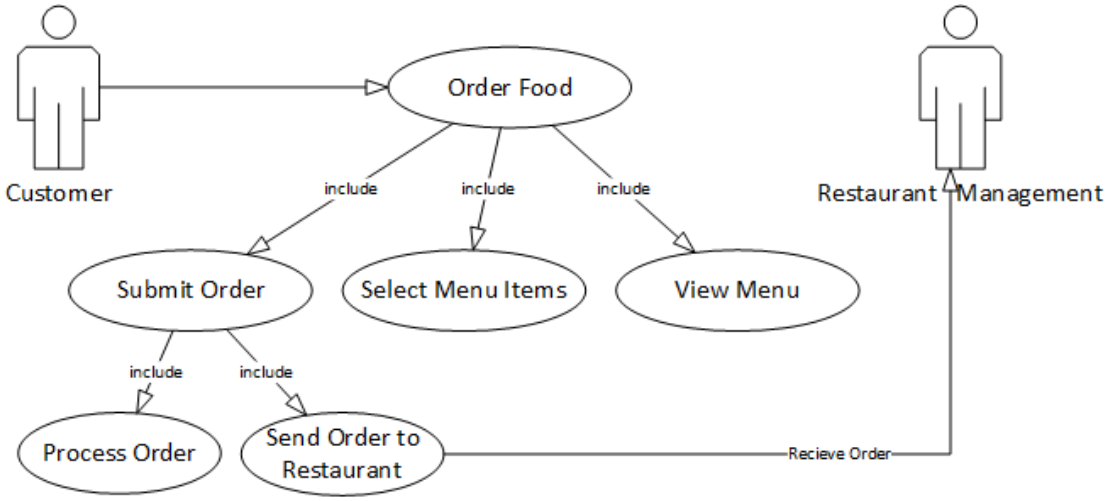

Figure 3.3: Order Food Use Case Diagram

Use Case ID	3
Title	Order Food
Description	Notification will be sent to the restaurant management of ordered items.
Primary Actor	Customer
Pre-Condition	Customer must select food items.
Post-Condition	Food will be served.

Table 3.3: Order Food Use Case

- **Make Reservation Use Case**

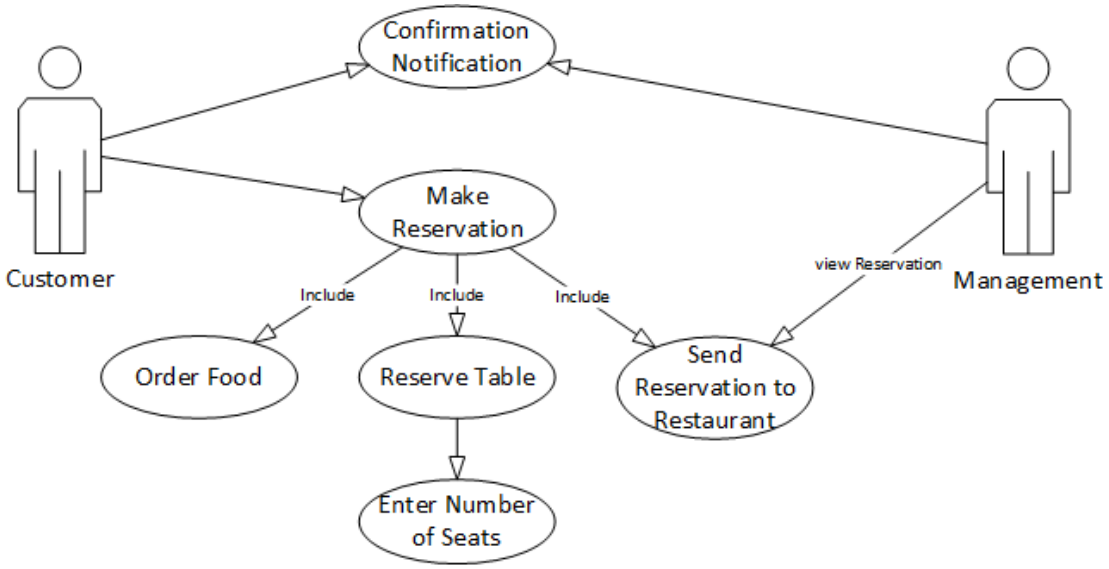

Figure 3.4: Make Reservation Use Case Diagram

Use Case ID	4
Title	Make Reservation
Description	Reserve table and food outside of the restaurant.
Primary Actor	Customer
Pre-Condition	Customer must log-in.
Post-Condition	Customer will reserve table and food.

Table 3.4: Make Reservation Use Case

3.5.2 Web Application Use Cases

- **Web Application Main Use Case**

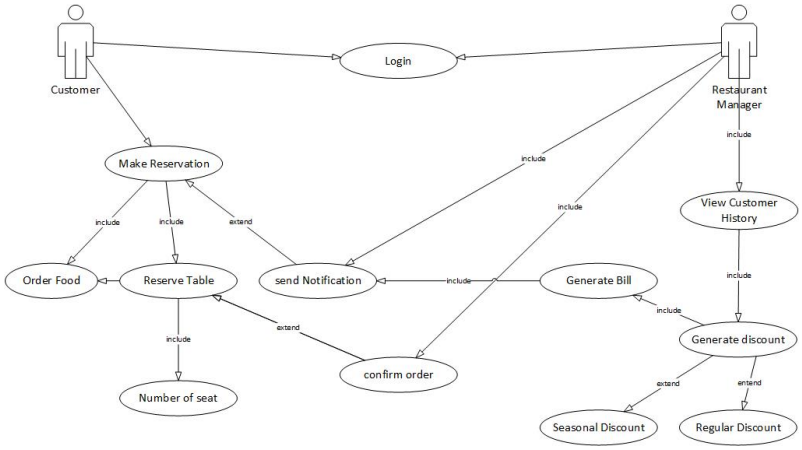

Figure 3.5: Web Application Main Use Case

- **Customer Details Use Case**

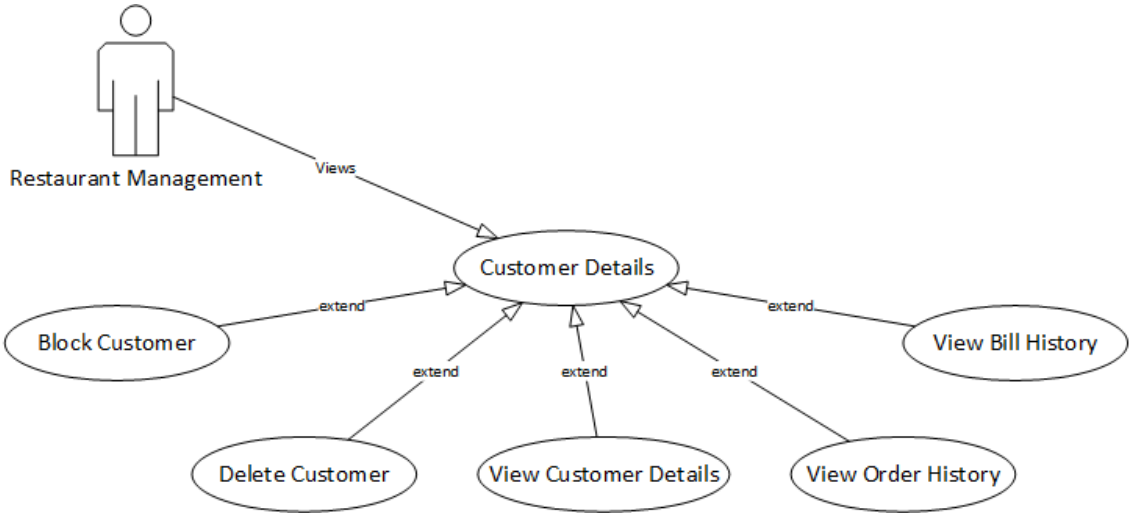

Figure 3.6: Customer Details Use Case Diagram

Use Case ID	6
Title	Customer Details
Description	All customer detail will be seen by the restaurant management.
Primary Actor	Restaurant management
Pre-Condition	Customers has register in the application.
Post-Condition	N/A

Table 3.5: Customer Details Use Case

- **Customer Orders Use Case**

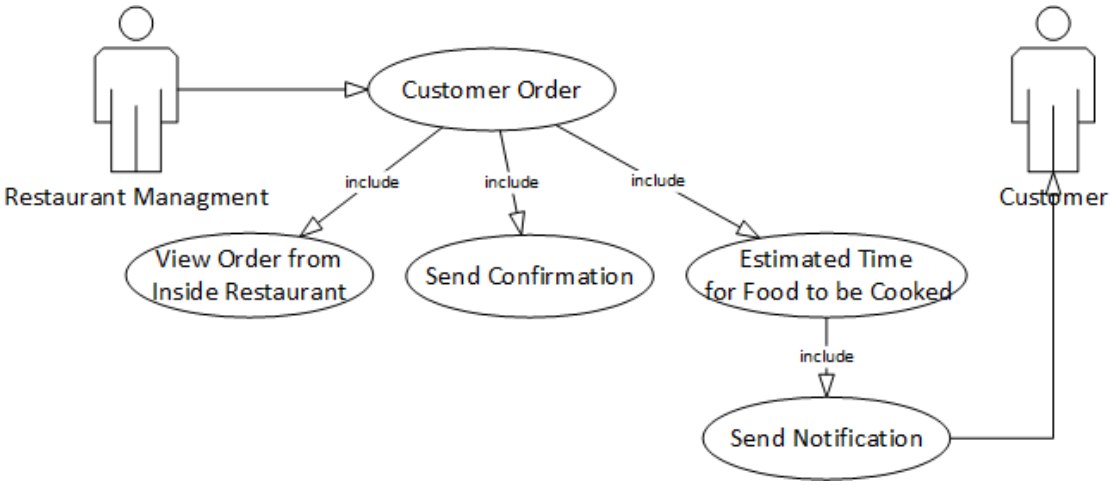

Figure 3.7: Customer Orders Use Case Diagram

Use Case ID	7
Title	Customers Order
Description	All customer order will be seen by the restaurant management.
Primary Actor	Restaurant management
Pre-Condition	Customers has order the food items.
Post-Condition	Confirm the order and serve food to the customer.

Table 3.6: Customers Order Use Case

- **Confirm online Reservation Use Case**

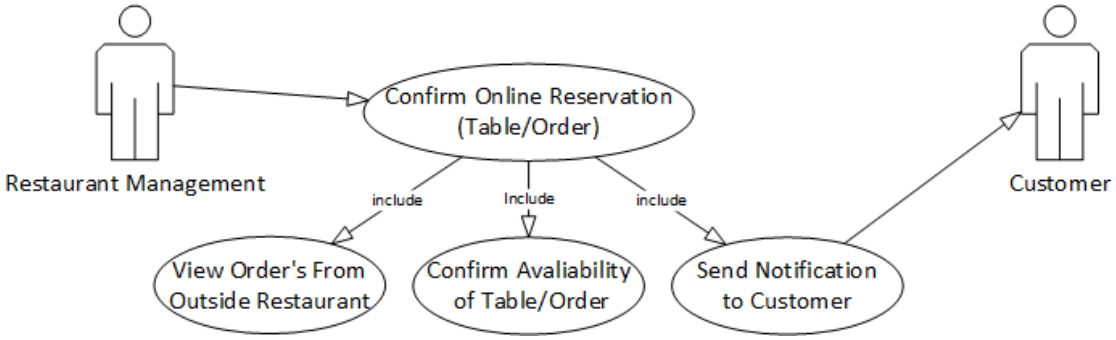

Figure 3.8: Customer online Reservation Use Case Diagram

Use Case ID	8
Title	Confirm online Reservation
Description	Restaurant management will confirm order and table when customer will reserve online.
Primary Actor	Restaurant management
Pre-Condition	Customer must reserve order and table.
Post-Condition	Confirm the order and table.

Table 3.7: Confirm online Reservation Use Case

- **Bill Details Use Case**

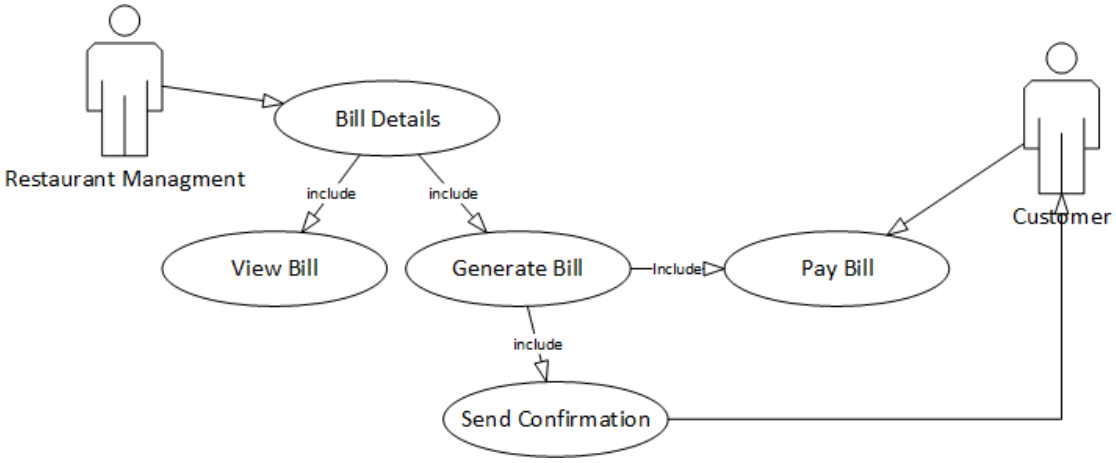

Figure 3.9: Bill Details Use Case Diagram

Use Case ID	9
Title	Bill Details
Description	Restaurant management will check out the bill when customer has paid the bill.
Primary Actor	Restaurant management
Pre-Condition	Customer has been served.
Post-Condition	Customer can go out of the restaurant.

Table 3.8: Bill Details Use Case

- **Give Discount Use Case**

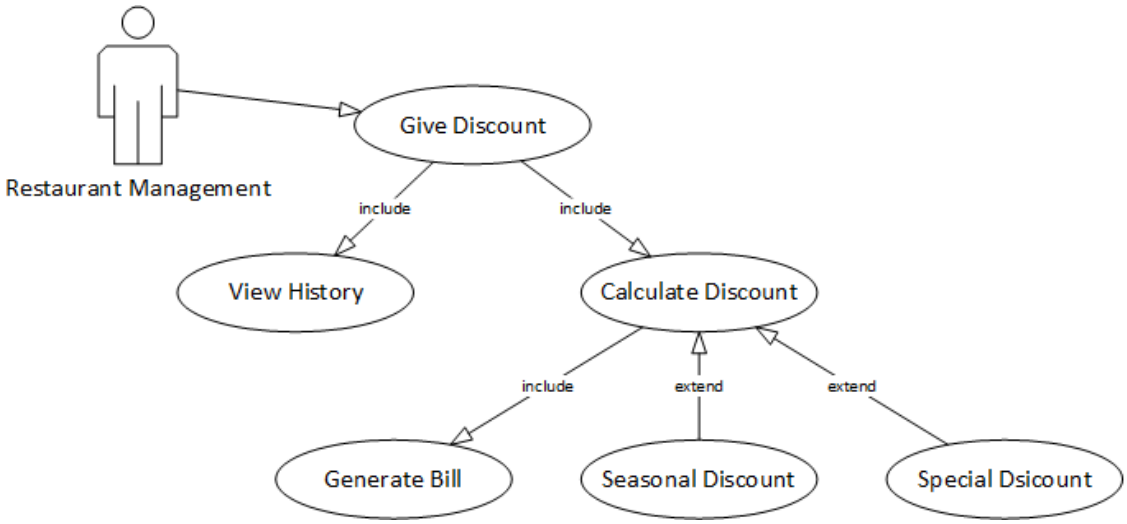

Figure 3.10: Give Discount Use Case Diagram

Use Case ID	10
Title	Give Discount
Description	Giving discount to the regularly visiting customers.
Primary Actor	Restaurant management
Pre-Condition	Customer has visited regularly.
Post-Condition	Discount on bill will be made.

Table 3.9: Give Discount Use Case

Chapter 4

Design

4.1 System Architecture

This diagram will show the general architecture of our system. It will show us how our system will function.

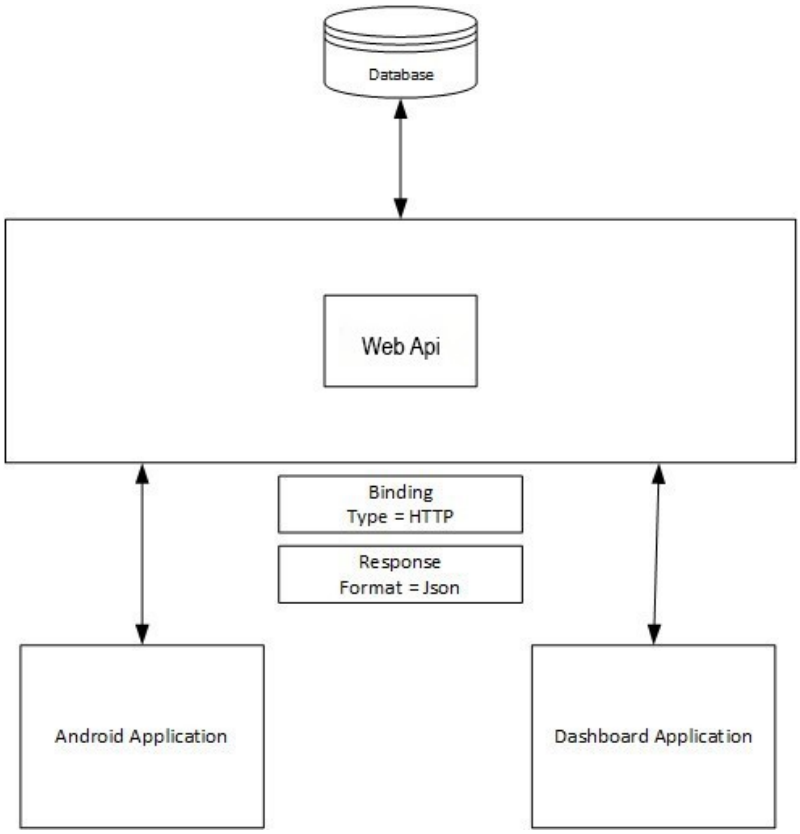

Figure 4.1: System Architecture Diagram

4.2 Sequence Diagram

Sequence diagram is used to show interaction between different object of the system. Web Sequence Diagram is tool used to draw the sequence diagram.

4.2.1 Mobile Application

- **Main Sequence Diagram**

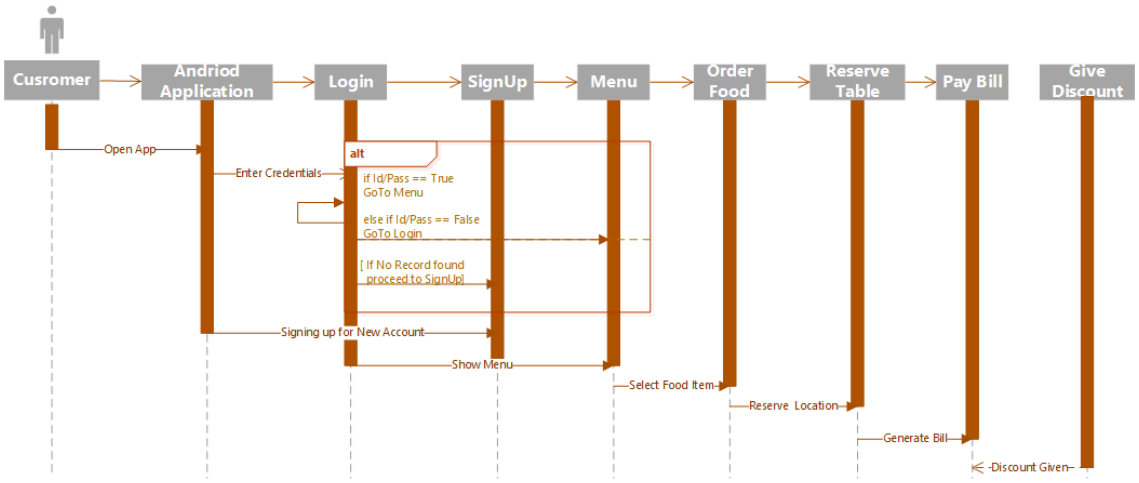

Figure 4.2: Main Sequence Diagram

- **Log-in Sequence Diagram**

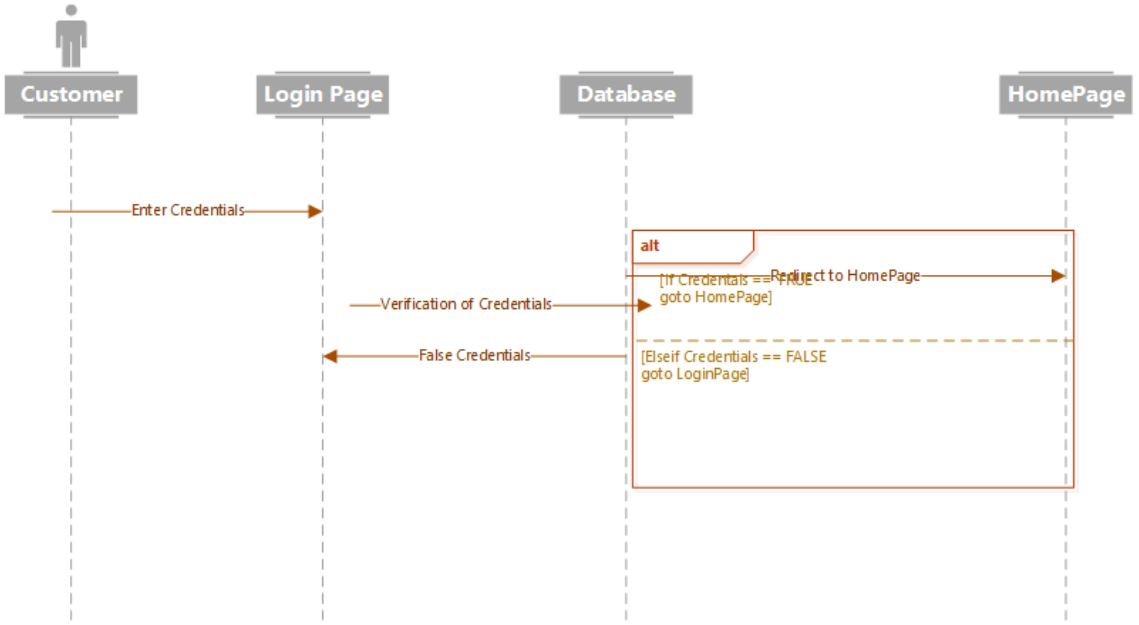

Figure 4.3: Log-in Sequence Diagram

- **Sign-up Sequence Diagram**

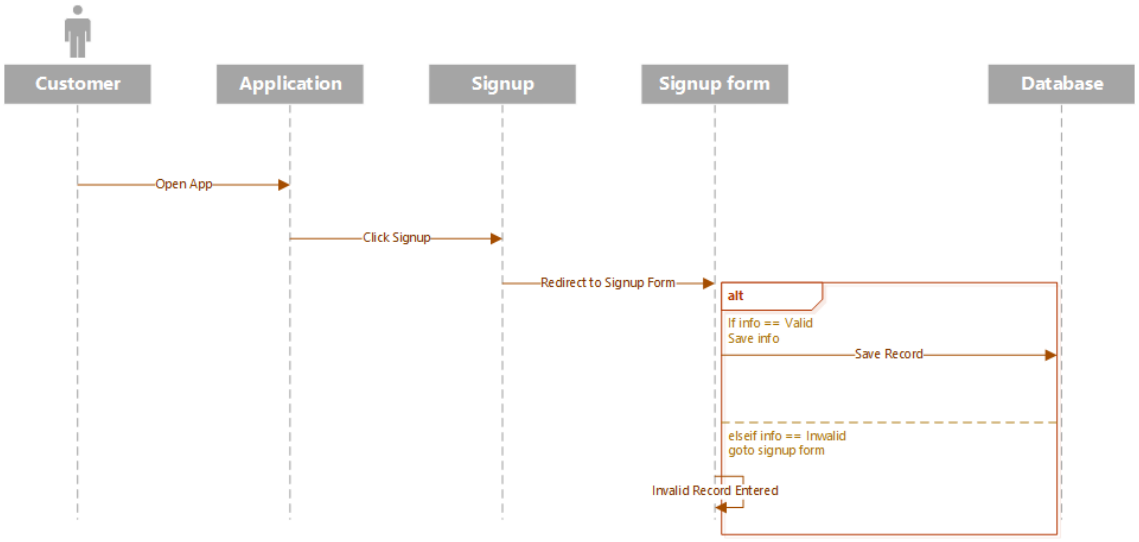

Figure 4.4: Sign-up Sequence Diagram

- **Order Food Sequence Diagram**

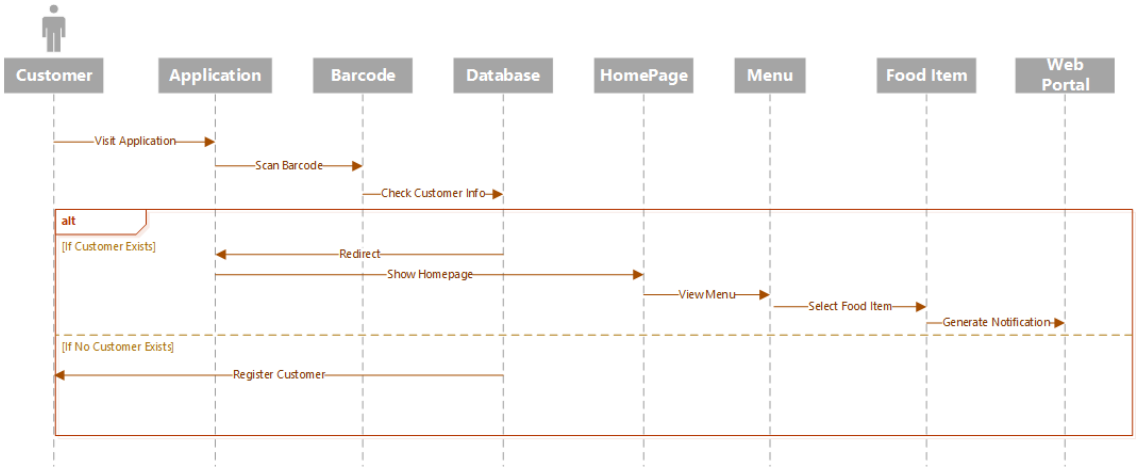

Figure 4.5: Order Food Sequence Diagram

- **Show Location/Menus of Nearby Restaurants Sequence Diagram**

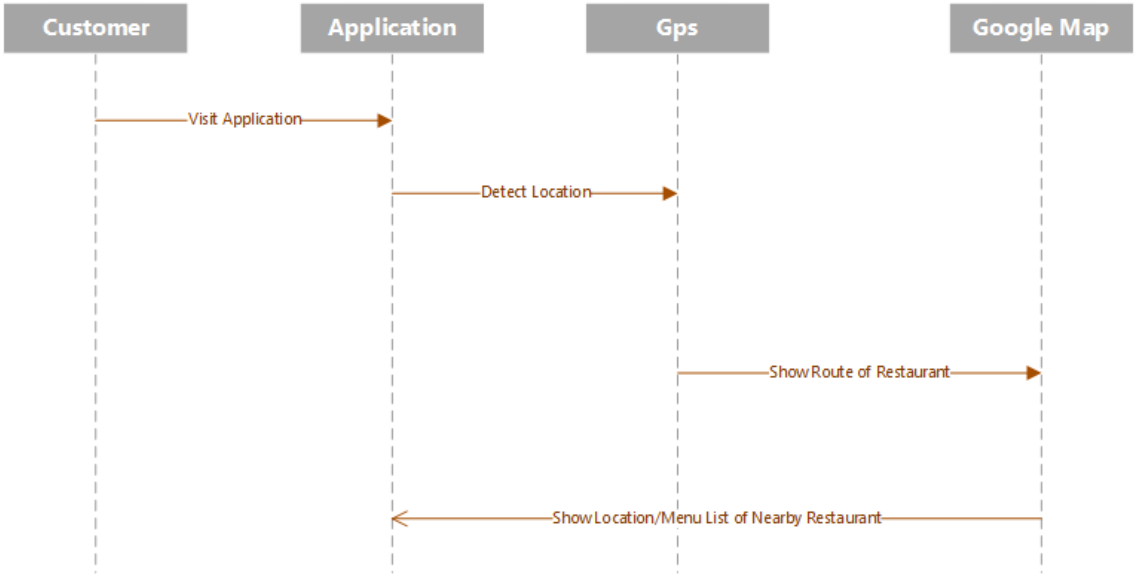

Figure 4.6: Show Location/Menus of Nearby Restaurants SequenceDiagram

4.2.2 Web Portal Sequence Diagram

- **Main Sequence Diagram**

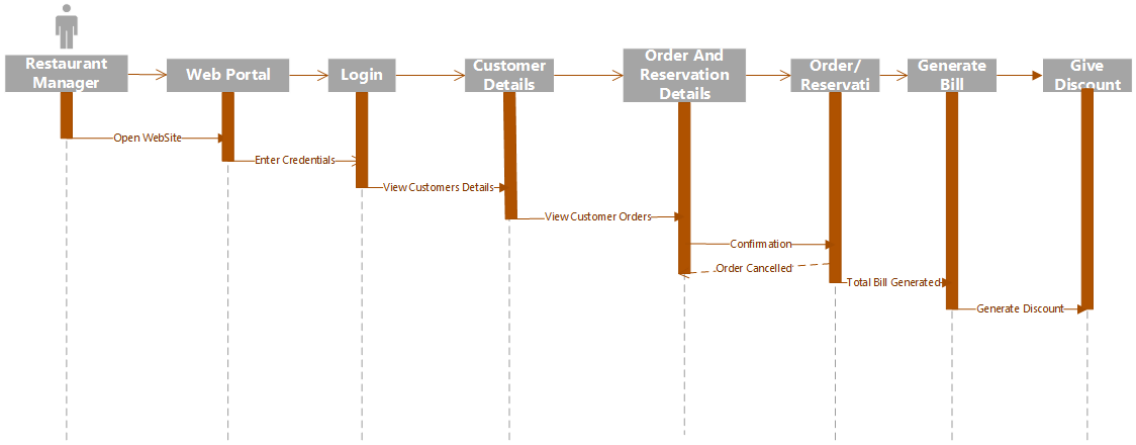

Figure 4.7: Main Sequence Diagram

- **Customer Orders Sequence Diagram**

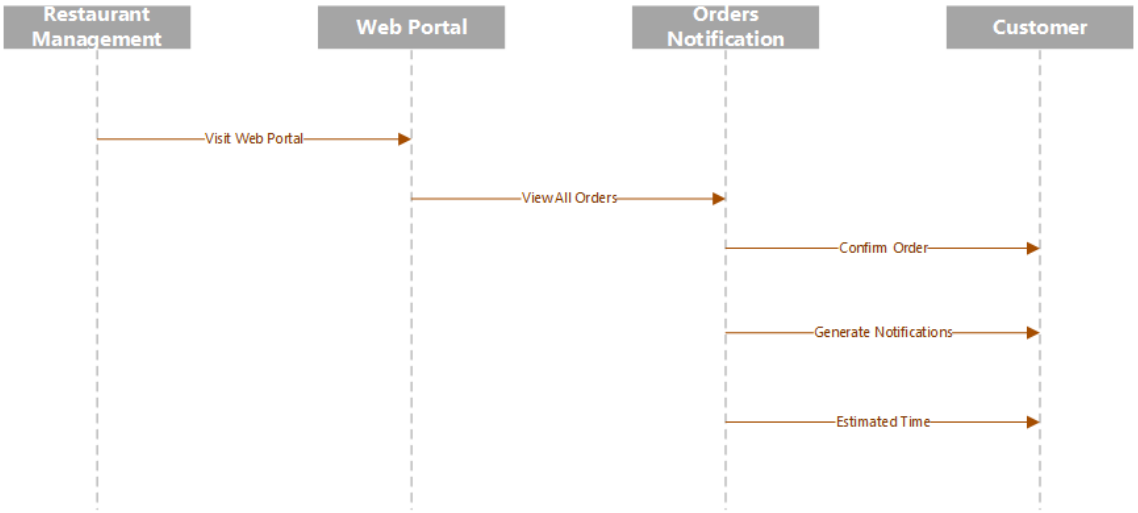

Figure 4.8: Customer Orders Sequence Diagram

- **Check out and Give Discount Sequence Diagram**

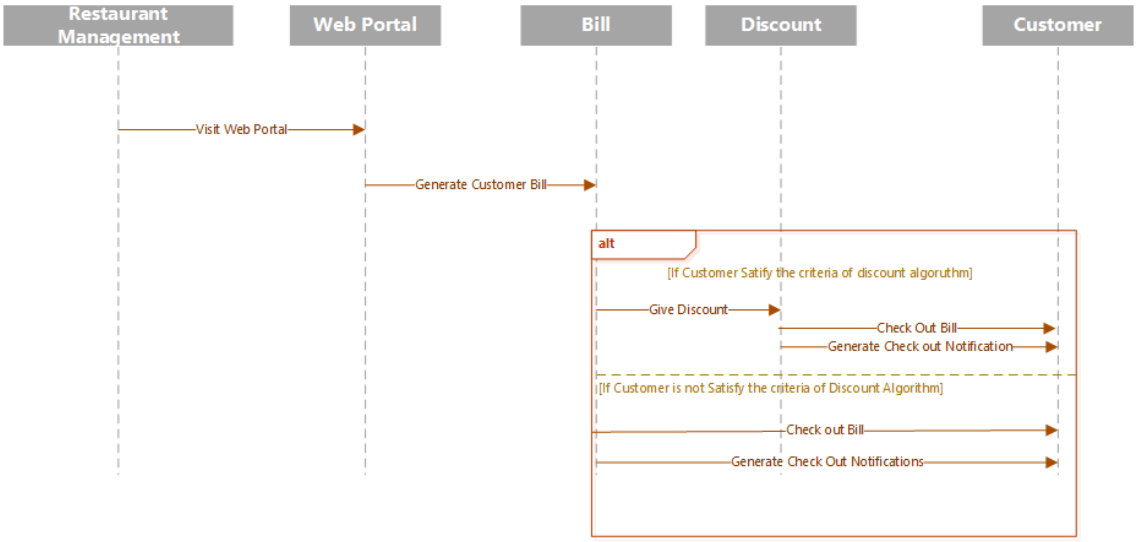

Figure 4.9: Check out and Give Discount Sequence Diagram

4.3 Activity Diagram

4.3.1 Customer Activity Diagram

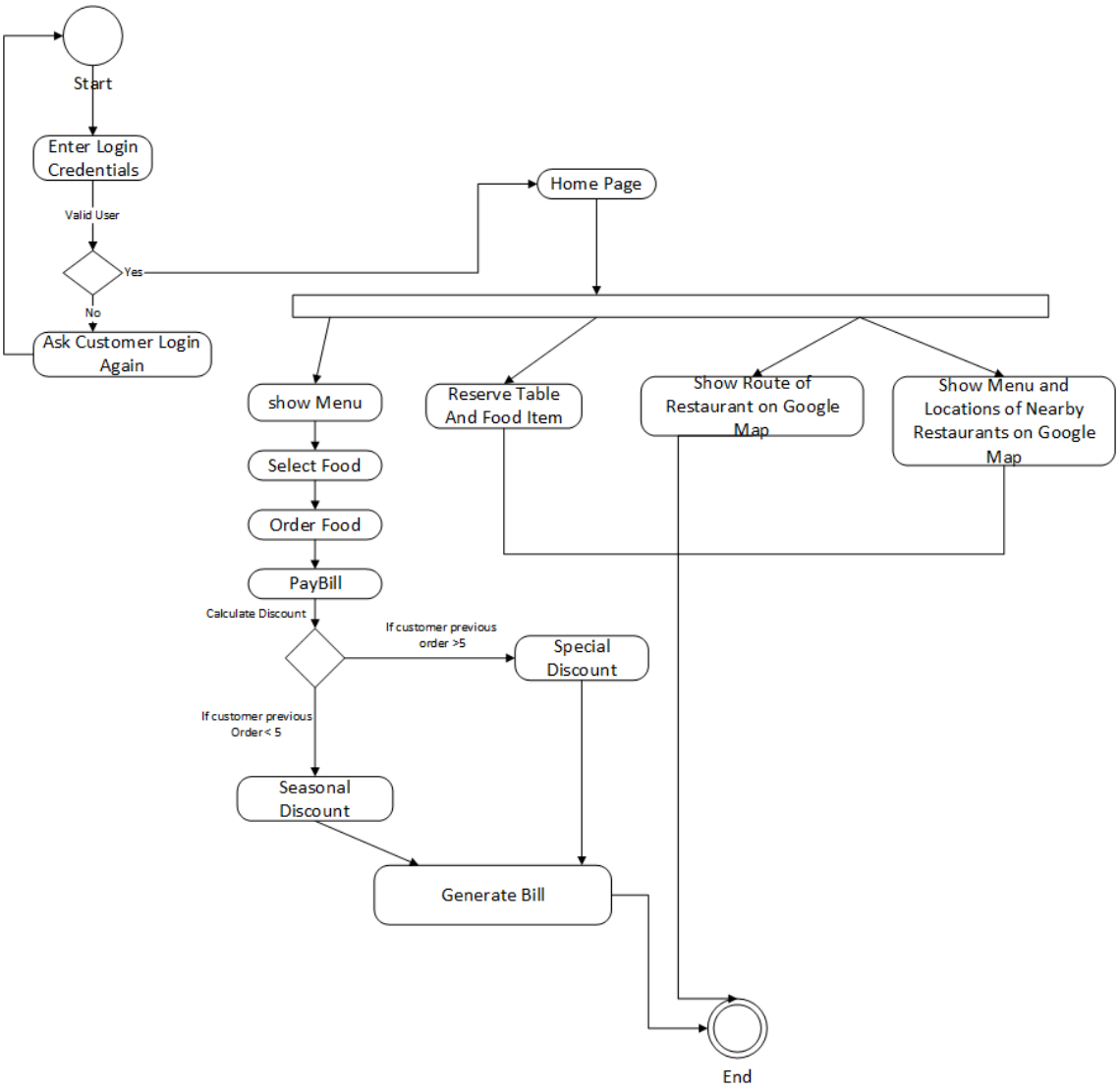

Figure 4.10: Customer Activity Diagram

4.3.2 Restaurant Management Activity Diagram

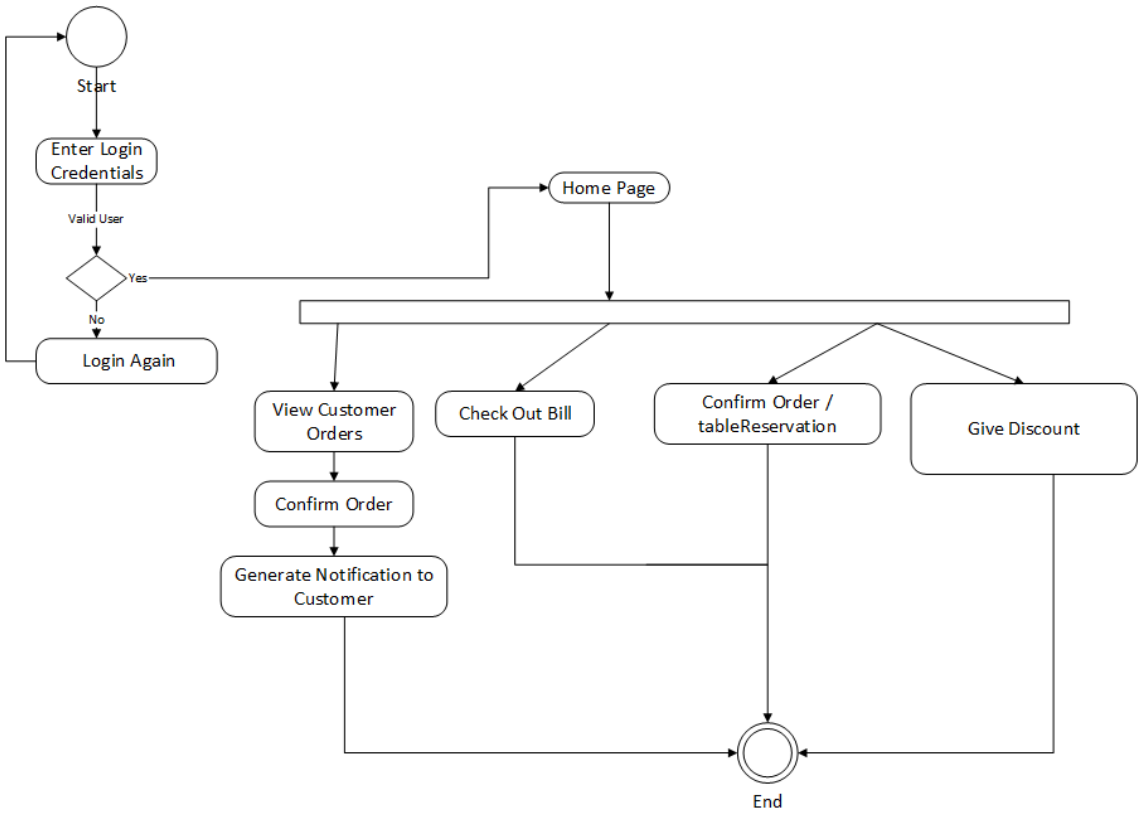

Figure 4.11: Restaurant Management Activity Diagram

4.4 Process Model

As this system is developed both of Mobile and Web applications and composed of different features so we must follow Incremental Model. It would help in developing of new features on every increment and also develop described model [14].

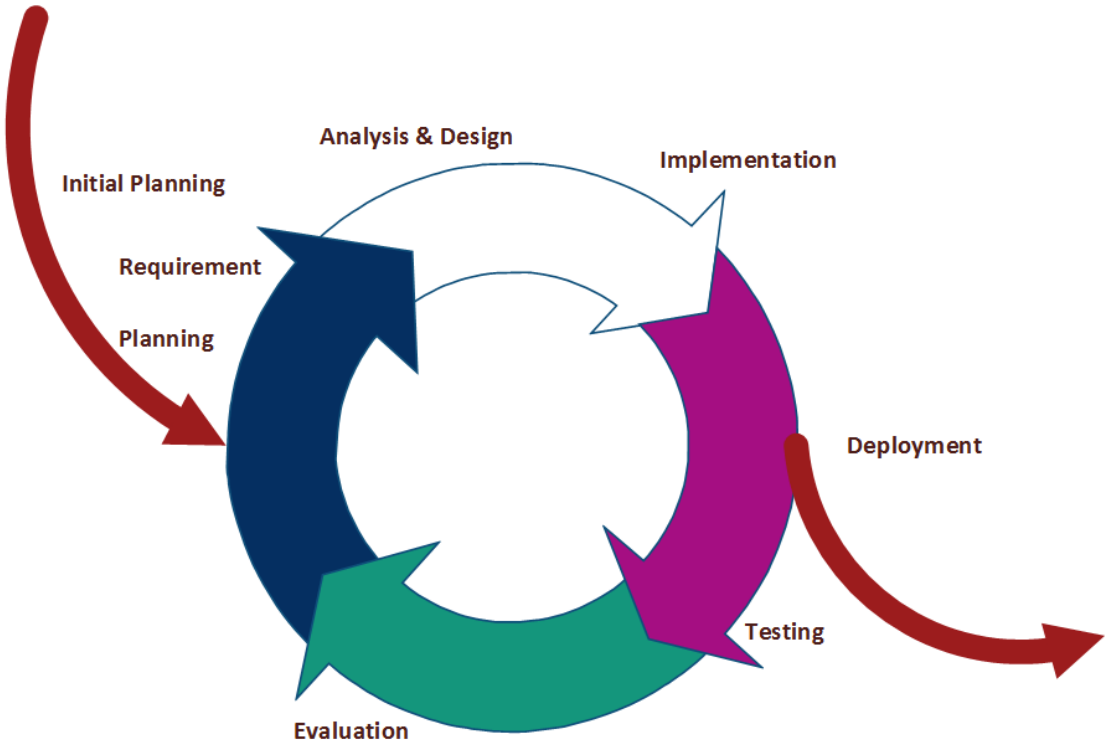

Figure 4.12: Incremental Model Diagram

s

Chapter 5

System Implementation

5.1 System Architecture

System Architecture describes the architecture of the system, which include the internal and external components of the system. The proposed system is divided into two main components, which includes

5.1.1 Web Application

Restaurant Management will use web Application only. Manager can log into this application using his ID and password. Manager will be able to inform customer when his order will be ready. Manger will also be receiving and sending notifications through desktop application. manager will also be able to add new food items and can add new categories and also be able to give discount and could see activity tables.

5.1.2 Mobile Application

Customers will be using Mobile Application in the proposed system. Customer can review, order food and can also make reservation of table. Customer will be required user ID and password to have access to their account and to the restaurant menu, where user contact number which is registered to the Restaurant system will be used to send notification about order details. Global Positioning System(GPS) Will be used to detect user location through mobile application and display route to the restaurant and approximate time to reach restaurant.

5.2 System Internal Component

5.2.1 Sign Up

In this Proposed System customer must sign up, from where he can log in to the mobile application. On sign up, Verification Code will be send on customer provided mobile number for authenticity.

5.2.2 Sign In

Customer must sign in to the mobile application by inputting id and password.Registered customer can be log-in to the Mobile Application only. after sign in customer can proceed to his account and restaurant menu.

5.2.3 Global Positioning System(GPS)

After sign in customer will be asked to input his location. location of customer will be used to detect location of customer to provide restaurant route and approximate time to reach restaurant. Menu of Nearby Restaurant will also be displayed on the map.

5.2.4 Food Ordering

Customer can order food after sign in through mobile application. Menu will be displayed to customer and then customer can order food. after ordering food customer will be given approximate time for his order to be ready and served so that he can save his time and for this purpose a confirmation notification will be send on registered mobile number. after confirmation record will be saved and order will be processed.

5.2.5 Table Reservation

Customer can reserve his favorite Table using mobile application. For reservation Customer must input number of persons which will be dinning. Reservation will be done on the basis of Categories defined i.e. balcony/hall/window side or any other.

5.2.6 Generate Discount

Discount will be generated to customer after placing order which will be visible to customer on mobile application. Criteria for discount will be based on previously placed orders.

5.3 Tools and Technology

There are many techniques which are being used in this Automated Restaurant System.

5.3.1 Microsoft Visual Studio

Microsoft Visual Studio is integrated development environment (IDE), which is developed from Microsoft. Visual Studio is used to develop computer programs for Microsoft Windows, as well as web sites, web applications and web services. Microsoft Visual Studio is used to make the Web Portal and WCF service of the system.Visual Studio supports different programming languages and allows the code editor and debugger to support nearly any programming language, provided a language-specific service exists [2].

5.3.2 SQL Server

Microsoft SQL Server is relational database management system which is developed by Microsoft Corporation. As SQL is database server, so it is software application with the key function of saving and retrieving information as requested by other software products which may runs either on the same computer or on another computer across a network which also include across the Internet. It is popular database application which is used for web applications as well for storing and maintaining their database information[3].

5.3.3 Android Studio

Android Studio is official IDE for developing Android application based on IntelliJ idea. IntelliJ idea makes work independent. We can easily develop android applications on it.Android Studio is most popular software for mobile application development [4].

5.3.4 Web API

Web API is used for the back-end functionality of the mobile. It has all the functionality that includes log in, sign-up, users friend list etc. Json is sent to the Android and is received to the Web API and does all its functionality. It is directly connected by the SQL Server database to get all the data and insert into the database. It is deployed separated on the Azure Cloud[5].

5.3.5 Global Positioning System

The Global Positioning System (GPS), is also known as Navistar GPS. GPS is a worldwide route satellite framework that gives Geo area and time data to a GPS beneficiary in every single climate condition, anyplace on or close to the Earth where there is an unhampered viewable pathway to at least four GPS satellites.GPS system does not need user to transmit

any kind of data, and it operates lonely of any telephonic or internet access, though these technologies can enhance the usefulness of the GPS positioning information[6].

5.3.6 Google Map API

Google maps has an application protocol interface which has many versions and being used in android smart phones in order to detect location and experience to locate users on Google map[7].

5.3.7 ASP.NET Signal R

ASP.NET Signal R is a new library for ASP.NET developers that makes it simple to add real-time web functionality to applications. When ever a user refreshes a web page to see new data, or the page implements Ajax long polling to retrieve new data, user is a candidate for using SignalR services[8].

5.3.8 Firebase

Firebase is Formerly known as Google Cloud Messaging (GCM). Firebase Cloud Messaging (FCM) is a cross-platform Android, iOS, and Web solution that lets you safely send and receive messages and notifications at zero cost.
• Using Firebase we can send unlimited upstream/downstream messages
• Using Firebase we can send messages to individual devices or a user segment
• Using Firebase we can Handle all aspects of queuing and delivery
• Using Firebase we can Optimize for battery efficiency[**?**].

5.3.9 Azure

Microsoft Azure is a cloud computing platform and its infrastructure is created by Microsoft for building, deploying and managing applications services through a global network of Microsoft-managed data centers. Azure provides different services i.e. software as a service, platform as a service and infrastructure as a service and supports different programming languages, tools and frameworks, including both Microsoft-specific and third-party software and systems[10].

5.4 Methodology

This application can be developed by using Incremental model, because requirements will be change according to the user suggestions. Development of this application was done in different methods.

• Phase 1

In phase 1 the main part of this application (i.e. web application) will be developed, so the Restaurant can maintain the record of the customer and change it if required.

• Phase 2

Mobile Application will be developed in this phase, mobile application will only be used by customer for ordering and reservation or to make any query or change their account information.

• Phase 3

In this phase, an interactive and proper interface of the application will be designed. And all the components of the system will be integrated with each other. In this phase system will be ready for testing.

Chapter 6

System Testing and Evaluation

6.1 Introduction

System testing ensures that each module of the system is working properly and providing results according to the expected output. Each module of the system is tested separately and then also complete application is also tested. The main purpose of testing is to examine whether the developed software meets the required quality standards or not. Some of the commonly used testing are:

- Unit testing
- Incremental Integration Testing
- Integration testing
- Functional testing
- System testing
- End-to-end testing
- Regression testing
- Interface testing
- Exception handling testing[15].

6.2 Interface Testing

Interface testing is the process of testing a product's graphical user interface to ensure it meets its required specifications. A variety of test cases normally does this testing[16].

6.2.1 Test Case for Log-in Screen

TC_FUNCT_01			
Tests the Log-in Screen			
Microsoft Visual Studio			
REQ_FUNCT_01			
Visual Studio should be installed on system.			
Step	**Task**	**Expected Result**	**Actual Result**
1	Open the log-in screen/menu	Pass/Fail	Pass
2	Verify that the log-in screen is displayed on both monitor.	Pass/Fail	Pass
3	Enter User-name and password.	Pass/Fail	Pass
4	Verify that the User-name can be entered.	Pass/Fail	Pass
5	Verify that the password is masked and can be entered.	Pass/Fail	Pass
6	Verify that a submit and reset buttons are displayed.	Pass/Fail	Pass
7	Verify that every field on the log-in screen working properly.	Pass/Fail	Fail

Table 6.1: TestCase01 (Testing the Log-in Screen)

6.2.2 Test Case for New Customer Tab

TC_FUNCT_02			
New Customer Tab			
Microsoft Visual Studio			
REQ_FUNCT_02			
Visual Studio should be installed on system.			
Step	**Task**	**Expect Result**	**Actual Result**
1	Open new customer tab.	Pass/Fail	Pass
2	Verify that all the required fields are there.	Pass/Fail	Fail
3	Verify that Add, Delete and Clear buttons are there.	Pass/Fail	Fail
4	Verify that all the fields take input properly.	Pass/Fail	Fail

Table 6.2: TestCase02 (Testing the New Customer screen of desktop)

6.2.3 Test Case for Registered Customer Tab

TC_FUNCT_03			
Registered Customer Tab			
Microsoft Visual Studio			
REQ_FUNCT_03			
Visual Studio should be installed on system.			
Step	**Task**	**Expected Result**	**Actual Result**
1	Open registered customer tab.	Pass/Fail	Pass
2	Verify that all the required fields are there.	Pass/Fail	Pass
3	Verify that update button is there/	Pass/Fail	Pass
4	Verify that all the fields take input properly.	Pass/Fail	Fail

Table 6.3: TestCase03 (Testing the Registered Customer screen)

6.2.4 Test Case for Home Page of Web Application

TC_FUNCT_04			
Tests the Home Page of Web Application			
Microsoft Visual Studio			
REQ_FUNCT_04			
Visual Studio should be installed on system.			
Step	**Task**	**Expected Result**	**Actual Result**
1	Open the home page.	Pass/Fail	Pass
2	Verify that the menu and its items are shown properly.	Pass/Fail	Pass
3	Verify that every menu item is working properly.	Pass/Fail	Fail
4	Verify that every menu item redirect to the desired web page.	Pass/Fail	Fail

Table 6.4: TestCase04 (Testing the home page of web application)

6.2.5 Test Case for Customers details

TC_FUNCT_05			
Tests the Customers details			
Microsoft Visual Studio			
REQ_FUNCT_05			
Visual Studio should be installed on system.			
Step	**Task**	**Expected Result**	**Actual Result**
1	Open the customers' details page.	Pass/Fail	Pass
2	Verify that it accepts the customer id to get details.	Pass/Fail	Pass
3	Verify that all the fields are read only.	Pass/Fail	Fail
4	Verify that details are taken against the customer ID.	Pass/Fail	Fail

Table 6.5: TestCase05 (Customer details page)

6.3 Usability Testing

Usability testing is used to check that how easy it is to use a software. Usability testing can be done by choosing some certain users and then ask them to use the system. Then Feedback of those users is taken to identify the issues related to the usability, so that these issues could be resolved[17].

6.3.1 Usability Test Case for log-in Screen

TC_FUNCT_06			
Log-in screen			
Microsoft Visual Studio			
REQ_FUNCT_06			
Visual Studio should be installed on system.			
Step	**Task**	**Expected Result**	**Actual Result**
1	Execute application.	Pass/Fail	Pass
2	Verify that log-in button work properly.	Pass/Fail	Pass
3	Verify that user log-in is properly done.	Pass/Fail	Fail

Table 6.6: TestCase06(Testing usability of the log-in screen)

6.3.2 Test Case for Insert / Update Record

TC_FUNCT_07			
Customer Info insert/update record			
Microsoft Visual Studio			
REQ_FUNCT_07			
Visual Studio should be installed on system.			
Step	**Task**	**Expected Result**	**Actual Result**
1	Open registered/ new customer page.	Pass/Fail	Pass
2	Verify that all the info of the customer is stored properly.	Pass/Fail	Pass
3	Verify that customer is showing properly.	Pass/Fail	Pass
4	Verify that registered and new customers have separate sections.	Pass/Fail	Pass
5	Verify that registered customers record is saved.	Pass/Fail	Fail

Table 6.7: TestCase07 (Testing usability of customer's info)

6.4 Exception Handling Testing

Exception handling testing refers to the anticipation, detection, and resolution of programming errors, application, and communications errors that are left behind during development phase[18].

6.4.1 Test Case for Log-in Exception Handling

TC_FUNCT_08			
Test Case for Log-in Exception Handling			
Microsoft Visual Studio			
REQ_FUNCT_08			
Visual Studio should be installed on system.			
Step	**Task**	**Expected Result**	**Actual Result**
1	Open log-in page.	Pass/Fail	Pass
2	Verify that all the fields accept input correctly.	Pass/Fail	Pass
3	Verify that user ID and password does match properly.	Pass/Fail	Fail
4	Verify that log-in must not through exception.	Pass/Fail	Fail

Table 6.8: TestCase08 (Exception handling of log-in screen)

TC_FUNCT_09			
New customer info Exception Handling.			
Microsoft Visual Studio			
REQ_FUNCT_09			
Visual Studio should be installed on system.			
Step	**Task**	**Expected Result**	**Actual Result**
1	Open new customer page.	Pass/Fail	Pass
2	Verify that all the fields accept input.	Pass/Fail	Pass
3	Verify that add button stores data properly.	Pass/Fail	Pass
4	Verify that all the data must be stored properly.	Pass/Fail	Fail

Table 6.9: TestCase09 (Exception handling for storing new customer)

6.4.2 Exception Handling Test Case for New Customer Info

6.5 Software Performance Testing

Performance testing is done in other to check the speed and efficiency or adequacy of a system, software project or gadget. This process includes quantitative tests done in a lab. for example, measuring the reaction time or the quantity of MIPS at which a framework capacities[19].

6.5.1 Test Case for Software Performance

TC_FUNCT_10			
Performance testing			
Microsoft Visual Studio			
REQ_FUNCT_10			
Visual Studio should be installed on system.			
Step	**Task**	**Expected Result**	**Actual Result**
1	Invoke application from its icon.	Pass/Fail	Pass
2	Log-in to application.	Pass/Fail	Pass
3	Select item from menu bar.	Pass/Fail	Pass
4	Enter new customer details.	Pass/Fail	Pass
5	Update or delete registered customer details.	Pass/Fail	Pass
6	Check status.	Pass/Fail	Fail
7	Log-out from application.	Pass/Fail	Fail

Table 6.10: TestCase10 (Software performance testing)

6.6 Compatibility Testing

Compatibility testing includes of software testing which is used to examine compatibility of the system/application/website build with different objects such as other web browsers, hardware platforms, operating systems etc. This kind of testing helps knowing out how well a system reacts in a specific atmosphere that includes hardware, network, operating system and other software etc. and also to check that intended application is compatible to all the computer systems having Microsoft Windows[20].

Tasks	**Excepted result**	**Actual result**
Android version 1.6 (Donut)	Pass / Fail	Fail
Android version 2.1 (Eclair)	Pass / Fail	Fail
Android version 2.2 (Froyo)	Pass / Fail	Fail
Android version 2.3 (Gingerbread) [Tested]	Pass / Fail	Fail
Android version 3.0 (Honeycomb)	Pass / Fail	Fail
Android version 4.0 (Ice Cream Sandwich) [Tested]	Pass / Fail	Pass
Android version 4.1 (Jelly Bean) [Tested]	Pass / Fail	Pass
Android version 4.4 (KitKat)	Pass / Fail	Pass
Android version 5.0 (Lollipop)	Pass / Fail	Pass
Android version 6.0 (Marshmallow) [Tested]	Pass / Fail	Pass
Android version 7.0 (Nougat)	Pass / Fail	Pass

Table 6.11: Table 6.6.1 Compatibility Testing

Chapter 7

Conclusion

7.1 Conclusion

We have established Automated Restaurant system which will save time of customer. Customer can order food and reserve table online by simply using android application. Customer will also be provided with discount on the base of his previous orders. Customer will also be able to see location of restaurant through graphical position system and exact distance could be calculated and average tome to reach restaurant will also be displayed. customer can also see menus of nearby restaurants.

7.2 Future Enhancement

Future enhancement includes:

• **Online Payment**

This application is only for ordering food and reserving tables, but payment is made manually

• **Home Delivery**

This system could further be enhanced for home delivery. which means food will be ordered online and could also be delivered to home and customer could enjoy food without coming to restaurant

Appendix A

User Manual

A.1 Introduction

User Manual shows guidance of system to its users. It provides bird's eye view of the complete system, and also how system will react upon specific actions. User guide of the intended application is given below.

A.2 Log-in Screen

This is the log-in screen of the Android Application; Customer will use this application only. Customer will input his user-name and password to log in to the application. After entering the user-name and password tailor will click Log-in button for signing in or Cancel button otherwise.

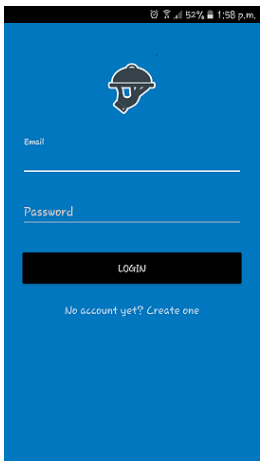

Figure A.1: Log-in Screen

A.3 Register New Customer

This is the new customer registration page of the android application, customer will insert the details and is saved to the database from here by clicking create account button.

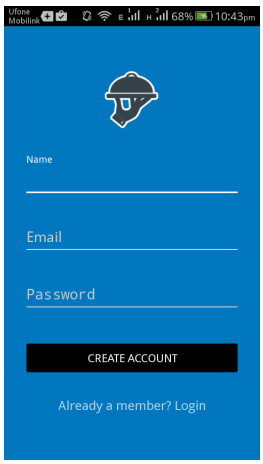

Figure A.2: Register New Customer

A.4 Start-up Window

This is the start-up window Customer time saving Automated Restaurant System.

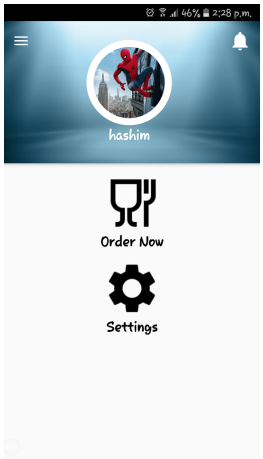

Figure A.3: Start-up Window

A.5 Update Record

This page will be used to update customer record. which means customer can edit his personal information and changes will be saved in database

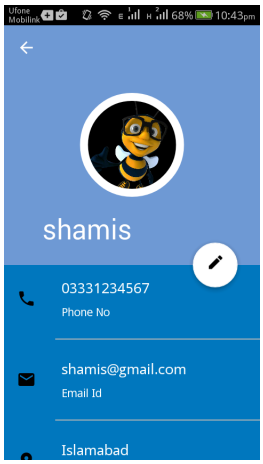

Figure A.4: Update Record

A.6 Menu Selection

This tab will be used to select the category of food items

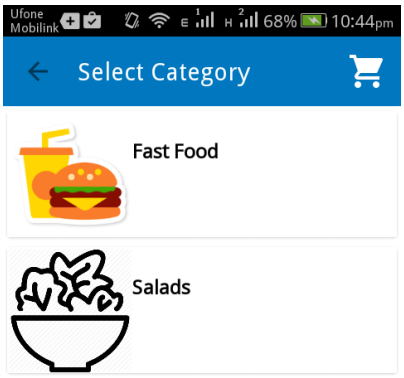

Figure A.5: Menu Selection

A.7 Adding cart

This is used to add food to cart menu and knowing the price details of food

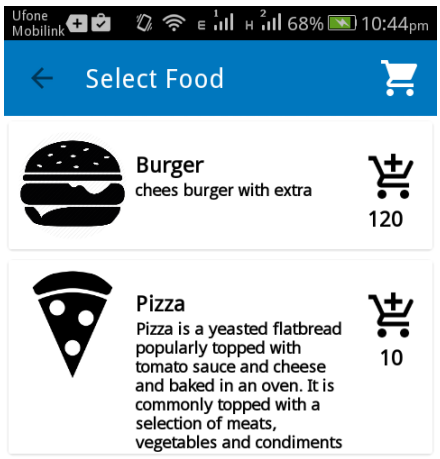

Figure A.6: Adding cart

A.8 Total Pricing

This page will display total bill after ordering food. customer can add up items amount and also remove items from here also. After than he will proceed to check out.

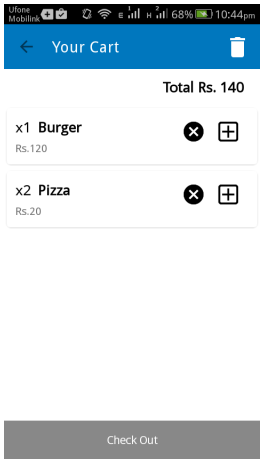

Figure A.7: Total Pricing

A.9 Previous Record

This page will show previous record of customers.

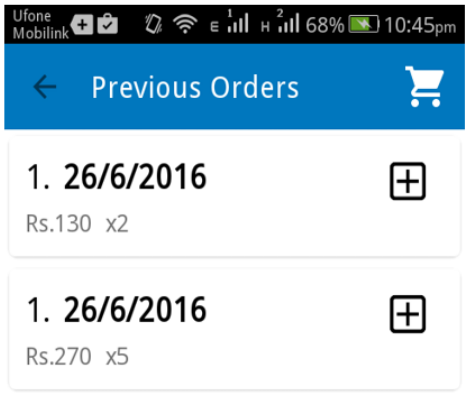

Figure A.8: Previous Record

A.10 Customer Profile View

This will be profile view of customer. From here he can view route, order food and see details of previous ordered food and also see last cart details

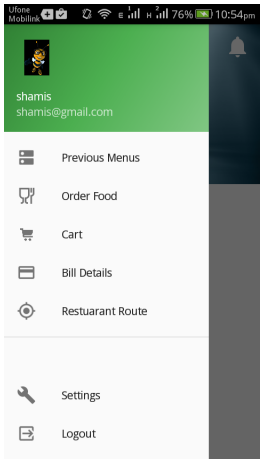

Figure A.9: Customer Profile View

A.11 QR code Scanner

This page will scan QR code of table and then user will be log-in from that table number. table number will be forwarded with order details to web portal and manager will came to know about new order.

Figure A.10: QR code Scanner

A.12 Log-in tab of Web portal

This is the log-in window for dashboard application.

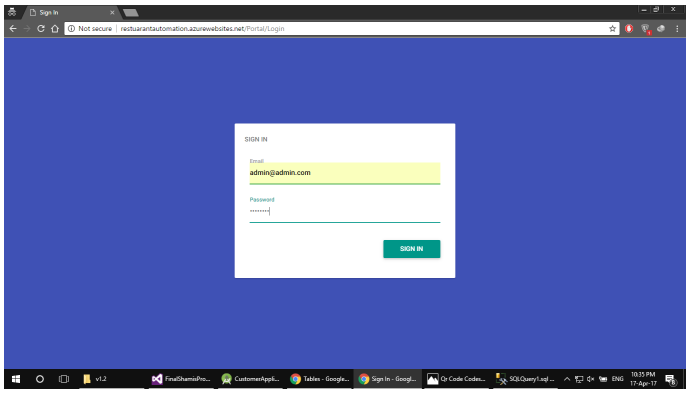

Figure A.11: Log-in tab of Web portal

A.13 Start-up tab of Web portal

This is user interface of the web portal of the application.

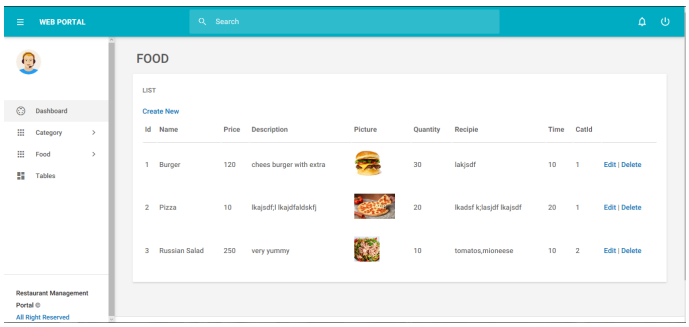

Figure A.12: Start-up tab of Web portal

A.14 Update menu items from Web portal

Restaurant manager will use this tab to update menu items.

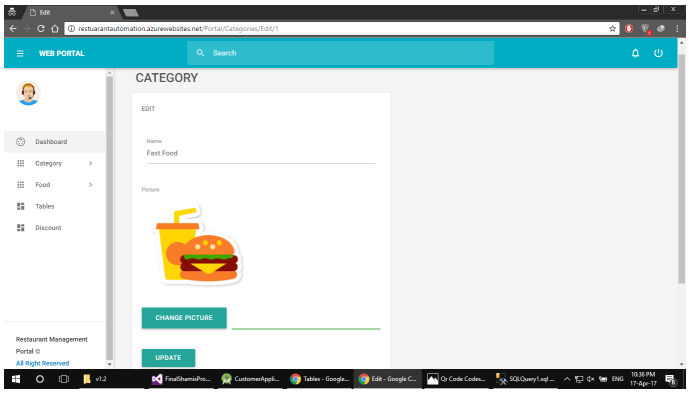

Figure A.13: Update menu items from Web portal

A.15 Creating new category from Web portal

Restaurant manager can add/create new food category from here

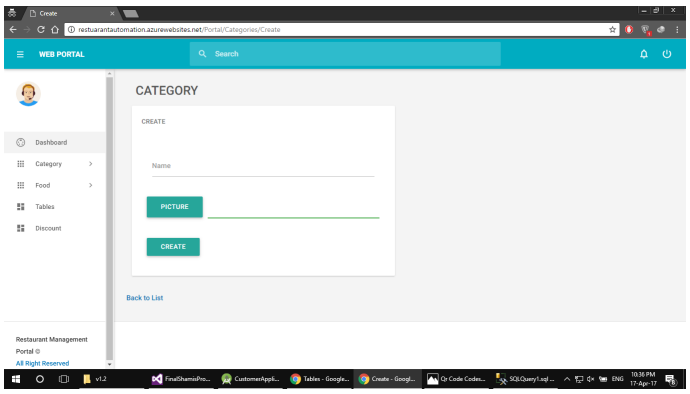

Figure A.14: Creating new category from Web portal

A.16 Viewing customers' orders from Web portal

Manager can view order from desktop application from this tab

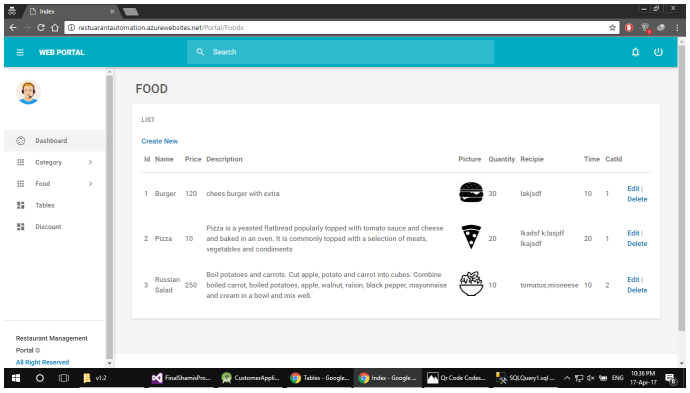

Figure A.15: Viewing customers' orders from Web portal

A.17 Creating New food items from Web portal

Manager can add new food items from here.

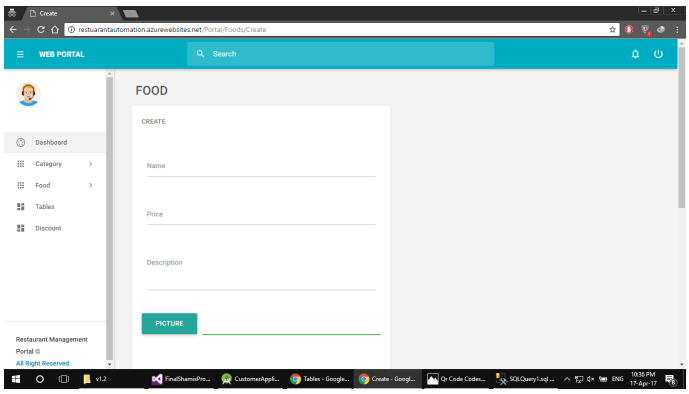

Figure A.16: Creating New food items from Web portal

A.18 Table Reservation details

This tab will show the table status i.e. reserved or empty.

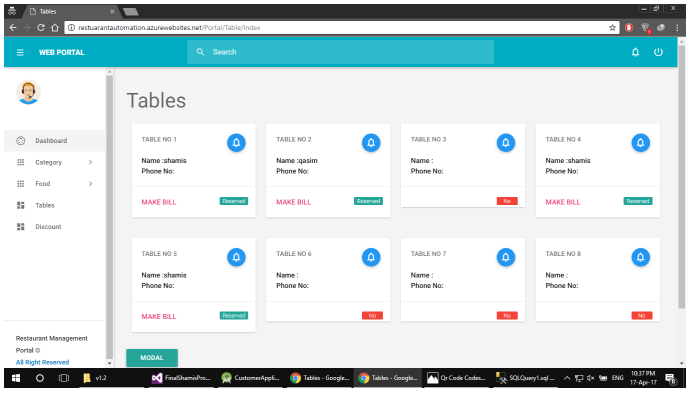

Figure A.17: Table Reservation details

A.19 Order confirmation

Manager will confirm order of customer from this tab after receiving confirmation from customer

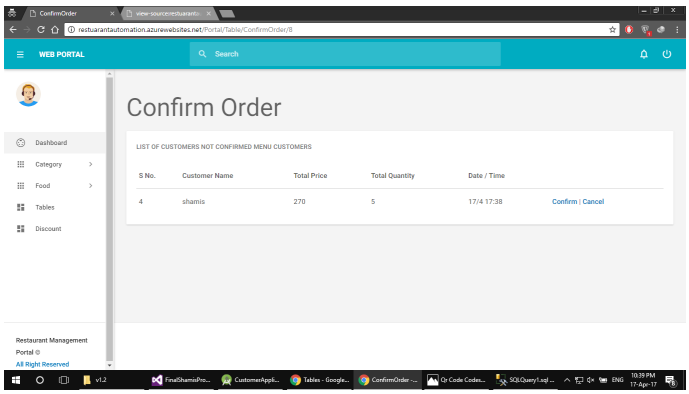

Figure A.18: Order confirmation

A.20 Generating Bill from Web portal

After confirmation bill will be generated by the manager. Manager will confirm order of customer from this tab after receiving confirmation from customer

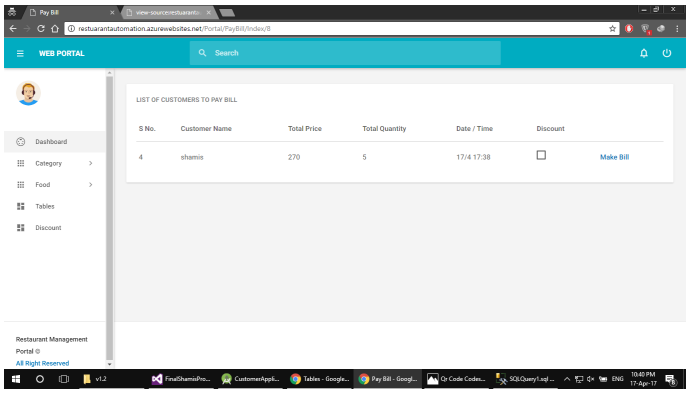

Figure A.19: Generating Bill from Web portal

A.21 Discount Generation

On bill generation discount will be given and total bill will be calculated.

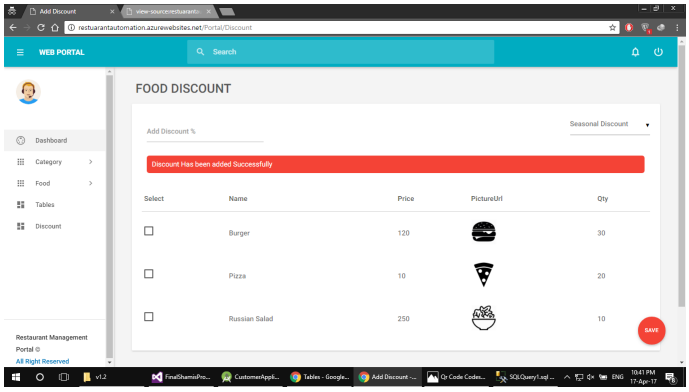

Figure A.20: Discount Generation

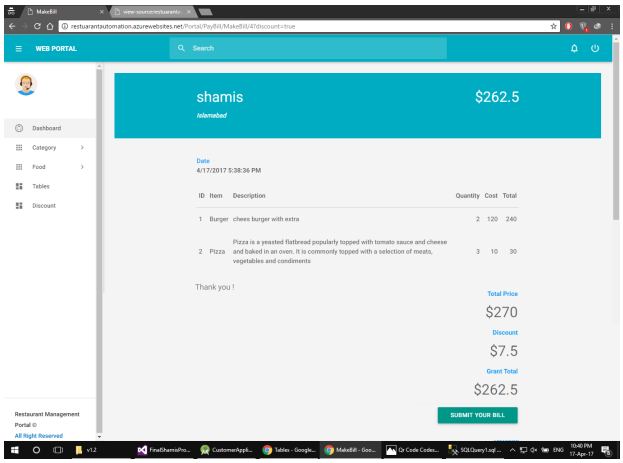

Figure A.21: Discount Generation

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