

RESTAURANT MANAGEMENT SYSTEM

Submitted to
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On May 05th, 2013

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ABSTRACT

In the today world customer satisfaction is the key to success for any business. In a restaurant, the traditional hand-waving method for calling services is inefficient often leading to many complaints and similarly keeping track of the restaurant customers billed items and, inventory management for the business would be a tedious job if we use the traditional method of tracking it using paper works. The proposed Restaurant Management System increases operational efficiency through use of a statistical data processing unit. The model has been divided in to 3 major features. Firstly, it handles front office and patron management to incorporate booking reservation tables for customers, ordering food and patrons paying the food bills. Secondly, inventory management system which keeps tracks of food product items. Thirdly, our software model maintains the vendor list and it also employee management, which keeps track of total number of hours worked by an employee and their hourly rate. A data processing unit allows managers and owners to easily monitor restaurant functions and employee progress.

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1.0 INTRODUCTION

If we consider restaurants there are so many activities that take place which needs to tracking and managed for overall efficiency of the system. Some of the tasks are the reservation of table for the patrons, tracking the food items ordered by patrons and generating bills. The other major tasks would be like inventory management to keep track of the items needs to prepare the food, and other inventory items needs to run the business like tissue papers, cutting boards, knife etc. Restaurant's have employees to run the business, they need to be managed, track their working hours and manage the payroll system for them. Keep these in our mind we have developed an application.

The manager or supervisor plays one of the important roles in overall efficiency of the Restaurant or food management system. The restaurant management is a tough and has complex tasks that needs much work and cares to work on. To easy the manger's or supervisors of the food management system we have developed a standalone application with a simple, user friendly Graphics User Interface (GUI) to serve the purpose.

The application is called Restaurant Management System which handles the reservations of the tables, employee management, and keep track of inventory of a restaurant. This application could be used by restaurant managers and owners to keep reservations, menu, and re-order food, track vegetables, condiments supply, etc., it can also be used to calculate revenues and pay employee salary. A restaurant has a lot of information that can be contained within the database management system and some of the sets of data we identified are reservations, employee human resource management, menu, patron, invoice (check and vendor invoice) and food stock pile.

2.0 SYSTEM DESIGN

Restaurant Application System is specifically made to increase efficiency of the restaurant with Main Dispatcher software program. Reservations of tables can be made with having to worry about manually checking tables are free or not. The application keeps tracks of the reservations table and tracking customer arriving and leaving the place after having food. It also keeps track of employee time sheet management and gives easy accesses for manager or supervisors to modify the details on the fly.

The application might be useful for the restaurant supervisors or managers to use this Graphic User Interface based software which is supported by a relational database structure at the back end and windows based application as the front end. The connection between the front end and back end is provided using the JDBC connection. The application is developed as a user friendly application which shows the flow in the system and which helps to manage the restaurant for the supervisors or managers from the point a patron enters the restaurant and to the point the patrons leaves the restaurant. It also deals with day to day running and functioning of the restaurant like employee management and inventory management system.

The application is broadly categorized into three parts. The first part is front office and patron management. The manager would start with entering the details of the patron to the restaurant. This would be according to the availability and reservations scheme. The patron would then order some dishes from the menu which would be served by the waiters. Finally the patrons would pay the bill and leave the restaurant causing the money paid to be added to the list of revenues. Second part of the database and application deals with inventory check mechanism. If a certain vegetable, condiment or meat item decreases beyond a certain check point then an employee can reorder amount from the vendor. The reorder amount is kept and when the fresh stock is received it is added to old stock. It also maintains balance sheet for employee management. This would be used to calculate the total hours worked by an employee and salary accounted for according to the hourly rate.

3.0 HARDWARE & SOFTWARE DESIGN REQUIREMENT, & SOFTWARE ARCHITECTURE

3.1 HARDWARE DESIGN REQUIREMENTS: - The hardware requirements to run the application are simple it can be used on any stand alone or network based machine; the system might be Desktop, Laptop, Netbook, NettApp, or a Tablet.

3.2 SOFTWARE DESIGN REQUIREMENT: - The software requirement to run the application are as follows, it might be run on Windows XP or higher version of family of windows based operating system.

3.3 SOFTWARE ARCHITECTURE

3.3.1 DATABASE IMPLEMENTED – MSSQL SERVER 2012

3.3.2 GRAPHICS USER INTERFACE – C# 4.0, Windows Presentation Foundation

3.3.3 ID – Visual Studio 2012

ER Diagram

ER DIAGRAM FOR RESTAURANT MANAGEMENT SYSTEM

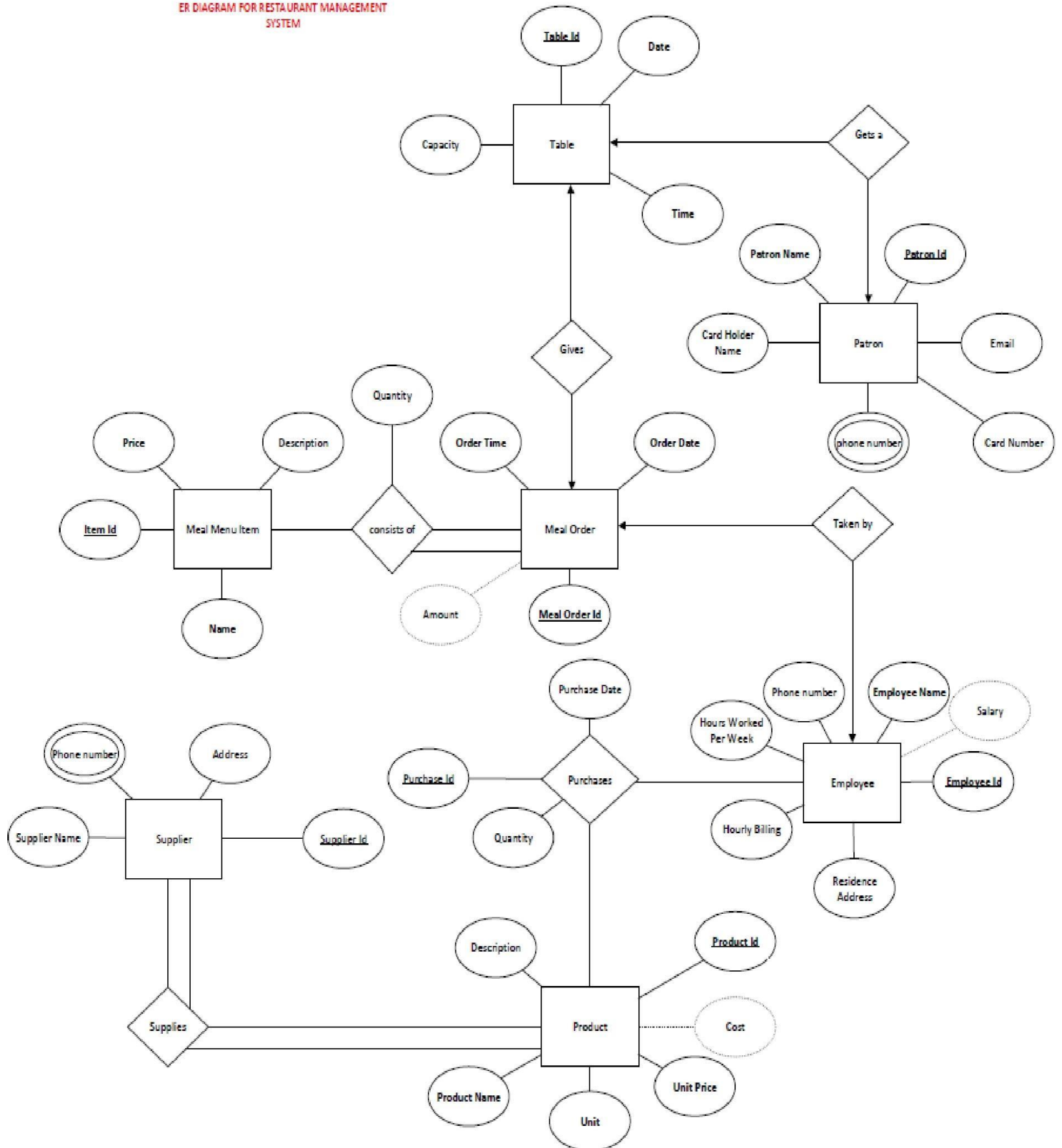
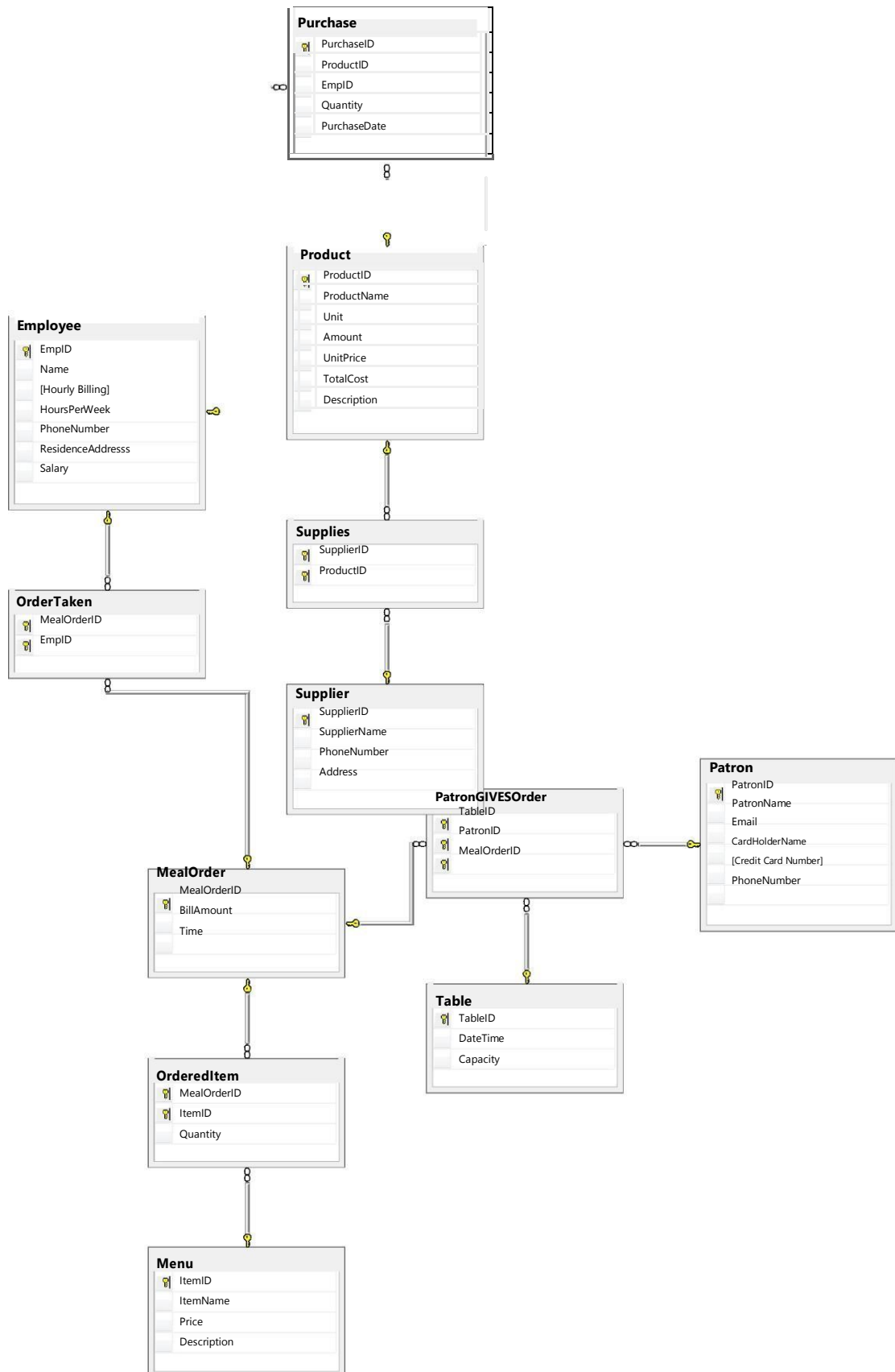


Figure 1.0: ER Diagram of Restaurant Management System

DATABASE DIAGRAM



4.0 FUNCTIONAL REQUIREMENTS

4.2 FUNCTIONALITIES OF RESTAURANT MANAGEMENT SYSTEM

The application we have developed is the Restaurant Management System which could be used in restaurants to keep track of the reservations of tables, tracking food items ordered by patrons, and generating bills. The second part would be tracking the employee work sheet management. The third part would be product management. The fourth part would be inventory management. Along with the inventory management if certain food item decreases beyond a certain check point then it would immediately triggers a reorder amount from the vendor.

4.2 Patron reservation system, food order and billing management

The main interface of the application is shown as below, using these application restaurant owners, supervisors or managers can use this application to keep track of employee records, by adding, deleting and editing the employee's details and time sheet management for the same. It can also be used in the front desk to book the reservation of the table for the patrons. Lets us explain one by in details:

- a. **Reserve New Table:** This is the interface where front desk can book the reservation table for the patrons. Track the food items ordered by the patrons and paying the bills.
- b. **Add Menu:** This is the interface where the new menu items can be added to the list.
- c. **Remove Menu:** This is the interface to remove the menu items for the list.
- d. **Edit Menu:** This is the interface to edit the items of the menu list.
- e. **Add Supplier:** This is the interface to add new supplier details.
- f. **Remove Supplier:** This is the interface to remove the supplier details.
- g. **Edit Supplier:** This is the interface to edit the Supplier details.
- h. **Add Employee:** This is the interface to add new Employee details.
- i. **Remove Employee:** This is the interface to remove the Employee details.
- j. **Edit Employee:** This is the interface to edit the Employee details.
- k. **Add Product:** This is the interface to add new Product details.
- l. **Remove Product:** This is the interface to remove the Product details.
- m. **Edit Product:** This is the interface to edit the Product details.

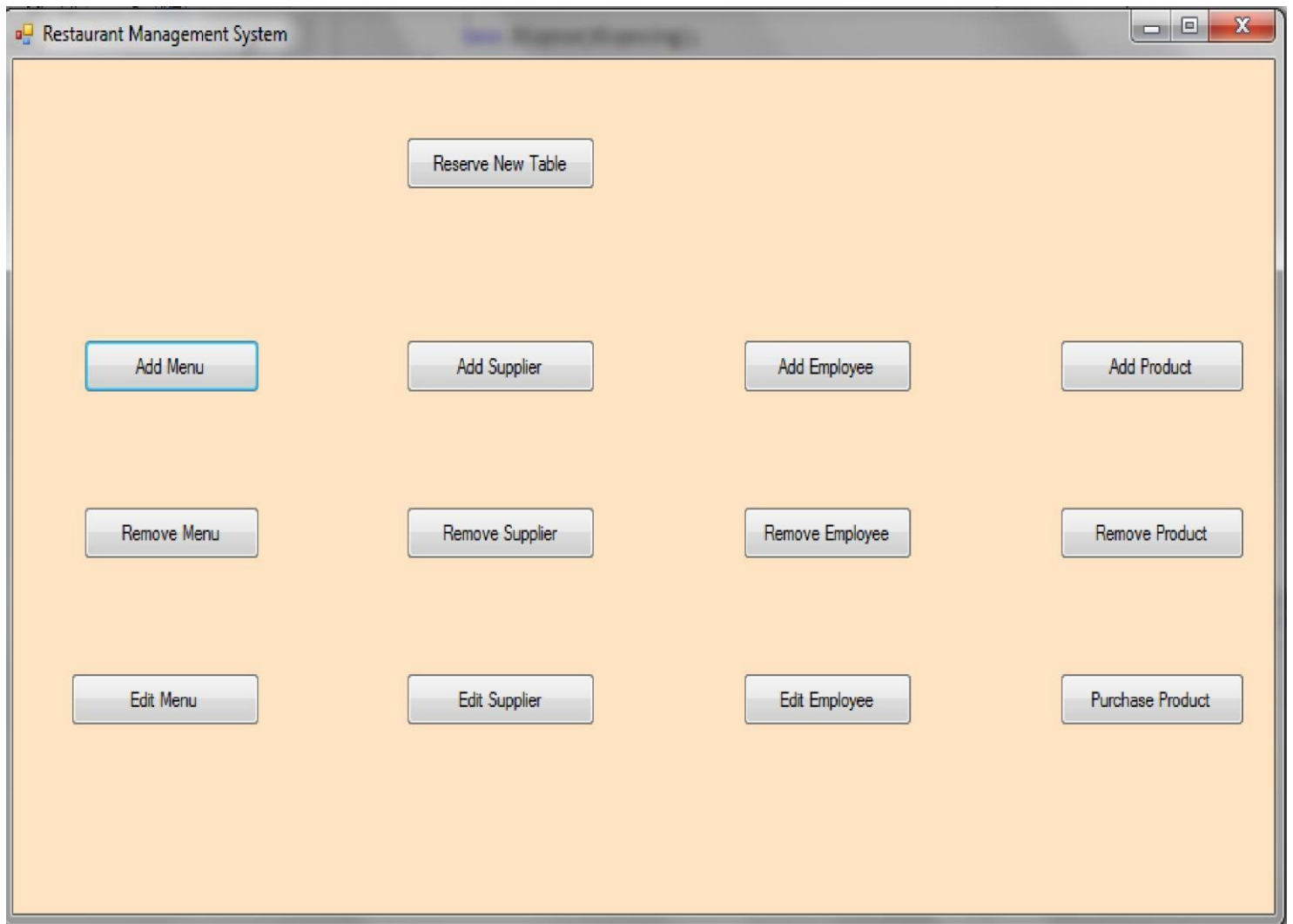
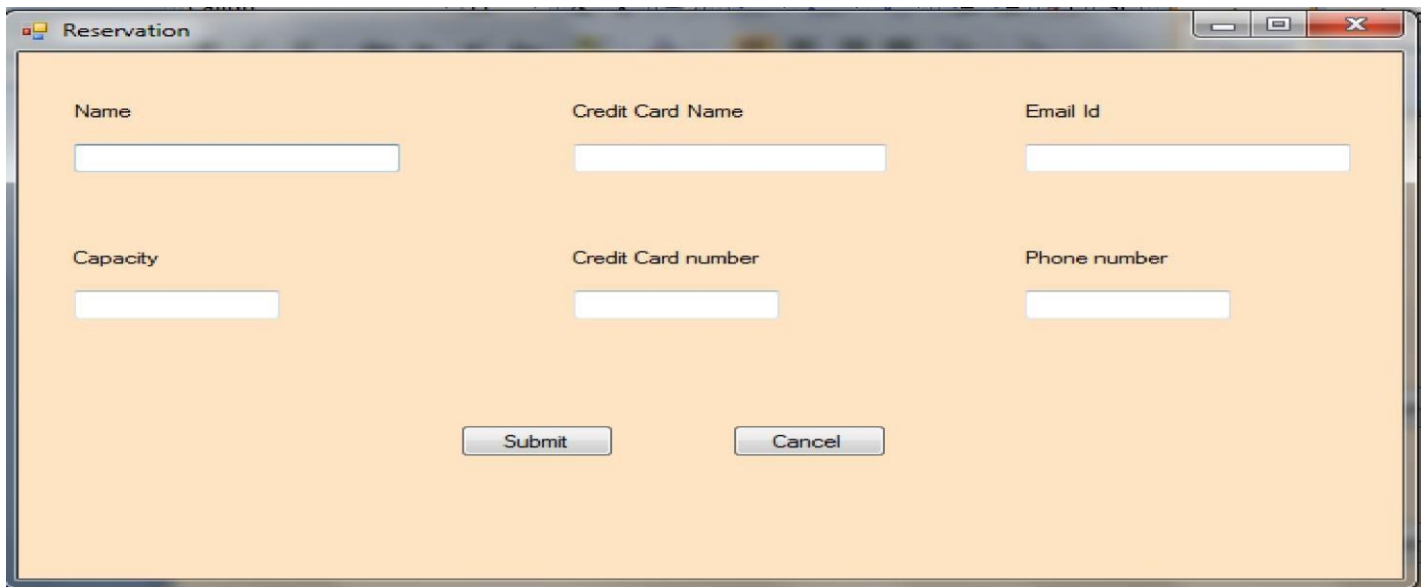


FIGURE 2.0: Restaurant Management System main page.

4.3 Reservation System Interface

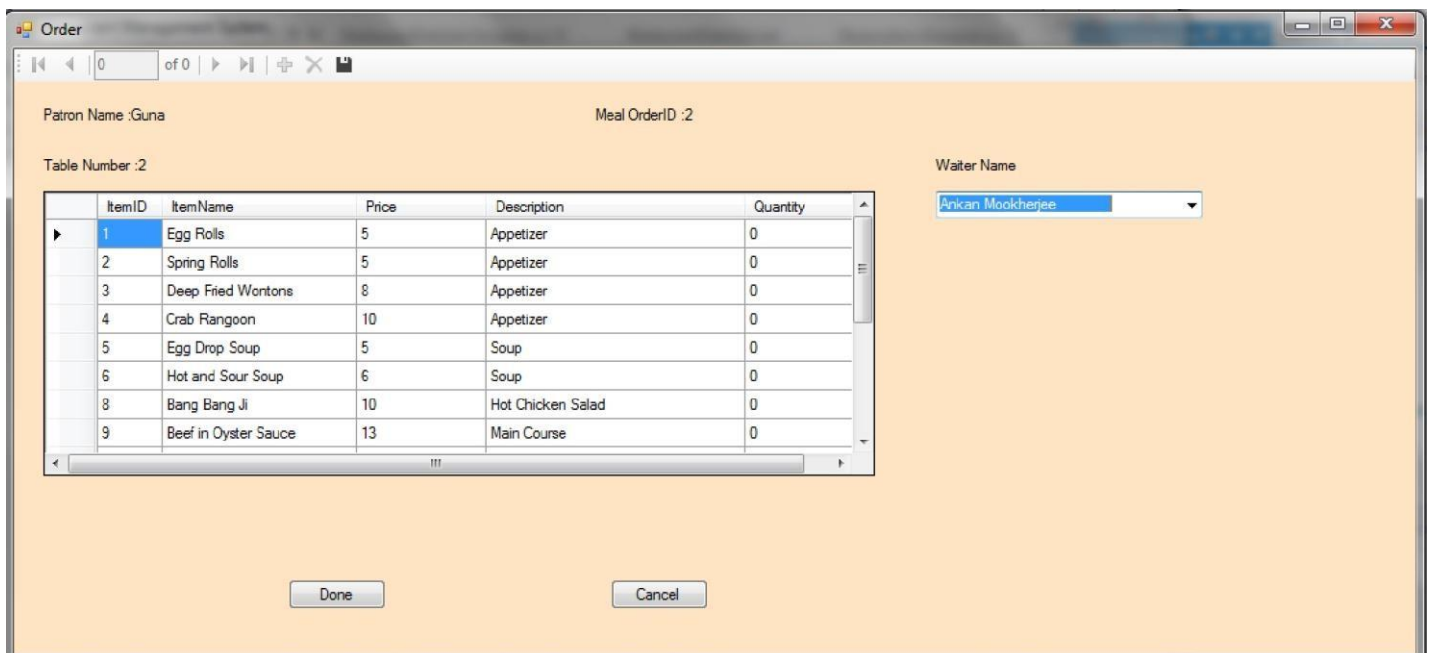
- 4.3.1 Request for new reservation:** As shown in the fig 2.1 below this is the interface to add the patron details to reserve the tables, it can be used by front desk to book the table by adding the Patron name, name on credit card, Credit card number, email id, phone number, and capacity requested.



A screenshot of a 'Reservation' window. It contains six text input fields arranged in two rows of three. The first row fields are labeled 'Name', 'Credit Card Name', and 'Email Id'. The second row fields are labeled 'Capacity', 'Credit Card number', and 'Phone number'. Below the input fields are two buttons: 'Submit' and 'Cancel'.

FIGURE 2.1: Reservation of new table for patron.

4.3.2 Ordering and tracking food items: The food ordered by the patron will be tracked as shown below by adding the details of the quantity of the orders, this is also mapped to the waiter's name for tracking purpose.



A screenshot of an 'Order' window. At the top, there is a status bar showing '0 of 0' with navigation icons. Below this, the window displays 'Patron Name :Guna', 'Meal OrderID :2', and 'Table Number :2'. On the right, there is a 'Waiter Name' dropdown menu with 'Ankan Mookherjee' selected. The main area contains a table with the following data:

	ItemID	ItemName	Price	Description	Quantity
▶	1	Egg Rolls	5	Appetizer	0
	2	Spring Rolls	5	Appetizer	0
	3	Deep Fried Wontons	8	Appetizer	0
	4	Crab Rangoon	10	Appetizer	0
	5	Egg Drop Soup	5	Soup	0
	6	Hot and Sour Soup	6	Soup	0
	8	Bang Bang Ji	10	Hot Chicken Salad	0
	9	Beef in Oyster Sauce	13	Main Course	0

At the bottom of the window are two buttons: 'Done' and 'Cancel'.

FIGURE 2.2: Patron food order tracking.

4.3.3 Generating the bills: Once the order's are served and patrons enjoyed their food, it's the time to generate the bills. The below interface would generate the bill and we can add the tips details to the final bill.

The screenshot shows a window titled "Bill" with a light orange background. At the top left, there is a text box labeled "Meal Order :2". Below this is a table with the following data:

	ItemID	ItemName	Price	Quantity	CumulativePrice
▶	1	Egg Rolls ...	5	4	20
	3	Deep Fried Wont...	8	4	32
	6	Hot and Sour So...	6	5	30
	9	Beef in Oyster Sa...	13	2	26
*					

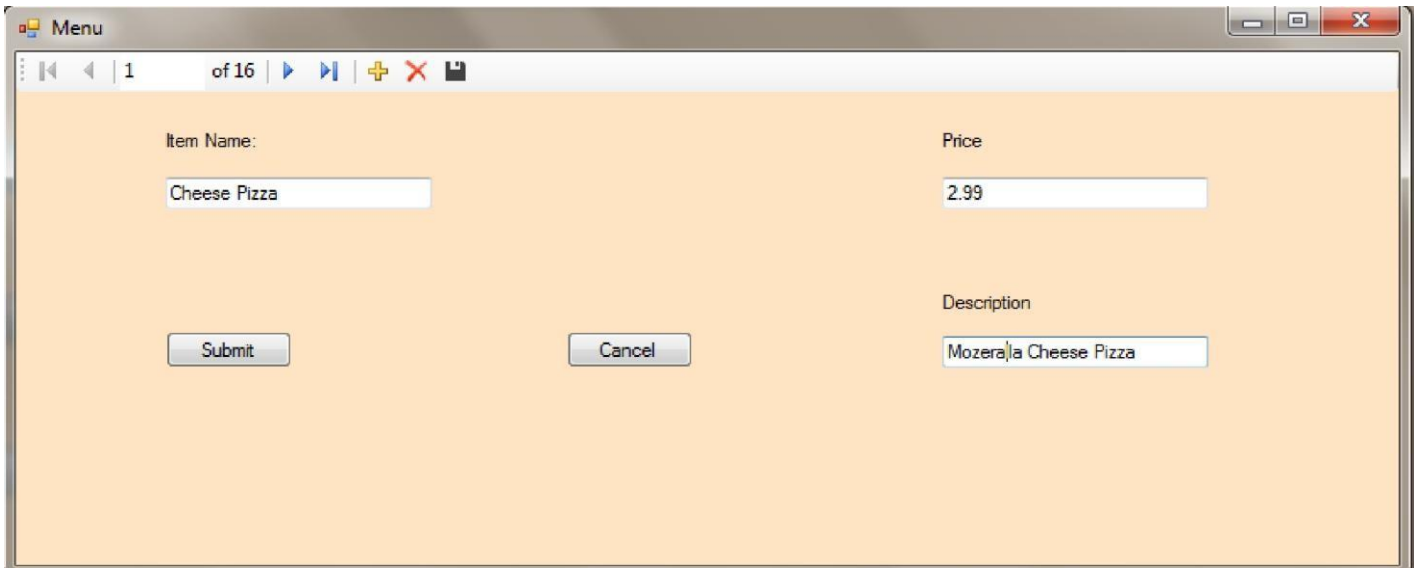
Below the table, there are four input fields arranged in two rows. The first row contains "Customer :" with the value "Guna" and "Total Amount :" with the value "\$108". The second row contains "Credit Card Number :" with the value "545989898981" and "Tip :" with the value "5". At the bottom right, there is a button labeled "Pay".

FIGURE 2.3: Patron food expense bill.

4.4 Managing Menu items – Add, Delete and Edit Menu

In our application we keep track of the menu items, it supports adding new menu items to the application, edit the menu and delete the menu items as needed.

4.4.1: Add new menu items: The below is the interface to add the new menu items to the application as shown in the figure 3.0. Manager or supervisors can add the new menu item with the details like Item name, price of the item, and a description of the item.



The screenshot shows a web application window titled "Menu". The window has a toolbar with navigation icons and a status bar indicating "1 of 16" items. The main form area is light orange and contains three input fields: "Item Name:" with the value "Cheese Pizza", "Price:" with the value "2.99", and "Description:" with the value "Mozarella Cheese Pizza". Below the "Item Name:" field are two buttons: "Submit" and "Cancel".

FIGURE 3.0: Adding new menu food item.

4.4.2: Delete a menu items: The below is the interface to delete the menu items from application as shown in the figure 3.1. Manager or supervisors can delete the unwanted menu items from the application by selecting the item name and checking other respective description of the item.

Menu

1 of 16

Item Name: Ling Mung Gai

Price: 12

Description: Lemon Chicken

Delete Cancel

FIGURE 3.1: Delete food menu item.

4.4.3: Edit a menu items: The below is the interface to edit the menu items from application as shown in the figure 3.2. Manager or supervisors can edit the menu items from the application by selecting the item name and modify the price, description or item name.

Menu

1 of 16

Item Name: Egg Rolls

Price: 6

Description: Appetizer

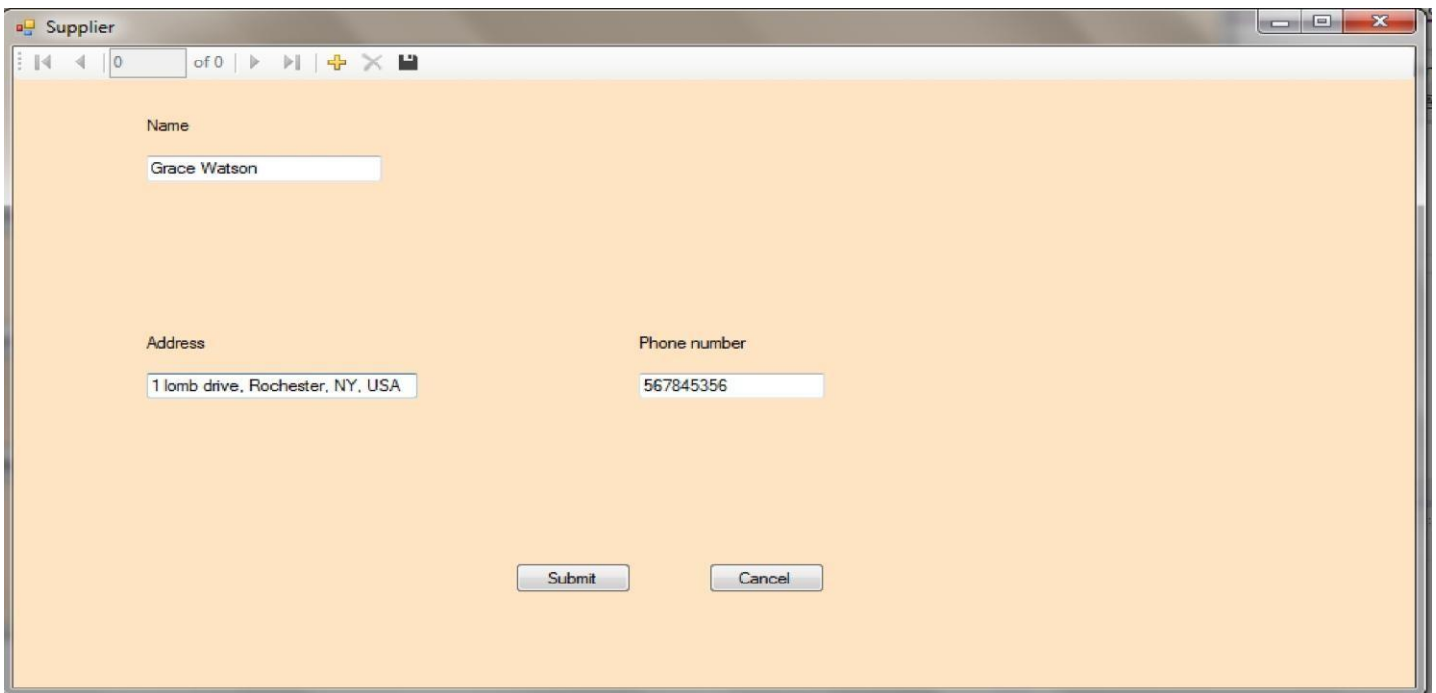
Edit Cancel

FIGURE 3.2: Edit food menu item.

5.5 Managing suppliers – Add, Delete and Edit Suppliers

In our application we keep track of the Supplier's, it supports adding new supplier details in to the application, edit the supplier details and deleting the supplier details as needed.

5.5.1: Add new Supplier details items: The below is the interface to add the new supplier details to the application as shown in the figure 4.0. Manager or supervisors can add the new menu item with the details like supplier's name, supplier's address and supplier's phone number.



The screenshot shows a web application window titled "Supplier". The window has a light orange background and a standard browser-like header with navigation icons and a "0 of 0" indicator. The main content area contains a form with three input fields: "Name" (containing "Grace Watson"), "Address" (containing "1 lomb drive, Rochester, NY, USA"), and "Phone number" (containing "567845356"). Below the input fields are two buttons: "Submit" and "Cancel".

FIGURE 4.0: Adding Suppliers

5.5.2: Delete the Supplier items: The below is the interface to delete the Supplier's items from application as shown in the figure 4.1. Manager or supervisors can delete the unwanted supplier details from the application by selecting the supplier's name and cross checking the address and phone number.

The screenshot shows a window titled "Supplier" with a standard toolbar at the top. The main area has an orange background. At the top, there is a "Name" label and a dropdown menu displaying "Grace Watson". Below this, there are two input fields: "Address" with the text "1 lomb drive, Rochester, NY, USA" and "Phone number" with the text "567845356". At the bottom of the window, there are two buttons: "Delete" and "Cancel".

FIGURE 4.1: Deleting Suppliers

5.5.3: Edit the Supplier's details: The below is the interface to edit the Supplier's details from application as shown in the figure 4.2. Manager or supervisors can edit the supplier's details from the application by selecting the supplier's name and cross verifying the supplier's respective address and phone number.

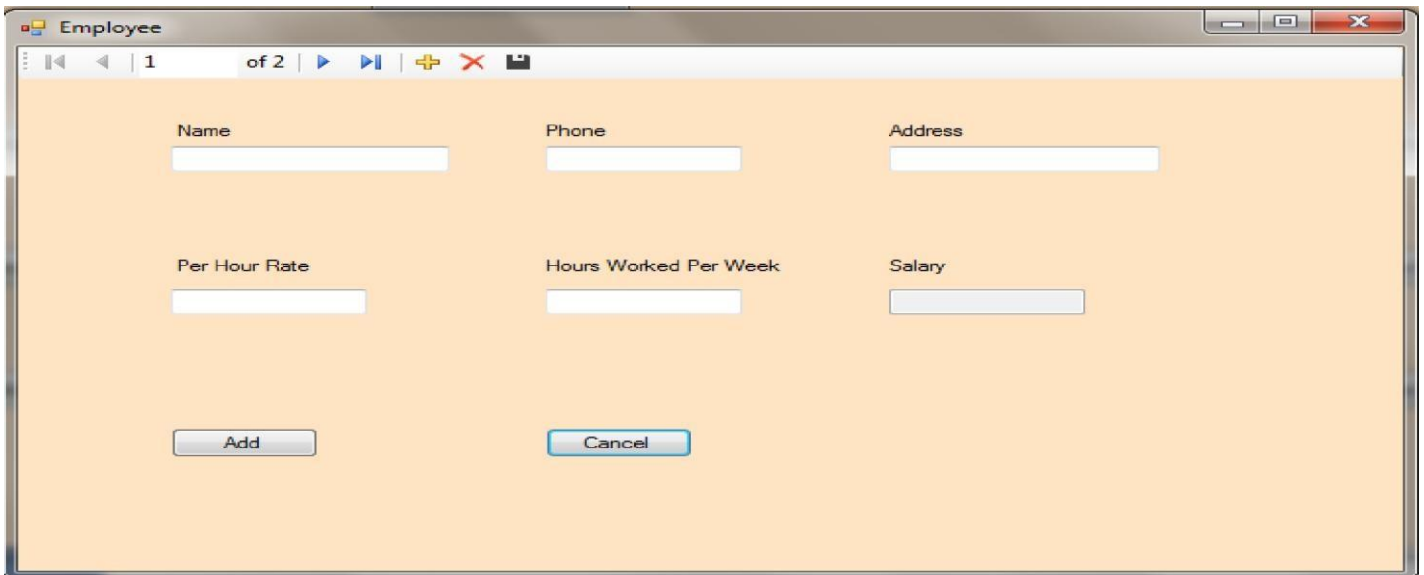
This screenshot is similar to the previous one, showing the "Supplier" window. The "Name" dropdown still shows "Grace Watson", and the "Address" and "Phone number" fields contain the same text. However, the buttons at the bottom are now "Edit" and "Cancel", indicating the user is in edit mode.

FIGURE 4.2: Editing Suppliers

5.6 Employee Management – Add, Delete and Edit Employee details

In our application we keep track of the Employee management, it supports adding new employee details in to the application, edit the employee details and deleting the employees details as needed.

5.6.1: Add new employee details: The below is the interface to add the new employee details to the application as shown in the figure 5.0. Manager or supervisors can add the new employee details with the details like employee's name, employee's address, phone number, Salary per hour rate.



The screenshot shows a window titled "Employee" with a standard Windows-style title bar. Below the title bar is a toolbar with icons for navigation and editing. The main area of the window contains a form with six text input fields arranged in two rows of three. The first row contains fields for "Name", "Phone", and "Address". The second row contains fields for "Per Hour Rate", "Hours Worked Per Week", and "Salary". At the bottom of the form are two buttons: "Add" and "Cancel".

FIGURE 5.0: Adding new Employee details

5.6.2: Delete the Employee details: The below is the interface to delete the employee's details from application as shown in the figure 5.1. Manager or supervisors can delete the unwanted employee's details from the application by selecting the employees' name and cross checking the address and phone number.

Employee

1 of 2

Name: kan Mookherjee

Phone: 512768893

Address: 51 West Squire Drive.

Per Hour Rate: 8

Hours Worked Per Week: 20

Salary: 150

Remove Cancel

FIGURE 5.1: Delete Employee details

5.6.3: Edit the Employer's details: The below is the interface to edit the Employer's details from application as shown in the figure 5.2. Manager or supervisors can edit the Employer's details from the application by selecting the Employer's name and cross verifying the Employer's respective address and phone number.

Employee

1 of 2

Name: Prashant Rao

Phone: 312508123

Address: 74 Crittendon Apartments.

Per Hour Rate: 9

Hours Worked Per Week: 20

Salary: 150

Edit Remove

FIGURE 5.2: Edit Employee details

5.7 Product Management – Add, Delete and Edit Product details

In our application we keep track of the product management, it supports adding new product details in to the application, edit the product details and deleting the product details as needed.

5.7.1: Add new product details: The below is the interface to add the new product details to the application as shown in the figure 6.0. Manager or supervisors can add the new product details with the details like product's name, unit, Amount, IblSupplier, Description, and employee name.

The screenshot shows a web application window titled "Product". The main form has the following fields and values:

Name	Unit	Unit Price	IblSupplier
Guna Shetty	456	56	Grace Watson

Amount	Description	Employee
67	Grains	Ankan Mookherjee

Cost: [Empty text box]

Buttons: Add, Cancel

Modal Dialog Box:

You bought the product worth \$3752

OK

FIGURE 6.0: Add Product Details

5.7.2: Delete the Product details: The below is the interface to delete the product details from application as shown in the figure 6.1. Manager or supervisors can delete the unwanted product details from the application by selecting the product name.

Product

1 of 1

Name: Guna Shetty

Unit:

Unit Price:

lblSupplier:

Amount Available:

Description:

Employee: Ankan Mookherjee

Cost:

Remove Cancel

FIGURE 6.1: Remove Product Details

5.7.3: Purchase the Product details: The below is the interface to add the purchase the Product details from application as shown in the figure 6.2. Manager or supervisors can add the product as shown below to the application.

Product

0 of 0

Name: Gunaseela Vittala Raya

Unit:

Unit Price:

lblSupplier:

Amount Available:

Description:

Employee: Ankan Mookherjee

Add Amount: 0

Cost:

Incremental Cost:

Add Cancel

FIGURE 6.2: Purchase Product Details

6.0 TESTING

For the above application we have performed Black Box Testing and Unit Level Testing as the components were building across. We have tested formally and informally as part of the development process some of the tests that we ran as part of formal testing is as follows:

6.1 FRONT END INTERFACE TESTING

We check the entire interface for the functionality, like the following:

- a. Test the interface of the main form and all sub forms for correctly displayed.
- b. Check the close, minimize and maximize button works correctly for all windows based forms.
- c. Check for syntax errors on the forms, typo`s etc.
- d. Check main form is displayed correct with respective color set in the background.
- e. Check the button of the sub form works when clicked from the main page.
- f. Provide invalid input on the form and check, for example by inputting character in place of credit card number text box. Check for correctness.
- g. The above tests were repeated for all sub forms as well.

6.2 BACK END FUNCTIONALITY AND INTERFACE TESTING

- a. Check one the data is entered in the form it is updated in the database.
- b. Check for data redundancy in the application or database.
- c. Checked the data is retrieved properly in all the forms.
- d. Checked triggers worked properly when the item in the stock goes below the level set.

6.3 INTEGRATION TESTING

- a. Tested the combining the both the back end and front end, verified the database to the form connection is proper.
- b. Checked over all functionalities by exploring all the options in the random passion using black box testing.

7.0 FUTURE SCOPE

Currently, the application is a standalone application, this can be made an online application accessing it over the internet or local area network. It can also be extended to support the patrons to order the food using the application, digital displays can be placed at every table so that patrons can order the food directly using the touch screens or simple user friendly computers. The patrons need not wait for the waiters to come and pick the order, patrons can also make payments directly using the credit cards or debit cards. The next future of this project would be extended to a distributed environment where multiple members can access the application at the same time and update the records accordingly, the manager or owner of the food management system can sit miles away and keep track of the orders that took place and work virtually from any part of the world. Overall efficiency of the restaurant would increase and minimize manpower resources.

