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a. Definition, Investigation and Analysis

(i) Definition- nature of the problem

Description of the Organisation

Hotel Five Monkeys & Restaurant was established in 2010 as a partnership organization jointly owned by Dhaniswor Kandel, Ramesh Kharel, Tirtha Raj Acharya, and Ballu Khadgi. It is located in Shankhamul, New Baneswor (Kathmandu) which is one of the growing commercial areas of capital city. The organisation mainly deals with the restaurant business. The restaurant has been a multi cuisine restaurant serving variety of cuisines including Italian, Indian, and Nepalese Foods. Along with restaurant, Hotel Five Monkeys & Restaurant has provided the facility of organising Parties, Seminar and conducting marriage ceremonies.

After few months of its establishment, Hotel Five Monkeys & Restaurant has gained an immense popularity. It has been successfully able to become the ultimate selection among the people in Shankhamul for conducting marriage ceremonies and other events as well as a place for having dinner. Several events such as the Seminar of Lions Club, Reporters Meeting, Interaction programmes of different political parties and hosting of Nepali Talent show ('Khoji Prativa ko') have further contributed to the popularity of this restaurant. The restaurant mainly hosts seminar and parties during the day time and serves as a dinner destination during the night.

With the aim of providing good service to its valuable customers, the Restaurant has employed 20 staffs including Security Guard, Bartender, Cooks, Store Keeper and Accountant.

Problem Definition

With the increasing popularity of the restaurant, the inflow of customers has increased. This increased volume of customers has resulted in more transaction causing problems in maintaining and processing the records in the present system.

The main area the origanisation is facing problem is Point of Sale System. The bartender and the receptionist is the same person and having to perform multiple tasks by the same person simultaneously has resulted in several errors and mistakes. This has directly hindered the quality of service provided by the restaurant. Sometimes, the customers are given the bill with the additional foods and drinks which they have not ordered and other times customers bill does not contain the food which they have ordered. Both of these mistakes have caused loss and tarnished the good will of the restaurant. Even the employees are not happy with this thing as the service charge from the bill is distributed and added to their income. Owners of the restaurant have received complaints from employees frequently regarding

the change to the current system so that their pay is accurate. This problem has also caused ups and downs in the daily and monthly Sales Report of the Restaurant.

Methods Currently Used

The present system is completely paper based system. Pre-formatted and pre-printed documents are used to store the data produced during the business cycle. The necessary calculation of the records and transaction is done by the owner and the employees using the calculator. The files are indexed chronologically and are analyzed daily and monthly to produce daily sales report and monthly reports respectively.

The customers are presented with the menu which contains the name of the food items and drinks along with their prices. The customer makes his selection and the waiter notes the ordered cuisines and drinks in KOT (Kitchen Order Ticket) and BOT (Bar Order Ticket) respectively. Multiple copies of KOT are produced using the carbon paper. Then the waiter hands down one copy of KOT to kitchen and other copy along with BOT to the Bar. Using that information, Bartender prepares the customer invoice using the pre-printed bills containing fields ready to accept data. Multiple copies of this bill are produced and one is handed down to the customer. This process continues for the whole day. At the end of the business hour, KOT and BOT are compared with the Bills and Daily Sales Statement is produced by the accountant. Finally, the daily sales statements, KOT, BOT and the bill are stored in different files in a safe place only accessible to accountant and the owners. At the end of each month, the daily sales report is analysed and Monthly Sales Report is produced.

Origin and Form that Data takes Place

Much of the records and documents used in the restaurant contain alphanumeric data (mainly currency). The formal documents used the organisation are KOT (Kitchen Order Ticket), BOT (Bar Order Ticket), Customer Invoice, Daily Sales Statement, Supplier bill, Bar Stock Statement, Kitchen Stock List and Menu.

KOT (Kitchen Order Ticket)

It is produced by the waiter taking the food order. He notes down the order given by the customers in the KOT and after the order is made he pass out one KOT to kitchen and another to the bar.

T.No	The table number which is primary key of KOT.
Waiter	Name of the waiter who takes the order.
NOC	Total number of customers in particular table.
Date	The date when the order was taken.

TM	Time when the order was taken.
Particulars	Name and quantity of ordered items.

BOT (Bar Order Ticket)

It is produced along with the KOT by the waiter who takes the order. The format of BOT is same as KOT. The only difference is that BOT contains drinks order only.

Customer Invoice

The bartender prepares customer bill for a particular table by referring KOT, BOT and Menu. When customer asks for the bill, it is handed down to them. The following are the fields on this document.

Invoice No.	This acts as a primary key of the bill.
Date	Date when the bill was created.
Table No.	The index of table where customer is seated.
S.No	The serial number of the item.
Particulars	The name of the ordered items.
Qty	Quantity of Items ordered.
Rate	The price of each quantity.
Beverages	Product of Quantity and Rate if the item is drinks or tobacco.
Foods	Product of Quantity and Rate if the item ordered is food.
Subtotal	Contains the sum of foods and beverages separately.
Total	Sum of two subtotals (foods and beverages).
Discount	Discount given to the customer.
Net Total	Difference between total and discount amounts.
Authorised Signature	To ensure that the bill is valid bill.

Daily Sales Statement

This document is created at the end of each day. It is created by referring the copy of each and every customer bills for the particular day. This document is in tabular form and the column headings are as follows:

S.No	Serial number of the statement.
Bill No.	The bill number of the customer invoice or bill.
Food	The total price of food items for particular bill number
Beverage	The total price of liquor and tobaccos for the particular bill
Total	Sum of Food and Beverage
Remarks	If there is extra information about the particular bill, it is noted here.

Menu

Menu contains the price list of available cuisines and the liquors. The customers view the menu and order the item they want to have. The fields in the menu are **Category, Product Name,** and **the corresponding prices.**

(ii) Investigation and Analysis

Investigation Plan

The present system is manual so, an in-depth study is required to understand fully how the Point of Sale and Billing System works. For this purpose, I have divided my investigation into four phases which will allow me to understand the problems in the present system and determine the loopholes causing the problems.

During the first phase, I will be conducting one interview session with the owner. I will be interviewing Owner of the restaurant to understand the business cycle and what seems to be the problem regarding the present system. Then I will be observing the Restaurant closely during the peak business hours. I have to be careful during this phase as the employees may recognize me as inspecting them and pretend to do what actually does not happen in the system. I also need to be careful with the customers to avoid them recognizing me inspecting the system as they may not be comfortable with it.

In the second phase, the interview sessions will be conducted with the Receptionist to know how the bills are processed. Finally, I will be interviewing the accountant to know how the reports are processed by him. I planned the three interview sessions not to be contiguous so that I won't be recognized by the employees of the restaurant during my observation. The interviews will be conducted in local Nepali language and I will be recording the conversation through my Mobile phone.

The third phase will be a Questionnaire phase where the customers will be presented with a set of questions after they make the payment. They will be given three options for each problem. These questions will help me determine the satisfaction and problems faced by the customer with the service of the Restaurant.

Finally, I will be looking at the original documents used during the business hours as well as the reports made after the business hour. These documents will enable me to understand the format of input and output in the present system.

First Phase (1 Interview & Observation)

Three interview sessions are conducted in local Nepali language using tape recorder. Care has been taken to preserve the actual tone of conversation.

First Interview

Interviewee: Ramesh Kharel (Owner)
Objective: To get a basic overview of the organization

1. *What are the main goals and objectives of this restaurant?*
   Of course we are doing a business and our main aim is to make profit by providing quality service to our customers.

2. *What do you have to say regarding the present situation of the business?*
   At present, our business is going fine. We are making good sales and receiving increasing customers daily. I have to say that we have made a huge progress at the present compared to beginning.

3. *Can you tell me about the popularity of this restaurant?*
   We are the only full-fledged restaurant in Shankhamul area. There are small restaurants where people are specially served with drinks which are not suitable for family. So, due to this reason we have proven to be the chosen destination as a family restaurant in Shankhamul Area. Apart from this, we have been providing facility to host marriage ceremonies, parties and seminars. The recent hosting of local reality show "Khoji Prativa ko" has also enhanced our popularity.

4. *What is your experience in this field?*
   Well, I have been in this realm for more than ten years. I first worked as a cook in London. Then I came here in Nepal and used my expertise to open a restaurant along with my friends. I worked as an owner with two restaurants previously both named Siddhartha Cottage one located at Tinkune and another at Old Baneswor. Now, at present I along with my friends am managing two restaurants: One is this (5 Monkeys) and another Diyalo.

5. *How many employees have been employed here?*

At present, we have employed 20 employees. 10 Waiters, 2 Receptionists, 5 Cooks, 1 Accountant, 1 Store Keeper (who is also cook) and 1 Security Guard.

6. *What do you have to say about their working performance?*
   It is fine. It is through their hard-work and loyalty that we have been able to achieve this success. However, many complaints usually come from them regarding the limitation and problems shown by the present system.

7. *What kind of problems?*
   Most of the complaints are usually related with the problems in billing and money. Receptionist says that small error in making the bills in the peak hour of the business is unavoidable no matter how prudent he is. I have also received the complaints from the customers regarding this billing problem. Usually, the customer bill shows more money than he has to pay.

8. *What kind of impact have these problems created?*
   No matter how small or minor the problem in billing system is, the consequence is huge. These small problems have raised questions over our good-will. I myself have been raised questions by our regular customers due to the rumors. We have not faced very huge impact but we have realized the potent of such minor mistake.

9. *Do you have any solutions in your mind?*
   I don't have the absolute solution to our problem but I think computerization can solve or minimize our problem. This is why we have appointed you to analyze the impact of computerization to our system.

10. *What made you think about the computerization aspect?*
    When I worked as a cook in London, I found that each and every aspect of their restaurant was computerized. Due to this they hardly received any complaints from the customer.

11. *So, you mean that you want to computerize every aspect of this restaurant?*
    No, at present our main problem is regarding the billing system so, we only want the software for billing system. We do not want to take the risk of computerizing the systems which are working fine. If the billing system works as expected then we may consider computerizing other systems as well.

12. *Now, my work will be analyzing each and every prospect of this restaurant. I hope I will receive the co-operation from you and other employees*
    Yes, Sure. You can contact me via my mobile phone whenever you need some help from me.

Observation

In order to get a crystal image of how the current system works, I decided to observe the system in its peak hour (evening). I met Mr. Ramesh Kharel on Thursday evening and asked him to arrange free dinner for me and my two friends for Friday evening. I chose this day because Saturday is the public holiday and Friday evening is the busiest time of week for the restaurant handling its customer. I also

told him not to tell anyone that it was an observation to let my observation flow in causal way as if we were customers. Mr. Ramesh Kharel agreed by proposal and handed me a paper with his signature. The next day as per the plan I along with my two friends went to the restaurant. We reached there at 7:00 pm. As expected there were many customers in the restaurant. Waiters were moving swiftly here and there. I asked one waiter to take us the vacant seat. He showed us the way and we were seated. After some minutes, another waiter came to take our orders. He took our orders in KOT and BOT and handed down KOT to kitchen and bar and BOT to Bar. After 30 minutes, our cuisines were delivered to our table. After having the table I alone went to the bar to make my observation.

There were two bartenders who are also the receptionist. I asked them a drink for me and I sat there in bar with my drink. Meanwhile, one man came and told the receptionist to prepare his bills. Another receptionist was busy preparing bill for another customer. At the same time, Waiter came and handed down BOT for a table. He (receptionist) excused the customer asking the bill and took a moment and prepared drinks as per the BOT and gave them to the waiter. Now, he gathered the customer's KOT and BOT. Doing it in haste, one KOT accidently fell over and he did not notice. I notified him of KOT that fell down. He thanked me and started his calculation and prepared bill for the customer.

After I finished my drink, I handed down the paper given to us by the owner. He phoned the owner to confirm it and after confirmation I along with my friends

Findings from observation

Kitchen Order ticket (KOT) and Bar Order Ticket (BOT) are very small paper which contains most vital information. They are the papers that are most frequently used during the business. As waiter creates new KOT and BOT after each order so a table may have as many KOT and BOT as they call the waiter to take their order.

Receptionist stacks up these papers in different piles (one for each table) and uses them to make the final customer invoice. I myself found the receptionist missing one KOT my mistake. This kind of thing has the possibility of happening frequently because a single receptionist has to handle multiple tasks of managing bills and Drinks to the customers. Also, receptionist may make mistake while calculating the total price.

Second Phase (Two Interview Sessions)

Second Interview

Interviewee: Devendra Thapa (Receptionist)
Objective: To know about the billing system in detail

1. *How long have you been working here?*
   Since the establishment of this restaurant i.e. 2 years.

2. *What are your responsibilities?*
   - To prepare customers bills by doing calculations of the food they ate.
   - To keep track of bar stock each day after each transaction.

- To serve the bar items and drinks to the customers.

3. *Is there any problem with the present system that you are working with?*
   Yes

4. *Can you elaborate it?*
   The main problem that I have been facing is regarding the accuracy of the calculation. It has happened many times that the customers receive the bill with more money than the actual money they need to pay. Some customers spot it out while others don't. It must have happened that someday customers also receive the bill with less money. Unless Customer spots it out (which usually they don't) it is almost impossible to find that I missed the food items in their bill.

5. *Is the occurrence of the problem totally your fault*?
   I don't think that it is totally my fault. Who does want to degrade the quality of organization he is working and raise questions over his work? I try to be as careful as possible. I always recheck the calculations and see if I have missed any of the items in the customer bill. However, during the peak hours it is almost impossible for me to check the bill twice and ensure everything is right. Also, I have to keep the track of bar stock after each transaction. So, this multi-tasking thing has also led to inaccuracy and problems in customer bills.

6. *What are the reactions of customer to the fault?*
   It entirely depends upon the customers. Some customers are calm and when they spot any problem, they tell us about the problem and advise us to be careful from next time. On the other hand, some customers are very aggressive. They create a whole new issue and scold us very badly. One time, one customer even called the owner during the business hour and scolded me and raised questions to the owner about the quality of the restaurant in-front of everyone.

7. *What are the reactions of the owner to the problem in making the bills?*
   One time when I made three billing mistakes in two consecutive days, I was called to the office by the owner and was warned. I have also told him about my problems several times. He has responded by saying that he will take some major step to reduce the inaccuracy in billing system.

8. *How do you list the price of the items in the main bill?*
   I look at the price of the items in the main menu which is kept by my side and perform necessary calculation in the bill.

9. *Have you faced problem listing the price this way?*
   Yes, lots of time. I have to switch my eyes between two things and it gets worse during peak hours. So, sometimes the price of indicated item may be up and down.

Third Interview

Interviewee: Binay Adhikari(Accountant)

Objective: To understand the responsibilities and problems faced while making reports

1. *As an accountant what are your responsibilities?*
   All the paper related things except billing are handled by me. I prepare the daily and monthly reports of the sales made by the restaurant using the bills provided to me by the receptionist. I also maintain the paperwork of Stock System in the restaurant i.e. prepare record of goods in and out of the restaurant. I am also given the responsibility of making report regarding the distribution of salary to the employees in the restaurant. Finally, I make a report in every three months showing the share of each owner.

2. *During which part of the day, do you do these tasks?*
   I receive all the bills (KOT, BOT and Customer invoice) from receptionist every night when the restaurant closes and I store them in safe place. Next morning, when the restaurant opens, I immediately start analyzing the bills from previous day and prepare daily sales report. Stock records are maintained immediately after transaction. At the last day of each month I prepare monthly sales report and salary report.

3. *What are the problems you have been facing doing these tasks?*
   The main problems that I have come through are the inconsistency in monthly sales reports. Although the inflow of customers seems to be about the same, the fluctuation in monthly sales report is high. It has been affecting other issues also such as employee salary distribution and share holders share distribution.

4. *What do you think is the reason for the problem?*
   I think the main problem lies within the accuracy of billing system. Had there been no problem in the bills then there would not have been so much fluctuation in Monthly Sales Report.

5. *Do you have anything in mind you think can rectify this problem?*
   I don't know the exact solution but I know that something must be done with the billing system to increase its accuracy and prevent the mistake being iterated.

Third Phase (Questionnaire)

Considering the time-factor involved in interviewing the customers, a set of questions was prepared so that the short and apt response could be received. These questions were given to customers continuously for a week.

QUESTIONNAIRE FOR THE CUSTOMERS OF 5 MONKEYS

Name: _____ Time: _____

1. **How often do you come to this restaurant?**
   a. Frequently
   b. Rarely
   c. First Time

2. **Have you faced any problem regarding bill?**
   a. Yes
   b. No
   c. Not Sure(Have not checked the bill)

If Billing Problems

3. **What kind of problem?**
   a. List unordered items
   b. Mistake in quantity
   c. Mistake in calculation

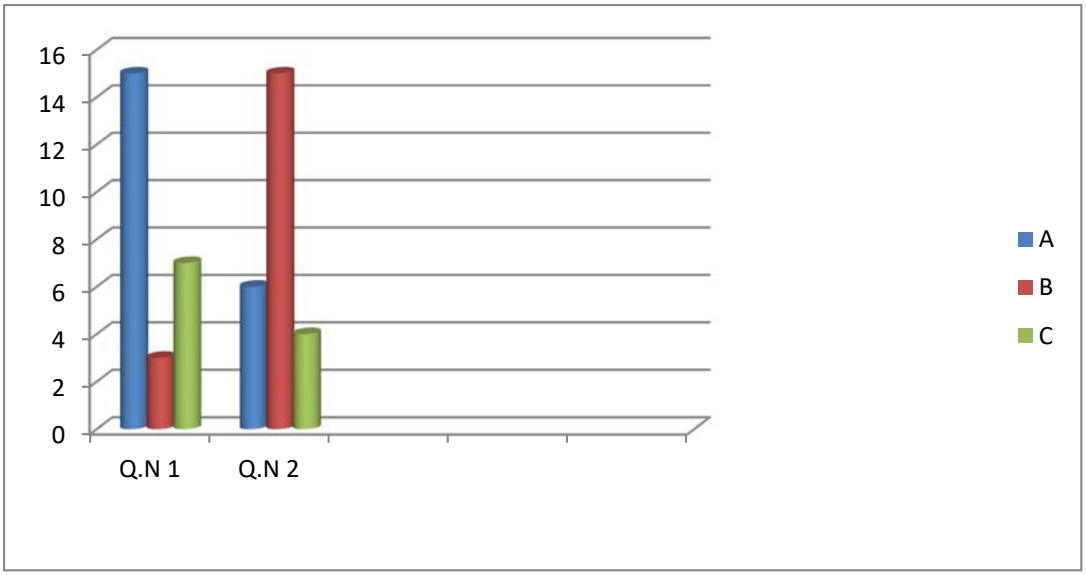
4. **How did you react?**
   a. Scold the receptionist
   b. Advice him to be careful
   c. Complain the owner

5. **Do you want to come back to this restaurant again?**
   a. No never
   b. Yes, Mistake happens sometimes
   c. Not Sure

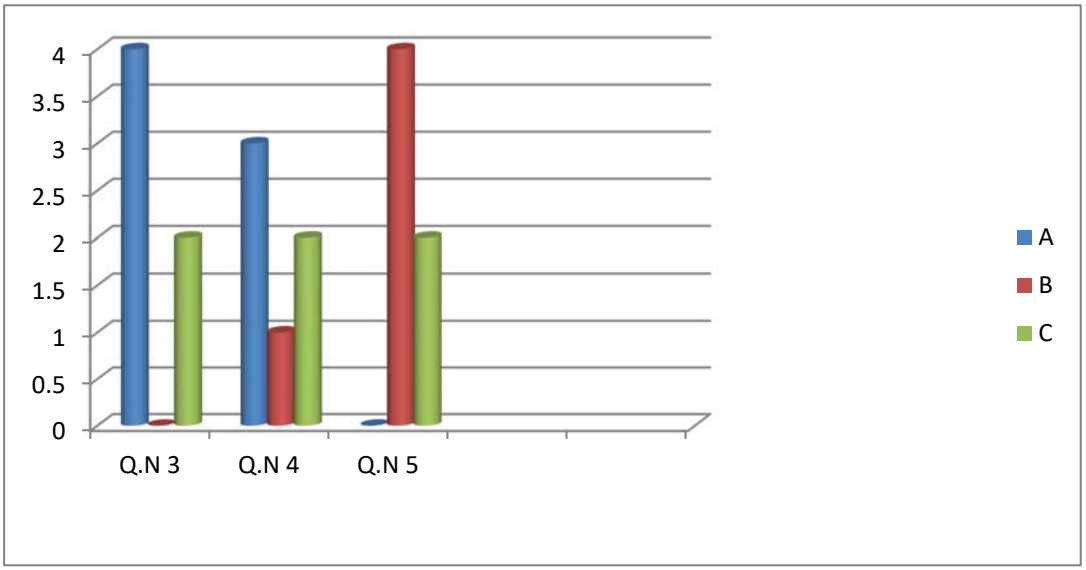
Conclusion from the Questionnaire

Within the period of 3 days, 25 random customers were given questionnaire when they were about to leave the restaurant after paying the money in the reception. Different time periods were chosen to determine the period of maximum flaw in bills. It was found that most of the billing errors occurred in the evening which is considered as peak hour. Though the number of people facing error in bill may seem small literally but for business like this it is not considered good. The results of the questionnaire have been presented diagrammatically in pie- charts below:

Results of Question no. 1 & 2



Results of Question no. 3, 4 &5 (Based on answer of Q.N 2)



Fourth Phase (Record Inspection)

The inspection of actual documents used in the present system will make it easier to obtain to format and input and output used by the current system. The data field and their purpose in the documents related to billing and POS have been mentioned in the section dealing with Origin of Data. The actual documents are attached in the Appendix section .This section shows how the document and mentioned in Origin of Data section, with the input, looks like.

KOT and BOT

Hotel Five Monkeys & Restaurant

KOT/BOT

T.No. 5 Date:12/17/2011

Waiter: Raju NOC: 3 TM: 8:45 pm

1.	Chicken Momo-1 plate
2.	Plain Nan-3 pcs
3.	Chicken Curry- 1 Plate
4.	Vanilla Milk Shake-2 Cups

Customer Invoice

Hotel Five Monkeys & Restaurant (P). Ltd.

New Baneswor, Shankhamul Chowk

Invoice No. 719 Date:12/17/2011

Table no. 3

S.n	Particulars	Qty	Rate	Bev.	Food
1.	Signature	1/4	410	410	
2.	T.Beer	1	275	275	
3.	Surya	4	10	40	
4.	Fish Fry	1	160		160
Sub Total				725	160
Total				885	
Discount				88	
Net Total				797	

Daily Sales Statement

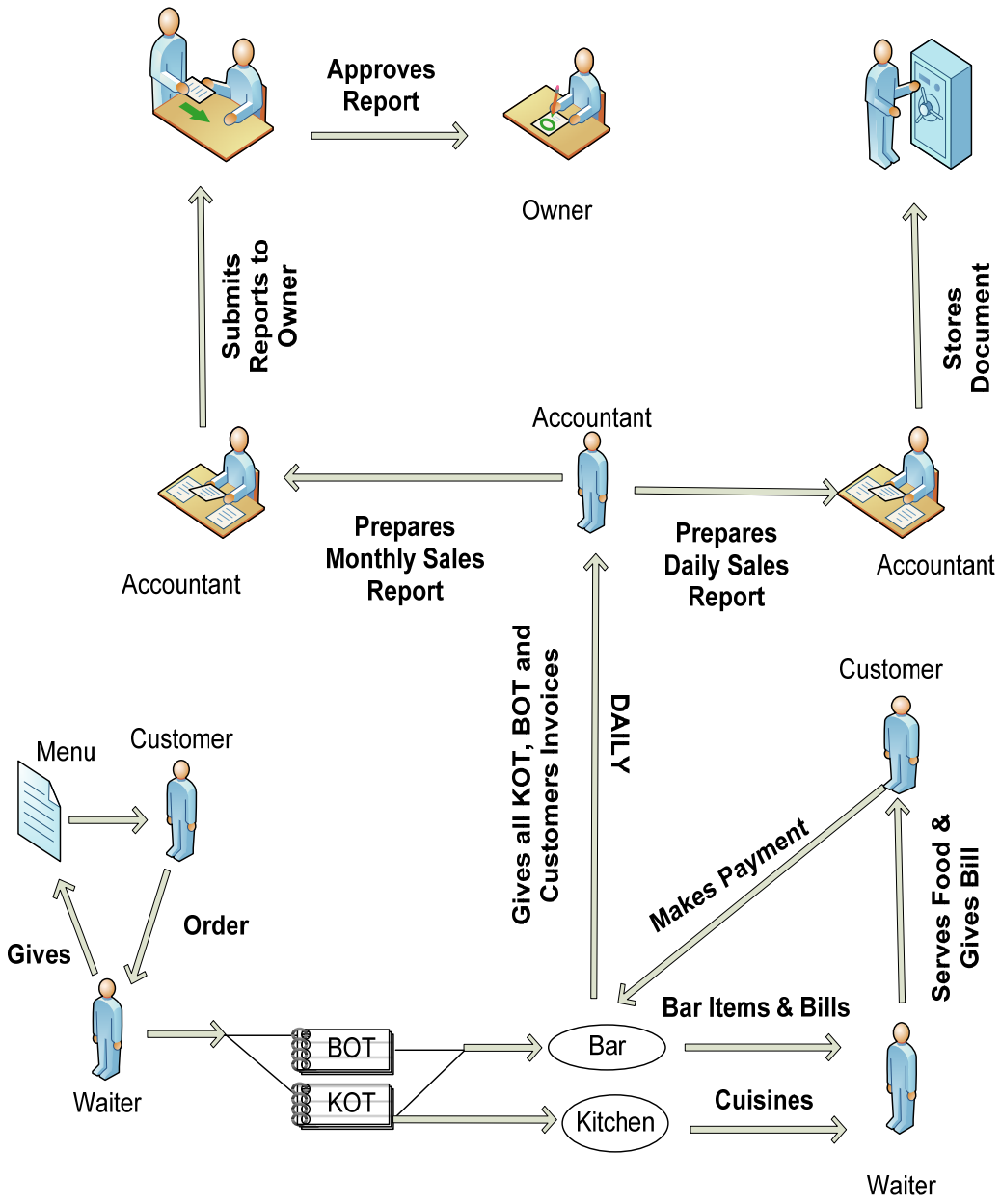
Date: 12/17/2011

S.No	Bill no.	Food	Beverage	Net Total	Remarks
1	719	160	725	797	
2	720	800	425	1000	Owner(No Ser Char+ More Discount)

Menu

Hotel Five Monkeys & Restaurant Main Menu	Chicken Items	Beverages	Bar Items

Diagrammatic Representation of Current POS & Billing System



Problems Identified in the Current System

After going through all the research process involving interview, questionnaire and observation, I came to know the lacking in the system exists.

- **Speed**: The current system is very slow. Bill preparing and processing is very slow and it may affect the goodwill and services of the restaurant to its valued customers. Preparing Daily sales report is also very slow and owner has to wait for it for long time.
- **Prone**: The process of making customer bill is always prone to errors. It is because a single person has to perform multiple tasks of preparing bills and handing the bar. The manual looking of the menu each time while noting the price has also made this problem worse.
- **Loss of Data:** while preparing customer bills, sometimes KOT and BOT are missed out by the receptionist.
- **Difficulty in Preparing Reports:** While preparing daily sales report it takes about 2-4 hours to prepare a report. Accountant has to go through all the related data and conclusions derived from observing all the data. Also the errors in bills may make the report unreliable.

Alternative Solutions

Increasing the number of employees

Increase in number of bartenders and receptionist can prevent the above mentioned delay and may also result in fewer inaccuracies in the customer bills.

Merits

- The distribution of workload over larger number of employees.
- Results in less delay in preparing bills.
- Prevents inaccuracy in calculation as they can divide the tasks of handling the bar and producing bills among each other.

Demerits

- The restaurant has to give more of its income to the employees
- The receptionist or bar may be crowded and create more problems.
- New employees may not be trustful.

Using Off-the Shelf Software

Off the shelf software like Restaurant Management System may readily be available for purchase

Merits

- They are readily available and cheap to purchase.
- Low changes of bug in the software as they go through testing phase before being available commercially.
- Trainings may be available.

Demerits

- Software like Restaurant Management system contains all the modules (like payroll, Stock control) which are unnecessary in this situation.
- They may not contain the specific feature that is unique to this restaurant.

Improving Current System

The present paper based system can be improved by using modern filing and indexing techniques to store documents, by designing more flexible and maintainable documents and bringing change in current working procedures.

Merits

- This method will be cheap as the cost of buying computers, printers and other expensive devices will be avoided. The cost of pen, pencil, registers, etc. is really small.
- No training needed.
- Basically, the system will remain the same, only working procedure is going to be changed.
- No reliance on electricity. This can prove very useful as we face up to 14 hours of power-cuts per day.

Demerits

- Paper based system is manual and prone to many errors.
- Increase in stationary expense
- Data processing will still be manual so may still be time-consuming.

Use of Custom-Written Software

The tailored software for Restaurant Billing system can perform the necessary calculation automatically and prepare the necessary report easily.

Merits

- It will contain the exact feature as per the requirement of the restaurant.
- Necessary modification and maintenance can be made if the way of working in the restaurant changes.
- Though high initial cost, it is cheap for long run.

Demerits

- It takes lots of time to prepare the software.
- The program may contain bugs.
- User need to be trained to use the software.

Solution proposed

After analyzing the merits and demerits of available solution, I came to the conclusion of proposing the system using the Custom-Written Software. The solution/software will be built using Visual Basic 2010(Vb.net) and Microsoft Access as I have sufficient expertise with these technologies to create the required software. Also, feature provided by these softwares are ideal for making the system.

The features provide by Visual Basic 2010 is perfect for making bullet-proof Windows Forms applications that businesses rely on. The toolbox panel of VB 2010 provides with all necessary controls such as Button, Checkbox, Radio button and many more. These controls can be used by just dragging and dropping into the form. The code necessary for these controls are automatically created. Furthermore,

being an Object Oriented Programming language Visual Basic 2010 provides with thousands of Classes which will make my work easier by making me code less.

Visual Basic 2010 also provides RAD (Rapid Application Development) features like Data sources and Data-Grid View control which allows one to create database-driven application in no time. Unlike Visual Basic 6, I don't have to several lines of code to just create connection with database. Additionally, the features like intellisense, code snippets will make by coding process easier. Also, Visual basic 2010 provides the facilities to create reports.

For Database, I will be using Microsoft Access 2007. It is a fully fledged Database Management System which can easily be integrated into my Visual Basic Application. It allows table and queries to be created easily. Those tables can easily be edited and updated by connecting them to Visual Basic Application. Microsoft Access also makes the normalization process easier by providing the feature of relating one table to another just by dragging and dropping feature.

The time period given by the restaurant owner for the system to be completed was ten weeks. I assured them that these tools will help me make the system within the given time. My proposal was accepted by my client.

Requirement Specifications

These are the requirements of the new system that has been discussed and agreed with the client.

- Data Entry
  - User wants to select the items from the program for the food menu items.
  - User wants the text box to input other data such as quantity, Remarks.
  - User wants some kind of validation technique to ensure that correct data was entered via keyboard
- Editing
  - User wants to have the feature of editing the price of items in the program whenever necessary.
  - User wants to have the feature of editing the final bill incase some error has been made
- Output
  - User wants to have on-screen output where the saved data as well as the reports can be viewed.
  - User wants the feature to print the final report(Customer Invoice, Daily Sales Statement, Monthly Sales Statement)
- Navigation
  - User wants menu system to be implemented.
  - They also want crosslink between the relevant screens.
- Back-Up
  - User wants the feature of making backup of the database and save them in the desired location
- Security

- User wants the program divided into two parts. One for receptionist and another for the Accountant and Owner
- Receptionist should only have the feature of preparing customer bills by inputting the required details in the respective fields.
- Admin and Accountant should have the full access to system(i.e. Editing Tables in Database, Viewing Reports)

- Help Feature
  - User wants help feature to be embedded into the system so that the user can look after it whenever he finds trouble using the software.

Hardware/Software Requirements

Hardware Requirements

The recommended hardware devices and their capacities required for the billing software are:

- LCD Monitor: It is the main output device which displays the result of processing and the data that he user has entered using input device. LCD Monitor is recommended because it is common and cheap nowadays and is ergonomically beneficial compared to CRT.
- Input Devices: Standard QWERTY Keyboard is required to enter the data to the software and Mouse to select the menu items in the software.
- Processor: 1.6 Giga Hertz or higher which can smoothly run the Operating System(Windows 7 preferred)
- Hard-Disk: At least 20 GB(Giga Byte) to store the Operating system and backups of the software(databases)
- CD R/W: The software will be installed from CD. Writable CD Drive is required for the backups of the software data files to be performed.
- Portable USB Drive: Pen drive or USB Drive for the backing up the data files with greater flexibility.
- Printer: A Printer is required to print Customer Invoices and other Reports. Dot Matrix printer will be suitable to print out the customer bill and Laser Printer will be suitable for Reports.

Software Requirements

- Microsoft Operating System (O.S): As the software is created using Microsoft technology (Microsoft Visual Basic), any version of Windows released after and including Windows XP (Service Pack 3) will work. Windows 7 is recommended.
- Microsoft Access 2007: Database is implemented using Microsoft Access 2007 so it is required.
- .NET Framework 4.0: It is required to convert the Compiled program (which is in Microsoft Intermediate language) into Machine Language so that the program can execute.

b. Design

(i) Nature of the Solution

Objectives of the new system

i. The task of adding, deleting, updating and viewing food items has to be easier. They should also consume less amount of time. All the food items should be arranged by their category.

ii. The system has to ensure that all the data are accurate. All the calculation performed should be showed exact figures and values of all the data involved in the calculation.

iii. The system should provide the proper data backup storage system to ensure the security of all the data. This task has to be made easier to reduce time consumption over the old system.

iv. The new system should also have the access right authentication and verifications features. This would allow only the accountant and administrator to view the reports.

v. The payment bill for customers has to be featured with the automated calculation system and also be able to print the receipt of the bills for them.

vi. The task of report preparation has to be made much easier. The system should be able to compile all the required data from different record set for the preparation of the daily and monthly sales report.

vii. The information stored in the database should be accurate and up-to-date.

These objectives are based on the interview and my suggestion after observing the present system. Mr. Ramesh Kharel and I have agreed on these objectives. This gave me a clear view of the making the computerized solution using by programming expertise.

Mr. Ramesh Kharel Ashwin Kandel

_____ _____

Data Structure

1. Food Category Table (Category_Table)

Field Name	Data Type	Size(Bytes)	Description	Validation	Example
Category Name(P.K)	String	30	Name of Food Category	Unique	Chowmin

2. Food Items (Items_Table)

Field Name	Data Type	Size(Bytes)	Description	Validation	Example
ID(P.K)	Integer	2	Unique Identification of each food item, System Generated	Unique	1
Item Name	String	40	Name of Food Item	Presence Check	Chicken Chowmin
Price	Currency	8	Selling Price of Food Item	Number Only	125
Category Name(F.K)	String	30	Name of Food Category	Presence Check	Chowmin

3. Customer Bill (CustomerBill_Table)

Field Name	Data Type	Size(Bytes)	Description	Validation	Example
Bill Number	Integer	2	Unique Identification of each receipt,Automatically Generated	Unique	1
Date	Date	8	Date when the transaction took place.	Presence Check	2/28/2012
Table Number	Integer	2	Table Number of the bill .	Numbers Only	5
Discount	Currency	8	Discount Amount of the particular bill.	Numbers Only	145
Grand Total	Currency	8	Amount that Customer paid.	Numbers Only	500
Remarks	String	50	Additional Detail about the transaction.		Was Owner

4. Bill Details (BillDetails_Table)

Field Name	Data Type	Size(Bytes)	Description	Validation	Example
Bill Number(P.K)	Integer	2	Receipt Number	Number Only	1
ID(P.K, F.K)	Integer	2	Identifier of Food Item	Presence Check	1
Quantity	Integer	2	Quantity of Food item of given ID	Number Only	3
Price	Currency	8	Selling Price of selected Food item	Number Only	125

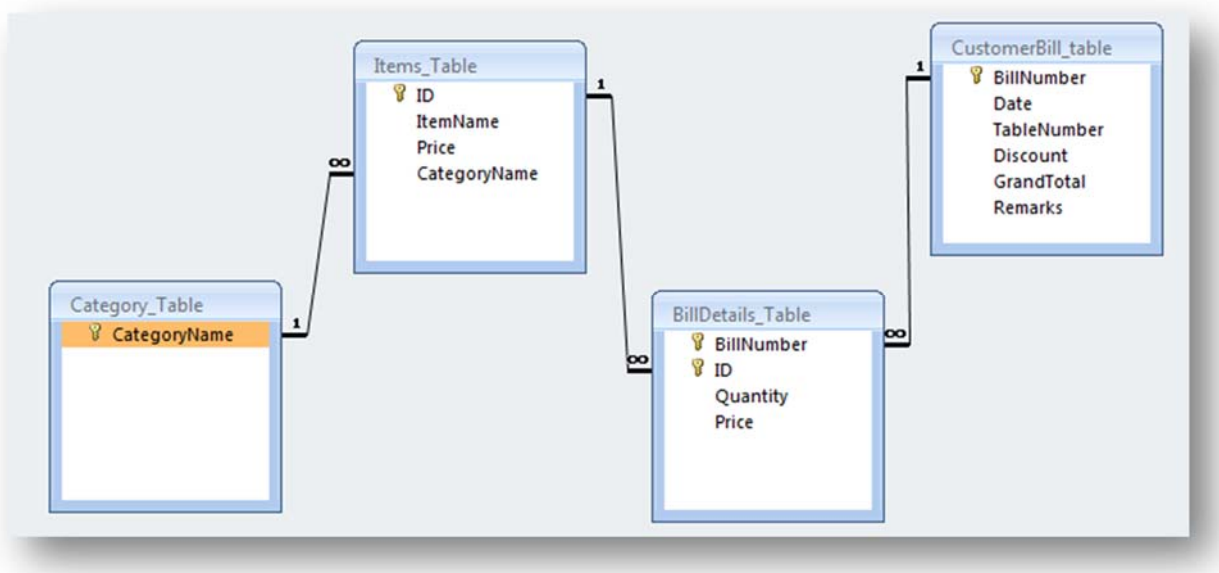
5. User Login (UserLogin_Table)

Field Name	Data Type	Size(Bytes)	Description	Validation	Example
Username	String	15	Username through which user gets access to system	Presence Check	Administrator, Receptionist
Password	String	20	Password of the Username	Presence Check, Length Check	Admin,recep

Data Validation

Most of the data are entered by the user through Keyboard manually, so there is chance of error being made by the user. User does not need to input the data directly to the database. They use the program interface to communicate with the Database. So, it must be ensured that the valid data reaches to the database. To ensure this, several validation techniques such as Presence Check, Format Check and Range check will be integrated in the main Program.

Entity Relationship (E-R) Diagram



Relationships

Category_Table Items_Table

Category_Table			**Items_Table**
CategoryName	1	1	CategoryName

Attributes: Enforced, Cascade Updates, Cascade Deletes
RelationshipType: One-To-Many

Items_Table BillDetails_Table

Items_Table			**BillDetails_Table**
ID	1	∞	ID

Attributes: Enforced, Cascade Updates, Cascade Deletes
RelationshipType: One-To-Many

CustomerBill_Table BillDetails_Table

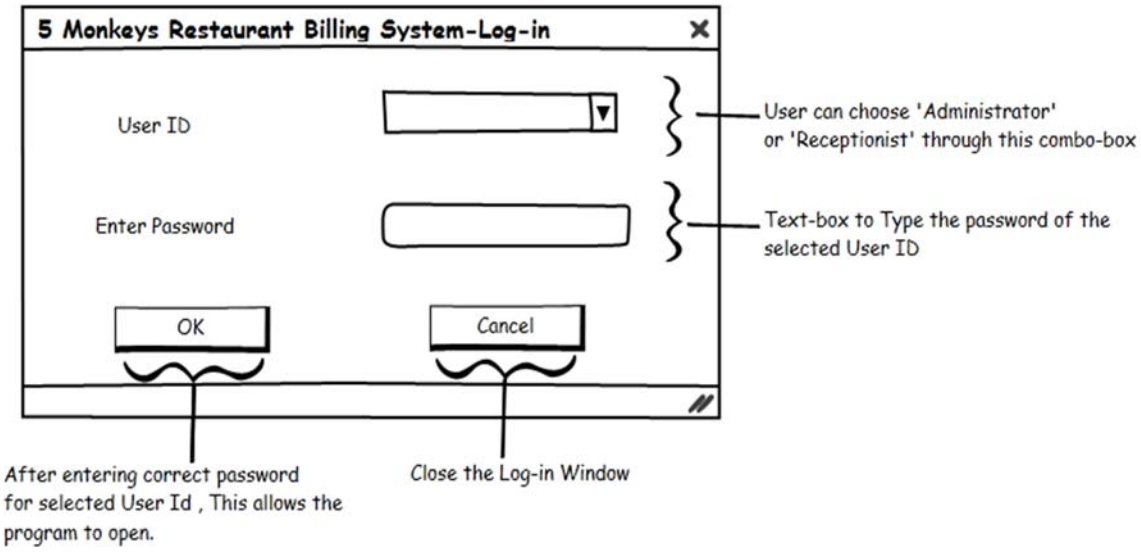
CustomerBill_Table			**BillDetails_Table**
BillNumber	1	∞	BillNumber

Attributes: Enforced, Cascade Updates, Cascade Deletes
RelationshipType: One-To-Many

Data Input Forms

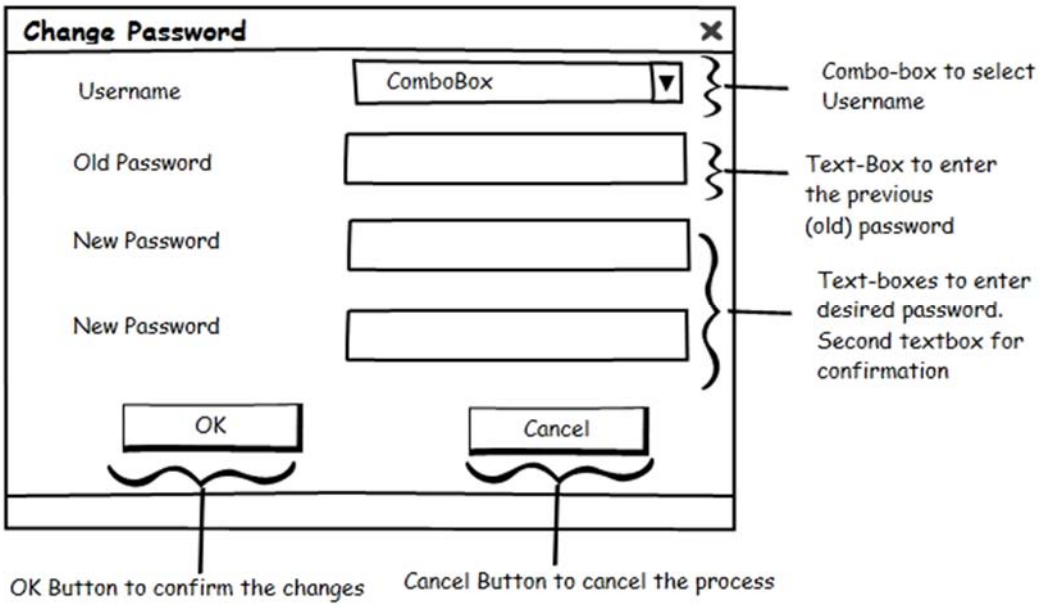
1. *Log-in Screen*

This form will be used to enter the password to selected User ID so that the user can get access to the features of the software



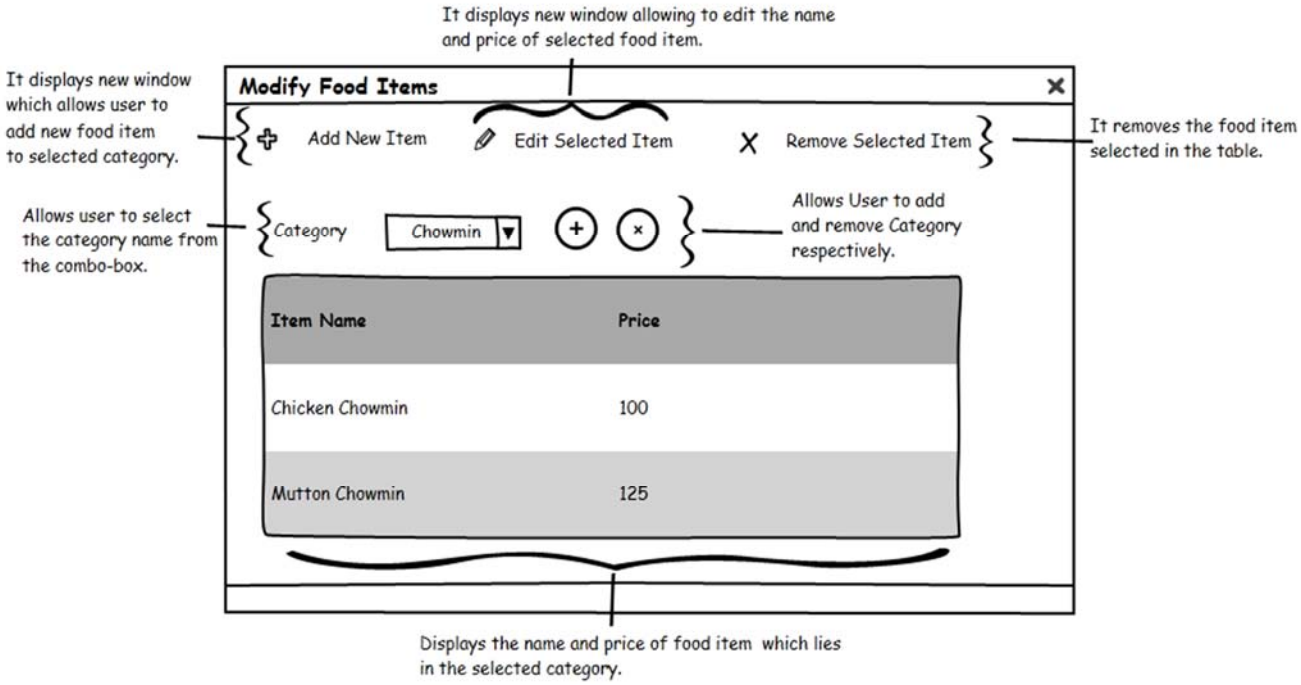
2. *Password Changer Screen*

This form will be used to change the password of the selected Username.



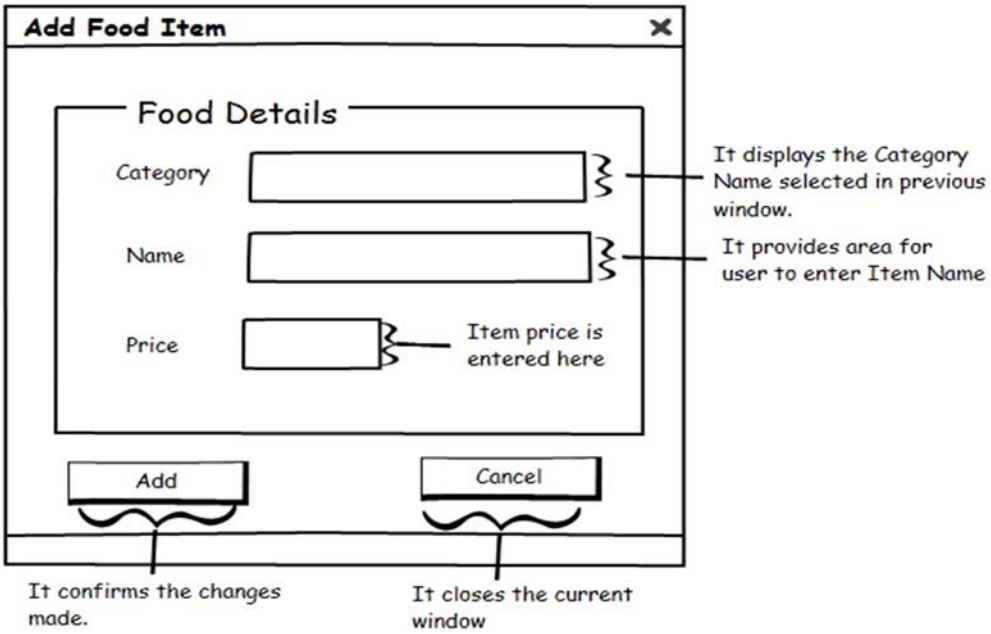
3. Modify Food Items Screen

This form provides the features of viewing, adding, removing and editing item names; and adding and removing category name.



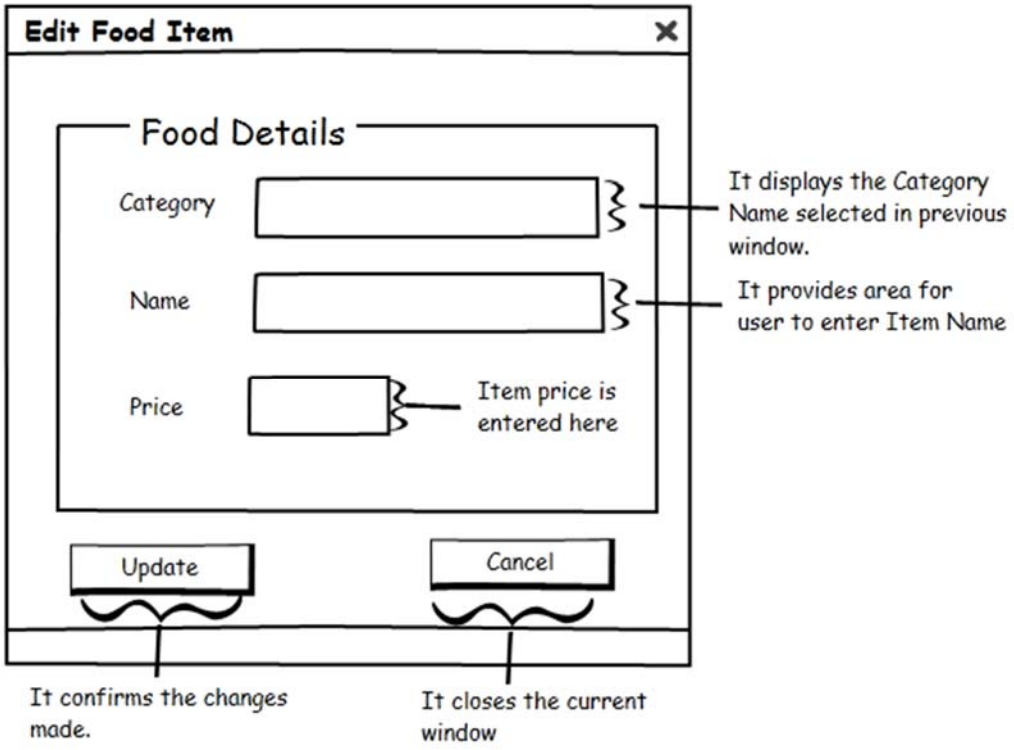
4. Add new Item Screen

This form is displayed when user clicks add new item in modify food items form.



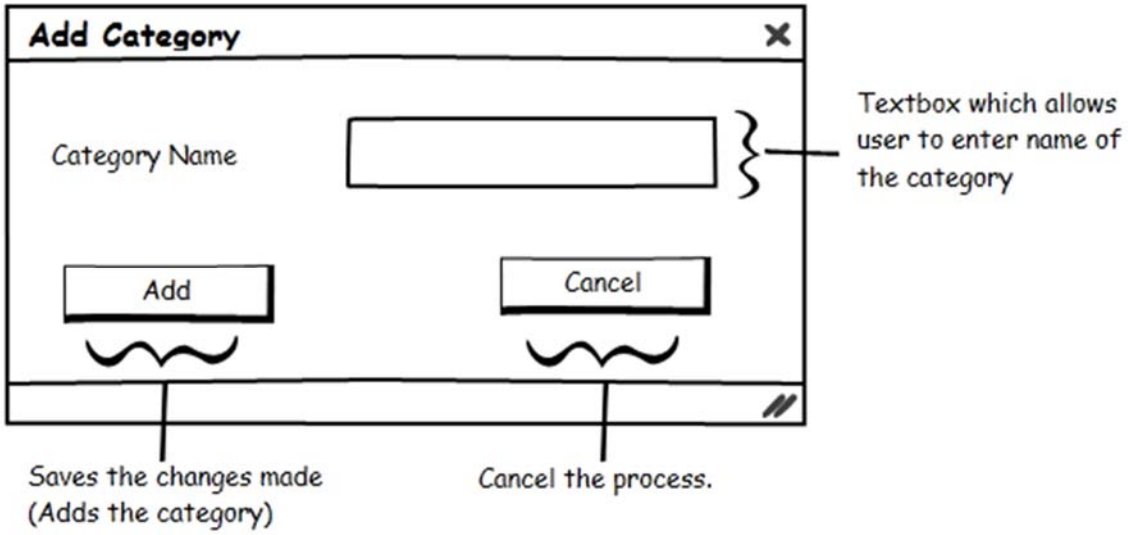
5. Edit Food Items Screen

This screen is similar to add item screen except it modifies existing food item



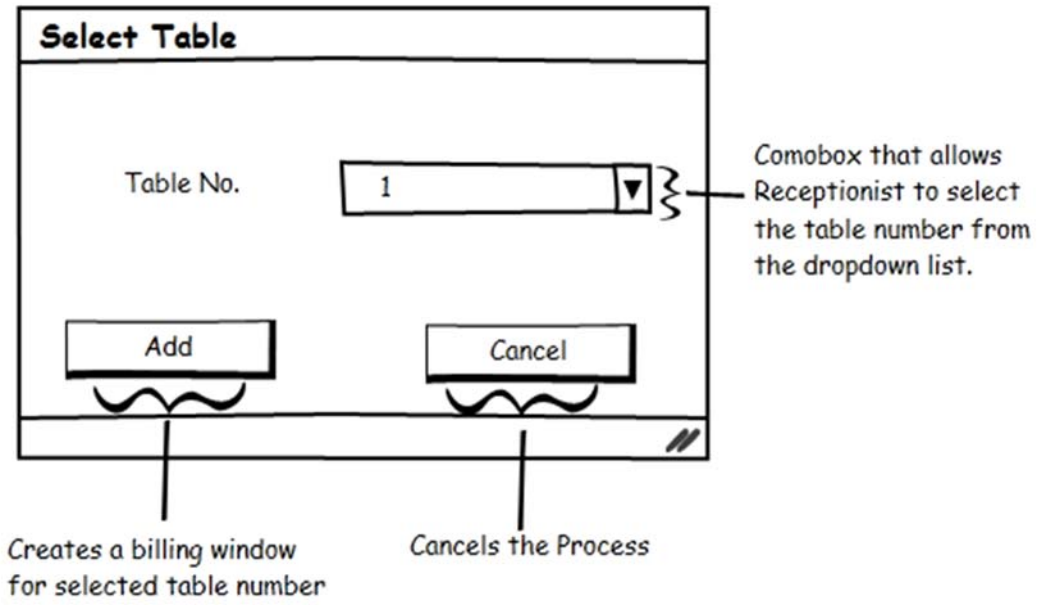
6. Add Category

This form will be displayed when user clicks add sign on the right hand side of category name in modify food items forms.



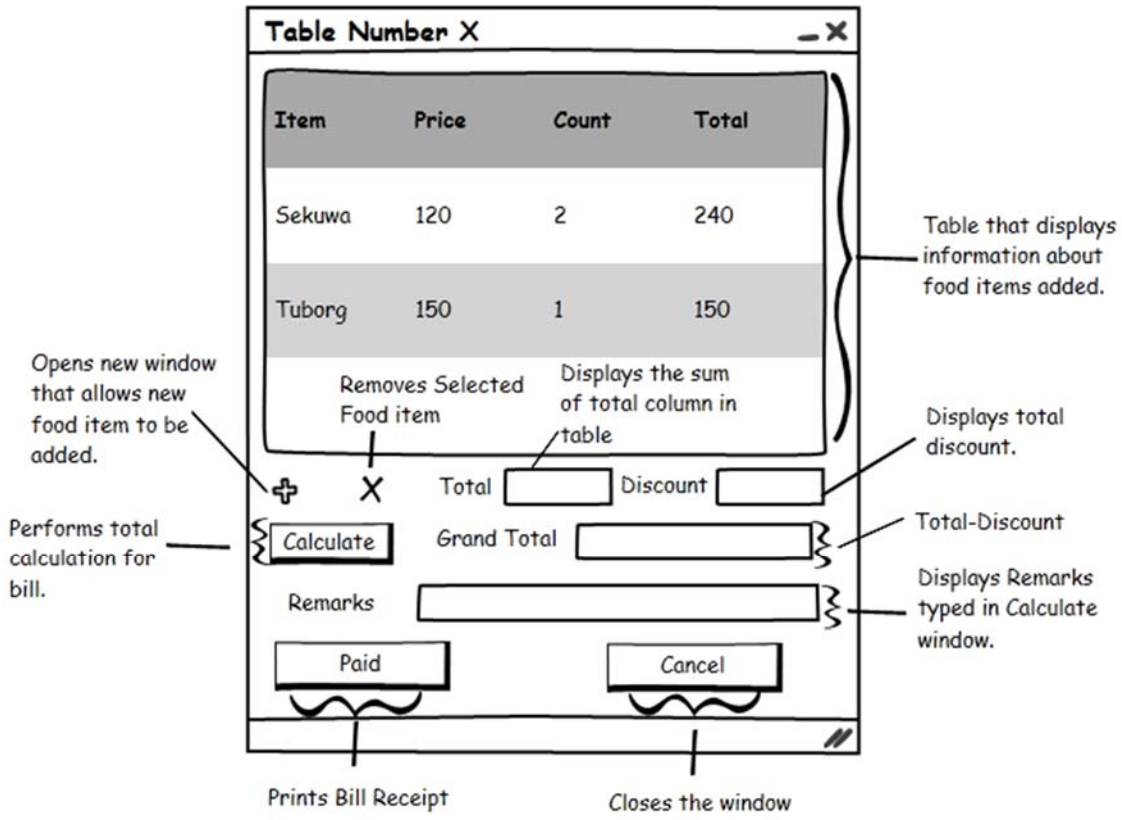
7. Select Table Screen

This form will be displayed when user adds new bill.



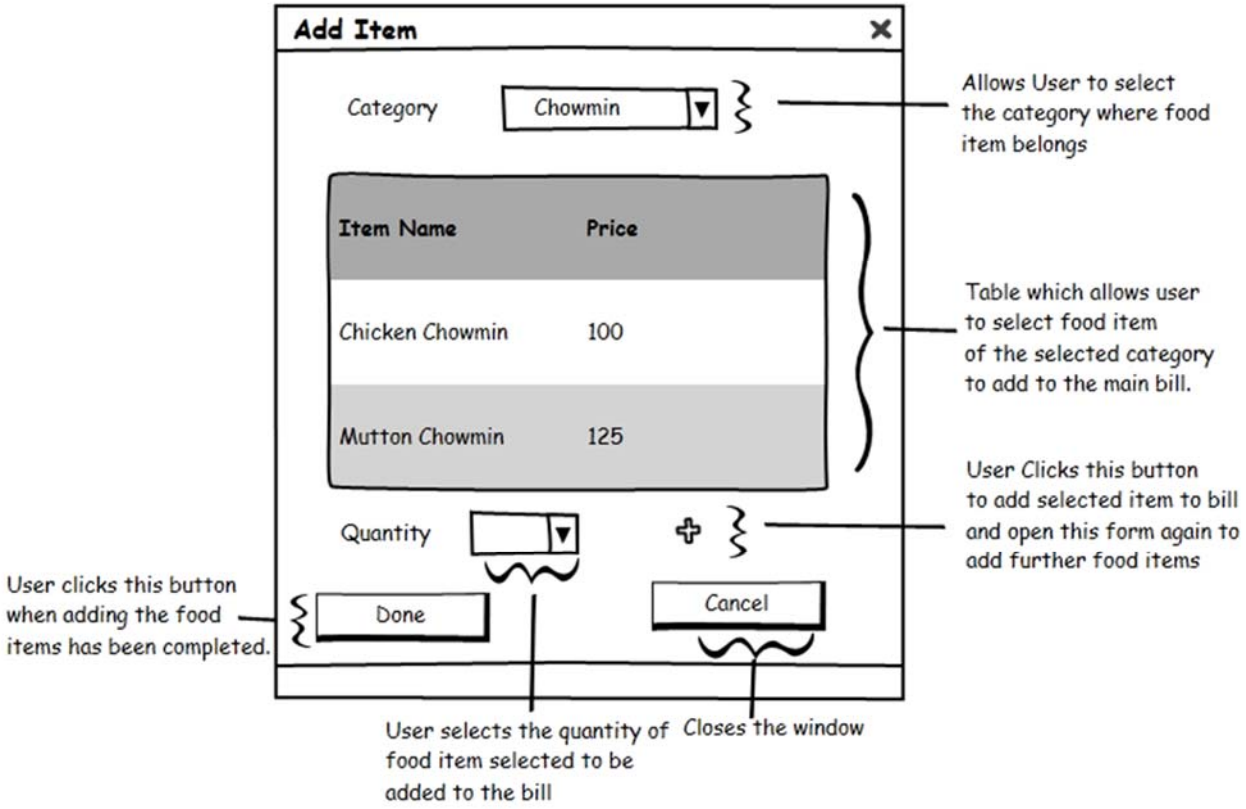
8. Bill Screen

This form will be displayed after user selects the table number



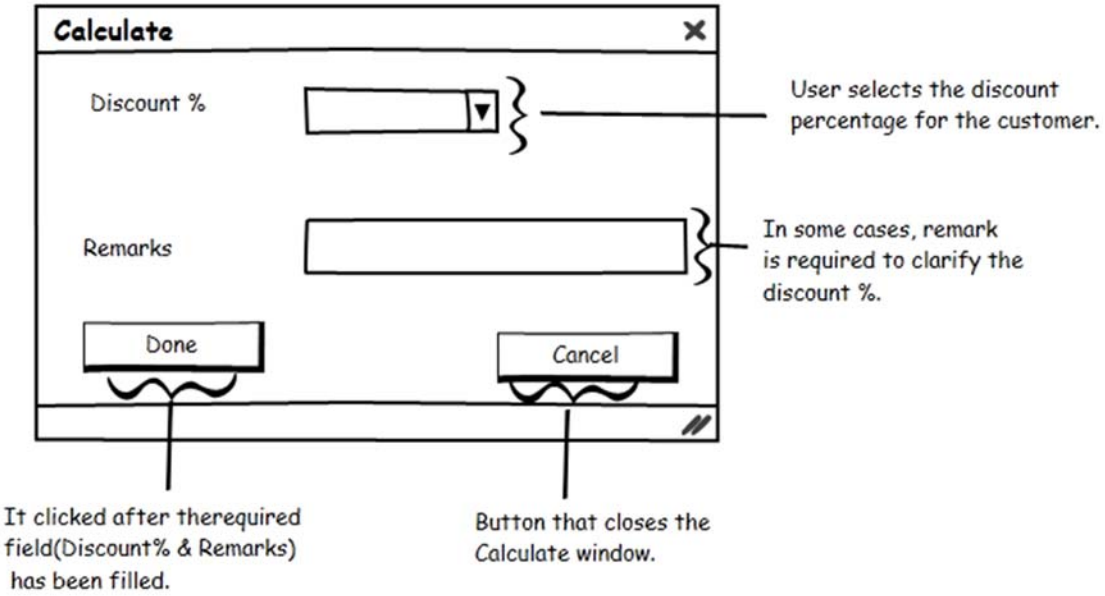
9. Add Item to bill

This form is displayed when user clicks + button in above form



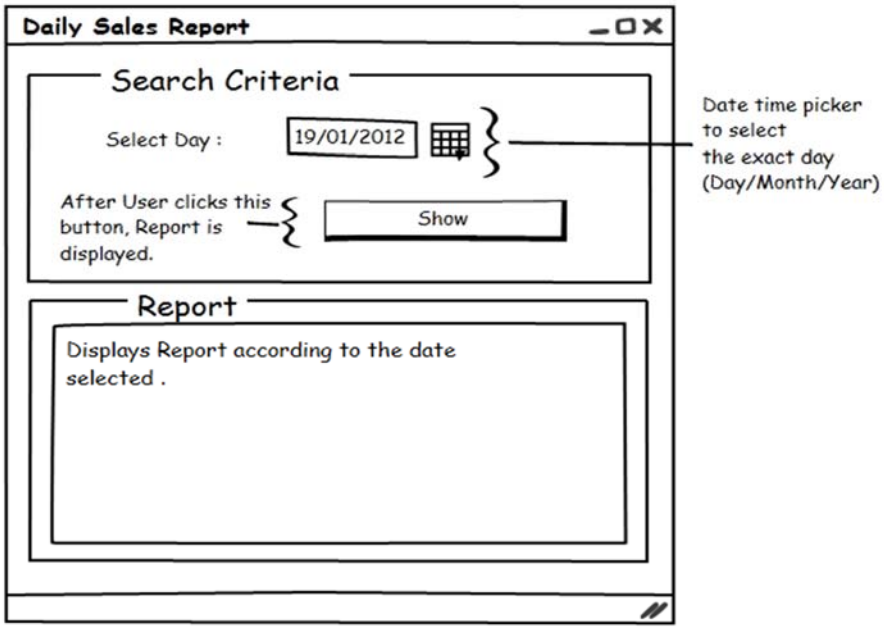
10. Calculate Screen

This form is displayed when user clicks Calculate button in the Bill form.



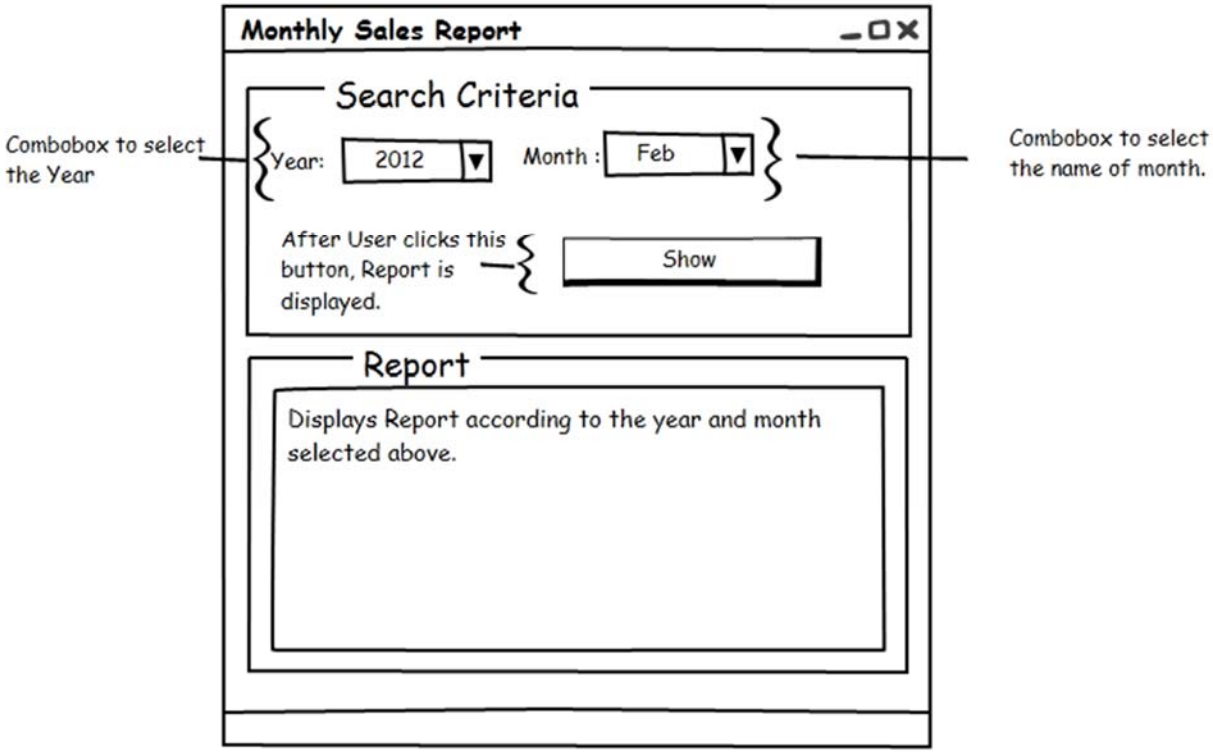
11. Daily Sales Report

User provides date as input for the daily sales reports to be produced.



12. Monthly Sales Report

Year and month are provided as input for monthly sales report.



Data Output (Printable Form)

1. *Daily Sales Report*

Company Logo

Daily Sales Report

Date:XX/XX/XXXX

Bill Number	Table Number	Discount	Grand Total	Remarks
XXX	X	XXXX	XXXX	XXXXXXXXXXXXX
XXX	X	XXXX	XXXX	XXXXXXXXXXXXX
		Summation(Grand Total)	XXXX	

2. *Monthly Sales Report*

Company Logo

Monthly Sales Report

Date	Bill Number	Table Number	Discount	Grand Total	Remarks
XX/XX/XXXX	XXX	X	XXXX	XXXX	XXXXXXXXXXXXX
	XXX	X	XXXX	XXXX	XXXXXXXXXXXXX
YY/YY/YYYY	YYY	Y	YYYY	YYYY	YYYYYYYYYYYYYY
	YYY	Y	YYYY	YYYY	YYYYYYYYYYYYYY
			Summation(Discount)	Summation(Grand Total)	

3. Bill Receipt

Hotel Five Monkeys & Restaurant (P) Ltd.

New Baneswor,Shankhamul Chowk

Bill No.: XX Date: XX/XX/XXXX

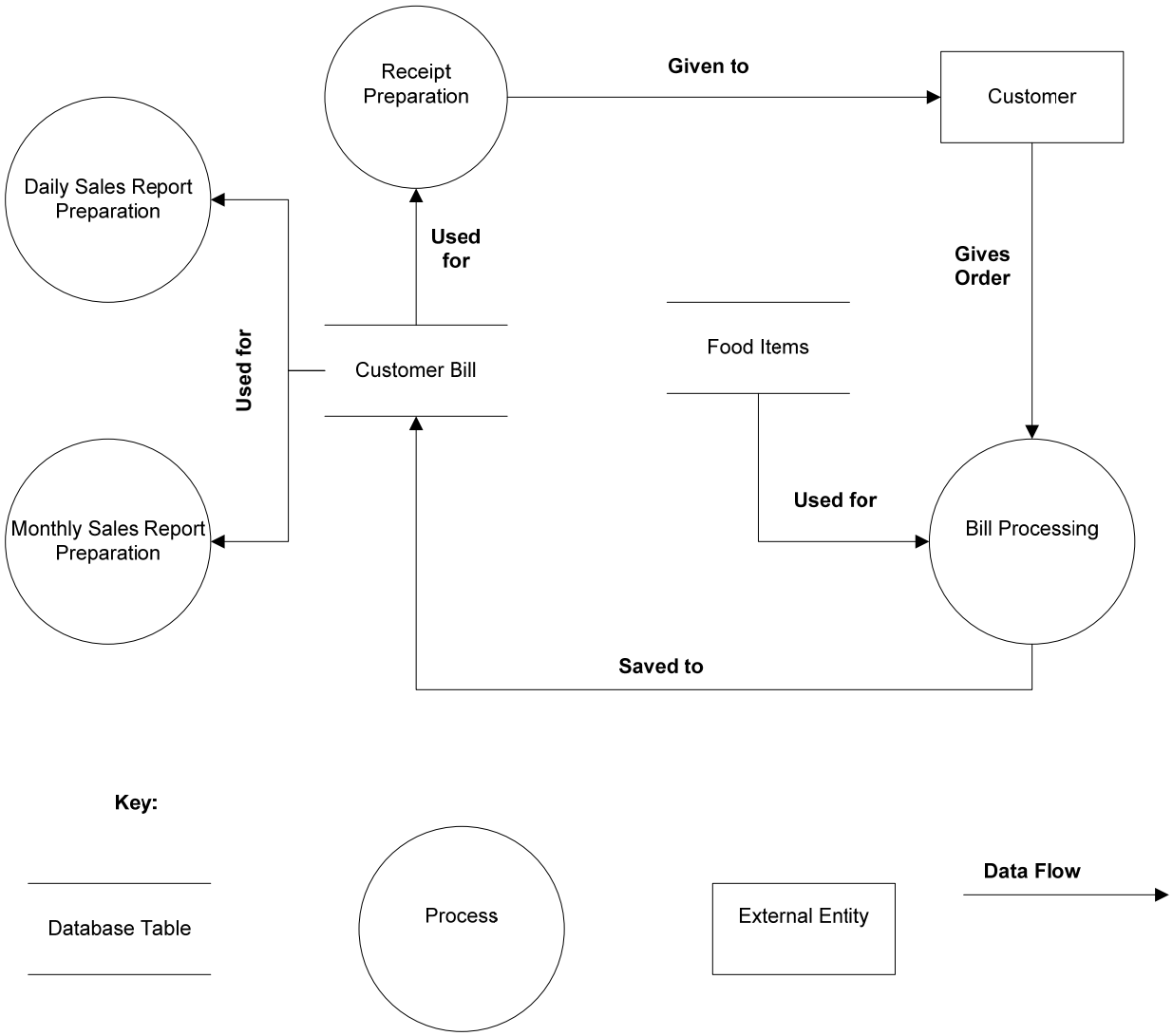
Table No.: X

Item Name	Price	Quantity
XXXX	XXX	X
XXXX	XXX	X

Discount: XXX Grand Total: XXX

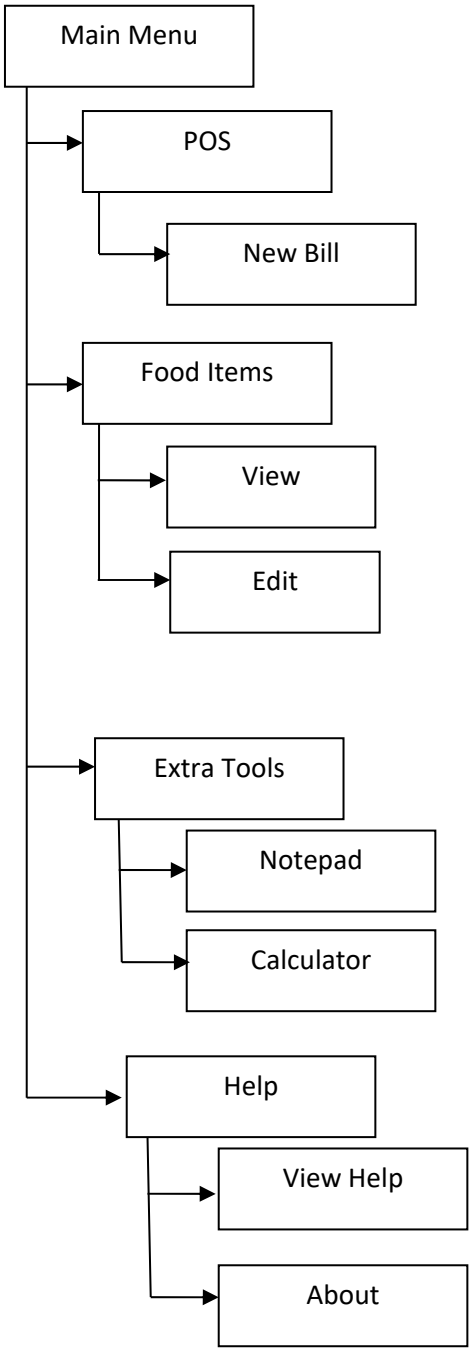
Remarks: XXXX

Data Flow Diagram

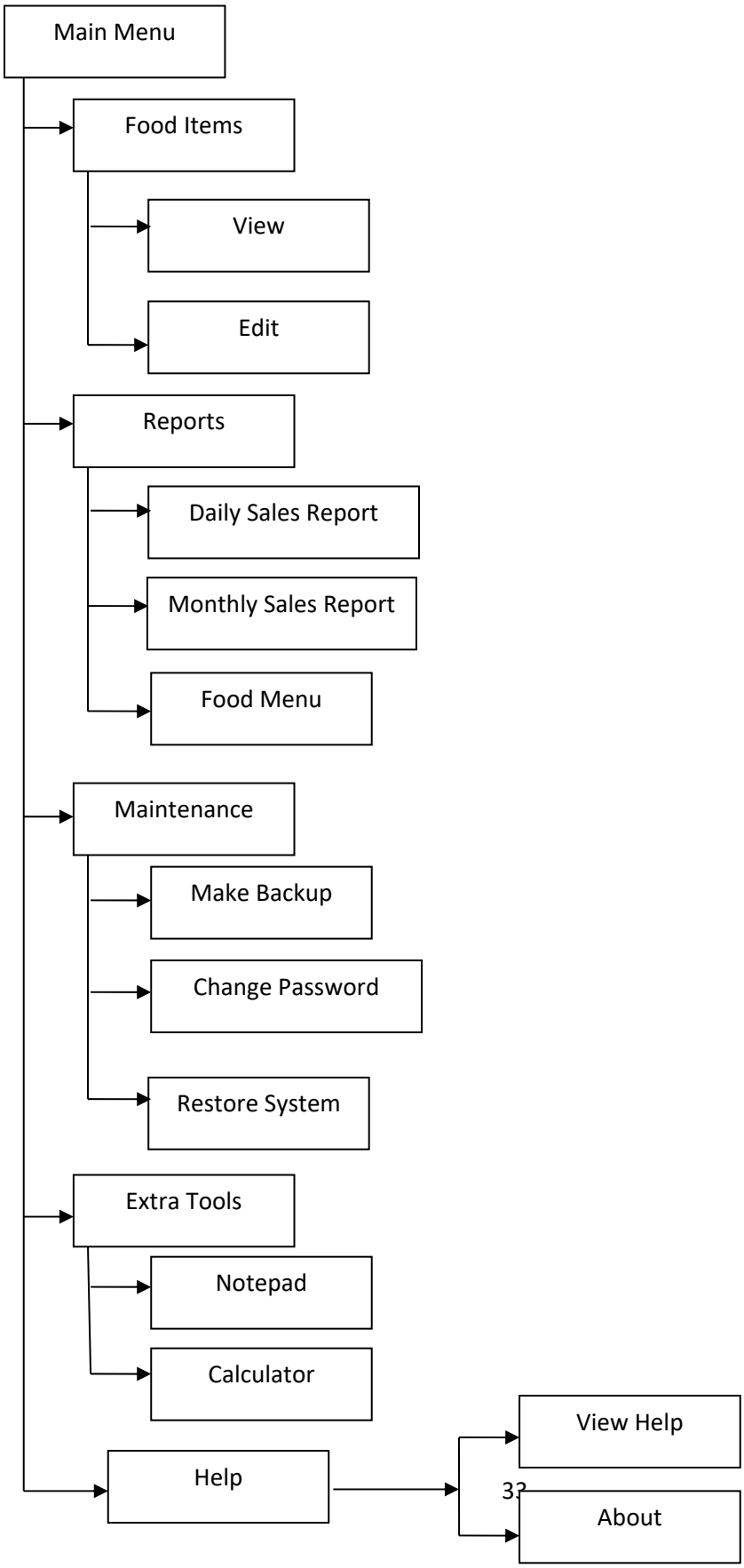


Menu Design

For Receptionist



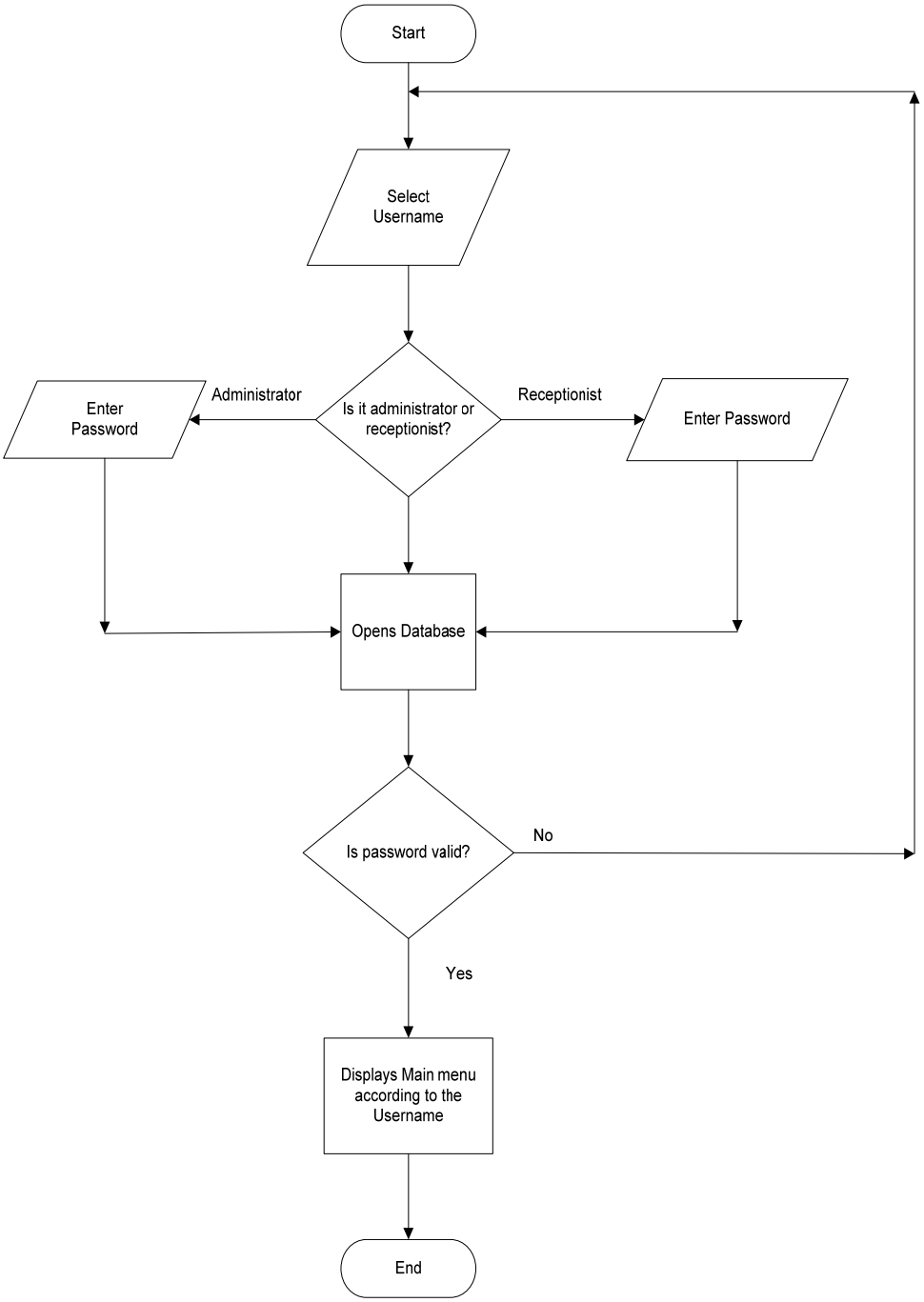
For Administrator



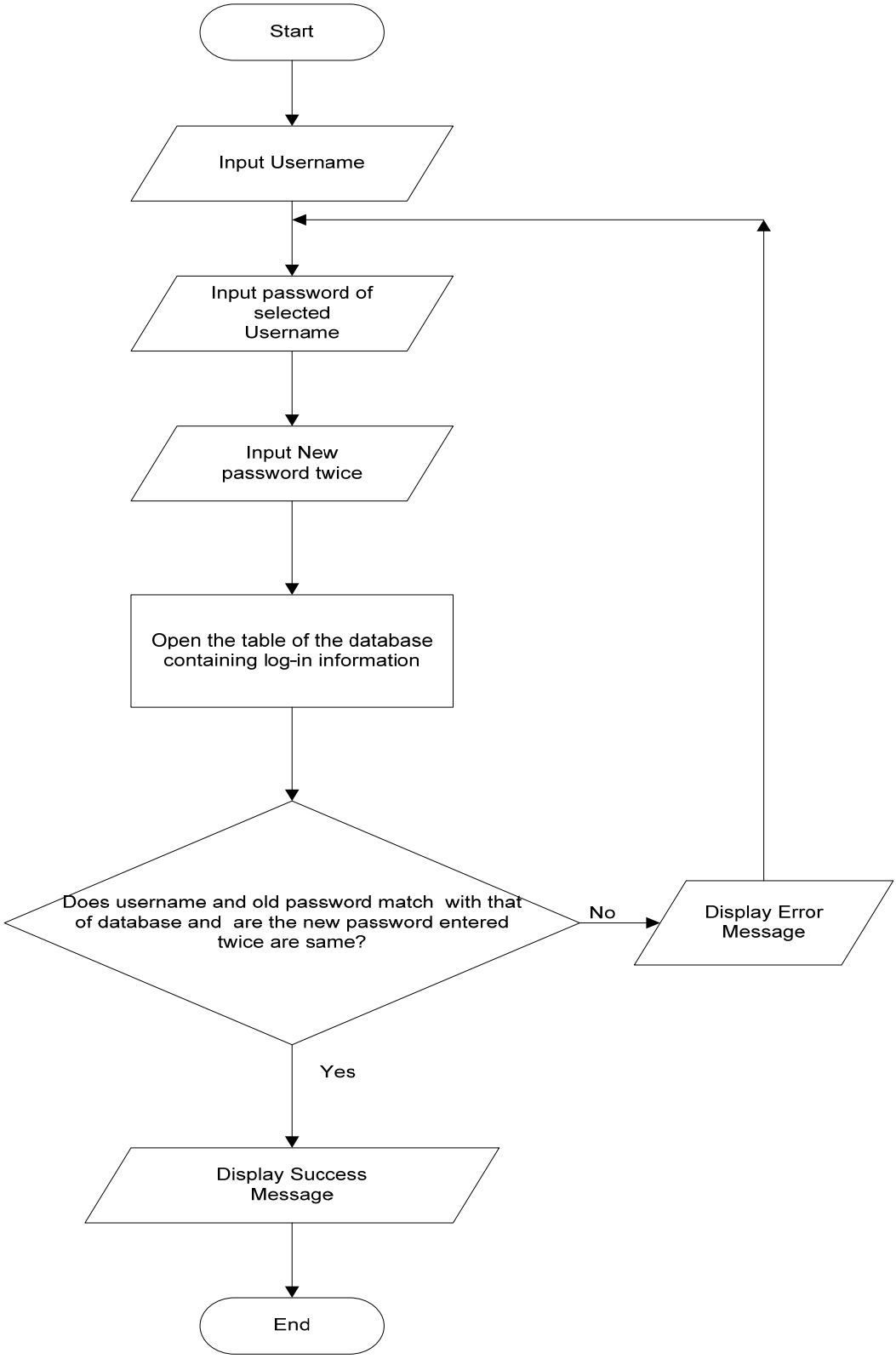
Flowcharts

Log-in

Log-in System

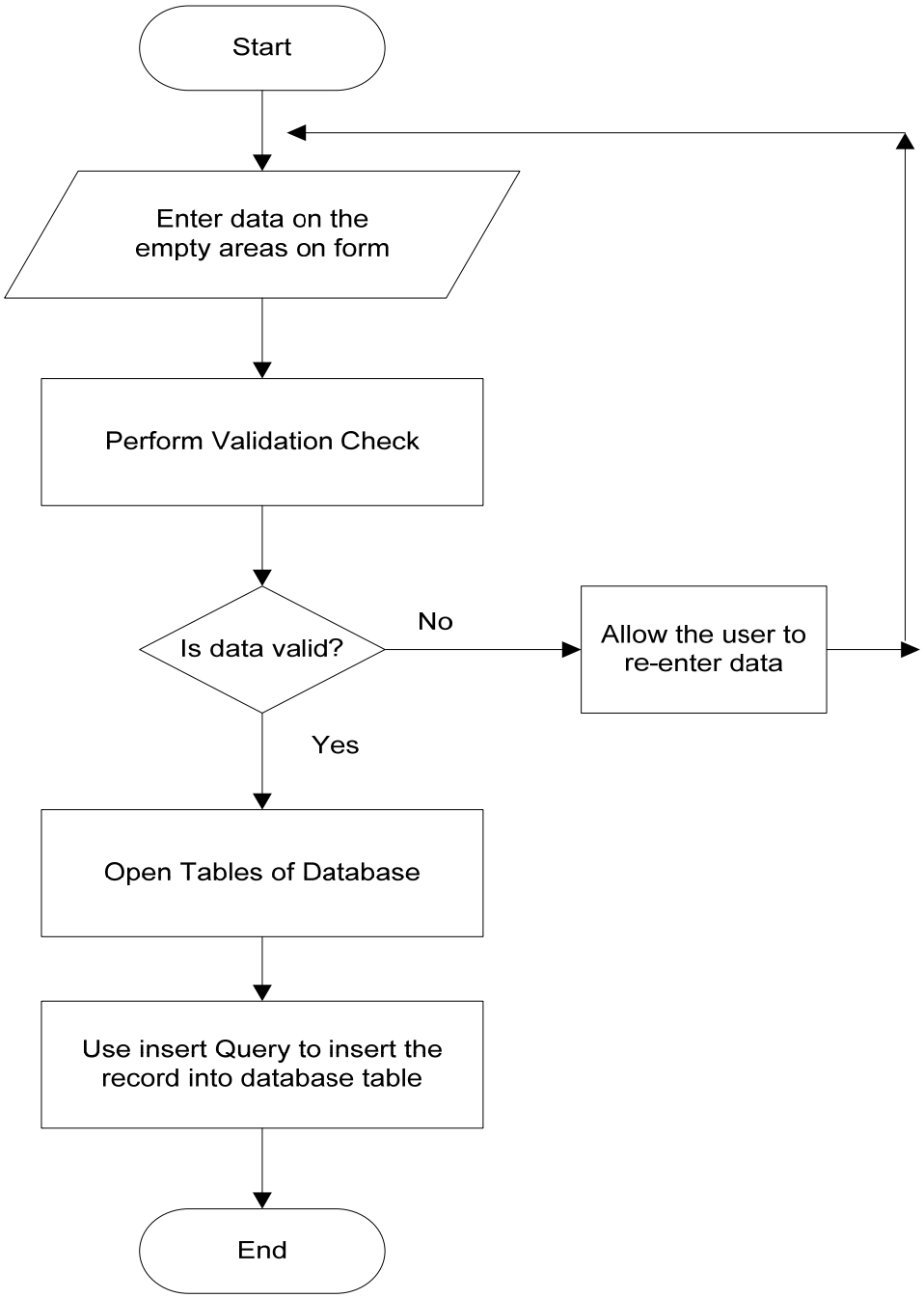


Change Password

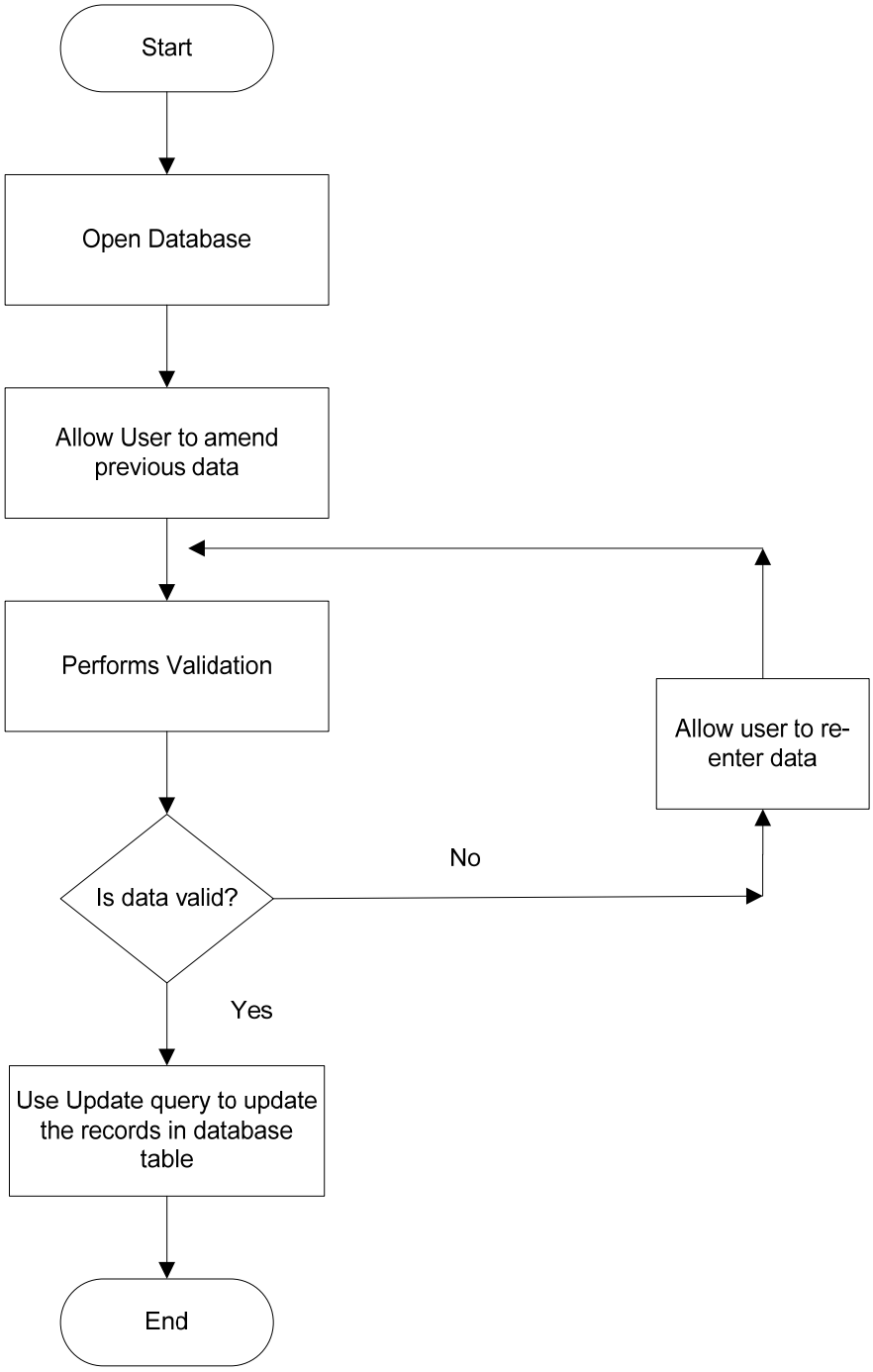


Food Items

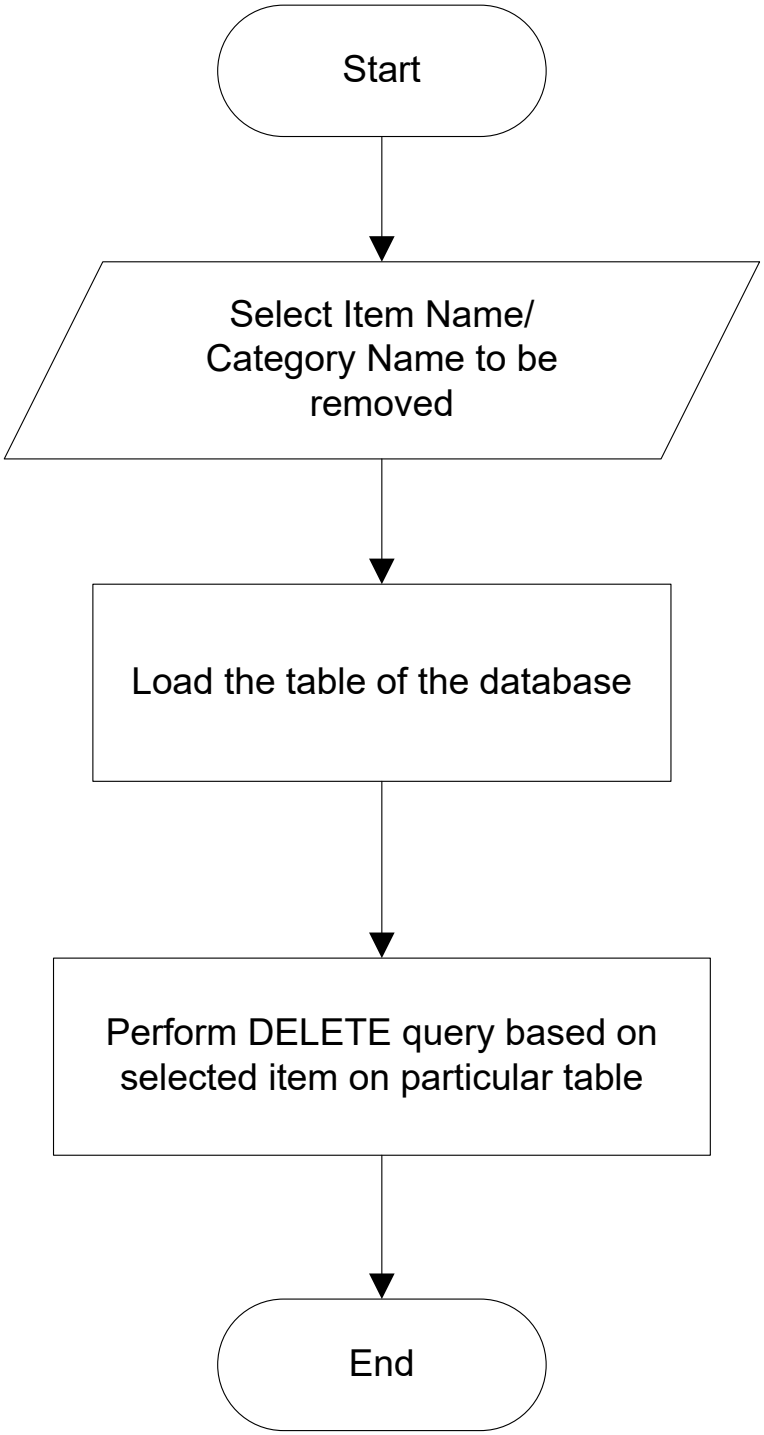
Add Food Item/Category



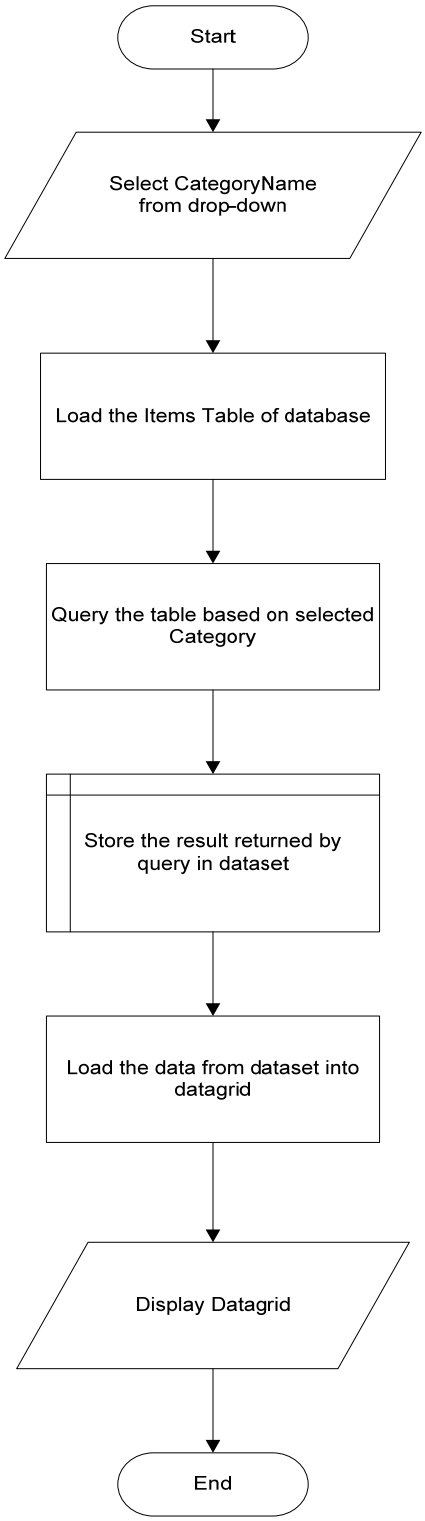
Edit Food Items



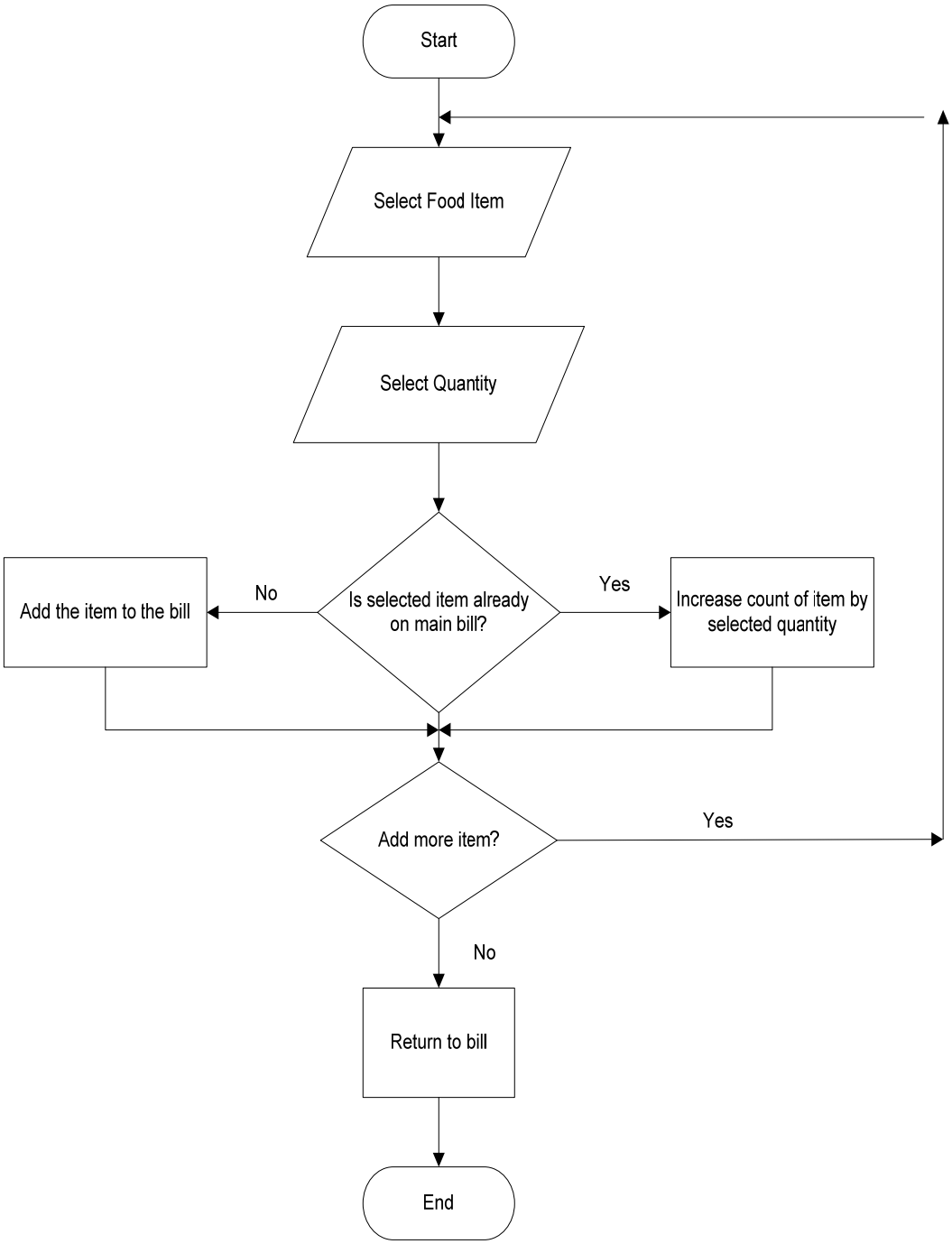
Remove Food Item/ Category



View Food Items

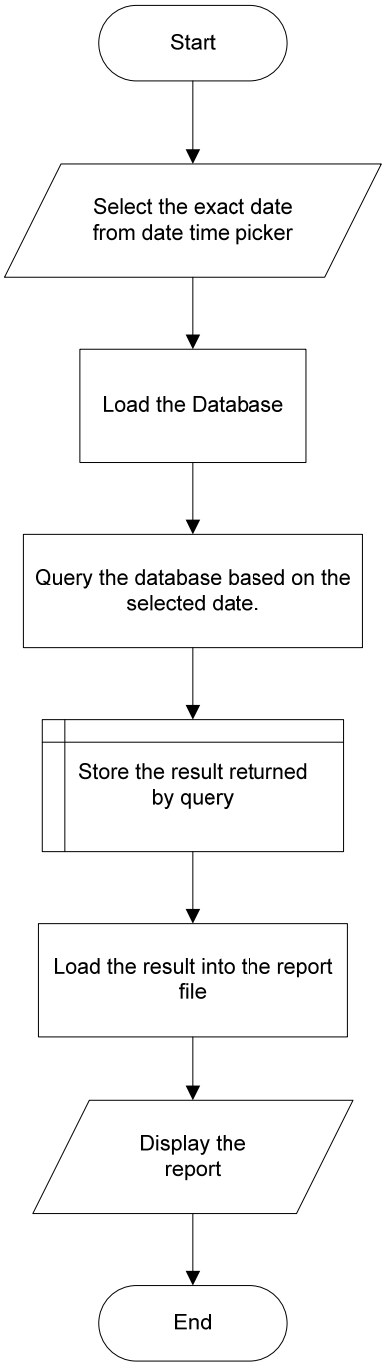


Bill(Adding Food Item)

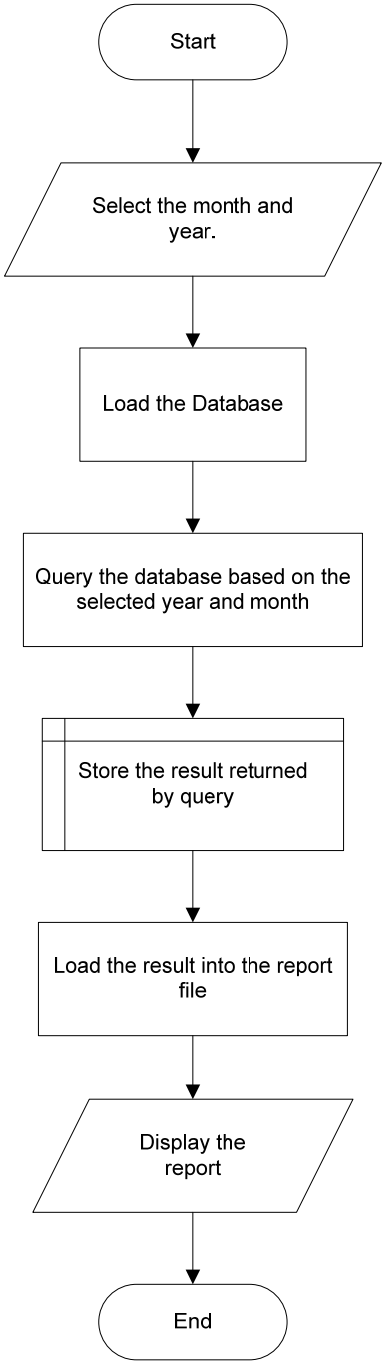


Reporting

Daily Sales Report

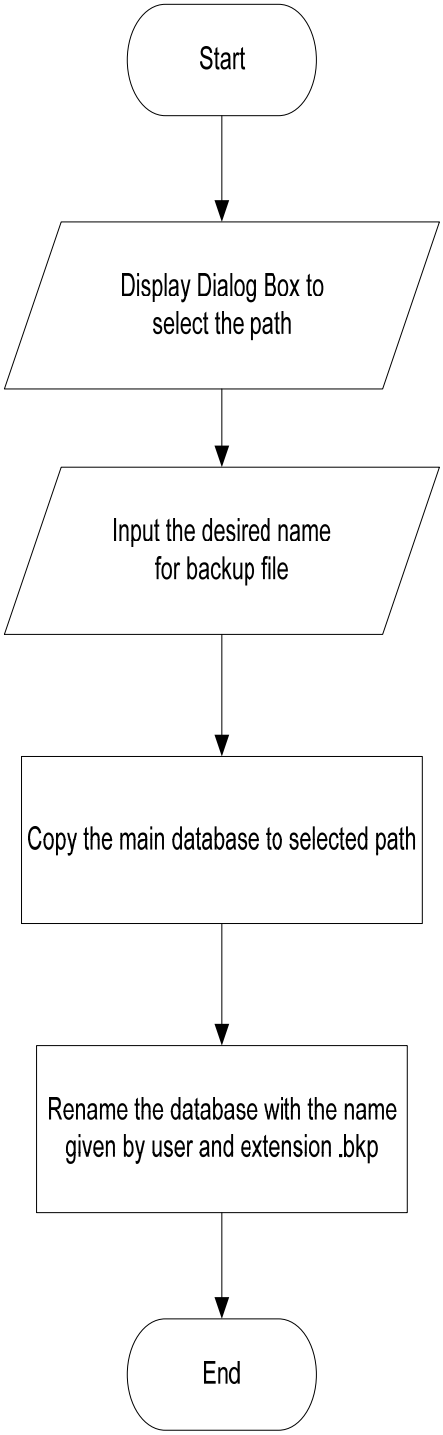


Monthly Sales Report

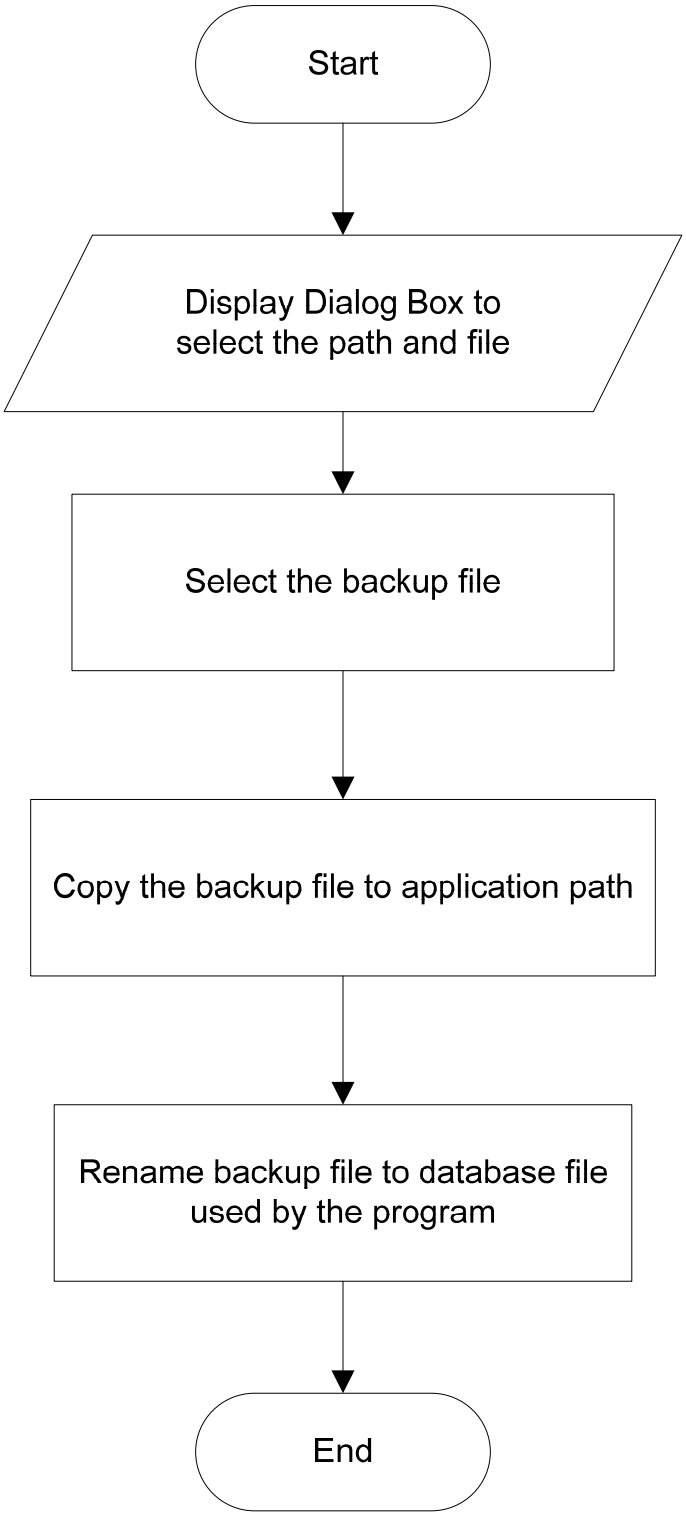


Maintenance

Backup



Restore


Start
Display Dialog Box to select the path and file
Select the backup file
Copy the backup file to application path
Rename backup file to database file used by the program
End

(ii) Intended Benefits

- **Easy to Use**
  Compared to the original system, the new computerized is easy to use. User needs to provide input to the system through Keyboard and use mouse to click the buttons to process those data. They needn't hesitate about the database as program automatically communicates with the database.

- **Speed of Operation**
  The new system will be very fast compared with the original one as the receptionist and accountant do not have to perform calculation manually. Also, Customer Receipt, Daily and Monthly sales can be produced in few clicks, so the owner can receive the reports from accountant in time.

- **Reduce the amount of Errors**
  The data entered by the user in the new system is validated before it reaches the master file (database) so, the errors which are usually made during busy hours can be minimized. Also, the system prevents the errors which could have been made during manual calculation using calculator.

- **Satisfaction among the Customers**
  The new system will produce error free Receipt (Invoice) and reduce the delay in preparing bills. So, customers will be satisfied with the fast service they have been provided with.

- **Security of the data**
  In original system, the records are stored in the papers which were prone to destruction. In contrast, the new system stores the data in electronic form as a database file. Furthermore, it allows the administrator to perform backup of the entire system and store it in portable drive such as flash drive. So, in case of data loss, the whole system can be recovered using the backup file. The password authentication feature in the program ensures that the right person has the access the sensitive data.

(iii) Limits of the scope of the solution

Although the new system rectifies many problems in the original one, there are some limits and disadvantages of the new system.

- The stock control and billing system are interrelated with each other but the software only handles the billing system so, receptionist has to do paperwork to maintain the stock of bar.
- Although the new system is user-friendly and easy to use, the users need to have the basic knowledge of using the computer. Also, the transition from paper-based system to computerized system may create some inefficiency.
- Customers cannot make payment through credit cards.
- User has to perform manual backing up of the system so in case of power failure or other damage, the data may be lost.
- The software is not customizable.
- The bugs may still be discovered during the normal working conditions.

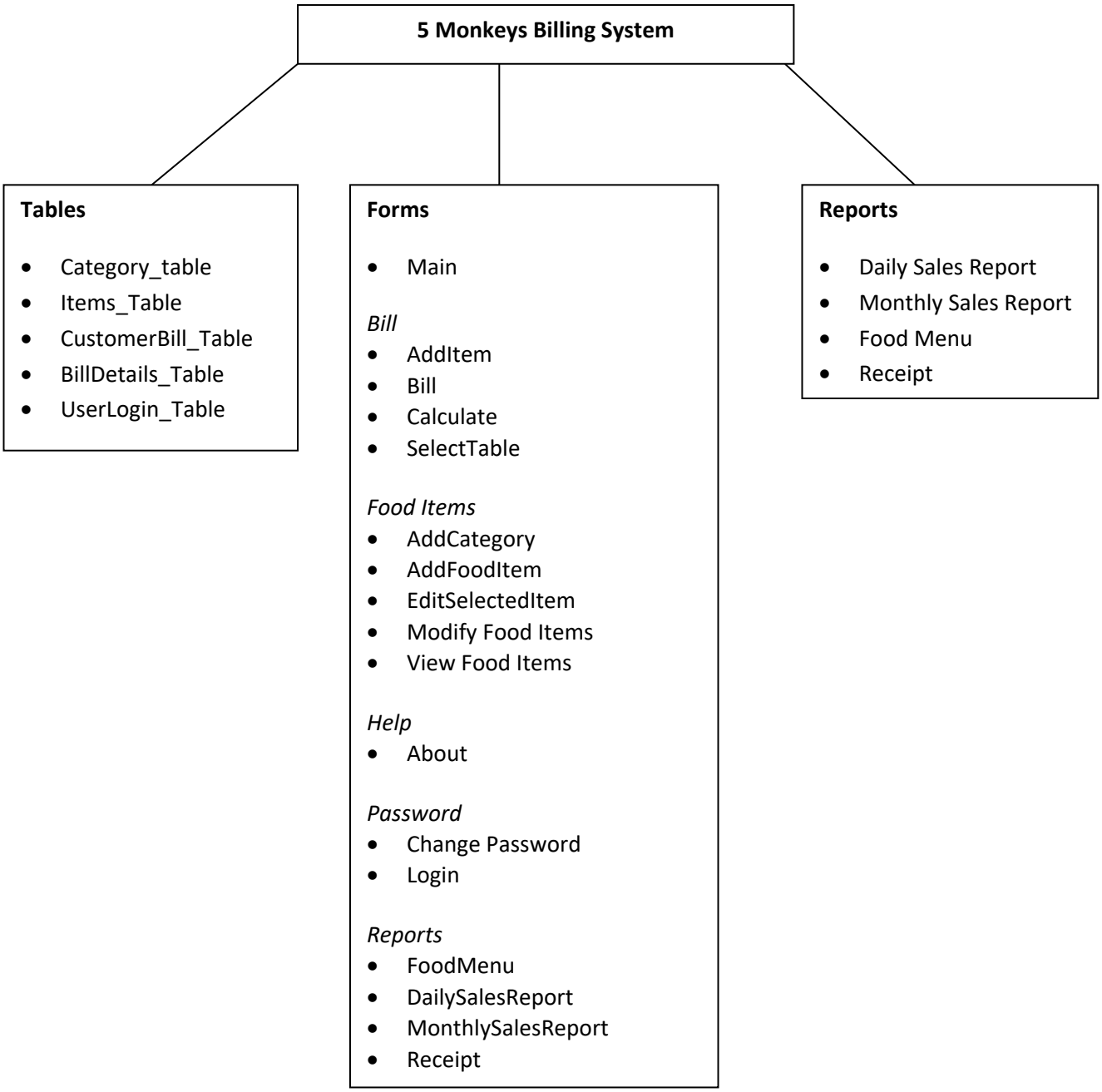
File Size Estimation

Table Name	Size of a record / bytes	Estimated no. of records per year	Total size of each table in a year / bytes
Category_Table	30	30	900
Items_Table	80	200	16000
CustomerBill_Table	78	20000	1560000
BillDetails_Table	14	100000	1400000
UserLogin_Table	35	2	70
Total size of the database in a year / bytes			2976970
Add (+) overheads (10%)			3006739
Total Size of the database in a year / Megabytes			2.87

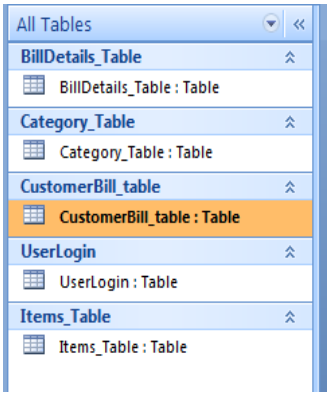
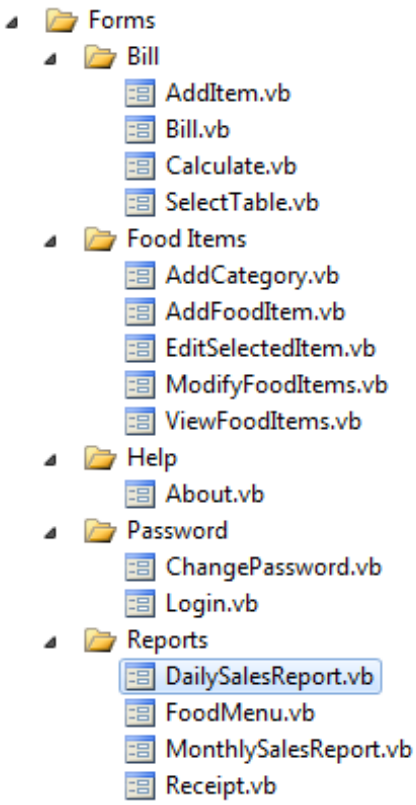
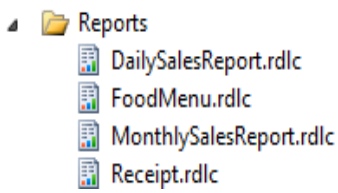
c. Software Development, Programming, testing and installation

(i) Development

System Design



The screenshot of above model in the real software development environment(Visual Basic 2010 and Microsoft Access 2010) has been shown below:

Tables	*Forms*	*Reports*
		

Program Listing

The methods used in each class (form class) with their purpose have been listed below:

Bill

Additem

Methods	Purpose
Private Sub ViewFoodItems_Load()	To load the food items name, their prices and their category from database
Private Sub cboCategoryName_SelectedValueChanged()	When user chooses another category, the items shown in data grid is changed
Private Sub btnCancel_Click()	Closes the form

Private Sub btnAdd_Click()	Transfers the name , price and quantity of selected item into main bill
Private Sub btnDone_Click()	Returns the control to calling form(main bill)

Bill

Methods	Purpose
Private Sub btnAddItem_Click()	Opens Additem form and adds the selected item to the main bill
Private Sub btnRemoveItem_Click()	Removes the selected item from the main bill
Private Sub btnCalculate_Click()	Opens Calculate form and performs calculation based on data entered in calculate form and displays the result in main bill
Private Sub btnPaid_Click()	Updates the database tables and displays the receipt bill for printing
Private Sub btnCancel_Click()	Closes the form
Private Sub Bill_Activated()	Displays the purpose of the form in the status bar

Calculate

Methods	Purpose
Private Sub btnDone_Click()	Validates the combo-box and returns the control to calling form
Private Sub Cancel_Click()	Closes the form

Select Table

Methods	Purpose
Private Sub btnAdd_Click()	Creates a new bill form with the name of selected table

Food Items

Add Category

Methods	Purpose
Private Sub btnAdd_Click()	Validates the category name and adds it to the database table.

Private Sub btnCancel_Click()	Close the form

AddFoodItem

Methods	Purpose
Private Sub btnAdd_Click()	Adds the entered item name and price to the table in database
Private Function IsValidData()	Performs validation on entered data using the Validator Class
Private Sub AddFoodItem_Load()	Displays the category selected in the text-box of this form when the form loads
Private Sub btnCancel_Click()	Closes the form

EditSelectedItem

Methods	Purpose
Private Sub EditSelectedItem_Load()	fills the category name text box with selected category
Public Sub FillItemInfo()	Fill the remaining text-box with the information of selected food item
Private Function IsValidData() As Boolean	Performs validation text using the validator class.
Private Sub txtUpdate_Click()	Updates the information about food items in database table
Private Sub txtCancel_Click()	Closes the form

ModifyFoodItems

Methods	Purpose
Private Sub ModifyFoodItems_Load()	Loads the food items and their prices in data grid
Private Sub cboCategoryName_SelectedValueChanged()	Displays the food items and their prices of the chosen category
Private Sub btnAddNewItem_Click()	Opens AddFoodItem form
Private Sub btnRemoveSelectedItem_Click()	Removes the selected Food Item
Private Sub btnEditSelectedItem_Click()	Opens EditSelectedItem form
Private Sub btnAddCategory_Click()	Opens AddCategory form
Private Sub btnDeleteCategory_Click()	Removes the slected category and updates the database

ViewFoodItems

Methods	Purpose
Private Sub ViewFoodItems_Load()	Loads the food items and their prices in data grid
Private Sub cboCategoryName_SelectedValueChanged()	Displays the food items and their prices of the chosen category

Help

About

Methods	Purpose
Private Sub btnOk_Click()	Closes the form

Password

Change Password

Methods	Purpose
Private Sub btnOk_Click()	Performs necessary validations and changes the password of the selected user in database table
Private Sub btnCancel_Click()	Closes the form
Private Sub ChangePassword_Load	Loads the user name in Combo-box from database

Login

Methods	Purpose
Private Sub Login_Load()	Loads the user name in Combo-box from database
Private Sub btnLogIn_Click()	Stores the entered password in tag property of login form
Private Sub btnCancel_Click()	Closes the form

Reports

DailySalesReport

Methods	Purpose
Private Sub btnShow_Click()	Displays the report according to selected date

FoodMenu

Methods	Purpose
Private Sub FoodMenu_Load()	Loads the food menu items categorically as a report

MonthlySalesReport

Methods	Purpose
Private Sub btnShow_Click()	Displays the monthly sales report according to the selected year and month

Receipt

Methods	Purpose
Private Sub Receipt_Load()	Displays the customer receipt for food

Validator

Methods	Purpose
Public Shared Function IsPresent(ByVal textbox As TextBox) As Boolean	Checks if the text-box is empty
Public Shared Function IsDecimal(ByVal textbox As TextBox) As Boolean	Checks if the value entered in text-box is decimal
Public Shared Function IsDecimal(ByVal textbox As TextBox) As Boolean	Checks if the number entered in text-box lies between given interval
Public Shared Function LengthCheck(ByVal textbox As TextBox) As Boolean	Checks if the length of string is suitable or not

Main

Methods	Purpose
Public Sub Main_Load	Displays log-in form and manages the settings for menu hierarchy according to selected username
Private Sub EditFoodItems()	Displays Edit Food Item form as a dialog box
Private Sub CreateNewBill()	Displays form to create a new bill

Private Sub MakeBackup()	Creates a backupfile of the system
Private Sub RestoreSystem()	Restores the system to the selected backup file
Private Sub Timer1_Tick	Updates the time(hour and minutes) in the status bar
Private Sub DisplayFoodMenu()	Displays Food Menu Report
Private Sub DisplayDailySales()	Displays daily sales report
Private Sub DisplayMonthlySales()	Displays Monthly Sales Report
Private Sub ViewFoodItems()	Displays View Food Items form
Private Sub mnuMaintenanceChangePassword_Click()	Displays form for changing the password of the system
Private Sub mnuFoodItemsView_Click()	Calls ViewFoodItem( ) sub procedure
Private Sub btnViewMenu_Click()	Calls ViewFoodItem( ) sub procedure
Private Sub mnuFoodItemsEdit_Click()	Calls EditFoodItems() sub procedure
Private Sub mnuPOSNewBill_Click()	Calls CreateNewBill() sub procedure
Private Sub btnNewBill_Click()	Calls CreateNewBill() sub procedure
Private Sub mnuExtraCalculator_Click()	Displays System Calculator
Private Sub mnuExtraNotepad_Click()	Displays System Notepad
Private Sub mnuMaintenanceBackup_Click()	Calls MakeBackup() sub procedure
Private Sub RestoreToolStripMenuItem_Click()	Calls RestoreSystem() sub procedure
Private Sub btnBackup_Click()	Calls MakeBackup() sub procedure
Private Sub btnRestore_Click()	Calls RestoreSystem() sub procedure
Private Sub AddNewBillToolStripMenuItem_Click()	Calls CreateNewBill() sub procedure
Private Sub EditFoodItemsToolStripMenuItem_Click()	Calls EditFoodItems() sub procedure
Private Sub FoodMenuToolStripMenuItem_Click()	Calls DisplayFoodMenu() sub procedure
Private Sub mnuReportsDaily_Click()	Calls DisplayDailySales() sub procedure
Private Sub btnMonthlySales_Click()	Calls DisplayMonthlySales() sub procedure
Private Sub BackupToolStripMenuItem_Click()	Calls MakeBackup() sub procedure
Private Sub RestoreToolStripMenuItem_Click()	Calls RestoreSystem() sub procedure
Private Sub DailySalesReportToolStripMenuItem_Click	Calls DisplayDailySales() sub procedure
Private Sub mnuReportsMonthly_Click()	Calls DisplayMonthlySales() sub procedure
Private Sub MonthlySalesReportToolStripMenuItem_Click()	Calls DisplayMonthlySales() sub procedure
Private Sub btnDailySales_Click()	Calls DisplayDailySales() sub procedure
Private Sub mnuHelpAbout_Click	Displays About Dialog box

Development of Database

Category Table (Category_Table)

Datasheet View

Category_Table

CategoryName
5 Monkey Special
Beers
Chowmin
Cigarette
Curries
Domestic Brands
Momo
Soup
Wine

Design View

Category_Table

Field Name	Data Type
CategoryName	Text

General | Lookup

Field Size	255
Format	
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No
Allow Zero Length	Yes
Indexed	Yes (No Duplicates)
Unicode Compression	No
IME Mode	No Control
IME Sentence Mode	None

Food Items (Items_Table)

Datasheet View

Items_Table

ID	ItemName	Price	CategoryNai	Add New Field
1	Mushroom Soup	80	Soup	
2	Bone Soup	90	Soup	
3	Mix Veg Soup	70	Soup	
4	Tawa Mutton	185	5 Monkey Spec	
5	Tawa Chicken	155	5 Monkey Spec	
6	Crispy Chicken	220	5 Monkey Spec	

Design View

Items_Table

Field Name	Data Type
ID	AutoNumber
ItemName	Text
Price	Number
CategoryName	Text

General | Lookup

Field Size	Long Integer
New Values	Increment
Format	
Caption	
Indexed	Yes (No Duplicates)
Smart Tags	
Text Align	General

Customer Bill (CustomerBill_Table)

Datasheet View

CustomerBill_table

BillNumber	Date	TableNumbe	Discount	GrandTotal	Remarks
2	2/28/2012	2	0	375	
3	2/28/2012	4	0	1120	

Design View

CustomerBill_table

Field Name	Data Type
BillNumber	AutoNumber
Date	Date/Time
TableNumber	Number
Discount	Number
GrandTotal	Number
Remarks	Memo

General | Lookup

Field Size	Long Integer
New Values	Increment
Format	
Caption	
Indexed	Yes (No Duplicates)
Smart Tags	
Text Align	General

Bill Details (BillDetails_Table)

Datasheet View

BillDetails_Table

BillNumber	ID	Quantity
2	9	5
3	17	4
4	2	2

Design View

BillDetails_Table

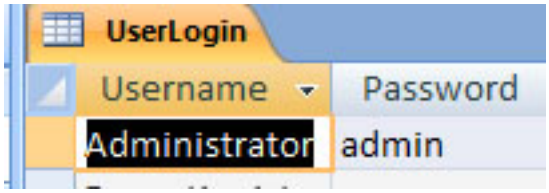
Field Name	Data Type
BillNumber	Number
ID	Number
Quantity	Number
Price	Currency

General | Lookup

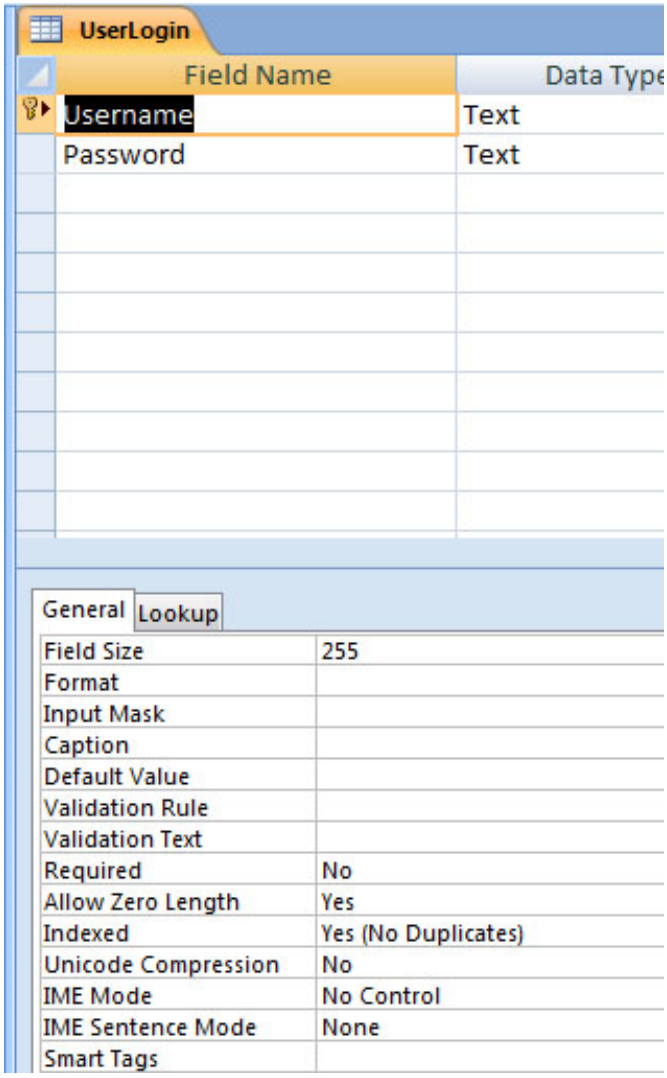
Field Size	Long Integer
Format	
Decimal Places	Auto
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	No
Indexed	No
Smart Tags	
Text Align	General

Login Information (Userlogin)

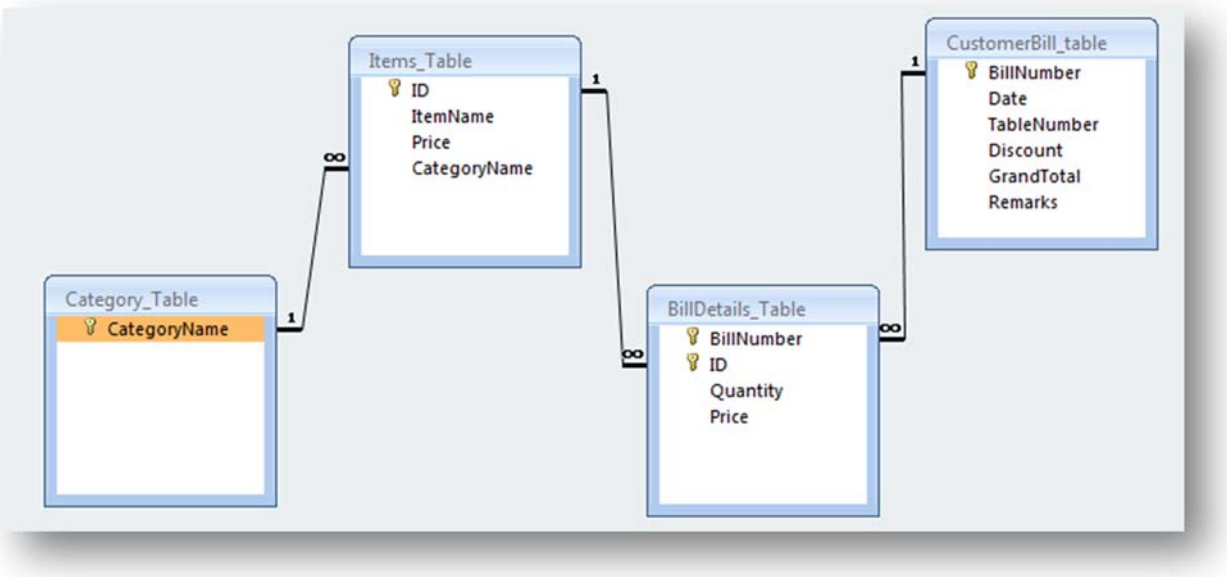
Datasheet View



Design View



Relationship between the Tables

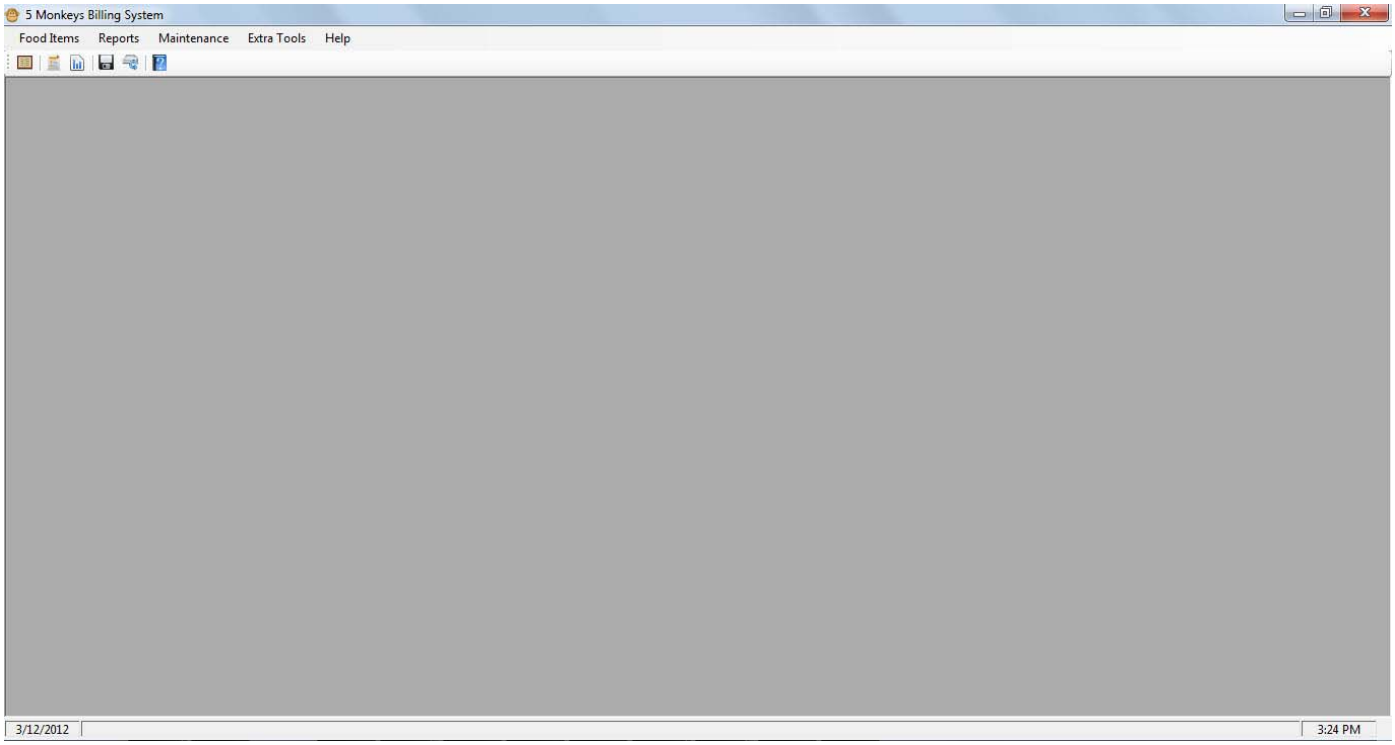


Development of Interface

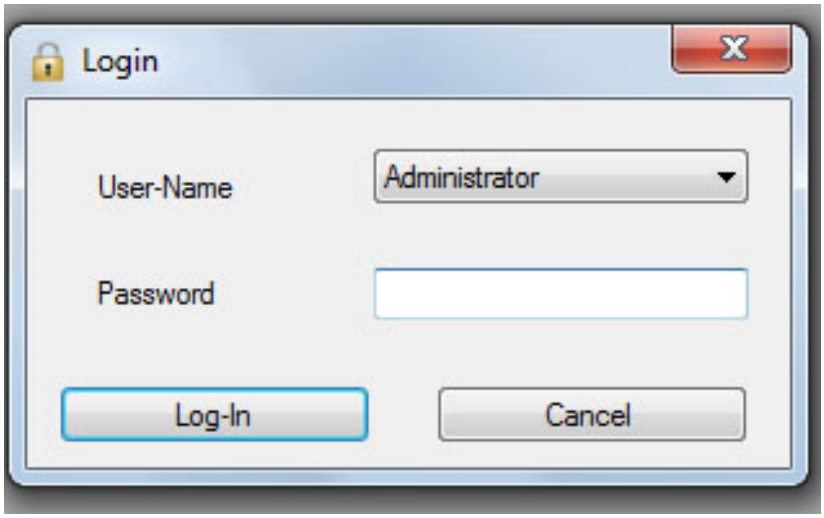
For annotation of screen, refer the design section.

Forms

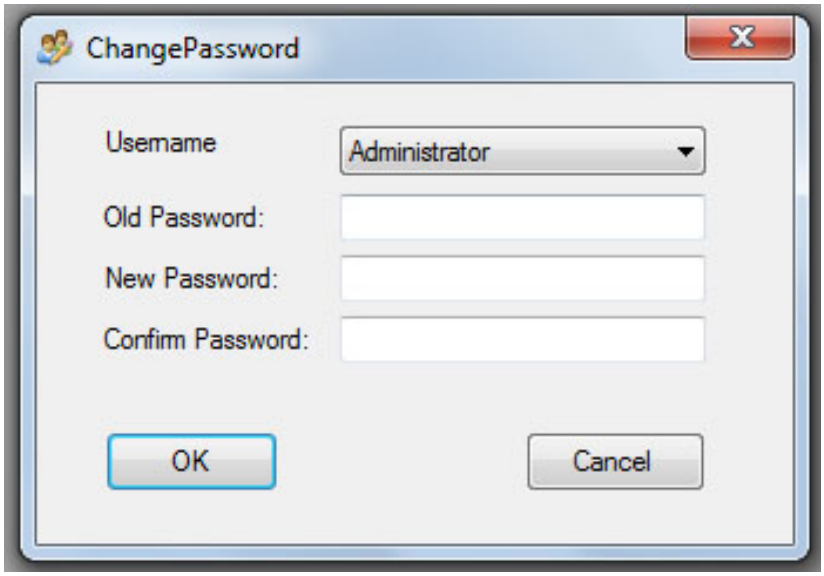
Main (MDI Form)



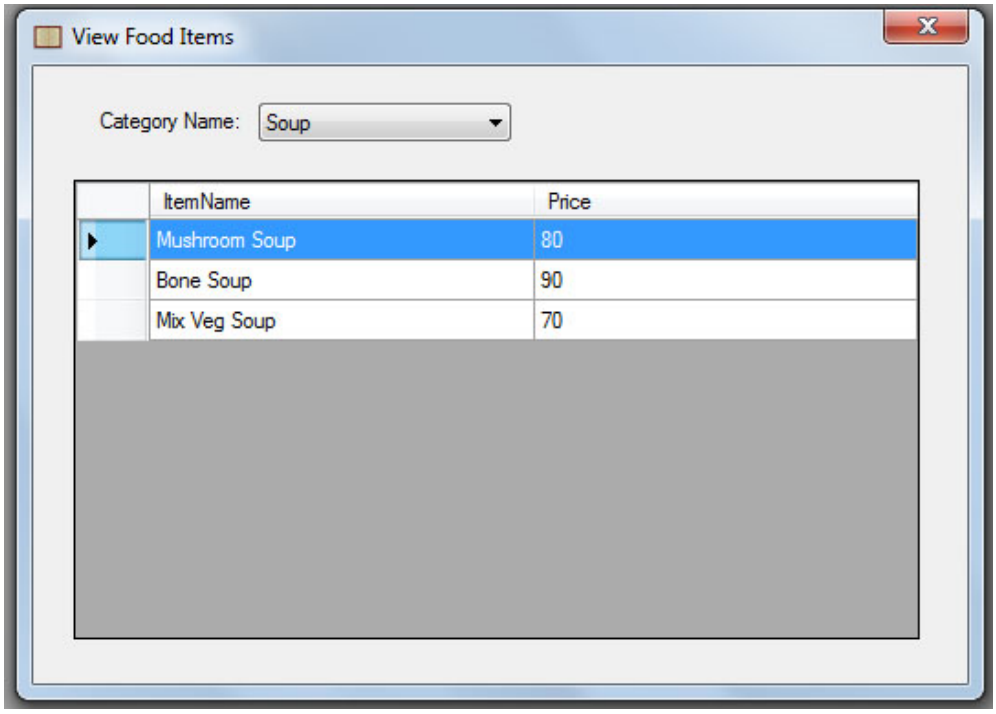
Login



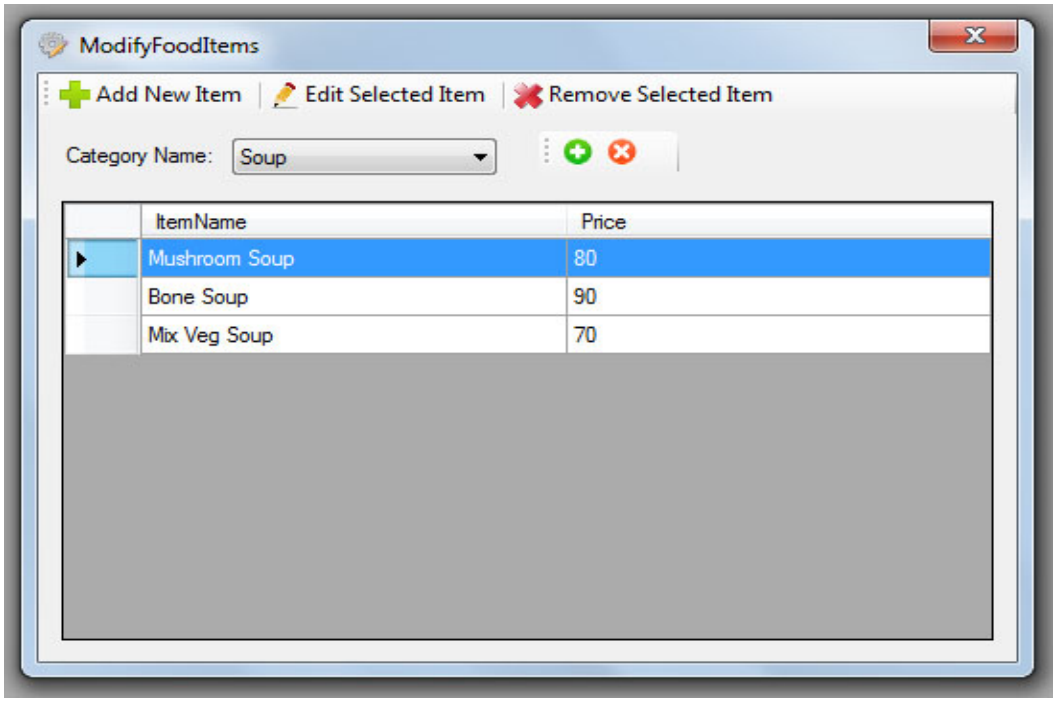
Change Password



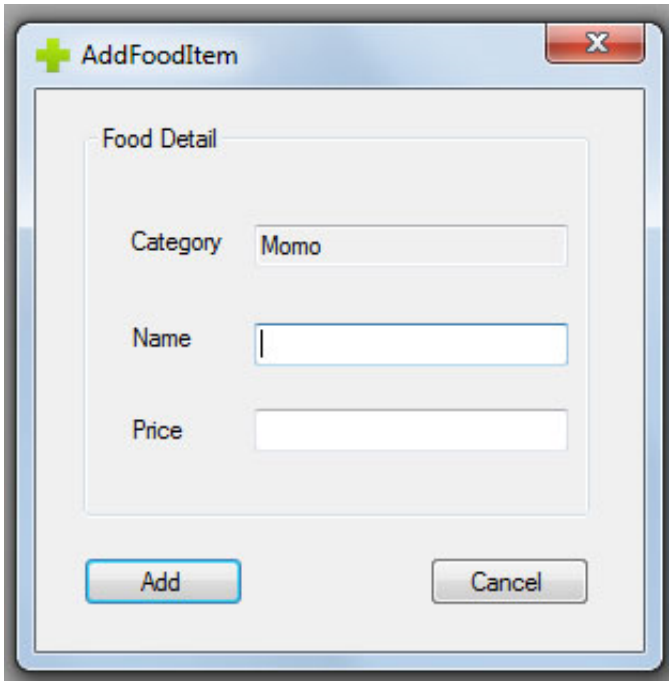
View Food Items



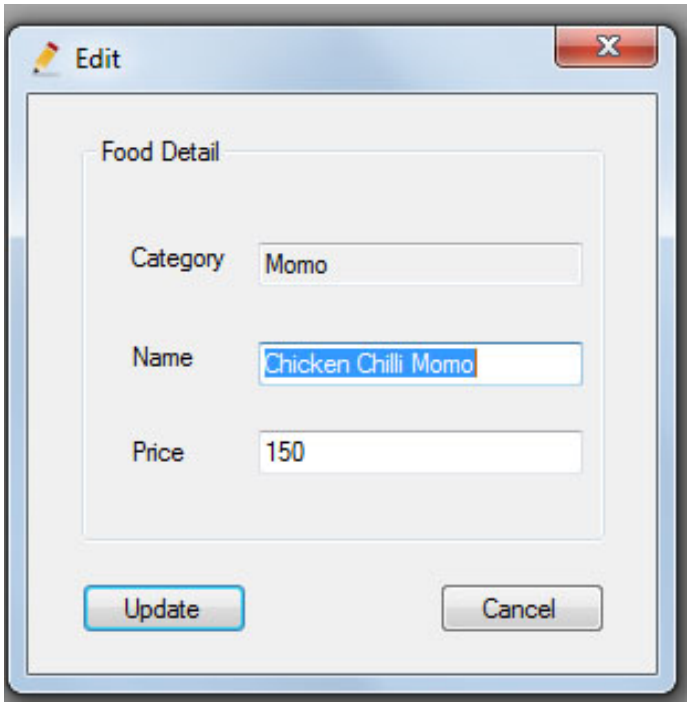
Modify Food Items



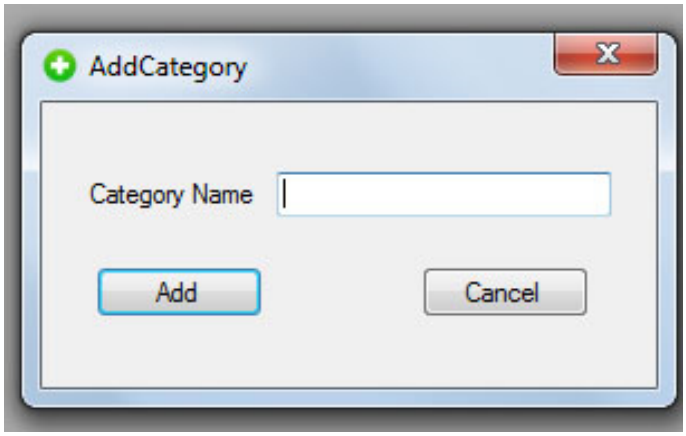
Add New Item



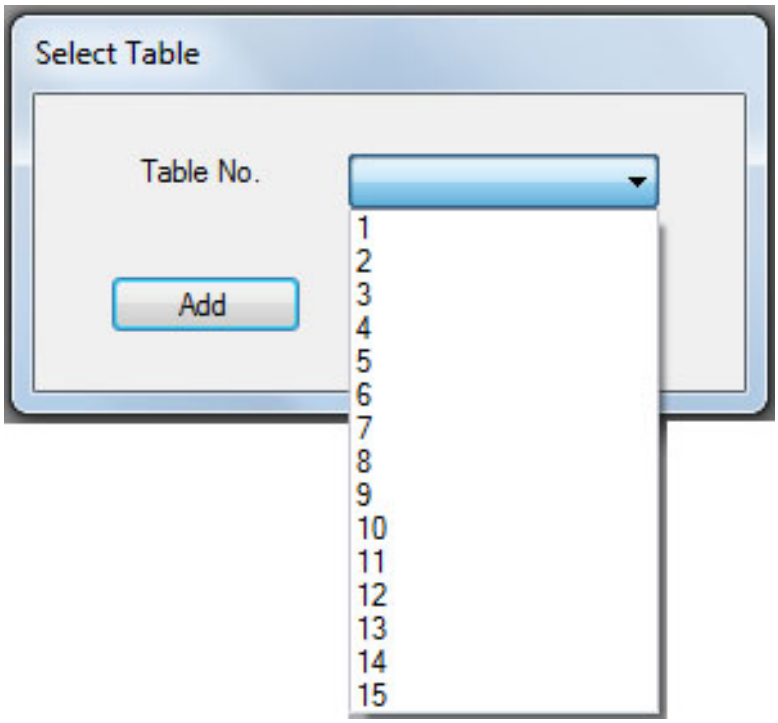
Edit Selected Item



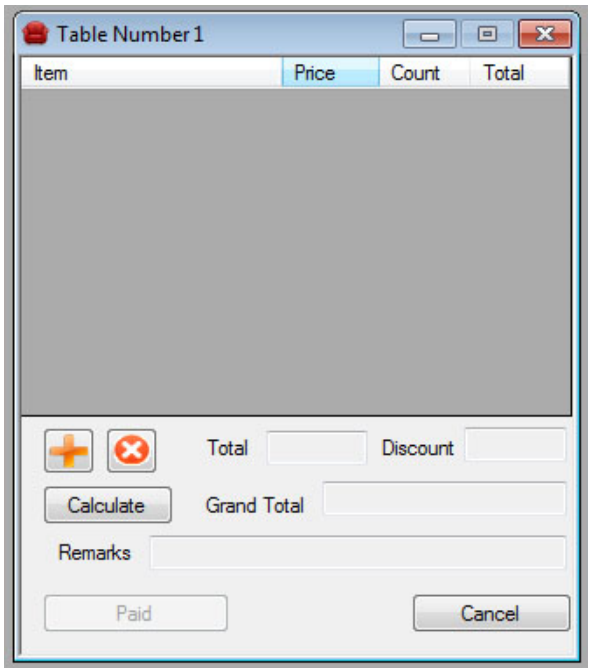
Add Category



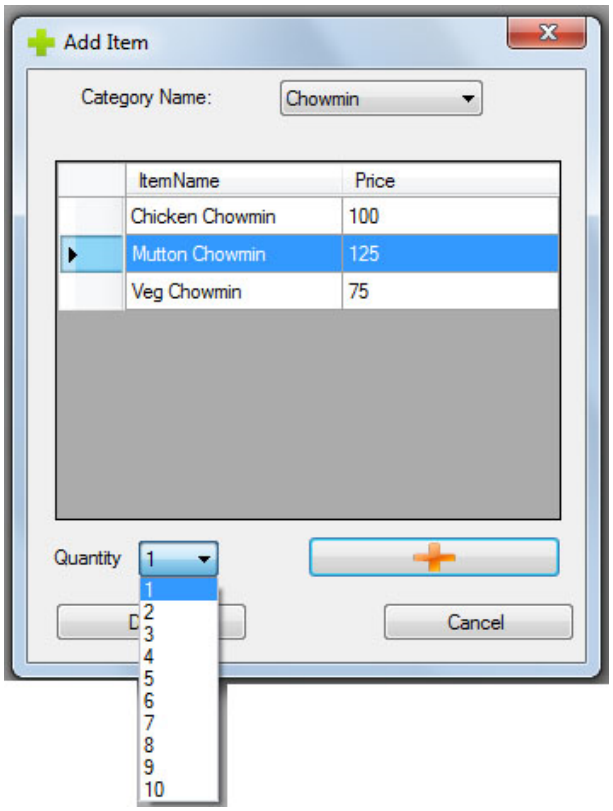
Select



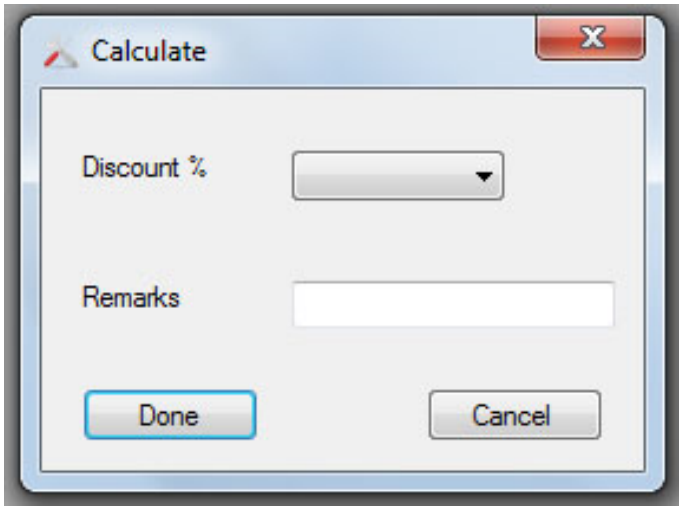
Bill



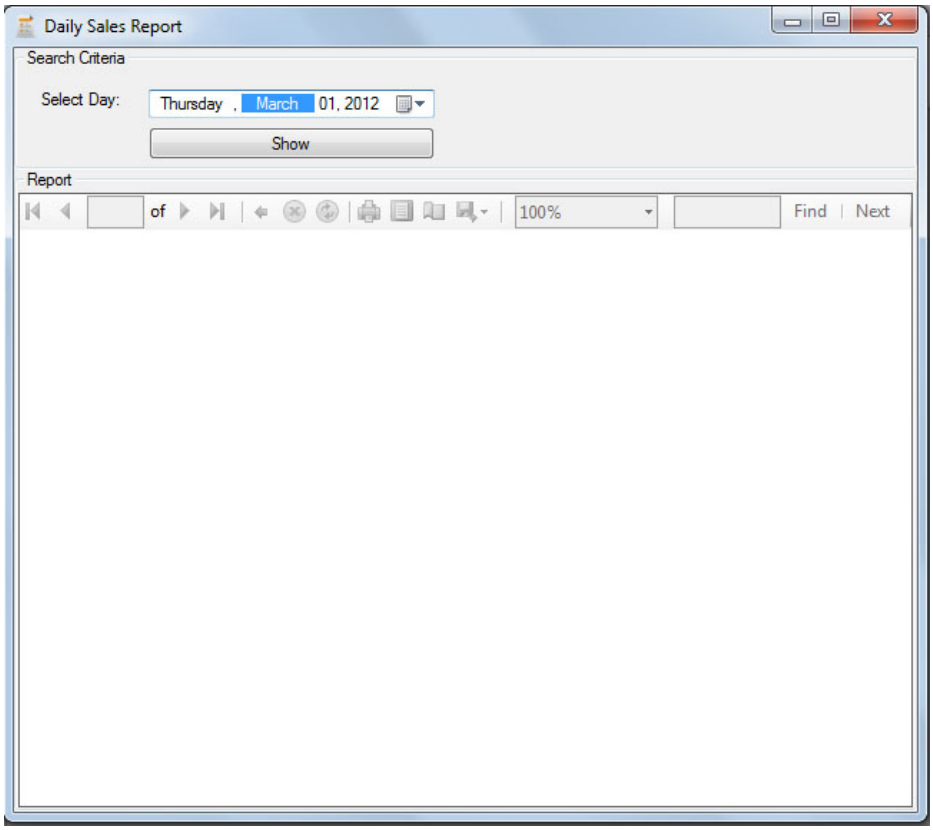
Add item to bill



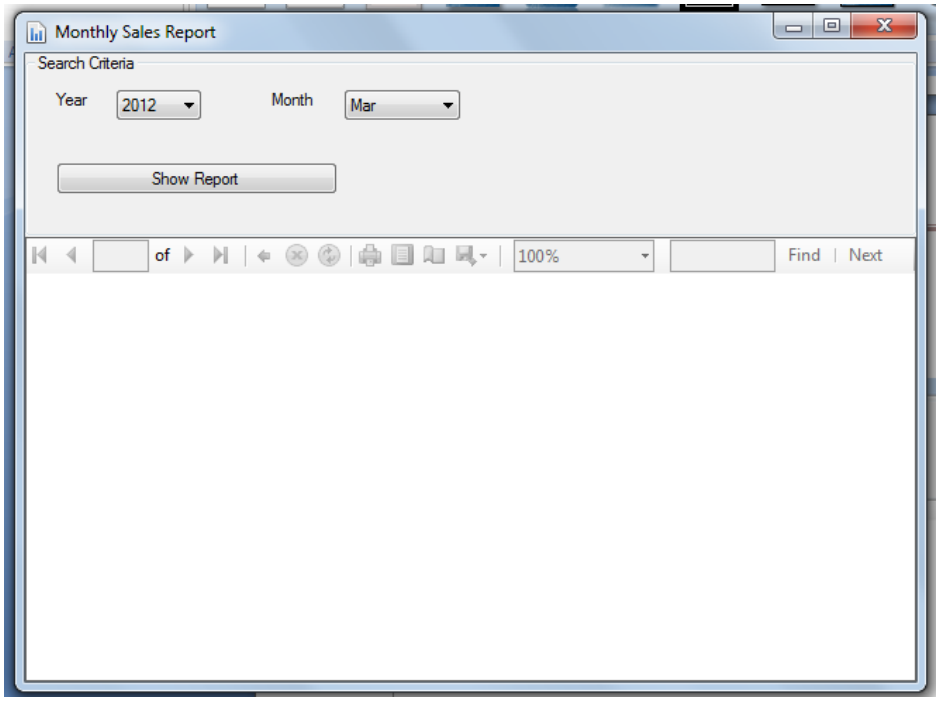
Calculate



Daily Sales Report



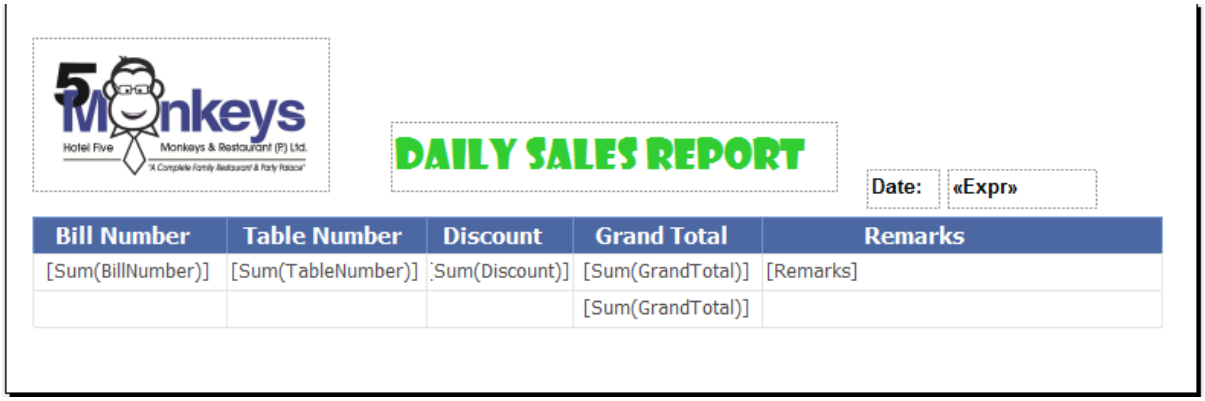
Monthly Sales Report



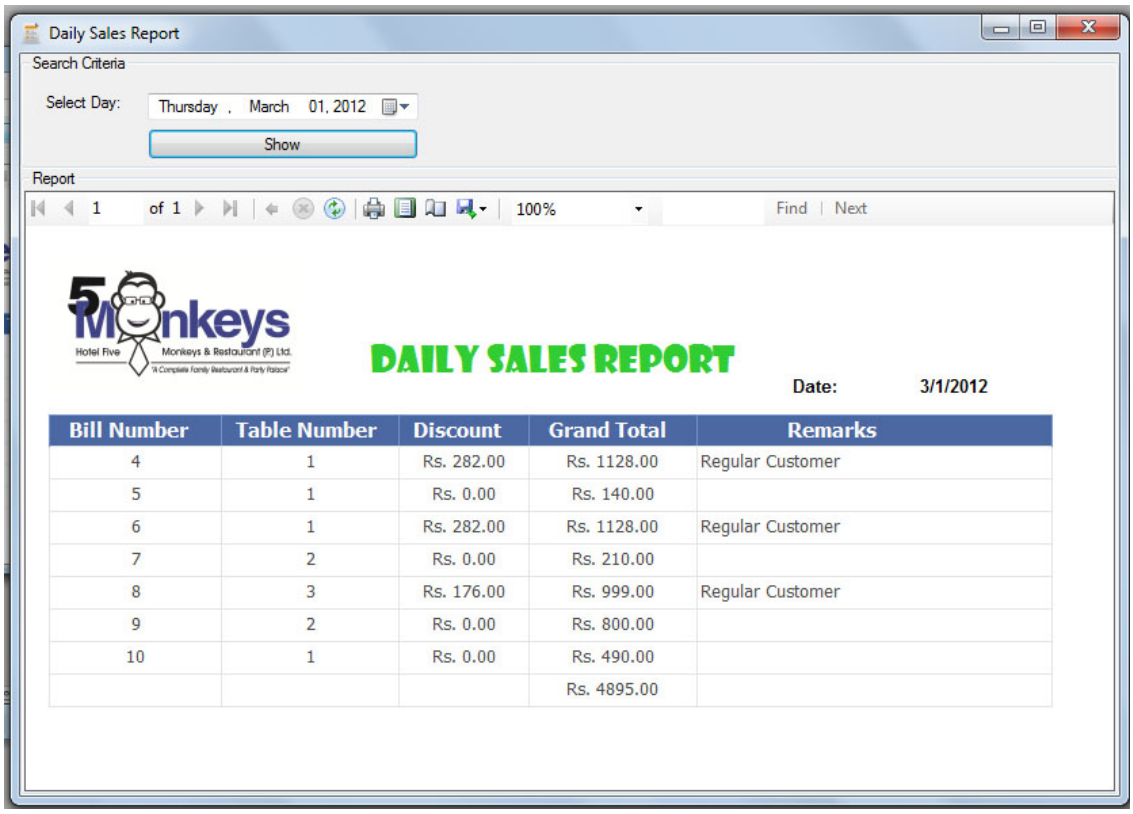
Reports

Daily Sales Report

Design View:



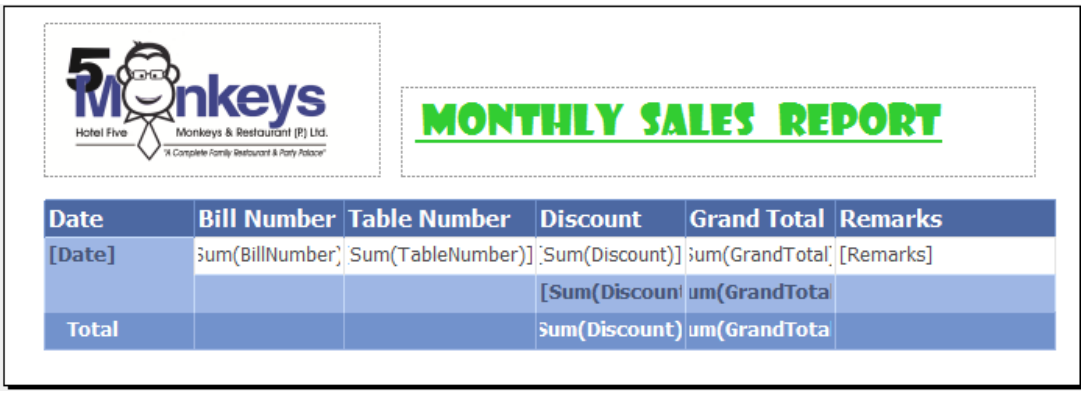
Run View:



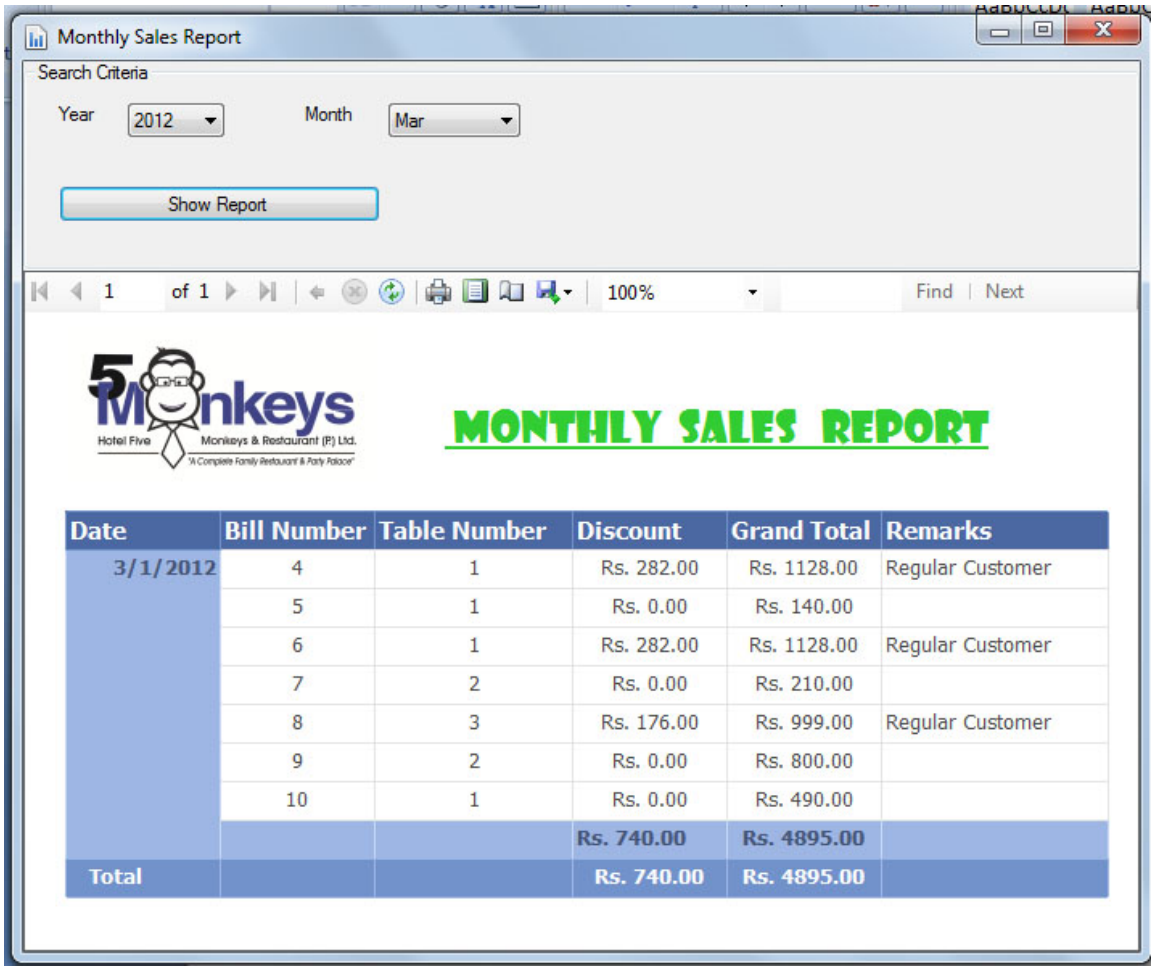
Bill Number	Table Number	Discount	Grand Total	Remarks
4	1	Rs. 282.00	Rs. 1128.00	Regular Customer
5	1	Rs. 0.00	Rs. 140.00	
6	1	Rs. 282.00	Rs. 1128.00	Regular Customer
7	2	Rs. 0.00	Rs. 210.00	
8	3	Rs. 176.00	Rs. 999.00	Regular Customer
9	2	Rs. 0.00	Rs. 800.00	
10	1	Rs. 0.00	Rs. 490.00	
			Rs. 4895.00	

Monthly Sales Report

Design View:



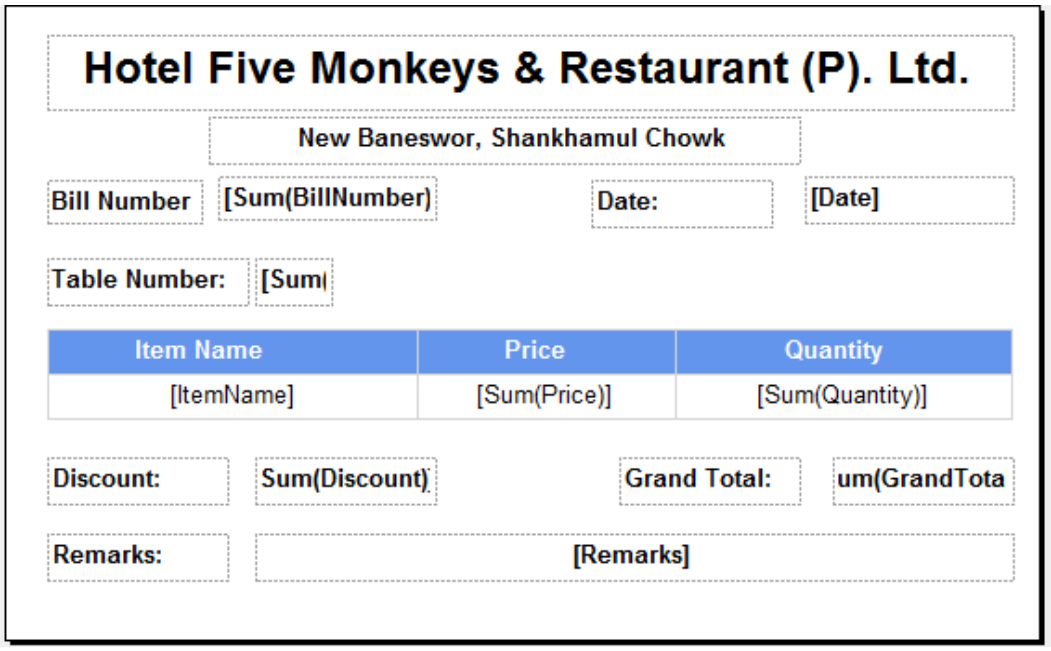
Run View:



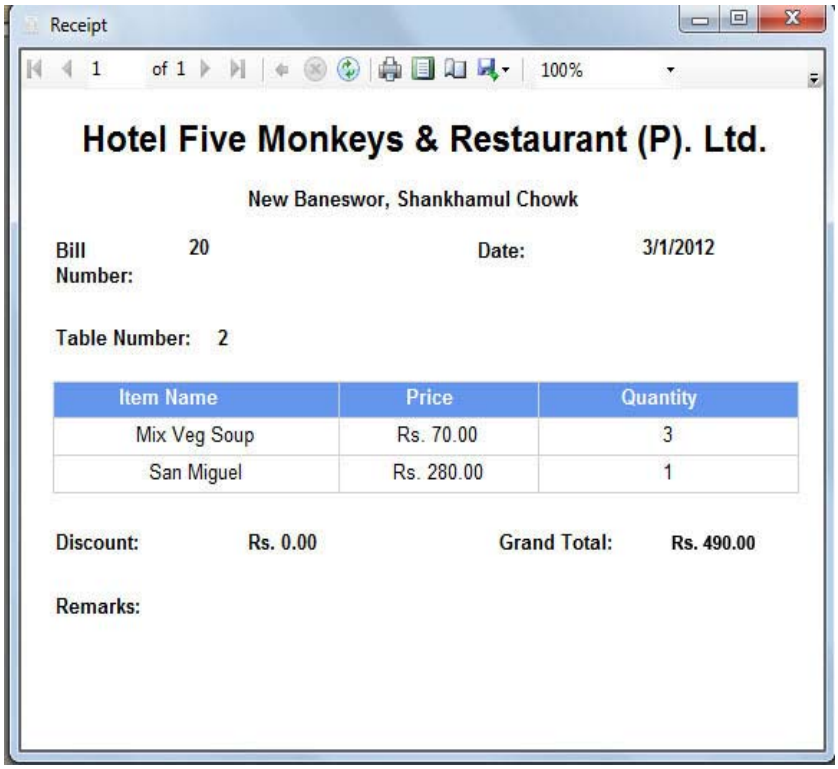
Date	Bill Number	Table Number	Discount	Grand Total	Remarks
3/1/2012	4	1	Rs. 282.00	Rs. 1128.00	Regular Customer
	5	1	Rs. 0.00	Rs. 140.00	
	6	1	Rs. 282.00	Rs. 1128.00	Regular Customer
	7	2	Rs. 0.00	Rs. 210.00	
	8	3	Rs. 176.00	Rs. 999.00	Regular Customer
	9	2	Rs. 0.00	Rs. 800.00	
	10	1	Rs. 0.00	Rs. 490.00	
			Rs. 740.00	Rs. 4895.00	
Total			Rs. 740.00	Rs. 4895.00	

Receipt

Design View:



Run View:



(ii) Programming

All the coding done in Visual Basic 2010 for making the software workable are shown in Technical Documentation.

(iii) Testing

Testing Strategy

I want to make sure that the program is free of errors before I hand it to the restaurant. For this, the program must undergo various phases of testing. I will use many different testing strategies to ensure that every possible error is considered.

I will carry out alpha testing which will mainly be black-box testing. The expected outcome will be compared with the actual result and modifications will be made to the program it they do not match each other. Normal Value and Extreme Values will be input to the program wherever it is possible.

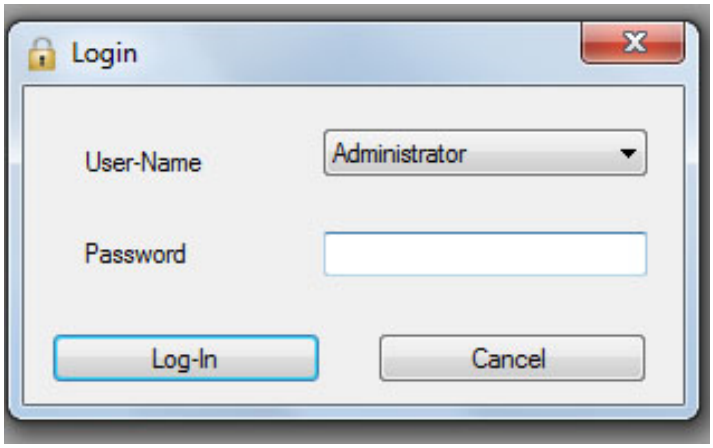
After the changes have been made in the program, the actual database holding the record will be cross checked to ensure that the changes made by the main program has been updated to the database tables.

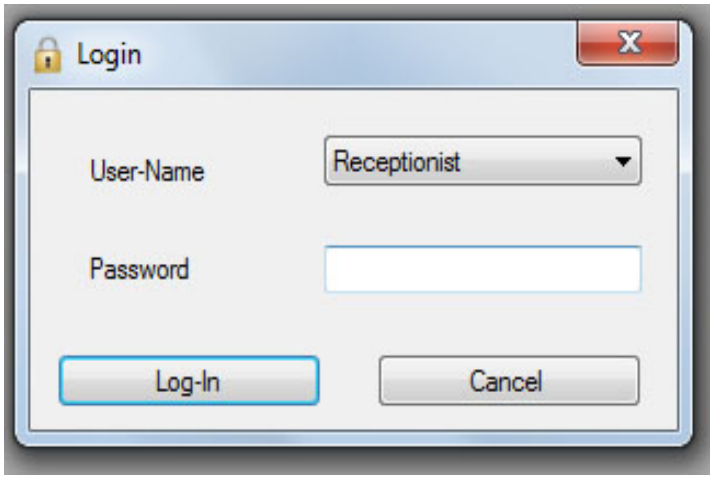
Test Plan and Testing

Login Test

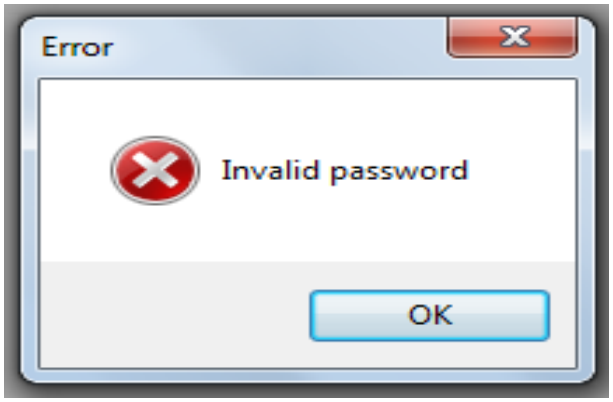
Test	Description	Test data or action	Expected Results	Actual Results	Proof (Pg)
1	Check whether the existing username is loaded in combo-box.	Open the main program	'Administrator' and 'Receptionist' will be loaded	As Expected	71
2	Ensure that that an incorrect password or blank password is not accepted	Incorrect password for the selected username is entered	An error message will be displayed	As expected	71
3	Checks if it is redirected to main program after log in is successful	Correct password for selected username is entered	Main Interface(MDI form) should open	As expected	72

Test 1

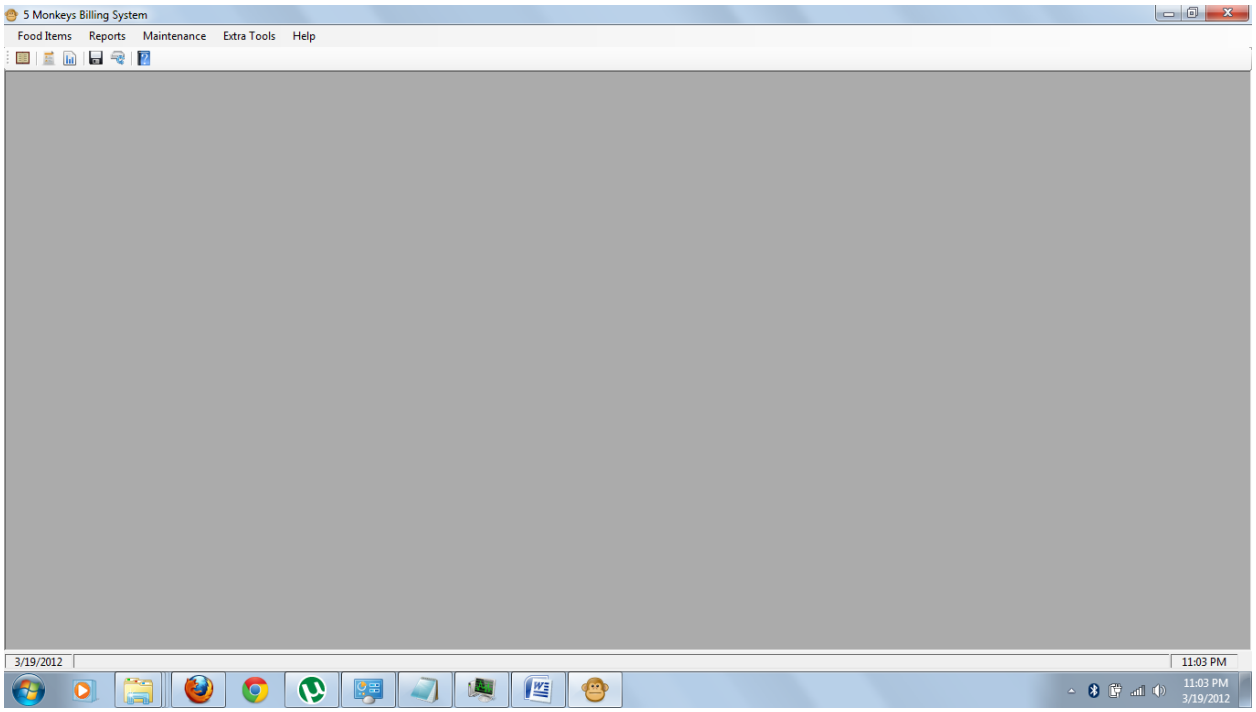

Login
User-Name
Administrator
Password
Log-In
Cancel


Login
User-Name
Receptionist
Password
Log-In
Cancel

Test 2


Error
Invalid password
OK

Test 3

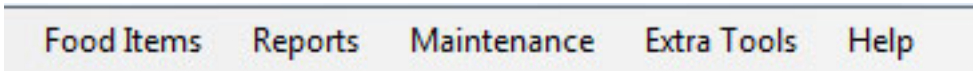


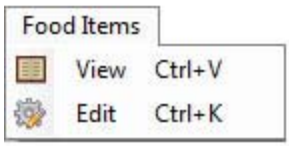
Main Window

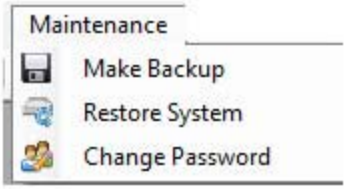
Test	Description	Test data or action	Expected Results	Actual Results	Proof
1	Checks if correct features are available for selected username	Log in as: a. Administrator b. Receptionist	Correct menu, context menu, toolbar should be displayed.	As expected	72
2	Check if the status bar is working correctly	Log-in to the system using correct password	System Date and time should be displayed	As expected	73

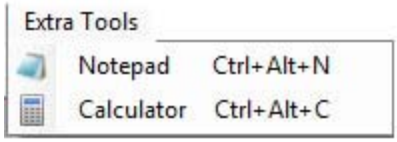
Test 1

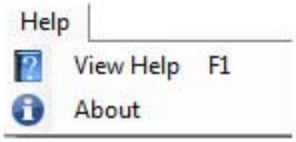
Logged in as administrator



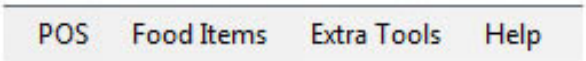


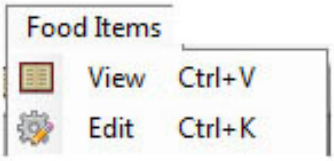


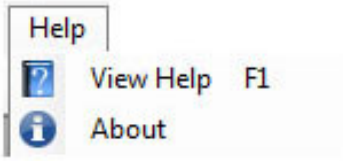


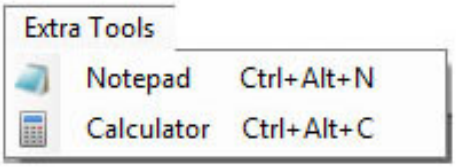


Logged in as Receptionist

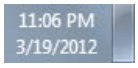








Test 2

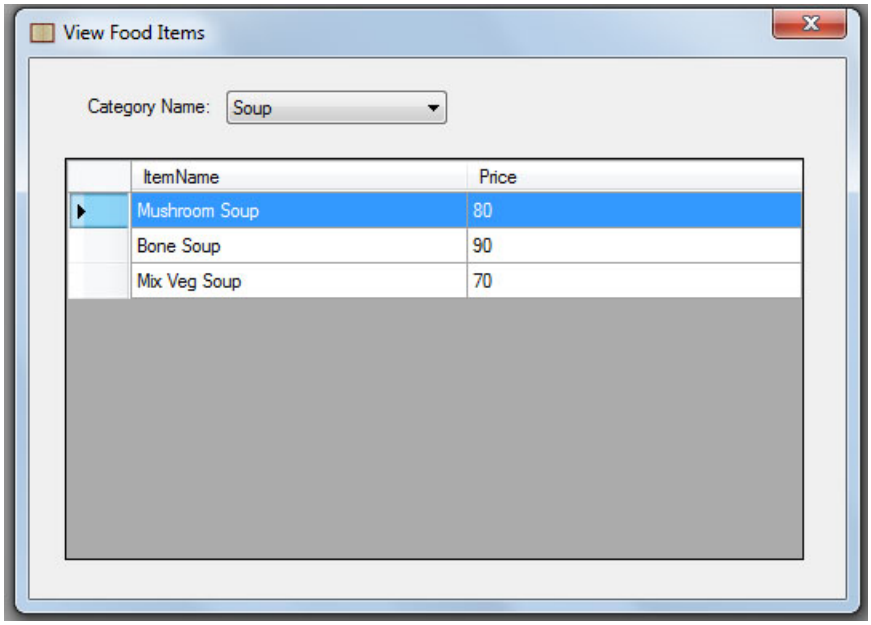


Food Item

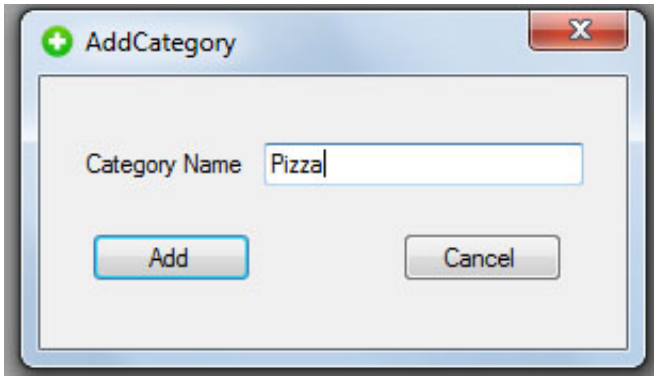
Test	Description	Test data or action	Expected Results	Actual Results	Proof (Pg)
Viewing Food Items					
1	Ensure that food items and price are displayed according to category name	Select the Category name 'Soup'	Food item such as Bone Soup, Mushroom Soup along with their price should be displayed	As expected	75
Working with Food Category					
2	Test that new Food Category can be added	Give name for category and click 'Add ' button	Desired category name should be added in database table and view form	As expected	75
3	Check whether the category name can have more than 30 characters	Random name such as 'asgsagsahshshshsh ashsahsahsahashshsh' is input	Error message should be displayed	As expected	76
4	Test that the selected category can be removed	Remove the selected category Name	Category Name and all the food items in that category should be deleted from the database as well as the form	As expected	77
Adding Food Items					
5	Ensure that food item and item price is entered	Leave the text-boxes empty	Error message should be displayed	As expected	78
6	Test whether the selected Category name is pre-loaded into the form	Select 'Momo' from Category name click add new item	'Momo' should be displayed in read-only text-box in add new item form	As expected	78
7	Check if the entered price is valid price	'two hundred fifty' is entered	Error message must be displayed	As expected	79
8	Check if the entered price lies within the range of 10 to 1500	4500 is entered as price	Error message must be displayed	As expected	80
9	Check if the food item details is added to database	Any set of valid input	Data entered should be updated in the form and database table	As expected	80
Removing Food Items					

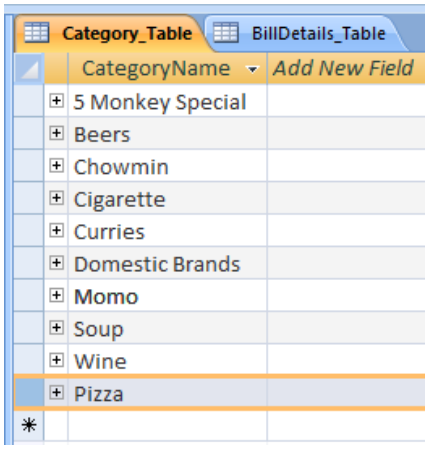
10	Check if the food item can be removed	Select any food item and click the 'Remove Selected Item' button	Selected food item should be removed from the form as well as the database	As expected	81
Editing Selected Food Item					
11	Check if the details of selected food item to be modified is loaded in new form	Select any food item from data-grid and click 'Edit Selected Item' button	Details of that item should be loaded so that it can be modified	As expected	82
Other tests and results for this form are same as it was for adding new items.					

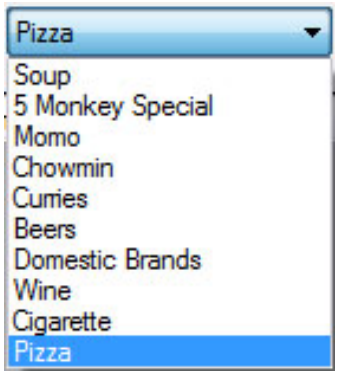
Test 1



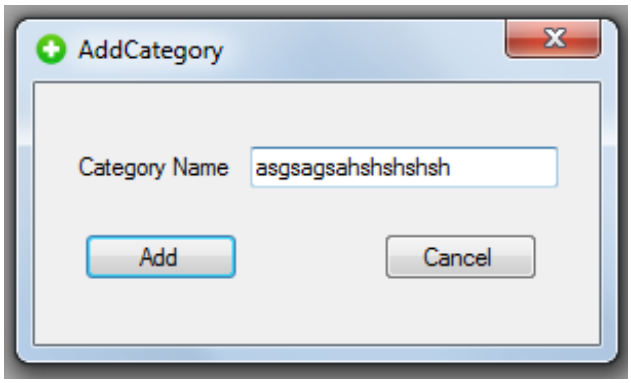
Test 2

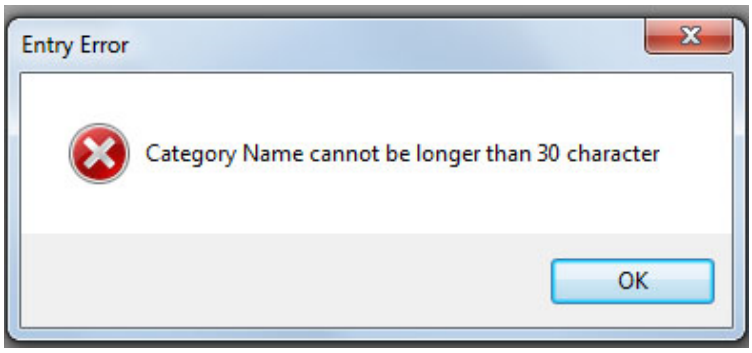



Category_Table
BillDetails_Table
CategoryName
Add New Field
5 Monkey Special
Beers
Chowmin
Cigarette
Curries
Domestic Brands
Momo
Soup
Wine
Pizza


Pizza
Soup
5 Monkey Special
Momo
Chowmin
Curries
Beers
Domestic Brands
Wine
Cigarette
Pizza

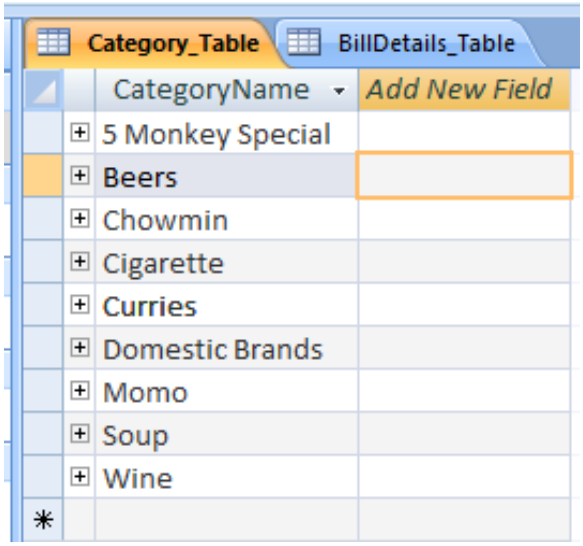
Test 3


AddCategory
Category Name
asgsagsahshshshsh
Add
Cancel


Entry Error
Category Name cannot be longer than 30 character
OK

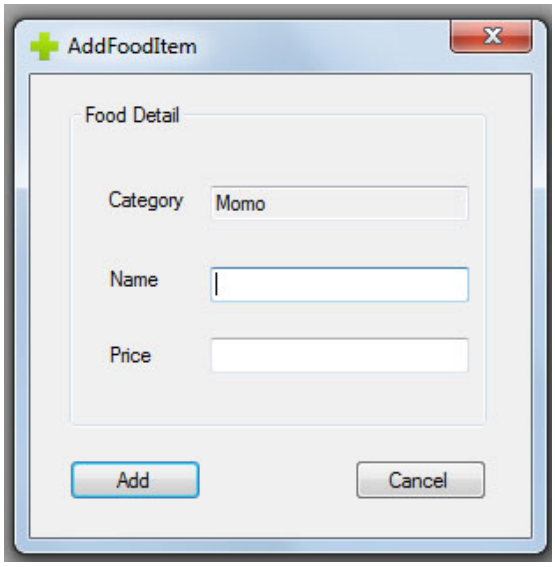
Test 4

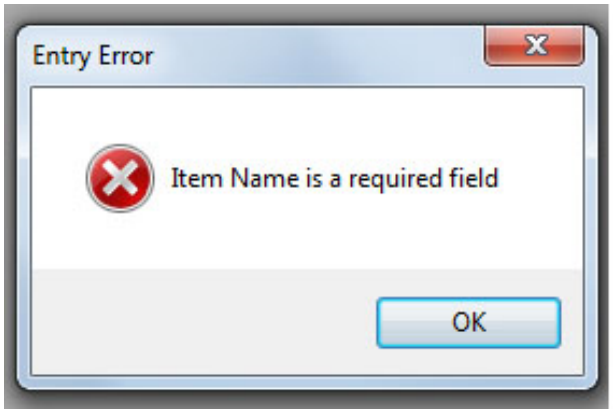
Category Name:
Pizza

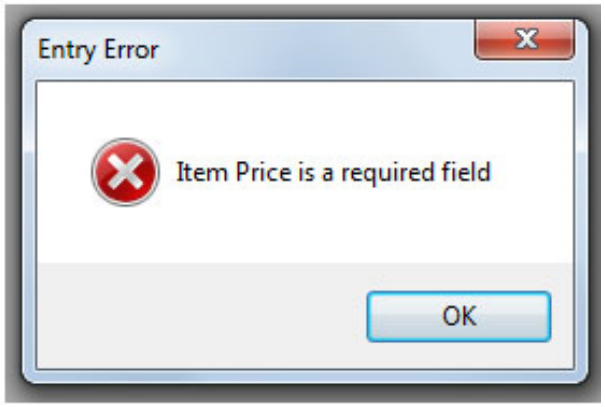

Category_Table
BillDetails_Table
CategoryName
Add New Field
5 Monkey Special
Beers
Chowmin
Cigarette
Curries
Domestic Brands
Momo
Soup
Wine

Soup
Soup
5 Monkey Special
Momo
Chowmin
Curries
Beers
Domestic Brands
Wine
Cigarette

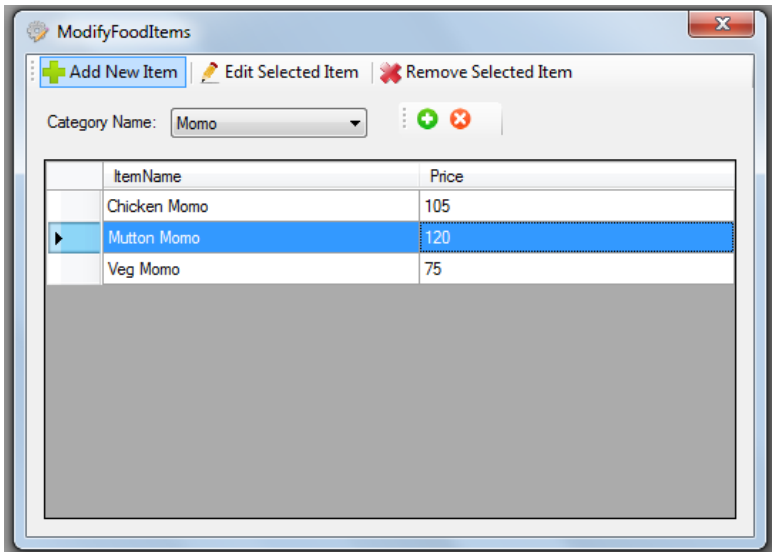
Test 5

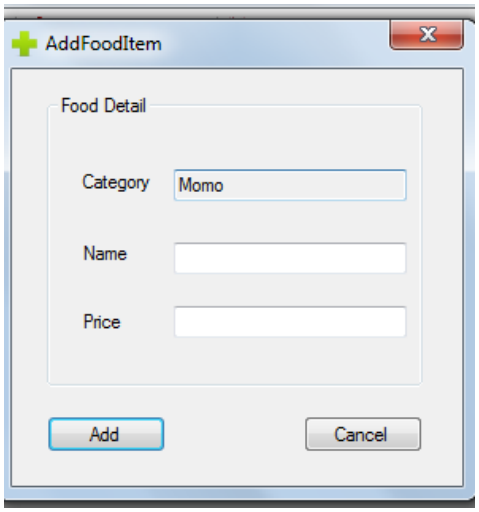

AddFoodItem
Food Detail
Category
Momo
Name
Price
Add
Cancel


Entry Error
Item Name is a required field
OK

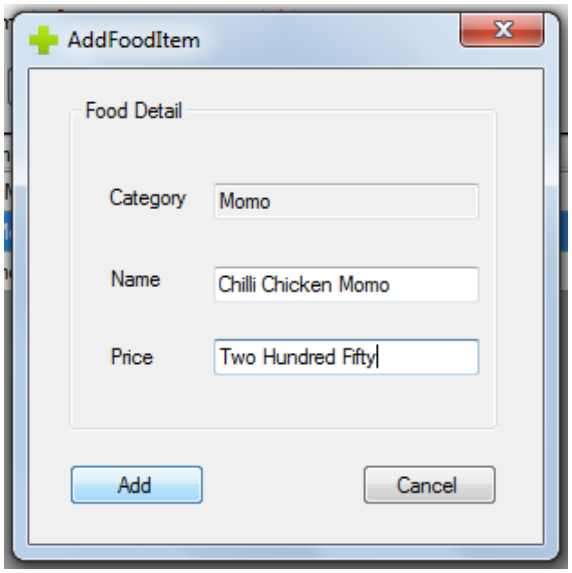

Entry Error
Item Price is a required field
OK

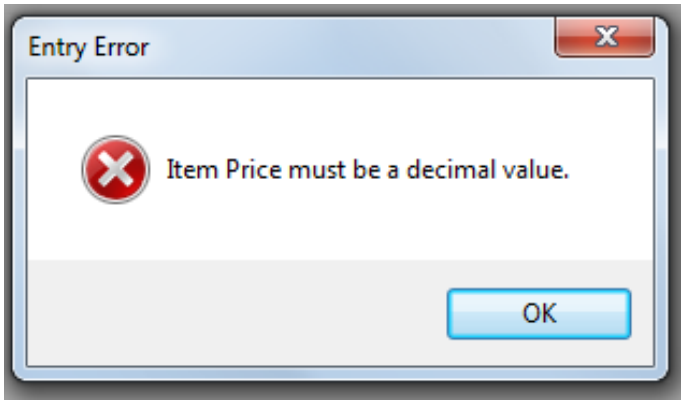
Test 6


ModifyFoodItems
Add New Item
Edit Selected Item
Remove Selected Item
Category Name:
Momo
ItemName
Price
Chicken Momo
105
Mutton Momo
120
Veg Momo
75

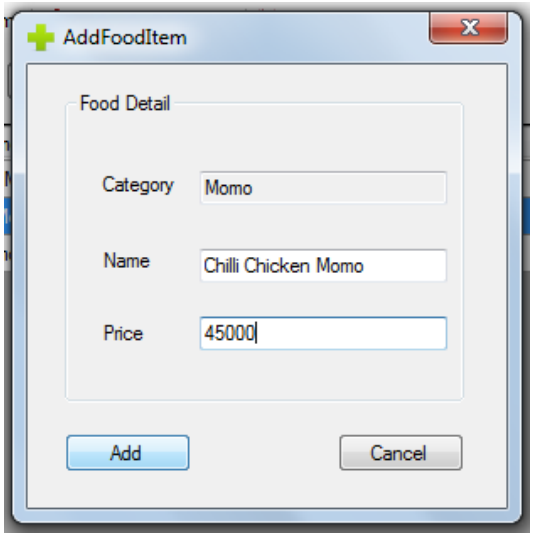

AddFoodItem
Food Detail
Category
Momo
Name
Price
Add
Cancel

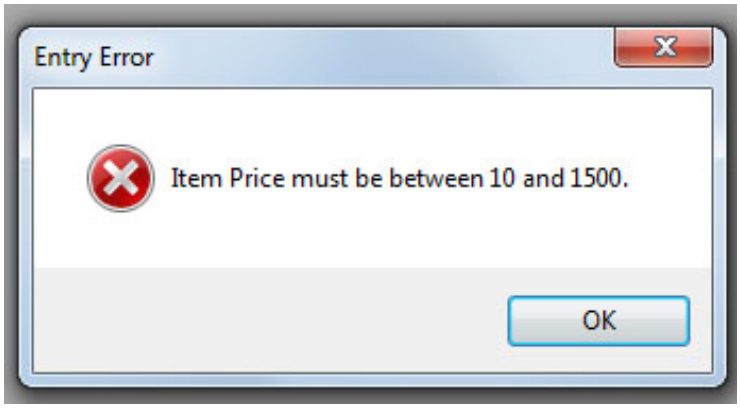
Test 7


AddFoodItem
Food Detail
Category
Momo
Name
Chilli Chicken Momo
Price
Two Hundred Fifty
Add
Cancel


Entry Error
Item Price must be a decimal value.
OK

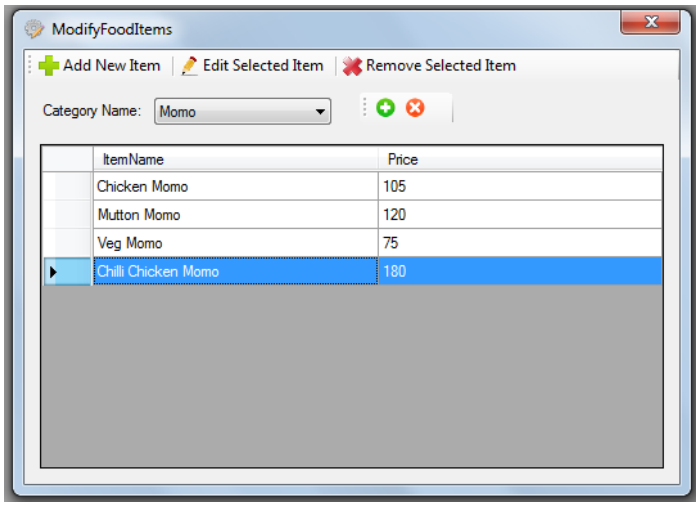
Test 8

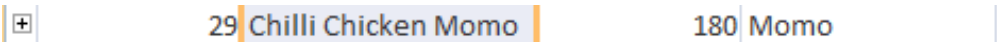

AddFoodItem
Food Detail
Category
Momo
Name
Chilli Chicken Momo
Price
45000
Add
Cancel


Entry Error
Item Price must be between 10 and 1500.
OK

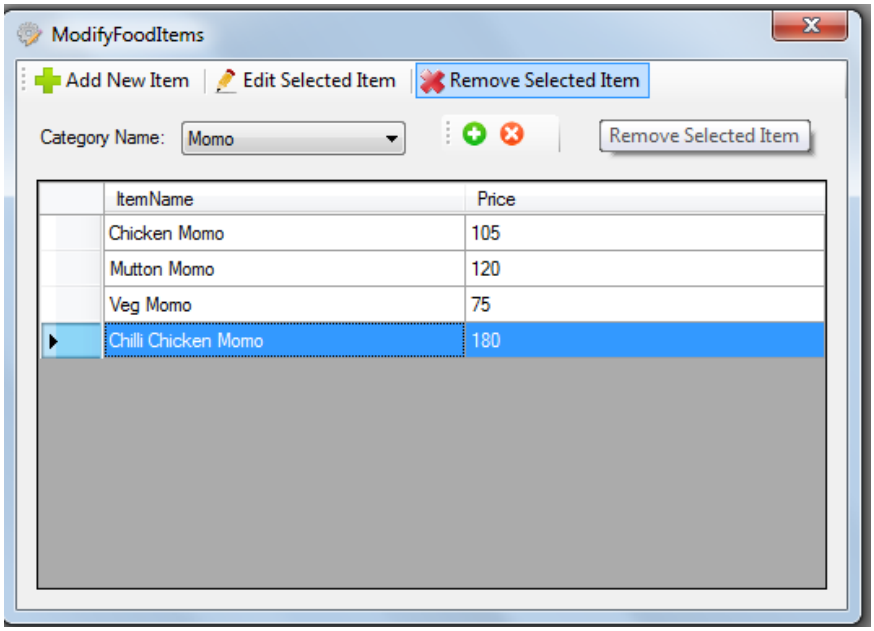
Test 9

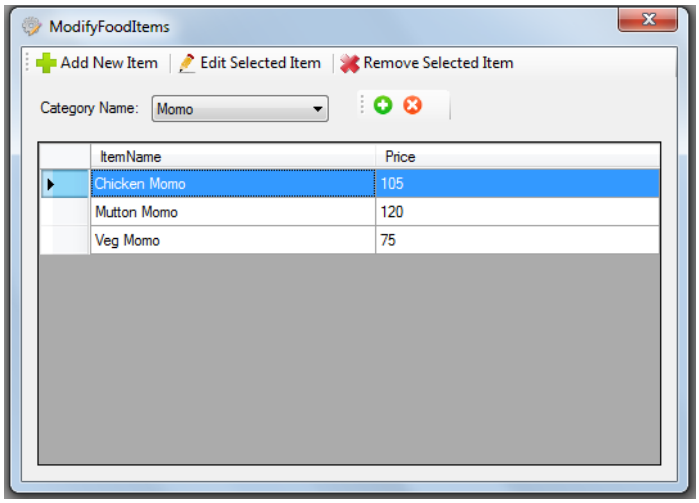
AddFoodItem
Food Detail
Category
Momo
Name
Chilli Chicken Momo
Price
180
Add
Cancel


ModifyFoodItems
Add New Item
Edit Selected Item
Remove Selected Item
Category Name:
Momo
ItemName
Price
Chicken Momo
105
Mutton Momo
120
Veg Momo
75
Chilli Chicken Momo
180


29
Chilli Chicken Momo
180
Momo

Test 10

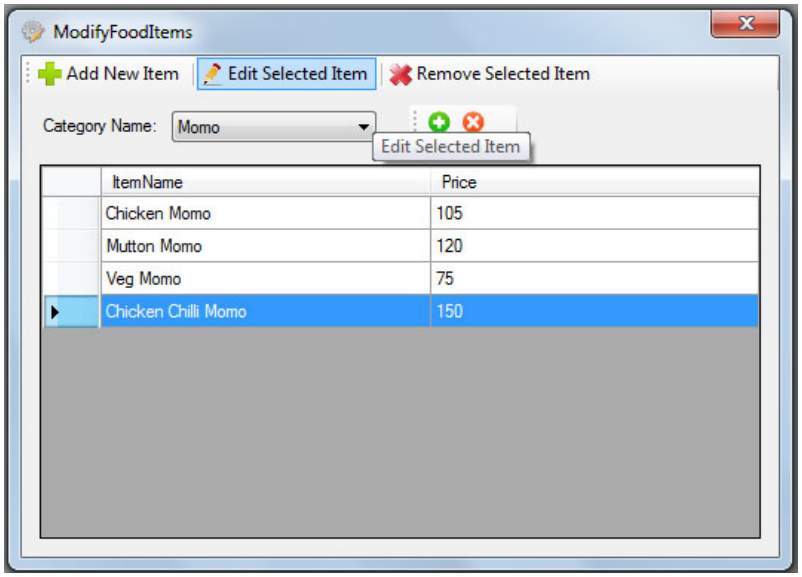

ModifyFoodItems
Add New Item
Edit Selected Item
Remove Selected Item
Category Name:
Momo
Remove Selected Item
ItemName
Price
Chicken Momo
105
Mutton Momo
120
Veg Momo
75
Chilli Chicken Momo
180

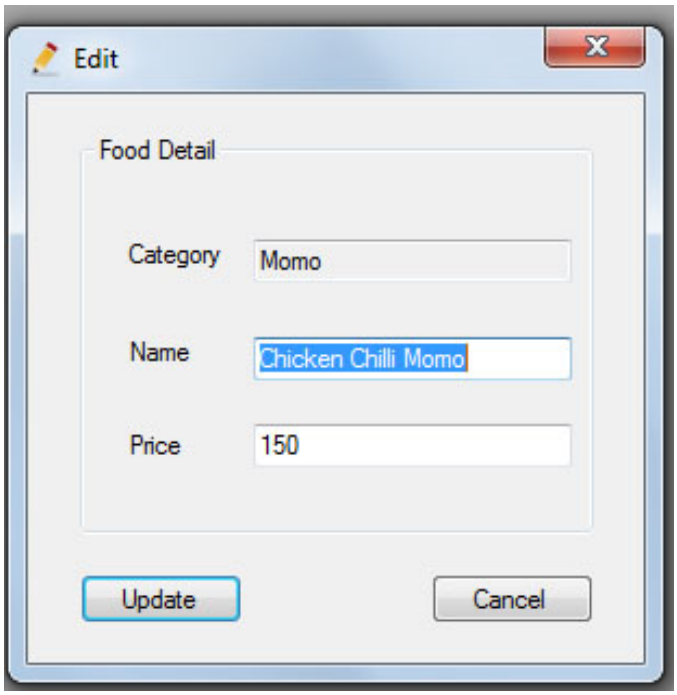


Items_Table

	ID	ItemName	Price	CategoryNa
	13	Chicken Momo	105	Momo
	14	Mutton Momo	120	Momo
	15	Veg Momo	75	Momo
	16	Tuborg	275	Beers
	17	San Miguel	280	Beers
	18	Carlsberg	295	Beers
	19	Signature(Qtr)	410	Domestic Bran
	20	Signature(Half)	810	Domestic Bran
	21	Signature(Full)	150	Domestic Bran
	22	Russian Vodka(Qtr)	280	Domestic Bran
	23	Russian Vodka(Half	530	Domestic Bran
	24	Russian Vodka(Full	1000	Domestic Bran
	25	Surya	10	Cigarette
	26	Marbello	15	Cigarette
*	(New)			

Test 11



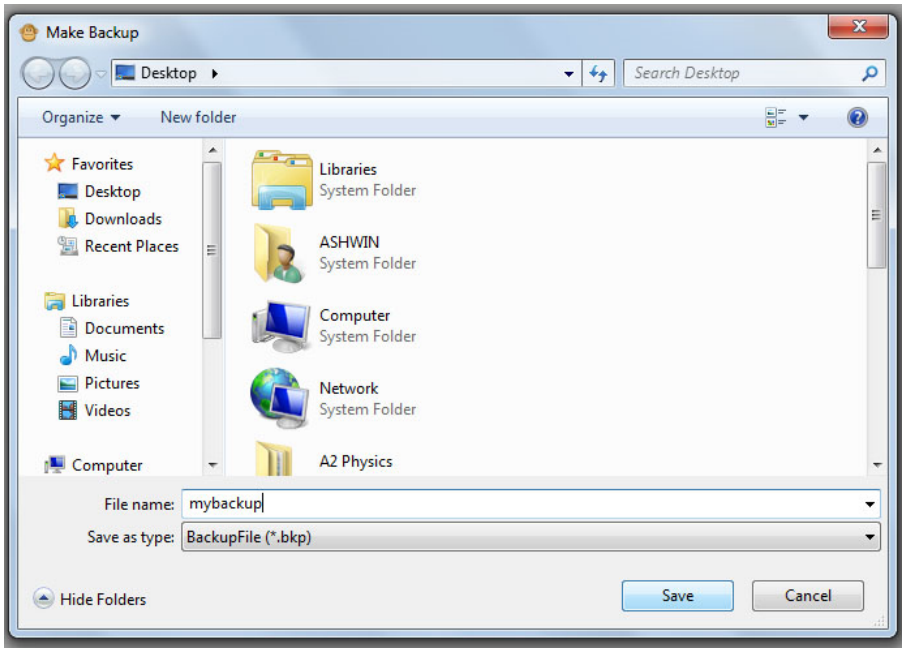


Maintenance

Test	Description	Test data or action	Expected Results	Actual Results	Proof (Pg)
Making backup of the system					
1	Check if a dialog box is displayed to choose the desired location for backup file	Select 'Make Backup' sub-menu from the main menu	Dialog box appears	As expected	84
2	Ensures that user can save the file only in .bkp extension	Same as above	Only extension .bkp will appear for the file in the combo-box	As expected	85
3	Test whether backup file is actually made	Type the name for backup file in the Make backup dialog and click 'Save' button	A success message will be displayed and backup file will appear in selected location	As expected	85
Restoring the whole system					
4	Check if a dialog box is displayed to select the backup file	Select 'Restore System' sub-menu from the main menu	Dialog box appears	As expected	85
5	Ensures that user can only select the backup file	Same as above	Only files with extension .bkp will be	As expected	86

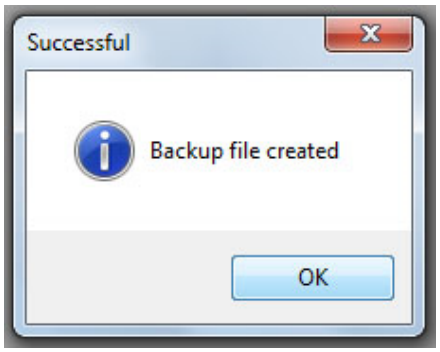
			filtered so that it can be opened		
6	Check if program alerts user the consequence of restoring the system	Select backup file and click the button 'Open'	A confirmation message will be displayed	As expected	86
7	Ensure that the system is actually restored to the old one	Compare the changes that was expected from the backup file	Changes should appear	As expected	86
Changing the password of the system					
8	Ensure that none of the text-box is left empty	Leave any one or every text boxes empty	Error message will be displayed	As expected	87
9	Ensure that old password matches with the entered one	Enter wrong password(old password) and click 'Ok' button	Error message should be displayed	As expected	88
10	Test whether the new password is correctly entered twice	Type two different passwords for new password	Error message will be displayed	As expected	88
11	Ensure that password for selected user has been changed	After entering valid input, click 'Ok' button	Check the database for confirmation and re-open the program and type old password	As expected	88

Test 1

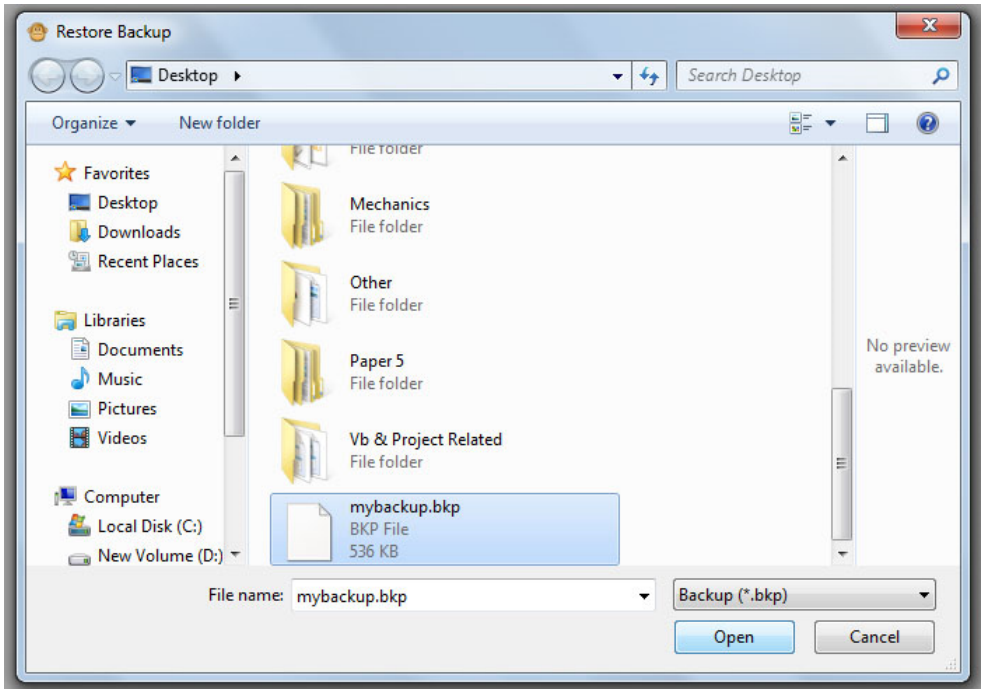


Test 2

Test 3

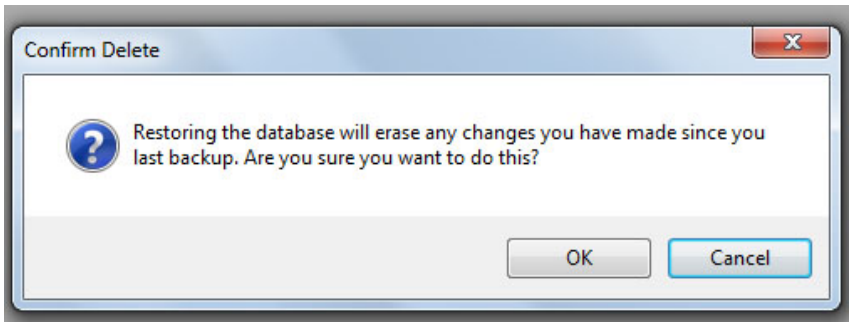


Test 4

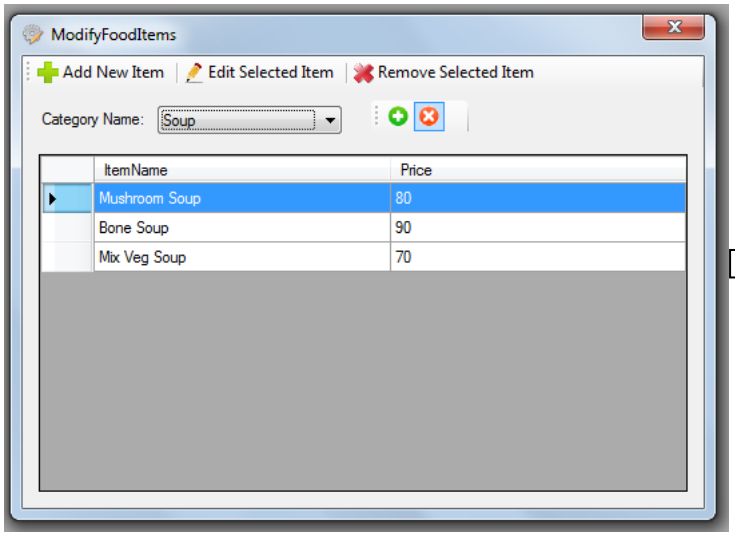


Test 5

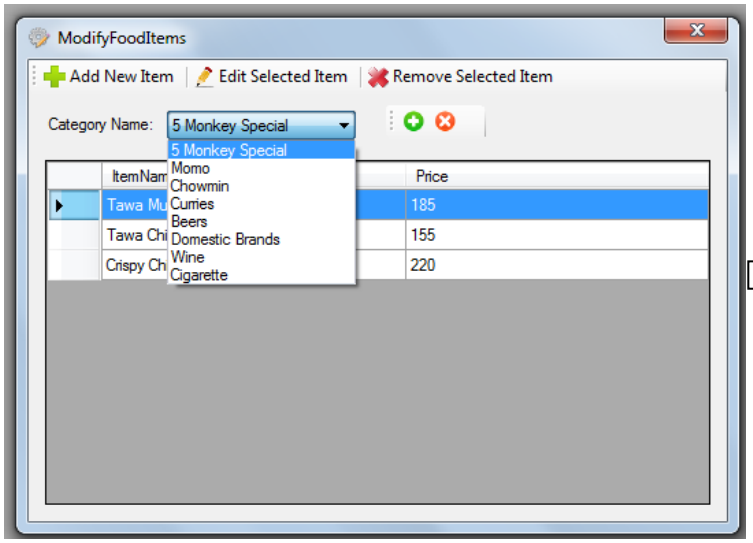
Test 6



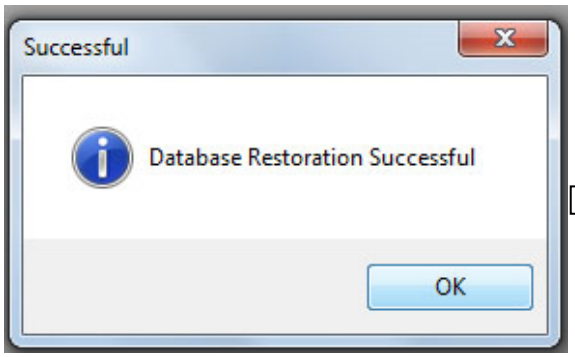
Test 7



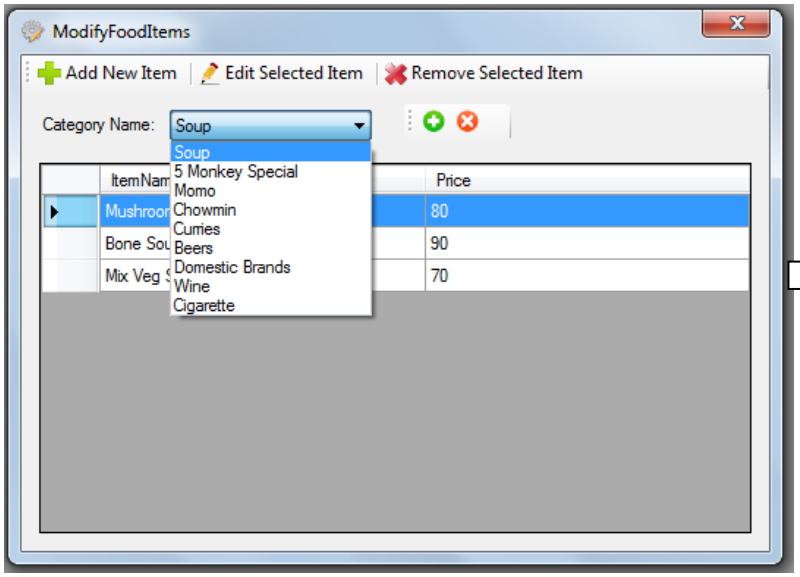
I selected Soup Category and deleted it from the list



Now Soup Category along with the food items falling under that category disappears

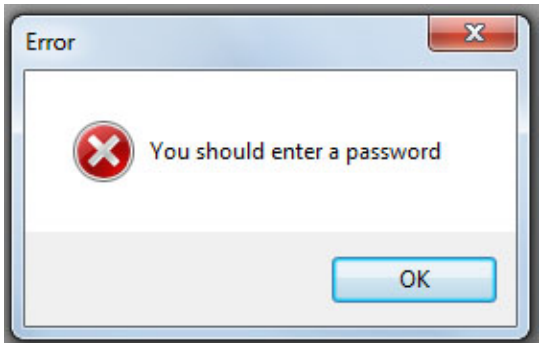


I followed the steps as shown in above Tests (4, 5, and 6) and I received this message after I clicked Ok in the messagebox shown in Test 5



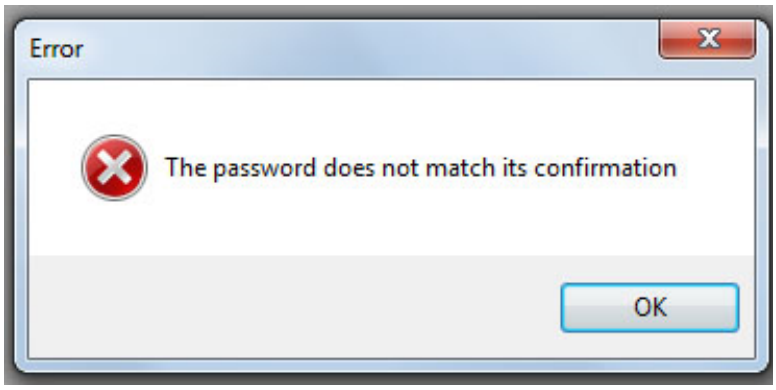
Now Soup Category along with its food item reappears which means that the system had been restore to the backup file

Test 8

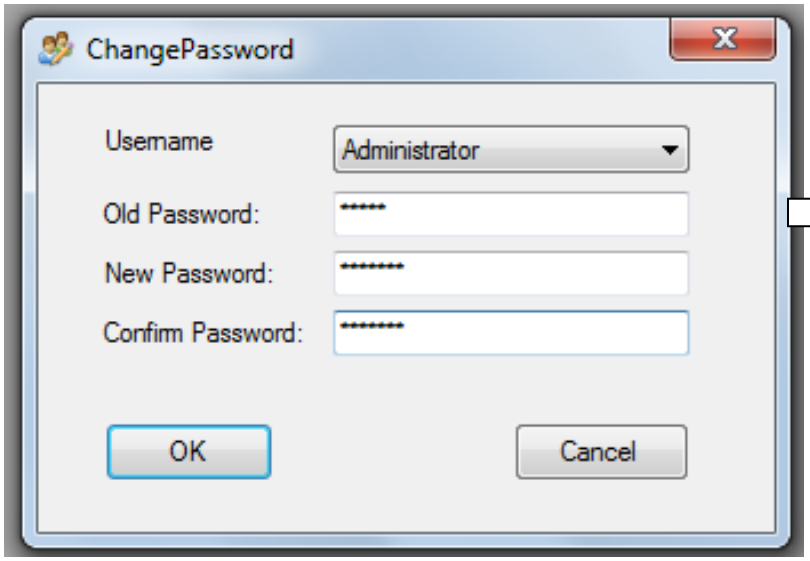


Test 9

Test 10

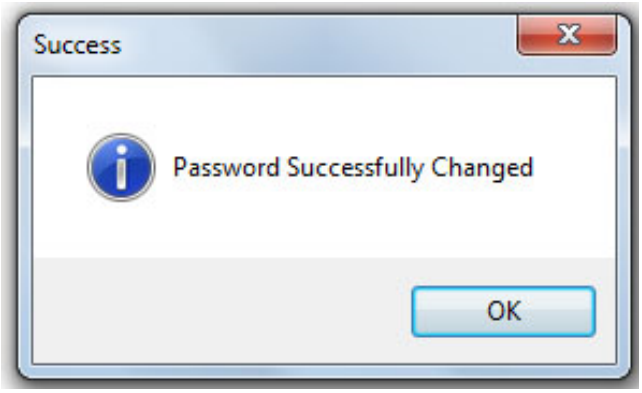


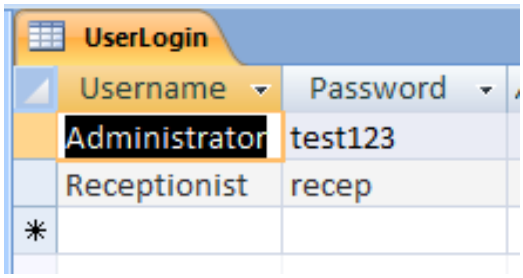
Test 11



I entered the correct old password (admin) and new password twice (test123) and clicked 'OK' button

Then, a success message was displayed

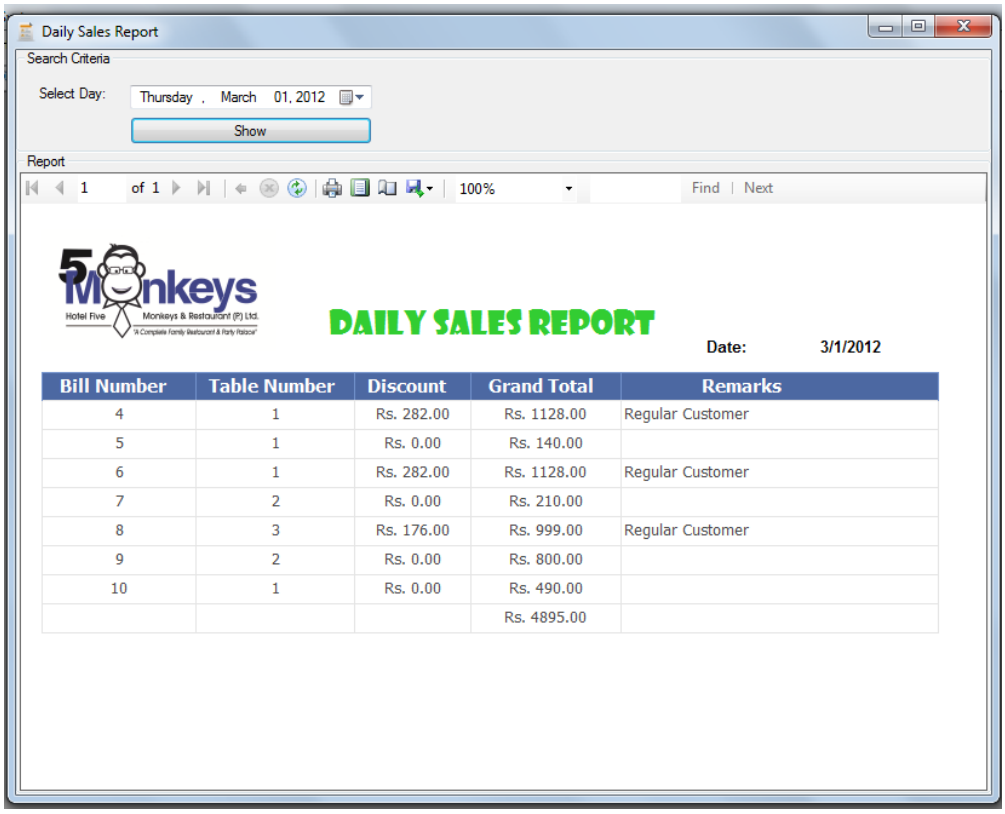




Reports

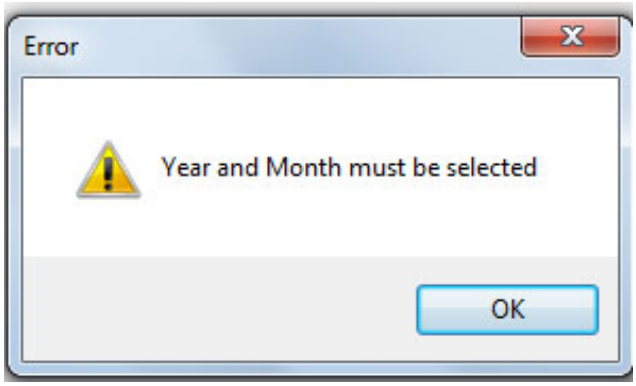
Test	Description	Test data or action	Expected Results	Actual Results	Proof (Pg)
Daily Sales Report					
1	Checks if the daily sales report for the selected date is displayed	Chose one date and click 'Show' button	Sales report will be generated for chosen date	As expected	90
Monthly Sales Report					
2	Ensures that 'Month' and 'Year is selected'	Do not select month or year or both	Error Message will be displayed	As expected	90
3	Check if the report is generated for the selected month of selected year	Select month and year from combo-box	Monthly Sales report for that month should be displayed	As expected	91
Food Menu					
4	Test whether food menu is displayed	Select 'Food menu' from Reports	Food items along with their price should be displayed categorically	As expected	91

Test 1

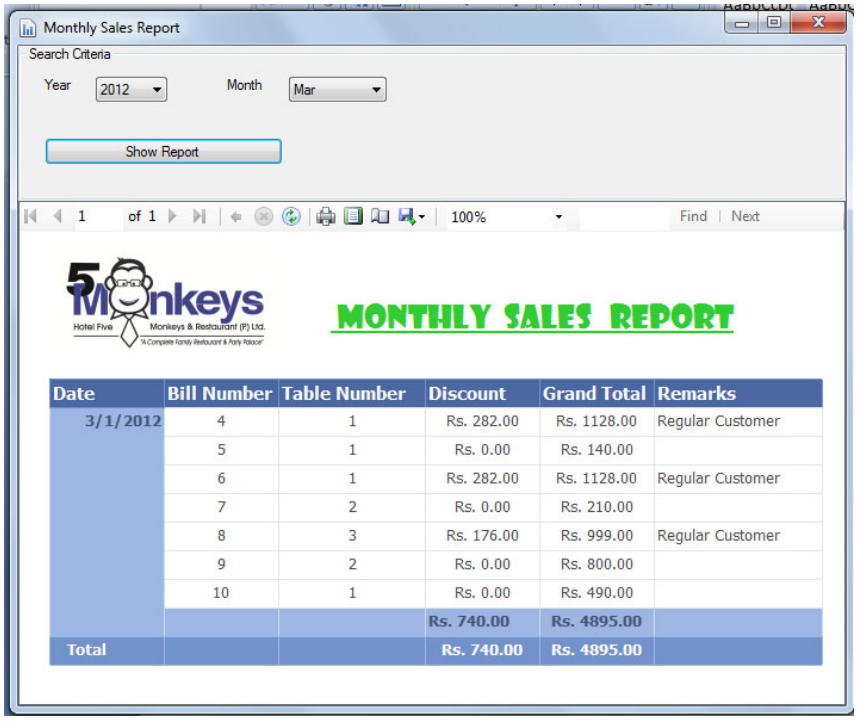


Bill Number	Table Number	Discount	Grand Total	Remarks
4	1	Rs. 282.00	Rs. 1128.00	Regular Customer
5	1	Rs. 0.00	Rs. 140.00	
6	1	Rs. 282.00	Rs. 1128.00	Regular Customer
7	2	Rs. 0.00	Rs. 210.00	
8	3	Rs. 176.00	Rs. 999.00	Regular Customer
9	2	Rs. 0.00	Rs. 800.00	
10	1	Rs. 0.00	Rs. 490.00	
			Rs. 4895.00	

Test 2

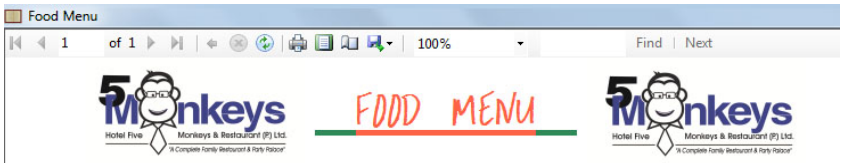


Test 3



Date	Bill Number	Table Number	Discount	Grand Total	Remarks
3/1/2012	4	1	Rs. 282.00	Rs. 1128.00	Regular Customer
	5	1	Rs. 0.00	Rs. 140.00	
	6	1	Rs. 282.00	Rs. 1128.00	Regular Customer
	7	2	Rs. 0.00	Rs. 210.00	
	8	3	Rs. 176.00	Rs. 999.00	Regular Customer
	9	2	Rs. 0.00	Rs. 800.00	
	10	1	Rs. 0.00	Rs. 490.00	
			Rs. 740.00	Rs. 4895.00	
Total			Rs. 740.00	Rs. 4895.00	

Test 5

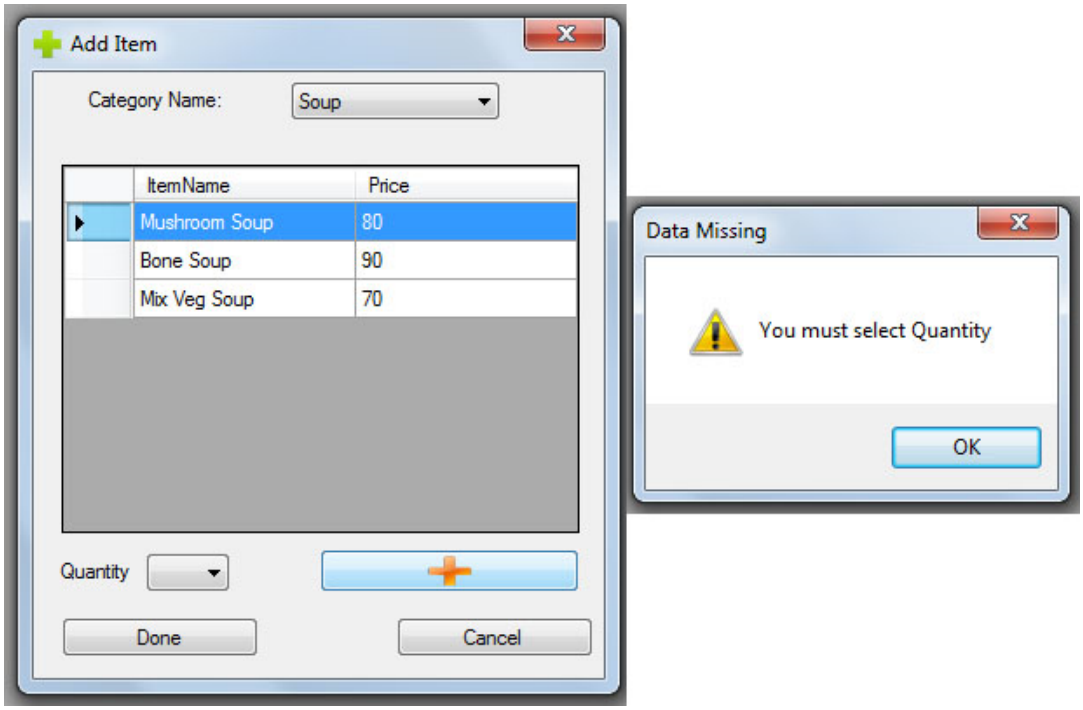


Category Name	Item Name	Price
5 Monkey Special	Tawa Mutton	Rs. 185.00
	Tawa Chicken	Rs. 155.00
	Crispy Chicken	Rs. 220.00
Beers	Tuborg	Rs. 275.00
	San Miguel	Rs. 280.00
	Carlsberg	Rs. 295.00
Chowmin	Chicken Chowmin	Rs. 100.00
	Mutton Chowmin	Rs. 125.00
	Veg Chowmin	Rs. 75.00
Cigarette	Surya	Rs. 10.00
	Marbello	Rs. 15.00
Curries	Chicken Curry	Rs. 150.00
	Mutton Curry	Rs. 175.00
	Fish Curry	Rs. 160.00
Domestic Brands	Signature(Qtr)	Rs. 410.00
	Signature(Half)	Rs. 810.00
	Signature(Full)	Rs. 150.00
	Russian Vodka(Qtr)	Rs. 280.00

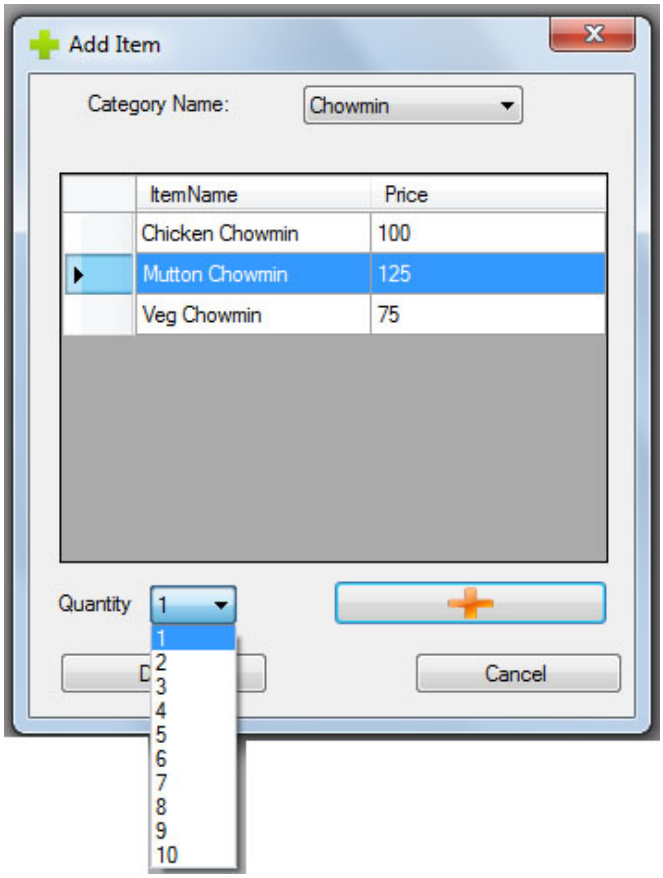
Bill

Test	Description	Test data or action	Expected Results	Actual Results	Proof (Pg)
Adding Food Items to the main bill					
1	Check if the quantity of the food has been selected	Select Food item and click '+ ' button without selecting quantity	Error Message will be displayed	As expected	93
2	Ensure that the dialog again appears after one food item is selected	Select Food item and quantity and click '+' button	The dialog box will again appear allowing to add more food items to the bill	As expected	93
3	Check if the food items are added to the bill	After done selecting food item, click 'Done' button	Main bill will show up with the selected food items	As expected	94
Removing Food Items from the main bill					
4	Test whether the food item from main bill can be removed	Select the food item from the data-grid view in main bill and click 'X' button	Selected food item should disappear from the main menu	As expected	95
Performing Calculation					
5	Ensure that there are food items in the main bill before calculation is performed	Click 'Calculate' button with no items added to the bill	Error message will be displayed	As expected	96
6	Check if the calculation is performed	After food items has been selected click 'Calculation'	Calculations will be performed and shown in the main bill	As expected	96
Receipt					
7	Test to see if the receipt is displayed or not	After calculation has been performed, click 'Paid' button	A receipt for that bill should be shown which can then be printed	As expected	97
Other					
8	Ensure that user can switch between several bills	Select Tables menu	Different sub menus will appear according to table number	As expected	97
9	Ensure that the database has been updated	Click 'Paid' button	Database should be updated	As expected	98

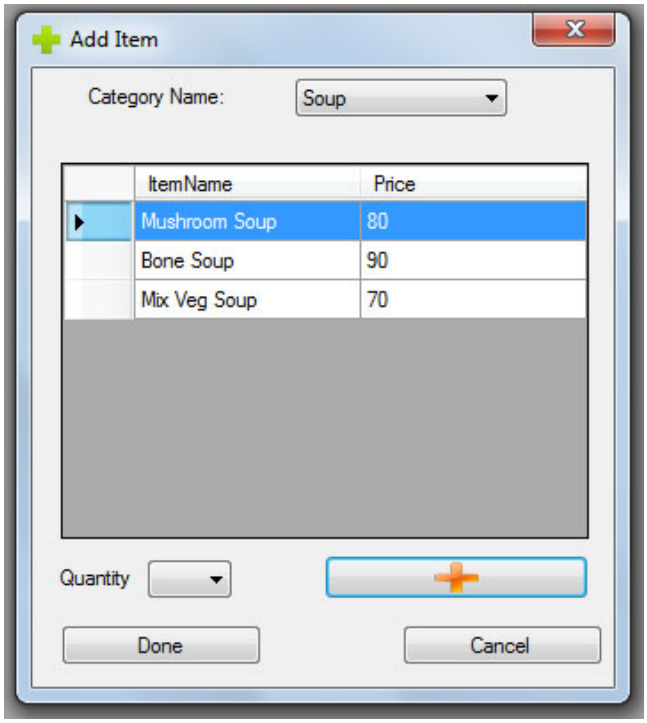
Test 1


Add Item
Category Name:
Soup
ItemName
Price
Mushroom Soup
80
Bone Soup
90
Mix Veg Soup
70
Quantity
Done
Cancel
Data Missing
You must select Quantity
OK

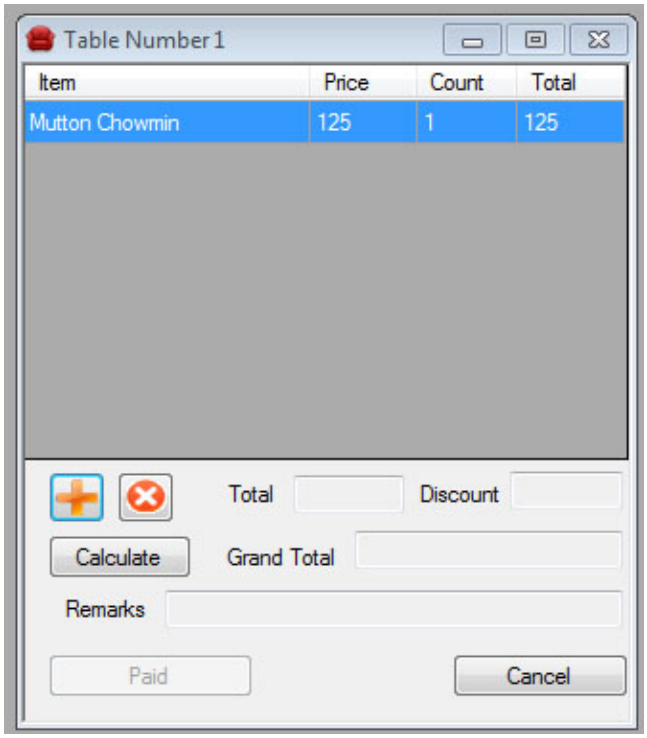
Test 2



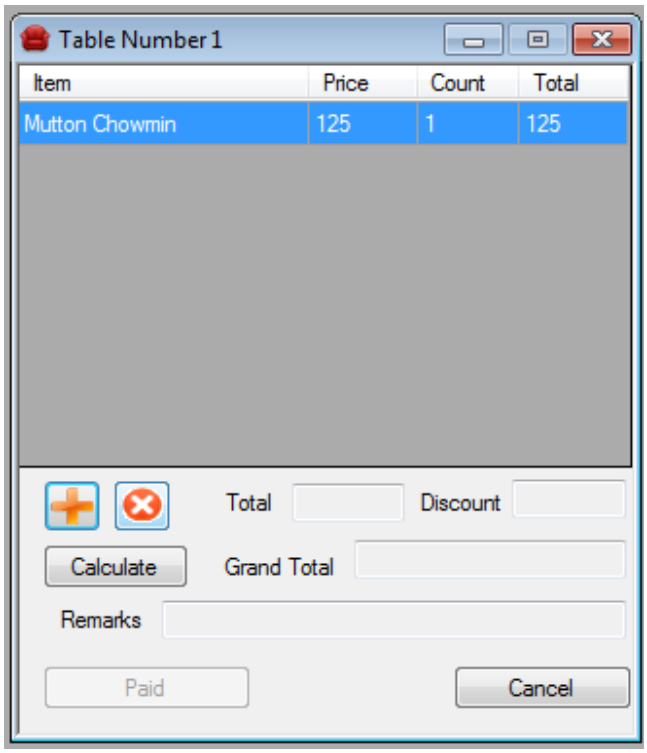
After clicking + button, add food item form appeared again allowing to add more food items



Test 3

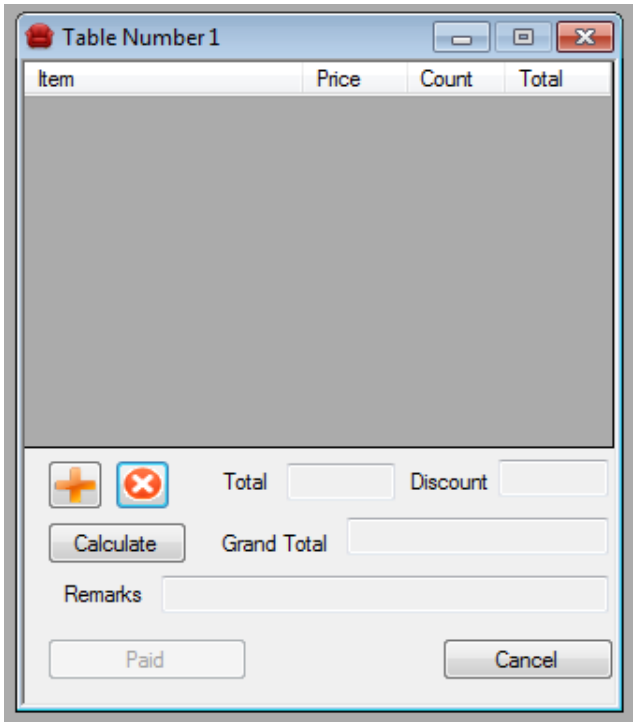


Test 4

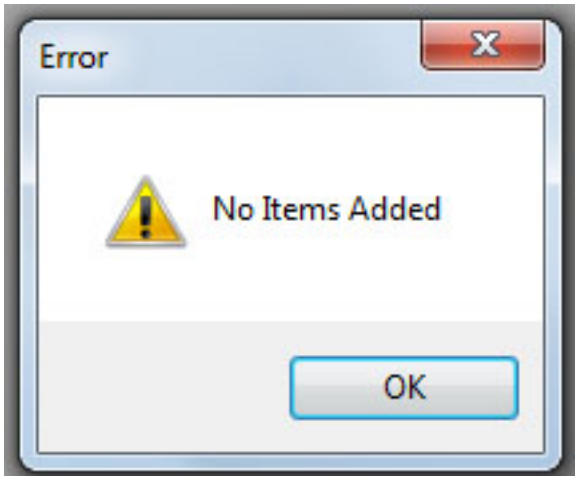


I selected the food item and clicked X button

The food item selected in the above screen now is removed from the main bill



Test 5



Test 6

I added more food items to the main bill and clicked the Calculate button to perform calculation

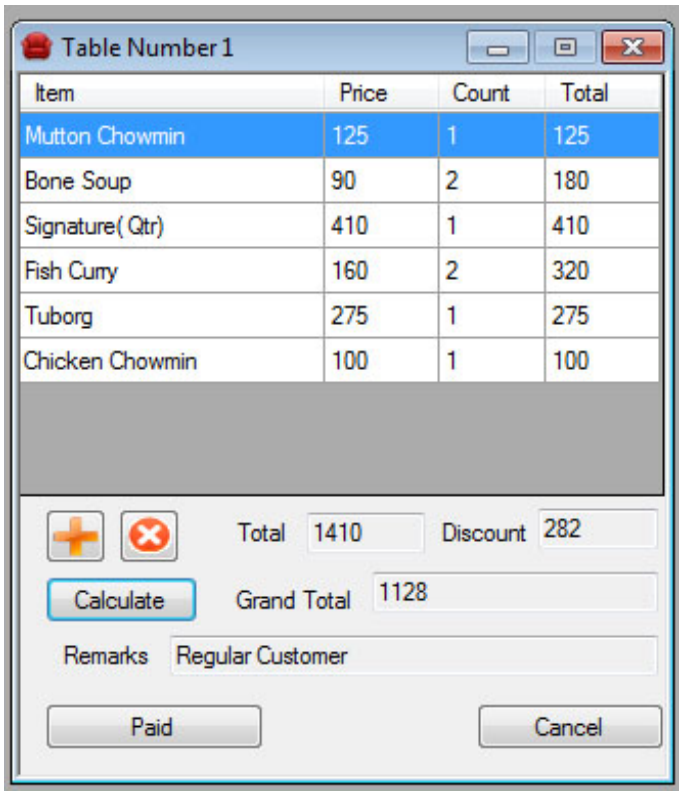
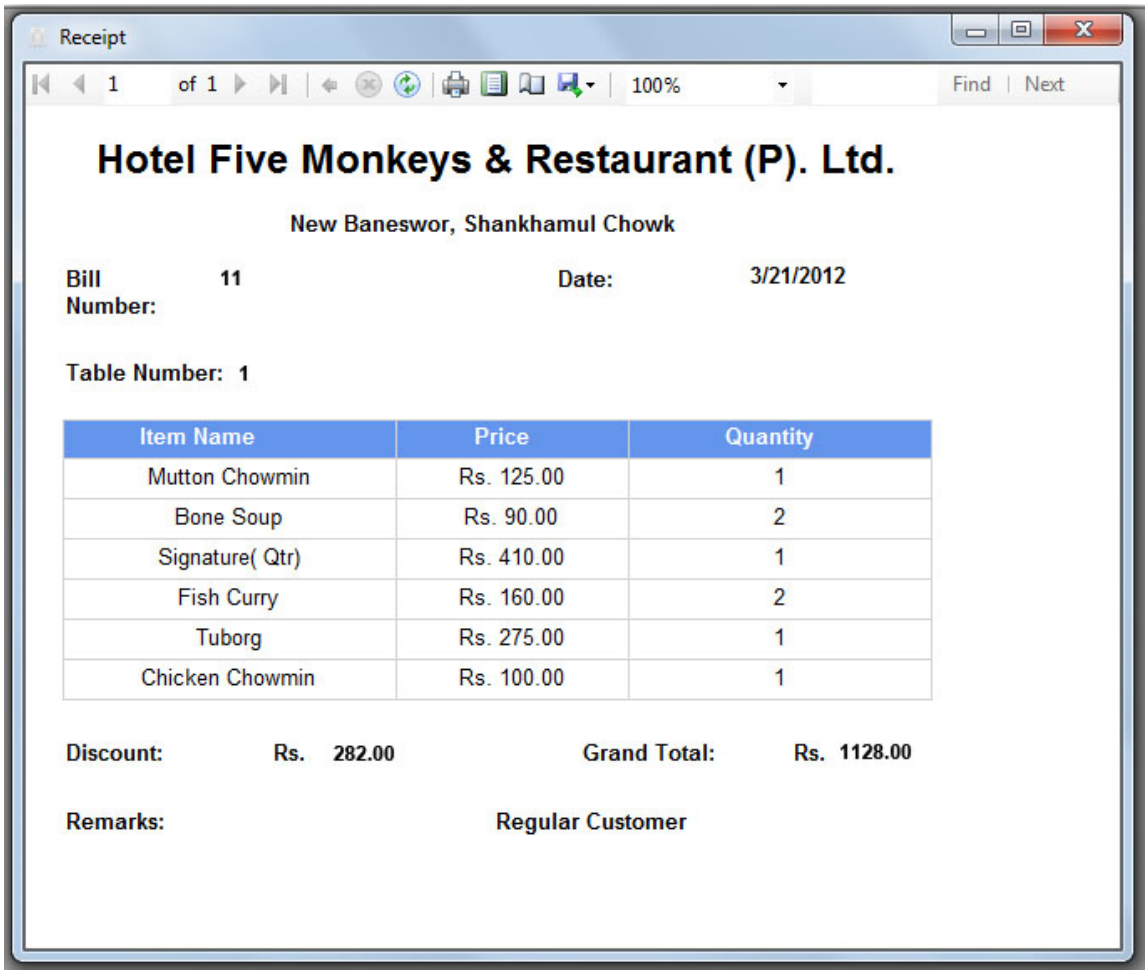


Table Number 1
Item
Price
Count
Total
Mutton Chowmin 125 1 125
Bone Soup 90 2 180
Signature(Qtr) 410 1 410
Fish Curry 160 2 320
Tuborg 275 1 275
Chicken Chowmin 100 1 100
Total 1410
Discount 282
Calculate
Grand Total 1128
Remarks Regular Customer
Paid
Cancel

Test 7



Receipt

1 of 1 100% Find | Next

Hotel Five Monkeys & Restaurant (P). Ltd.

New Baneswor, Shankhamul Chowk

Bill Number: 11 Date: 3/21/2012

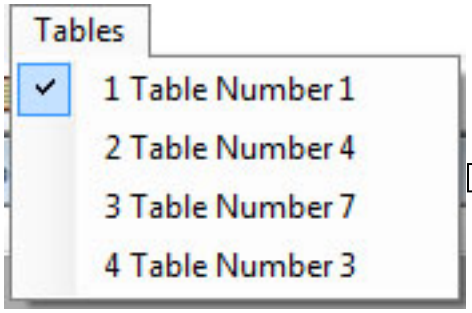
Table Number: 1

Item Name	Price	Quantity
Mutton Chowmin	Rs. 125.00	1
Bone Soup	Rs. 90.00	2
Signature(Qtr)	Rs. 410.00	1
Fish Curry	Rs. 160.00	2
Tuborg	Rs. 275.00	1
Chicken Chowmin	Rs. 100.00	1

Discount: Rs. 282.00 Grand Total: Rs. 1128.00

Remarks: Regular Customer

Test 8



After I started adding bill (tables) new menu named Tables appeared which allows me to switch between various bills

Test 9

CustomerBill_table

BillNumber	Date	TableNumber	Discount	GrandTotal	Remarks	Add New Field
2	2/28/2012	2	0	375		
3	2/28/2012	4	0	1120		
4	3/1/2012	1	282	1128	Regular Customer	
5	3/1/2012	1	0	140		
6	3/1/2012	1	282	1128	Regular Customer	
7	3/1/2012	2	0	210		
8	3/1/2012	3	176	999	Regular Customer	
9	3/1/2012	2	0	800		
10	3/1/2012	1	0	490		
11	3/21/2012	1	282	1128	Regular Customer	
(New)						

Records in CustomerBill_Table

11	2	2	$90.00
11	7	1	$100.00
11	8	1	$125.00
11	12	2	$160.00
11	16	1	$275.00
11	19	1	$410.00

Records in BillDetails_Table

(iv) Installation

System Changeover

I presented user with various implementation plans that are available including their merits and demerits. Among them I proposed to use Parallel Implementation and user was satisfied with it and he accepted my proposal (shown in Appendix). With the following plan, the expected time of implementation is one month.

First Week:

Day 1: the software will be installed in the computers of receptionist and account.

Day 2: Database will be updated according the food menu of the restaurant.

Day 3, 4, 5: Receptionists will be provided training on using the food menu and producing bills

Day 6, 7: Accountant and Administrator will be provided training

Second-Fourth Week

- Receptionist will start using the computerized system.
- Bill Receipts will be prepared using the software.
- Software will regularly be used by Accountant to prepare Daily Sales Report.

- This task will continue till the end of the month.

At the end of the month if user is completely satisfied with the system then the old billing system will completely replaced by this.

User Training

As there are few users (two receptionists, one accountant, four administrator) I will demonstrate them how to use the software personally in different sessions according to plan. They will be shown how to use each and every feature which they have the right to use on the software. While conducting the training session I will be recording the screen with the voice at the same time so that it will serve as a video tutorial later when it is needed.

As implementation of software will be parallel, they will be using the old system and new system side by side. It will allow them to make a clear distinction between the two systems which will further enhance the learning process.

Also, whenever User needs help on using the particular feature, the user manual is integrated with the software will be provide them on-screen help.

User Testing

The month long parallel running of the new system is itself the beta testing phase and simulation of the new system. The clear difference between the two systems will be apparent in this period. Also, the software will be used in real scenario and its effectiveness in the real use will be known. User is expected to provide feedback on the experience of the software use and report to me in case of any inconveniences encountered.

At the end of the month long probation period of the software, user will generate the reports and compare with the corresponding reports of the old system and provide me feedback

d. Evaluation

(i) Discussion of the degree of success in meeting the original objectives

The user objectives were compared with the real problem. The user objectives, evaluation status along with the evidence has been listed below.

i. The task of adding, deleting, updating and viewing food items has to be easier. They should also consume less amount of time. All the food items should be arranged by their category.
Evaluation Status: Achieved
Evidence: All the testing done for adding, deleting, updating and viewing food items were successful.
Page Reference: Pg. no 74

ii. The system has to ensure that all the data are accurate. All the calculation performed should be showed exact figures and values of all the data involved in the calculation.
Evaluation Status: Achieved
Evidence: This was proved by the calculation done in the bill as well as the receipt shown after the calculation had been performed.
Page Reference: Pg. no 97, 98

iii. The system should provide the proper data backup storage system to ensure the security of all the data. This task has to be made easier to reduce time consumption over the old system.
Evaluation Status: Achieved
Evidence: Testing for backing up and restoring the system were successful.
Page Reference: Pg. no 97, 98

iv. The new system should also have the access right authentication and verifications features. This would allow only the accountant and administrator to view the reports.
Evaluation Status: Achieved
Evidence: Pg. no 84-86

v. The payment bill for customers has to be featured with the automated calculation system and also be able to print the receipt of the bills for them.
Evaluation Status: Achieved
Evidence: The calculation in the bill was and receipt was displayed after user clicked Calculate and Paid button respectively. Windows displaying receipt allowed the option of printing it.
Page Reference: Pg. no 97, 98

vi. The task of report preparation has to be made much easier. The system should be able to compile all the required data from different record set for the preparation of the daily and monthly sales report.
Evaluation Status: Achieved
Evidence: Daily Sales Report, Monthly Sales Report and Food Menu report were generated automatically by selecting the option and clicking the Show button.
Page Reference: Pg. no 89, 90, 91

vii. The information stored in the database should be accurate and up-to-date.
Evaluation Status: Achieved
Evidence: Information in the database was updated instantly after the changes were made in the main program.
Page Reference: Pg. no 75, 77, 80, 81, 88, 98

From the evaluation and evidence presented, it can be concluded that all requirements are fully met.

(ii) Evaluation of Client's response

After using the software for a month, I asked for client's response. He was impressed with my work and efforts in making the software. He was fully satisfied with the software as it completely met the requirements for the billing system of the restaurant. He also praised the ability of the software to produce daily and monthly reports instantly as it saved ample amount of time.

The Appendix can be referred to look at the letter sent to me by the client where he has evaluated the system.