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ABSTRACT

The advent of wireless technology along with other communication techniques has helped in making electronic commerce very popular. In this report, we discuss an innovative concept of ***'SUPER-MARKET BILLING SYSTEM'****. The key idea here is to assist a person in everyday shopping in terms of reduced time spent while purchasing a product.*

In this project we are developing real time android mobile application for the customers to make the shopping procedure less time consuming. Although the traditional billing system in accurate and precise, but it is time consuming since the cash counters need to scan all items at the time of billing. This results in long queues leaving the customers exhausted. If the bill is generated before reaching the counter it will save a lot of time which could have been wasted standing in queues. This is achieved by the application and make the shopping process easy and faster. The application also provides functionalities like searching for a product and displaying history of bills. The main goal is to provide a technology oriented, low-cost and easily scalable.

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CHAPTER 1 INTRODUCTION

1.1 Background

The supermarket shopping application intends to assist shopping that will minimize the time spent in shopping as well as to aid the store management with real-time updates on the inventory. Existing system requires customers to wait in long queues until the supermarket staff scans all products and generates bill. Our aim is to develop the shopping system which can be used in shopping malls to solve the problem mentioned above. This system uses android phones to scan products while shopping and makes the shopping processes faster, transparent and efficient. As soon as the object is purchased the barcode reader identifies the product and updates the bill. When the customer is done with shopping, he can just press the 'Finish shopping' button and the details are sent to the shop's server and the customer has to pay just the amount and leave. The shopping system will change the way people shop as radically as ATM's changed banking. The proposed system is easy to use and does not need any special training. In this way the application will help save time and energy since the customers will not need to wait in long queues. Not just the customers, but the application benefits the supermarket too. They can reduce the human resource required at the counters. It is beneficial to both customers and the owner of supermarket.

1.2 Problem Defination

Our project definition is Supermarket Billing Application. This application focuses on saving time. While the tradional billing system requires customers to stand in long queues at the cash counter where each item is scanned and then the bill is generated, with this application customers can scan products while shopping and the bill is generated parallelly. Then the customers just have to show the bill at the counter and pay. Its requires basic knowledge about android phone, hence can be used by elderly too. Also it will eliminate the need of paper bills, as the bills will be stored as softcopy and is accessible anytime. In this way the application will benefit both the customers and the owner of supermarket.

1.3 Motivation

Although the traditional billing system in accurate and precise, but it is quite time consuming and tedious since the cash counters need to scan all items at the time of billing. This results in long time consuming queues leaving the customers exhausted especially during festivals or sales. Overcrowded counters are always annoying. If the bill is generated

before reaching the counter it will save a lot of time which could have been wasted standing in queues. This is achieved by our application. It generates bills/invoice parallel while shopping. So at the end of shopping the customers just have to walk by the counter show the bill, pay and return happily.

1.4 Scope/Application

- **Scope of the project**

  This application is supermarket-specific but with few modifications it can be implemented by every other supermarket/mall. Every supermarket has their own server and database schemas. Hence, with little modification, the application can be used by any supermarket.We can start implementation of the project with small firms and expand it to be implemented in large malls and super markets. The supermarkets can have the application registered with their name. Since it requires basic knowledge about android phone, it can be used by the elderly too.

- **Application**

  i. Nowadays, if a consumer would like to buy something at a shopping mall, consumers need to take the particular items from the display shelf and then queue up and wait for their turn to make payment. But with this application, they can scan the items while shopping.

  ii. Besides, consumers also need to queue for a long time at the cashier to wait for turn to make payment. The time taken for consumers to wait for the customers in front of the queue to scan every single item and then followed by making payment will definitely take plenty of time. Hence, with this application, much of the waiting time can be saved which promotes customer satisfaction.

  iii. This condition will surely become worst during the season of big sales or if the shopping mall still uses the conventional way to key in the price of every item by hand to the cash register.

  iv. On the other hand, consumers often have to worry about plenty of things when going to the shopping mall. For example, most consumers will worry the amount of money brought is not enough to pay for all the things that wanted to be bought until it comes to our turn to pay at the cashier.

CHAPTER 2 SYSTEM PLANNING

2.1 Project Development

Each project need to be developed with software model which makes the project with high quality, reliable and cost effective.

- In our project we are using Iterative Model.
- **Iterative Model :**
    - Iterative process starts with a simple implementation of a subset of the software requirements and iteratively enhances the evolving versions until the full system is implemented. At each iteration, design modifications are made and new functional capabilities are added. The basic idea behind this method is to develop a system through repeated cycles (iterative) and in smaller portions at a time (incremental). [2]
    - Following is the representation of Iterative and Incremental model:

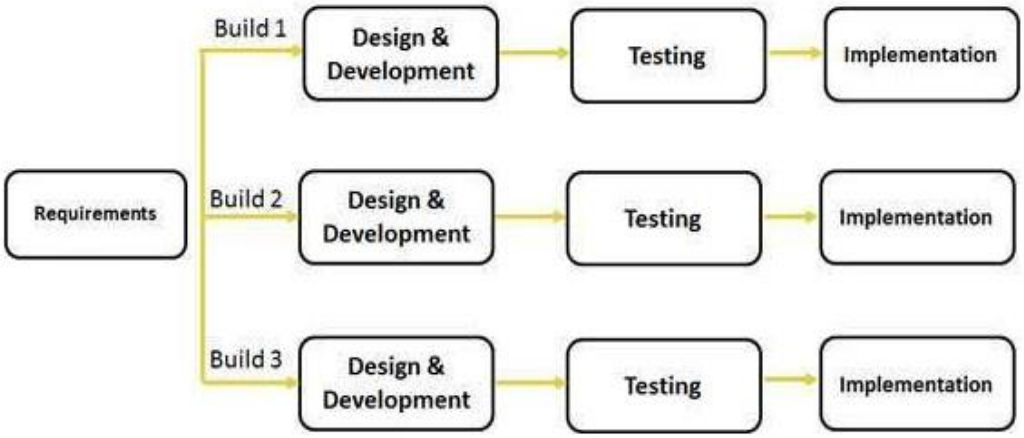

Figure 2-1 : Phases of iterative model

During each iteration, the development module goes through the requirements, design, implementation and testing phases. Each subsequent release of the module adds function to the previous release. The process continues till the complete system is ready as per the requirement. The key to successful use of an iterative software development lifecycle is rigorous validation of requirements, and verification & testing of each version of the software against those requirements within each cycle of the model. As the software evolves through successive cycles, tests have to be repeated and extended to verify each version of the software. [2]

- In our system, we will implement small set of software requirements and then iteratively enhance the application versions until the complete system implemented. So, we use iterative model in our project. [2]
- Advantages of iterative model [2] :

  The advantage of this model is that there is a working model of the system at a very early stage of development which makes it easier to find functional or design flaws. Finding issues at an early stage of development enables to take corrective measures in a limited budget.
  - Some working functionality can be developed quickly and early in the life cycle.
  - Results are obtained early and periodically.
  - Parallel development can be planned.
  - Progress can be measured.
  - Less costly to change the scope or requirements.
  - Testing and debugging during smaller iteration is easy.
  - Risks are identified and resolved during iteration; and each iteration is an easily managed milestone.
  - Easier to manage risk - High risk part is done first.
  - With every increment operational product is delivered.
  - Issues, challenges & risks identified from each increment can be applied to the next increment.
  - It supports changing requirements.
  - Risk analysis is better.

2.2 System Modules

2.2.1 Login module

The customer enters their registered user id and password. If verified, they may start shopping i.e. scanning items. Otherwise, they will have to re-enter the user id and password.

2.2.2 Registration module

New customers first have to register themselves with the supermarket. They have to enter basic details like name, phone number, desired user id and password.

2.2.3 Scan item module

After successful login, the customer can start scanning desired items while shopping and the items will be added to current cart. This also shows current total amount so that customer can estimate whether they can purchase any more items with the amount of cash they have.

2.2.4 View history module

The customer can view previous bills here. This may help in planning which items need to be purchased and can help in budget.

2.2.5 Bill generation module

When the customer has finished shopping, they can simply click on “Finish” and the final bill/invoice will be displayed. Now they can show this bill and pay. This also informs the supermarket server about the details of the bill of particular customer and stores it for information.

2.3 Functional Requirements

Table 2.1 : Functional Requirements

ID	Title & Description
FR1	**Title: User registration** **Desc:** The user should be able to register through the Application/Website. The user must provide user-name, password and e-mail address. The user can choose to provide a regularly used phone number and other details.
FR2	**Title: Customer login.** **Desc:** Customer's username and password, if successful then redirect to the cart.
FR3	**Title: Add item to cart.** **Desc:** Scan barcode of item and item will be added in the cart.
FR4	**Title: Remove an item from cart.** **Desc:** Select the item to be removed and the item will be removed.
FR5	**Title: Generate bill.** **Desc:** Click on “Finish” and the bill will be generated with payment option.

FR6	**Title: View previous records.** **Desc:** By entering the date in search option the previous detailed bill will be displayed.

2.4 Non Functional Requirements

- Portability: Application will be mall specific but can be extended to adapt to other malls with few modifications.
- Performance: Application will help to remove time constrain and long queues.
- Reliability: Application will be reliable. Backup server is recommended to handle large amount of customers and for redundancy.
- Reusability: Information fetched from previous bills/invoices can be useful for generating different reports.

2.5 Hardware and Software Requirements

- Hardware Requirements:
  A Smart-Phone for the installation of application with good camera.
- Software Requirements:
  Smart phone with android OS.

2.6 Timeline Chart

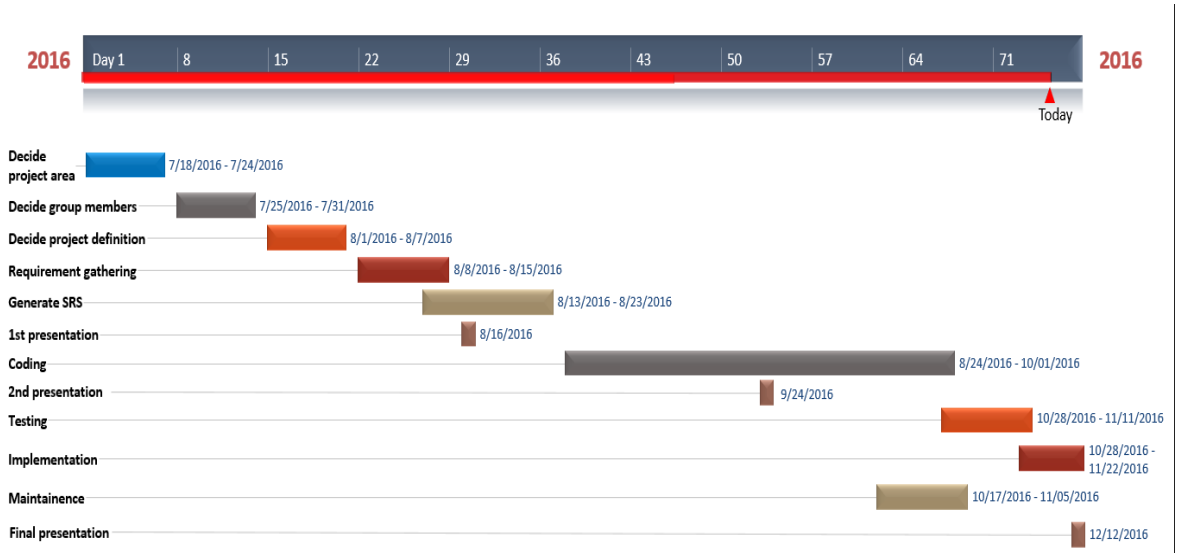

Figure 2-2 : Timeline chart

CHAPTER 3 SYSTEM DESIGN

3.1 Use-Case Diagram

In our project, there are mainly two actors :

- USER
- MALL SERVER

Operations which are perfomed by all actors are shown in below diagrams.

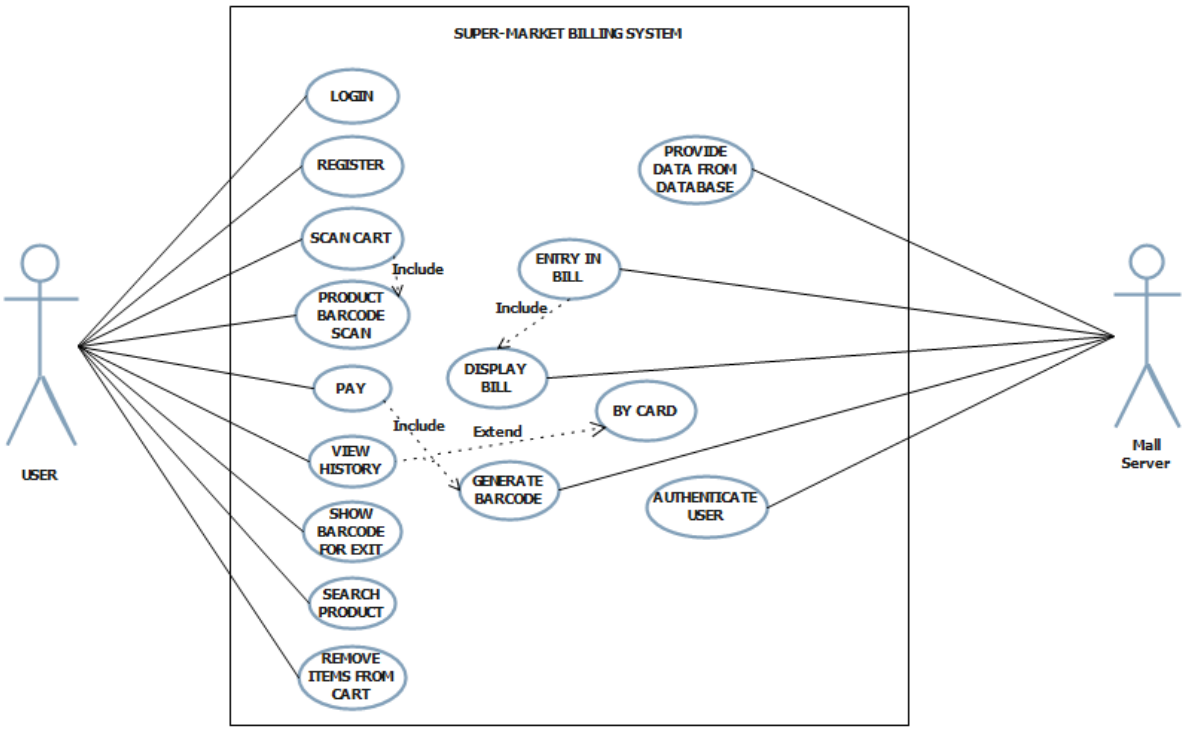

Figure 3-1 : Use case diagram

3.2 Sequence Diagram

Sequance diagram will show the flow of the applicaton. It will also shows the lifetime of the operation which are perform by the users. The line will shows the lifetime of the user to perform the operations.

Following figure shows sequence diagram for supermarket billing application.

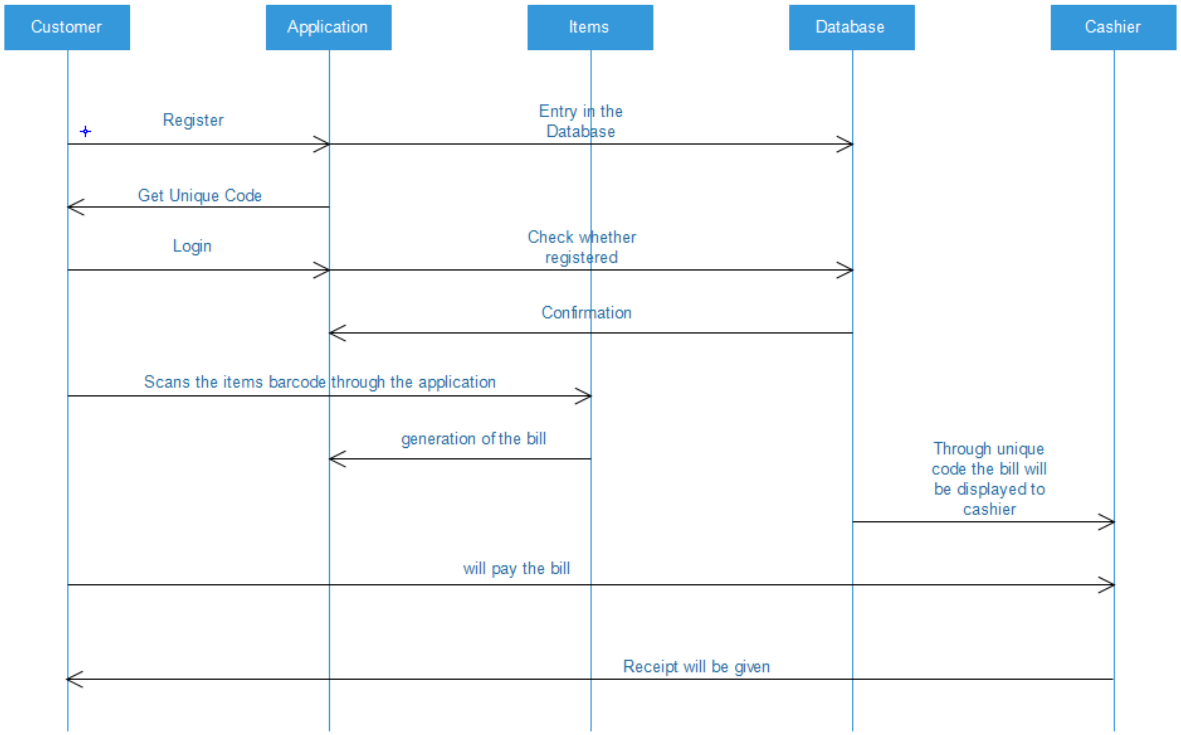

Figure 3-2 : Sequence diagram

3.3 Actvity Diagram

In activity diagram symbol of circle will show the beginning of the diagram known as initialization symbol. Owl circle will shows the activities and diamond will represents different conditions perform by the activity. Arrows represents the flow and the text written above the arrows will show the name of the condition perform by the activity.

Following figure shows activity diagram for supermarket billing application.

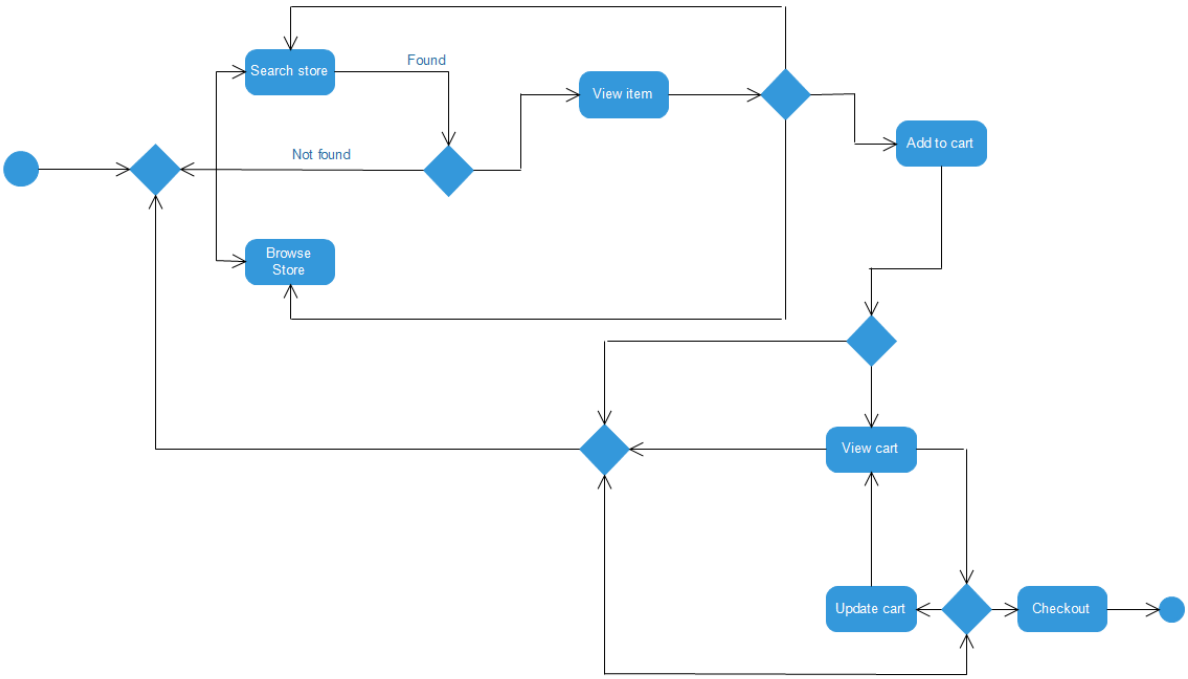

Figure 3-3 : Activity diagram

3.4 Class Diagram

In class diagram rectangle will shows the class name and its attributes name. Line between two classes are use to link between them and the name above the line will indicate the name of relationship. At the both end of line it will shows the relationship.

In our project, following classes are present:

- Inventory
- Items – Crockery, Household etc.
- Invoice/Bills
- Supermarket

Following figure shows class diagram for supermarket billing application.

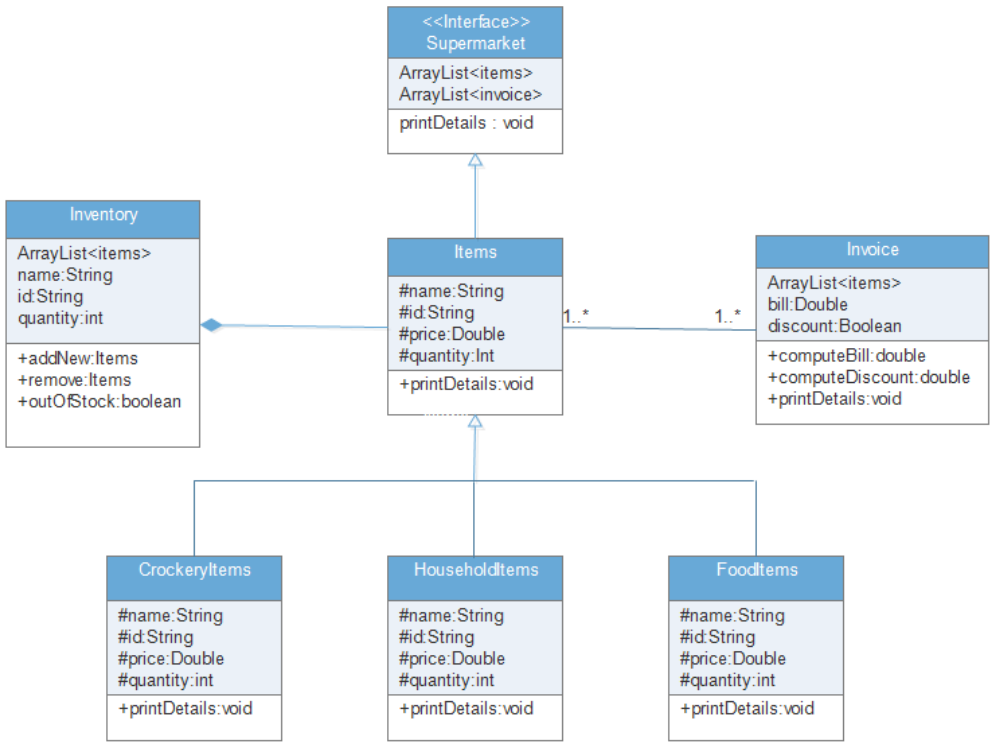

Figure 3-4 : Class diagram

3.5 Database Schema

Following tables are used in our project.

- Customer
- Product
- Bill

Table 3-1 : Customer Table

Column Name	Data Type	Size	Constraint	Description
Id	INT	5 (can be increased or decresed according to supermarket)	Primary Key Auto Increment	ID No.
Fname	TEXT	50	---	First Name
Lname	TEXT	50	---	Last Name
Phone	INT	10	---	Phone No.
Password	TEXT	10	---	Password

Table 3-2 : Product Table

Column Name	Data Type	Size	Constraint	Description
PId	INT	5 (depends on format of barcode of product)	Primary Key	Product Id.
Name	TEXT	50	---	Product Name
Price	INT		---	Price of product
Category	TEXT	20	---	Category of product

Table 3-3 : Bill Table

Column Name	Data Type	Size	Constraint	Description
Bid	INT	5 (can be increased or decresed according to supermarket)	Primary Key Autoincrement	Bill Id.
Id	INT	50	---	Customer Id.
Total	INT		---	Total amount
Items	TEXT	100	---	Details of items
Date	DATE		---	Date and time of bill generation

3.6 Data Flow Diagram

A data flow diagram (DFD) illustrates how data is processed by a system in terms of inputs and outputs. As its name indicates its focus is on the flow of information, where data comes from, where it goes and how it gets stored.

Following figure shows data flow diagram for supermarket billing application.

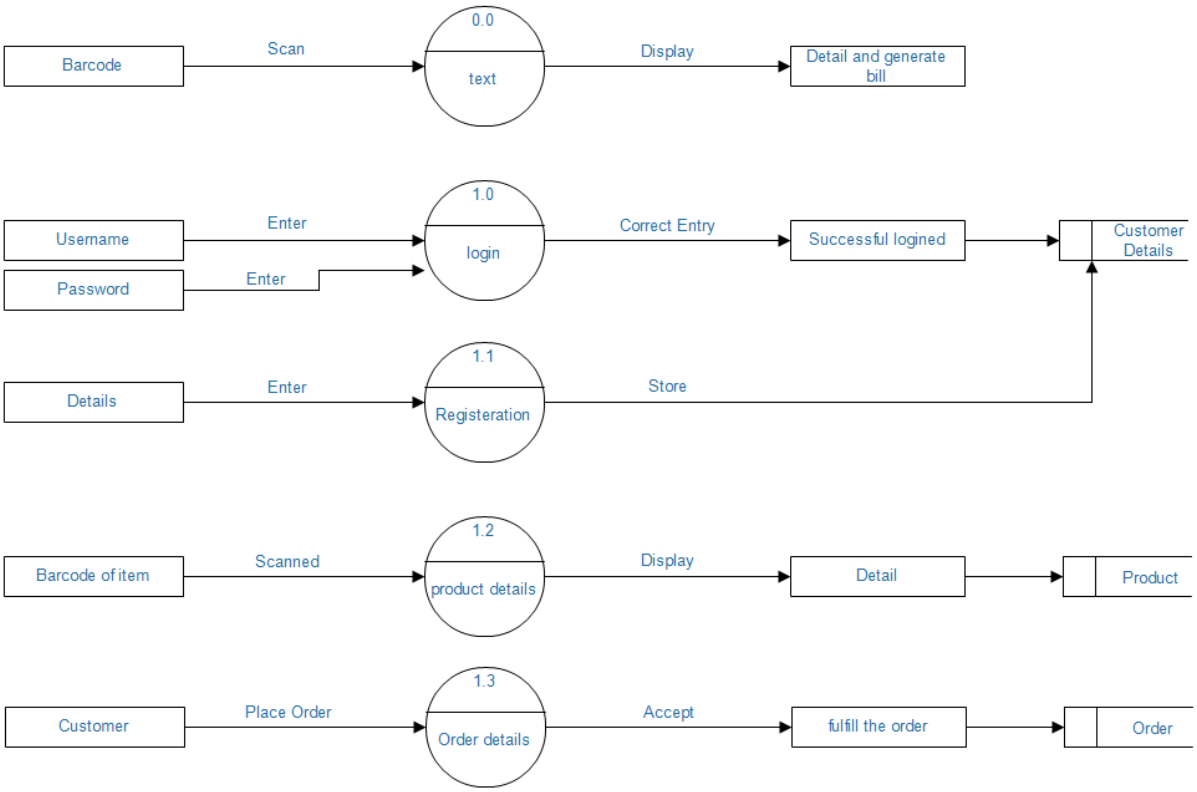

Figure 3-5 : Data flow diagram

3.7 E-R Diagram

An entity-relationship diagram is a graphical representation of an information system that shows the relationship between people, objects, places, events within that system. An ERD is a data modeling technique that can help to define business process and can be used as the foundation for a relational database.

Following figure shows ER diagram for supermarket billing application.

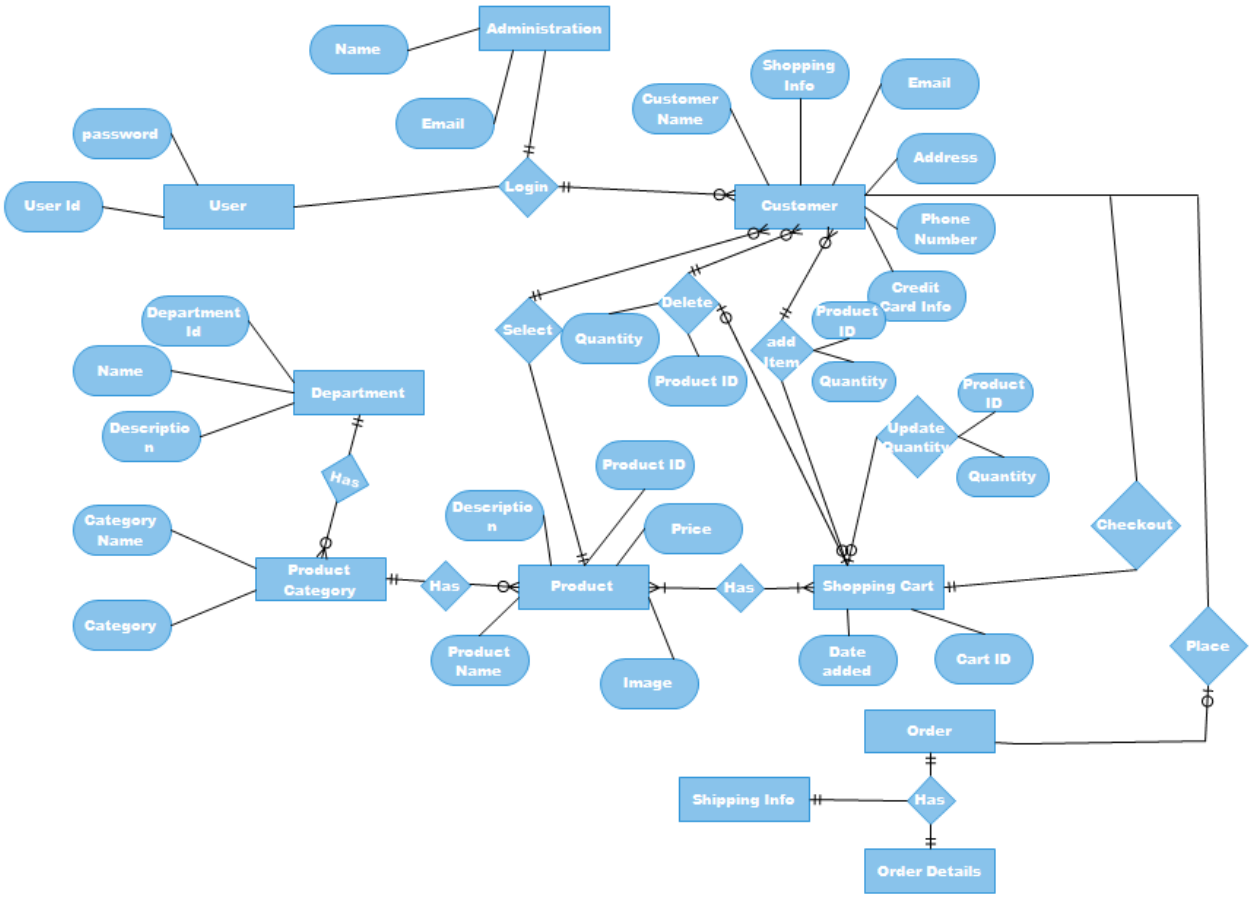

Figure 3-6 : E-R diagram

CHAPTER 4 IMPLEMENTATION AND TESTING

4.1 Snapshots

- **Login Page**

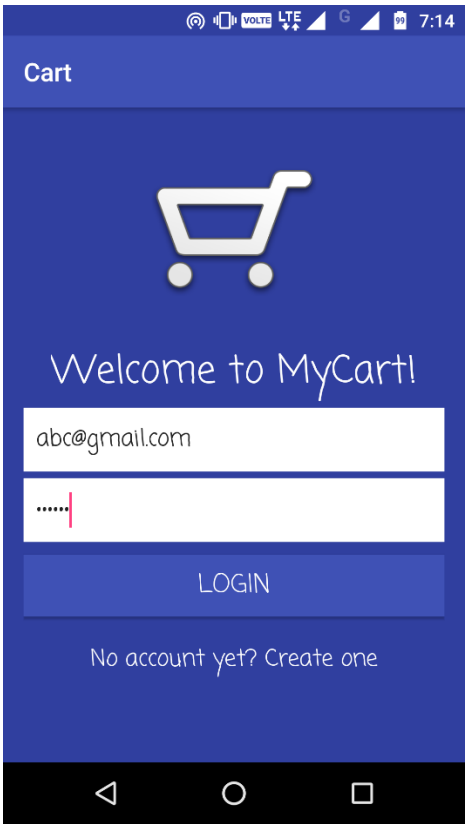

Figure 4-1 : Login page

User will enter login details i.e. username (email id) and password. If username and password are authenticated then user will be redirected to the home page, otherwise an error will be shown. If a new user wants to register, user will be redirected to registeration page when he/she clicks on the link at the bottom.

- **Registeration Page**

Figure 4-2 : Register

New user will enter their details here. If the entered user name is already registered then appropriate message is shown and the user is requested to enter another username. Otherwise, a new account will be created and the user will be redirected to login page.

- **Home Page**

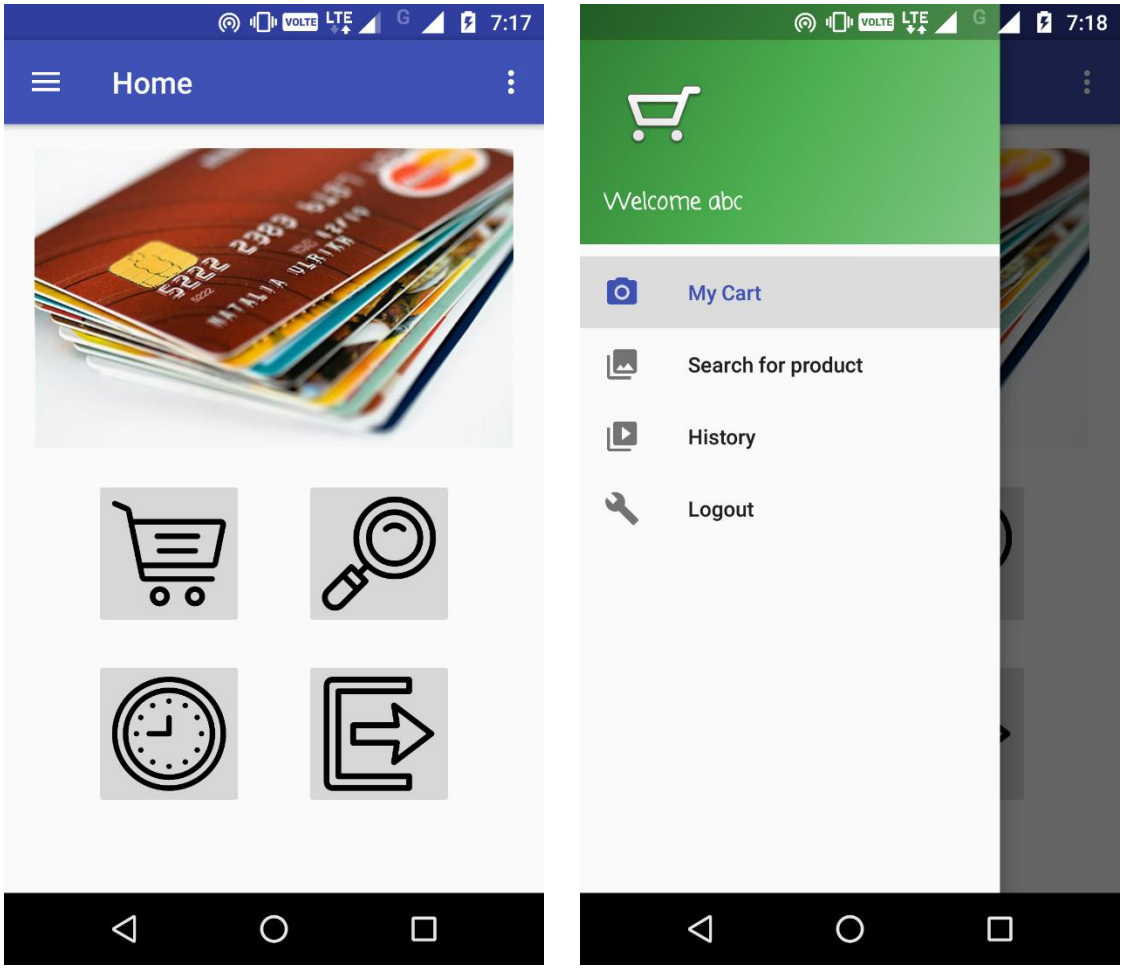

Figure 4-3 : Home page

Upon successful login, the user will be redirected to the home page. The home page contains the following options:

- New cart.
- Search for a product.
- History.
- Logout.

- **Scan Cart Page**

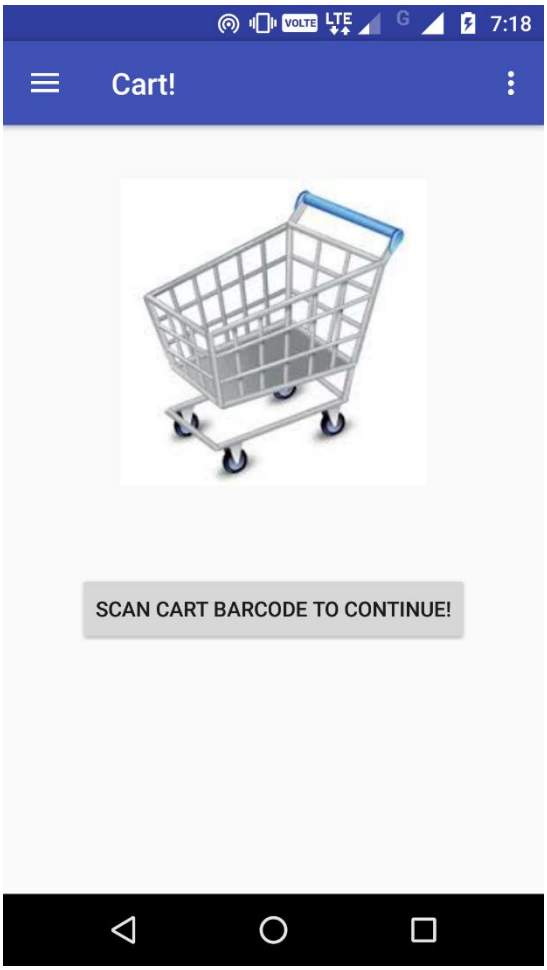

Figure 4-4 : Scan new cart barcode

In order to start shopping, the user needs to scan the barcode of the cart first. This will map the userid to the cart. After scanning the cart barcode, the user can start adding items to cart by scanning their barcodes.

- **Product Scanning Page**

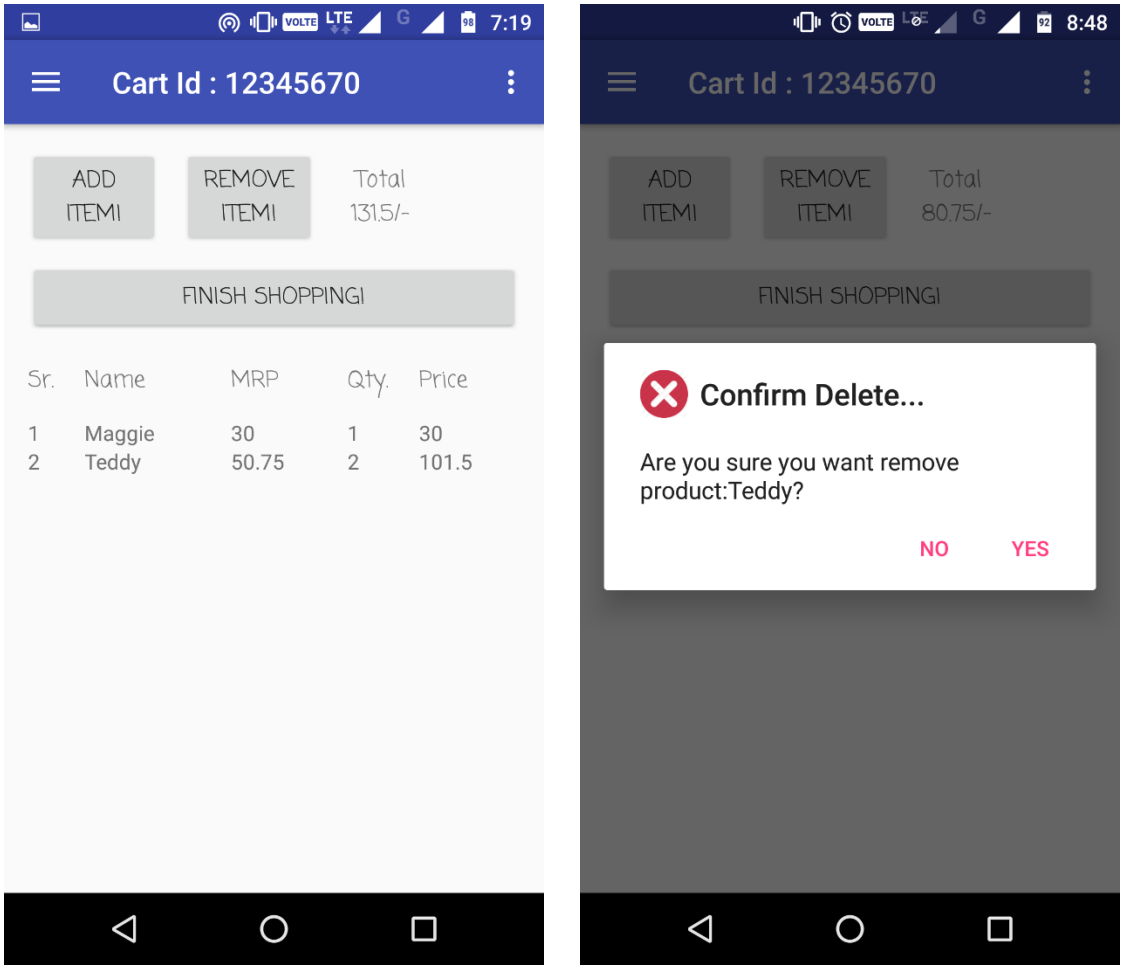

Figure 4-5 : Items in current cart

User can start adding products to the cart by clicking on “Add Item” button. After adding the product, if user changes his/her mind and does not want to purchase the product anymore, they can delete the product from the cart by clicking on “Remove Item” button. The total of all the products currently in the cart is done and displayed on the screen. This helps the user to maintain budget. The user can finalize the bill by clicking on “Finish Shopping”. This will generate the final bill.

- **Bill Generation Page**

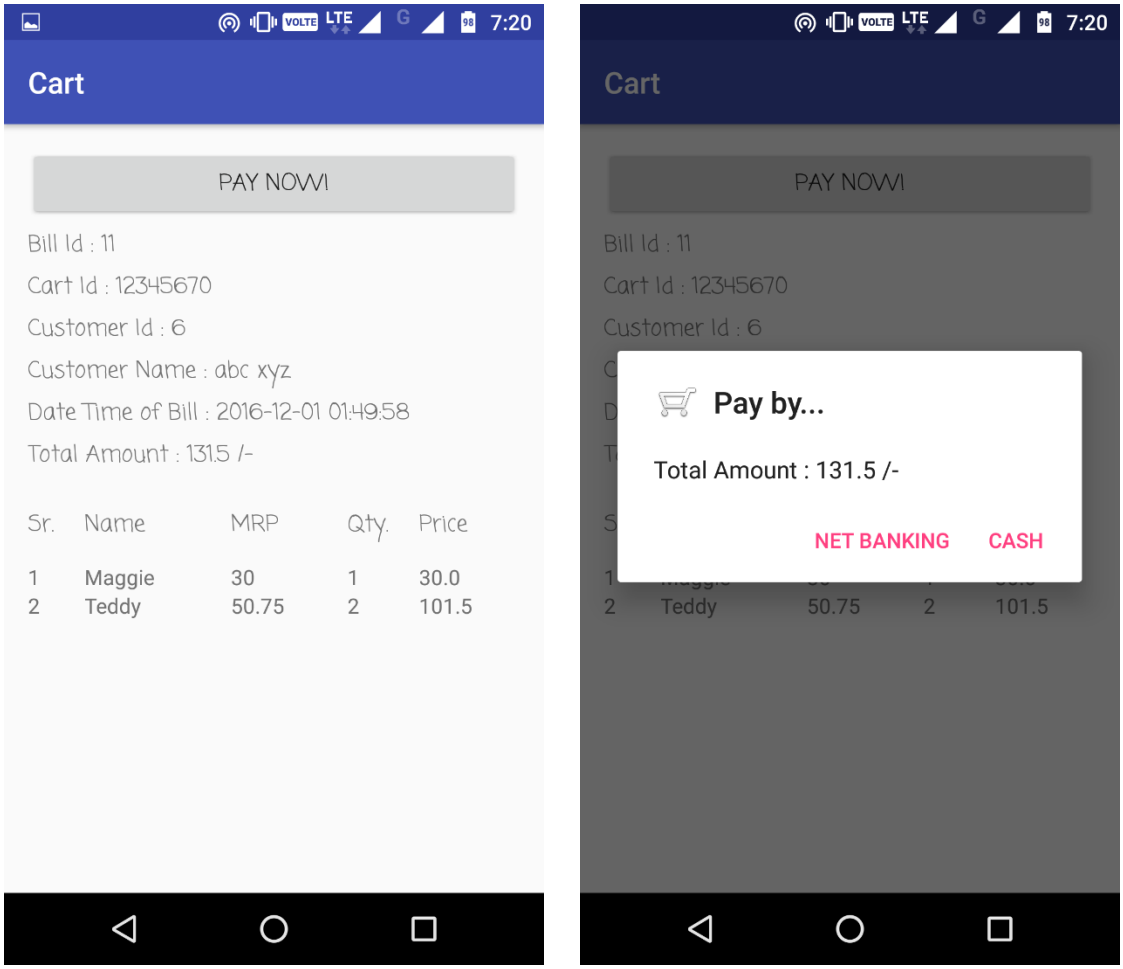

Figure 4-6 : Bill generation

The final bill is generated with a unique bill id. The bill details are stored on server. The user can pay by cash or by net banking.

- **Payment**

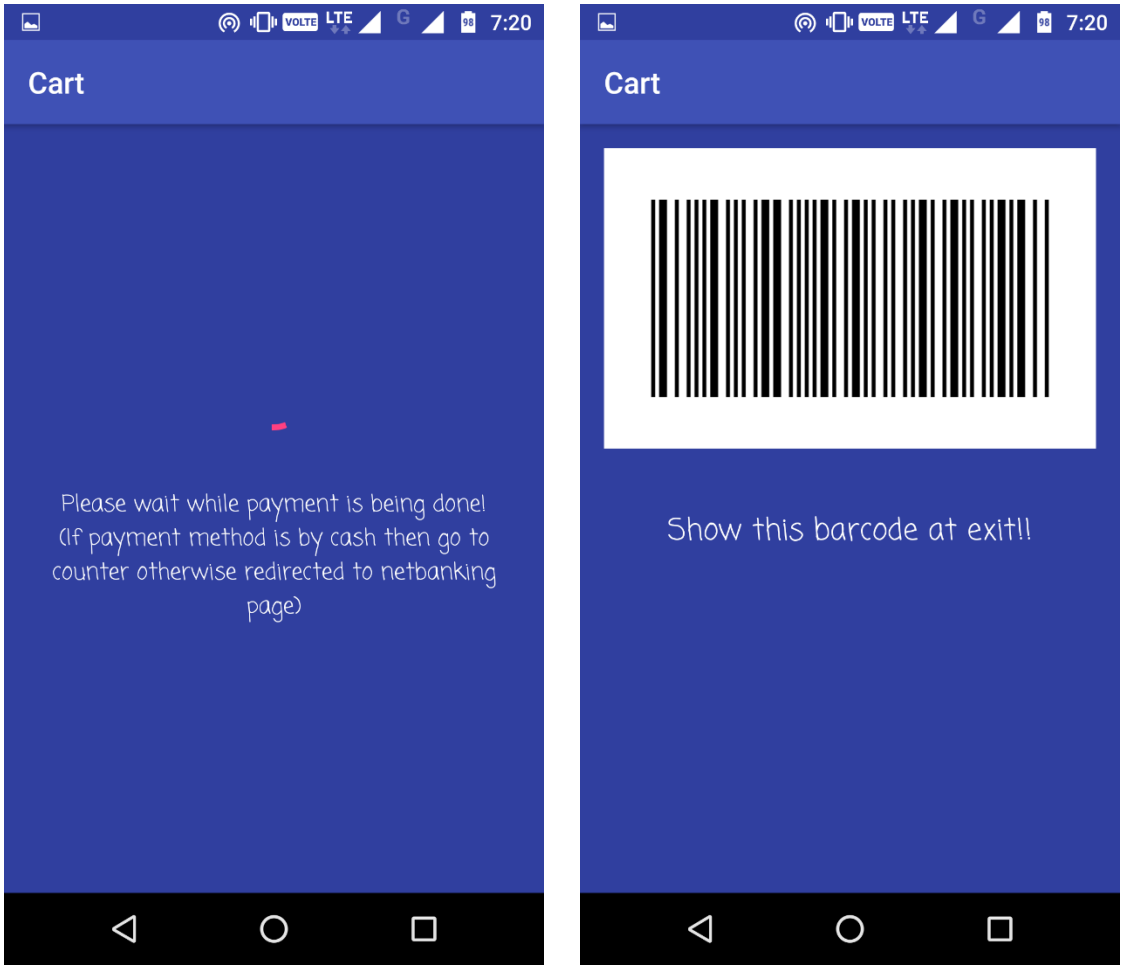

Figure 4-7 : Payment

If the user selects to pay by cash, they need to reach the cash counter. There the cart barcode is scanned and the person at cash counter can view the bill since the cart id is mapped to the user id. The user can pay by cash and a unique barcode will be generated. If the user wants to pay by netbaning, they will be redirected to the net banking authentication page. Again, after payment, a unique barcode will be generated. This barcode is scanned at the exit. The barcode is needed as a proof of payment.

- **Search**

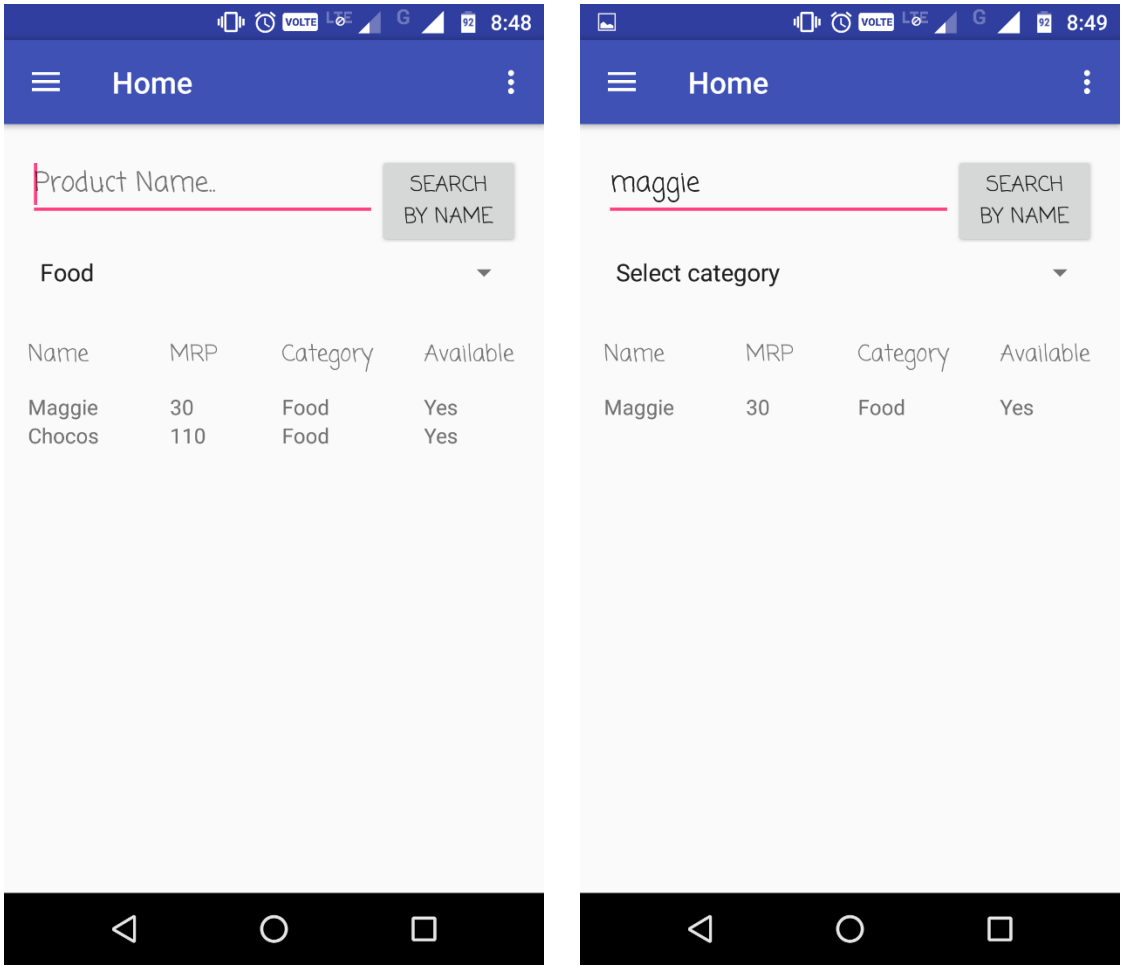

Figure 4-8 : Search

User can search for details of any product by either entering the name of product or by category.

- **View History**

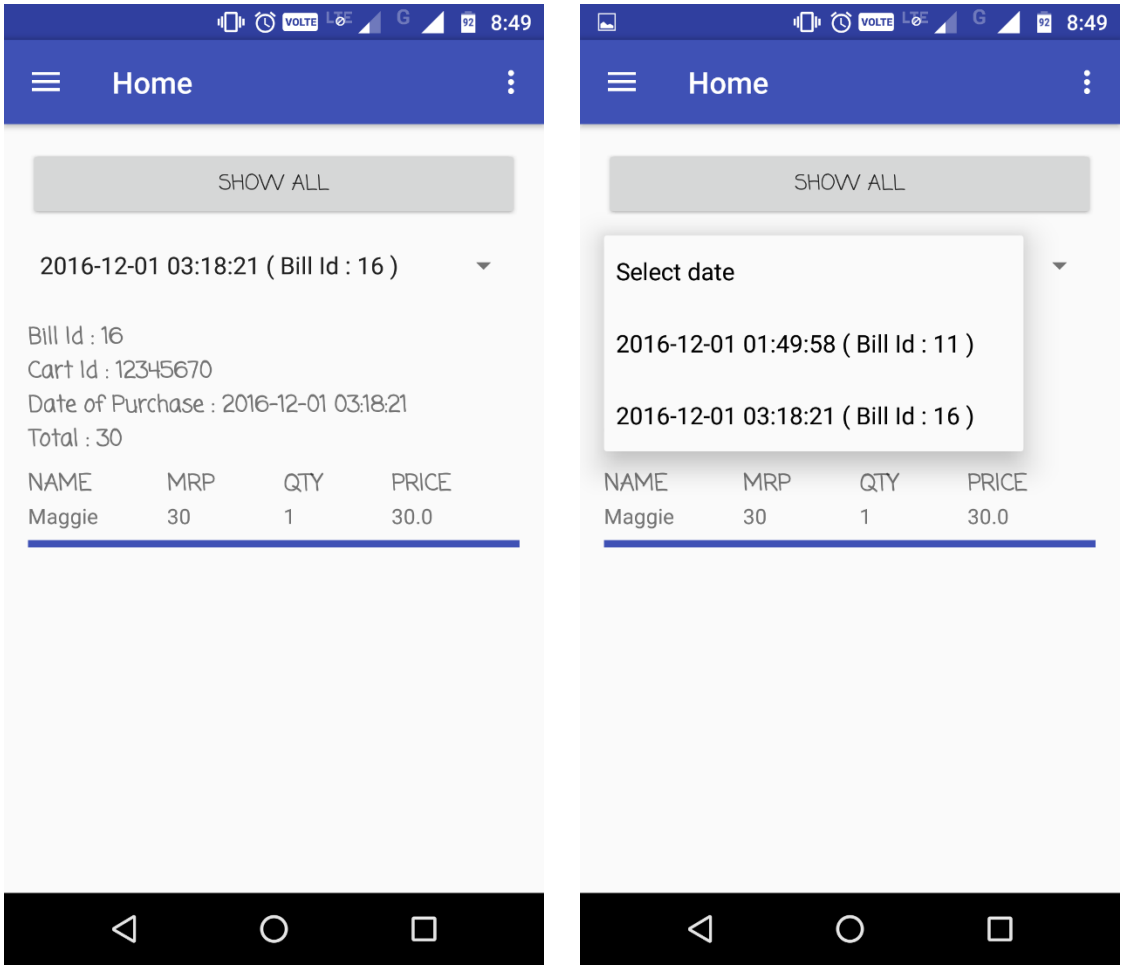

Figure 4-9 : History

Sometimes the user may want to refer to previous bills for some information. The user may view all the bills altogether or they can search for a particular bill from the list.

- **Logout**

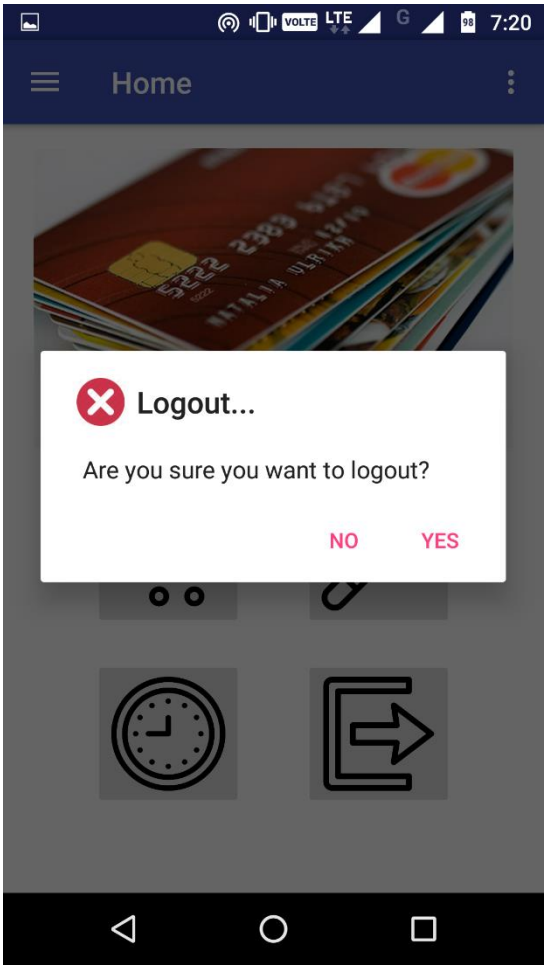

Figure 4-10 : Logout

User can logout after using the application.

4.2 Test Cases

Sample test cases are given as below:

Test ID	Case	Test Data	Expected Result	Actual Result	Pass/Fail
1	Login	- User ID - Password	If User ID & password is empty or invalid then display error message otherwise login sucessfully	If User ID & password is empty or invalid then display error message.	Pass
2	Register	All fields	If any field is empty, the display message “Blank field”	If any field is empty, display message “Blank field”	Pass
3	Logout	Select Logout	User should Logout of the application and redirected to Login page.	User get Logout of the application and redirected to Login page.	Pass
4	Product Scan	Barcode	If the product for scanned barcode is not registered, then display “Product is not available”.	If the product for scanned barcode is not registered, then display “Product is not available”	Pass
5	Remove item from cart	Barcode	If the product for scanned item is not added in cart, display “Product is not added in cart”.	Message is displayed“Product is not added in cart”.	Pass
6	Logout with open cart	Select Logout	If user clicks on logout and there are items added in cart, notify user.	User is notified that the items in cart will be deleted and asked whether he/she want to logout.	Pass

CHAPTER 5 CONCLUSION AND FUTURE SCOPE

The introduction of this application to the supermarkets will be a boon for shopping as it would make shopping easier. Now, customers need not to stand in a long queue to pay the bill. This product makes billing less time consuming. The inspiration and idea of this application was drawn from large queues at the shopping mall and the inconvenience that it causes to the costumers. This new system of billing is fast as the bill is generated along with shopping as the product is scanned and is dropped into the cart. Moreover, this smart application will be very beneficial as it would reduce the number of salesmen and billing counters and also prove to be time saver for both customer and the shopkeeper.

On a larger scale, we can generalise the application to be used and accessed to an individual supermarkets i.e. one account for multiple supermarkets all over the country. Use of plastic money i.e. debit/credit cards can eliminate the need for cash counters altogether. There are some more features to be added such as: Application applicable for multiple supermarket and further more bug fixes if necessary.

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