Smart Shopping- An Android Based Shopping Application

[1]Adarsh Borkar, [2]Madhura Ansingkar, [3]Monali Khobragade, [4]Pooja Nashikkar, [5]Arti Raut

[1,2,3,4] *Department of Computer Science and Engineering,*

[5] *Department of Computer Technology,*
Rajiv Gandhi college of Engineering and Research,
Wanadongri, Nagpur, Maharashtra, India.

***Abstract*— This paper presents a novel method of collaborating ease in online shopping and the sense of security money wise as well as for customer satisfaction while doing shopping offline. This is implemented using an Android application. In Offline mode, the customer needs to physically pick up his purchase, carry cash, credit/debit cards along with them and wait in the long queue to make payments. The application mentioned here would read the barcode(s) of the product(s) & add it to the shopping cart in the application. It provides methods to change the quantity of product/s purchased and edit the list. Along with this the customer would be informed about the on-going offers in the store. Payment can be according to customer convenience.**

***Index Terms*— Android, REST, Maven, Barcode Scanner, ZXing library.**

I. INTRODUCTION

From past 2 decades, use of mobile devices has greatly increased, that has led to ease of carrying out day to day activities. Nowadays, wireless networks have taken over the entire world. Business and financial transactions can now be done easily and securely, anywhere and anytime. Using Internet, connections can be established with any devices almost anywhere in the world and can share necessary information amongst them. The daunting tasks faced in daily lives can now be accomplished by few of clicks on our Smartphone.

A. Traditional Shopping

Traditional shopping is a tedious and time consuming job. Although the growing trend of online shopping has reduced some load, there is still some difference in actually going to shops, and hand picking products to get the feel of their quality and features, that cannot be experienced online. Customers also feel wary to carry out online purchases due to fear of less secure transaction process that may lead to hacking of user's sensitive data, insecurity of credit/debit cards, unreliability or breach of privacy. The project aims at removing flaws of both kinds of shopping, and bridge the gap between physical and virtual world.

In traditional shopping, the customer has to wait in long queues at the cash counter. The cashier scans barcode for every individual product and then generates the bill. This consumes lot of time and energy of both the shopper as well as cashier. To overcome this flaw, the customer himself can scan the barcode using his mobile while making purchase, retrieve

essential details of all products from shop's database and generate bill himself. This bill can be sent to the cashier's computer using web service. Thus the user can make quick payment at the counter and leave the shop early.

B. Android

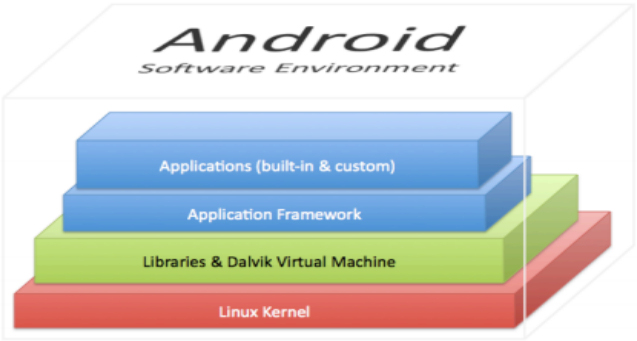

Fig. 1: Android Software Environment

Android is an operating system developed for smartphones and tablets. It is based on Linux kernel and uses Dalvik Virtual Machine (DVM) for executing Java byte code [1]. Absence of GNU C Library and some functions differentiate it from being Pure Linux. Android's source code is released by Google under open source licenses.

Some features of Android are-

- Highly customizable nature
- Reasonable Price
- High degree of ease due to presence of PC like apps.
- Hardware and Software features
- Full control over OS.

Android software environment consists of-

- Linux kernel
- Libraries and Dalvik Virtual Machine
- Application Framework
- Applications (built-in and custom)

ISSN: 2278 – 1323

II. LITERATURE SURVEY

The retail industry has been advocating "Smart Shopping" for many years by adopting various technologies to enhance the shopping experience at the retail environment. The vision of smart shopping promises is to provide on-the-spot information about various discounts, schemes, etc. at your fingertip.

The advantages of mobile commerce are-

- Customer satisfaction
- Cost savings
- New business opportunities
- Time saving
- Allow for considerable profit
- Improvement of Customer relations

While coming across various technologies such as Online Shopping [2], where items are purchased online through various websites, the drawbacks encountered were –

- Fraud
- Shipping cost
- Deprives our Tangibility
- Lack of Options

In traditional shopping method various difficulties faced are-

- Long queues
- Huge waiting time
- Carrying heavy items home

Survey was conducted at three shops –

- Reliance Fresh
- Purti super bazaar
- Big Bazar

Issues-

- Long queues
- Barcode scanning for each item
- Payment issues on a regular basis

This paper assumes that the application described would be a prototype that would shape the future & there still remains much to do in terms of development and improvement of the existing models. Applications created with ease of understanding and the design can be created and tailored to the shopping process to make it more effective and user friendly, thus making it easier & convenient for the users to do the entire shopping process with the use of this application.

III. PROPOSED WORK

In the proposed work, the user will scan the item which he wants to purchase with the help of scanner provided by this app. After scanning of the item a web service will get called which will create a connection with the database of the shop. As the connection is established, the user is now synched with the database and information related to that item is provided to him. In this whole procedure the overall time of scanning of individual items is saved and thus reducing the time of the shopping. The assumptions for the app are-

- Shop has Wi-Fi facility
- User has installed the app

A. Web Service

A Web service is software which can connect any device that is active in the internet to another and establish communication between them. It uses HTTP as common communication protocol. Web service is required to establish communication between Android device and Shop's database to exchange information.

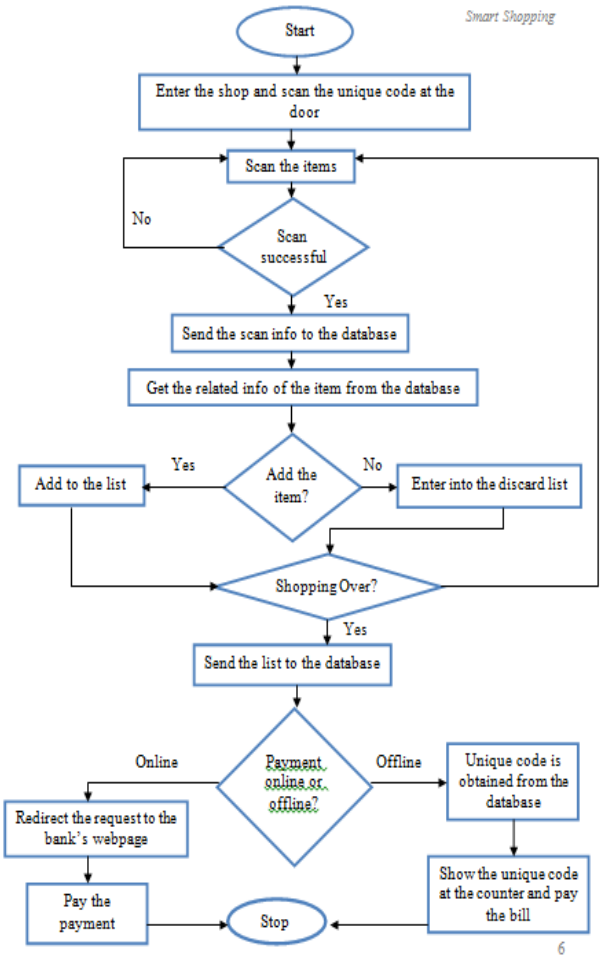

Fig. 2: Flow Graph

Smart Shopping application uses REST, an architectural style, as a web service for the app. REST is called as Representational State Transfer protocol, which is a lightweight process. It is a set of guidelines for creating web services. REST has following architectural properties-

- Client-server
- Stateless
- Manipulation of the resources
- Self-descriptive messages
- Resource identification

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B. Database

The shop's database is designed using MYSQL workbench. It provides an interface with the help of which any database can be easily designed. The shop's database consists of six table-

- *Inventory system*- It provides information about the availability of the items, their unique id, product id etc.
- *Item table*- It provides detailed information of each item from its manufacturing date, price, weight, etc.
- *Shopper details*- The customer's information will be stored in this table including his address and phone number that will be used at the time of online payment.
- *Shopper session*- This table will have information about the time when customer has log in after scanning the shop's barcode till the successful payment completion.
- *Store details*- This table will have detail information about the shop's name, its branch and unique id (barcode) that will be retrieved at the time of scanning of the shop's barcode.
- *Final order table*- This table maintains customer information about his purchases, total cost, session id and all those information that is required to generate a final bill.

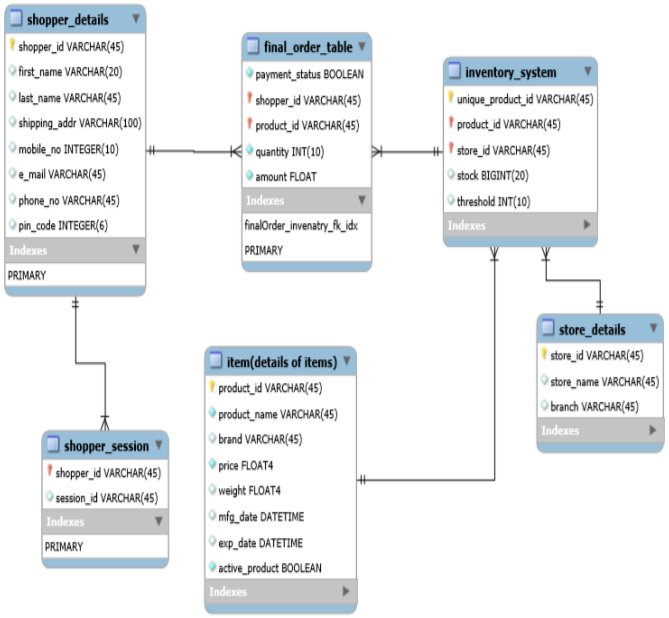

Fig. 3: Schema of shop's database.

IV. IMPLEMENTATION DETAILS

A. Application Features

Smart Shopping app has following features-

- Reduces scanning time
- Personalization of items
- Maintains History of purchased products
- Provides information regarding Discounts and Offers

B. Technologies Used

- Android SDK
- ADT (Android Development Tool)
- ZXing
- MySQL 5.6
- Maven
- REST web service

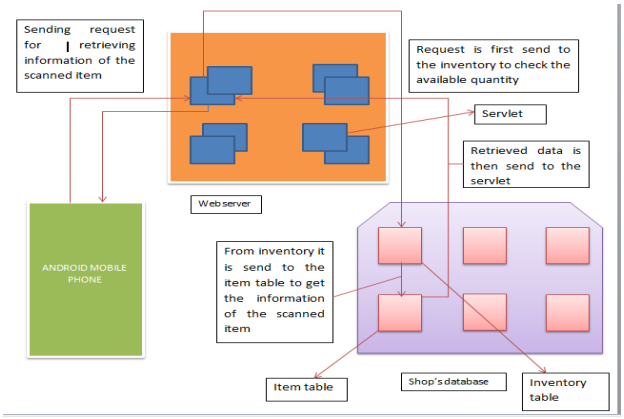

Fig. 4: Working of the app.

Android SDK- It is the software development kit used for developing android apps. This kit includes-

- Debugger
- Libraries
- Quick emulator
- Documentation
- Sample code
- Tutorials

Android virtual device is used to get a view of an app. This SDK will be included in the android in the bundle called as ADT bundle. This ADT bundle is then extracted to get the above facilities.

Android Development Tool- It is the plugin for the eclipse with the help of which following tasks can be performed-

- Set up new Android projects
- Creating a new application UI

In total it provides an environment in which the android projects can be imported, build and run successfully.

ZXing- It is the library which is used for scanning purpose and used in this app for scanning the items to be purchased.

The following are the barcodes that can be read using ZXing-

- EAN-13
- EAN-8
- UPC-A
- UPC-E
- Code 39 , Code 93 and Code 128
- QR Code

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With this library, the barcode will be read and decoded and then converted into any specific number that will be unique for every product. This library can also be used for generating barcodes.

Maven- It is an automation tool which proves helpful in the building the java projects. It alone can provide various features like-

- Source code generation as well as compilation
- Packaging the source code into jar files and zip files

If any necessary plugins are required then they are downloaded from the repositories. The important thing for the maven is the POM file. POM file is the project object model file which is read by the maven every time when the code gets executed.

MYSQL- MYSQL is a RDBMS that supports-

- Multiple administrative tools
- Programs and libraries
- Application programming interfaces

It can run on different platforms like windows, MACOS and Linux. It is designed with the help of languages like C and C++ and uses kernel threads for most of its operation. Use of kernel threads allows MYSQL to use multiple CPU'S. In order to increase the execution speed MYSQL uses thread based memory allocation and optimized nested loop joins.

REST web service- As only the basic operations are to performed like CRUD (Create, Retrieve, Update, Delete) in this app, a lightweight web service was in need. This can be easily found in the REST web service. It is lightweight because it makes use of HTML and their basic commands like GET, POST, DELETE, etc.
The app uses following concepts for the UI-

- Fragment
- Navigation drawer
- ZXing
- Shared preference

A fragment is a portion of the user interface in an activity of an android. Navigation drawer is the facility in which there is a transition from the left edge. In this app, it shows all the app's main options for the navigation.

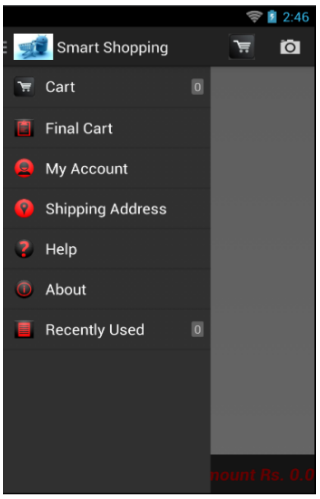

Fig. 5: Snapshot of navigation drawer used in the app.

Using the ZXing, barcode scanning and it's decoding is performed.

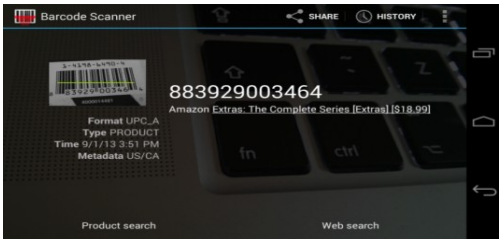

Fig. 6: Snapshot of the barcode scanner used in the app.

Android provides many ways of storing data of an application. One of the ways is called shared preference. The main reason for using this feature is that it does not require storage into the local database. It will use the device's SD card in order to store the information.

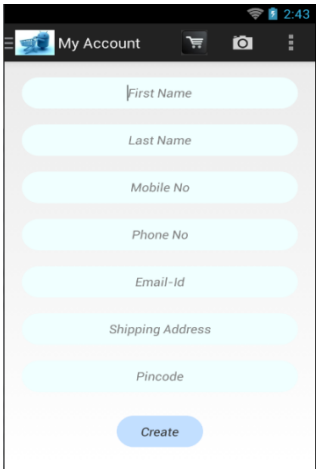

Fig. 7: Snapshot of the shared preference.

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Customer will scan the barcode; will send a web service that will retrieve data from the database. After retrieval, that item related information can then be seen into an expandable format.

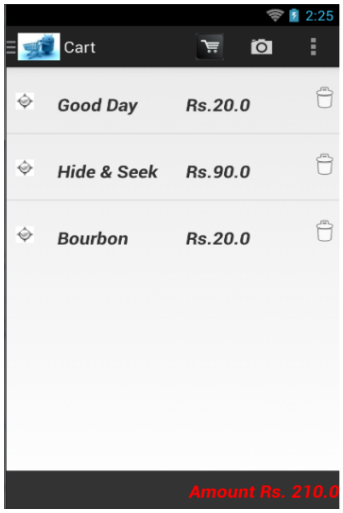

Fig. 8: Expandable list of items.

V. CONCLUSION

As the demand for the online shopping is increasing the requirement of more secure, safe and reliable transaction is of utmost demand. [3] Smart phones, that have become an important part of today's life, have reduced all the efforts that are required for shopping. With camera feature in it, the user can scan the barcode of the item to be purchased and then directly add it into the cart. There are two advantages of it: first no need to stand in the queue for a long time in malls just for scanning the item, second there will be no scope for the frauds that happen in online shopping. The items so far purchased by the customer will be maintained in the app that can be used by the customer in the next purchase. The transactions that will take place frequently with the shop's database will be made secured. This will ensure no modifications in the shop's database either by the customer or by any unauthorized user.

VI. REFERENCES

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ISSN: 2278 – 1323