UNIVERSITY OF WOLVERHAMPTON

REPORT ON INVENTORY MANAGEMENT SYSTEM

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Module Code: 6CS007

Module Name: Project and Professionalism

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Submission date: 2019/05/13

Declaration Sheet

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Abstract

This project is aimed at developing an android based application named Inventory Management System for managing the inventory system of any organization. The Inventory Management System states to the system and processes to Handel the business's stocks with the involvement of Technology system. This system can be used to store the details of the inventory, stock maintenance, update the inventory based on the sales details, generate sales and inventory report daily or weekly based. This project is categorized individual aspects for the sales and inventory management system. In this system, I am solving a different problem affecting to direct sales management and purchase management. Inventory Management System is important to ensure quality control in businesses that handle transactions resolving around consumer goods. Without proper inventory control, a store may face the scarcity of items or goods in a business. A good inventory management system will alert the wholesaler when it is time to record. Inventory Management System is also an important means of automatically tracking a large amount of storage. An automated Inventory Management System helps to reduce the errors while recording the stock.

Table of Contents

Table of Figure

1. Introduction

In this section, I have provided the brief description about my project including the project features, academic question, aims, and objectives, problem domain, brief details of the artefact produced and background to the project. It also includes the research method used, scope and limitation of my project. I have also described the structure of the report.

1.1   Introduction to Topic

1.1.1   Terminology, History, etc. related to my project

In the modern age, as time increases, needs & requirements of businessman also increases. They desire more facility & try to do their task quickly & within time. But they cannot get all the things easily, so they have no idea how to keep tracks of their inventory. So, here we come with a solution. The Inventory Management System is a real-time inventory database capable of storing various item. This can be used to track the record of a single store or to manage the delivery of stock between different salesmen.   Additional features are take in the capability to produce information about sales (Ramlee, et al., 2006).

An inventory management system can help a business owner to have more than one business site also effectively keep track of inventory at each without being present. No more worries about employee theft or pricing changeability between one locality and another. The boss does not need to worry about employee theft. Employee productivity can be maintained. Point of sale systems can take care of those problems that result when management isn't present (CINDYSO1998, 2019).

This system will be the android-based application. It is any platform which is retrieved over a system connection using SQLite, rather than prevailing within a device's memory (Lockard, 2012).

1.1.2   Project Features

- ❖ Simple user interface.

- ❖ Prediction on which goods should be in stocks.

- ❖ Track items by serial number.

- ❖ Add, Update, and Delete the items easily.

- ❖ Manage inventory items with tags, price, and quantity.

- ❖ Quick and easy counting information, including Salesman's details.

- ❖ Several customizable fields for a product.

- ❖ User can phone or email the Salesman for order the inventory.

- ❖ Reminder to remind the user which goods are about to finish.

- ❖ User can add a picture of goods.

- ❖ Can handle a large amount of data.

1.1.3   Academic Question

How can "Inventory Management System" keep track of every products using Android OS?

How can "Inventory Management System" notify you which products is going finished or should be in stock?

1.1.4 Aims and Objectives

The project will aim to create an android application which will provide services to record the inventory details for a salesman and also the prediction of the goods which should be stock.

When creating a mobile phone application, the objective is part of development, as we plan and develop so that objectives must be clearly displayed. The objectives are as:

General Objectives:

- ❖ To fulfill the requirement for achieving the Bachelor's degree.
- ❖ To understand how android application works, their lifecycle, etc.
- ❖ To understand the problem facing by today's businessman.
- ❖ To help the user to add, update and delete the product in the system.
- ❖ To keep a record of sales record of goods.

Specific Objectives:

- ❖ Up-to-date information about data processing resources through the creation and archiving of records in a centralized repository.
- ❖ To alert the user through reminder when the good is about to finish.
- ❖ To overcome the problem of which goods should be ordered.
- ❖ Financial records are specific to a single component, or groups of components.
- ❖ Service records for all components in the inventory.
- ❖ Data used to support configuration diagrams of the hardware and software components contained within specific locations, or the entire data processing environment.

❖ To utilize the power of background services, threads, and notification.

❖ To create good User Interface to interact with system.

1.1.5   Artefact Produced, Background

Mostly the people use MS Excel and maintain their records in the past. However, it is not possible them to share the data from multiple systems in a multi-user environment, there is a lot of redundant work, and the chance of error. When the data are changed they need to bring up to date each and every excel file. They cannot find and print previously saved records because there is no option. The data will not be secured. Anybody can access any report or any important data. This Inventory Management System is used to solve the entire problem which they are facing now and making comprehensive atomization of the labor-intensive system to the computerized system (Sheakh, 2018).

In the context of Nepal, there are many small organization in which the modern application system is not applied for keeping tracking of products. The Inventory is being expanded but also there is no any quality system for maintaining and keeping records of the products. Due to which the owner of the inventory, faced different losses and damaging of products yearly. In today's era supermarket like Bhatbhatani used the system for managing their stores but their system is also not that much secured and good. So, our system is here with the solution to every problem.

1.1.6 Problem Domain

❖ Counting current stock

All productions must know what they have on hand and calculate stock level with detail to present and estimated demands. You must know what you have in stock to ensure you can meet the demands of customers and products and to be sure you are ordering enough stock in the future. Counting is also essential because it is the only way you will know if there is a difficult with theft arising at some point in the supply chain. When you become alert of such harms you can take steps to exclude them.

❖ Controlling supply and demand

The supply according to demand is very necessary for the successful running of the business or organization. If the demand will high the supply should be in equal proportion.

❖ Managing details of the product

Details of the products and goods are also one of the major reason for successively the organization. If the details of the products are cleared, the owner can fulfill the market's demand in time.

1.1.7 Project as a Solution

The main goal of the Inventory Management System is to guarantee dependable availability of provisions for consumers. Thus, it is focused toward vendors of small to large stores and stock managers who are responsible for maintaining sufficient goods on hand in a retail or manufacturing business. It can measure from a single computer running both customer and server software up to several suppliers and warehouses.

❖ Up-to-date statistics about data processing assets through the creation and archiving of records in a centralized manner.

❖ Financial records detailed to a single section or groups of the section.

❖ Service records for all mechanisms in the inventory.

❖ Data used to maintenance configuration diagrams of the hardware and software components contained within specific fields (Bronack, 2012).

1.1.8   Research Method, Scope and Limitation

The research method that I used before the project is semi-standardized interview. Which is very effective way of interviews. Semi-standardized (or semi-structured) interviews offer a more flexible approach to the interview process. I have booked a meeting with different salesmen around the Kathmandu valley. Most of them are facing the problem of storing data in a manage way. They don't know about the remaining stocks in the shop. Most of goods are damage due to long time stocks. People usually use a file to keep record of how much goods arrived and how much sales done. Their file or sales record lost most of the time by which they cannot study their past transition which may have negative effect in their future business. Data were collected from 5 heterogeneous supermarkets and used as a tool for finding facts (Opeyemi, 2013).

The system covers add, update, and delete of the items buy by the user. It also reminds the user that which goods are finishing or less in the stocks. It maintain and control the stocks in the shop. It will show the details of goods which have finished a year before within a same date. It analysis opening of new stocks, stock updates and capability to view remaining ones. It delivered quick way of operation by catching the manual process and automating them.

1.2　Introduction of structure of the report

Below is the format that represents how the structure of the report is organized.

Abstract

The abstract section displays the summary of the overall report.

Introduction

This section introduces about the subject matter of the project followed by its history, artefact produced and background to the project, Research method used, scope and Limitation, problem domain and Aim and Objectives of the project. Further, it also introduce the structure of the project.

Literature review and Background

In the literature review section, technology related to my project is described as well as the book, journal, article are reviewed, database research and mentioned the key point in the literature review also compare, contrast and evaluate with the similar system analysis with the system and finally included the finding of the research.

Design

In the design section, design related to my project is described which include System Requirement Specifications (SRS) document. This section also include process flow diagram, use case diagram, data flow diagram and wireframe diagram of my project.

System Analysis

This section explain about the different type of SDLC and comparison and selection of SDLC for my project, feasibility study, and methodology used also it's describe about the tools and technology used in my project. Also this section show the screenshot and description of my project major source code, GUI and major SQL queries.

Tools and technology Used

This session deals with the tools and technology used while building the system.

Testing

This section show the all the functional test of my project and the screenshot of test is also provided.

Answering the academic question

This session gives answer to the academic question that the system can satisfy or not.

Conclusion

This section describe the summary of achievement of the project. It further show the revision of the objectives that I have mentioned and also show the issues that may arise after implementing my project. At last, this section include the future work of my project which I will implement in coming future.

Critical Evaluation

This session deals with the evaluation of final report, software, findings, process, planning, management, quality of source found, etc. It also include my self-reflection, good and bad aspects of the project.

2. Literature Review

This session includes the current knowledge including substantive findings, as well as theoretical and methodological contributions to Inventory Management.

2.1 Background Research

I started research by identifying the need of Inventory Management System in the organization. Initially I bounded my research to find the general reasons that emerged the needs of Inventory Management System. I have used different techniques to collect the data that can clearly give us the overall image of the application. The techniques I have interview with the developers, visiting online websites that are presented as the templates and visiting some organization to see their Inventory Management System application (Kareem, 2014). Basically the following factors forced us to develop IMS application:

❖ Cost and affordability

❖ Lack of stock management.

❖ Effective flow of stock transfer and management.

❖ Difficulty in monitoring the stock management.

Android-based system is a complex system wherein information technology plays a major role. It makes the work stress-free, faster and more correct. Due to that fact, the computerized scheme has become necessary to small and big companies for they are estimated to give the best services possible. However, some businesses still desire sticking with the system that is not joined with technology (Santiago, 2016). Probable reasons are computer untaught staff and lack of funds. Companies, exclusively the big ones are suggested to switch from physical to automated systems because this will advance the efficiency and productivity of the business which will raise the industry's reputation (Gediya, 2013).

One of the most required after automated systems of different companies is a sales and inventory system which originates hand in hand. A sales and inventory system is very important in every organization because a good sales and inventory management can generate excellent output. Primarily, inventory work involves of input, output and restock. Input is a process of ordering new products into the inventory and exchanging the old products with the new ones. Meanwhile, the output is a technique of bringing out the products from the inventory for sales or technique and a refill is a process of growing the number of existing products in the inventory in order to satisfy the insufficient products or increasing demands (Fawad, 2015). Most of the trading market is using the traditional way in the inventory management system where a person is assigned to check and record the stock by hand using pen and paper. It is where actions with respects to all the stock will be archived. It is without a doubt that one of the most important roles played by today in nearly every area in the society mostly in business and marketing is the electronic system (Bronack, 2012). This system allows us to make very complete work and follows correct directives without error. The basic advantages of the system are to make the method fast and well-organized which means that they can procedure much more quickly than humans. Data recovery has to be searched in lots of registers slowly and it wastes a lot of time. It creates the data not dependable enough as it is hand written and there is a high possibility of errors to occur. Data recording consumes a lot of space since it is kept in cabinets and folders. It is also disposed to data loss where it could be lost because of incorrect file management (Junio, 2017).

According to the survey, the similar types of system are run by the supermarket as well as the Inventory in the city but those systems do not give those efficient results and work. So they are planning to replace the system if they get a new system which can solve their current problem efficiently.

2.2   Architectural Review

The programming language for the Inventory Management System application will be in Java since the JSP/Tomcat architecture will be used. Both types of clients will communicate with the server using Java Remote Method Invocation (RMI) with Secure Socket Layer (SSL). Thus, security will be upheld by HTTPS in both a private network and a network connection to the Internet. The application will use a client-server model (Miss. Kashid Pourima B., Miss. Pansare Shital S., Mr. Aher Harshal B.,Mr. Pilgar Ravikiran G.,Prof. M.R Bendre, 2017).

In the above figure 1, the Java Database Connectivity (JDBC) will use the SQL lite Connector/J driver for the server to communicate to the inventory database. Upon receiving requests from the clients, the server will issue transactions to the SQL lite database with ACID properties (Ramlee, et al., 2006).
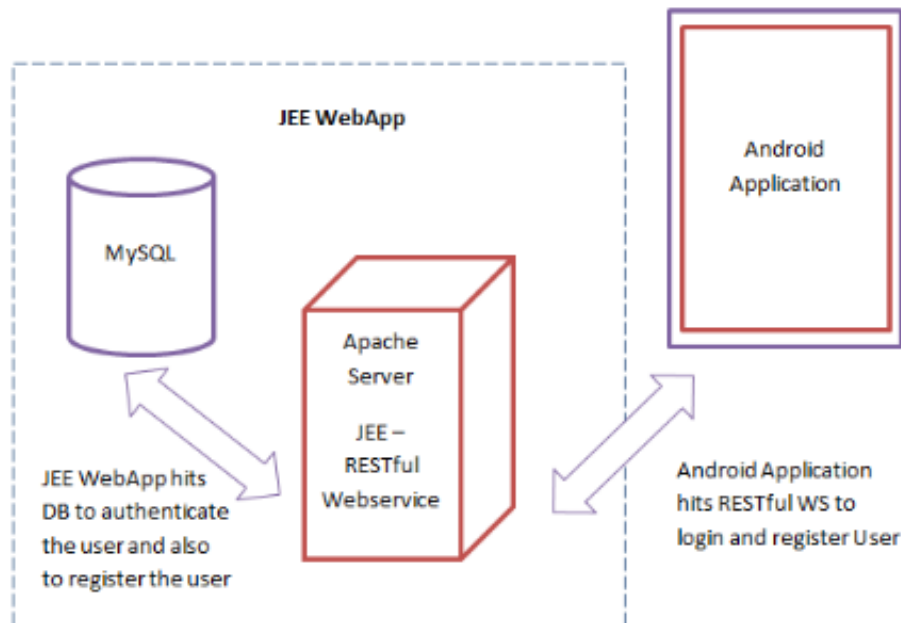

Figure 1 Client-server architecture model of the Inventory Management System application.

A number of studies have been done in the field of Inventory Management by various investigators. One of them is given below;

1. Author: Bern at de William year 2012

> This reading states that the central focus of Inventory management is on transportation and warehousing. The decision taken by management depend on the traditional method of inventory control models. The traditional method of inventory management is how much use in these days that author tell about it. He is also saying that the traditional method is not a cost reducing, it is so much expensive. But the managing the inventory is most important work for any manufacturing unit (D.Willams, 2013).

2.3   Difficulties in the Manual Inventory System

The current system operates a manual inventory system, from stocks, products, ordering, and purchases, etc. recorded in a book. This is faced with errors, incompleteness, and insufficient data for analysis. Information concerning stocks, products, sales, and purchases are still in black and white which is not correctly prepared and managed. From the traders to retailer bills, tickets, vouchers, receipts of products are documented in a book but additional operations are not being correctly handled. As a result, it is challenging in processing, updating, and handling (Mansoor_Gombe, 2012). The factors for these difficulties are:

Time Consumption:

Manual inventory systems are timewasting, as the business holder must keep track of inventory sales on an everyday basis while modernizing the system manually at the end of the day.

Poor Communication:

A manual inventory needs employees and managers to write down each time an item is removed from the inventory. If one employee overlooks to mention that the last coffee invention has been detached from the inventory, a manager thinks the item to still be available for a customer through a sale. Compared with a technical inventory system, a manual inventory system does not help communication in the workplace (Kareem, 2014).

Physical Counts:

A manual inventory system does not offer any number, as all numbers from the inventory are increased through physical inventory sums. One of the problems of running a physical inventory system is that physical inventory counts must be completed frequently to control the items in the inventory. This is time-consuming and can cost the commercial money if employees must come in to help out separate business hours (Sharma, 2014).

Daily Purchases:

Keeping track of daily purchases is another problematic supervisory measure with physical inventory systems. A manual inventory system requires the employees to write down the things sold throughout a single work day. This can be a difficult task, as one employee may lose the list of items sold or another may forget to write down a sale (Sheakh, 2018).

Ordering Supplies:

A physical inventory system does not update at the finish of the day with restructured inventory sums. This means you must go through the inventory things each time you need to place an instruction for new raw materials, products or supplies for the inventory. This can be a time-consuming procedure, as you will actually have to go through each creation box and peruse through the items (D.Willams, 2013).

2.4 Algorithms Research

The Apriori Algorithm

The Apriori Algorithmis an influential algorithm for mining frequent itemsets for boolean association rules.

Join Step: C_k is generated by joining L_{k-1} with itself

Prune Step: Any (k-1)-item set that is not frequent

Cannot be a subset of a frequent k-itemset

1) Pseudo-code:

C_k: Candidate itemset of size k

L_k: frequent itemset of size k

L_1= {frequent items};

for (k= 1 ; L_k != ∅ ; k++) do begin

Ck+1= candidates generated from Lk;

For each transaction t in database do

Increment the count of all candidates in C_{k+1}

That are contained in t

L_{k+1}= candidates in C_{k+1} with min_support

end

return $∪_k L_k$; (Wasilewska, 2018)

2.5   Database Theory Research

A database is a collection of information that is prepared so that it can easily be retrieved, achieved and modernized. In one view, the database can be classified according to types of content: bibliography, full-text, numeric, and image. In computing, the database is sometimes categorized according to their structural approach. A scattered database is one that can be distributed or computer-generated among various points in a network (Punam Khobragade, Roshni Selokar, Rina Maraskolhe, Prof.Manjusha Talmale, 2018).

2.5.1 Relational database

Inventory Management System has the relational database model. A relational database is an arithmetical database whose business is based on the relational model of data. This model organizes data into one or more tables of rows and columns. These tables here have the relation. The relation is maintained by the unique key defined in each row. The key can be primary and foreign dependent on their nature of joining. The normal user and application program interface to a relational database is the structured query language (SQL). SQL statement are used both for communicating queries for evidence from relational database and for collecting data for reports (Darwen, 2012).

Primary Key

The primary key of a relational table individually categorizes each record in the table. It can either be an ordinary attribute that is sure to be unique or it can be produced by the DBMS. A primary key's main features are:

❖ It must contain an exceptional value for each row of data.
❖ It cannot contain a null value.

Foreign Key

A foreign key is a column or group of column in a relational database table that provides a link between data in two tables. In foreign key location, a relation is designed among two tables when the column or columns that clamp the primary key value for one table are referenced by the column or column in another table thereby creating a link among them (CINDYSO1998, 2019). Creating a foreign key automatically contains the following advantages:

❖ Changes to primary key constraints are checked with foreign key constraints in relation table.

❖ An index enables the Database Engine to quickly find related data in the foreign key tables.

2.5.2 Structure Query Language (SQL)

The structured Query language (SQL) is the set of commands used to interact with a relational database. In fact, SQL is the only language the most database really recognize. Whenever you interact with such a database, the software translates your commands into SQL statement that the database knows how to interpret. SQL has three major Components:

❖ Data Manipulation Language (DML)

❖ Data Definition Language (DDL)

❖ Data Control Language (DCL)

2.6   End User/Client Description

This android app is for those kinds of the user who are facing the problem of keeping the record of their goods and other materials in the store. The user who does not have time to take care of their shop. In order to create a system, I have taken a survey and ask multiple questions related to my project to the different shopkeeper. Everyone comes to conclude that they are really facing the problem of goods damage, lost, and unmanaged way of keeping things (Fawad, 2015). After the survey, I start a feasibility study in this field. I found a good aspect to develop the Android application to improve the field.

2.7   Research Work (Technology)

1. **Java: -** Java is the only object-oriented programming language that is frequently used all around. The language is flexible and can run either in the virtual machine or in the browser window. Java is the official language for android development that covers of maximum parts of android. Java is Object oriented language that runs on almost all platforms. It makes integration easier with the support of API and easy to read and learn. Java have many open source libraries are available (Conder & Darcey, 2010).

2. **PHP: -** PHP (Hypertext Preprocessor) is a server-side scripting and open source language. It is used for general purpose development. Apart from server side scripting, PHP is also used for coding applications and command line scripting. The language created dynamic websites for both iOS and android. It is an open-source and has no specific platform with Server compatibility and Light database integration (php.net, 2017).

3. **MySQL: -** MySQL is used to create database and stored data. It is the most popular Open Source SQL database management system, is developed, distributed, and supported by Oracle Corporation. MySQL language is mainly popular for adding, accessing and managing content in a database. It is most noted for its quick processing, proven reliability, ease and flexibility of use.

4. **Google Map API: -** Google Map API is used to implement maps. Google Maps API is a set of methods and tools that can be used for building software applications. Google Maps API allows us to display maps on our android application. Maven is a site and documentation tool. Maven extends Ant to let us download dependencies. Maven is a set of reusable Ant script lets (Maven, 2017).

5. **Facebook API: -** Facebook API to integrate with Facebook and make application more user friendly. Facebook API is set of subroutine definitions, protocols, and tools for building application software. An API specification can take many forms, but often includes specifications for routines, data structures, object classes, variables or remote calls.

6. **Maven: -** Maven is a popular software project management tool that helps organize project dependencies using repositories. It is used for projects build, dependency and documentation. It simplifies the build process like Another Net Tools (ANT). But it is too much advanced than ANT.

7. **Gradle: -** A Gradle build consists of one or more projects. Projects can be something which should be built or something that should be done. Each project consists of tasks. A task represents a piece of work which a build performs, e.g., compile the source code.

2.8   Similar System (Compare, Contract and Evaluate)

Pro Active Inventory Manager

It is a Web based Inventory Management solution. Can be customized to your unique work flows. Hosted on ProActive servers or can be hosted on your server. Option to use barcodes and Mobile computing. . Built on Microsoft ASP.net and Microsoft SQL server database Data available for clients to use Adhoc reporting. Low cost Standard variety, or complete blown Enterprise version. Extensive set of versions for many Vertical industries (Sheakh, 2018).

BS1 Enterprise Accounting Free Edition

BS1 Enterprise Accounting Free Edition is a freeware program for inventory control and management which is useful for the small business section. This program has a same simple interface with very cool to use design. It has a different department like accounting, distribution, and manufacturing department which have further sub terms like sales orders, purchase orders, accounts payable, accounts receivable general ledger, inventory and much more (Fattah, 2016).

Vendor management systems

This system is a new trend for inventory management system. With this system the distributors can control inventory management for customers .The reports are calculated on daily basis and are transferred from the customer to the vendor. The data gathered from these reports lets the vendor knows when to recalculate the stock of the customers merchandise. This method significantly reduces the load of paper work /the cost and the labor .There are few drawbacks of using this method which is this will be difficult for the distributor/suppliers to keep up with demand of the product that is popular and is demanded by the customers from all around the world. Companies believe that the money saved in time and labor is worth the risks involved (Harrington, 2013).

Warehouse management system

WMS (warehouse management system) is a software application that supports day to day operations in the warehouse of company. The system enables centralized management of tasks such as tracking inventory levels and stock locations .WMS systems may be standalone systems or integrated with the ERP system.

Warehouse management system used previously could only store the data of stock locations .the current systems are so complex and data intensive that they require a dedicated staff to operate the system. High end system may include routing and tracking technologies such as RFID and voice recognition.

It does not matter how complex the system but the goal remains the same that to provide the management for information that it needs to move efficiently and control the movement of the materials within warehouse (Gediya, 2013).

2.9 Analysis of Reviewed Literature

According to the above literature review, there are similar types of the system but had many defects which cause the problem is the management of the Inventory. There are not proper methods to list out and show the details of the products. So, here we come with the solution to every problem faced by the Inventory's owner. The system will have features of barcode scanner which provides the details of the products and keep them tracking of their details, it also includes the latest technology which is user-friendly and easy to use.

3. Design

3.1 Step by Step Description of SRS Development

A software requirements specification (SRS) is an explanation of a software system to be established. It lays out functional and non-functional necessities and may contain a set of use cases that define user connections that the software must deliver. The SRS document is mainly created to list and describe the functional requirement of the project, which includes system features and other function, and another is the non-functional requirement.

To create the SRS system, First of all, I have written the purpose to create the android application and its scope. After that, I have described the major term that is used in the project and its definition. The next section of the SRS development I have described the overall system where I have mentioned about product function, Android operating environment, project limitation and project architecture with the figure. Then I have described the project major features which are the part of the functional requirement. These major requirements are further divided into three subcategories, they are Stimuli/Response Sequences, User requirement, and functional requirement. I have described other functional requirement as well as non-functional requirement in another section. With describing these content with a figure where appropriate, I have completely created the SRS document.

Software Requirement Specifications

Inventory Management System

Introduction

This section delivers a brief summary of everything included in this SRS document. This section also describe the purpose, project scope, abbreviations and their respective definition.

Purposes

The project is an android application to find the current doctor location who are on duty and also show the map direction to the doctor location and user location. This document describe the system's functional and non-functional requirements and also explain about the application function.

Project Scope

This document describe the application purpose, objectives, benefits and goals. This application use the abstract android class (AsyncTask), open source SQL database, and JavaScript Object Notation (JSON) and API framework as a main part of the application. AsyncTask is an intangible Android class which helps the Android applications to switch the Main UI thread in effective way. AsyncTask class permits us to achieve long long-lasting tasks/background procedures and show the result on the UI thread without disturbing the main thread.

AsyncTask is used in my application to download data from the server database to the android database with the help of SQLite Database. SQLite is an open source SQL database that supplies data to a text file on a device. Android comes in with built-in SQLite database implementation and it supports all the relational database features. JSON is used in my project when downloading the data and storing it in the SQLite database. While downloading data all the data are encoded in JSON and decode when storing in SQLite database. The Android platform runs a framework API that applications can use to cooperate with the original Android system. The framework API contains of: An essential set of packages and classes.

Definitions, Abbreviation, Acronyms

Term	Definition
Activity	A screen or menu inside an app that can be called on exactly. Use an app like Activity Launcher to open an activity directly.
Android	The world's most popular operating system for any platform. An open source platform that is developed by Google, but was originally derived from Linux as a touch-oriented fork of the popular desktop operating system.
AsyncTask	AsyncTask is an abstract class providing by Android which offers us the right to perform heavy tasks in the contextual and keep the UI thread light thus creates the application more approachable.
SQLite Database	SQLite is a sweeping source SQL database that stocks data to a script file on a device. Android arises in with built-in SQLite database execution.
API Framework	An application package interface (API) is a set of routines, protocols, and tools for constructing software applications. Basically, an API requires how software components should interrelate.
GUI	A kind of user interface that authorities operators to cooperate with automated devices through graphical icons and visual indicators such as minor notation, as a substitute of text-based user interfaces, typed command brands or text triangulation is the graphical user interface (GUI).

3.3   Design Diagram

3.3.1 Process Flow Diagram

Process Flow Diagram or Flowchart is a diagram which uses geometric symbols and arrows to define the relationships. It is a diagrammatic representation of the algorithm. The Process Flow Diagram of our application is shown below:
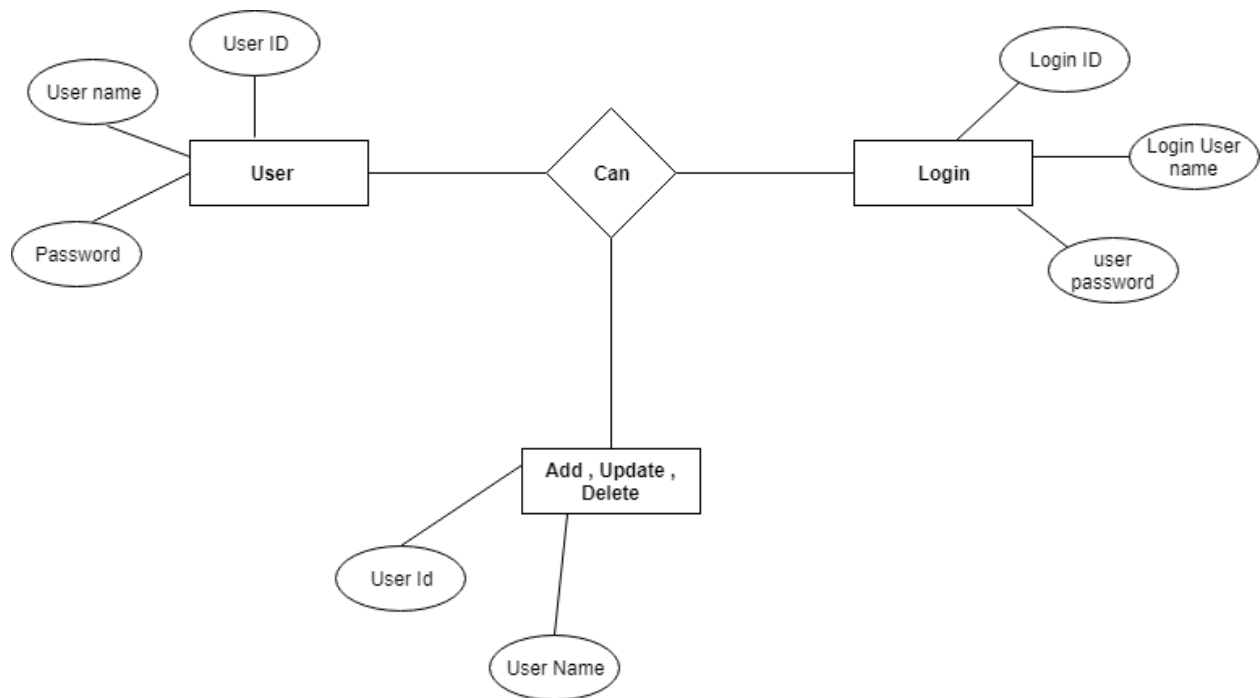

Figure 2 Process flow diagram

3.3.2 Use Case Diagram

The purpose of the use case diagram is to present a graphical outline of the functionality delivered by a system in relations of actors and their goals. The main purpose of a use case diagram is to demonstrate what system purposes are achieved for which actors.

Diagram Building Block

Use cases

A use case defines an arrangement of actions that deliver something of determinate value to an actor and is pinched as a horizontal ellipse.
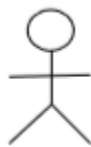
Actor

An actor is a person, association or exterior system that shows a role in one or more relations with the system.
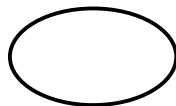
System boundary boxes (optional)

A rectangle is drawn around the use case called the system boundary box to indicate the scope of the system.
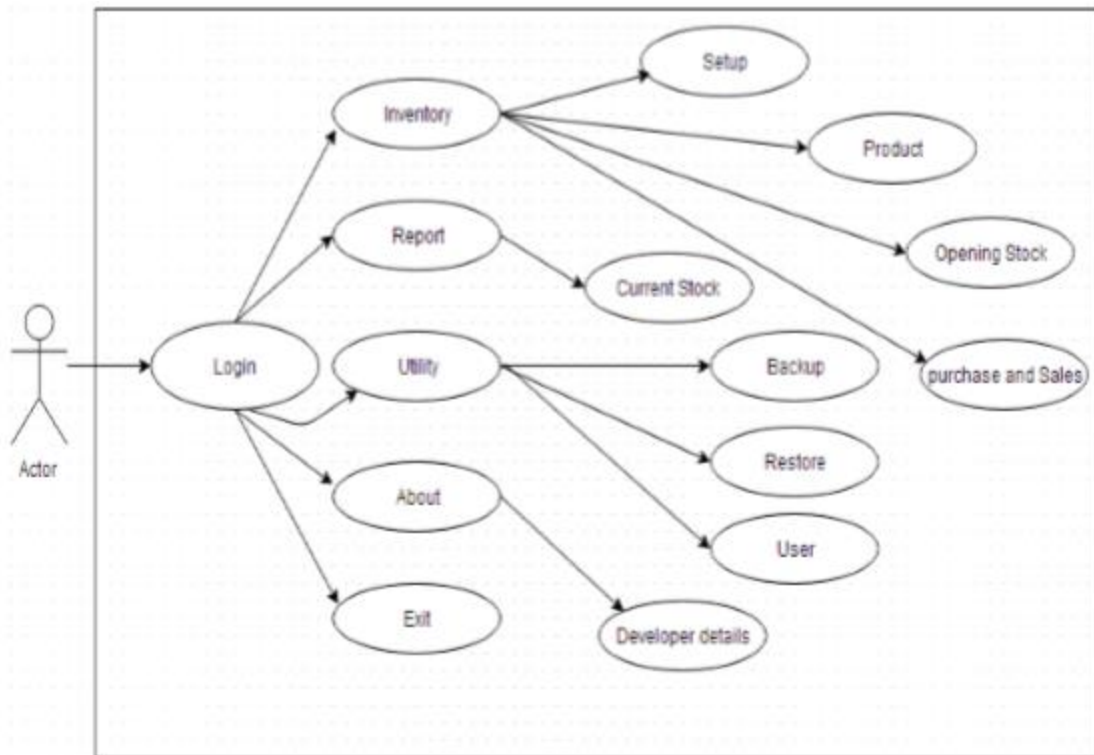
Actor

Use case
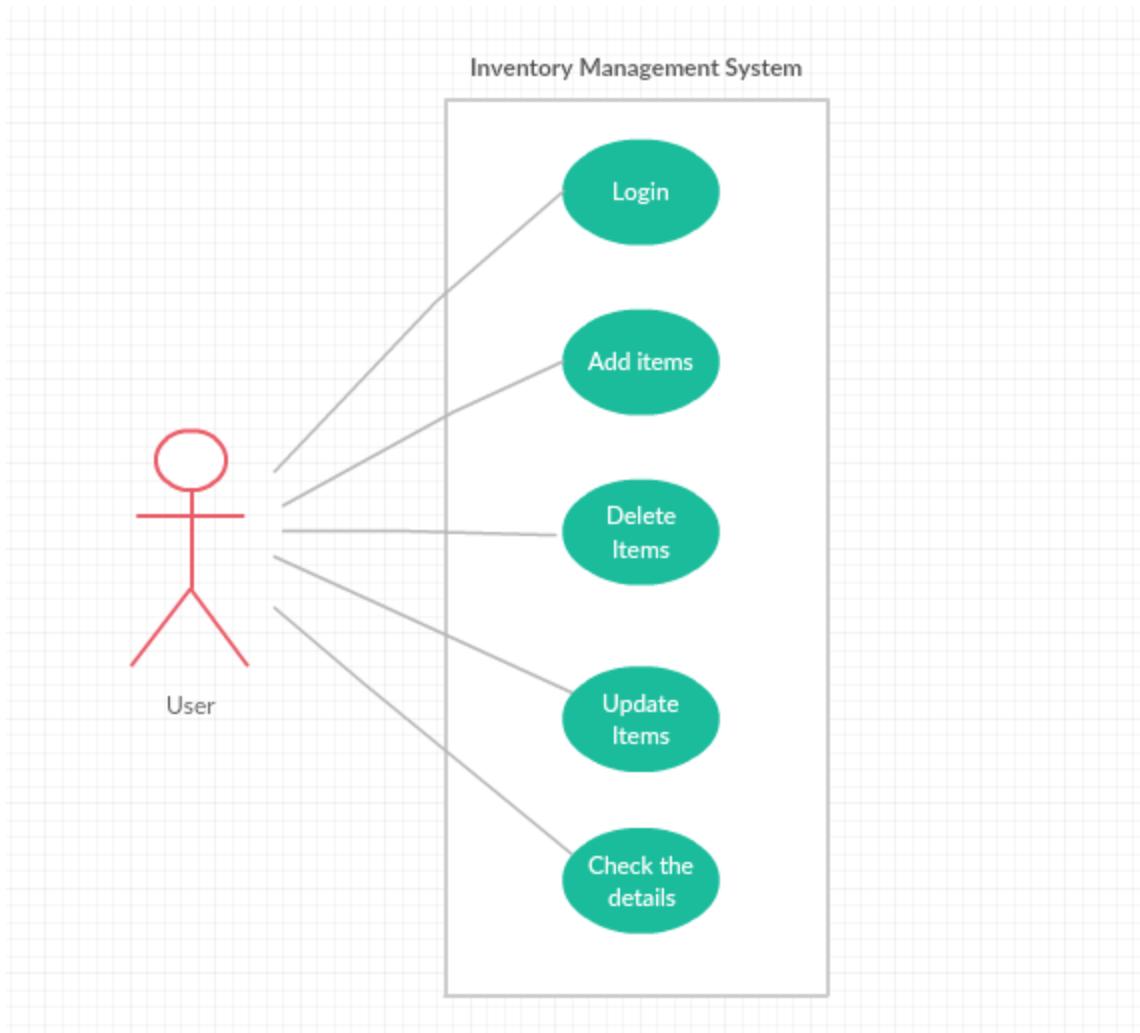
Figure 3 Use case Diagram

Figure 4 Use case Diagram for Single user

3.3.3 Data flow Diagram

Data flow diagram (DFD) provide a graphical demonstration of the system that purposes to be available to computer specialist and non-specialist users alike. The models allow software engineers, customers and users to work together successfully during the investigation and specification of requirements
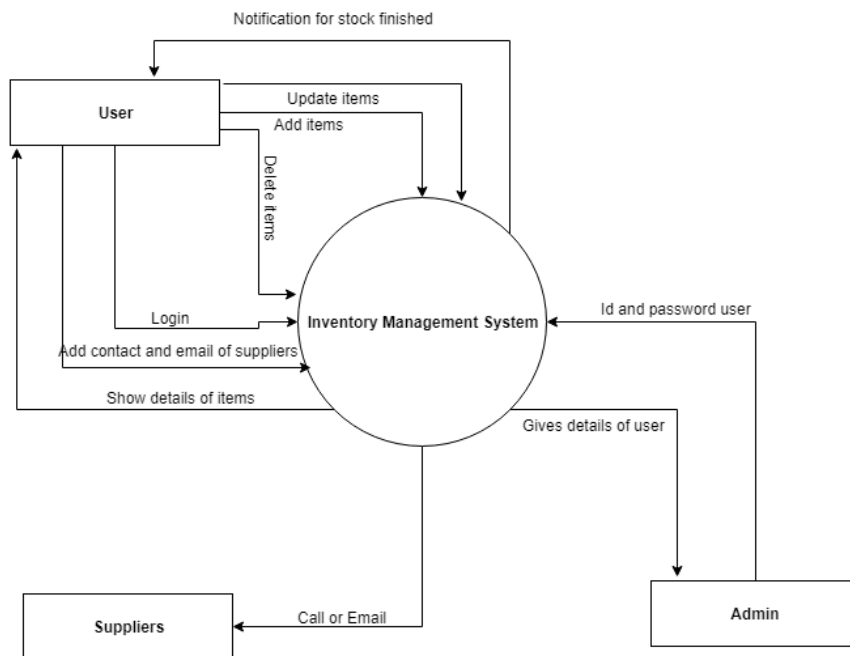

Figure 5 Data flow Diagram

4. System Analysis

4.1   Development Cycle

SDLC is a process followed for a software plan, within a software institute. It contains a full strategy telling how to develop, maintain, replace and alter or improve particular software. The life cycle describes a methodology for refining the feature of the software and the complete development process (Tutorials point, 2018).

The following diagram is a graphical illustration of the several stages of a typical SDLC:
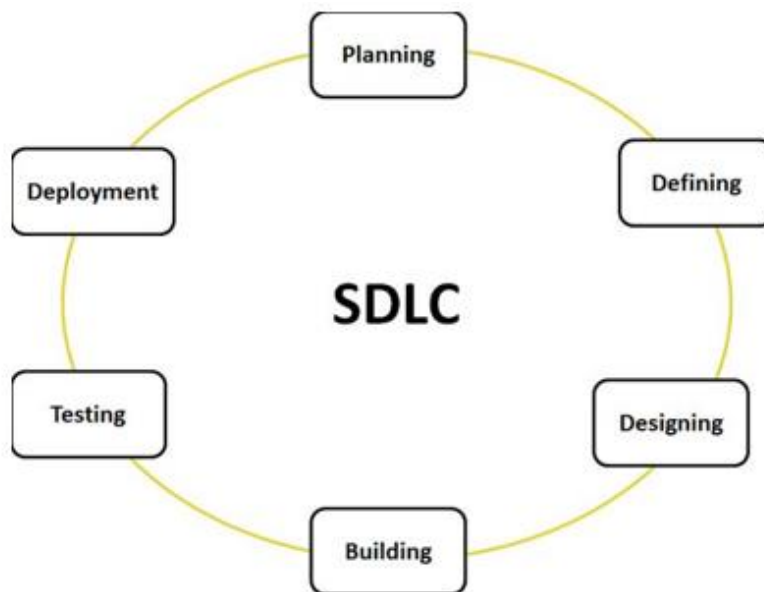

Figure 6. Graphical Representation of SDLC

Stage 1: Planning and Requirement Analysis

Requirement analysis is the most essential and important phase in SDLC. It is executed by the older members of the team with efforts from the customer, the sales branch, market surveys and domain specialists in the industry. This evidence is then used to plan the basic project methodology and to conduct a product feasibility study in the commercial, effective, and technical areas (Bronack, 2012).

Stage 2: Defining Requirements

Once the requirement analysis is finished the next part is to clearly define and document the product needs and get them accepted from the customer or the market analysts. This is prepared through SRS. Software Requirement Specification document which contains all the product requirements to be planned and developed through the project life cycle (Santiago, 2016).

Stage 3: Designing the product architecture

SRS is mention for product designers to arise out with the best design for the product to be developed. Based on the necessities detailed in SRS. Generally, more than one strategy approach for the product architecture is offered and documented in a DDS - Design Document Specification.

This DDS is reviewed by all the significant investors and established on different strictures as risk valuation, product strength, design modularity, budget and time limits, the best design method is designated for the product.

A design method clearly describes all the architectural components of the product alongside its announcement and data flow symbol with the outward and third-party components. The interior design of all the components of the

projected architecture should be clearly defined with the minutes of the specifics in DDS.

Stage 4: Building or developing the product

In this stage of SDLC, the real progress starts and the product is manufactured. The programming code is produced as per DDS during this phase. If the design is achieved in a complete and controlled manner, code generation can be skillful without much stress.

Developers have to track the coding rules distinct by their institute and programming tools like compilers, interpreters, debuggers and are used to produce the code. C, C++, Pascal, Java, and PHP are used for coding which is different high-level language. The programming language is selected with respect to the type of software being developed (V2Soft, 2017).

Stage 5: Testing the Product

This phase is commonly a division of all the phases as in the current SDLC models, the testing actions are regularly involved in all the phases of SDLC. However, this phase states to the testing only phase of the product where products weaknesses are reported, tracked, fixed and retested, until the product grasps the quality principles definite in the SRS.

Stage 6: Deployment in the Market and Maintenance

When the product is verified and complete to be deployed it is released officially in a suitable market. Sometimes product arrangement happens in phases as per the administrations, Business tactic. The product may first be out in a limited section and verified in the real business environment (UAT-User acceptance testing).

Then based on the response, the product may be released as it is or with proposed improvements in the pursuing market section. Next, the product is released in the market, its preservation is done for the existing customer base.

There are many SDLC methodology and some of them are as follows:

Waterfall Model

The waterfall model is the traditional model of software manufacturing. This model is one of the ancient models and is commonly used in government tasks and in many main corporations. As this model emphasizes planning in the early stages, it ensures design flaws before they develop. In addition, it is an intensive document and planning makes it work well for projects in which quality control is a major concern. The waterfall life cycle consists of several no overlapping stages; the model begins with establishing system requirements and software requirements and continues with architectural design, detailed design, coding, testing, and maintenance. The waterfall model works as a starting point for many other life cycle models (D.Willams, 2013). The steps of the waterfall model are shown in the given figure below:
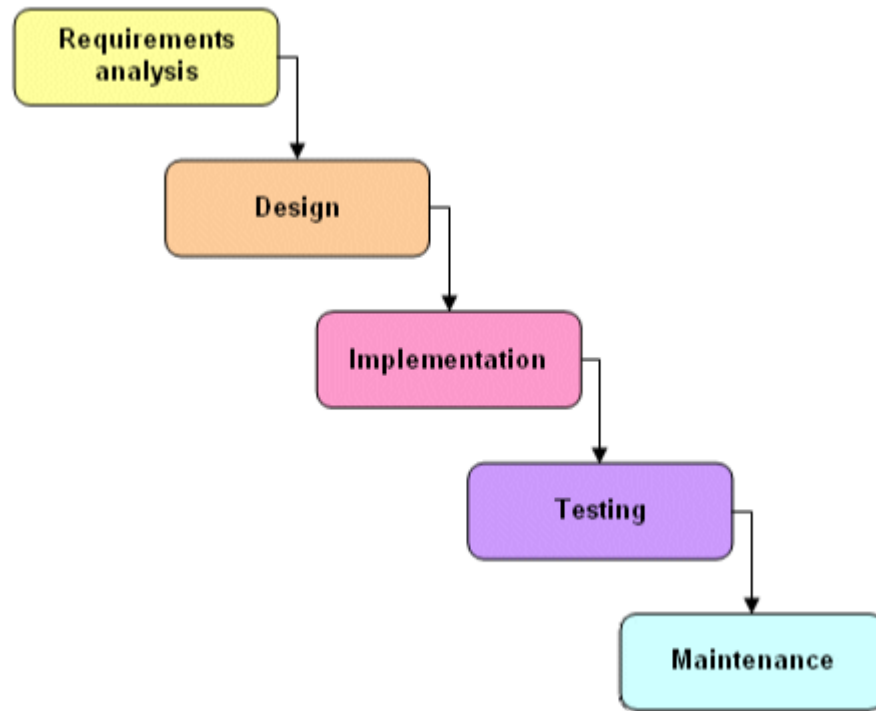
Figure 7 Waterfall Mode

Basic Principle

- ❖ Project is divided into sequential phases, with some overlap and splash back acceptable between phases.

- ❖ Emphasis is on planning, time schedules, target dates, budgets and implementation of an entire system at one time.

- ❖ Tight control is maintained over the life of the project via extensive written documentation and information technology management to occurring at the end of most phases before beginning the next phase

Iterative Model

An iterative life cycle model does not challenge to start with a full description of necessities. As an alternative, development arises by identifying and applying just part of the software, which can then be revised in order to classify additional necessities. This procedure is then recurrent, manufacturing a new variety of software for every single cycle of the model.
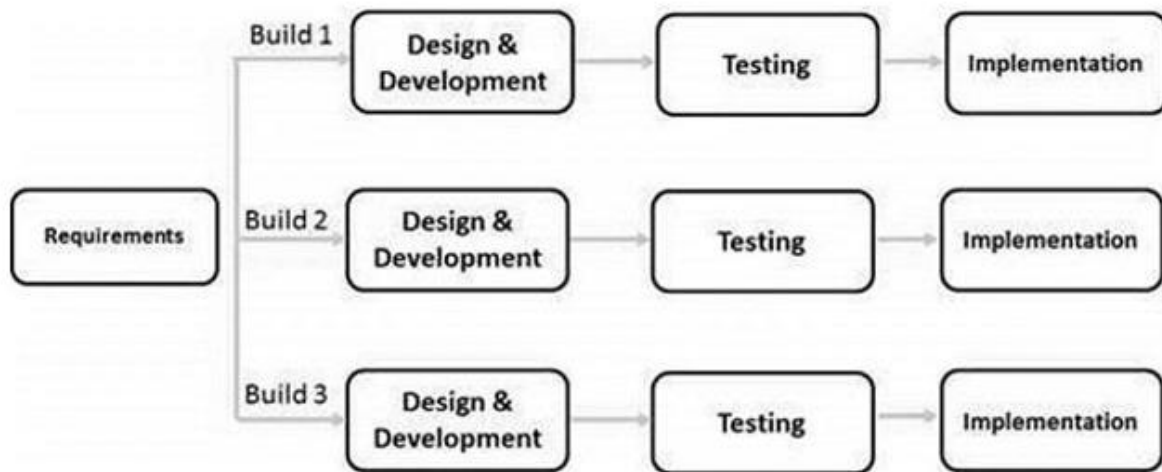

Figure 8 Iterative Model

Basic Principle

❖ Iterative model, the project is divided into small parts. This agrees the development team establish results before on in the method and gain a respected reaction from system users.

❖ Each iteration is actually a mini-Waterfall process with the feedback from one phase providing vital Information for the design of the next phase.

V-shaped Model

Just like the waterfall model, the V-Shaped life cycle is a progressive track of the implementation of procedures. Every stage must be finished earlier the next stage arises. Testing is highlighted in this model extra so that the waterfall model, however. The testing procedures are developed early in the life cycle before any coding is done, during each of the phases preceding implementation. Requirements arise the life cycle model just like the waterfall model. Earlier development is taking place, a system test design is generated. The test plan attentions on gathering the functionality identified in the necessities assembly. The high- level design stage emphases on system construction and design. An incorporation test plan is shaped in this phase as well in order to test the fragments of the software systems capacity to work together. The low- level design stage is where the real software gears are designed, and unit tests are produced in this phase as well. The implementation stage is, again, where all coding takes place. Once coding is complete, the path of implementation continues up the right side of the V where the test plans established previously are now put to use.
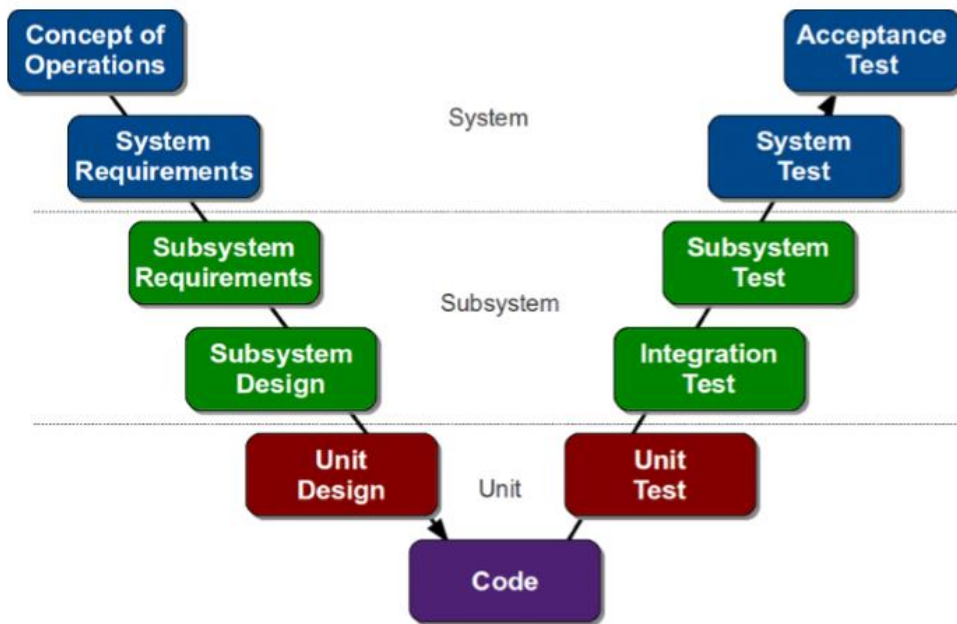
Figure 9 V Shaped Model

Spiral Model

This model was not the first model to argue iterative development, but it was the first model to clarify why the iteration matters. As firstly scheduled, the iterations were normally 6months to 2years long. Each stage creates with a design goal and ends with the user (who may be internal) reviewing the improvement thus far. Analysis and engineering efforts are useful at each stage of the project, with an eye in the direction of the end goal of the project. The procedure creates at the center location. From there it moves clockwise in traversals. Each traversal of the spiral usually results in a deliverable. It is not clearly defined what this deliverable is. This changes from traversal to traversal. For example, the first traversals may result in a requirement specification. The second will result in a prototype, and the next one will result in another prototype or sample of a product, until the last traversal suggestions to a product which is appropriate to be sold. Consequently the interrelated activities and their documentation will also developed towards the outside traversals. E.g. a formal design and testing period would be placed into the last traverse.
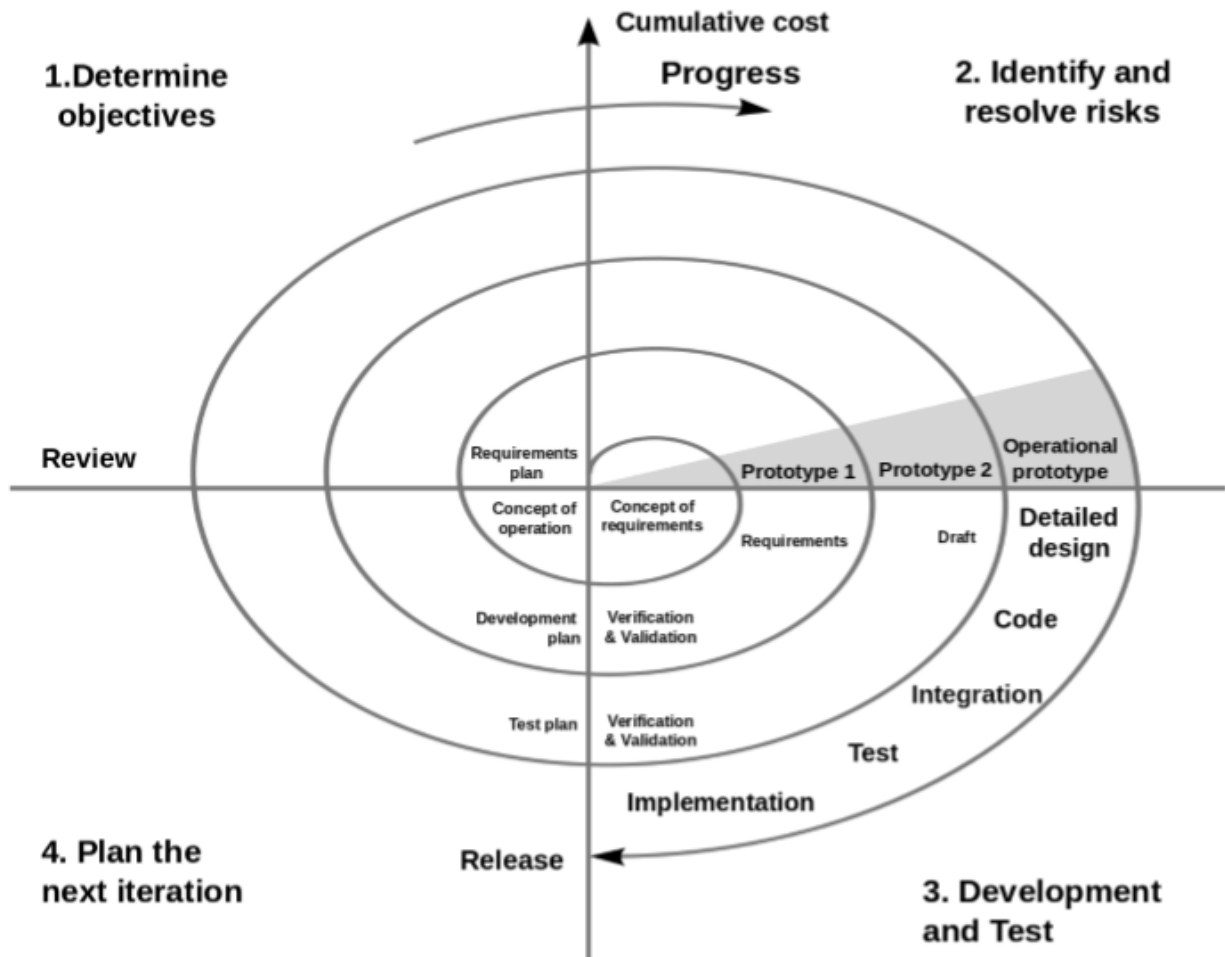
Figure 10 Spiral Model

Prototype model

The Prototyping Model is a systems development method (SDM) in which a prototype (an early estimate of a final system or product) is constructed, verified, and then studied as essential until an adequate prototype is finally done from which the whole system or product can now be developed. This model works best in scenarios where not all of the project necessities are known in detail ahead of time. It is an iterative, trial-and-error process that takes place between the inventors and the users. There are several steps in the Prototyping Model:

❖ The new system requirements are defined in as much detail as possible. This frequently contains interviewing a number of users demonstrating all the departments or phases of the existing system.

❖ A preliminary design is created for the new system.

❖ A first prototype of the new system is constructed from the preliminary design. This is usually a scaled-down system, and represents an approximation of the characteristics of the final product.

❖ The users thoroughly evaluate the first prototype, noting its strengths and weaknesses, what needs to be added, and what should to be removed. The developer gathers and studies the comments from the users.

❖ The first prototype is modified, based on the comments supplied by the users, and a second prototype of the new system is constructed.
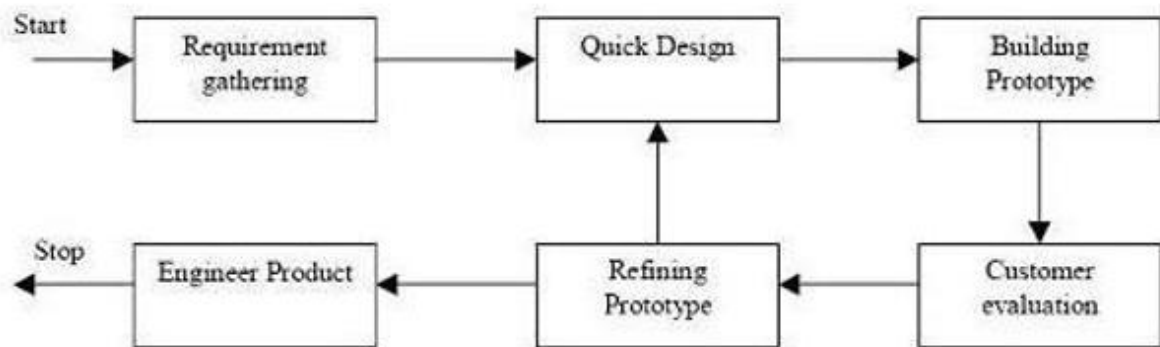
Figure 11 Prototype Model

Among the above mentioned methodology, I choose waterfall model because: -

❖ This model is easy to explain to the users and each phase has specific deliverables.

❖ Structures approach and is not focus on changing the requirements of projects.

❖ Stages and activities are well defined and any phase in the development process begins only if the previous phase is complete.

❖ Helps to plan and schedule the project and have a definite idea of what their program will do in the end.

❖ Verification at each stage ensures early detection of errors/misunderstanding.

❖ The waterfall model progresses through easily understandable and explainable phases and thus it is easy to use.

❖ It is easy to manage due to the rigidity of the model – each phase has specific deliverables and a review process.

4.2　Feasibility Analysis

This software has been tested for various feasibility criterions from various point of views.

4.2.1　Economic feasibility

The system is estimated to be economically affordable. The system is medium scale android application and has affordable price. The benefits include increased efficiency, effectiveness, and the better performance. Comparing the cost and benefits the system is found to be economically feasible.

4.2.2　Technical feasibility

Development of the system requires tools like:

❖ Android Studio 2019
❖ SQL lite.

Which are easily available within the estimated cost and schedule.

4.2.3　Operational feasibility

The system delivers better result to the libraries by totaling the typical requirement and requirements. The solution provided by this system will be satisfactory to ultimate result for the stock management (Fattah, 2016).

4.2.4　Schedule feasibility

The structured schedule for the development of the system is presented in the timetable sub-section. The reasonable timeline reveals that the system development can be finished on the desired time framework.

4.3 Selection of Methodology

The agile methodology is going to be used in the development of the system. Agile software development represents the software development methodologies which is constructed on iterative development, where desires and solution developed through the corporation among self-organizing cross valuable teams. It's a well-organized project management procedure that encourages frequent review and edition which agree with the rapid distribution of the software of high quality with consumer needs and business goals (cPrime, n.d.). Some of the features of the agile methodology are as follows:

❖ Quality

❖ Visibility

❖ Early Identification and resolution of issues

❖ Accommodating change due to volatile requirement(Flexibility / Agility)

❖ Iterative releases, Communication, continuous integration

❖ Transparency

❖ Early and Predictable Delivery

❖ Predictable Costs and Schedule (V2Soft, 2017).

4.4 Explanation of stages of Methodology Uses

The different stages of agile methodologies are

❖ Planning
❖ Requirement Analysis
❖ Designing
❖ Building
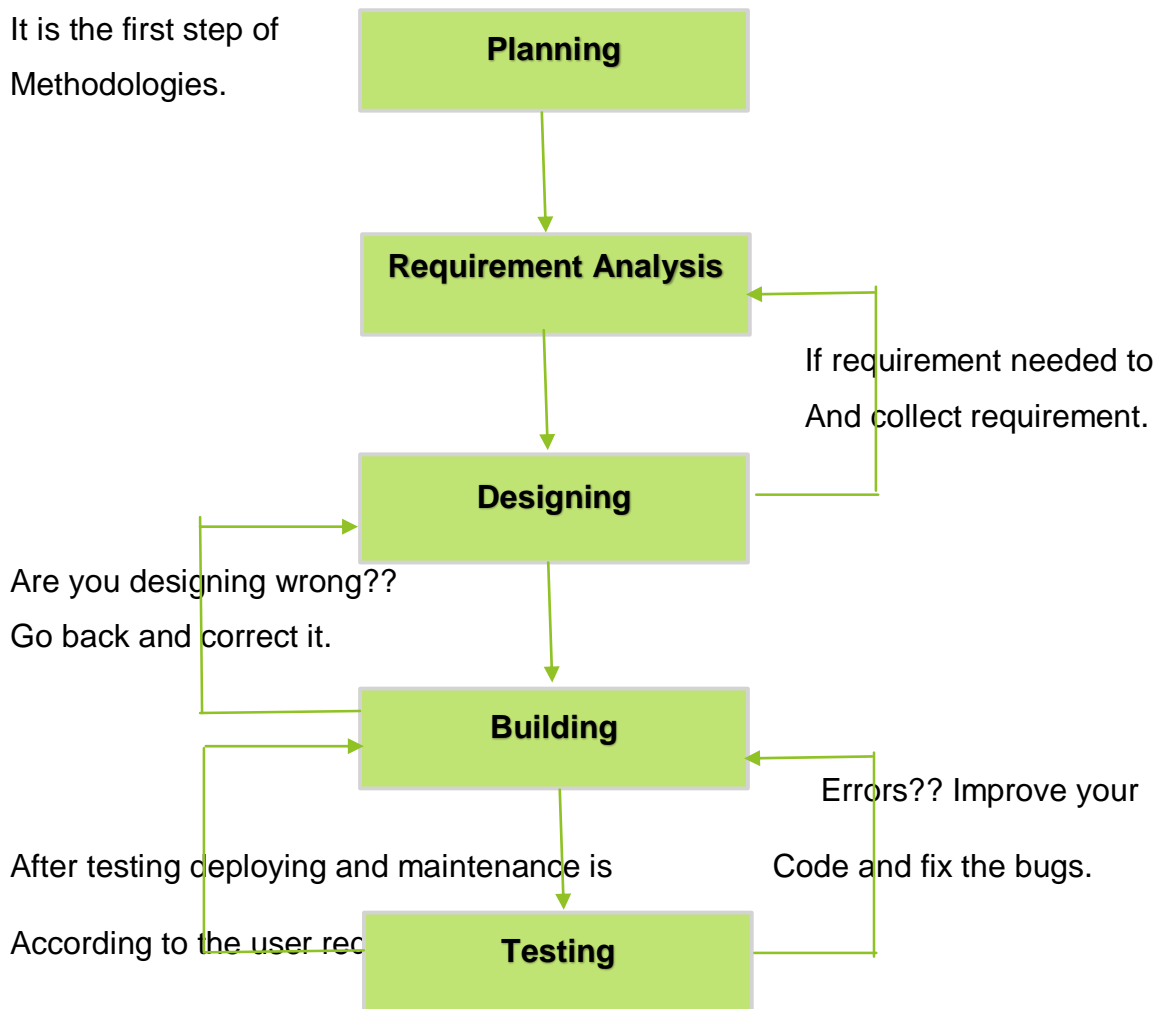❖ Testing (Tutorials point, 2018)

It is the first step of
Methodologies.

Planning

Requirement Analysis

If requirement needed to

And collect requirement.

Designing

Are you designing wrong??

Go back and correct it.

Building

Errors?? Improve your

After testing deploying and maintenance is

Code and fix the bugs.

According to the user req

Testing

Figure 4 figure showing the life cycle of agile methodology.

Planning

In this phase, the result making actions are done. It is alarmed with determining whether the project is worth doing or not Different cost estimate, the structural design of a project, applications, cost factors are determined. Threats, Constraints, Integration, and security of the system are also measured in this stage (Sharma, 2014).

Requirement analysis

In this stage the dissimilar necessities which are needed for the project are resolute. The scope is determined in term of use cases, actors, Logistic span, Telecommunication needs, and technology platform essential. The necessity of the user is to deal at this stage. The information need of end user and growths of system goal are surveyed. It also includes the SRS document.

Designing

In this phase designing of an application, network, database, user interface, system interface are done. Creation of eventuality, training, maintenance and operation plan are also done at this stage. And the planned design is reviewed and the final design ensures which meet the requirement of SRS document. (Tutorials point, 2018)

Building

In this phase, the design is executed into source code through coding and all modules are combined together. All the programming part are done in this phase.

Testing

This is the phase which is focused on investigation and discovery. It is the phase where developers find out whether their code and programming are work according to customer requirement in which the project team develops the test plan. It contains quality assurance, system integration testing and user acceptance testing (V2Soft, 2017).

4.5   Development Engagement

4.5.1   Screen Shot of GUI and its Description

At first we login with Id password then the dashboard page will appear then we go to main page by clicking current stock.
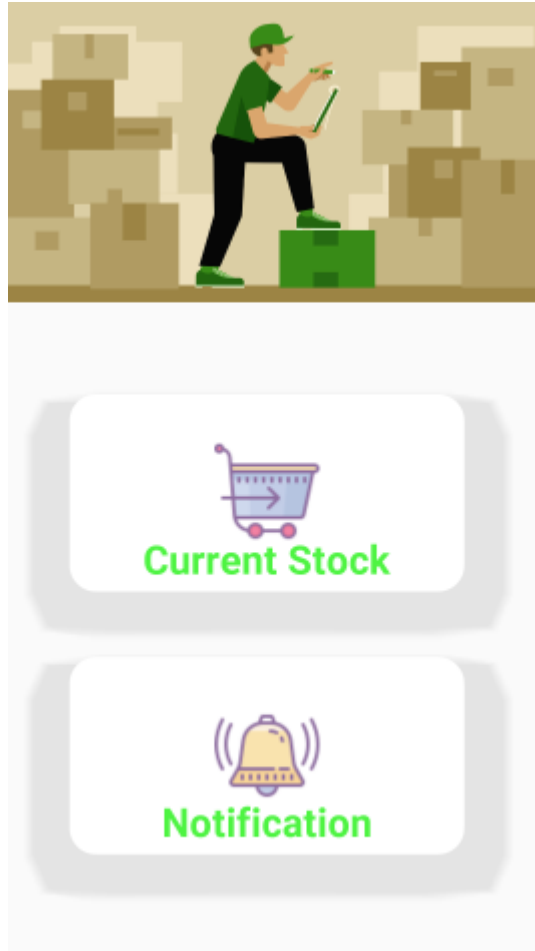

Figure 12 Dashboard Page after login

Page after clicking Current stock where we can add items.

Figure 13 Page after clicking Current Stock where we can add items

Adding Items details.

Figure 14 adding the details of Items

Items details added.
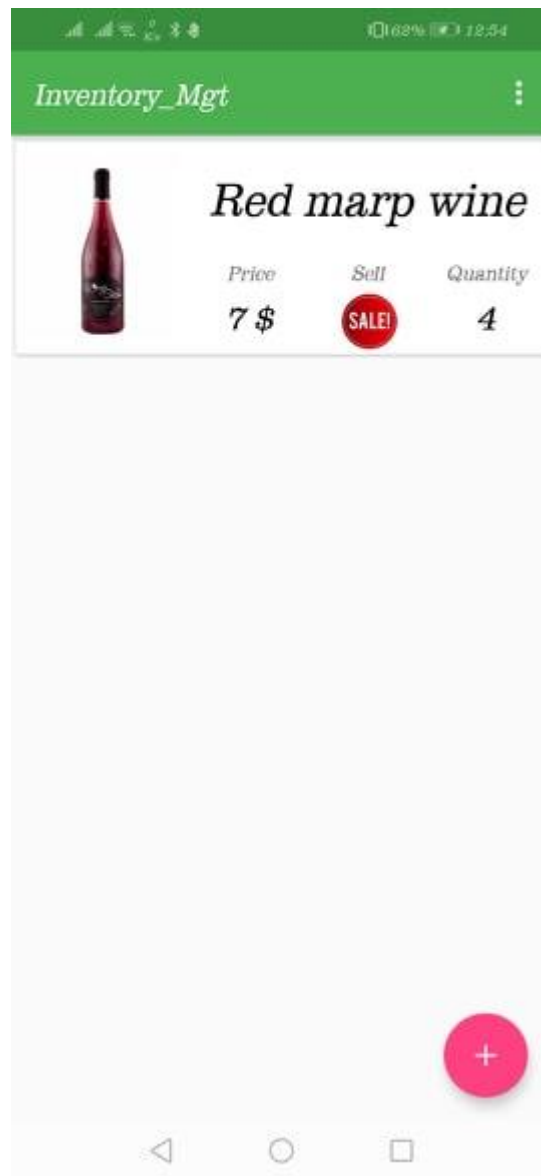
Figure 15 Item added

Editing the items details.

Figure 16 Editing the Item details

Message after editing items details.

Figure 17 Item Uploaded message
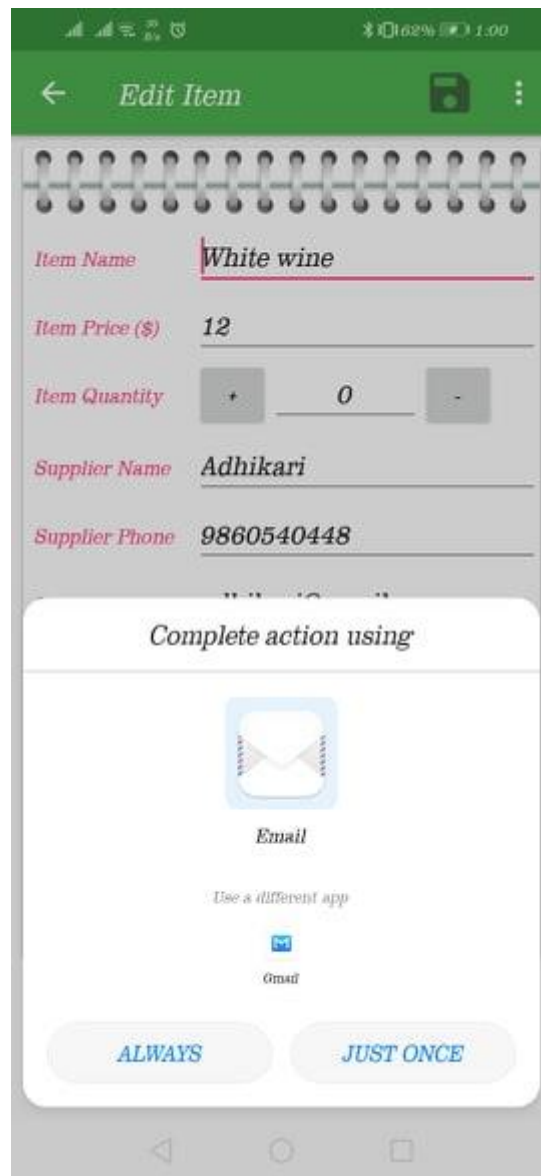
Email option for ordering new items from seller.

Figure 18 Emailing to supplier to order more
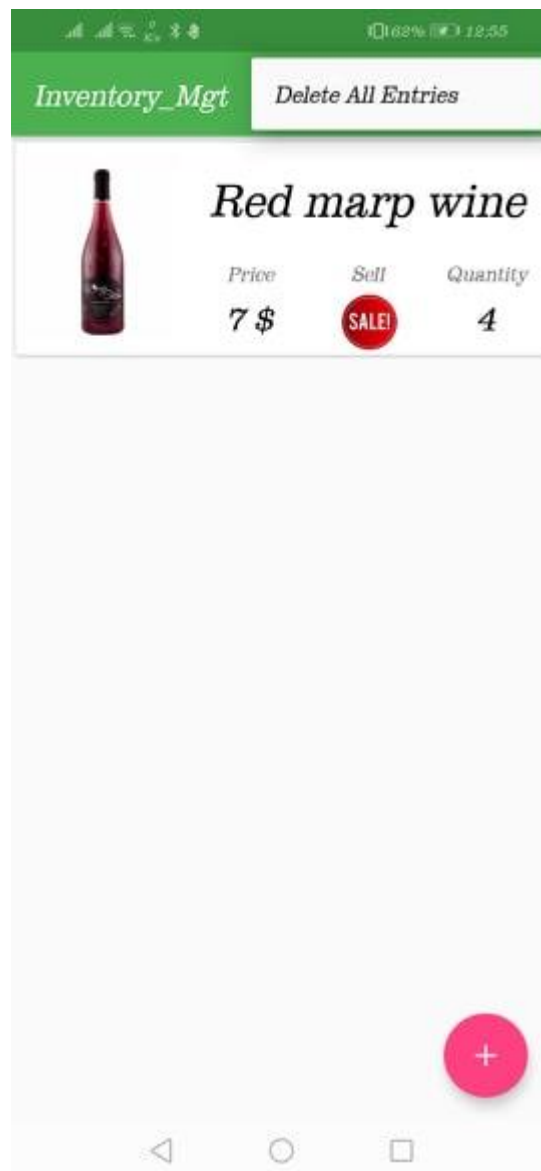
Delete add items options.

Figure 19 delete all item option

Page after deleting all items.

Figure 20 Page after deleting all items

5. Tools and Technology Used

Software Resources

Different software resources are required for building the app

❖ **Android**

Android is the platform for a programmer to build the android application. It makes life meaningfully informal compared with non-specialist software. It is an open source software and it gives access to a different platform.

❖ **Photoshop**

Photoshop is a powerful raster based graphics program produced by Adobe cooperation. Which is used to create designs which contain the feature of resizing, photo restoration, website graphics and building the high quality of website prototype or application prototype (Ketchum, 2018).

❖ **GitHub**

Git is used by a computer programmer, Developers and designers to store enlargements and keep track of changes to their files. It's a cloud-based server that revolutionized real-time collaboration between digital workers. And it is open source. Which helps collaboration simple, version control made easy.

❖ **MySQL server**

MySQL is RDMS structured query language. This application is used for a wide range of purposes, including data warehousing commerce and login applications. So for the database of the application MySQL is used.

❖ **Xampp**

It's a widely used web server software. It is an open source software which is free, which allow to setting virtual hosting in own computer.

❖ **Axure**

Axure is the modern tool which replaced the previous tool Visio. Axure handles flow charts/diagram, wireframe, and prototyping. Due to its huge feature set, flexibility, iterate faster it is widely popular nowadays.

Hardware requirements needed for the project

❖ **Wi-Fi**

It is an important part of the system making. We need to research many information and details for making the system.

❖ **Laptop**

The Laptop is the most necessary factor for making software all generating works are done on the laptop.

6.   Testing

6.1   White and Black Box Testing

Two basic approaches to software testing are black box testing and white box testing. White box testing based on an examination of interior working and construction of a piece of software. It only checks how the system processes the input to generate the required output. On the other hand, black box testing concentrate on the practical requirement of the software. Black box testing is an important part of accuracy testing but its thoughts are not limited to correctness testing only. Black box testing is complementary to white box testing technique and likely to uncover a different class of errors then white box method. Black Box testing is better than (Khan, 2011).
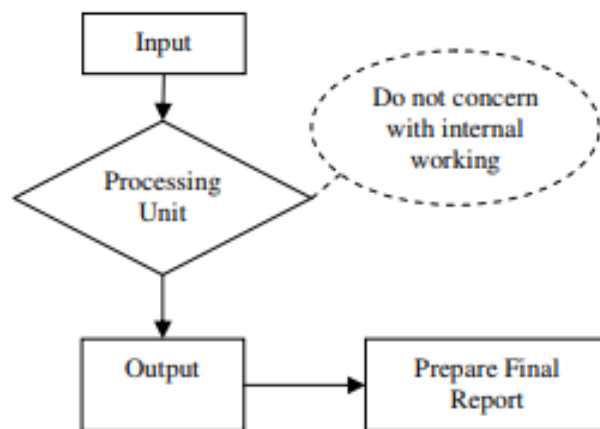

Figure 21 Working process of black box testing technique

Below are the steps which explain the working process of Black Box Testing:

Step 1: Input: Requirement and functional specification of the system are examined. High-level design documents and application block source code are also observed. The tester chooses valid input and rejects the invalid inputs.

Step 2: Processing Unit: Do not concern with the internal working of the system. In processing unit tester constructs test cases with the selected input and execute them. Tester also performs load testing, stress testing, security review, and globalization testing. If any defect is detected it will be fixed and re-tested.

Step 3 Output: After all these testing, the tester gets the desired output and prepares the final report.
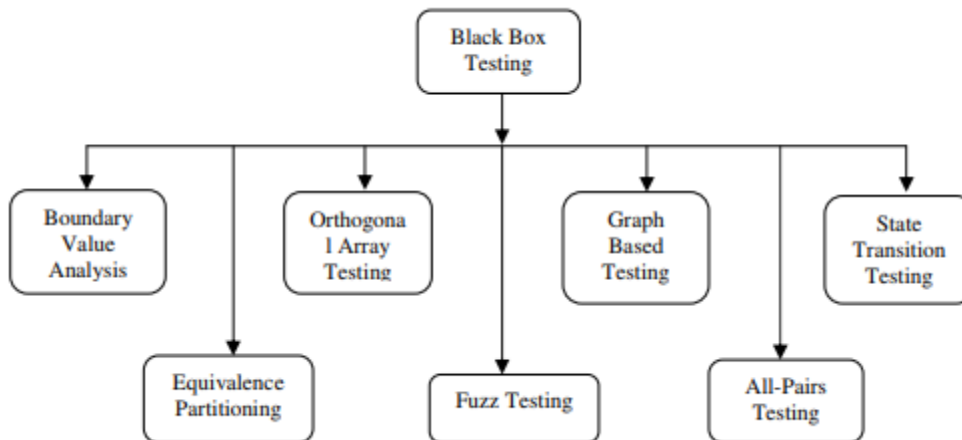

Figure 22 various forms of black box testing.

6.2 Test Cases

Case 1: Adding Items

Adding Red marp wine in the system. At first we need to click in add button then the detail should be added. After fill all the details we need to save it by clicking the save button right above side.

Figure 24 Adding Red marp wine

Figure 23 Adding details of Red marp wine
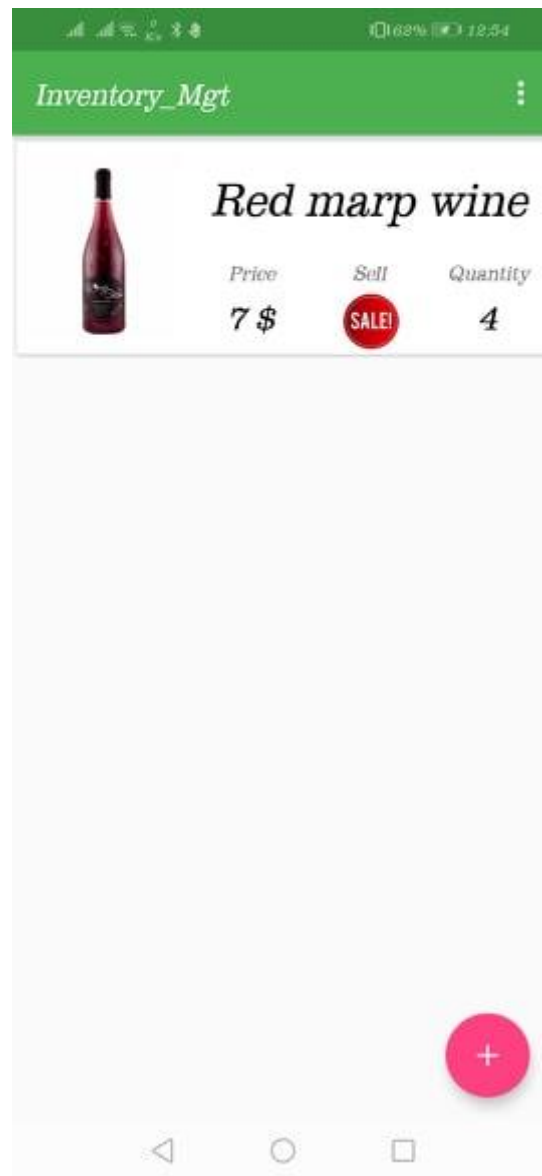
Output

Figure 25 Red marp wine added.

Case 2: Editing the Items

        For editing the details of the item we need to click on that item and edits the fields which we want to edit. After that we need to save it then it will updated.
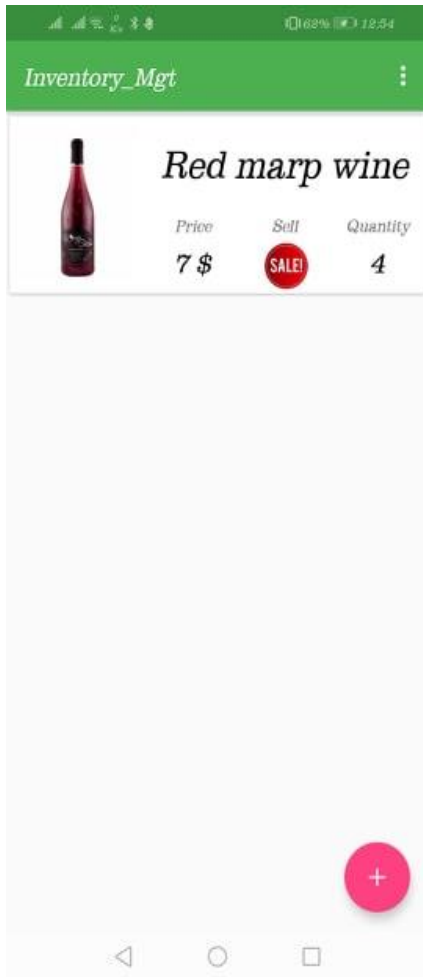
Output:

Figure 28 editing price and quantity of Red marp wine.

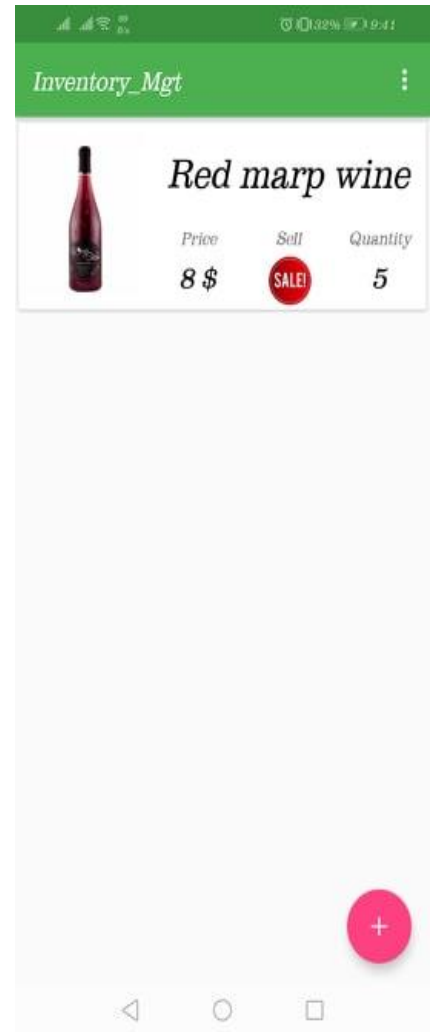*Figure 27 editing the value*

Figure 26 Output after editing

Case 3: Deleting the Items

To delete item we should click on the item then click in the top right corner there is three dotted line deleted item option pop out. Than you should click the delete item. It will delete the item.

Output:

Figure 30 Deleting option for Red marp wine

Figure 29 Item deleted message pop out

6.3 Test Result

Test Case	Test Result
Case 1: Adding Items	Success
Case 2: Editing the Items	Success
Case 3: Deleting the Items	Success

7. Answering the Academic Question

After the development of the system, I conduct the survey among the salesman by giving them my system to test. They all response positively. The system can easily add, delete and update the items. It also alert the user that your items is about to finished. It has capacity to learn from past that and can inform the user that you should have this one items in the stocks. It learn from pervious data where the items finished earlier in which date, climate and situation. It analysis this type of data and give feedbacks to the user so that user can have enough stocks and can earn in a good way.

Future work

The task that I am going to implement in my project in coming future are as follows:

❖ RFID features which can easily add items by scanning QR code.
❖ Can predict using past data.
❖ Good UI and UX.

8.   Conclusion

"Inventory Management System" developed for a company has been aimed to achieve maximum effectiveness and reduce the time taken to handle the payroll activity. It is designed to replace an existing manual record system thereby reducing time taken for calculations and for keeping data. The system is strong enough to withstand progressive daily operations under situations where the database is maintained and clear over a certain time of span. The implementation of the system in the organization will considerably reduce data entry, time. It has each simple thing which is used for the small organization. Our team is successful in making the application where we can update, insert and delete the item as per the requirement. This application also provides a simple report on a daily basis to know the daily sales and purchase details. This application matches for the small organization were there small limited if godwits. Through it has some limitations, our team strongly believes that the implementation of this system will surely benefit the organization (Bronack, 2012)

After doing this project I have learnt what android application really is and how it was developed. I have also learned to draw a block diagram of complex architecture to simple form to understand it easily. While doing this task, there is some specific troubles and to overcome from those challenges I took help from various Books, Journals, sites like YouTube, articles and manuals etc. I discuss with my supervisor and reader for developing application and writing report.

9.   Critical Evaluation

During the time of development, it has enabled me in conducting researches on the most widely used android system and relational databases in the world. I have learnt many things and I have also faced with different problems related with this development in the system. I have got problems with finding the appropriate links and sites for research. I have some problems in writing SQL syntax. I have handled these problems carefully, sometimes I have discussed with supervisor and readers to overcome the problems.

Finally, with this system I could see my career in different fields of android application and database which make me easy to implement in my upcoming future.

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❖ http://www.asapsystems.com/barcloud/inventory-management-software-online.php

Appendices

1. What is your role within and organization?

   ❖ Manager
   ❖ Developer
   ❖ Accountant
   ❖ Engineer
   ❖ Others

2. What is the current way of tracking the inventory at the organization?

   Ans:

3. Do you use inventory management application?

   ❖ Yes, for my personal use.
   ❖ Yes, for my professional use.
   ❖ Yes, for both.
   ❖ No, I don't know how to use it
   ❖ No, because I don't know what is it.

4. If yes, what software or application do you use? If yes, how often do you use the inventory management application?

   ❖ Daily
   ❖ Weekly
   ❖ Monthly

5. On which platform would you prefer to use the application?

   ❖ Desktop /laptop using Web application.
   ❖ Mobile application.
   ❖ Both.
   ❖ Others.

6. About the low levels of inventory in the inventory, how do you manage the inventory?

 ❖ Email
 ❖ SMS
 ❖ Call the manager
 ❖ Update inventory status
 ❖ Other