E-STORE

Final Year Project

Session 2018-2022

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Department of Software Engineering

Faculty of Computer Science & Information Technology

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* The candidates affirm that the work submitted is their own work and that proper credit has been given when other people's work has been referenced.

Plagiarism Free Certificate

This is to confirm that I am Alisha Arif S/O Arif Masih, group leader of FYP at Computer Science Department, The Superior College, Lahore, under registration number BCSM-F18-334. I certify that my supervisor reviews my FYP report.

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Project Report

[E-STORE]

Change Record

Author(s)	Version	Date	Notes	Supervisor's Signature
Alisha Arif Afan Ahmed	1.0		Chapter#1	
Alisha Arif	1.1		Chapter#2	
Alisha Arif Afan Ahmed	1.2		Chapter#3	
Alisha Arif Afan Ahmed	1.3		Chapter#4	
Alisha Arif	1.4		Chapter#5	
Alisha Arif Afan Ahmed	1.5		Chapter#6	
Alisha Arif	1.6		Chapter#7	

APPROVAL

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PROJECT MANAGER

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Date:_____ Signature:_____

HEAD OF THE DEPARTMENT

Comments: _____

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Date:_____ Signature:_____

Dedication

With the prayers of our parents, other family members and friends without whose uncontained help; we could not have made this career in project development.

Acknowledgements

I am very appreciative of my supervisor, who has Mr. Talha Amjad for his motivational and valuable suggestion throughout the BS(CS) Program. We also extend thanks to other Faculty member for their cooperation during my program.
Finally, we would like to thanks my friends for their cooperation to complete this project.

Executive Summary

We intend to develop a software system for managing stores. It is a project that customizes underlying software. The software and data of the products customers and store employees will manage all the details. The Point of Sale system will handle all orders placed through the online store. The user can search for and modify all of the product details in the store to get the item they need.

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Chapter 1

Introduction

Chapter 1: Introduction

E-Store is a complete E-Commerce Store having linked to a Point of Sale system. There will be an admin panel for the website with complete customizing functionality and Point of Sale system which will perform all billing and inventory managing tasks. All the orders from the E-Commerce Store will be responded through the Point of Sale system. The website and the Point of Sale software will be interlinked with each other. From the website admin panel complete website will be able to customize e.g. admin can change the Color Scheme, Theme Style, Logo , Content on the Pages etc.

1.1. Background

E-commerce began as a standard for the transmission of commercial documents, such as orders or invoices, between suppliers and their commercial customers.
Those origins date back to the Berlin airlift and blockade in 1948–1949, a time when a system of ordering goods that relied mostly on telex was in operation.

1.2. Motivations and Challenges

To develop E-Commerce Website and Point of Sale system combined.
To develop the easy management of the Departmental-store.
To handle the inventory details like sales details, purchase details and balance stock details by connecting with one database of both website and POS.
To make website that Admin Customized in the Website e.g updated LOGO, updating Website content , updating themes and appearance.

1.3. Goals and Objectives

All the existing systems that are available in the market have some drawbacks like they have to purchase E-Commerce Website and Point of Sale system separately. Both the Website and software are not interlinked. On the other hand Website Owner need to hire someone else to

manage little updates in the Website e.g updated LOGO, updating Website content , updating themes and appearance.
Today's Frameworks are bit difficult to handle and to use. Client needs some easy framework where they can update daily use things on the website.

1.4. Literature Review/Existing Solutions

As the many systems are running at different organization. So our aim to compete the market systems also do something different from the others. By seeing the requirements of the customers OR user of the system we are trying to develop best system. We develop multiple functionality system. Our software is quite different form the existing soft wares in the market because it will be more responsive and fast working software.

1.5. Gap Analysis

Gap analysis results in a thorough investigation.

Issues you are currently having with your performance

the causes of the issues

Solutions that might be found and their associated costs

You'll have hard data on which to base your judgments and a roadmap to lead you rather than "shooting from the hip" or using sheer force.

1.6. Proposed Solution

We are going to introduce a complete E-commerce Web App along with Point of Sale System. All the order received are managed and updated in Website as well as in POS System. All the billing System is also managed through POS System.

POS System includes:

- Inventory management System
- Billing System
- Bar code reading
- Invoice printing
- Monthly Report Generating
- New order alert
- Order Manager

There is an admin panel with the website which has complete customizing access. All the website will be customize on single click e.g updated LOGO , updating Website content , updating themes and appearance.
Both website and POS System are very easy to manage by Owner.

1.7. Project Plan

We are flowing a simple plan to developing this project. Frist we analysis the user requirements than finds the basic and necessity wants of the system. Than make solutions for the desire requirements. Implements the first practical trials of the software. Complete the evolution process of the software. Make updates in the system a then finalize the complete final system.

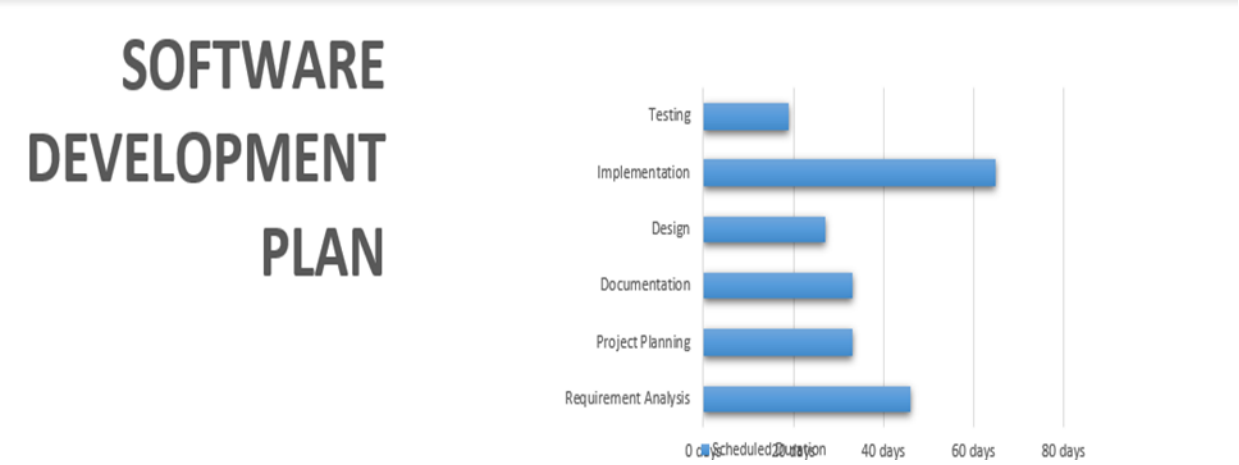
1.7.1. Work Breakdown Structures

Sno	Deliverable	Activity#	Achieving the deliverable through activity	Duration (No. of days)	Team Member(s) Responsive to Their Role (s)
1	Requirement Analysis	1.1	Problem Statements	10 Days	Alisha
		1.2	Requirement Gathering	24 Days	Alisha Afan
		1.3	Analysis	24 Days	Alisha Arif Afan Ahmed
		1.4	Project Scope	4 Days	Alisha Arif Afan Ahmed
2	Project Planning	2.1	WBS	7 Days	Both
		2.2	Roles & Responsibilities	6 Days	Both
		2.3	Gantt Chart	1 Days	Both
		2.4	Change Control Management	2 Days	Afan Ahmed
3	Documentation	3.1	Project Plan Document	3 Days	Both
		3.2	Functional & Non-Functional Requirements	7 Days	Both
		3.3	Use Case Diagram	7 Days	Both
		3.4	Class Diagram	2 Days	Afan Ahmed
		3.5	Activity Diagram	2 Days	Both
		3.6	Sequence Diagram	4 Days	Both
		3.7	Operational Contract	2 Days	Alisha Arif Afan Ahmed

1.7.2. Roles & Responsibility Matrix

Sno	Deliverable	Achieving the deliverable through activity	Duration (# of Days)	Team Member(s) Responsive to Their Role (s)
1	Planning	Develop Requirements, Research Hosting Option		Alisha Arif Afan Ahmed
2	Implementation	Develop POS and website		Alisha Arif Afan Ahmed

1.7.3. Gantt Chart



Chapter 2

Software Requirement Specifications

Chapter 2: Software Requirement Specifications

2.1. Introduction

2.1.1. Purpose

We purchase every item we need on a daily basis from the e-store since they must maintain records of their products, numerous suppliers, customer information, personnel, etc. Most of these tasks are carried out manually or with outdated software. We are going to introduce a complete E-commerce Web App along with Point of Sale System. All the order received are managed and updated in Website as well as in POS System. All the billing System is also managed through POS System. There is an admin panel with the website which has complete customizing access. All the website will be customize on single click e.g. updated LOGO, updating Website content, updating themes and appearance.
Both website and POS System are very easy to manage by Owner.

2.1.2. Document Conventions

Documentation rules are followed in order to create website and POS.

2.1.3. Intended Audience and Reading Suggestions

The documents are intended to the supervisor for the purpose of the complete description of the Website and POS of E-Store. The document contains complete development description of the both website and POS. The sequence which we set to read this document is starting from the first chapter to the second chapter.

2.1.4. Product Scope

To develop E-Commerce Website and Point of Sale system combined.

To develop the easy management of the Departmental-store.

To handle the inventory details like sales details, purchase details and balance stock details by connecting with one database of both website and POS.

To make website that Admin Customized in the Website e.g updated LOGO , updating Website content , updating themes and appearance.

2.1.5. References

W3school (html ,css ,java ,javascript)

2.2. Overall Description

2.2.1. Product Perspective

This software is unique software and developing for particular customer or user. The software will be different itself from the others software because it is linked with website. It may be used as the replacement of the existing software. The major interfaces of the software are two: one is the access of the products from the system is only by one attached database of both POS and Website and other Admin can Customized their own website.

2.2.2. Product Functions

The major functions are performed by this POS and Website are customized and management of the products which are sales in store (like arrangement of the products), Check the data as check , count the amount of the products in store, Addition of new data, arrangement of products, deletion of old data and customer's record with one database.

2.2.3. User Classes and Characteristics

There are multiple user classes are implemented in the Website and POS. POS is basically for the use of admin side for the E-Store management.

- Admin can login to the system
- Admin can add the products records and later on he can edit that records.
- Admin can have the responsibility to make a record of the sales.

Website is basically for the use of both admin and vendor side for the E-Store management.

- Admin can login to the system
- Admin can add the products records and later on he can edit that records.

- Admin can have the responsibility to make a record of the sales.
- Admin can customized in the Website e.g. updated LOGO, updating Website content, updating themes and appearance.
- Multivendor can cart the products and selects the delivery boy.

2.2.4. Operating Environment

Hardware requirements

SERVER:

Processor	:	Core i3
Speed	:	1.7 GHz
Memory Capacity	:	4 GB
Hard Disk Capacity	:	80 GB
Monitor Make	:	HP

Client:

Processor	:	Core i3
Speed	:	1.7 GHz
Memory Capacity	:	4 GB
Hard Disk Capacity	:	20 GB
Monitor Make	:	HP

2.2.5. Design and Implementation Constraints

The website and POS will be controlled by many constrain and limitations. Many constrains are implemented on it.

- Maintain minimum amount of the products.
- Check the expiry date of the products and alert the admin.
- Out of date products will not be sale out.

- If product is out of sock in store then must be unavailable product in website.

2.2.6. User Documentation

- Copy of user manuals
- Copy of implemented constraints.
- Features of the both web and POS.
- Description about the functionality.
- On-line help tutorials also available.

2.2.7. Assumptions and Dependencies

The requirement phase terminates with the production of the validate SRS document. Producing the SRS document is the basic goal of this phase.

The SRS phase consists of two basic activities:

1) Problem/Requirement Analysis:

The process is order and more nebulous of the two, deals with understand the problem, the goal and constraints.

2) Requirement Specification:

Here, the focus is on specifying what has been found giving analysis such as representation, specification languages and tools, and checking the specifications are addressed during this activity.

2.3. External Interface Requirements

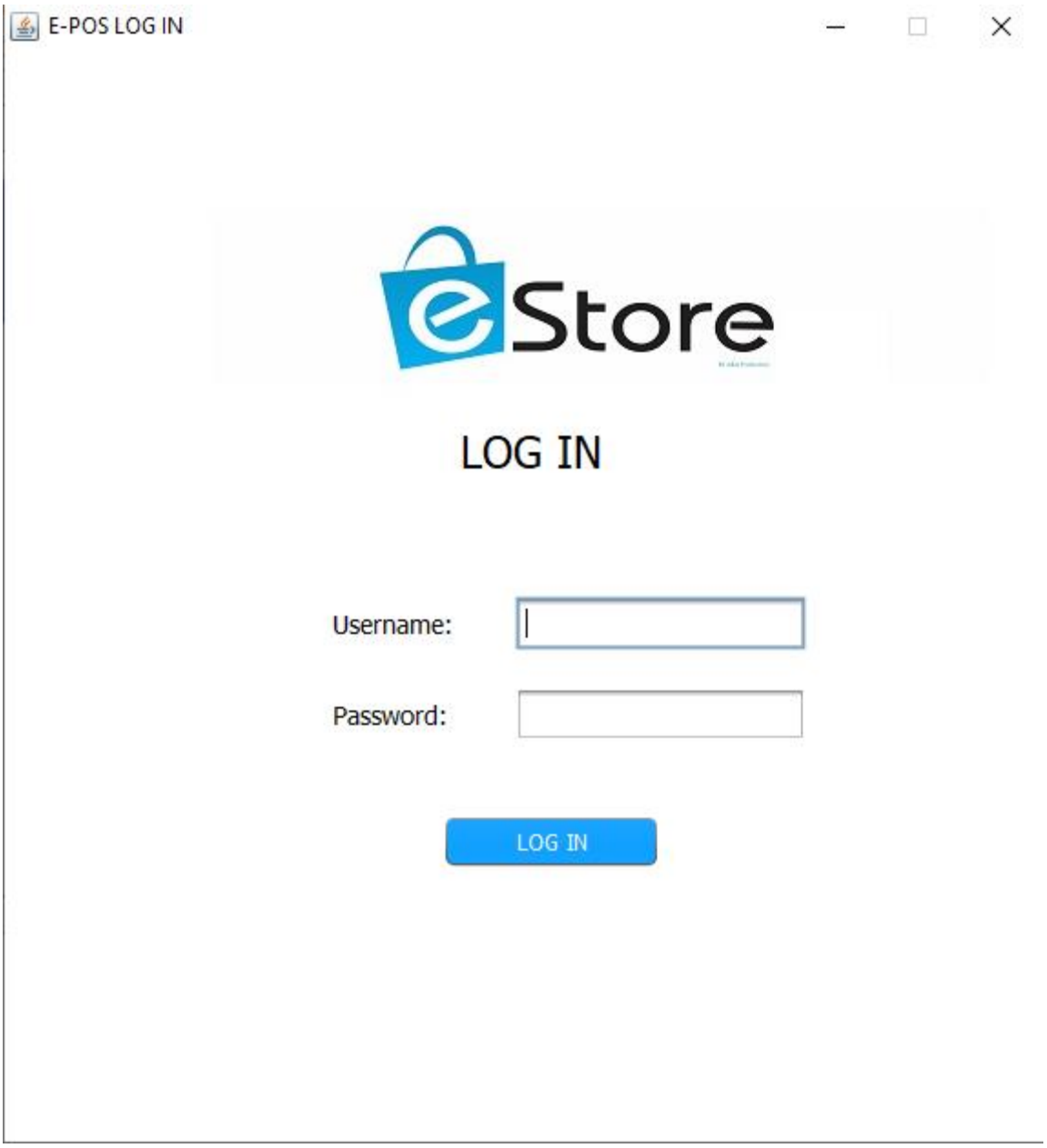
2.3.1. User Interfaces

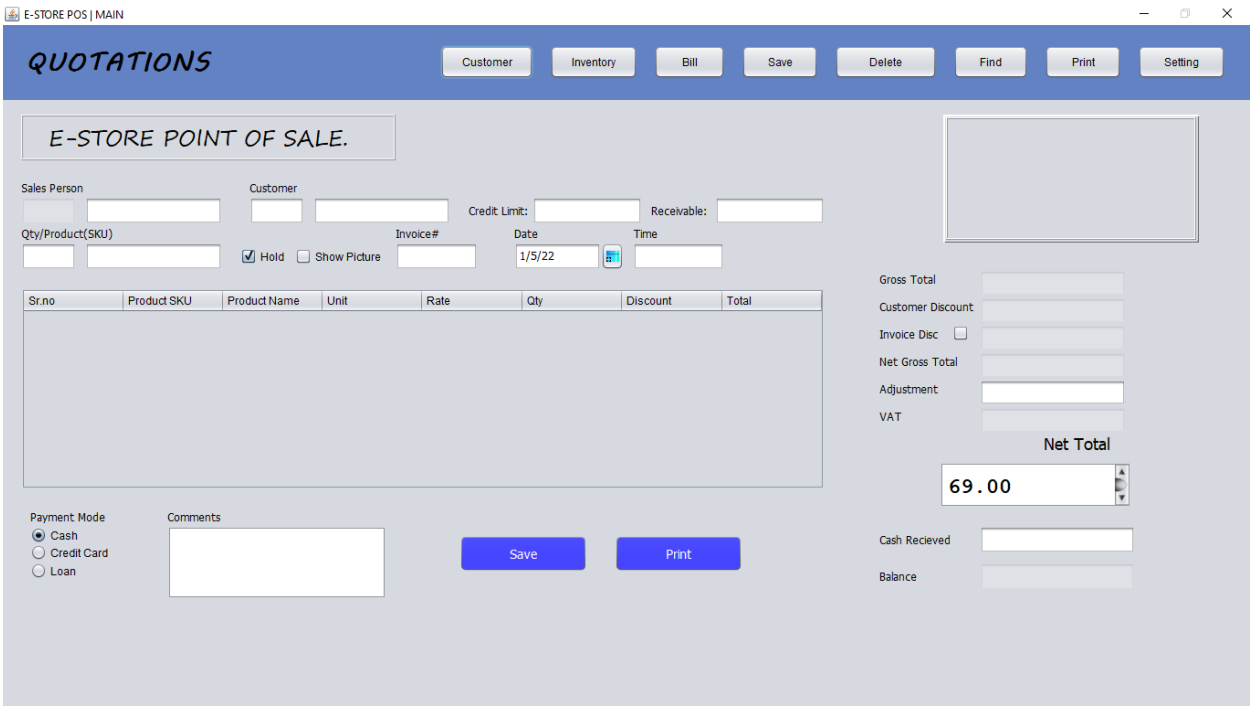
User can be become the admin of the POS. User can become admin or vendor of the website. Admin can see the all data of the linked database. Admin can be added the new data and delete data. User can access some selected products. User can be mange the billing. Admin also save the monthly records of sale purchase. Admin can customized website.

2.3.2. Hardware Interfaces

2.3.3. Software Interfaces

- Microsoft SQL Server
- The Data Reader objectThe command Object
- The Connection object
- Netbeams
- Microsoft SQL server Management Studio Expres
- .NET Framework 4.5
- Data Provider
- Xampp


E-POS LOG IN
eStore
LOG IN
Username:
Password:
LOG IN



2.3.4. Communications Interfaces

The web and POS also has feature to communicate with the costumers of the store. Send them massage through the local network.
POS can be browse the data over the internet or Google.

2.4. System Features

This POS and Website is used to show the stock remaining and details about the sales and purchase. It gives the details about the stock on daily based and weekly based from admin side. And website Admin can customize their own website. Both POS and web linked with one database.

Login page:

As application starts the login page appears. Admin login is determined by the username and password that has all the authority to add, update and delete the stock of the organization as per the requirement.

Sales details:

It shows the details about the sales and the remaining stock of sales. It also shows the details about the sales in return.

Purchase details:

It shows the details about the purchase made by the organization along with the price and dates.

2.4.1. Login system

Login system is the part of whole software security and for the security of the data of software.

2.4.1.1. Description and Priority

Login is the basic and most important feature of the software for use for the purpose of security of the system. Login system is always high priorities as the important one feature of the software.

2.4.1.2. Stimulus/Response Sequences

The response sequence of the login system is at the initial stage of the software. All the other functionality of the software will be execution after the login.

2.4.1.3. Functional Requirements

There are three functional requirements of the login first is about the set the admin id as the new use. Than check is it the user of the system is a valid person or not. If he is the valid person then allow

REQ-SF1-1: set the new admin ID

REQ-SF1-2: check the login ID

REQ-SF1-3: allow the admin for access

2.4.2. Access of the record

Admin can be adding new record or data in the database and also can be access the any data of one or more than one products at a time on the user view.

2.4.2.1. Description and Priority

Access the record is the main function of the Web App which includes the addition of the new data in database modification of the data and do updates on the record or data.

2.4.2.2. Stimulus/Response Sequences

2.4.2.3. Functional Requirements

Identification of the data must be unique or well defined. Create separate tables for all kind of information. All the constraints on the data should be valid or according to the user wants.

REQ-SF2-1: unique ID

REQ-SF2-2: table old data

REQ-SF2-3: constraints

2.5. Other Nonfunctional Requirements

2.5.1. Performance Requirements

The computer system where the Web App is run should be fast and all the specification of the system must be compatible with the software. The storage or backup of data is always attached with the system.

2.5.2. Safety Requirements

Use large and secure database or storage for the data. Must have Urgent backup data systems. The work load should be within the limit. If the load of data is out of the range of the system, then system or software may be crashed or hanged.

2.5.3. Security Requirements

Data backup plans.

Regular Maintenance of the system.

Login signup system.

2.5.4. Software Quality Attributes

Adaptability:

Our software will be well defined and according to the user needs.

Availability:

The software has full access to the data user at and time or at any stage during the execution of the software can manipulate the data

Correctness:

The software will be more accurate and functionality of software will be corrected as possible we can.

Flexibility

Software will accept the latter changes and have the flexibility to make changes in it.

Others

Interoperability, maintainability, portability, reliability, reusability, robustness, testability, and usability.

2.5.5. Business Rules

Up gradation of the system must be sign with the same development team which developing the Web App. Organization may sign some different contracts with the team. Also some responsibilities of the developer's team members with the business point of view.

2.6. Other Requirements

No other requirements needs.

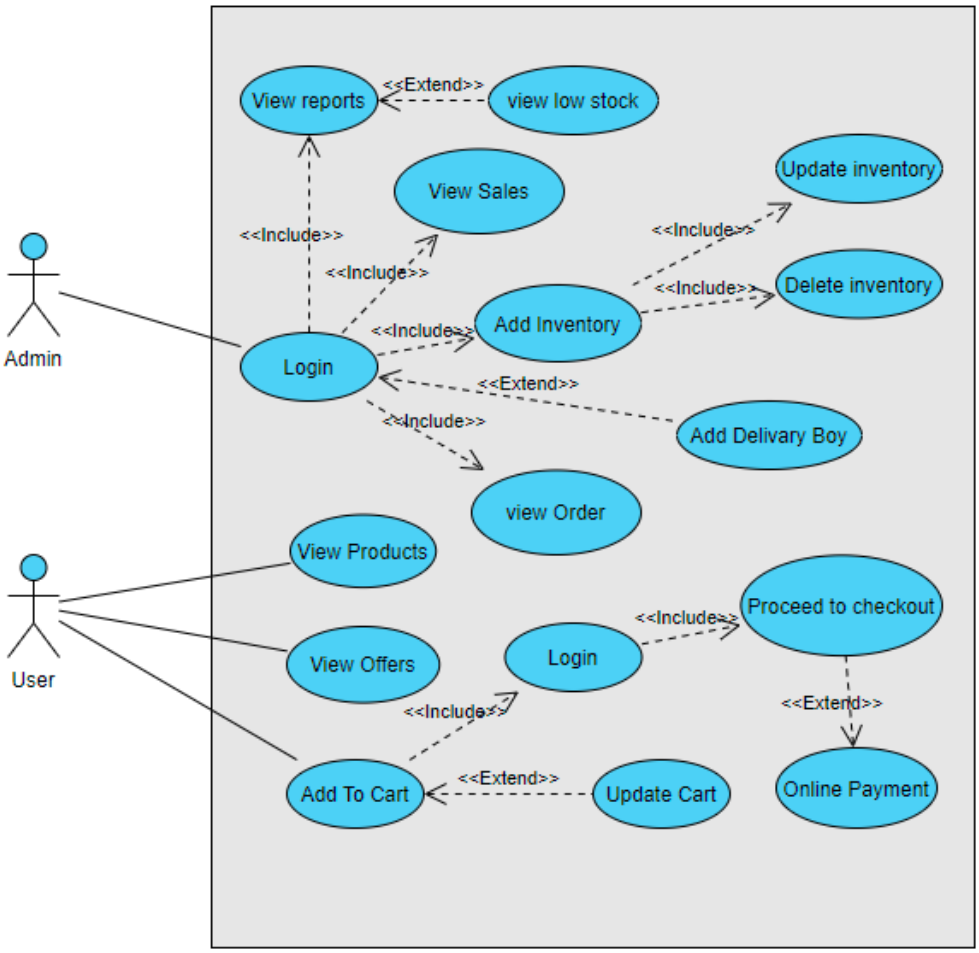
Chapter 3

Use Case Analysis

Chapter 3: System Analysis

System analysis is the starting point of the software developing activity. As system grew more complex, it became evident that the goal of the entire system cannot be easily comprehended. Hence the need for the requirement phase arose. The software project is initiated by the client needs. The system analysis is the means of translating the ideas of the minds of clients (the input) into a formal document (the output of the requirement phase.) System analysis incudes the study of the software requirement and the client requirements from the software.

3.1. Use Case Model



3.2. Use Case Descriptions

A use case describes a sequence of actions that provide something of measurable value to an actor and is drawn as a horizontal ellipse. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors and their goals. The main purpose of a use case diagram is to show what system functions are performed for which actors.

Actor

An actor is a person, organization, admin or external system that plays a role in one or more interactions with the system.

System boundary boxes (optional)

Name	**Admin login**	
Summary	**And admin can signup or login to his/her accounts**	
Preconditions	**Admin has login to the system**	
Post conditions	**Admin must have an account to manage the system**	
Primary Actor(s)	**Admin**	
Secondary Actor(s	**Customer, sales man**	
Trigger	**Admin have found the products and manage sales**	
Main Scenario	**Step**	**Action**
	1	**System displays add new products portal**
	2	**System displays edit portal**
	3	**Admin will add all the basic info of products**
	4	**Admin will add sales details**
	5	**A new customer visits the store and make an purchase**
	6	**Admin will make a bill for customer purchase**
	7	**System prints and dispenses receipt**
	8	**admin removes receipt**
	9	**System displays closing message and dispenses customer side.**
Extensions	**Step**	**Branching Action**
		System notifies admin about the remaining quantity of the product .
		System exits option
Open Issue	**Should the system ask if the user wants to more shopping?**	

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

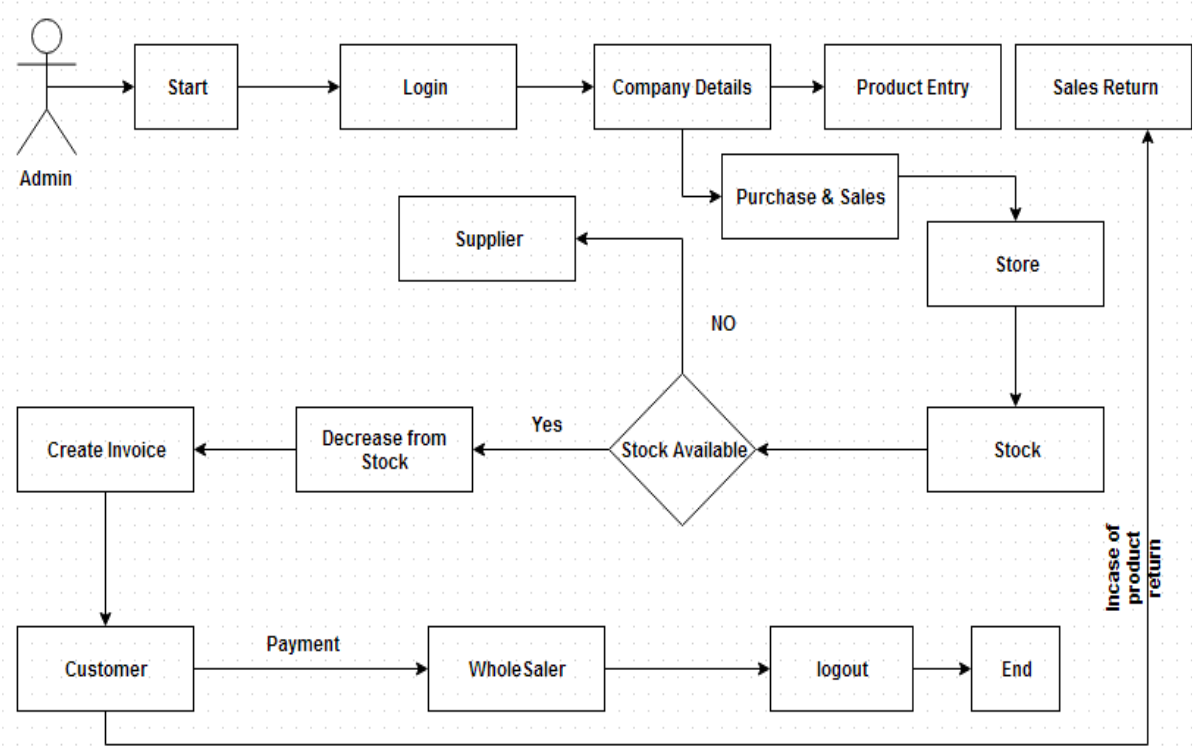
Chapter 4

System Design

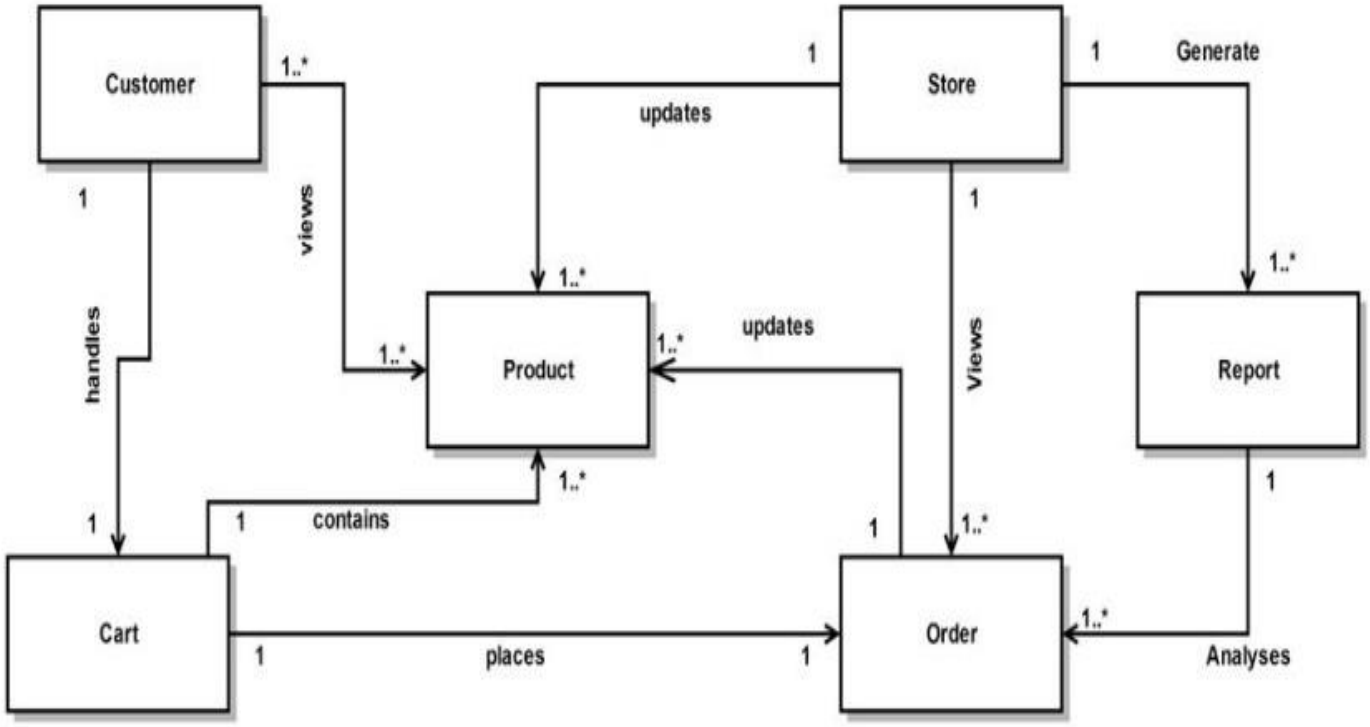
Chapter 4: System Design

In the system design we describes the all the pre evolution of the requirements of the software and defines the software in such that is implementable in future. In general we define the basic outline of the software system and then carry on these basic designs as the practical implementation of the system.

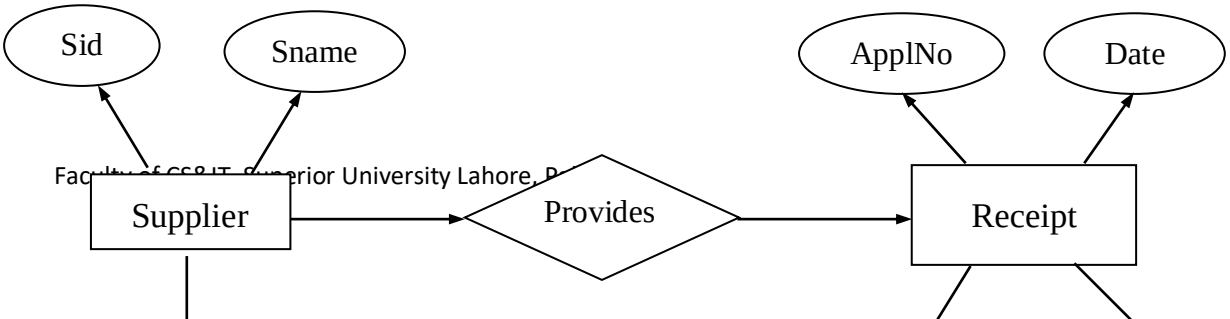
4.1. Architecture Diagram



4.2. Domain Model



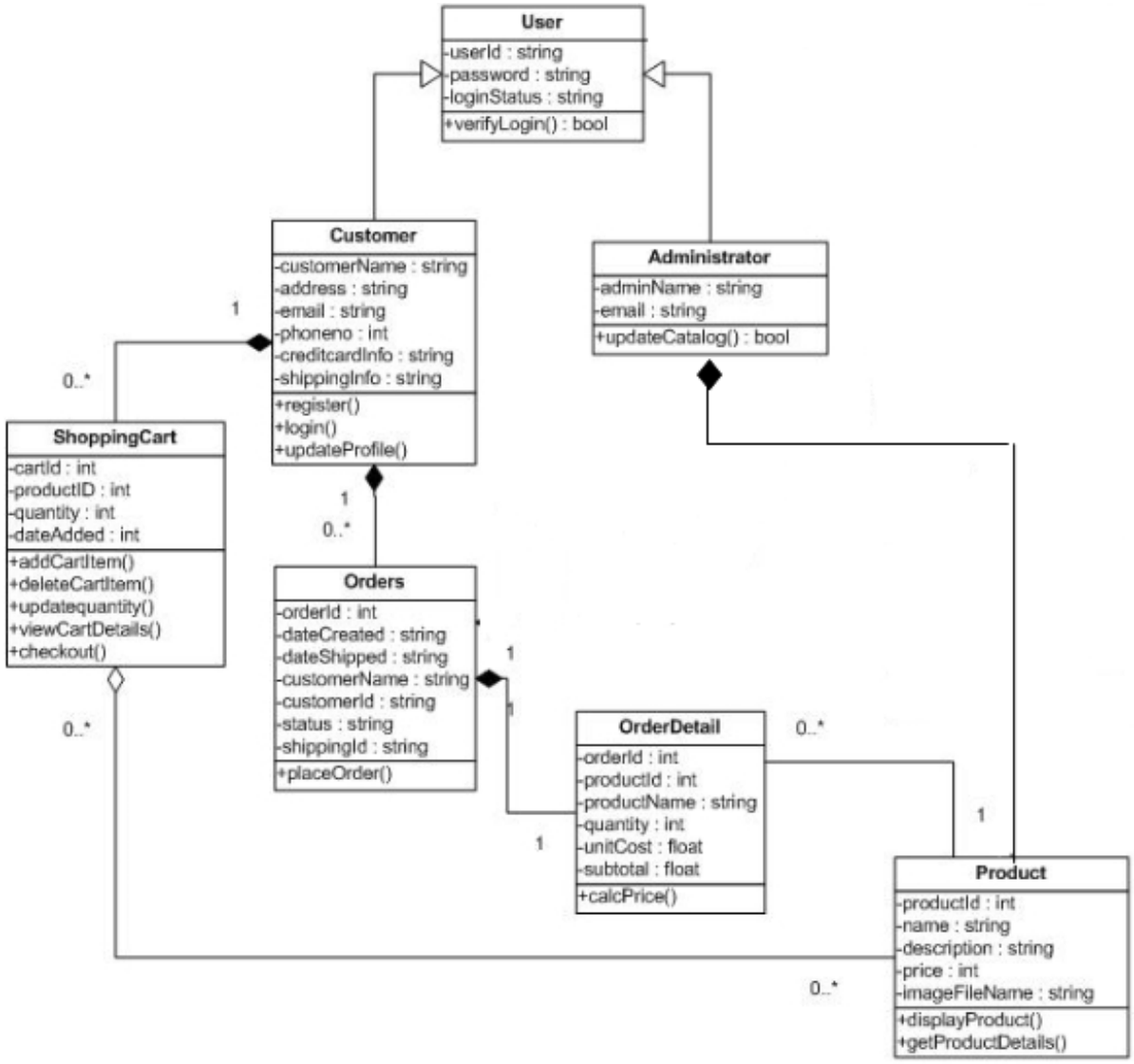
4.3. Entity Relationship Diagram with data dictionary



4.4. Class Diagram

Class diagram is used for developing an object-oriented system model to show the classes in a system and the associations between these classes. An object class is a general definition of one kind of system object. An

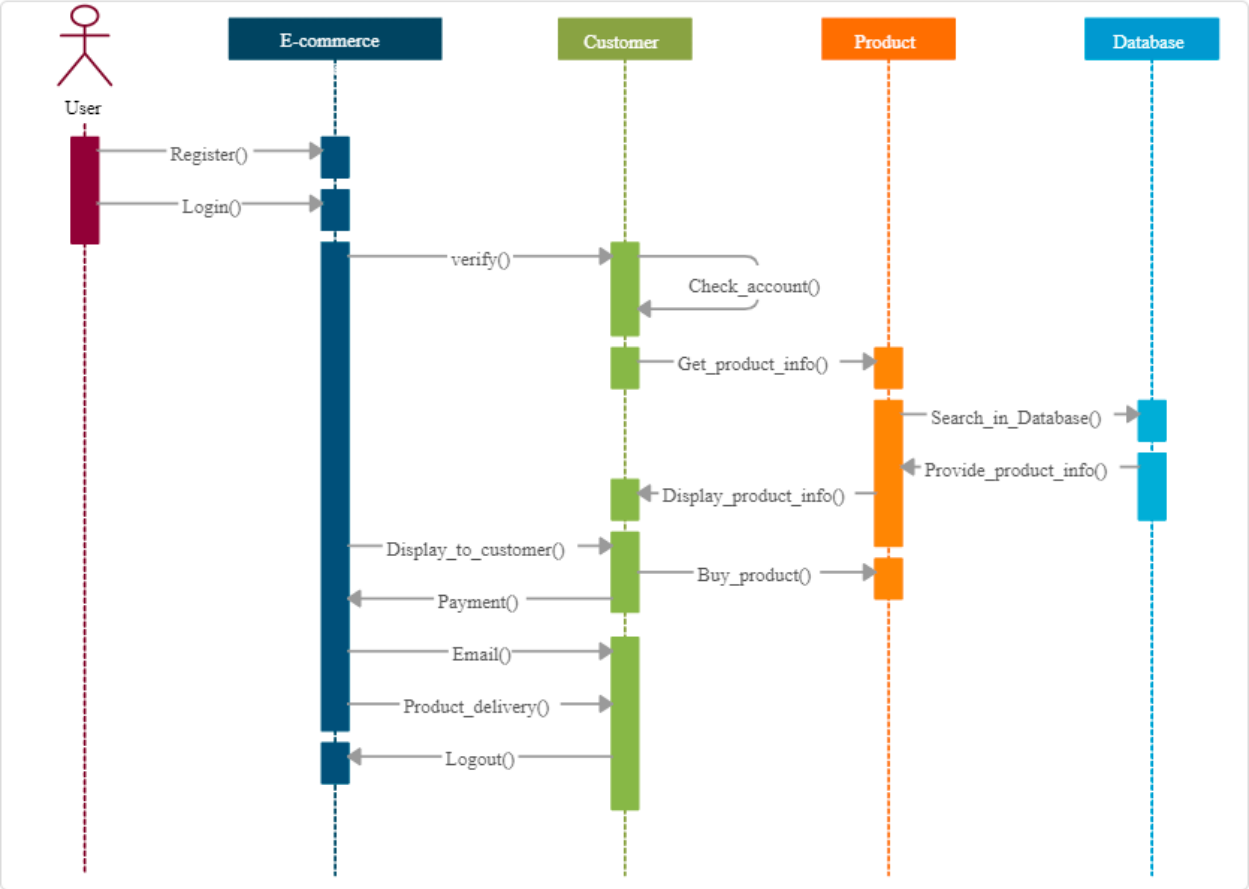
association is a link between classes that indicates that there is some relationship between these classes.



4.5. Sequence / Collaboration Diagram

Sequence diagrams are part of the UML and are used to model the interactions between the actors and the objects within a system. A sequence diagram shows the sequence of interactions that take place during a particular use case or use case instance.

The sequence diagram of the desire system is:

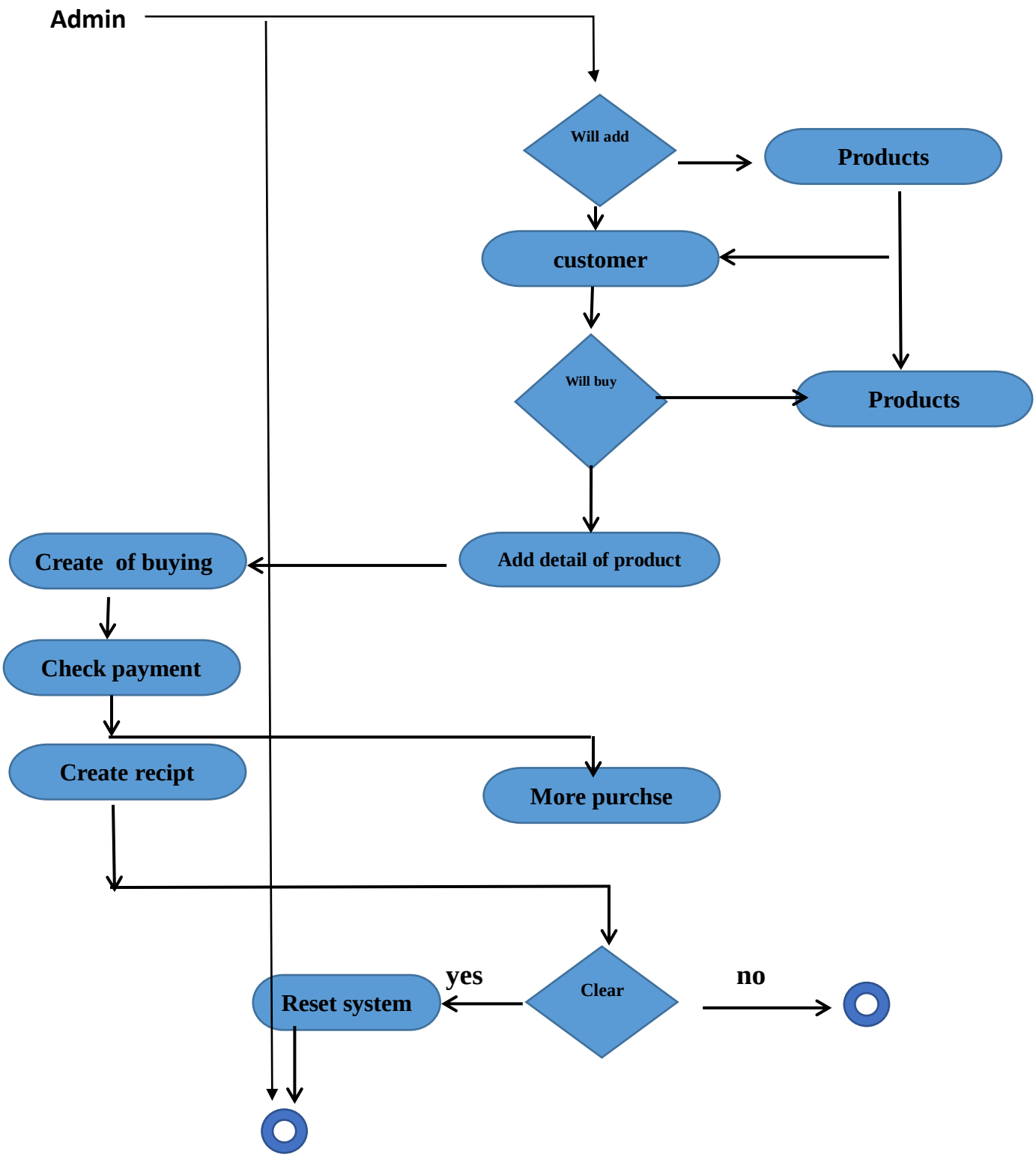


4.6. Operation contracts

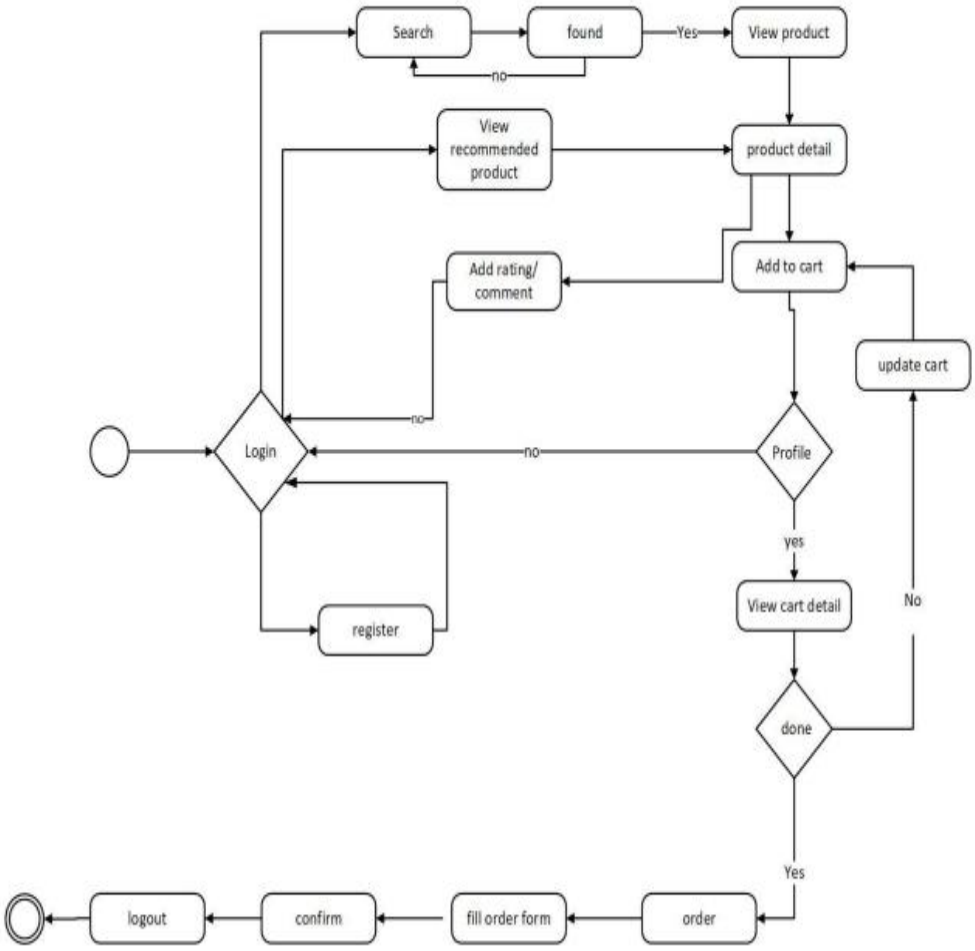
As internet-based businesses, e-commerce businesses face many potential legal issues related to their web presence. It might be something relating to their website, or an agreement with a service provider. In addition, because they sell goods and services through the internet, these businesses must also address payment and delivery terms or warranties.

Because of the various activities performed by e-commerce businesses, your business must use the appropriate e-commerce contracts. These agreements provide your company with protections and limit liabilities, which is especially important for businesses with high volumes

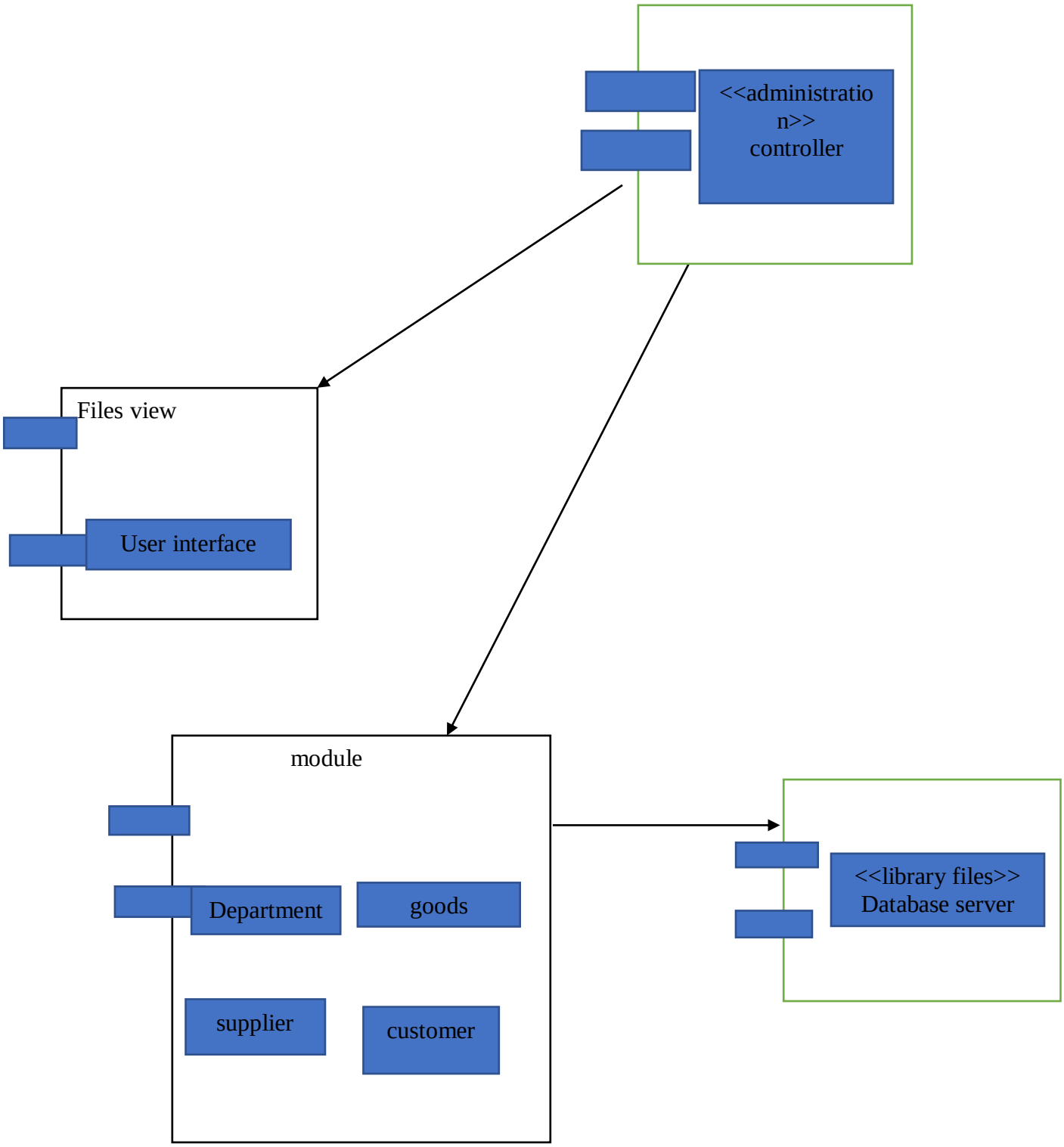
4.7. Activity Diagram



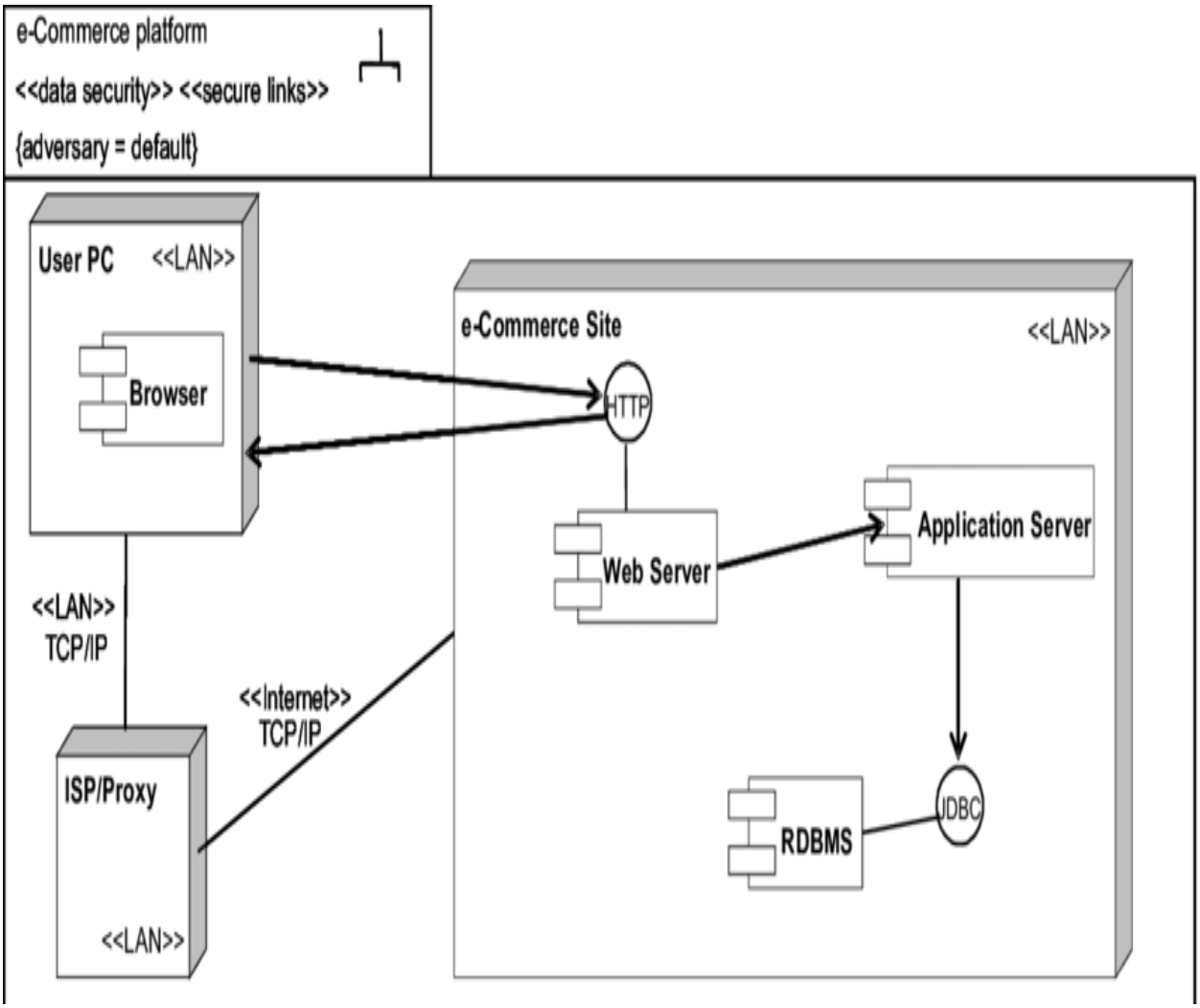
4.8. State Transition Diagram



4.9. Component Diagram

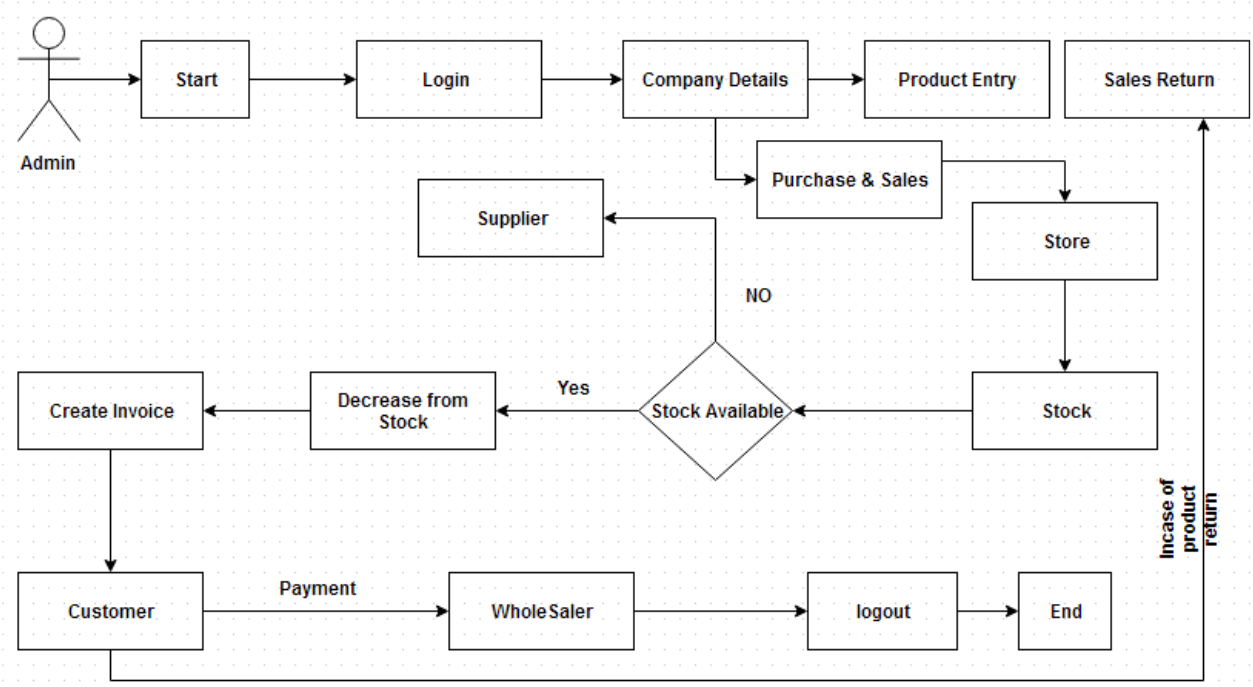


4.10. Deployment Diagram



4.11. Data 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.



Chapter 5
Implementation

Chapter 5: Implementation

This chapter includes the practical implementation of the software which we are developing for the purpose of management of the departmental store system. This chapter will cover all the programming implementation of the projects and describe about the tools and techniques are using for the development of the software.

5.1. Important Flow Control/Pseudo codes

- Admin can login to the system
- Admin can add the products records and later on he can edit that records.
- Admin can have the responsibility to make a record of the sales.
- Admin can add sales person and his information about the product.
- Admin can customize website on single click e.g. updated LOGO, updating Website content, updating themes and appearance.
- Customer can purchase products.
- Admin logout the system.

5.2. Components, Libraries, Web Services and stubs

- Mysql
- Html
- Java script
- JDBC conector
- Css styles
- Php
- Java

5.3. Deployment Environment

Java Is Object-Oriented:

Java programming language is object oriented, which makes program design focus on what you are dealing with rather than on how you are going to do something. This makes it more useful for programming in sophisticated projects because one can break the things down into understandable components. A big benefit is that these components can than be reused.

Object Oriented languages use the paradigm of classes. In simplest terms, a class includes both the data and the functions to operate on the data, all the data members and functionality of its class. Because of this, you can think of a class as being like template, with each object being a specific instance of a particular type of a class.

The class paradigm allows one to encapsulate data so that specific data values are those using the data cannot see function implementation. Encapsulation makes is possible to make the changes in code without breaking other programs that use that code. If for example the implementation of a function is changed, the change is invisible to the programmer who invokes that function, and it does not affect his/her program, except hopefully to improve it.

Java includes inheritance, or the ability to derive new classes from existing classes. The derived class, referred to as the parent class. A subclass can add new data members to those inherited from the parent class. As far as methods are concerned, the subclass can reuse the inherited methods as it is, change them, and/or add its own new methods.

5.4. Tools and Techniques

Java Overview:

Java is powerful but lean Object-Oriented programming language. It has generated a lot of excitement because it makes it possible to program for Internet by creating applets, programs that can be embedded in the web page.

The context of an applet is limited by only one's imagination. For Example, an applet can be an imagination with sound, an interactive game or a ticker tape with constantly updated stock prices. Applets can be just like decorations to liven up the Web Pages, or they can be serious applications like word processors or spreadsheet.

But java is more than programming languages for writing applets. It is being used more and more for writing standalone applications as well. It is becoming so popular that many people believe it will become standard language for both general purpose and Internet Programming.

There are many buzzwords associated with java, but because of its spectacular growth in popularity, a new buzzword has appeared ubiquitous. Indeed, all indications are that it will soon be everywhere.

Java builds on the strength of C++. It has taken the best features of C++ and discarded the more problematic and error prone parts. To this lean core, it has added garbage collection (automatic memory management), multi threading (the capacity for one program to do more than one thing at a time) and Security capabilities. The results are that java is simple, elegant, powerful and easy to use.

Java is actually a platform consisting of three components:

1) Java programming language.

2) Java library of classes and interfaces.

3) Java virtual Machine.

The java server pages technology offers the following advantages:

- Write once, run anywhere properties
- High quality tool support.
- Re-use of components and tag libraries.
- Support for scripting and actions

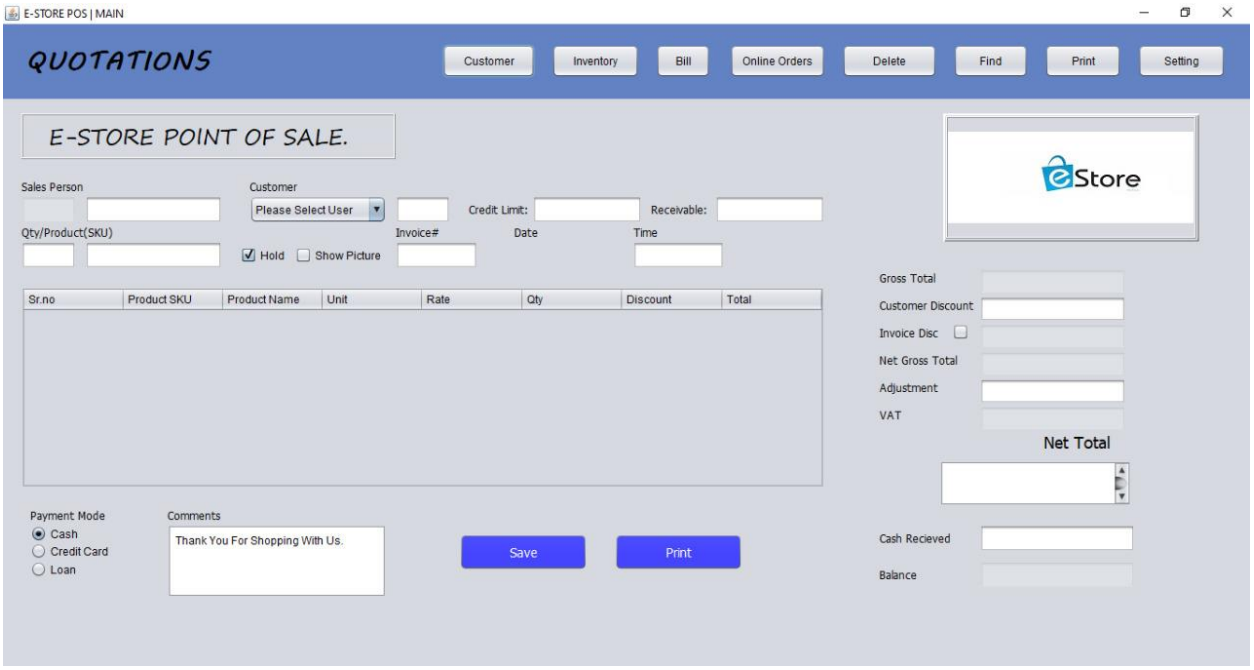
5.5. Best Practices / Coding Standards

```
private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    this.setVisible(false);
    new Customer().setVisible(true);
  }

  private void jButton2ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    this.setVisible(false);
    new Inventory().setVisible(true);
  }

  private void jButton3ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    this.setVisible(false);
    new Bill().setVisible(true);
  }
```

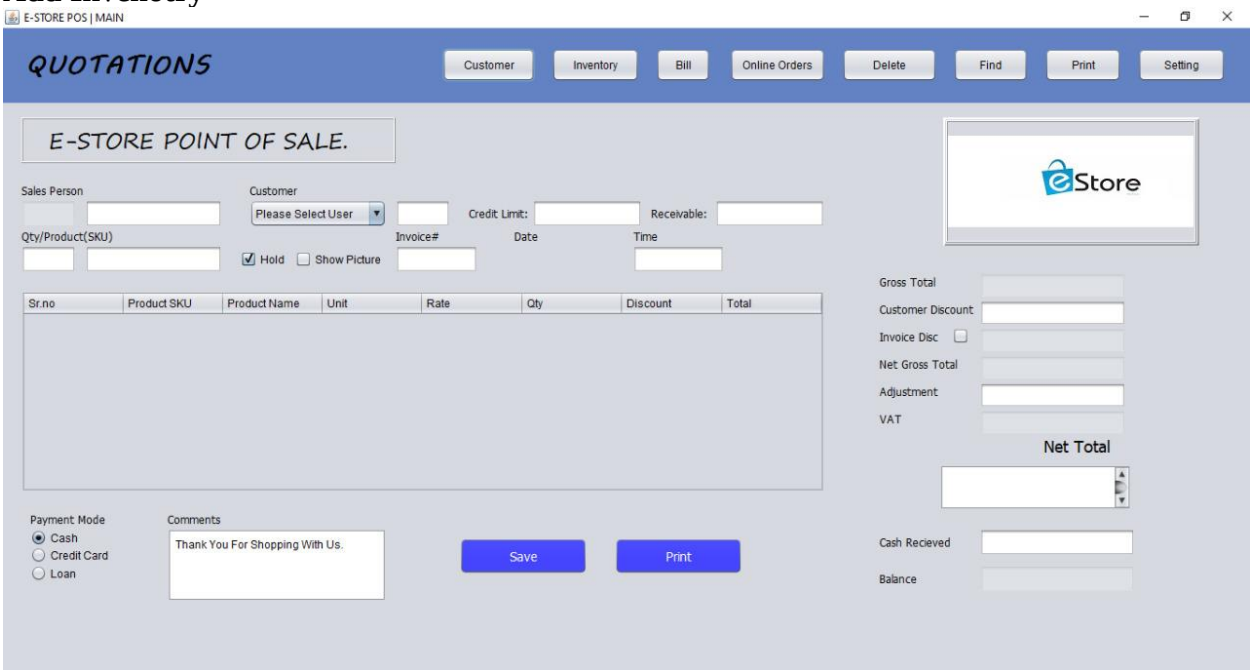
```
private void jButton1ActionPerformed(java.awt.event.ActionEvent evt) {
    // TODO add your handling code here:
    String pass;
    String user;
    user = jTextField1.getText();
    pass = jTextField2.getText();

    if(pass.equals("1234") && user.equals("admin") ){
       this.setVisible(false);
       new Main().setVisible(true);
    }
    else{
       JOptionPane.showMessageDialog(this, "Wrong Credentials. Try Again.");

    }
  }
```

5.6. Screenshot

Point of Sale Dashboard

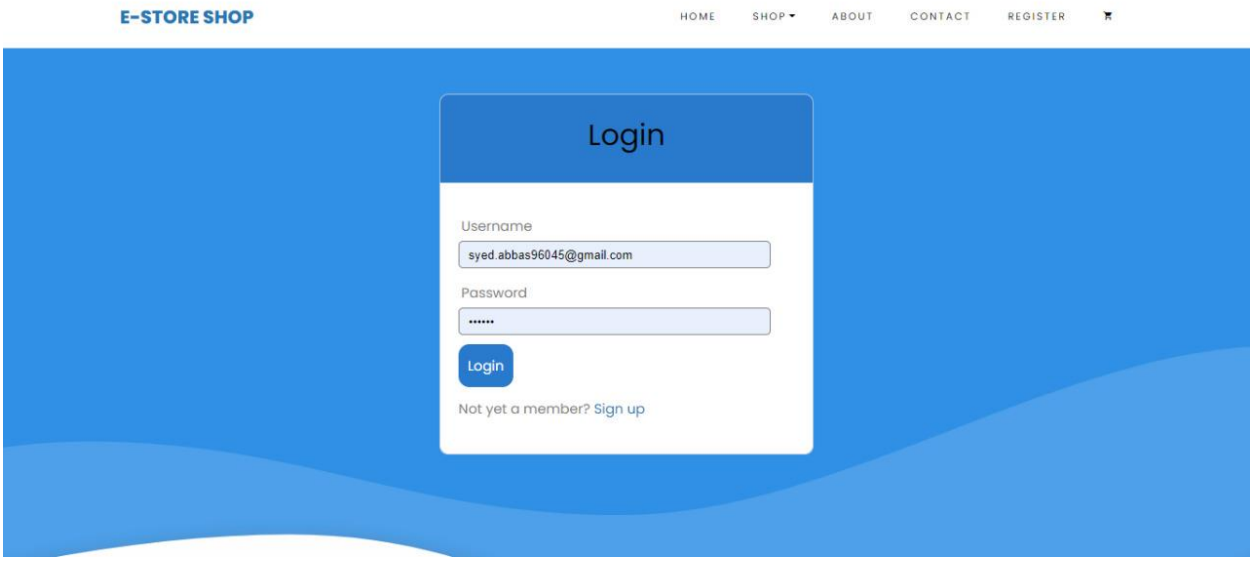


Add Invenotry

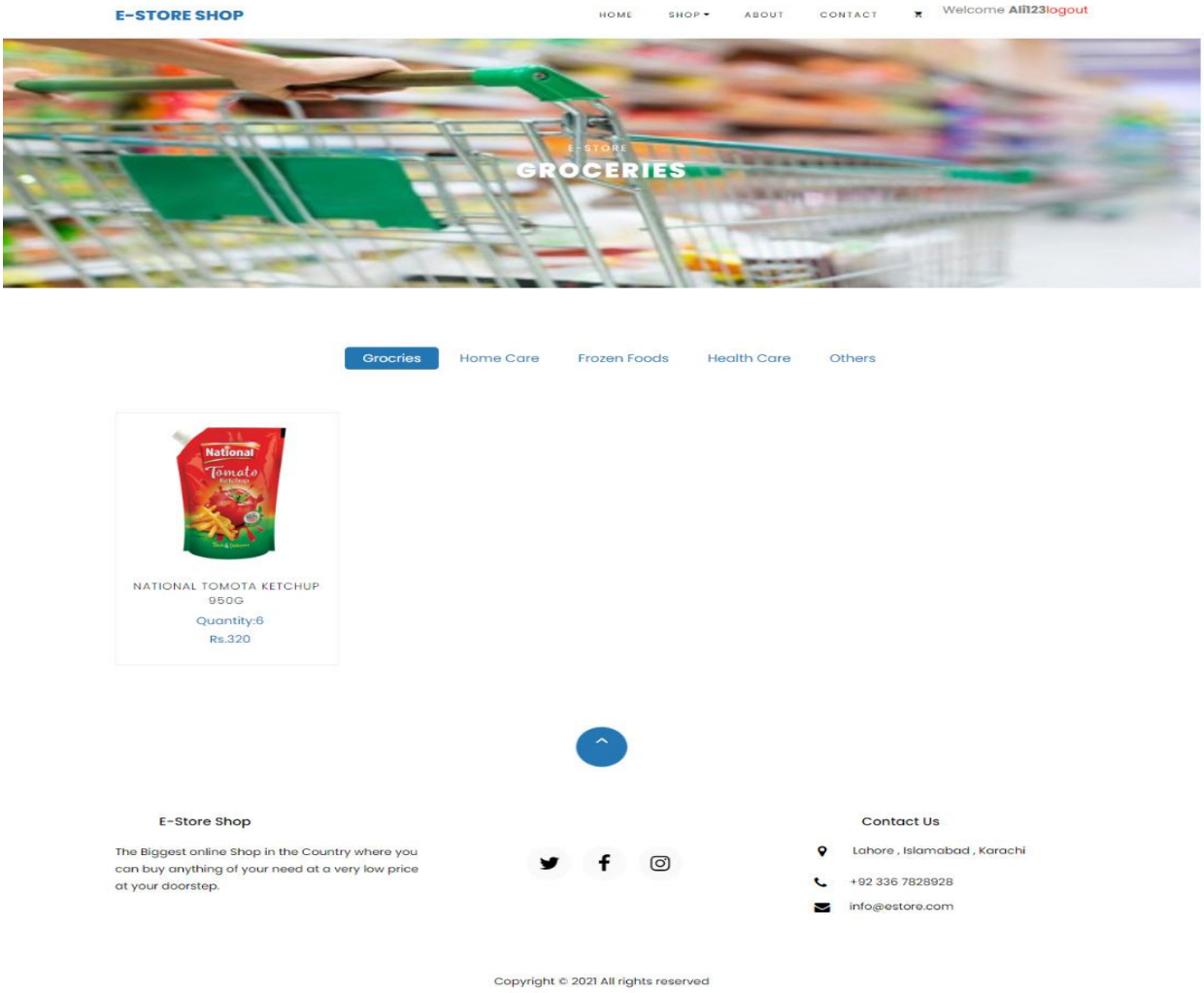


Add Customer

Login Page



Shop Page


E-STORE SHOP
HOME
SHOP
ABOUT
CONTACT
Welcome Ali123logout
E-STORE
GROCERIES
Grocries
Home Care
Frozen Foods
Health Care
Others
National
Tomato
NATIONAL TOMOTA KETCHUP 950G
Quantity:6
Rs.320
E-Store Shop
The Biggest online Shop in the Country where you can buy anything of your need at a very low price at your doorstep.
Contact Us
Lahore , Islamabad , Karachi
+92 336 7828928
info@estore.com
Copyright © 2021 All rights reserved

Product Page

National Tomota Ketchup 950G

Quantity:6

Size:950

Price: Rs.320

Description: No Description

Quantity: Add to Cart

E-Store Shop

The Biggest online Shop in the Country where you can buy anything of your need at a very low price at your doorstep.

Contact Us

Lahore , Islamabad , Karachi

+92 336 7828928

info@estore.com

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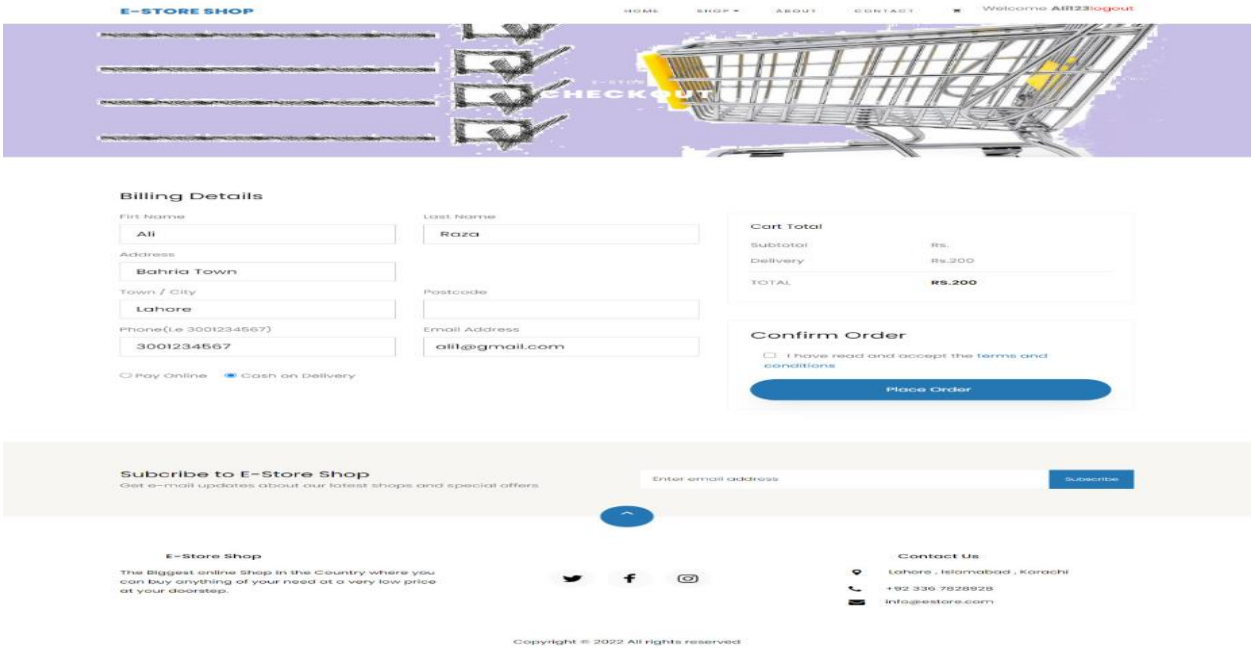
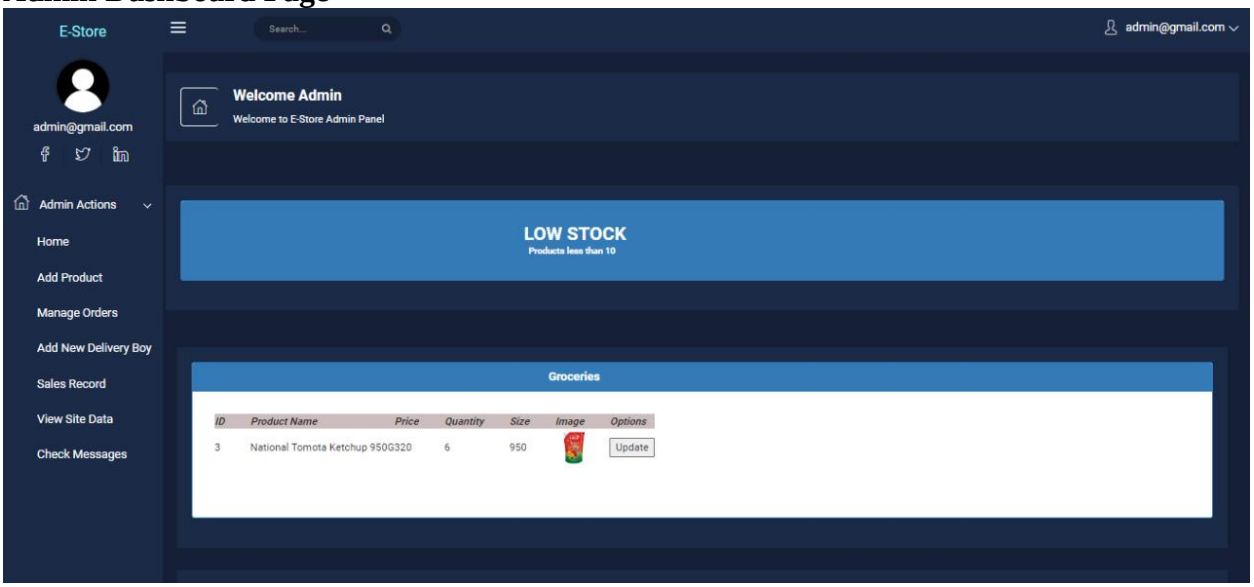
Checkout Page



Admin Dashboard Page



Chapter 6

Testing and Evaluation

Chapter 6: Testing and Evaluation

System testing is the process of checking whether the developed system is working according to the objective and requirement. All testing is to be conducted in accordance to the rest conditions specified earlier. This will ensure that the test coverage meets the requirements and that test is done is a systematic manner.

The main purpose of testing an information system is to find the errors and correct them. The scope of systems testing should include both manual and computerized operations.

6.1. Use Case Testing

- Verify that all the specified fields are present on the registration page.
- Verify that the required/mandatory fields are marked with * against the field.
- Verify that for better user interface dropdowns, radio buttons and checkboxes, etc fields are displayed wherever possible instead of just textboxes
- Verify the page has both submit and cancel/reset buttons at the end.
- Verify that clicking submits button after entering all the required fields, submits the data to the server.
- Verify that clicking cancels/reset button after entering all the required fields, cancels the submit request, and reset all the fields.
- Verify that whenever possible validation should take place at client side
- Verify that not filling the mandatory fields and clicking the submit button will lead to validation error.

- Verify that not filling the optional fields and clicking the submit button will still send data to the server without any validation error.
- Check the upper limit of the textboxes.
- Check validation on the date and email fields (only valid dates and valid email Ids should be allowed.
- Check validation on numeric fields by entering alphabets and special characters.
- Verify that leading and trailing spaces are trimmed.
- Verify that entering blank spaces on mandatory fields leads to validation error.
- Verify that after making a request to the server and then sending the same request again with the same unique key will lead to server-side validation error.

6.2. Equivalence partitioning

Equivalence partitioning is also known as "Equivalence Class Partitioning". In this method, the input domain data is divided into different equivalence data classes – which are generally termed as 'Valid' and 'Invalid'. The inputs to the software or system are divided into groups that are expected to exhibit similar behavior. Thus, it reduces the number of test cases to a finite list of testable test cases covering maximum possibilities.

6.3. Boundary value analysis

BVA is another Black Box Test Design Technique, which is used to find the errors at boundaries of input domain (tests the behavior of a program at the input boundaries) rather than finding those errors in the centre of input. So, the basic idea in boundary value testing is to select input variable values at their: minimum, just above the minimum, just below the minimum, a nominal value, just below the maximum, maximum and just above the maximum. That is, for each range, there are two boundaries, the lower boundary (start of the range) and the upper boundary (end of the range) and the boundaries are the beginning and end of each valid partition. We should

design test cases which exercise the program functionality at the boundaries, and with values just inside and outside the boundaries. Boundary value analysis is also a part of stress and negative testing.

6.4. Data flow testing

Data Flow Testing is a type of structural testing. It is a method that is used to find the test paths of a program according to the locations of definitions and uses of variables in the program. It has nothing to do with data flow diagrams.

It is concerned with:

1. Statements where variables receive values,
2. Statements where these values are used or referenced.

6.5. Unit testing

The unit testing is performed to test the validity of the individual units. This is done in the coding phase with the interactive testing. Thus it itself constitutes a majority of functionality test for each logical unit.

6.6. Integration testing

When all the development of all the units or modules is completed and integrity test phase is started. In this phase the interface between the modules are tested. This phase basically verifies whether inter-modules exchange of information and events are as per required system behavior.

6.7. Performance testing

Performance testing of e-commerce applications performs overall testing of the software, determining if it is functioning properly or if the loading time taken by the pages is perfect. Other than that, it also checks about the billing, shopping guide part as well.

6.8. Stress Testing

Load testing is an effective way to measure your website performance against various parameters under huge user traffic conditions. Load testing is done by simulating a high number of virtual users performing different actions on your website. User actions are guided by creating simple user scripts in the load testing environment. Load testing gives useful information about memory utilization, CPU utilization, disk I/O, load balancers, page issues, etc.

An e-commerce website has more chances of going down under high traffic due to the nature of browsing and transactions happen on it. And that's a negative impact on revenue as well as credibility. For example, if you are running an end-of-season sale and don't test your website for the expected number of users during the sale, your users may experience downtime, slow loading, and failed transactions. This can totally ruin your sales goal.

E-store require load testing to make sure that users on your website experience smooth experience in high traffic scenarios and able to make purchases without any trouble. Load testing for an e-commerce website is equivalent to business risk mitigation. It identifies and resolves all bottleneck issues that can be a blocker for sales during peak traffic times.

Chapter 7

Summary, Conclusion and Future Enhancements

Chapter 7: Summary, Conclusion & Future Enhancements

7.1. Project Summary

E-Store is a complete E-Commerce Store having linked to a Point of Sale system. There will be an admin panel for the website with complete customizing functionality and Point of Sale system which will perform all billing and inventory managing tasks. All the orders from the E-Commerce Store will be responded through the Point of Sale system. The website and the Point of Sale software will be interlinked with each other. From the website admin panel complete website will be able to customize e.g. admin can change the Color Scheme, Theme Style, Logo , Content on the Pages etc.

7.2. Achievements and Improvements

All the existing systems that are available in the market have some drawbacks like they have to purchase E-Commerce Website and Point of Sale system separately. Both the Website and software are not interlinked. On the other hand Website Owner need to hire someone else to

manage little updates in the Website e.g updated LOGO, updating Website content , updating themes and appearance.
Today's Frameworks are bit difficult to handle and to use. Client needs some easy framework where they can update daily use things on the website.

7.3. Critical Review

The nature and future of electronic commerce is considered. Four areas of the new economy and its effects on retailers are explained; first the extent to which the emergence of new electronic channels to market has led to distinctive means of businesses differentiation, secondly how business-to-business companies use electronic channels to improve their supply chain, thirdly how companies are dealing with organizational changes, and lastly the future of electronic-commerce is considered.

7.4. Lessons Learnt

One of the most important things to capture upfront for any web project is a defined feature list. There are many ways to generate this list including online research, user surveys, brainstorming, workshops, stakeholder interviews, user interviews, etc.
In my experience though we often end up with a very long list of features for the sake of having features. Clients often mistake having a lot of features and functionality on their site with having a great website.

7.5. Future Enhancements/Recommendations

Recommendation systems are the hot topic in online big tech. Constantly, recommendation systems are changing to user's behavior in the system. The recommendation systems are of different types as described in literature review part. The distance between similar user can be calculated by using different approach as shown in Chapter 2. I tried some of the approach for calculating distance. I used latent factor model

for recommendation purpose. The matrix is used with user's and their particular rating in product in this system. Most of the ecommerce site uses rating as one of the main components to get the user's preferences on particular topic. So, I did the same thing. I used the rating as the main component for determining or predicting the rating of the particular user. Apart of rating, other implicit features such as like, comment, purchase record, purchase feedback etc. can also be used to recommend products more accurately.

The load time for loading the recommendation is pretty good. To make the system even faster caching can be used. Further enhancements to this system would be to integrate deep learning and hybrid approach for recommending the product. Natural language processing can also be used in comment section of product to detect the user's preferences on certain products.

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Reference and Bibliography

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