

Point of Sale
Desktop Application

Final Year Project

Session 2016-2020



Department of Computer Science
Faculty of Computer Science & Information Technology
The Superior College, Lahore
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Project Report

[Point Of Sale]

Change Record

Author(s)	Version	Date	Notes	Supervisor's Signature
	1.0		<Original Draft>	
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APPROVAL

PROJECT SUPERVISOR

Comments: _____

Name: _____

Date: _____

Signature: _____

PROJECT MANAGER

Comments: _____

Date: _____

Signature: _____

HEAD OF THE DEPARTMENT

Comments: _____

Date: _____

Signature: _____

Dedication

*We dedicate this project to
God Almighty our creator,
To the society to whom it is for.
This work is dedicated to
My respected parents,
Who educated me and enabled me
To reach at this level
Of my life.
Their guidance, motivation,
Encouragement and trust made me
To complete this project*

Acknowledgements

First Of all, I am really thankful to my God after that I am thankful to my supervisor Sir Umair Ahmed for his kind attention and keep interest throughout the course of this work by providing valuable guidance and continuous support that helped us a lot in our work. Last but not the least, I would also thank to my group members for their cooperative nature and supportive behavior throughout this project

Executive Summary

We are going to make this software to avoid the disturbance of the internet. The Problem which mostly departmental store faced is that they have to keep their data in database and the database exist on the server. So, when they have no internet or less speed the communication between the server and the system probably crash so they are not able to store the data and the billing system will down. SO, we are going to design an offline point of sale that no longer needs the internet connection. You can update, delete, insert and read. Our application is built on python. This solution is specially for the medium size company that does not have the any branch within the city or within the country.

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Chapter 1

Introduction

Chapter 1: Introduction

We are going to design a Software for Cash & Carry store. The Software based on the following features.

- Scanning through Barcode
- Manage Stocks
- Manage Sales
- All Crud Operations
- Database handling
- Billing System
- Sales Report
- Stock Report
- Refund
- Supplier Report

1.1. Background

The Problem which mostly departmental store faced is that they have to keep their data in database and the database exist on the papers and sometime they not keep their record of sales, stock and at the end of year and or month they don't have any type of record of their profit or loss. A Point-of-Sale System is the frontend of a retail shop. It is needed by large shops to keep track of shop credits consumed.

A need for a computerized system for keeping their records and manage as well and regularly know about their profit or loss

The timing of the request for this system and the availability of technology to make it cheaply possible is important to the goal of the project.

1.2. Motivations and Challenges

Some of the problems related to software which exist in point of sale are:

- Cranky and outdated user interface
- The software may not be fast and efficient enough to handle multiple operations
- User friendly interface
- Integrated payments methods
- Discount offers
- Launch of user-friendly websites

1.3. Goals and Objectives

Unlike a cash register, **POS Systems** are known to have the capability of collecting more information. From stock inventory, data collection, and detailed reports, a good point of sale systems will be able to offer them all. Understanding the objectives of your POS software will give you an operating edge. The following are some of the objectives that you should familiarize yourself with:

- **Managing Your Inventory**
- **Automation of Accounting**
- **Collection of Customer Data**

And the Goals and Benefit of pos management system are:

- **Accuracy**
- **Remote control**
- **Insights**
- **Consistency**
- **Managing promotions with ease**
- **Inventory**

1.4. Literature Review/Existing Solutions

The existing utility software are mostly required an internet connection without of these they are going to down. In our software we provide the facility to improve this system as we manage our system with or without internet connection. In which we place a LAN network for our setup.

1.5. Gap Analysis

We are going to design an Application Based Software. The Problem which mostly departmental store faced is that they have to keep their data in database and the database exist on the server. So, when they have no internet or less speed the communication between the server and the system probably crash so they are not able to store the data and the billing system will down. SO, we are going to design an offline point of sale that no longer needs the internet connection.

1.6. Proposed Solution

We are going to design an offline point of sale that no longer needs the internet connection. You can update, delete, insert and read. Our application is built on python. This solution is specially for the medium size company that does not have the any branch within the city or within the country.

1.7. Project Plan

We are going to design an Application Based Software. The Problem which mostly departmental store faced is that they have to keep their data in database and the database exist on the server. So, when they have no internet or less speed the communication between the server and the system probably crash so they are not able to store the data and the billing system will down. SO, we are going to design an offline point of sale that no longer needs the internet connection.

1.7.1. Work Breakdown Structure

Project Start	Thu, Aug 22, 2019
---------------	-------------------

Level	WBS	Task Description	Assigned To	Start	End	Notes
1	1	Phase 1				
2	1.1	Documentation	Uzair	22-8-19	24-8-19	
2	1.2	Problem Statement	Usman Raza	25-8-19	25-8-19	
3	1.2.1	Research	Salman	26-8-19	28-8-19	
3	1.2.2	Solution	Usman Raza	29-8-19	2/9/2019	
4	1.2.2.1	Coleect Public Data	Uzair	3/9/2019	4/9/2019	
4	1.2.2.2	Analysis Public Data	Salman	5/9/2019	6/9/2019	
4	1.2.2.3	Identify Current State	Usman Raza	7/9/2019	20/9/2019	
1	2	Phase 2				
2	2.1	UML Diagrams Analysis	Salman	2/10/2019	7/10/2019	
3	2.1.1	Design Implementation	Usman Raza	8/10/2019	15-10-2019	
3	2.1.2	Testing	Uzair	16-10-2019	30-10-2019	
1	3	Phase 3				
2	3.1	Development	Salman,Usman			
3	3.1.1	Implement	Salman,Usman			
4	3.1.1.1	Testing	Uzair			

1.7.2. Gantt Chart

Task	Start Date	# Days Required	Percent Complete
Develop broad plan	22-8-2019	3	100
Present plan to council	26-8-2019	4	100
Identify team	22-8-2019	3	100
Train team	25-8-2019	7	100
Develop detailed plan	28-8-2019	5	100
Conduct preliminary research	30-8-2019	12	100
Identify key practices	3/9/19	7	100
Identify benchmark partners	4/9/19	7	0
Collect public data	11/9/19	15	0
Analyze public data	12/9/19	15	0
Identify current state	15-9-2019	20	0
Develop benchmark questions	20-9-2019	18	0
Visit benchmark partners	23-9-2019	28	0

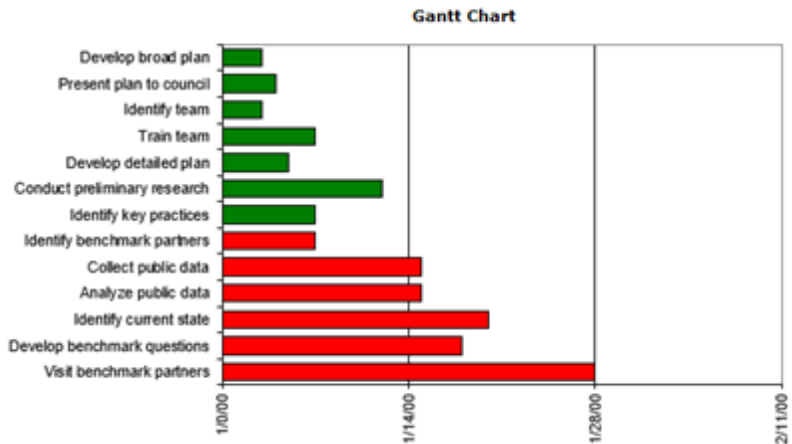
Gantt Chart

Description

This template illustrates a Gantt Chart, also called a Milestone Chart, Project Bar Chart or Activity Chart. A detailed discussion of Gantt Charts can be found at www.ASQ.org

Instructions

- Enter up to 30 tasks in the cells provided
- Enter the Start Date for each task and the number of days to complete it.
- Enter the Percent Complete for each task.



Chapter 2

Software Requirement Specifications

Chapter 2: Software Requirement Specifications

2.1. Introduction: -

Fast Checkout: -

The transactions process while making payments should be fast. It should not take much time and manual work to be done by sale's team.

Inventory Tracking: -

All information about the products being out of stock to the critical information about the store must be monitored with an ease. This will make the ordering easy from vendors & the inventory manager would not waste time while calculating the re- order level.

Customer Data: -

A good POS software will maintain sheet of customer's data by storing their profile data. The data can also help the customer relation team building an effective loyalty program which can increase sales in long term.

Mobility: -

A good POS should also offer online access which helps you stay connected with the business anywhere remotely. It is a convenient feature for franchise and business more than one location.

Reporting Tools: -

Every retail POS should have a reporting feature which is user friendly. It should store information such as product such as product styles or models, weekly sales monthly sales, annual sales and hourly transactions.

2.1.1. Document Conventions

These are the following list of terms and abbreviation used by the Meal Recommended System

Serial#	Abbreviation	Definition
1	POS	Point of Sale
2	UI	User Interface
3	OOP	Object Oriented Programming
4	DBA	Desktop Based Application
5	DB	Databases
6	C#	C Sharp

2.1.2. Intended Audience and Reading Suggestions

There are the different types of readers for this document and it is helpful for of all that like:

Audience	Use
Developers	They will use this document for guidance in design and documentation
Customer	They can ensure by reading this document that this product met their needs or not
Product Managers	Manager will read this document for check all constraints. For example, time and costs are in limit or not
Testers	They will use this document to test the implementations according to the requirements.
Documentation Writer	They will use this document during the documentation of the project. It will be really helpful for them.

2.1.3. Product Scope

- (1) The accuracy rate during inserting records and during processing, the system will be reliable.
- (2) In manual system many inherit problems were existing. So that it is required to replace the manual system with a computerized system
- (3) Our proposed system is very strong in implementation and will be user friendly. This system will be so easy to use that after training users can run this software easily.
- (4) Our purpose is to provide the system with minimum level of errors, maximum level of efficiency and user friendly.

2.1.4. Product Perspective

This software is based on the desktop base application that can overcome the all issues of entering record, saving record and all that because our system don't need an internet to save these all. All the systems that are available w in the market cannot have facility ton run the POS without internet.

2.1.5. Product Functions

Our software can handle these functionalities

- (1) Maintain the all records of Employs (add, del, update, insert)
- (2) Maintain the all records of products (add, del, update, insert)
- (3) Billing System
- (4) Sales Report
- (5) Stock Alert.

2.1.6. User Classes and Characteristics

Our application is user friendly. Each classes and functions are user friendly. The Technical and non-technical person will also use this product easily.

2.1.7. Operating Environment

It will include hardware and software requirements.

- It can be open on window 10, Linux (optional)
- The processor should be at least Pentium 3 or above.
- The processor speed should be greater than 400Mhz
- Operating system: window 10
- Ram should be or greater than 4 Gb

2.1.8. User Documentation

As stated in a previous section, extensive online help will be available at all times when using the system. This online help will guide the user.

User manual provided will give a clear idea in interacting with the system.

2.1.9. Assumptions and Dependencies

It assumed that this application will be developed in latest electron addition.

It is assumed that this application will be helped to the company for managing the sales record

It assumes that the security of the software cannot be break by an external power.

2.2. External Interface Requirements

- Pc or Laptop
- Barcode Machine
- Receipt Generator Device
- Cash Collector Machine

2.2.1. User Interfaces

This is Desktop Based Application so its interfaces should be user friendly like:

- First interface is for Employ and admin is main home page where he can search products and check details of product.
- Second interface is login or sign in page where employ can create his account and login to his account

2.2.2. Hardware Interfaces

This is Desktop Based Application so the hardware interface that are going to be used are the hardware components that are required for the internet access. These have been mentioned in the following table.

LAN	Ethernet cross-cable	Modem	Router
-----	----------------------	-------	--------

2.2.3. Software Interfaces

External Machine Interfaces: -

External Machine interface is not required since computation will be done on Windows So.

External System Interfaces: -

This will only include the SQL Database for the products.

Human Interface: -

The Desktop Based Application will use a Graphical Use Interface coded in C#.

2.2.4. Communications Interfaces

Basically, POS system is based on FTP and end to end encryption. In POS system (customer) will send the PASV command to FTP server, server will check the port number then customer machine will initiate the connection and then FTP server send acknowledgment to the customer.

2.3. System Features

The POS software stores the information and maintains it within a database. A feature-rich POS software provides a huge range of capabilities such as billing and order processing, sales monitoring and reporting, inventory tracking, returns, analytics, mobile connectivity, customer data management, employee management, and loyalty programs.

Now that you know what a POS system is, here are 4 key features that you should look while purchasing it:

- **Billing System**
- **Sales Monitoring and Reporting**
- **Inventory and Stock Management**
- **Employee Management**

2.3.1. System Feature 1

2.3.2. Billing System

2.3.2.1. Description and Priority

A point of sale system must have the basic functionality of billing and order processing. It should be able to bill orders by scanning items and capturing different payment modes. It has the capability to generate order invoice, reprint and email to end customer along with adding the discount, customer details, additional remarks and salesman's name to an order.

2.3.3. Functional Requirements

In Admin Case:

- **login**
Admin must login with a username and password in order to use the POS System.
- **Sale**
The admin must be able to see record the sale of an items.
- **New Member Registration**
New members must be able to register by Admin.
- **Display Member Information**
Admin can see the information of all employee which are register in system.
- **Update and delete**
Admin are able for delete and editing of member details such as change address and phone number as well as delete member etc.
- **Item Information**
Admin can see information about items such as name, description and price of an item.
- **Stock Alert**
Automatically alert on low level of stock.

In case of Employee:

- login
Employee must login with a username and password in order to use the POS System.
- Add Item
Add item to shopping cart by the Employee.
- Update and Delete
The Employee must be Remove or update items in shopping cart.
- Generate Receipts
After add item in shopping cart employee Generate receipt.
- Check Sale
Employee can also check the total sale at the end of day.
- Stock Alert
Automatically alert on low level of stock.

2.3.4. System Feature 2

2.3.5. Sales Monitoring and Reporting

2.3.5.1. Description and Priority

The point of sale system must be able to generate a robust report on sales result. It should be able to report hourly, daily, weekly, monthly and yearly takings and outgoings so that the merchants can easily understand the overall success of their business. Sales trends such as seasonal demand in products, forecast on the basis of sales trends, insights on unnecessary product overspend, and information relating to stock management are some of the features of an advanced POS reporting module.

2.3.6. System Feature 3 (and so on)

Inventory and Stock Management

A POS system's **inventory management** module must provide complete visibility and accountability at store level at all times.

The system should provide a view of lot-wise inventory, SKU transaction history about 'in', 'out' and 'within' movements of any SKU, and inbound & outbound inventory.

It should be able to make stock adjustments i.e. increase/decrease stock while viewing inventory and capture the reason for stock adjustments.

2.4. Other Nonfunctional Requirements

Response Time

When recording the sale of an item, the description and price will appear within a second

Easily Usable

The system must be user friendly, with easy to understand menu, instructions etc. Minimal learning time for commands

Operating platform.

The system should be able to run effectively on a PC with a minimum requirement. The system must be operating on all type of Microsoft Windows easily

Interface

The interface of the system must include windows, dialog boxes, menus, buttons and on-screen instructions etc.

2.4.1. Safety Requirements

Specify those requirements that are concerned with possible loss, damage, or harm that could result from the use of the product. Define any safeguards or actions that must be taken, as well as actions that must be prevented. Refer to any external policies or regulations that state safety issues that affect the product's design or use. Define any safety certifications that must be satisfied.

2.4.2. Security Requirements

Specify any requirements regarding security or privacy issues surrounding use of the product or protection of the data used or created by the product. Define any user identity authentication requirements. Refer to any external policies or regulations containing security issues that affect the product. Define any security or privacy certifications that must be satisfied.

2.4.3. Software Quality Attributes

Specify any additional quality characteristics for the product that will be important to either the customers or the developers. Some to consider are: adaptability, availability, correctness, flexibility, interoperability, maintainability, portability, reliability, reusability, robustness, testability, and usability. Write these to be specific, quantitative, and verifiable when possible. At the least, clarify the relative preferences for various attributes, such as ease of use over ease of learning

2.4.4. Business Rules

List any operating principles about the product, such as which individuals or roles can perform which functions under specific circumstances. These are not functional requirements in themselves, but they may imply certain functional requirements to enforce the rules.

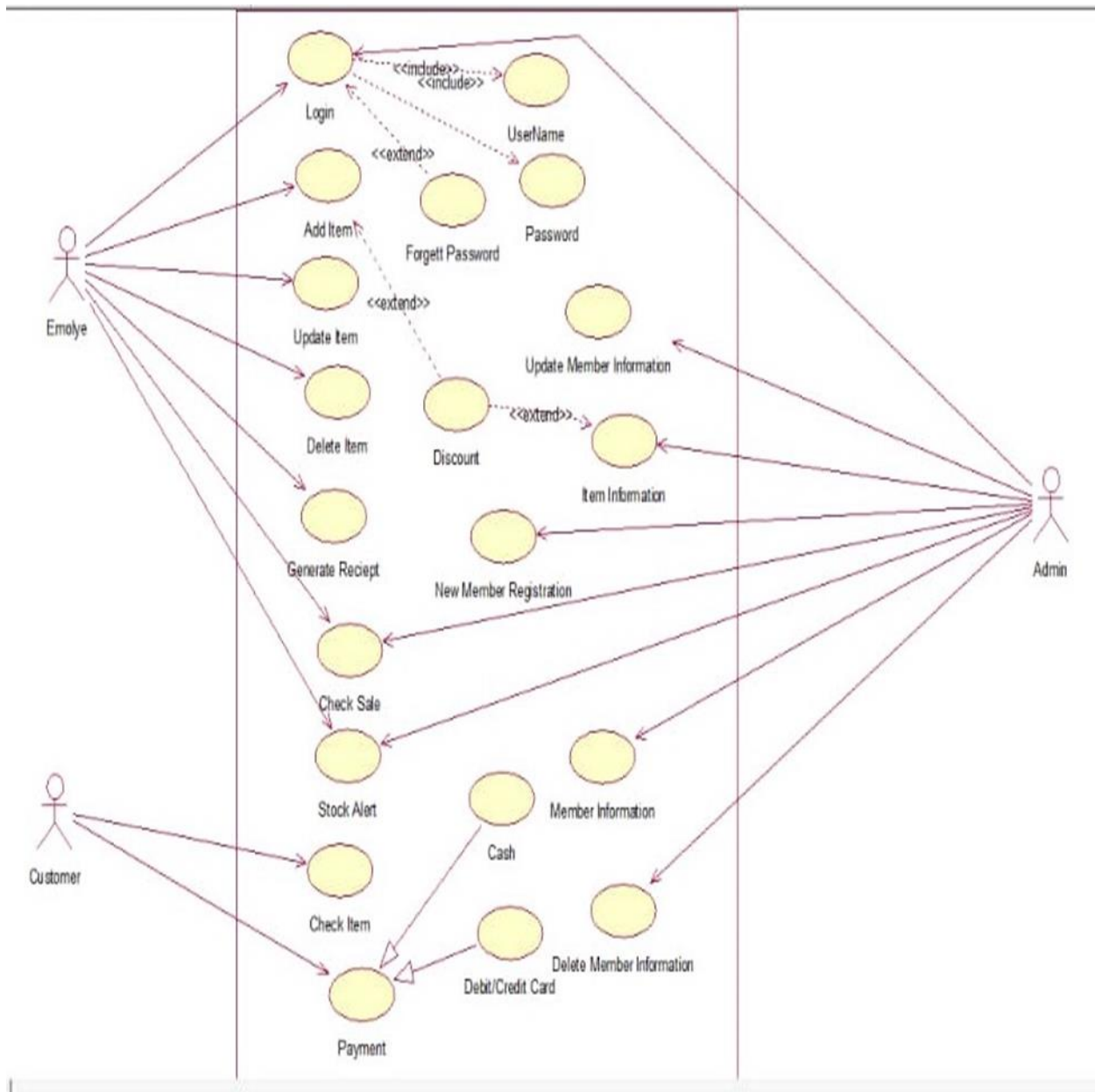
2.5. Other Requirements

The system must store the entire User information in Database and all the sales record in it. For each user data saved with its unique Email id in the database.

Chapter 3

Use Case Analysis

3.1. Use Case Model



3.2. Use Case Specification

New Member Registration/Sign Up

Use Case Name	New Member registration
Description	To register a new employee
Primary Actor	Employee
Secondary Actor	None
Pre-Condition	None
Post Condition	The information that can be stored in database or system
Main Flow	1. Admin must click on sign up button 2. Fill the boxes with the given information provided by employee 3. After fill all the entries click on save button 4. The new member will be registered.

Login

Use Case Name	Admin or Customer Login
Description	1. Employee must be login for give order 2. Admin must login to perform their different activities
Primary Actor	Employee
Secondary Actor	None
Pre-Condition	Must be login
Post Condition	The data can be stored in database or system
Main Flow	1. Admin or Employee must click on login button 2. Enter their admin or employee user id and password 3. After enter id and password click on login button 4. The different new window will be open for employee and admin

Update Member Information

Use Case Name	Update Member Information
Description	When any employee wants to update their information such as employee change their phone number with the existing one
Primary Actor	Admin
Secondary Actor	Employee
Pre-Condition	Admin must select the employee in order to change or update their information.
Post Condition	Information are change successfully
Main Flow	1. Admin must click on Employee in order to change their information 2. Select the info cell which he wants to change 3. Update the information 4. Click on save button

Member Information

Use Case Name	Member Information
Description	When Admin want to see the employee information
Primary Actor	Admin
Secondary Actor	None
Pre-Condition	Go to the Employee information section
Post Condition	The information of employee is on the screen
Main Flow	1. Admin must go to employee information section 2. Click on the desired employee 3. The Information of employee are on the screen

Delete Member

Use Case Name	Delete Member
Description	When admin want to delete the member or employee which are no longer exist on the store
Primary Actor	Admin
Secondary Actor	Employee
Pre-Condition	None
Post Condition	Member or employee data are deleted permanently
Main Flow	1. Admin must go to employee information section 2. Click on the desired member which he wants to delete 3. Click the delete button 4. Member or employee data are deleted permanently

Item Information

Use Case Name	Item Information
Description	When admin want to see the information about the item which are not present in store and those which are in stock
Primary Actor	Admin
Secondary Actor	None
Pre-Condition	Must go the item information section
Post Condition	Information are displayed on the screen
Main Flow	1. Admin must go to item information section 2. All the item are shown on the screen 3. See whose item are in stock and whose are in danger zone

Check Sale

Use Case Name	Check Sale
Description	When admin or Employee want to check the sale of the day and month
Primary Actor	Employee
Secondary Actor	None
Pre-Condition	None
Post Condition	The sales data are display on the screen of the system
Main Flow	1. Admin or Employee must go to sales section 2. Click on the sale of the desire days, month or year 3. After selecting Click on that sale 4. The sales data are on the screen are display

Add Item

Use Case Name	Add item
Description	When employee or cashier add item in the receipt list which are buy by customer
Primary Actor	Employee
Secondary Actor	None
Pre-Condition	The employee must login before add item in list.
Post Condition	Employee can add all the item in receipt list which are bought by the customer
Main Flow	1. Pick the item 2. Write the name of the item or code or scan the item 3. Add the quantity 4. Click on add or press the enter button 5. Item are adding in the list

Update Item

Use Case Name	Update item
Description	When employee or cashier update the item from the existing receipt list such a when customer add or remove item at the time of shopping
Primary Actor	Employee
Secondary Actor	Customer
Pre-Condition	None
Post Condition	Employee or cashier easily update the item buy add item in the list as well as delete item
Main Flow	1. Pick the item or check the list for remove the item 2. Write the name of the item or code or scan the item 3. Increase the quantity/Delete item/Add item 4. Click on add or press the enter button 5. Item list is Update Successfully

Delete Item

Use Case Name	Delete Item
Description	When cashier/Employee delete item from the receipt list of the customer
Primary Actor	Employee
Secondary Actor	Customer
Pre-Condition	None
Post Condition	Employee can delete the item from the list which the customer wants to delete easily
Main Flow	1. Pick the item you want to delete 2. Write the name of the item or code 3. Click on delete button option 4. Item are successfully deleted from the item list

Generate Receipt

Use Case Name	Generate Receipt
Description	When the employee/cashier add all the item in shopping list they generate a bill receipt for the customer
Primary Actor	Employee
Secondary Actor	Customer
Pre-Condition	The employee must be adding item in the list before generate a receipt
Post Condition	After paying the bill of the item the bill receipt gives to the customer by the cashier/Employee
Main Flow	1. Select the item 2. Add the item in the list 3. After adding the item the click to generate a bill button 4. The bill receipt will be come through the machine

Payment

Use Case Name	Payment
Description	When employee or cashier add item in the receipt list which are buy by customer the cashier gives the payment receipt to customer
Primary Actor	Customer
Secondary Actor	Employee/Cashier
Pre-Condition	The employee must login Payment must be deducted from the customer account
Post Condition	None
Main Flow	1. Pick the item 2. Write the name of the item or code or scan the item 3. Add the quantity 4. Click on add or press the enter button 5. Item are adding in the list the payment receipt will be generate for the customer

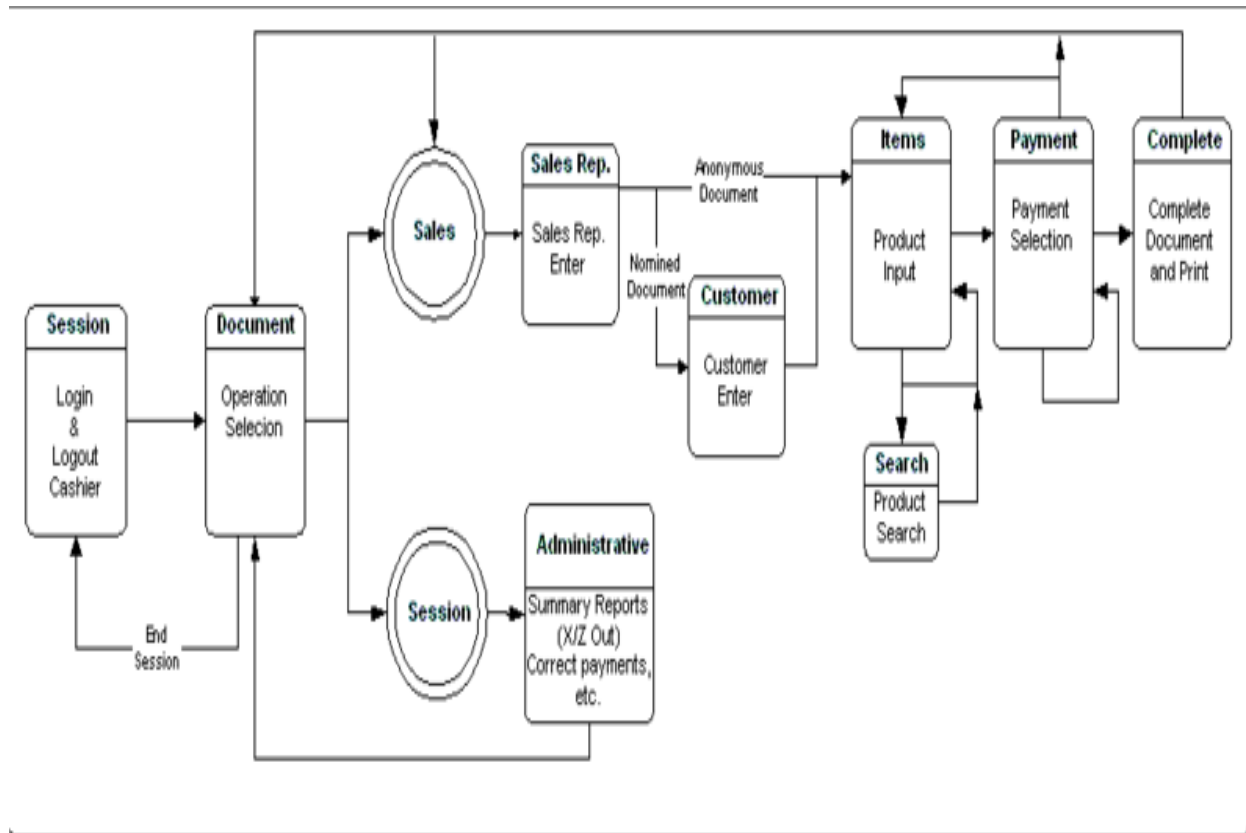
Check Item

Use Case Name	Check Item
Description	When employee or cashier add item in the receipt list which are buy by customer which can also check by the customer
Primary Actor	Customer
Secondary Actor	Admin
Pre-Condition	The employee must be login for display the selecting item to the customer
Post Condition	After the add all the item in list customer can also check and verify the list which are display on the screen
Main Flow	1. Pick the item 2. Write the name of the item or code or scan the item 3. Add the quantity 4. Click on add or press the enter button 5. Item are adding in the list 6. Now customer can check the list on display screen

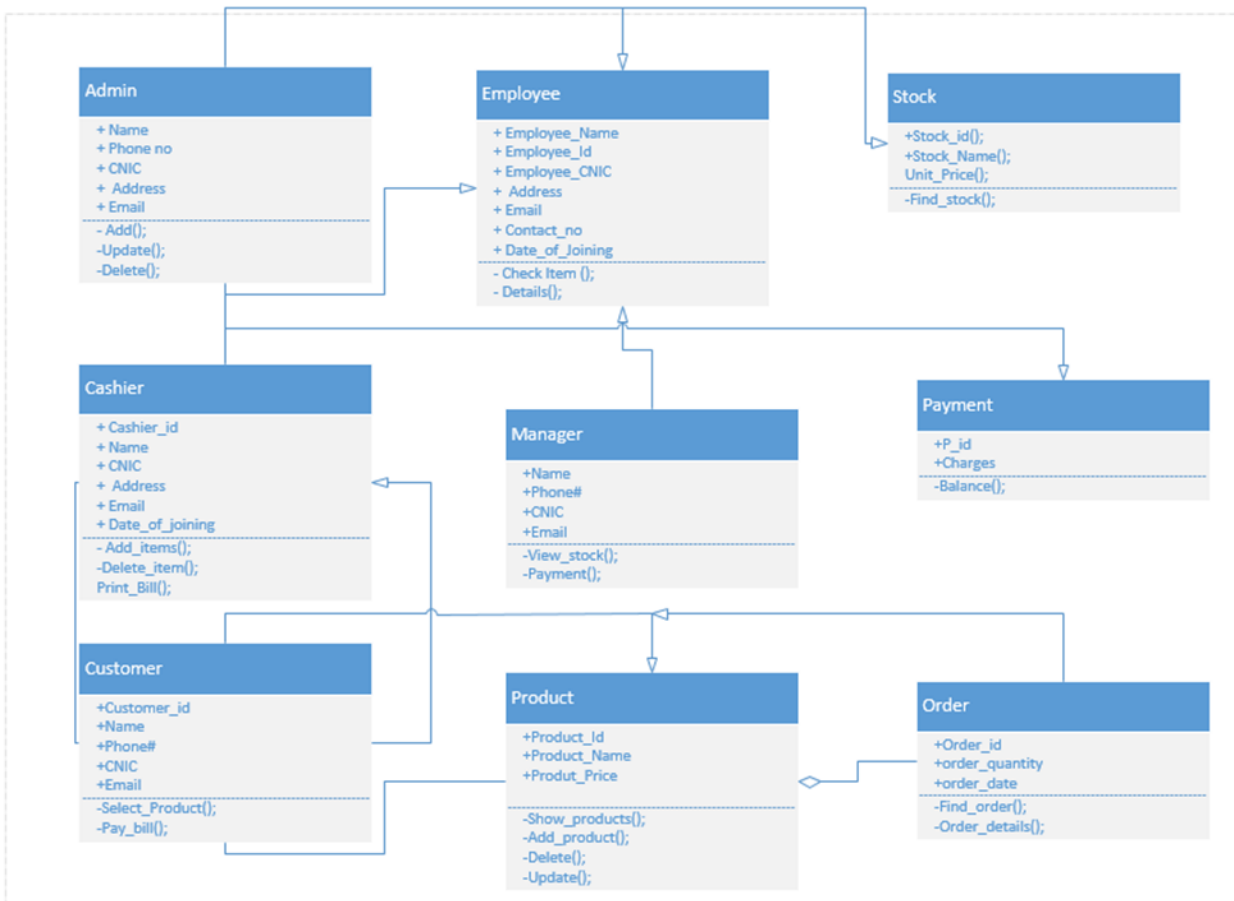
Chapter 4

System Design

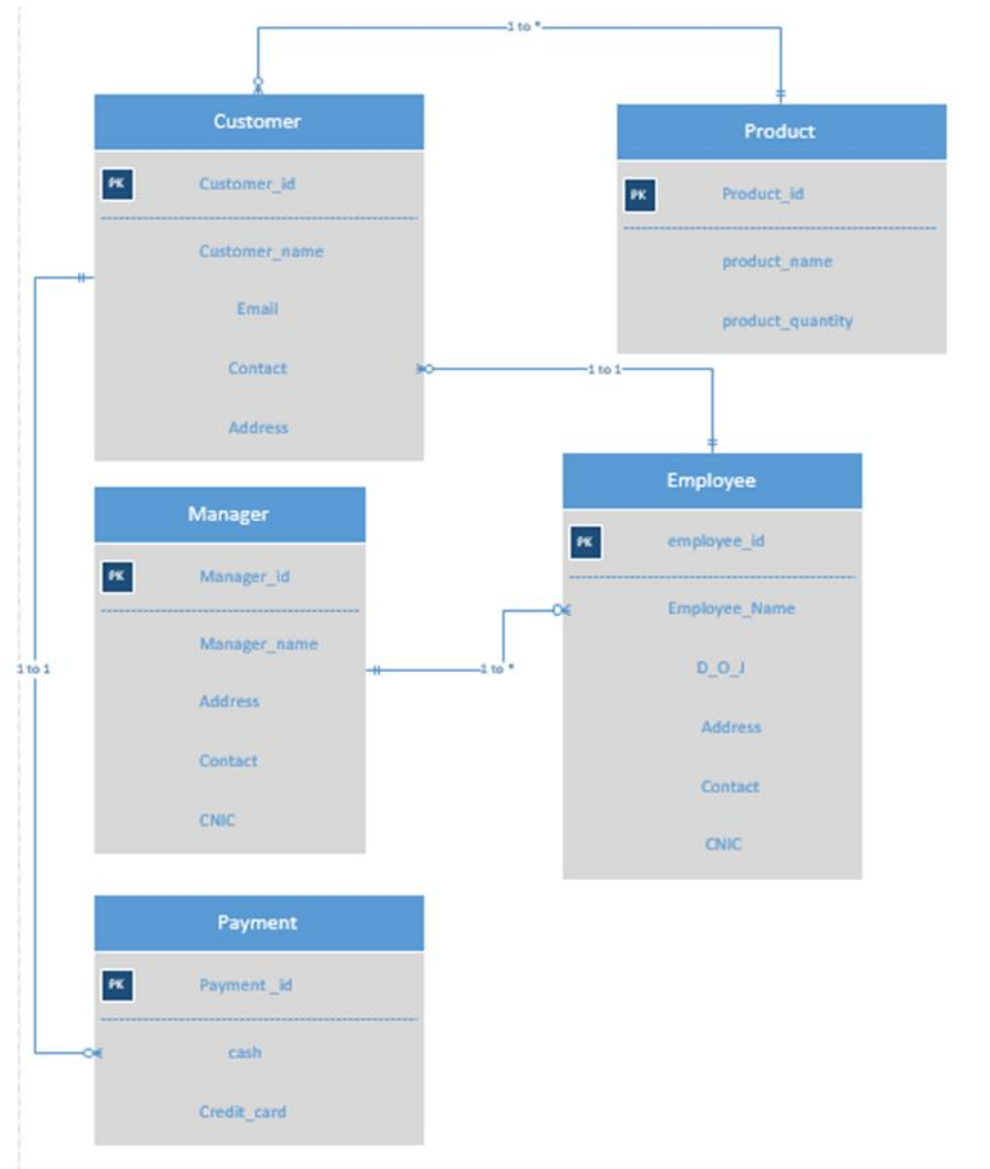
4.1. Architecture Diagram



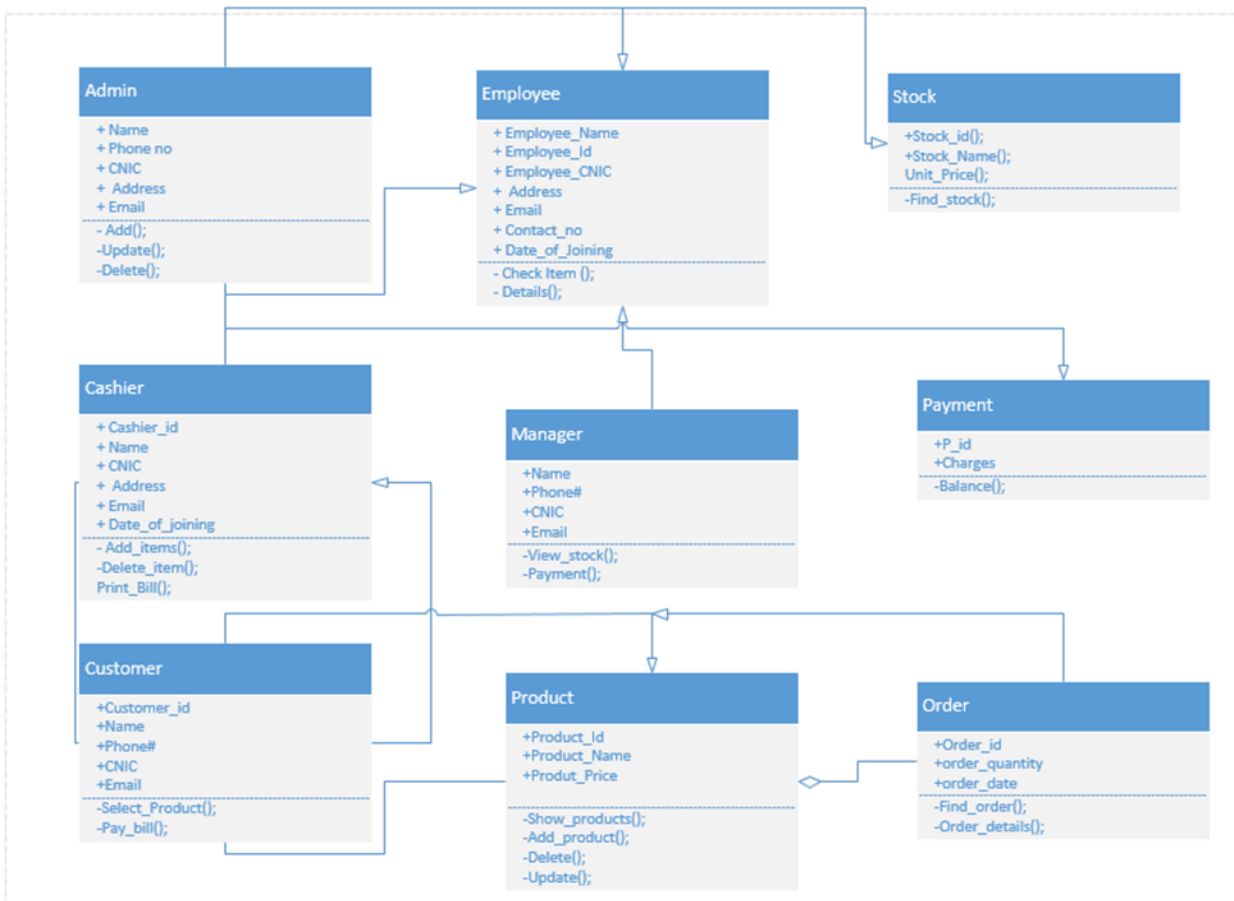
4.2. Domain Model



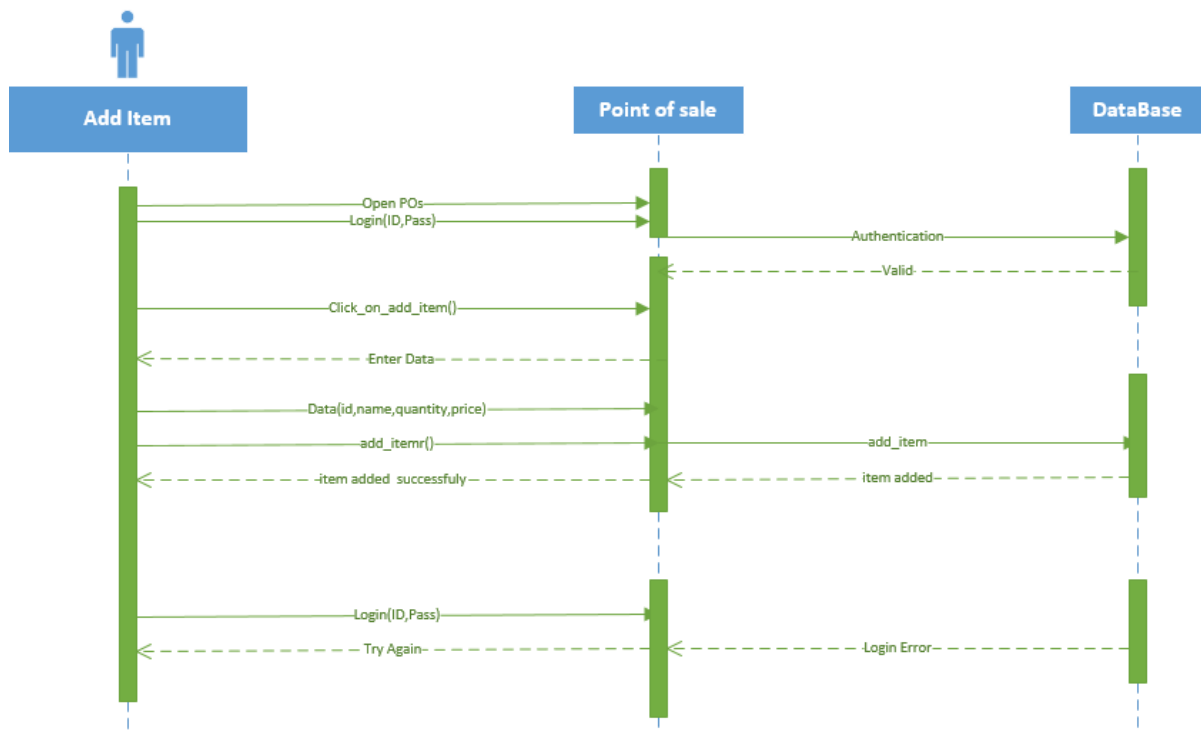
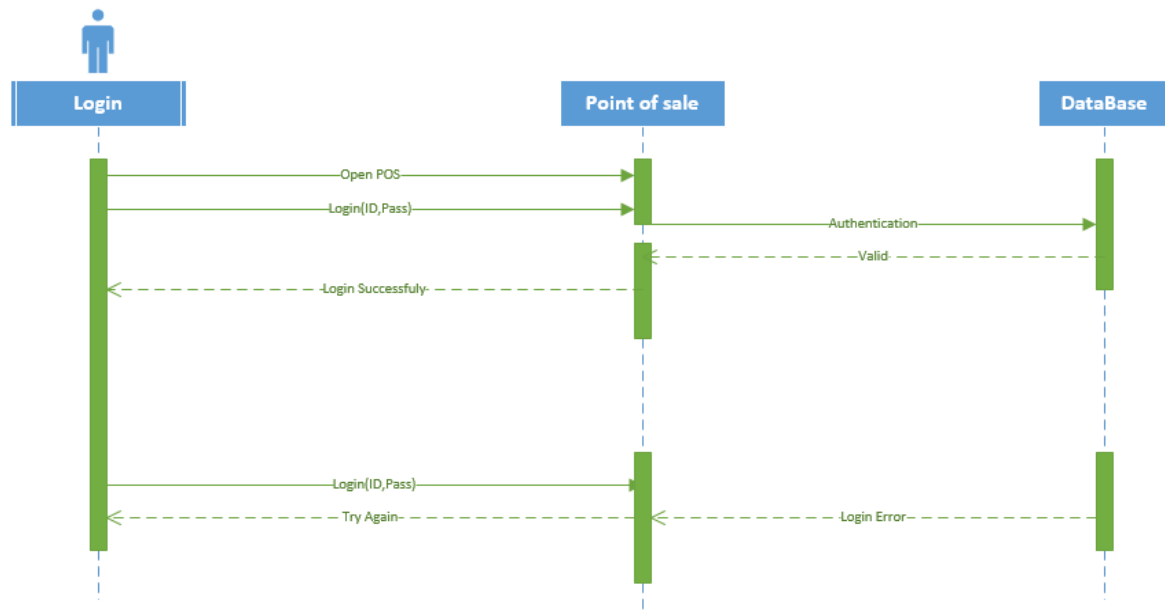
4.3. Entity Relationship Diagram with data dictionary

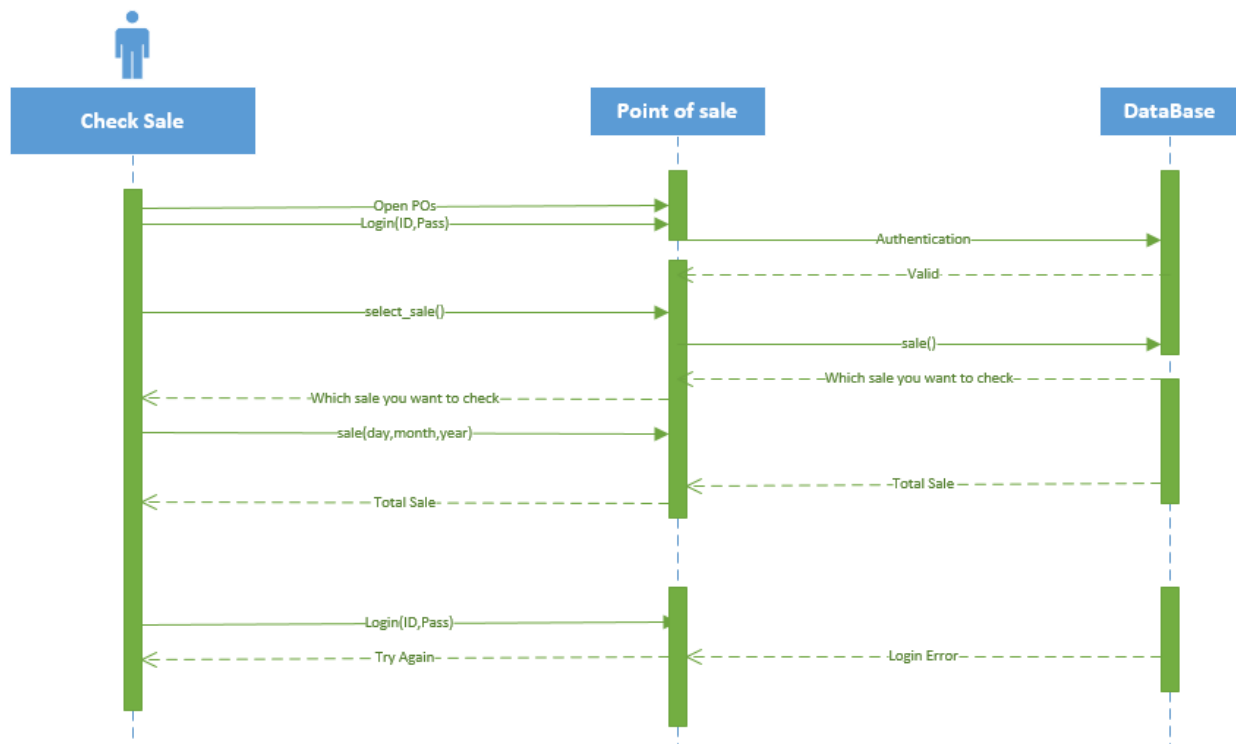


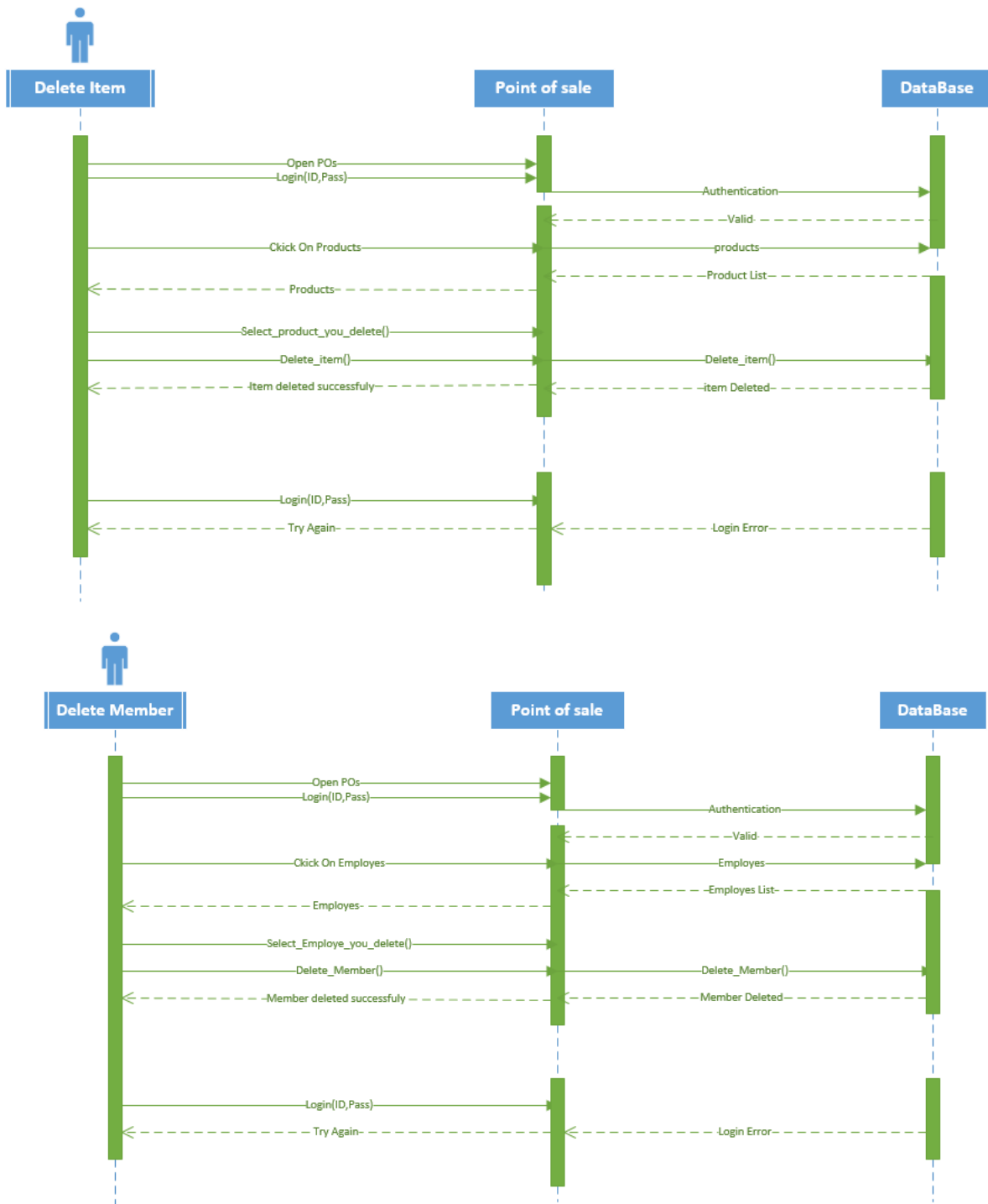
4.4. Class Diagram

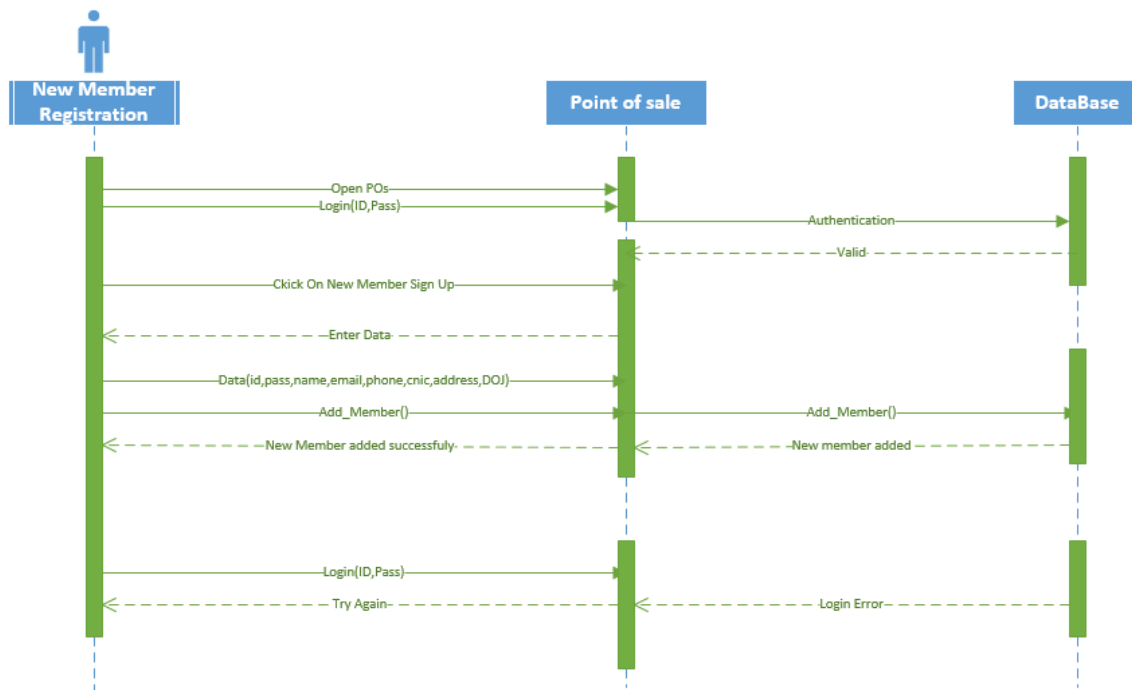
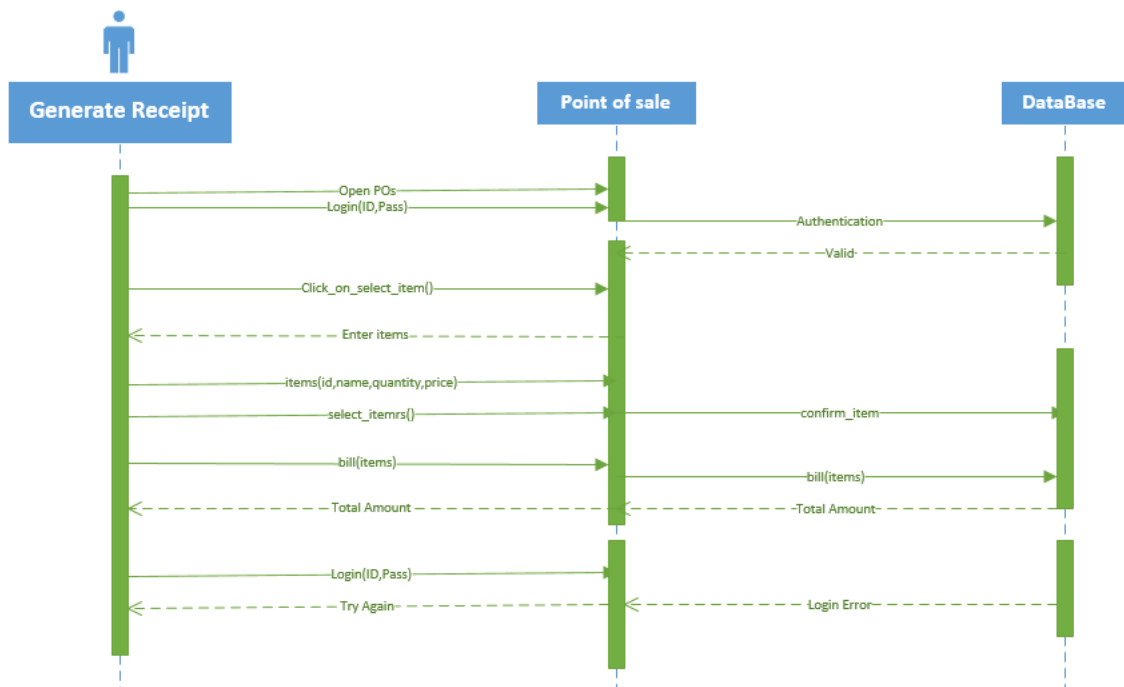


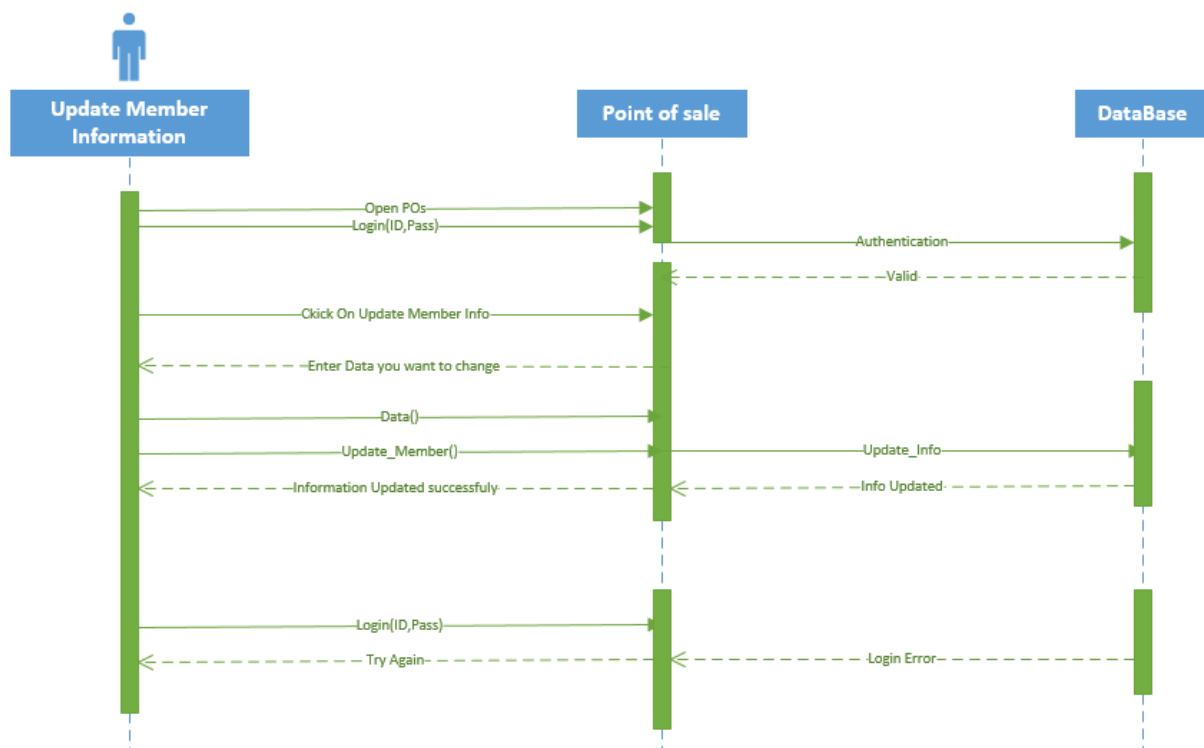
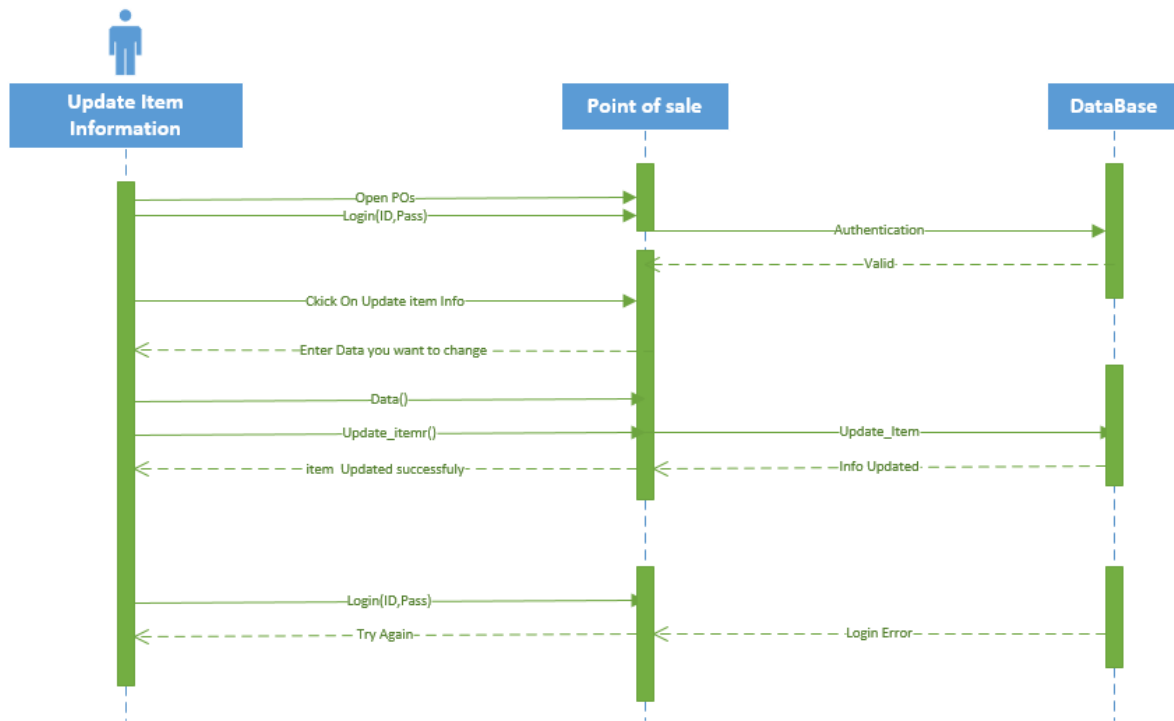
4.5. Sequence / Collaboration Diagram





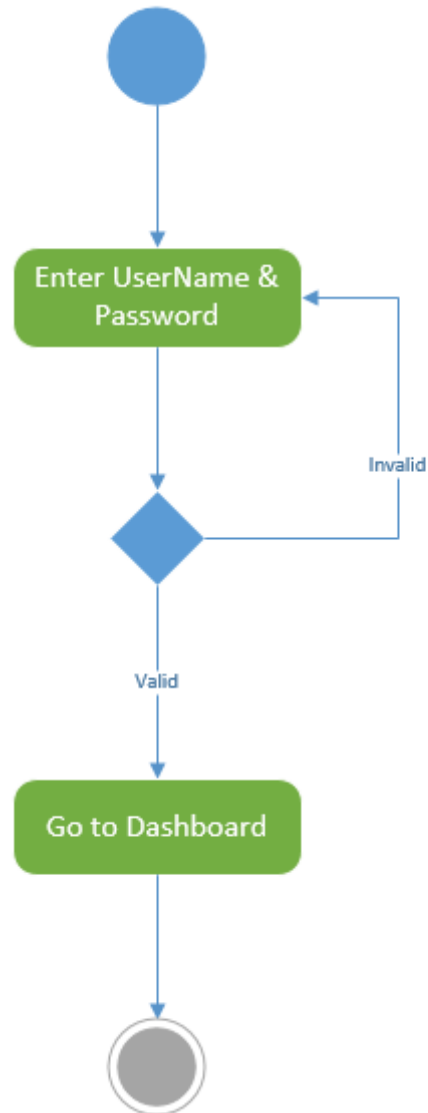




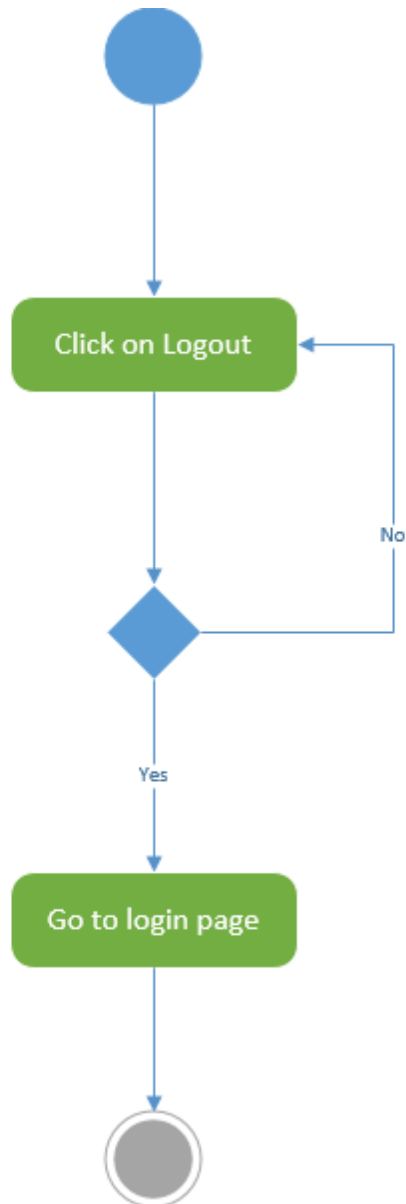


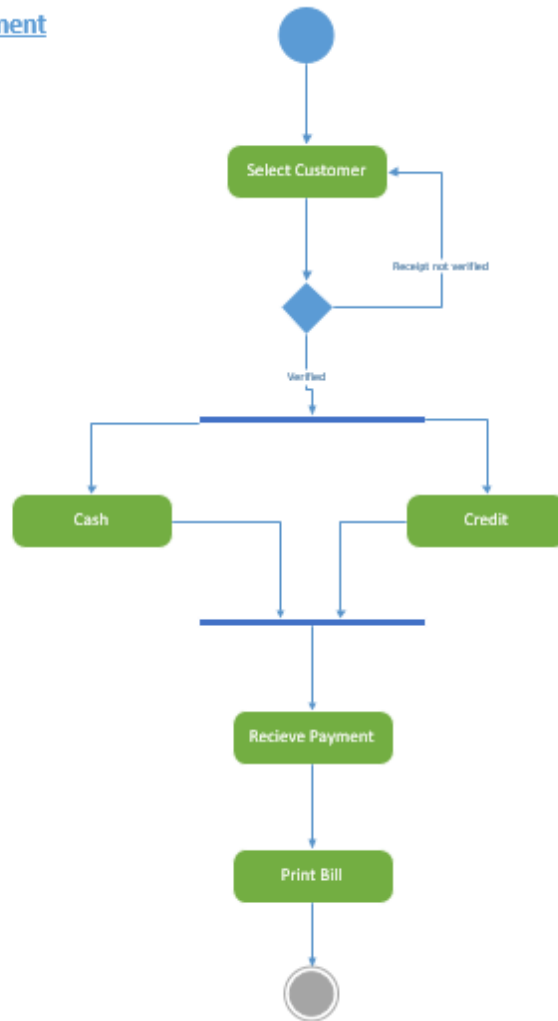
4.6. Activity Diagram

LOGIN



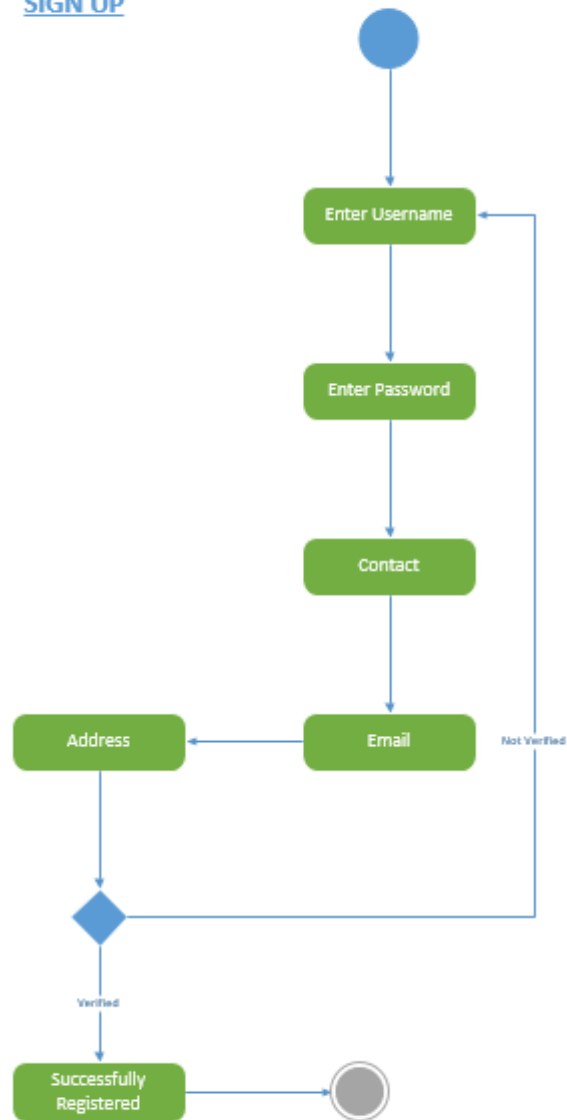
Log Out



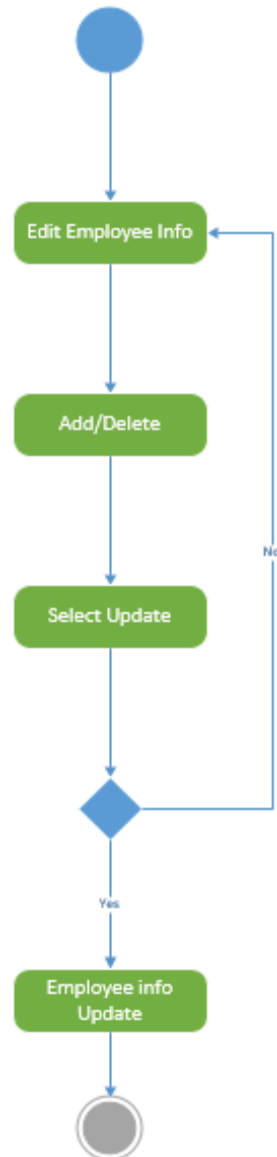
Payment

Select Product

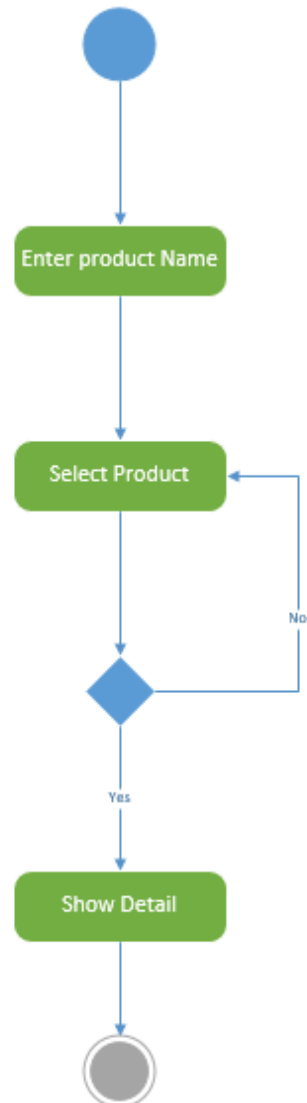


SIGN UP

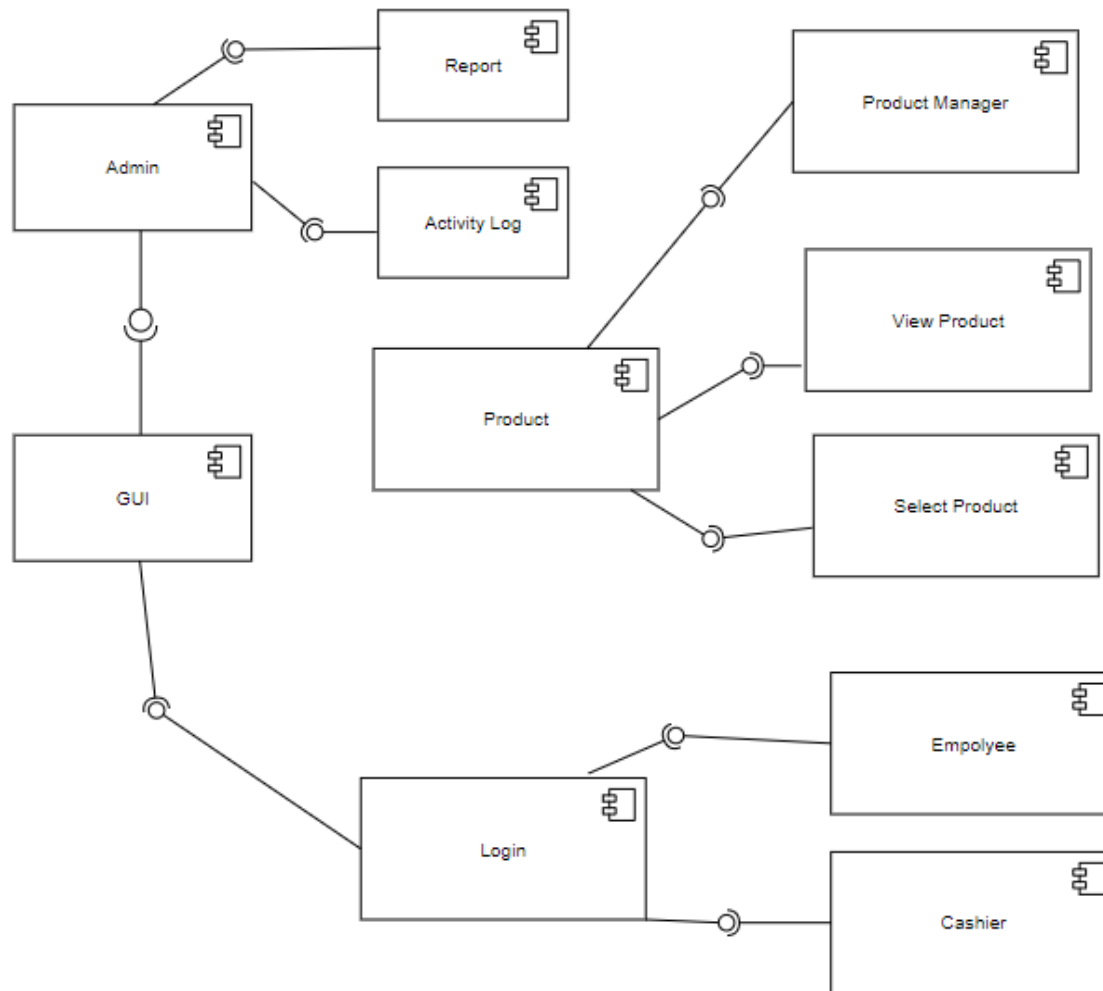
Update Customer Information



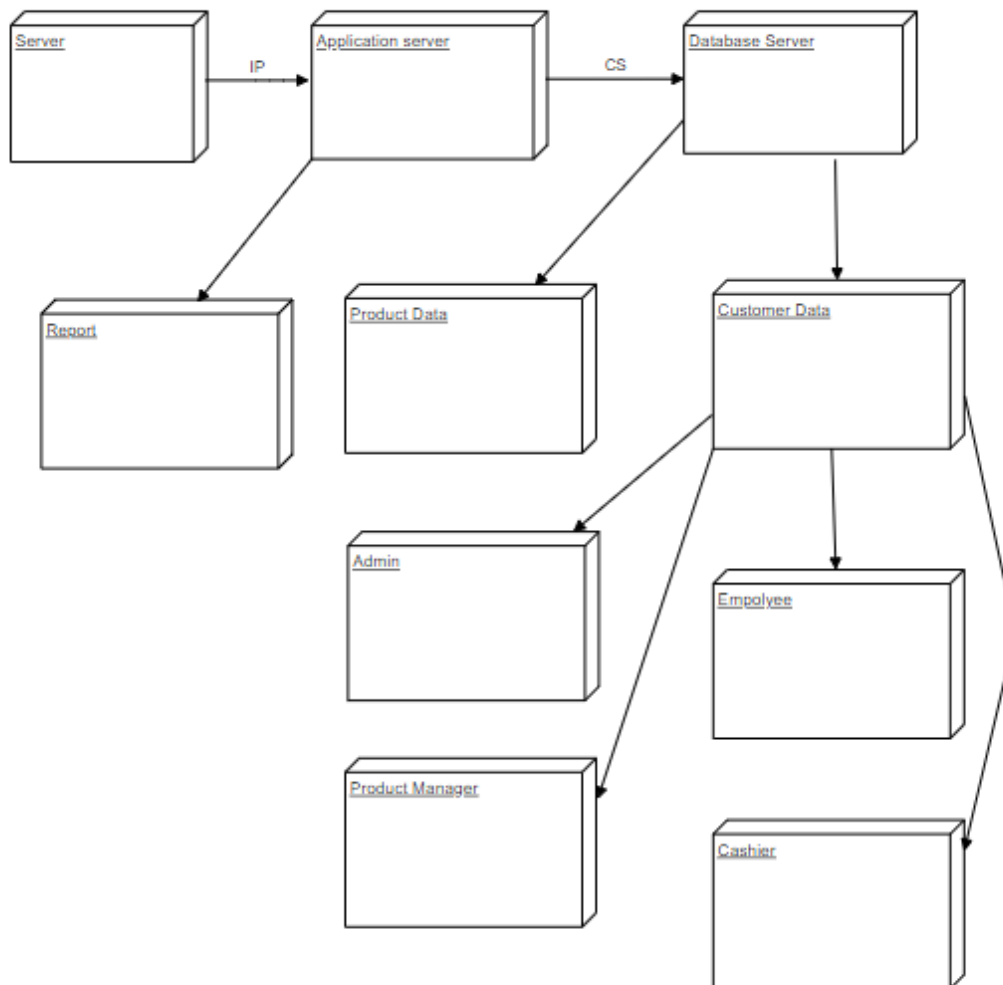
Skk

View Product

4.7. Component Diagram



4.8. Deployment Diagram



Chapter 5

Implementation

Implementation

Agile methodology use for the implementations of this system. We get all the necessary information of all the development phases including requirement gathering, analysis, design, implementation, testing and development. In implementation we develop the platform and we check either the system fulfills the requirements.

Requirement Gathering & Analysis	In this Phase all the requirements and assets necessary are ready for analyzing. Errors and bugs are pinpointed during analysis and fixed. And then the feasibilities in the different areas of implementation are formulated (including time & post)
Planning	In this phase plan will be manifested on the basis on the analyzed data and requirements. The time and cost for each SDLC phase will also be decided.
Design	In this phase, development model will be chosen and website, database will be designed. It will be verified by supervisor.
Implementation	After design phase implementation according to the requirements. During and after completion of this Phase, V&V will be applied to check if the system fulfills the requirements
Testing	Testing will be done to check requirements and functionality. Both dynamic and static testing will be performed. Dynamically through testing tools and statically to check every line of code manually. Static testing will reduce errors upon execution and allow us to find errors that otherwise are very difficult to find.

5.1. Important Flow Control/Pseudo codes

Admin Panel:

- Log In
- Check Activity
- View Intelligent report
- Decision making, removes and verifies accounts

Product Manager Panel: -

- Log In
- View Product
- Profile Chat
- Add Product
- Remove Product

Employ Panel: -

- View Product
- Provide Product
- Receive Salary

Cashier Panel: -

- Enter Items
- Receive Bill
- Details

5.2. Components, Libraries, Web Services and stubs

Language and Libraries: -

C#, Database.

5.3. Deployment Environment

- LAN
- Server

5.4. Tools and Techniques

- C#
- Database

5.5. Best Practices / Coding Standards

- Coding will be neat and clean
- Code will not be repeated
- Code will be easy to understand
- Making changes in code will be easy

5.6. Version Control

All versions can control this.

Chapter 6

Testing and Evaluation

Chapter 6: Testing and Evaluation

6.1. Use Case Testing

Actors	NO.	Steps	Description
Admin	1	Login as admin	Login to system with correct username and password. System will redirect to next page
Admin	2	New Member Registration	Add a new member to the database to allow him to use service of system.
Admin	3	Member Information	Takes the important information of member
Admin	4	Update Member Information	Can update the information of member.
Admin	5	Delete Member Information	Can delete the information of member.
Admin	6	Check Sale	Check the whole sale at anytime
Admin	7	Stock Alert	
Admin	8	Payment Proceeding	Manage payment and receive checks from customer.

Use Case testing extension

No.	Step	Description
1a	Login Failed	Login failed if admin enter wrong email and password. System will display an error message.
1b	Login Failed	Login Failed if admin enter wrong password. System will display an error message.
6a	Registration Failed	Registration will be failed if a new user doesn't follow the rules. System will display an error message.
7a	Login Failed	Login failed if user enter wrong username. System will display an error message.
7b	Login Failed	Login failed if user enter wrong username. System will display an error message.

6.2. Boundary value analysis

Boundary testing in the process of testing that is between start point and extreme ends or boundaries between partials of input values.

Login username

- Username that a person enter in the text box at the time of login must be correct and unique.
- If the username is not correct, the system must restrict the user at the current page.

Login password

- Username that a person enter in the text box at the time of login must be correct and greater than 5 characters.
- If the username is not correct, the system must restrict the user at the current page.

6.3. Unit testing

Test Units	Test items	Input specification	Functionality	Result
Test unit 1	Login to system	The field of inputs and password cannot be empty. The username and password must match with the registered username and password	Enter the registered username, password and press login button. Get access to system.	Successfully logged in to the system.
Test unit 2	View dashboard	In dashboard, all sales, purchases shown, and the products going to be finished.	Test all the graphs and sale and purchase information that shown in the dashboard.	Successfully checked whole dashboard
Test unit 3	Connect to database	Use SQL server database. Enter correct username and password for authentication. Check the connection successful manage	Connect server to database to save your record into the database	Successfully connected to database
Test unit 4	Testing to add an ingredient	Input can be a string, numbers, integers and floating digits. Never accepts the blank fields. Input integers must greater than zero.	Add category enter the relevant information to the fields and add records into database.	Category, added successfully.
Test unit 5	Testing of purchase	Input strings for the name. Enter special characters. Empty fields not accepted. Duplicate data also not accepted.	Input strings for the name. Enter special characters. Empty fields not accepted. Duplicate data also not accepted	Add, view and edit purchase successfully.

Test unit 6	Testing of purchase returns	Enter only purchases that return from the customers. Empty fields not allowed.	View purchases returns Edit/Delete purchases return	Purchases return testing successfully return
Test unit 7	Testing of sales	Input string for the name. Enter special characters. Empty fields not accepted. Duplicate data not accepted.	Add a sale view sales Edit/Delete sale	Add, view and edit sales successfully to the system
Test unit 8	Testing of sales return	Enter only those sales that returns from the customers. Empty field not allowed.	View sale returns Edit/Delete sale returns.	Sales return checked successfully
Test unit 9	Testing of supplier	Input strings for the name. Enter special characters. Empty fields not accepted. Duplicate data also not accepted.	Add supplier in a specific type. View all suppliers Edit/delete suppliers	Done successfully
Test unit 10	Testing of stock	Input strings for the name. Enter special characters. Empty fields not accepted. Duplicate data also not accepted.	Add stock View sale Edit/Delete stock and also search stock	Test successfully
Test unit 11	Check interfaces of system	Check all user interface	Test all interface of the system	All interfaces work perfectly.
Test unit 12	Check whole system	Check full code and functions	Check all functions	System work efficiently.
Test unit 13	Check for logout	Logout from the system	Press logout button and return to login page	Logout Successfully

6.4. Integration testing

integration testing(insert)

Test Item	Input Specifications	Functionality	Result
Add user type	Enter a type of user you want to register	Enter use type and press enter	Add data successfully
Add user	Enter user all information, create password and select type	Fill all fields and press save record	Add data successfully
Add products	Select category and fill name and description	Fill all fields and press save	Add data successfully
Add supplier type	Add the type of supplier	Add type and press save	Add data successfully
Add supplier	Select the type and enter all other information	Fill the fields correctly and press save button	Add data successfully
Add category	Add a product category to save a product	Category added	Add data successfully
Add products	Select category and fill name and description	Fill all fields and press save	Add data successfully
Add purchases	Make a purchase by select its type	Select type and add other information	Add data successfully
Add sales	Add a sold product here	Add sales by filling information	Add data successfully
Add stock	Add company's stocks	Fill the fields with information about stock	Add data successfully

integration testing(view)

Test Item	Functionality	Result
View all users	All user's data retrieve from database	View data successfully

View all customers	Customer data is show here	View data successfully
View category	All category retrieved	View data successfully
View all products	Products information shown here	View data successfully
View all purchases	All purchases show successfully	View data successfully
View sales	All sales available here	View data successfully
View stock	Show all information about stock	View data successfully

integration testing(delete)

Test Item	Functionality	Result
Delete user	Select a user and press delete button	Remove user successfully
Delete supplier type	Press delete button to delete a type of supplier	Remove successfully
Delete supplier	Delete a supplier information	Remove data successfully
Delete category a	Category removed by pressing delete button	Remove data successfully
Delete a product	Select and press to delete the product	Remove successfully
Delete purchase a	Select and press delete to remove purchases	Remove data successfully

Delete a sale	Select sale and delete	Remove sale successfully
Delete stock	Delete information about stock	Remove stock successfully

integration testing (Edit/update)

Test Item	Functionality	Result
Update users	Changing in information made successfully	Update data
Update supplier type	Edit a supplier type by pressing edit button	Operation successfully
Update all suppliers	Edit information of supplier and update	Edit data successfully
Update Category	Make changes in the category data	Operation successfully
Update all products	Products information edited successfully	Update data successfully
Update all purchases	Edit information of purchases	Data successfully edited
Update sales	Make changes in sales portion	Edit sales successfully
Update stock	Edited selected information about stock	Stock edited successfully

integration testing (interfaces)

Test Item	Functionality	Result
Login page	Login page checked. Work perfectly	Interface work perfectly
Dashboard	All component of dashboard checked	Interface work perfectly

Suppliers	Supplier portion's interfaces checked	Interface work perfectly
Products	Products interfaces checked successfully	Interface work perfectly
Sales	All sales interfaces work perfectly	Interface work perfectly
Stock	All stock interfaces add and view checked	Interface work perfectly
Users	Interfaces of add and view users checked	Interface work perfectly

6.5. Performance testing

performances testing (System response time testing)

Test Type	Performance Testing	Test result
Required performance	The required response time of the system is less than 5 seconds	
System Performance	The actual performance response time is 4 second	Test passed

performance testing (Page load time testing)

Test Type	Performance Testing	Test Result
Required performance	The required page load time of the system is less than 3 second	
System Performance	The actual page load time is 2 seconds	Test passed

performance testing (Huge number of users)

Test Type	Performance Testing	Test Result
Required performance	System should perform normally and efficiently with a large number of users	
System Performance	System performed all activities normally with a large number of users.	Test passed

performance testing (Waiting time testing)

Test Type	Performance Testing	Test Result
Required performance	The average waiting time of the system is less then 3 seconds	
System Performance	The actual performance response time is 2 seconds in some circumstances	Test passed

performance testing (Huge number of users)

Test Type	Performance Testing	Test Result
Required performance	The connection must be stablshed in less than 2 seconds	
System Performance	The actual connection stablsh time is about 1 second	Test passed

performance testing (Huge number of users)

Test Type	Performance Testing	Test Result
Required performance	The system should save or retrieve data from database in less then 2 seconds	
System Performance	The actual time system send or get information to database in 1 second	Test passed

Chapter 7

Summary, Conclusion and Future Enhancements

Chapter 7: Summary, Conclusion & Future Enhancements

7.1. Project Summary

A POS (Point-Of-Sale) system is a computer system typically used to manage the sales in retail stores. It includes hardware components such as a computer, a bar code scanner, a printer and also software to manage the operation of the store. The most basic function of a POS system is to handle sales. When a customer arrives at a POS counter with goods to purchase, the cashier will start a new sale transaction. When the barcode of a good is read by the POS system, it will retrieve the name and price of this good from the backend catalog system and interact with inventory system to deduce the stock amount of this good. After the payment is successful, a receipt will be printed.

As well tracking system such as if user can delete the product and stock and other item, they can be easily track by their id.

7.2. Achievements and Improvements

- Keeping the stock data and report.
- Supplier data and report.
- Sales invoices and sales receipt also.
- Item return policy and receipt.
- Product pricing (set item profit margin as well as discount on different items)
- As well tracking system such as if user can delete the product and stock and other item, they can be easily track by their id.
- At the end monthly and yearly sales reports

7.3. Critical Review

Now a days, everyone is trying to maintain a balance between what needed and what demanded. Every business organization wants to earn big profit our business will also earn 100% profit without any scared of loss to users.

7.4. Lessons Learnt

When you come to practical life you should learn multiple lessons. Our team also learns multiple lessons while promoting this idea. Following are some basic lessons which we learn during this complete project:

1.) Choose the right software:

Firstly, in technically side, you should choose the right software which is more beneficially for your system. You should not waste your time on pirated software. Selecting most appropriate software for your company will make your company healthier and more profitable.

2.) Always consult with an expert:

Before taking a critical and crucial decision, always consult with an expert because their advice can be more effective for you at that stage. In our project we consult all the time with our supervisor (Mr. Umair) and secondly, we also consult different catering services to know what user need all the time.

7.5. Future Enhancements/Recommendations

It is a very good approach to think about the future of your app. In our app we also think for future also because for the ease of use and also to earn more profit by our ideas.

We will add the Artificial Algorithms (AI) in this system which will help us to tell the expected sale of the month on the basis of last month sale.