



IJRASET

International Journal For Research in
Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 Issue: V Month of publication: May 2022

DOI: <https://doi.org/10.22214/ijraset.2022.43622>

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General Store Management System

Jatin Jangid¹, Prof. Sushma Khatri²

¹Student, ²Sr. Asst. Prof., Department of Computer Science and Engineering, Acropolis Institute of Technology and Research, Indore, Madhya Pradesh, India

Abstract: As the world is continuously advancing and software to automate everything is available already. General stores are a very basic need of every citizen as they provide a variety of services like stationary, grocery, daily necessities etc. So, an efficient way to manage and run a general store is very important. Also, the paper bills are not very handy and are not reliable as well as they degrade overtime, stock calculations get unmanageable and hard to keep records of, the retailer also faces hardships on employee tracking.

Keywords: Software, automation, Service, Productivity, System.

I. INTRODUCTION

General Stores are an important and basic utility for the citizens as they provide all sorts of needs/items to the customers. But mostly it happens that the item is available, and the employee/manager is not able to find/locate the item, this problem is almost faces in every general store and it also causes great inconvenience to the customers as well, In the business world customer satisfaction is very important but, in such scenarios, it is ruined completely. By using this general store management system, you can avoid these conditions by a great margin thus increasing the management of the store and the customer satisfaction which increases the stores popularity as well.

II. FUNCTIONALITY

Following are the functionalities provided by the General Store Management System

- 1) Create User ID: In this the user will create his/her profile and the priority is high
- 2) Login: In this the user will enter the credentials set by him/her during the create user ID functionality and the priority is high
- 3) Manage Stock: Through this the user can manage all the stocks and the priority is medium
- 4) Add Stock: Through this the user can add the stocks and the priority is medium
- 5) Remove Stock: Through this the user can remove the stocks and the priority is medium
- 6) Manage Employee: Through this the user can manage all the employees and the priority is medium
- 7) Add Employee: Through this the user can add an employee and the priority is medium
- 8) Remove Employee: Through this the user can remove an employee and the priority is medium
- 9) Report Generation: Through this the user can generate the report of the stocks & employee and the priority is medium
- 10) QR code Scanning: For instant product identification and easy tracking, QR codes are used.
- 11) Application should be made using C/C++ and java only to increase speed and security of the software
- 12) Desktop purpose only
- 13) Minimum requirement should be at least windows 7
- 14) Should be available 24/7.
- 15) At most 5 employees should be able to use the software at once

III. OBJECTIVE

- 1) *Material Availability:* Ensure the availability of all kinds of material whenever they are needed.
- 2) *Keeping Losses to a Minimum:* When there is no monitoring at the store the chances of losing/misplacing an item are more which is not good in terms of customer satisfaction and economically too.
- 3) *Maintaining Sufficient Stocks:* Stocks should be maintained properly to ensure the availability of the item every time the customer asks about it.
- 4) *Cost effective Storage:* The storage of the extra stocks should be proper and space efficient as it will reduce the total cost of storing the stocks.
- 5) *Optimizing Product Sales:* Sales are the most important aspect of a general store without there is no meaning of the general store, the software will understand the volume of sales occasionally and then it will automatically maintain the stocks according to previous sales and will also make assumptions on the future sales as well.

IV.SCOPE

The scopes of this project are:

- 1) All the small-scale General Store owners
- 2) All the large-scale General Store owners
- 3) Can be used in the management of the items kept at warehouses

V. PROJECT DESCRIPTION

The General Store Management System will manage the stocks and the flow of money and will the store employees to control and keep track of the goods they buy and sell. It will contain many modules to ensure the proper coordination between the user and the software.

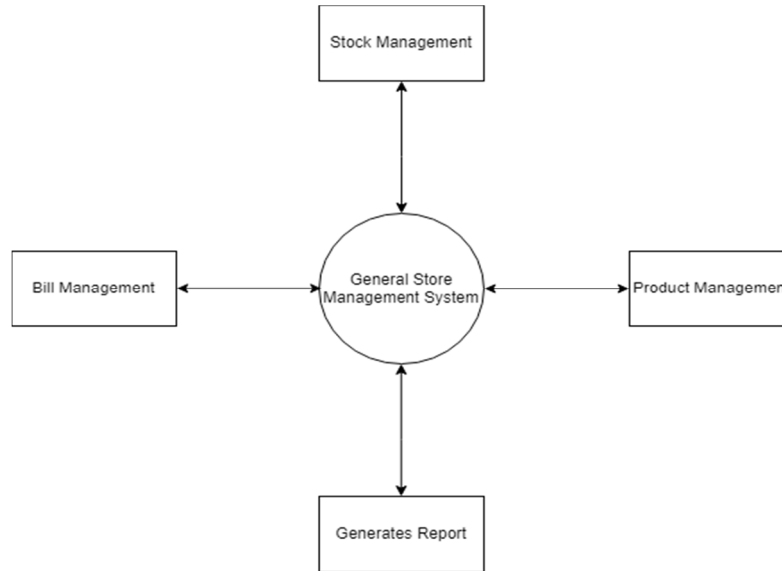


Fig.5.1 Flow Chart of the Project

VI.METHODOLOGY

For this project development we'll use Incremental model and develop the project in iterations as this is not a very large project so the iteration model will be good in terms of development and will also provide faster results.

VII. EXPECTED OUTCOME

The outcomes of this project are:

- 1) Increase in the efficiency of the management system of the store
- 2) increases in the workflow of the store.
- 3) Will increase the overall profit of the store by increasing the workflow and management of the system.
- 4) User friendly interface.
- 5) Will provide a user friend experience to the Store employee.

VIII. RESOURCES AND LIMITATIONS

The requirement of the resources for designing and developing the proposed system must be given. The resources might be in form of the hardware / software or the data from the industry. The limitations of the proposed system in respect of a larger and comprehensive system must be given.

A. Software Requirements

- a) Will work on all windows prior to Windows 7.
- b) Database MySQL.
- c) Excel for reports

B. Hardware Requirements

- a) CPU: Intel core 2 duo (minimum).
- b) Ram: 512 megabytes.
- c) Display with any type of output/input.
- d) Input device such as keyboard and mouse.
- e) Storage: 256 gigabytes (any type: hard disk/SSD).

IX. ESTIMATION OF PROJECT METRICS

A. Basic COCOMO Model

Using COCOMO model we declare this project as “Semi-detached” as the team consist of inexperienced members as well as one experienced mentor/member. Based on the study of the existing project the size of this project could be around 2500 lines of code. We will assume this for the estimation of the project metrics using basic COCOMO model.

B. Calculating Efforts and Time

As this project is categorized as “Semi-detached” the values of a, b and c are 3.0, 1.12 and 0.35

Table 9.1 - Values of constant a, b, c based on different types of projects.

Software project	a	b	c
Organic	2.4	1.05	0.38
Semi-detached	3.0	1.12	0.35
Embedded	3.6	1.20	0.32

To calculate efforts the formula is

$$\begin{aligned} \text{Efforts} &= a * (\text{KLOC})^b \text{ PM} \\ &= 3.0 * (2.5)^{1.12} \text{ PM} \\ &= 8.372 \text{ PM} \end{aligned}$$

Here PM = Person Month

Now to calculate time to develop the software the formula is

$$\begin{aligned} T_{\text{dev}} &= 2.5 * (\text{Efforts})^c \text{ Months} \\ &= 2.5 * (8.372)^{0.35} \text{ Months} \\ &= 5.26 \text{ Months} \end{aligned}$$

So, the time required to develop the project is 6 months and the efforts required are 9 Person Month

C. Intermediate COCOMO Model

Now we will use the intermediate COCOMO model to refine the old values by using Effort Adjusting Factors (EAF)

Table 9.2 - Effort Multipliers for different attributes

Cost Drivers	Ratings					
	Very Low	Low	Nominal	High	Very High	Extra High
Product attributes						
Required software reliability	0.75	0.88	1.00	1.15	1.40	
Size of application database		0.94	1.00	1.08	1.16	
Complexity of the product	0.70	0.85	1.00	1.15	1.30	1.65
Hardware attributes						
Run-time performance constraints			1.00	1.11	1.30	1.66
Memory constraints			1.00	1.06	1.21	1.56
Volatility of the virtual machine environment		0.87	1.00	1.15	1.30	
Required turnabout time		0.87	1.00	1.07	1.15	
Personnel attributes						
Analyst capability	1.46	1.19	1.00	0.86	0.71	
Applications experience	1.29	1.13	1.00	0.91	0.82	
Software engineer capability	1.42	1.17	1.00	0.86	0.70	
Virtual machine experience	1.21	1.10	1.00	0.90		
Programming language experience	1.14	1.07	1.00	0.95		
Project attributes						
Application of software engineering methods	1.24	1.10	1.00	0.91	0.82	
Use of software tools	1.24	1.10	1.00	0.91	0.83	
Required development schedule	1.23	1.08	1.00	1.04	1.10	

To calculate the EAF we will multiply all the values present inside blue boxes

$$EAF = 1.5 \text{ (Approx.)}$$

Now the corrected Efforts are:

$$\begin{aligned} \text{Efforts}_{\text{corrected}} &= EAF * \text{Efforts} \\ &= 1.5 * 8.372 \text{ PM} \\ &= 12.558 \text{ PM} \end{aligned}$$

Now the corrected time to develop is

$$\begin{aligned} T_{\text{dev (Corrected)}} &= 2.5 * (\text{Efforts}_{\text{(Corrected)}})^{0.35} \text{ Months} \\ &= 2.5 * (12.558^{0.35}) \text{ Months} \\ &= 6.06 \text{ Months} \end{aligned}$$

Through Intermediate COCOMO Model the Efforts required are 13 PM and Time required is 6.5 Months.

X. USE CASE DIAGRAM

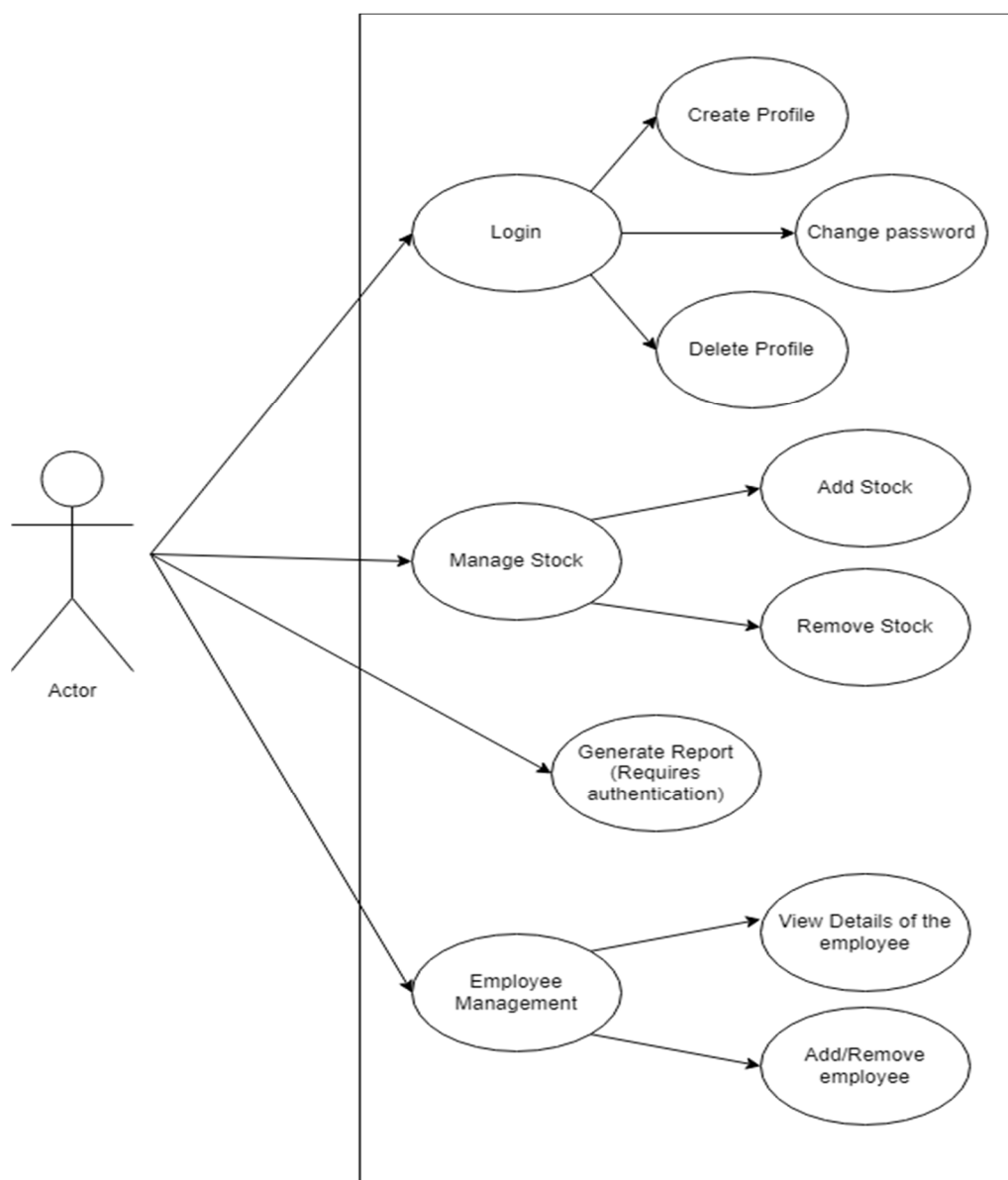


Figure 10.1 Use case diagram

A. List of Actors

Table 10.1: List of actors

ACTOR	DESCRIPTION
Manager	Can control everything in the software and can manipulate the data.

B. List of Use Cases

Table 10.2: List of use cases

#	USE CASE	DESCRIPTION
UC1	Create Profile	Allows to create a profile to manage every task from adding employee to managing stocks.
UC2	Login	Will ask for the user id and password if correct then will direct the user to the home page.
UC3	Change Password	Allows the user to change the password by asking the current password for security.
UC4	Delete Profile	Will allow the user to delete the user profile and will also ask the current password before deletion for security.
UC5	Manage Stocks	This will allow the manager to manage all the available stocks and the operation he can perform are add, search and remove stock.
UC6	Add Stocks	This will allow the manager to add any stock into the software.
UC7	Remove Stock	This will allow the manager to remove any stock from the software
UC8	Generates Report	This will generate the report of sales and purchase between any time range also the software will ask for the password before generating the report for security.
UC9	Employee Management	Allows the manager to manage all the employee from adding any new employee to removing any employee
UC10	View details of the employee	This will allow the manager to view details of the employee selected like name, age, gender, date of joining etc
UC11	Add/Remove Employee	This will allow the manager to add/remove any employee

C. Mapping functional requirements to use cases

Table 10.3: Mapping functional requirements to use cases

FR#	FR DESCRIPTION	Use Case(s)
R1	Create Profile	UC1
R2	Login	UC2
R3	Change Password	UC3
R4	Delete Profile	UC4
R5	Manage Stocks	UC5
R6	Add Stocks	UC6
R7	Remove Stock	UC7
R8	Generates Report	UC8
R9	Employee Management	UC9
R10	View details of the employee	UC10
R11	Add/Remove Employee	UC11

Table 10.4 UC2: User Login

Use case	UC2. User Login
Description	Allows the user id and password if correct then will direct the user to the home page.
Assumption	<ul style="list-style-type: none"> User has already created an account
Actors	<ul style="list-style-type: none"> Manager
Steps	<ul style="list-style-type: none"> User types the id User types the password Then he/she will click on Login button If the password and user id are correct, then only proceed to the home page else display user id or password is incorrect
Variations	
Non – functional	
Issues	

Table 10.5 UC1: Create Profile

Use case	UC1. Create Profile
Description	Allows to create a profile to manage every task from adding employee to managing stocks.
Assumption	<ul style="list-style-type: none"> User is using the software for the first time, or all the data of the software has been cleared
Actors	<ul style="list-style-type: none"> Manager
Steps	<ul style="list-style-type: none"> User will enter the ID which the software will ask every time the user logins. User types the password for the respective ID. User again types the password for confirmation. Then he/she will click on the create profile button and the profile gets created.
Variations	
Non – functional	
Issues	

XI. DATA FLOW DIAGRAM

For this project development we'll use Incremental model and develop the project in iterations as this is not a very large project so the iteration model will be good in terms of development and will also provide faster results.

1) Level 0 DFD of General Store Management System

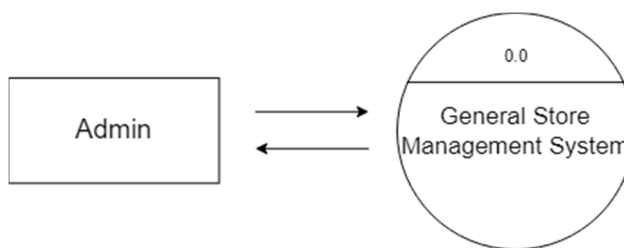


Figure 11.1 Level-0 DFD

2) Level 1 DFD of General Store Management System

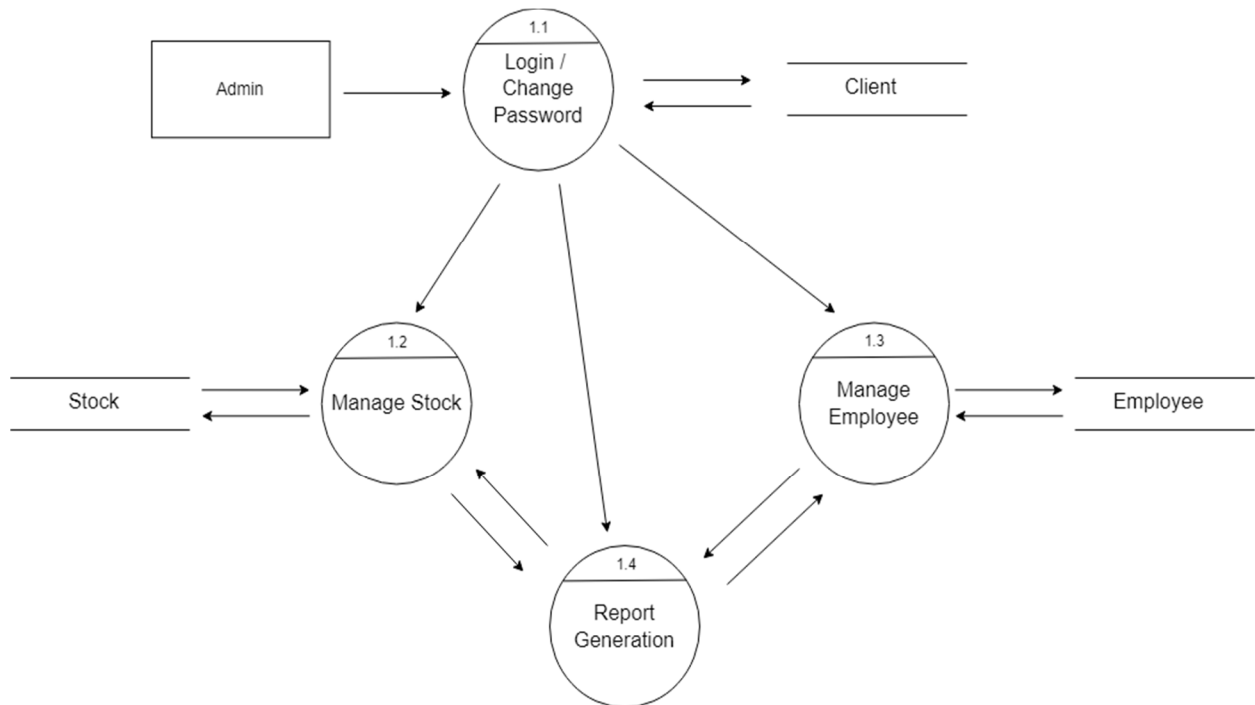


Figure 11.2 Level-1 DFD

3) Level 2 DFD of General Store Management System

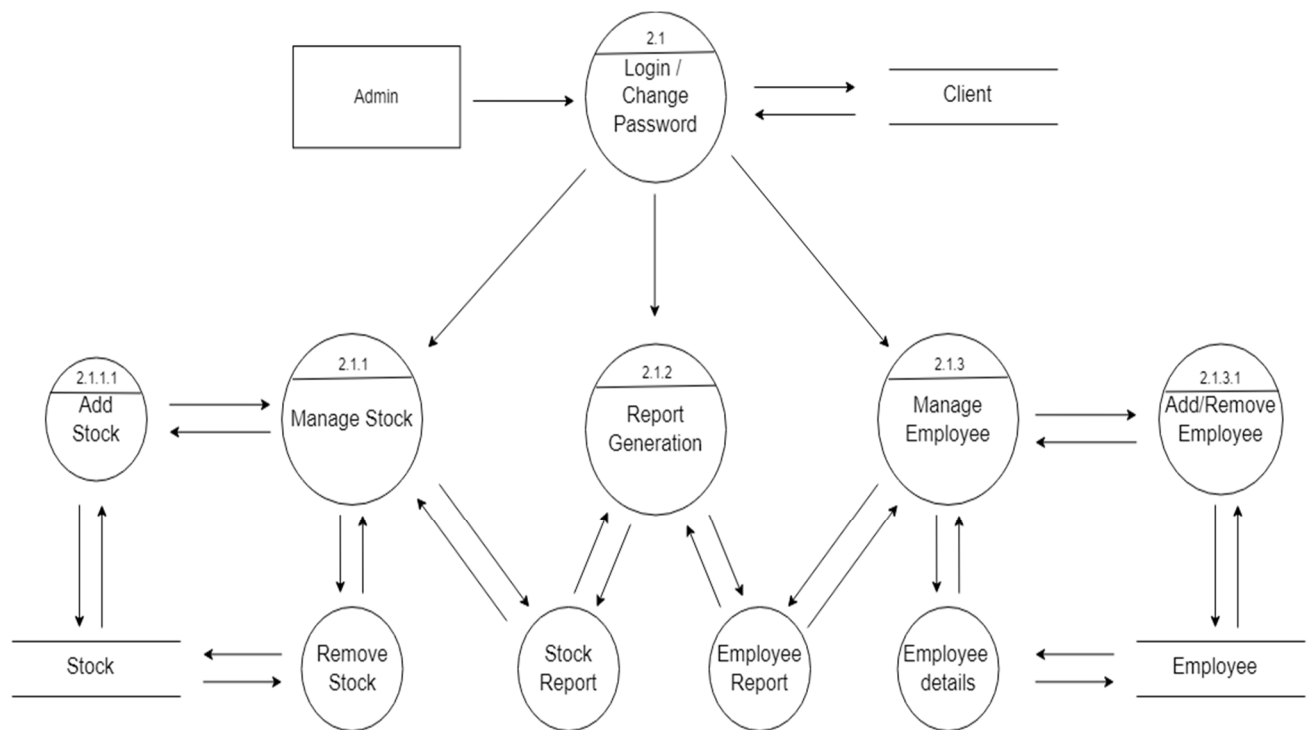


Figure 11.3 Level-2 DFD

XII. ER MODELLING DIAGRAM

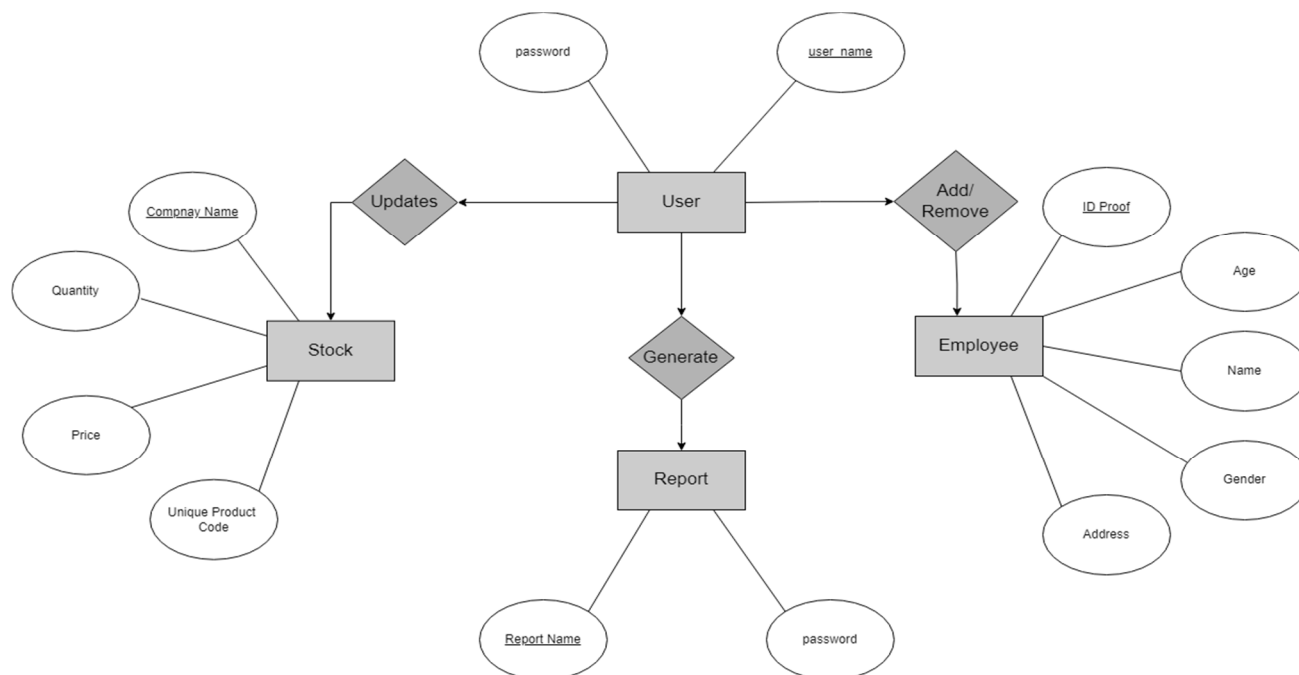


Figure 12.1 Entity Relationship Diagram of General Store Management System

XIII. IDENTIFYING DOMAIN CLASSES

As the world is continuously advancing and software to automate everything is available already. General stores are a very basic need of every citizen as they provide a variety of services like stationary, grocery, daily necessities etc. So, an efficient way to manage and run a general store is very important. Also, the paper bills are not very handy and are not reliable as well as they degrade overtime, stock calculations get unmanageable and hard to keep records of, the retailer also faces hardships on employee tracking.

From the given problem statement, we can identify the following nouns and noun phrases:

- 1) General Store
- 2) Software Engineering
- 3) Manager
- 4) Admin
- 5) Owner
- 6) Customer
- 7) System
- 8) Records
- 9) Application
- 10) Software
- 11) Information
- 12) Password
- 13) Profile
- 14) Stock Management
- 15) Employee
- 16) Details
- 17) Registration
- 18) Login

Let us put the above into different categories:

- a) *People*
 - Manager
 - Admin
 - Owner
 - Customer
 - Employee
- b) *Places*
 - General Store
- c) *Things*
 - System
 - Stocks
- d) *Concepts*
 - Records
 - Information
 - Password
 - Profile
 - Software Engineering
- e) *Events*
 - Registration
 - Login

The nouns and noun phrases in the problem in the problem statement gives us a list of 18 potential classes. However, all of them may not be relevant. if we filter these entities, we might find that the following set of classes directly relate to the activity of General Store management system:

- User
- Stock
- Employee
- Generate Report

XIV. STATE CHART AND ACTIVITY MODELLING

The figure below is State Chart diagram for General Store Management System

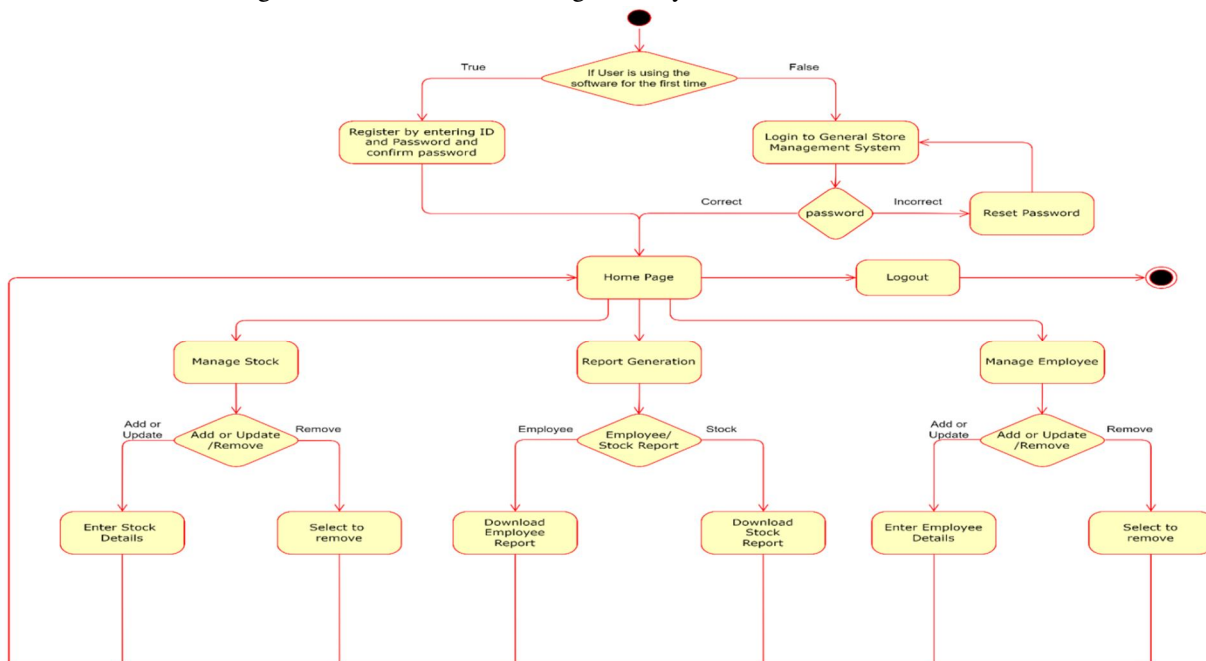


Figure 14.1 State Chart diagram for General Store Management System

XV. MODELLING UML DIAGRAM

Based on conceptual modelling and domain knowledge we already had identified a list of classes:

- 1) User
- 2) Stock
- 3) Employee
- 4) Generate Report

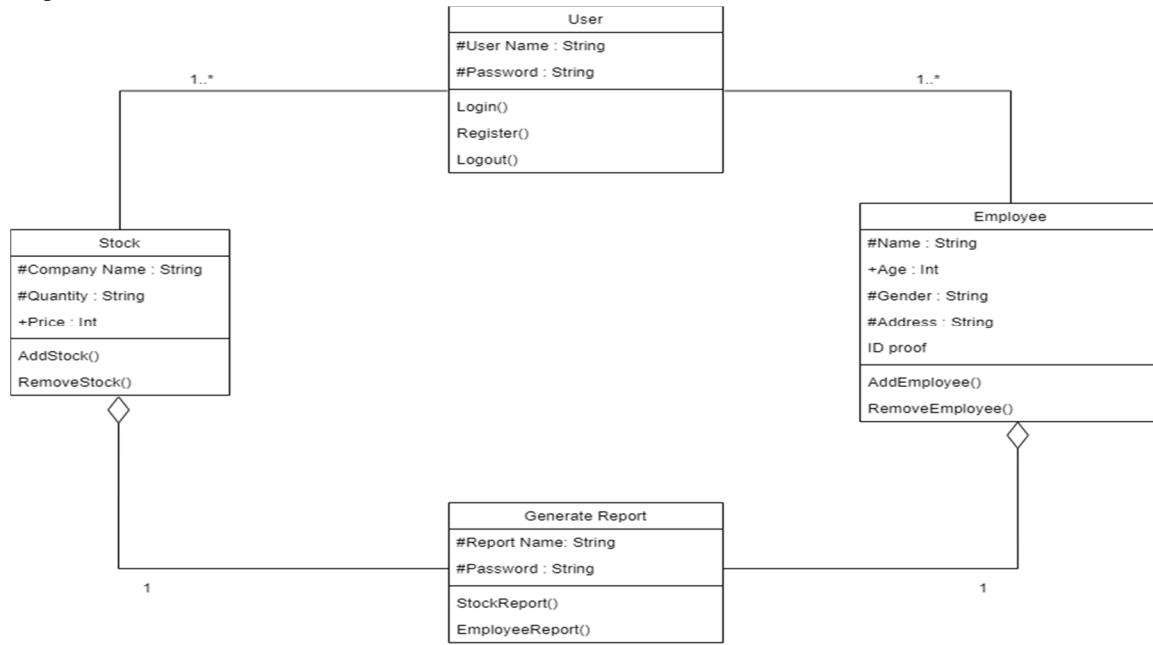


Figure 15.1 UML Class Diagram of General Store Management System

XVI. MODELLING UML SEQUENCE DIAGRAM

It represents the behavioural aspects of a system. Sequence diagram shows the interactions between the objects by means of passing messages from one object to another with respect to time in a system. Figure 12.1 shows Sequence Diagram for Report Generation and Figure 12.2 shows Sequence Diagram for Add Employee

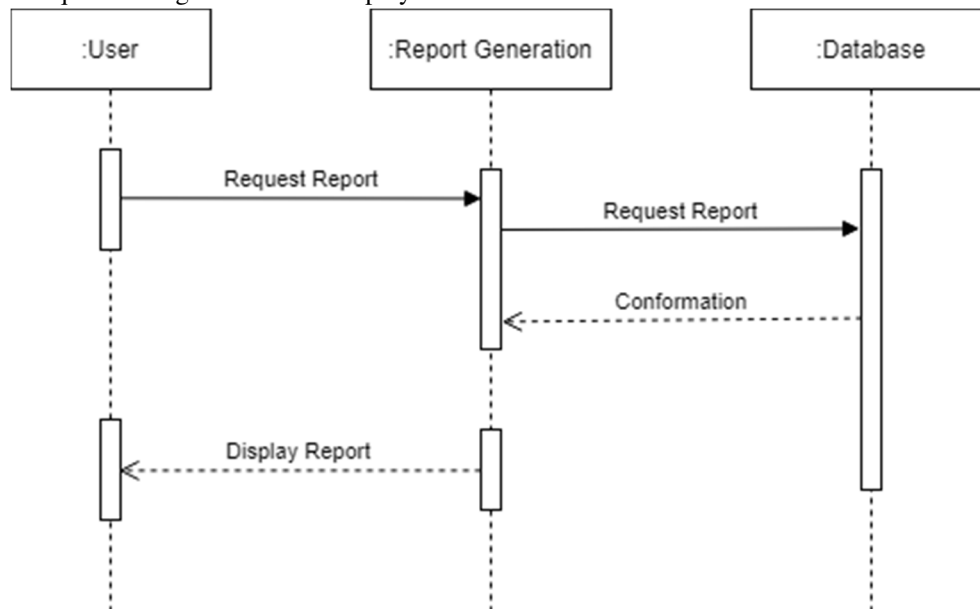


Figure 16.1 UML Sequence Diagram for Report Generation

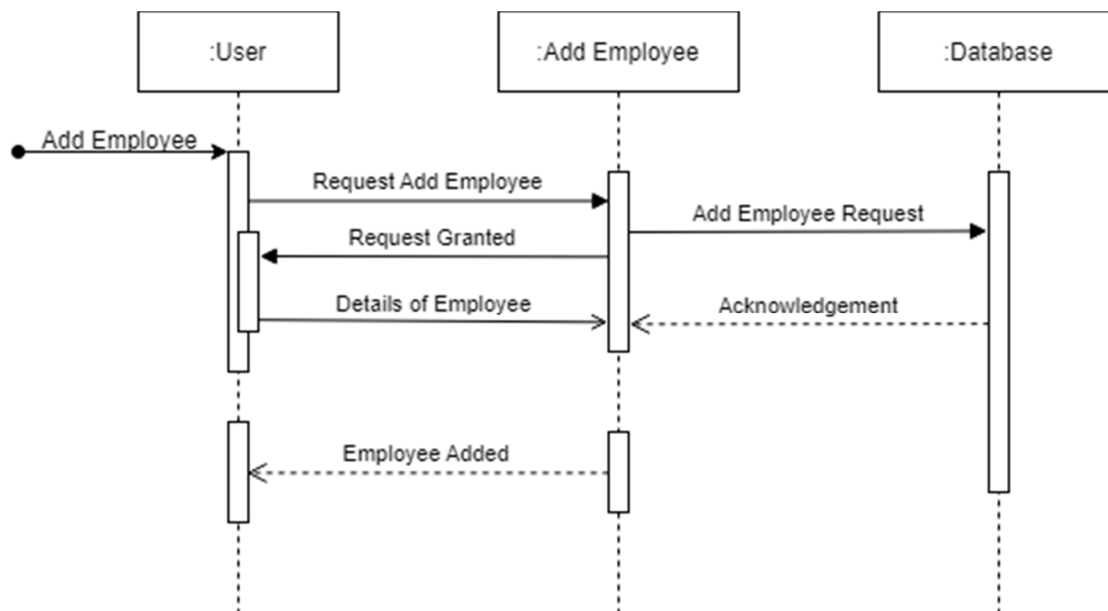


Figure 16.2 UML Sequence Diagram for Add Client

XVII. CONCLUSIONS

General Stores are the very essential part of individual’s life. So, the presence of effective general store management application/system is necessary as it will help in reducing the human labour by organizing the stocks and will increase the cash flow which will ultimately help the customers and the store owners as well. It also checks the availability of the materials and if they are not available then the software will give warning and will ask the user to refill the stocks this will help the store managers to maintain the stocks. It will also manage the proper storage of the extra stocks and will provide space efficient storage as it will reduce the total cost of storing the stocks.

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