



# ERP SYSTEM

## SOFTWARE ARCHITECTURE DEVELOPMENT

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**GIT LINK:-** <https://github.com/yanivc89/ERPSystem>

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## 1. PROJECT OVERVIEW

With the increased difficulties in industries to integrate their business units, ERP serves as a central solution. ERP systems are the systems that support various functions across different business units.

In this project, we are developing an ERP system for retail stores. The users are the Data entry, Purchase department, Goods receiving department, Billing department and the Sales department. The goal of this project is to provide a single system that can serve different department needs and automatic updates that reduces manual effort.

The solution developed incorporates functions such as Billing, user management, stock management, authentication and approvals, report generation, purchase and acknowledgement. The system also automates the business process by continuously synchronizing and automatically updating changes across business units. This application can benefit the retail stores to integrated business processes and to better organize their work.

### 1.1. INTRODUCTION

In present day, the number of retail shops is increasing with increase in demand for the retail industry. Also, the growth in technology is changing the way business is done. One such technological development is an ERP system. An ERP system is a single platform that integrates and supports functionalities across business units.

A retail store has different operational units performing its own functionalities. This application, is focused on the following units: Stock management, Billing and Purchase management.

The application's primarily focuses on integrating and enhancing communication between different departments like: Purchase, Sales, Billing and Stock.

As the business units rely on the same information for their target needs, the primary feature of this application is a shared database that can support different business units. The

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key functionalities of the application include create, view, update or delete data related to Dealers, Products, Stores, GRN (Goods Received Note), Bills and Purchase Orders.

## 1.2. OBJECTIVES

The key objectives of The ERP application are as follows:

- To integrate different business units.
- To impart better communication between different business units.
- To implement synchronization and automatic updates.
- To reduce manual efforts.
- To implement an Effective business process.

## 1.3. PURPOSE

This software Application is developed to support retailers to accomplish smarter, well organized and well connected business units and to minimize the manual effort and time.

## 2. PERSONAS

This section consists of fictional characters created to represent the targeted audience or a user scenario. Personas are created based on the present real time scenarios to get a better understanding of the requirements or challenges faced by the target audience.

The target audiences for our project are the retail stores. The personas for this project are developed based on our research on the retail stores, operating process, organization, technologies, logistics and other relevant data.

Below are three personas considered to describe the possible issues or requirements of retail stores.

### 2.1. PERSONA-1

"**The Techtronics**" is a small sized retail store. It sells Home appliances, Computer and accessories, Audio and accessories and other Electronic gadgets. Although a small sized store, "The Techtronics" is fast growing and getting popular for its quality products. They are planning to expand the store by increasing the range of products and size of the store"

## Details: -

They use receipts for billing products. They keep track of the available stocks by comparing the Billing reports, Available stocks count (manually done every week) and the ordered product information (From the purchase department). With a plan of improving the business and expanding the size of store and range of products, The Techtronics feels that they should incorporate a software billing system as the storage of paper bills for substantial number of products is not the best option.

## 2.2. PERSONA-2

"Farm Fresh" is a supermarket selling wide variety of food, groceries and household items. It is well established and has its branches in different locations. It has several dealers supplying goods from different manufacturers and they are sold to the customers in the supermarket.

## Details: -

The supermarket purchases various categories of products (various brands of products in each category) from different dealers. To purchase products from the dealers, the purchase manager/ salesman prepares a purchase order gets it approved by purchase approver and sends it to the dealer via telephone/fax or Emails. As the purchase management is done on excel sheets and telephones, it is becoming hard for the purchase department to coordinate and keep track of the purchase orders as "Which all purchase order has been ordered? and which all have to be ordered yet? or which all have to be approved for the order to be placed to dealers?".

## 2.3. PERSONA-3

"Queens" is a retail store that sells apparels, accessories and gifts. They have stores developing in major cities like Berlin, Munich and Stuttgart. They sell most of the popular brand of products and the growth rate is increasing every year. "

## Details: -

Queens is a well-established store and they are planning to improve their process by having a well-defined and organized software infrastructure and systems to manage the business end to end. They want a solution to be developed that can help them improve the stock management.

## 3. ITERATION-1

This section consists of the personas and the first iteration of proposed solution.

### PERSONA 1: -

"**The Techtronics**" uses receipts for billing products. They keep track of the available stocks by comparing the Billing reports, Available stocks count (manually done every week) and the ordered stocks information (From the purchase department). With a plan of improving the business and expanding the size of store and range of products, The Techtronics feels that they should incorporate a software billing system as the storage of paper bills for large number of products/sale is not the best option.

#### Solution: -

Software that can do the following

- Generate bills for the products purchased.
- Print the bill.
- Store the bills for viewing later.

### PERSONA 2: -

"**Farm Fresh**" supermarket purchases different categories of products (various brands of products in each category) from different dealers. To purchase products from the dealers, the purchase manager/ salesman prepares a purchase order gets it approved by purchase approver and sends it to the dealer via telephone/fax or Emails. As the purchase management is done on excel sheets and telephones, it is becoming hard for the purchase department to coordinate and keep track of the purchase orders as "Which all purchase order have been ordered? and which all have to be ordered yet? or which all have to be approved for the order to be placed to dealers?".

#### Solution: -

Software that can do the following

- Authorized person (Purchase manager, purchase order approver or the sales man) should be able to generate, view or edit a purchase order.
- The approver should be able approve or reject the created purchase order.

### PERSONA 3: -

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"Queens" is a well-established store and they are planning to improve their process by having a well-defined and organized software infrastructure and systems to manage the business end to end. They want a solution to be developed that can help them improve the stock management.

## **Solution: -**

Software that can do the following

- Generate a Goods Received Note for the purchase order.
- Update the Purchase order delivery status depending on all the goods in PO are delivered or only some.
- Automatic increase in the number of available stocks.

## **4. INTERVIEWS**

This section contains the details of interviews conducted. We conducted interviews by getting the form with Questionnaires filled by the small sized, midsize and large sized retail stores. The response was studied, analyzed and the analysis graph was generated to understand the present scenario of the retail stores and to come up with solution that can improve our application.

### **4.1. INTERVIEW QUESTIONS**

The below interview questions were formulated in such a way that, the response will assist us in understanding and analysing the present status of retail stores, organization of the stores, the process followed and how it operates?

Below are the questions divided into sections that helps us to examine and understand the challenges faced by different sectors in a retail store.

#### **Purchase Order Management**

- How is the Purchase order placed to the dealers?
- How frequently do you order the products from dealers?
- Can a salesman create purchase order?
- How do you place the product order to dealers?

#### **Stock Management**

- How do you maintain store stocks?
- When count of available stocks gets reduced, how do you get to know?



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- How do you check/document and acknowledge the received goods from dealers (e.g.: - "We had ordered 10 products and we have received 10 products")?
- How do you document the received goods from dealers?

### Billing

- How are new product added to the billing system?
- How frequently you use the billing reports from the billing system?

### Miscellaneous

- Where are the dealers and their product details maintained?
- Who decides on which new product to be added to the shop?
- How are products/goods delivered to stores?
- How many Departments are there in your shops/stores? Name them
- How many employees are in each department/division
- How do you check if the stock's expiry date has crossed?

## 4.2. INTERVIEW RESPONSE

This section contains the response to the above interview questions.

### INTERVIEW 1

Vorname: -

Nachname: -

Geschäftsname: **GRUNE KREBS**

E-mail: -

Telefonnummer: -

### QUESTIONS: -

1) How do you maintain store stocks?

- Written on paper/book

2) When count of available stocks gets reduced, how do you get to know?

- Manual count is taken

3) How do you place the product order to dealers?

- Telefonisch

4) Where are the dealers and their product details maintained?

- Excel sheet

5) How do you check/document and acknowledge the received goods from dealers (eg:- "We had ordered for 10 products and we have got 10 products")

- Written on paper/book

6) How do you document the received goods from dealers?

- Written on paper/book
- Excel Sheet

7) How is the Purchase order placed to the dealers

- Telephone

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8) Who decides on which new product to be added to the shop?

- Geschäftsführer und Store Manager

9) How are new product is added to the billing system

- With Software

10) How are products/goods delivered to stores?

- Transport companies

11) How many Departments are there in your shops/stores? Name them

- 2 Abteilungen

12) How many employees are in each department/division

- verschieden

13) How frequently do you order the products from dealers

- Weekly

14) How do you check if the stock's expiry date has crossed

- Manually

15) How frequently you use the billing reports from the billing system

- Weekly

16) Can a salesman create purchase order?

- Yes

## INTERVIEW 2

**Vorname:**Werner

**Nachname:**bullre

**Geschäftname:** "eye and art GmbH"

**E-mail:** info@eye-and-art.de

**Telefonnummer:**06221-183394

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## QUESTIONS: -

1) How do you maintain store stocks?

- With Software

2) When count of available stocks gets reduced, how do you get to know?

- Manual count is taken
- With software

3) How do you place the product order to dealers?

- With software
- Web+Fax+Tel

4) Where are the dealers and their product details maintained?

- With Software

5) How do you check/document and acknowledge the received goods from dealers (eg:- "We had ordered for 10 products and we have got 10 products")

- Written on paper/book
- With software

6) How do you document the received goods from dealers?

- With Software
- Written on paper/book

7) How is the Purchase order placed to the dealers

- Via Email
- Telephone
- With software
- **Händler nimmt den bestellung**

8) Who decides on which new product to be added to the shop?

- Chef mit team

9) How are new product is added to the billing system

- With Software

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10) How are products/goods delivered to stores?

- Transport companies

11) How many Departments are there in your shops/stores? Name them

- Kleinst unternehmen verkauf, Buchhaltung

12) How many employees are in each department/divisions

- 9 personen Messung Verkauf, 1 person Beratung+ Buchhaltung

13) How frequently do you order the products from dealers

- Daily

14) How do you check if the stock's expiry date has crossed

- Manually
- Es gibt nur 1 product mit

15) How frequently you use the billing reports from the billing system

- Weekly

16) Can a salesman create purchase order?

- Yes

## INTERVIEW 3

Vorname: **HERMANN**

Nachname: **SOCK**

Geschäftsname: **HeiselHerrenmode**

E-mail: **INFO@HEISEL.COM**

Telefonnummer: **06221-23333**

### **QUESTIONS: -**

1) How do you maintain store stocks?

- Written on paper/book
- VorbeiBestellung

2) When count of available stocks gets reduced, how do you get to know?

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- Ich bin in laden und sehe was Fehlt.

3) How do you place the product order to dealers?

- Ich bin im laden und sehe was fehlt

4) Where are the dealers and their product details maintained?

- Ich bin der Händler

5) How do you check/document and acknowledge the received goods from dealers (eg:- "We had ordered for 10 products and we have got 10 products")

- Written on paper/book

6) How do you document the received goods from dealers?

- Not answered

7) How is the Purchase order placed to the dealers

- Via Email
- Fax

8) Who decides on which new product to be added to the shop?

- Ich/ Owner

9) How are new product is added to the billing system

- Kein system zeichnung am produkt

10) How are products/goods delivered to stores?

- Transport companies

11) How many Departments are there in your shops/stores? Name them

- 1

12) How many employees are in each department/division

- All

13) How frequently do you order the products from dealers

Not Answered

14) How do you check if the stock's expiry date has crossed

- Manually

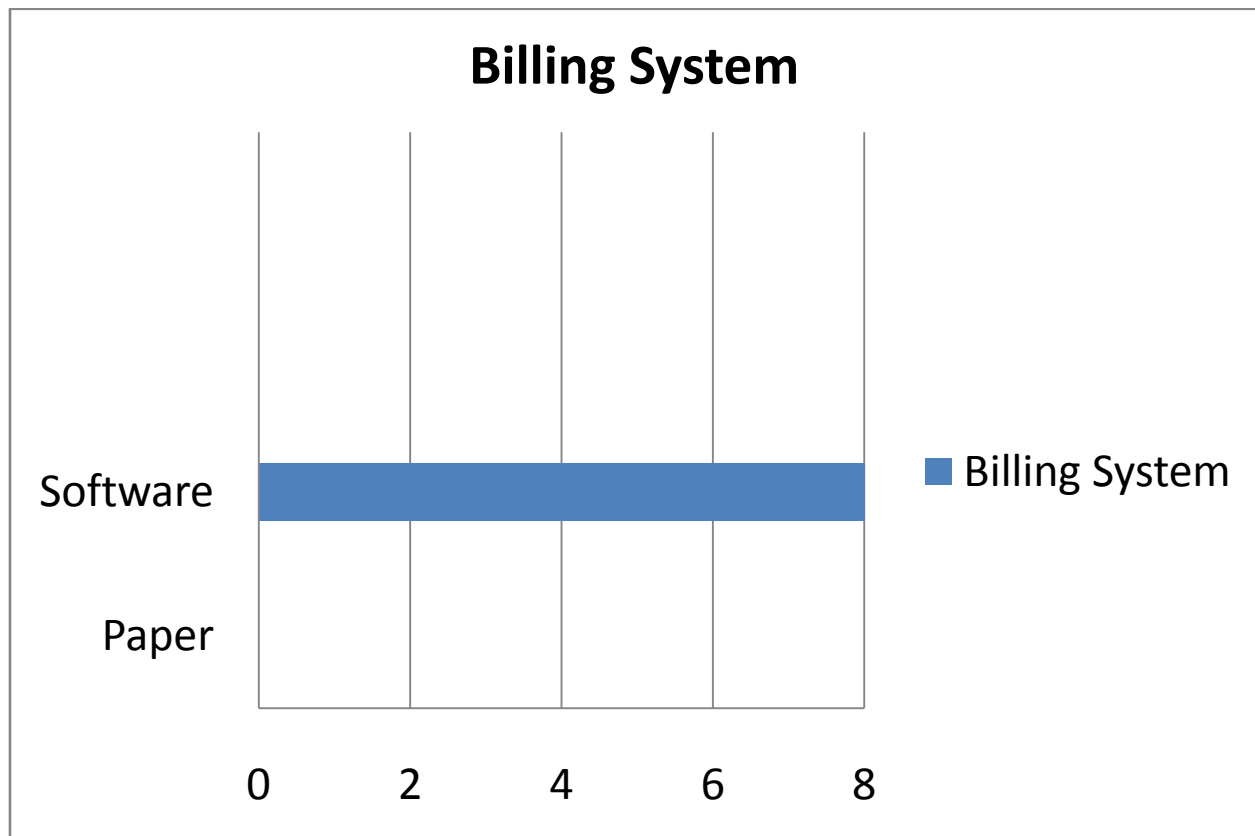
15) How frequently you use the billing reports from the billing system

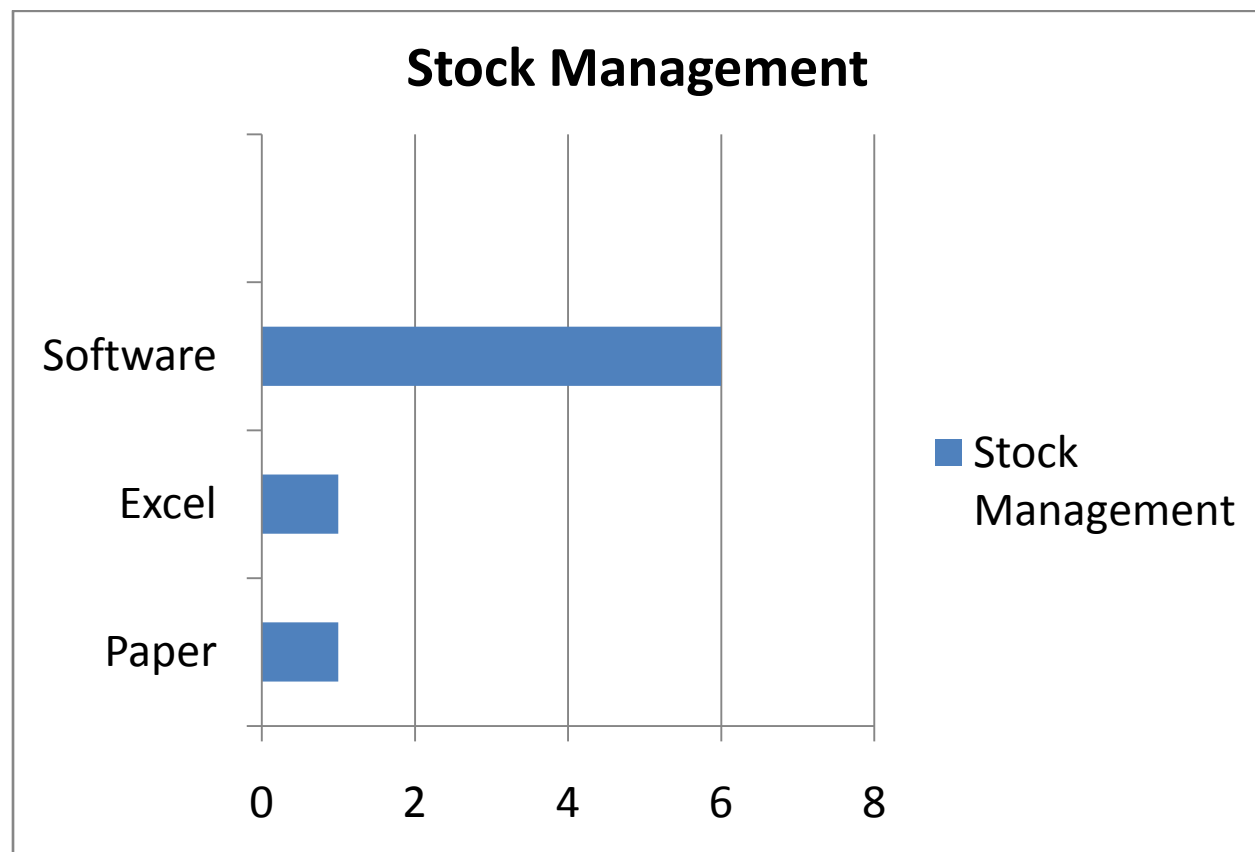
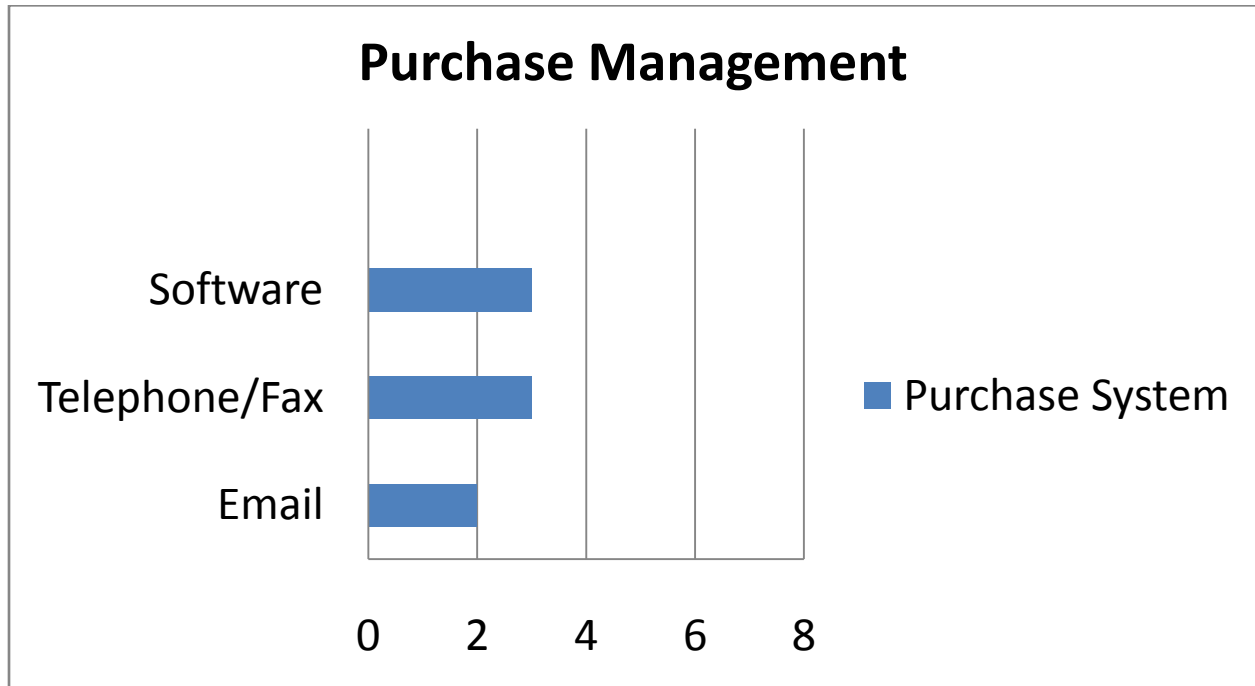
- Depending on situation- sometimes daily

16) Can a salesman create purchase order?

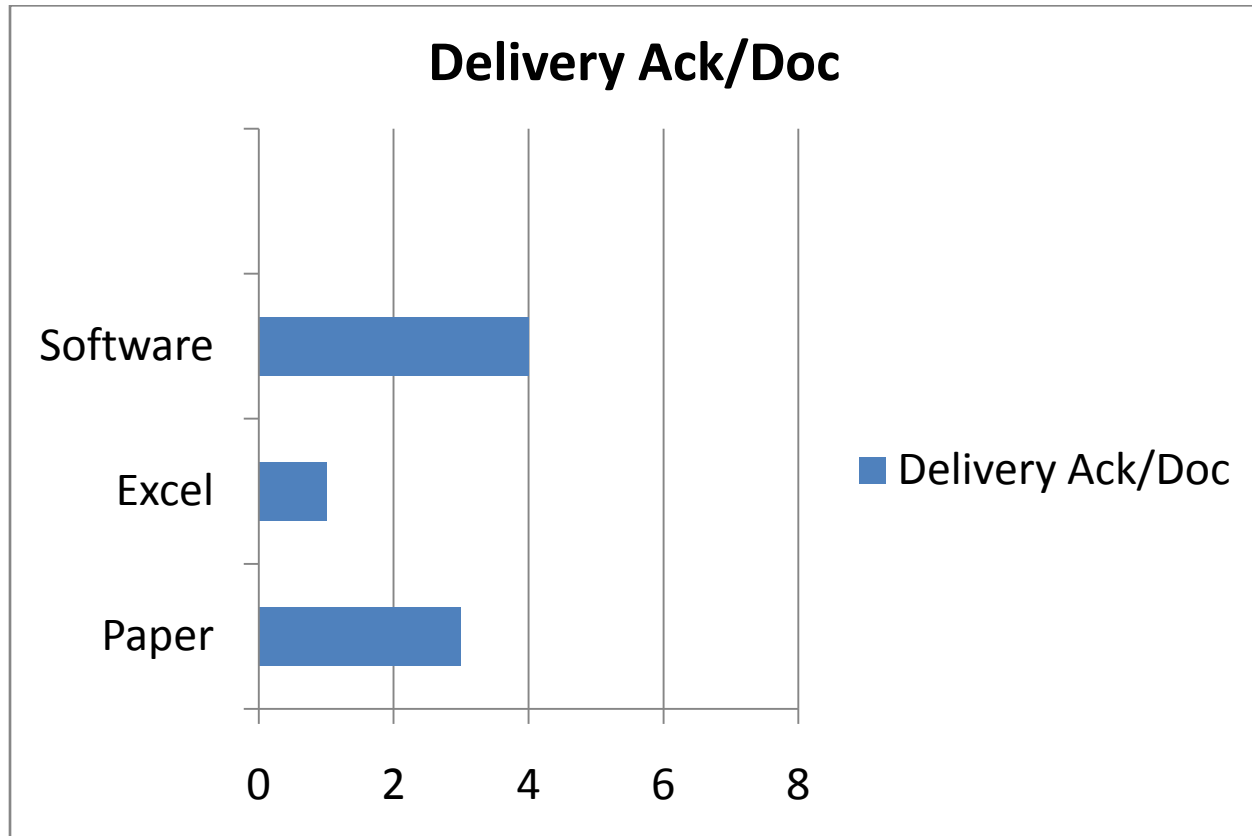
- No

### 4.3. RESPONSE ANALYSIS









Following are the inference from the above graphical analysis.

- The improvement in software technology has made everyone move to software based billing system.
- The purchase management analysis shows that, many have not started using the software application based approach.
- In stock management, many stores are using software to maintain their stocks. But due to the gap between stock management and purchase management, there is a lot of manual work carried to track the available stocks, because of which available stocks have to be manually counted and updated into the system.
- In delivery Acknowledgement/Documentation, half of the people are using paper and excel based documentation.

## 5. USER STORIES

This section consists of the personas and its proposed solution after analyzing our assumptions and the interview response.

## 5.1. USER STORY 1

### **THE TECHTRONICS:** -

*" We use receipts for billing products. We are planning of improving the business by expanding the size of store and range of products. We feel that storage of paper bills for large number of products is not the best option. Hence, we would like to incorporate a software billing system."*

### **Solution:** -

#### **Iteration2**

Software that can do the following

- Generate bill for the products sold.
- Print the bill
- Store the bills for viewing later.
- Email bill to the customer.
- Automatic reduction in the number of available stocks when it is billed.

## 5.2. USER STORY 2

### **FARM FRESH:** -

*"We sell selling wide variety of food, groceries and household items. We are well established and have branches in various locations. Our purchase department has a purchase manager and a purchase approver. The purchase manager/salesman prepares a purchase order gets it approved by purchase approver and sends it to the dealer via telephone/fax and Emails. As the purchase management is done on excel sheets and telephones, it is becoming hard for the purchase department to coordinate and keep track of the purchase orders as "Which all purchase order have been ordered? and which all have to be ordered yet? or which all have to be approved for the order to be placed? We would be glad to know if any software can make this work any easier".*

## **Solution: -**

### **Iteration2**

Software that can do the following

- Generate, view or edit a purchase order from the authorized persons (Purchase manager, purchase order approver or the sales man).
- The manager can approve or reject the created purchase order.
- If the PO is approved, it is automatically mailed to the corresponding dealer.
- If the PO is rejected the concerned shop manager is notified of the same.

## **5.3. USER STORY 3**

### **QUEENS:-**

*"We are a retail store selling apparels, accessories and gifts. We are planning to improve our business by incorporating helpful software for better an organization. Primarily, we would like to have a software that can help improve and ease the work of stock management."*

## **Solution: -**

### **Iteration2**

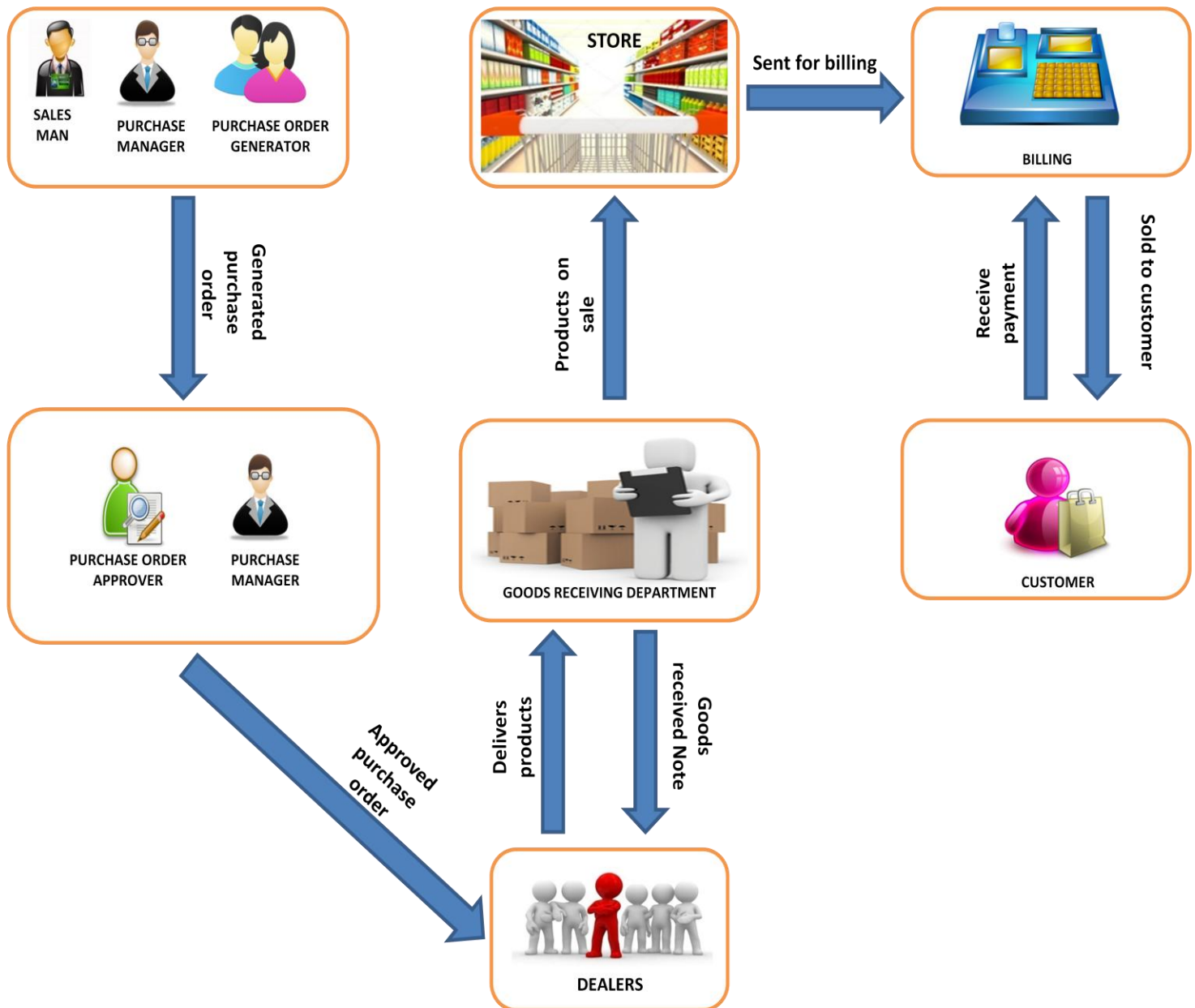
Software that can do the following

- Generate a Goods Received Note for the purchase order.
- Update the Purchase order delivery status depending on all the goods in PO are delivered or only some.
- Email the GRN acknowledgement to dealers.
- Automatic increase in the number of available stocks.
- A Notification to the concerned person when the count of available stock goes below threshold count.
- Export the stock report to excel.

## 6. STORY BOARD

### 6.1. PROCESS FLOW

The logistics of retail stores is organized in the form of images to form a story for pre-understanding of the system.



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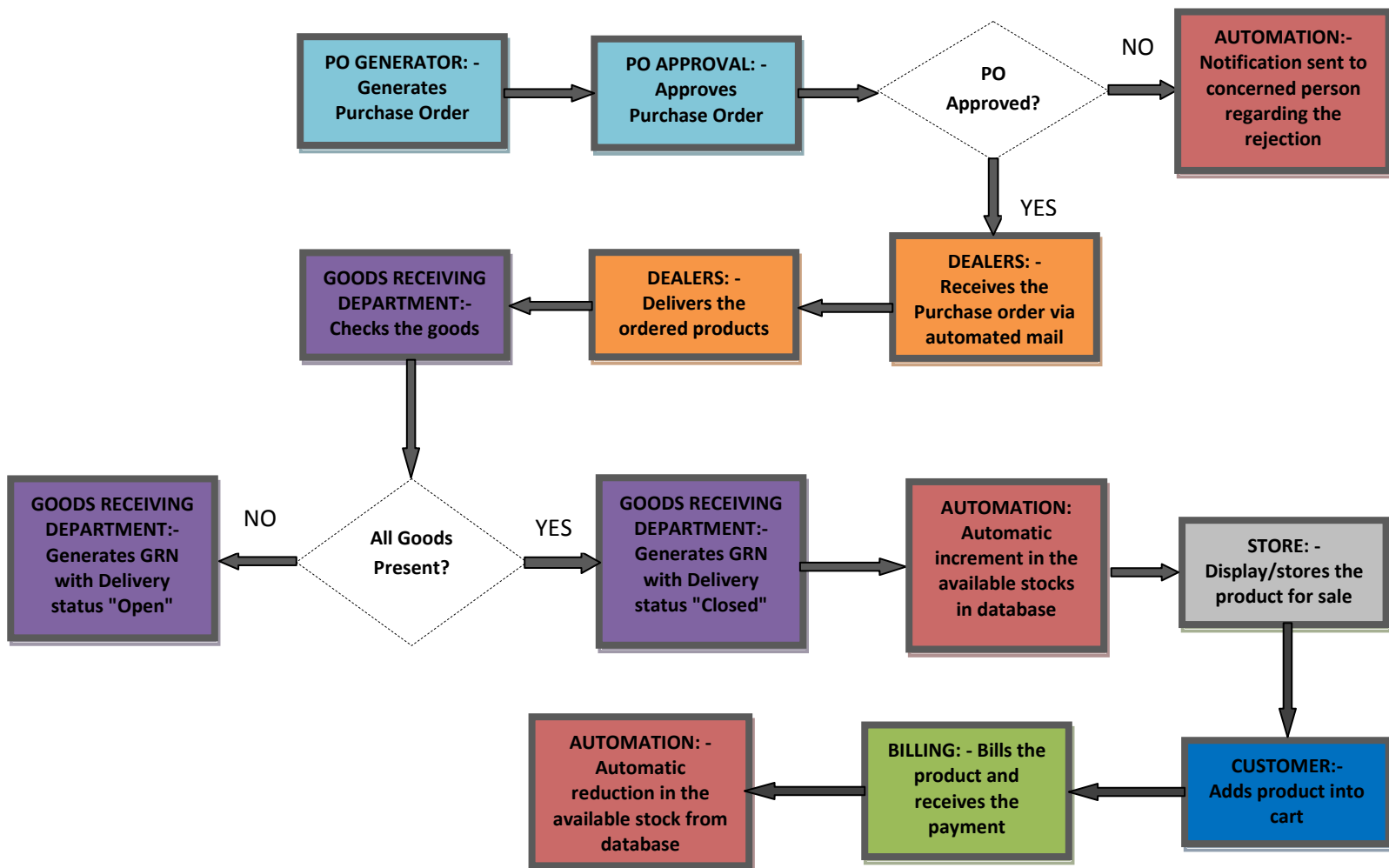
## 6.2. LOGISTICS

The logistics of the application is organized in the form of a flow diagram with the colour coded units for distinguishing between different operational units of the retail store.

**Colour code: -**

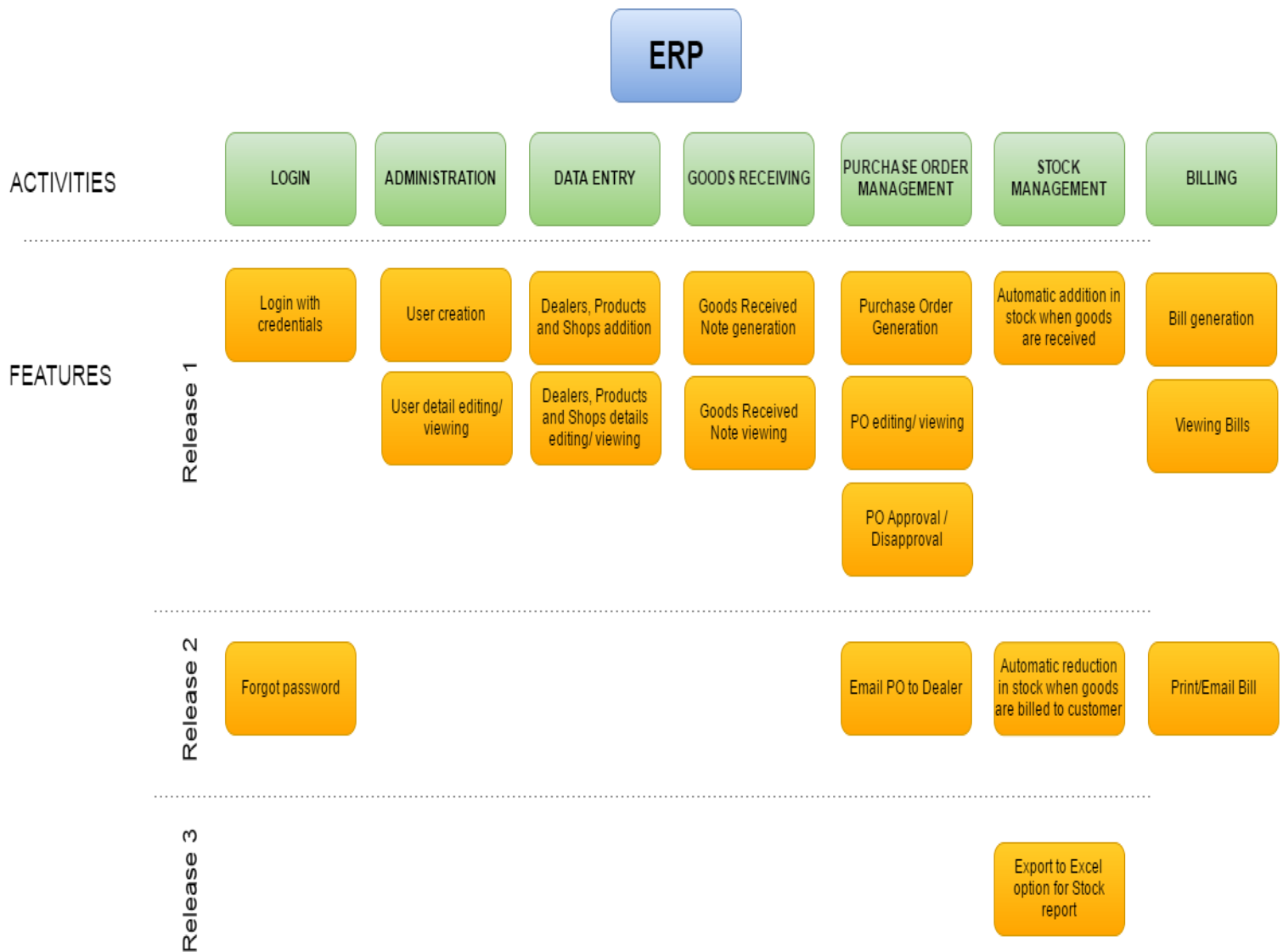


### FLOW DIAGRAM



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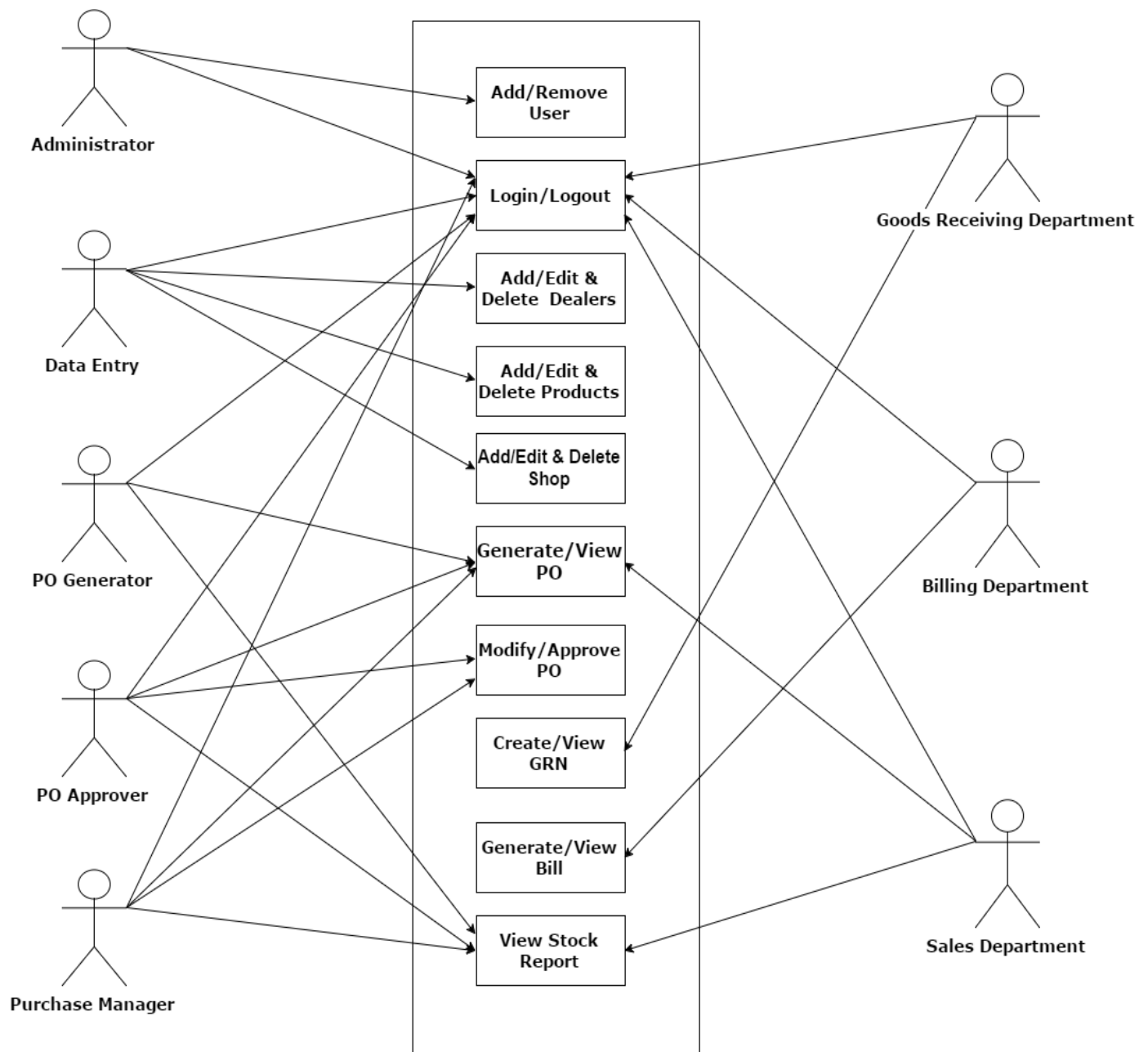
The below graphical representation shows the user story mapping of the application.



## 7. DECOMPOSITION DESCRIPTION

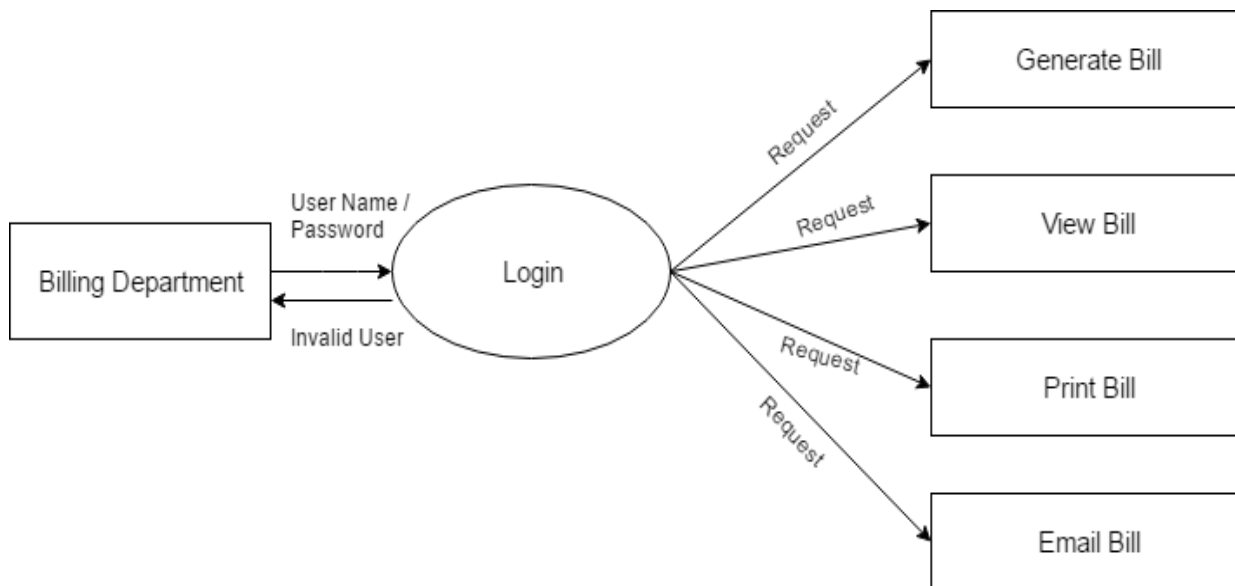
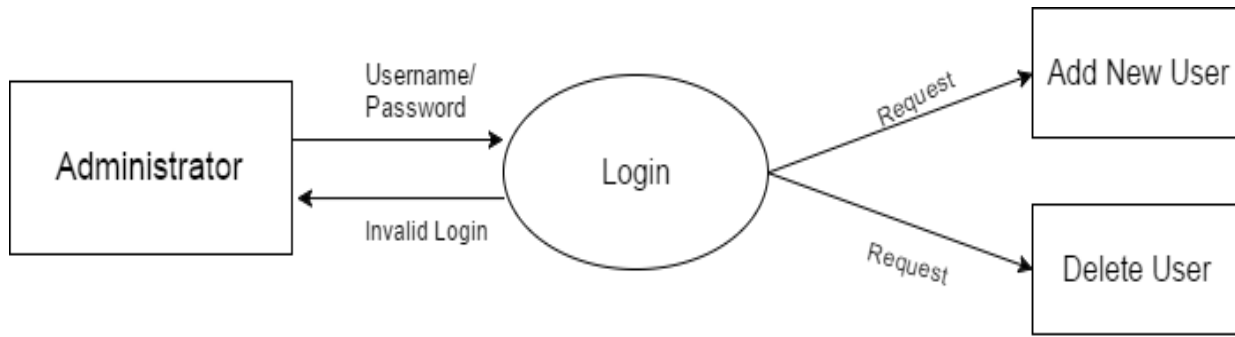
### 7.1. USE CASE DIAGRAM

Below is the use case diagram that depicts the behaviour of the application. It consists of the types of user and their corresponding actions that can be performed in the ERP application.



## 7.2. DATA FLOW DIAGRAM

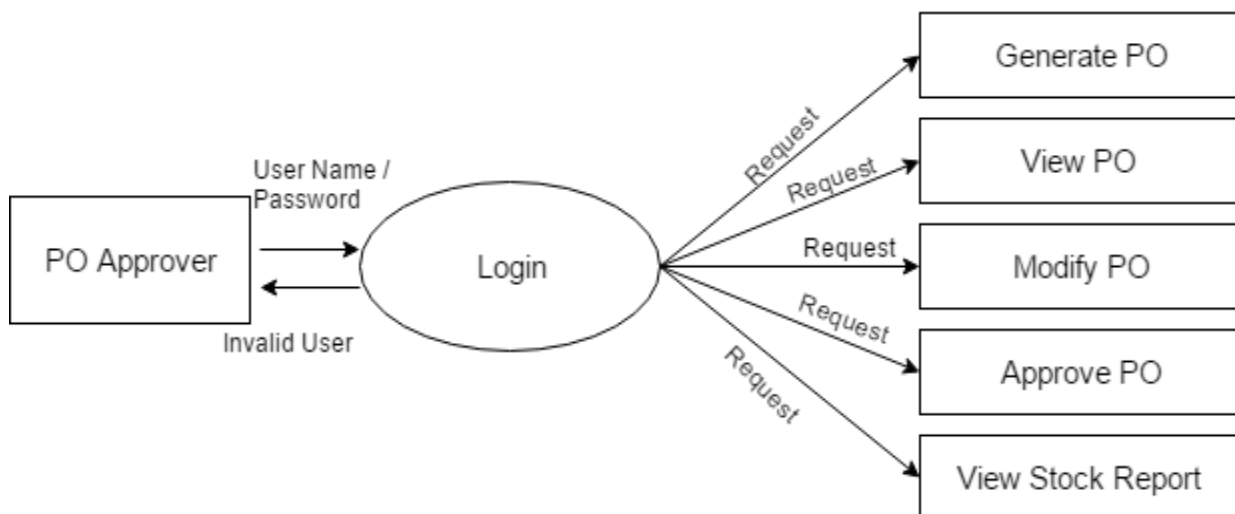
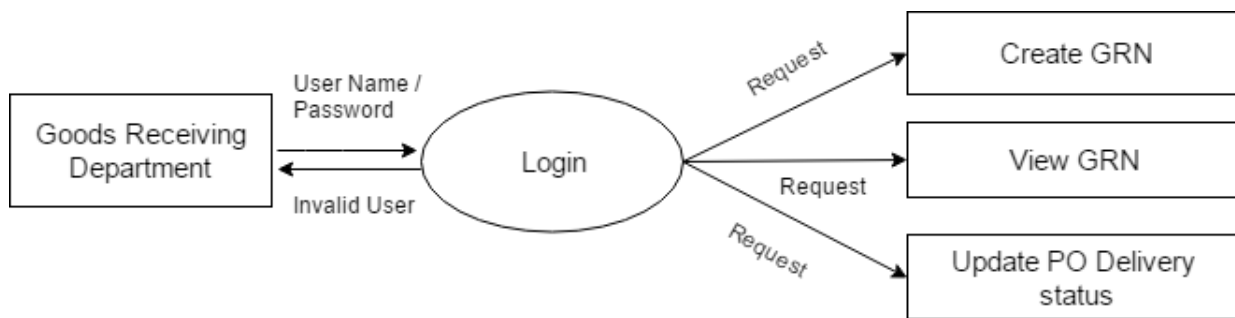
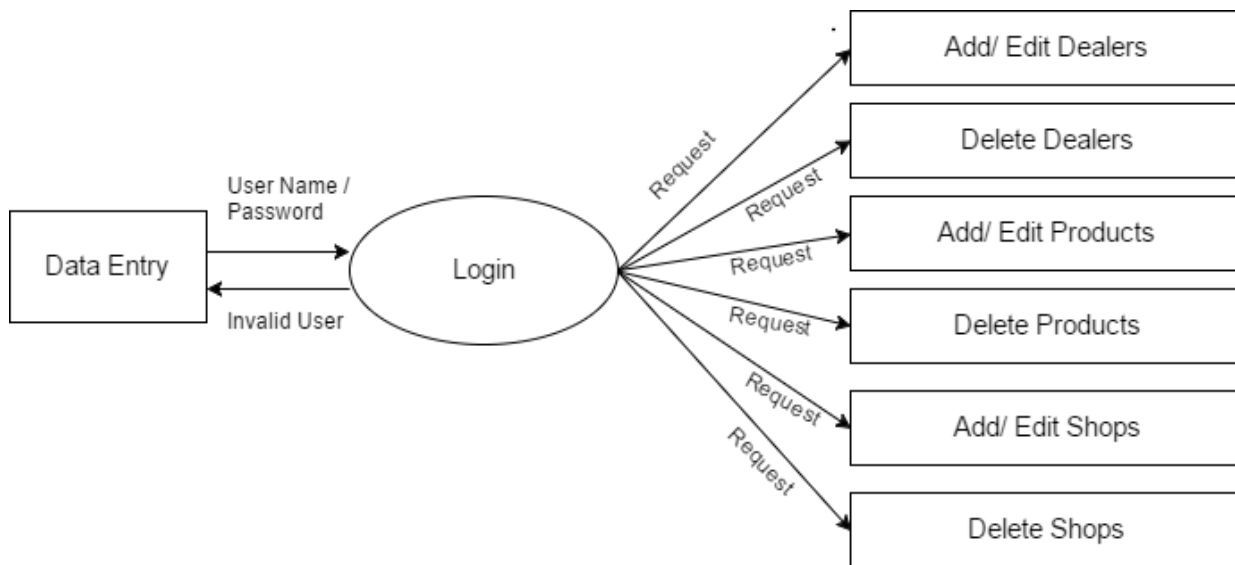
Below are the dataflow diagrams for better understanding of the all the user actions.





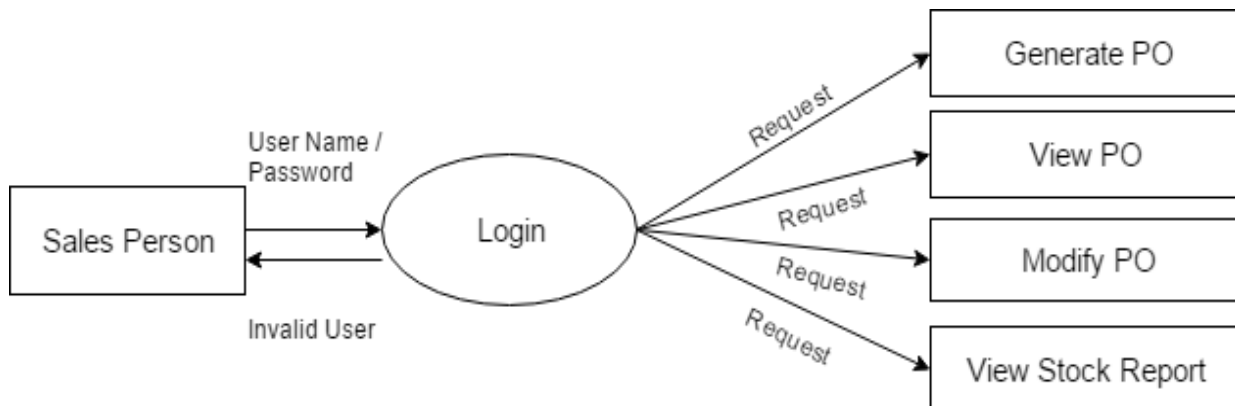
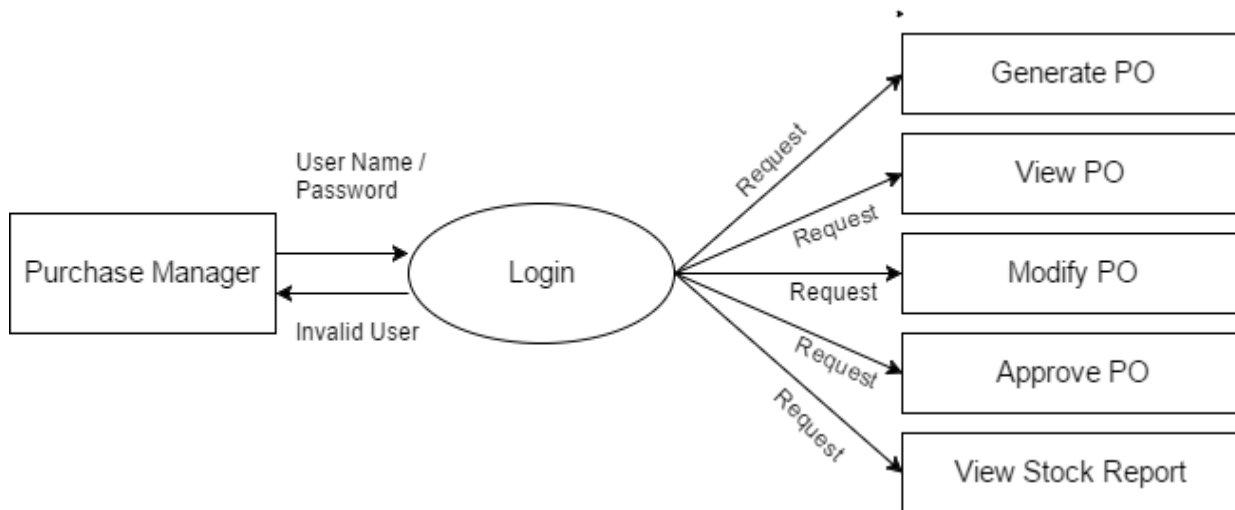
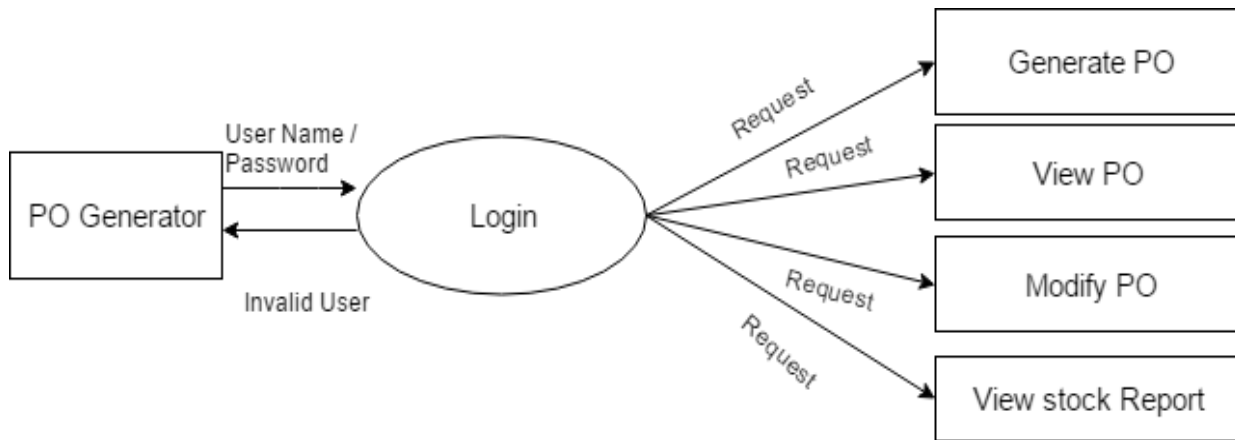
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## 8. PROTOTYPING

### 8.1. LOW FIDELITY PROTOTYPE

This section contains the pencil sketches that represents the screens and characteristics of the final product.

#### ADMINISTRATOR:-

**ADD USER**

New User

First Name :

Last Name :

Password :  ?

Confirm Password :

Address :

City :  Zip :  Country :

Email :

Telephone :

User type :

Save Cancel

**View/Edit User**

Search User

First Name :  Last Name :

Email-ID :  User type :

Search Reset

User ID	First Name	Last Name	Email ID	User type	
1	Steven	Owens	example@gmail.com	sales	<input checked="" type="checkbox"/> <input type="checkbox"/>

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## DATA ENTRY:-

Logo

NEW DEALERS INVENTORY

Add/New

View/Edit

NAME :

Firm NO. :

ADDRESS :

Country :

ZIP code :  City :  Country :

Email :

Phone :

Contact Person 1 :

Contact Person 2 :

Cancel Edit Submit

Logo

View/Edit Dealers

Add New

View/Edit

Search Dealers

Country :  Created date from:  to

Zipcode :  Name:  No:

Cancel Search

Dealer NO.	Dealer Name	Email	Phone	Address	City	Country	Remarks	CP1 Name	CP1 No.	CP2 Name	CP2 No.	Options
101	SRM GmbH	RH@gmail.com	+4917 62012 345	Bonjer strafe 13	Heidel-berg	Germany		Vinay	+4917 23456	Anusha	+49 1762 7890	<input type="button" value="View"/> <input type="button" value="Edit"/>



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Add Shop

View/Edit

Shop Inventory

Store Name

Store Address:

zipcode

city

country

v

Email

Phone

Store Manager:

Remarks

cancel

Submit

phone

View/Edit SHOP							
ADD shop	S.No.	Shop Name	Address	Email	Phone	store Address	Option
View Edit shop	1	PSH GmbH	Bergschraße 13	psht@gmail.com	+49 1762 0 12 24	Hoffman	<input type="button" value="view"/> <input type="button" value="Delete"/>
<input type="button" value="Export to Excel"/>							

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NEW PRODUCT INVENTORY

Add New

View Edit

Select Dealer:

Product category:

Product Name:

Quantity (grams):

Basic Rate:  vat%:

Cost:  Selling rate:

Threshold Qty:

status:

cancel submit

View/Edit Products

Add New

View/Edit

Search Products

Dealer:  Product Name:

Created date from:  to

cancel search

Dealer Name	Product Name	Qty	Rate	Vat	Cost	Options
SRH GmbH	chicken	400g	2.75	0	2.75	Edit Delete

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## PURCHASE DEPARTMENT:-

Approve PO

PO NO:  Due Date:  PO Amount:

	S.No.	Product Name	Qty	Rate	Tax	Cost
✓						

Purchase Order

Generate PO  Dealer  Product category:  Shop:

Approve PO  Product:  Qty:

View PO  Purchase No:

S.No.	Product Name	Qty	Rate	Total cost
1	Chicken 1000gms	10	2.75	20.75

Total Amount:

View PO

Generate PO  PO NO:  PO Date from  to

Approve PO  Purchase Manager:

View PO

S.No.	PO Number	PO Date	Due Date	Dealer Name	Purchase Manager	PO Amount



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## GOODS RECEIVING DEPARTMENT:-

GRN

Generate GRN

View GRN

PO NO:  Due Date:

SNO	Product Name	Ordered Qty	Received Qty	Rate	Cost Incl Vat
1.	Maggi Noodles	5		0.65	3.75

Tax:

Bill Amount:

Cancel Submit

GRN

Generate GRN

View GRN

Dealers:  Date: From  to

PO NO:

S.No.	Dealers Name	PO No	PO Date	PO Amount	GRN Date	GRN Amount
1	SRH GmbH	1001	20.04.17	3500	24.04.2017	3500

Export to Excel

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# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

## BILLING DEPARTMENT:-

**BILLING**

Generate Bill

View Bill

S.No.	Product Name	Qty	Rate	Total Cost
		✓		
		✓		
		✓		

Add to bill

P.Code  Qty

add

Vat 1st  Vat 2nd  Vat 5th

Bill Amount:

Cash Received:

Balance:

cancel  Done

**View Bills**

Generate Bills

View Bills

Bill No:  Bill Date from:  to

Bill Amount:  shop:  cancel  Search

S.No.	Bill No	Bill Date	Qty	Tax	Cost
2	100123	04.04.17	12	2.05	29.05

Total Amount:

Export to Excel

# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

## AUTHORIZED PERSON:-

STOCK REPORT

View Report

Shop Name :

Product category :

Product code :

Product Name :

S.No.	Product Name	Cost	Qty.
1.	Iphone 6S 16 GB	500.00	1

Page << 1 2 3 >>

## 8.2. HIGH FIDELITY PROTOTYPING

This is a prototype with all the required details, features implemented with the help of Low fidelity prototype and looks close to the final product.

### LOGIN SCREEN



## ADMIN SCREEN

Welcome Vinay

+ Add User

View / Edit User

New user

First name

Last name

Password

Confirm password

Email

User Type

Save

Cancel

Welcome Vinay

+ Add User

View / Edit

Search User

First name



Last name

Email

User type

Search

Reset

User id	First name	Last name	Email	User type	
1	Steven	Owens	example@mail.com	Sales	 

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Page 36

## DATA ENTRY DEPARTMENT

Welcome Vinay

Add Dealer
View / Edit

### New Dealer

Company Name

Company No.
?

Address

Street
Nr.

City
ZIP
Country

Email
?

Telephone
?

Contact person 1

Name
Telephone

Contact person 2

Name
Telephone

Remarks

Save
Cancel

Welcome Vinay

Add Dealer
View / Edit

### Search Dealer

Company Name
Company no.

City
Zip code

Country
Created date


from (dd/mm/yyyy)
to (dd/mm/yyyy)


Search
Reset


Id	Company name	Company no.	Created date	
01	ABC	ABC123	25/04/2017	
02	XYZ	XYZ123	25/04/2017	
03	ABZ	ABZ123	25/04/2017	

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# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

Welcome Vinay 


 Add Product


 View / Edit

New Product

Dealer

Company name / Company number



Product category


Product name

Quantity

-

+

Units



Basic rate

-

+

€

VAT (%)

Cost

€

Threshold quantity


-


+


Status

Save

Cancel

Welcome SAD 


 Add Product

 View / Edit

View / Edit Products

Dealer

Company name / Company number





Product category

Product name

Created date



from (dd/mm/yyyy)

to (dd/mm/yyyy)



Search

Reset

Dealer Name	Product Name	Qty.	B.rate	VAT	Cost	
ABC123	Product 1	5Kg	100	5	105	 

« Previous

1

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
...


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# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

Welcome Vinay 

 Add Store

 View / Edit

### New Store

Store Name

Store Address

Street


Nr.

City


ZIP

Country

Email

Telephone


 


Store Manager


Remarks

Save


Cancel



Welcome Vinay 

 Add Store

 View / Edit Store

### Store Details



No.	Store Name	Address	Email	Telephone	Store Manager	Option
1	Store 1	Product 1	example@mail.com	+49XXXXXXXXXX	Manager 1	 

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# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

## PURCHASE DEPARTMENT

Welcome Vinay 

 Generate PO

 Approve PO

 View / Edit PO

### Generate Purchase Order

Product Category

Product


Dealer

Shop

Quantity

Add


Reset


No.	Product name	Qty.	Rate	Tax	Cost	
1	Product 1	5Kg	1000	10	1100	


« Previous **1** 2 3 4 ... 12 13 Next »


Total bill amount  €

Submit

Welcome Vinay 


 Generate PO


 Approve PO

 View / Edit PO

### Approve Purchase Order

PO Number

from (dd/mm/yyyy) 

to (dd/mm/yyyy) 

Due date


PO Amount 

from

to

Search

Reset

No.	Product name	Qty.	Rate	Tax	Cost	
1	Product 1	5Kg	1000	10	1100	

« Previous **1** 2 3 4 ... 12 13 Next »

Approve

Reject



# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

Welcome Vinay

Generate PO

Approve PO

View PO

### Purchase Order (PO)

PO Number

Purchase manager

Status

Due date

from (dd/mm/yyyy)

to (dd/mm/yyyy)

Search

Reset

No.	PO Number	PO date	Due date	Dealer	Manager	Amount	Status
1	P100	30/04/2017	09/05/2017	XYZ	ABC	1000	P

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# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

## GOODS RECEIVING DEPARTMENT

Welcome SAD

Generate GRN

View GRN

GRN

Product no.

Date

dd/mm/yyyy

No.	Product Name	Order Qty.	Received Qty.	Rate	Cost (Inc.VAT)	

Tax

Bill Amount

Save

Cancel

Welcome SAD

Generate GRN

View GRN

View GRN

Dealers

Product No

Created date

from (dd/mm/yyyy)

to (dd/mm/yyyy)

Search

Reset

No.	Dealer Name	Product no.	Product date	GRN date	Product price	GRN amount

« Previous

1

2

3

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...

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Next »

## STOCK REPORT SCREEN

Welcome Vinay

View Report

Stock Report

Store Name

Product Category

Product Code

Product Name

Search

Cancel

No.	Product Name	Rate	Qty.
1	Product 1	40€	5

« Previous

1

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3

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...

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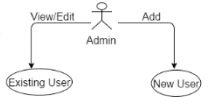
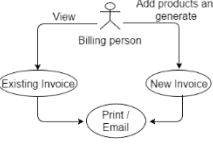
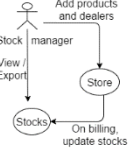
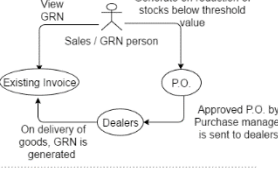
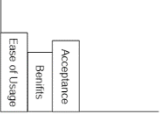
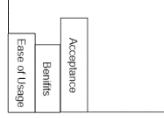
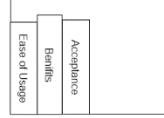
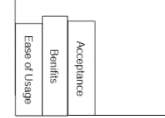
13

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# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

## 9. EXPERIENCE MAP

The below section consists of the customer interactions with the application and their experience when they navigate through the application.

Stages	Users	Billing	Stock Management	Purchase Management
Application features	1. User Management (Add, Edit, Delete Users)	1. Manage Bills (Generate, View) 2. Print or email the invoice	1. Manage Products (Add, Edit, Delete) 2. Manage Dealers (Add, Edit, Delete) 3. Manage Stores (Add, Edit, Delete) 4. View Stocks 5. Export as Xls	1. Manage Purchase Order (P.O.) (Generate, View, Approve) 2. Manage Goods Received Note (GRN) (Generate, View)
Application working				
Thinking	1. Is there a provision to differentiate users? 2. Can I update user info in case of any change? 3. These activities have to be done by one person, Can we do such restriction?	1. This is similar to most of the existing billing system, What's the difference in this? 2. Is there a way to search and view historical invoices? 3. Can I send invoices via email to customers?	1. I am using phone to store the dealer information, Can I store the dealer information in this application? 2. Can I maintain list of products that my store has? 3. Can I notify customers on product offers? 4. What difference this makes in stock management?	1. I am using telephone to place purchase orders. How does this make a difference? 2. Can I keep track of received good? 3. Can I edit generated purchase order? 4. Will I be given privilege to check and sign the P.O before sending it to dealers?
Feeling	1. This application gives me a centralized way of controlling different users 2. I hope I can maintain user information easily 3. This application doesn't cost a fortune	1. This application seems to have a great way to reach historical invoices 2. Its hard to search for the bills when customer wants us to re-check 3. Customers are gonna like receiving email on their purchase	1. Stock management seems easy with this application 2. It's time consuming to manually reach out to check available stocks 3. I have lost previously some important dealers information as I had them on my phone and got accidentally deleted	1. I can now place orders via email or fax with this application directly 2. I dont have to maintain any received goods information on a peice of paper anymore 3. I can now allow sales person to generate orders and I just have to sign them. Reduces my involvement a lot
Experience				
Opportunities	1. Help owners of shops to maintain different users 2. Help owner to restrict access as per the roles assigned	1. Help shops in helping their customers by sending invoices via email 2. Help billing person to quickly search invoices	1. Help stock manager to maintain stocks with less manual intervention 2. Help shop owner to maintain different inventory information in his / her finger tips 3. Help maintain dealers information	1. Help owner to allow sales person in generating P.O. and check on them before sending it to dealers 2. Help keep track of received goods from dealers 3. Help update the stocks automatically on goods arrival

Stage 1: Users

Features: User Management

*Application working:*

The owner of the shop should keep track of employees of his stores. He/she should have all the information about his employees and it should be safe and accessible to designated persons. Also, this information should be easily editable in case of any changes in the employee information such as change in address, phone number etc.

# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

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*Thinking: Owner's thoughts when he thinks of an application*

1. Is there a provision to differentiate users?
2. Can I update user info in case of any change?
3. These activities must be done by one person; can we do such restriction?

*Feeling: Owner's feelings towards application*

1. This application gives me a centralized way of controlling different users.
2. I hope I can maintain user information easily.
3. This application doesn't cost a fortune.

*Opportunities:*

1. Help owners of shops to maintain different users.
2. Help owner to restrict access as per the roles assigned.

Stage 2: Billing

Features:

1. Manage Bills (Generate, View)
2. Print or email the Invoice

*Application working:*

Billing person expects a straightforward way to search for an invoice that was generated in the past. Also, expects newer way of helping the customers not lose the invoices generated. The application allows user to view the historical invoices by searching with different filters and emailing the invoices to the customers.

*Thinking: Owner's thoughts when he thinks of an application*

1. This is like most of the existing billing system, What's the difference in this?
2. Is there a way to search and view historical invoices?

3. Can I send Invoices via email to customers?

*Feeling: Owner's feelings towards application*

1. This application seems to have a great way to reach historical invoices.
2. It's hard to search for the bills when customer wants us to re-check.
3. Customers are going to like receiving email on their purchase.

*Opportunities:*

1. Help shops in helping their customers by sending invoices via email.
2. Help billing person to quickly search invoices.

### Stage 3: Stock Management

Features:

1. Manage Products (Add, Edit, Delete)
2. Manage Dealers (Add, Edit, Delete)
3. Manage Stores (Add, Edit, Delete)
4. View Stocks
5. Export as Xls

*Application working:*

Application lets the concerned person in the store to maintain product information, dealer information, store information etc. It also allows viewing of available stocks and thereby helps take decision based on the stocks availability. The prominent feature of the application is that it reduces the stock as and when the products are sold which in turn gives the easiest way forward to manage stocks.

# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

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*Thinking: Owner's thoughts when he thinks of an application*

1. I am using phone to store the dealer information, Can I store the dealer information in this application?
2. Can I maintain list of products that my store has?
3. Can I notify customers on product offers?
4. What difference this makes in stock management?

*Feeling: Owner's feelings towards application*

1. Stock management seems easy with this application.
2. It's time consuming to manually reach out to check available stocks.
3. I have lost previously some important dealers information as I had them on my phone and got accidentally deleted.

*Opportunities:*

1. Help stock manager to maintain stocks with less manual intervention.
2. Help shop owner to maintain different inventory information in his / her finger tips.
3. Help maintain dealers' information.

Stage 4: Purchase Management

Features:

1. Manage Purchase Order (P.O.) (Generate, View, Approve)
2. Manage Goods Received Note (GRN) (Generate, View)

# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

---

Application working:

Application allows the owner to keep track of Purchase orders and the GRNs. It provides an intelligent way to check and approve the generated P.O. before placing the order with dealers. It helps the store employees in comparing the P.O. and the received goods and generating the GRN on the same if everything seems right.

*Thinking: Owner's thoughts when he thinks of an application*

1. I am using telephone to place purchase orders. How does this make a difference?
2. Can I keep track of received good?
3. Can I edit generated purchase order?
4. Will I be given privilege to check and sign the P.O. before sending it to dealers?

*Feeling: Owner's feelings towards application*

1. I can now place orders via email or fax with this application directly.
2. I don't have to maintain any received goods information on a piece of paper anymore.
3. I can now allow sales person to generate orders and I just should sign them. reduces my involvement a lot.

*Opportunities:*

1. Help owner to allow sales person in generating P.O. and check on them before sending it to dealers.
2. Help keep track of received goods from dealers.
3. Help update the stocks automatically on goods arrival.



## 10. USER TEST

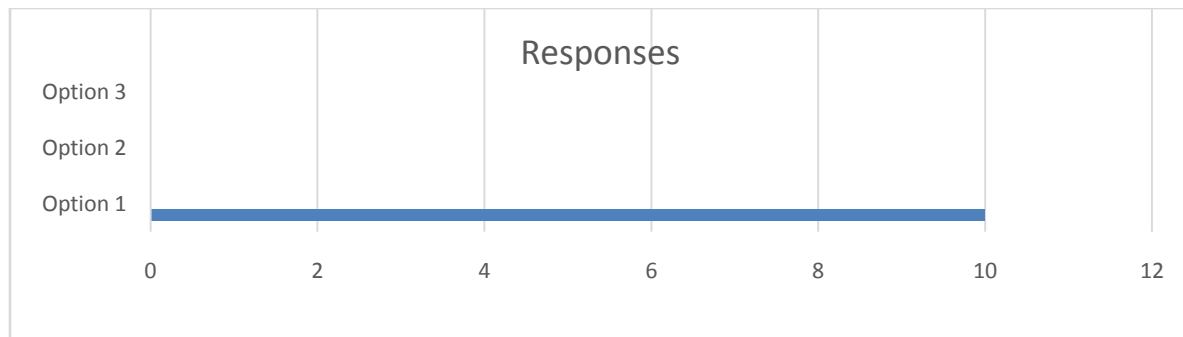
### 10.1.TEST

Users were asked to operate on the app and below is the feedback of the users

**Mark one of the options given below**

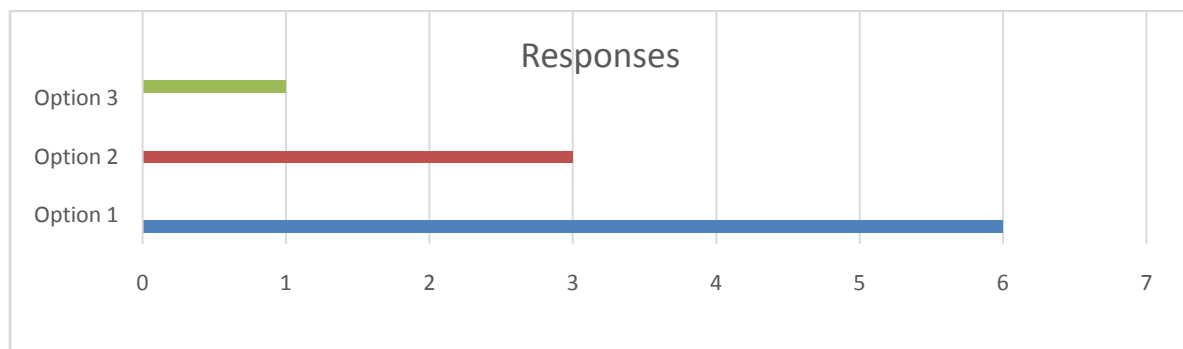
#### 1. Login Screen page

- ☐ I can easily understand the screen. It is self-explanatory.
- ☐ It is difficult to understand what this screen is for.
- ☐ It's totally confusing.



#### 2. Login Screen Color

- ☐ I like the color contrast. Its smooth on sight.
- ☐ The color is somewhat flashy.
- ☐ I dint like the color.

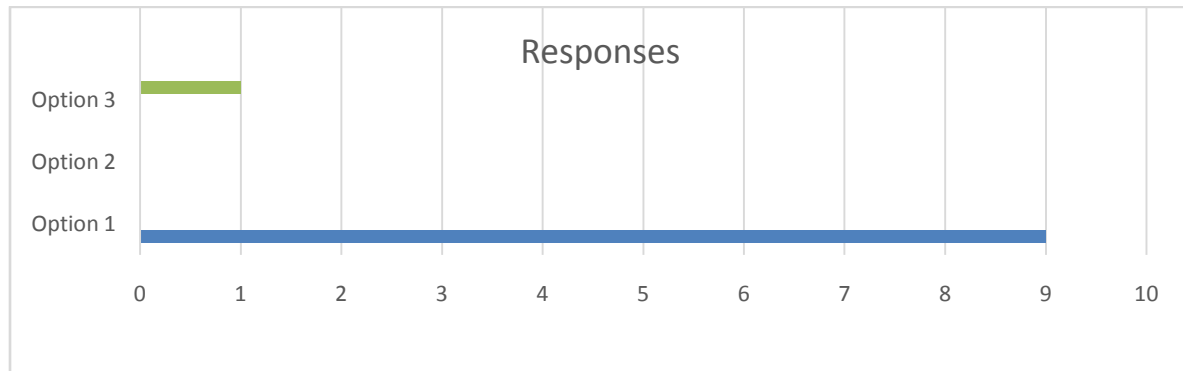


## SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

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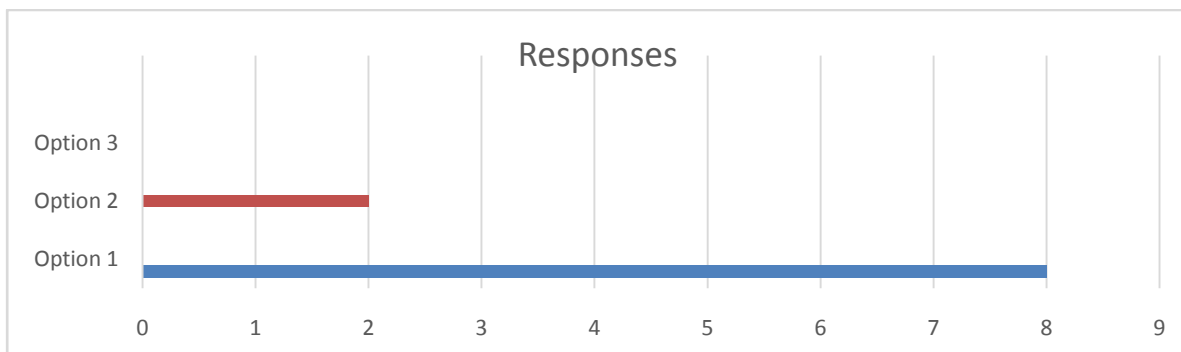
### 3. Add pages (User, Product, Dealer, Store, GRN, P.O., Bills)

- ☐ It has got basic necessary fields. Input fields are big enough.
- ☐ It has not got basic necessary fields. (Mention if any).
- ☐ Input fields are not big enough.



### 4. Add pages (User, Product, Dealer, Store, GRN, P.O., Bills)

- ☐ Input fields are Self Explanatory.
- ☐ Input fields are hard to understand. (Mention where you observed this).
- ☐ Input fields are confusing.



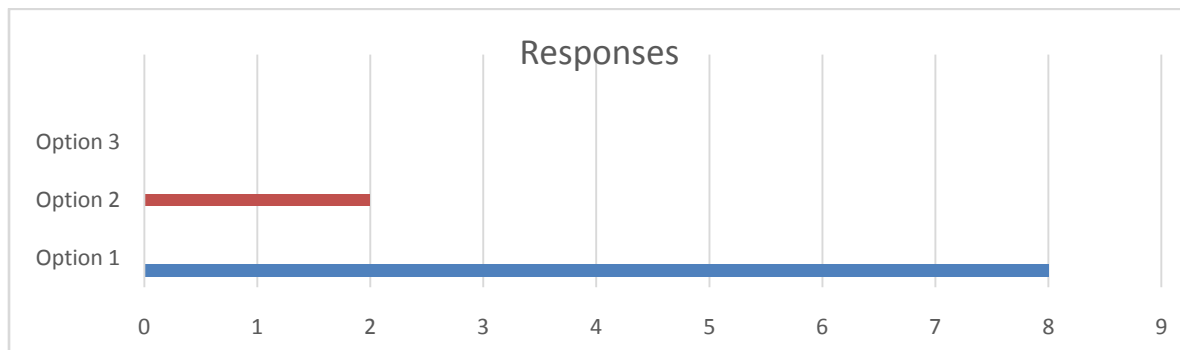
Reason: Lack of domain knowledge prompted in selecting option 2 in some cases.

## SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

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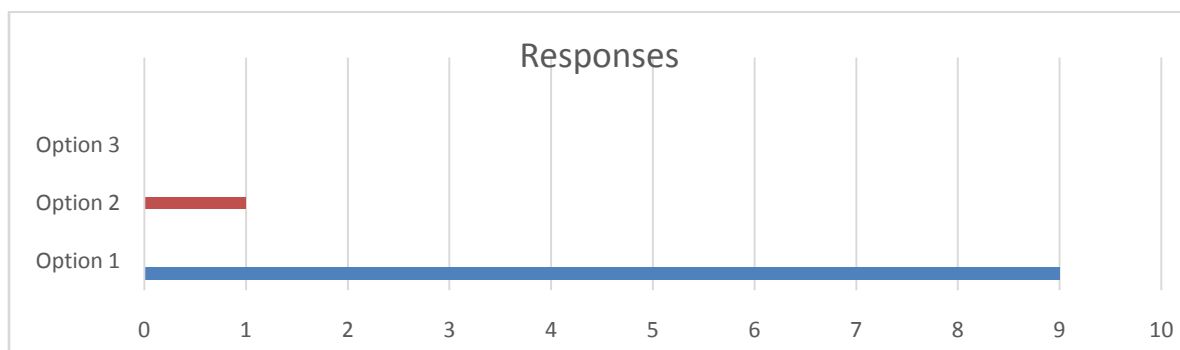
### 5. Add pages (User, Product, Dealer, Store, GRN, P.O., Bills)

- ☐ I like the color of buttons used.
- ☐ Button colors could have been better.
- ☐ I don't like the colors on button used.



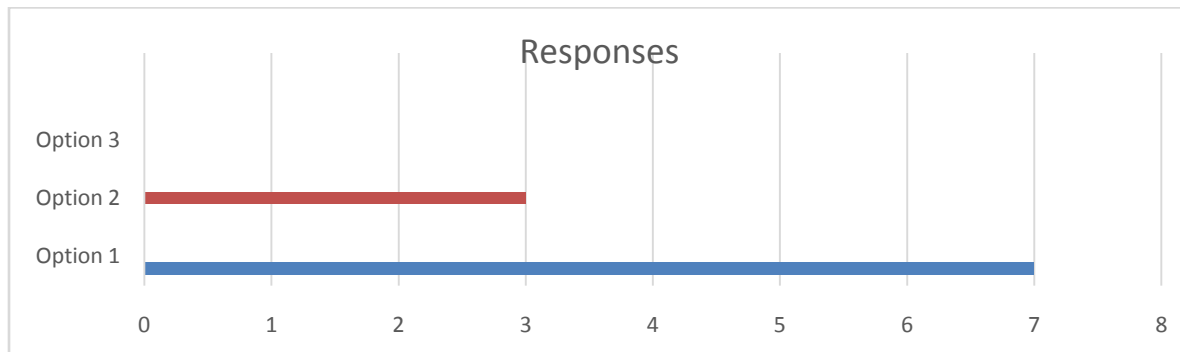
### 6. Add pages (User, Product, Dealer, Store, GRN, P.O., Bills)

- ☐ I like the way input fields are arranged.
- ☐ All Input fields could have been arranged one below the other.
- ☐ I dint like the arrangement of Input fields.



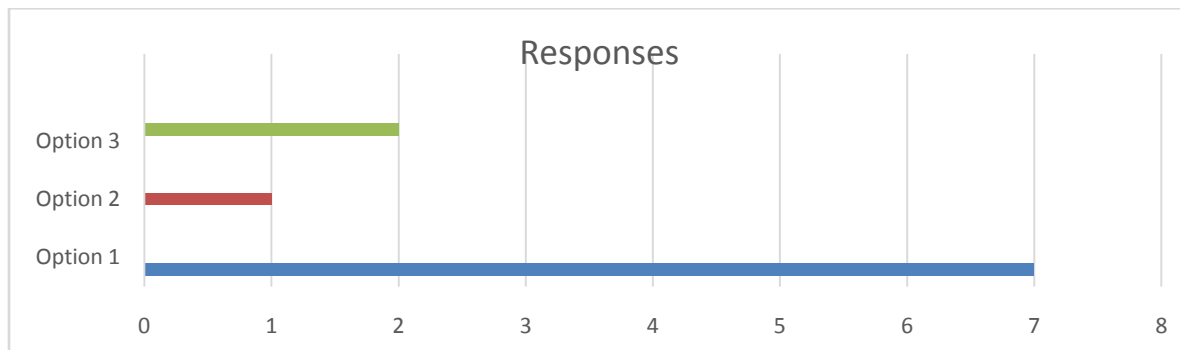
### 7. Add pages (User, Product, Dealer, Store, GRN, P.O., Bills)

- ☐ I like the placement of buttons.
- ☐ I felt it could have been on the right side of the screen.
- ☐ I dint like buttons.



8. View / Edit pages (User, Product, Dealer, Store, GRN, P.O., Stock, Bills)

- ☐ Search fields are enough.
- ☐ Search fields are not enough.
- ☐ No Idea.

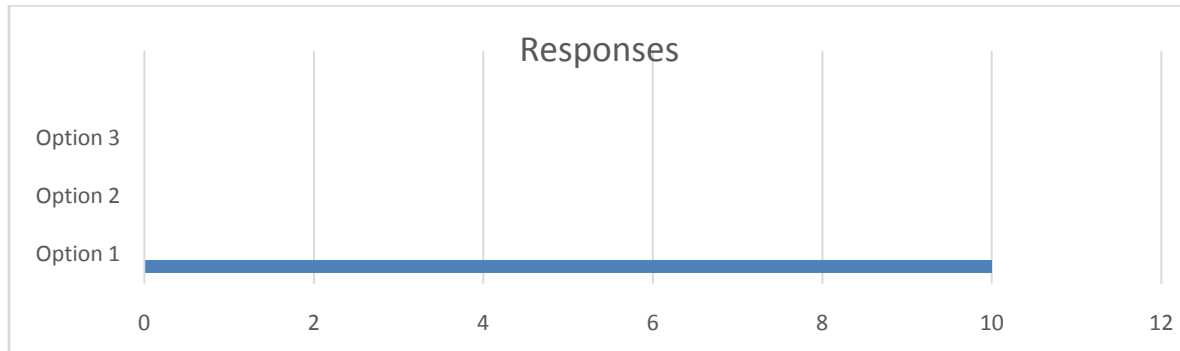


9. View / Edit pages (User, Product, Dealer, Store, GRN, P.O., Stock, Bills)

- ☐ Data table looks good.
- ☐ Data table could have been better.
- ☐ I dint like the data table used.

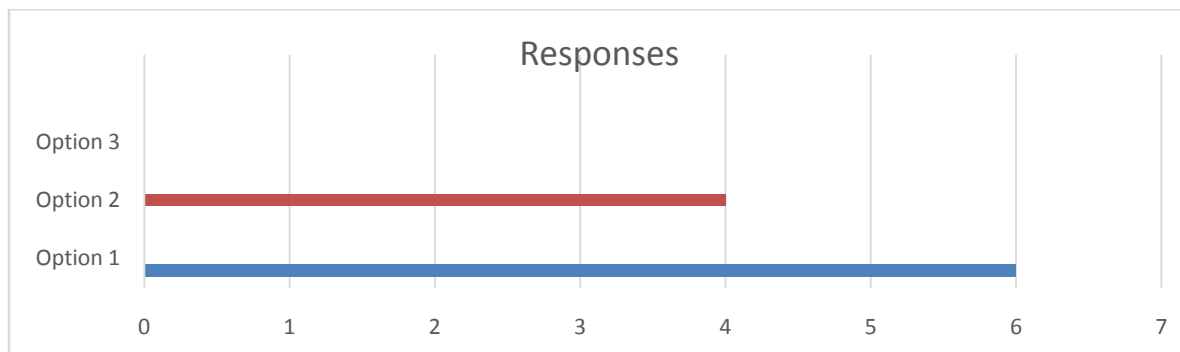
## SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

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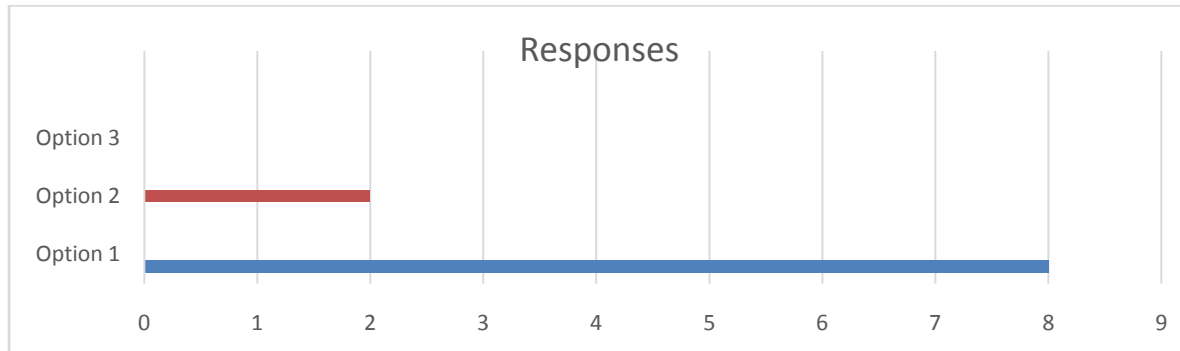
### 10. View / Edit pages (User, Product, Dealer, Store, GRN, P.O., Stock, Bills)

- ☐ Icons used inside data table looks great.
- ☐ Buttons could have been more appropriate.
- ☐ I dint like the icons inside the data table.



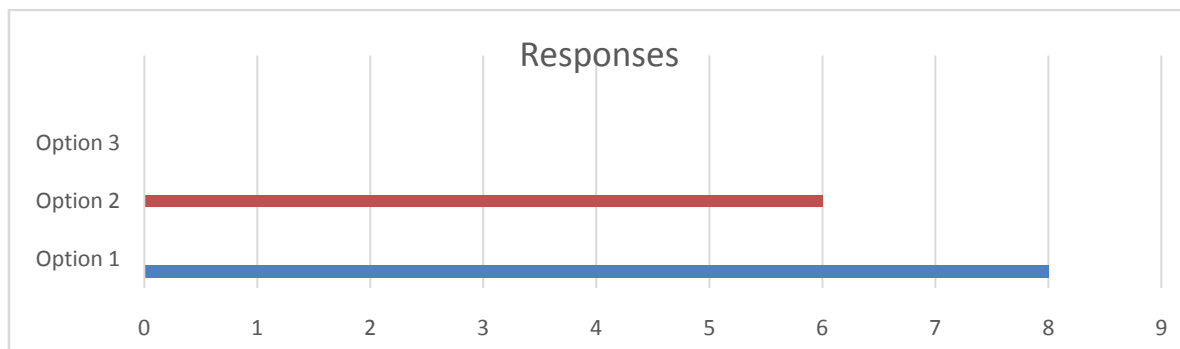
### 11. Overall Page layout in general

- ☐ Page layout and use of space looks appropriate.
- ☐ Page layout could have been better. It looks too simple.
- ☐ I dint like the Page layout.



### 12. Right Menu in the Page Header

- ☐ Looks good and has basic features included.
- ☐ More features could be added into this menu.
- ☐ I dint like Menu there.

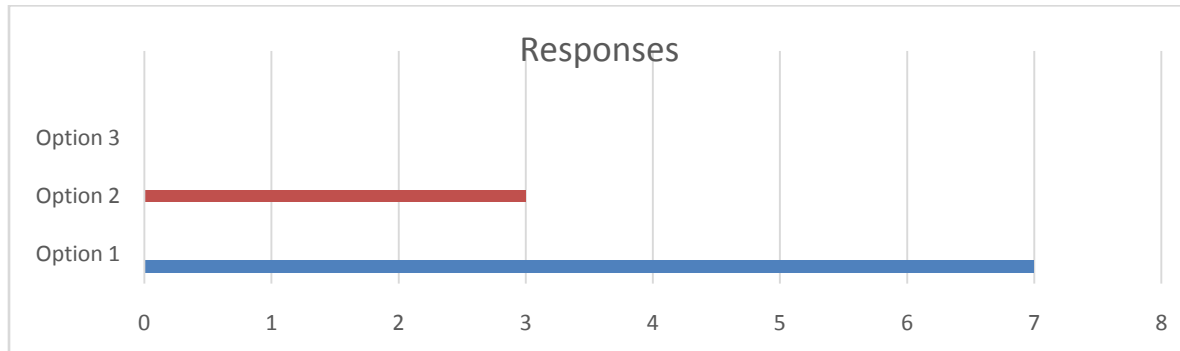


### 13. Overall Color combination on the pages

- ☐ Looks great and simple.
- ☐ Looks simple.Could have been more colorful.
- ☐ I dint like the color selection.

## SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

---



### General Comments on any improvement required

1. *"It looks simple and good. The header looks blank. Needs something there. Logo or something filling."*
2. *"I like the left navigation. It's easy to know where the user is. Great job!"*
3. *"I would like to see more features included in the Right top menu such as Outlook integrated you know."*
4. *"The page looks too grayish. It would have looked different with different colors."*
5. *"I want to see this fully completed and working."*
6. *"I hope this helps workers in shops to a great extent."*
7. *"The icons looked more of mobile versioned. Can be improved."*
8. *"Google like search would have been great."*
9. *"Slight alignment corrections can be made."*
10. *"Can't see forgot password functionality in login page. Need it."*
11. *"Looks great for me. Hope it comes out well once completed."*

## 10.2. ITERATION 2

Keeping in mind the feedback of the users and reexamining the application for more improvements the application screens are updated as below.


### LOGIN SCREEN: -







# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

## ADMINISTRATOR SCREENS

Welcome Vinay 

 Add User


 View / Edit User

New user

First name

Last name

Password

Confirm password

Address

Street


Nr.

City


ZIP

Country

Email


Telephone


 


User Type


Save

Cancel

Welcome Vinay 

 Add User

 View / Edit

Search User 

First name



Last name

Email

User type

Search

Reset

User Id	First name	Last name	Email	User type	
1	Steven	Owens	example@mail.com	Sales	 

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...


12

13


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# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT


## DATA ENTRY SCREENS


Welcome Vinay 


+ Add Dealer

 View / Edit Dealer

 Add Product


 View / Edit Product

 Add Store

 View / Edit Store

### New Dealer


Company Name


Company No.  

Address

Street  Nr.

City  ZIP  Country

Email  

Telephone  

Contact person 1

Name

Telephone

Contact person 2


Name

Telephone


Remarks


Save


Cancel


Welcome Vinay 


+ Add Dealer

 View / Edit Dealer

 Add Product

 View / Edit Product

 Add Store

 View / Edit Store

### Search Dealer

Company Name


Company no.


City

Zip code

Country




Created date

from (dd/mm/yyyy) 

to (dd/mm/yyyy) 


Search

Reset


Company name	Company no.	Email	Contact no.	Created date	
ABC	ABC123	abc@mail.com	+49XXXXXXXXXX	25/04/2017	
XYZ	XYZ123	xyz@mail.com	+49XXXXXXXXXX	25/04/2017	
ABZ	ABZ123	abz@mail.com	+49XXXXXXXXXX	25/04/2017	

« Previous **1** 2 3 4 ... 12 13 Next »


# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT


Welcome Vinay 


+ Add Dealer

 View / Edit Dealer


**+ Add Product**


 View / Edit Product

 Add Store

 View / Edit Store

### New Product



Dealer  

Product category  


Brand

Product name



Quantity 

Units



Basic rate 



  

 € VAT (%)



Cost  €

Selling price  € Profit (%)

Minimum order 


Threshold quantity 


Status

Save


Cancel


Welcome SAD 


+ Add Dealer

 View / Edit Dealer


**+ Add Product**

 View / Edit Product

 Add Store

 View / Edit Store


### View / Edit Products


Dealer  

Product category

Product name



Created date 

from (dd/mm/yyyy) 

to (dd/mm/yyyy) 


Search


Reset


Dealer Name	Product Name-Brand-Qty	B.rate	VAT	Cost	
ABC123	Product1-Brand A-5kg	100	5	105	 


« Previous **1** 2 3 4 ... 12 13 Next »


# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT


Welcome Vinay 


 Add Dealer

 View / Edit Dealer

 Add Product

 View / Edit Product


 **Add Store**


 View / Edit Store


### New Store


Store Name

Store Address 

Country 

Email  


Telephone  


Store Manager  Contact no.  


Remarks


Save


Cancel


Welcome Vinay 


 Add Dealer

 View / Edit Dealer


 Add Product



 View / Edit Product

 Add Store

 **View / Edit Store**

### Store Details





No.	Store Name	Address	Email	Telephone	Store Manager	Option
1	Store 1	Product 1	example@mail.com	+49XXXXXXXXX	Manager 1	 


« Previous **1** 2 3 4 ... 12 13 Next »

# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

## PURCHASE DEPARTMENT SCREENS

Welcome Vinay 

 Generate PO

 View/ Edit PO

### Generate Purchase Order

Product Category

Product


Dealer

Shop

Quantity

Add


Reset


No.	Product name	Qty.	Rate	Tax	Cost	
1	Product 1	5Kg	1000	10	1100	


« Previous **1** 2 3 4 ... 12 13 Next »

Total bill amount  €


Submit

Welcome Vinay 

 Generate PO

 View/ Edit PO

### Purchase Order (PO)





P.O. Number

Purchase manager

Status

Due date

from (dd/mm/yyyy) 

to (dd/mm/yyyy) 

Store

Search

Reset

No.	P.O. Number	P.O. date	Due date	Store	Dealer	Manager	Amount	Status
1	P100	30/04/2017	09/05/2017	XYZ	ABC	XYZ	1000	P

« Previous **1** 2 3 4 ... 12 13 Next »

# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

Welcome Vinay



## Approve Purchase Order



P.O. Number PO123  
P.O. Date 30/04/2017  
P.O. Due Date 10/05/2017  
Dealer ABC123  
Manager XYZ  
Amount 1000 €

No.	Product name	Qty.	Rate	Tax	Cost	
1	Product 1	5Kg	1000	10	1100	

« Previous 1 2 3 4 ... 12 13 Next »

Approve

Reject

# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

## GOODS RECEIVING DEPARTMENT SCREENS

Welcome SAD

Generate GRN

View GRN

GRN

PO no.

Dealer name: ABC

TIN Number: XXXXXXXX

Approver Comment: Comment

Due Date: DD/MM/YYYY

GRN Status: Pending/ Closed

No.	Product Name	Order Qty.	Received Qty.	Rate	Cost (inc.VAT)	

Tax

Bill Amount

Welcome SAD

Generate GRN

View GRN

View GRN

Dealers

PO No

Created date

from (dd/mm/yyyy)

to (dd/mm/yyyy)

Delivery status

No.	Dealer Name	PO no.	PO date	GRN date	PO price	GRN amount	Delivery Status

« Previous **1** 2 3 4 ... 12 13 Next »

# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

## BILLING DEPARTMENT SCREENS

Welcome Vinay

Generate Bill

View / Edit

New Invoice

Barcode

scan or type

Quantity

Product

Price

Add

Cancel

No	Barcode	Product	Qty.	Price	Total	
1	XYZ0001	Product 1	5	40€/Kg	200	

« Previous

1

2

3

4

...

12

13

Next »

Payment

Cash

Total (€)

Recieved (€)

VAT (%)

Balance (€)

Grand total

Save

Cancel

Welcome SAD

Generate Bill

View Bills

View Bills

Bill No.

Shop

Amount

from

to

Bill date

from (dd/mm/yyyy)

to (dd/mm/yyyy)

Search

Reset

S.No	Bill No.	Bill Date	Qty.	Tax	Cost
1	1000001	04.04.2017	12	2.05	2905

« Previous

1

2

3

4

...

12


13

Next »


Total Amount



## STOCK REPORT SCREEN

Welcome Vinay

View Report

Stock Report

Store Name

Product Category

Product Code

Product Name

Search

Cancel

No.	Product Name	Rate	Qty.
1	Product 1	40€	5

« Previous

1

2

3

4

...

12

13

Next »

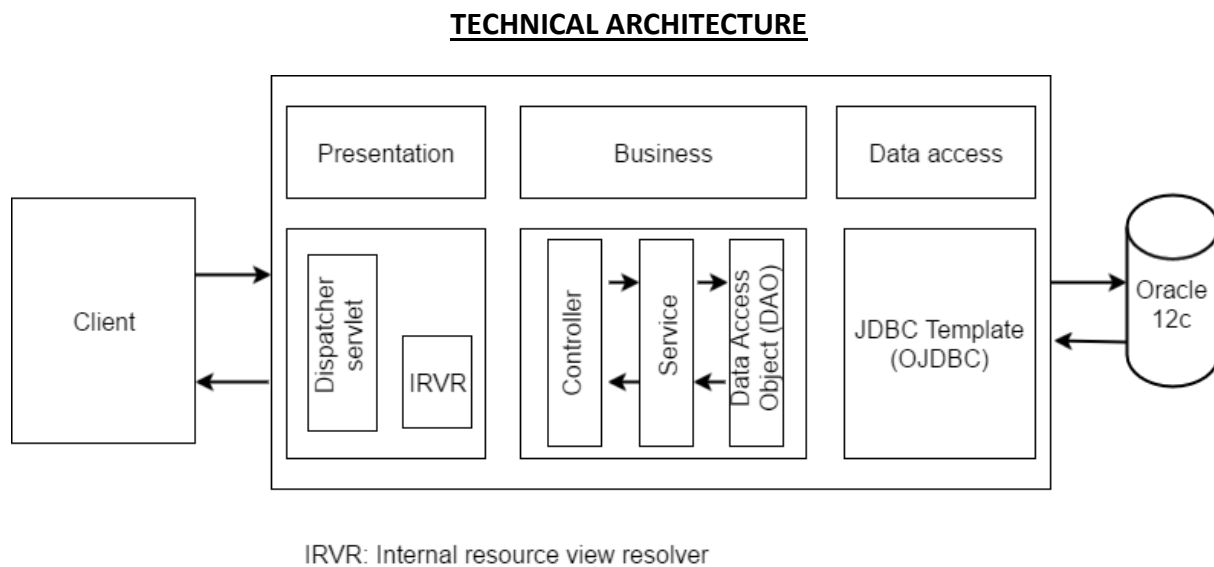
## 11. TECHNOLOGY

Below are the technologies that will be used to implement the ERP application.

**Technology:** Java J2EE 1.8, HTML5, CSS3, Angular JS4.

**Framework:** Spring MVC design pattern.

**Database:** Oracle 12c.



1. Java J2EE combined with Spring MVC design pattern is one of the better ways to come up with http REST coding. Some of the key features are as below

Dispatcher servlet - It is a design pattern that serves as the sole servlet implementation in servicing all the incoming http requests.

Internal resource view resolver – It's a spring implementation which identifies the view example jsp, html etc. based on the http URL patterns.

2. Angular JS is a JavaScript based open source front end web application framework that supports MVC framework on the client side. Important feature of are as below

Decoupling of DOM elements from application logic.

Decoupling client side of an application from the server side.

# SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

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3. Oracle 12c – Since, the application requires no compromise on consistency when it comes to CAP theorem and Oracle is one of the better Database Base in providing consistency. Oracle 12c will be used for the implementation. Being the latest of the Database release from Oracle, this serves the purpose of data storage.

## 12. VISION AND MISSION

### VISION

Our vision is to help Retail stores operate in a smart and efficient way.

### MISSION

Our mission is to develop an ERP application that can act as a single platform for all the retail sectors and automate certain processes which can reduce manual effort.

## 13. USER STORY TO TASK MAPPING

The below task map shows the task estimation to develop the application.

ACTIVITIES	TASKS			
	FRONT END (Screens)	MIDDLEWARE		DATABASE
Login	Login screen	1)Login credentials Validation and verification	Connection to the database	Database queries to select
Administration	Add User details	1)Validation and verification of the user details	Connection to the database	Database queries to insert a user
	View/ Edit users	1)Validation and verification of the requested user details	Connection to the database	Database query to fetch/update the user record
	Display user details or Display user details/ details to edit	1)Return result to the frontend		

## SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

<b>Data Entry</b>	Add Dealers/Products/Shop details	1)Validation and verification of the details	Connection to the database	Database queries to insert a Dealers/Products /Shop details
	View/Edit Dealers/Products /Shop details	1)Validation and verification of requested Dealers/Products /Shop details	Connection to the database	Database query to fetch/update corresponding record
	Display Dealers/Products/Shop details or Display Dealers/Products/Shop details to edit	1)Return result to the frontend		
<b>Goods Receiving</b>	Generate GRN	1)Validation and verification of GRN details 2)Business logic to add products to available stocks( <b>Automation</b> )	Connection to the database	Database queries to insert generated GRN and to update the Delivery status
	View GRN	1)Validation and verification of requested GRN details	Connection to the database	Database queries to fetch GRN
	Display GRN details	1)Return result to the frontend		
<b>Purchase Order Management</b>	Create Purchase order	1)Validation and verification of the PO details	Connection to the database	Database queries to insert the PO details
	View/Edit PO	1)Validation and verification of requested PO details	Connection to the database	Database queries to fetch/update PO details
	Display PO details Display PO details to edit	1)Return result to the frontend		

## SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

	PO approval	1)Validation and verification of the PO details 2)Business logic to trigger email to Dealers( <b>Automation</b> )	Connection to the database	Database query to update approval status
<b>Billing</b>	Generate bill	1)Validation and verification of bill details 2)Business logic to update available stocks( <b>Automation</b> )	Connection to the database	Database query to insert Billing details
	View Bill	1)Validation and verification of requested bill details	Connection to the database	Database query to fetch details
	Display bill details	1)Return result to the frontend		
<b>Reporting</b>	Generate report	1)Validation and verification of requested stock details	Connection to the database	Database query to fetch requested stock details
	Display stock report	1)Return result to the frontend		

## 14.WORKLOAD DOCUMENTATION

The below table consists of the hours of meeting and the tasks accomplished after each meeting.

HOURS OF MEETING HELD	TASK	MEMBERS PRESENT IN MEETING	TASK RESPONSIBILITY
2	Project topic discussion	Anusha, Vinay, Prabhu, Sachin, Manoj	Prabhu
3	use cases	Anusha, Vinay, Prabhu, Sachin, Manoj	Anusha, Vinay, Prabhu, Sachin, Manoj
4	Interviews	Anusha, Vinay, Prabhu, Sachin, Manoj	Prabhu,Anusha, Vinay, Sachin, Manoj
3	Interview analysis	Anusha, Vinay, Prabhu, Sachin, Manoj	Anusha, Vinay, Prabhu, Sachin, Manoj

## SOFTWARE ARCHITECTURE DEVELOPMENT DOCUMENT

	Interview analysis reporting	Anusha, Vinay, Prabhu, Sachin, Manoj	Prabhu
	Persona	Anusha, Vinay, Prabhu, Sachin, Manoj	Anusha
	UXPin account and GIT repo setup	Anusha, Vinay, Prabhu, Sachin, Manoj	Vinay
4	Low fidelity prototype	Anusha, Vinay, Prabhu, Sachin, Manoj	Prabhu
3	Hi fidelity prototype(Iteration 1)	Anusha, Vinay, Prabhu, Sachin, Manoj	Vinay ,Anusha,Prabhu,Sachin,Manoj
4	Hi fidelity prototype interaction	Anusha, Vinay, Prabhu, Sachin, Manoj	Vinay, Anusha
3	Hi fidelity prototype user testing and feedback analysis	Anusha, Vinay, Prabhu, Sachin, Manoj	Sachin
	Hi fidelity prototype response updates	Anusha, Vinay, Prabhu, Sachin, Manoj	Vinay, Anusha
3	Project Environmental setup	Anusha, Vinay, Prabhu, Sachin, Manoj	Vinay
3	Documentation	Anusha, Vinay, Prabhu, Sachin, Manoj	Anusha, Vinay, Prabhu, Sachin, Manoj
	Documentation merge	Anusha, Vinay, Prabhu, Sachin, Manoj	Anusha

## 15. REFERENCES

[1] <https://en.wikipedia.org/wiki/Retail>

[2] <https://www.thebalance.com/retail-store-organization-2890447>