INVENTORY MANAGEMENT SYSTEM FOR RETAILERS

IBM PROJECT

Submitted By

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in partial fulfilment for the award of the degree

of

BACHELOR OF ENGINEERING

In

COMPUTER SCIENCE AND ENGINEERING

DHANALAKSHMI SRINIVASAN INSTITUTE OF TECHNOLOGY,

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NOVEMBER 2022

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BONAFIDE CERTIFICATE

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ACKNOWLEDGEMENT

First of all, we thank the Almighty and our parents for blessings without which we couldn't complete the project work within stipulated time.

We are in debated to our respected **Chairman, Shri. A. Srinivasan,** for his noble guidance to accomplish the project successfully.

This project would have been a distant reality if not for the help and encouragement from various people. We take immense pleasure in thanking our **Principal Dr. S. Selvakumar, M.E., Ph.D.,** Dhanalakshmi Srinivasan Institute of Technology for having permitted us to carry out this project.

I would like to express gratitude to **Dr. V. Raju, MCA., Ph.D.,** for his timely guidance and providing all necessary facilities at the right time for completing this project.

We thank our honourable **Head of the Department Mr. S. Sashikumar, M.E.,** Department of Computer Science and Engineering, Dhanalakshmi Srinivasan Institute of Technology for going through the report and giving valuable suggestions.

We would like to take an opportunity to express our sincere thanks to our Institutional Guidance **Ms. R. Padmavathi, M.E.,** Assistant Professor, Dhanalakshmi Srinivasan Institute of Technology for the valuable suggestion given during a project work.

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ABSTRACT

Inventory management is one of the pillars of a successful retail operation. Inventory management techniques help stores and ecommerce sellers satisfy customers, reduce costs and increase profits. Inventory management is the process of ensuring you carry merchandise that shoppers want, with neither too little nor too much on hand. By managing inventory, retailers meet customer demand without running out of stock or carrying excess supply. In practice, effective inventory management results in lower costs and a better understanding of sales patterns. Inventory management tools and methods give retailers more information with which to run their businesses. Inventory management is vital for retailers because the practice helps them increase profits. They are more likely to have enough inventory to capture every possible sale while avoiding overstock and minimizing expenses. From a strategic point of view, inventory management increases efficiency.

CHAPTER 1

INTRODUCTION

1.1 Project Overview

Retail inventory management is the process of ensuring you carry merchandise that shoppers want, with neither too little nor too much on hand. By managing inventory, retailers meet customer demand without running out of stock or carrying excess supply.

In practice, effective retail inventory management results in lower costs and a better understanding of sales patterns. Retail inventory management tools and methods give retailers more information on which to run their businesses. Applications have been developed to help retailers track and manage stocks related to their own products. The System will ask retailers to create their accounts by providing essential details. Retailers can access their accounts by logging into the application.

Once retailers successfully log in to the application they can update their inventory details, also users will be able to add new stock by submitting essential details related to the stock. They can view details of the current inventory. The System will automatically send an email alert to the retailers if there is no stock found in their accounts. So that they can order new stock.

1.2 Purpose

The primary purpose of inventory management is to ensure there is enough goods or materials to meet demand without creating overstock, or excess inventory. Accurate inventory management is key to running a successful product

business. Tracking stock regularly can help avoid stock errors and other problems. And the main purpose of inventory management is to help businesses easily and efficiently manage the ordering, stocking, storing, and using of inventory. By effectively managing your inventory, you'll always know what items are in stock, how many of them there are, and where they are located.

And practicing strong inventory management allows you to understand how you use your inventory and how demand changes for it over time. You can zero in on exactly what you need, what's not so important, and what's just a waste of money. That's using inventory management to practice inventory control. By the way, inventory control is the balancing act of always having enough stock to meet demand, while spending as little as possible on ordering and carrying inventory.

CHAPTER 2

LITERATUTE SURVEY

2.1 Existing Problem

- Lack of real-time reporting
- Lack of Inventory Visibility
- Inefficient Inventory Management Process or Software
- Identifying Incorrectly Located Materials
- Keeping up with Overstocks or Understocks
- Managing Inventory Waste & Defects
- Lack of Centralized Inventory Hub
- Changing Demand and Increasing Competition
- Supply Chain Complexity and Evolving Packaging
- Managing Warehouse Space and Efficiency
- Insufficient Order Management and Poor Production Planning
- Lack of Expertise and Poor communication
- Inconsistent Tracking
- Inaccurate Data and Inventory Loss
- Manual Documentation and Inadequate Software
- Stock Problem and Inefficient Processes
- Insufficient Order Management
- Expanding Product Portfolios

2.2 References

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5. https://www.kapturecrm.com/blog/20-top-challenges-solutions-of-inventory-management/
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7. https://magenest.com/en/inventory-management-challenges/

2.3 Problem Statement Definition

Demand is frequently unpredictable in inventory systems, and lead times can often vary. Managers frequently keep a safety supply to minimize shortages. In such cases, it's difficult to say what order amounts and reorder points will result in the lowest total inventory cost. The inventory issue refers to the general issue of deciding how much inventory to keep on hand in expectation of possible demand. Loss occurs when a business is unable to meet demand (for example, when a store loses sales or when soldiers in a war run out of ammunition) or when commodities are stocked for which there is no demand.

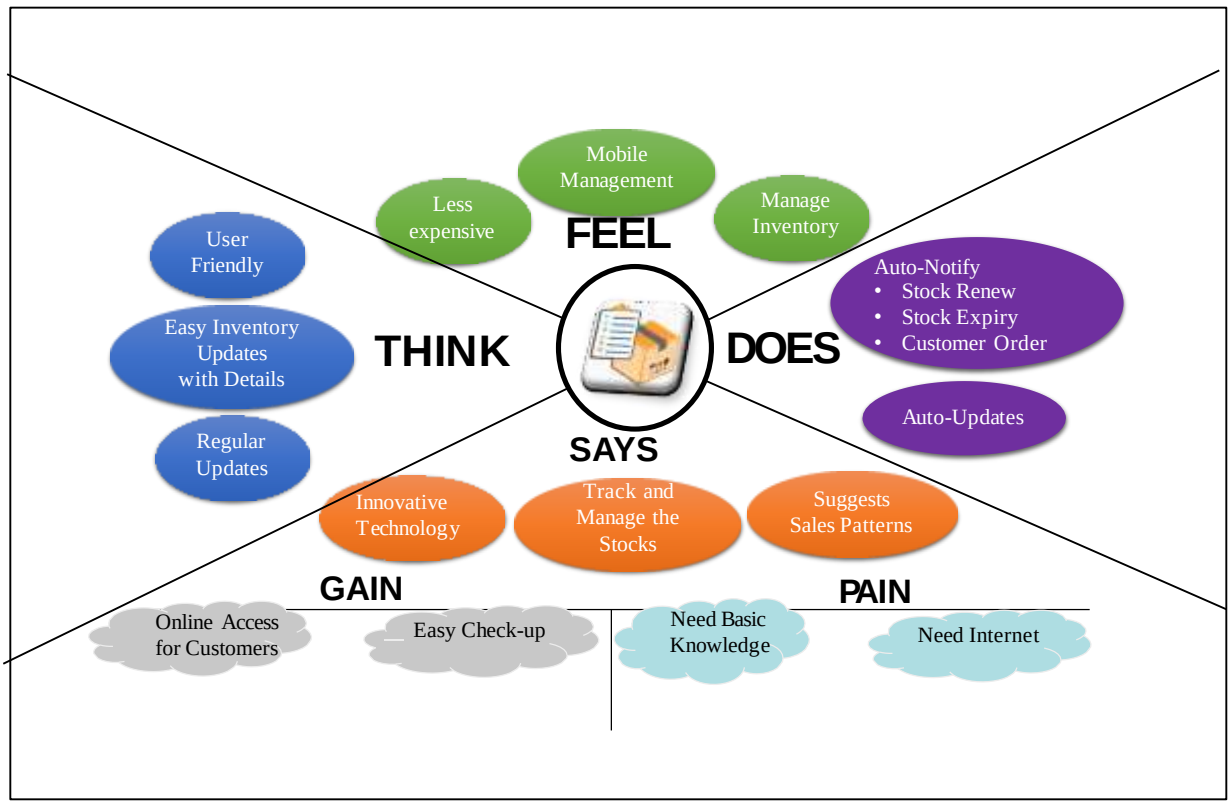
Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS – 1	Pharmacist	Save time and reduce operational effort	Software can be too expensive for small and mid-sized companies	Lack of control and organization & difficulty maintaining the accuracy of information	Frustrated & Stressed
PS – 2	Automotive Industry	Minimize loss occurring from damages and wasted materials	Poor real-time updates on reporting & Data-entry errors	Lack of streamlined communication between departments	Frustrated & Tired

CHAPTER 3

IDEATION & PROPOSED SOLUTION

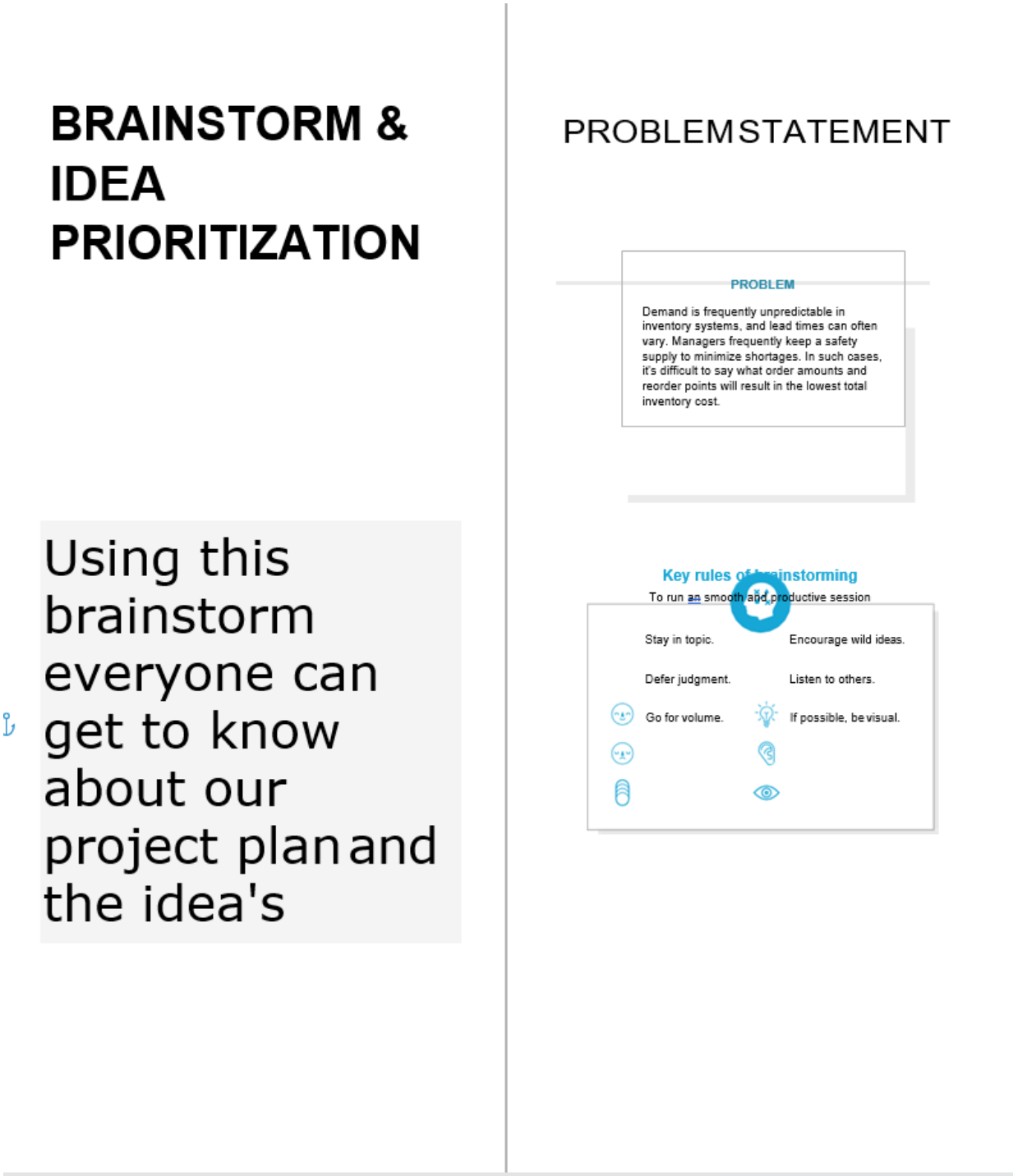
3.1 Empathy Map Canvas

An empathy map is **a collaborative tool teams can use to gain a deeper insight into their customers**. Much like a user persona, an empathy map can represent a group of users, such as a customer segment. The empathy map was originally created by Dave Gray and has gained much popularity within the agile community.



3.2 Ideation & Brainstorming

Ideation is often closely related to the practice of brainstorming, a specific technique that is utilized to generate new ideas. A principal difference between ideation and brainstorming is that **ideation is commonly more thought of as being an individual pursuit, while brainstorming is almost always a group activity**.



BRAIN STORM

Logesh

- Give Sales Pattern for inventory
- Inventory Alert
- Minimizes Out-of-Stocks
- Batch Tracking
- Improves Customers Satisfaction
- Improves Multi-Channel and Omnichannel Performance and Order Fulfillment
- Prioritize Accuracy
- Customer relationship management
- Physical Inventory Audit

Arun

- Developing your inventory strategy
- Cost Savings
- Improves Profit Margins
- Simplifies Processes and Facilitates Growth
- Improves Forecasting
- Wholesale cost
- Gross Margin Return on Investment
- Spot Checking
- Better forecasting

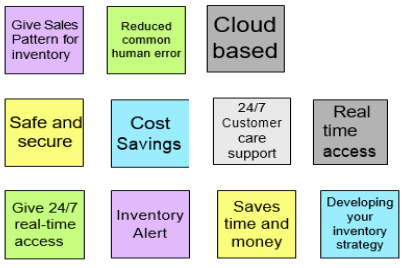
Ghousonisan

- Safe and secure
- Cycle Counting
- Inventory Turnover Rate
- Reduces Shrinkage
- First In, First Out (FIFO)
- Prevents Spoilage and Obsolescence
- Do Regular and Accurate Stock Counts
- Saves time and money
- Custom notifications

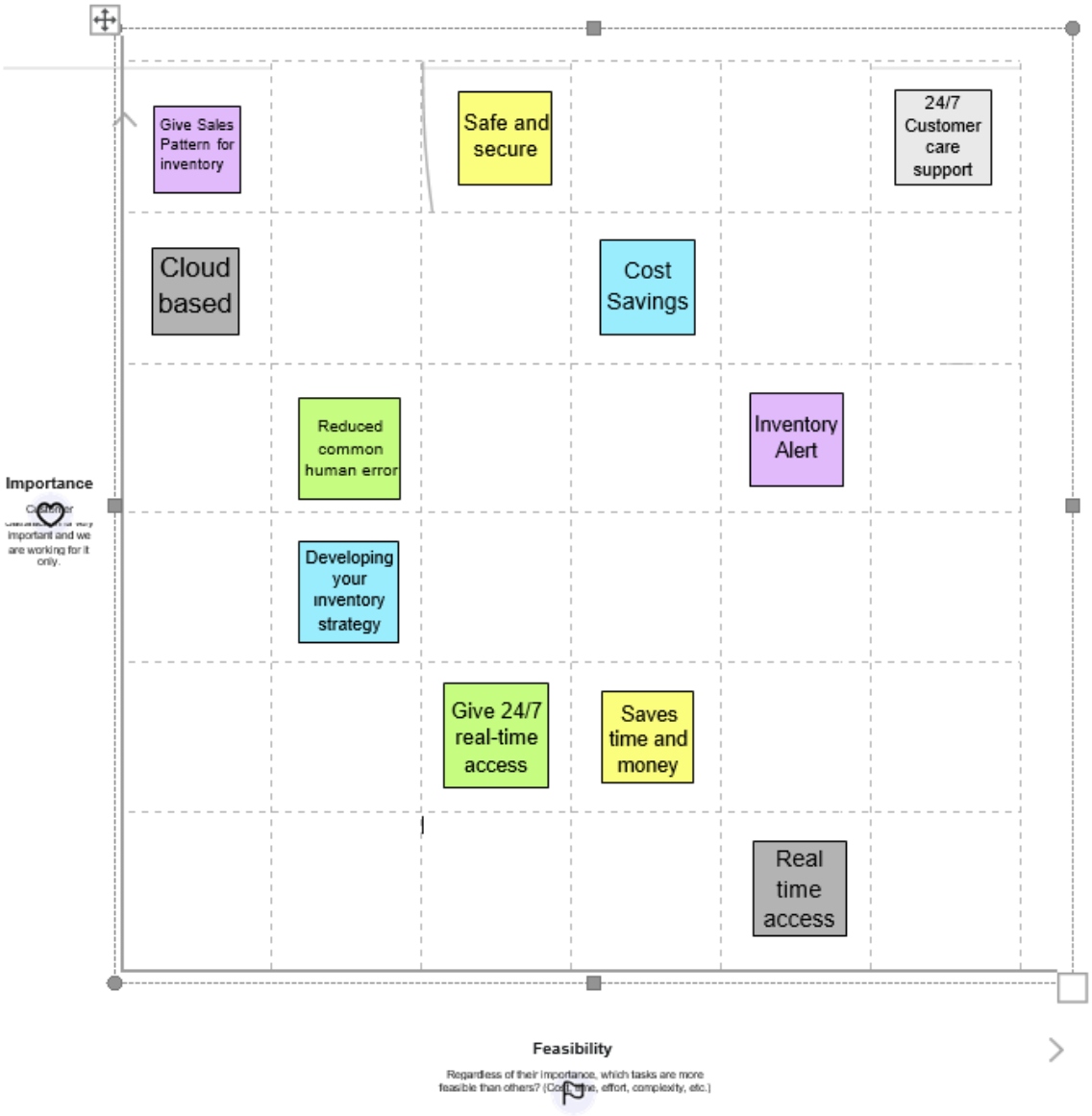
Ilavarasan

- Reduced common human error
- Give 24/7 real-time access
- Decreases Inventory Costs
- Eases Supply Chain Management
- Combine Sales Data With Inventory Data to Simplify Reporting
- Last In, First Out (LIFO)
- Retail Demand Forecasting
- Maximize Efficiency
- Lower Overhead

GROUP IDEA



IDEA PRIORITIZATION



3.3 Proposed Solution

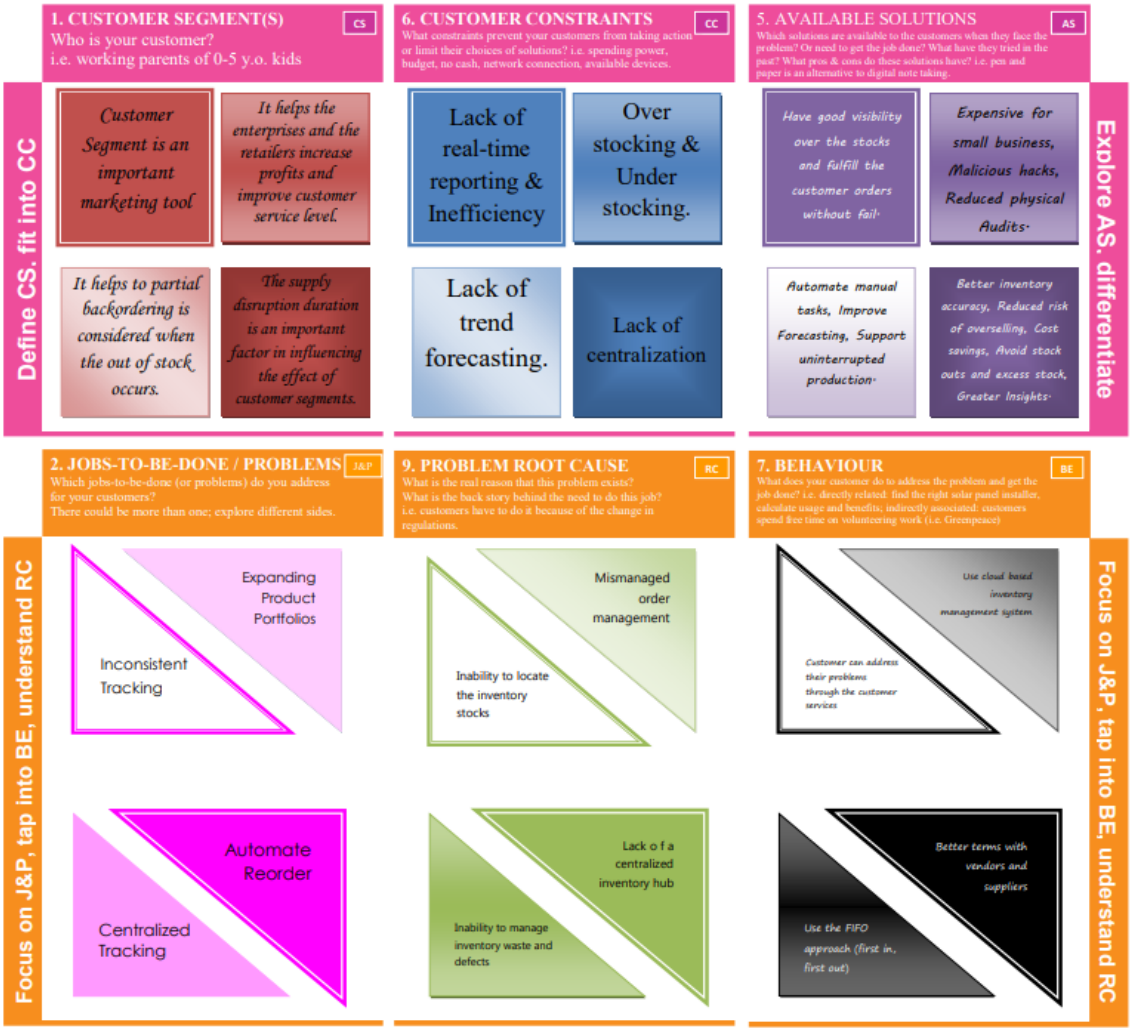
Proposed Solution means **the technical solution to be provided by the Implementation agency in response to the requirements and the objectives of the Project**.

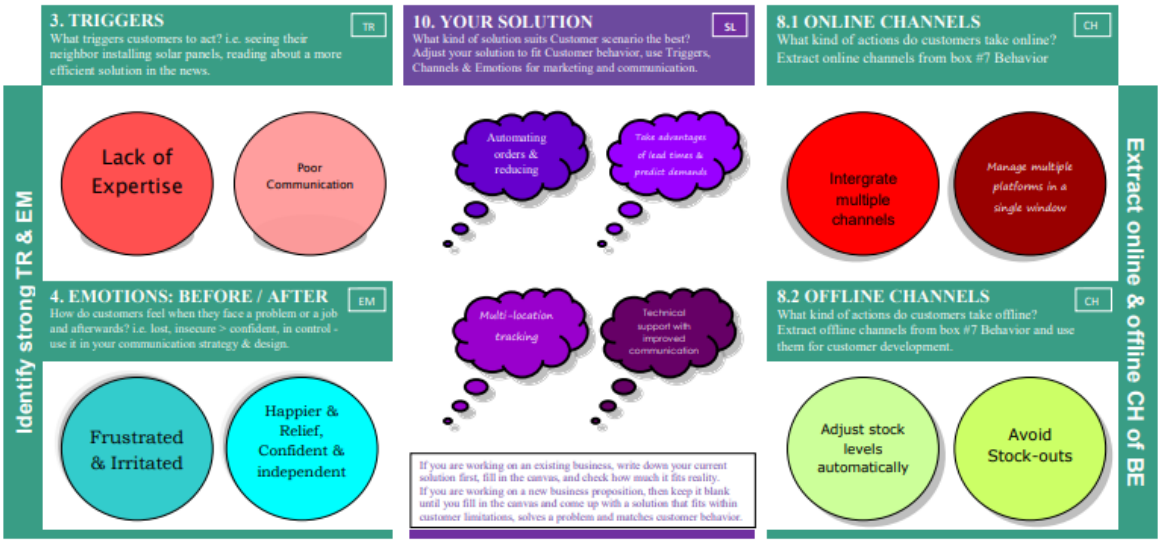
S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Stock-taking becomes very challenging when you have inventories in multiple locations. Discrete stock data from various locations makes shipping complex, resulting in delays. It's one of the biggest and continual challenges faced by most businesses today.
2.	Idea / Solution description	**Central inventory system** You can significantly reduce expenses and save a great deal of time by simply creating a centralized inventory hub for your inventory-related data, including stock-taking. This gives you comprehensive visibility and control of inventory and data in one single location, making stock management simple. It also becomes much easier to track the inventory that enters and leaves your business premises.
3.	Novelty / Uniqueness	Provision of better customer service through a focus on skilled workers, better ways to respond to inquiries and requests and also better equipment.
4.	Social Impact / Customer Satisfaction	The availability of product is just one way in which an inventory management system attempts to create customer satisfaction. A comprehensive understanding of the impact of inventory control on customer satisfaction helps you to create an effective inventory management system. Customers want to receive precisely what they ordered within an acceptable time frame, and at a reasonable cost.
5.	Business Model (Revenue Model)	When starting your ecommerce business, you have a lot of decisions to make but, one of the most important is where you'll store your inventory.

		More specifically, you'll need to decide whether to centralize your inventory, or distribute inventory across multiple locations. Centralized inventory is an inventory storage strategy in which you keep all your stock in one central location. This central hub can be a retail store, a warehouse, or another type of storage facility. Because all inventories is stored at a central location, instead of different distribution centers, that location also typically houses all or most of the logistics operations, including order processing and fulfillment.
6.	Scalability of the Solution	The centralized inventory management approach involves a business storing all of their stock at a single warehouse or location, and managing logistical functions such as order fulfillment from that hub. This is the most traditional approach to inventory management, as it simplifies your supply chain management by keeping most critical functions under one roof. Centralized inventory makes inventory control and management simpler. Since you only need to monitor inventory levels in one location, it's easier to keep track of how much inventory you have left, and properly manage fulfillment for multiple channels at once. Operating only one warehouse also consolidates expenses and decreases facilities and operations costs. • Streamlined inventory control and management • Lower operational and facilities costs • Easier multi-channel fulfillment.

3.4 Problem Solution fit

The Problem-Solution Fit simply means that **you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem**.





CHAPTER 4

REQUIREMENT ANALYSIS

4.1 Functional requirement

A Functional Requirement (FR) is *a description of the service that the software must offer*. It describes a software system or its component. Functional requirements are **product features that developers must implement to enable the users to achieve their goals**. They define the basic system behavior under specific conditions.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through Facebook Registration through phone number
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User login	Login with Fingerprints Login with Password Login with Username
FR-4	Periodic stock checking	Cycle counting Physical counting
FR-5	Promotion	Maintain enough stock on hand to meet demand.
FR-6	Markdown	Show product discount
FR-7	Death stock	Return to the vendor for credits
FR-8	Returns Management System	1. Add it to inventory counts 2. Check for damage

4.2 Non-Functional requirements

Non-Functional Requirements are the constraints or the requirements imposed on the system. They specify the quality attribute of the software. Non-Functional Requirements deal with issues like scalability, maintainability, performance, portability, security, reliability, and many more. Non-Functional Requirements address vital issues of quality for software systems.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The System must be intuitive and simple in the way It displays a relevant data and relationships and the menus of the system are easily navigated by the users with buttons that are easy to understand. If it takes hours for your staff to learn the software, then it's not worth it. You should remember to choose a solution that simplifies inventory management.
NFR-2	**Security**	Only authorized users can access the system with er name and password of administrator. Inventory is the process of ensuring the safety and optimum management control of stored goods. It is of central importance for optimum warehouse management because the performance of a company stands or tells with the safety and efficiency of a warehouse.
NFR-3	**Reliability**	Important for several reasons. Your delivery reliability depends on it, but also consider the cost involved. The system must successfully add any recipe, ingredients, vendors, or special occasions given by the user and provide estimations and inventory status in relevance to the newly updated entities. The system must give accurate inventory status to the user continuously. Any inaccuracies are corrected by regularly comparing the actual levels to the levels displayed in the system.
NFR-4	**Performance**	The goal of inventory performance metrics is to compare actual on-hand dollars versus forecasted cost of goods sold. The system must successfully complete updating the databases, adding new recipes, ingredients, vendors, and occasions every time the user requests such a process All the functions of the system must be available to the user every time the system is turned on, the calculations performed by the system must comply with the norms set by the user and should not vary unless implicitly changed by the user.
NFR-5	**Availability**	The software will be available only to administrator of the organization and the product as well as atoner details will be recorded by him. Inventory availability refers to whether a specific item is available for customer orders. Additional information provided by retailers may include the quantity available.
NFR-6	**Scalability**	The inventory management software or app you choose be able to grow as your business does? The last thing you want is to have to manually re-enter all your inventory if you outgrow your current system. The ability of a system to handle growing amount of work.

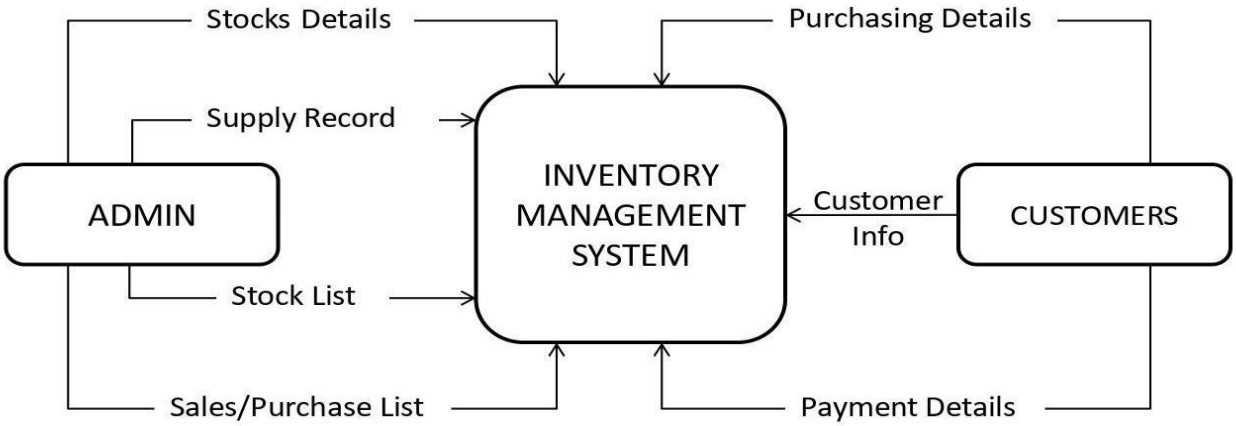
CHAPTER 5

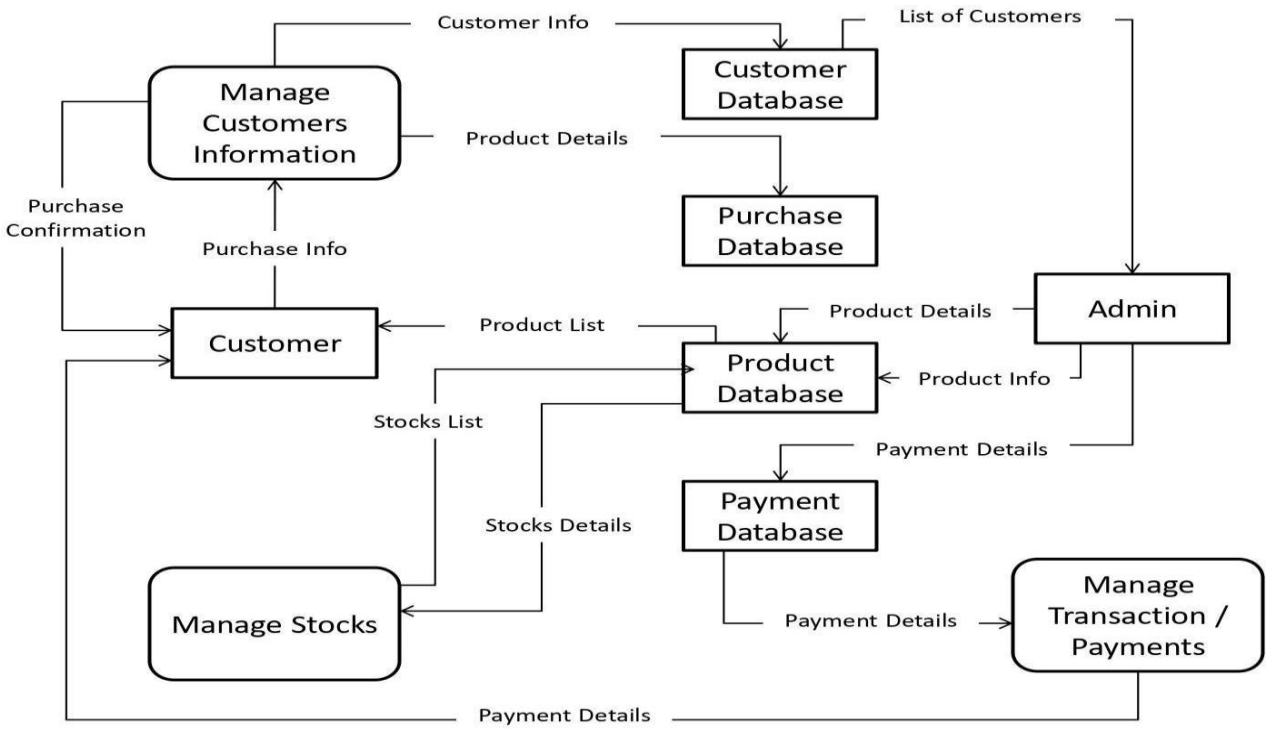
PROJECT DESIGN

5.1 Data Flow Diagrams

A **data flow diagram (DFD)** maps out the flow of information for any process or system. It includes **data inputs and outputs, data stores, and the various subprocesses the data moves through**. DFDs are built using standardized symbols and notation to describe various entities and their relationships.

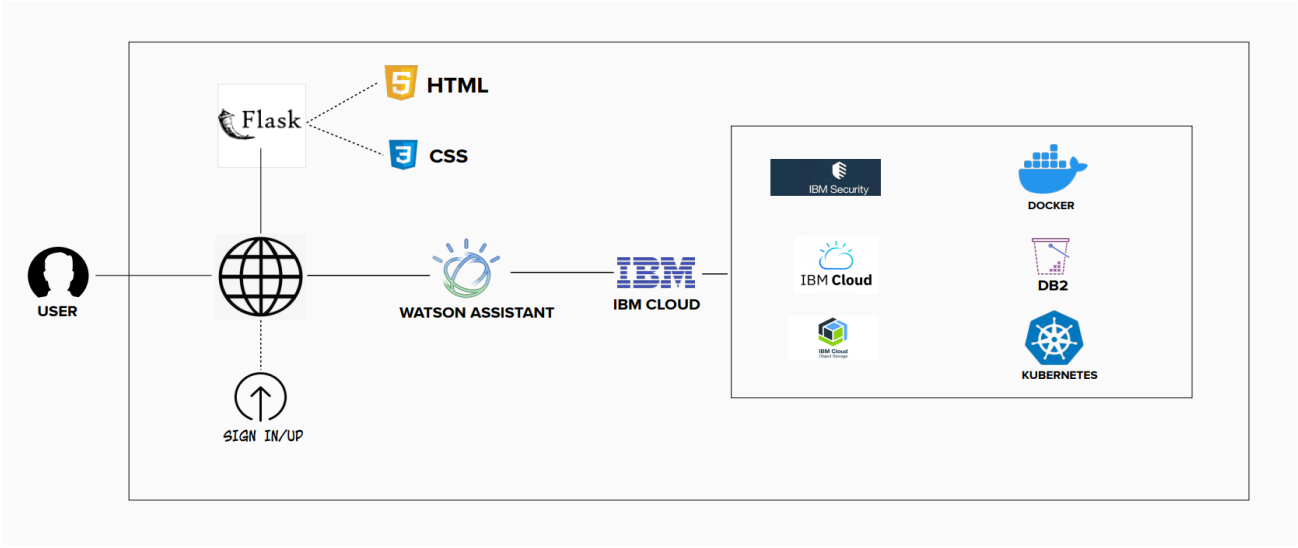
Data Flow Diagrams:
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enter and leaves the system, what changes the information, and where data is stored.





5.2 Solution & Technical Architecture

Solution architecture is the process of developing solutions based on predefined processes, guidelines and best practices with the objective that the developed solution fits within the enterprise architecture in terms of information architecture, system portfolios, integration requirements and many more. **Technical Architecture** ensures that technology fits into existing computer systems by specifying its hardware, access methods, protocols and more.



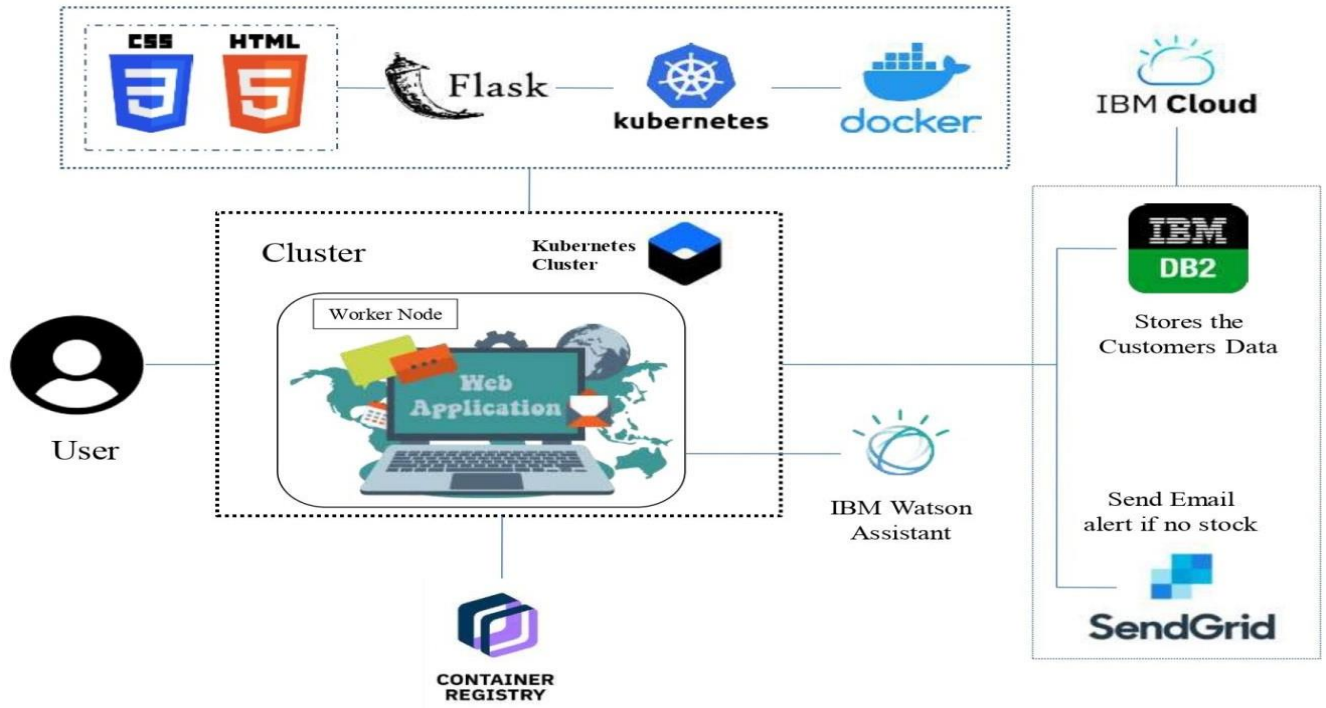


Table-1: Components & Technologies:

S. No.	Component	Description	Technology
1.	User Interface	Web UI, Mobile App, Chatbot	HTML, CSS, JavaScript, Query etc.
2.	Calculating Product Count	By entering barcode details into the application	Barcode Scanner
3.	Alert and notification	Alerting the retailers regarding the low stock count of the product	Send Grid
4.	Cloud Database	Database Service on cloud	IBM DB2
5.	Chat	Chat with Watson assistant	IBM Watson Assistant
6.	File Storage	File Storage Requirements	IBM Object Storage
7.	Infrastructure	Cloud Server Configuration	Cloud Foundry, Kubernetes

Table-2: Application Characteristics:

S. No.	Characteristics	Description	Technology
1.	Open-Source Frameworks	Styling our page, Python flask micro framework	Python Flask, Bootstrap
2.	Security Implementations	For securing our cloud data	SSL Certificates
3.	Scalable Architecture	Three – tier architecture (MVC)	**Technology used are:** **Web server** - HTML, CSS, Java script **Application server**- Python Flask Docker **Database Server** – IBM DB2
4.	Availability	availability of application	Technology used is IBM Load Balancer
5.	Performance	2 requests per seconds, Use of Local Machine Cache Memory	Technology used is IBM Cloud, CDN (content delivery network)

5.3 User Stories

A **user story** is an informal, general explanation of a software feature written from the perspective of the end user.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming mypassword.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Face book	I can register & access the dashboard with Face book Login	Low	Sprint-2
		USN-4	As a user, I can register for the application throughGmail	I can register and access the dashboard with Gmail login	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by enteringemail & password	I can register and access the dashboard with email and password	High	Sprint-1
	Dashboard	USN-6	As a user, I can view the stock availability status	I can view the stock availability status	High	Sprint-2
		USN-7	As a user, I can view the orders status	I can view the order status	Medium	Sprint-3
		USN-8	As a user, I can view the shipping tracking status	I can view the shipping tracking status	Medium	Sprint-4
CustomerCare Executive		USN-9	As a customer care executive, I can view thecomplaints on chat box	I can view the complaints on chatbox	Medium	Sprint-4
		USN-10	As a customer, I should be able solve and reply for the customers queries	I can reply to customer queries in the chat thread	Low	Sprint-4
		USN-11	As a customer, I can close the complaint after assisting	I can close the complaint after assisting	Low	Sprint-4
Administrator		USN-12	As a Administrator, I would take care of registrationsand maintenance of accounts	I can take care of registrations and maintenance of accounts	High	Sprint-3
		USN-13	As a Administrator, I Would resolve issues on Access	I can resolve issues in Access	High	Sprint-2