IBM NALAIYATHIRAN PROJECT REPORT

Domain: Cloud Application Development

Title: Inventory Management System for Retailers

Submitted by

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1. INTRODUCTION

Inventory management system for the retailer is essential to maintain the retailing businesses in order to satisfy the customer's needs and comfort. Some benefits of the retail inventory management are increased profits, reduced dead stock, time savings, improved finances, simplicity and increased growth and better forecasting. It can still be uplifted by implementing some practices like creating a strategy to record stock receipts, building strong supplier relationships, manage residual inventory and managing priorities.

1.1 PROJECT OVERVIEW

The project design is completely focused on providing a better shopping experience for the customers with complete satisfaction. It implements the comfortable view of products and offers, new launches, checking the availability of products, items ordering and packing, tracking the product, online payment, providing EMI facilities, making easy returns, and customer feedback. These are implemented with the help of software like Flask, Docker, SendGrid and IBM Watson.

1.2 PURPOSE

The purpose of making this project is to provide utmost comfort and trust towards the inventory management system, not only for the customers, but also for the retailers. This uplifts the economic progress and customer support as well.

2. LITERATURE SURVEY

2.1 EXISTING PROBLEM

After a survey of a number of papers, it can be stated that the inventory management system for the retailers is good at providing services at good cost, but still the problem is that the expected level of satisfaction is being achieved till now. Some issues that lower the satisfaction and performance level of the existing system are irrelevant searches and filters, slow response of the web page, uneasy payment, late tracking of the delivery and so on.

2.2 REFERENCES

a) **Title: Study on manufacture inventories (1970)**

Authors: Krishnamurthy and Sastry

Summary:

It is the most comprehensive study on manufacturers' inventories. They used the CMI data and the consolidated balance sheet data of public limited companies published by the RBI, in order to analyze each of the major components, like the raw materials, goods-in-process and finished goods, for 21 industries over the period ranging from 1946-62.

b) **Title: Impact of Inventory Performance on Industrial Financial Performance of Pakistan (2012)**

Authors: Eneje et al

Summary:

He researched the changes of raw stock inventory management system with margin of beer company in Nigeria during data from 1989 to 2008 which had gathered for analysis from the annual reports of the sampled brewery firms.

Measures of profitability were examined and related to proxies for raw materials inventory management by brewers.

c) **Title: Inventory management practices in Cement Industry (2015)**

Authors: Edwin Sitienei and Florence Memba

Summary:

Conducted a study on Effect of Inventory Management on profitability of Cement Manufacturing Companies in Kenya. The study concluded that Gross profit margin is negatively correlated with the inventory conversion period, increase in sales, which denotes the firm size enriches the firm's inventory levels, which pushes profits upwards due to optimal inventory levels.

d) **Title: Research Paper on Inventory Management (2018)**

Authors: Punam Khobragade, Roshni Selokar, Rina Maraskolhe, Prof. Manjusha Talmale

Summary:

Inventory Management System is software which is helpful for the businesses Selokar, Rina Maraskolhe, Prof. Manjusha Talmale operate hardware stores, where storeowner keeps the records of sales and purchase. Mismanaged inventory means disappointed customers, too much cash tied up in warehouses and slower sales.

e) **Title: Simulation of inventory management systems in retail stores: A case study (2021)**

Authors: Puppala Sridhar, C.R. Vishnu, R Sridharan

Summary:

A simulation model is developed and run for particular merchandise using Arena simulation software. Rigorous experimentation is conducted with the model by altering the inputs/model characteristics, and a more effective system is proposed. Compared with the existing 87% traditional inventory management

system, the proposed system will reduce the inventory level by 40% and lost sales by 87%.

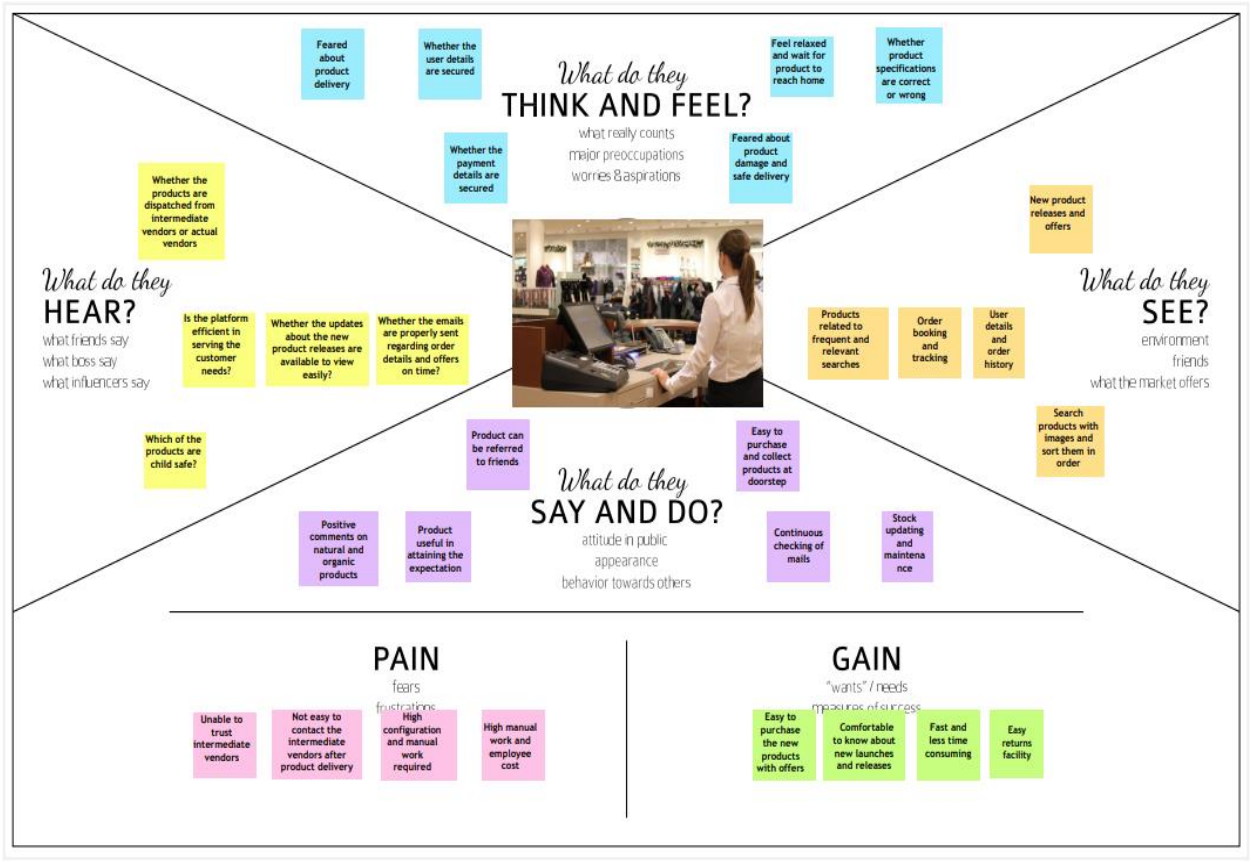
2.3 Problem Statement Definition

Two problem statements have been stated and defined as follows:

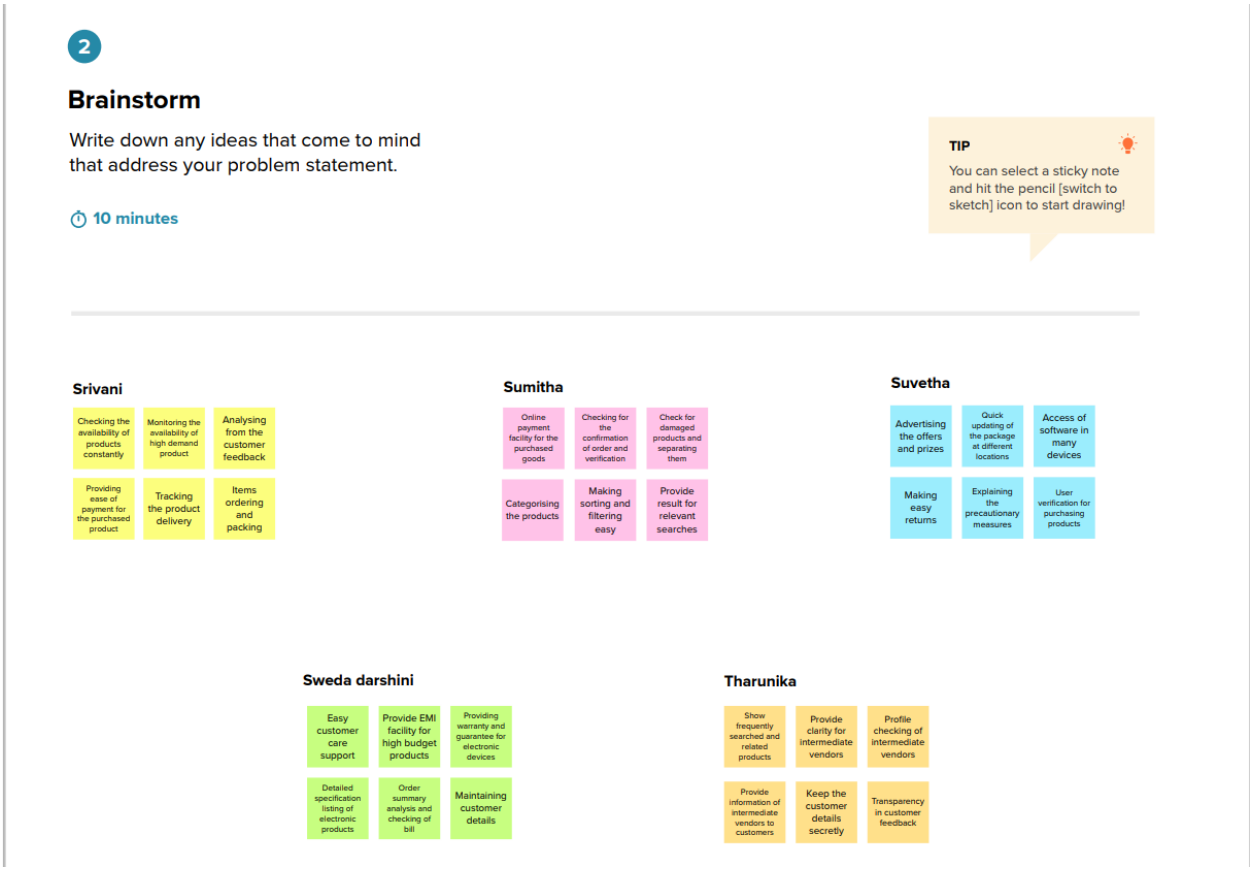
Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Sita, a reseller of cosmetic products.	Keep my customers updated about the date of expiry and manufacture for each product. This makes the customer to trust the dealers for the product quality.	It is difficult to manually check the date for each and every booked product.	There are a lot of products under same category and is hard to segregate them on the basis of manufacturing and expiry date. It is very important for natural products, especially.	Worried and uncomfortable to serve the needs of the customer properly, which affects my business also.
PS-2	Ravi, a shop owner, who updates his stock manually with the labours.	Manage the stock ordering and arranging with labours at a large scale, that requires a lot of planning and execution.	It is expensive and risky to employ huge manpower for the work to be done, and at some time, the labours may lose energy and concentration on work.	There are chances of human errors and can cost a great amount to employ the labours. If this happens, then it may cost a lot to resolve the errors and they must be done before the product reaches the customer's hands.	Troubled and uneasy to pay the labours with large sum. This can tend to great loss and customer dissatisfaction to the products after delivery.

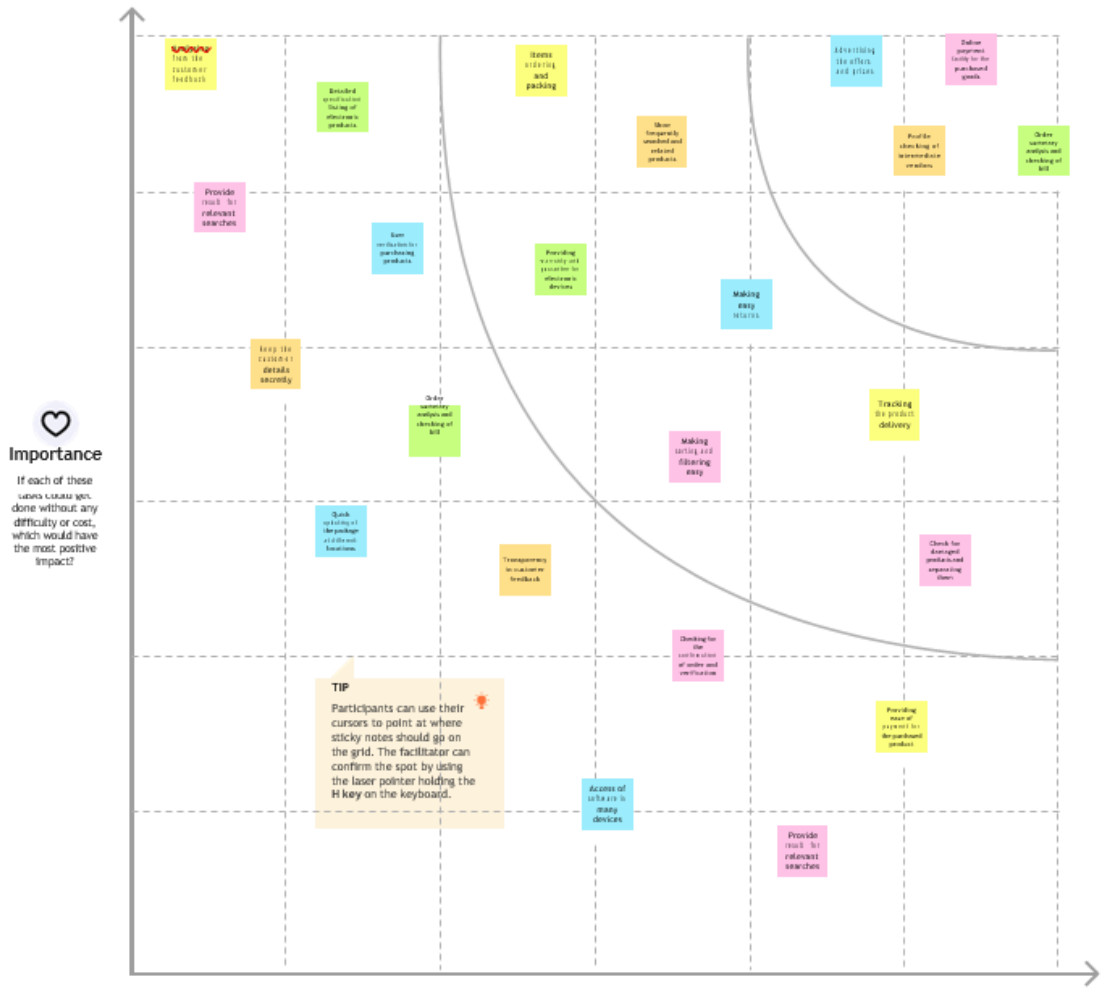
3. IDEATION AND PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 IDEATION AND BRAINSTORMING





Importance

If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

Feasibility

Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

3.3 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To properly manage the inventory and run their business, the retailer needs a technique to effectively analyse conditions, avoid out-of-stock problems, avoid overstocking, and keep customers coming back.
2.	Idea / Solution description	Economic order quantity, which is the maximum amount of goods that may be ordered affordably at one time. • ABC analysis means greater management is always possible; the inventory is divided into three groups based on its value and the importance of its cost. • VED analysis: Items are categorised based on how crucial they are to the provision of production services. Without these essential components, the production process would halt, hence the letter V. E stands for an essential item, the absence of which would negatively impact the production system's efficiency. Desirable items are those that are needed but do not immediately result in a loss of production, denoted by the letter D. • Just In Time: Having the appropriate number and quality of goods in the appropriate location at the appropriate time. • Stock keeping unit: Each item in the shop has a special code. This aids with the product's identification and tracking. • Stock Review: check your inventory; • First in, first out method; • Identify low-turn stock.
3.	Novelty / Uniqueness	• Smooth integrations with CRM • Increased Sales. • Management of online and offline orders. • Enhanced client satisfaction thanks to end-to-end tracking.
		• Greater flexibility and scalability because to the abundance of add-ons that are accessible. • Plain and reasonable pricing.
4.	Social Impact / Customer Satisfaction	By offering both small and large stores service.
5.	Business Model (Revenue Model)	Inventory management aids businesses in determining which merchandise to order when and in what quantities. Inventory is tracked from product acquisition to sale. To guarantee there is always adequate inventory to fulfil client orders and proper warning of a shortfall, the technique recognises trends and reacts to them.
6.	Scalability of the Solution	The profitability of the business increases, as does its effectiveness.

3.4 PROBLEM SOLUTION FIT

4. REQUIREMENT ANALYSIS

4.1 Functional Requirements

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through Username and Password
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Login	Log in to the programme using your Gmail account, username, and password for authentication.
FR-4	Dashboard	See the product details and updation.
FR-5	Ordering	Place necessary items in a cart before placing an order.
FR-6	Restocking	Ordering additional goods when supplies are low.

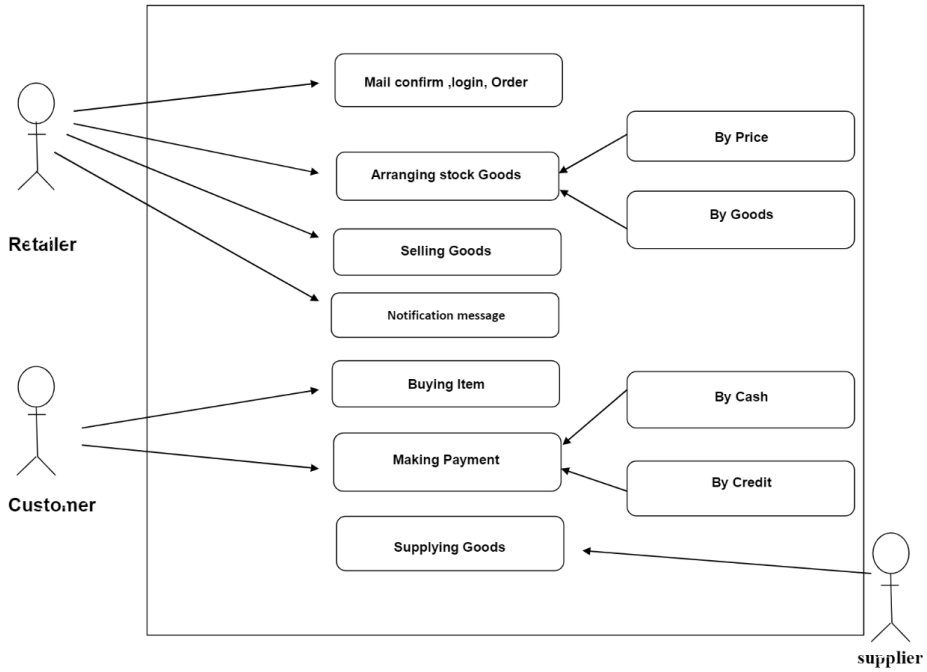
4.2 Non-Functional Requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Creating a learning curve for the website during design and development. This software helps speed up your in-store inventory process cycles. Attractive looking web-page. Make sure that it will reduce error because human intervention is less in this system.
NFR-2	**Security**	The security should be strong by protecting the firewalls by using separate user account and credentials Log in system is used to prove authentication and authorization.

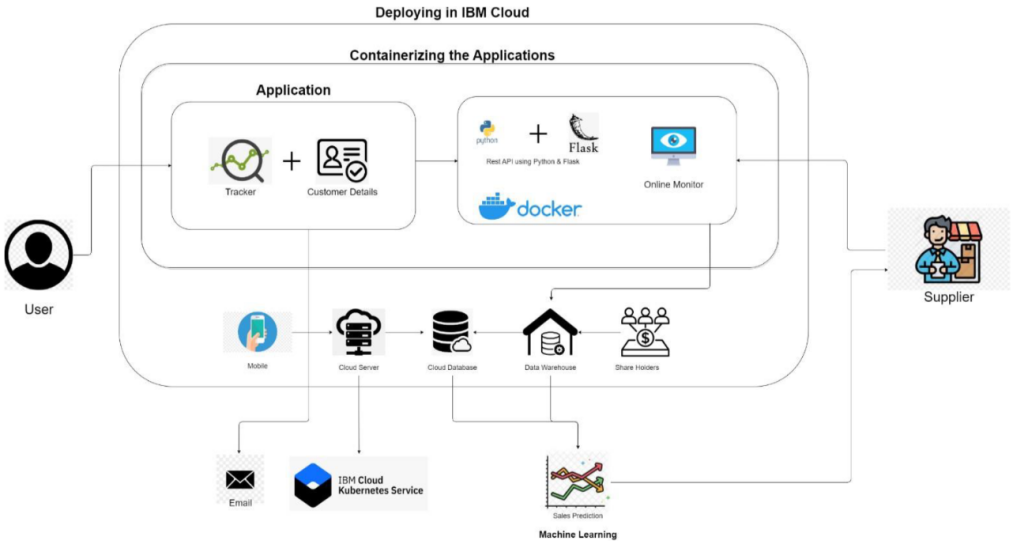
NFR-3	**Reliability**	No more missing components of finished products at the main site or assembly place.so customer will easy to find the new products.Should have more efficient ordering practices.
NFR-4	**Performance**	By seeing the updated stocks and finished product in the dashboard it reduces the time to searching in the full products. It reduces the time for restocking period and predicts the best selling products. This makes the business more productive and profitable by having an organized managementsystem.
NFR-5	**Availability**	By supplying more goods and new products will enthusiastic the customer to buy more products and showing the offers of the product will make more eager to buy the products easily.
NFR-6	**Scalability**	Availability of the new features can be introduced easily by the notification message easily and leads to long period. Reusing the code can be done to add any new features. IBM Container in Docker registry is used which ishighly scalable.

5. PROJECT DESIGN

5.1 Data flow diagrams



5.2 Solution & Technical Architecture



5.3 User Stories

User Type	Functional Requirement(Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Retailer (Web user,	Registration	USN-1	As a user, I can register for the application by entering my email, password and confirming my password.	I can access my account / dashboard	High	Sprint-1
	Confirmation	USN-2	As a user, I can receive my confirmation email once I have registered for the application	I can get confirmation through email for my account and get authenticated to the required account.	Medium	Sprint-1
	Login	USN-4	As a user, I can log in to the authorized account by entering the registered email and password	I can login with registered email and password.for authentication.	High	Sprint-1
	Dashboard	USN-5	As a user, I can view the products that are available currently.	Inventory can be viewed once logged in.	High	Sprint-2
	Arranging Stock Goods	USN-6	As a user, I can add products which are not available in the inventory and restock the Goods..	When the Goods are not available retailers can restock and update their inventory.	Medium	Sprint-2
	Notification message	USN-7	As a user ,I can Notify the new products,and offers details as a notification message to the user.	I get the notification message.	Low	Sprint-3
Customer	Request for customer care	USN-8	As a user, I can clarify the doubts and problem and needs they want.	Users can contact customer to get help and services.	Medium	Sprint-4

6. PROJECT PLANNING AND SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	4	High	Srivani C, Sumitha H, Suvetha S, Sweda darshini A, Tharunika B M
Sprint-1	User details verification	USN-2	As a user, I can verify the details that I had entered and check whether they are properly stored.	3	High	Srivani C, Sumitha H, Suvetha S, Sweda darshini A, Tharunika B M
Sprint-1	Login	USN-3	As a user, I am able to login with the registered credentials.	4	Medium	Srivani C, Sumitha H, Suvetha S, Sweda darshini A, Tharunika B M
Sprint-2	Dashboard	USN-4	As a user, I can view my account information, order history, address, Bank and payment details.	3	Medium	Srivani C, Sumitha H, Suvetha S, Sweda darshini A, Tharunika B M
Sprint-2	New releases and offers	USN-5	As a user, I can view the newly launched products in the market and the offers applied on them for the orders.	3	High	Srivani C, Sumitha H, Suvetha S, Sweda darshini A, Tharunika B M

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Stock verification and sales updating	USN-6	As a user, I can check for the available products under the searches and filters, and can verify with its specifications and sales of the product	4	Medium	Srivani C, Sumitha H, Suvetha S, Sweda darshini A, Tharunika B M
Sprint-3	Order booking & checking	USN-7	As a user, I am able to book an order to purchase the products of my choice, pay money through online and can track the product till its delivery.	4	High	Srivani C, Sumitha H, Suvetha S, Sweda darshini A, Tharunika B M
Sprint-4	Customer feedback	USN-8	As a user, I can enter the feedback for the service provided.	3	Medium	Srivani C, Sumitha H, Suvetha S, Sweda darshini A, Tharunika B M
Sprint-4	Customer care services	USN-9	As a user, I can access the customer care services and address the issues that I face.	4	High	Srivani C, Sumitha H, Suvetha S, Sweda darshini A, Tharunika B M

Project tracker:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	11	6 Days	24 Oct 2022	29 Oct 2022	11	29 Oct 2022
Sprint-2	6	6 Days	31 Oct 2022	05 Nov 2022	6	05 Nov 2022
Sprint-3	8	6 Days	07 Nov 2022	12 Nov 2022	8	12 Nov 2022
Sprint-4	7	6 Days	14 Nov 2022	19 Nov 2022	7	19 Nov 2022

Velocity Estimation:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day).

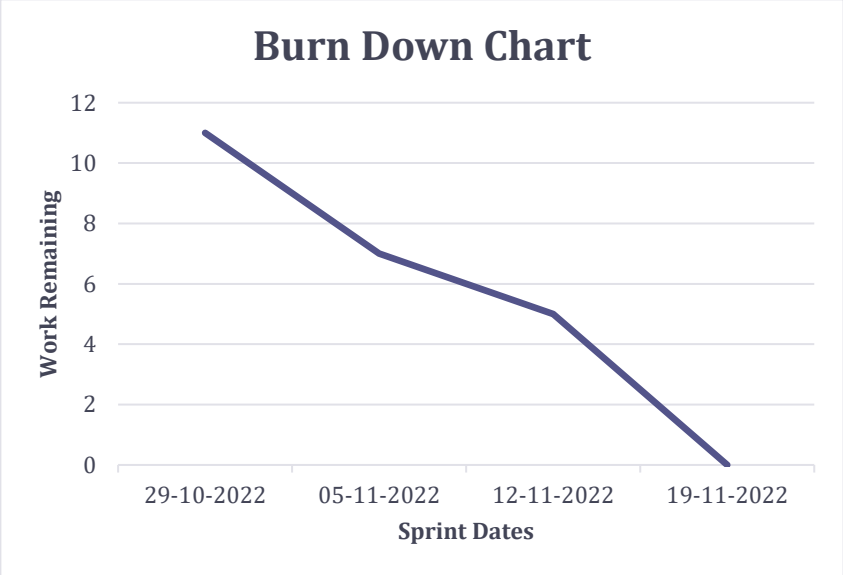
$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

Our velocity should be: AV = (11+6+8+7)/ 24

= 32/24 = 1.33

Burndown Chart

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum.



6.2 Sprint Delivery Schedule

TITLE	DESCRIPTION	DATE
Literature Survey & Information Gathering	Literature survey on the most relevant 5 papers have been made and the information gathered have been submitted.	19 SEPTEMBER 2022
Prepare Empathy Map	Prepare an empathy map canvas to capture the user's pains & gains and almost 4 WH questions have been answered and prepare the list of problem statements.	20 SEPTEMBER 2022
Ideation	To list by organizing brainstorming sessions And prioritize the top three ideas based on feasibility and importance.	21 SEPTEMBER 2022
Proposed Solution	To prepare the proposed solution documents, which includes the novelty, feasibility of ideas, business model, social impact, scalability of the solution, etc.	24 SEPTEMBER 2022

Problem Solution Fit	Preparing the problem-solution fit document.	25 SEPTEMBER 2022
Solution Architecture	To prepare the solution architecture document	30 SEPTEMBER 2022
Customer Journey	Preparing the customer's journey map helps the customers understand the user interaction and experiences with the application from the beginning to the end	11 OCTOBER 2022
Functional Requirement	Prepare the functional requirement document.	15 OCTOBER 2022
Data Flow Diagrams	Draw the data flow diagrams and submit them for review.	18 OCTOBER 2022
Technology Architecture	Prepare a technical architecture diagram.	20 OCTOBER 2022
Prepare Milestone & Activity List	Prepare the milestones and activities of the project.	02 NOVEMBER 2022
Project Development – Delivery of Sprint-1,2,3,4	Develop and submit the developed code by testing it and having no errors.	05 NOVEMBER 2022

7. CONCLUSION

The project is designed to achieve the expected efficiency and customer satisfaction. It is successfully implemented with the help of Flask, Docker, SendGrid, and IBM Watson. The issues in the existing system like irrelevant searches and filters, slow response of the web page, uneasy payment, late tracking of the delivery is overcome by the proposed project. It implements comfortable view of products and offers, new launches, checking the availability of products, items ordering and packing, tracking the product, online payment, providing EMI facilities, making easy returns, and customer feedback.

8. APPENDIX

GitHub Repo link:

https://github.com/IBM-EPBL/IBM-Project-20198-1659714605