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TITLE:

INVENTORY MANAGEMENT SYSTEM FOR RETAILERS

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INVENTORY MANAGEMENT SYSTEM FOR RETAILERS

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 with which to run their businesses.

1.2 Purpose

The 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.

Plus, 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. effective retail inventory management results in lower costs and a better understanding of sales patterns.

2. LITERATURE SURVEY

2.1 Existing problem

Inventory management is an essential process in many different businesses ranging from retail sales to manufacturing industries. Good inventory management is crucial to the success of these businesses. Better inventory management improves cash flows and reduces expenses. Some inventory management problems are common across industries.

Visibility problems

When your inventory becomes hard to find, you have inventory visibility problems. Lack of visibility is one of the most common inventory management problems. Locating the correct item in the right place as quickly as possible is essential to inventory. If the hard to find inventory is part of the supply chain for manufacturing, it can impact the operations of the entire manufacturing process. If the inventory stock is being accessed for shipping and cannot be located, it leads to incomplete or wrong shipments and severely impacts customer satisfaction. Either way inventory visibility problems have a severe impact on the performance of the business and is one of the symptoms of poor inventory management.

Lack of real-time reporting

Inventory reports are essential to making decisions. An inventory department cannot summarize and report based on real-time inventory data when using a manual system. Reports on historical trends are also challenging to prepare quickly. When management cannot visualize inventory stock or trends, making informed decisions on purchase and inventory becomes tough. This directly affects the bottom line of the company.

Overstocking

Money that is spent on inventory gets locked in if the items are not used. Overstocking can impact the profitability of a business. This is because more stock is bought than being sold. Management of inventory to stock the correct quantity of items is essential to a company's financial well-being. Overstocking also results

in the buildup of obsolete stock. This is the material that has been bought or stocked in excess and is no longer in demand. In a manual system, this stock may be abandoned or forgotten. When it is in demand again, the company may buy more of it instead of using what is already stocked.

Understocking

Being understocked is also one of the inventory management problems. In manual systems, the flagging of materials that need to be reordered is dependent on the vigilance of the people managing inventory. When there is a slip-up, the company may find itself understocked to meet demand. In a supply chain, inventory management feeds the entire production process. Understocking can slow down production or even bring it to a halt. Not utilizing the available warehouse space is also money wasted. Improper inventory management does not make the best use of all the available warehousing space that the company is paying for or bearing overheads on.

Lack of centralization

Centralisation is not a problem in smaller businesses, with all their inventory stored in one location. As companies grow, they expand their inventory to different locations. Manual maintenance of inventory records makes it very difficult to communicate and access inventory data across locations. Manual reports and lists do not show the real-time stocks of inventory. Disconnected data is often a cause of delayed or incorrect shipping. It is also impossible for management to get an accurate real-time report on all their inventory across locations.

Accuracy in recording and tracking inventories

Management of stock through inventory management software reduces human error and provides accurate and up to date data. A computerized inventory management system ,lets you know exactly where your inventory items are. Inventory data is updated and accurate in real-time.

Easy to manage and track inventories

When you use an inventory management system, you have a better handle and control over the stock levels. You can easily track items that are being unnecessarily stockpiled. Even if you have obsolete inventory, it is tracked by the system to avoid buying more of what you already have.

Get to know the fast-moving and high profitable inventories

When you can visualize and study the inventory movement and profit margins, it helps you identify fast moving items as well as items that fetch you a better profit margin.

No worries of understocking and overstocking Of inventories

Inventory management shows you the items that are falling below the set reorder level. You can promptly order the required materials so that you do not fall short.

Insights from reports help you in on-time business decisions

The easy access to reports that analyze inventory over time also empowers the company to better forecast trends and manage inventory accordingly. Decision making in the company becomes fact driven.

Help you get rid of the risk Of old And expired Stock

Goods that sit in inventory too long are a waste of money too! Efficient inventory management helps you attain that perfect balance of inventory to reduce costs and increase profits

2.2 References

- Inventory Management Challenges For B2C E-Commerce Retailers - Harish Patil 2014(March)
- Inventory Management System - Dhruvika Patel 2017(Jan-May)
- Inventory Management System - Anish Singh Maharjan 2016 (Jan)
- Research paper on Inventory management system - Punam Khobragade,Roshni Selokar 2018 (April)

- Inventory management for retail companies: A literature review and current trends - Cinthya Vanessa, Jorge Andres 2021(March)

2.3 Problem Statement Definition

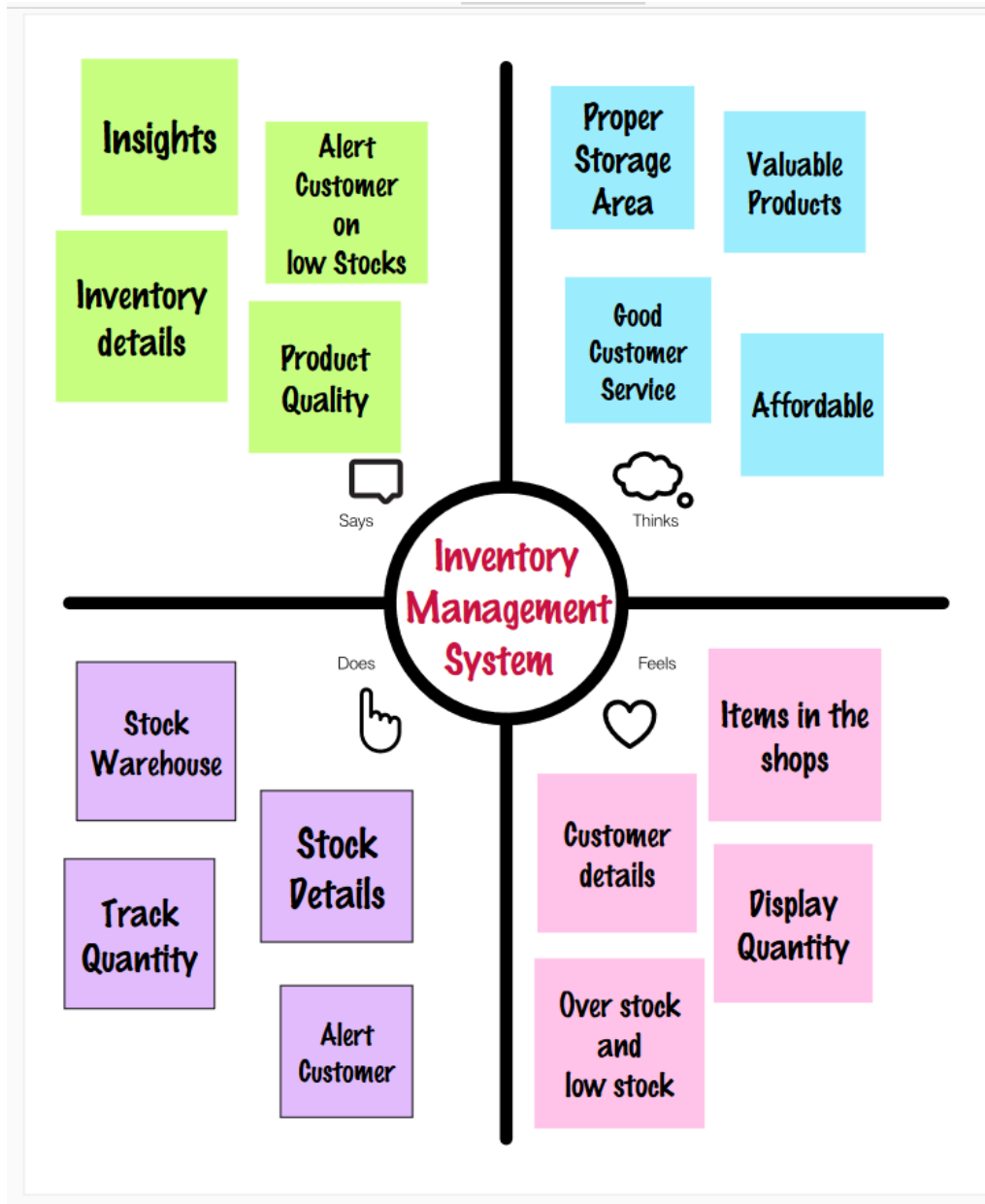
Retail inventory management is the process of ensuring you carry merchandise that shoppers want, with neither too little nor too much on hand. By managing inventory, retailers meet customer demand without running out of stock or carrying excess supply.

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

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming

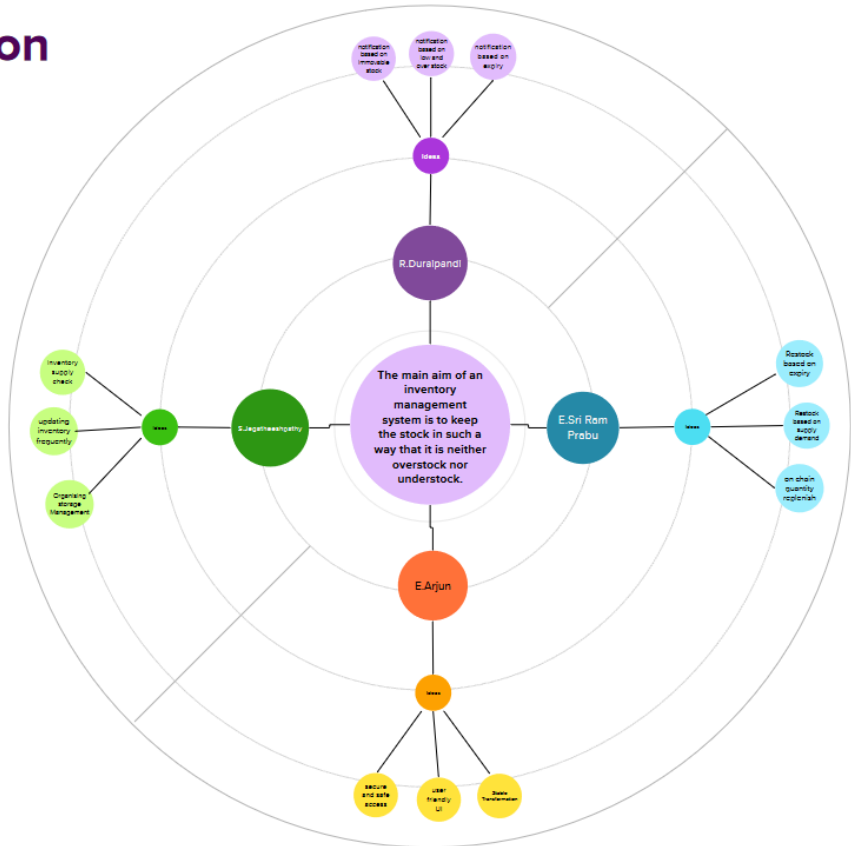
Brainstorming and Idea prioritization

Best Ideas

notification based on Immoveable stock

Restock based on expiry

Inventory supply check



3.3 Proposed Solution

Proposed Solution :

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	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.
2.	Idea / Solution description	<p>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.</p> <p>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.</p>
3.	Novelty / Uniqueness	The Notifications are sent to the customers on the low stock in the inventories.the further features will also be added.the informations on the expired products will also be notified to the customers before the expiry date.the stocks which are held on inventory without being sold will also be
4.	Social Impact / Customer Satisfaction	The customers will be able know about the expired products or the products which are not being sold.so,they can aware of the products they are holding in the inventory.
5.	Business Model (Revenue Model)	We can provide the application to the retail companies on some payment.

3.4 Problem Solution fit

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) Retail sellers who are all maintaining stocks in their inventory. CS	6. CUSTOMER CONSTRAINTS Spending power, Budget, No cash, Available devices CC	5. AVAILABLE SOLUTIONS Pre existing techniques are used to store the dates manually using hard copies. And there will be a chance to miss the dates. AS	Explore AS, differentiate
	2. JOBS-TO-BE-DONE / PROBLEMS Maintaining stocks and keeping track the quantities of the stocks are managed. JB	9. PROBLEM ROOT CAUSE The system used before cannot the maintain the stocks properly and notify about expiry. PR	7. BEHAVIOUR People are expecting to maintain and monitor the stocks frequently BE	

3. TRIGGERS Customers are triggered by the surroundings talking about this approach of storing and maintaining the inventory details is correct. TR	10. YOUR SOLUTION The system provided by us will maintain the stocks and store the details of the stocks frequently. SL	8. CHANNELS of BEHAVIOUR 8.1 ONLINE Customers can connect to the database and store the dates. 8.2 OFFLINE Customers can review the database. CH
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4. REQUIREMENT ANALYSIS

4.1 Functional requirement

FUNCTIONAL REQUIREMENTS:

The project was developed as a web application, the web site functional requirements were mentioned below:

Registration Page:

- User can register through the form.
- User must provide the his/her details to register.

Login Page:

- User can login into the system.
- If the credentials is valid, user can logged into the system.
- When user successfully logs on, the system displays the Main Screen. I

Main Page:

- Displays about the stock details when enter into this page.
- Alert users when the stocks are less through email.

- Update user profile.

Add Items:

- Add new stocks in this page by providing stocks information.
- Update stocks information.

Log out:

- Log out button provide users to log out from the system.
- After logged out, the login page displayed.

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Account Creation	Creation through Google Creation through Email Creation through LinkedIn Creation through Github
FR-2	User Confirmation	Confirmation via Email
FR-3	Successful Log in	Notification through Email
FR-4	Update inventory details	Notification through Email
FR-5	Add new stock	Notification through Email
FR-6	Unavailability of stock	Alert notification through Email

4.2 Non-Functional requirements

NON FUNCTIONAL REQUIREMENTS:

The Non Functional Requirements of the project mentioned below:

Usability:

We should provide our business analysis model to be supported in any devices like Laptop , Mobiles , PC's and also in computer . Hence it is more flexible to use.

Security:

The security requirements deal with the primary security. The software should be handled only by the administrator and authorized users. Only the administrator has right to create new accounts and generating inventory. Only authorized users can access the system with username and password of administration.

Availability:

The software will be available only to administrator of the organization and the product as well as customer details will be recorded by him. He can add customers, update and delete them as well as add new products and manage them.

Performance:

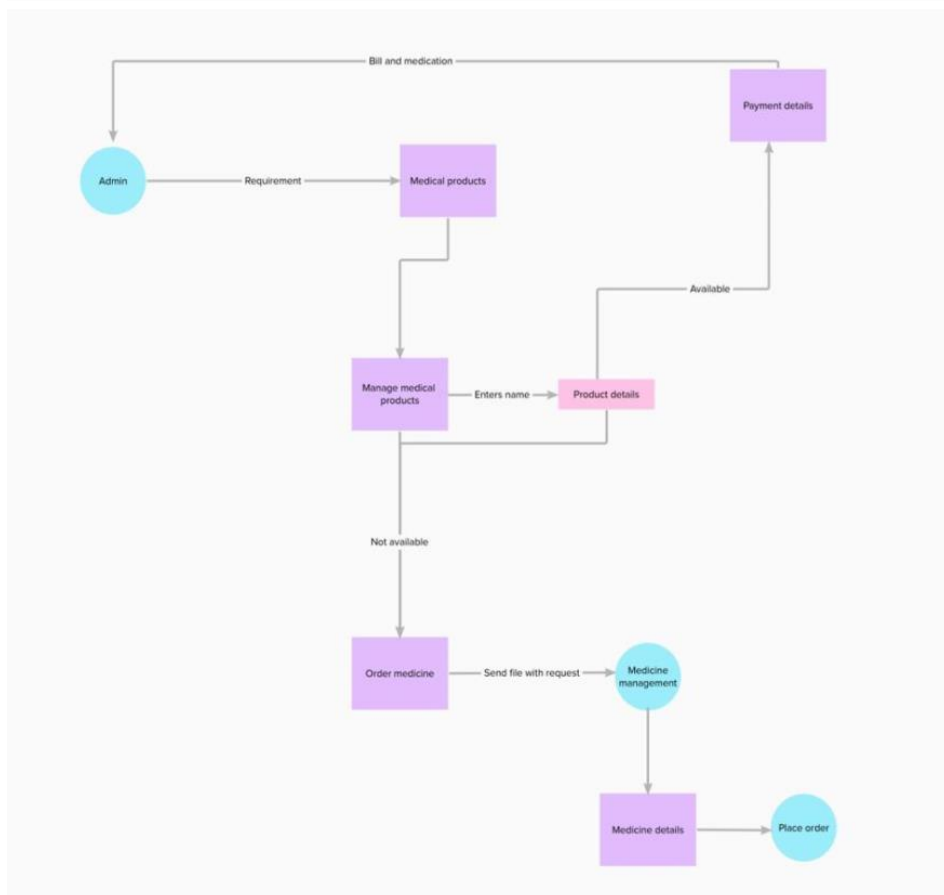
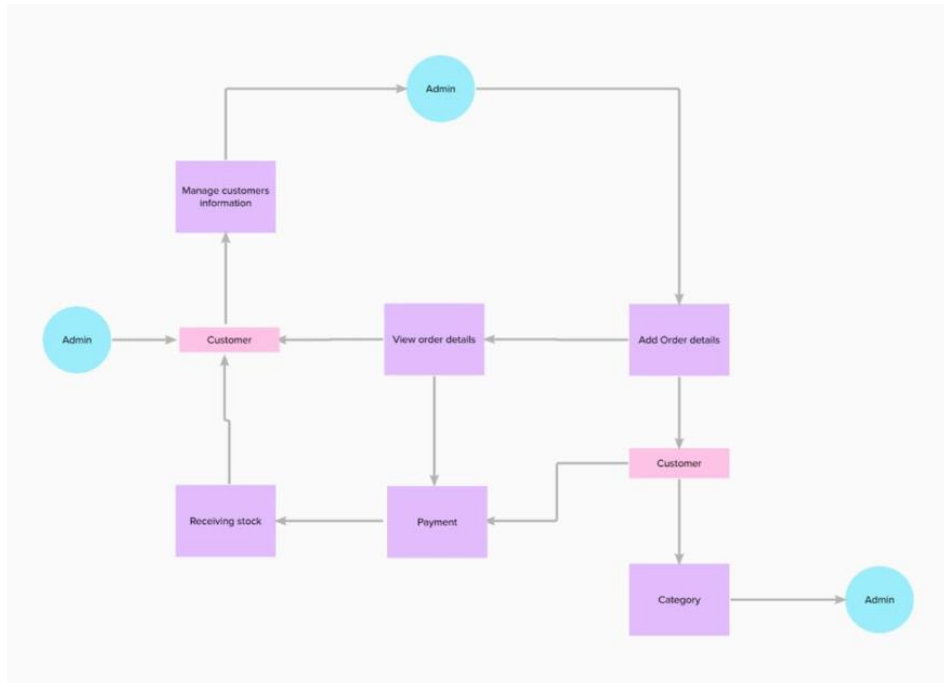
The system must be capable of handling multiple users at a time flexibly without causing any errors.

Reliability:

Stocks can be balanced exactly without having any fluctuations in terms of excess flow or under flow of stocks. We can ensure accurate inventory valuation.

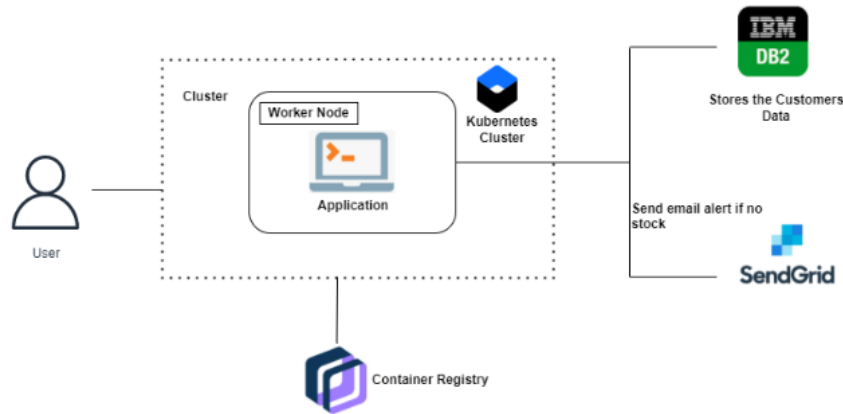
5. PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture

TECHNOLOGY ARCHITECTURE:



6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create product backlog and sprint schedule

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.	13	High	R.Duraipandi S.Jegadeshpathy E.Arjun S.Sri Ram Prabu
Sprint-1	Confirmation	USN-2	As a user, I will receive confirmation email once I have registered for the application	13	High	R.Duraipandi S.Jegadeshpathy E.Arjun S.Sri Ram Prabu
Sprint-2	Registration through Google account	USN-3	As a user, I can register for the application through Google account	8	Low	R.Duraipandi S.Jegadeshpathy E.Arjun S.Sri Ram Prabu
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	13	High	R.Duraipandi S.Jegadeshpathy E.Arjun S.Sri Ram Prabu
Sprint-2	Dashboard	USN-5	As a user, I can log in into the application and view the dashboard for Inventory information	8	Medium	R.Duraipandi S.Jegadeshpathy E.Arjun S.Sri Ram Prabu
Sprint-2	Notification	USN-6	As a user, I can get notifications after registering their Inventory	13	High	R.Duraipandi S.Jegadeshpathy E.Arjun S.Sri Ram Prabu

Sprint-3	Database	USN-7	Admin can access, view, modify, update alldetails of the Inventory	20	High	R.Duraipandi S.Jegadeshpathy E.Arjun S.Sri Ram Prabu
Sprint-4	Software testing and deployment	USN-8	As user want to access the application withoutany drawbacks, we need to test the software before release.	13	High	R.Duraipandi S.Jegadeshpathy E.Arjun S.Sri Ram Prabu

6.2 Sprint Delivery Schedule

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

Velocity:

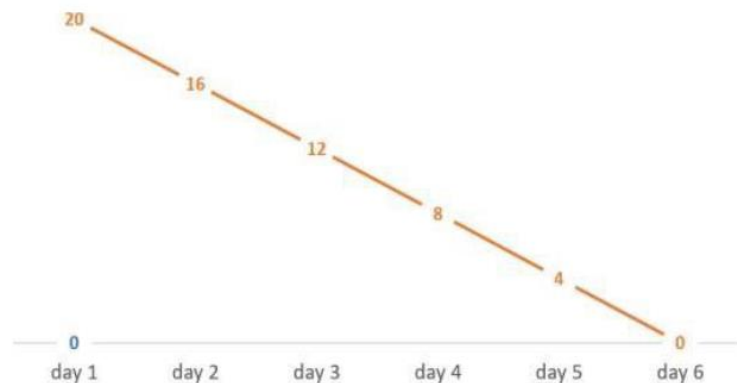
Sprint 1(AV) =3.34

Sprint 2(AV) =3.34

Sprint 3(AV) =3.34

Sprint 4(AV) =3.34

Burndown Chart:

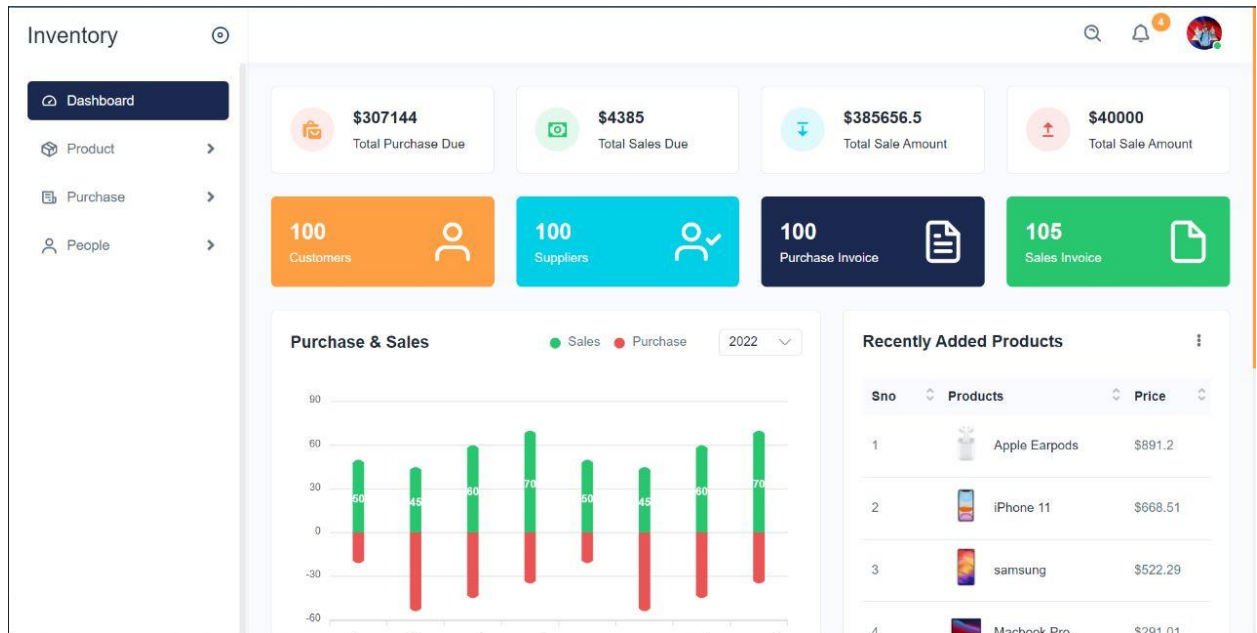


7. CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 Feature 1

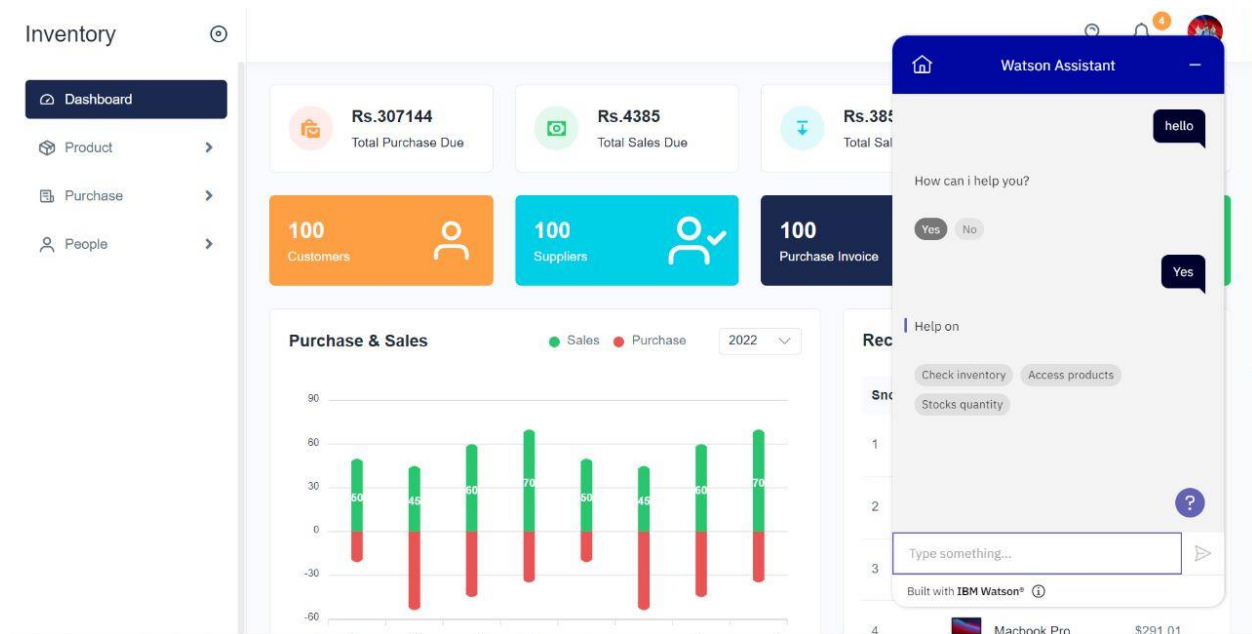
The custom user interface of the Inventory management software allows any person to have simple hassle free access to the user environment and make

changes to manipulate data like add products, category list at ease. It displays the effective status of the balance on how the financial and marketing sales report status is presented with customer backed sales reports along with the supply demand to meet end user requirements.



7.2 Feature 2

The software has an In-built “Chat Bot” which can help assist with ongoing queries and provide fast and effective solutions to user problems which may occur and also redirect to management attention if need be there any complications the customer service will be available 24*7 to assist in case of any controversial issues arise



8. TESTING

8.1 User Acceptance Testing

Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the Inventory Management System project at the time of the release to User Acceptance Testing (UAT).

Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	12	4	3	2	21
Duplicate	4	0	3	0	4
External	3	5	0	1	8
Fixed	12	2	4	21	39

Not Reproduced	0	0	1	0	1
Skipped	0	0	2	1	3
Won't Fix	0	4	1	2	7
Totals	22	12	14	21	69

Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pas s
Print Engine	8	0	0	8
Client Application	47	0	0	47
Security	3	0	0	3
Outsource Shipping	4	0	0	4
Exception Reporting	7	0	0	7
Final Report Output	5	0	0	5
Version Control	3	0	0	3

9. RESULTS

9.1 Performance Metrics

10.ADVANTAGES & DISADVANTAGES

Advantages of inventory management

1. **It helps to maintain the right amount of stocks:** contrary to the belief that is held by some people, inventory management does not seek to reduce the amount of inventory that you have in stock, however, it seeks to maintain an

equilibrium point where your inventory is working at a maximum efficiency and you do not have to have many stocks or too few stocks at hand at any particular point in time. The goal is to find that zone where you are never losing money in your inventory in either direction. With the aid of an efficient inventory management strategy, it is easy to improve the accuracy of inventory order.

2. **It leads to a more organized warehouse:** with the aid of a good inventory management system, you can easily organize your warehouse. If your warehouse is not organized, you will find it very difficult to manage your inventory. A lot of businesses choose to optimize their warehouse by putting the items that have the highest sales together in a place that is easy to access in the warehouse. This ultimately helps to speed up order fulfillment and keeps clients happy.
3. **It saves time and money:** an effective inventory management system can translate to time and money saved on the part of the business. By keeping track of the product that you already have at hand, you can save yourself the hassles of having to do an inventory recount in order to ensure your records are accurate. It also allows you to save cash that would have otherwise been spent on slow moving products.
4. **Improves efficiency and productivity:** inventory management devices like bar code scanners and inventory management software can help to greatly increase the efficiency and productivity of a business. They do this by eliminating the manual way of doing things thus allowing employees to do other more important things for the business.
5. **A well-structured inventory management system leads to improved customer retention:** for customers to keep patronizing you, you will need to always have the goods they want, at the amount they want, and at the time they want it. Inventory management helps you to meet up this demand by allowing you to have the right products all the times so that you and your customers are never stranded.
6. **Reduction in holding costs:** yet another benefit of an efficient management system is that it helps to save on inventory cost. These types of cost can be large and can be detrimental to a healthy profit margin. These types of costs are financing costs, warehouse rent, warehouse staff salaries, electricity bills, security et al. The key to keeping these costs in check is to have only the amount of inventory that you need at a particular time. With an inventory management program that assists you to make good forecasts, you can avoid

over stocking and thus over pay on holding costs. Furthermore, having confidence in your forecast will mean that you will not have to hold a lot of “safety stock”.

7. **Flexibility:** a good inventory management strategy will allow the manager to be flexible and adapt to situations as they arise. The business world is dynamic and often unpredictable, and the same can also be said for inventory management. There are a plethora of problems that could come up such as incorrect shipments, warehouse accidents, manufacturing issues, theft et al. It is usually not possible to foresee or predict with certainty when they could happen, but if they happen, the best case scenario will be for the manager to know at once so that he or she can rectify the issue.
8. **Increased information transparency:** a good inventory management helps to keep the flow of information transparent. This information includes when items were received, picked, packed, shipped, manufactured et al. You also get to know when you need to order more of any good, when you have too much stock or too little stock.

Disadvantages of inventory management

1. **Bureaucracy:** even though inventory management allows employees at every level of the company to read and manipulate company stock and product inventory, the infrastructure required to build such a system adds a layer of bureaucracy to the whole process and the business in general. In instances where inventory control is in-house, this includes the number of new hires that are not present to regulate the warehouse and facilitate transactions. In instances where the inventory management is in the hands of a third party, the cost is a subscription price and a dependence on another separate company to manage its infrastructure. No matter the choice you go for, it translates to a higher overhead cost and more layers of management between the owner and the customer. From the view point of the customer, a problem that requires senior management to handle will take a longer period of time before it will be trashed out.
2. **Impersonal touch:** another disadvantage of inventory management is a lack of personal touch. Large supply chain management systems make products more accessible across the globe and most provide customer service support

in case of difficulty, but the increase in infrastructure can often mean a decrease in the personal touch that helps a company to stand out above the rest. For instance, the sales manager of a small manufacturing company that sells plumbing supplies to local plumbers can throw in an extra box of washers or elbows at no charge to the customer without raising any alarms. This is done for the sake of customer relations and often makes the customer feel like he is special. While free materials can also be provided under inventory management, processing time and paper work make obtaining the material feel more like a chore for the customer or even an entitlement.

3. **Production problem:** even though inventory management can reveal to you the amount of stock you have at hand and the amount that you have sold off, it can also hide production problems that could lead to customer service disasters. Since the management places almost all of its focus on inventory management to the detriment of quality control, broken or incorrect items that would normally be discarded are shipped along with wholesome items.
4. **Increased space is need to hold the inventory:** in order to hold inventory, you will need to have space so unless the goods you deal in are really small in size, then you will need a warehouse to store it. In addition, you will also need to buy shelves and racks to store your goods, forklifts to move around the stock and of course staff. The optimum level of inventory for a business could still be a lot of goods and they will need space to be stored in and in some cases additional operational costs to manage the inventory. This will in turn increase cost and impact negatively on the amount of profit the business makes.
5. **Complexity:** some methods and strategies of inventory management can be relatively complex and difficult to understand on the part of the staff. This may result in the need for employees to undergo training in order to grasp how the system works.
6. Some inventory management systems such as the fixed order period system compels a periodic review of all items. This itself makes the system a bit inefficient.
7. **High implementation costs:** some inventory management systems can come at a high price because the business needs to install specialized systems and software in order to use them. This can be problematic for large businesses which operate in difficult locations. Even after installing the costly system, it still needs to be maintained and upgraded on a regular basis, thus incurring more costs.

8. Even with an efficient inventory management method, you can control but not eliminate business risk.

S.no	Advantages	Disadvantages
1	Cost saving	Expensive
2	Saves time	Complexity
3	Increased efficiency	Limited elimination of business risk
4	Warehouse organization	
5	Updated data	
6	Data security	
7	Insight into trends	
8	Uninterrupted Production	
9	Adequate Stocks	
10	Optimization of inventories	
11	Minimizes losses	
12	Economical	

11.CONCLUSION

The supply chain's inventory management system is a very complicated yet crucial component. Using an efficient inventory management system may save expenses associated with stock, including those associated with storage, carrying, and ordering.

12.FUTURE SCOPE

An inventory system can take care of a variety of requirements, such as valuing the stock, monitoring changes in the stock, and forecasting future stock levels. The balance sheet's financial reporting is based on the inventory value at the end of each period. The corporation can calculate the cost of goods sold during the time period by measuring the change in inventory. As a result, the business can prepare for future inventory requirements.

13.APPENDIX

[Source Code](#)

[GitHub & Project Demo Link](#)