INVENTORY MANAGEMENT SYSTEM FOR RETAILERS

REPORT

Team ID: PNT2022TMID12716

Team Members:
    Hemavarshini B – 19Z217 (Team Member – 1)
    Sanjai S – 19Z242 (Team Member – 2)
    Sruthi S – 20Z434 (Team Member – 3)
    Udhayakumaran H – 20Z435 (Team Leader)

College: PSG College of Technology

CONTENT

INTRODUCTION

Project Overview

Whether the stocked goods are company assets, raw materials and supplies, or finished goods that are ready to be sent to vendors or end users, an inventory management system is the combination of technology (hardware and software), processes, and procedures that oversees the monitoring and maintenance of stocked goods. An entire inventory management system includes a method for cataloguing each inventory item and the data it carries, such as asset tags or barcode labels. system for managing inventories,Hardware for reading barcode labels, such as mobile devices with barcode scanning apps or handheld barcode scanners,A central database and point of reference for all inventory is provided by inventory management software, which also has the ability to analyse data, provide reports, predict demand in the future, and do other things.

Purpose

The basic goal of inventory management is to make it simple and effective for organisations to order, stock, store, and use inventory. You'll always be aware of the things you have on hand, their quantity, and location if you manage your inventory well.Additionally, good inventory management practises help you comprehend how you use your stock and how demand varies over time. You may focus on what you really need, what is unnecessary, and what is just a waste of money. That is the use of inventory management to put inventory control into effect. Inventory control, incidentally, involves striking a balance between keeping enough inventory on hand to meet demand at all times and minimising the cost of acquiring and maintaining inventory.

LITERATURE SURVEY

Title - Year	Authors	Description	Merits
Algorithmic Approaches to Inventory Management Optimization - **2021**	Hector D Perez, Christian D Hubbs, Can Li, Ignacio E Grossmann	This paper takes two sales scenarios for an unfulfilled demand involving a single productand the modelling and optimizing of daily replenishment requests have been implemented by deterministic linear programming, multi-stage stochastic linear programming, and reinforcement learning methods.	The comparative study of the performance of the three methods on the basis of profit, service level, and inventory profiles indicate the advantages and suitability of each approach over the other.
A Novel Fuzzy MCDM Model for Inventory Management in order to increase businessefficiency - **2021**	Dragan Vukasović, Dejan Gligović, Svetlana Terzić, Željko Stević, Perica Macura	In the first model, Fuzzy full consistency Method (FUCOM) and the fuzzy Evaluation based on Distance from Average Solution (EDAS) methods have been integrated for sorting productsin the inventory based on unit price, procurement costs and demand. In the second model, FUCOM and ABC analysis have been integrated for sorting inventory considering significance of criteria.	. Thecomparison has shown that these 2 novel models perform better when compared to the traditional approaches driving business efficiency.

Inventory management for retail companies: A literature review and current trends-**2021**	Cinthya Vanessa Munoz Macas, Jorge Andres Espinoza Aguirre, Rodrigo Arcentales Carrion, Mario Pena	Retail companies have acquired significant importance within several countries due to theirhigh economic contribution. Therefore, the need to analyze their KPIs becomes highly significant, as well as their different systems, methodologies, and tools used within inventory management and optimization. Retail companies have acquired significant importance within several countries dueto their high economic contribution	Therefore, the need to analyze their KPIs becomes highly significant, as well as their different systems, methodologies, and tools used within inventory management and optimization.
Research paper on Inventory management system - **2018**	Punam Khobragade, Roshni Selokar, Rina Maraskolhe, Prof.Manjusha Talmale	Inventory Management System is software which is helpful for the businesses operate hardware stores, where storeowner keeps the records of sales and purchase. Generating backup data is a critical process in a project for our shopkeeper. This work can be categorized as time consuming job and need high accuracy when placing the proper materials with its quantity	Research strategy can be characterized as efficient and purposive examination of actualities with a goal deciding the powerful relationship among such certainties and research between at least two wonders from the broad writing study it is much clearer to contribute specifically for the effective consummation of the venture, are impacted by stock administration framework.

Existing problem

- **Centralized Tracking**: Take into account upgrading to tracking software with automated functionality for purchase and reordering. Platforms for inventory management offer centralised, cloud-based databases that enable precise, automatic inventory changes and continuous data backup.

- **Transparent Performance:** To address warehouse inefficiencies, track and publish warehouse performance measures like inventory turnover, customer satisfaction, and order processing time. Share this information with your team and vendors.

- **Stock auditing**: Regular stock auditing procedures, such as daily cycle counting, minimise human error and supply more precise, up-to-date inventory data for controlling cash flow. For more precise financial data, categorise audits and cycle count smaller inventory samples on a regular basis.

References

- https://www.mdpi.com/2227-9717/9/1/102
- https://journals.vilniustech.lt/index.php/TEDE/article/view/14427 (
- https://www.irjet.net/archives/V5/i4/IRJET-V5I448.pdfV
- https://www.researchgate.net/publication/352235223_Inventory_management_for_retail_companiesA_literature_review_and_current_trends#read
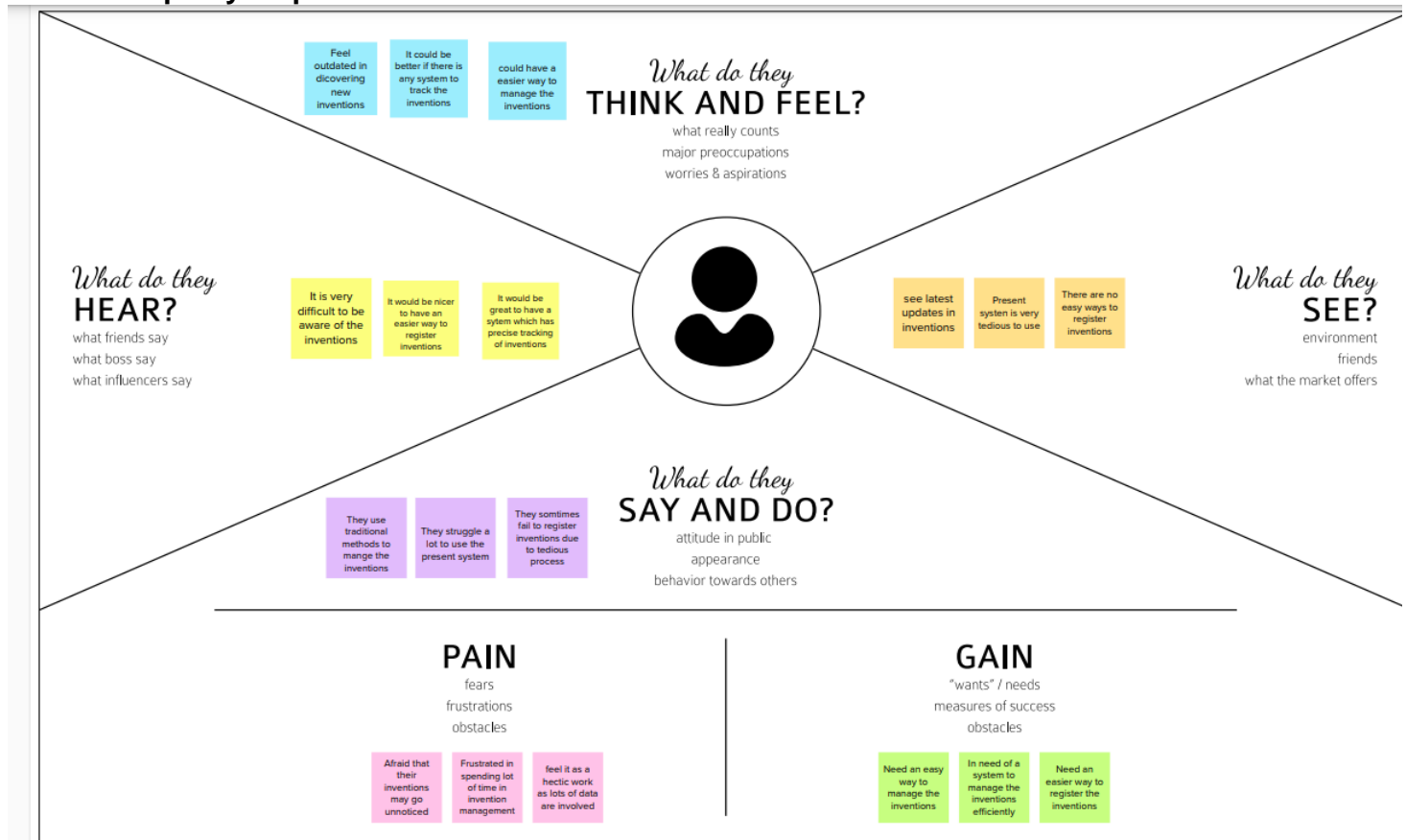- https://docs.oracle.com/cd/E26228_01/doc.93/e21560/ovrvw_inv_mgmt.htm#WEA IM108

Problem Statement Definition

The company's issue is that they don't have a structured system in place to track and maintain their inventory data. Because they only retain the inventory data in the logbook and are not properly organised, the admin finds it challenging to record the data promptly and safely.

IDEATION & PROPOSED SOLUTION

Empathy Map Canvas

What do they THINK AND FEEL?
what really counts
major preoccupations
worries & aspirations

- Feel outdated in dicovering new inventions
- It could be better if there is any system to track the inventions
- could have a easier way to manage the inventions

What do they HEAR?
what friends say
what boss say
what influencers say

- It is very difficult to be aware of the inventions
- It would be nicer to have an easier way to register inventions
- It would be great to have a sytem which has precise tracking of inventions

What do they SEE?
environment
friends
what the market offers

- see latest updates in inventions
- Present system is very tedious to use
- There are no easy ways to register inventions

What do they SAY AND DO?
attitude in public
appearance
behavior towards others

- They use traditional methods to mange the inventions
- They struggle a lot to use the present system
- They somtimes fail to register inventions due to tedious process

PAIN
fears
frustrations
obstacles

- Afraid that their inventions may go unnoticed
- Frustrated in spending lot of time in invention management
- feel it as a hectic work as lots of data are involved

GAIN
"wants" / needs
measures of success
obstacles

- Need an easy way to manage the inventions
- In need of a system to manage the inventions efficiently
- Need an easier way to register the inventions

Ideation & Brainstorming

Hemavarshini B

Track and update stock levels for each product	Analyze trends in fast moving goods by collecting data	Use an interactive dashboard to display data
The inventory must handle high traffic during festive times	Display the last update to inventory with time stamp	Concurrent access of the same product should be disabled

Sanjai S

The products should be delivered in a FIFO basis	The retrieval and updation must take least amount of time	The UI should be friendly enough for the sales team
Database Integrity has to be maintained through protocols	Inventory mustn't contain expired or stale goods	Review the inventory once a week to align it with business goals

Udhayakumaran H

Use JIT inventory management	Employ a safety stock Inventory	Automate Inventory management System
Get feedback from users to improve the performance	Use software to simplify stock	Using Batch tracking

Sruthi S

Forecast inventory accurately	Employ a conventional manufacturing startergy	Use material requirement planning
Employ the economic order quantity model	Integrate with mobile technology	Use a consignment inventory stratergy

Inventory Database

- Concurrent access of the same product should be disabled
- Database Integrity has to be maintained through protocols

Inventory Management Application

- Use an interactive dashboard to display data
- The UI should be friendly enough for the sales team
- Get feedback from users to improve the performance
- Integrate with mobile technology

Inventory Management Software

- Use JIT inventory management
- The inventory must handle high traffic during festive times
- The retrieval and updation must take least amount of time

Logistics

- Use material requirement planning
- Using Batch tracking

Analyzing Inventory

- Forecast inventory accurately
- Analyze trends in fast moving goods by collecting data

Stock Management

- Track and update stock levels for each product
- Use software to simplify stock

Optimization Techniques

- Use a consignment inventory stratergy
- Employ a conventional manufacturing startergy

Additional Features

- Display the last update to inventory with time stamp
- Automate Inventory management System

Stock Delivery

- The products should be delivered in a FIFO basis
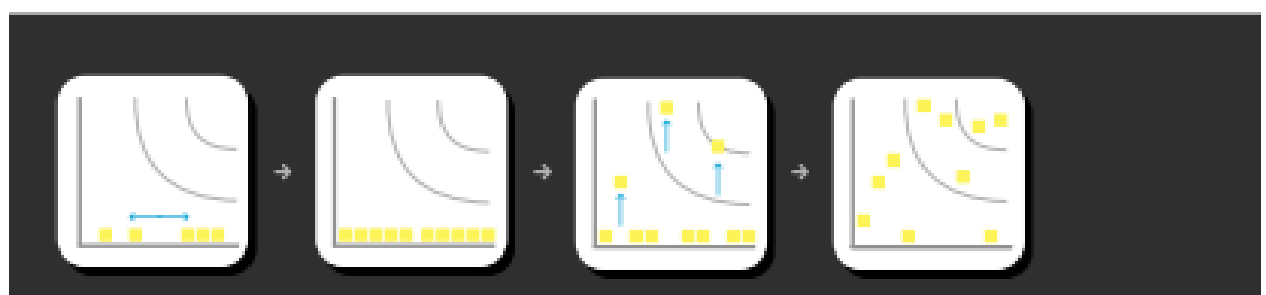
Quality Control

- Inventory mustn't contain expired or stale goods
- Employ a safety stock Inventory

Business Requirements

- Review the inventory once a week to align it with business goals
- Employ the economic order quantity model

Importance

It 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.)

Proposed Solution

Date	24 September 2022
Team ID	PNT2022TMID12716
Project Name	Inventory Management System for Retailers

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The retail companies are not facilitated with an organized system for tracking the orders of the customers. It is a very hectic process for the companies to keep track of the records and delivery correctly without any mismatch and to provide on time delivery. In order to meet the requirements of the customers with ease, an inventory management system should be built for handling stocks, orders and delivery efficiently.
2.	Idea / Solution description	In order to manage stocks, the customers can be provided with a mobile application through which the customers can place orders track the delivery and register their queries and feedback for which the customers must have created an individual account. Using this application the retailers will be able to efficiently handle the placed orders by updating new stocks, deleting the old ones, and keeping track of the number of stocks .There can be a facility to indicate the low number of stocks.
3.	Novelty / Uniqueness	An informative app whichgives all the details about different orders placed by the customer

Providing tracking facilities for retailers which will help them keep a check about the precise delivery of the orders in the right place at promised time.

Providing an indication when the number of stocks are low which will avoid the situation of running out of stock. |

4.	Social Impact / Customer Satisfaction	From the view point of the corporate there must be a positive impact on the society which would also increase the revenue of the company. This must bring in social transformations with fair business practices which will make the lives of the people easier as they will have easy access to the stocks.
		Customer satisfaction is an important evaluation criteria to know how the customers have liked a product or a service when compared to their expectation. Feedback must be got from the customers and services must be improved in specific areas of customers interest in a way that increases customer's repurchase.
5.	Business Model (Revenue Model)	We propose efficient inventory management system that is capable of reducing the effort and errors and which is also capable of increasing the profit and customer satisfaction by introducing strategical ideas and technical implementation. - Providing user friendly platforms for the user - Preparing and implementing stratergies for no or minimal loss - Using attractive advertisements which are closely related to the lifestyle of people. - Providing attractive discounts and users to the customers.
6.	Scalability of the Solution	- An application to monitor all the orders - Shrinkage or expansion of stock database as per requirement - Providing trustworthy support for the customer by allowing direct querying facility with the retailers

Problem Solution fit

INVENTORY MANAGEMENT SYSTEM FOR RETAILERS
Team ID : PNT2022TMID12716
Problem-Solution Fit

Define CS, fit into CL	**1. CUSTOMER SEGMENT(S)** `CS`	**6. CUSTOMER LIMITATIONS** EG. BUDGET, DEVICES `CL`	**5. AVAILABLE SOLUTIONS** PROS & CONS `AS`	Explore AS, differentiate
	• Retailers, manufacturers, distributors who are struggling to managing and maintaining inventory to optimize their warehouse and notify the unavailability of stocks	• Stock availability • Total number of orders placed • Delay in delivery • Network restrictions	• Maintain the record of the stocks • Forecast demand • Plan production and distribution	

Focus on PR, tap into BE, understand RC	**2. PROBLEMS / PAINS** + ITS FREQUENCY `PR`	**9. PROBLEM ROOT / CAUSE** `RC`	**7. BEHAVIOR** + ITS INTENSITY `BE`	Focus on PR, tap into BE, understand RC
	• Avoid overstocking • Selling expired stock • Poor demand forecasting • Management of the inventory	• Time consuming manual work prone to error • Improper import of a product • Poor UX & UI • Proper maintenance of inventory	• Enquire the retailers in the neighborhood • Provides better customer service through fast delivery and less shipping cost • Consumes more time for checking the stock of a product	

Identify strong TR & EM	**3. TRIGGERS TO ACT** `TR`	**10. YOUR SOLUTION** `SL`	**8. CHANNELS of BEHAVIOR** `CH`	Extract online & offline CH of BE
	• Difficulty in maintaining huge number of stocks[products]	• Creating an Inventory Management System for Retailers on a cloud based environments, where the stock details are stored in a online database platform. • Tracks the real-time inventory and alerts the retailers when a stock going to be unavailable through email or SMS	ONLINE • Since it is a cloud based inventory management system it is easy to access anywhere.	
	4. EMOTIONS BEFORE / AFTER `EM` • Before: difficult to keep tracks of stock availability • After: easy to maintain and know the stocks to be inadequate or adequate		OFFLINE • SMS notifications • Creating awareness among the retailers	

REQUIREMENT ANALYSIS

Functional requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Successful Log In	Sign into the application using the registered email ID and password
FR-4	Update inventory details	Notification through alert message and Email[if needed]
FR-5	Add new stock	Update the database through python/flask and notified through Email[if needed]
FR-6	Unavailability of stock	Alert notification through Email or SMS

Non-Functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	When the account is created in the application, all the details about the stock has to be filled. And when the stocks are no more left, the application will get to know this and does the process
NFR-2	**Security**	The software should be handled only by the administrator and authorized users. Only the administrator has the right to create new accounts and generating inventory.
NFR-3	**Reliability**	In the event of application failure due to software or hardware, the software should be able to connect to the database
NFR-4	**Performance**	The performance of the application must be capable of handling multiple users at a time flexibly without causing errors
NFR-5	**Availability**	The system is designed to monitor systems are designed to monitor product availability, determine purchasing schedules for better customer interaction

PROJECT DESIGN

Data Flow Diagrams
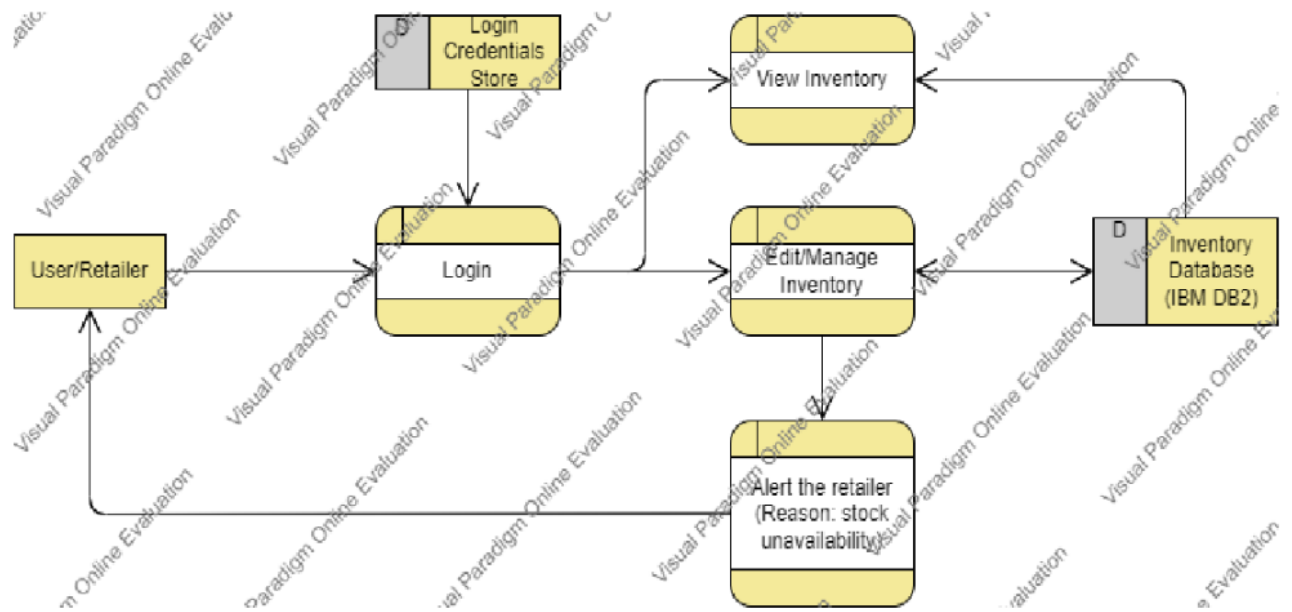
Solution & Technical Architecture
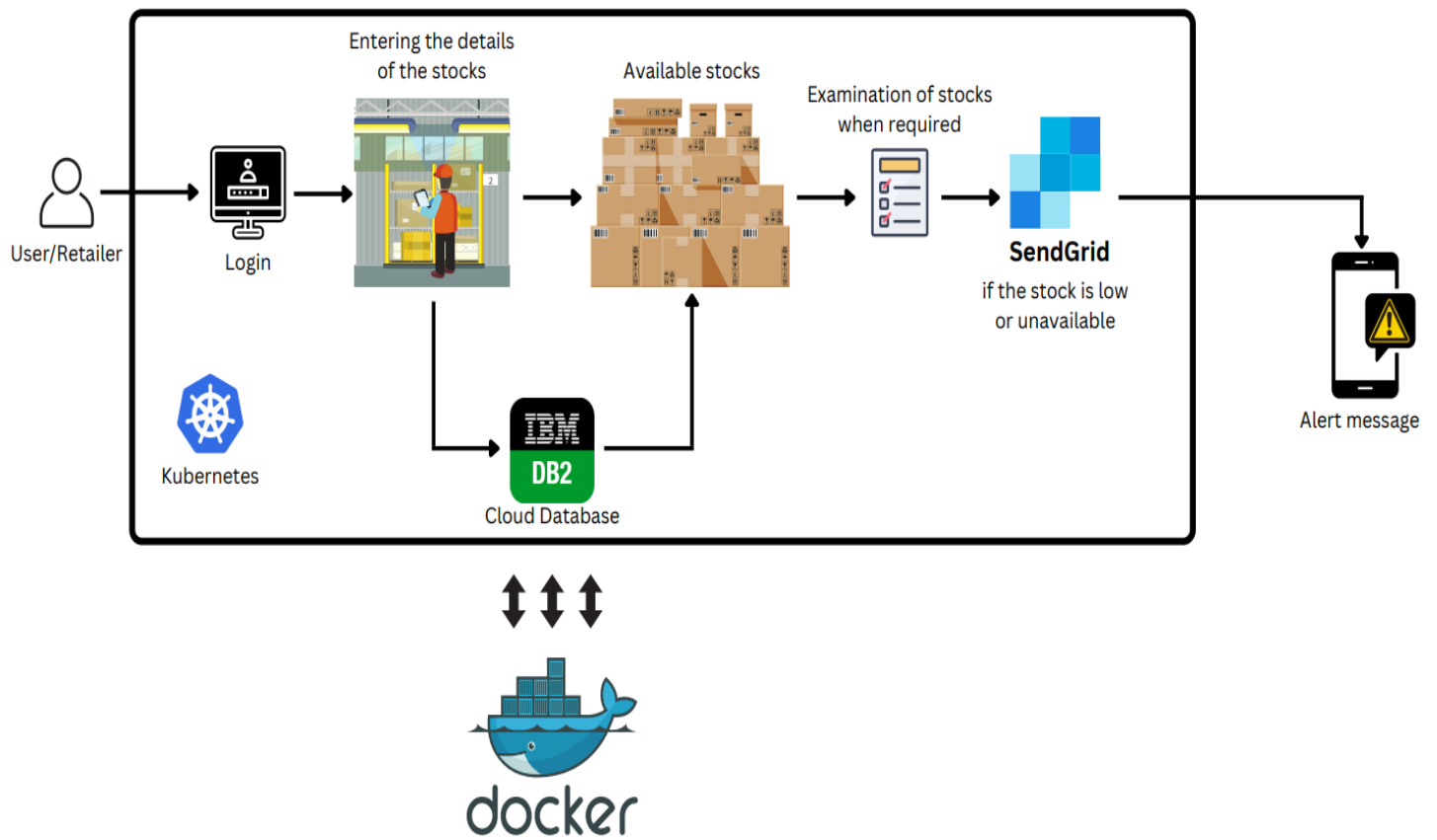
User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile 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
		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 Gmail		Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering email & password		High	Sprint-1
	Alert	USN-5	When the stock is going to be out of stock in the inventory, the retailer should be alerted with a mail or SMS	Mail or SMS to the retailer	Medium	Sprint-3
	View Inventory	USN-6	After logging in, the user should be able to view the inventory in his homepage	Inventory details displayed in the screen	Medium	Sprint-2
	Edit Inventory	USN-7	The user should be able to update or edit the inventory	Changes can be viewed in View Inventory	Medium	Sprint-2
	Logout	USN-8	As an user, I can logout of my application whenever needed, by clicking on logout button	Back to login page	High	Sprint-1

PROJECT PLANNING & SCHEDULING

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 forthe application by entering my username, password,and email.	20	High	Hemavarshini B Sanjai S Sruthi S Udhayakumaran H
Sprint-2	Login	USN-2	As a user, I can sign in theapplication by entering username & password	10	High	Hemavarshini B Sanjai S Sruthi S Udhayakumaran H
Sprint-3	Add and delete inventory	USN-3	As a user, I can enter thestocks to be added	20	High	Hemavarshini B Sanjai S Sruthi S Udhayakumaran H
Sprint-4	Update inventory	USN-4	As a user, I can update thestock information	10	High	Hemavarshini B Sanjai S Sruthi S Udhayakumaran H
Sprint-4	Alert email	USN-5	As a user, I'll receive indication when the stock is low.	10	Medium	Hemavarshini B Sanjai S Sruthi S Udhayakumaran H
Sprint-2	Logout	USN-6	User can log out	10	High	Hemavarshini B Sanjai S Sruthi S Udhayakumaran H

Sprint Delivery Schedule

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	6	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	4	5 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	9	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	4	19 Nov 2022

Reports from JIRA

✓ IMS Sprint 1 ✏ Add dates (6 issues)   0 ⓪ ⓪ **Start sprint** ⋯

🔲 IMS-1 import the packages   TO DO ∨ 👤

🔲 IMS-2 Create the setup environment   TO DO ∨ 👤

🔲 IMS-3 Design Login page   TO DO ∨ 👤

🔲 IMS-4 Design Home page   TO DO ∨ 👤

🔲 IMS-5 Design the dashboard   TO DO ∨ 👤

🔲 IMS-6 Logout option   TO DO ∨ 👤

✓ IMS Sprint 2 ✏ Add dates (3 issues)   0 ⓪ ⓪ Start sprint ⋯

🔲 IMS-7 creating the cloud account   TO DO ∨ 👤

🔲 IMS-8 create a database in the cloud   TO DO ∨ 👤

🔲 IMS-9 Implement Add inventory details function   TO DO ∨ 👤

+ Create issue

✓ IMS Sprint 3 ✏ Add dates (2 issues)   0 ⓪ ⓪ Start sprint ⋯

🔲 IMS-10 Update the inventory details option   TO DO ∨ 👤

🔲 IMS-11 Delete the inventory details option   TO DO ∨ 👤

+ Create issue

✓ IMS Sprint 3 ✏ Add dates (2 issues)   0 ⓪ ⓪ Start sprint ⋯

🔲 IMS-10 Update the inventory details option   TO DO ∨ 👤

🔲 IMS-11 Delete the inventory details option   TO DO ∨ 👤

+ Create issue

CODING & SOLUTIONING

DASHBOARD

```html
<nav class="navbar navbar-light bg-light p-3">
        <div class="d-flex col-12 col-md-3 col-lg-2 mb-2 mb-lg-0 flex-wrap flex-md-nowrap
justify-content-between">
            <a class="navbar-brand" href="#">
                Inventory Management System for Retailers
            </a>
            <button class="navbar-toggler d-md-none collapsed mb-3" type="button" data-
toggle="collapse" data-target="#sidebar" aria-controls="sidebar" aria-expanded="false" aria-
label="Toggle navigation">
                <span class="navbar-toggler-icon"></span>
            </button>
        </div>
        <div class="col-12 col-md-5 col-lg-8 d-flex align-items-center justify-content-md-end
mt-3 mt-md-0">

            <div class="dropdown">
                <button class="btn btn-secondary dropdown-toggle" type="button"
id="dropdownMenuButton" data-toggle="dropdown" aria-expanded="false">
                    Hello, {{user_name}}
                </button>
                <ul class="dropdown-menu" aria-labelledby="dropdownMenuButton">
                    <li><a class="dropdown-item" href="{{ url_for('logout') }}">Sign
out</a></li>
                </ul>
            </div>
        </div>
    </nav>
    <div class="container-fluid">
        <div class="row">
            <nav id="sidebar" class="col-md-3 col-lg-2 d-md-block bg-light sidebar collapse">
                <!-- sidebar content goes in here -->
                <div class="position-sticky pt-md-5">
                    <ul class="nav flex-column">
                        <li class="nav-item">
                            <a class="nav-link active" aria-current="page"
href="{{url_for('dashboard')}}">
                                <svg xmlns="http://www.w3.org/2000/svg" width="24" height="24"
viewBox="0 0 24 24" fill="none" stroke="currentColor" stroke-width="2" stroke-linecap="round"
stroke-linejoin="round" class="feather feather-home"><path d="M3 9l9-7 9 7v11a2 2 0 0 1-2
2H5a2 2 0 0 1-2-2z"></path><polyline points="9 22 9 12 15 12 15 22"></polyline></svg>
                                <span class="ml-2">Dashboard</span>
                            </a>
                        </li>
                        <li class="nav-item">
                            <a class="nav-link" href="{{url_for('add_items')}}">
                                <svg xmlns="http://www.w3.org/2000/svg" width="24" height="24"
fill="currentColor" class="bi bi-file-plus" viewBox="0 0 16 16">
```

```
                            <path d="M8.5 6a.5.5 0 0 0-1 0v1.5H6a.5.5 0 0 0 0
1h1.5V10a.5.5 0 0 0 1 0V8.5H10a.5.5 0 0 0 0-1H8.5V6z"/>
                            <path d="M2 2a2 2 0 0 1 2-2h8a2 2 0 0 1 2 2v12a2 2 0 0 1-2
2H4a2 2 0 0 1-2-2V2zm10-1H4a1 1 0 0 0-1 1v12a1 1 0 0 0 1h8a1 1 0 0 0 1-1V2a1 1 0 0 0-1-1z"/>
                          </svg>
                          <span class="ml-2">Add New Stock</span>
                        </a>
                      </li>
                      <li class="nav-item">
                        <a class="nav-link" href="{{url_for('view_inventory')}}">
                          <svg xmlns="http://www.w3.org/2000/svg" width="24" height="24"
viewBox="0 0 24 24" fill="none" stroke="currentColor" stroke-width="2" stroke-linecap="round"
stroke-linejoin="round" class="feather feather-shopping-cart"><circle cx="9" cy="21"
r="1"></circle><circle cx="20" cy="21" r="1"></circle><path d="M1 1h4l2.68 13.39a2 2 0 0 0 2
1.61h9.72a2 2 0 0 0 2-1.61L23 6H6"></path></svg>
                          <span class="ml-2">View Inventory</span>
                        </a>
                      </li>
                      <li class="nav-item">
                        <a class="nav-link" href="{{url_for('update_item')}}">
                          <svg xmlns="http://www.w3.org/2000/svg" width="24" height="24"
fill="currentColor" class="bi bi-arrow-up-circle" viewBox="0 0 16 16">
                            <path fill-rule="evenodd" d="M1 8a7 7 0 1 0 14 0A7 7 0 0 0 1
8zm15 0A8 8 0 1 1 0 8a8 8 0 0 1 16 0zm-7.5 3.5a.5.5 0 0 1-1 0V5.707L5.354 7.854a.5.5 0 1 1-
.708-.708l3-3a.5.5 0 0 1 .708 0l3 3a.5.5 0 0 1-.708.708L8.5 5.707V11.5z"/>
                          </svg>
                          <span class="ml-2">Update Item</span>
                        </a>
                      </li>
```

INDEX

```
<body>
    <br><br>
    <h1
      class="text-green text-center font-weight-bold"
      style="font-size: 40px;"
    >
    Inventory Management System for Retailers
    </h1>

    <br><br>
    <center>
    <div class="container" style="background-color: whitesmoke; border-radius: 10px; width:
500px; height: 310px;">
      <div class="col-lg-5 m-auto d-block" >
        <br><br><br><br>
        <div class="container text-center mb-5">
          <button class="btn btn-primary" onclick="location.href='/login_page'"><i
class="bi-door-open"></i> Login</button>
          <br>
          <hr>
```

```
            <button class="btn btn-info text-white"
onclick="location.href='/registration_page'"><i class="bi-person-plus"></i> Register</button>
        </div>

      </div>
    </div>
    <br><br>
    {{message}}
    </center>
  </body>
</html>
```

LOGIN

```
Inventory Management System for Retailers
    </h1>
    <br><br>
    <h4 class="text-blue text-center font-weight-bold" style="font-size: 20px;">
      LOGIN
    </h4>

    <div class="container">
      <br />

      <div class="col-lg-5 m-auto d-block" style="background-color: whitesmoke;border-radius:
15px;">
        <br>
        <form action="/validate" onsubmit="{{ url_for('validate') }}" class="bg-light"
method="post">
          <div class="form-group" style="background-color: whitesmoke;">
            <label for="user" class="font-weight-regular"> Username </label>
            <input
              type="text"
              name="user"
              class="form-control"
              id="user"
              autocomplete="off"
            />
            <span id="username_Alert" class="text-danger font-weight-regular">
              {{nme}} </span>
          </div>

          <div class="form-group" style="background-color: whitesmoke;">
            <label class="font-weight-regular"> Password </label>
            <input
              type="password"
              name="pass"
              class="form-control"
              id="pass"
              autocomplete="off"
            />
            <span id="password_Alert" class="text-danger font-weight-regular">
```

```
            {{pwd}}
          </span>
        </div>
        <input
          type="submit"
          name="submit"
          value="LOGIN"
          class="btn btn-success"
          autocomplete="off"
        />        Did not have an account?
        <a href="{{url_for('register')}}">SignUp</a>
      </form>
      <br>
      <span id="username_Alert" class="text-danger font-weight-regular">{{msg}} </span>
      <br>
    </div>
  </div>
```

REGISTRATION

```
Inventory Management System for Retailers
    </h1>

    <br>
    <h4 class="text-blue text-center font-weight-bold" style="font-size: 20px;">
      Sign Up
    </h4>

    <div class="container">
      <br />

      <div class="col-lg-5 m-auto d-block"  style="background-color: whitesmoke; border-
radius: 10px;">
        <form action="/registration_page" onsubmit="{{ url_for('register') }}" method="post"
class="bg-light">
          <div class="form-group"  style="background-color: whitesmoke;">
            <br>
            <label for="name" class="font-weight-regular"> Name </label>
            <input
              type="text"
              name="name"
              class="form-control"
              id="name"
              autocomplete="off"
              required
            />
            <span id="Name" class="text-danger font-weight-regular"> {{nme}} </span>
          </div>

          <div class="form-group"  style="background-color: whitesmoke;">
            <label class="font-weight-regular"> Email </label>
            <input
```

```
      type="text"
      name="email"
      class="form-control"
      id="email"
      autocomplete="off"
      required
    />
    <span id="emailids" class="text-danger font-weight-regular"> {{mail}} </span>
  </div>

  <div class="form-group" style="background-color: whitesmoke;">
    <label for="user" class="font-weight-regular"> Username </label>
    <input
      type="text"
      name="user"
      class="form-control"
      id="user"
      autocomplete="off"
      required
    />
    <span id="username" class="text-danger font-weight-regular"> {{usr}} </span>
  </div>

  <div class="form-group" style="background-color: whitesmoke;">
    <label class="font-weight-regular"> Password </label>
    <input
      type="password"
      name="pass"
      class="form-control"
      id="pass"
      autocomplete="off"
      required
    />
    <span id="passwords" class="text-danger font-weight-regular"> {{pwd}} </span>
  </div>

  <div class="form-group" style="background-color: whitesmoke;">
    <label class="font-weight-regular"> Confirm Password </label>
    <input
      type="password"
      name="conpass"
      class="form-control"
      id="conpass"
      autocomplete="off"
      required
    />
    <span id="confrmpass" class="text-danger font-weight-regular"> {{cpwd}} </span>
  </div>

  <div class="form-group" style="background-color: whitesmoke;">
    <label class="font-weight-regular"> Mobile Number </label>
    <input
```

```
                type="text"
                name="mobile"
                class="form-control"
                id="mobile"
                autocomplete="off"
              />
              <span id="mobileno" class="text-danger font-weight-regular"> {{mble}} </span>
          </div>

            <input
              type="submit"
              name="submit"
              value="Submit"
              class="btn btn-primary"
              autocomplete="off"
            />
            <input
              type="reset"
              name="reset"
              value="Reset"
              class="btn btn-secondary"
              autocomplete="off"
            />
               Already have an account?
            <a href="{{url_for('login')}}">Login</a>
          </form>
          <br>
      </div>
    </div>
    {{msg}}
    <br><br>
```

UPDATE ITEM

```
<body>
    <nav class="navbar navbar-light bg-light p-3">
        <div class="d-flex col-12 col-md-3 col-lg-2 mb-2 mb-lg-0 flex-wrap flex-md-nowrap
justify-content-between">
            <a class="navbar-brand" href="#">
                Inventory Management System for Retailers
            </a>
            <button class="navbar-toggler d-md-none collapsed mb-3" type="button" data-
toggle="collapse" data-target="#sidebar" aria-controls="sidebar" aria-expanded="false" aria-
label="Toggle navigation">
                <span class="navbar-toggler-icon"></span>
            </button>
        </div>
        <div class="col-12 col-md-5 col-lg-8 d-flex align-items-center justify-content-md-end
mt-3 mt-md-0">

            <div class="dropdown">
```

```html
                    <button class="btn btn-secondary dropdown-toggle" type="button"
id="dropdownMenuButton" data-toggle="dropdown" aria-expanded="false">
                        Hello, {{user_name}}
                    </button>
                    <ul class="dropdown-menu" aria-labelledby="dropdownMenuButton">
                        <li><a class="dropdown-item" href="{{ url_for('logout') }}">Sign
out</a></li>
                    </ul>
                </div>
            </div>
        </nav>
        <div class="container-fluid">
            <div class="row">
                <nav id="sidebar" class="col-md-3 col-lg-2 d-md-block bg-light sidebar collapse">
                    <!-- sidebar content goes in here -->
                    <div class="position-sticky pt-md-5">
                        <ul class="nav flex-column">
                            <li class="nav-item">
                                <a class="nav-link" aria-current="page"
href="{{url_for('dashboard')}}">
                                    <svg xmlns="http://www.w3.org/2000/svg" width="24" height="24"
viewBox="0 0 24 24" fill="none" stroke="currentColor" stroke-width="2" stroke-linecap="round"
stroke-linejoin="round" class="feather feather-home"><path d="M3 9l9-7 9 7v11a2 2 0 0 1-2
2H5a2 2 0 0 1-2-2z"></path><polyline points="9 22 9 12 15 12 15 22"></polyline></svg>
                                    <span class="ml-2">Dashboard</span>
                                </a>
                            </li>
                            <li class="nav-item">
                                <a class="nav-link" href="{{url_for('add_items')}}">
                                    <svg xmlns="http://www.w3.org/2000/svg" width="24" height="24"
fill="currentColor" class="bi bi-file-plus" viewBox="0 0 16 16">
                                        <path d="M8.5 6a.5.5 0 0 0-1 0v1.5H6a.5.5 0 0 0
1h1.5V10a.5.5 0 0 0 1 0V8.5H10a.5.5 0 0 0 0-1H8.5V6z"/>
                                        <path d="M2 2a2 2 0 0 1 2-2h8a2 2 0 0 1 2 2v12a2 2 0 0 1-2
2H4a2 2 0 0 1-2-2V2zm10-1H4a1 1 0 0 0-1 1v12a1 1 0 0 0 1h8a1 1 0 0 0 1-1V2a1 1 0 0 0-1-1z"/>
                                    </svg>
                                    <span class="ml-2">Add New Stock</span>
                                </a>
                            </li>
                            <li class="nav-item">
                                <a class="nav-link" href="{{url_for('view_inventory')}}">
                                    <svg xmlns="http://www.w3.org/2000/svg" width="24" height="24"
viewBox="0 0 24 24" fill="none" stroke="currentColor" stroke-width="2" stroke-linecap="round"
stroke-linejoin="round" class="feather feather-shopping-cart"><circle cx="9" cy="21"
r="1"></circle><circle cx="20" cy="21" r="1"></circle><path d="M1 1h4l2.68 13.39a2 2 0 0 0 2
1.61h9.72a2 2 0 0 0 2-1.61L23 6H6"></path></svg>
                                    <span class="ml-2">View Inventory</span>
                                </a>
                            </li>
                            <li class="nav-item">
                                <a class="nav-link active" href="{{url_for('update_item')}}">
```

```
                          <svg xmlns="http://www.w3.org/2000/svg" width="24" height="24"
fill="currentColor" class="bi bi-arrow-up-circle" viewBox="0 0 16 16">
                          <path fill-rule="evenodd" d="M1 8a7 7 0 1 0 14 0A7 7 0 0 0 1
8zm15 0A8 8 0 1 1 0 8a8 8 0 0 1 16 0zm-7.5 3.5a.5.5 0 0 1-1 0V5.707L5.354 7.854a.5.5 0 1 1-
.708-.708l3-3a.5.5 0 0 1 .708 0l3 3a.5.5 0 0 1-.708.708L8.5 5.707V11.5z"/>
                          </svg>
                          <span class="ml-2">Update Item</span>
                      </a>
                  </li>
```

VIEW INVENTORY

```
<body>
    <nav class="navbar navbar-light bg-light p-3">
        <div class="d-flex col-12 col-md-3 col-lg-2 mb-2 mb-lg-0 flex-wrap flex-md-nowrap
justify-content-between">
            <a class="navbar-brand" href="#">
                Inventory Management System for Retailers
            </a>
            <button class="navbar-toggler d-md-none collapsed mb-3" type="button" data-
toggle="collapse" data-target="#sidebar" aria-controls="sidebar" aria-expanded="false" aria-
label="Toggle navigation">
                <span class="navbar-toggler-icon"></span>
            </button>
        </div>
        <div class="col-12 col-md-5 col-lg-8 d-flex align-items-center justify-content-md-end
mt-3 mt-md-0">

            <div class="dropdown">
                <button class="btn btn-secondary dropdown-toggle" type="button"
id="dropdownMenuButton" data-toggle="dropdown" aria-expanded="false">
                    Hello, {{user_name}}
                </button>
                <ul class="dropdown-menu" aria-labelledby="dropdownMenuButton">
                    <li><a class="dropdown-item" href="{{ url_for('logout') }}">Sign
out</a></li>
                </ul>
            </div>
        </div>
    </nav>
    <div class="container-fluid">
        <div class="row">
            <nav id="sidebar" class="col-md-3 col-lg-2 d-md-block bg-light sidebar collapse">
                <!-- sidebar content goes in here -->
                <div class="position-sticky pt-md-5">
                    <ul class="nav flex-column">
                        <li class="nav-item">
                            <a class="nav-link" aria-current="page"
href="{{url_for('dashboard')}}">
                                <svg xmlns="http://www.w3.org/2000/svg" width="24" height="24"
viewBox="0 0 24 24" fill="none" stroke="currentColor" stroke-width="2" stroke-linecap="round"
```

```
stroke-linejoin="round" class="feather feather-home"><path d="M3 9l9-7 9 7v11a2 2 0 0 1-2
2H5a2 2 0 0 1-2-2z"></path><polyline points="9 22 9 12 15 12 15 22"></polyline></svg>
                                <span class="ml-2">Dashboard</span>
                              </a>
                            </li>
                            <li class="nav-item">
                              <a class="nav-link" href="{{url_for('add_items')}}">
                                <svg xmlns="http://www.w3.org/2000/svg" width="24" height="24"
fill="currentColor" class="bi bi-file-plus" viewBox="0 0 16 16">
                                  <path d="M8.5 6a.5.5 0 0 0-1 0v1.5H6a.5.5 0 0 0 0
1h1.5V10a.5.5 0 0 0 1 0V8.5H10a.5.5 0 0 0 0-1H8.5V6z"/>
                                  <path d="M2 2a2 2 0 0 1 2-2h8a2 2 0 0 1 2 2v12a2 2 0 0 1-2
2H4a2 2 0 0 1-2-2V2zm10-1H4a1 1 0 0 0-1 1v12a1 1 0 0 0 1h8a1 1 0 0 0 1-1V2a1 1 0 0 0-1-1z"/>
                                </svg>
                                <span class="ml-2">Add New Stock</span>
                              </a>
                            </li>
                            <li class="nav-item">
                              <a class="nav-link active" href="{{url_for('view_inventory')}}">
                                <svg xmlns="http://www.w3.org/2000/svg" width="24" height="24"
viewBox="0 0 24 24" fill="none" stroke="currentColor" stroke-width="2" stroke-linecap="round"
stroke-linejoin="round" class="feather feather-shopping-cart"><circle cx="9" cy="21"
r="1"></circle><circle cx="20" cy="21" r="1"></circle><path d="M1 1h4l2.68 13.39a2 2 0 0 0 2
1.61h9.72a2 2 0 0 0 2-1.61L23 6H6"></path></svg>
                                <span class="ml-2">View Inventory</span>
                              </a>
                            </li>
                            <li class="nav-item">
                              <a class="nav-link" href="{{url_for('update_item')}}">
                                <svg xmlns="http://www.w3.org/2000/svg" width="24" height="24"
fill="currentColor" class="bi bi-arrow-up-circle" viewBox="0 0 16 16">
                                  <path fill-rule="evenodd" d="M1 8a7 7 0 1 0 14 0A7 7 0 0 0 1
8zm15 0A8 8 0 1 1 0 8a8 8 0 0 1 16 0zm-7.5 3.5a.5.5 0 0 1-1 0V5.707L5.354 7.854a.5.5 0 1 1-
.708-.708l3-3a.5.5 0 0 1 .708 0l3 3a.5.5 0 0 1-.708.708L8.5 5.707V11.5z"/>
                                </svg>
                                <span class="ml-2">Update Item</span>
                              </a>
                            </li>
```

Database Schema (if Applicable)

Name	Data type	Nullable	Length	Scale
PID	VARCHAR	N	10	0
PNAME	VARCHAR	N	32	0
STOCK	INTEGER	N		0
DATE	VARCHAR	N	10	0

Name	Data type	Nullable	Length	Scale
NAME	VARCHAR	N	32	0
EMAIL	VARCHAR	N	32	0
USERNAME	VARCHAR	N	20	0
PASSWORD	VARCHAR	N	20	0
MOBILE	VARCHAR	Y	10	0

TESTING

Test Cases

Test case ID	Feature Type	Component	Test Scenario	Steps To Execute	Expected Result	Status
LoginPage_TC_O O1	Functional	Login Page	Verify user is able tosee the Login/Registration popup when user enters the site.	1.Enter URL and clickgo 2.Verify login/Singup popup displayed or not	Login/Sign up popup should display	Pass
LoginPage_TC_O O2	UI	Login Page	Verify the UI elementsin Login/Signup popup	1.Enter URL and clickgo 2.Verify login/Singup popup with below UI elements: a.name text box b.email text box c.password text boxd.Login button e.New customer? Registration link	Application should show below UI elements: a.email text box b.password text box c.Login buttonwith orange colour d.New customer? Create account link e.Last password? Recovery password link	Pass
LoginPage_TC_O O3	Functional	Login page	Verify user is able to log into application with Valid credentials	1.Enter URL and clickgo 2.Enter Valid username/emai l inEmail text box 3.Enter valid passwordin password text box 4.Click on login button	User should be able to navigate to user account homepage.	Pass
LoginPage_TC_O O4	Functional	Login page	Verify user is able to log into application with InValid credentials	1.Enter URL and clickgo 2.Enter InValid username/emai l inEmail text box 3.Enter valid passwordin	Application should show 'Incorrect email or password ' validation	Pass

				password text box 4.Click on login button	message.	
LoginPag e_TC_O O5	Functio nal	Logi n pag e	Verify user is able to log into application with InValid credentials	1.Enter URL and clickgo 2.Enter Valid username/emai l inEmail text box	Applicatio n should show 'Incorrect email or password '	Pass

User Acceptance Testing

Defect Analysis

Resolution	Severity1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	2	18
Fixed	6	2	2	2	12
Skipped	0	0	0	1	1
Won't Fix	0	0	0	1	1
Totals	16	6	4	6	32

Test Case Analysis

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	8	0	0	8
Client Application	17	0	0	17
Security	2	0	0	2
Exception Reporting	2	0	0	2
Final Report Output	5	0	0	5
Version Control	1	0	0	1

ADVANTAGES & DISADVANTAGES

Merits

- **Better Inventory Accuracy:** With solid inventory management, you know what's in stock and order only the amount of inventory you need to meet demand.
- **Reduced Risk of Overselling:** Inventory management helps track what's in stock and what's on backorder, so you don't oversell products.
- **Cost Savings:** Stock costs money until it sells. Carrying costs include storage handling and transportation fees, insurance and employee salaries. Inventory is also at risk of theft, loss from natural disasters or obsolescence.
- **Avoiding Stockouts and Excess Stock:** Better planning and management helps a business minimize the number of days, if any, that an item is out of stock *and* avoid carrying too much inventory.
- **Greater Insights:** With inventory tracking and stock control, you can also easily spot sales trends or track recalled products or expiry dates.
- **Better Terms With Vendors and Suppliers:** Inventory management also provides insights about which products sell and in what volume. Use that knowledge as leverage to negotiate better prices and terms with suppliers.
- **More Productivity:** Good inventory management solutions save time that could be spent on other activities.
- **Increased Profits:** A better understanding of both availability and demand leads to higher inventory turnover, which leads to greater profits.
- **A More Organized Warehouse:** An efficient warehouse with items organized based on demand, which items are often sold together and other factors reduces labor costs and speeds order fulfillment.
- **Better Customer Experience:** Customers that receive what they order on time are more loyal.

Demerits

- **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.
- **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.
- **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.

CONCLUSION

Inventory management is a complex job, especially for large businesses. And with the business growth, it becomes more challenging. Inventory automation is the essential technique to make the job easier. By utilizing inventory management software, such as eSwap, businesses can cut the heaviest part of stock management. Forecasting, counts, purchasing, tracking will become automated and synchronized in one place. As a result, businesses reduce human error and human resource waste. Inventory management is a very complex but essential part of the supply chain. An effective inventory management system helps to reduce stock-related costs such as warehousing, carrying, and ordering costs.

FUTURE SCOPE

- The Fourth Industrial Revolution will continue to drive technological change that will impact the way that we manage inventories.
- Successful companies will view inventory as a strategic asset, rather than an aggravating expense or an evil to be tolerated.
- Collaboration with supply chain partners, coupled with a holistic approach to supply chain management, will be key to effective inventory management.
- The nature of globalization will change, impacting inventory deployment decisions dramatically.
- Increased focus on supply chain security, and concerns about the quality of inventory itself, will be primary motivators to changing supply chain and inventory strategy.

APPENDIX

Source Code

https://github.com/IBM-EPBL/IBM-Project-13361-1659517109/tree/main/Project%20Development%20Phase/Sprint-4

GitHub Link

https://github.com/IBM-EPBL/IBM-Project-13361-165951710

WebApp Link

http://169.51.203.120:31015/