

PROJECT REPORT

DATE	18 NOV 2022
TEAM ID	PNT2022TMID04526
PROJECT NAME	Inventory Management 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.

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

1.2 Purpose

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.

2. LITERATURE SURVEY

2.1 Existing problem

The challenges faced by an inventory management system

Unclear Communication

Even in straightforward business processes, miscommunication can cause irreversible damage to efficiency. You can only imagine the far reaching impact it would have on a complex and multifarious process, like inventory management.

Inadequate Access

Generally, insufficient access to information would lead to miscommunication issues. Every department needs to have access to data that is crucial to their processes.

Hence, the impact of the lack of proper access is not limited to individual processes. But it also affects the complete retail inventory management.

Inefficient Warehouse Management

Warehouse management is a core component of brick-and-mortar retail inventories. Hence, ineffective warehouse management would affect the complete retail inventory process. A decentralized inventory management system would comprise the accuracy of the operations.

2.2 References

1) <https://stackoverflow.com/>

2) <https://www.ibm.com/>

3) <https://smartinternz.com/>

2.2 Problem Statement Definition

Inventory can be a company's most important asset. Inventory management is where all the elements of the supply chain converge. Too little inventory when and where it's needed can create unhappy customers. But a large inventory has its own liabilities

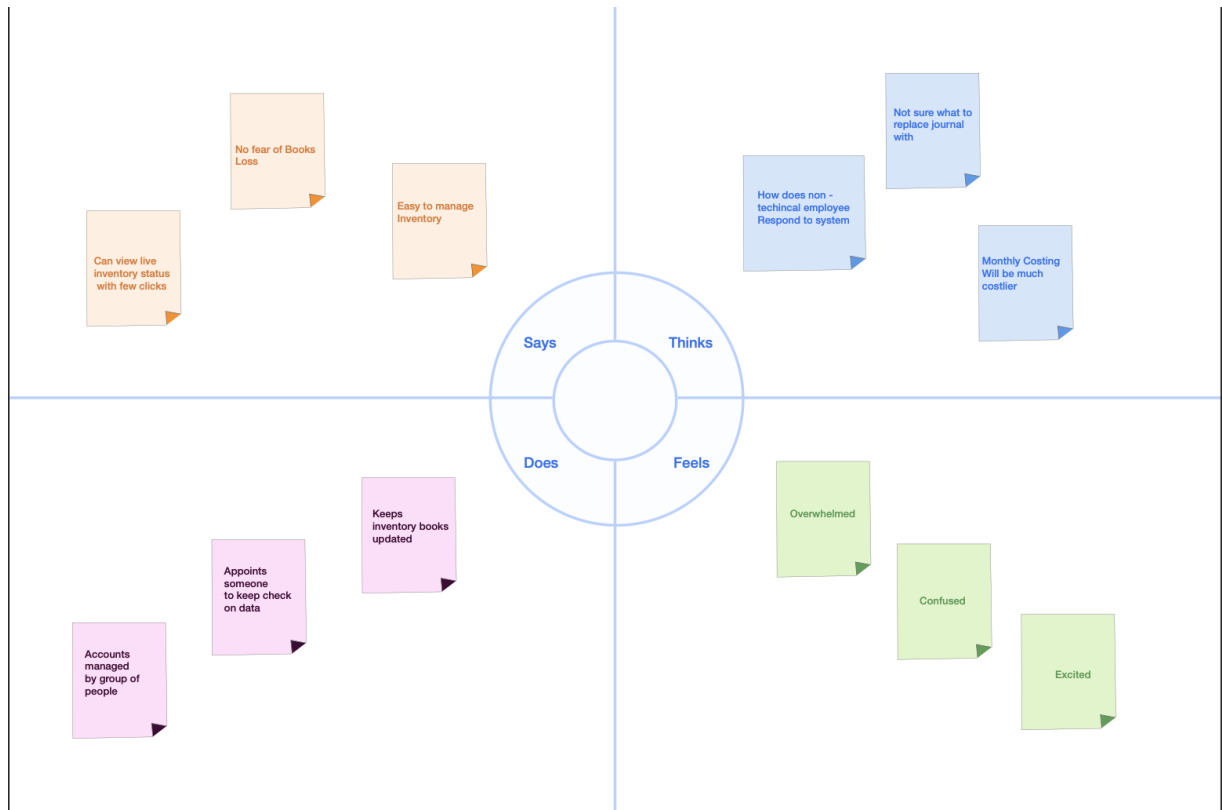
— the cost to store and insure it, and the risk of spoilage, theft and damage.

Companies with complex supply chains and manufacturing processes must find the right balance between having too much inventory on hand or not enough.

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

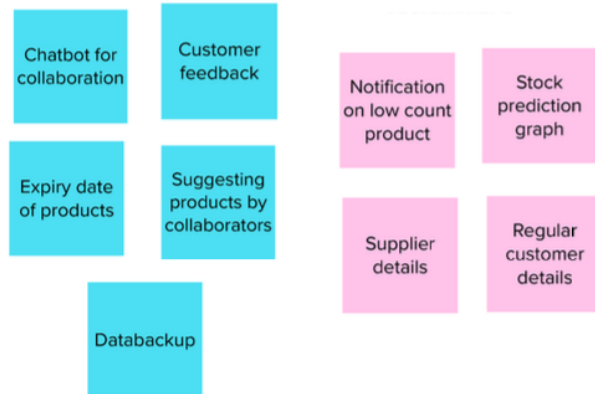


3.2 Ideation & Brainstorming

Inder Pal Singh



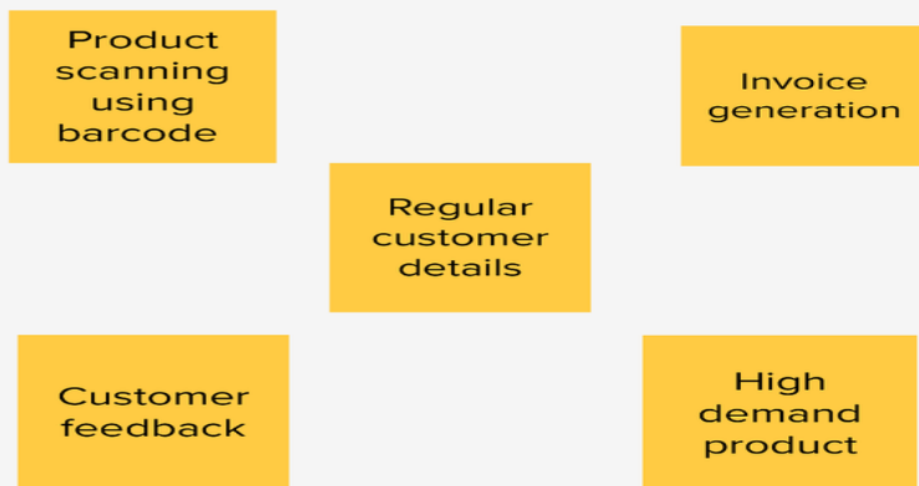
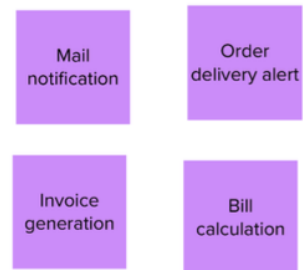
Amrit Preet Singh



Vishwa harish D S



Yogeshwaran R



3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement	The retailer wants to monitor and maintain stock levels, analyze stocks effectively, avoid selling of excessive stocks in the store, retain customers so that he/she can maintain the inventory system effectively and successfully run their retail store.
2.	Idea / Solution description	<p>Measure and report warehouse performance metrics like inventory turnover, customer satisfaction, and order processing speed to overcome warehouse inefficiencies. Share this data with employees and suppliers.</p> <p>Give employees the right inventory tools for the job. They need software to replace manual inventory documentation, and paperless transactions for invoices and purchase orders.</p> <p>Categorize inventory storage down to shelf, bin and compartment, and automate order picking, packing and shipping workflows.</p> <p>Reduce Human Error: Use inventory control processes like blind receiving with barcodes and mobile scanners to prevent human error, inventory manipulation, and shrinkage due to theft or negligence.</p> <p>Stock Review: audit your stock</p> <p>Use the LIFO approach (Last in, first out)</p> <p>Identify low-turn stock.</p> <p>Inventory Tracking</p>

		System can be Invoked in that application
3.	Novelty / Uniqueness	Reduce the time, effort, and cost involved in stock audits. Forecast customer demands and plans the supply of stocks Sales Effectiveness. Physical and Remote centered ordering Reduce manual errors and flexibility.
4.	Social Impact / Customer Satisfaction	We provide enlargement Services for small and large-scale retail stores at affordable pricing.
5.	Business Model (Revenue Model)	Retail Inventory management system helps to track from purchase to sale of goods. It ensures that always enough stock to fulfill the customer demands & orders and proper warning on the scarcity of stocks. In that case, we use a Transaction free Revenue Model the buyer and seller both of them can get the stocks easily through them.
6.	Scalability of the Solution	By Increase Business Scalability you can build consistent growth of Increased Sales.

3.4 Problem Solution fit

Proposed Solution :

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	<p>For Retailers maintaining and securing the Ledger is difficult. Calculating and updating the product count every time needs Manpower.</p> <p>There is a need to count low stock and High Demand products.</p> <p>If any product is under low stock retailer is not aware of that information.</p>
2.	Idea / Solution description	<p>Instead of maintaining a ledger we create software that displays the count of all product and their information.</p> <p>It calculates the price value of available products in the stock.</p> <p>If any product is under low stock the Retailer will get an email alert.</p>
3.	Novelty / Uniqueness	<p>The High sold product along with customer details and their product feedback will be maintained.</p> <p>While selling the product with the help of the Barcode scanning option the product count will be updated.</p>
4.	Social Impact / Customer Satisfaction	<p>Customer details and feedback will be collected and maintained so that the retailers view the details of the product in the stock.</p> <p>Without any Manpower the stock details will be tracked and maintained easily.</p>
5.	Business Model (Revenue Model)	<p>With the help of high-demand product details, retailers can order more supply.</p> <p>We provide data backup using cloud storage</p>
6.	Scalability of the Solution	<p>Any kind of business people or Retailer can use this system and it can be collaborated with multiple retailers and have clear stock information.</p>

4. REQUIREMENT ANALYSIS

4.1 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	Login	User can enter to the Application via Email and Password to access the Inventory System
FR-4	DashBoard Page	Customers can see all the available Products in this phase.
FR-5	Add to Cart	Customers can view the products and send them to add to cart option afterward Users can buy later if it is not sold.
FR-6	Billing and Payment	Customers should buy a product it will redirect to the payment page and automatically generate a bill for the respective Products.
FR-7	Stock Updation	The Particular Stock can be oversold and the stock can be updated by the admin quickly and Stock Statistics can be displayed on the Dashboard page.

4.2 Non-Functional requirement

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	This application can be used in any diversity of languages. The UI should be very clear, it can be used by everyone in the world. We can use any Assistant like google assistant so that blind people can access this application.
NFR-2	Security	This application should be very securely Created. In case the customers can buy any products in the inventory store the payment phase can be very secure and finally get a receipt for the bought products.
NFR-3	Reliability	The application can be TrustWorthy UI and the Stock Statistics can be properly displayed on the dashboard page and all the modules can be Properly working on that application.
NFR-4	Performance	The User and stock Data can be Stored in IBM DataBase(DB) and Stock Data can be displayed on the main page, Incase stock can be simultaneously updated on the main page.
NFR-5	Availability	The application contains user data and stock data and that particular data can be available to display it in the main page.
NFR-6	Scalability	The application can be modified according to our User Request and accessing speed of that changes can be very fast based on our Internet Speed.

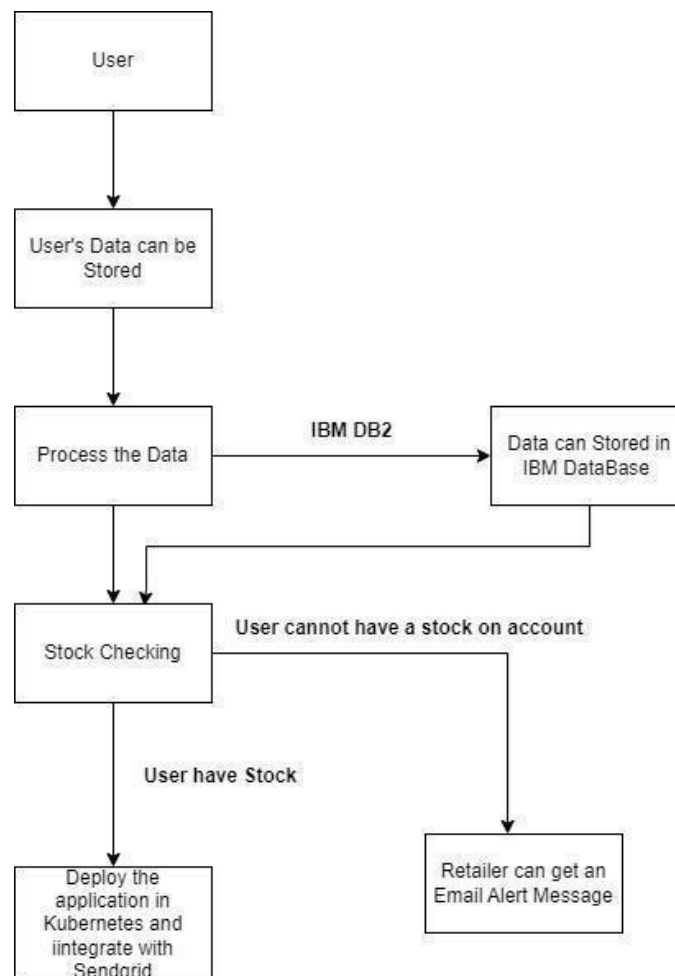
5. PROJECT DESIGN

5.1 Data Flow Diagrams

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right

amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where that is stored.



5.2 Solution & Technical Architecture

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

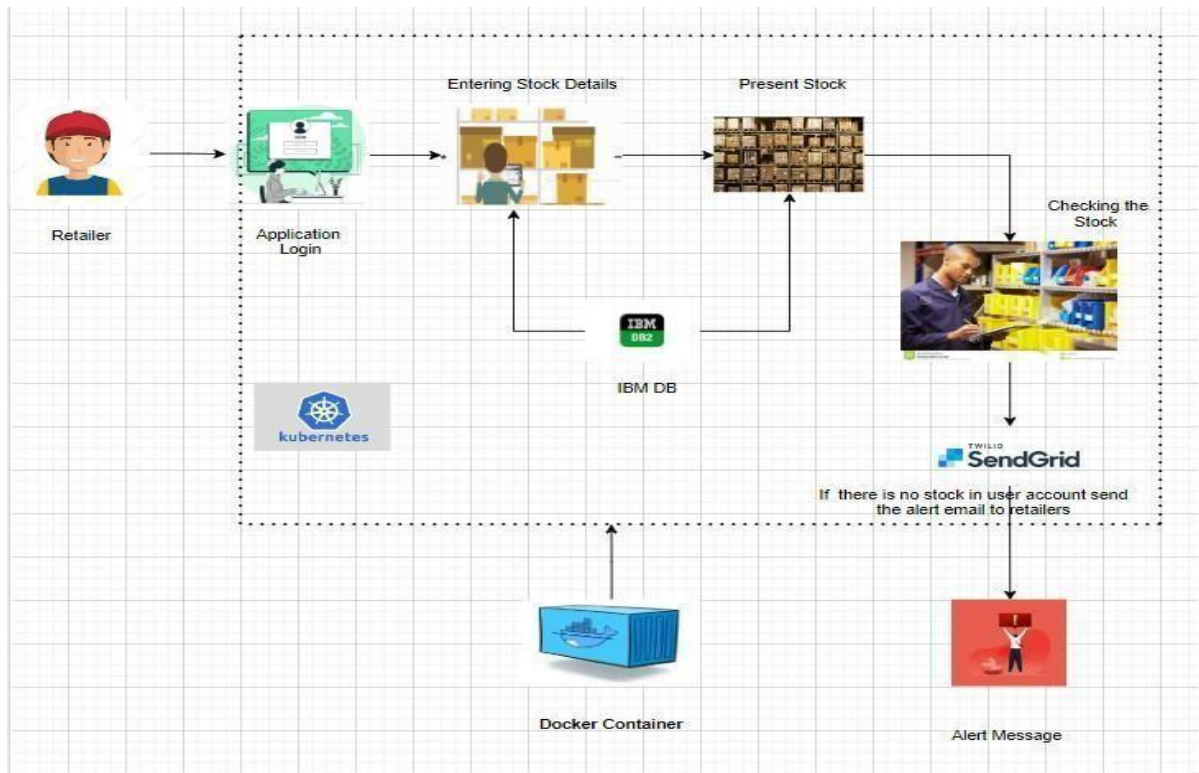


Table-1: Components & Technologies:

S. No	Component	Description	Technology
1.	User Interface	Website User Interface	HTML, CSS, BootStrap
2.	Login	User can login to the application via Email and password	Java Servlet
3.	DashBoard	User can view the Stock Statistics on this page.	HTML,CSS,BootStrap
4.	Product Scanning	The Individul products can be scanned using Barcode Scanner.	Zia Barcode Scanner

5.	Database	User and Stock Data can be retrieved and Stored in DataBase..	MySQL
6.	Cloud Database	Database Service on Cloud	IBM DB2,.
7.	File Storage	File storage requirements	IBM Object Storage

8.	Alert Notification	If the User cannot have Stock on accounts the System will automatically sends an email to Retailers so that they can order a new stock.	SendGrid
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Table-2: Application Characteristics:

S. No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Styling a UI Page,Python using Flask Framework	Bootstrap,Python Framework
2.	Security Implementations	To Protect the IBM Cloud Data	IBM DataBase(IBM DB2)
3.	Scalable Architecture	Three Tier Architecture	DataBase – IBM DB2 Web Server-HTML,CSS,Bootstrap,JSApplication – Docker,Flask Using Python
4.	Availability	Availability of Data Application	IBM Load Balancer
5.	Performance	Accessing Speed will be High	IBM Cloud

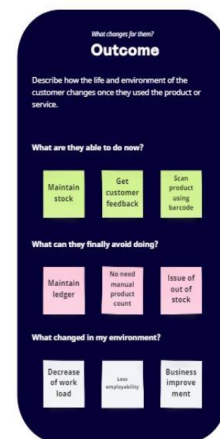
5.3 User Stories

Project Design Phase-II Customer Journey - Day 1

Date	03 October 2022
Team ID	PNT2022TMID04526
Project Name	Project - Inventory Management System for Retailers
Maximum Marks	

Customer Journey Map:

Journey Steps Which step of the experience are you describing?	Discovery Why do they even start the journey?	Registration Why would they trust us?	Onboarding and First Use How can they feel successful?	Sharing Why would they invite others?
Actions What does the customer do? What information do they look for? What is their context?	Stock count	Exact data Cost effective Time efficient	Satisfied Work Load is Reduced Understandable Process is fast	Tell about features User friendly History tracking
Needs and Pains What does the customer want to achieve or avoid? Tip: Reduce ambiguity, e.g. by using the first person narrator.	Fear of data Leakage Mismatching data	Entering Incorrect details Less Man Power Easy Maintenance	Processing is Easy Workload is Reduced Work Speed Increased Resource saved	Regular adding of stocks Automatic bill generation Bar code scanner automatically add product
Touchpoint What part of the service do they interact with?	Customer Feedback	Invoice Product Quality & Quantity	Adding products Stock in & out details Billing details Transact on history	Correct stock management Customer feedback Automatic update of stock
Customer Feeling What is the customer feeling? Tip: Use the emoji app to express more emotions	🏆	👍	😊	💰



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6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Product Backlog, Sprint Schedule, and Estimation

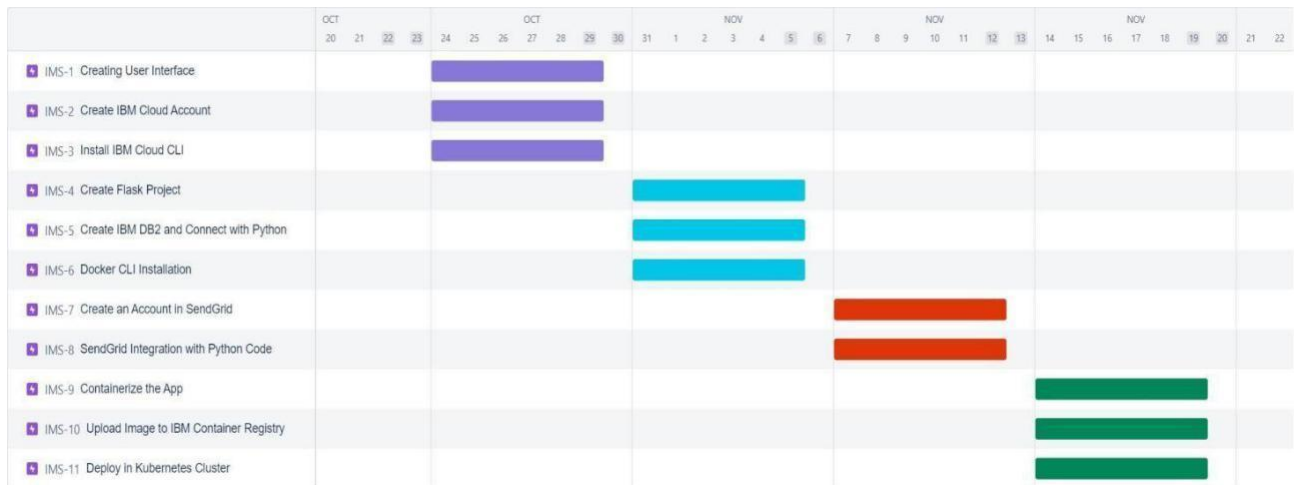
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	5	High	4

Sprint-1	Login	USN-2	As a user, I can log into the application by entering my email & password	5	Medium	4
Sprint-1	Dashboard	USN-3	As a user, once logged in I can view the stock Statistics in the Dashboard page.	10	High	4
Sprint-2	Add items to Stock	USN-4	As a User can able to add the item to stock	5	Medium	4
Sprint-2	Stock Updation	USN-5	As a user, To update the stock for check availability	5	High	4
Sprint -3	Customer Care Executive	USN-6	As a customer care executive, I can fix any issues in my application.	10	Medium	4
Sprint-4	Alert Message	USN-7	As a user, I cannot have any stock on my account can get the alert email message	10	Medium	4

Project Tracker, Velocity & Burndown Chart:

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

Burndown Chart:



6.2 Sprint Delivery Schedule

Activity title	Activity Description	Submission Date	Status
Create Flask Project	An application Framework written in python	20 Sep 2022	Completed
Create IBM Cloud	Create and log into IBM Cloud	22 Sep 2022	Completed
Install IBM Cloud CLI	General-Purpose developer tool that provides access to your IBM Cloud Account	22 Sep 2022	Completed
Docker CLI	Use Docker CLI configuration to customize settings	14 Oct 2022	Completed
Create Account in Send grid	Create account on SendGrid to send mails	27 Oct 2022	Completed
Create UI to Interact with Application	Pages such as Registration, Login page, Displaying items, etc.	27 Oct 2022	Completed

Create IBM Db2 and connect with Python	Create IBM Db2 service in IBMCloud and connect with python code using DB.	2 Nov 2022	Completed
Send Grid Integration with Python Code	to send emails from the applications we need to integrate SendGrid Service.	10 Nov 2022	Completed
Containerize the App	Need to create Docker Image of the application and push it into the IBM Container Registry	10 Nov 2022	Completed
Upload Image to IBMContainer Registry	Upload the Image to IBM Container Registry	10 Nov 2022	Completed

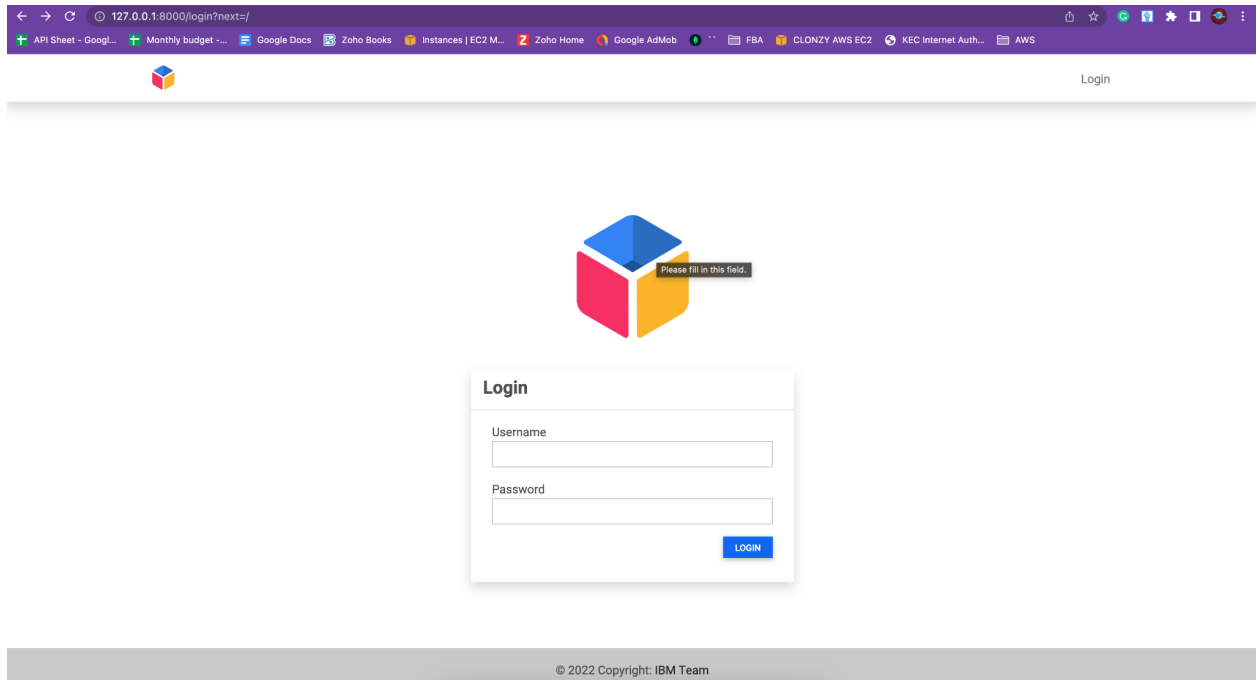
6.3 Reports from JIRA



7. CODING & SOLUTIONING

7.1 Feature 1

Login Page:



The screenshot displays a web browser window with a purple header bar. The address bar shows the URL '127.0.0.1:8000/login?next=/' and the page title is 'Login'. The browser's tab bar shows several open tabs, including 'API Sheet - Googl...', 'Monthly budget - ...', 'Google Docs', 'Zoho Books', 'Instances | EC2 M...', 'Zoho Home', 'Google AdMob', 'FBA', 'CLONZY AWS EC2', 'KEC Internet Auth...', and 'AWS'. The main content area is white and features a large, colorful 3D cube logo in the center. Below the logo is a 'Login' form with two input fields: 'Username' and 'Password'. A blue 'LOGIN' button is located at the bottom right of the form. A small error message 'Please fill in this field.' is visible next to the password field. The footer of the page shows the copyright notice '© 2022 Copyright: IBM Team'.

Signup page:



Login

Create New User

First Name

Last Name

Email

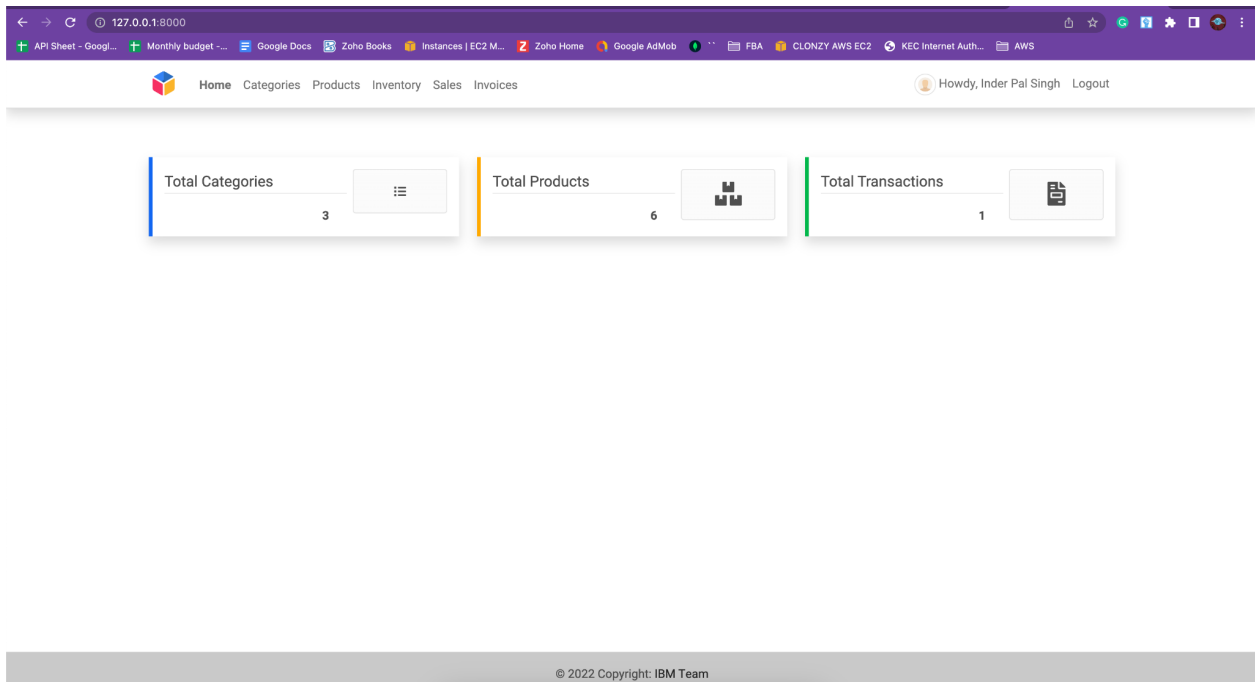
Username

Password

Confirm Password

LOGIN

Dashboard Page:



7.2 Feature 2

1) ADD ITEMS TO STOCK



Product Categories

Show 10 entries

#	Date/Time	Name
1	2022-03-21 11:26 AM	123456 - Product 1
2	2022-03-21 11:32 AM	6231415 - Product 2
3	2022-03-21 11:32 AM	987654 - Product 3
4	2022-03-22 08:32 AM	623141510 - Product 4
5	2022-11-18 01:44 PM	7995c09 - Horlics
6	2022-11-18 02:19 PM	Demo product 44-44

Showing 1 to 6 of 6 entries

+ Add Product

Product Code

Product Name

Description

Price

Status
Active

SAVE

CANCEL

+ ADD NEW

Search:

Type	Status	Action
Active	150.59	Edit Delete
Active	178.99	Edit Delete
Active	100.85	Edit Delete
Active	125.88	Edit Delete
Active	200.0	Edit Delete
Active	2,222.0	Edit Delete

Previous 1 Next

2) STOCK UPDATION

Product Stock History + ADD STOCK

Product Details

Code
123456

Name
Product 101

Description
Sample Product only

Price
150.59

History

Show entries

Search:

#	Date/Time	Quantity	Type	Action
1	2022-03-21 01:38 PM	20	Stock In	✓ ✗
2	2022-03-21 01:40 PM	25	Stock In	✓ ✗

Showing 1 to 2 of 2 entries

Previous 1 Next

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3) IBM WATSON

Web chat Draft Close Save and exit

Greeting
Good greetings are welcoming, actionable, and expressive of your assistant's personality.
This message will override the dialog welcome node and Actions greeting.
Greeting message

Conversation starters
Help your customers get going. When selected, the text of these starters is sent as a message. Each should be something your assistant is trained and tested to answer.

-
-
-

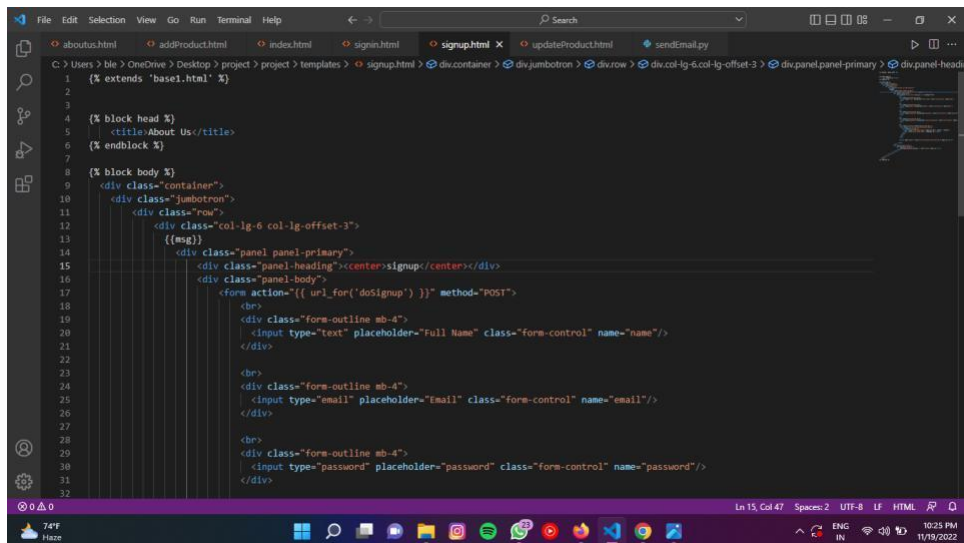
Live Chat Window

Hi! I'm a virtual assistant. How can I help you today?

Type your comment

8. TESTING

8.1 Test Cases



```
1  {% extends 'base1.html' %}
2
3
4  {% block head %}
5      <title>About Us</title>
6  {% endblock %}
7
8  {% block body %}
9      <div class="container">
10         <div class="jumbotron">
11             <div class="row">
12                 <div class="col-lg-6 col-lg-offset-3">
13                     <img />
14                     <div class="panel panel-primary">
15                         <div class="panel-heading"><center>signup</center></div>
16                         <div class="panel-body">
17                             <form action="{% url_for('doSignup') %}" method="POST">
18                                 <br>
19                                 <div class="form-outline mb-4">
20                                     <input type="text" placeholder="Full Name" class="form-control" name="name"/>
21                                 </div>
22                                 <br>
23                                 <div class="form-outline mb-4">
24                                     <input type="email" placeholder="Email" class="form-control" name="email"/>
25                                 </div>
26                                 <br>
27                                 <div class="form-outline mb-4">
28                                     <input type="password" placeholder="password" class="form-control" name="password"/>
29                                 </div>
30                             </form>
31                         </div>
32                     </div>
33                 </div>
34             </div>
35         </div>
36     </div>
```

8.2 User Acceptance Testing

127.0.0.1:8000/login?next=/

API Sheet - Googl... Monthly budget -- Google Docs Zoho Books Instances | EC2 M... Zoho Home Google AdMob FBA CLONZY AWS EC2 KEC Internet Auth... AWS

Login

Please fill in this field.

Login

Username

Password

LOGIN

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9. RESULTS

9.1 Performance Metrics

In terms of performance metrics as we are using python flask as a web framework this includes features like routing, templating, request/response handling, a development server, unit testing support, and a few more. Moreover, the flask is lightweight, fast, and scalable and is therefore used to power huge web apps we are using IBM DB cloud for the backend database which is a plus.

10. ADVANTAGES

Faster develop the application using IBM cloud DB.

User-Friendly Chatbot feature implemented using IBM Watson.

Easier to manage stock details like quantity, product type, etc.

The user receives an email alert when the stock quantity reduces below a threshold.

DISADVANTAGES:

IBM db2 can be used for limited resources, the lite version is available in regions. The chatbot will produce generic solutions for frequently asked questions. As we are using a third-party application for email alerts, if there is an issue in its operation, the user will not receive the email alert.

11. CONCLUSION

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. To conclude there is an automated inventory management system accomplished.

11. FUTURE SCOPE

Manage Inventory: Inventory management helps to manage the stock of the company. it provides proper details of the products what kind of raw material, what sizes we require and etc. to the purchasing department.

Less Storage: When inventory management provides proper information to management, they buy according to them which helps the company to store fewer products.

Improve Productivity: Inventory management helps to improve the productivity of the machines and manpower. Employees are aware of stocks and the quantity that require to produce.

Increase Profits: Inventory management helps to improve the profits of the company. it helps to provide proper information about stocks, which saves unnecessary expenses on stocks.

12. APPENDIX

Source Code - Uploaded in GitHub

GitHub & Project Demo Link - <https://github.com/IBM-EPBL/IBM-Project-22704-1659856729>