PROJECT REPORT

DATE	**18 NOV 2022**
TEAM ID	**PNT2022TMID53314**
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 wouldaffect thecomplete retail inventory process. A decentralized inventory managementsystem would comprise the accuracy of the operations.

2.2 References

1) https://stackoverflow.com/
2) https://www.ibm.com/
3) https://smartinternz.com/

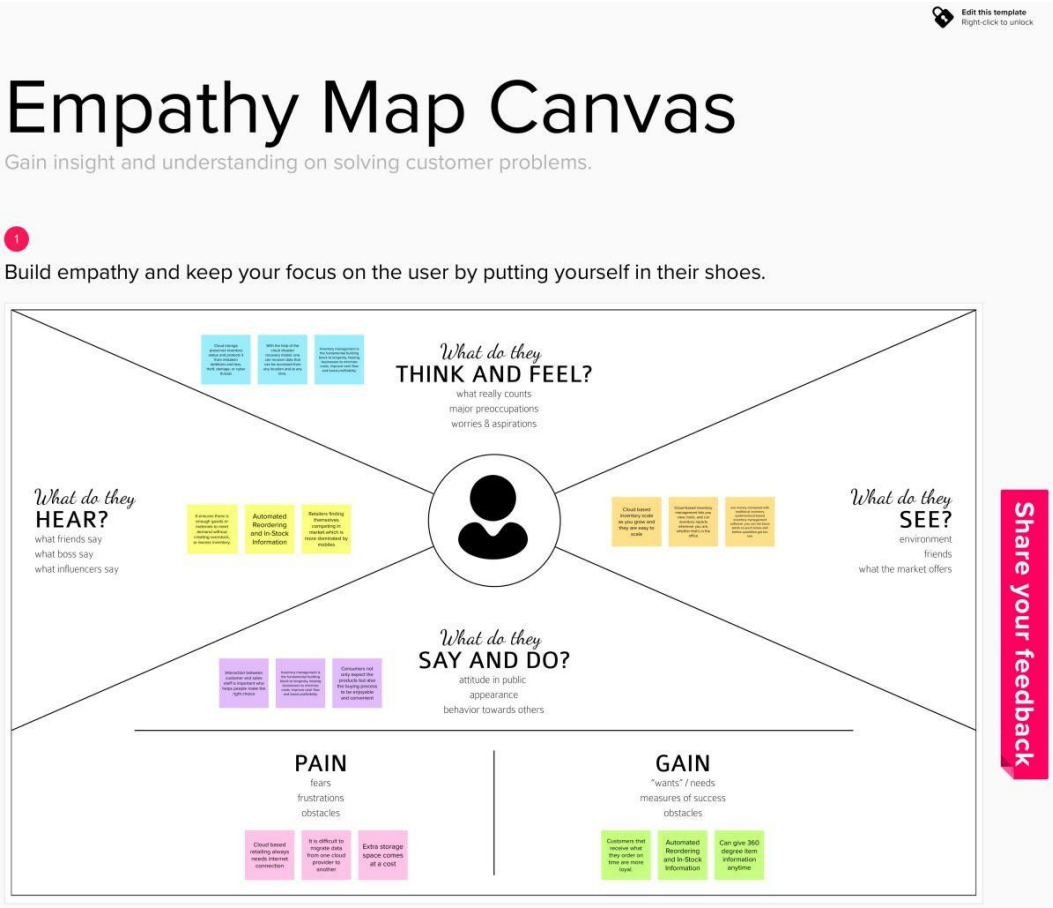
2.2 Problem Statement Definition

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.

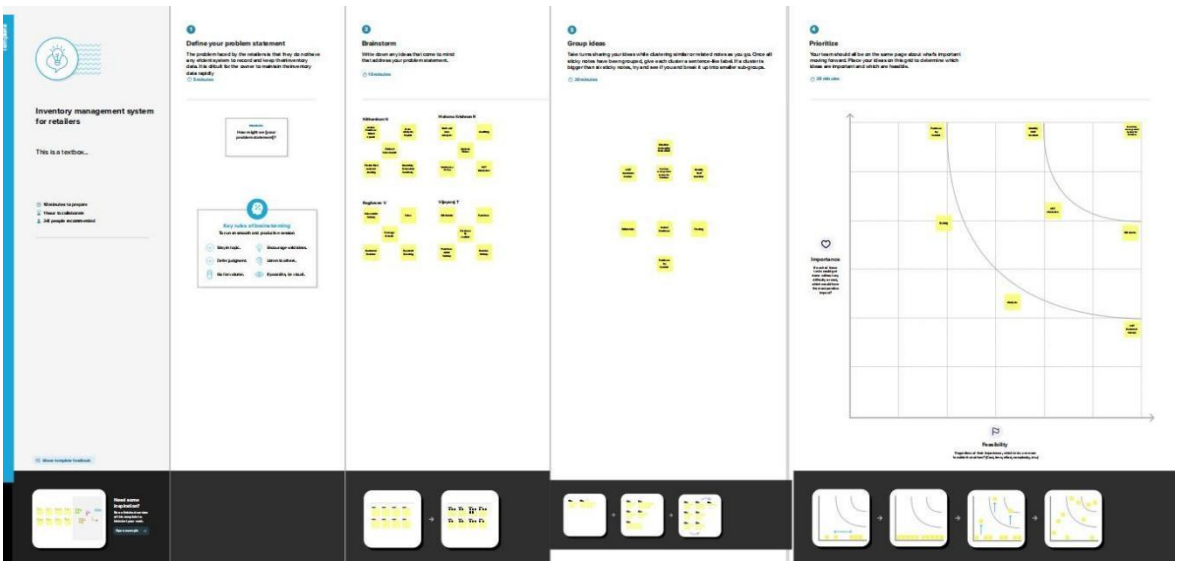
Once retailers successfully log in to the application they can update their inventory details, also users will be able to add new stock by submitting essential details related to the stock. They can view details of the current inventory. The System will automatically send an email alert to the retailers 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

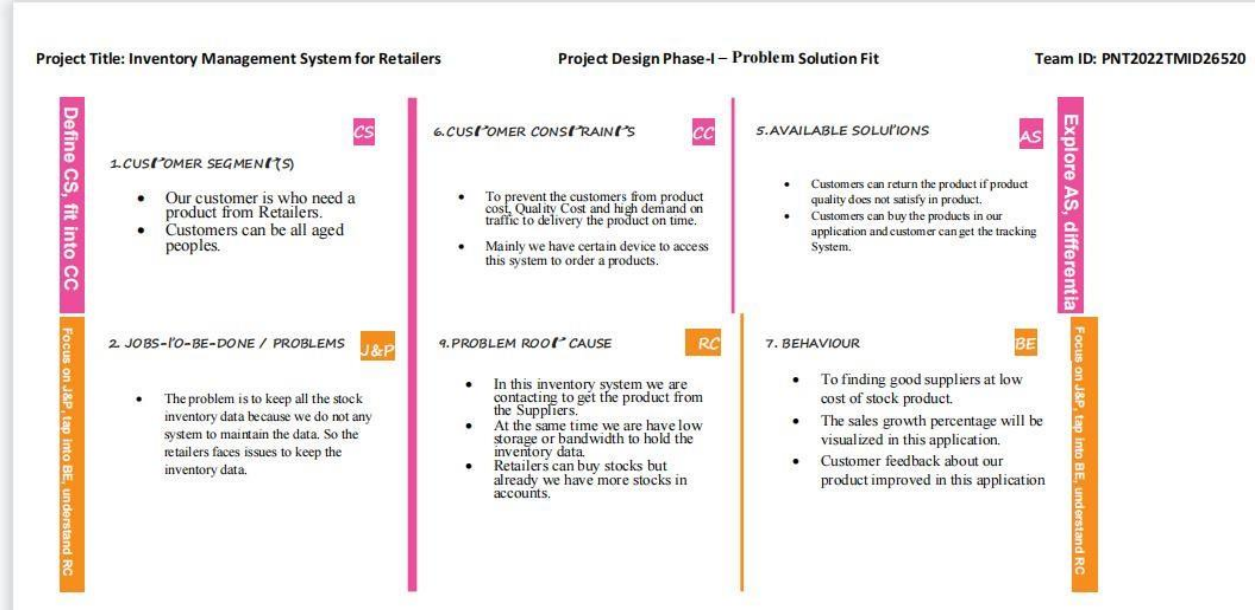


3.3 Proposed Solution

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	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. 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. Categorize inventory storage down to shelf, bin and compartment, and automate order picking, packing and shipping workflows. 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. Stock Review : audit your stock Use LIFO approach(Last in,first out) Identify low-turn stock. Inventory Tracking

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

3.4 Problem Solution fit



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 EmailConfirmation 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 to add to cart option afterwards User can buy later if it is notsold.
FR-6	Billing and Payment	Customers should buy a product it will redirect to payment page automatically generate a bill for the respective Products.
FR-7	Stock Updation	The Particular Stock can be over sold and the stock can be update by the admin quickly and Stock Statistics can be Displayed in the DashBoard page.

4.2 Non-Functional requirement

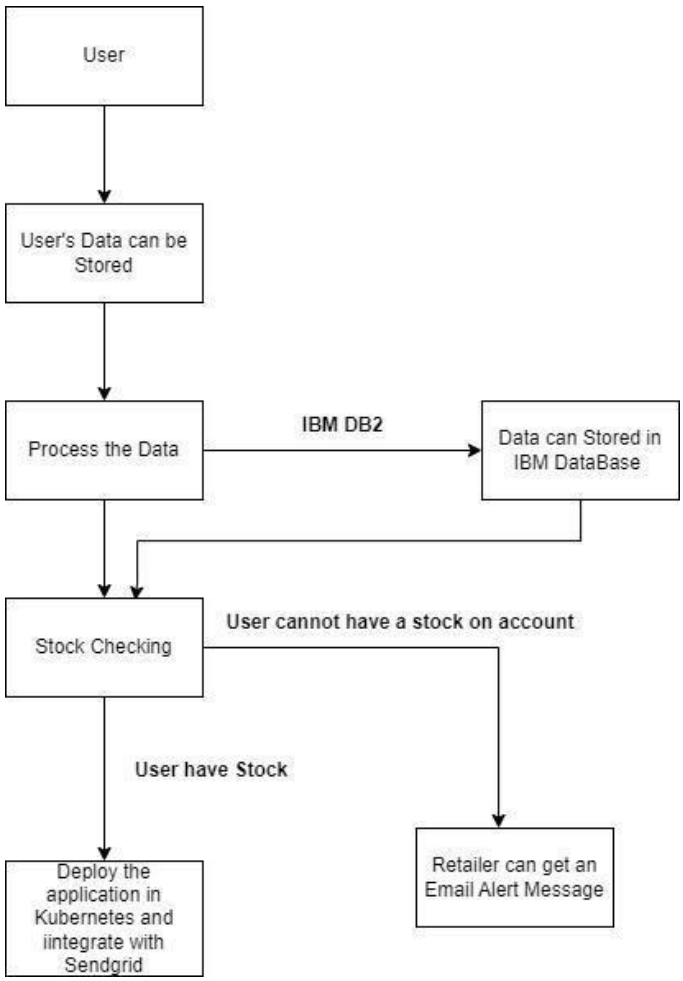
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	This application can be use any diversity of languages. The UI should be very clear, it can be used by everyone in the world. We can use any Assistant like google assistant so that blind people can access this application.
NFR-2	**Security**	This application should be very securely Created. Incase the customers can buy any products in the inventory store the payment phase can be very securely and finally get a receipt of the buyed 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 that Stock Data can be displayed in main page ,Incase stock can be update simultaneously updated in main page.
NFR-5	**Availability**	The application contains user data and stock data and that particular data can be available to display it in 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

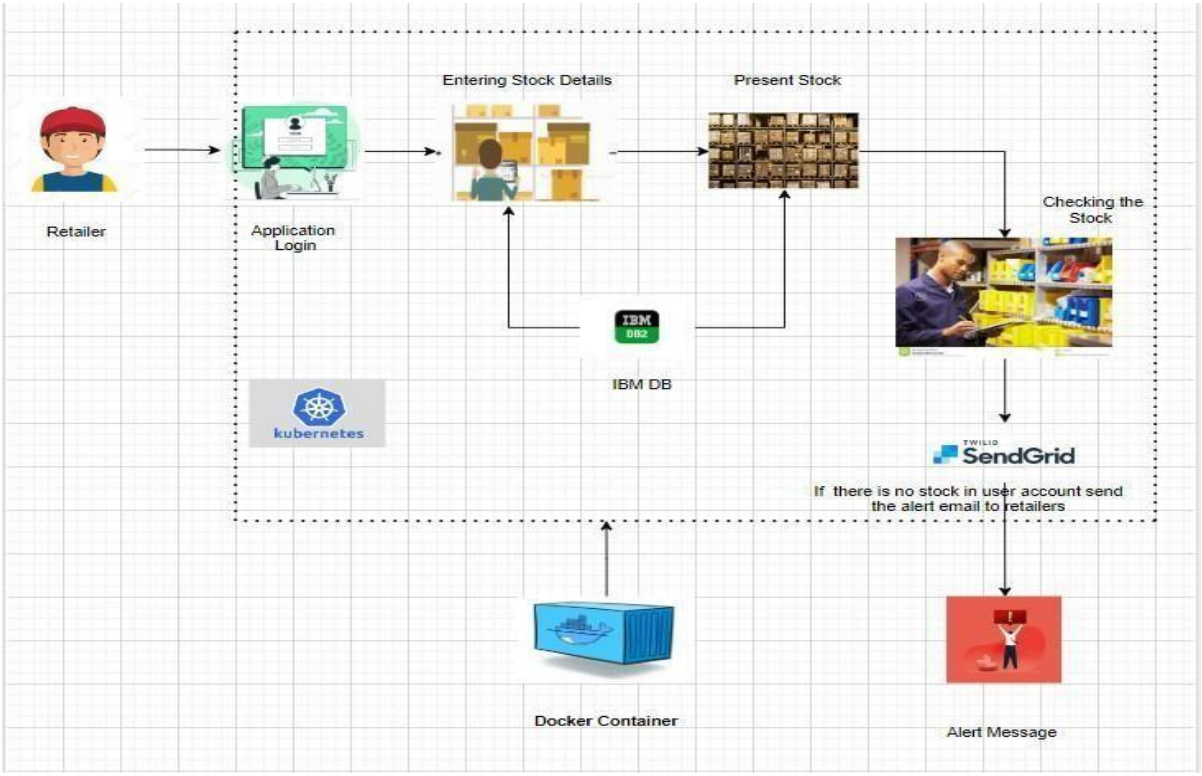


Table-1 : Components & Technologies:

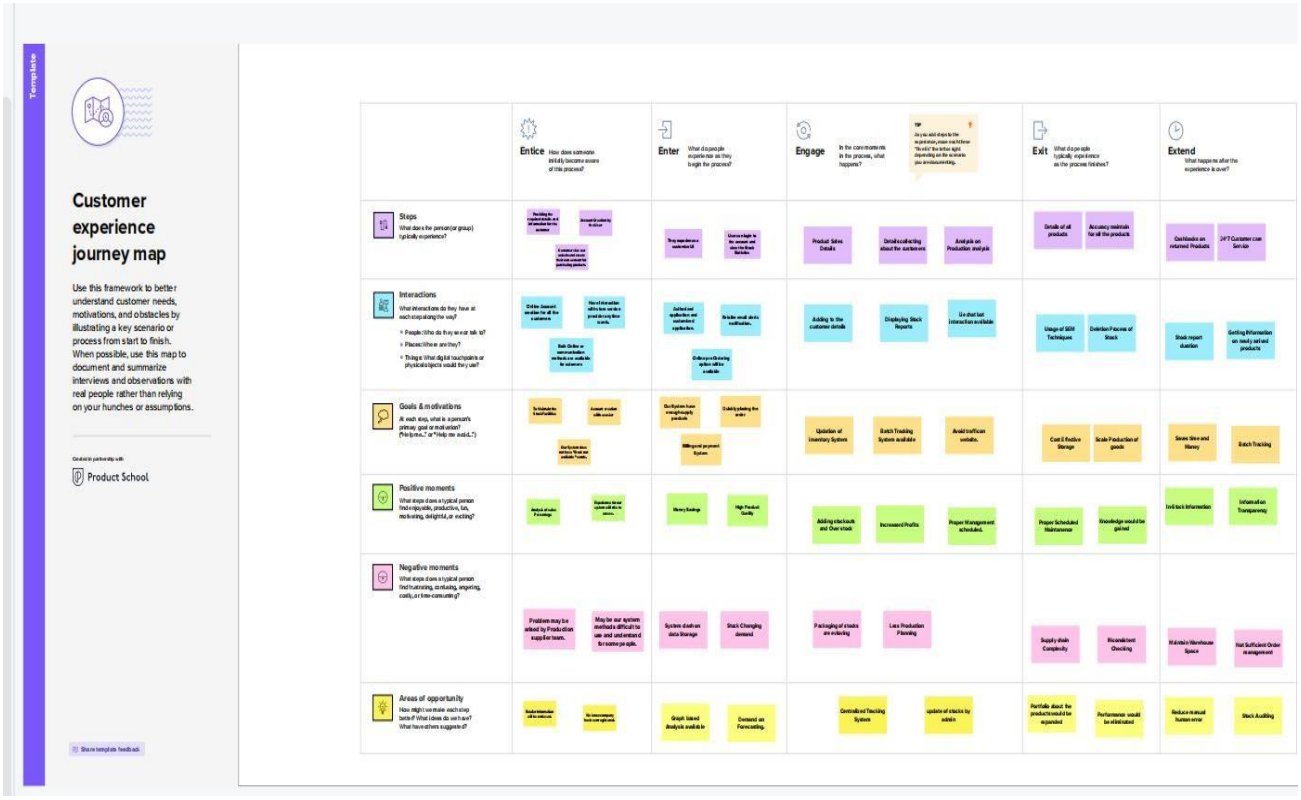
S. No	Component	Description	Technology
1.	User Interface	Website User Interface	HTML, CSS, BootStrap
2.	Login	User can login to the application via Email andpassword	Java Servlet
3.	DashBoard	User can view the Stock Statistics on this page.	HTML,CSS,BootStrap
4.	Product Scanning	The Indivudual products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

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



6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Product Backlog, Sprint Schedule, and Estimation

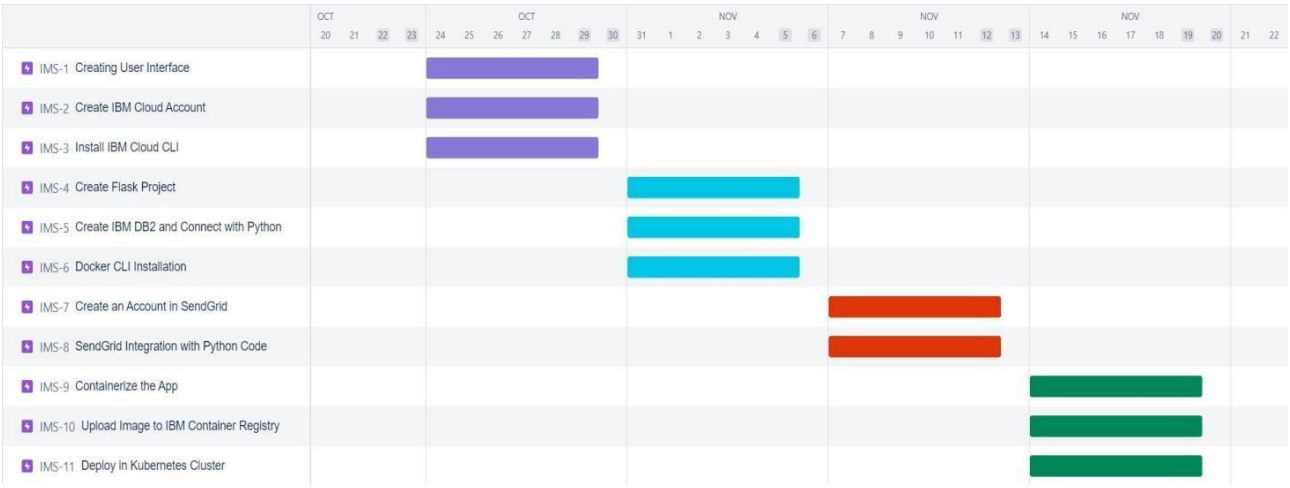
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	5	High	4

Sprint-1	Login	USN-2	As a user, I can log into the application byentering email & password	5	Medium	4
Sprint-1	Dashboard	USN-3	As a user, once logged in I can view theStock 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 checkavailability	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	17 Sep 2022	Completed
Create IBM Cloud	Create and log into IBM Cloud	17 Sep 2022	Completed
Install IBM Cloud CLI	General-Purpose developer tool that provides access to your IBM Cloud Account	21 Sep 2022	Completed
Docker CLI	Use Docker CLI configurationto customize settings	27 Oct 2022	Completed
Create Account in Send grid	Create account in SendGrid tosend mails	27 Oct 2022	Completed
Create UI to Interact with Application	Pages such as Registration, Login page, Displaying items etc.	27 Oct 2022	Completed

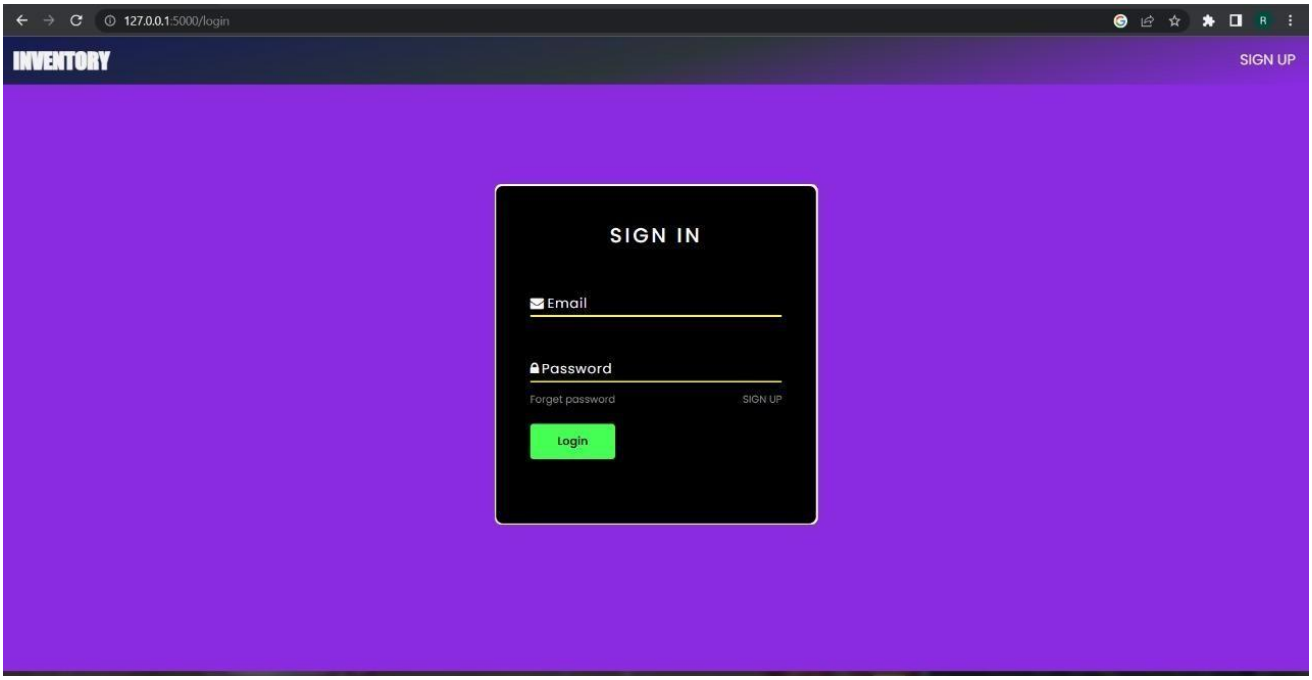
Create IBM Db2 and connect with Python	Create IBM Db2 service in IBMCloud and connect with python code using DB.	28 Oct 2022	Completed
Send Grid Integration with Python Code	to send emails from the applications we need to integratethe SendGrid Service.	28 Oct 2022	Completed
Containerize the App	Need to create Docker Imageof the application and push into the IBM Container Registry	28 Oct 2022	Completed
Upload Image to IBMContainer Registry	Upload the Image to IBM Container Registry	31 Oct 2022	Completed

6.3 Reports from JIRA

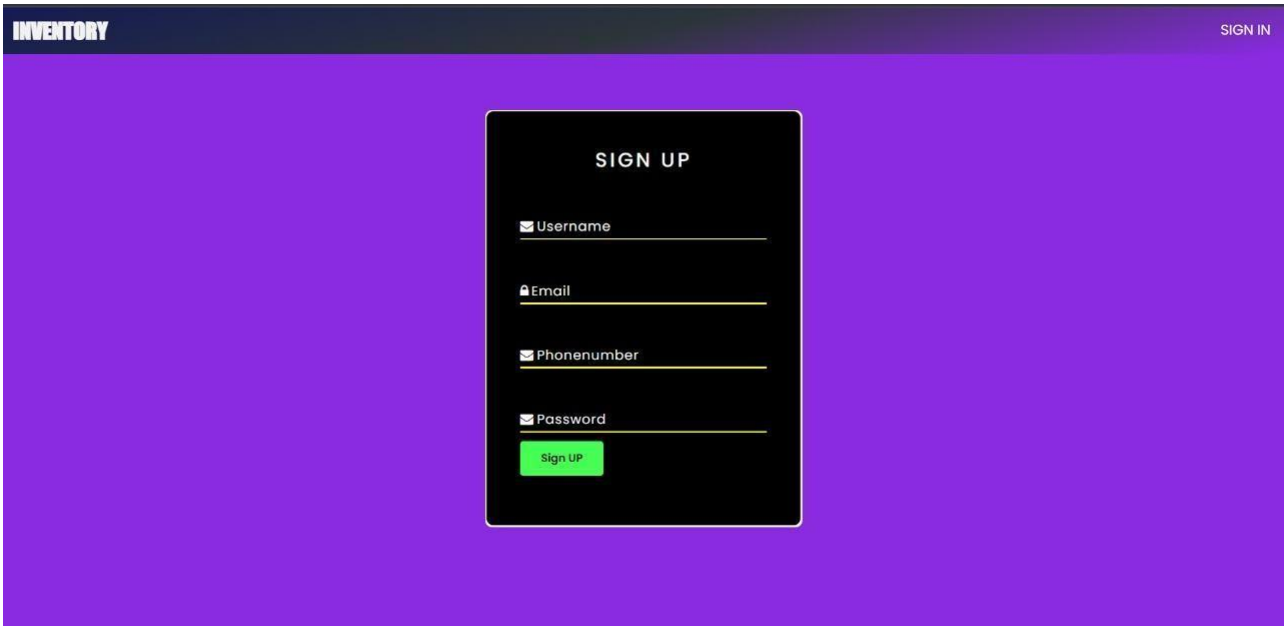
7. CODING & SOLUTIONING

7.1 Feature 1

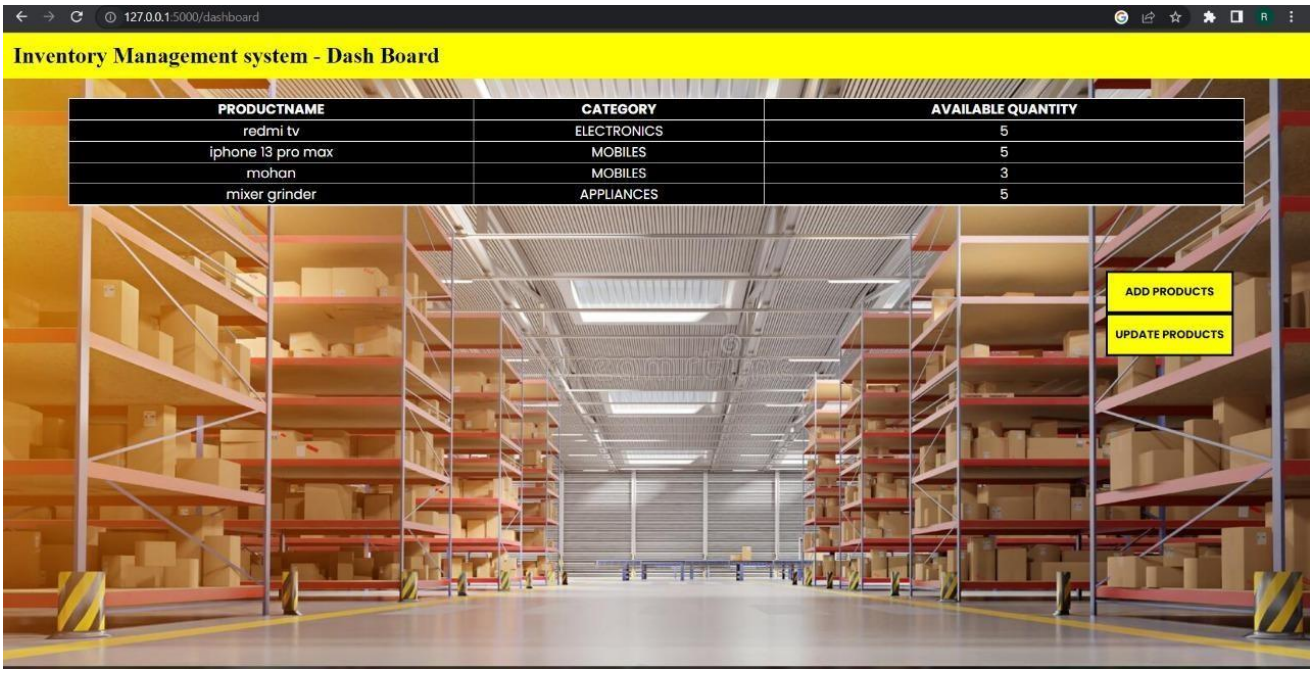
Login Page:



Signup page:

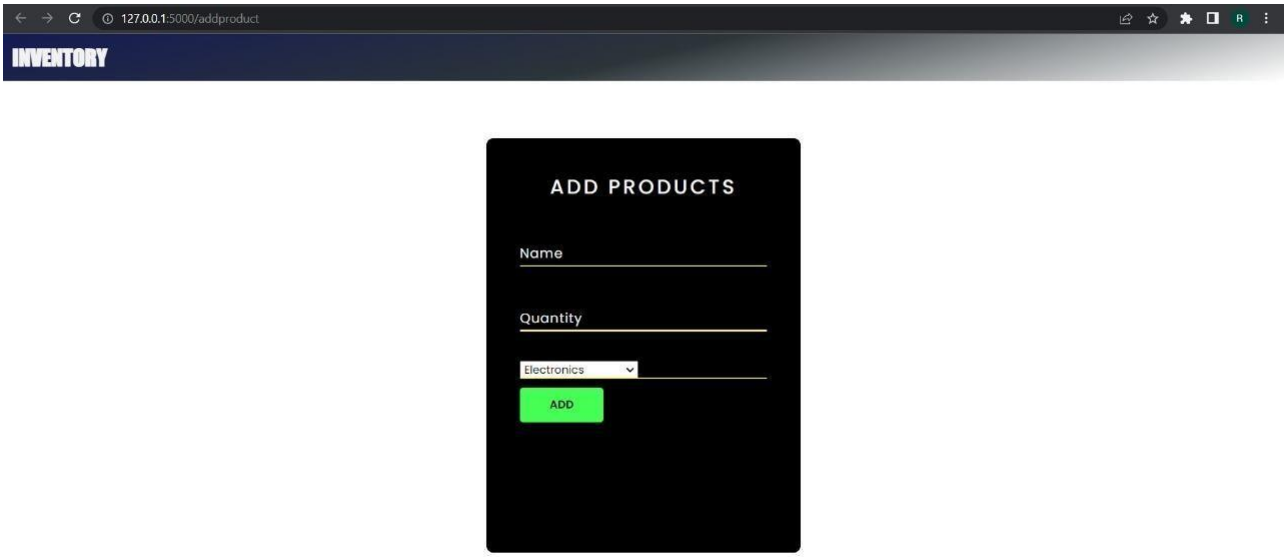


Dashboard Page :

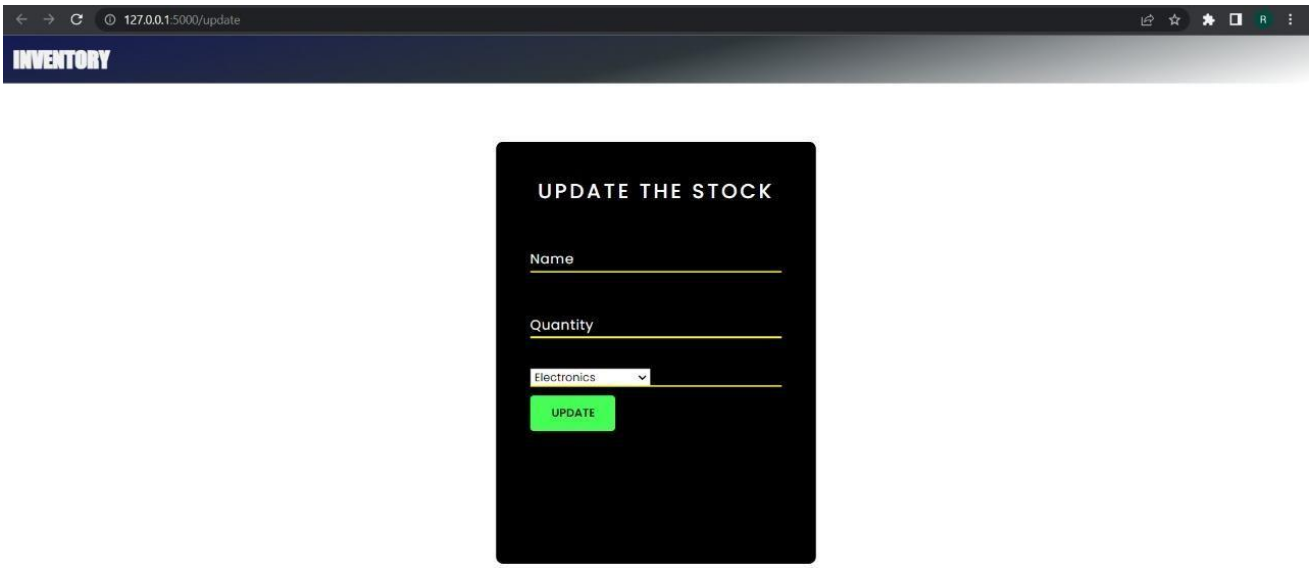


7.2 Feature 2

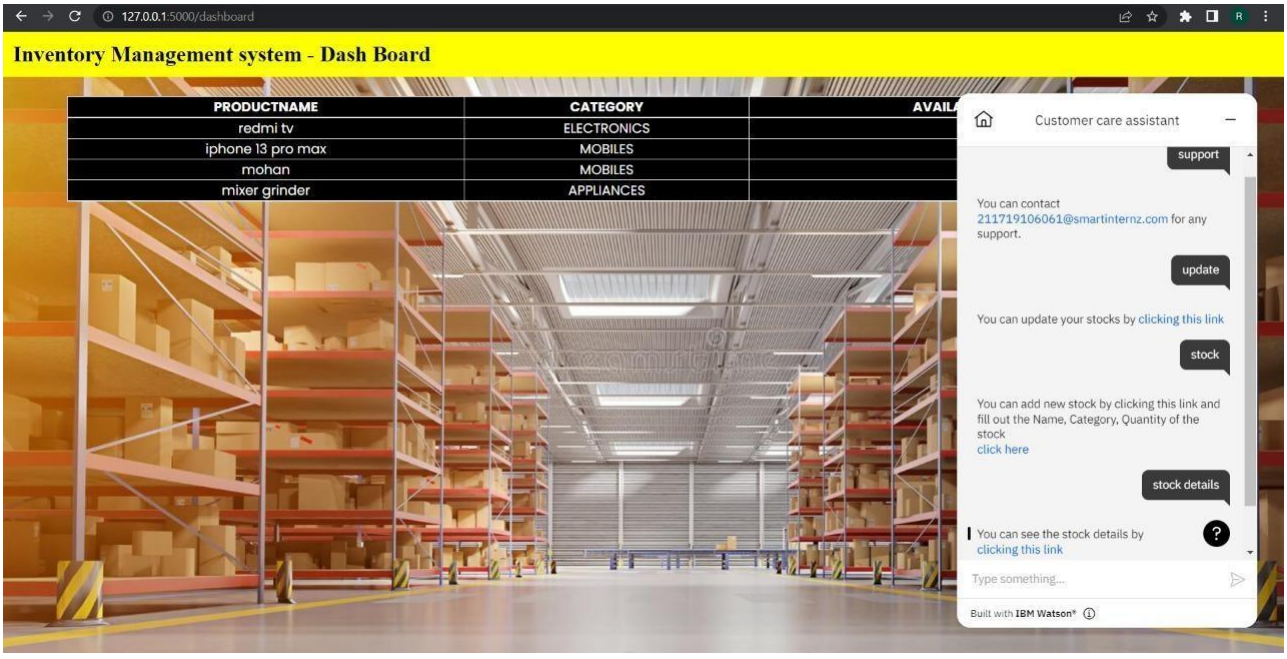
1) ADD ITEMS TO STOCK



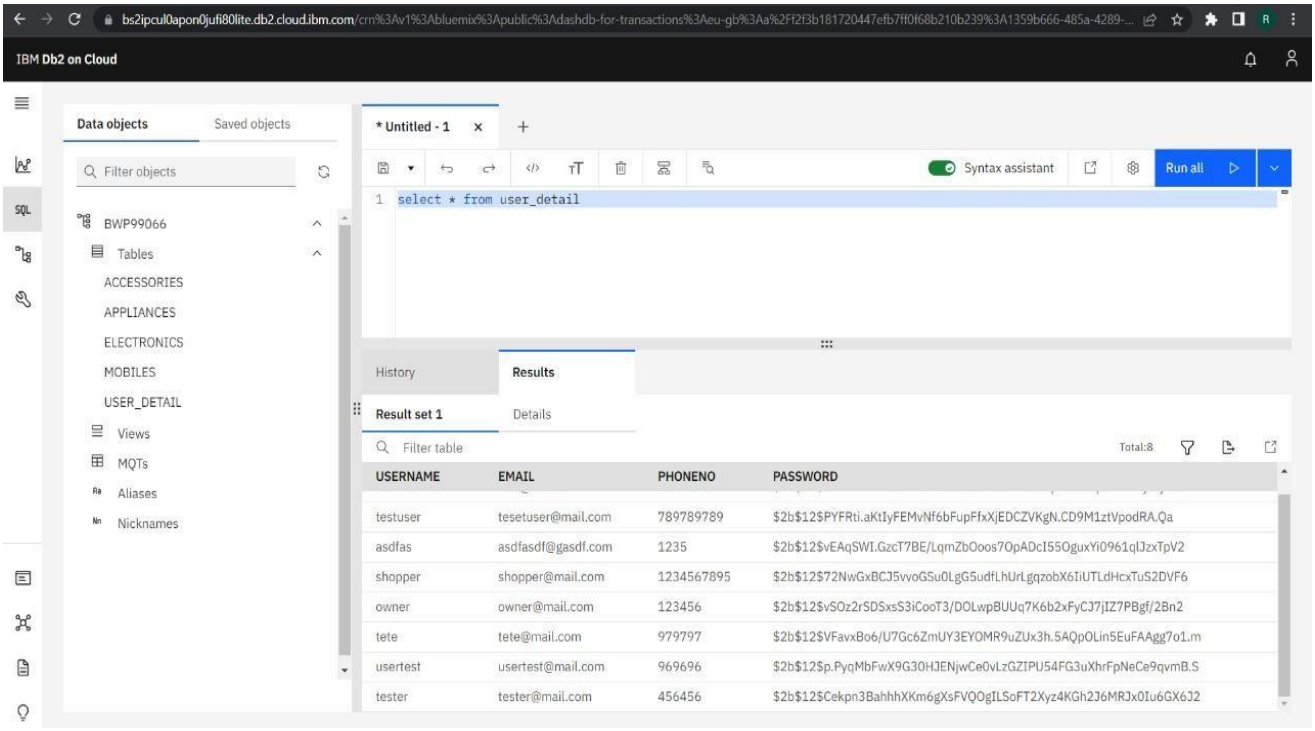
2) STOCK UPDATION

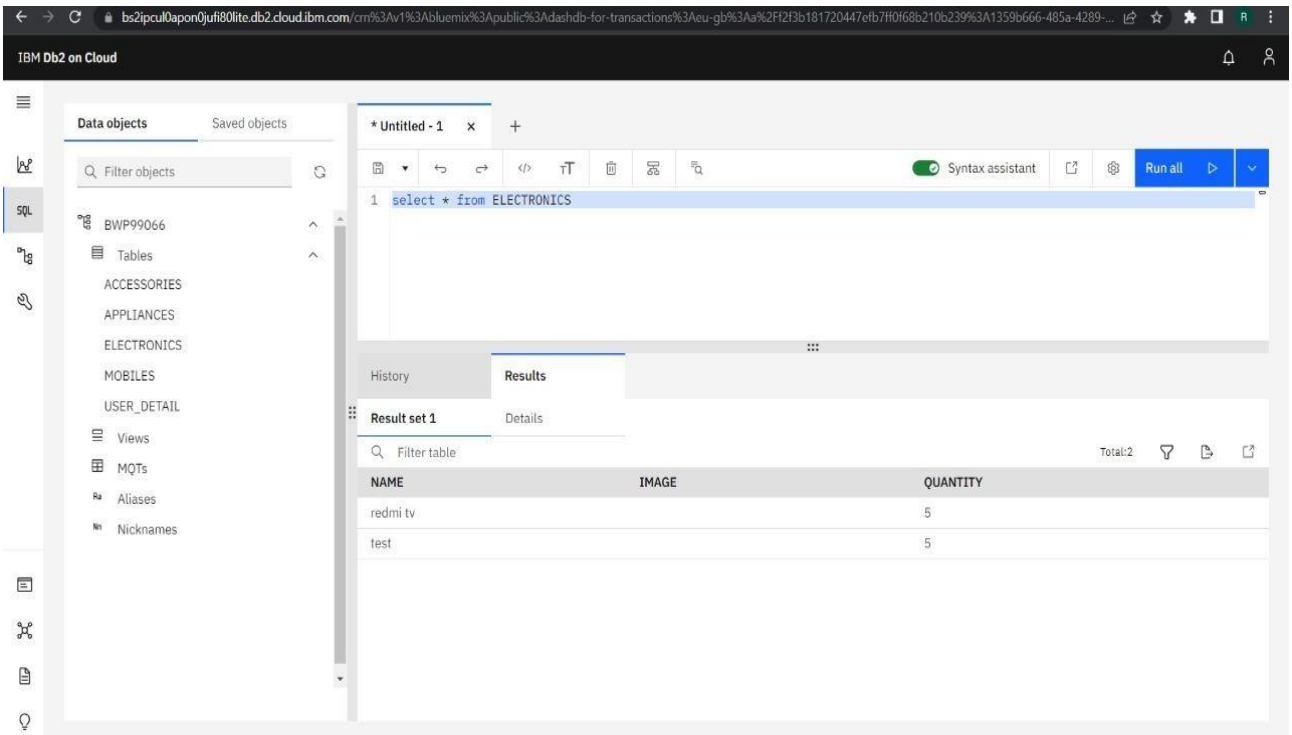


3) IBM WATSON



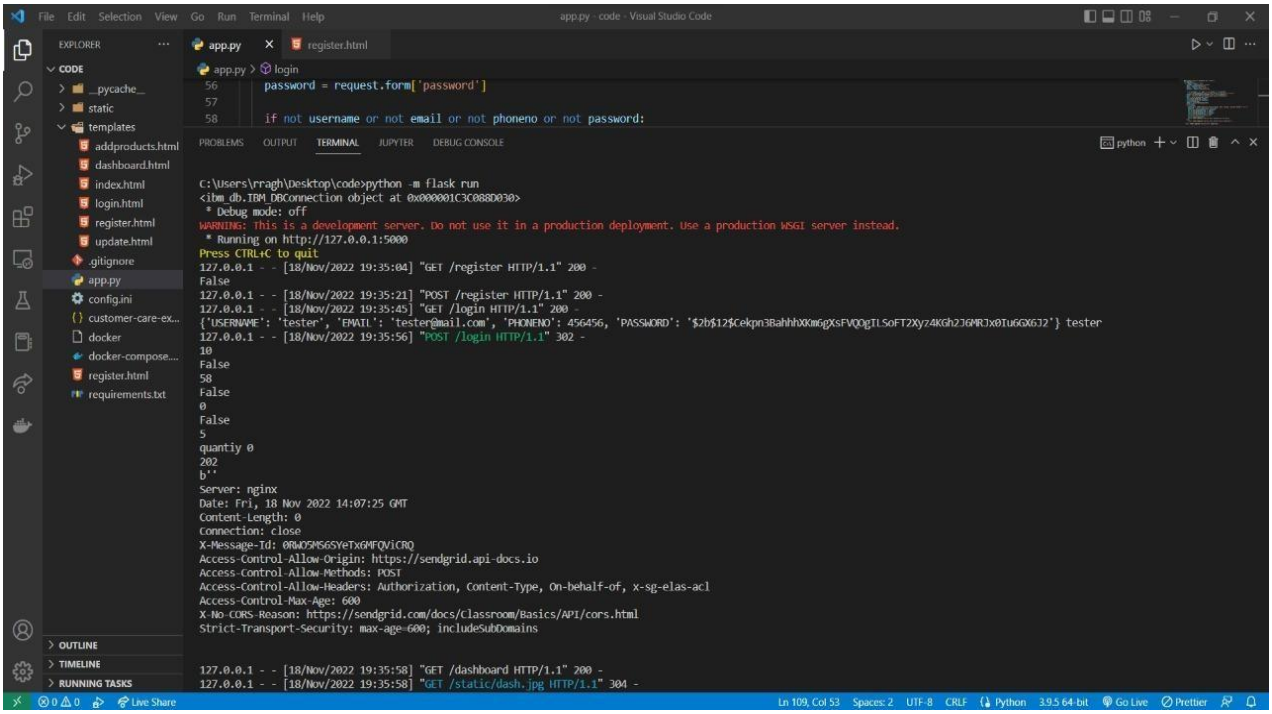
7.2 Database Schema

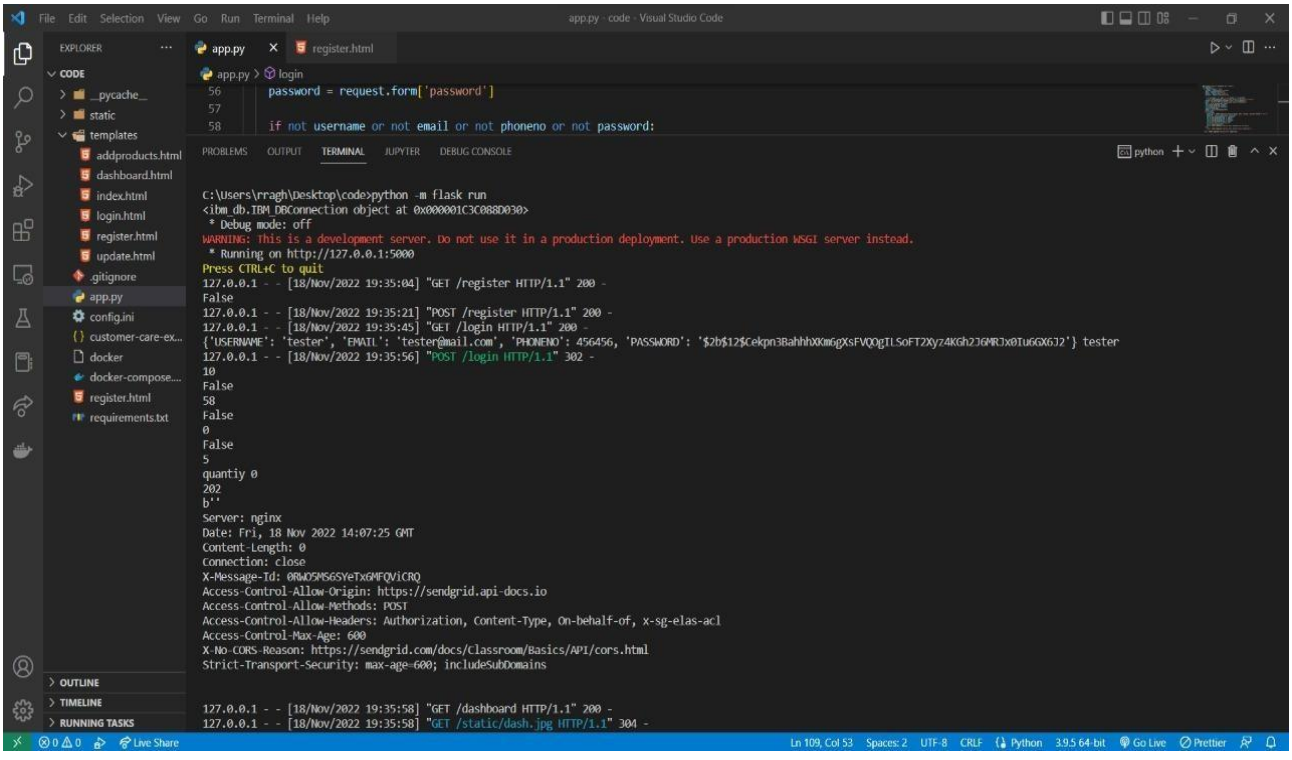




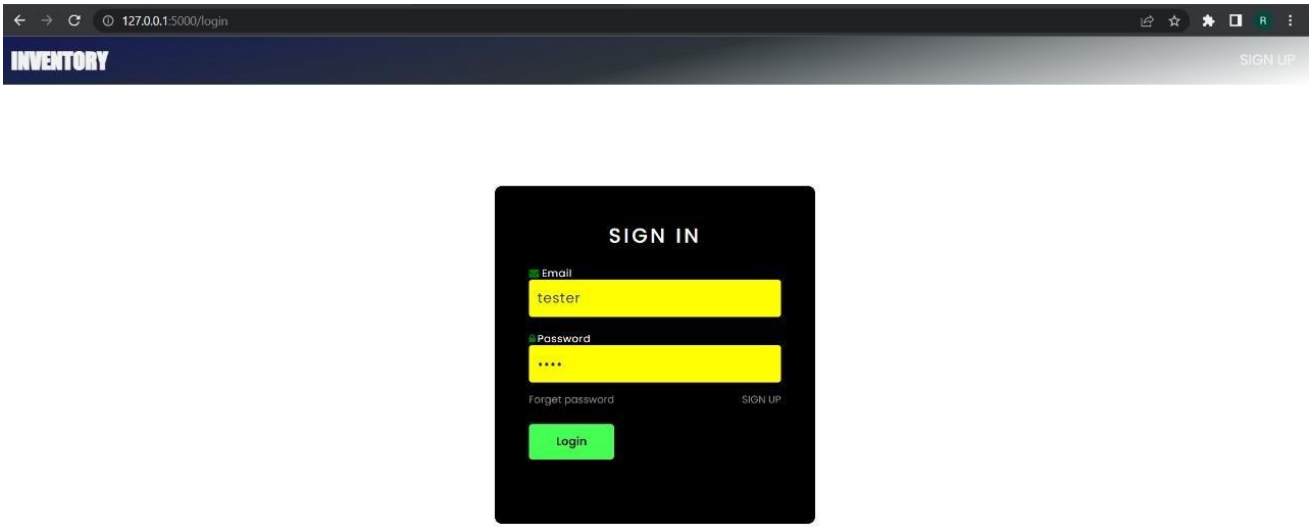
8. TESTING

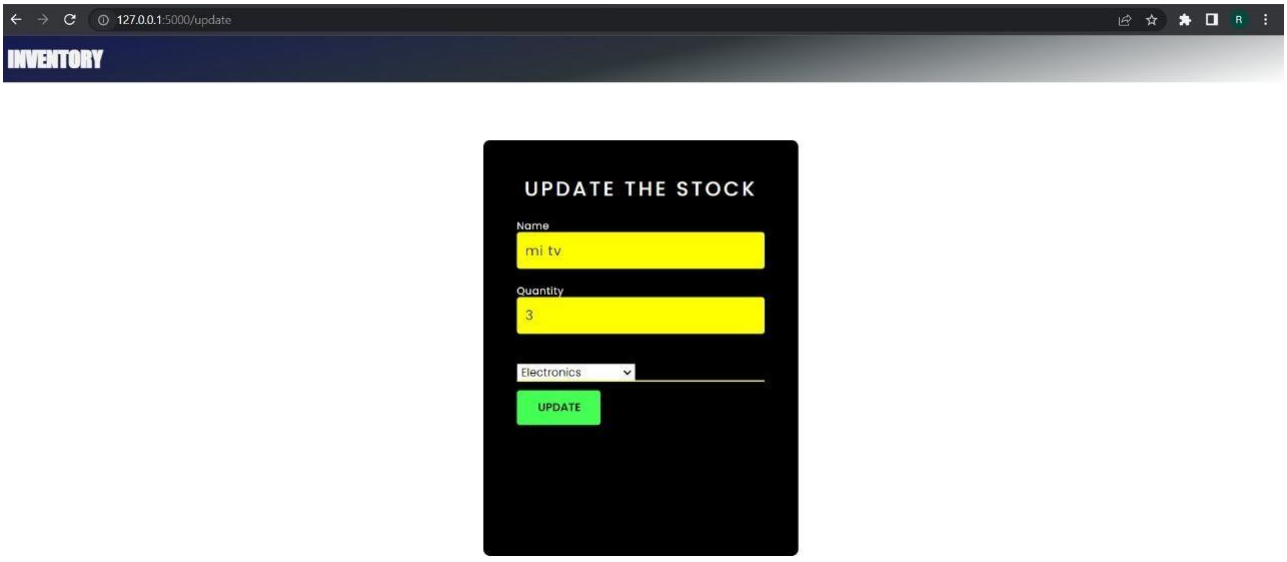
8.1 Test Cases





8.2 User Acceptance Testing





9. RESULTS

9.1 Performance Metrics

Interms of performance metric 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 flask is lightweight, fast, and scalable and is therefore used to power huge web apps and we are using ibm db cloud for the backend database which is a plus.

10. ADVANTAGES & DISADVANTAGES

ADVANTAGES:

- Faster develop the application using ibm cloud db.
- User Friendly Chatbot feature implemented using ibm watson.
- Easier to manage stocks details like quantity, product type, etc.
- User receives email alert when the stock quantity reduces a below a threshold.

DISADVANTAGES:

- IBM db2 can be used for limited resources, lite version is available regions.
- The chatbot will produce generic solutions for frequently asked questions.
- As we are using third party application for email alerts, if there is 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 are the sizes we require and etc. to the purchasing department.
- **Less Storage**: When the 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, that saves the unnecessary expenses on stocks.

12. APPENDIX

Source Code - Uploaded in github

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