PROJECT REPORT

Team ID	**TEAM ID - PNT2022TMID27456**
Project Name	**INVENTORY MANAGEMENT SYSTEM FOR RETAILERS**

1. INTRODUCTION

1.1 Project Overview:

Retail inventory management is the process of ensuring you carry merchandise that shoppers want, with neither too little nor too much on hand. By managing inventory, retailers meet customer demand without running out of stock or carrying excess supply. In practice, effective retail inventory management results in lower costs and a better understanding of sales patterns. Retail inventory management tools and methods give retailers more information 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. In today's more turbulent environment there is no longer any possibility of manufacturing and marketing acting independently of each other. It is now generally accepted that the need to understand and meet customer requirements is a prerequisite for survival. At the same time, in the search for improved cost competitiveness, manufacturing management has been the subject of massive renaissance. The last decade has seen the rapid introduction of flexible manufacturing systems, of new approaches to inventory based on materials requirement planning (MRP) and just in time (JIT) methods, a sustained emphasis on quality. Equally there has been a growing recognition of the critical role that procurement plays in creating and sustaining competitive advantage as part of an integrated logistics process.In this scheme of things, logistics is therefore essentially an integrative concept that seeks to develop a system wide view of the firm. It is fundamentally a planning concept that seeks to create a framework through which the needs of the manufacturing strategy and plan, which in turn link into a strategy and plan for procurement.

1.2 Purpose:

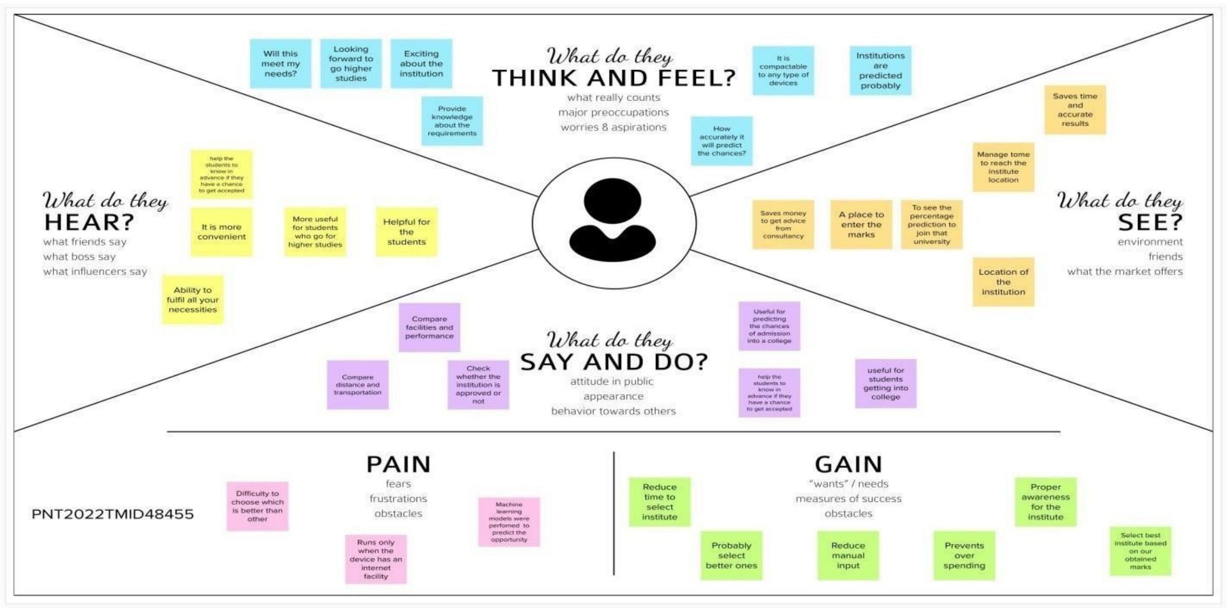
Once retailers successfully log in to the application they can update their inventory details, also users will be able to add new stock by submitting essential details related to the stock. They can view details of the current inventory. The System will automatically send an email alert to the retailers if there is no stock found in their accounts. So that they can order new stock. In the industries there will be a competitor who will be a low cost producer and will have greater sales volume in that sector. This is partly due to economies of scale, which enable fixed costs to spread over a greater volume but more particularly to the impact of the experience curve.It is possible to identify and predict improvements in the rate of output of workers as they become more skilled in the processes and tasks on which they work. Bruce Henderson extended this concept by demonstrating that all costs, not just production costs, would decline at a given rate as volume increased. This cost decline applies only to value added, i.e. costs other than bought in supplies. Traditionally it has been suggested that the main route to cost reduction was by gaining greater sales volume and there can be no doubt about the close linkage between relative market share and relative costs. However it must also be recognized that logistics management can provide a multitude of ways to increase efficiency and productivity and hence contribute significantly to reduced unit costs.

1.3 Problem Statement Definition

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	I am a rice shop owner who keeps his stock updated	Update the current stock in my inventory according to the customer's purchases	I 'm unable to upload and update the data	The server is very bad due to the network in remote areas	Frustrated and unable to update the products which users needed.
PS-II	I am Murugesan, who is a customer to a shop.	Update the products which are not available at the store.	the data has been entered wrongly	heavy network traffic to update	to go for alternative decisions like searching on another shop, leave the product out etc.

2.IDEATION & PROPOSED SOLUTION

2.1 Empathy Map Canvas


What do they THINK AND FEEL?
what really counts
major preoccupations
worries & aspirations
Will this meet my needs?
Looking forward to go higher studies
Exciting about the institution
Provide knowledge about the requirements
It is compactable to any type of devices
Institutions are predicted probably
How accurately it will predict the chances?
What do they HEAR?
what friends say
what boss say
what influencers say
help the students to know in advance if they have a chance to get accepted
It is more convenient
More useful for students who go for higher studies
Helpful for the students
Ability to fulfil all your necessities
What do they SEE?
environment
friends
what the market offers
Saves time and accurate results
Manage tome to reach the institute location
Saves money to get advice from consultancy
A place to enter the marks
To see the percentage prediction to join that university
Location of the institution
What do they SAY AND DO?
attitude in public
appearance
behavior towards others
Compare facilities and performance
Compare distance and transportation
Check whether the institution is approved or not
Useful for predicting the chances of admission into a college
help the students to know in advance if they have a chance to get accepted
useful for students getting into college
PAIN
fears
frustrations
obstacles
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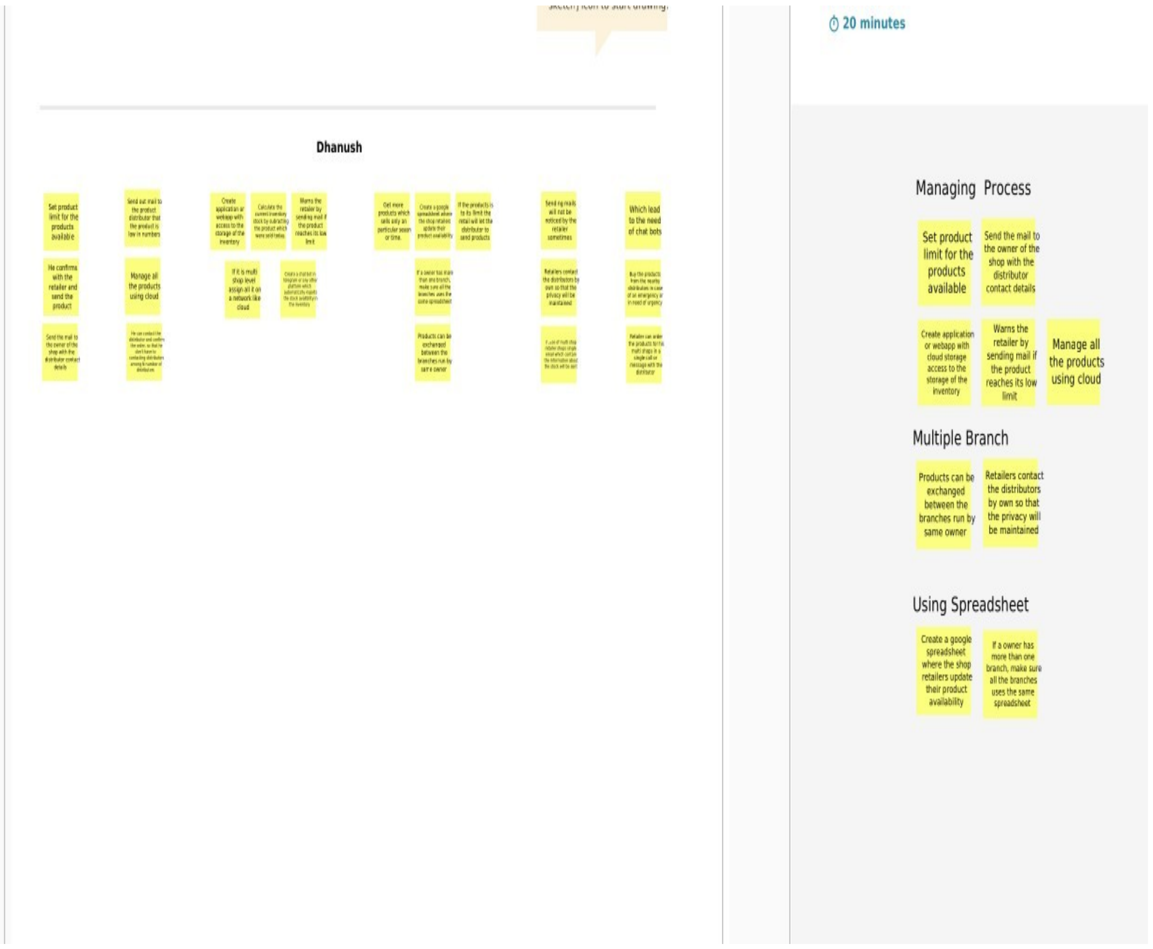
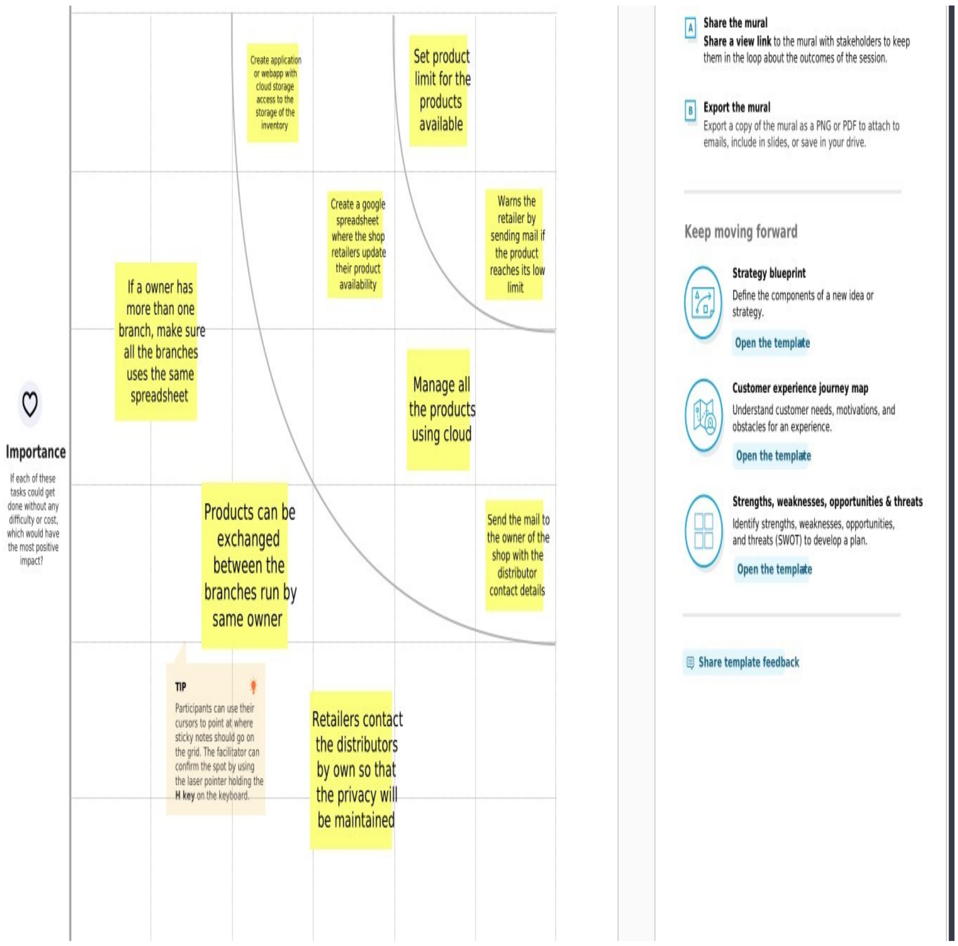
Difficulty to choose which is better than other
Machine learning models were perfomed to predict the opportunity
Runs only when the device has an internet facility
GAIN
"wants" / needs
measures of success
obstacles
Reduce time to select institute
Probably select better ones
Reduce manual input
Prevents over spending
Proper awareness for the institute
Select best institute based on our obtained marks

2.2 Ideation & Brainstorming


20 minutes
Dhanush
Set product limit for the products available
Send out mail to the product distributor that the product is low in numbers
He confirms with the retailer and send the product
Manage all the products using cloud
Which lead to the need of chat bots
Managing Process
Set product limit for the products available
Send the mail to the owner of the shop with the distributor contact details
Create application or webapp with cloud storage access to the storage of the inventory
Warns the retailer by sending mail if the product reaches its low limit
Manage all the products using cloud
Multiple Branch
Products can be exchanged between the branches run by same owner
Retailers contact the distributors by own so that the privacy will be maintained
Using Spreadsheet
Create a google spreadsheet where the shop retailers update their product availability
If a owner has more than one branch, make sure all the branches uses the same spreadsheet



Create application or webapp with cloud storage access to the storage of the inventory

Set product limit for the products available

Create a google spreadsheet where the shop retailers update their product availability

Warns the retailer by sending mail if the product reaches its low limit

If a owner has more than one branch, make sure all the branches uses the same spreadsheet

Manage all the products using cloud

Products can be exchanged between the branches run by same owner

Send the mail to the owner of the shop with the distributor contact details

Retailers contact the distributors by own so that the privacy will be maintained

Importance

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

TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.

A **Share the mural**

Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.

B **Export the mural**

Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

Keep moving forward

Strategy blueprint

Define the components of a new idea or strategy.

Open the template

Customer experience journey map

Understand customer needs, motivations, and obstacles for an experience.

Open the template

Strengths, weaknesses, opportunities & threats

Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.

Open the template

Share template feedback

2.3 Proposed Solution

S. No.	Parameter	Description
1	Problem Statement	To solve the need that the shopkeepers doesn’t have the systematic way to keep their record of inventory data.
2	Idea / Proposed Solution	An application which retailers successfully log in to the application, that 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 the stock reduced to the limited amount found in the inventory. So that they can order new stock.
3	Novelty / Uniqueness	With this inventory management system, the shopkeeper not only can fill the inventory but also reduce the wastage of goods. The users can register the stocks that they need by logging in from their account.
4	Social Impact / Customer Satisfaction	Customer Satisfaction is entirely depend on the services which they expected. If the retailer’s system exceeds with customer’s expectation, the customers will be satisfied.
5	Business Model	With the better inventory management system, Update the inventory without any need of manpower. Retailer can live up with user’s need and be on the flow with current sale products and they can update the inventory with that products.
6	Scalability of the Solution	To create a scalable inventory management system, the retailer have to 1. Keeping low inventory levels as much as possible 2. Keep an eye on Sales Projections 3. Use ODM (On-Demand Manufacturing). ODM refers to manufacture or in this case, update the products which are highly in demand.

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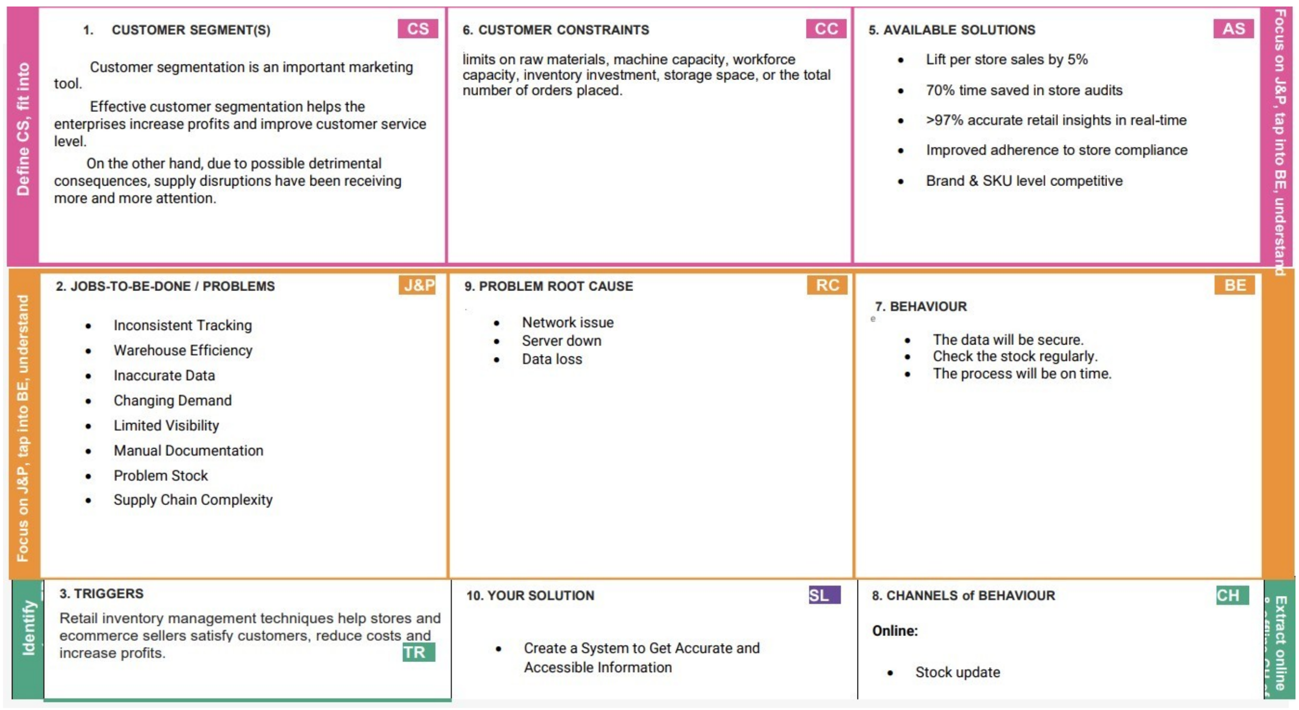
2.4 Problem Solution fit



Define CS, fit into

1. CUSTOMER SEGMENT(S) CS

Customer segmentation is an important marketing tool.

Effective customer segmentation helps the enterprises increase profits and improve customer service level.

On the other hand, due to possible detrimental consequences, supply disruptions have been receiving more and more attention.

6. CUSTOMER CONSTRAINTS CC

limits on raw materials, machine capacity, workforce capacity, inventory investment, storage space, or the total number of orders placed.

5. AVAILABLE SOLUTIONS AS

- Lift per store sales by 5%
- 70% time saved in store audits
- >97% accurate retail insights in real-time
- Improved adherence to store compliance
- Brand & SKU level competitive

Focus on J&P, tap into BE, understand

Focus on J&P, tap into BE, understand

2. JOBS-TO-BE-DONE / PROBLEMS J&P

- Inconsistent Tracking
- Warehouse Efficiency
- Inaccurate Data
- Changing Demand
- Limited Visibility
- Manual Documentation
- Problem Stock
- Supply Chain Complexity

9. PROBLEM ROOT CAUSE RC

- Network issue
- Server down
- Data loss

7. BEHAVIOUR BE

- The data will be secure.
- Check the stock regularly.
- The process will be on time.

Identify

3. TRIGGERS TR

Retail inventory management techniques help stores and ecommerce sellers satisfy customers, reduce costs and increase profits.

10. YOUR SOLUTION SL

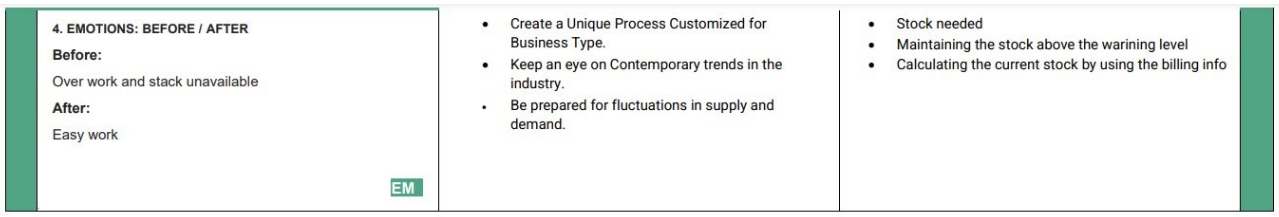
- Create a System to Get Accurate and Accessible Information

8. CHANNELS of BEHAVIOUR CH

Online:

- Stock update

Extract online



4. EMOTIONS: BEFORE / AFTER EM

Before:

Over work and stack unavailable

After:

Easy work

- Create a Unique Process Customized for Business Type.
- Keep an eye on Contemporary trends in the industry.
- Be prepared for fluctuations in supply and demand.

- Stock needed
- Maintaining the stock above the warining level
- Calculating the current stock by using the billing info

Solution Architecture

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3.REQUIREMENT ANALYSIS

3.1 Functional requirement

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Email
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Login	Log into the application by entering the Email and Password
FR-4	Dashboard	View the products availability
FR-5	Add items to cart	Users they wish to buy products, they can add it to the cart.
FR-6	Stock Update	If the desired product is unavailable, they can update the products into the list for buying products.

3.2 Non-Functional requirements

Following are the non-functional requirements of the proposed solution.

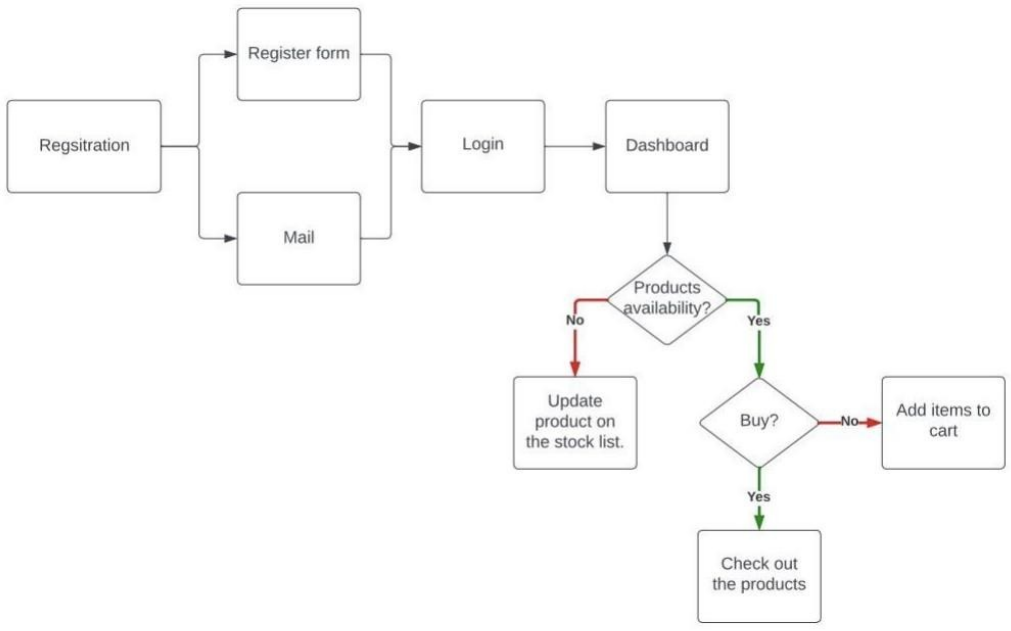
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	While usability determines how effective implementing an inventory tracking system is in your business. If it takes hours for your staff to learn the ins and outs of the software, then it’s probably not worth buying.
NFR-2	**Security**	The process of ensuring the safety and optimum management control of stored goods. It is of central importance for optimum warehouse management because the performance of a company stands or falls with the safety and efficiency of a warehouse.
NFR-3	**Reliability**	Relying on manual inventory counts to know what you have will only guarantee high inefficiencies and a loss of customers.

NFR-4	**Performance**	Creating systems to log products, receive them into inventory, track changes when sales occur, manage the flow of goods from purchasing to final sale and check stock counts.
NFR-5	**Availability**	Whether a specific item is available for customer orders. Additional information provided by retailers may include the quantity available.
NFR-6	**Scalability**	They should use an automated inventory management system for inventory tracking. This will make your business much more scalable so that you can continue building consistent growth and take advantage of increased sales.

4.PROJECT DESIGN

4.1 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 data is stored.



4.2 Solution & Technical Architecture:

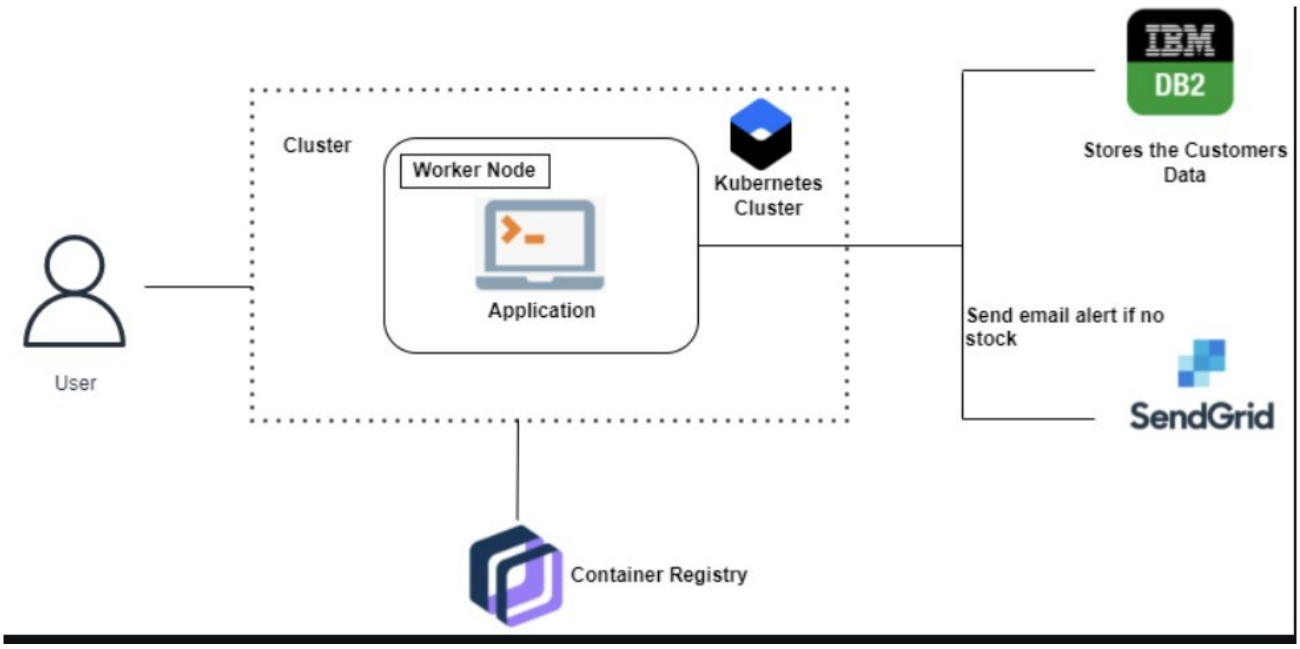


Table-1:Components&Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic	Logic for a process in the application	Python-Flask
3.	Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.
4.	Cloud Database	Database Service on Cloud	IBM DB2
5.	File Storage	File storage requirements	IBM Cloud Object Storage
6.	App Container	Contain the whole application in a single container	Docker Container / IBM Container Registry
7.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration:	Local, Cloud Foundry, Kubernetes, etc.
8.	Send Mails	Sending mails about stocks available in the Inventory to the Retailer	SendGrid

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	React Js / Flask
2.	Security Implementations	List all the security / access controls implemented, use of firewalls etc.	IBM Cloud Security
3.	Availability	Justify the availability of application (e.g., use of load balancers, distributed servers etc.)	Python-Flask

4.3 User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Custoer (Web user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I can register for the application through E-mail	I can access my account / dashboard	Medium	Sprint-1
	Confirmation	USN-3	As a user, I will receive confirmation email once I have registered for the application	I can get confirmation for my email and password and create authent icated accoun t.	Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering email & password	I can log onto the application with verified email and password	High	Sprint-1
	Dashboard	USN-5	As a user, I can view the products which are available	Once I log on to the application, I can view products to buy.	High	Sprint-2

User Type	Functional Requiremen t (Epic)	User Story Numbe r	User Story / Task	Acceptance criteria	Priority	Release
	Add items to cart	USN-6	As a user, I can add the products I wish to buy to the carts.	As a user, I can buy any products or add it to my cart for buying it later.	Medium	Sprint-2

	Stock Update	USN-7	As a user, I can add products which are not available in the dashboard to the stock list.	If any of the products which are not available, as a user I can update the inventory and send mail to the owner.	Medium	Sprint-3
Custom er Care Executi ve	Request to Custome r Care	USN-8	As a user, I can contact the Customer Care Executive and request any services I want from the customer care.	As a user, I can contact Customer Care and get support from them.	Low	Sprint-4
Administrator	Contact Administrato r	USN-9	I can be able to report any difficulties I experience as a report	As user, I can give my support in my possible ways to administrator and the administration.	Medium	Sprint-4

5. PROJECT PLANNING & SCHEDULING

5.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	Dhanush
Sprint-1		USN-2	As a user, I can register for the application through E-mail	1	Medium	Dhanush
Sprint-1	Confirmation	USN-3	As a user, I will receive confirmation email once I have registered for the application	2	Medium	Dhanush

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	2	High	Dhanush
Sprint-2	Dashboard	USN-5	As a user, I can view the products which are available	4	High	Dhanush
Sprint-2	Add items to cart	USN-6	As a user, I can add the products I wish to buy to the carts.	5	Medium	Dhanush
Sprint-3	Stock Update	USN-7	As a user, I can add products which are not available in the dashboard to the stock list.	5	Medium	Dhanush
Sprint-4	Request to Customer Care	USN-8	As a user, I can contact the Customer Care Executive and request any services I want from the customer care.	5	Low	Dhanush
Sprint-4	Contact Administrator	USN-9	I can be able to report any difficulties I experience as a report	5	Medium	Dhanush

6.2. 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	7	6 Days	24 Oct 2022	29 Oct 2022	7	29 Oct 2022
Sprint-2	9	6 Days	31 Oct 2022	05 Nov 2022	9	05 Nov 2022
Sprint-3	5	6 Days	07 Nov 2022	12 Nov 2022	5	12 Nov 2022
Sprint-4	10	6 Days	14 Nov 2022	19 Nov 2022	10	19 Nov 2022

6. CODING & SOLUTIONING

6.1 Feature 1

```
from flask import Flask, render_template, flash, redirect, url_for, session, request, logging
from wtforms import Form, StringField, TextAreaField, PasswordField, validators, SelectField,
IntegerField
import ibm_db
from passlib.hash import sha256_crypt
from functools import wraps

from sendgrid import *

#creating an app instance
app = Flask(__name__)

app.secret_key='a'

conn = ibm_db.connect("DATABASE=;HOSTNAME=;
PORT=;SECURITY=SSL;SSLS
ererCertificate=DigiCertGlobalRootCA.crt;UID=;PWD=",",")

#Index
@app.route('/')
def index():
    return render_template('home.html')

#Products
@app.route('/products')
def products():
    sql = "SELECT * FROM products"
    stmt = ibm_db.prepare(conn, sql)
    result=ibm_db.execute(stmt)

    products=[]
    row = ibm_db.fetch_assoc(stmt)
    while(row):
        products.append(row)
        row = ibm_db.fetch_assoc(stmt)
    products=tuple(products)
    #print(products)

    if result>0:
        return render_template('products.html', products = products)
    else:
        msg='No products found'
        return render_template('products.html', msg=msg)

#Locations
@app.route('/locations')
def locations():

    sql = "SELECT * FROM locations"
    stmt = ibm_db.prepare(conn, sql)
    result=ibm_db.execute(stmt)
    locations=[]
    row = ibm_db.fetch_assoc(stmt)
    while(row):
        locations.append(row)
        row = ibm_db.fetch_assoc(stmt)
    locations=tuple(locations)
    #print(locations)

    if result>0:
        return render_template('locations.html', locations = locations)
    else:
        msg='No locations found'
        return render_template('locations.html', msg=msg)

#Product Movements
@app.route('/product_movements')
def product_movements():

    sql = "SELECT * FROM productmovements"
    stmt = ibm_db.prepare(conn, sql)
    result=ibm_db.execute(stmt)

    movements=[]
    row = ibm_db.fetch_assoc(stmt)
    while(row):
        movements.append(row)
        row = ibm_db.fetch_assoc(stmt)
    movements=tuple(movements)
    #print(movements)

    if result>0:
        return render_template('product_movements.html', movements = movements)
    else:
        msg='No product movements found'
        return render_template('product_movements.html', msg=msg)

#Register Form Class
class RegisterForm(Form):
    name = StringField('Name', [validators.Length(min=1, max=50)])
    username = StringField('Username', [validators.Length(min=1, max=25)])
    email = StringField('Email', [validators.length(min=6, max=50)])
    password = PasswordField('Password', [
        validators.DataRequired(),
        validators.EqualTo('confirm', message='Passwords do not match')
    ])
    confirm = PasswordField('Confirm Password')

#user register
@app.route('/register', methods=['GET','POST'])
def register():
    form = RegisterForm(request.form)
    if request.method == 'POST' and form.validate():
        name = form.name.data
        email = form.email.data
        username = form.username.data
        password = sha256_crypt.encrypt(str(form.password.data))
        sql1="INSERT INTO users(name, email, username, password) VALUES(?,?,?,?)"
        stmt1 = ibm_db.prepare(conn, sql1)
        ibm_db.bind_param(stmt1,1,name)
        ibm_db.bind_param(stmt1,2,email)
        ibm_db.bind_param(stmt1,3,username)
        ibm_db.bind_param(stmt1,4,password)
        ibm_db.execute(stmt1)
        #for flash messages taking parameter and the category of message to be flashed
        flash("You are now registered and can log in", "success")

        #when registration is successful redirect to home
        return redirect(url_for('login'))
    return render_template('register.html', form = form)


#User login
@app.route('/login', methods = ['GET', 'POST'])
def login():
    if request.method == 'POST':
        #Get form fields
        username = request.form['username']
        password_candidate = request.form['password']

        sql1="Select * from users where username = ?"
        stmt1 = ibm_db.prepare(conn, sql1)
        ibm_db.bind_param(stmt1,1,username)
        result=ibm_db.execute(stmt1)
        d=ibm_db.fetch_assoc(stmt1)
        if result > 0:
            #Get the stored hash
            data = d
            password = data['PASSWORD']

            #compare passwords
            if sha256_crypt.verify(password_candidate, password):
                #Passed
                session['logged_in'] = True
                session['username'] = username

                flash("you are now logged in","success")
                return redirect(url_for('dashboard'))
            else:
                error = 'Invalid Login'
                return render_template('login.html', error=error)
            #Close connection
            cur.close()
        else:
            error = 'Username not found'
            return render_template('login.html', error=error)
    return render_template('login.html')

#check if user logged in
def is_logged_in(f):
    @wraps(f)
    def wrap(*args, **kwargs):
        if 'logged_in' in session:
            return f(*args, **kwargs)
        else:
            flash('Unauthorized, Please login','danger')
            return redirect(url_for('login'))
    return wrap

#Logout
@app.route('/logout')
@is_logged_in
def logout():
    session.clear()
    flash("You are now logged out", "success")
    return redirect(url_for('login'))

#Dashboard
@app.route('/dashboard')
@is_logged_in
def dashboard():
    sql2="SELECT product_id, location_id, qty FROM product_balance"
    sql3="SELECT location_id FROM locations"
    stmt2 = ibm_db.prepare(conn, sql2)
    stmt3 = ibm_db.prepare(conn, sql3)

    result=ibm_db.execute(stmt2)
    ibm_db.execute(stmt3)


    products=[]
    row = ibm_db.fetch_assoc(stmt2)
    while(row):
        products.append(row)
        row = ibm_db.fetch_assoc(stmt2)
    products=tuple(products)

    locations=[]
    row2 = ibm_db.fetch_assoc(stmt3)
    while(row2):
        locations.append(row2)
        row2 = ibm_db.fetch_assoc(stmt3)
    locations=tuple(locations)

    locs = []
    for i in locations:
        locs.append(list(i.values())[0])

    if result>0:
        return render_template('dashboard.html', products = products, locations = locs)
    else:
        msg='No products found'
        return render_template('dashboard.html', msg=msg)

#Product Form Class
class ProductForm(Form):
    product_id = StringField('Product ID', [validators.Length(min=1, max=200)])
    product_cost = StringField('Product Cost', [validators.Length(min=1, max=200)])
    product_num = StringField('Product Num', [validators.Length(min=1, max=200)])
```

```
#Add Product
@app.route('/add_product', methods=['GET', 'POST'])
@is_logged_in
def add_product():
    form = ProductForm(request.form)
    if request.method == 'POST' and form.validate():
        product_id = form.product_id.data
        product_cost = form.product_cost.data
        product_num = form.product_num.data



        sql1="INSERT INTO products(product_id, product_cost, product_num) VALUES(?,?,?)"
        stmt1 = ibm_db.prepare(conn, sql1)
        ibm_db.bind_param(stmt1,1,product_id)
        ibm_db.bind_param(stmt1,2,product_cost)
        ibm_db.bind_param(stmt1,3,product_num)

        ibm_db.execute(stmt1)

        flash("Product Added", "success")

        return redirect(url_for('products'))

    return render_template('add_product.html', form=form)

#Edit Product
@app.route('/edit_product/<string:id>', methods=['GET', 'POST'])
@is_logged_in
def edit_product(id):
    sql1="Select * from products where product_id = ?"
    stmt1 = ibm_db.prepare(conn, sql1)
    ibm_db.bind_param(stmt1,1,id)
    result=ibm_db.execute(stmt1)
    product=ibm_db.fetch_assoc(stmt1)

    print(product)
    #Get form
    form = ProductForm(request.form)

    #populate product form fields
    form.product_id.data = product['PRODUCT_ID']
    form.product_cost.data = str(product['PRODUCT_COST'])
    form.product_num.data = str(product['PRODUCT_NUM'])

    if request.method == 'POST' and form.validate():
        product_id = request.form['product_id']
        product_cost = request.form['product_cost']
        product_num = request.form['product_num']

        sql2="UPDATE products SET product_id=?,product_cost=?,product_num=? WHERE product_id=?"
        stmt2 = ibm_db.prepare(conn, sql2)
        ibm_db.bind_param(stmt2,1,product_id)
        ibm_db.bind_param(stmt2,2,product_cost)
        ibm_db.bind_param(stmt2,3,product_num)
        ibm_db.bind_param(stmt2,4,id)
        ibm_db.execute(stmt2)

        flash("Product Updated", "success")

        return redirect(url_for('products'))

    return render_template('edit_product.html', form=form)

#Delete Product
@app.route('/delete_product/<string:id>', methods=['POST'])
@is_logged_in
def delete_product(id):

    sql2="DELETE FROM products WHERE product_id=?"
    stmt2 = ibm_db.prepare(conn, sql2)
    ibm_db.bind_param(stmt2,1,id)


    ibm_db.execute(stmt2)

    flash("Product Deleted", "success")

    return redirect(url_for('products'))

#Location Form Class
class LocationForm(Form):
    location_id = StringField('Location ID', [validators.Length(min=1, max=200)])

#Add Location
@app.route('/add_location', methods=['GET', 'POST'])
@is_logged_in
def add_location():
    form = LocationForm(request.form)
    if request.method == 'POST' and form.validate():
        location_id = form.location_id.data

        sql2="INSERT into locations VALUES(?)"
        stmt2 = ibm_db.prepare(conn, sql2)
        ibm_db.bind_param(stmt2,1,location_id)
        ibm_db.execute(stmt2)

        flash("Location Added", "success")

        return redirect(url_for('locations'))

    return render_template('add_location.html', form=form)

#Edit Location
@app.route('/edit_location/<string:id>', methods=['GET', 'POST'])
@is_logged_in
def edit_location(id):

    sql2="SELECT * FROM locations where location_id = ?"
    stmt2 = ibm_db.prepare(conn, sql2)
    ibm_db.bind_param(stmt2,1,id)
    result=ibm_db.execute(stmt2)
    location=ibm_db.fetch_assoc(stmt2)
    #Get form
    form = LocationForm(request.form)
    print(location)

    #populate article form fields
    form.location_id.data = location['LOCATION_ID']

    if request.method == 'POST' and form.validate():
        location_id = request.form['location_id']

        sql2="UPDATE locations SET location_id=? WHERE location_id=?"
        stmt2 = ibm_db.prepare(conn, sql2)
        ibm_db.bind_param(stmt2,1,location_id)
        ibm_db.bind_param(stmt2,2,id)
        ibm_db.execute(stmt2)

        flash("Location Updated", "success")

        return redirect(url_for('locations'))

    return render_template('edit_location.html', form=form)



#Delete Location
@app.route('/delete_location/<string:id>', methods=['POST'])
@is_logged_in
def delete_location(id):
    sql2="DELETE FROM locations WHERE location_id=?"
    stmt2 = ibm_db.prepare(conn, sql2)
    ibm_db.bind_param(stmt2,1,id)
    ibm_db.execute(stmt2)

    flash("Location Deleted", "success")

    return redirect(url_for('locations'))

#Product Movement Form Class
class ProductMovementForm(Form):
    from_location = SelectField('From Location', choices=[])
    to_location = SelectField('To Location', choices=[])
    product_id = SelectField('Product ID', choices=[])
    qty = IntegerField('Quantity')

class CustomError(Exception):
    pass

#Add Product Movement
@app.route('/add_product_movements', methods=['GET', 'POST'])
@is_logged_in
def add_product_movements():
    form = ProductMovementForm(request.form)

    sql2="SELECT product_id FROM products"
    sql3="SELECT location_id FROM locations"
    stmt2 = ibm_db.prepare(conn, sql2)
    stmt3 = ibm_db.prepare(conn, sql3)
```

```
result=ibm_db.execute(stmt2)
ibm_db.execute(stmt3)


products=[]
row = ibm_db.fetch_assoc(stmt2)
while(row):
    products.append(row)
    row = ibm_db.fetch_assoc(stmt2)
products=tuple(products)

locations=[]
row2 = ibm_db.fetch_assoc(stmt3)
while(row2):
    locations.append(row2)
    row2 = ibm_db.fetch_assoc(stmt3)
locations=tuple(locations)

prods = []
for p in products:
    prods.append(list(p.values())[0])

locs = []
for i in locations:
    locs.append(list(i.values())[0])


form.from_location.choices = [(l,l) for l in locs]
form.from_location.choices.append(("Main Inventory","Main Inventory"))
form.to_location.choices = [(l,l) for l in locs]
form.to_location.choices.append(("Main Inventory","Main Inventory"))
form.product_id.choices = [(p,p) for p in prods]

if request.method == 'POST' and form.validate():
    from_location = form.from_location.data
    to_location = form.to_location.data
    product_id = form.product_id.data
    qty = form.qty.data


    if from_location==to_location:
        raise CustomError("Please Give different From and To Locations!!")


    elif from_location=="Main Inventory":
        sql2="SELECT * from product_balance where location_id=? and product_id=?"
        stmt2 = ibm_db.prepare(conn, sql2)
        ibm_db.bind_param(stmt2,1,to_location)
        ibm_db.bind_param(stmt2,2,product_id)
        result=ibm_db.execute(stmt2)
        result=ibm_db.fetch_assoc(stmt2)
        print("-----------------")
        print(result)
        print("-----------------")
        app.logger.info(result)
```

```
            if result!=False:
                if(len(result))>0:
                    Quantity = result["QTY"]
                    q = Quantity + qty

                    sql2="UPDATE product_balance set qty=? where location_id=? and product_id=?"
                    stmt2 = ibm_db.prepare(conn, sql2)
                    ibm_db.bind_param(stmt2,1,q)
                    ibm_db.bind_param(stmt2,2,to_location)
                    ibm_db.bind_param(stmt2,3,product_id)
                    ibm_db.execute(stmt2)

                    sql2="INSERT into productmovements(from_location, to_location, product_id, qty)
VALUES(?, ?, ?, ?)"
                    stmt2 = ibm_db.prepare(conn, sql2)
                    ibm_db.bind_param(stmt2,1,from_location)
                    ibm_db.bind_param(stmt2,2,to_location)
                    ibm_db.bind_param(stmt2,3,product_id)
                    ibm_db.bind_param(stmt2,4,qty)
                    ibm_db.execute(stmt2)
            else:

                sql2="INSERT into product_balance(product_id, location_id, qty) values(?, ?, ?)"
                stmt2 = ibm_db.prepare(conn, sql2)
                ibm_db.bind_param(stmt2,1,product_id)
                ibm_db.bind_param(stmt2,2,to_location)
                ibm_db.bind_param(stmt2,3,qty)
                ibm_db.execute(stmt2)




                sql2="INSERT into productmovements(from_location, to_location, product_id, qty)
VALUES(?, ?, ?, ?)"
                stmt2 = ibm_db.prepare(conn, sql2)
                ibm_db.bind_param(stmt2,1,from_location)
                ibm_db.bind_param(stmt2,2,to_location)
                ibm_db.bind_param(stmt2,3,product_id)
                ibm_db.bind_param(stmt2,4,qty)
                ibm_db.execute(stmt2)



            sql = "select product_num from products where product_id=?"
            stmt = ibm_db.prepare(conn, sql)
            ibm_db.bind_param(stmt,1,product_id)
            current_num=ibm_db.execute(stmt)
            current_num = ibm_db.fetch_assoc(stmt)

            sql2="Update products set product_num=? where product_id=?"
            stmt2 = ibm_db.prepare(conn, sql2)
            ibm_db.bind_param(stmt2,1,current_num['PRODUCT_NUM']-qty)
            ibm_db.bind_param(stmt2,2,product_id)
            ibm_db.execute(stmt2)
            alert_num=current_num['PRODUCT_NUM']-qty

            if(alert_num<=0):
                alert("Please update the quantity of the product {}, Atleast {} number of pieces must be added to
finish the pending Product Movements!".format(product_id,-alert_num))

        elif to_location=="Main Inventory":
            sql2="SELECT * from product_balance where location_id=? and product_id=?"
            stmt2 = ibm_db.prepare(conn, sql2)
            ibm_db.bind_param(stmt2,1,from_location)
            ibm_db.bind_param(stmt2,2,product_id)
            result=ibm_db.execute(stmt2)
            result=ibm_db.fetch_assoc(stmt2)

            app.logger.info(result)
            if result!=False:
                if(len(result))>0:
                    Quantity = result["QTY"]
                    q = Quantity - qty

                    sql2="UPDATE product_balance set qty=? where location_id=? and product_id=?"
                    stmt2 = ibm_db.prepare(conn, sql2)
                    ibm_db.bind_param(stmt2,1,q)
                    ibm_db.bind_param(stmt2,2,to_location)
                    ibm_db.bind_param(stmt2,3,product_id)
                    ibm_db.execute(stmt2)

                    sql2="INSERT into productmovements(from_location, to_location, product_id, qty)
VALUES(?, ?, ?, ?)"
                    stmt2 = ibm_db.prepare(conn, sql2)
                    ibm_db.bind_param(stmt2,1,from_location)
                    ibm_db.bind_param(stmt2,2,to_location)
                    ibm_db.bind_param(stmt2,3,product_id)
                    ibm_db.bind_param(stmt2,4,qty)
                    ibm_db.execute(stmt2)

                    flash("Product Movement Added", "success")




                    sql = "select product_num from products where product_id=?"
                    stmt = ibm_db.prepare(conn, sql)
                    ibm_db.bind_param(stmt,1,product_id)
                    current_num=ibm_db.execute(stmt)
                    current_num = ibm_db.fetch_assoc(stmt)

                    sql2="Update products set product_num=? where product_id=?"
                    stmt2 = ibm_db.prepare(conn, sql2)
                    ibm_db.bind_param(stmt2,1,current_num['PRODUCT_NUM']+qty)
                    ibm_db.bind_param(stmt2,2,product_id)
                    ibm_db.execute(stmt2)

                    alert_num=q
                    if(alert_num<=0):
                        alert("Please Add {} number of {} to {} warehouse!".format(-q,product_id,from_location))
            else:
                raise CustomError("There is no product named {} in {}.".format(product_id,from_location))
```

```
else: #will be executed if both from_location and to_location are specified
   f=0
   sql = "SELECT * from product_balance where location_id=? and product_id=?"
   stmt = ibm_db.prepare(conn, sql)
   ibm_db.bind_param(stmt,1,from_location)
   ibm_db.bind_param(stmt,2,product_id)
   result=ibm_db.execute(stmt)
   result = ibm_db.fetch_assoc(stmt)

   if result!=False:
      if(len(result))>0:
         Quantity = result["QTY"]
         q = Quantity - qty

         sql2="UPDATE product_balance set qty=? where location_id=? and product_id=?"
         stmt2 = ibm_db.prepare(conn, sql2)
         ibm_db.bind_param(stmt2,1,q)
         ibm_db.bind_param(stmt2,2,from_location)
         ibm_db.bind_param(stmt2,3,product_id)
         ibm_db.execute(stmt2)
         f=1

         alert_num=q
         if(alert_num<=0):
            alert("Please Add {} number of {} to {} warehouse!".format(-q,product_id,from_location))

   else:
      raise CustomError("There is no product named {} in {}.".format(product_id,from_location))

   if(f==1):
      sql = "SELECT * from product_balance where location_id=? and product_id=?"
      stmt = ibm_db.prepare(conn, sql)
      ibm_db.bind_param(stmt,1,to_location)
      ibm_db.bind_param(stmt,2,product_id)
      result=ibm_db.execute(stmt)
      result = ibm_db.fetch_assoc(stmt)





      if result!=False:
         if(len(result))>0:
            Quantity = result["QTY"]
            q = Quantity + qty

            sql2="UPDATE product_balance set qty=? where location_id=? and product_id=?"
            stmt2 = ibm_db.prepare(conn, sql2)
            ibm_db.bind_param(stmt2,1,q)
            ibm_db.bind_param(stmt2,2,to_location)
            ibm_db.bind_param(stmt2,3,product_id)
            ibm_db.execute(stmt2)
```

```
                else:

                    sql2="INSERT into product_balance(product_id, location_id, qty) values(?, ?, ?)"
                    stmt2 = ibm_db.prepare(conn, sql2)
                    ibm_db.bind_param(stmt2,1,product_id)
                    ibm_db.bind_param(stmt2,2,to_location)
                    ibm_db.bind_param(stmt2,3,qty)
                    ibm_db.execute(stmt2)
                sql2="INSERT into productmovements(from_location, to_location, product_id, qty)
VALUES(?, ?, ?, ?)"
                stmt2 = ibm_db.prepare(conn, sql2)
                ibm_db.bind_param(stmt2,1,from_location)
                ibm_db.bind_param(stmt2,2,to_location)
                ibm_db.bind_param(stmt2,3,product_id)
                ibm_db.bind_param(stmt2,4,qty)
                ibm_db.execute(stmt2)

                flash("Product Movement Added", "success")

        render_template('products.html',form=form)


        return redirect(url_for('product_movements'))

    return render_template('add_product_movements.html', form=form)

#Delete Product Movements
@app.route('/delete_product_movements/<string:id>', methods=['POST'])
@is_logged_in
def delete_product_movements(id):

    sql2="DELETE FROM productmovements WHERE movement_id=?"
    stmt2 = ibm_db.prepare(conn, sql2)
    ibm_db.bind_param(stmt2,1,id)
    ibm_db.execute(stmt2)

    flash("Product Movement Deleted", "success")

    return redirect(url_for('product_movements'))

if __name__ == '__main__':
    app.secret_key = "secret123"
    #when the debug mode is on, we do not need to restart the server again and again
    app.run(host=”0.0.0.0”, debug=True)
```

6.2 Feature 2

```
import smtplib
from email.mime.multipart import MIMEMultipart
from email.mime.text import MIMEText
from email.mime.base import MIMEBase

def alert(main_msg):
   mail_from = 'dhanush.23cs@licet.ac.in'
   mail_to = 'lokeswar.23cs@licet.ac.in'
   msg = MIMEMultipart()
   msg['From'] = mail_from
   msg['To'] = mail_to
   msg['Subject'] = '!Alert Mail On Product Shortage! - Regards'
   mail_body = main_msg
   msg.attach(MIMEText(mail_body))

   try:
      server = smtplib.SMTP_SSL('smtp.sendgrid.net', 465)
      server.ehlo()
      server.login('apikey', 'API_KEY')
      server.sendmail(mail_from, mail_to, msg.as_string())
      server.close()
      print("Mail sent successfully!")
   except:
      print("Some Issue, Mail not Sent :(")
```

6.3 User Acceptance Testing

User Acceptance Testing (UAT) is a type of testing performed by the end user or the client to verify/accept the software system before moving the software application to the production environment. UAT is done in the final phase of testing after functional, integration and system testing is done.

Purpose of UAT

The main Purpose of UAT is to validate end to end business flow. It does not focus on cosmetic errors, spelling mistakes or system testing. User Acceptance Testing is carried out in a separate testing environment with production-like data setup. It is kind of black box testing where two or more end-users will be involved.UAT is performed by -

- Client
- End users

Need of User Acceptance Testing arises once software has undergone Unit, Integration and System testing because developers might have built software based on requirements document by their own understanding and further required changes during development may not be effectively communicated to them, so for testing whether the final product is accepted by client/end-user, user acceptance testing is needed.

Developers code software based on requirements document which is their "own" understanding of the requirements and may not actually be what the client needs from the software.

Requirements changes during the course of the project may not be communicated effectively to the developers.

Defect Analysis

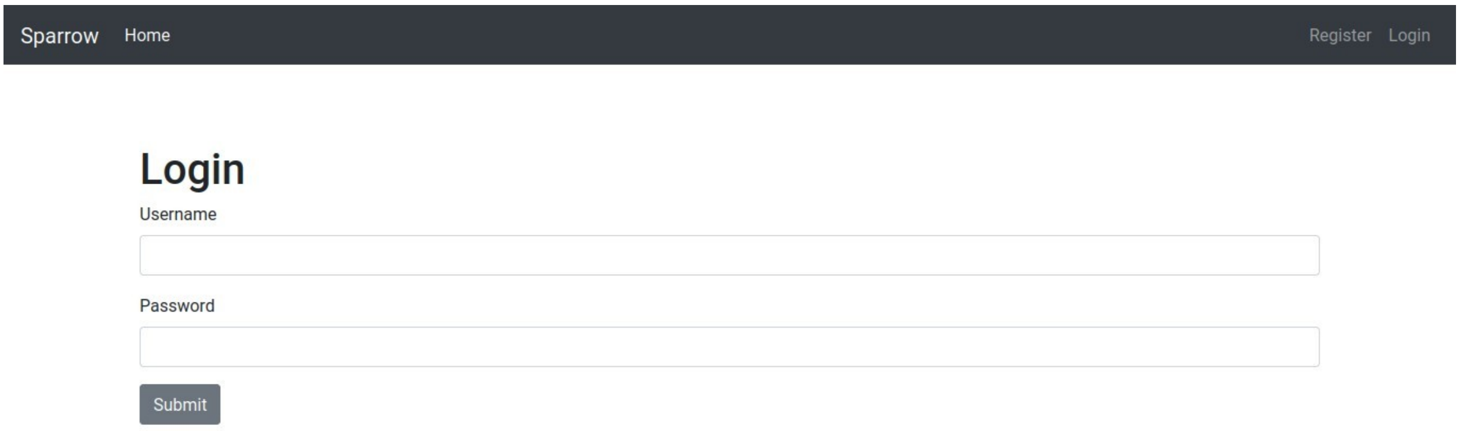
This report shows the number of resolved or closed bugs at each severity
they were resolved.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	8	2	2	3	15
Duplicate	1	1	2	2	6
External	0	3	9	13	25
Fixed	8	7	9	20	44
Not Reproduced	0	0	5	0	5
Skipped	0	0	1	1	2
Won't Fix	0	5	1	1	7
Totals	17	18	23	39	121

Results:

website link: http://169.51.203.165:30000/

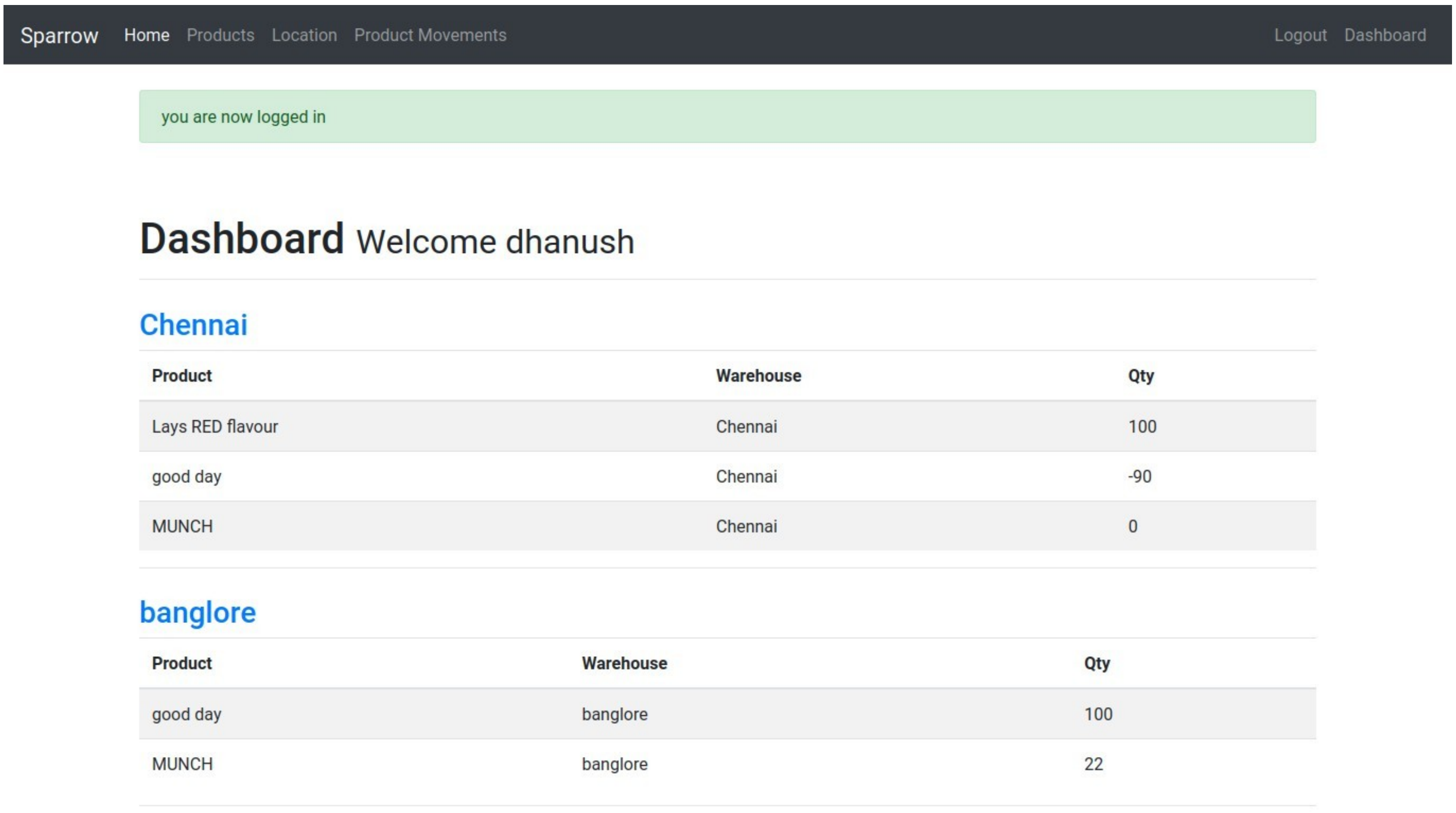
Demo link: https://youtu.be/KwTL9nVBPkw



Login

Username

Password



you are now logged in

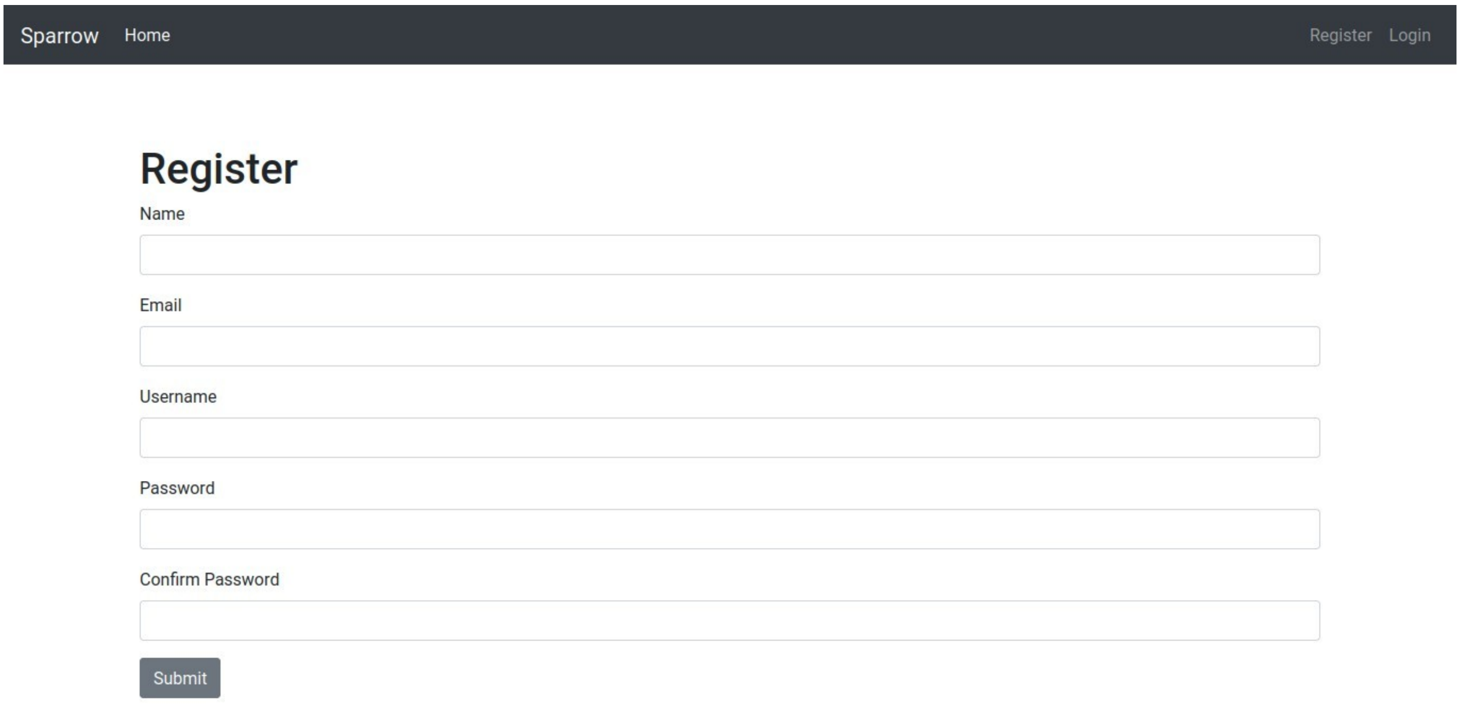
Dashboard Welcome dhanush

Chennai

Product	Warehouse	Qty
Lays RED flavour	Chennai	100
good day	Chennai	-90
MUNCH	Chennai	0

banglore

Product	Warehouse	Qty
good day	banglore	100
MUNCH	banglore	22



Register

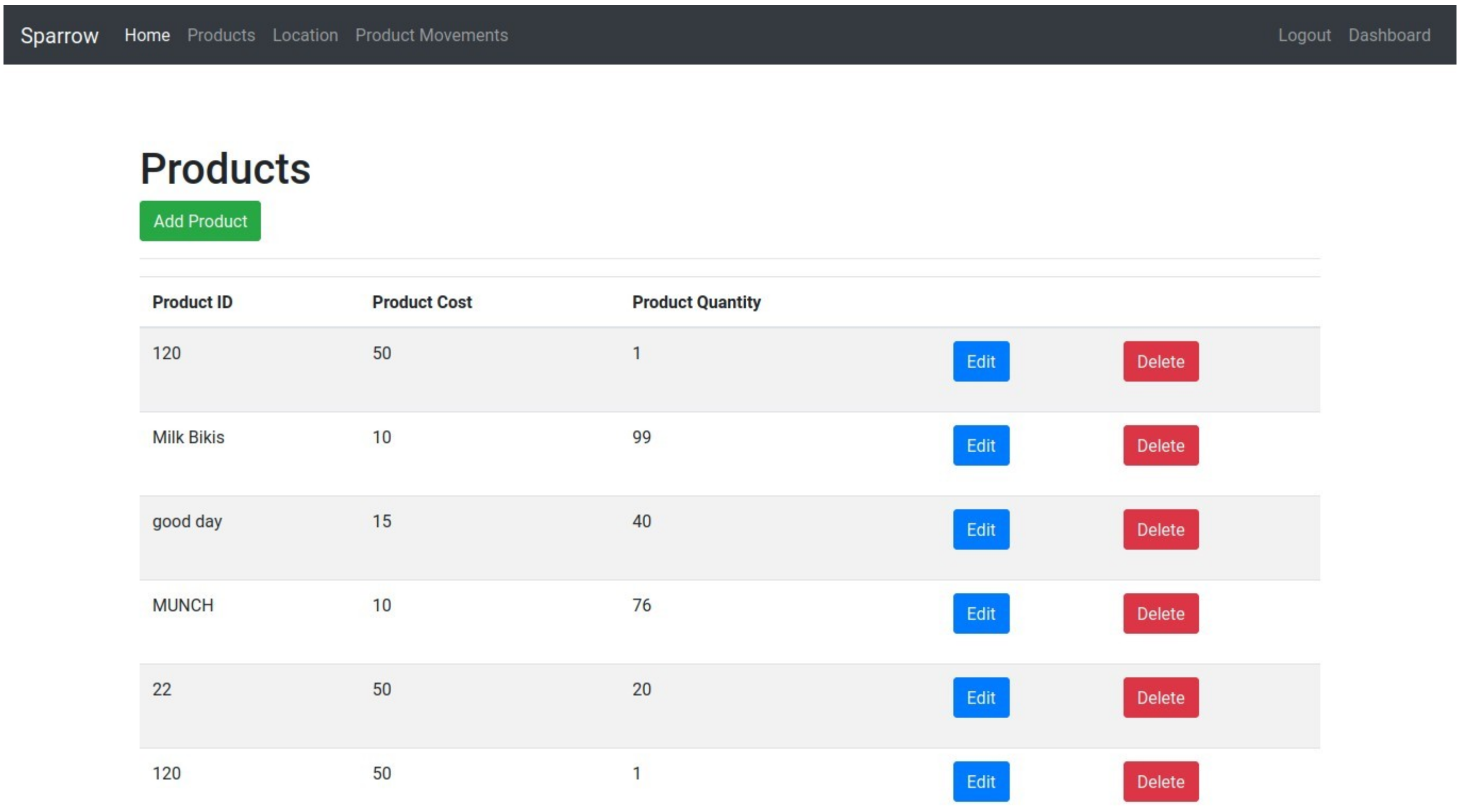
Name

Email

Username

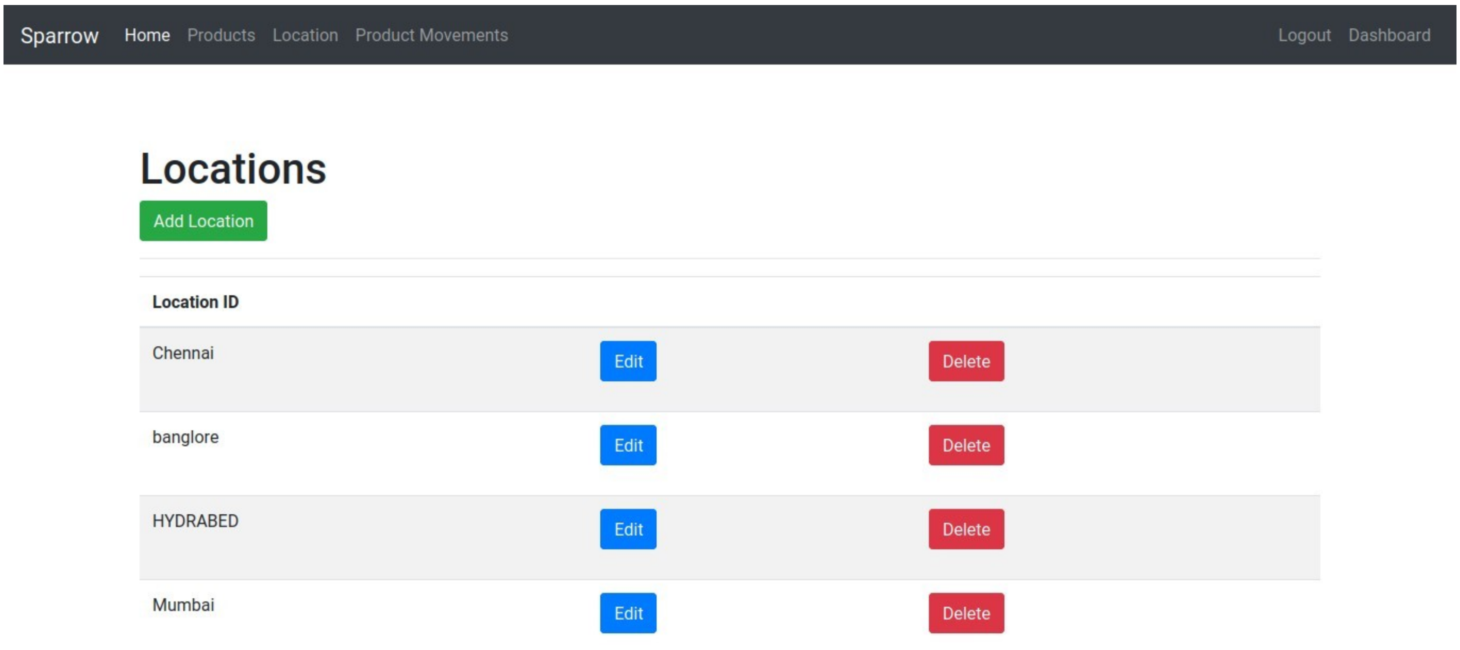
Password

Confirm Password



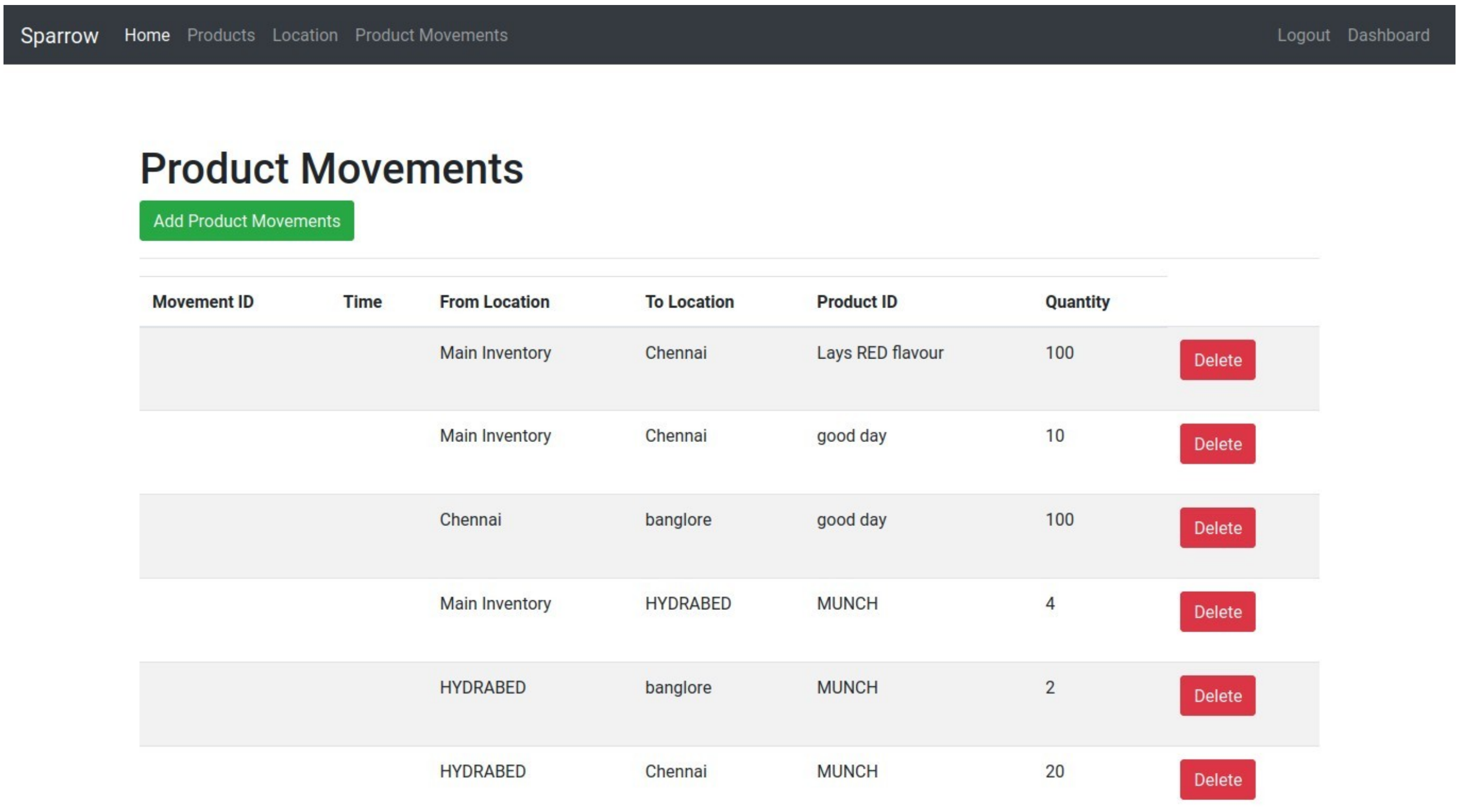
Products

Product ID	Product Cost	Product Quantity		
120	50	1	Edit	Delete
Milk Bikis	10	99	Edit	Delete
good day	15	40	Edit	Delete
MUNCH	10	76	Edit	Delete
22	50	20	Edit	Delete
120	50	1	Edit	Delete



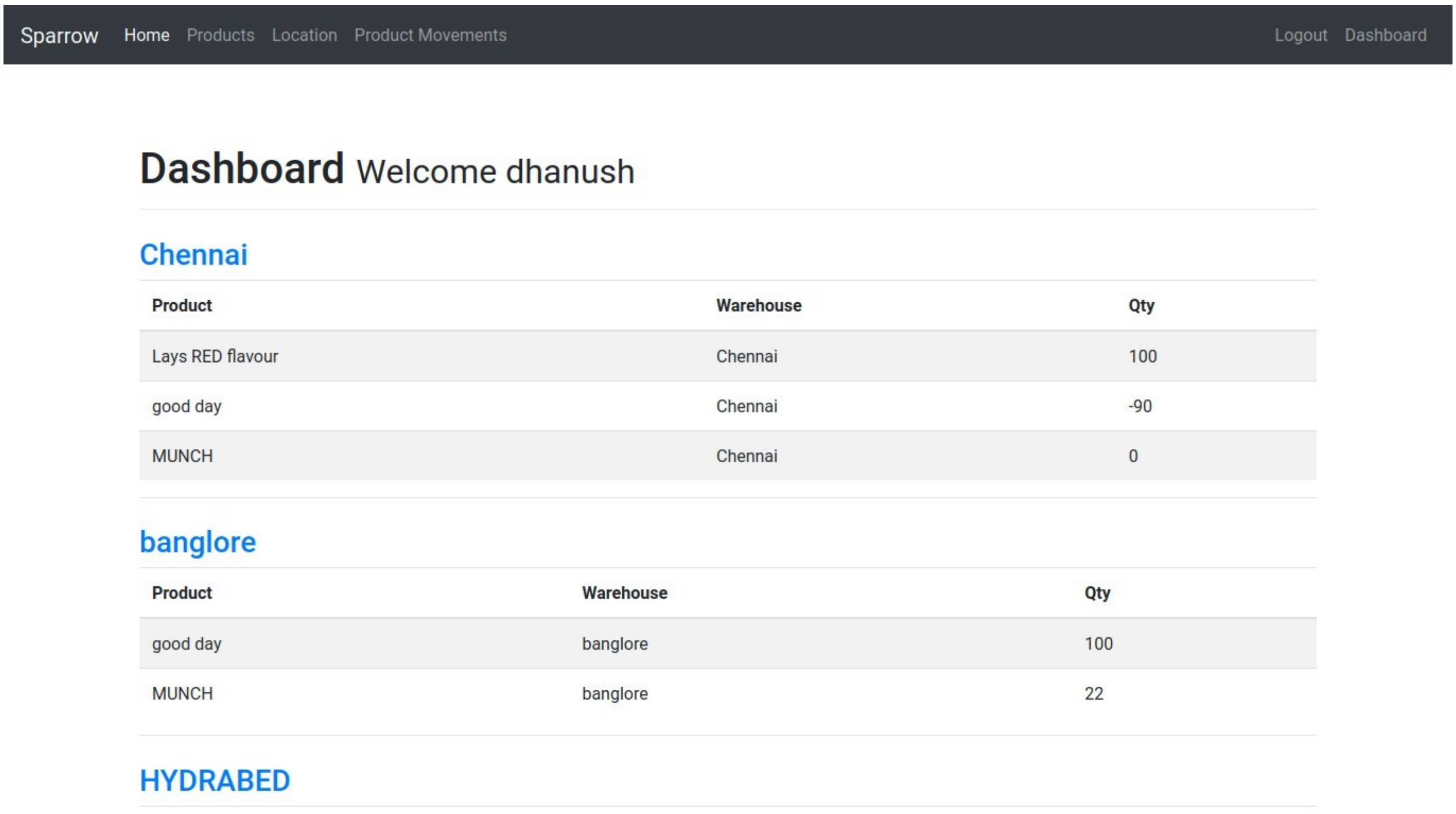
Locations

Location ID		
Chennai	Edit	Delete
banglore	Edit	Delete
HYDRABED	Edit	Delete
Mumbai	Edit	Delete



Product Movements

Movement ID	Time	From Location	To Location	Product ID	Quantity	
		Main Inventory	Chennai	Lays RED flavour	100	Delete
		Main Inventory	Chennai	good day	10	Delete
		Chennai	banglore	good day	100	Delete
		Main Inventory	HYDRABED	MUNCH	4	Delete
		HYDRABED	banglore	MUNCH	2	Delete
		HYDRABED	Chennai	MUNCH	20	Delete



Dashboard Welcome dhanush

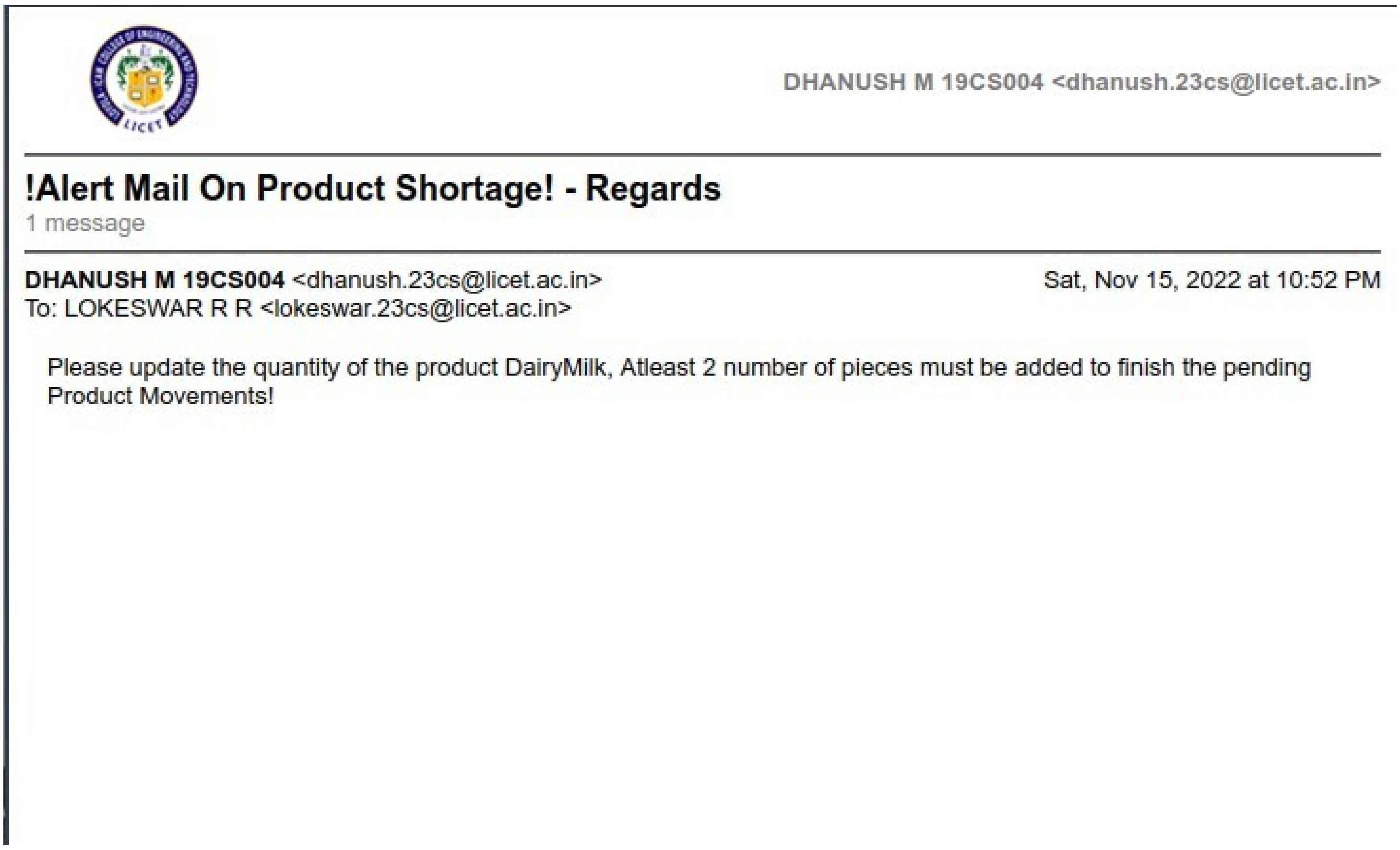
Chennai

Product	Warehouse	Qty
Lays RED flavour	Chennai	100
good day	Chennai	-90
MUNCH	Chennai	0

banglore

Product	Warehouse	Qty
good day	banglore	100
MUNCH	banglore	22

HYDRABED

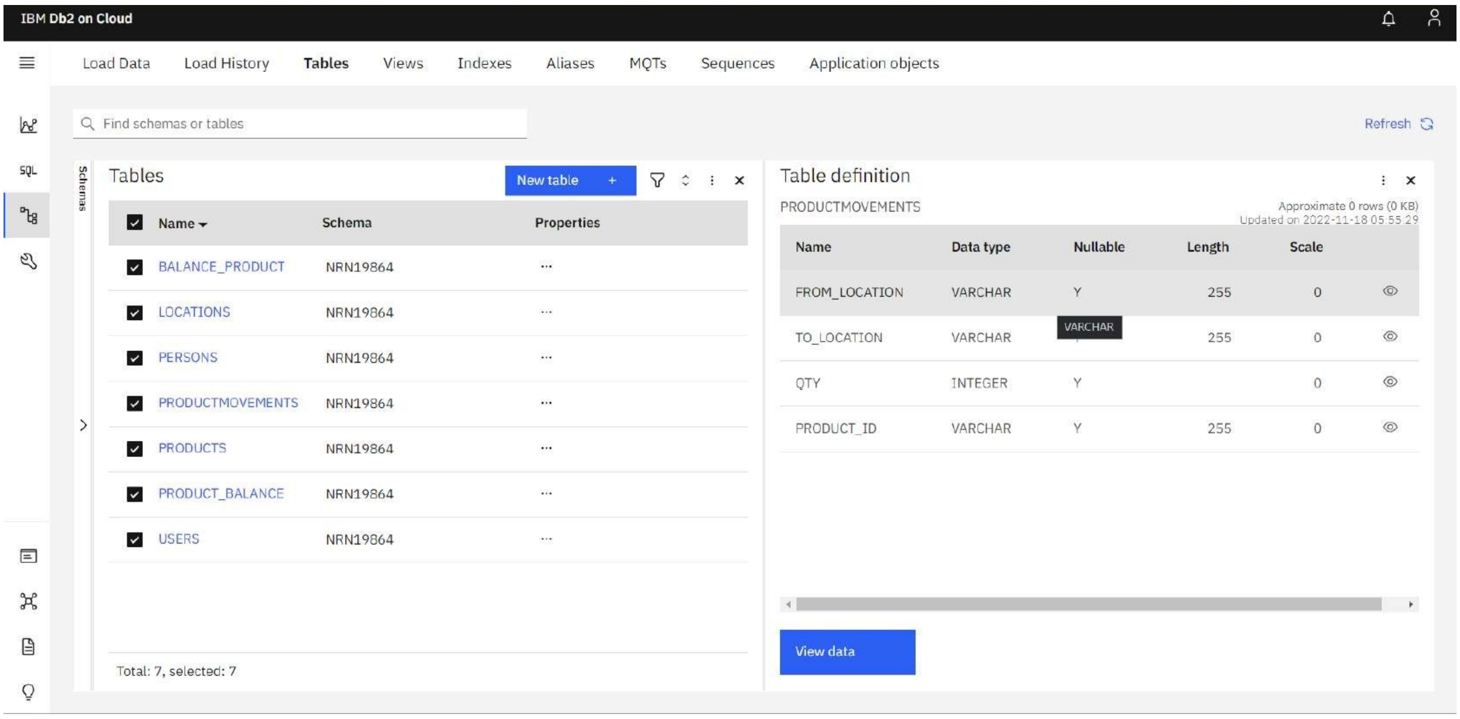


DHANUSH M 19CS004 <dhanush.23cs@licet.ac.in>

!Alert Mail On Product Shortage! - Regards
1 message

DHANUSH M 19CS004 <dhanush.23cs@licet.ac.in> Sat, Nov 15, 2022 at 10:52 PM
To: LOKESWAR R R <lokeswar.23cs@licet.ac.in>

Please update the quantity of the product DairyMilk, Atleast 2 number of pieces must be added to finish the pending Product Movements!



Tables

Name	Schema	Properties
BALANCE_PRODUCT	NRN19864	···
LOCATIONS	NRN19864	···
PERSONS	NRN19864	···
PRODUCTMOVEMENTS	NRN19864	···
PRODUCTS	NRN19864	···
PRODUCT_BALANCE	NRN19864	···
USERS	NRN19864	···

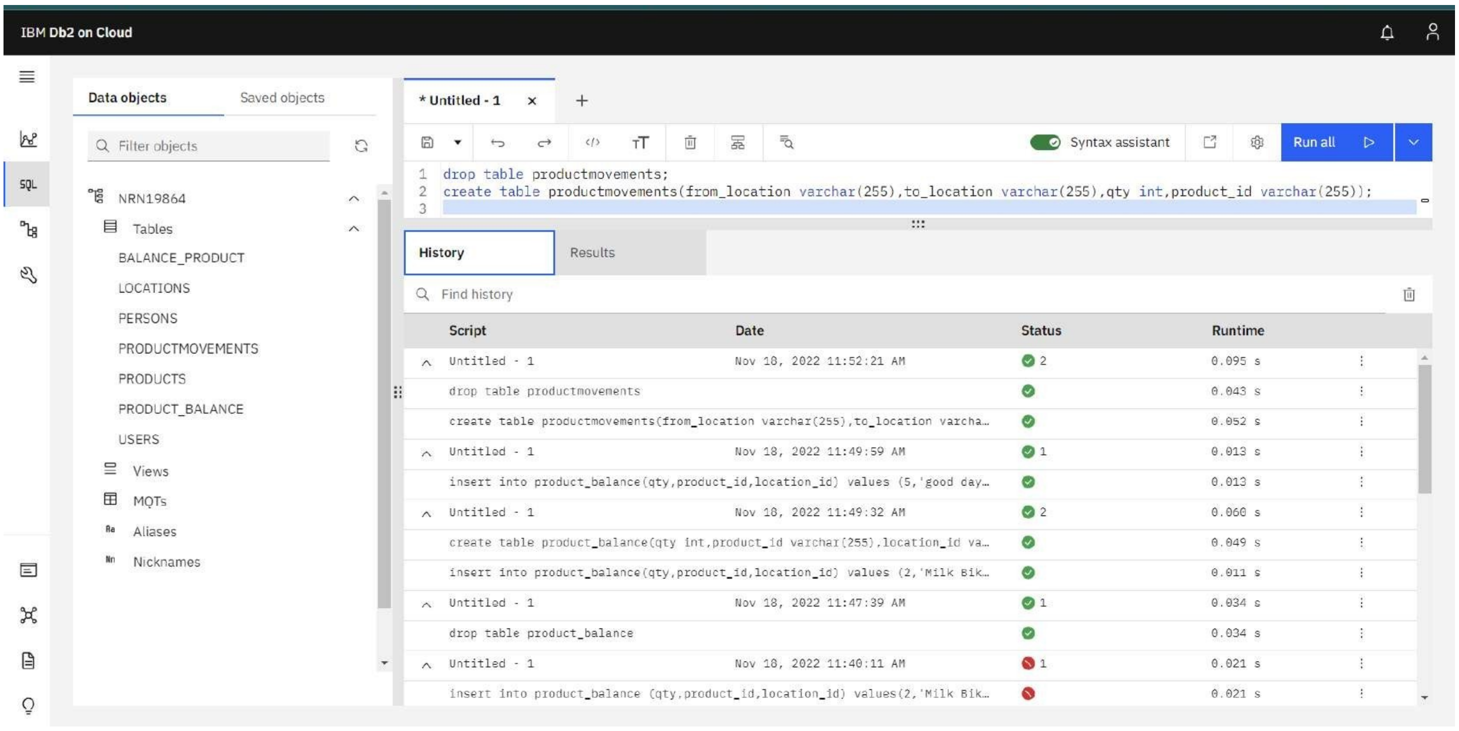
Total: 7, selected: 7

Table definition

PRODUCTMOVEMENTS

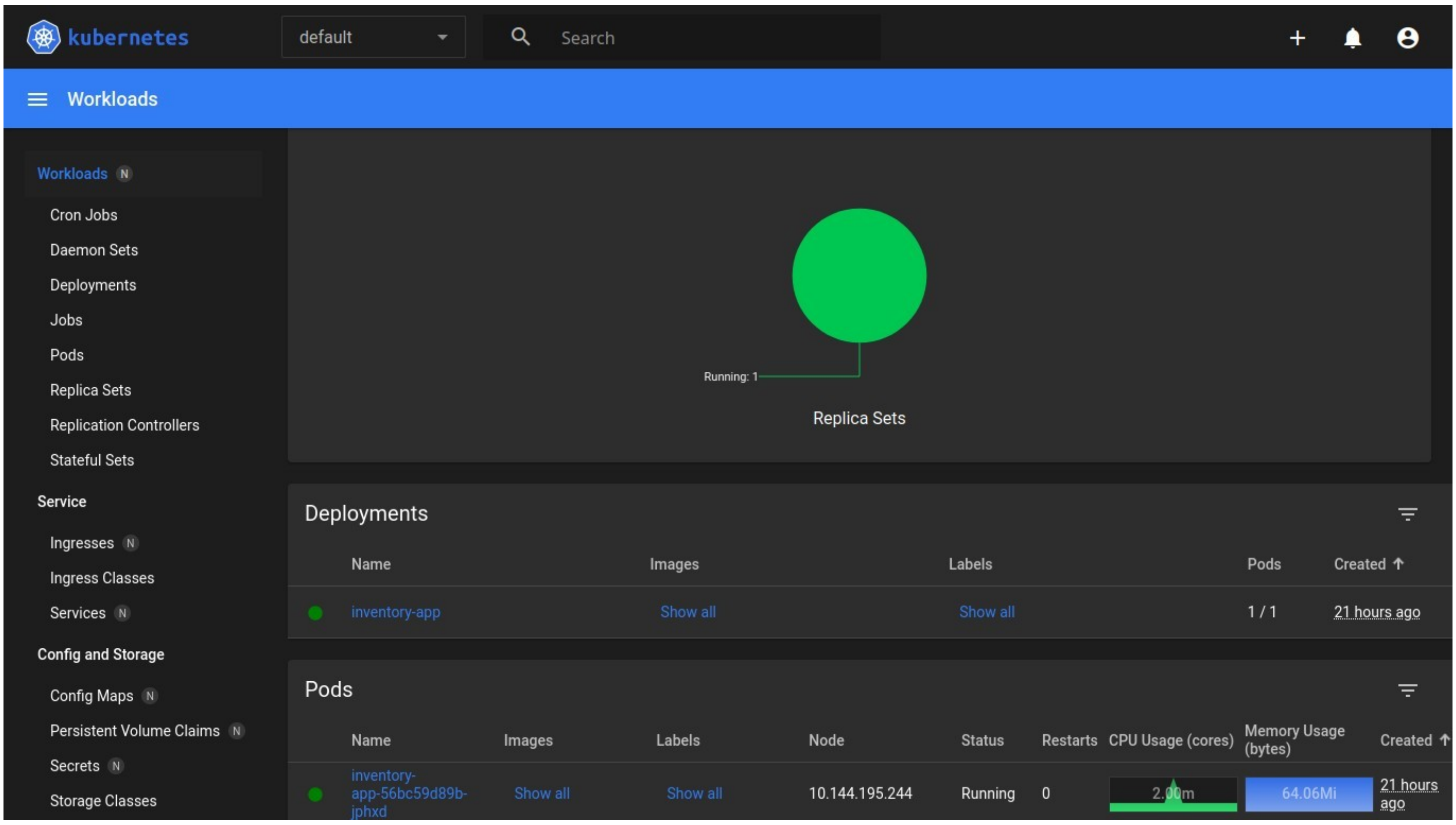
Approximate 0 rows (0 KB)
Updated on 2022-11-18 05 55 29

Name	Data type	Nullable	Length	Scale
FROM_LOCATION	VARCHAR	Y	255	0
TO_LOCATION	VARCHAR		255	0
QTY	INTEGER	Y		0
PRODUCT_ID	VARCHAR	Y	255	0



```
drop table productmovements;
create table productmovements(from_location varchar(255),to_location varchar(255),qty int,product_id varchar(255));
```

	Script	Date	Status	Runtime
^	Untitled - 1	Nov 18, 2022 11:52:21 AM	✓ 2	0.095 s
	drop table productmovements		✓	0.043 s
	create table productmovements(from_location varchar(255),to_location varcha…		✓	0.052 s
^	Untitled - 1	Nov 18, 2022 11:49:59 AM	✓ 1	0.013 s
	insert into product_balance(qty,product_id,location_id) values (5,'good day…		✓	0.013 s
^	Untitled - 1	Nov 18, 2022 11:49:32 AM	✓ 2	0.060 s
	create table product_balance(qty int,product_id varchar(255),location_id va…		✓	0.049 s
	insert into product_balance(qty,product_id,location_id) values (2,'Milk Bik…		✓	0.011 s
^	Untitled - 1	Nov 18, 2022 11:47:39 AM	✓ 1	0.034 s
	drop table product_balance		✓	0.034 s
^	Untitled - 1	Nov 18, 2022 11:40:11 AM	⊘ 1	0.021 s
	insert into product_balance (qty,product_id,location_id) values(2,'Milk Bik…		⊘	0.021 s

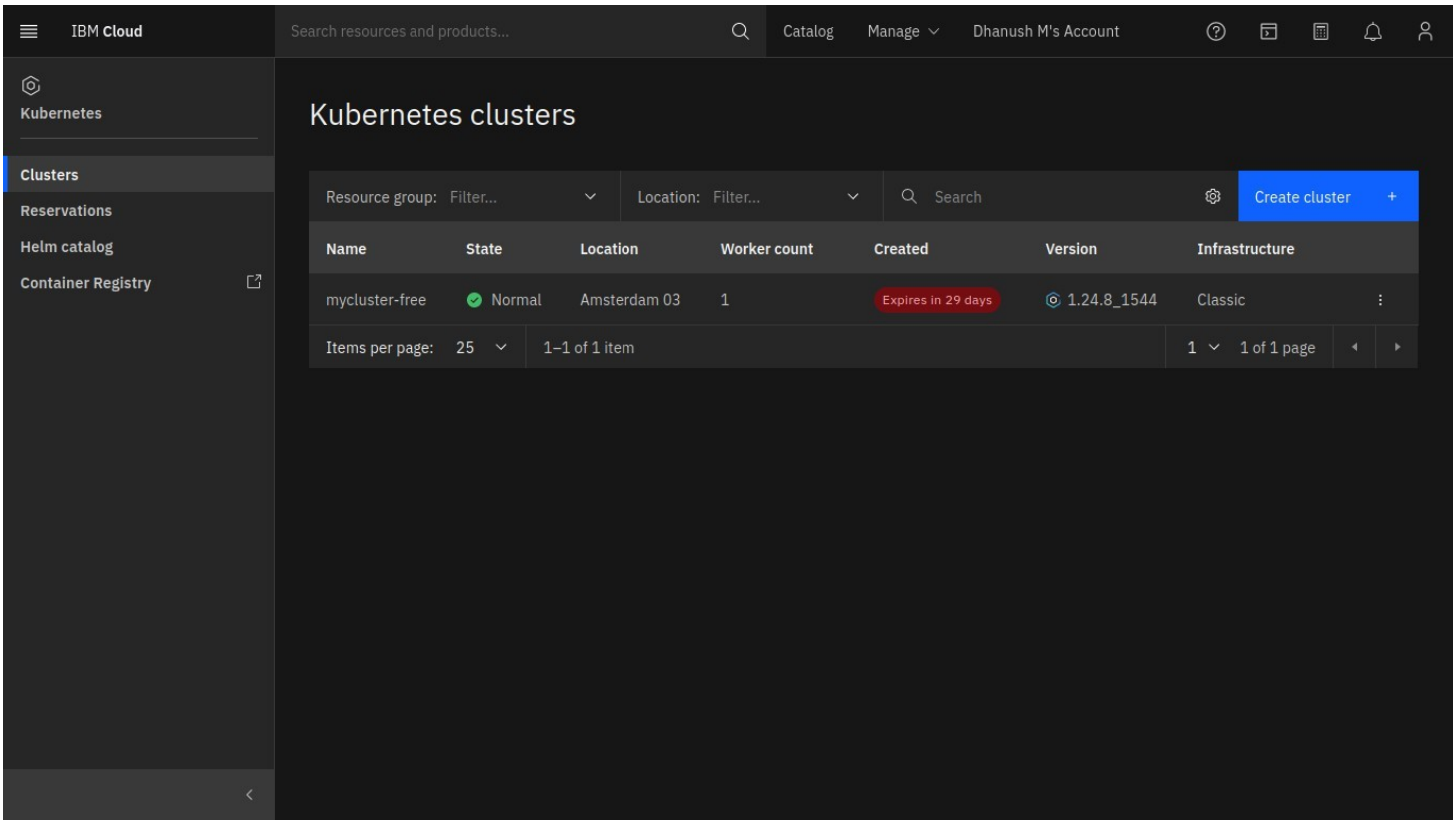


Deployments

	Name	Images	Labels	Pods	Created ↑
●	inventory-app	Show all	Show all	1 / 1	21 hours ago

Pods

	Name	Images	Labels	Node	Status	Restarts	CPU Usage (cores)	Memory Usage (bytes)	Created ↑
●	inventory-app-56bc59d89b-jphxd	Show all	Show all	10.144.195.244	Running	0	2.00m	64.06Mi	21 hours ago

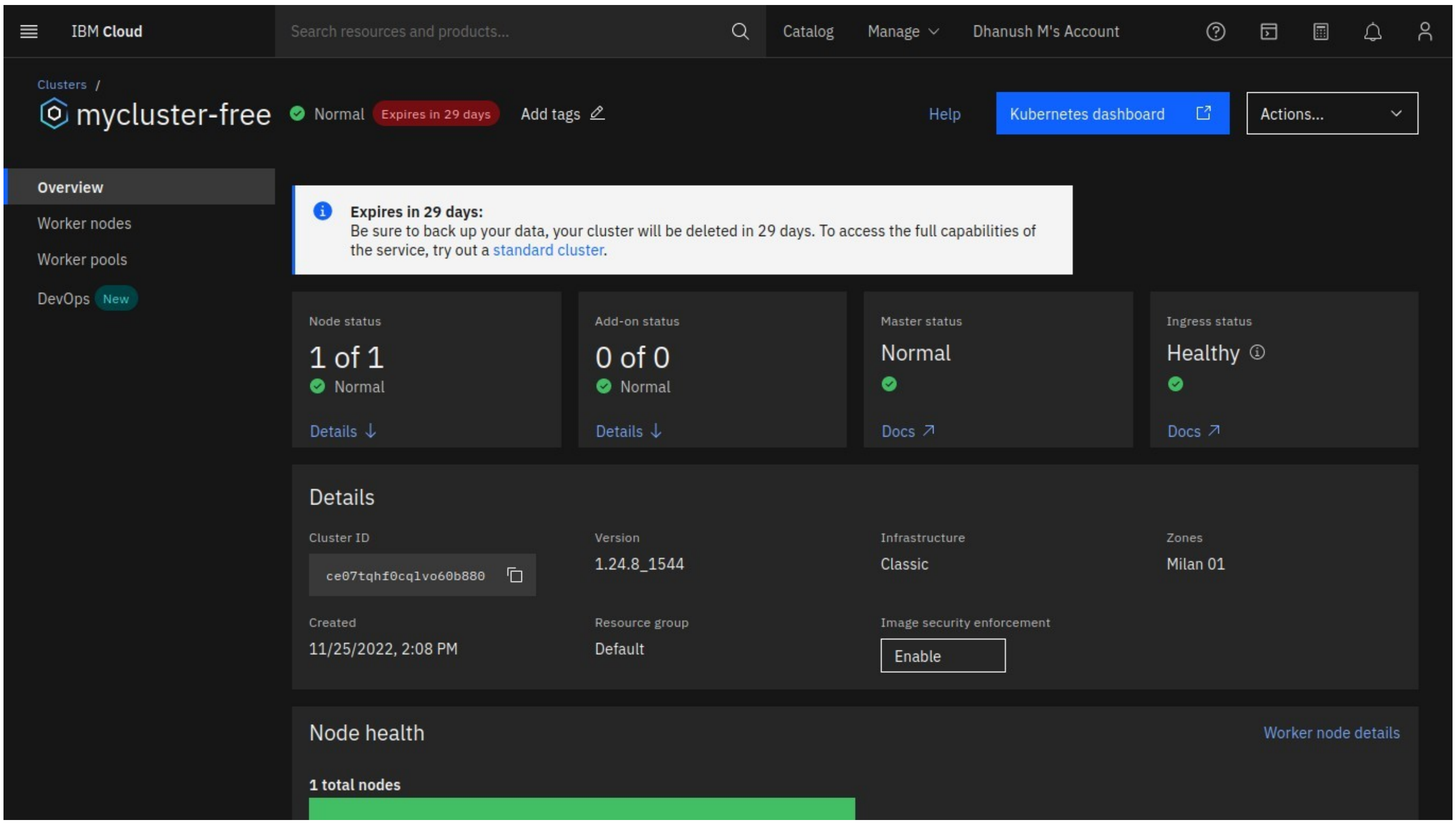


Kubernetes clusters

Resource group: Filter... Location: Filter... Search Create cluster +

Name	State	Location	Worker count	Created	Version	Infrastructure
mycluster-free	Normal	Amsterdam 03	1	Expires in 29 days	1.24.8_1544	Classic

Items per page: 25 1–1 of 1 item 1 1 of 1 page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Clusters /

mycluster-free Normal Expires in 29 days Add tags

Help Kubernetes dashboard Actions...

Overview
Worker nodes
Worker pools
DevOps New

Expires in 29 days:
Be sure to back up your data, your cluster will be deleted in 29 days. To access the full capabilities of the service, try out a standard cluster.

Node status	Add-on status	Master status	Ingress status
1 of 1	0 of 0	Normal	Healthy
Normal	Normal		
Details	Details	Docs	Docs

Details

Cluster ID	Version	Infrastructure	Zones
ce07tqhf0cqlvo60b880	1.24.8_1544	Classic	Milan 01
Created	**Resource group**	**Image security enforcement**	
11/25/2022, 2:08 PM	Default	Enable	

Node health

Worker node details

1 total nodes

Conclusion:

The main purpose of the software is to provide assistance to the retailers in maintaining their inventory. The UI has been designed in a less complex way so that the retailers will need to spend less time in understanding the software. User acceptance test indicates that the software is capable of performing better in the real world.