

## Final Deliverables Report

<b>Date</b>	14.11.2022
<b>Team ID</b>	PNT2022TMID28817
<b>Project Name</b>	Inventory Management System for Retailers

### Team members and their Contribution:

Name	Roll no	Contribution
Bojja Naveen Kumar	410719106073	Frontend – 5 Pages, Integration of Sendgrid, Deployment of using docker and Kubernetes.
Dasari Chethana	410719106022	Frontend – 5 Pages, Documentation
Shaik Shehanaz	410719106091	Frontend – 4 Pages, Documentation
Nagappagari Devasankarsai	410719106069	Backend Fully (For all 14 Pages), Integration of IBM Cloud, Deployment of using docker and Kubernetes.

### Introduction:

1. Sprint 1 – Backend
  2. Sprint 2 – Frontend
  3. Sprint 3 – IBM Cloud Integration + Integration of SendGrid
  4. Sprint 4 – Deploying the application using Docker and Kubernetes
- Sprint 1 – Backend:**

All the routes to each page and APIs are created.

Example, (For Products page)

```

22
23 #Products
24 @app.route('/products')
25 def products():
26     sql = "SELECT * FROM products"
27     stmt = ibm_db.prepare(conn, sql)
28     result=ibm_db.execute(stmt)
29
30     products=[]
31     row = ibm_db.fetch_assoc(stmt)
32     while(row):
33         products.append(row)
34         row = ibm_db.fetch_assoc(stmt)
35     products=tuple(products)
36     #print(products)
37
38     if result>0:
39         return render_template('products.html', products = products)
40     else:
41         msg='No products found'
42         return render_template('products.html', msg=msg)
43
44 #Locations
45 @app.route('/locations')
46 def locations():
47

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER

```

* Serving Flask app 'app'
* Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on http://127.0.0.1:5000
Press CTRL+C to quit
* Restarting with stat
* Debugger is active!
* Debugger PIN: 512-196-405

```

Ln 33, Col 29 Spaces: 4 UTF-8 CRLF Python 3.10.7 64-bit Go Live

## Sprint 2 – Frontend:

The frontend is written using HTML, CSS (using Bootstrap) and JavaScript for all the pages to which the routes created in Sprint 1.

For Example, (The Hierarchy of different pages and the code for login page)

```

1 {% extends 'layout.html' %}
2
3 {% block body %}
4 <h1>Login</h1>
5 <form method="POST" action="">
6     <div class="form-group">
7         <label>Username</label>
8         <input type="text" name="username" class="form-control" value="{{request.form.username}}>
9     </div>
10    <div class="form-group">
11        <label>Password</label>
12        <input type="password" name="password" class="form-control" value="{{request.form.password}}>
13    </div>
14    <p><button type="submit" class="btn btn-primary" value="Submit">Submit</button></p>
15 </form>
16 {% endblock %}

```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER

```

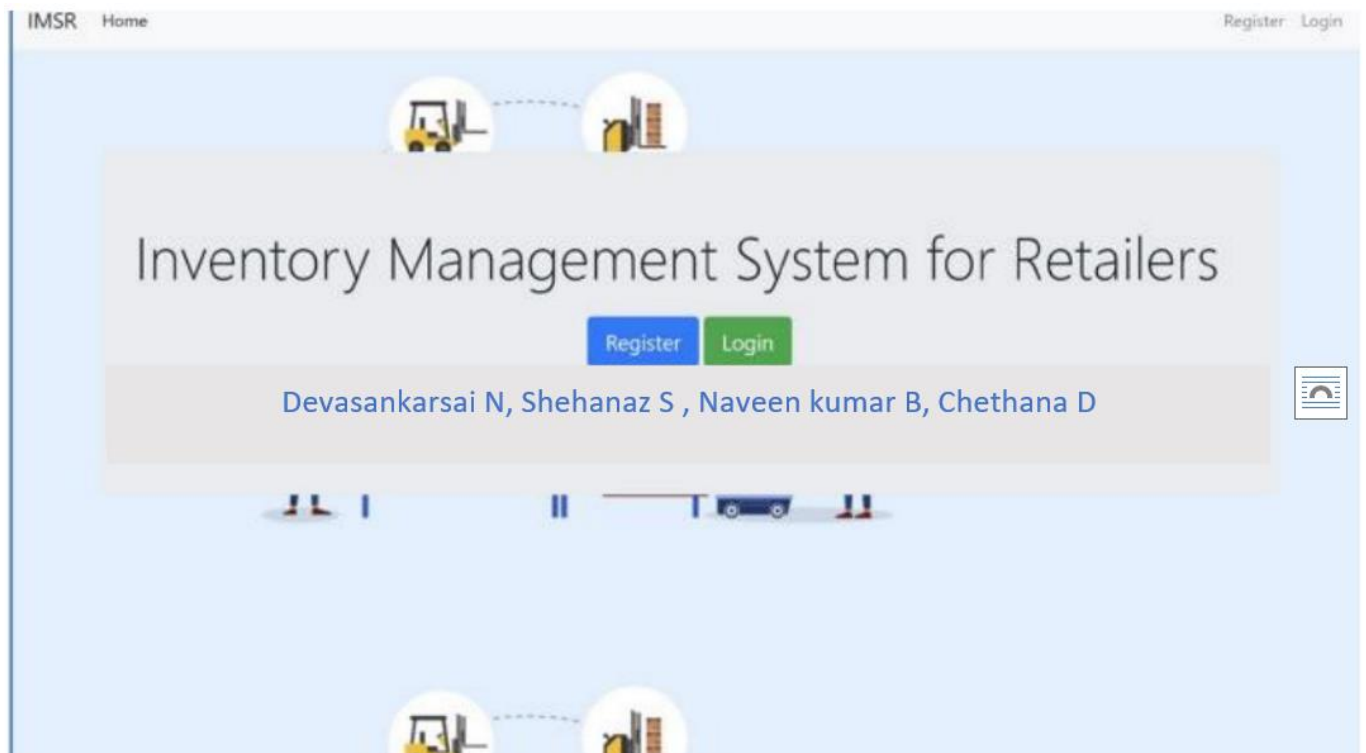
* Serving Flask app 'app'
* Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on http://127.0.0.1:5000
Press CTRL+C to quit
* Restarting with stat
* Debugger is active!
* Debugger PIN: 512-196-405

```

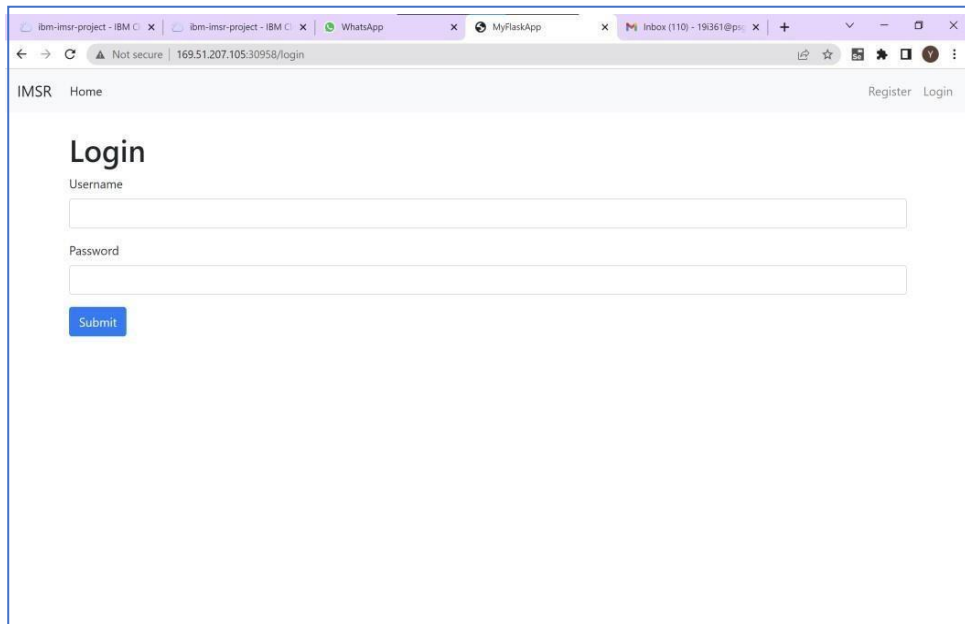
Ln 16, Col 15 Spaces: 4 UTF-8 CRLF HTML Go Live

Sample FrontEnd Pages,

Home Page,



## Login Page,



The screenshot shows a web browser window with multiple tabs. The active tab is titled 'ibm-imrs-project - IBM C'. The address bar shows the URL '169.51.207.105:30958/login'. The page has a header with 'IMSR Home' on the left and 'Register Login' on the right. The main content area is titled 'Login' and contains two input fields: 'Username' and 'Password'. Below these fields is a blue 'Submit' button.

ibm-imrs-project - IBM C x ibm-imrs-project - IBM C x WhatsApp x MyFlaskApp x Inbox (110) - 19361@ps: x +

← → ↻ Not secure | 169.51.207.105:30958/login

IMSR Home Register Login

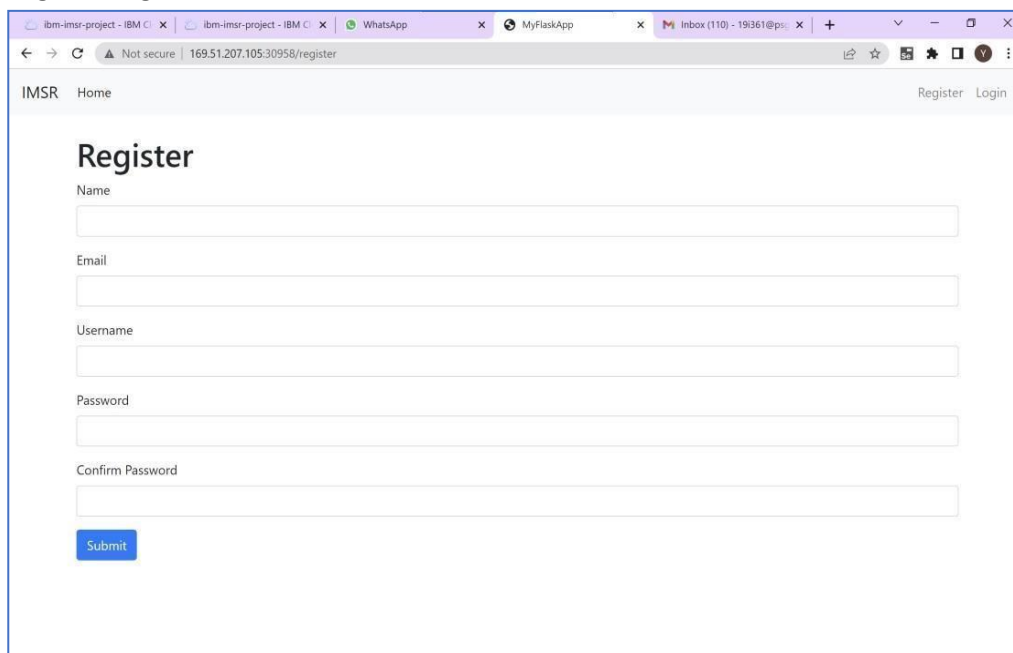
### Login

Username

Password

Submit

## Register Page,



The screenshot shows a web browser window with multiple tabs. The active tab is titled 'ibm-imrs-project - IBM C'. The address bar shows the URL '169.51.207.105:30958/register'. The page has a header with 'IMSR Home' on the left and 'Register Login' on the right. The main content area is titled 'Register' and contains five input fields: 'Name', 'Email', 'Username', 'Password', and 'Confirm Password'. Below these fields is a blue 'Submit' button.

ibm-imrs-project - IBM C x ibm-imrs-project - IBM C x WhatsApp x MyFlaskApp x Inbox (110) - 19361@ps: x +

← → ↻ Not secure | 169.51.207.105:30958/register

IMSR Home Register Login

### Register

Name

Email

Username

Password

Confirm Password

Submit

## Products Page,

The screenshot shows a web browser window with multiple tabs. The active tab is 'ibm-imrs-project - IBM C', displaying the URL '169.51.207.105:30958/products'. The page has a navigation bar with 'IMSR', 'Home', 'Products', 'Location', and 'Product Movements'. A 'Logout' and 'Dashboard' link are in the top right. The main heading is 'Products', followed by a green 'Add Product' button. Below is a table with three columns: 'Product ID', 'Product Cost', and 'Product Quantity'. The table lists three products: 'Bedspreads' (Cost: 600, Quantity: 100), 'Cutlery' (Cost: 1500, Quantity: 495), and 'Shampoo' (Cost: 50, Quantity: 520). Each row has 'Edit' and 'Delete' buttons.

Product ID	Product Cost	Product Quantity		
Bedspreads	600	100	Edit	Delete
Cutlery	1500	495	Edit	Delete
Shampoo	50	520	Edit	Delete

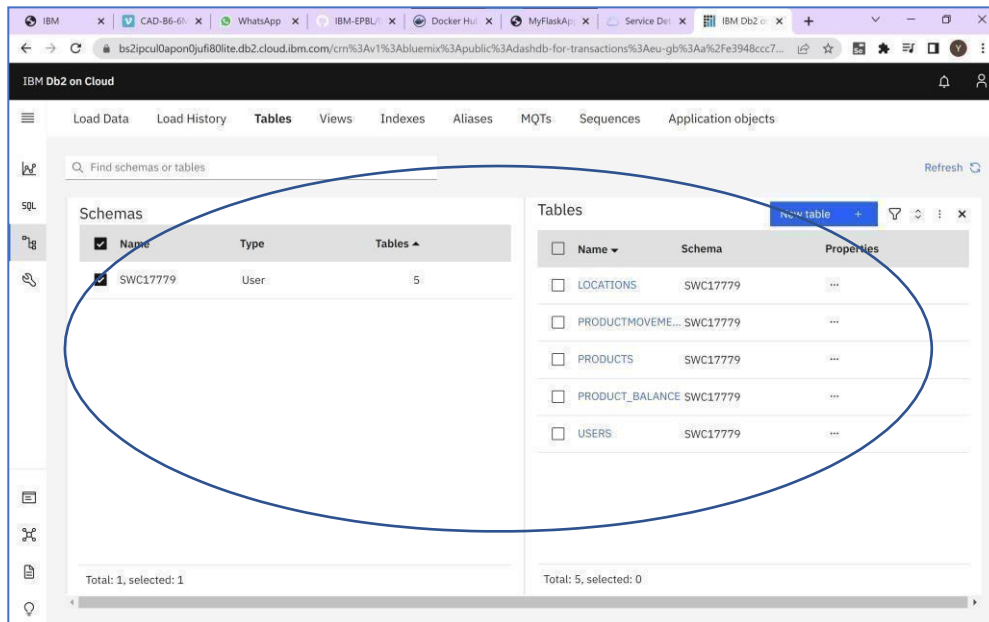
## Product Movements Page,

The screenshot shows a web browser window with the same tabs as the previous page. The active tab is 'ibm-imrs-project - IBM C', displaying the URL '169.51.207.105:30958/product\_movements'. The navigation bar is identical. The main heading is 'Product Movements', followed by a green 'Add Product Movements' button. Below is a table with six columns: 'Movement ID', 'Time', 'From Location', 'To Location', 'Product ID', and 'Quantity'. The table lists three movements: Movement ID 41 (Time: 2022-11-14 04:32:57.213981, From: Chennai, To: Main Inventory, Product: Shampoo, Quantity: 20), Movement ID 42 (Time: 2022-11-14 04:51:47.519001, From: Chennai, To: Karnataka, Product: Shampoo, Quantity: 1553), and Movement ID 40 (Time: 2022-11-14 03:57:52.649656, From: Bangalore, To: Chennai, Product: Shampoo, Quantity: 100). Each row has a 'Delete' button.

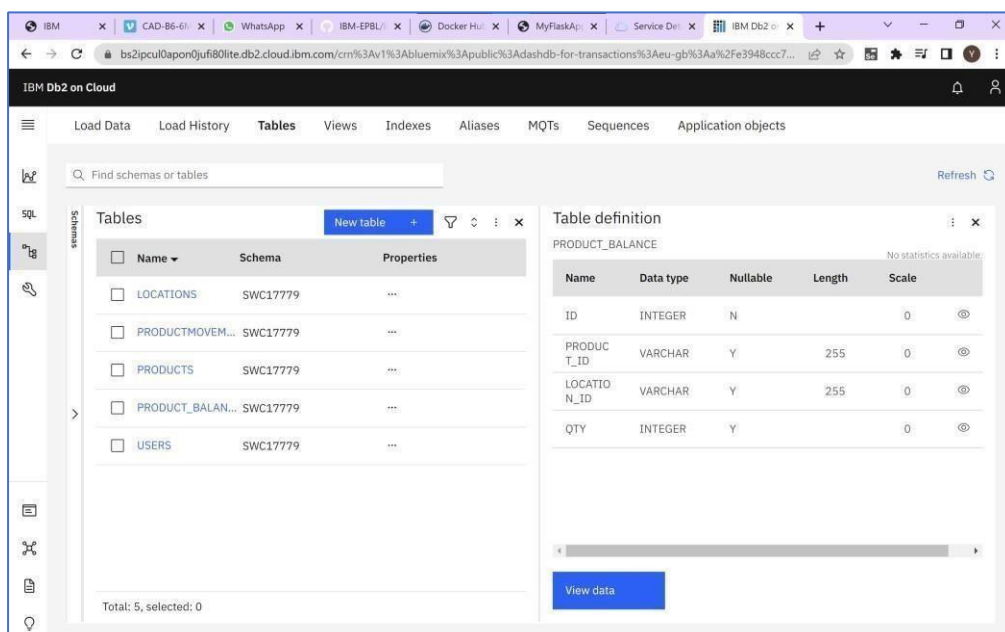
Movement ID	Time	From Location	To Location	Product ID	Quantity	
41	2022-11-14 04:32:57.213981	Chennai	Main Inventory	Shampoo	20	Delete
42	2022-11-14 04:51:47.519001	Chennai	Karnataka	Shampoo	1553	Delete
40	2022-11-14 03:57:52.649656	Bangalore	Chennai	Shampoo	100	Delete

### Sprint 3 - IBM Cloud Integration + Integration of SendGrid: IBM Cloud Integration:

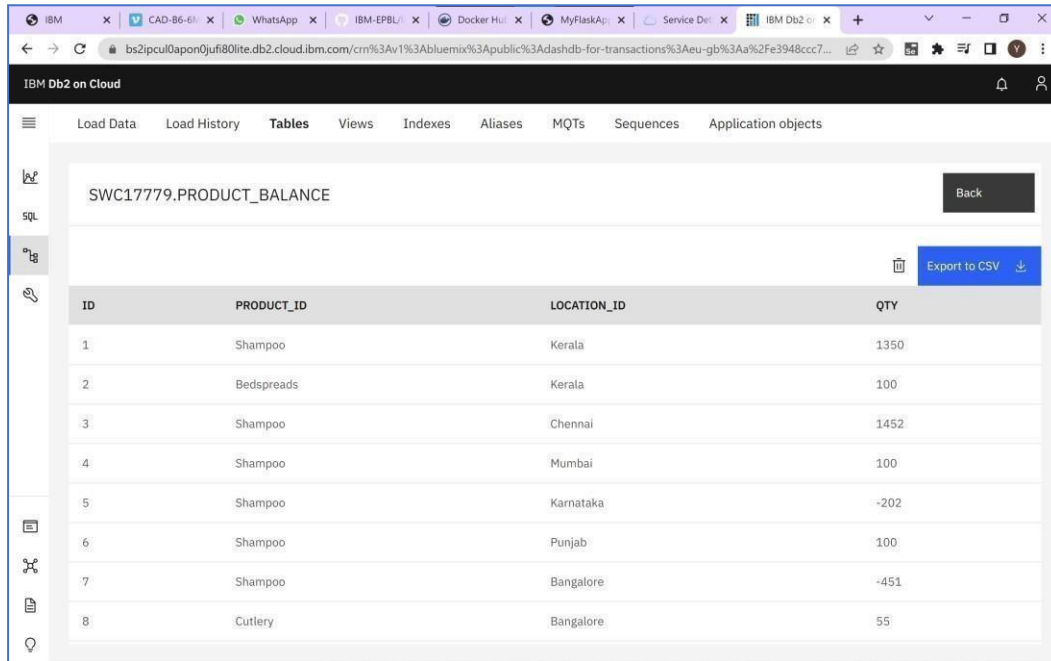
5 tables created for our project,



Schema of the particular table (For Example, Product\_Balance)



Data of a particular table (For Example, Product\_Balance)



The screenshot shows the IBM Db2 on Cloud web interface. The 'Tables' tab is selected, and the table 'SWC17779.PRODUCT\_BALANCE' is displayed. The table has four columns: ID, PRODUCT\_ID, LOCATION\_ID, and QTY. The data is as follows:

ID	PRODUCT_ID	LOCATION_ID	QTY
1	Shampoo	Kerala	1350
2	Bedspreads	Kerala	100
3	Shampoo	Chennai	1452
4	Shampoo	Mumbai	100
5	Shampoo	Karnataka	-202
6	Shampoo	Punjab	100
7	Shampoo	Bangalore	-451
8	Cutlery	Bangalore	55

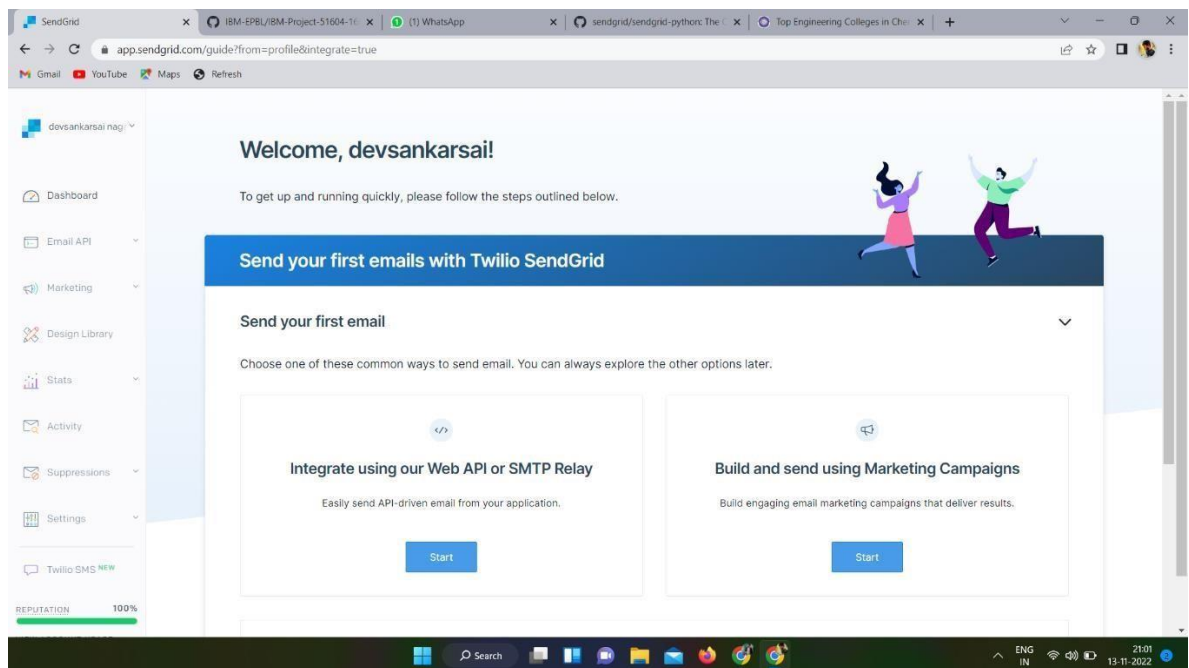
Code for Connection of IBM Database,

```
conn=ibm_db.connect("DATABASE=bludb;HOSTNAME=55fbc997-9266-4331-afd3-888b05e734c0.bs2io90l08kqb1od8lcg.databases.appdomain.cloud;PORT=;SECURITY=SSL;SSLServerCertificate=DigiCertGlobalRootCA.crt;UID=;PWD=','")
```

**Note:** DigiCertGlobalRootCA.crt should be downloaded and configured within the project folder.

**SendGrid Integration:**

## Creation of SendGrid account,



## Code for email alert:

```
File Edit Selection View Go Run Terminal Help
email_alert.py - IMSR-1 - Visual Studio Code

EXPLORER
IMSR-1
  > __pycache__
  > templates
  app.py
  DigiCertGlobalRootCA.crt
  email_alert.py
  requirements.txt

email_alert.py
1 import smtplib
2 from email.mime.multipart import MIMEMultipart
3 from email.mime.text import MIMEText
4 from email.mime.base import MIMEBase
5
6 def alert(main_msg):
7     mail_from = '19i36i@psgtech.ac.in'
8     mail_to = '19i303@psgtech.ac.in'
9     msg = MIMEMultipart()
10    msg['From'] = mail_from
11    msg['To'] = mail_to
12    msg['Subject'] = '!Alert Mail On Product Shortage! - Regards'
13    mail_body = main_msg
14    msg.attach(MIMEText(mail_body))
15
16    try:
17        server = smtplib.SMTP_SSL('smtp.sendgrid.net', 465)
18        server.ehlo()
19        server.login('apikey', 'API_KEY')
20        server.sendmail(mail_from, mail_to, msg.as_string())
21        server.close()
22        print("mail sent")
23    except:
24        print("issue")
25

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL JUPYTER
python + Python 3.10.7 64-bit Go Live

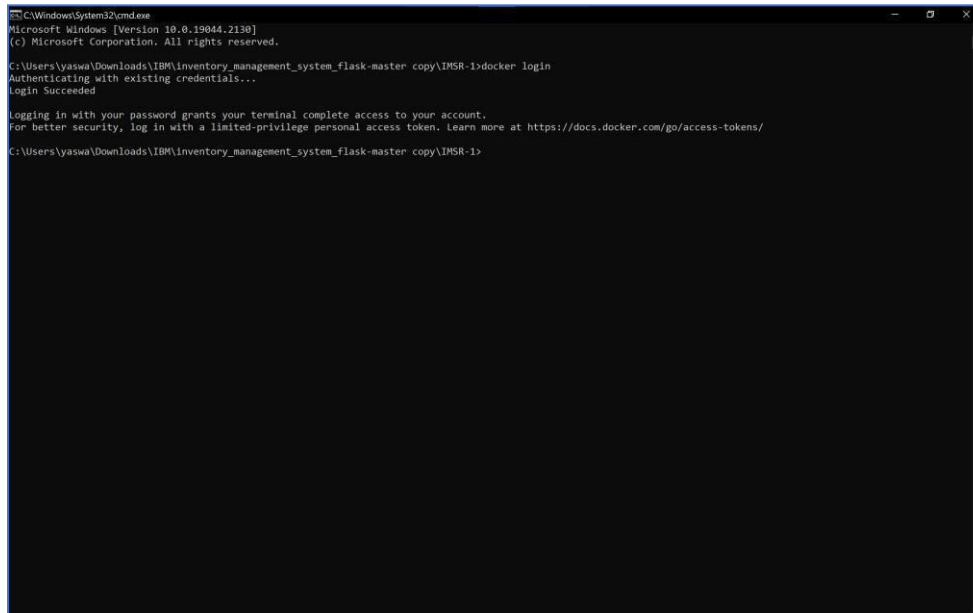
* Detected change in 'C:\Users\yawsa\Downloads\IBM\inventory_management_system_flask-master copy\IMSR-1\email_alert.py', reloading
* Restarting with stat
* Debugger is active!
* Debugger PIN: 512-196-405
* Detected change in 'C:\Users\yawsa\Downloads\IBM\inventory_management_system_flask-master copy\IMSR-1\email_alert.py', reloading
* Restarting with stat
```



#### **Sprint 4 (Deploying the application using Docker and Kubernetes):**

**Note:** Make sure to create a Dockerfile in the project folder.

Login into DockerHub in Project Folder using command prompt. This connects local docker desktop to cloud docker hub.



```
C:\Windows\System32\cmd.exe
Microsoft Windows [Version 10.0.19044.2130]
(c) Microsoft Corporation. All rights reserved.

C:\Users\yasma\Downloads\IBM\inventory_management_system_flask-master copy\IMSR-1>docker login
Authenticating with existing credentials...
Login Succeeded

Logging in with your password grants your terminal complete access to your account.
For better security, log in with a limited-privilege personal access token. Learn more at https://docs.docker.com/go/access-tokens/

C:\Users\yasma\Downloads\IBM\inventory_management_system_flask-master copy\IMSR-1>
```

Building an image for our project,

```
File "/usr/local/lib/python3.11/site-packages/flask/app.py", line 1820, in full_dispatch_request
PS C:\Users\yaswa\Downloads\IBM\IMSR-1> docker build -t yaswanthmanoharan/ibm_imsr .
[+] Building 2.7s (11/11) FINISHED
=> [internal] load build definition from Dockerfile                                0.0s
=> => transferring dockerfile: 32B                                              0.0s
=> [internal] load .dockerignore                                                0.0s
=> => transferring context: 2B                                                  0.0s
=> [internal] load metadata for docker.io/library/python:latest                2.4s
=> [auth] library/python:pull token for registry-1.docker.io                  0.0s
=> [internal] load build context                                                0.0s
=> => transferring context: 24.29kB                                           0.0s
=> CACHED [2/5] WORKDIR /inventory                                             0.0s
=> CACHED [3/5] COPY requirements.txt requirements.txt                         0.0s
=> CACHED [4/5] RUN pip install -r requirements.txt                           0.0s
=> [5/5] COPY . .                                                             0.0s
=> exporting to image                                                         0.1s
=> => exporting layers                                                         0.0s
=> => writing image sha256:0afb0c793a704eaf85acc886443c57a0cbeca9473b841897ef4a9162f3c4bd06 0.0s
=> => naming to docker.io/yaswanthmanoharan/ibm_imsr                         0.0s

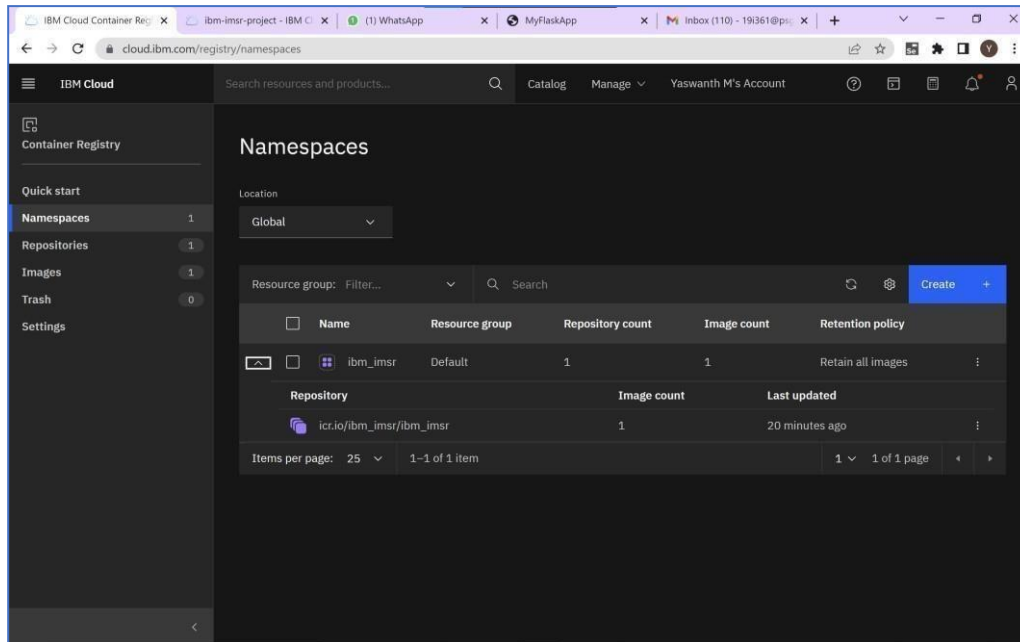
Use 'docker scan' to run Snyk tests against images to find vulnerabilities and learn how to fix them
PS C:\Users\yaswa\Downloads\IBM\IMSR-1> docker run -p 8080:5000 yaswanthmanoharan/ibm_imsr
* Debug mode: off
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
* Running on all addresses (0.0.0.0)
* Running on http://127.0.0.1:5000
* Running on http://172.17.0.2:5000
Press CTRL+C to quit
172.17.0.1 - - [14/Nov/2022 03:57:11] "GET /login HTTP/1.1" 200 -
172.17.0.1 - - [14/Nov/2022 03:57:22] "POST /login HTTP/1.1" 302 -
172.17.0.1 - - [14/Nov/2022 03:57:23] "GET /dashboard HTTP/1.1" 200 -
172.17.0.1 - - [14/Nov/2022 03:57:27] "GET /product_movements HTTP/1.1" 200 -
172.17.0.1 - - [14/Nov/2022 03:57:30] "GET /add_product_movements HTTP/1.1" 200 -
[2022-11-14 03:57:37,822] ERROR in app: Exception on /add_product_movements [POST]
Traceback (most recent call last):
```

Create a

valid Deployment.yaml file,

```
PS C:\Users\yaswa\Downloads\IBM\IMSR-1> kubectl apply -f deployment.yaml
deployment.apps/ibmimsr created
PS C:\Users\yaswa\Downloads\IBM\IMSR-1> █
```

Create a namespace in IBM Container registry,

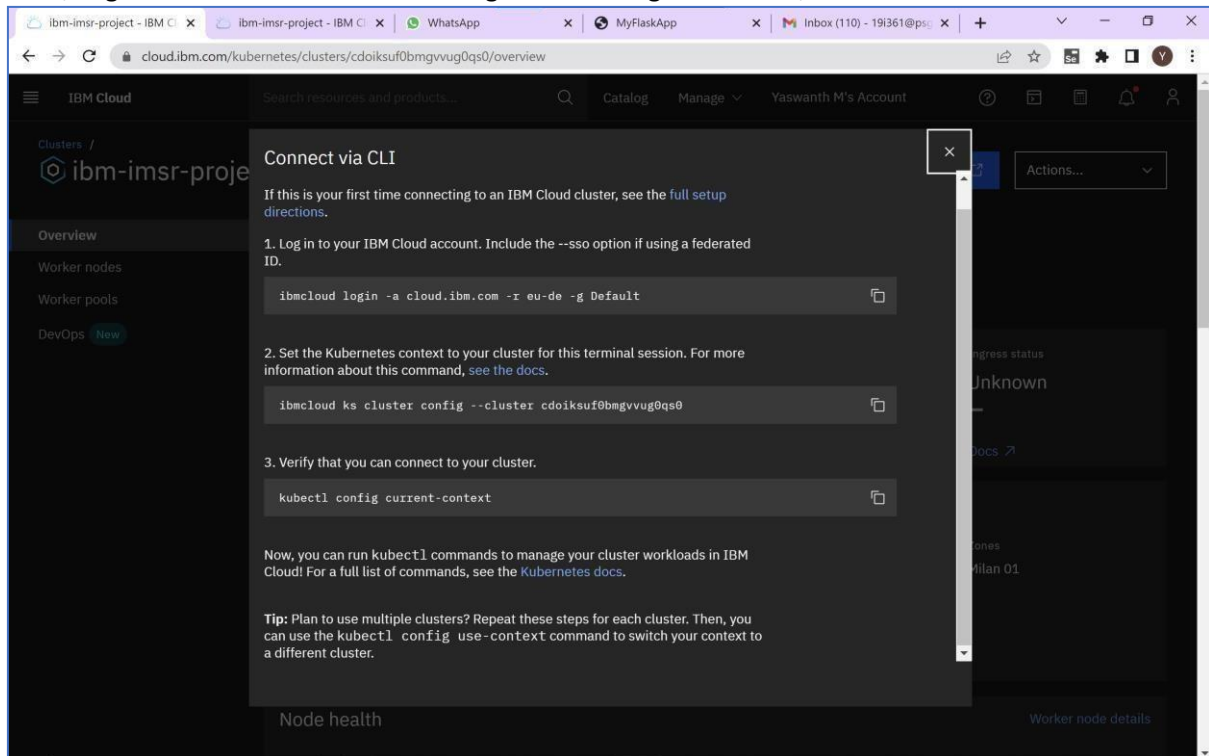


Pushing the project into IBM container Registry,

```
Select Command Prompt
C:\Users\yaswa>docker tag yaswanthmanoharan/ibm_imsr icr.io/ibm_imsr/ibm_imsr
5b3f1ed98915: Pushing [====>] 6.053MB/67.7882fd36bfd35: P
ushing 174.2MB/529MB
d5b2c4afb8d6: Pushing [=====>] 40.6MB/191.6MB
Using default tag: latest
The push refers to repository [icr.io/ibm_imsr/ibm_imsr]
6b183c62e3d7: Pushing [=====>] 6.465MB/18.48MB
d5b2c4afb8d6: Pushing [====>] 17.2MB/191.6MB
d5b2c4afb8d6: Pushing [=====>] 75.71MB/191.6MB
4db7c1329ec9: Pushed
6f6e69c2c592: Pushed
882fd36bfd35: Pushing [=====>] 308.4MB/529MB
d5b2c4afb8d6: Pushing 138.5MB/191.6MB
d5b2c4afb8d6: Pushed
6b183c62e3d7: Pushing [=====>] 5.285MB/18.48MB
882fd36bfd35: Pushing 175.3MB/529MB
882fd36bfd35: Pushing [=====>] 319MB/529M5b3f1ed98915: P
ushed
d1dec9917839: Pushing [>] 2.735MB/152M882fd882888882
882fd36bfd35: Pushed
d1dec9917839: Pushed
d1dec9917839: Pushing 70.76MB/152MB
d38adf39e1dd: Pushed
d9d07d703dd5: Pushed
latest: digest: sha256:0575b171d321ade1d5a3def1d1bb5afe8a00d00c1f7e157a5347aca6a6ee1470 size: 3052
882fd36bfd35: Pushing [=====>] 265.7MB/529MB
C:\Users\yaswa>dshing [=====>] 264MB/529MB
d1dec9917839: Pushing [>] 1.62MB/152MB
```

**Note:** Create a Kubernetes Cluster in IBM Cloud and wait for the work node to get fully deployed.

Then, Login into Kubernetes Cluster using the following commands,



Expose your application using the following command and check for the port number using the next command.

```
Command Prompt
C:\Users\yaswa>kubectl get pods
NAME                                READY   STATUS    RESTARTS   AGE
ibm-inventory-management-system-for-retailers-6cd7dfcc7b-8q2w2    1/1     Running   0           10h
ibm-project-9bbb47d-5vn2w                                           1/1     Running   0           9h
ibmimrsr-586d66c8c8-kkjqp                                          0/1     ContainerCreating   0           26s

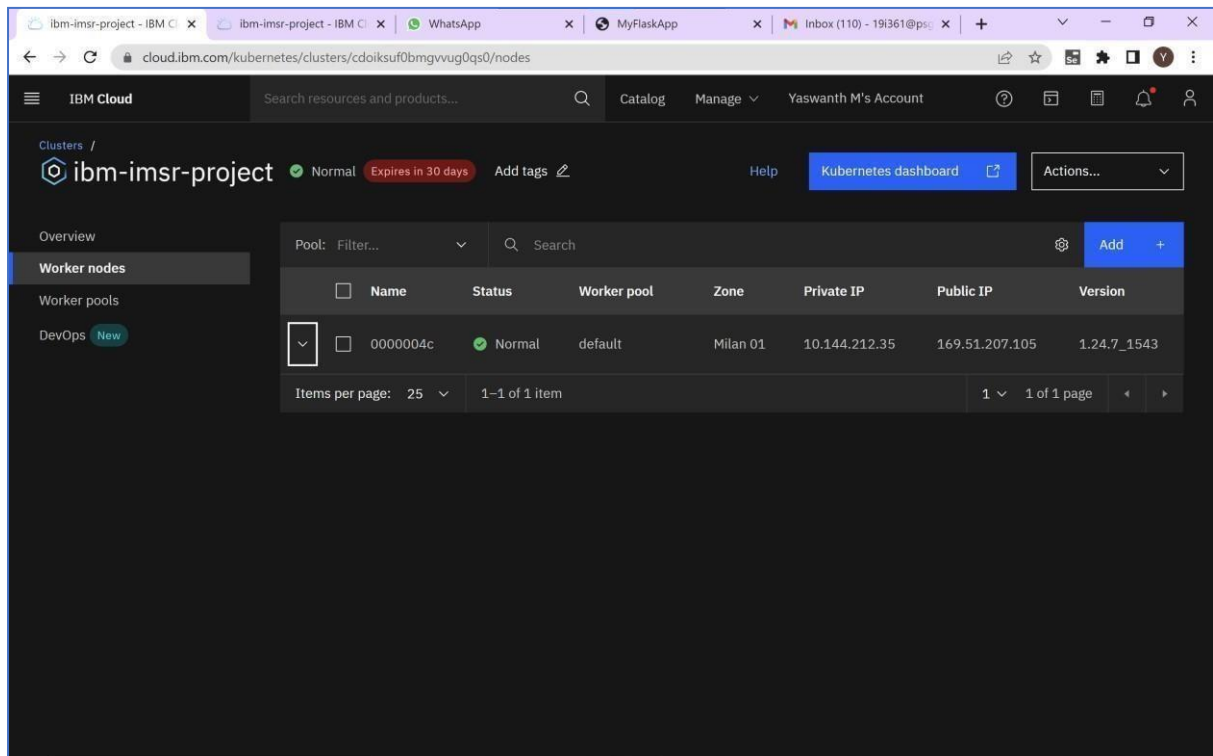
C:\Users\yaswa>kubectl expose deployment ibmimrsr --type=NodePort --name=ibmimrsr
service/ibmimrsr exposed

C:\Users\yaswa>kubectl describe service ibmimrsr
error: unknown command "describe" for "kubectl"

Did you mean this?
    describe

C:\Users\yaswa>kubectl describe service ibmimrsr
Name:                 ibmimrsr
Namespace:            default
Labels:               app=ibmimrsr
Annotations:          <none>
Selector:             app=ibmimrsr
Type:                 NodePort
IP Family Policy:     SingleStack
IP Families:          IPv4
IP:                   172.21.98.28
IPs:                  172.21.98.28
Port:                 <unset> 5000/TCP
TargetPort:           5000/TCP
NodePort:             <unset> 30958/TCP
Endpoints:            172.30.116.13:5000
Session Affinity:     None
External Traffic Policy: Cluster
Events:               <none>
```

Then, Check for the public IP address in your IBM Kubernetes Cluster under Worker Node,

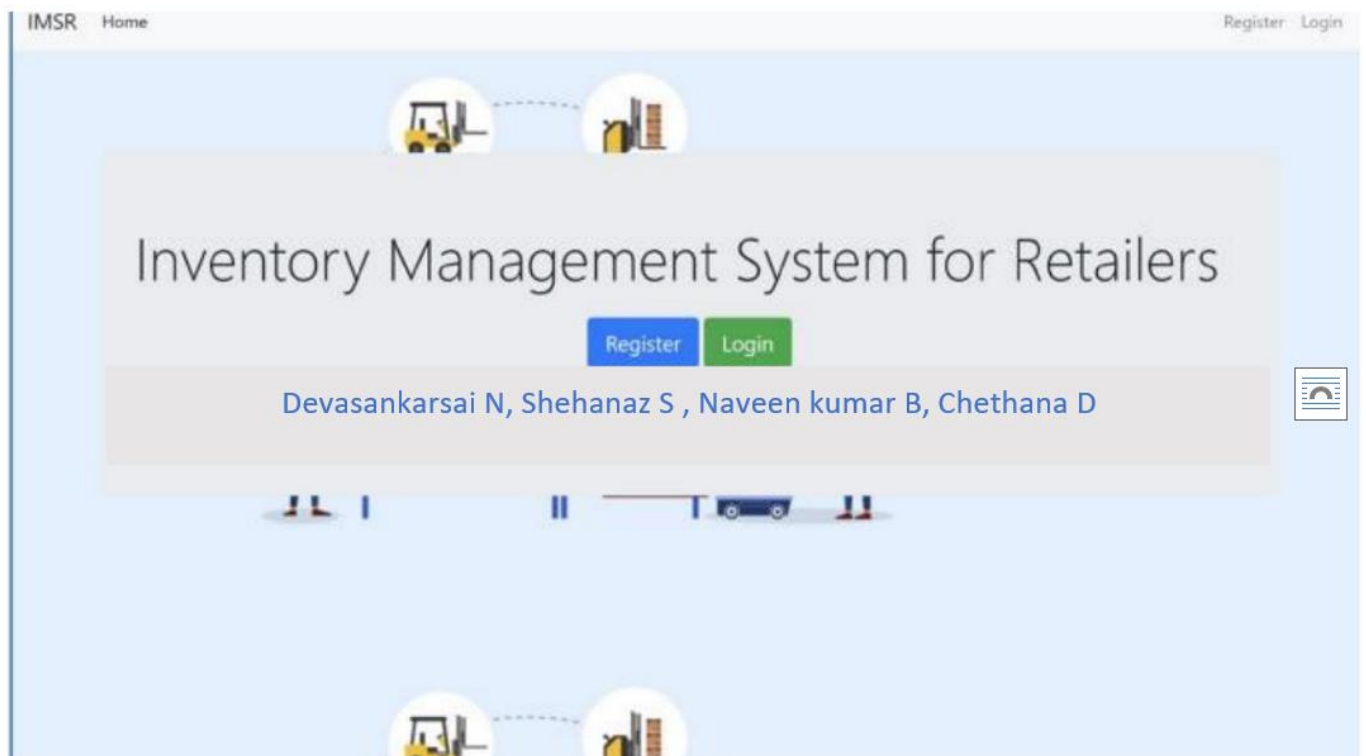


Thus we have the Public IP address and the Nodeport.

Now just type in this format - <Public\_IP>:<NodePort>

For our Inventory management system application it is, **169.51.207.105:30958**

Type this in the browser and click enter to access the deployed application,



**Result:**

Thus In this way We developed a “Inventory management System for Retailers” using Python, Sendgrid and IBM Cloud Services (IBM DB2, IBM Container registry, IBM Kubernetes).

**Thank You!**