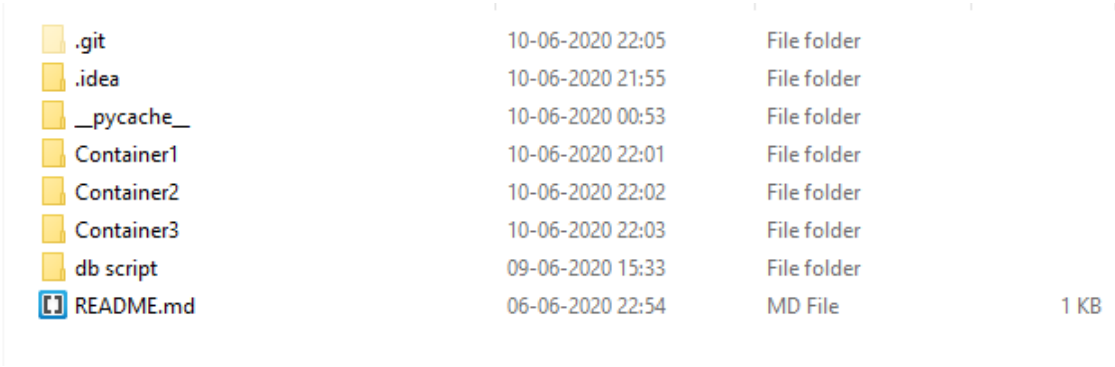
Documentation

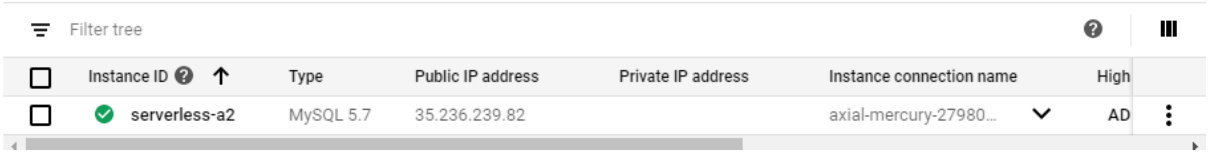
Part A. Build, deploy, and run a Containerized Application using GCP.

a. Create three containers using Docker. These containers are responsible for the backend logic. The database you will be using here is, MySQL

1. 3 Container directories

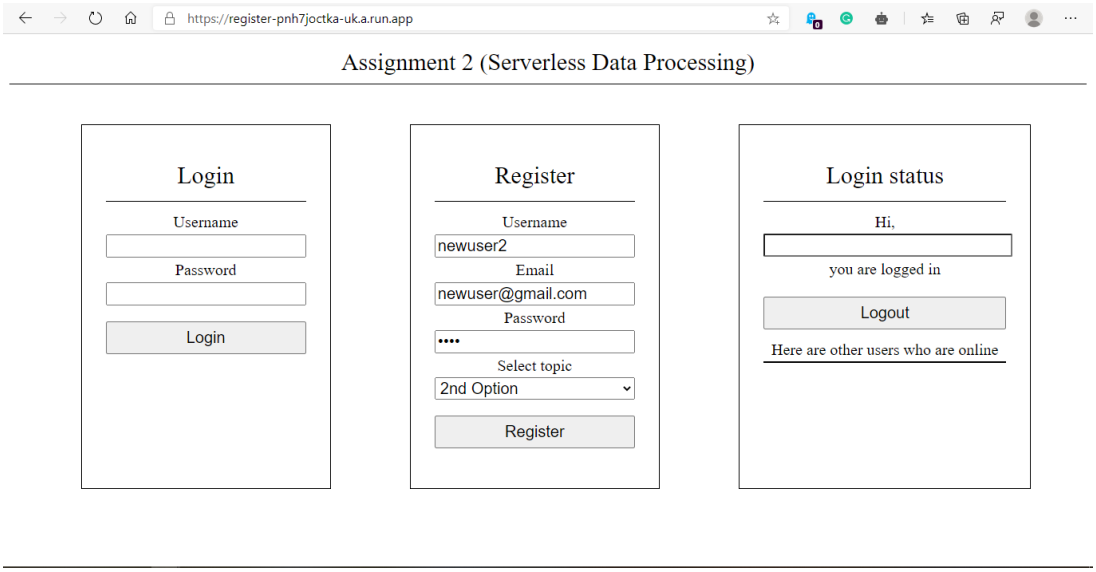


2. Google SQL database

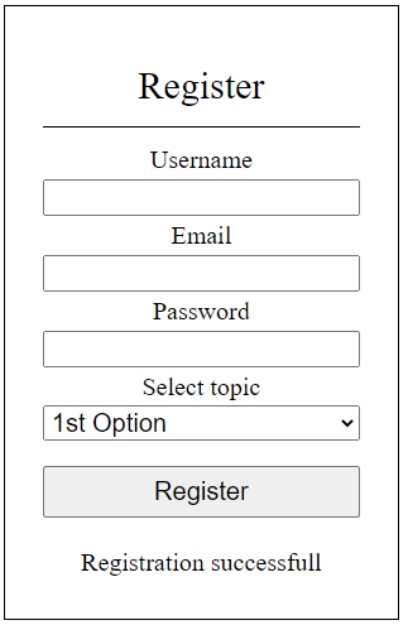


b. Container 1 is responsible for accepting registration details from frontend and store it in backend database. (image 1)

1. User registration is done in the 1st container (url is shown in url bar). The first container contains 2 routes (‘/’ and ‘register’). ‘/register’ route works on pressing Register button.

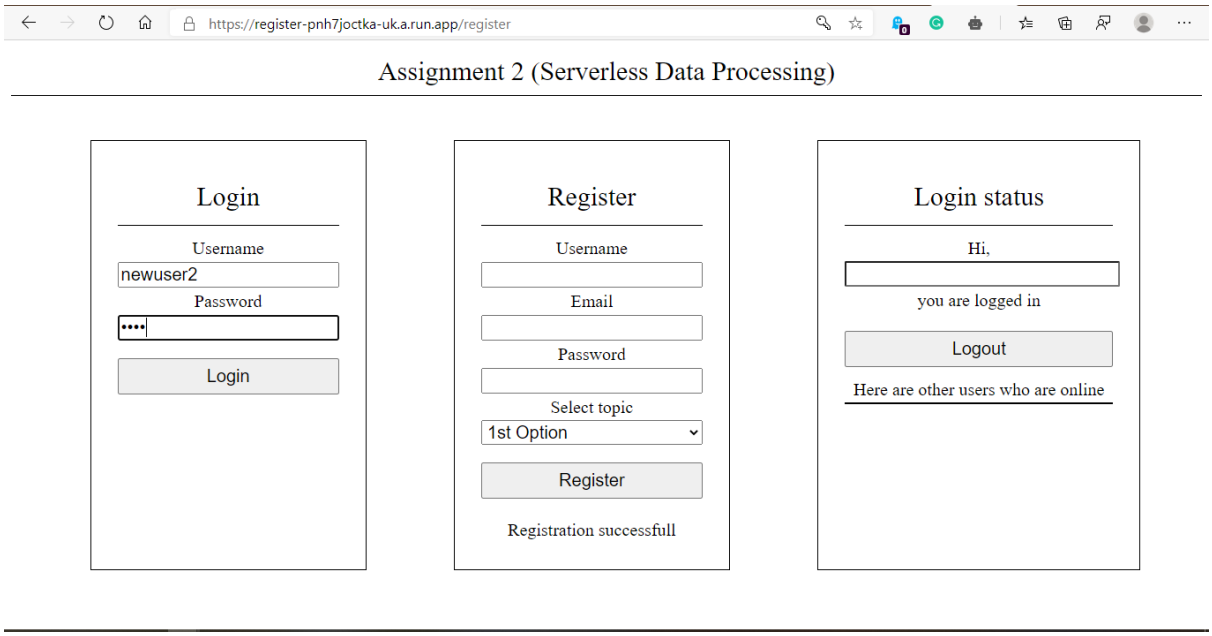


2. Registration complete

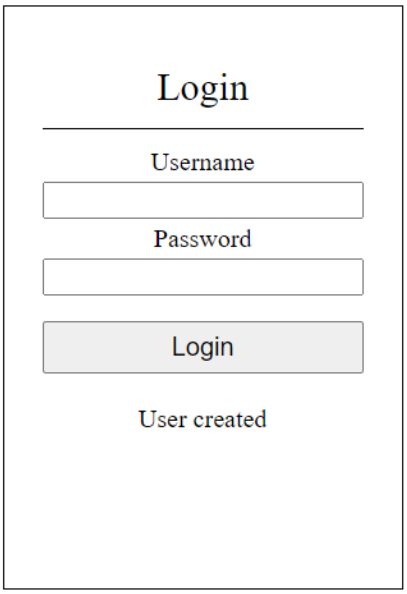


c. Container 2 is responsible for validating the Login information (image 2)

1. Login of user works on 2nd container. As the user has pressed the Register button, the URL bar shows the'/register' route and 1st container link. On pressing the login button, the system will fetch '/login' route present in the 2nd container.



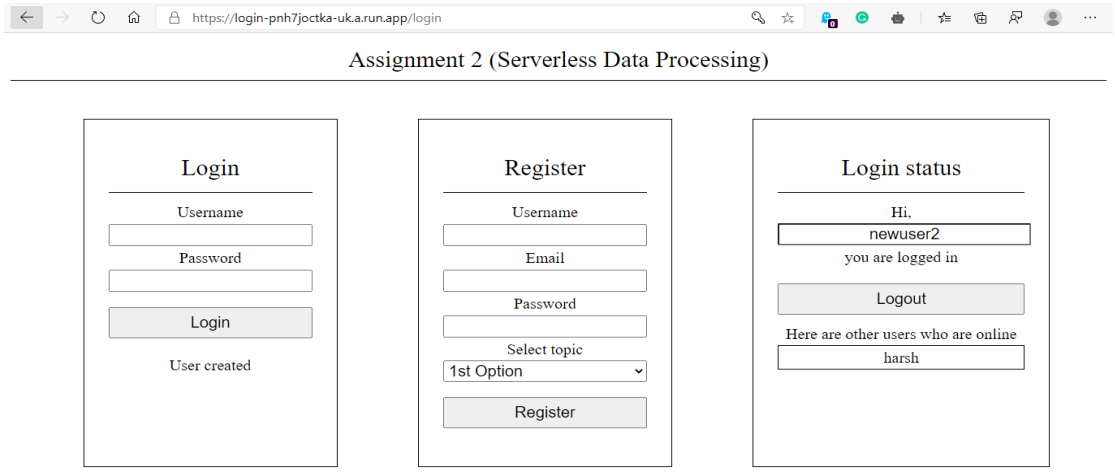
2. Login complete



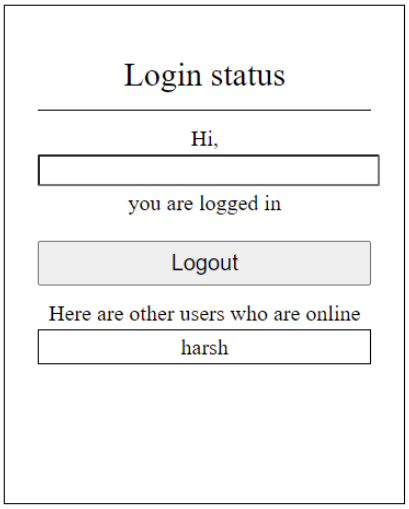
The values in the input are erased once the user presses the login button, hence they are not visible in the above image.

d. Once a user is logged in – the state changes to online, and it appears on the front page (image 3)

1. After the user logs in, the Login status box changes and the username appears. Users can log out using the Logout button and the box also shows other users currently online in the system. It is programmed as such that the current user does not have the authority to logout other users (which should be the obvious case).

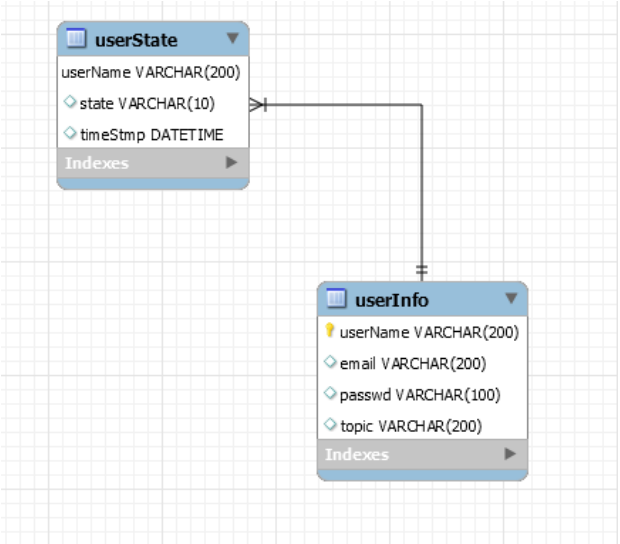


2. After the user clicks on Logout, the current user logs out and other users who are online in the system are still shown.

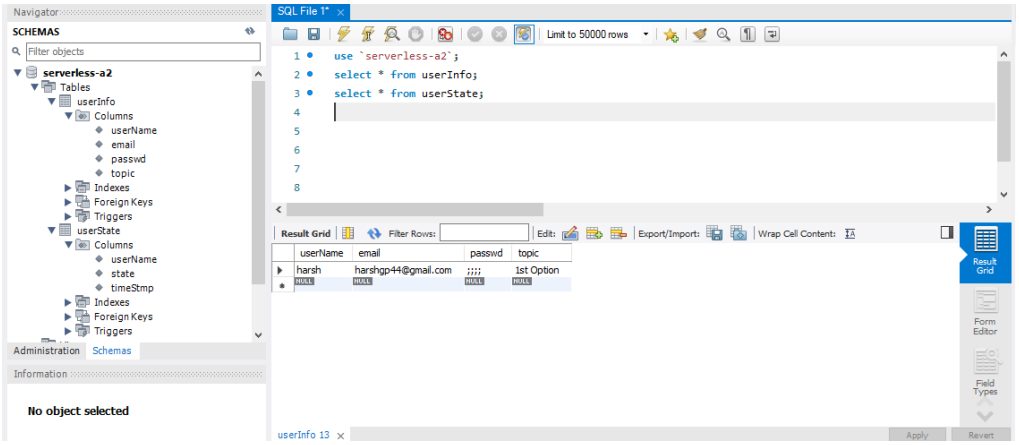


e. Your database should contain only 2 tables. One to contain data, another to contain user state (online, offline, timestamp, etc.) information.

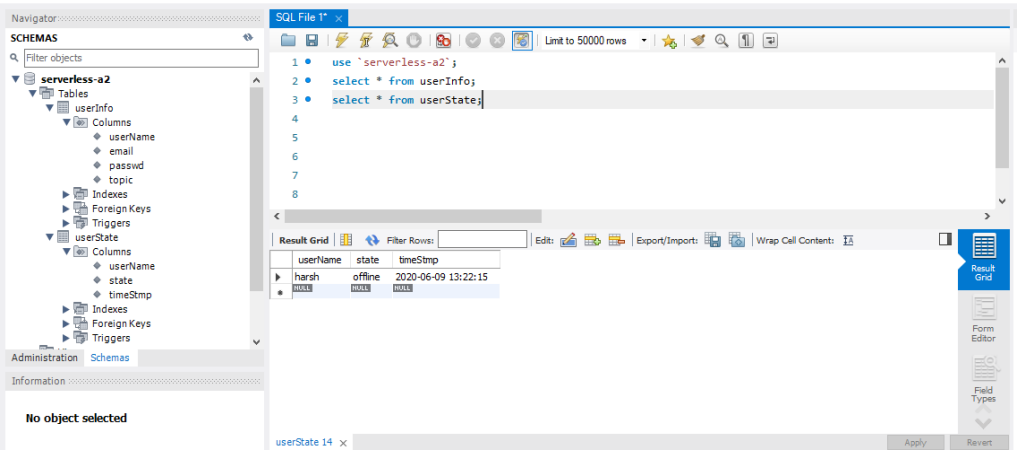
1. Database Schema



2. ‘userInfo’ table values



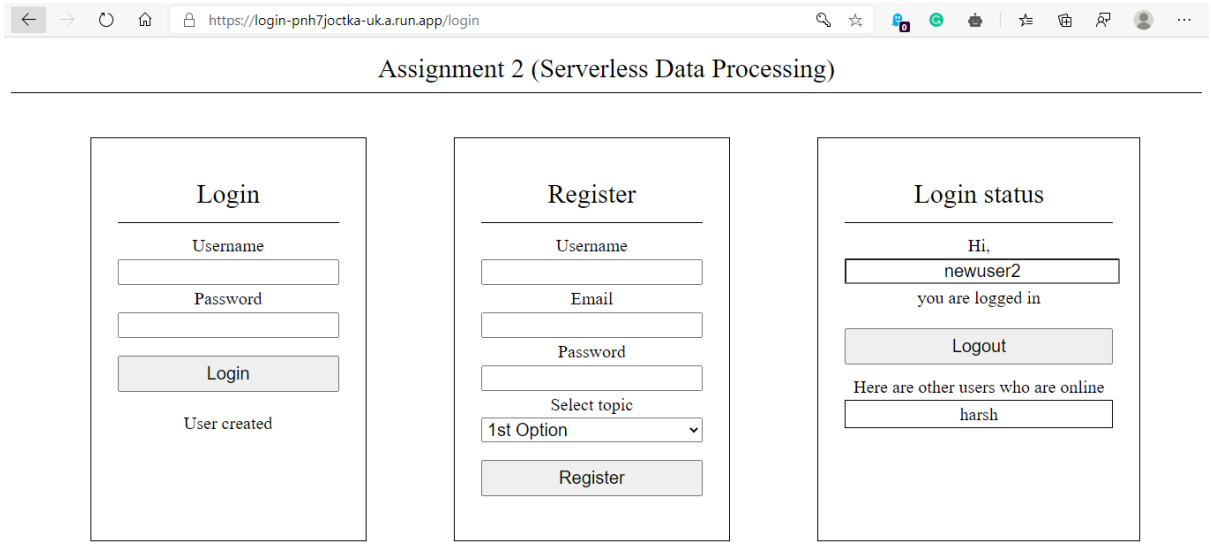
3. ‘user state’ table values



All these screenshots are provided in the ‘Screenshots’ folder to view properly.

f. Container 3 is responsible for extracting state information from the database. E.g. who is online. You need to maintain the session from login to logout. The session must expire after clicking the logout, which should update the state table.

1. As shown in this below image, as the user gets created and the message appears on the Login box, (‘User-created’), The Login status box shows the value of the user currently logged in which signifies the session. Moreover, when the user clicks on the Logout button, the user gets removed from ’online’ users which are shown in the above images. The other online users are also shown in the Login status box.

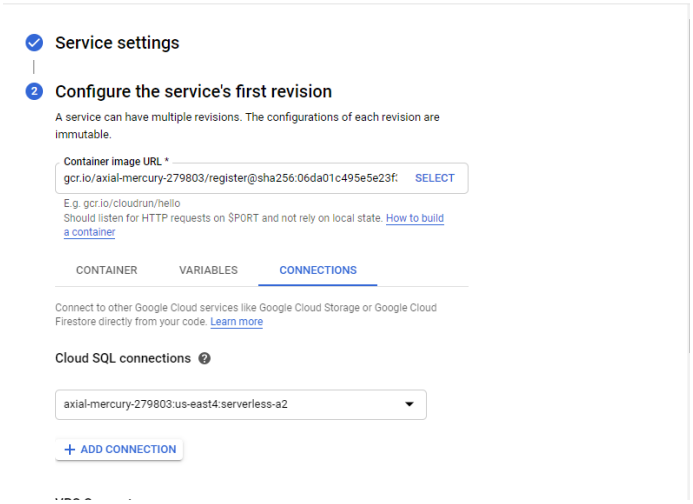


g. Once the docker images are built, you need to run those using Google Cloud Run.

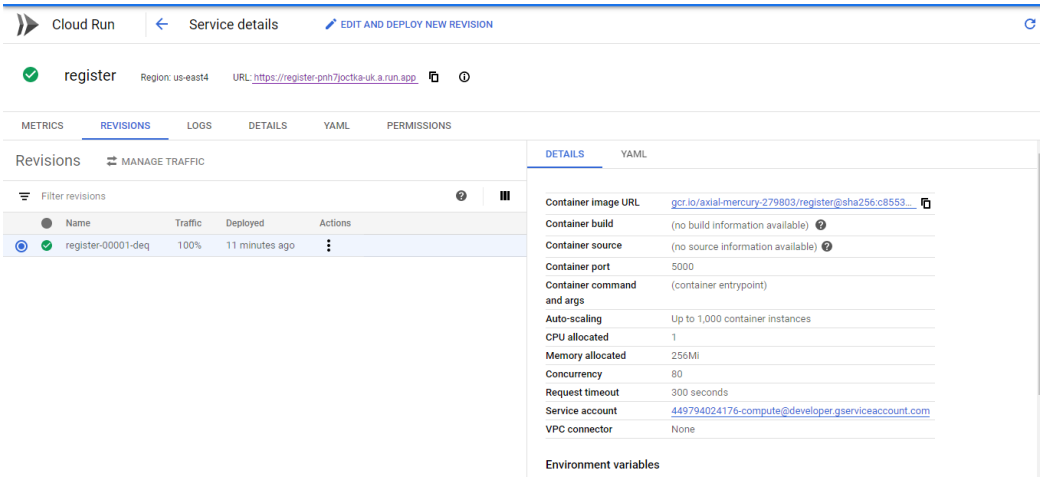
1. Build and Push for container1 is shown in the below image. Build and Push screenshots for other containers are available in the Screenshots folder.

```
Removing intermediate container 60d4ff682e3b
 ---> f9915e816ae0
Step 5/7 : EXPOSE 5000
 ---> Running in 42572f1463e0
Removing intermediate container 42572f1463e0
 ---> cd001e5f7639
Step 6/7 : ENV NAME register
 ---> Running in 3c2293e4cf40
Removing intermediate container 3c2293e4cf40
 ---> c4142b3e57e2
Step 7/7 : CMD ["python","src/Controller.py"]
 ---> Running in 7a206e97a297
Removing intermediate container 7a206e97a297
 ---> a6b62d6c3763
Successfully built a6b62d6c3763
Successfully tagged gcr.io/axial-mercury-279803/register:latest
harshgp44@cloudshell:~/Serverless-AS-2/Container1 (axial-mercury-279803)$ docker push gcr.io/axial-mercury-279803/register:latest
The push refers to repository [gcr.io/axial-mercury-279803/register]
717066fd66c6: Pushed
cb82897a86f2: Pushed
b06e423c2cf9: Layer already exists
1cc2f45986fd: Layer already exists
de4f53fbd5e1: Layer already exists
311f330fa783: Layer already exists
f55f65539fab: Layer already exists
30339f20ced0: Layer already exists
0eb22bfb707d: Layer already exists
a2ae92ffcd29: Layer already exists
latest: digest: sha256:c855310f6a134c7846ed690db8e3b20a20e531dd94e8973b8dca58d899b838b2 size: 2423
harshgp44@cloudshell:~/Serverless-AS-2/Container1 (axial-mercury-279803)$
```

2. Service Creation on Google Cloud Run



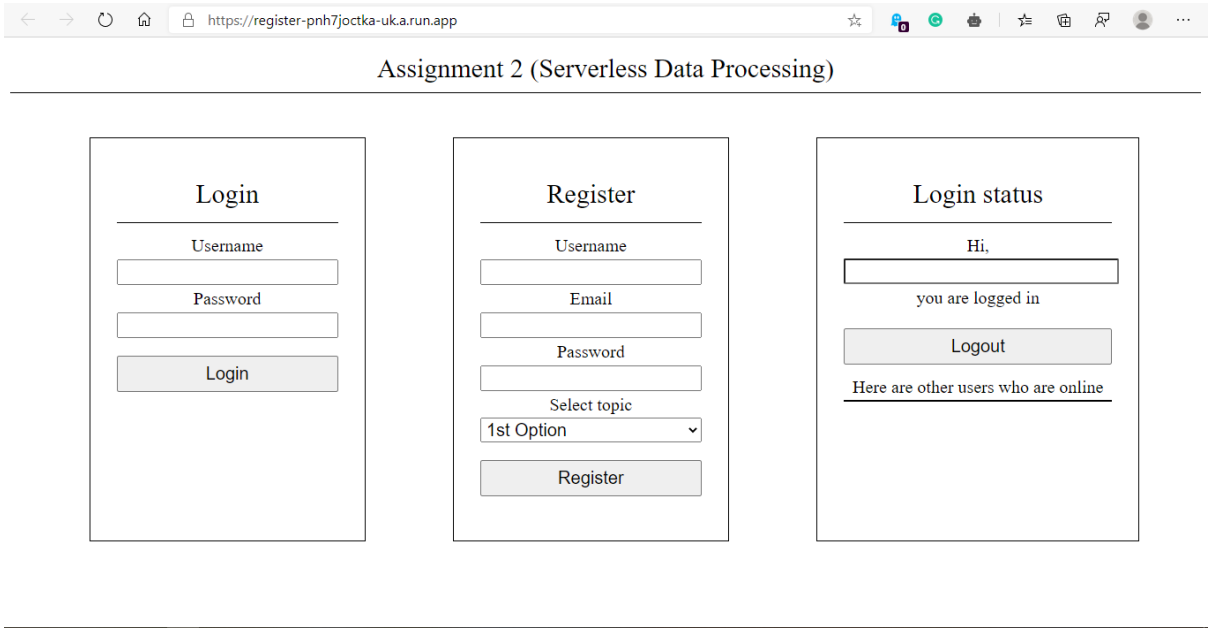
3. Google Cloud Run Service Activated for container1.



Screenshots for other containers are available in Screenshots directory

h. To complete the tasks, and perform interaction, you need to build 3 simple web pages (or 1), using any technology of your choice.

1. I created a single page that performs all the required functionalities i.e. (Registration, Login, Login Status of the user).



i. Write test case to test your application, and perform testing

After testing the application with all the test cases, I have mentioned their results as follows. There are 3 tables. The first one is for all the routes and services' testing, second is for Business logic function's testing and the last one is for DB interaction function's testing.

Routes	**Expected output**	**Real output**
/	Index.html	Index.html
/register	Index.html	Index.html
/login	Index.html	Index.html
/logout	Index.html	Index.html

Function Logic	**Input**	**Output**
getOnlineUserService()	No input	['hash','ABC','def']
registerService()	'registerUserName','registerEmail@email.com','registerPassword','Topic1'	True
loginService()	'userName', 'password'	True
logoutService()	'userName'	True

Function Logic	**Input**	**Output**
registerRepo()	'registerUserName','registerEmail@email.com','registerPassword','Topic1'	True
registerRepo()	'registerUserName','registerEmail@email.com','registerPassword','Topic1'	Registration Unsuccessfull
getOnlineUsersRepo()	No input	List of online users
activateState()	'username','online'	True
activateState()	'username','offline'	True
loginRepo()	'username','password'	'User logged in'
loginRepo()	'username','password'	'User already logged in'
logoutServiceRepo()	'username'	True

j. You need to explore, Google Cloud Run, GCR, Docker Container documents, and write a summary of ½ page explaining how you have used these technologies in your application.

First and foremost, I created a Google instance to explore docker and I tried creating docker containers using commands. After building and running the docker on google instance, I moved on to Google Cloud Run to do the same. I used Google cloud shell to build and push the docker. As this was the first time I was creating docker containers, I saw documentation for creating Dockerfile and created it. I cloned my repository from Github which contained Dockerfile and requirements.txt using which I finally built and pushed the docker container and gave it a tag. Then I created a service in Google Cloud Run and mentioned the port which I mentioned to expose in Dockerfile, and selected Google SQL database to connect with the container. Finally, my container service was ready which provided me a URL to run the application. There were some problems I faced while connecting to the Google SQL database with the docker. I resolved it by referring to the Google documentation and did some configuration with the database file and changed the SQL module in python. So I repeated this process for every container. And after I received the URL of the application, I changed my code routes accordingly which led me to again build and push the containers to update the application.

Login Validation Code:

```
    def loginRepo(self, userName, password):
    flag=False
    try:
        db = Database()
        db.connectDB()
        results=db.executeQueryWithResults('select * from userInfo')
        for i in results:
            if(i[0]==userName and Passwd().decrypt(i[2])==password):
                flag=True
        if(flag==True):
            if(self.activateState(userName,'online')):
                return "User logged in"
            else:
                return "User already logged in"
        return "Invalid credentials"
    except Exception as e:
        print(e)
        return "User doesn't exist"
```

```
def activateState(self,username,state):
    try:
        db = Database()
        db.connectDB()
        db.executeQuery('delete from userState where userName="{0}"'.format(username))
        db = Database()
        db.connectDB()
        db.executeQuery('insert into userState values("{0}","{1}","{2}")'.format(username, state,
                                                                datetime.now().strftime(
                                                                    '%Y-%m-%d %H:%M:%S')))
        return True
    except Exception as e:
        print(e)
        return False
```

Basic Password Encryption

```
class Passwd:
    def __init__(self):
        pass

    def encrypt(self,text):
        str=''
        for i in text:
            str+=chr(ord(i)+10)
        return str

    def decrypt(self,text):
        str=''
        for i in text:
            str+=chr(ord(i)-10)
        return str
```

Registration module

```
def registerRepo(self, registerUserName, registerEmail, registerPassword, registerTopic):
    encrypted_password=Passwd().encrypt(registerPassword)
    try:
        db = Database()
        db.connectDB()
        db.executeQuery('insert into userInfo values("{0}","{1}","{2}","{3}")'.format(registerUserName,
registerEmail,
                                                                encrypted_password, registerTopic))
        return True
    except Exception as e:
        print(e)
        return False
```

Part B. Building a Chatbot:

a. Using AWS Lex - Create a chatbot on OrderFood

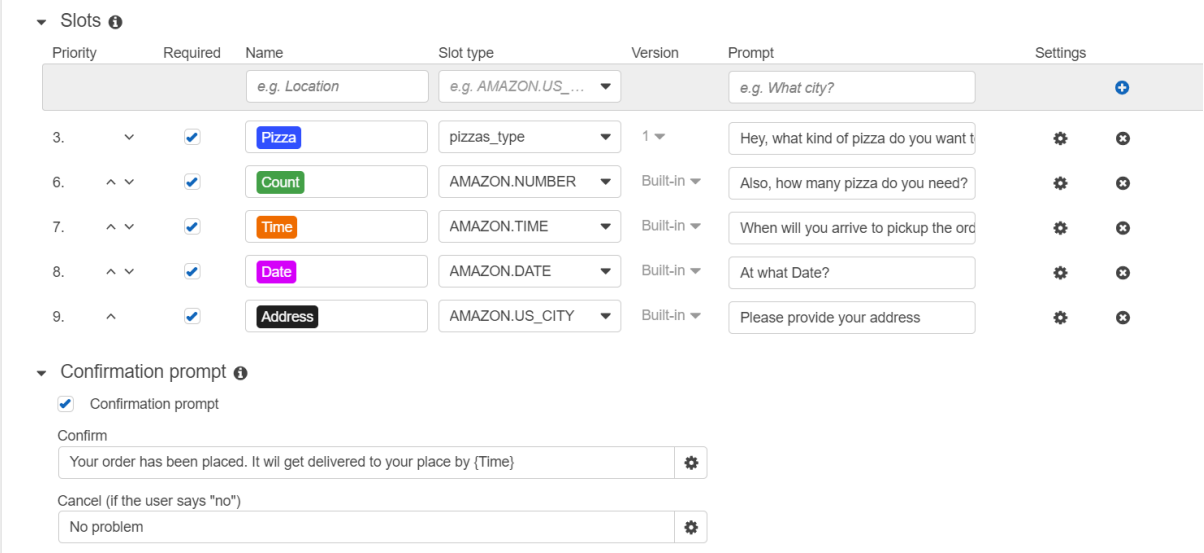
b. Consider it as a pizza place. (assumptions: they have 3 types of regular size pizzas –veg, cheese, pepperoni.

c. The chatbot can accept information on food delivery or pickup

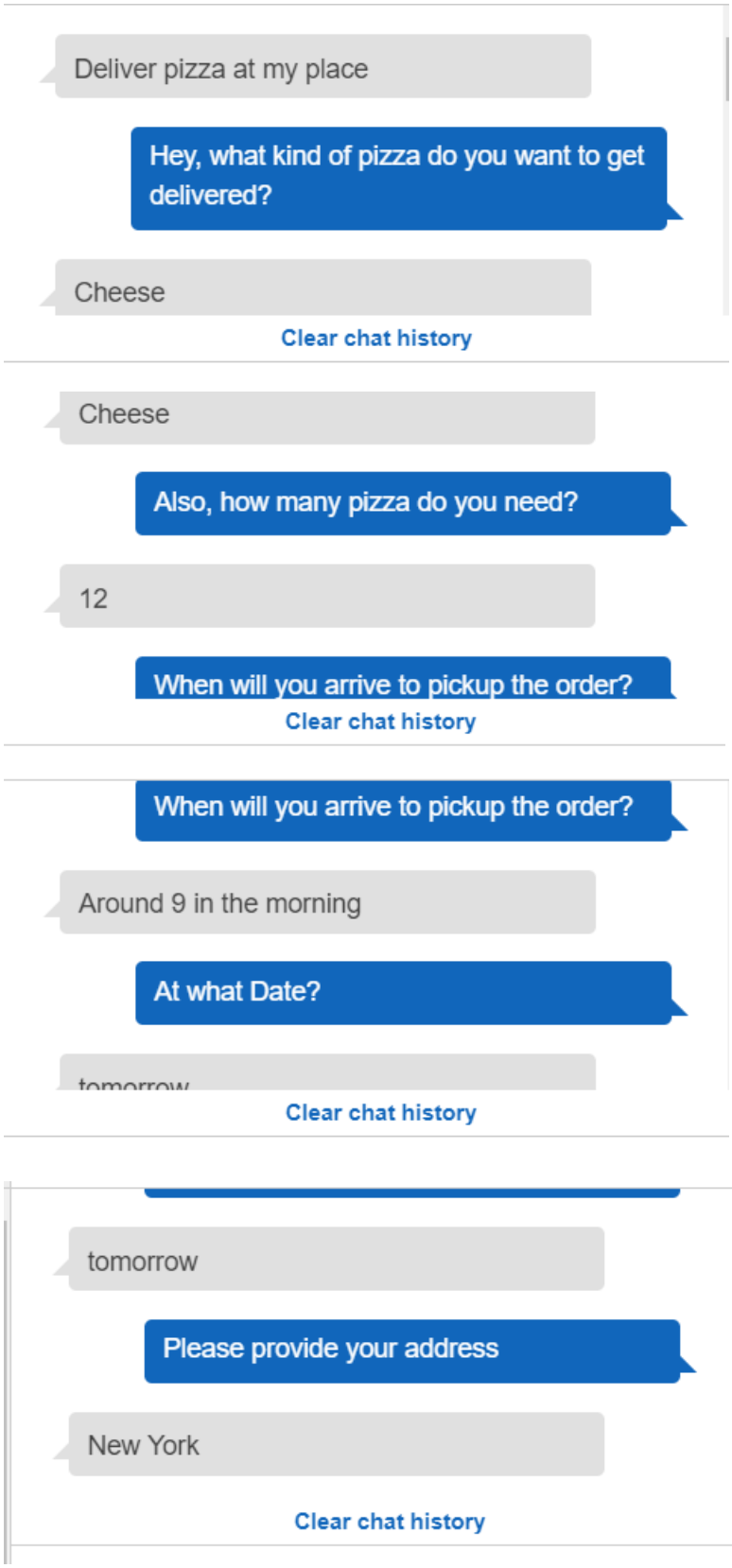
d. If it is delivery, then customer address, delivery date, and time is important

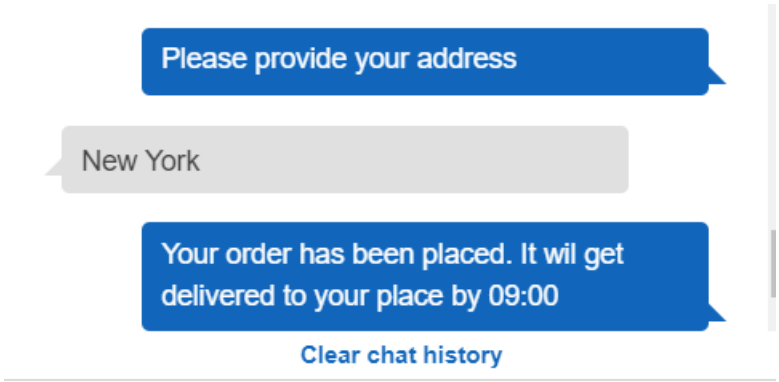
e. If it is takeaway, then assuming the same day, it should ask the arrival time of the customer.

1. Chatbot Creation page.

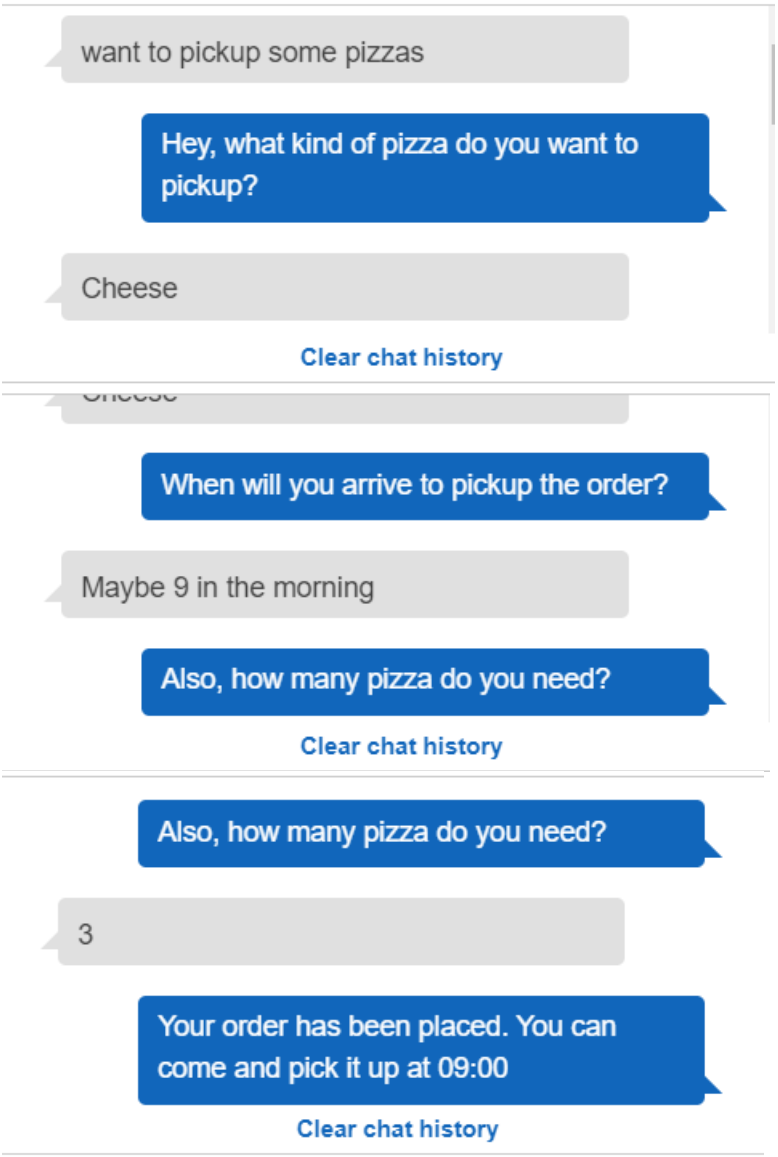


2. Full Chatflow for Pizza Delievery

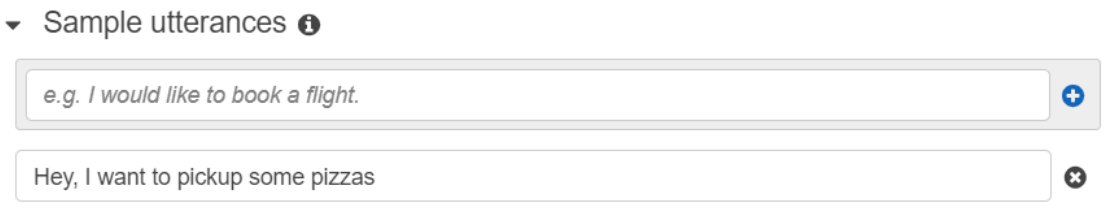



Please provide your address
New York
Your order has been placed. It wil get delivered to your place by 09:00
Clear chat history

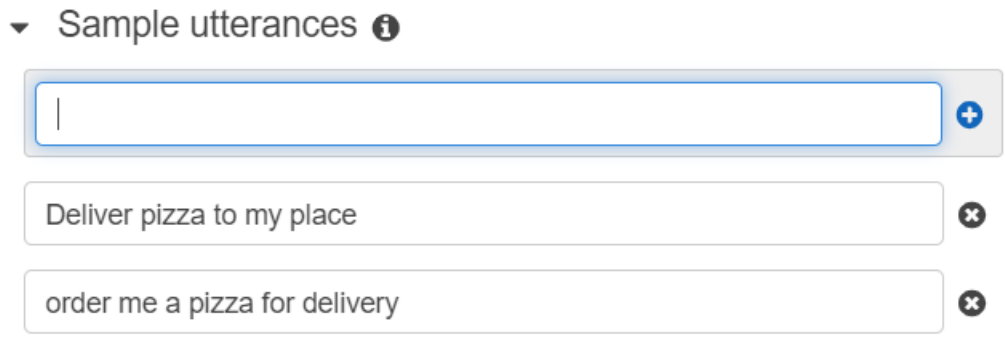
3. Full chat flow for pizza pickup



4. Utterances for Pickup



5. Delivery utterances



References

[1]"Cloud Computing Services | Google Cloud", *Google Cloud*, 2020. [Online]. Available: https://cloud.google.com/. [Accessed: 9- Jun- 2020].

[2]"Docker Documentation", *Docker Documentation*, 2020. [Online]. Available: https://docs.docker.com/. [Accessed: 9- Jun- 2020].

[3]"Set up your first microservice using Flask and Docker: Part 2", Medium, 2020. [Online]. Available: https://medium.com/hacksnextdoor/set-up-your-first-microservice-using-flask-and-docker-part-2-d8e078357500. [Accessed: 9- Jun- 2020].

[4]2020. [Online]. Available: https://www.youtube.com/watch?v=KTa1T14nkbw. [Accessed: 9- Jun- 2020].