MINI PROJECT (SEM V)

BANKING CHATBOT

Using **IBM Cloud** & **AWS**

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Project Link: Trinket Bank

Introduction:

A chatbot (called bot for short) is a computer program designed to mimic conversation with human users on the internet, according to Oxford Dictionaries. Using robotics and **Artificial Intelligence** (AI), a chatbot can assist customers without the need for a customer service agent on the other end. Customers started to see chatbots in banking in the early 2000s through text messaging. These bots could do simple tasks like show an account balance when given a specific command. Now, AI vendors like **Abe** are making chatbot interactions about banking as natural as chatting with a friend across platforms like Facebook Messenger, Slack and in banks' mobile apps.

Taking an inspiration from revolutionary banking chatbots like Bank of America's Erica and Capital-One, I tried to create a banking chatbot in this project.

Objective:

Create a Banking Chatbot using IBM Watson Assistant and embed it on a website hosted on AWS Cloud.

Cloud Service Providers Used:

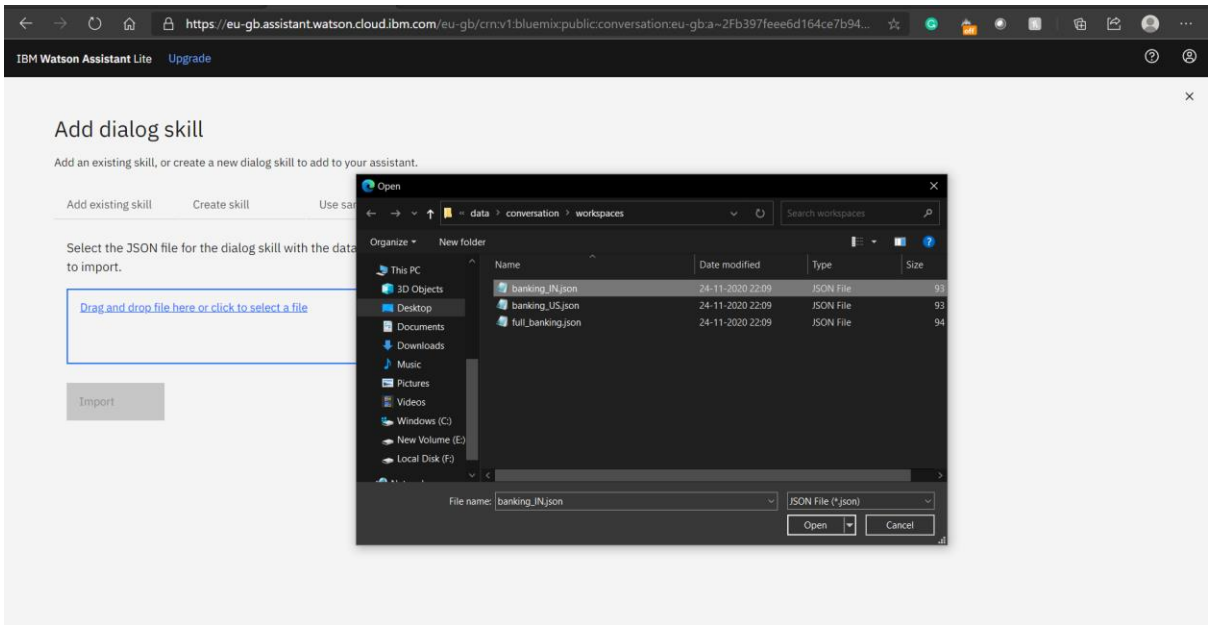
IBM Cloud and AWS

Tools Used:

Watson Assistant from IBM Cloud, Bucket Storage Service from IBM Cloud & EC2 from AWS.

STEPS & CODE USED:

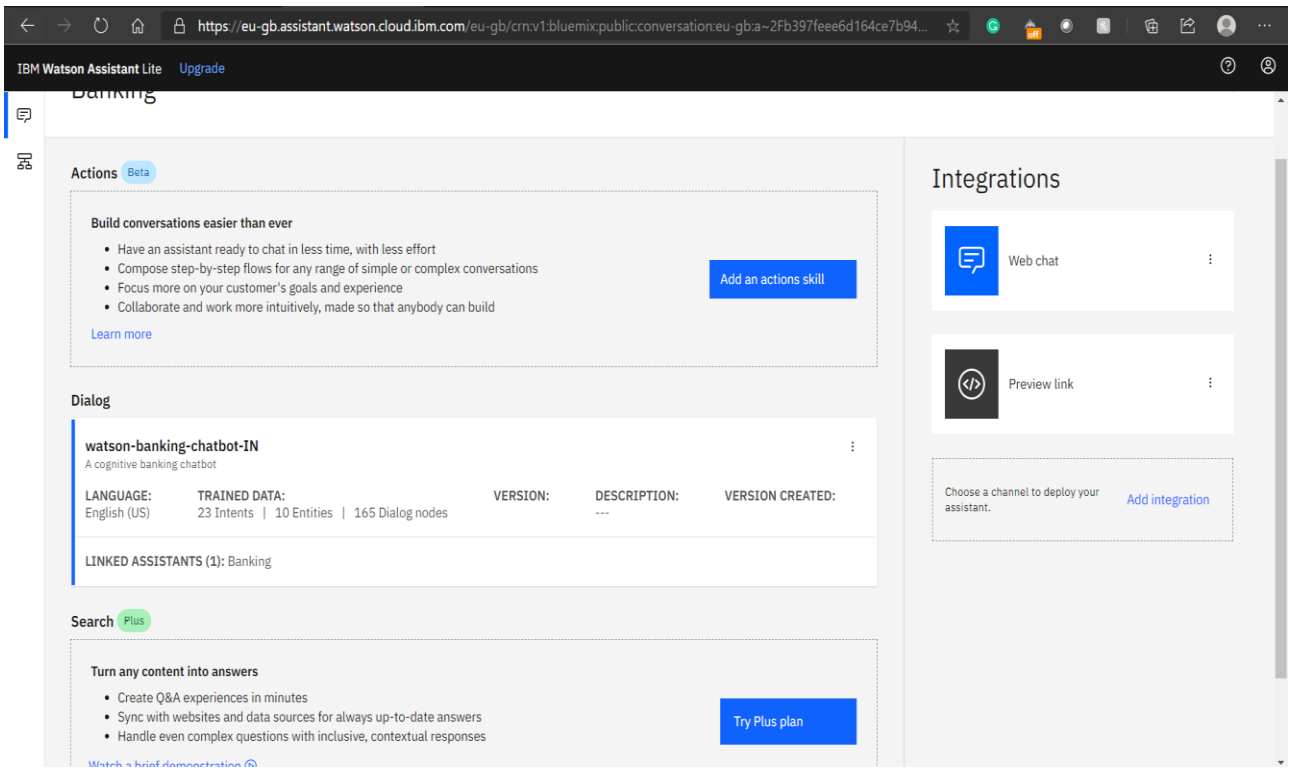
1. Login into IBM Cloud: https://cloud.ibm.com
2. Click the CatLog tab
3. Search for the Watson Assistant service and click that tile under the AI heading.
4. Fill out the necessary information and click Create
5. Click Launch Watson Assistant. If you're prompted to log in, provide your IBM Cloud credentials.
6. An assistant named My first assistant is created for you automatically. An assistant is a cognitive bot to which you add skills that enable it to interact with your customers in useful ways.
7. A dialog skill named My first skill is added to the assistant for you automatically. A dialog skill is a container for the artifacts that define the flow of a conversation that your assistant can have with your customers.
8. Go to the Skills tab.
9. Click Create skill
10. Select the Dialog Skill option and then click Next
11. Click Create Skill
12. Select the Dialog Skill option and then click Next.
13. Click the Import Skill tab.
14. Click Choose JSON file and copy the banking_IN.json file which contains the content for banking in India. Click Import.

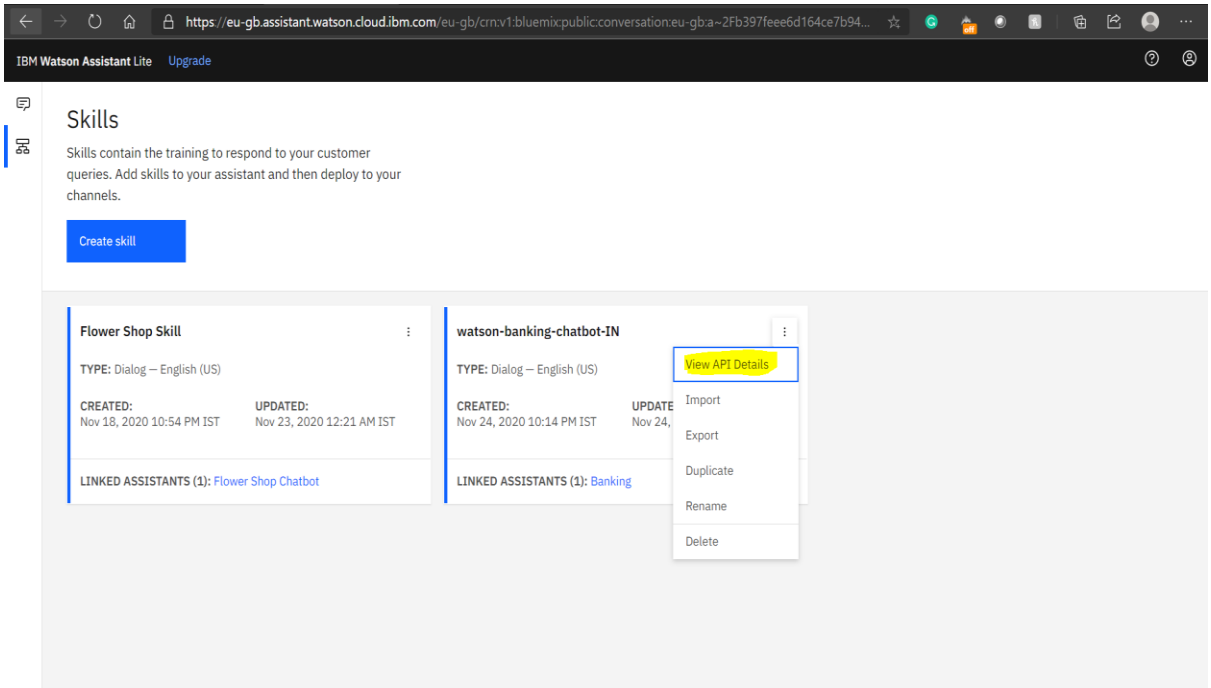


banking_IN.json file:

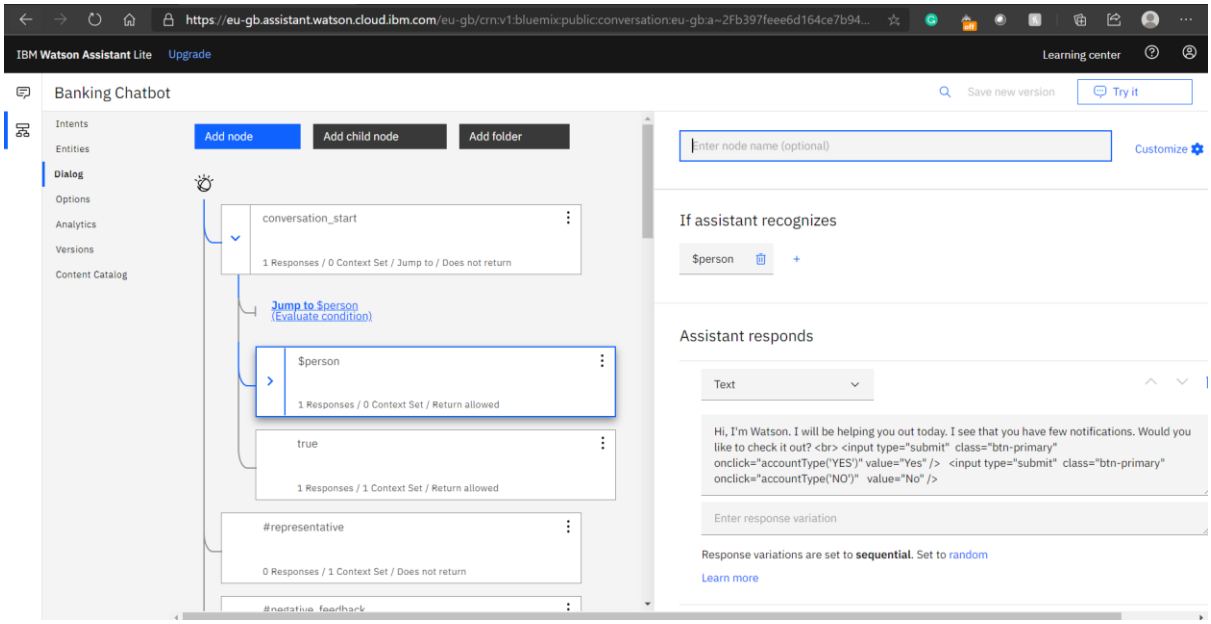
This file contains the information about intents and entities in json format. This information is what is going to makeup the chatbot. Only by importing this JSON file, one can create a whole chatbot and do necessary customizations if any. This can be done manually- the creation of entities and intents. But the JSON not only increases automation but also provides a ready-to-use infrastructure and is faster. *I have attached the GitHub repository link at the end of this doc containing the necessary files used in this project.*

15. By default, the application will import and use the skill named **watson-banking-chatbot-IN**, but we can change this by clicking on three dots at the top right of the dialog tab and clicking on rename option. Here, rename it to Banking Chatbot.





To view the Assistant dialog, click on the skill and choose the Dialog tab. Here's a snippet of the dialog:



16) Make the required customisations as per your requirement or add one or more intents and entities.

<u>For adding an intent:</u>

An intent is specified using #.

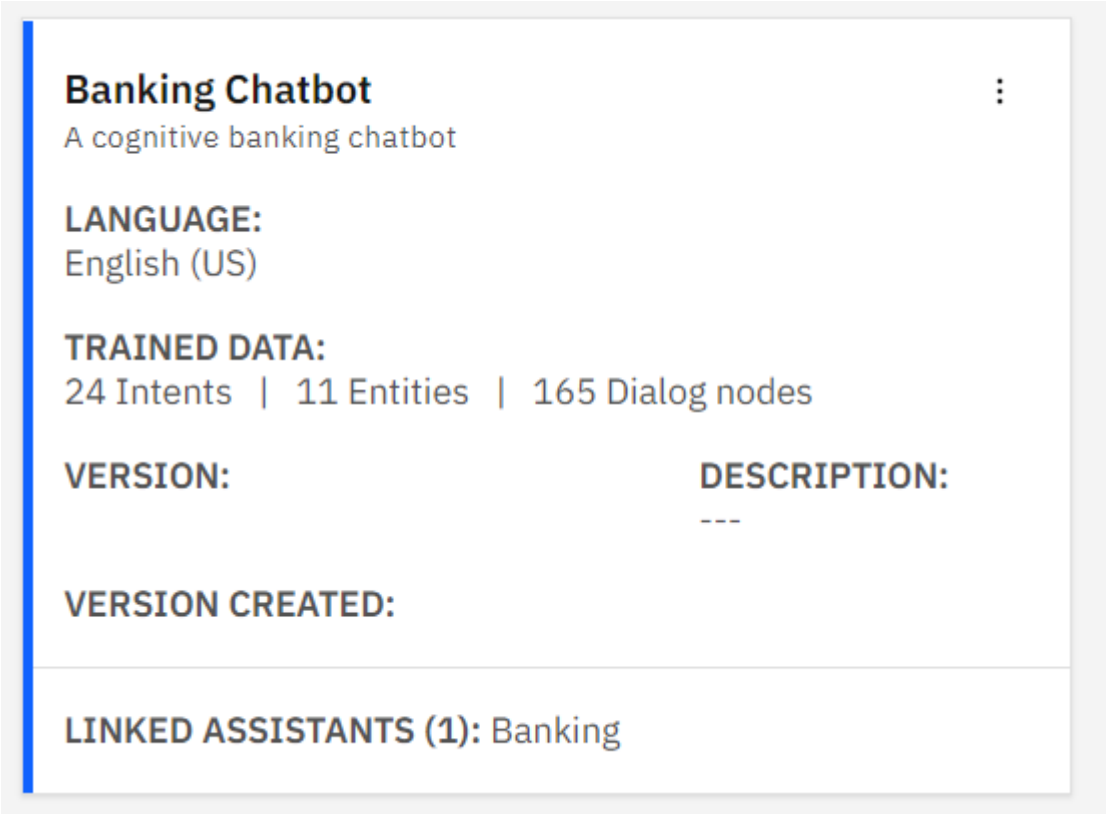
- Click on Intents tab, then click on Create intent +
- Type the intent name and click Add
- Give a few examples based on the intent
  For example: #Greetings intent had 5 examples: Hello, Hi, Howdy, Hi how are you and how are you.
- Click Add example after adding every example.
- Now you can use these intents anywhere as required in dialogs while creating the chatbot

<u>For adding entities:</u>

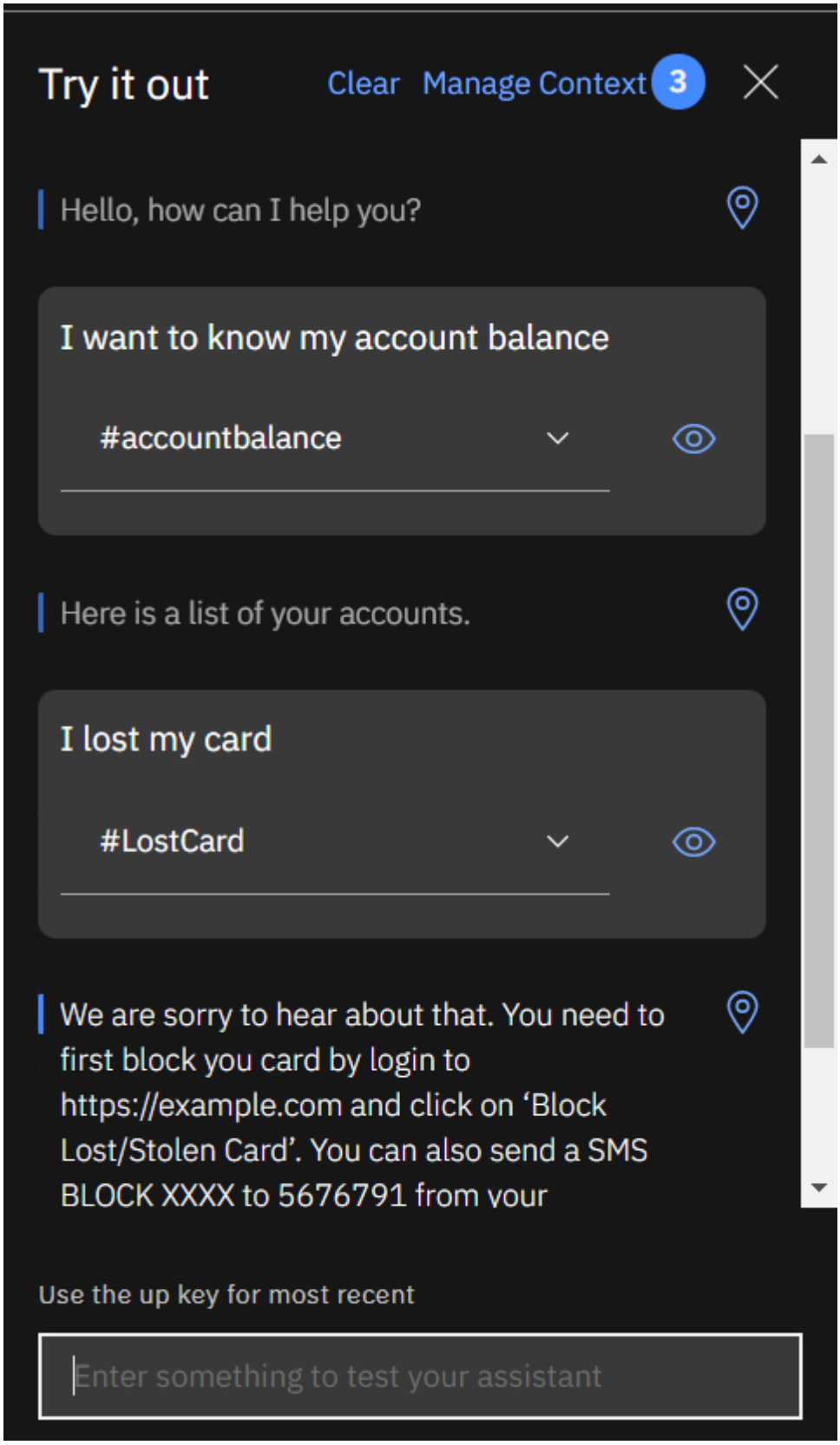
An entity is specified using @.

- Click on Entities tab, then click on Create entity +
- Give the name and click Create entity
- Give Value and Synonyms based on the entity provided
  For example, if the entity is @location, value will be Mumbai and the synonyms can be Andheri, Juhu and so on.
- Click Add Value.

For this chatbot, we have:

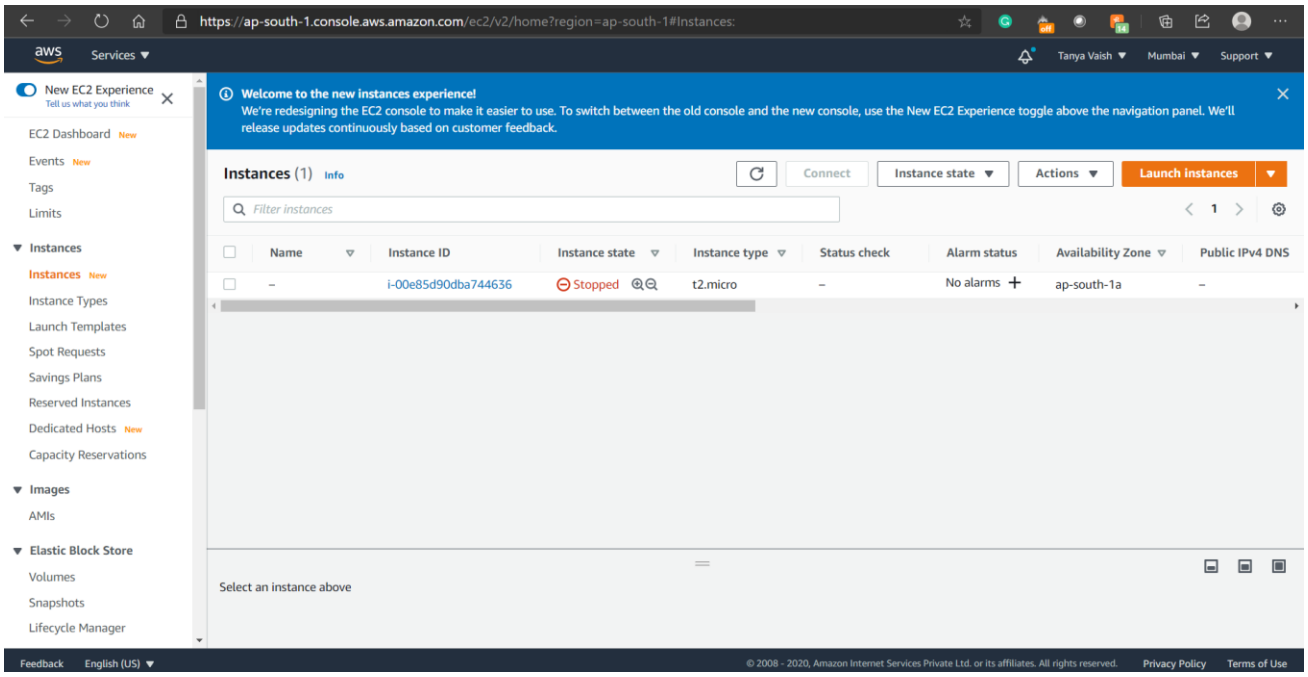


17) Testing the Chatbot:

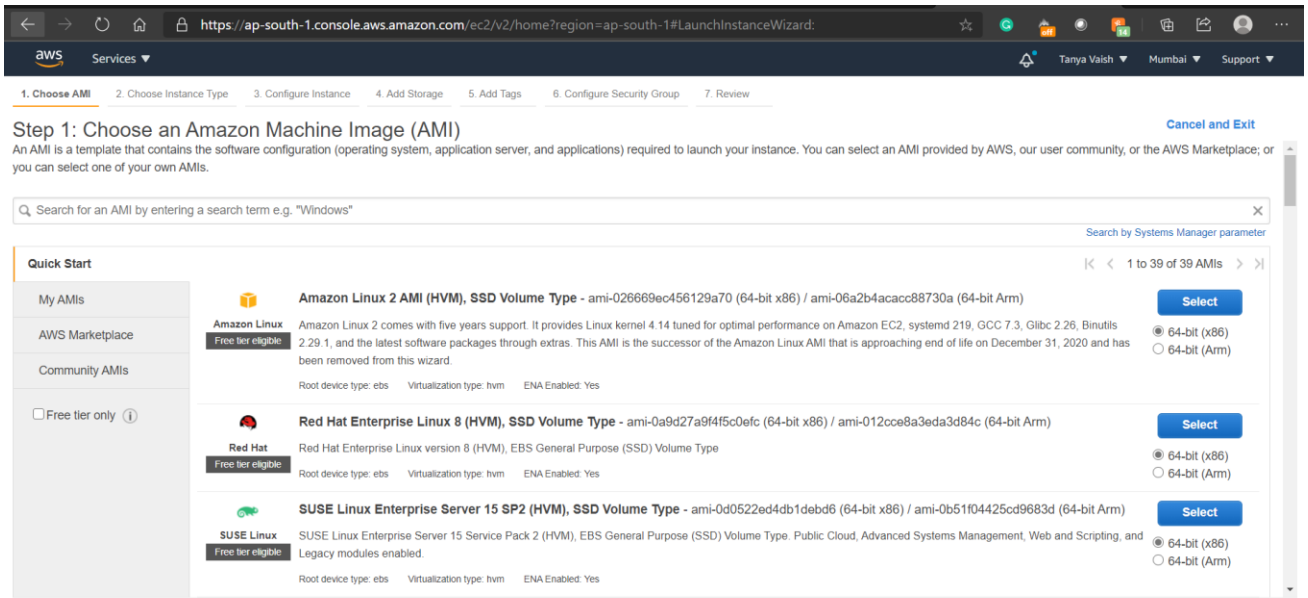


18) Now we have to integrate this chatbot to make it accessible to users. Log in AWS account (here using AWS Free Tier Account) [Amazon Web Services (AWS) - Cloud Computing Services]

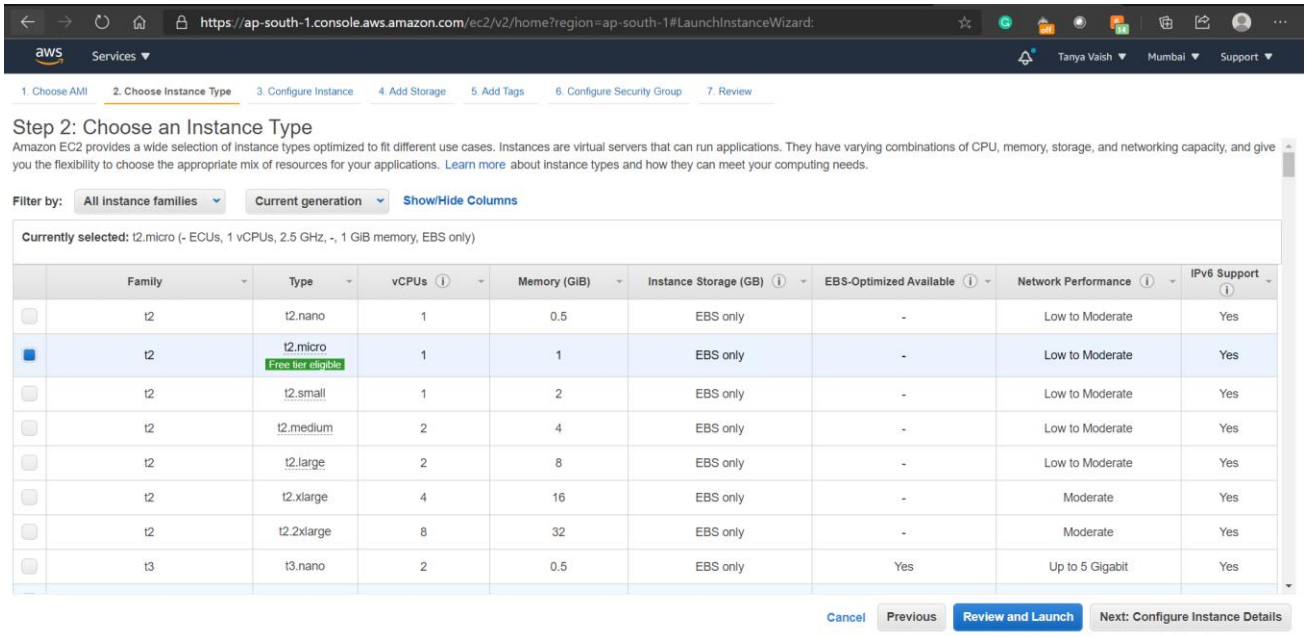
19) Go to EC2 Service



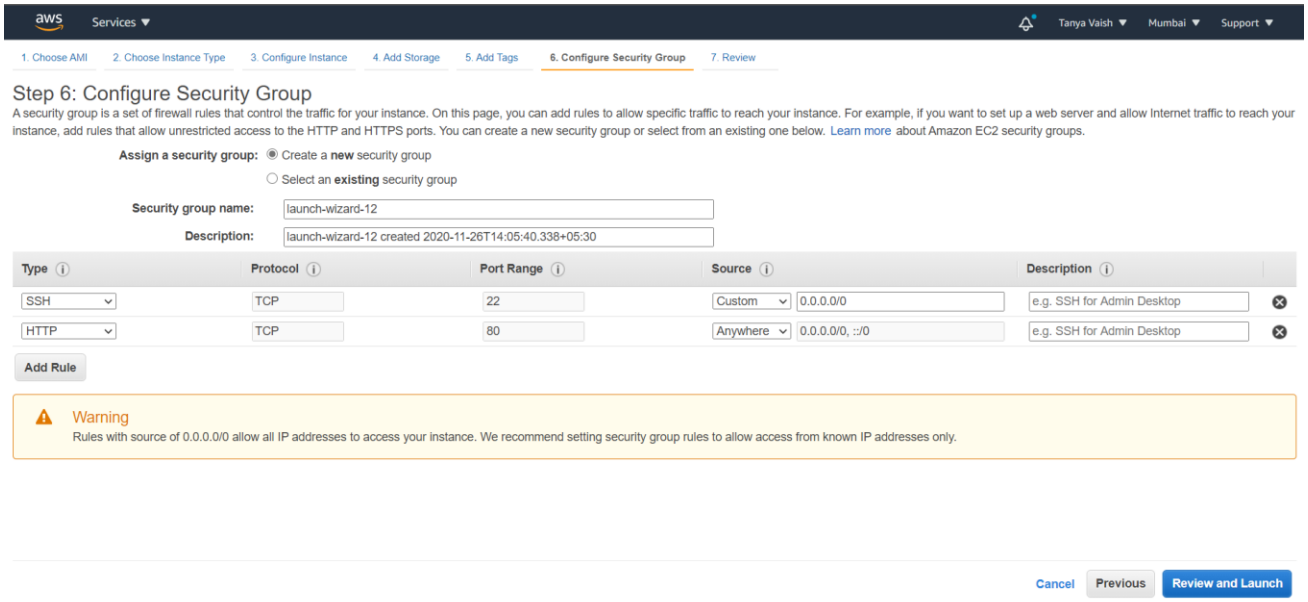
20) Click on Launch Instance. Select AMI and other necessary specs needed for instance:

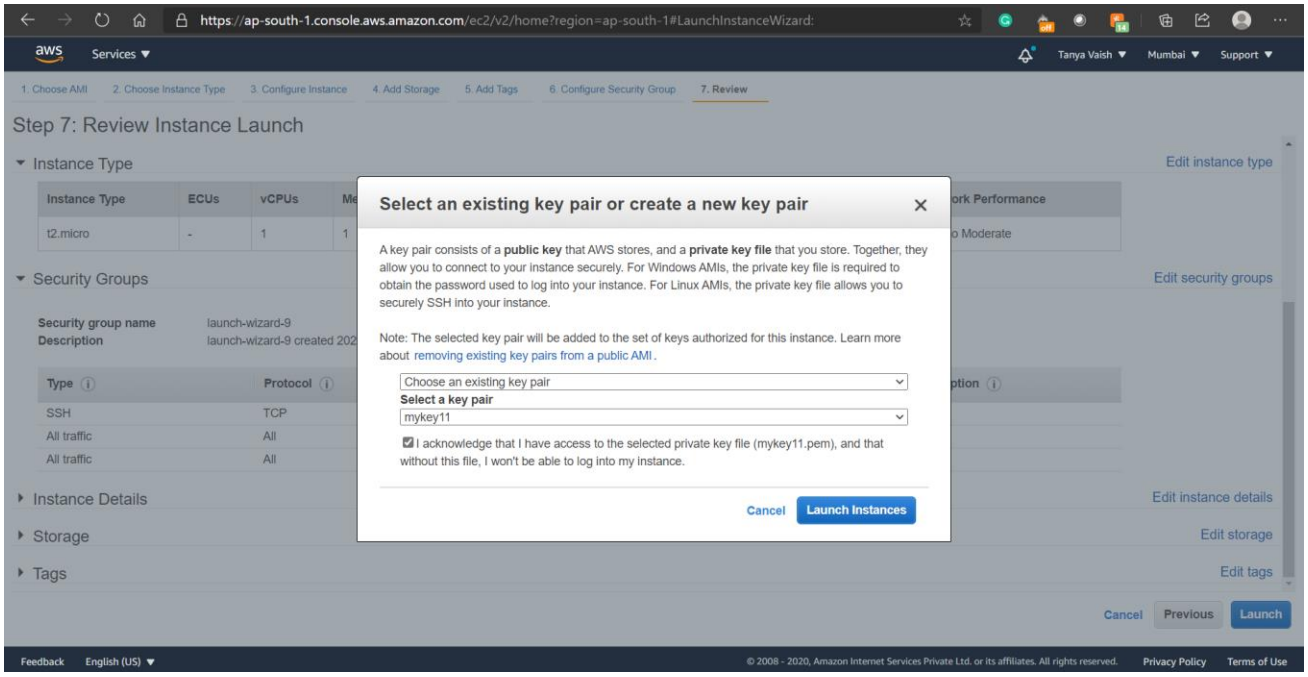


Used t2. micro instance as part of free tier account.



Here I selected 2 security groups to allow networking, so that we can access the webpage hosted on this instance-one is SSH using which we can connect to this instance using our bare systems, and other is HTTP to allow this instance to be over Internet from anywhere. Specify the source as Anywhere (0.0.0.0/0, ::/0)





Make sure to download the key to access the instance locally.

Click on Launch Instance and after a while the instance will be in running state.

21) Now SSH connect with this instance using key on terminal. Make sure you have AWS CLI setup already to access AWS using CLI/terminal.

```
C:\Users\TANYA\Downloads>ssh -i "mykey11.pem" ec2-user@ec2-65-0-12-214.ap-south-1.compute.amazonaws.com
The authenticity of host 'ec2-65-0-12-214.ap-south-1.compute.amazonaws.com (65.0.12.214)' can't be established.
ECDSA key fingerprint is SHA256:p0PK5n/Z+KNsHPQzhPsesMOyIayKQ9gPgyUW/VP3Dgo.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'ec2-65-0-12-214.ap-south-1.compute.amazonaws.com,65.0.12.214' (ECDSA) to the list of known h
osts.

       __|  __|_  )
       _|  (     /   Amazon Linux 2 AMI
      ___|\___|___|
       _|  (     /   Amazon Linux 2 AMI
      ___|\___|___|

https://aws.amazon.com/amazon-linux-2/
No packages needed for security; 3 packages available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-172-31-40-226 ~]$
```

21) After logging into the instance, run the following commands:

sudo su – root [To login as root user]

yum update -y [To update yum]

yum install httpd -y [To setup Apache webserver]

service httpd start

chkconfig httpd on

```
[ec2-user@ip-172-31-43-25 ~]$ yum update -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
You need to be root to perform this command.
[ec2-user@ip-172-31-43-25 ~]$ sudo su - root
[root@ip-172-31-43-25 ~]# yum update -y
Loaded plugins: extras_suggestions, langpacks, priorities, update-motd
Resolving Dependencies
--> Running transaction check
---> Package ec2-instance-connect.noarch 0:1.1-12.amzn2 will be updated
---> Package ec2-instance-connect.noarch 0:1.1-13.amzn2 will be an update
---> Package iptables.x86_64 0:1.8.4-10.amzn2.1.1 will be updated
---> Package iptables.x86_64 0:1.8.4-10.amzn2.1.2 will be an update
---> Package iptables-libs.x86_64 0:1.8.4-10.amzn2.1.1 will be updated
---> Package iptables-libs.x86_64 0:1.8.4-10.amzn2.1.2 will be an update
--> Finished Dependency Resolution

Dependencies Resolved

================================================================================================================
 Package                        Arch              Version                        Repository              Size
================================================================================================================
Updating:
 ec2-instance-connect           noarch            1.1-13.amzn2                   amzn2-core              22 k
 iptables                       x86_64            1.8.4-10.amzn2.1.2             amzn2-core             476 k
 iptables-libs                  x86_64            1.8.4-10.amzn2.1.2             amzn2-core              93 k
```

22) Now after successful installation, head into /var/www/html directory to create the HTML page here. Use the pre-installed nano editor:

```
[root@ip-172-31-39-123 ~]# cd /var/www/html
[root@ip-172-31-39-123 html]# ls
[root@ip-172-31-39-123 html]# nano index.html
```

Here, begins the necessary steps of IBM Watson Assistant and EC2 AWS integration

Here's the HTML code used:

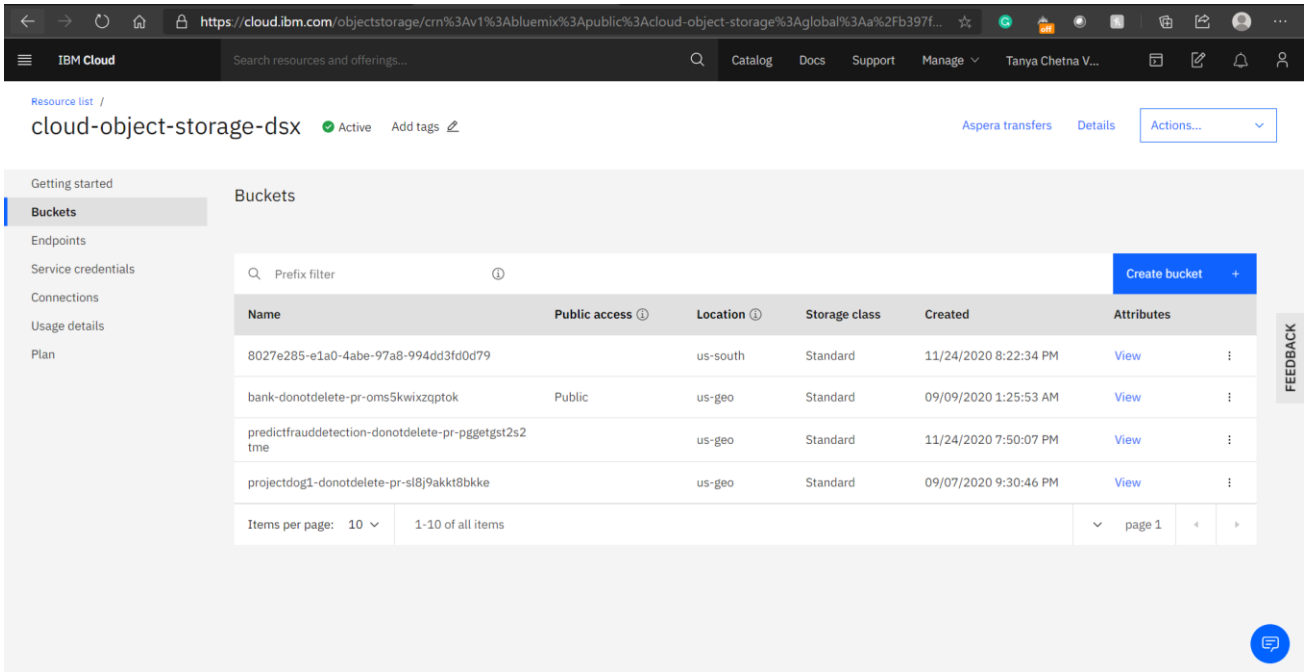
```
root@ip-172-31-36-6:/var/www/html
  GNU nano 2.9.8                                                    index.html

<!DOCTYPE html>
<html>
<head>
<title>Trinket Bank</title>
</head>
<style>
body {
background-image: url('https://bank-donotdelete-pr-oms5kwixzqptok.s3.us.cloud-object-storage.appdomain.cloud/Pin-on-Super-gif.gif')
}
</style>
<body>
<center>
<h1 style="font-size:60px;color:white">Welcome to Trinket Bank</h1>


<p style="font-size:40px;color:lightblue">Chat with your virtual assistant here</p>
<img src="https://bank-donotdelete-pr-oms5kwixzqptok.s3.us.cloud-object-storage.appdomain.cloud/aaaaaa.PNG" alt="Bank icons" width="550" height="600">
</center>
</body></html>

<script>
  window.watsonAssistantChatOptions = {
      integrationID: "567c4e21-c2f7-4765-bd44-9935eef2fd72", // The ID of this integration.
      region: "eu-gb", // The region your integration is hosted in.
      serviceInstanceID: "fc08724b-a457-4838-936e-e6b76678190c", // The ID of your service instance.
      onLoad: function(instance) { instance.render(); }
    };
  setTimeout(function(){
    const t=document.createElement('script');
    t.src="https://web-chat.global.assistant.watson.appdomain.cloud/loadWatsonAssistantChat.js";
    document.head.appendChild(t);
  });
</script>
```

Let's discuss the parts of this code one by one:

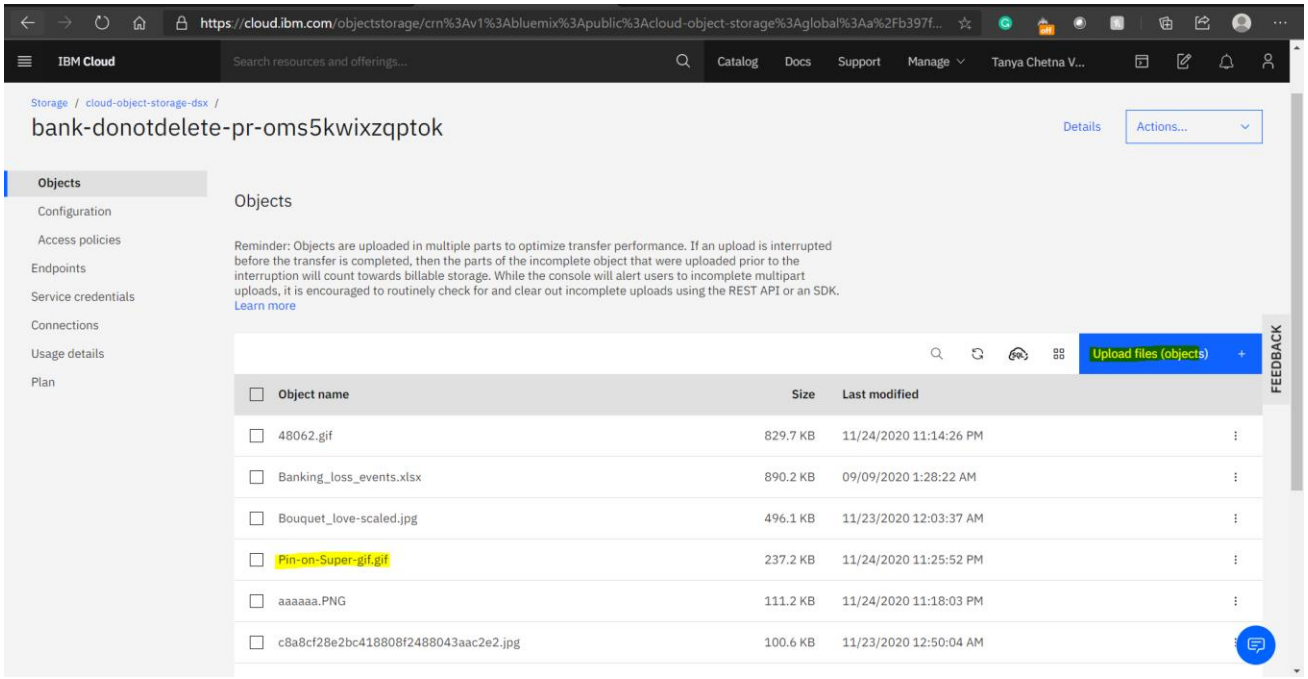
- The **HTML** <**doctype**> **tag** is used for specifying which version of **HTML** the document is using. This is referred to as the document type declaration (DTD).
- For the background-image and img src specified URLs to the images stored in IBM's Bucket Storage Service and made it publicly accessible.

<u>Steps for storing image in IBM Bucket Storage:</u>

a) Go to your Cloud Object Storage

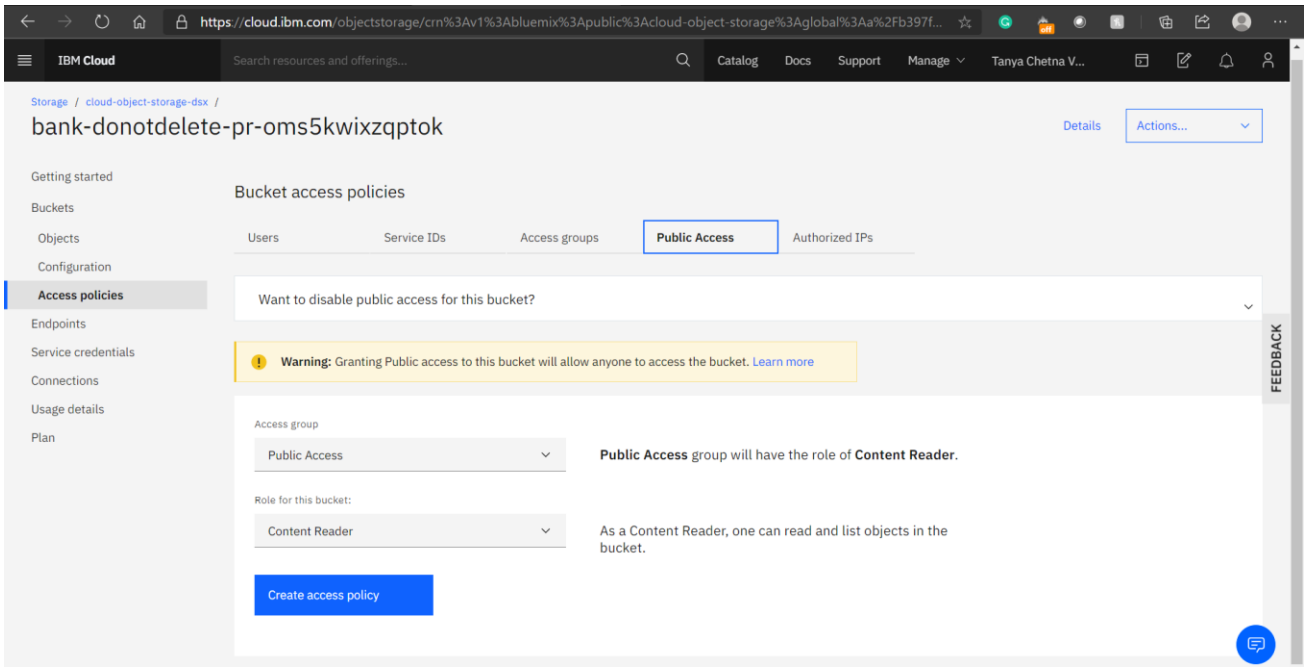


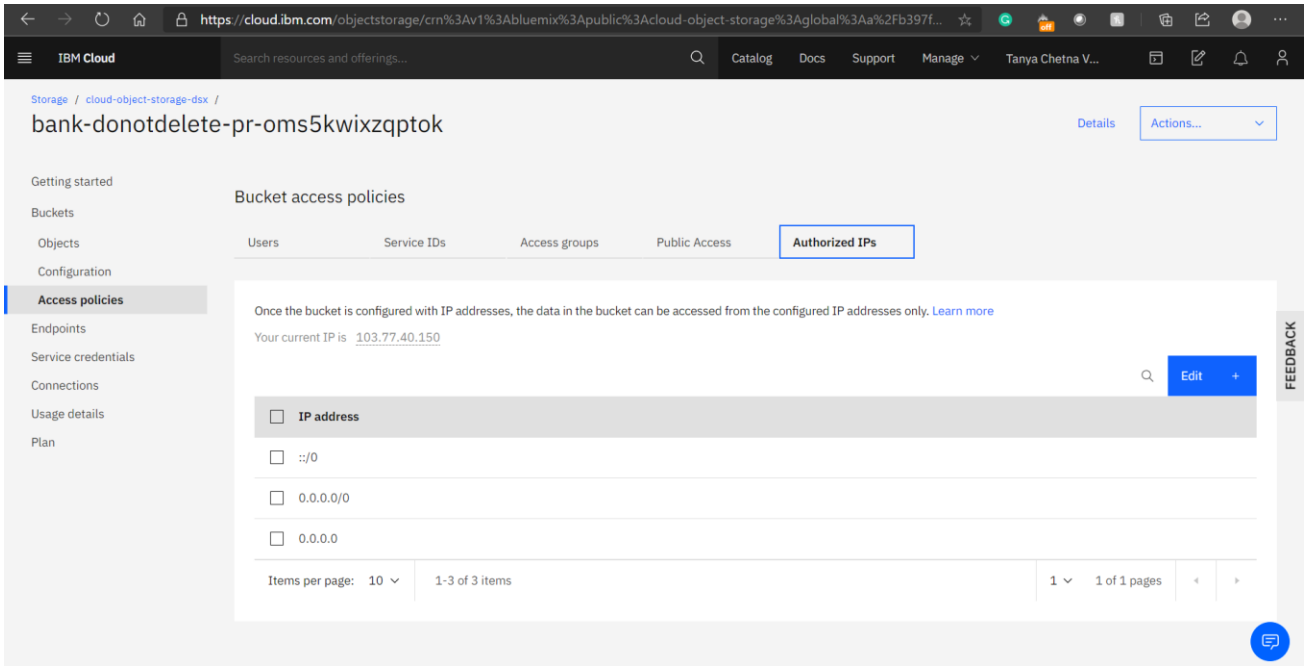
b) Either create a new bucket here or use a pre-defined bucket. Click on Upload files(objects) + and upload a file here.



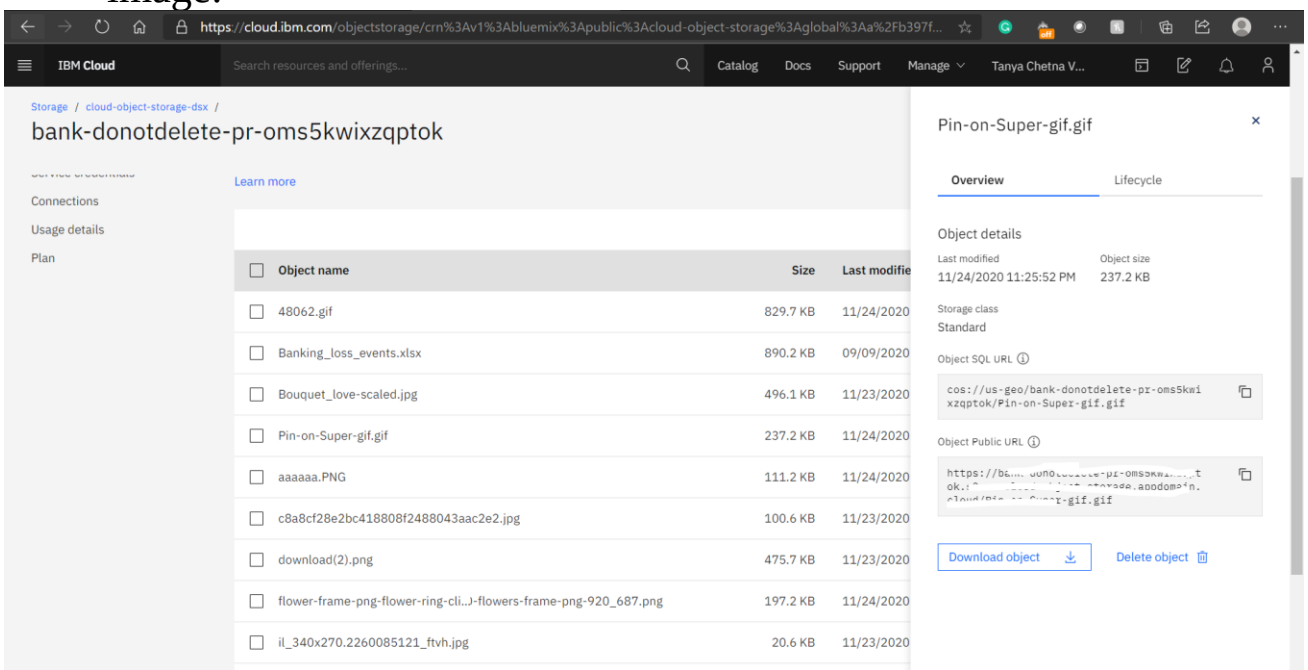
I uploaded 2 images here which I will be using for my webpage. *Also, you can upload images you want to use in your chatbot as part of response as image.*

c) To make the image publicly accessible make the bucket and its object public by updating the access policies and granting public access.





d) After granting public access, click on the image details of the image you want to use to get the object public URL of the image:

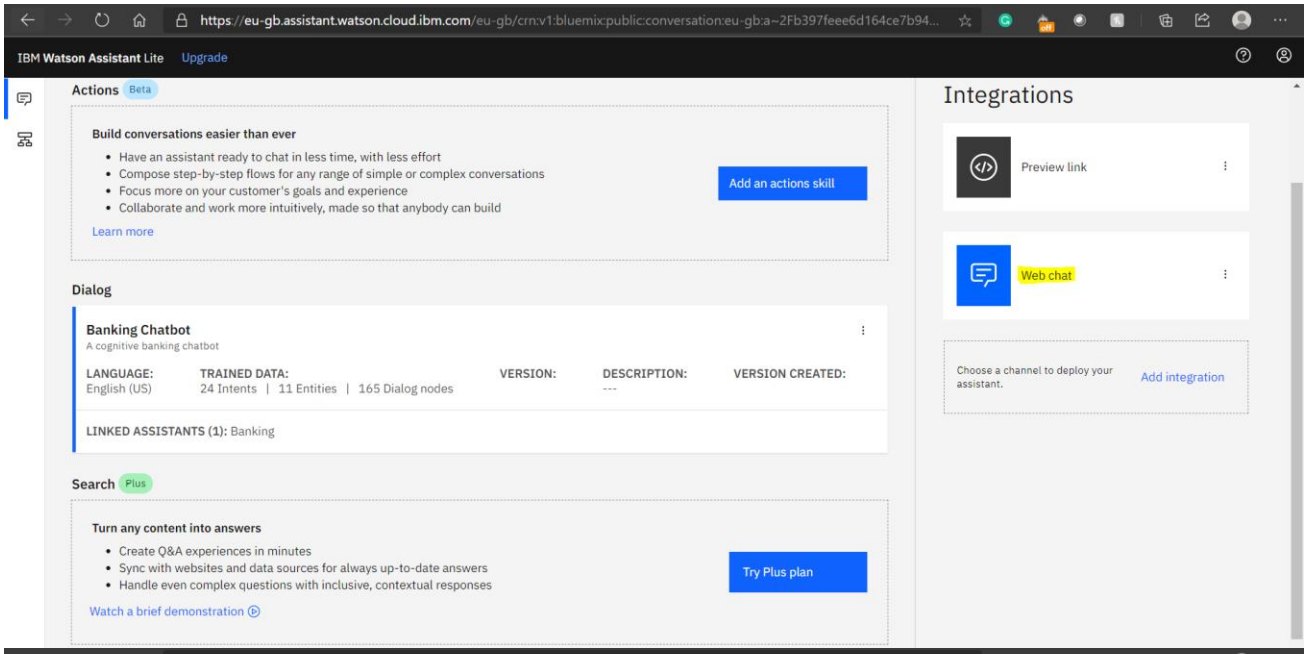


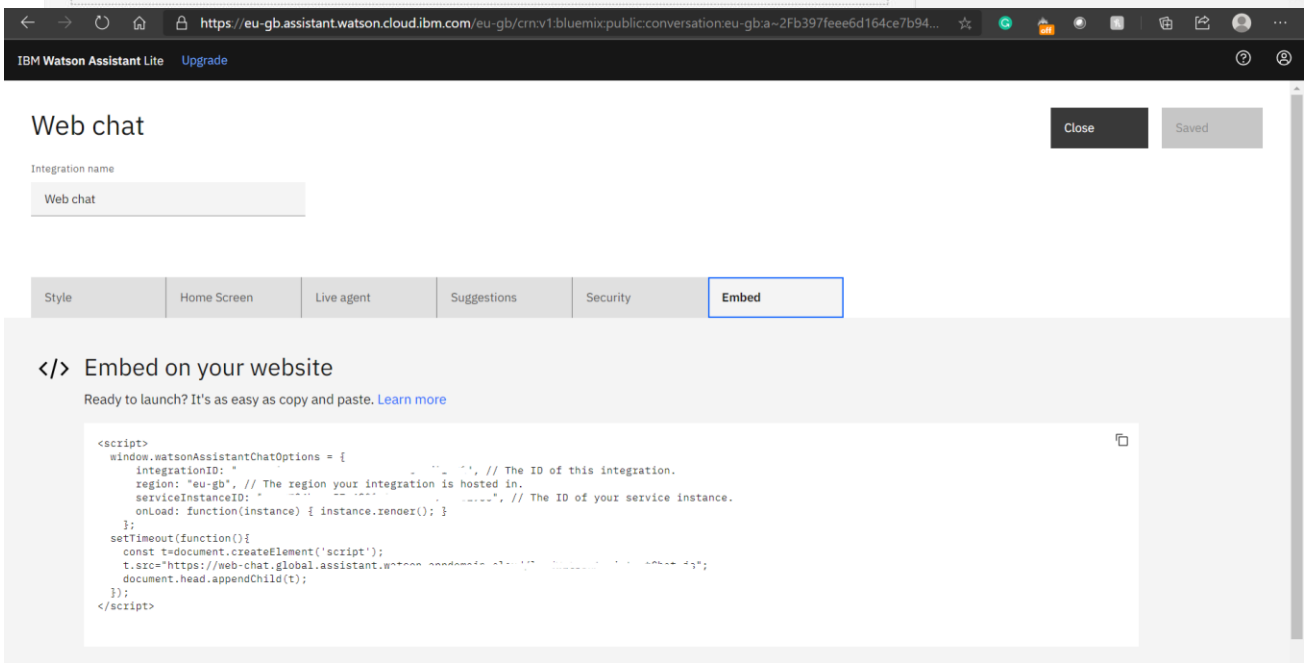
- Embedded the chatbot to this HTML page using code.

<u>Steps to Embed Chatbot:</u>

a) Go to IBM Cloud and Launch Watson Assistant

b) Head into Banking Chatbot and select Webchat tab from right. Now head into the Embed section and copy the code written there and paste it below the html code you wrote on your EC2 instance.





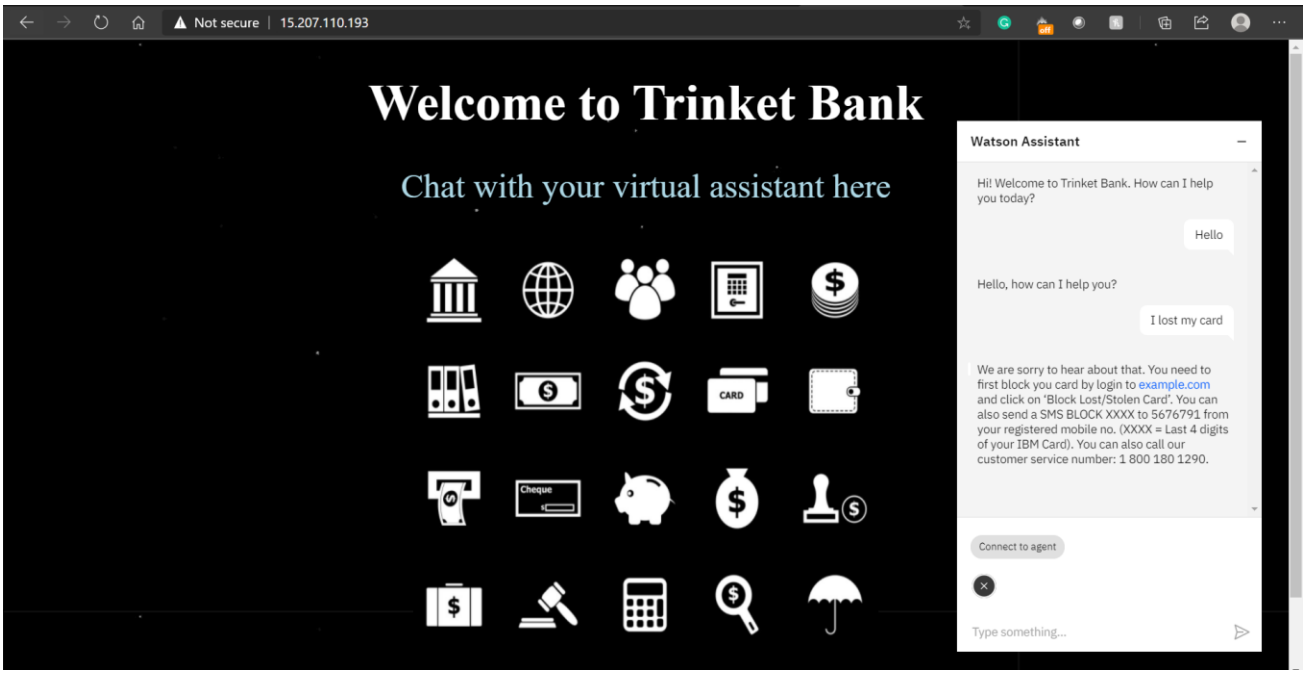
Also , do some customisation if you want to change the color of the bar of Watson Assitant from default blue color to red or pink.I changed it to white.

23) Write this code into nano editor and after writing press Cntrl+S to save and Cntrl+X to exit the nano editor.

24) Now go to the instances page of AWS and get the public IP of the Banking Chatbot instance.In my case its : http://13.233.114.230/

25) Paste this IP onto browser and that's it the page is accessible with the floating IBM Watson Assistant icon at the bottom right.

Click on the Watson Assistant icon to access and use it.

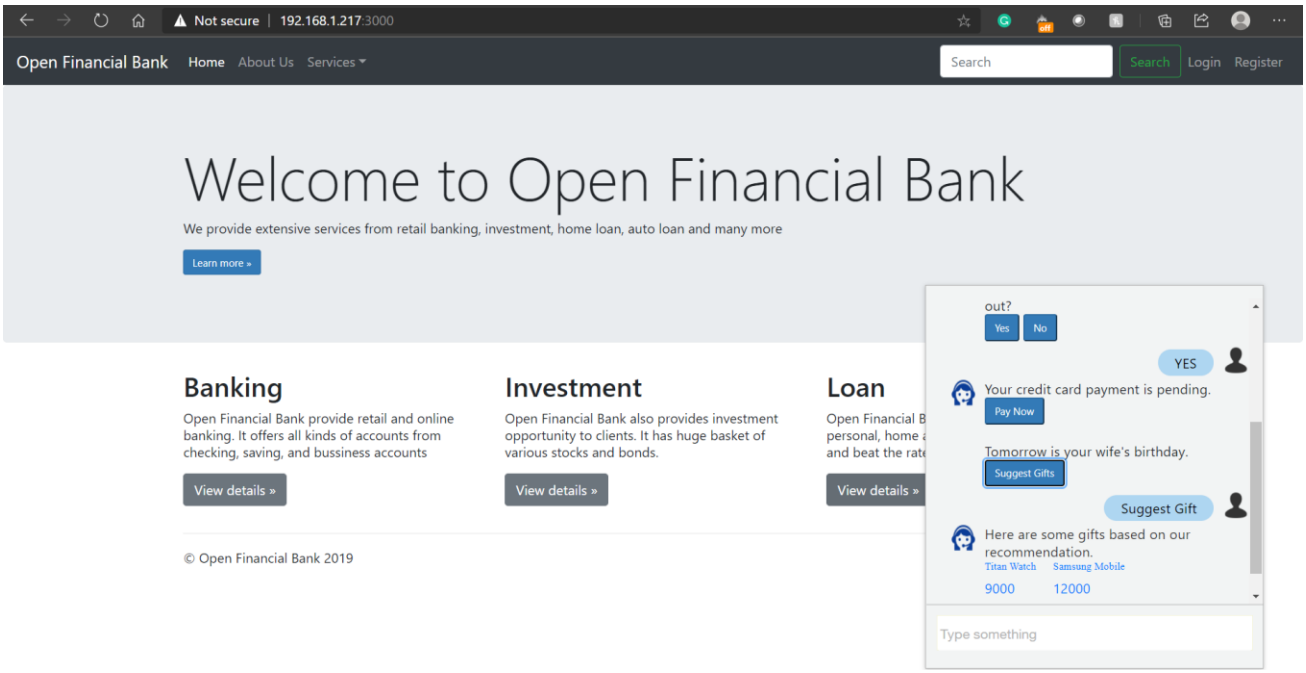


INFERENCE:

This was however a basic Banking Chatbot, but more customisations can be done and the Watson Assistant can be integrated with Watson Discovery or Natural Language Understanding services to provide a wider outlook to this chatbot. This can be easily used by banks to aid customers by providing data. As a future scope of this project, I will try to add more dialogs making it more customer-friendly and try to host it using a more informative webpage with greater number of functionalities.

In this project I integrated the services from 2 Cloud Service Providers- IBM Cloud and AWS, and build a publicly accessible chatbot.

One can use Nodejs and deploy locally this chatbot on there systems and integrate it with Watson Discovery and Natural Language Understanding so that not only the chatbot can iterate over greater set of data and then reply but also understand questions posed to it more properly. The steps for which are given in IBM docs and is pretty straightforward to apply. I deployed the app locally too to get hands on that as well:



For doing this just setup the Watson Discovery using necessary csv files (also uploaded to GitHub repository) and Natural Language Understanding services on IBM cloud and save the credentials. Create the .env file providing the credentials for each of the 3 services-Watson Assistant, Watson Discovery and Natural Language Understanding. Also install

node.js. Run the npm install and then npm start command in the same directory as the .env file and that's it. Your app is running locally now, while also fetching information from internet:

```
C:\Users\TANYA\Desktop\Untitled Folder\watson-banking-chatbot>npm audit fix

removed 4 packages, changed 2 packages, and audited 406 packages in 15s

found 0 vulnerabilities

C:\Users\TANYA\Desktop\Untitled Folder\watson-banking-chatbot>npm start

> watson-banking-chatbot@0.0.1 start
> node server.js

locale = en_IN
Using configured SKILL_ID: 77bfa7c8-3889-486c-a75d-712457119637
Watson Assistant is ready!
Server running on port: 3000
environments[0]: {
  "environment_id": "system",
  "name": "Watson System Environment",
  "description": "Shared system data sources",
  "read_only": true
}
environment: {
  "environment_id": "system",
  "name": "Watson System Environment",
  "description": "Shared system data sources",
  "read_only": true
}
environment: {
  "environment_id": "89be6596-8f4b-4b8c-a038-6f758c935d95",
  "name": "byod",
  "description": "",
  "created": "2020-11-24T16:53:57.525Z",
  "updated": "2020-11-24T16:53:57.525Z",
  "read_only": false
}
Found Discovery environment using DISCOVERY_ENVIRONMENT_ID.
{
  environment_id: '89be6596-8f4b-4b8c-a038-6f758c935d95',
  name: 'byod',
  description: '',
  created: '2020-11-24T16:53:57.525Z',
  updated: '2020-11-24T16:53:57.525Z',
  read_only: false
}
Found Discovery collection using DISCOVERY_COLLECTION_ID.
{
```

Chatbot Link:

Webpage: Trinket Bank

Preview Link: https://web-chat.global.assistant.watson.cloud.ibm.com/preview.html?region=eu-gb&integrationID=63656b1f-8922-4104-a0c5-b2879a23ac25&serviceInstanceID=fc08724b-a457-4838-936e-e6b76678190c

GitHub: TanyaChetnaVaish/MiniProjectSemV (github.com)

Thankyou!