AI BASED DISCOURSE FOR BANKING INDUSTRY

Team ID: PNT2022TMID28536

TEAM MEMBERS:

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CONTENT

1 INTRODUCTION:

1.1 Project Overview:

✓ Industries are forced to evolve and update their practices due to technological advances and the contemporary market. The banking sector is one of the most developed sectors and is always looking for the latest technological solutions that improve its efficiency.

✓ Net banking websites are complex and involve navigating through a lot of pages to find the information you need. Bank staff undergoes a lot of stressful situations when communicating with clients directly. Such situations can be avoided gracefully by using chatbots.

✓ Only 32% of companies in the finance industry currently use AI chatbots, and 37% are planning to start using them within 18 months said a report from Salesforce. This results in a potential growth rate of 118% which indicates the demand in the industry.

✓ A smart chatbot takes a query from the user in natural language and gives the appropriate response for the same. This paper aims to discuss the relevance of chatbots in the banking sector and explore how chatbots can be implemented using natural language processing techniques that can be used in the banking industry.

1.2 Purpose:

✓ Banks are quickly incorporating **chatbots** into their operations to improve efficiency. Bots are assisting banks in interacting with clients at all stages of the customer life cycle.

✓ Using the services of an AI chatbot creation firm may offer you compelling reasons to use chatbots and make your website/app a modern classic.

✓ **Chatbots for digital banking** services are here to stay, and banks would be unable to function without them. Taking control of the situation now is the best course of action. Contact a reputable financial software development firm to save hours each day that can be spent on more productive tasks.

2 LITERATURE SURVEY:

2.1 Existing Problem:

✓ This paper [1] presents the use of the RASA framework for building smart context-remembering chatbots, it also describes how Rasa NLU works and how its performance is elevated by using intent recognition and entity extraction. It also

compares the accuracies of entity extraction using Rasa NLU and a NN, results show Rasa NLU performs better to extract entities when whole sentences are provided as compared to neural networks which require segmented inputs. This paper discusses Rasa by implementing a chatbot related to the finance domain, using which the users can inquire about stock-related information.

✓ RASA NLU can introduce a vital component in intelligent chatbot systems. We can compose the system to extract the entity after intent recognition. This can be further improved for complicated sentences and more entities.

✓ This paper [2] briefly discusses advancements in the field of AI and how this has led to major shifts in some organizations about how they operate. It further mentions how the banking industry has moved to use chatbots for providing an interface to customers so that they can have an assistant throughout the day for service. This paper also gauges the ability of current chatbots to provide all the services that a user needs.

✓ It includes several strategies for managing dialogue in the banking and finance industry based on ontology. Although further use of AI can make the chatbot not only respond to questions but also self-learning to improve itself in more stages, improving user service quality and also reducing human load.

2.2 Reference:

[1] Jiao, Anran. (2020). An Intelligent Chatbot System Based on Entity Extraction Using RASA NLU and Neural Network. Journal of Physics: Conference Series. 1487. 012014. 10.1088/1742-6596/1487/1/012014.

[2] Fathima, Sasha & Student, Suhel & Shukla, Vinod & Vyas, Dr Sonali & Mishra, Ved P. (2020). Conversation to Automation in Banking Through Chatbot Using Artificial Machine Intelligence Language. 10.1109/ICRITO48877.2020.9197825.

[3] Singh, Netra & Singh, Devender. (2019). Chatbots and Virtual Assistant in Indian Banks. Industrija. 47. 75-101. 10.5937/industrija47-24578.

[4] Petr Lorenc, "Joint model for intent and entity recognition" in arXiv:2109.03221v1 [cs.CL] 7 Sep 2021

[5] The Rasa documentation. [Online]. Available: https://rasa.com/docs/rasa/2.x

[6] Django documentation. [Online]. Available: https://docs.djangoproject.com/en/4.0/

[7] Adamopoulou, Eleni, and Lefteris Moussiades. "An overview of chatbot technology." In IFIP International Conference on Artificial Intelligence Applications and Innovations, pp. 373-383. Springer, Cham, 2020.

[8] Cahn, Jack. "CHATBOT: Architecture, design, & development." University of Pennsylvania School of Engineering and Applied Science Department of Computer and Information Science (2017).

[9] Hien, Ho Thao, Pham-Nguyen Cuong, Le Nguyen Hoai Nam, Ho Le Thi Kim Nhung, and Le Dinh Thang. "Intelligent assistants in higher- education environments: the FIT-EBot, a chatbot for administrative and learning support." In Proceedings of the ninth international symposium on information and communication technology, pp. 69-76. 2018.

[10] Waterman, Chinia. 2018. "Consumer Online Banking Trends 2018". Humley. https://humleyai.com/2018/09/18/consumer-online-banking- trends-2018/.

[11] "Chatbots, A Game Changer For Banking & Healthcare, Saving $8 Billion Annually By 2022". 2017. Juniperresearch.Com. https://www.juniperresearch.com/press/chatbots-a-game-changer-for- banking-healthcare.

[12] Pal, Singh Netra, and Devender Singh. "Chatbots and virtual assistant in Indian banks." Industrija 47, no. 4 (2019): 75-101.

2.3 Problem Statement definition:

✓ The solution to the problem is Artificial intelligence in the banking sector makes banks efficient, trustworthy, helpful, and more understanding. It is strengthening the competitive edge of modern banks in this digital era. The growing impact of AI in banking sector minimizes operational costs improves customer support and process automation.

✓ Nearly 40% to 50% of financial and banking service providers are using AI in their processes to harness the power of next-generation AI capabilities. The companies believe that AI is the future of banking sector which can perform a range of banking operations in faster, easier, and more secure ways.

✓ AI banking Chatbots help customers in many ways. AI-based chatbot service for financial industry is one of the significant use cases of AI in banking sector. AI chatbots in banking are modernizing the way how businesses provide services to their customers

✓ AI chatbots in the banking industry can assist customers 24*7 and give accurate responses to their queries. These chatbots provide a personalized experience to users.

✓ AI chatbots in banking is providing a better customer experience.

✓ Hence, AI chatbots for banking and finance operations let banks attract customer attention, optimize service quality, and expand the brand mark in the market.

3 IDEATION AND PROPOSED SOLUTION:

3.1 Empathy Map Canvas

3.2 Ideation & Brainstorming
Step-1: Team Gathering, Collaboration and Select the Problem Statement

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- 10 minutes to prepare
- 1 hour to collaborate
- 2-8 people recommended

Share template feedback

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

⏱ 10 minutes

A Team gathering
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B Set the goal
Think about the problem you'll be focusing on solving in the brainstorming session

C Learn how to use the facilitation tools
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

Problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

⏱ 5 minutes

PROBLEM

Conversational Banking is a smarter way to retain the customers by offering them a quick response to their queries. But the problem is to train the bank employees to get knowledge to answer every query to customers. More over the employee cant be available 24*7 and may not be reliable and secure to communicate. Thus we have to create a AI based discourse for banking industry.

Key rules of brainstorming
To run an smooth and productive session

- Stay in topic.
- Encourage wild ideas.
- Defer judgment.
- Listen to others.
- Go for volume.
- If possible, be visual.
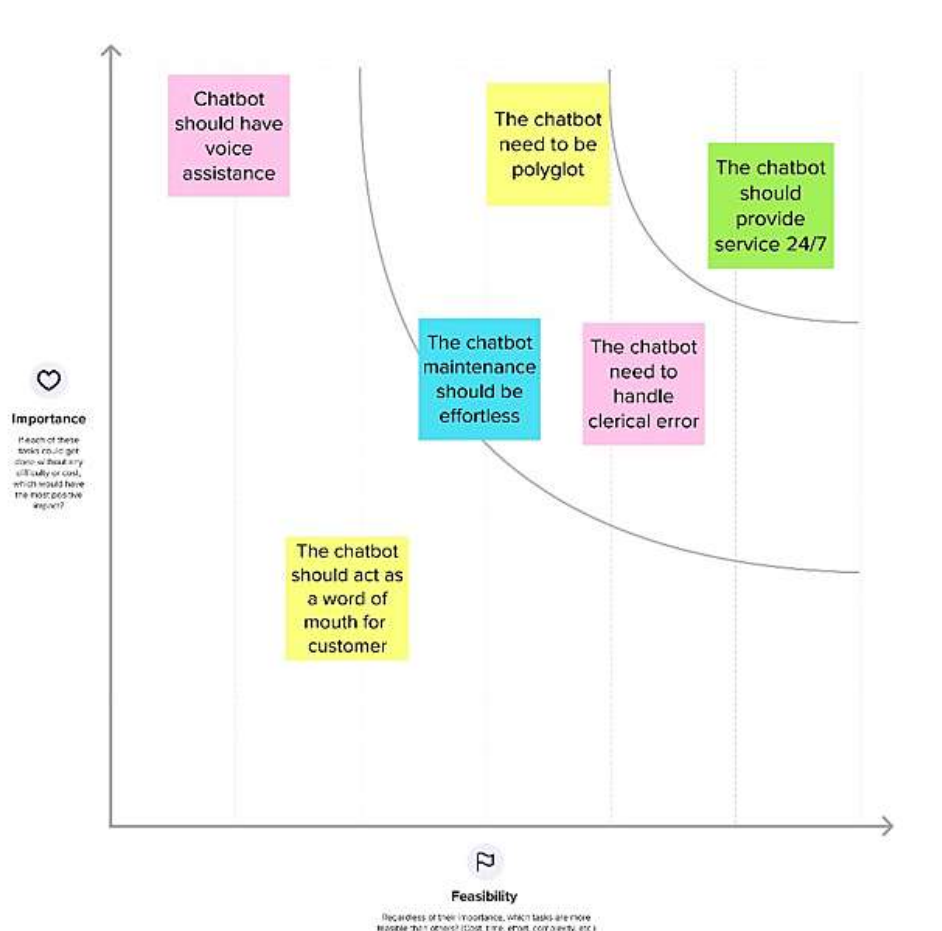
Step-2: Brainstorm, Idea Listing and Grouping

Step-3: Idea Prioritization

Importance

Feasibility

3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	1. In the banking sector, they need to provide 24*7 service to customers. 2. Humans cannot provide personalized services to all customers. 3. Customers need to wait for the availability of customer representatives. 4. Delay in the support to the customers. 5. Huge manpower is needed to provide services to all customers. 6. Customer satisfaction is less in bank customer service. 7. Less touch of personalization in customer relationships.
2.	Idea / Solution description	1. The solution to the problem is Artificial intelligence in the banking sector makes banks efficient, trustworthy, helpful, and more understanding. It is strengthening the competitive edge of modern banks in this digital era. The growing impact of AI in the banking sector minimizes operational costs improves customer support and process automation. 2. Nearly 40% to 50% of financial and banking service providers are using AI in their processes to harness the power of nextgeneration AI capabilities. The companies believe that AI is the future of the banking sector which can perform a range of banking operations in faster, easier, and more secure ways. 3. AI banking Chatbots help customers in many ways. AI-based chatbot service for the financial industry is one of the significant use cases of AI in the banking sector. 4. AI chatbots in banking are modernizing the way how businesses provide services to their customers. AI chatbots in the banking industry can assist customers 24*7 and give

		•	accurate responses to their queries. These chatbots provide a personalized experience to users.
		•	AI chatbots in banking are providing a better customer experience.
		•	Hence, AI chatbots for banking and finance operations let banks attract customer attention, optimize service quality, and expand the brand mark in the market.
3.	Novelty / Uniqueness	•	Our main aim is to create a chatbot that provides 24*7*365 service and personalized services to the customer.
4.	Social Impact / Customer Satisfaction	•	Chatbots, as we already know, collect all the personal data they can get. Why not use that data to deliver highly personalized suggestions to clients based on their profile information and preferences? With this marketing campaign, you can significantly improve your conversion rate and bring highly targeted goods and services to users at the right time and place.
5.	Business Model (Revenue Model)	•	Chatbots can deliver cost savings of over $8 billion per year by 2022 in the banking sector.
		•	**86%** of financial institutions believe that chatbots will help them engage with millennials.
6.	Scalability of the Solution	•	Chatbots are no longer dull programs that use the same prescribed answers. AI chatbots are highly intelligent and can easily process all sorts of queries – and what's more, they can learn. Here are some facts and predictions concerning the use of artificial intelligence in the banking sector to prove our point.

3.4 Problem Solution fit

Define CS, fit into CC

1. CUSTOMER SEGMENT(S)

Who is your customer?

Bank customers (18+ old account holders)

6. CUSTOMER CONSTRAINTS

- Security constraint
- Available devices
- Technology awareness
- Spending power

5. AVAILABLE SOLUTIONS

Over-the-phone customer service is the most popular option for service companies all over the world. Phone customer service is useful in a variety of private and public sectors, including healthcare, government, banking, eCommerce, SaaS, and IT.

Pros

Quickly solve complex problems Almost everyone owns a telephone. Emotions of customers can be assessed more easily. A difficult problem can be presented more easily and quickly. Some customers prefer face-to-face interaction.

Cons

Trends change over time; for example, the younger generation prefers texting to phone conversations. Hold times are long

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS

Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one, explore different sides.

>In the banking sector, they need to provide 24*7 service to customers.

>Humans cannot provide personalized services to all customers.

>Customers need to wait for the availability of customer representatives.

>Delay in the support to the customers.

>Huge manpower is needed to provide services to all customers.

9. PROBLEM ROOT CAUSE

- Bank customer service executives are less to respond to all customer queries which results in increased customer waiting time.
- Human executives can't able to provide a personalized response.
- Manpower is less in bank customer services.
- Due to this delay in response, the customer leaves the service providers.
- Human executives can't able to provide 24*7*365 services.

7. BEHAVIOUR

What does your customer do to address the problem and get the job done?

Direct:
- Customer use bank chatbot

Indirect:
- Customer approach the bank service providers

Focus on J&P, tap into BE, understand RC

3. TRIGGERS

What triggers customers to act?

- The average customer sees the chatbot as a popup, a reminder that it will solve all your banking queries. They remember asking the chatbots out of curiosity all kinds of questions that — as expected — couldn't be answered because the technology wasn't quite there yet. But all hope isn't lost either. The technology is there, and it's only getting better.

4. EMOTIONS: BEFORE / AFTER

How do customers feel when they have a problem or a job and afterwards?

- Customers are insecure about their information.
- Customers feel lost when they have delays in response.

10. YOUR SOLUTION

- The solution to the problem is Artificial intelligence in the banking sector makes banks efficient, trustworthy, helpful, and more understanding. It is strengthening the competitive edge of modern banks in this digital era. The growing impact of AI in the banking sector minimizes operational costs and improves customer support and process automation.
- AI chatbots in the banking industry can assist customers 24*7.
- Give accurate responses to their queries.
- These chatbots provide a personalized experience to users.
- AI chatbots in banking is providing a

8. CHANNELS of BEHAVIOUR

8.1 ONLINE

- Banking chatbots help customers complete banking transactions with ease using voice or text. Chatbots are useful to banks because they can reduce operational costs, as well as improve customer satisfaction by streamlining interactions.

8.2 OFFLINE

- Customers can directly visit the bank and solve their problems directly.

4 REQUIREMENT ANALYSIS:

4.1 Functional requirement

Functional Requirements: Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	1. Registration through Form 2. Registration through Gmail 3. Registration through LinkedIn
FR-2	User Confirmation	1. Confirmation via Email 2. Confirmation via OTP
FR-3	Complex dialogues	• In addition to understanding and interacting within conversations, outstanding chatbot software has NLP functions (Natural Language Processing) to analyze the context of a conversation.
FR-4	Response	• The bot should respond to any input it receives.
FR-5	User data storage	• The bot should be able to create a private cloud or virtual machine instances from user input.
FR-6	Send users data	1. The data can be sent as a text message. 2. The data can be sent as a graph + accompanying text, if requested by the user.

4.2 Non-Functional requirements

Non-functional Requirements: Following are the non-functional requirements of the proposed solution.

| FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	1. Web interface. 2. One account for all locations. 3. API.

NFR-2	**Security**	1. The bot should authenticate the users before being able to query information from the bot. 2. Encrypted Storage.
NFR-3	**Reliability**	• Faster than humans and because of the repetitive tasks.
NFR-4	**Performance**	• Response time is less
NFR-5	**Availability**	• Service level agreement (SLA)
NFR-6	**Scalability**	• The product should be open-source and published under some license.

5 PROJECT DESIGN:

5.1 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.
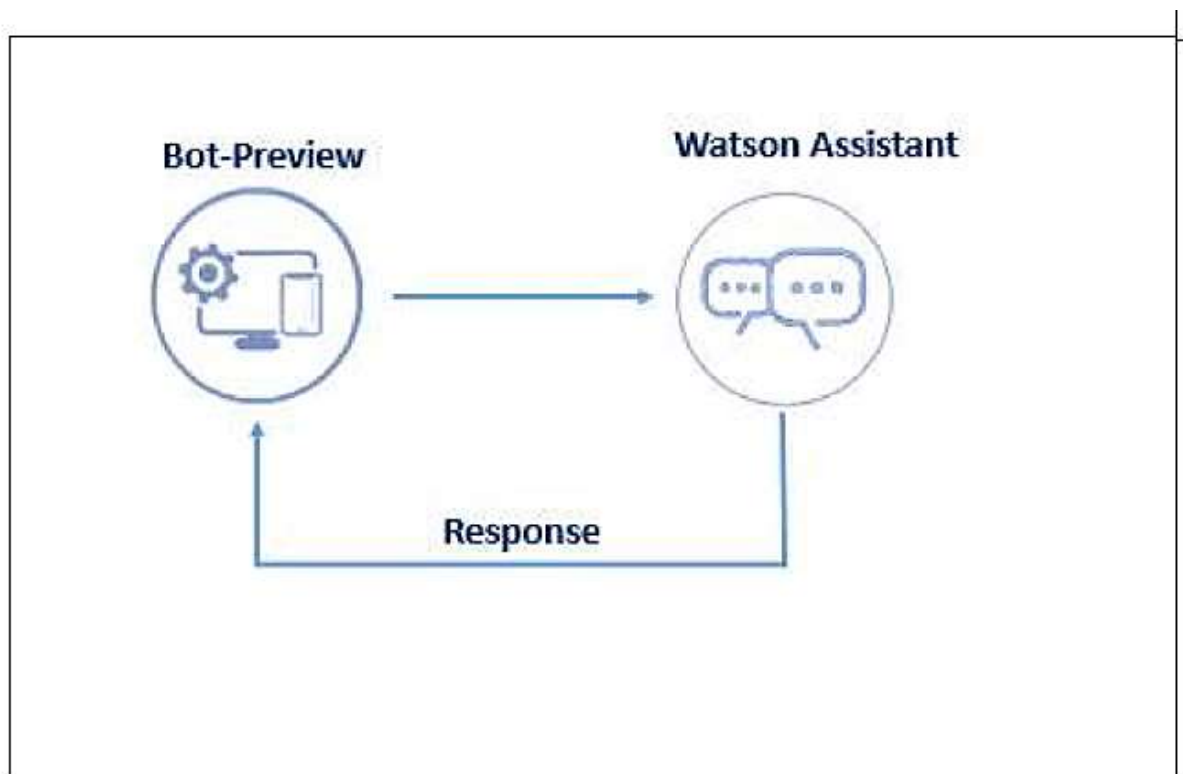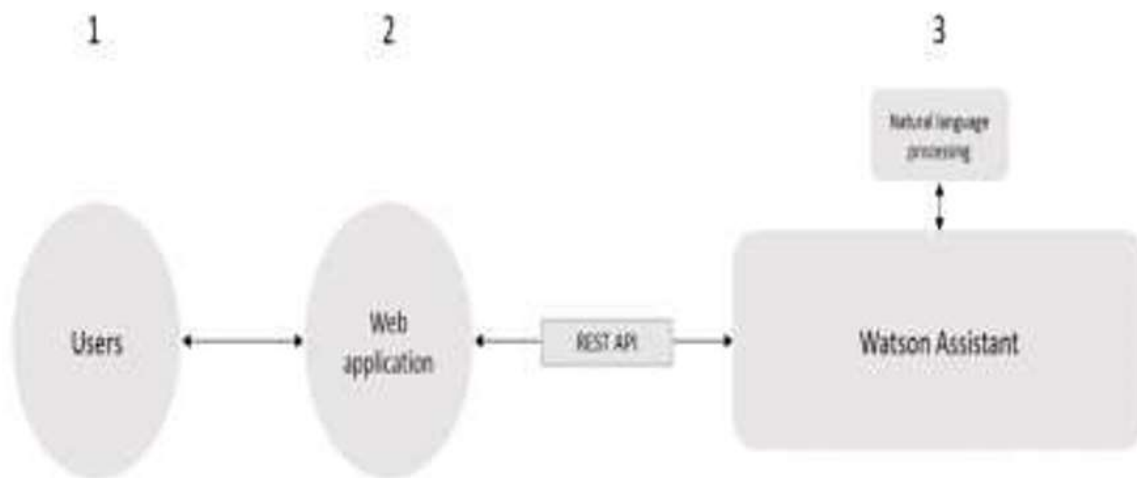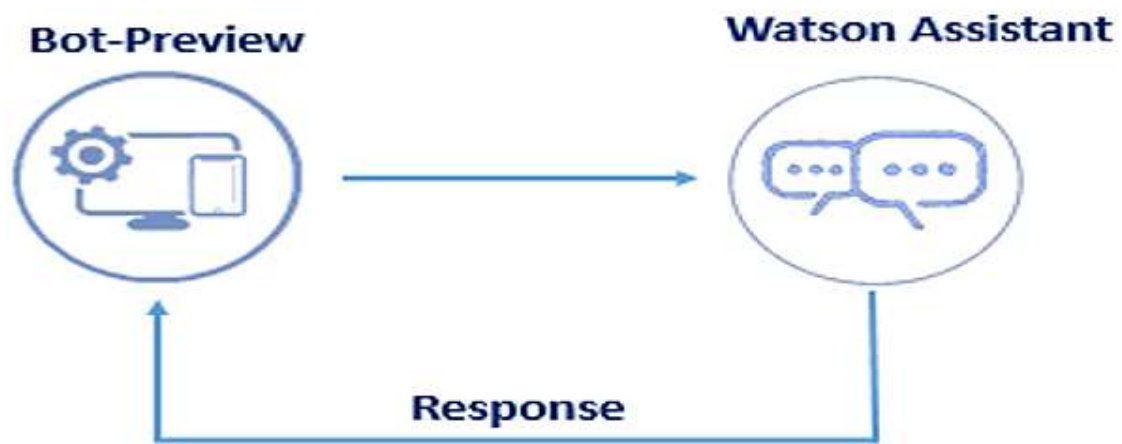
5.2 Solution & Technical Architecture

Services Used:

- IBM Watson Assistant

Block diagram:

Hardware / Software designing:

To complete this project, you should have the following software and packages.

Softwares:

1. Visual studio code

2. IBM Watson studio

Packages:

1. Flask

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-1	Logic for a process in the application	Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson STT service
4.	Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5.	Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.

7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
8.	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
9.	External API-2	Purpose of External API used in the application	Aadhar API, etc.
10.	Machine Learning Model	Purpose of Machine Learning Model	Object Recognition Model, etc.
11.	Infrastructure (Server / Cloud)	Cloud Server Configuration :	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Anaconda Navigator, Tensor flow, Keras, Flask
2.	Security Implementations	List all the security / access controls implemented, use of firewalls etc.	e.g. SHA-256, Encryptions, IAM Controls, OWASP etc.
3.	Scalable Architecture	Justify the scalability of architecture (3 – tier, Microservices)	Response time, Throughput, CPU and network usages, etc.
4.	Availability	Justify the availability of application (e.g. use of load balancers, distributed servers etc.)	All kind of users.

|					
5.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.		Watson Assistant is used to build the chatbot.	

5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority
Customer (Mobile user)	Download the database	USN-1	As a user, I can register for the application by entering my email, and password, and confirming my password.	I can access my account / dashboard	High
	Register	USN-2	As a user, I can register for the application by entering my email, and password, and confirming my password.	I can receive a confirmation email & click confirm	High
	Login	USN-3	As a user, I will receive a confirmation email once I have registered for the application	I can register & access the dashboard with Facebook Login	Low
	Querying	USN-4	User query with a chatbot for clarifications.		Medium
Customer (Web user)	The functional requirements are same as a mobile user	Same as a mobile user	Same as a mobile user	Same as a mobile user	High when compared to mobile users

6 PROJECT PLANNING AND SCHEDULING:

6.1 Sprint Planning & Estimation

To accomplish the above task, you must complete the below activities and tasks:

1. Create IBM Services.

2. Creating skills & Assistant for Chatbot.

3. Creating Savings account action.

4. Creating Current account action.

5. Creating Loan account action.

6. Creating a general query action.

7. Creating a Net banking action.

8. Create HTML web page.

9. Integrate the Watson Chatbot with web page.
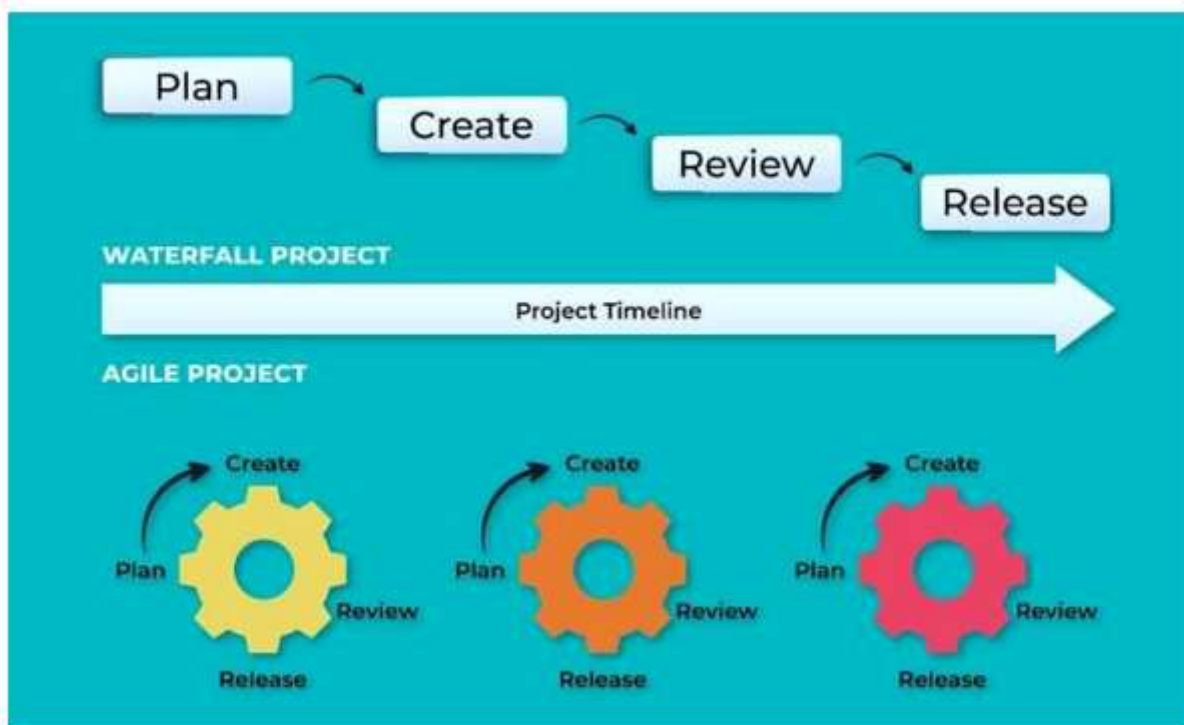
Agile Methodology for Activity Planning

6.2 Sprint Delivery Schedule
Product Backlog, Sprint Schedule, and Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Create IBM Service	USN-1	As a user, I can see a Watson Assistant.	1	High	Siva Sankari L Mathumitha V
Sprint-1	Chatbot Skills Creation	USN-2	As a user, I will see the Chatbot having banking-related skills.	1	High	Siva Sankari L Mathumitha V
Sprint-2	Creating Saving Account Action	USN-3	As a user, I can converse with the chatbot regarding saving account-related queries.	2	Medium	Mathumitha V Gokul R
Sprint-2	Creating Current Account Action	USN-4	As a user, I can converse with the chatbot regarding current account-related queries.	2	Medium	Mathumitha V Gokul R
Sprint-3	Creating Loan Account Action	USN-5	As a user, I can converse with the chatbot regarding loan account-related queries.	2	High	Mathumitha V Gokul S

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Creating General Query Action	USN-6	As a user, I can converse with the chatbot regarding general queries.	2	Medium	Mathumitha V Gokul S
Sprint-3	Creating Net Banking Action	USN-7	As a user, I can converse with the chatbot regarding net banking-related queries.	2	High	Mathumitha V Gokul S

Sprint		USN	User Story			Assigned To
Sprint-4	Creating Assistant & Integrate with Web Python Flask	USN-8	As a user, I can see a flask web page for bank.	1	Low	Siva Sankari L Mathumitha V
Sprint-4	Build HTML Code	USN-9	As a user, I can web pages integrated with a chatbot.	1	Medium	Siva Sankari L Mathumitha V
Sprint-4	Run The Application	USN-10	As a user, I can communicate with the chatbot 24*7.	1	Low	Siva Sankari L Mathumitha V

Project Tracker, Velocity & Burndown Chart:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	26 Oct 2022
Sprint-2	20	6 Days	27 Oct 2022	05 Nov 2022	20	29 Oct 2022
Sprint-3	20	6 Days	29 Nov 2022	12 Nov 2022	20	01 Nov 2022
Sprint-4	20	6 Days	02 Nov 2022	19 Nov 2022	20	04 Nov 2022

Velocity:
Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint).
Let's calculate the team's average velocity (AV) per iteration unit (story points per day)
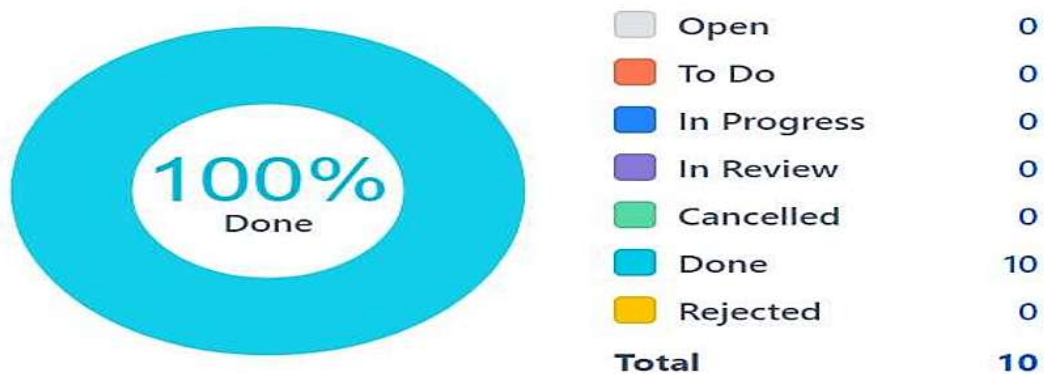
$$AV=20/2=10$$

AV=10

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

Status overview

View the progress of your project based on the status of each item. For more details, go to the board view.

100% Done

Open		0
To Do		0
In Progress		0
In Review		0
Cancelled		0
Done		10
Rejected		0
Total		**10**

Priority breakdown

Get a holistic view of how work is being prioritized within your project. To check if the team's focusing on the right work, go to the list view.

Highest	High	Medium	Low	Lowest
1	1	3	1	
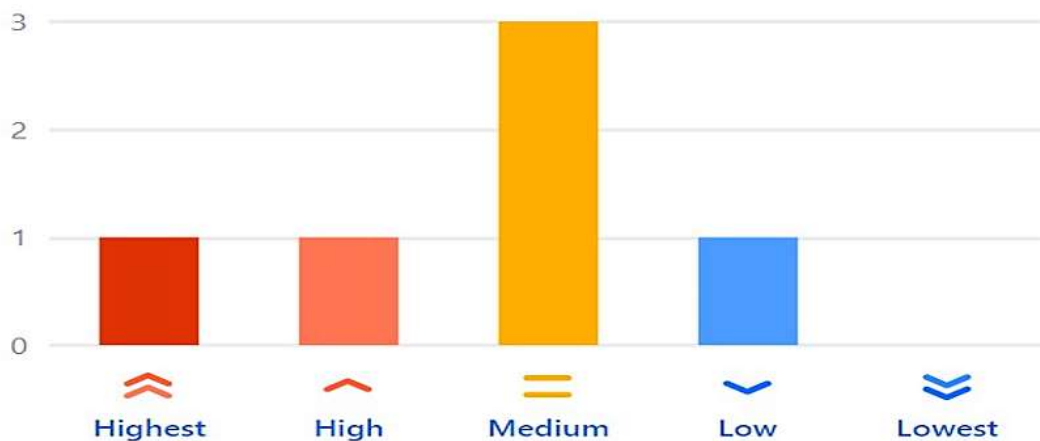
6.3 Reports from JIRA
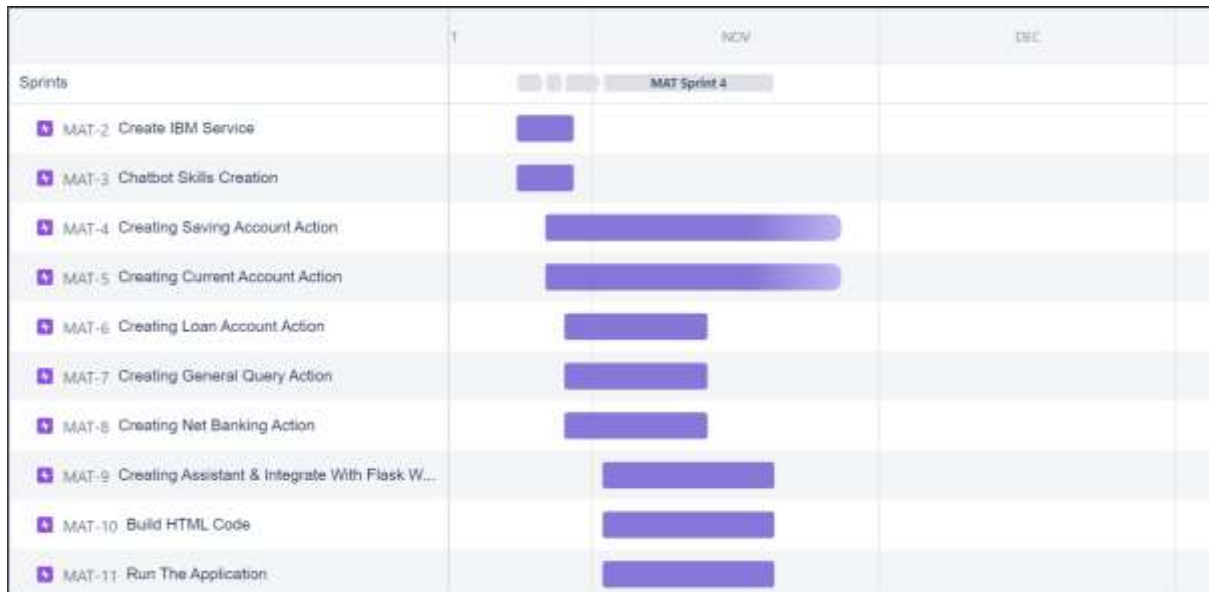
7 CODING & SOLUTIONING:

7.1 Feature 1
Create IBM Service

In this activity, you will be creating the Necessary IBM service. The following are the service that you have to create.
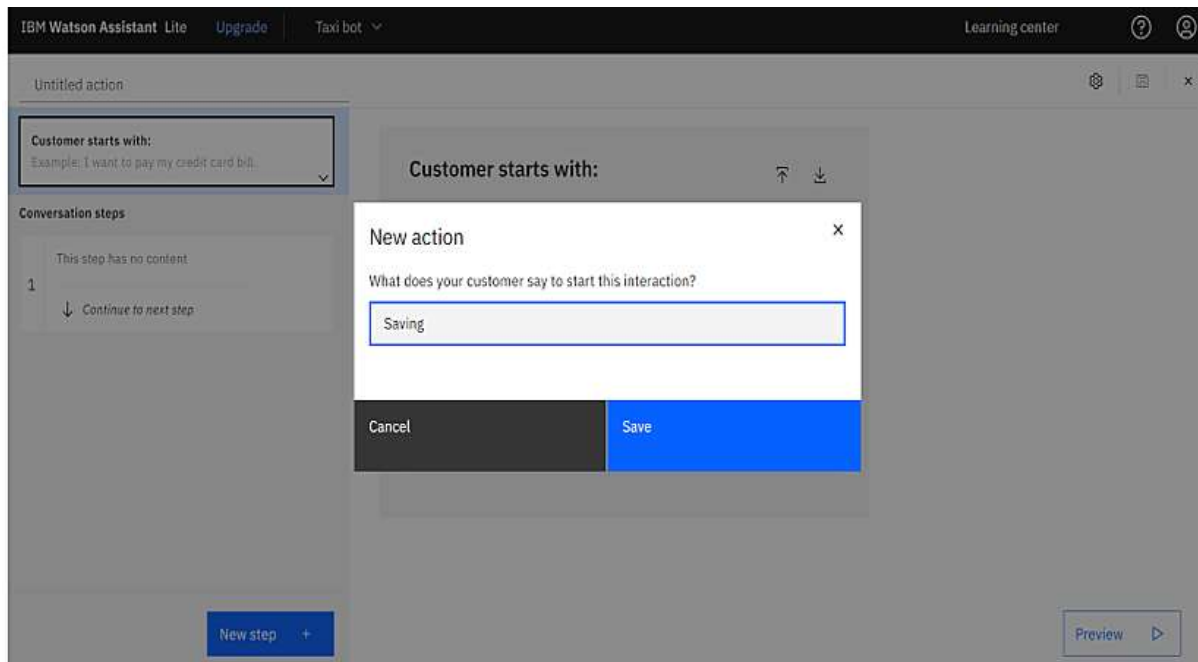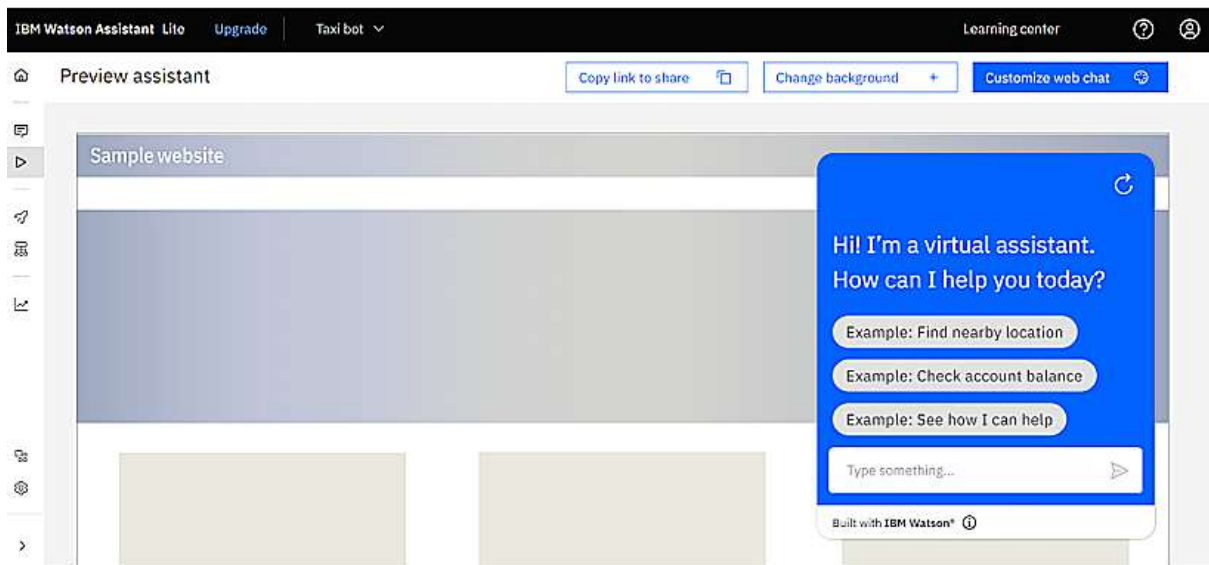- Watson Assistant

Creating Skills & Assistant For Chatbot

Skills are nothing but actions and steps. Steps are the subset of actions where conversations are built and Assistant is used to integrate skills.
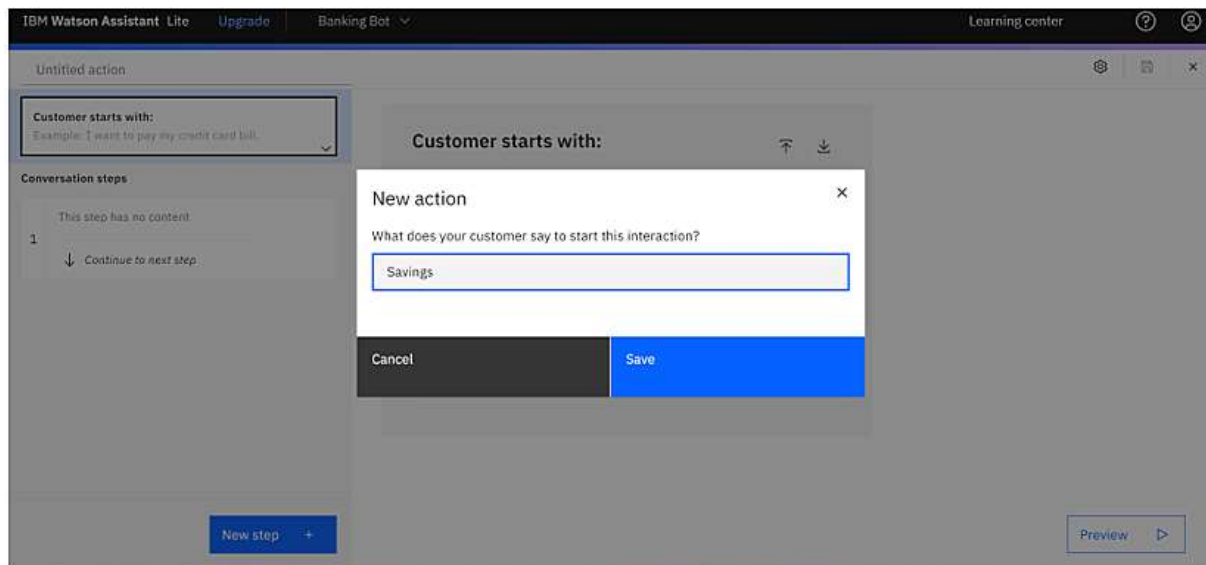

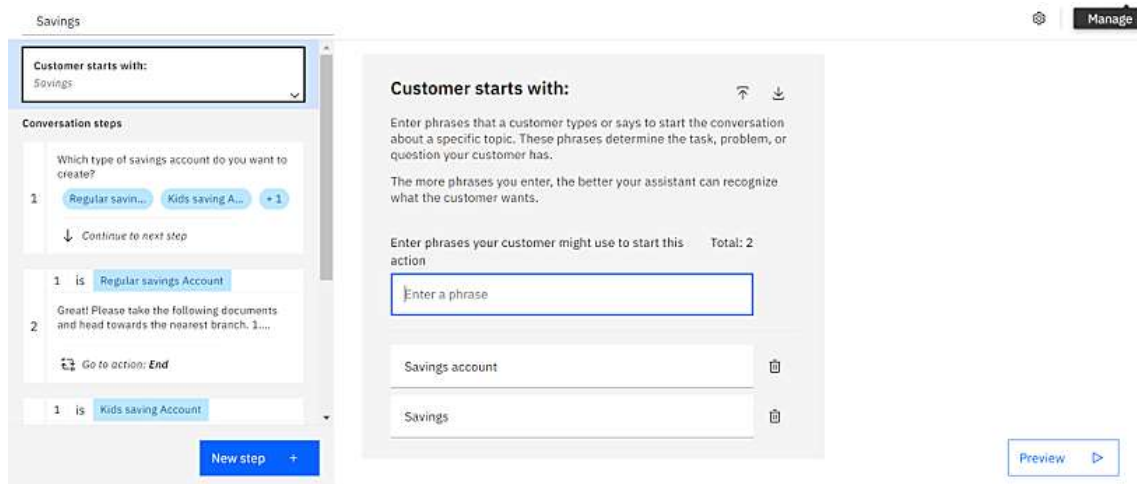A default template chatbot is created. Need to add actions.
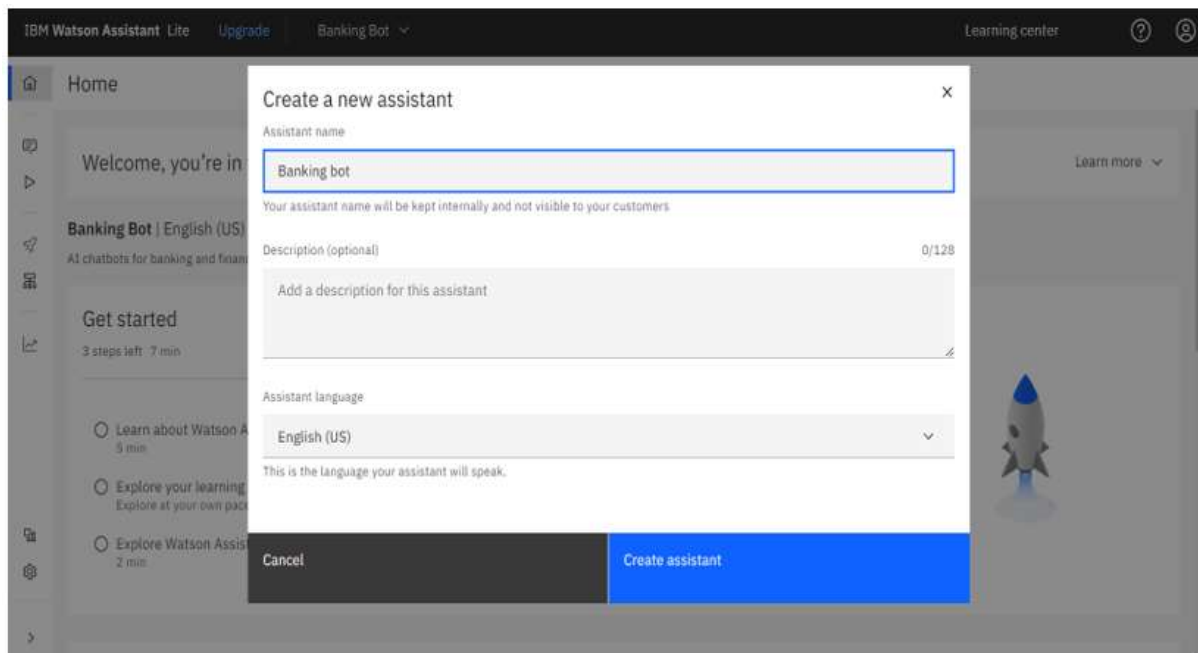
Creating Saving Account Action

Create a saving account in IBM Watson. Create new **Action** Saving.

Add steps in savings action.

Creating Current Account Action

Create a new **Action** Current for the current account action.
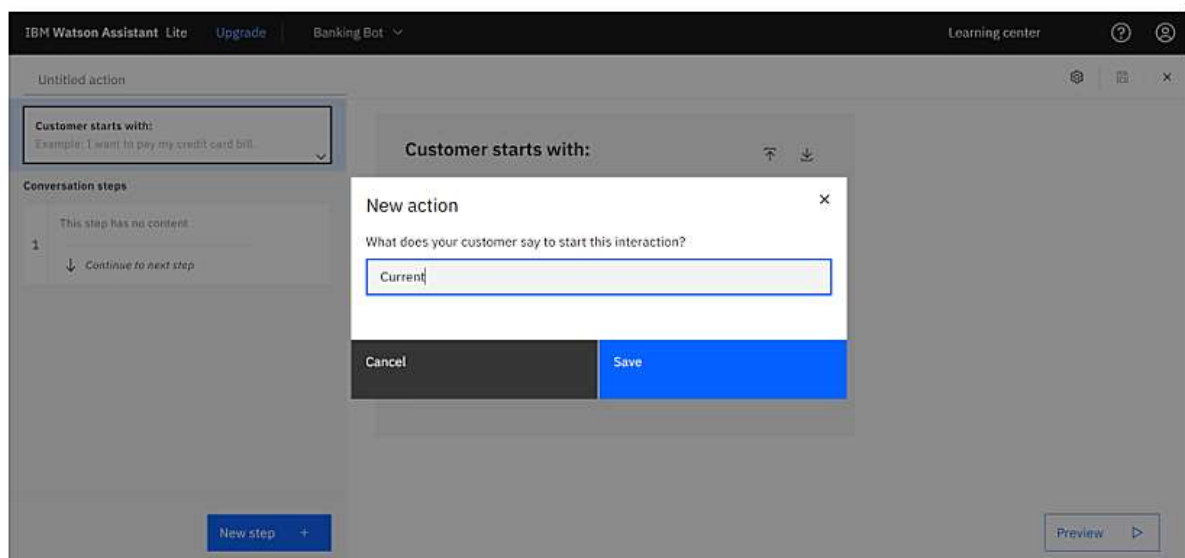
Add steps in current action.
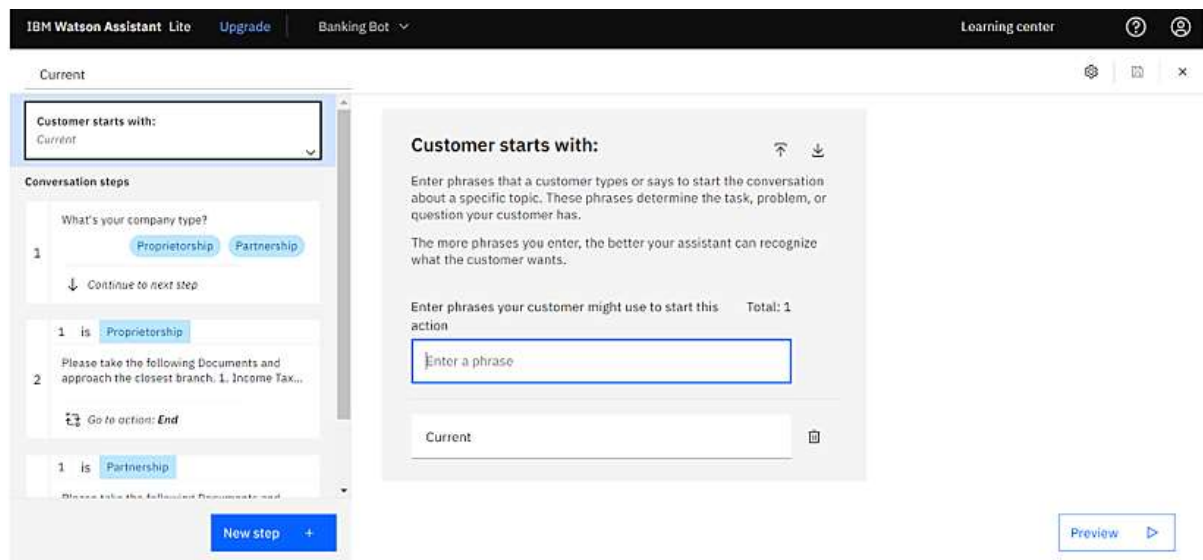
Creating Loan Account Action

Loan action is created with the necessary steps.
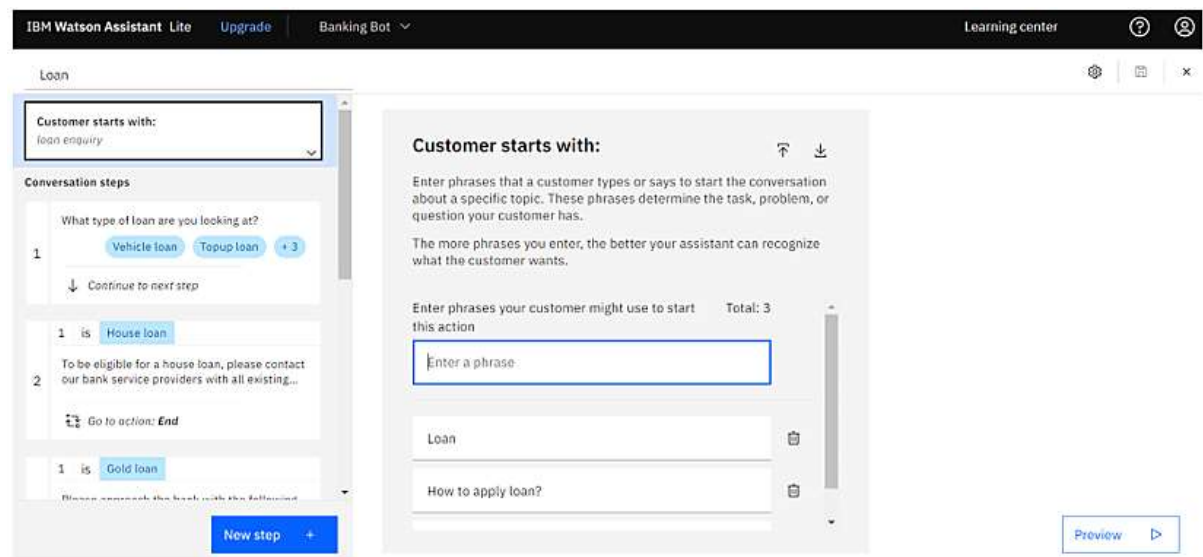
Creating General Query Action

General query action is created with the necessary steps.
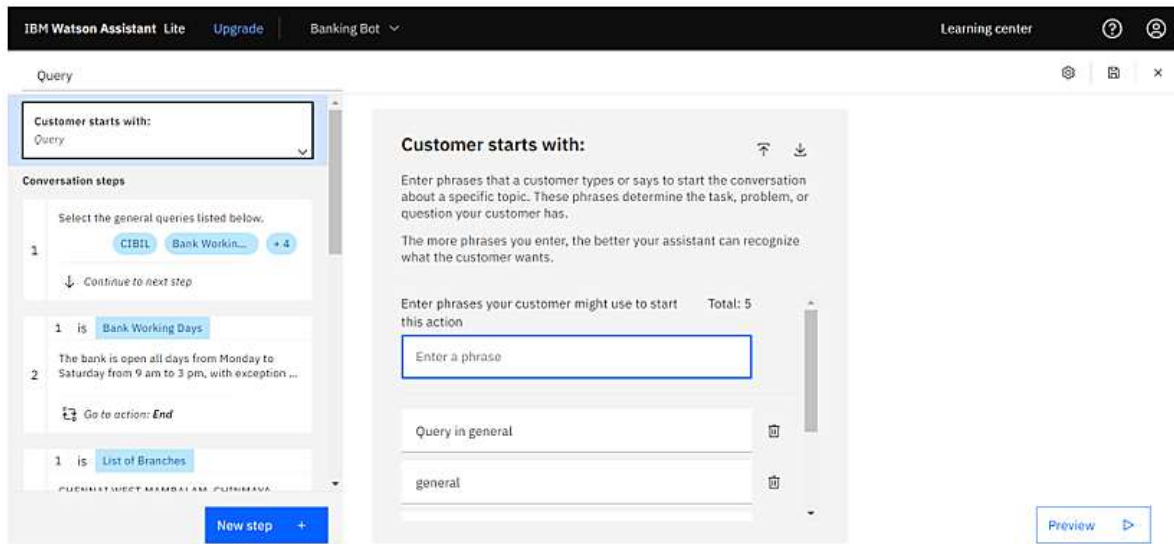
Creating Net Banking Action

Net banking action is created with the necessary steps.
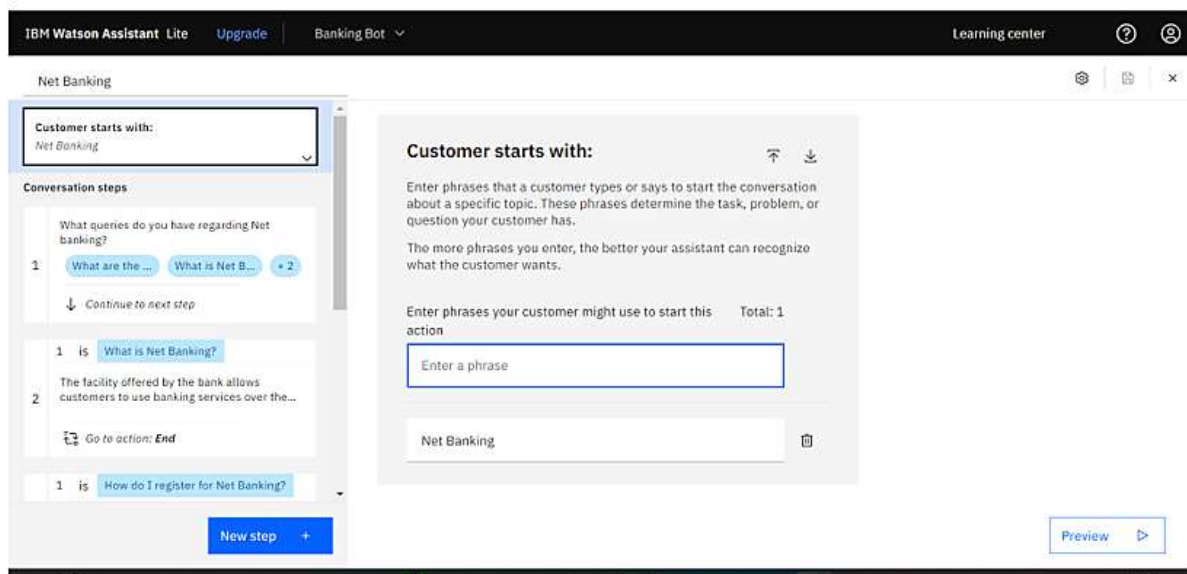
In addition to this greeting, end greeting ,index and end actions are also created.

Creating Assistant & Integrate With Flask Web Page

You will be creating a banking bot in this activity that has the following capabilities

1. The Bot should be able to guide a customer to create a bank account.

2. The Bot should be able to answer loan queries.

3. The Bot should be able to answer general banking queries.

4. The Bot should be able to answer queries regarding net banking.

5. With the help of this bot, you can get all the required details related to banking.

7.2 Feature 2

Let us build our flask application which will be running in our local browser with a user interface.

In the flask application, users will interact with the chatbot, and based on the user queries they will get the outcomes.

Build Python Code

1: Importing Libraries

The first step is usually importing the libraries that will be needed in the program.

```python
from flask import Flask, render_template
```

Importing the flask module into the project is mandatory. An object of the Flask class is our WSGI application. Flask constructor takes the name of the current module (__name__).

2: Creating our flask application and loading

```python
app = Flask(__name__)
```

3: Routing to the Html Page

Here, the declared constructor is used to route to the HTML page created earlier.

The '/' route is bound with the bot function. Hence, when the home page of a web server is opened in the browser, the HTML page will be rendered.

```python
@app.route('/')
def bot():
    return render_template('chatbot.html')
```

Main Function
This is used to run the application in localhost.

```python
if __name__ == '__main__':
    app.run()
```

Build HTML Code

- We use HTML to create the front-end part of the web page.

- Here, we have created 1 HTML page-Chatbot.html

- Chatbot.html displays the home page which integrates with Watson Assistant.

- A simple HTML page is created. Auto-generated source code from IBM Watson Assistants is copied and pasted inside the body tag

Run The Application

- Open the anaconda prompt from the start menu.
- Navigate to the folder where your app.py resides.
- Now type the "python app.py" command.
- It will show the local host where your app is running on http://127.0.0.1.5000/
- Copy that localhost URL and open that URL in the browser. It does navigate me to where you can view your web page.

8 TESTING

8.1 Test Cases

✓ Verify user is able to see the chatbot icon when website is launched
✓ Verify the UI elements in chatbot icon popup
✓ Verify user is able to see the greeting from chatbot "Hi! I'm a Banking Bot. How can I help you today?
Banking
Enquiry
Loan"
✓ Verify user is able to type query in text field.
✓ Verify user is able to get the response from chatbot
✓ Verify user whether get the response if the user enter the wrong query also

8.2 User Acceptance Testing

Defect Analysis

This report showsthe number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	1	0	0	0	1
Duplicate	3	1	0	1	5
External	1	3	0	1	5

Fixed	2	5	3	2	12
Not Reproduced	0	0	0	1	1
Skipped	0	0	0	0	0
Won't Fix	0	0	0	0	0
Totals	7	9	3	5	24

Test Case Analysis

This report shows the number of test cases that have passed, failed,and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	1	0	0	1
Client Application	1	0	0	1
Security	1	0	0	1
Outsource Shipping	0	0	0	0
Exception Reporting	1	0	0	1
Final Report Output	1	0	0	1
Version Control	1	0	0	1

9 RESULTS:
9.1 Performance Metrics

Locust Test Report

During: 11/17/2022, 9:32:26 PM - 11/17/2022, 9:33:59 PM

Target Host: http://127.0.0.1:5000

Script: locustfile.py

Request Statistics

Method	Name	# Requests	# Fails	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	RPS	Failures/s
GET	/	619	0	3	2	17	5296	6.7	0.0
	Aggregated	619	0	3	2	17	5296	6.7	0.0

Response Time Statistics

Method	Name	50%ile (ms)	60%ile (ms)	70%ile (ms)	80%ile (ms)	90%ile (ms)	95%ile (ms)	99%ile (ms)	100%ile (ms)
GET	/	3	3	4	4	4	6	7	17
	Aggregated	3	3	4	4	4	6	7	17

Charts

Total Requests per Second

RPS   Failures/s

Response Times (ms)

Median Response Time   95% percentile
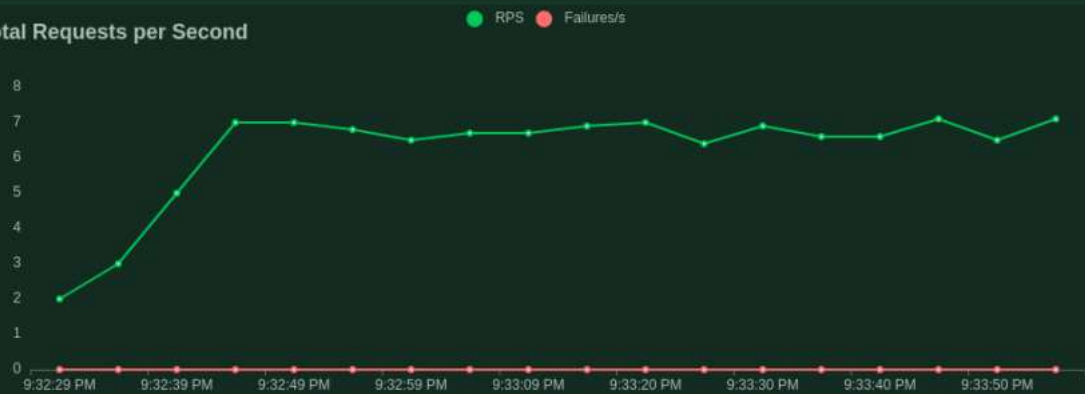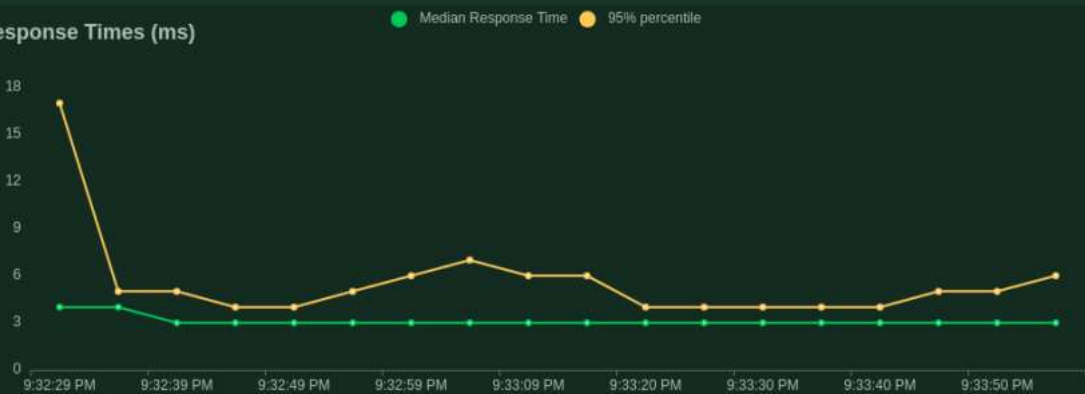
Number of Users

Users
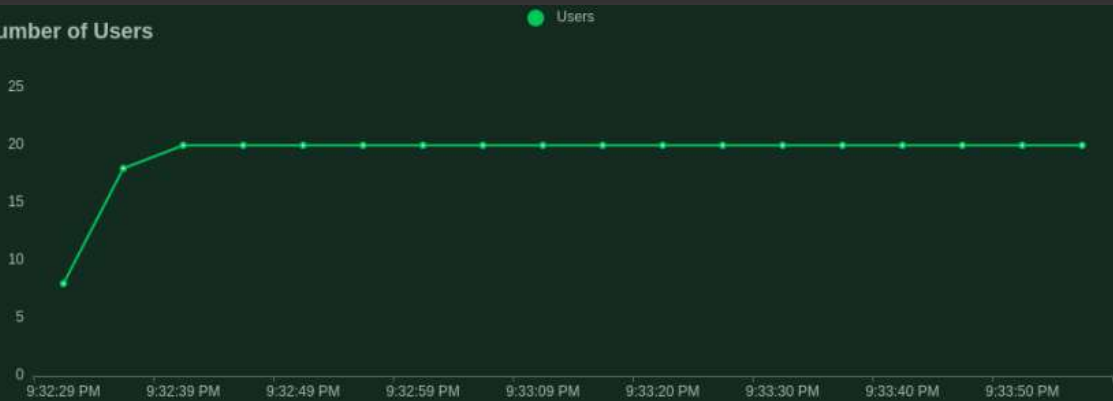
Final ratio

Ratio per User class

- 100.0% AppUser
  - 100.0% bank

Total ratio

- 100.0% AppUser
  - 100.0% bank

9.2 Output
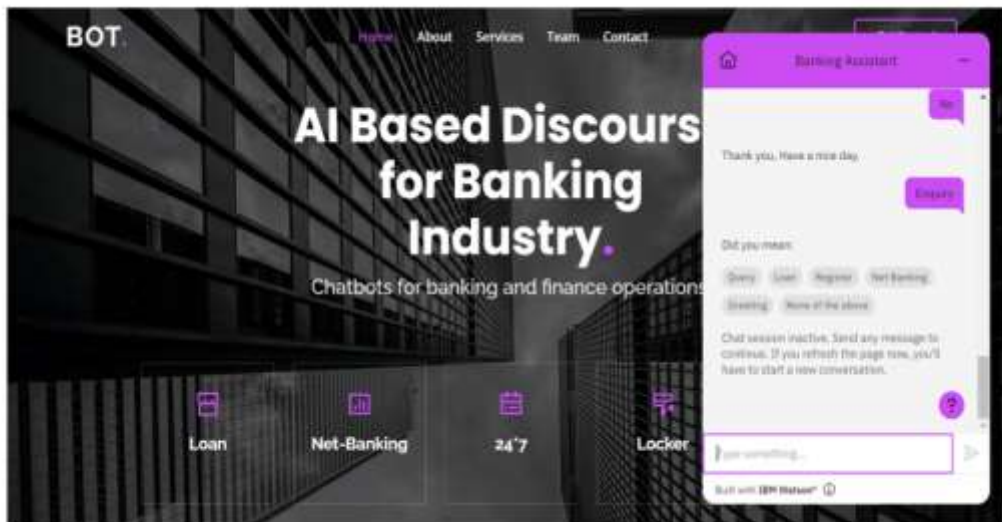
10 ADVANTAGES & DISADVANTAGES:

Advantages:

- Round-the-clock service.

- Brand Consistency.

- Increased Productivity.

- Reduced Staffing Needs.

- Consistent Response Rate and Availability.

- Helps with Fraud Prevention.

- Chats can be saved.

- Lower costs.

Disadvantages:

- Questions must be programmed beforehand.

- Impersonal

- Must keep information up-to-date.

- Technology issues.

- Needs additional measures to protect identities.

11 CONCLUSION:

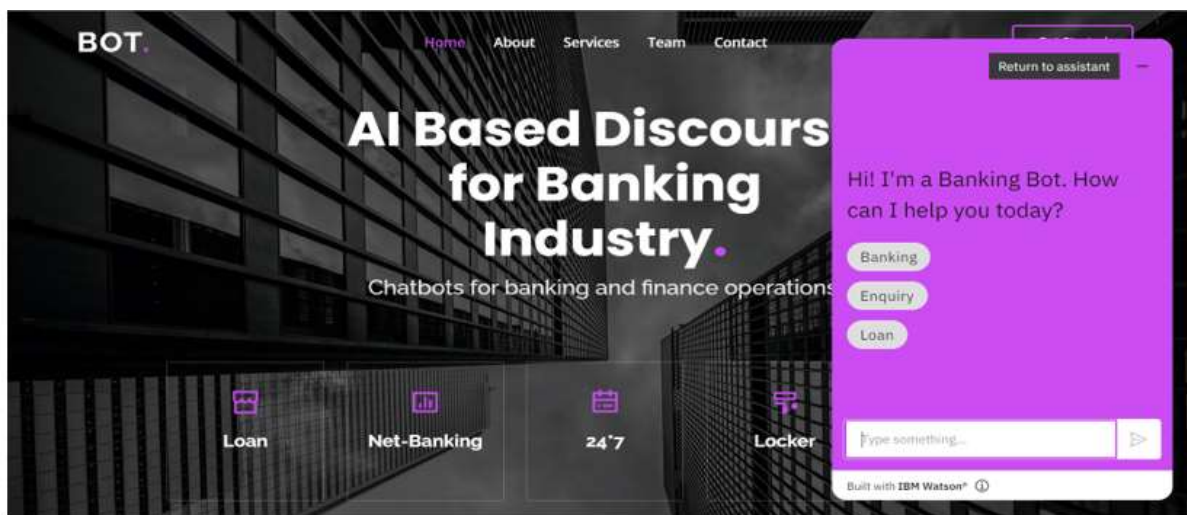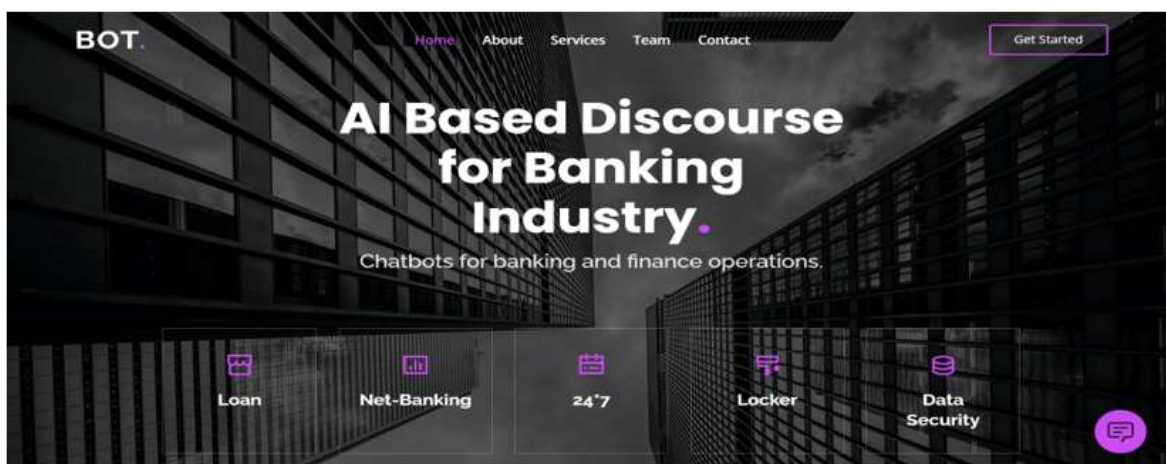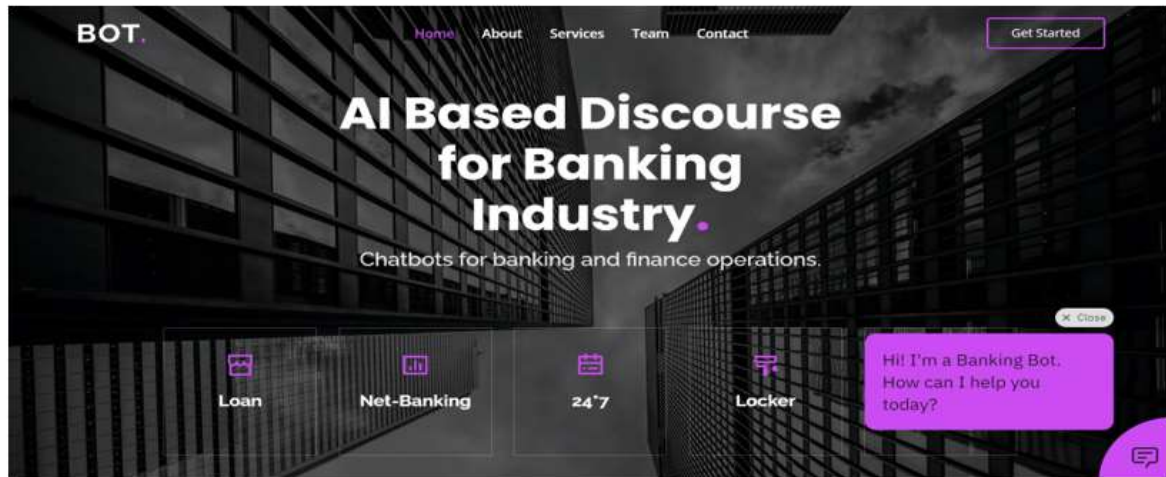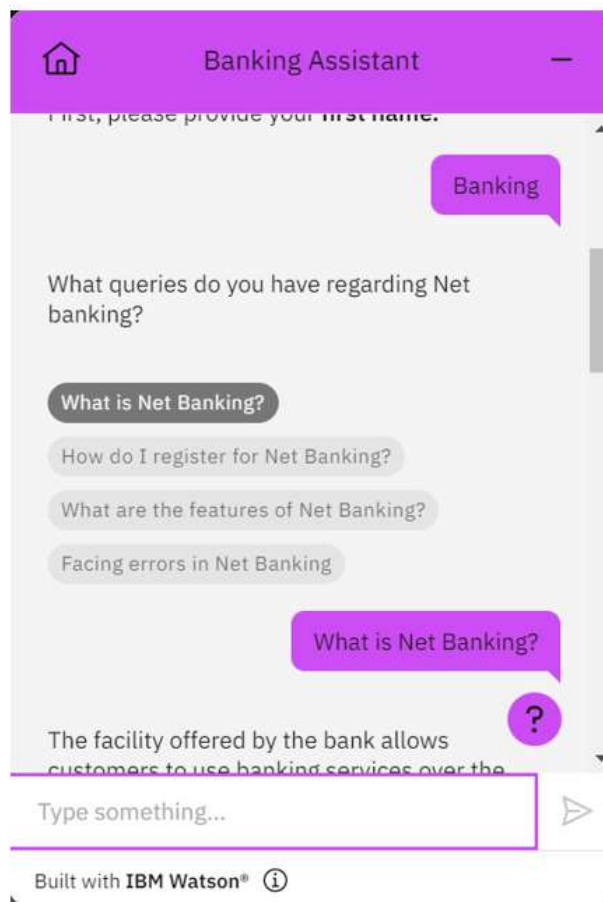The adoption of technologies applied in the banking industry are widely studied in the literature. However, a more and more popular and frequently implemented technology, namely chatbot technology in the context of the banking industry, has received limited attention.

12 FUTURE SCOPE:

✓ The share of banks that use AI solutions and chatbots in particular is constantly rising. As another factor, the use of smartphones and other smart devices is also a rapidly growing trend. These two driving forces determine the near future of artificial intelligence assistants in the banking industry.

✓ More and more banks tend to integrate chatbots into their mobile apps. This is a convenient way to stay in touch with their clients and, at the same time, reduce the involvement of human personnel. According to estimations calculated by Juniper Research, in 2023, chatbot interactions will save 862 million hours for banks, which equals to $7.3 billion cost savings worldwide.

13 APPENDIX:

13.1 Source Code:

```html
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="utf-8">
  <meta content="width=device-width, initial-scale=1.0" name="viewport">

  <title>Banking Bot</title>
  <meta content="" name="description">
  <meta content="" name="keywords">

  <!-- Favicons -->
  <link href="assets/img/favicon.png" rel="icon">
  <link href="assets/img/apple-touch-icon.png" rel="apple-touch-icon">

  <!-- Google Fonts -->
  <link
href="https://fonts.googleapis.com/css?family=Open+Sans:300,300i,400,400i,600,600i
,700,700i|Raleway:300,300i,400,400i,500,500i,600,600i,700,700i|Poppins:300,300i,40
0,400i,500,500i,600,600i,700,700i" rel="stylesheet">

  <!-- Vendor CSS Files -->
  <link href="assets/vendor/aos/aos.css" rel="stylesheet">
  <link href="assets/vendor/bootstrap/css/bootstrap.min.css" rel="stylesheet">
  <link href="assets/vendor/bootstrap-icons/bootstrap-icons.css" rel="stylesheet">
  <link href="assets/vendor/boxicons/css/boxicons.min.css" rel="stylesheet">
  <link href="assets/vendor/glightbox/css/glightbox.min.css" rel="stylesheet">
  <link href="assets/vendor/remixicon/remixicon.css" rel="stylesheet">
  <link href="assets/vendor/swiper/swiper-bundle.min.css" rel="stylesheet">
```

```html
<!-- Template Main CSS File -->
<link href="assets/css/style.css" rel="stylesheet">

</head>

<body>
<script>
 window.watsonAssistantChatOptions = {
   integrationID: "fafa4141-555c-427c-9e44-66a101cbb178", // The ID of this integration.
   region: "us-south", // The region your integration is hosted in.
   serviceInstanceID: "785992fb-b6cf-4d51-b222-23f37f3cee20", // 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/versions/" + (window.watsonAssistantChatOptions.clientVersion || 'latest') + "/WatsonAssistantChatEntry.js";
   document.head.appendChild(t);
 });
</script>
 <!-- ======= Header ======= -->
 <header id="header" class="fixed-top ">
   <div class="container d-flex align-items-center justify-content-lg-between">

     <h1 class="logo me-auto me-lg-0"><a href="index.html">Bot<span>.</span></a></h1>
     <!-- Uncomment below if you prefer to use an image logo -->



     <nav id="navbar" class="navbar order-last order-lg-0">
```

```html
    <ul>
      <li><a class="nav-link scrollto active" href="#hero">Home</a></li>
      <li><a class="nav-link scrollto" href="#about">About</a></li>
      <li><a class="nav-link scrollto" href="#services">Services</a></li>
      <li><a class="nav-link scrollto" href="#team">Team</a></li>
      <li><a class="nav-link scrollto" href="#contact">Contact</a></li>
    </ul>
    <i class="bi bi-list mobile-nav-toggle"></i>
  </nav><!-- .navbar -->

  <a href="#about" class="get-started-btn scrollto">Get Started</a>

 </div>
</header><!-- End Header -->

<!-- ======= Hero Section ======= -->
<section id="hero" class="d-flex align-items-center justify-content-center">
  <div class="container" data-aos="fade-up">

    <div class="row justify-content-center" data-aos="fade-up" data-aos-delay="150">
      <div class="col-xl-6 col-lg-8">
        <h1>AI Based Discourse for Banking Industry<span>.</span></h1>
        <h2>Chatbots for banking and finance operations.</h2>
      </div>
    </div>

    <div class="row gy-4 mt-5 justify-content-center" data-aos="zoom-in" data-aos-delay="250">
      <div class="col-xl-2 col-md-4">
       <div class="icon-box">
        <i class="ri-store-line"></i>
        <h3><a href="">Loan</a></h3>
```

```html
        </div>
      </div>
      <div class="col-xl-2 col-md-4">
        <div class="icon-box">
          <i class="ri-bar-chart-box-line"></i>
          <h3><a href="">Net-Banking</a></h3>
        </div>
      </div>
      <div class="col-xl-2 col-md-4">
        <div class="icon-box">
          <i class="ri-calendar-todo-line"></i>
          <h3><a href="">24*7 </a></h3>
        </div>
      </div>
      <div class="col-xl-2 col-md-4">
        <div class="icon-box">
          <i class="ri-paint-brush-line"></i>
          <h3><a href="">Locker</a></h3>
        </div>
      </div>
      <div class="col-xl-2 col-md-4">
        <div class="icon-box">
          <i class="ri-database-2-line"></i>
          <h3><a href="">Data Security</a></h3>
        </div>
      </div>
    </div>

  </div>
</section><!-- End Hero -->
```

```
 <div id="preloader"></div>

 <a href="#" class="back-to-top d-flex align-items-center justify-content-center"><i
class="bi bi-arrow-up-short"></i></a>


 <!-- Vendor JS Files -->

 <script src="assets/vendor/purecounter/purecounter_vanilla.js"></script>

 <script src="assets/vendor/aos/aos.js"></script>

 <script src="assets/vendor/bootstrap/js/bootstrap.bundle.min.js"></script>

 <script src="assets/vendor/glightbox/js/glightbox.min.js"></script>

 <script src="assets/vendor/isotope-layout/isotope.pkgd.min.js"></script>

 <script src="assets/vendor/swiper/swiper-bundle.min.js"></script>

 <script src="assets/vendor/php-email-form/validate.js"></script>

 <script src="assets/js/main.js"></script>
</body>
</html>
```

13.2 GitHub & Project Demo Link

DEMO VIDEO: https://youtu.be/0OJ1FNhlpOg

PROJECT: https://chatbotprojectibm.000webhostapp.com/

GitHub Link: https://github.com/MATHUMITHAV/IBM-Project-36634-1660296760

PREVIEW OF CHATBOT:

https://web-chat.global.assistant.watson.appdomain.cloud/preview.html?backgroundImageURL=https%3A%2F%2Fus-south.assistant.watson.cloud.ibm.com%2Fpublic%2Fimages%2Fupx-785992fb-b6cf-4d51-b222-23f37f3cee20%3A%3A33c532ec-f7b3-46f0-becb-d89ad77b3d68&integrationID=fafa4141-555c-427c-9e44-66a101cbb178&region=us-south&serviceInstanceID=785992fb-b6cf-4d51-b222-23f37f3cee20