Team id	PNT2022TMID04164
Project Name	AI-Based Discourse for Banking Industry

Project Report

1. INTRODUCTION

1.1 Project Overview

To build a bank chatbot which can have the following capabilities:

- It should be able to guide a customer to create a bank account.
- It should be able to answer loan queries.
- It should be able to answer general banking queries.
- It should be able to answer queries regarding net banking.

1.2 Purpose

- To create a chatbot to help the customers.
- The chatbot should work 24X7.
- The chatbot can be attached to the websites of the bank, or can be created as an app.
- The chatbot may have regional or local languages.
- The software should give the latest statictics if there is any change in banking rules.
- It should be user friendly.
- Should be easy to use.
- Should get as much queries from the customers as possible.
- Should include queris which the customers may have in the future.
- Should have polite and decent words.
- The software should not lag in time.

2. LITERATURE SURVEY

2.1 Existing problem

The customers of the banks face common issues like bad service experience, funds and checks bouncing, no internet and system availability in the bank, no service available during lunch and break time, loan arguments, slow work progress, excessive and hidden fees withi the banking organizations and to name a few.

The customers have also emphatized that they do not get the required service on time, and at some circumstances, they need to wait in a long queue to wait for their turn. There are similar problems mentioned by the customers.

2.2 References

2.2.1 Chatbots in banking industry: a case study

The authors have given an introduce about the chatbots to its customers. The paper is a case study of chatbots and its impact in banking systems. Chatbots designed with AI are one of the most promising strategies of a banking business that can lead the bank to win the satisfaction vote of their loyal customers.

The authors have provided the details of the progress made by chatbots in Indian banking. Conducted a case study of HDFC and Kotak Mahindra Bank regarding the Chatbots usage. Established an insight into the views of various banks regarding the use of AI based techniques

There are limitations provided too. The dialogue capability is limited to very a very specific set or format of questions. Chatbots have significant limitations based on accents and languages. Not all consumers are familiar with or comfortable with chatbots. The expansion of chatbot capabilities is limited by the ability to hire trained teams or partner with organizations familiar with this rather new technology.

2.2.2 Conversation to Automation in Banking Through Chatbot Using Artificial Machine Intelligence Language

Utilization of AI techniques is done here to provide and improve the chatbots in the banking sector. It makes the interaction between the bank and customers comfortable and useful. The algorithms used were Artificial Intelligence Modelling Language, Natural Language Processing and Latent Semantic Analysis.

LSA is basically a technique to identify the patterns from the text document or in simple words, to find out relevant and important information from the text document. It is clearly an unsupervised approach. User need not only used to chat through message, he can also voice chat.

2.2.3 Banking with a chatbot – a study on technology acceptance

The publishers try to identify the factors that influence the consumers' intention to use the chatbot technology applied in the banking industry. The measurement development and hypotheses were based on the technology acceptance model extended with compatibility, customers' perceived privacy risk and awareness of the service.

They have also highlighted the importance of perceived compatibility and perceived usefulness in the adoption of banking chatbot technology.

2.2.4 JAICOB: A Data Science Chatbot

The authors of have come up with a system which is implemented as a personal agent to assist students in learning Data Science and Machine Learning techniques. It aims at researching the application of cognitive computing in blended learning environments. It is a modular cognitive agent architecture for pedagogical question answering, featuring social dialogue, small talk, improved for a specific knowledge domain.

But this software needs more analysing, creates some misunderstanding while conversations, which leads to unsatisfied customers.

2.2.5 Xatkit: A Multimodal Low-Code Chatbot Development Framework

Xatkit chatbot, a multi-channel and multiplatform chatbot modeling framework was introduced here, it proposes a set of domain-specific languages for chatbot definition from the technical details of the platform-specific aspects where the bot is going to be deployed.

Xatkit provides a set of Domain Specific Languages to define chatbots in general in a platform independent way. Xatkit also comes with a runtime engine that automatically deploys the chatbot application and manages the defined conversation logic over the platforms of choice. Xatkit's modular architecture facilitates the separate evolution of any of its components.

At the language level it has to improve the variability of the bot specification, moving towards a product-line approach that enables companies to create and quickly update several versions of the same bot, to create a localized versions of the bot for each branch of the company. At the framework level, it can improve on the integration of chatbot generators, able to create partial bot specifications from existing data sources within the company.

2.2.6 Using the SOCIO Chatbot for UML Modelling: A Family of Experiments

The chatbot named as SOCIO, was made by the writers. It is a collaborative tool for creating class diagrams, building models and meta-models. The chatbot is accessible from Twitter or Telegram. The designers and stakeholders can take advantage of social network collaborative and ubiquity to perform lightweight modelling tasks.

Here, the experiments were run to compare the usability of the SOCIO chatbot with a website named "Creately" in order to increase the reliability of the results of the baseline experiment.

They provided the analytics on the experiments that shows the usability of the SOCIO chatbot, and a list of suggestions from SOCIO chatbot users to understand the impact of three human-computer interaction and usability characteristics like effectiveness, efficiency, satisfaction on collaborative modelling and chatbot design.

2.2.7 Entertainment Chatbot for the Digital Inclusion of People Without Abstraction Capabilities

EBER chatbot was proposed in this paper and adapts its responses based on the user's mood. It is trained with some selected Machine Learning algorithms from the Scikit-Learn Python library, Gradient Descent, Decision Tree and Random Forest, on some datasets. The NLG module employs SA knowledge to avoid monotony by adjusting the polarity of the dialogue depending on the polarity of user responses.

This chatbot combines AI, ML, NLG and SA to generate short coherent contextualised dialogues as connectors between newscasts. EBER behaves realistically as an ''intelligent radio'' for entertaining elderly people.

As it requires classification dialogue, more keystrokes to understand and learn, it is not predictable of giving right solution all the time.

References:

[1] Dr. Shalini Sayiwal, "Chatbots in banking industry: a case study", 2020 JETIR June 2020, Volume 7, Issue 6.

[2] S. F. Suhel, V. K. Shukla, S. Vyas and V. P. Mishra, "Conversation to Automation in Banking Through Chatbot Using Artificial Machine Intelligence Language," 2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO), 2020, pp. 611-618, doi: 10.1109/ICRITO48877.2020.9197825.

[3] Mónika-Anetta ALT, Ibolya vizeli, zsuzsa săplăcan, "Banking with a chatbot – a study on technology acceptance", studia universitatis babeș-bolyai oeconomica, volume 66, issue 1, 2021, pp. 13-35, DOI: 10.2478/subboec-2021-0002.

[4] D. Carlander-Reuterfelt, Á. Carrera, C. A. Iglesias, Ó. Araque, J. F. Sánchez Rada and S. Muñoz, "JAICOB: A Data Science Chatbot," in IEEE Access, vol. 8, pp. 180672-180680, 2020, doi: 10.1109/ACCESS.2020.3024795.

[5] G. Daniel, J. Cabot, L. Deruelle and M. Derras, "Xatkit: A Multimodal Low-Code Chatbot Development Framework," in IEEE Access, vol. 8, pp. 15332-15346, 2020, doi: 10.1109/ACCESS.2020.2966919.

[6] R. Ren, J. W. Castro, A. Santos, O. Dieste and S. T. Acuna, "Using the SOCIO Chatbot for UML Modelling: A Family of Experiments," in IEEE Transactions on Software Engineering, doi: 10.1109/TSE.2022.3150720.

[7] S. García-Méndez, F. De Arriba-Pérez, F. J. González-Castaño, J. A. Regueiro-Janeiro and F. Gil-Castiñeira, "Entertainment Chatbot for the Digital Inclusion of People

Without Abstraction Capabilities," in IEEE Access, vol. 9, pp. 75878-75891, 2021, doi: 10.1109/ACCESS.2021.3080837.

2.3 Problem Statement Definition

To create a chatbot that can fulfill all the features required by the consumers and even by the bank employees, using the IBM Watson Assistant for creating this chatbot software, as it meets all the latest features aand is easy to implement.

Banking bots can give customers financial advice on how to manage and invest their money. Professionals train them enough so that they are updated with the latest news, trends, and information. Chatbots can demystify complex banking and financial terminologies and help customers make smart financial decisions.

Artificial intelligence based chatbot applications have become a very popular form automatizing customer service processes in the financial sector, transforming communication between banks and consumers. Many banks have implemented chatbots in order to reduce costs and to improve services quality. Thus, it is essential for these institutions to identify factors that influence customer adoption of this technology. Perceived compatibility has a very strong effect on customers' intention to use banking chatbots which is consistent with earlier findings of i-banking and m-banking adoption research. The results indicate that the higher is consumers' perception of the banking chatbot being compatible with their lifestyle, the higher their willingness is to adopt the technology.

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes.

Empathy Map

SAYS	THINKS
Queries related to bank	is fast
Open new account for me	User friendly
Branches of bank?	Easy to use
Bank timings?	Provide solutions to me
Online transfer	

DOES	FEELS
Logging in	Secure
Type details	Excited
Type password	Curiosity
Access online services	Efficient work

PAIN	GAIN
Requires internet. Has language barriers.	Provides fast solutions.
Not a human-to-human interaction.	Accessible anywhere.

3.2 Ideation & Brainstorming

- The chatbot may have regional or local languages.
- The software should give the latest statictics if there is any change in banking rules.
- It should be user friendly.
- Should be easy to use.
- Should get as much queries from the customers as possible.
- Should include queris which the customers may have in the future.
- Should have polite and decent words.
- The software should not lag in time.
- Create a chatbot to help the customers.

- The chatbot should work 24X7.
- The chatbot can be attached to the websites of the bank, or can be created as an app.

3.3 Proposed Solution

Our proposed solution consists of using IBM Watson Assistant service to create a bank chot which will help the customers to get the required service on time and also to provide the answer for the most frequently asked queries. This chatbot will be useful during the times of inavailabilities of the banks, to get instant suggestions and much more. It will be free to use and will have user friendly interface.

Using banking chatbots for scaling customer support can reduce the need for human resources for handling thousands of queries manually. Custom support agents can help customers with complex queries that chatbots cannot resolve. With automation, the cost of customer support can be reduced considerably. With the use of AI Chatbots for banking, banks and the financial sector have seen 75% of cost reduction with quality and timely query resolution.

It will provide the following capabilities:

- Guide a customer to create a bank account.
- Be able to answer loan queries.
- Should answer general banking queries.
- To answer queries regarding net banking, and much more.

3.4 Problem Solution fit:

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

- Bad customer service
- Cheque / funds bouncing
- Bad maintainance
- Bank loan issues
- Not good response

9. PROBLEM ROOT CAUSE RC

- Poor Maintainance network connection from bank side.
- Very slower answer from the customer side.
- Service not available on all days.

7. BEHAVIOUR BE

Maintaining a good environment in the team of customer service and bank employees to guide and answer customers for queries like account savings, loan, cheque bouncing.

2. CUSTOMER SEGMENTS CS

Bank Client, bank customers

6. CUSTOMER

- Poor mobile network signal. CC
- Poor internt connectiviy
- Need for money to buy a sofware device like mobiles.
- Inapproprite software device.

5. AVAILABLE SOLUTION AS

Solutions like clearing customer queries through toll-free telephone numbers, customer support via email, live chat option.

3.TRIGGERS TR

Customer has many queries over transaction, savings, loan, FD, insurance,etc.

4. EMOTIONS: BEFORE / AFTER EM

Before : Uncertain, confused, Unhappy, Sorrowful

After : Happy, Secured, Relaxed, fullfillment.

10. YOUR SOLUTION SL

All these problems can be easily solved with the help of an automatic AI system known as Chat bot which overcome all these problems and answer all the customer queries easily and clearly in a short amount of time that is immediately. It also reduces the work pressure of customer service employees. It has a greatest advantage of being available for 24/7 time. It also can be available for mostly all kinds of software devices with low internet connectivity and understands human language easily and delivers the answer for that particular query clearly in a text format to the customer.

8. CHANNELS OF BEHAVIOUR CH

ONLINE

Reply customer queries through email or live chat or through phone calls quickly and clearly.

OFFLINE

Reply customer queries directly face to face in bank clearly without wasting the time of the customer.

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Following are the functional requirements of the proposed solution:

FR No.	Functional Requirement	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	The form is available on the official bank website.
FR-2	User Login	It is possible to login to the account via registered Username and Password.
FR-3	Asking query	The frequently asked questions can be explored by the user and they may post their own queries.
FR-4	Response	The available data about the user should be responded to.

4.2 Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Chat queries can be easily handled by the AI chat bot, so customers won't have to wait in a line. It provides a personalised experience for the user.
NFR-2	**Security**	The bot requires users to authenticate themselves before they are able to query information.
NFR-3	**Reliability**	The bot should interpret correctly the intention of the user query.
NFR-4	**Performance**	Query responses are faster and more accurate.

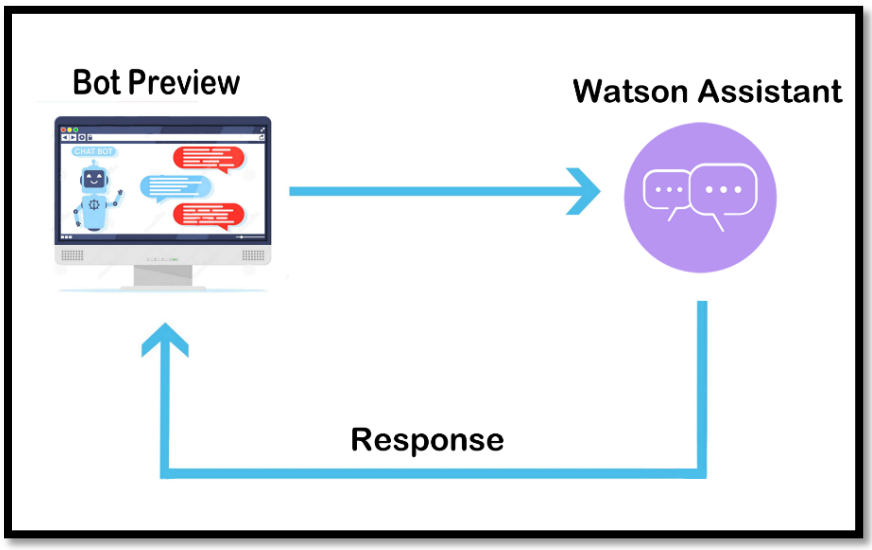
NFR-5	**Availability**	Chat bot should be available for 24*7, so that it can reduce the customers waiting time.
NFR-6	**Scalability**	Any number of users can be handled by the system with faster response and correct query results.

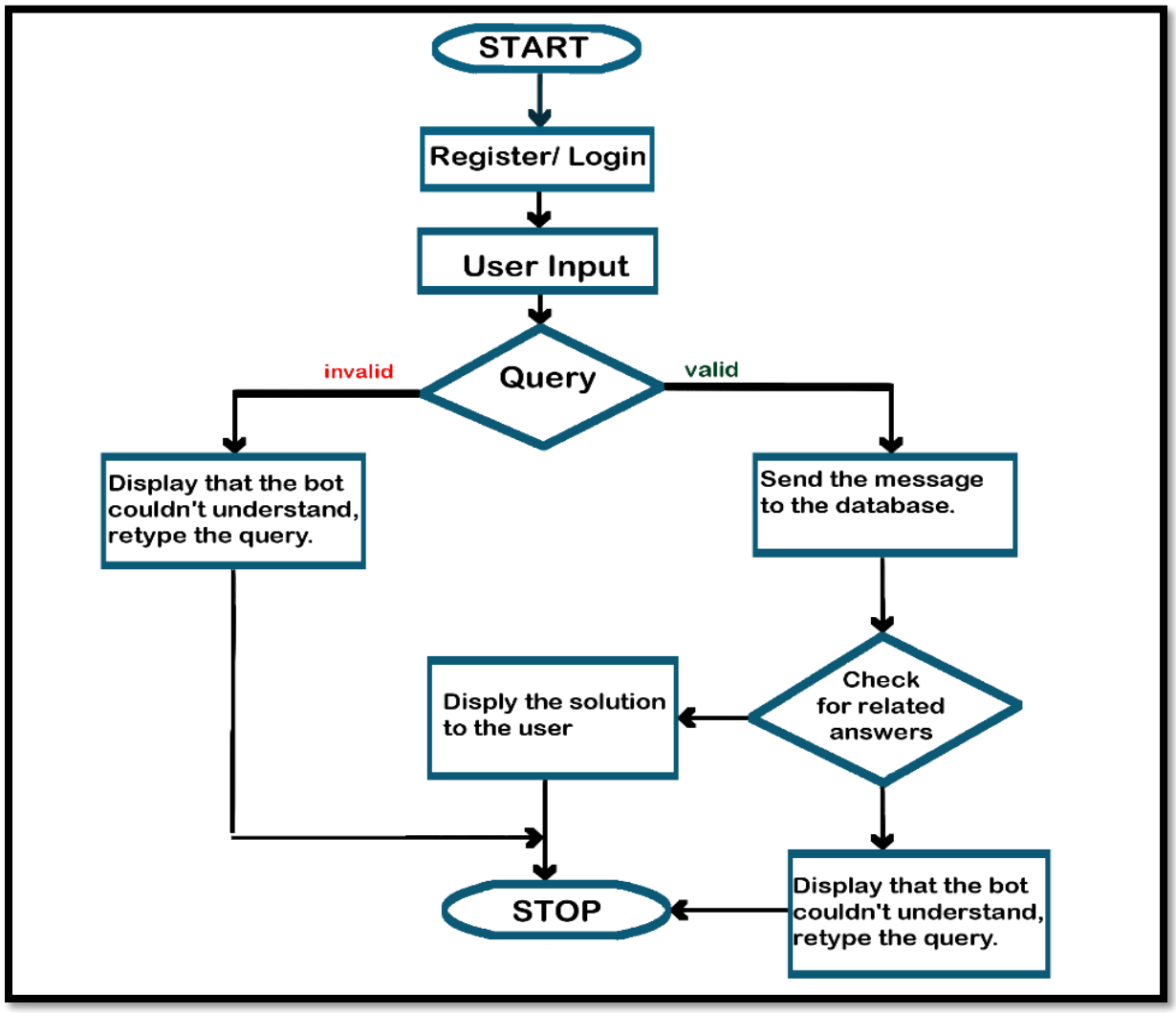
5. PROJECT DESIGN

5.1 Data Flow Diagrams

Data Flow Diagrams:

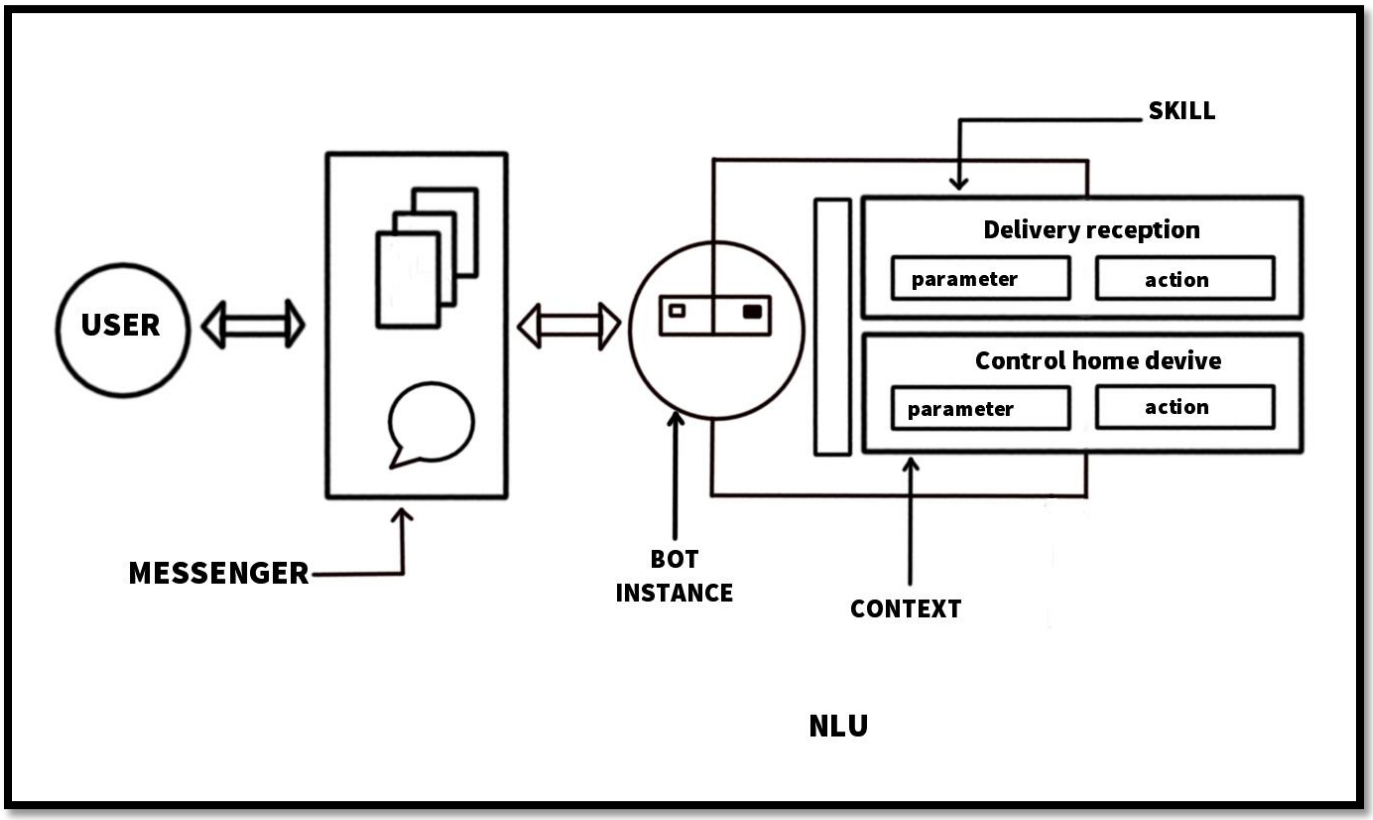
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.





5.2 Solution & Technical Architecture

Architecture Diagram :



Components:

1. User
2. Messenger
3. Bot Instance
4. Context
5. Parameters
6. Actions
7. Delivery reception
8. Control home device
9. Natural language understanding

1.User:

Chatbots in banking industries can help customers with issues that can be non-complex but urgent. These issues include unlocking or locking cards, resetting, checking bank statements, and completing fund transfers. AI chatbot allows customers to complete the entire process without waiting on the phone.

2. Messenger:

A chatbot is a piece of automated messaging software that uses artificial intelligence to converse with people. Facebook Messenger bots live within Facebook Messenger, and can converse with some of the 1.3 billion people who use Facebook Messenger every month. Chatbots are like virtual assistants. These messengers are found in websites and in apps.

3. Bot Instance:

A banking bot is built using artificial algorithms that analyzes user's queries and to understand user's message. The system is designed for banks use where users can ask any bank related questions like loan, account, policy etc. This application is developed for android devices.

4.Context:

Context allows the user to have an informal conversation with the AI chatbot using pronouns. The intent in each message is identified and carried forward across multiple messages. Contextual feature helps shape the speech according to the need and environment.

5. Parameters:

- Easy customization
- Quick chatbot training
- Easy omni-channel deployment
- Integration with 3rd-party apps
- Interactive flow builder
- Multilingual capabilities
- Easy live chat

6.Actions:

- Transfer Money
- Get Account Balance
- Send Timely Alerts & Notifications
- Track Transactional History
- Tackle Suspicious Activities
- Hassle-free Application for Other Services
- Customer Support with just One Tap
- Easy & Uncomplicated Lead Generation
- Personal Banking Assistance
- Make Secure Payments

7. Delivery reception:

A document that proves that a person has received a message.

8. Control home device:

A home automation system will monitor and/or control home attributes such as lighting, climate, entertainment systems, and appliances. It may also include home security such as access control and alarm systems.

9. Natural language understanding:

Natural language understanding is a branch of artificial intelligence that uses computer software to understand input in the form of sentences using text or speech. NLU enables human-computer interaction.

5.3 User Stories

User Type	Functional Requirement	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration, Login, Dashboard	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account, dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can type my questions in the provided chat area.	I can show and state my queries and concerns.	Medium	Sprint-2
		USN-4	As a user, I can get the answers for my doubts.	I can see the answers types in the chat area.	Medium	Sprint-2
		USN-5	As a user, I can get to know the latest features and advantages of the banks.	I can view the new updates of the bank in the webpage/chatbot.	Medium	Sprint-3
Customer (Web user)	Web Search	USN-6	As a user, can clarify my query at any place and anytime.	I can get the replies from the chatbot from any browser, at any time.	Medium	Sprint-3

User Type	Functional Requirement	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer Care Executive	Receiving Calls	USN-7	As an executive, the chatbots reduce the workload and save our time and energy.	I get less amount of calls from customers.	Medium	Sprint-4
Administrator	Supervising	USN-8	As an admin, the reputation of the company has been increased.	I get good feedback from the customers.	Medium	Sprint-4

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Product Backlog, Sprint Schedule, and Estimation:

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Bank website	USN-1	The customer logs inside the website, and can use the chatbot option given at the bottom right.	20	High	Rakesh Kumar M, Srimukund K G G, Hariharan M, Kailash A L
Sprint-2	Chatbot	USN-2	The bank customers can ask their queries to the chatbot by typing their questions. The chatbot will analyse the query and provide a relevant answer.	20	High	Rakesh Kumar M, Srimukund K G G, Hariharan M, Kailash A L
Sprint-3	Admin Panel	USN-3	The role of the admin of the chatbot is to update the bot's database to rectify the wrong replies, and also to add new replies for new frequently asked queries. Having an admin panel is important.	20	High	Rakesh Kumar M, Srimukund K G G, Hariharan M, Kailash A L
Sprint-4	Final delivery	USN-4	The created chatbot using IBM Watson Assistant is linked in the bank website and is published and deployed. Creation of final documentation and submission of the project.	20	High	Rakesh Kumar M, Srimukund K G G, Hariharan M, Kailash A L

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	4 Days	19 Oct 2022	22 Oct 2022	20	22 Oct 2022
Sprint-2	20	4 Days	23 Oct 2022	26 Oct 2022	20	26 Oct 2022
Sprint-3	20	4 Days	27 Oct 2022	30 Oct 2022	20	30 Oct 2022
Sprint-4	20	4 Days	31 Oct 2022	03 Nov 2022	20	03 Nov 2022

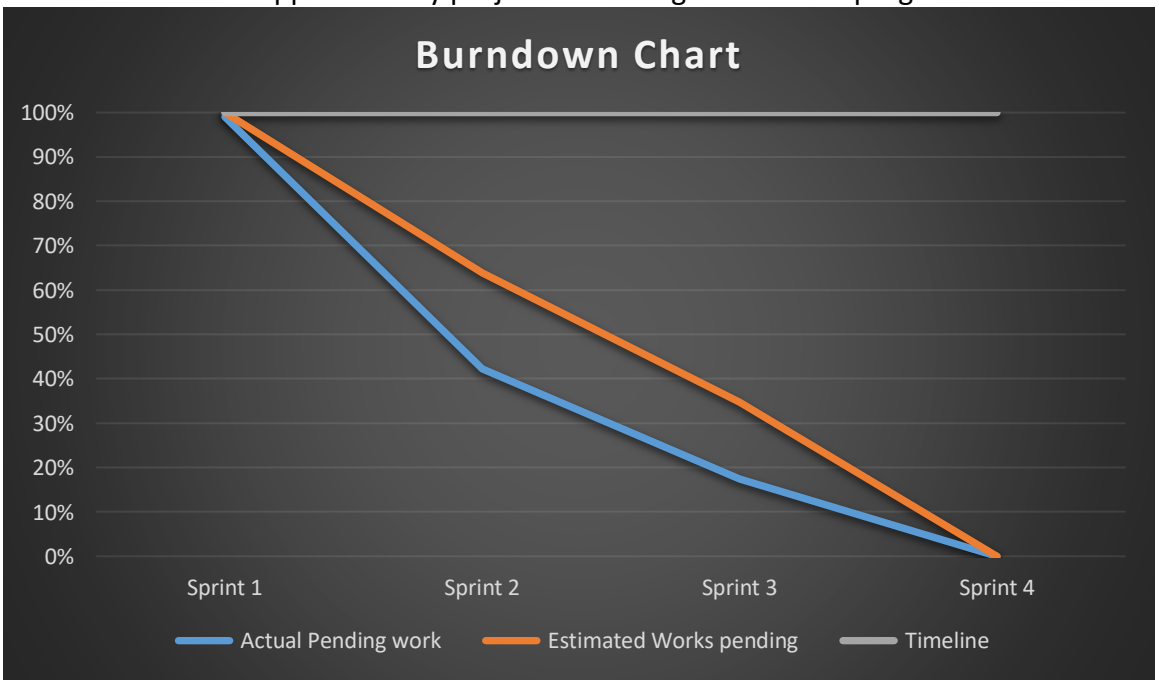
Velocity:

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 = 20/4 = 5

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.



6.2 Sprint Delivery Schedule

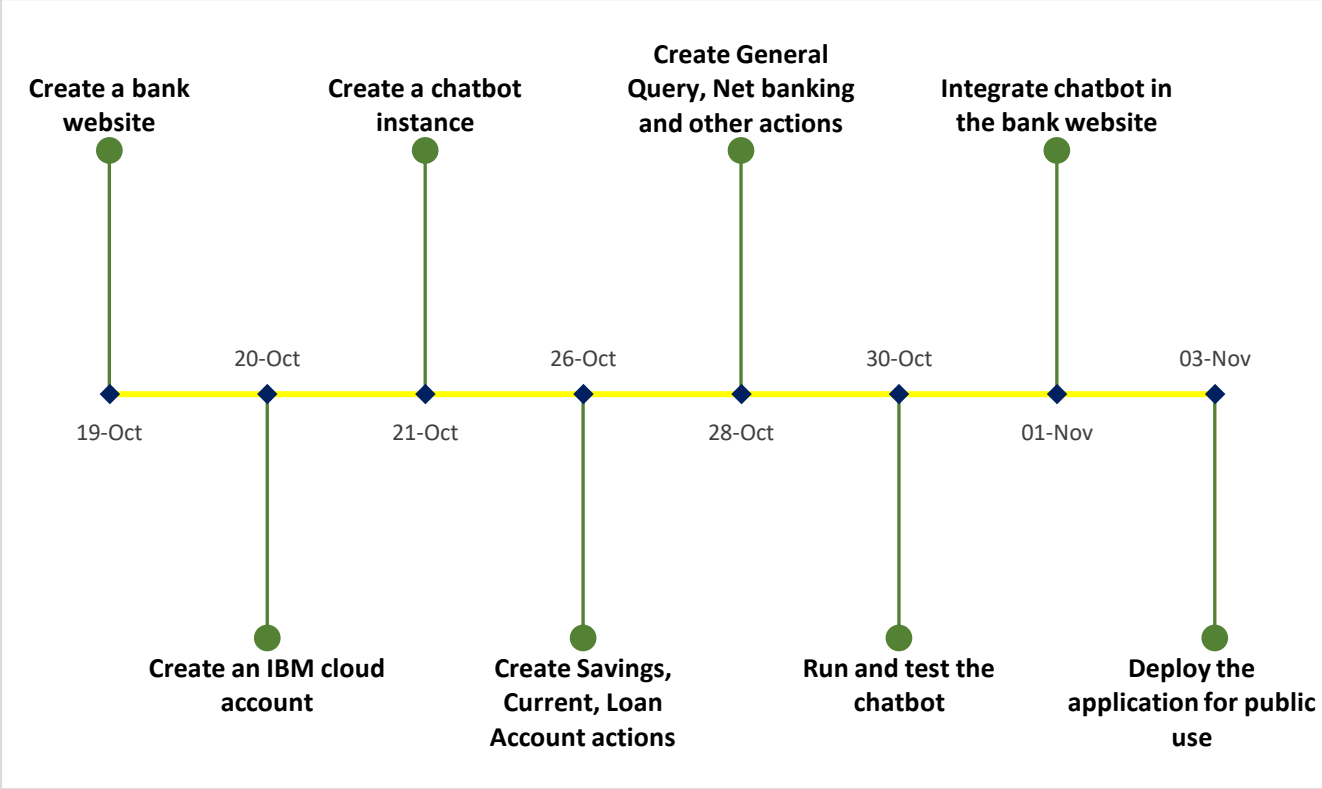
Sprint Delivery Plan:

Month	**OCT**				**OCT**				**OCT**				**Oct**	**Nov**		
Date	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**1**	**2**	**3**
Sprints	**Sprint - 1**				**Sprint – 2**				**Sprint – 3**				**Sprint - 4**			
Create a bank website																
Create IBM cloud account																
Create a chatbot instance																
Create Savings Account action																
Create Current Account action																
Create Loan Account action																
Create General Query action																
Create Net Banking action																
Run the application																
Test the application																
Integrate chatbot in the bank website																
Deploy the application for public use																

MILESTONES:

Milestones are used in project managements to mark specific points along a a project timeline. These points may signal anchors such as a project start and end date, or a need for external review or input and budget checks.

Deadline date	Milestone
19-Oct	Create a bank website
20-Oct	Create an IBM cloud account
21-Oct	Create a chatbot instance
26-Oct	Create Savings, Current, Loan Account actions
28-Oct	Create General Query, Net banking and other actions
30-Oct	Run and test the chatbot
01-Nov	Integrate chatbot in the bank website
03-Nov	Deploy the application for public use



The various activities in the project are:

1. Create a bank website
2. Create an IBM cloud account
3. Create a chatbot instance
4. Create Savings, Current, Loan Account actions
5. Create General Query, Net banking and other actions
6. Run and test the chatbot
7. Integrate chatbot in the bank website
8. Deploy the application for public use

i. **Create a bank website:**
A new website will be created for the bank, in case the bank doesn't has it own website. This website will not only hold a chatbot, but also the necessary details of the bank. To be done by Rakesh Kumar and Srimukund.

ii. **Create an IBM cloud account:**
Using an institutional or organizational mail id, a new IBM cloud account is generated. To be done by Rakesh Kumar and Srimukund.

iii. **Create a chatbot instance:**
After making an IBM Cloud Account, an IBM Watson Assistant cloud service free subscription is acquired. This will be used to create the chatbot for helping the bank customers. To be done by Hariharan and Kailash.

iv. **Create Savings, Current, Loan Account actions:**
On providing a suitable name to the chatbot, the actions, descriptions and replies for savings account, loan account, current account, and responses for its sub actions are created and saved. To be done by Rakesh Kumar and Srimukund.

v. **Create General Query, Net banking and other actions:**
The rest of the actions for General Query, Net Banking, Credit Cards, Personal Details are generated along with the replies which they will give when prompted by a customer. To be done by Hariharan and Kailash.

vi. **Run and test the chatbot:**
After creating the chatbot, it is tested under the "Preview Section" of the Watson Assistant. The working of the chatbot is verified here. Any bugs, if found, will be rectified. To be done by Hariharan and Kailash.

vii. **Integrate chatbot in the bank website:**
Under the integrations section of IBM watson, copy the chatbot's javascript code for embeding the chatbot with the website. The javascript code is to be embedded in the HTML code of the website. To be done by Rakesh Kumar and Srimukund.

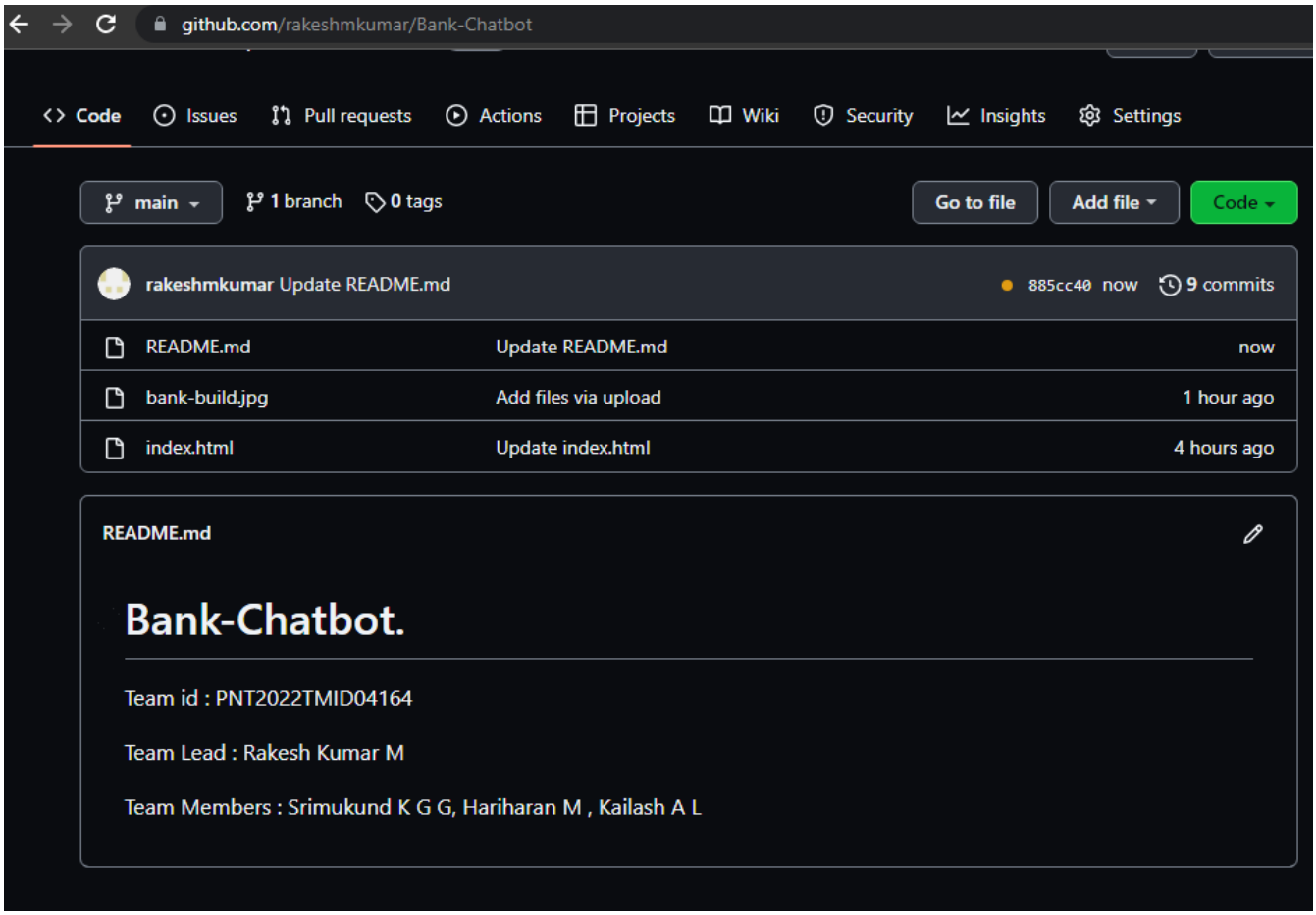
viii. **Deploy the application for public use:**

The files of the HTML code and the background image is uploaded in the GitHub for the public to use it anytime and anywhere. To be done by Rakesh Kumar and Srimukund.

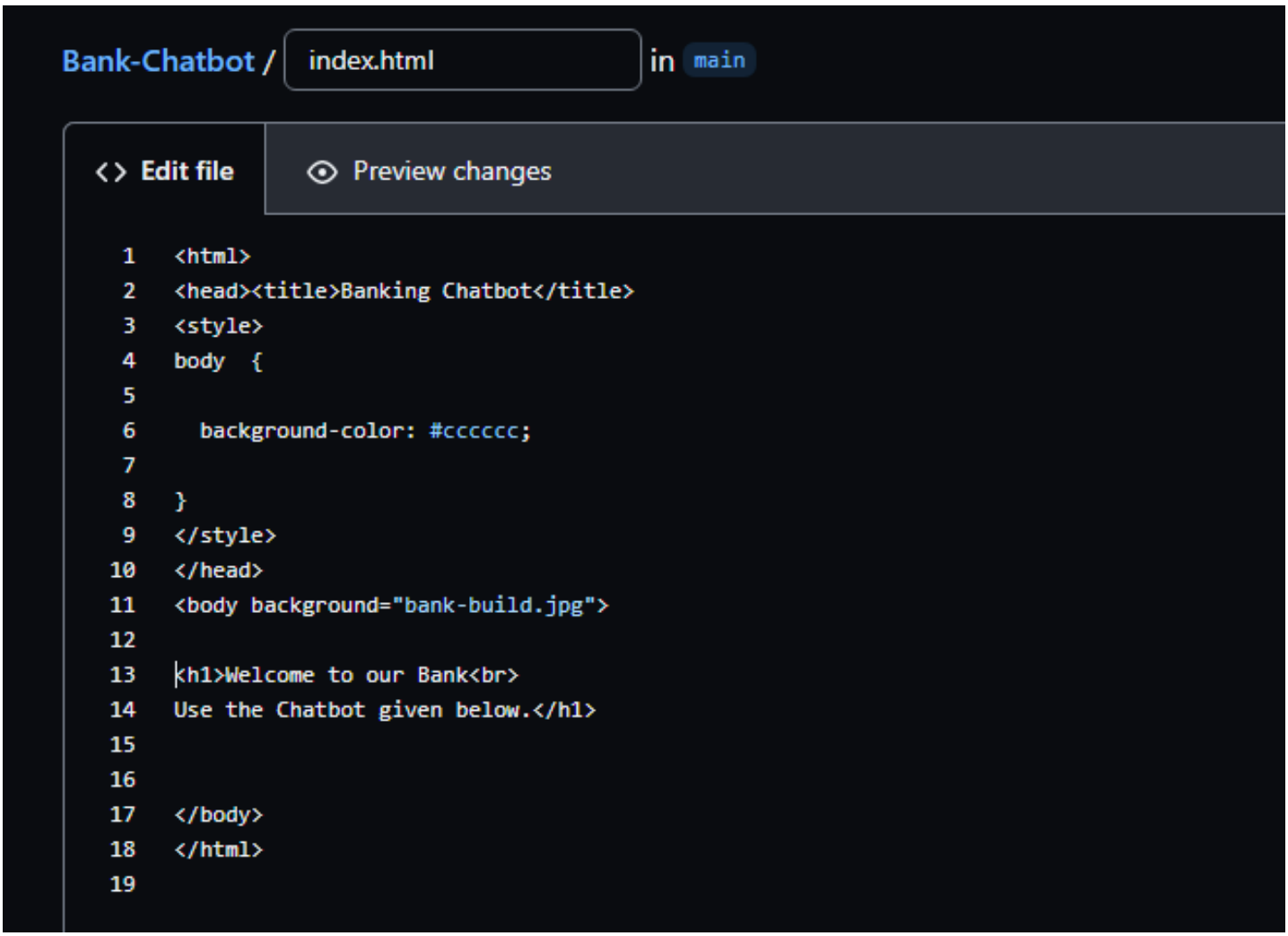
7. CODING & SOLUTIONING

7.1 Feature 1:

Creating HTML based website for the bank, using Github.

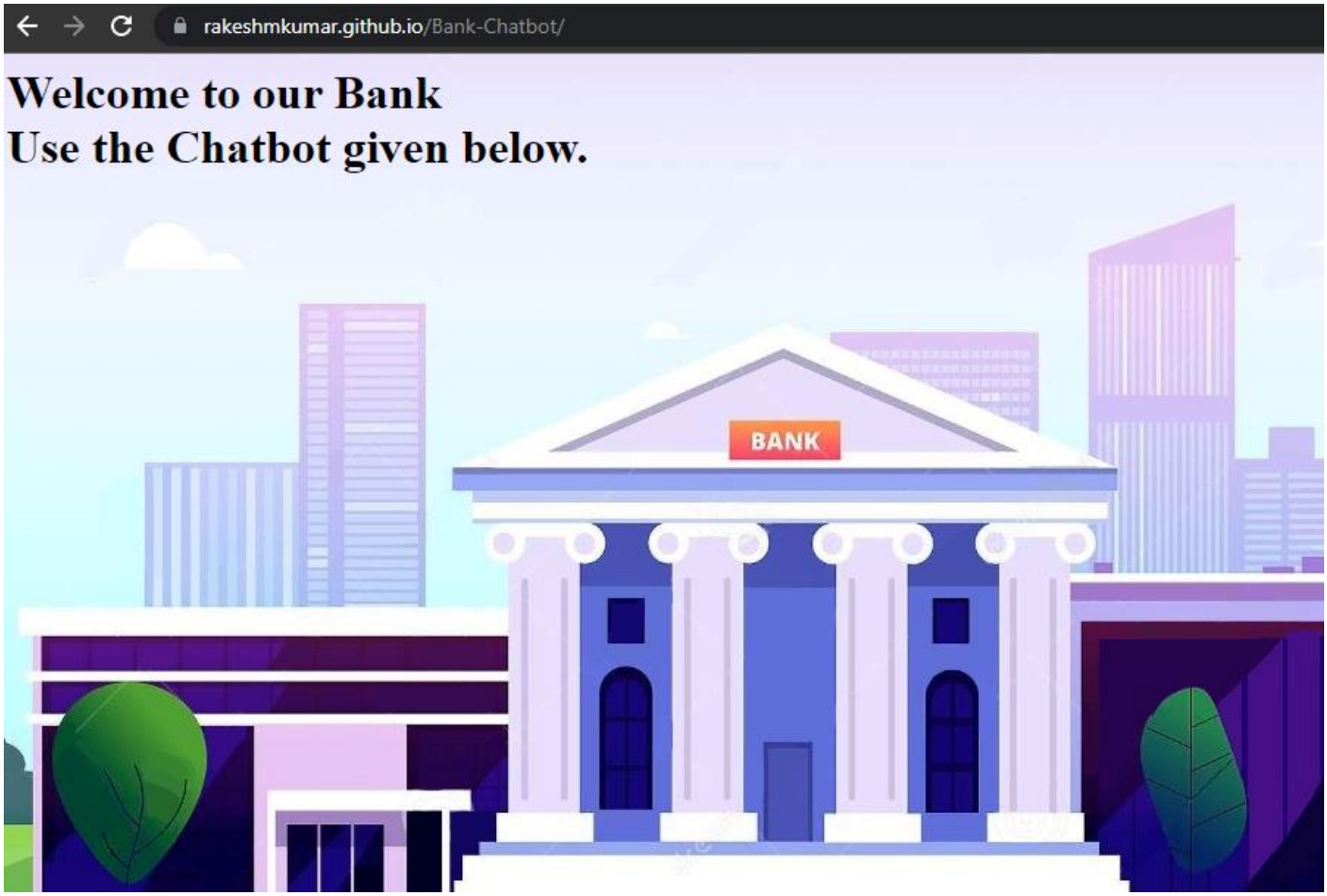


Code for website:

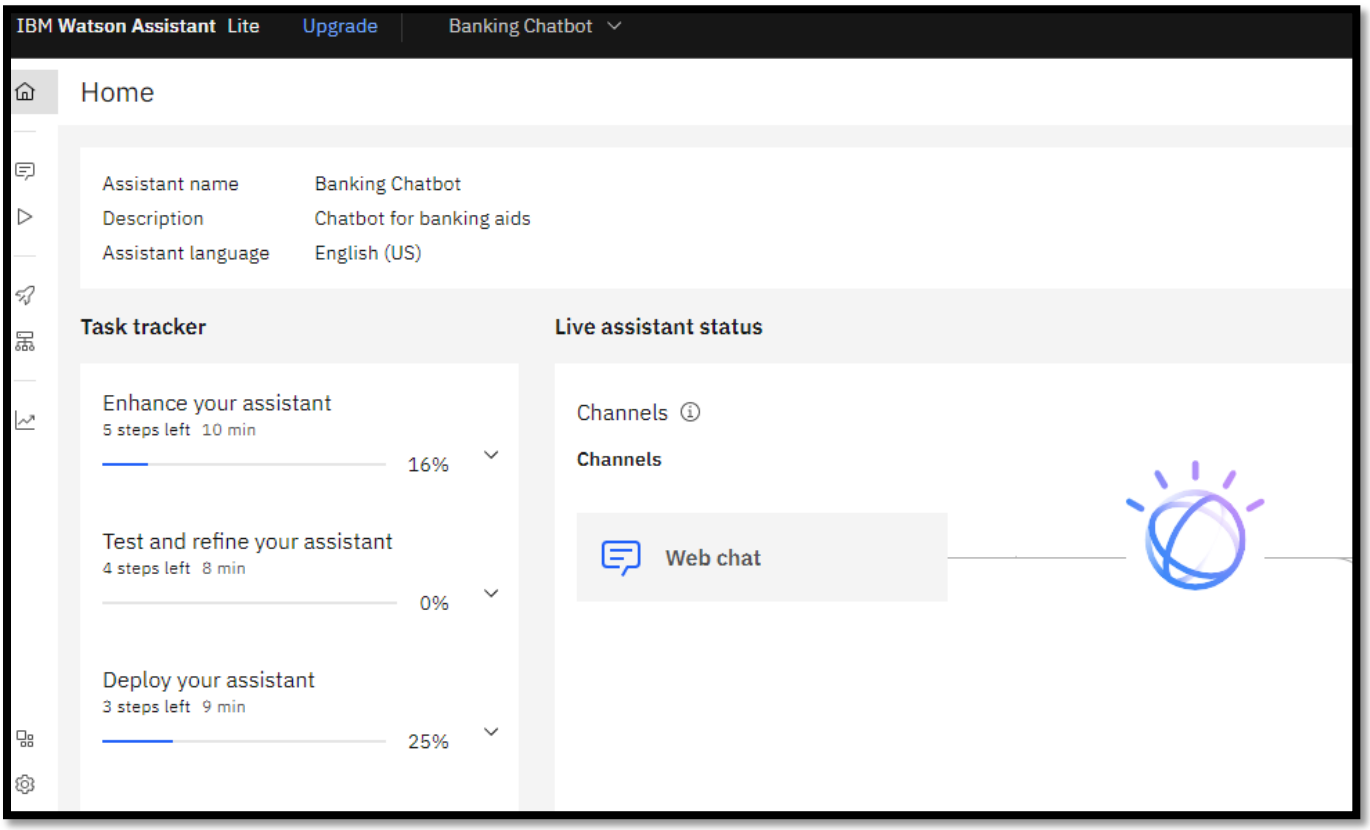


Apply a background image:

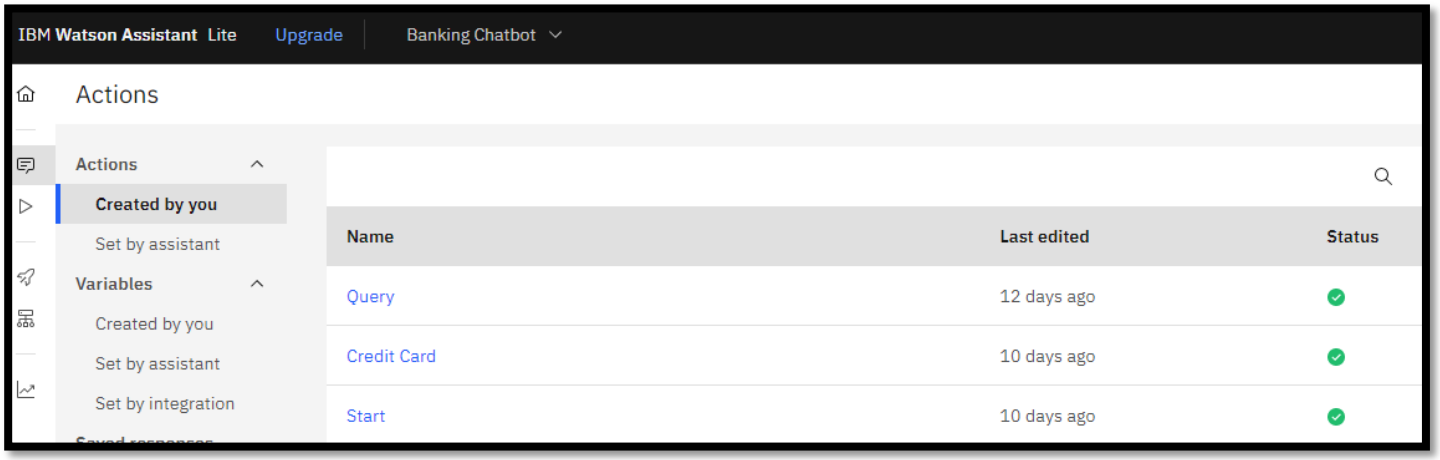
Website image:

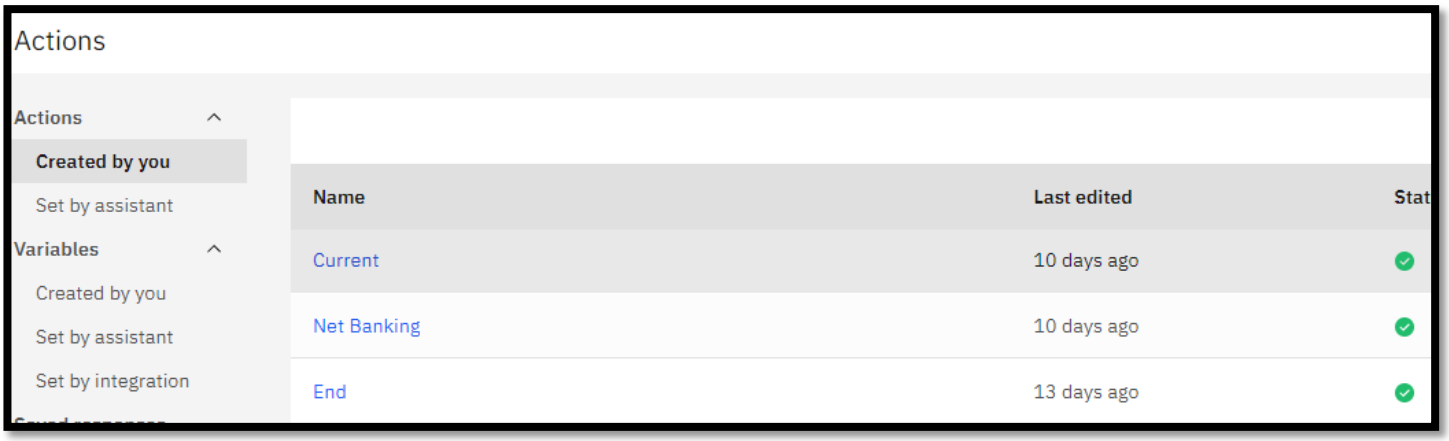


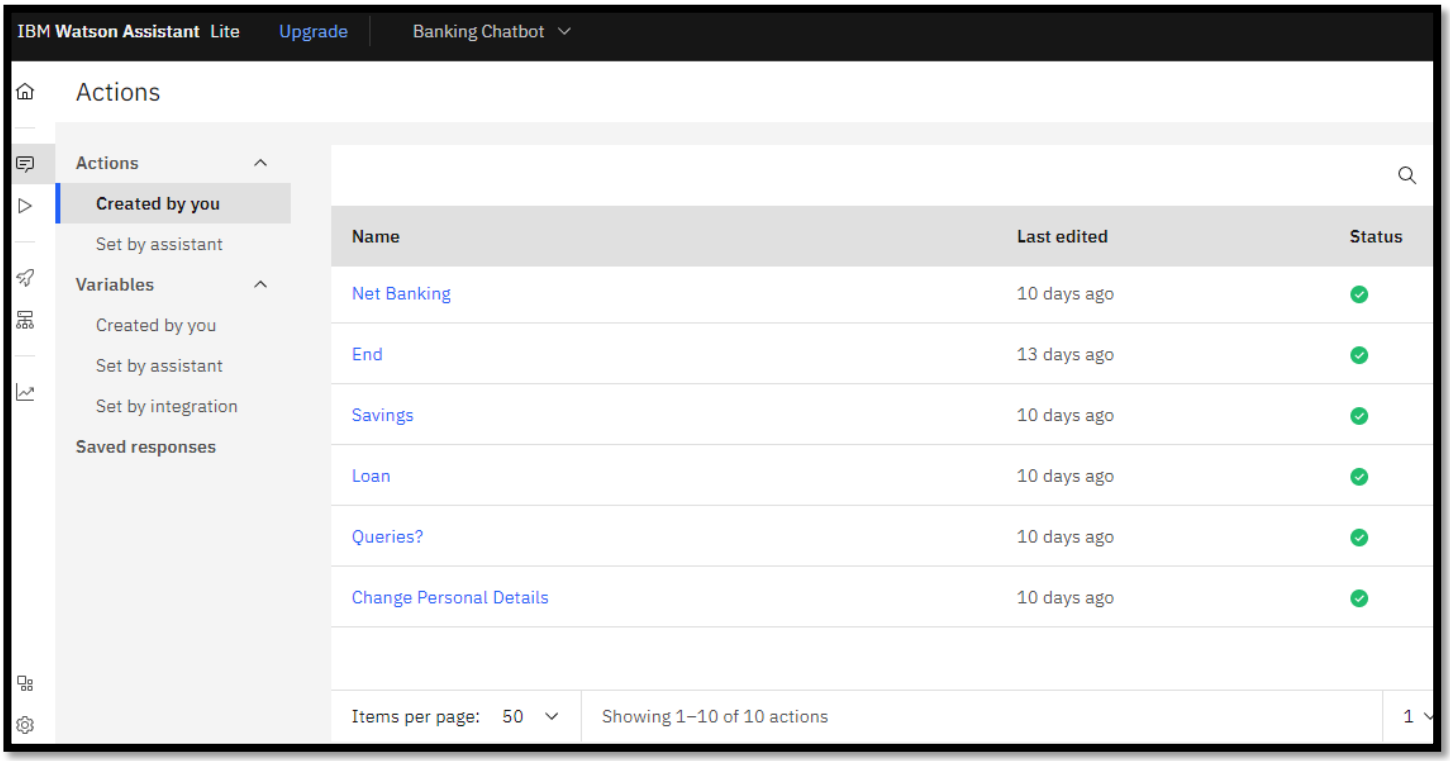
Open Watson Assistant



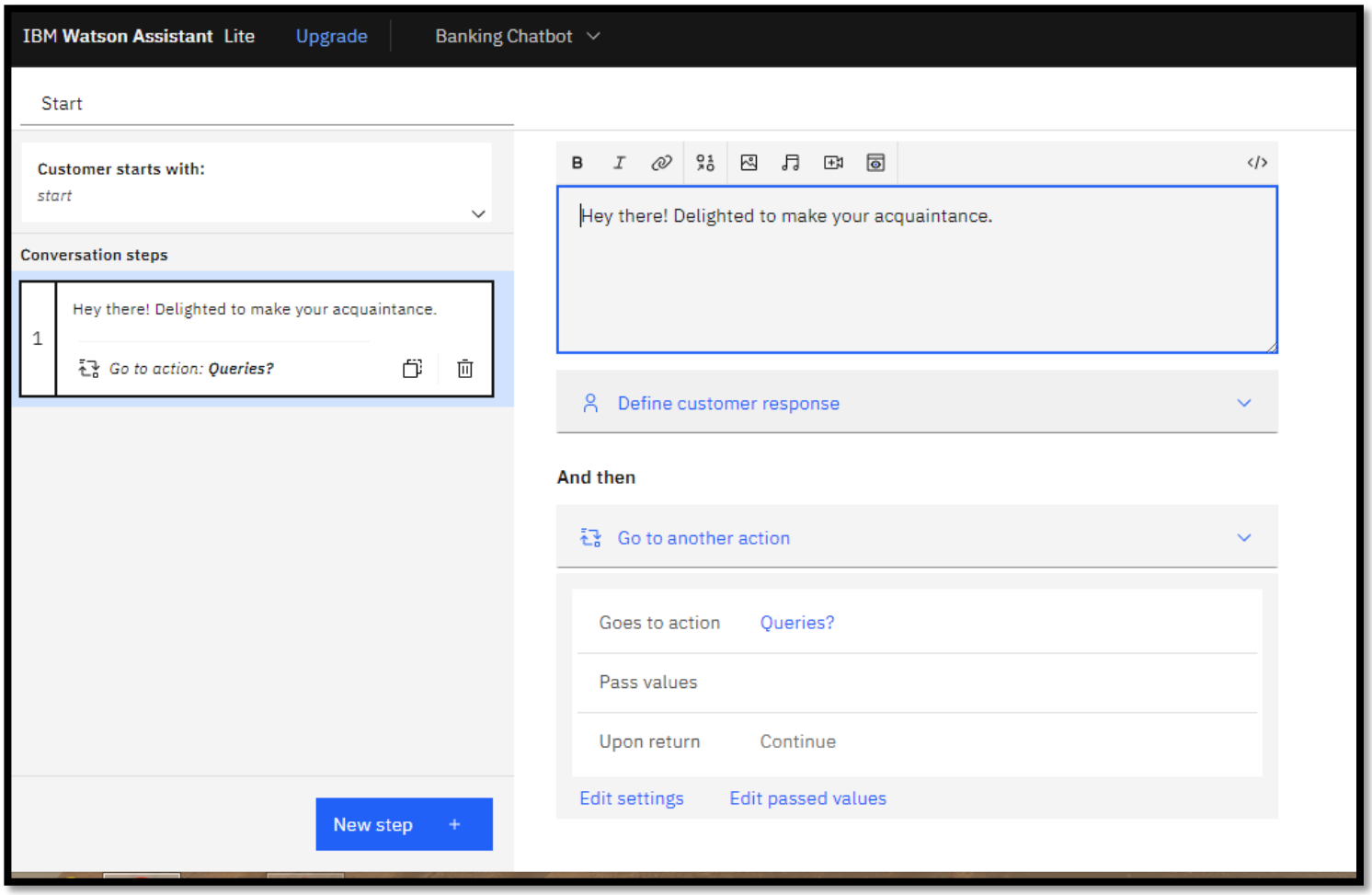
Create “Actions” for dialog conversations



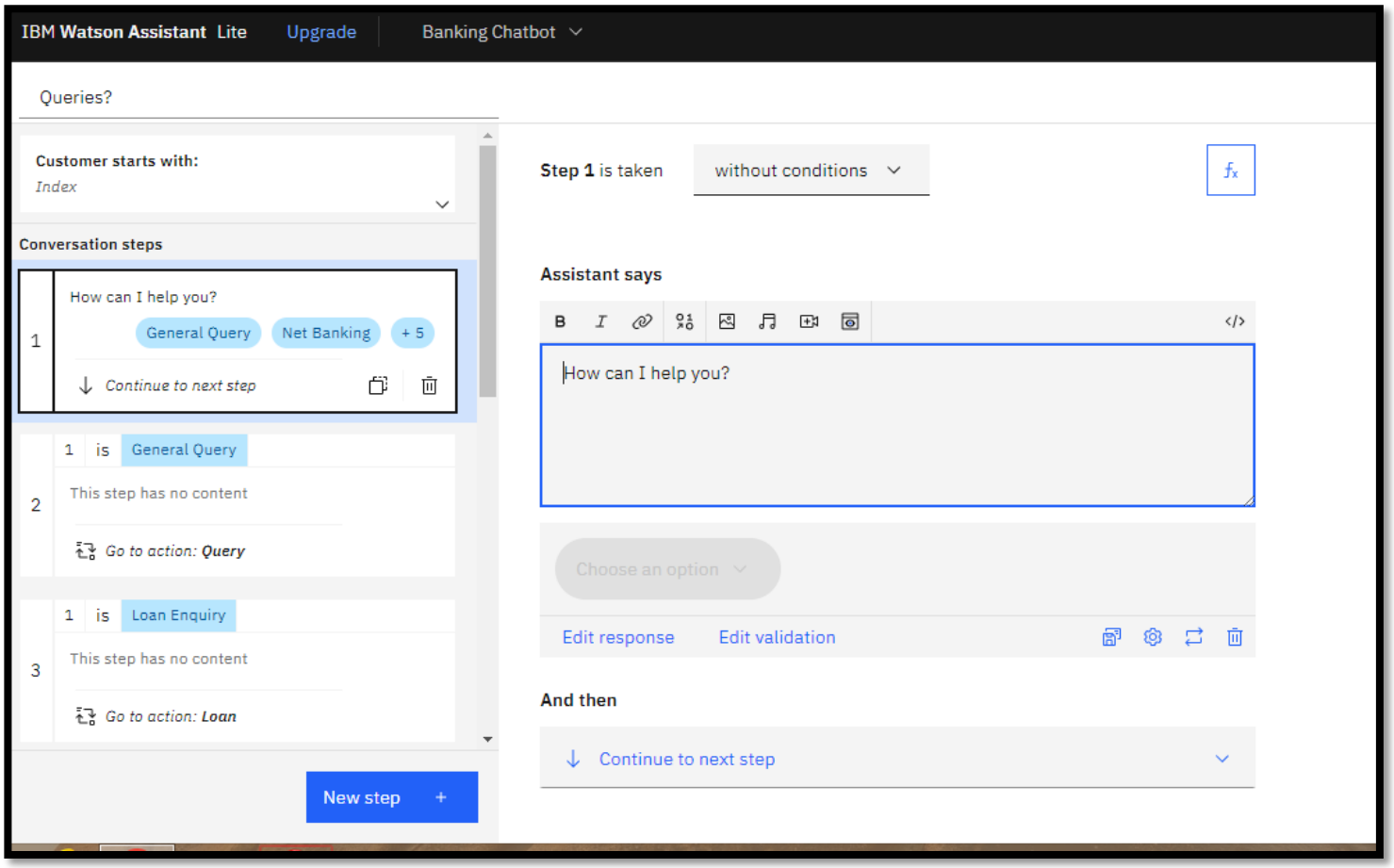

Actions
Actions
Created by you
Set by assistant
Variables
Created by you
Set by assistant
Set by integration
Name
Last edited
Stat
Current
10 days ago
Net Banking
10 days ago
End
13 days ago


IBM Watson Assistant Lite
Upgrade
Banking Chatbot
Actions
Actions
Created by you
Set by assistant
Variables
Created by you
Set by assistant
Set by integration
Saved responses
Name
Last edited
Status
Net Banking
10 days ago
End
13 days ago
Savings
10 days ago
Loan
10 days ago
Queries?
10 days ago
Change Personal Details
10 days ago
Items per page: 50
Showing 1–10 of 10 actions
1

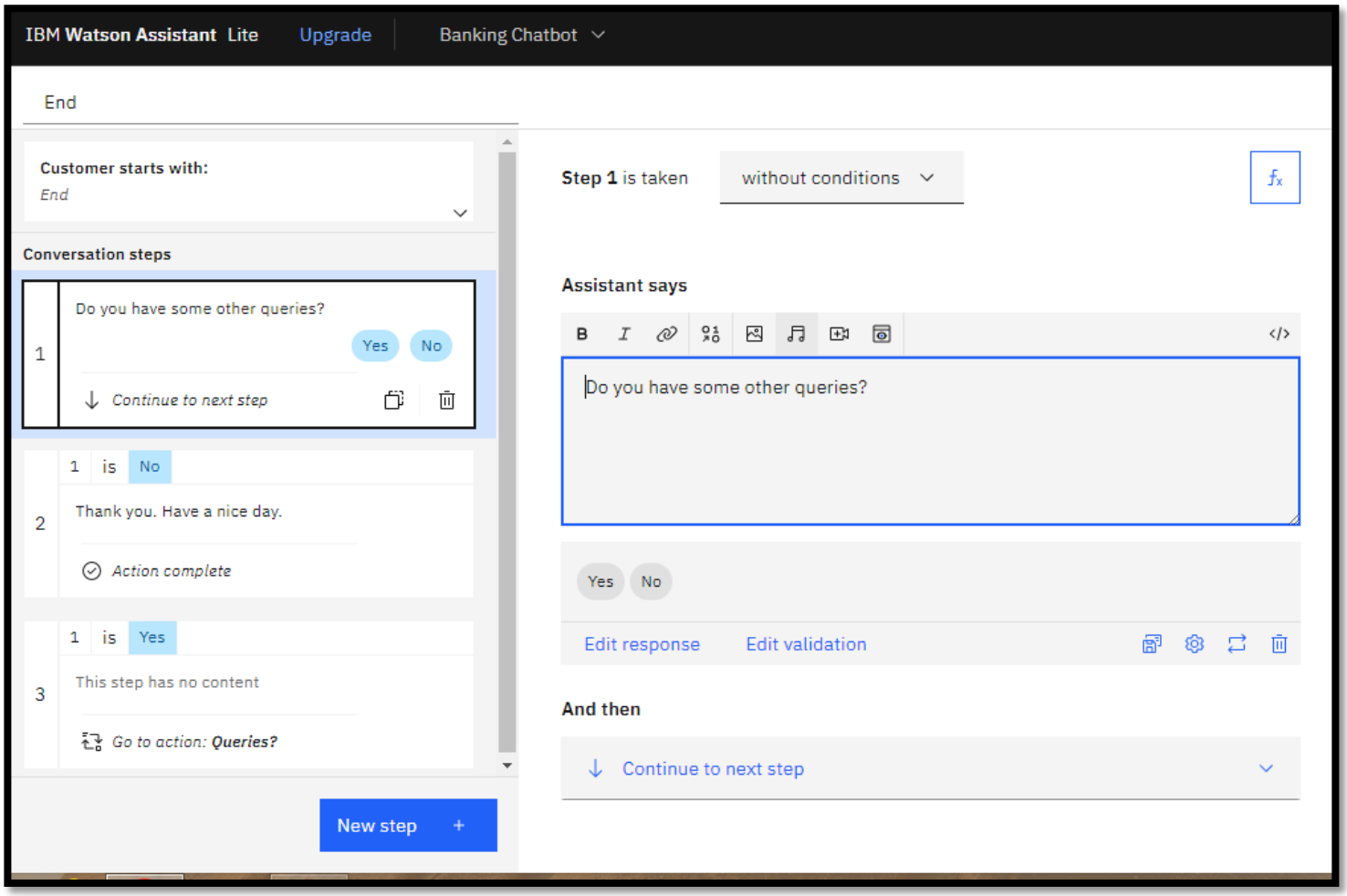
Give contents and responses for “Start” action:



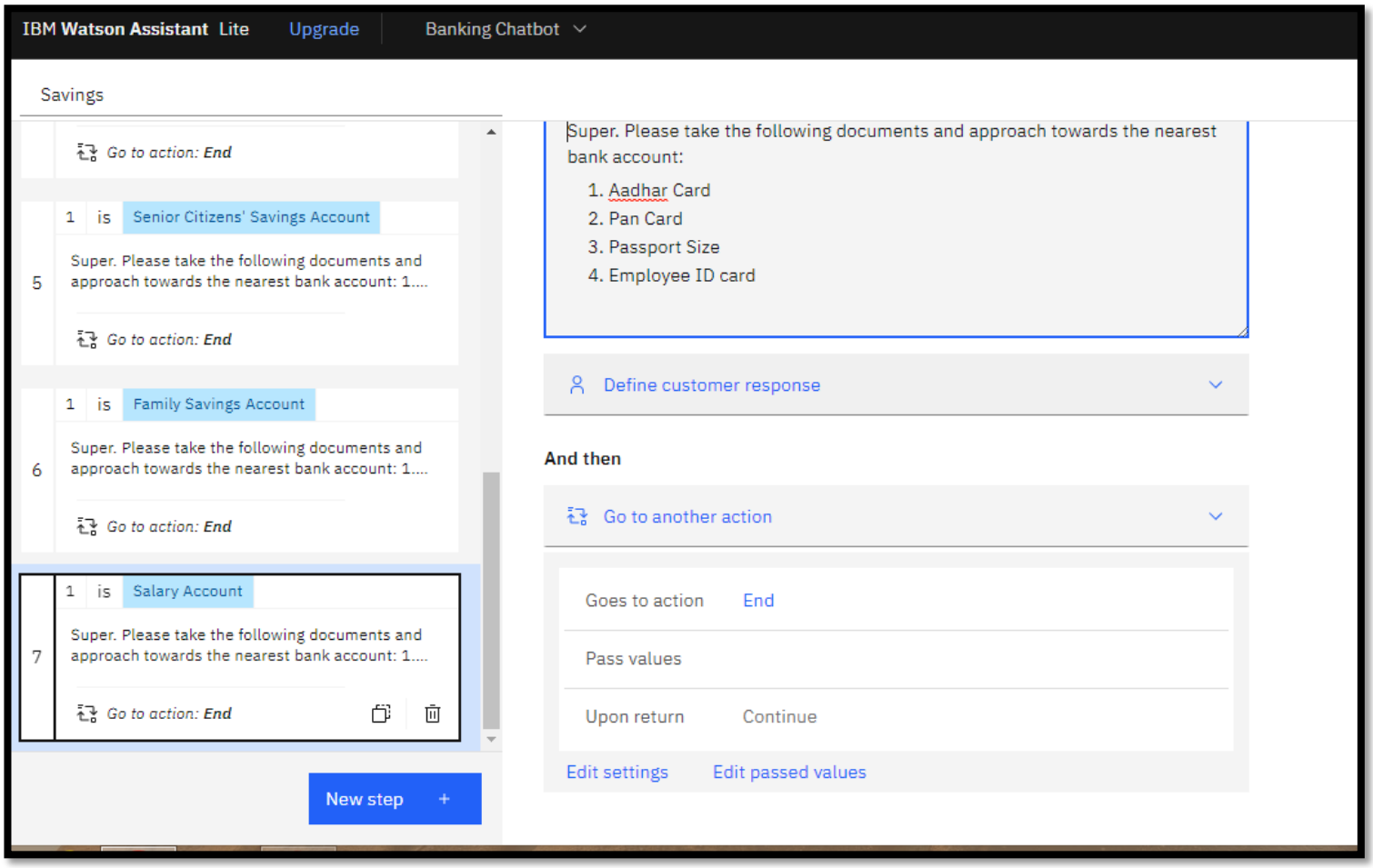
Give contents, responses for “Queries” action:



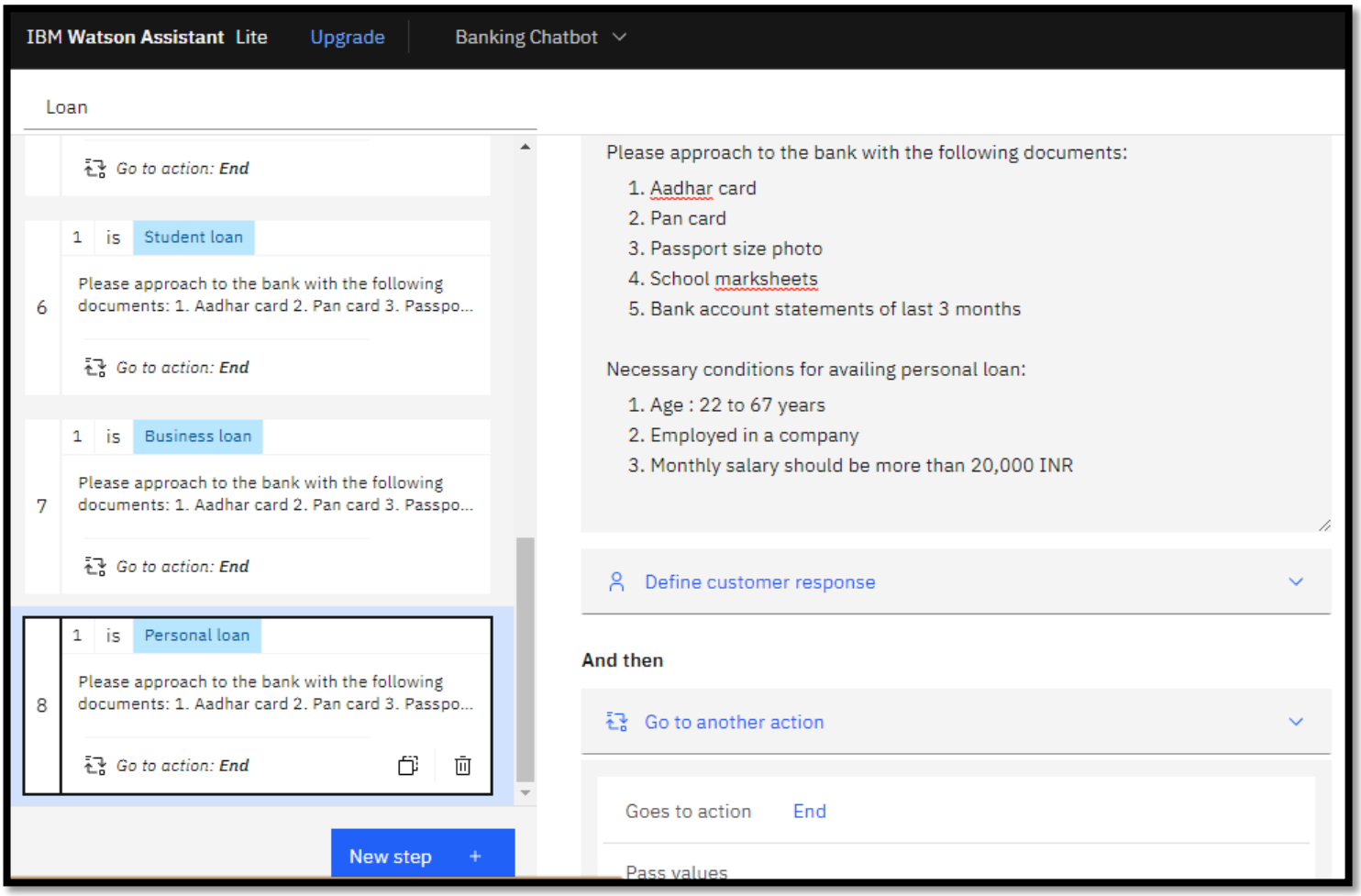
Give contents, responses for “End” action:



Give contents, responses for “Savings” action:

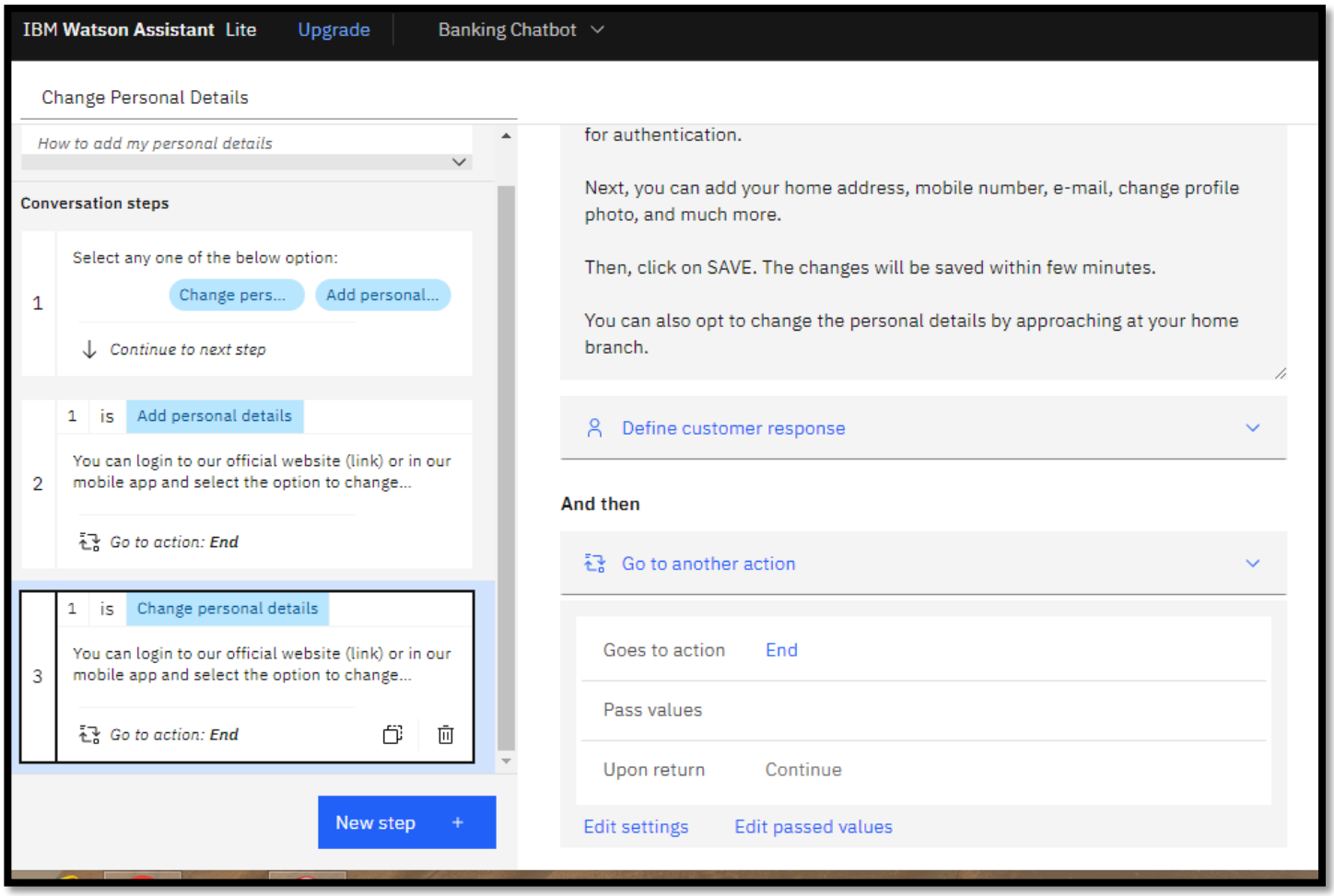


Give contents, responses for “Loan” action:

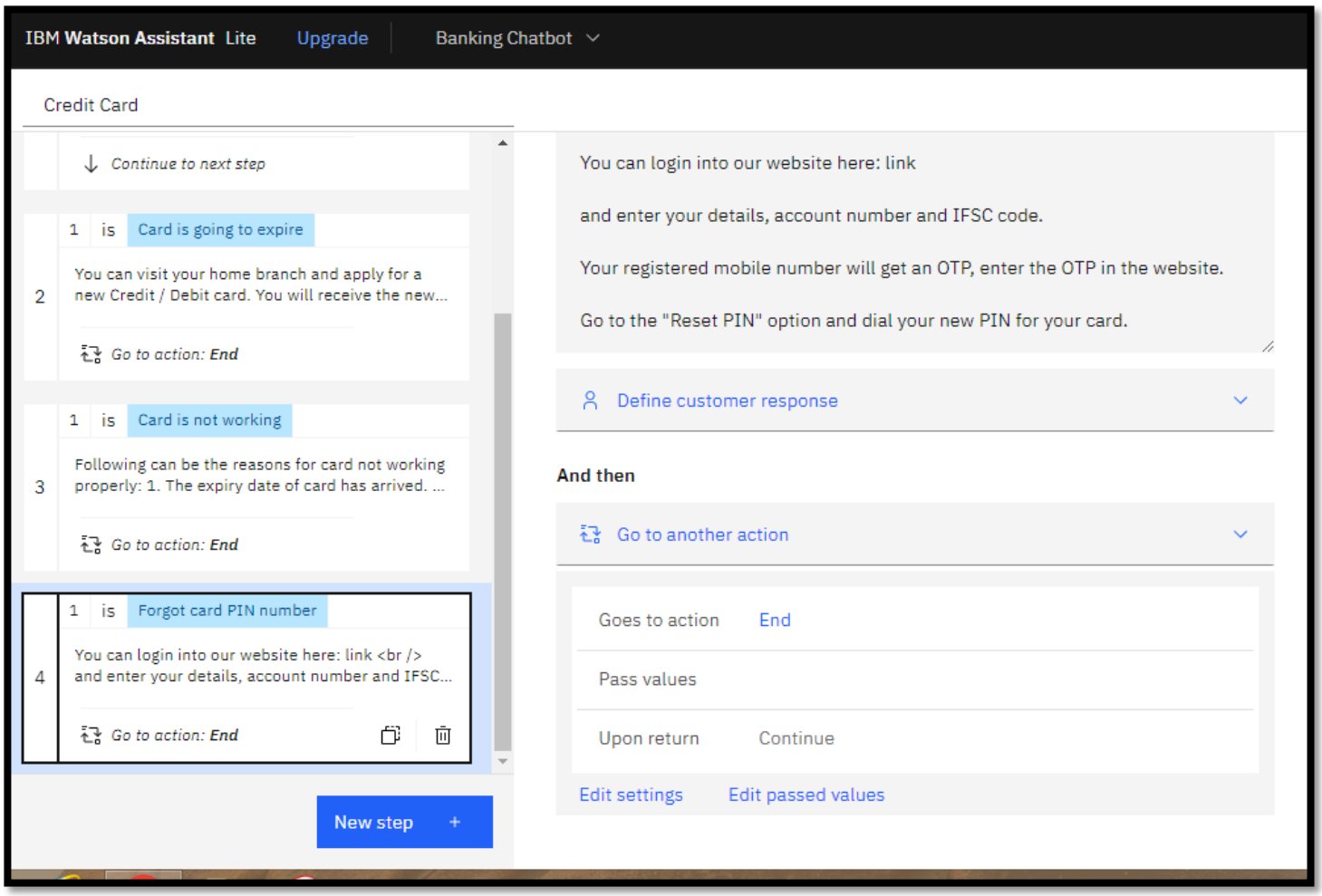


7.2 Feature 2

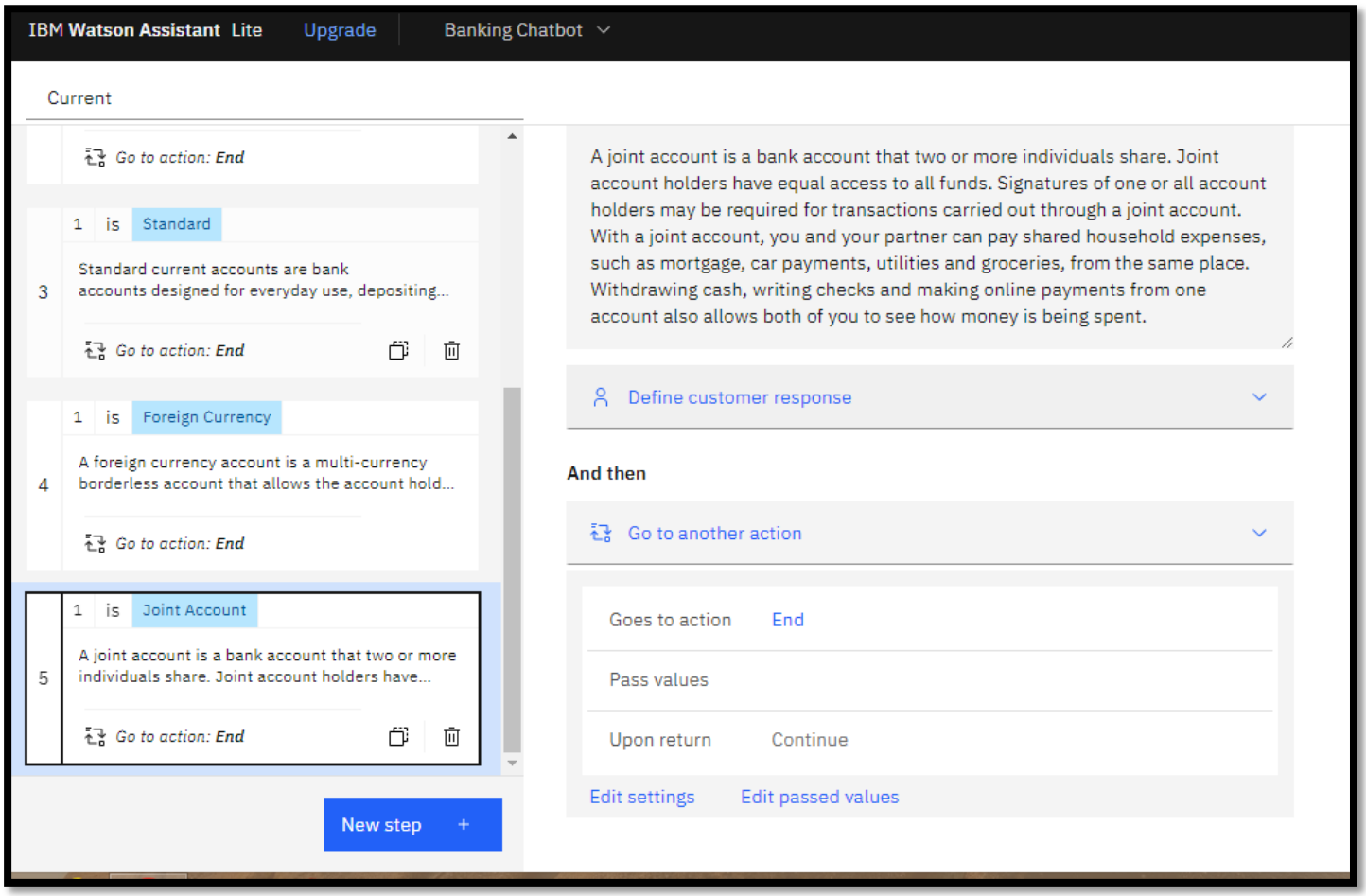
Creating contents and responses for “Change personal details” Action:


IBM Watson Assistant Lite
Upgrade
Banking Chatbot
Change Personal Details
How to add my personal details
Conversation steps
1
Select any one of the below option:
Change pers...
Add personal...
Continue to next step
2
1 is Add personal details
You can login to our official website (link) or in our mobile app and select the option to change...
Go to action: End
3
1 is Change personal details
You can login to our official website (link) or in our mobile app and select the option to change...
Go to action: End
New step
for authentication.
Next, you can add your home address, mobile number, e-mail, change profile photo, and much more.
Then, click on SAVE. The changes will be saved within few minutes.
You can also opt to change the personal details by approaching at your home branch.
Define customer response
And then
Go to another action
Goes to action
End
Pass values
Upon return
Continue
Edit settings
Edit passed values

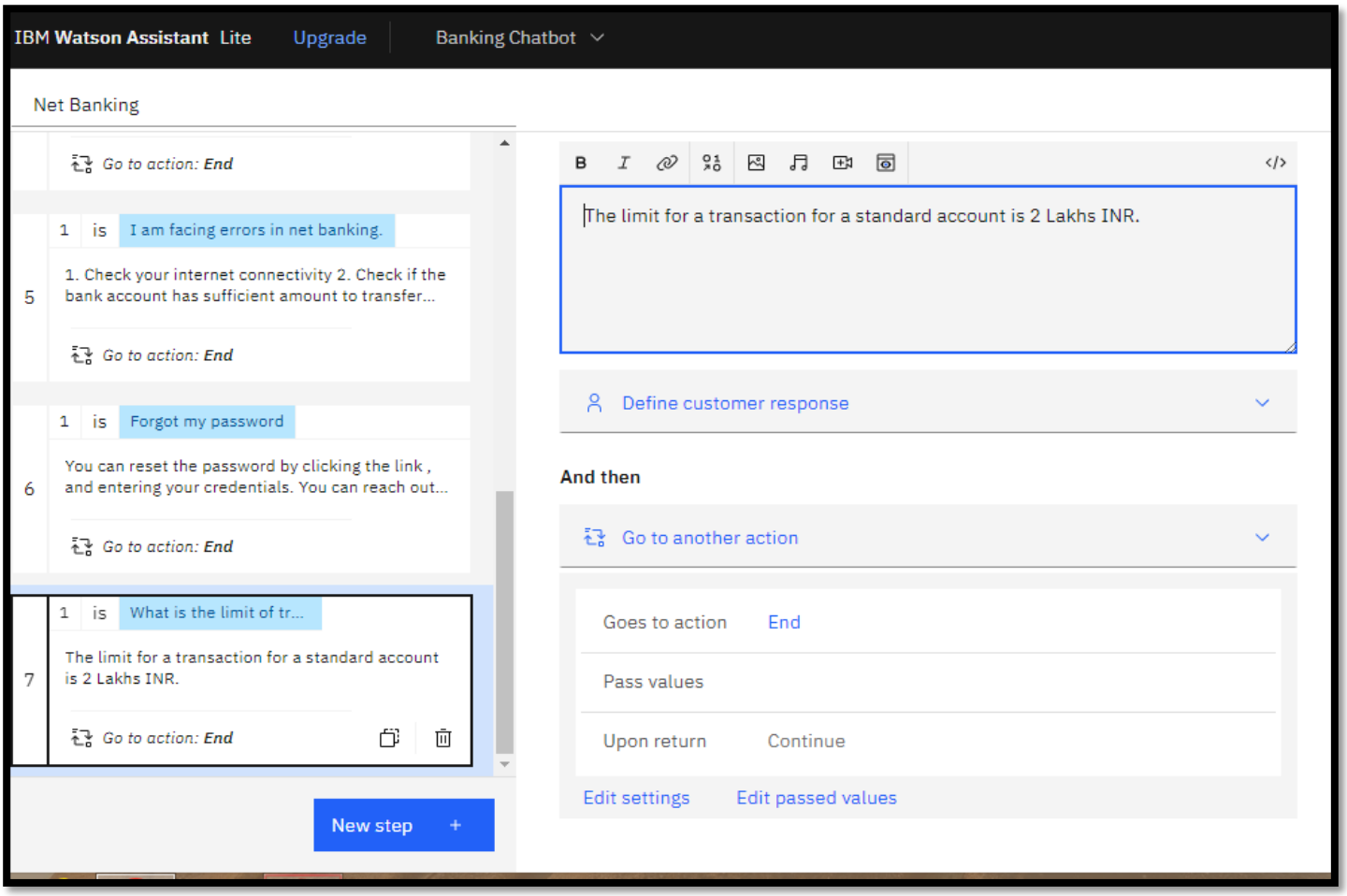
Creating contents and responses for “Credit card” Actions:



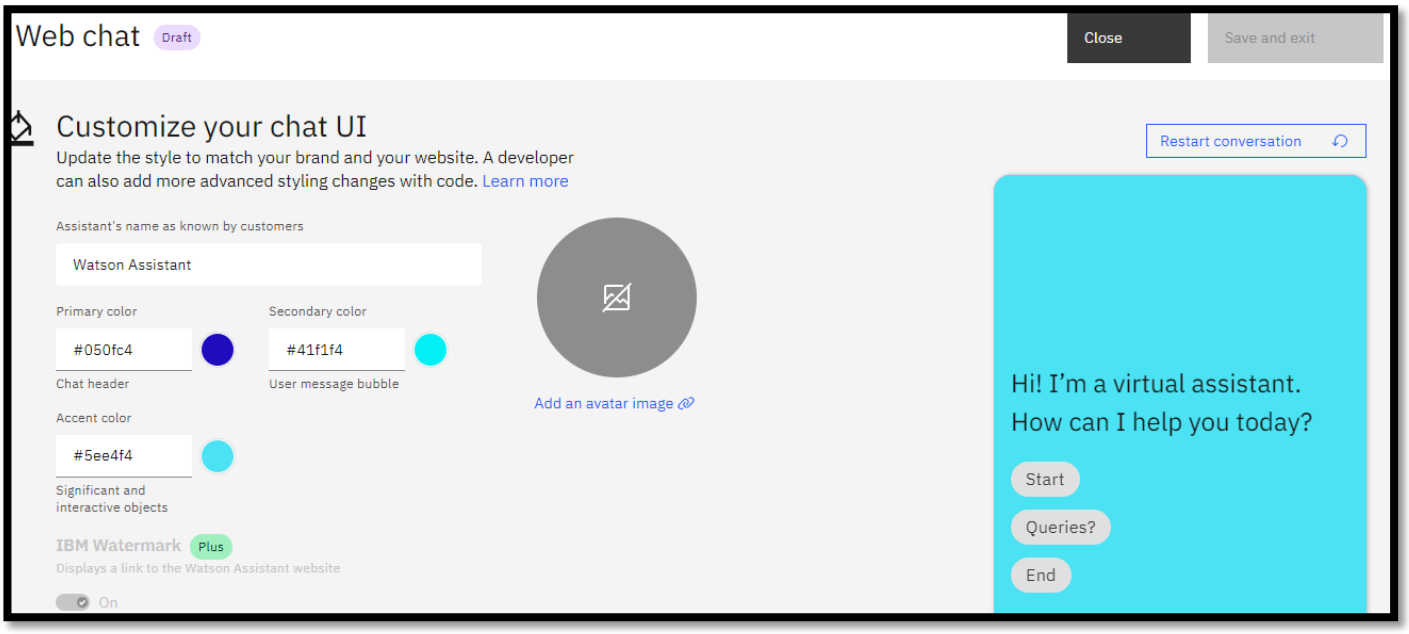
Creating contents and responses for “Current” Actions:



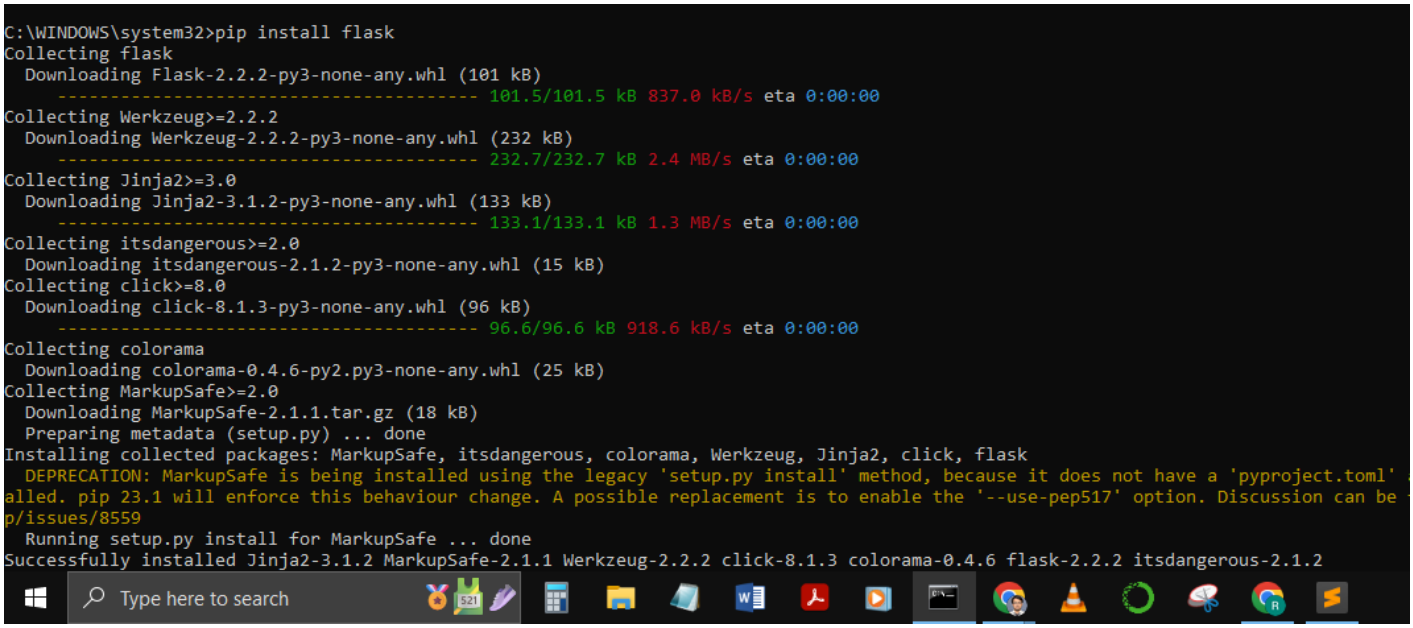
Creating contents and responses for “Net banking” Actions:



Customize the User Interface of the chat-bot



Install python and flask modules:



E:\ibm\FlaskApp\app.py • (FlaskApp) - Sublime Text (UNREGISTERED)

File Edit Selection Find View Goto Tools Project Preferences Help

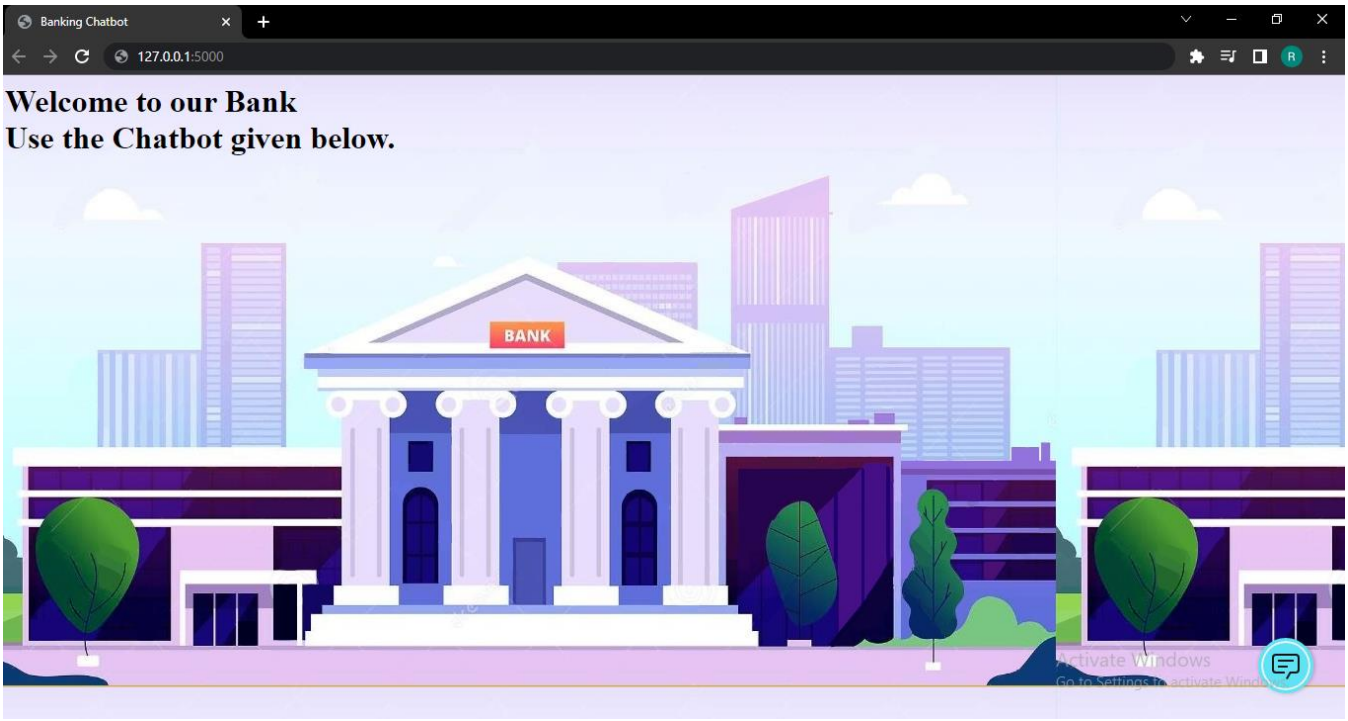
OPEN FILES
- app.py
- index.html

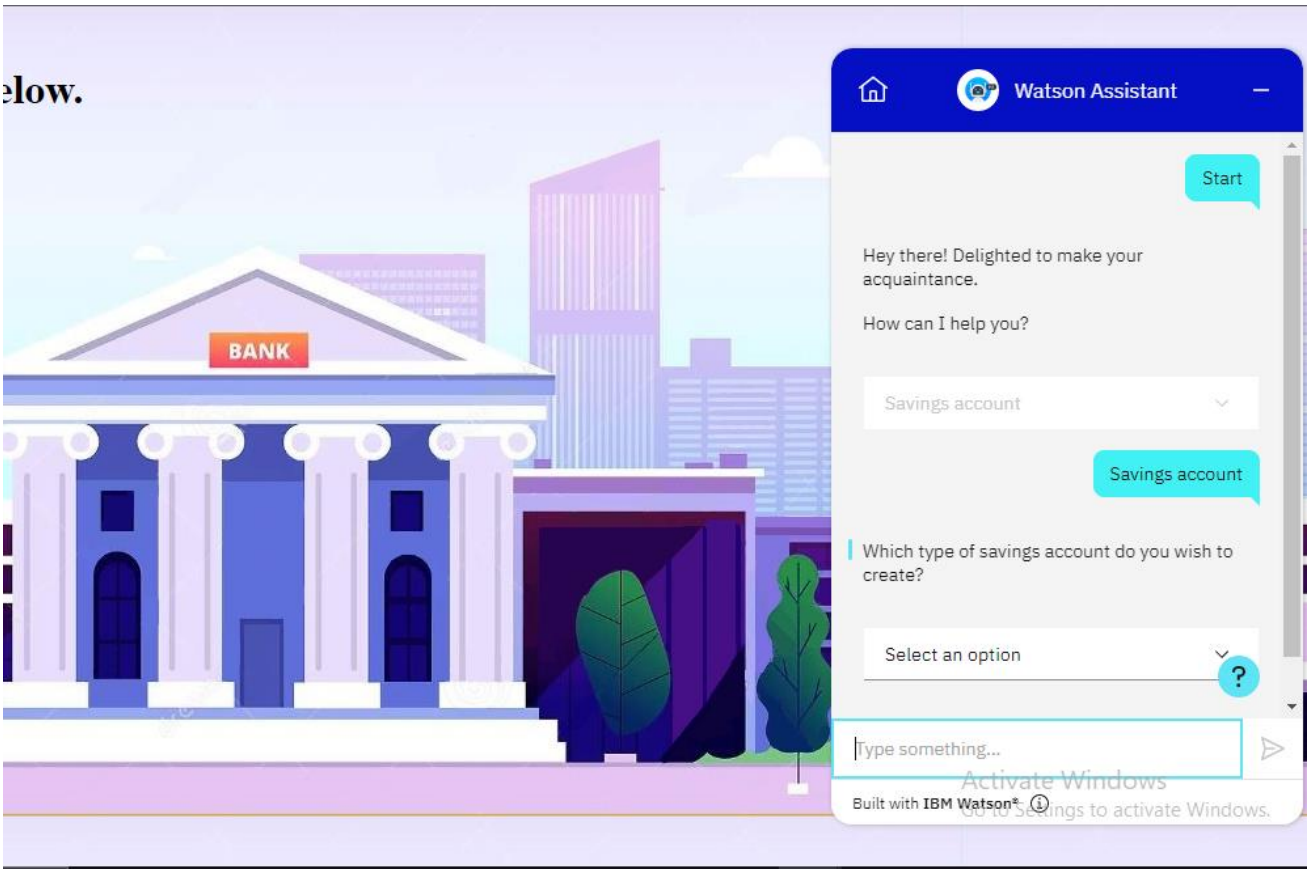
FOLDERS
- FlaskApp
  - templates
    - bank-build.jpg
    - index.html
  - app.py

app.py | index.html

```python
#Done by Rakesh Kumar M , Srimukund K G G , Kailash A L , Hariharan M

#Team ID : PNT2022TMID04164

from flask import Flask , render_template

app = Flask(__name__)

@app.route("/")
@app.route("/home")

def home():
    return render_template("index.html")

if __name__ =='__main__':
    app.run(debug=True , port=5000)
```

```
 * 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: 478-634-855
```





8. TESTING

8.1 Test Cases

Below are the important test cases to be executed by a tester:

i. Verify the design of the website, availability of the chatbot at the bottom of the website.
ii. Verify if the chatbot starts or not.
iii. Application should show below elements in dropdown box:
    a. Savings Account
    b. Current Account
    c. Loan Enquiry
    d. General Query
    e. Net Banking
    f. Credit / Debit Card Queries
    g. Change personal details
iv. Verify the working of Savings account action, and its sub-actions too.
v. Verify the working of Current account action, and its sub-actions too.
vi. Verify the working of Loan Enquiry action, and its sub-actions too.
vii. Verify the working of GENERAL QUERY action, and its sub-actions too.

viii. Verify the working of NET BANKING action, and its subactions too.
ix. Verify the working of Credit/Debit Card Queries action, and its subactions too.
x. Verify the working of Credit/Debit Card Queries action, and its subactions too.

8.2 User Acceptance Testing

Section	Total Cases	Not tested	Fail	Pass
Print Engine	2	0	0	2
Client Application	42	0	0	42
Security	1	0	0	1
Outsource Shipping	1	0	0	1
Exception Rporting	0	0	0	0
Final report Output	1	0	0	1
Version Control2	2	0	0	2

Ressolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By design	1	0	2	0	3
Duplicate	0	0	0	0	0
External	0	0	0	0	0
Fixed	1	0	2	0	0
Not Reproduced	0	0	0	0	0
Skipped	0	0	0	0	0
Won’t fix	0	0	0	0	0
Totals	2	0	4	0	6

9. RESULTS

9.1 Performance Metrics

Test Scenarios	Steps To Execute	Actual Result	Status
Verify the design of the website, availability of the chatbot at the bottom of the website.	1.Enter the URL. 2.Click on Chatbot button which will appear at bottom right.	Working as expected	Pass
Verify if the chatbot starts or not.	1. Click on the START button	Working as expected	Pass
Verify the working of Savings account action, and its sub-actions too.	1. Choose Savings Account option. 2. Verify each of the sub-actions present in the dropdown box: A. Regular Savings Account B. Kids Savings Account C. Zero Balance D.Senior Citizens savings E. Family Savings F.Salary Account	Working as expected	Pass
Verify the working of Current account action, and its sub-actions too.	1. Choose Current Account option. 2. Verify each of the sub-actions present in the dropdown box: A. Premium account B. Standard C. Foreign Currency D. Joint Currency	Working as expected	Pass
Verify the working of Loan Enquiry action, and its sub-actions too.	1. Choose Loan Enquiry option. 2. Verify each of the sub-actions present in the dropdown box: A. Home loan B. Gold loan C. TopUp Loan D. Car Loan E. Student Loan F. Business Loan F. Personal Loan	Working as expected	Pass

Verify the working of GENERAL QUERY action, and its sub-actions too.	1. Choose GENERAL QUERY option. 2. Verify each of the sub-actions present in the dropdown box: A. Bank working days B. List of branches C. Locker Storage Facility D. Currency conversion facility E. CIBIL F. Find the nearest branch	Working as expected	Pass
Verify the working of NET BANKING action, and its subactions too.	1. Choose NET BANKING option. 2. Verify each of the sub-actions present in the dropdown box: A. What is net banking? B. How do I register for net banking? C. What are the features for net banking? D. I am facing errors in net banking E. Forgot my password F. What is the limit of trnsaction in net banking?	Working as expected	Pass
Verify the working of Credit/Debit Card Queries action, and its subactions too.	1. Choose CREDIT/DEBIT CARD option. 2. Verify each of the sub-actions present in the dropdown box: A. Card is going to expire B. Card is not working C. Forgot card PIN number	Working as expected	Pass
Verify the working of Credit/Debit Card Queries action, and its subactions too.	1. Choose CHANGE PERSONAL DETAILS option. 2. Verify each of the sub-actions present in the dropdown box: A. Add personal details B. Change personal details	Working as expected	Pass
Verify if the chatbot stops or not	Click on the End button, or select "NO" when prompted for more queries.	Working as expected	Pass

10. ADVANTAGES & DISADVANTAGES

Advantages:

a. High engagement of the customers and clients with the chatbots made through IBM Wason.
b. Customizable chatbot with low cost deployment.
c. High query response time.
d. High accuract rate when replying to complex customer queries.
e. Compatible o attach with social media websites.
f. Easy to train the bot in Watson Assistant.
g. User friendly and simple interface.

Disadvantages:

a. Can be tough to troubleshoot en error.
b. No feature to upload or capture responses from users.
c. For admin, large data visualization is not easy.

11. CONCLUSION

Thus this project banking bot will be more efficient while it is been put into practice and it helps the customers to easily perform the user's action of performing various banking tasks. It allows the user having various bank accounts to integrate into a single interface and he/she can add their account details into this bot account and easily perform their banking operations within seconds.Natural language processing is a vital component of intelligent Chatbot systems is used. In this paper The user will definitely have accounts in various banks. It will be tedious for the user to login to the various internet banking site every time so this bot will be handy at this situation and it is interactive too. Customer expectations are growing with increasing technological development.

Customer satisfaction is very important to businesses and enterprises because if the customers are not satisfied with the service customers never return.If we consider the bot's safety, it is been secured through the one time password. So user will have no issues in using this bot. This banking bot will be really helpful when it is been integrated with the payment gateway. Still no such development like this is not been implemented in real time environment. When this is been implemented in the real time the customers will be able to access all the banking information from a single integrated site that can be any like social media or web application.

12. FUTURE SCOPE

The extent of this exploration is to decide whether AI-empowered Chatbots can change the clientexperience and assist the Banks with developing their business by accomplishing supportable upperhand and satisfying the client's requests. This exploration likewise assists with figuring out theimpression of clients when a bank carries out innovation like a Chatbot. This exploration will likewisefocus on the issues and limitations of the chatbot application 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 many million hours for banks, which will lead to save billions of cost worldwide.

13. APPENDIX

Source Code

Python code:

```
from flask import Flask , render_template
app = Flask(__name__)
@app.route("/")
@app.route("/home")
def home():
    return render_template("index.html")

if __name__ =='__main__':
    app.run(debug=True , port=5000)
```

HTML code:

```
<html>
<head><title>Banking Chatbot</title>
<style>
body  {
 background-color: #cccccc;
}
</style>
</head>
<body background="bank-build.jpg">

 <script>
  window.watsonAssistantChatOptions = {
   integrationID: "53b1979f-abf1-46ac-b3d3-b759ead203be", // The ID of this integration.
   region: "us-south", // The region your integration is hosted in.
   serviceInstanceID: "c3f40e7b-6277-4577-b2cb-9c99871180a5", // 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>

<h1>Welcome to our Bank<br>
Use the Chatbot given below.</h1>
</body>
</html>
```

GitHub & Project Demo Link:

Link to view deployed chatbot: https://rakeshmkumar.github.io/Bank-Chatbot/

Github link to view our project documents: https://github.com/IBM-EPBL/IBM-Project-13522-1659520292