ADHIYAMAAN COLLEGE OF ENGINEERING (AUTONOMUS)

HOSUR-635109

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

AI BASED DISCOURSE FOR BANKING INDUSTRY

TEAM ID: PNT2022TMID07965

PROJECT GUIDED BY

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(ASSISTANT PROFESSOR)

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1. INTRODUCTION

1.1 Project Overview

This project, titled "AI Based Discourse for Banking Industry", aims at providing a platform for customers to clarify their queries online regarding banking. This is achieved with the help of a chatbot that is trained with some of the most frequently asked questions that banking customers usually tend to come up with. The chatbot is created using IBM Watson Assistant and is trained by manually adding the queries to it along with the relevant responses. The chatbot will then be available for use on a website which usually is the bank's website for anyone to access. Customers or anyone in fact can access the chatbot to interact with it and find solutions to their queries.

1.2 Purpose

With banking being an essential service that people require and with it being a slightly complicated and confusing topic for many, a lot of queries naturally tend to arise. For them to be answered as they are predominantly now in a manual aspect either by face to face interactions with a banking employee or through a customer care service, will require a lot of workforce and still end up with long waiting times. Hence, comes the need for an automated solution to the problem which can be easily handled by our chatbot. A chatbot is free, easy to use and is readily accessible at all times and from anywhere. It also provides instant reliable answers to queries and hence eliminating the need for the customers to wait to get their queries cleared. It also ensures that there is no spread of misinformation by providing official and authentic responses to queries straight from the bank sources.

2. LITERATURE SURVEY

2.1 Existing problem

Banks are not able to resolve the queries of customers at all times related to the products or services in a satisfactory way which in turn hinders the customer satisfaction. Customers need to visit banks frequently for simple queries.

S.No	TITLE	PROPOSED WORK	TOOLS USED/ ALGORITHM	TECHNOLOGY	ADVANTAGES/ DISADVANTAGES
1	Banking Virtual Assistant	Accuracy of giving correct answer can be increased.	• Natural Language Processing • Deep Learning Algorithm	• Python • artificial intelligence. • MySQL • Django Server • Deep Learning	Increase in productivity and increased no of customers/Limted response
2	Conversation to Automation in Banking through Chatbot using Artificial Machine Intelligence Language	Strategies for handling dialog in banking and financed area	• Natural Language Processing Tools • Rule Based Algorithm • Machine Learning Algorithms • Artificial Intelligence Markup Language	• Artificial Intelligence • Deep Learning	Reduce humanloads,Quality of user service/Limtedness,Short preview,unproductive development

| S.NO	TITLE	PROPOSED WORK	TOOLS USED/ ALGORITHM	TECHNOLOGY	ADVANTAGES/ DISADVANTAGES
3	A Study of Applications of Artificial Intelligence in Banking and Finance Sector	Using rules to reach approximate or definite conclusion	• Artificial Intelligence	• Arificial Intellligence	Complaines and fraud detection,personalized customer service,predictive analytics//Remain unnoticed
4	Artificial Intelligence Based Chatbot	Provide as accurate path without wasting our time	• Artificial Intelligence Markup Language • Natural Language Processing tools	• Airtificial Intelligence • DBMS	Chatbot which suceed in practical domains like education,business/Chatbot only reply using responses learned from the training corpus lack of additional reasoning

S.No	TITLE	PROPOSED WORK	TOOLS USED/ ALGORITHM	TECHNOLOGY	ADVANTAGES/ DISADVANTAGES
5	Chatbot as Finance expert	Introducing Chatbot will help the customerface many questions and complaints on daily basis and tries to contack branches to get theircomplaints complex and its not easy for a common man to understand easily	• IBM Watson • Rasa NLU • Dialog flow	• Artificial Intelligence • Natural Language Processing	Open Source and Supports enterprise platform, On-premise hosting is possible/No possibility to integrate with other messaging clients
6	Bank Chatbot	Most of the people,especially the first timers ,struggle to know various process and procedure requires to get their work done at the bank and the query is easy to identify and gets solved	• Decision tree classifier • Random Forest Classifier • K-nearest neighbour classifier • Support vector machine	• Machine Learning • Natural Language processing	Query Mapping gettting naswers/They are not often able to answer multi part questions .This often means your customer are left without a solution

2.2 Problem Statement Definition

Banking is one the crucial sectors, it deals with financial transactions which can be availed by everyone, but banks are not able to resolve the queries of customers at all times related to the products or services in a satisfactory way in turn hinders the customer satisfaction. In order to guide the customers throughout all the financial services provided by the bank, an intelligent system has to be introduced to provide people with the best solution possible. The users are bank customers who need 24/7 service to clear all their queries and guide them through all the banking processes. So, an enhanced and smarter way of interaction with the customers has to be built to ensure efficient delivery of service. In order to overcome the user satisfaction issues associated with banking services, chatbot will provide personal and efficient communication between the user and the bank. It is built to be the overall virtual assistant that can facilitate customers to ask banking- related questions without visiting the bank or calling up customer service centers as well as providing them with relevant suggestions.

3. IDEATION AND PROPOSED SOLUTION

3.1 Empathy Map Canvas
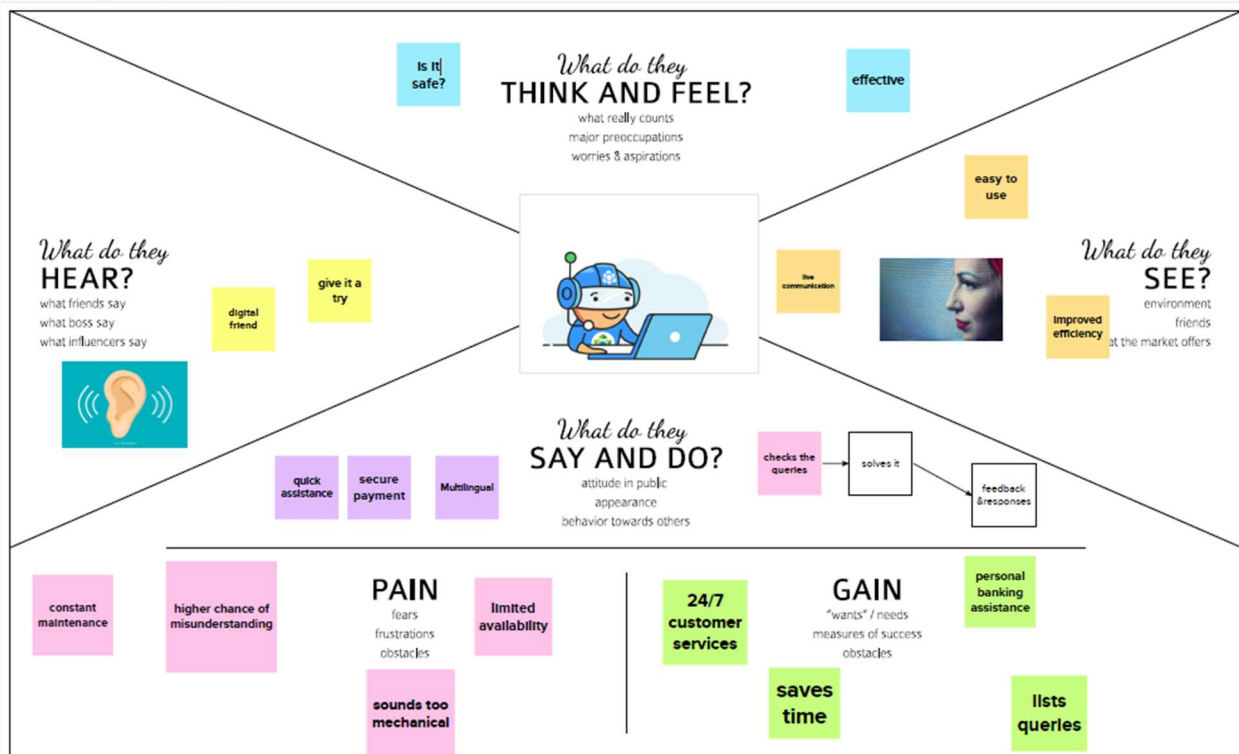
3.2 Ideation & Brainstorming

Template

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 →

Define your 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

Elon is a user who needs to create a Bank account through online.where he needs an virtual assistant(FINCY) to guide him

Key rules of brainstorming
To run a smooth and productive session

- Stay in topic.
- Encourage wild ideas.
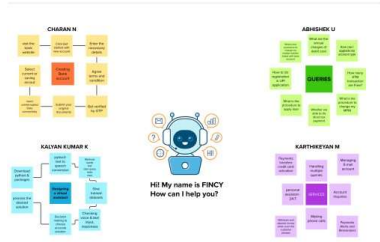- Defer judgment.
- Listen to others.
- Go for volume.
- If possible, be visual.

Brainstorm

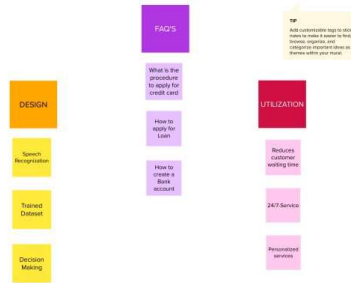Write down any ideas that come to mind that address your problem statement.

⏱ 10 minutes

TIP
You can select a sticky note and hit the pencil (switch to sketch) icon to start drawing!

CHARAN N

ABHISHEK U

QUERIES

Hi! My name is FINCY
How can I help you?

KALYAN KUMAR K

KARTHIKEYAN M

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go.
In the last 10 minutes, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.
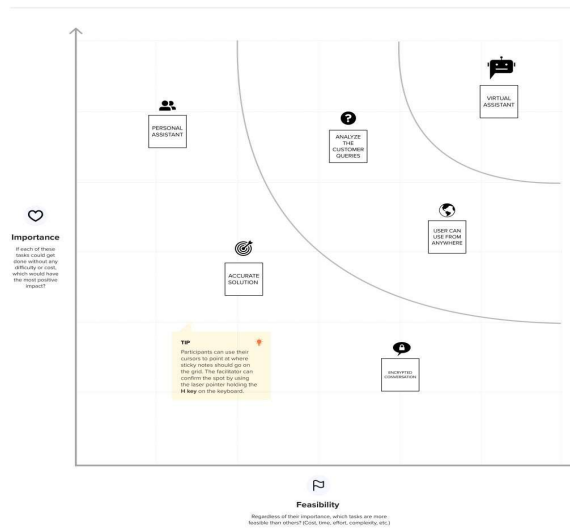
⏱ 20 minutes

FAQ'S

What is the procedure to apply for credit card

How to apply for Loan

How to create a Bank account

TIP
Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural

DESIGN

Speech Recognition

Trained Dataset

Decision Making

UTILIZATION

Reduces customer waiting time

24/7 Service

Personalized services

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

⏱ 20 minutes

VIRTUAL ASSISTANT

PERSONAL ASSISTANT

ANALYZE THE CUSTOMER QUERIES

Importance
If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

USER CAN USE FROM ANYWHERE

ACCURATE SOLUTION

TIP
Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.

ENCRYPTED CONVERSATION

Feasibility
Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

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3.2 Proposed Solution

S.NO	PARAMETER	DESCRIPTION
1.	Problem Statement (Problem to be solved)	User's who needs to solve his/her queries through an Virtual Assistant for Banking Sector
2.	Idea / Solution description	The proposed solution is to solve multiple queries to give best solutions(higher accuracy) by usingNLP and deep learing techniques.
3.	Novelty / Uniqueness	For detecting the queries, We use an efficient methods where we have pre-defined trained dataset for attaining higher accuracy solutions.
4.	Social Impact / Customer Satisfaction	By this model the customer can efficiently keep track of their queries and accordingly get required consultations in a less time consumingmanner.
5.	Business Model (Revenue Model)	• Input module • Categorize the given queries • Data set training module • deliver automated smart responses • Suggestion module.
6.	Scalability of the Solution	AI Chatbots provides 24/7 service to clear all customer queries and guide them through all the banking processes. It supports voice assistance feature and maintains a confidential conversation with customers. It can be scaled as per the requirements of the bank to include answers to queries related to any new feature or service introduced by the bank.

3.3 Problem Solution fit

Project Title: AI BASED DISCOURSE FOR BANKING INDUSTRY   **Team ID:** PNT2022TMID07965

1. CUSTOMER SEGMENT(S) — CS	Who is your customer? i.e. working parents of 0-5 y.o. kids
	Bank Customers who can clarify their doubts by asking queries through an chatbot.

6. CUSTOMER CONSTRAINTS — CC
What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.

- Customer service may not be available at everytime
- Customer not able to get their solution for the queries without a bank employee

5. AVAILABLE SOLUTIONS — AS
Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking

Conversation between the Customer and Chatbot by using NLP

Pros:
- Understanding human language in an context

Cons:
- Unpredictable
- Errors in text / speech

2. JOBS-TO-BE-DONE / PROBLEMS — J&P
Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.

- Customer may not be able to reach the bank for clarifying their banking queries everytime.
- Customer wants to spendtheir time to achieve their solutions for the respective queries.

9. PROBLEM ROOT CAUSE — RC
What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations.

- To reduce the man power used on frequently and common questions to get answered one-by-one
- The bot will answer at the same time for all the based service providers can have the instant connection and have attention to customer questions at any time.

7. BEHAVIOUR — BE
What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)

- Customer will go to bank for clarifying their doubts and they will be waiting to solve their queries.
- Solution for the queries may not be clarified instantly by a bank employee

3. TRIGGERS — TR
What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.

Customer knowing about the efficient process through an social media and Customer tends to use the chatbot.

4. EMOTIONS: BEFORE / AFTER — EM

BEFORE:Customer will go to bank for clarifying their doubts .
AFTER:They can clarify their doubts anywhere at anytime by using mobile phones

10. YOUR SOLUTION — SL
If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality.
If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.

Developing an Chatbot to solve the customer's queries in an efficient manner

8. CHANNELS of BEHAVIOUR — CH
8.1 ONLINE
What kind of actions do customers take online? Extract online channels from #7

Provides many procedures and choose the efficient one to solve their queries

8.2 OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.

Customer wants to contact bank employee

(Left margin labels: Define CS, fit into CC; Identify. Right margin labels: Explore; tract online & offline CH of BE)

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4. REQUIREMENT ANALYSIS

4.1 Functional requirements

FR NO.	FUNCTIONAL REQUIREMENT (EPIC)	SUB REQUIREMENT (STORY / SUB-TASK)
FR-1	Savings Account Related Actions	• Type of Savings Account Creation Details • Interest Rate • Minimum Balance • Debit Card • Credit Card
FR-2	Current Account Related Actions	• Type of Company • Current Account Closure Steps • Update GSTIN • Zero Balance Current Account
FR-3	Loan Account Related Actions	• Type of Loan • How long for approval • Available Loan Amounts • Loan Status • Joint Loan
FR-4	General Queries Related Actions	• Bank Working Days • List of Branches • Storage Locker Facility • Currency Conversion Facility • CIBIL • Find a nearest branch
FR-5	Net Banking Related Actions	• Login Steps • Change Net Banking Password • Daily Limit • Types of Fund Transfer • Add Beneficiary

4.2 Non-Functional requirements

| NFR NO.	NON-FUNCTIONAL REQUIREMENT	DESCRIPTION
NFR-1	Usability	Chatbots developed using AI should be able to answer any general banking queries on account creation, loan, netbanking, other services etc. It addresses the queries of customers immediately and effectively in a cost efficient manner.
NFR-2	Security	The AI Chatbot maintains a confidential conversation with customers. Chatbot will provide personal and efficient communication between the user and the bank.
NFR-3	Reliability	Chatbots are trained very well using AI to provide solutions for the popular and frequently asked questions, thereby providing the best suited service quickly. Thus AI Chatbots has a reliable end-user experience.
NFR-4	Performance	AI Chatbots are a great way to overcome the limitation of workload of humans. There can be multiple instances of a single chatbot inquiring about different people at the same time. Such chatbots work in real time with no need for the customers to wait. This ensures faster, easier and more efficient face-time with customers.
NFR-5	Availability	AI Chatbots provide 24/7 service to clear all customer queries and guide them through all the banking processes. It is available to anyone with access to the internet with basic hardware.
NFR-6	Scalability	AI Chatbots are helping the banking industry to scale their customer service and to improve customer service satisfaction at the same time. It can be scaled as per the requirements of the bank to include answers to queries related to any new feature or service introduced by the bank.

5. PROJECT DESIGN

5.1 Data Flow Diagrams
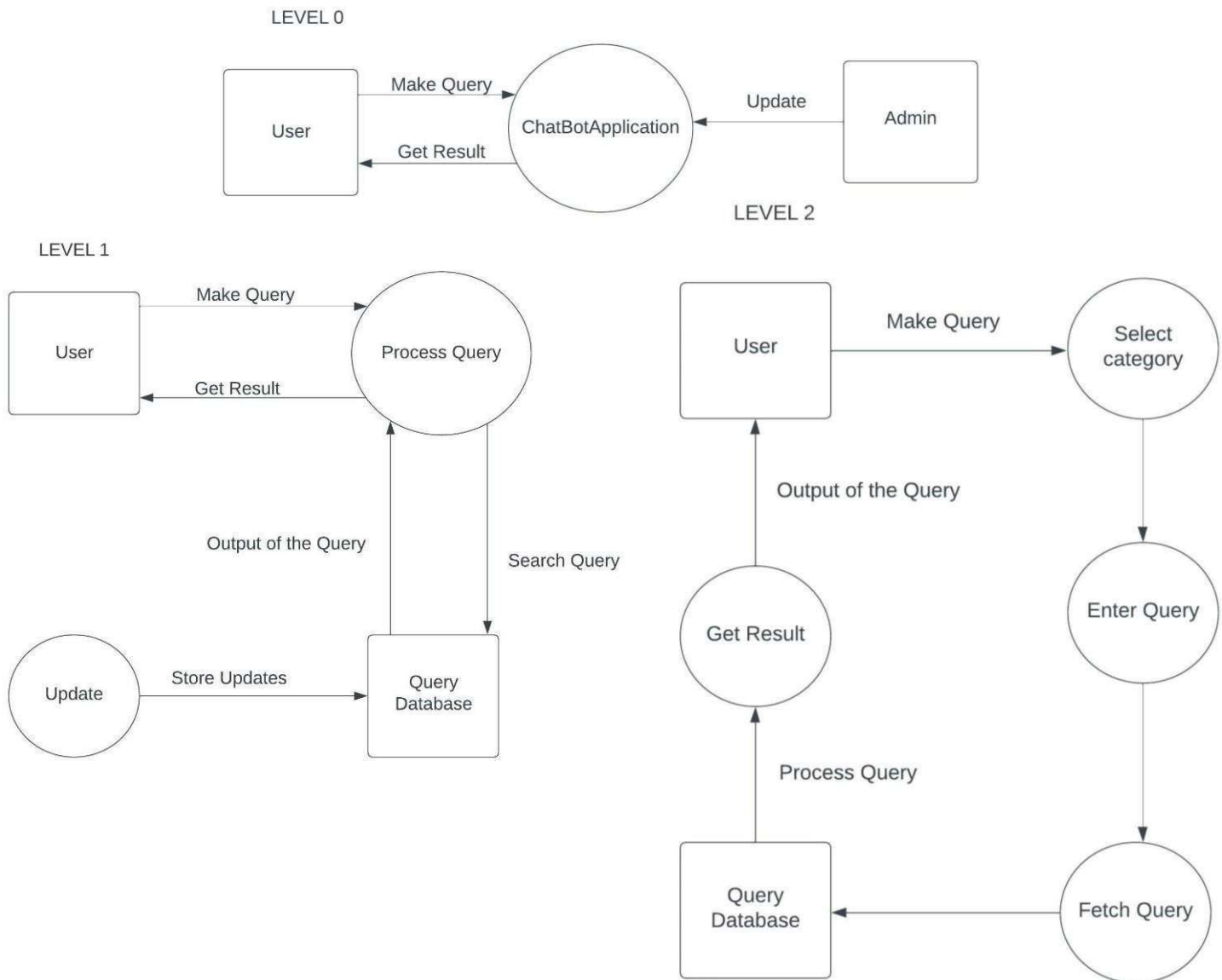
5.2 Solution & Technical Architecture
Solution Architecture
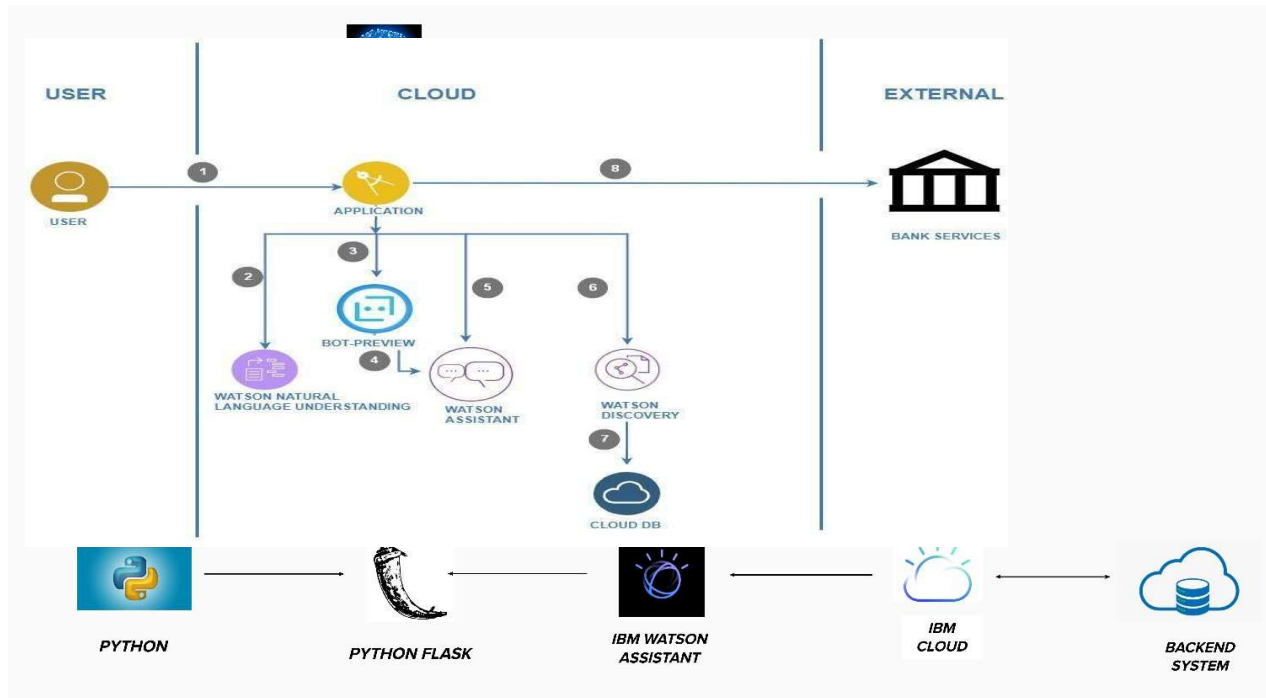
Technical Architecture

5.3 User Stories

USER TYPE	FUNCTIONAL REQUIREMENT (EPIC)	USER STORY NUMBER	USER STORY / TASK	ACCEPTANCE CRITERIA	PRIORITY	RELEASE
Customer (Mobile or Web user)	Savings Account Related Actions	USN-1	As a user, in the Savings Account option, I can select Types of Savings Account to get details regarding documents required for creating that savings account.	I can clear my queries regarding types of savings account	High	Sprint-1
		USN-2	As a user, I can check the Interest Rates of Savings Account	I can clear my queries regarding interest rates of savings account	High	Sprint-1
		USN-3	As a user, I can check the Minimum Balance of Savings Account	I can clear my queries regarding minimum balance of savings account	Medium	Sprint-2
	Current Account Related Actions	USN-4	As a user, I can choose the Type of Company to know the information on documents to be submitted for creating current account	I can clear my queries regarding types of companies	High	Sprint-1
		USN-5	As a user, I want to get details on procedure to close my Current Account	I can clear my queries regarding current account closure	High	Sprint-2
	Loan Account Related Actions	USN-6	As a user, I can choose the Type of Loans to know the information on choosing an essential loan scheme	I can clear my queries regarding types of loan account	High	Sprint-1
		USN-7	As a user, I can check the Loan Amounts that can be offered for corresponding Loan Accounts chosen	I can clear my queries regarding loan amounts of loan account	High	Sprint-2
		USN-8	As a user, I can check the Status of Loan for my Loan Accounts	I can clear my queries regarding loan status of loan account	Low	Sprint-2

USER TYPE	FUNCTIONAL REQUIREMENT (EPIC)	USER STORY NUMBER	USER STORY / TASK	ACCEPTANCE CRITERIA	PRIORITY	RELEASE
		USN-10	As a user, I want to check my CIBIL score for my loan application and to ensure whether my loan application is approved by the bank.	I can clear my queries regarding CIBIL score of loan application	Medium	Sprint 3
		USN-11	As a user, I want to get the procedure details for maintaining Storage Locker facility of my bank account	I can clear my queries regarding storage locker facilities of bank account	High	Sprint-3
	Net Banking Related Actions	USN-12	As a user, I want to get the procedure details for changing the Net Banking password of my bank account	I can clear my queries regarding change of net banking password	Medium	Sprint-2
		USN-13	As a user, I can select types of fund transfers to get details regarding different services available in net banking	I can clear my queries regarding types of fund transfers in net banking	High	Sprint-3
		USN-14	As a user, I want to get the procedure details for adding beneficiaries to my net banking account.	I can clear my queries regarding adding beneficiaries in net banking	Low	Sprint-3
Administrator		USN-15	As an admin, I can change responses to queries and modify them as and when needed.	I can modify responses of the chatbot	Medium	Sprint-1
		USN-16	As an admin, I can add more options to queries and add new options as new features get added.	I can add more options and queries into the chatbot	Medium	Sprint-1

6. PROJECT PLANNING AND SCHEDULING

6.1 Sprint Planning & Estimation

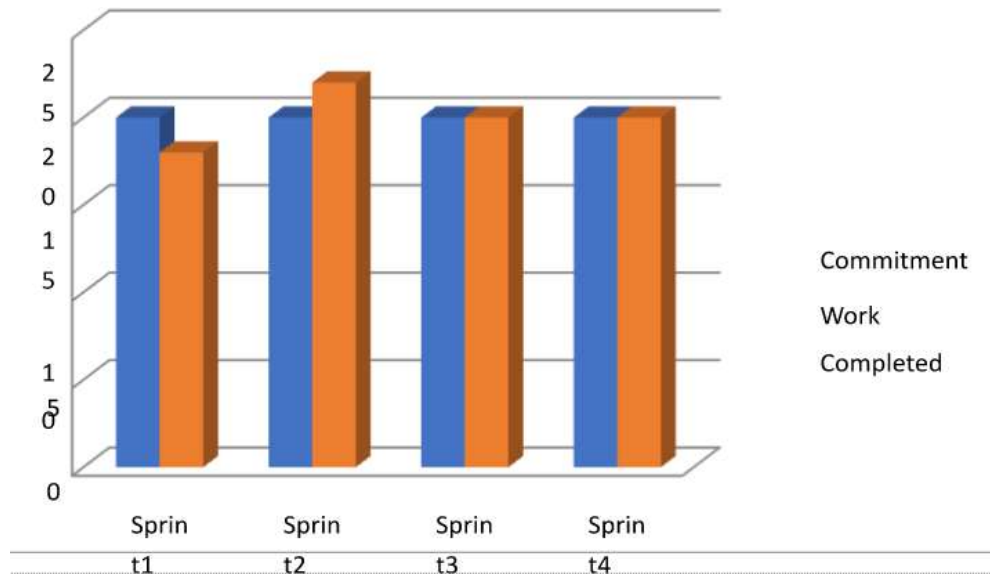| SPRINT	FUNCTIONAL REQUIREMENT (EPIC)	USER STORY NUMBER	USER STORY / TASK	STORY POINTS	PRIORITY	TEAM MEMBERS
Sprint-1	Savings Account Related Actions	USN-1	As a user in Savings Account option, I can select the Type of Savings Account to get details regarding documents required for creating Savings Account	4	High	ABHISHEK CHARAN KALYAN KUMAR KARTHIKEYAN
Sprint-1		USN-2	As a user, I can check the Interest Rates of Savings Account	4	High	ABHISHEK CHARAN KALYAN KUMAR KARTHIKEYAN
Sprint-1		USN-3	As a user, I can check the Minimum Balance of Savings Account	3	Medium	ABHISHEK CHARAN KALYAN KUMAR KARTHIKEYAN
Sprint-1	Current Account Related Actions	USN-4	As a user, I can choose the Type of Company to know the information on documents to be submitted for creating current account	5	High	ABHISHEK CHARAN KALYAN KUMAR KARTHIKEYAN
Sprint-1		USN-5	As a user, I want to get details on procedure to close my Current Account	4	High	ABHISHEK CHARAN
Sprint-2	Loan Account Related Actions	USN-6	As a user, I can choose the Type of Loans to know the information on choosing an essential loan scheme	3	High	KALYAN KUMAR KARTHIKEYAN
Sprint-2		USN-7	As a user, I can check the Loan Amounts that can be offered for corresponding Loan Accounts chosen	3	High	CHARAN KARTHIKEYAN
Sprint-2		USN-8	As a user, I can check the Status of Loan for my Loan Accounts	1	Low	ABHISHEK KALYAN KUMAR
Sprint-2	General Queries Related Actions	USN-9	As a user, I want to get the procedure details for Currency Conversion facility of my bank account	2	Medium	ABHISHEK CHARAN KALYAN KUMAR
Sprint-2		USN-10	As a user, I want to check my CIBIL score for my loan application and to ensure whether my loan application is approved by the bank.	1	Low	ABHISHEK KARTHIKEYAN
Sprint-2		USN-11	As a user, I want to get the procedure details for maintaining Storage Locker facility of my bank account	3	High	CHARAN KALYAN KUMAR

Sprint-2	Net Banking Related Actions	USN-12	As a user, I want to get the procedure details for changing the Net Banking password of my bank account	3	High	ABHISHEK KARTHIKEYAN
Sprint-2		USN-13	As a user, I can select types of fund transfers to get details regarding different services available in net banking	2	Medium	CHARAN KALYANKUMAR
Sprint-2		USN-14	As a user, I want to get the procedure details for adding beneficiaries to my net banking account.	2	Medium	KARTHIKEYAN CHARAN
Sprint-3	Web Application	USN-15	As a user, I want to access the chatbot in a web browser that can be accessed from almost all devices.	20	High	ABHISHEK CHARAN KALYAN
Sprint-4	User Interface and Web Pages	USN-16	As a user, I want to view pages of the banking website and have access to the chatbot easily.	20	High	ABHISHEK KARTHIKEY AN

6.2 Sprint Delivery Schedule

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	31 Oct 2022	05 Nov 2022	22	02 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	09 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	16 Nov 2022

SPRINT	TOTAL STORY POINTS	DURATION	AVERAGE VELOCITY
Sprint-1	20	6 Days	20/6 = 3.33
Sprint-2	20	6 Days	20/6 = 3.33
Sprint-3	20	6 Days	20/6 = 3.33
Sprint-4	20	6 Days	20/6 = 3.33
Overall	**80**	**24 Days**	**80/24 = 3.33**

Velocity chart:

Burn down chart:

Sprint1
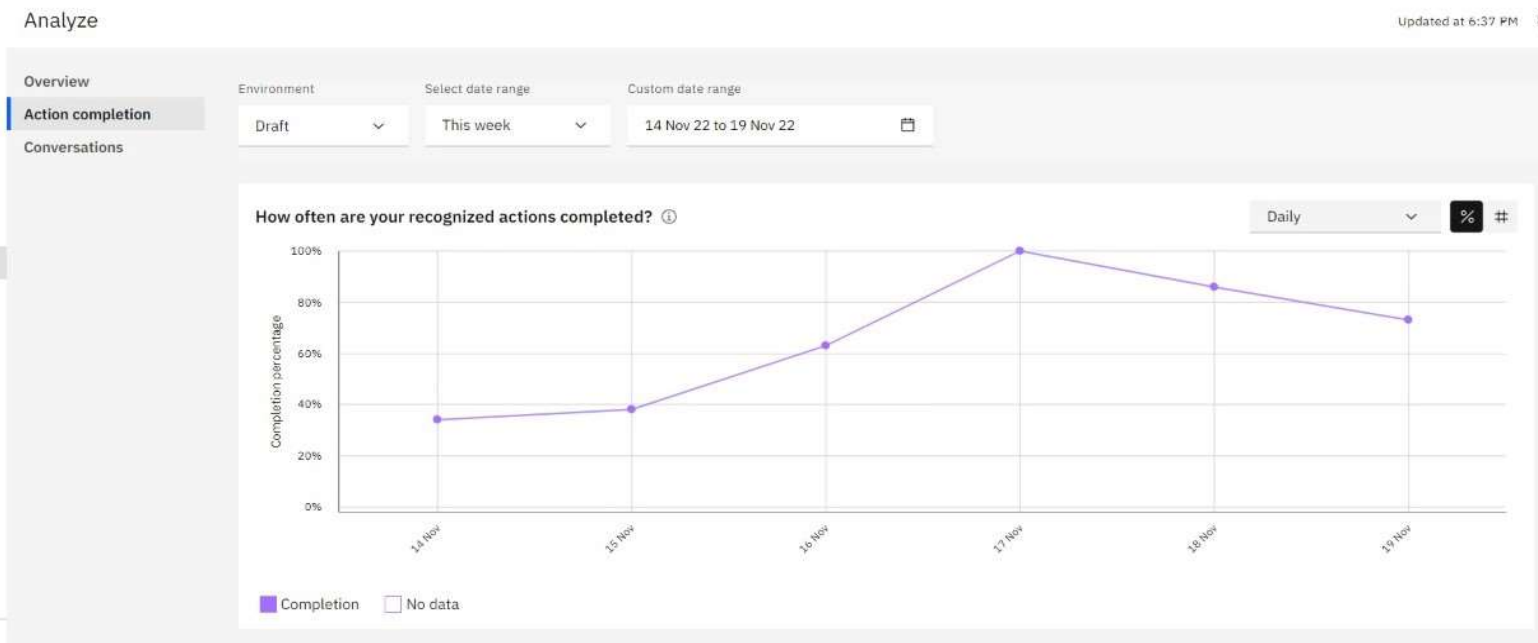
Sprint2
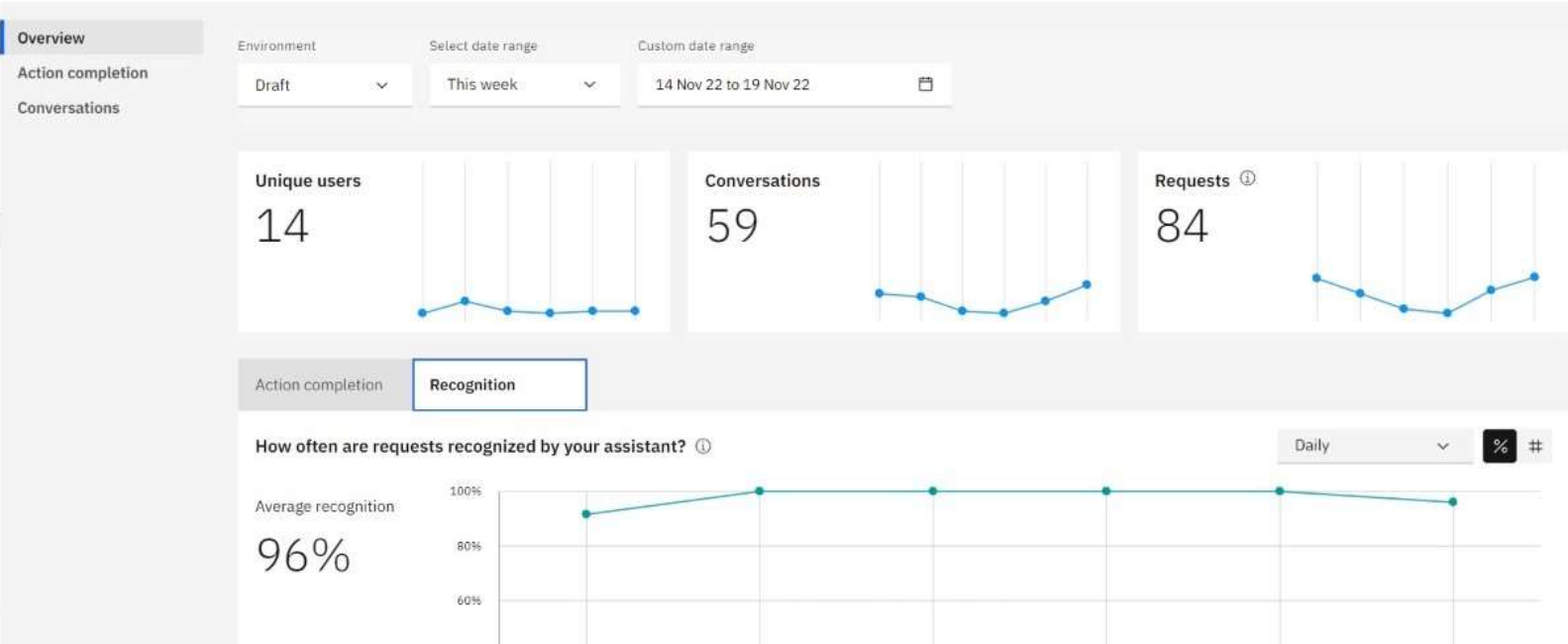
Sprint3

Sprint4

Analyze

Overview

Action completion

Conversations

Environment	Select date range	Custom date range
Draft	This week	14 Nov 22 to 19 Nov 22

Action completion   Recognition

How often are requests recognized by your assistant? ⓘ

Daily   % #

Average recognition

96%

Recognition   No data

View unrecognized requests →

6.3 Reports from JIRA

Sprints		OCT			NOV
			ABDF...	ABDF...	ABDF... ABDF...
> ⚡ ABDFBI-26 Savings Account Related Actions **DONE**					
> ⚡ ABDFBI-27 Current Account Related Actions **DONE**					
> ⚡ ABDFBI-28 Loan Account Related Actions **DONE**					
> ⚡ ABDFBI-29 General Queries Related Actions **DONE**					
> ⚡ ABDFBI-30 Net Banking Related Actions					
> ⚡ ABDFBI-31 Web Application **DONE**					
> ⚡ ABDFBI-32 User Interface and Web Pages **DONE**					

23
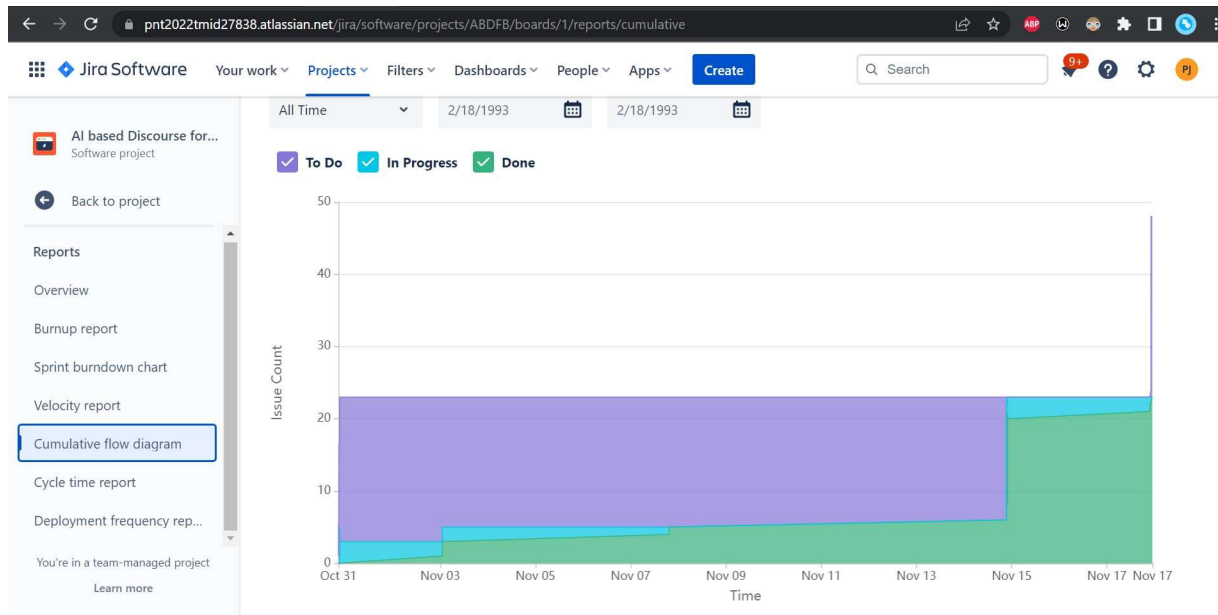
7. CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 Feature 1

Python Flask

Python Flask is used to develop chatbot applications using python. Flask is mainly used to render and integrate the chatbot application in the browser by providing API. By running the python application, the suitable server domain link is obtained and run in the browser.

HTML

The HTML and CSS is used to design the overall chatbot UI. HTML is used to add UIcomponents and CSS is used to add style to those components. IBM watson assistant deploys

HTML code to train the Chatbot.

app.py:

```
from flask import Flask, render_template
app=Flak(_name_,template_folder='templates')

@app.route('/')
def home():
    return render_template(Step1.html)
if_name_=='_main_':
    app.run(debug=True)
```

Step1.html:

```
<html lang="en">
<head>
<title>AI BASED DISCOURSE FOR BANKING INDUSTRY</title>
</head>
<body>
 <div class="main">
     <div class="navbar">
        <div class="icon">
           <h2 class="logo">BankBot</h2>
        </div>
 <div class="menu">
         <u <li><a href="#">HOME</a></li>
```

```html
            <li><a href="#">SERVICE</a></li>
            <li><a href="#">CONTACT</a></li>
            <li><a href="#">ABOUT</a></li>
        </ul>
      </div>
    </div>
    <div class="content">
       <h1>AI Based Discourse for <br><span>Banking</span> <br>Industry</h1>
       <br>
         <button class="cn"><a href="#">JOIN US</a></button>
  </div>
  </div>
<script>
    window.watsonAssistantChatOptions = {
    integrationID: "c3bff345-f26d-47d8-94a4-459ade939da1", // The ID of this integration.
    region: "us-south", // The region your integration is hosted in.
    serviceInstanceID: "84a4d536-ad71-4db7-965b-dc28a31315e6", // 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>
</body>
</html>
```
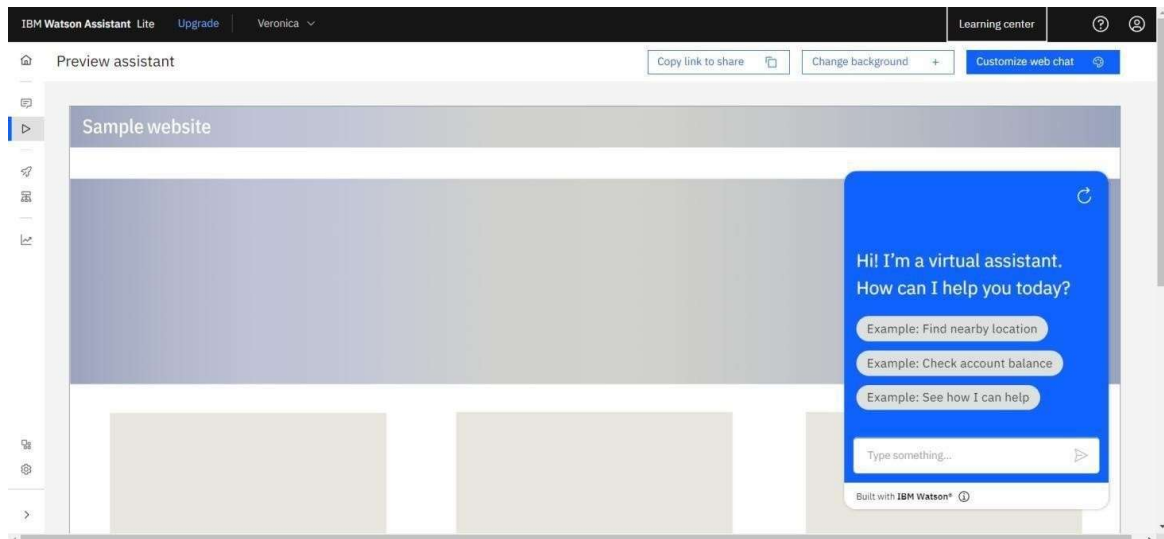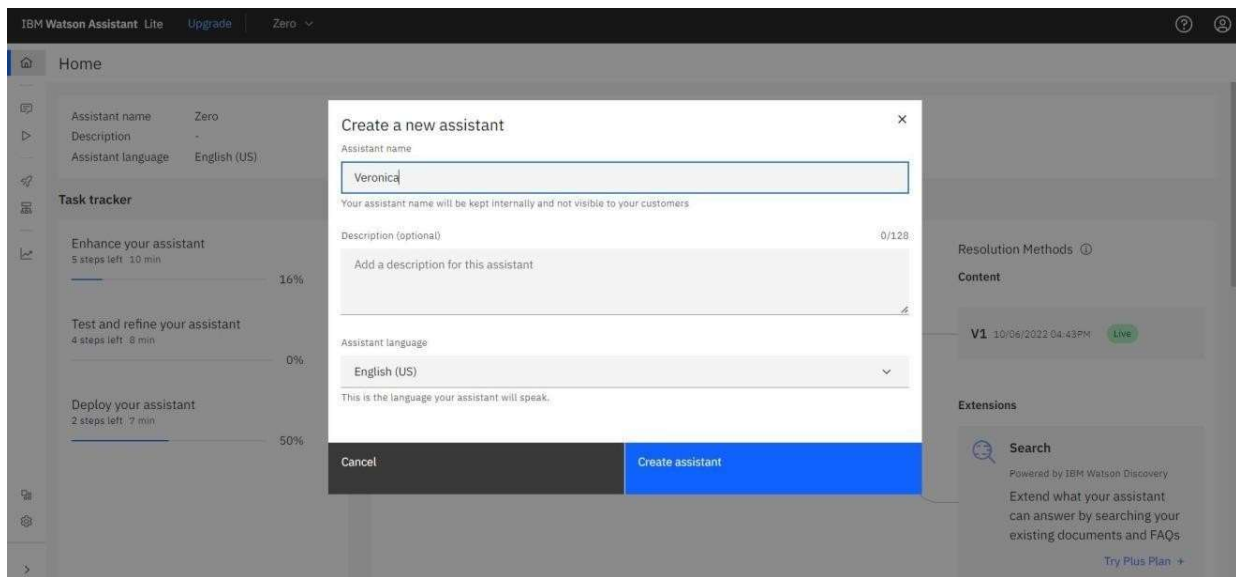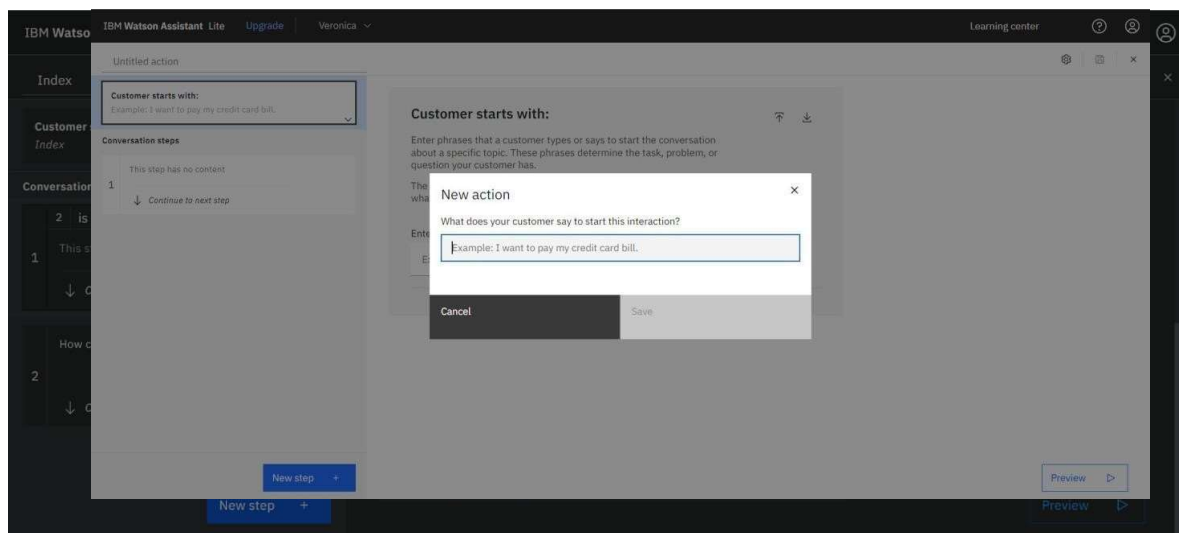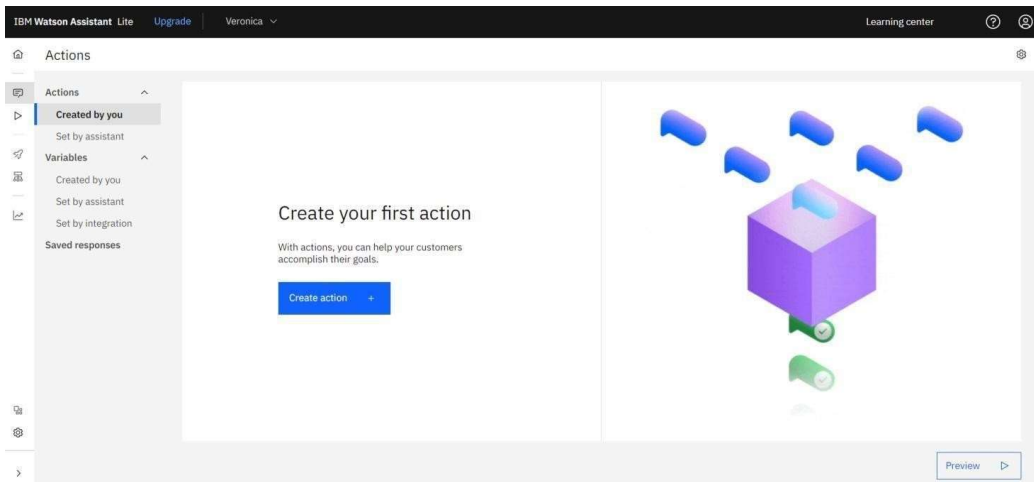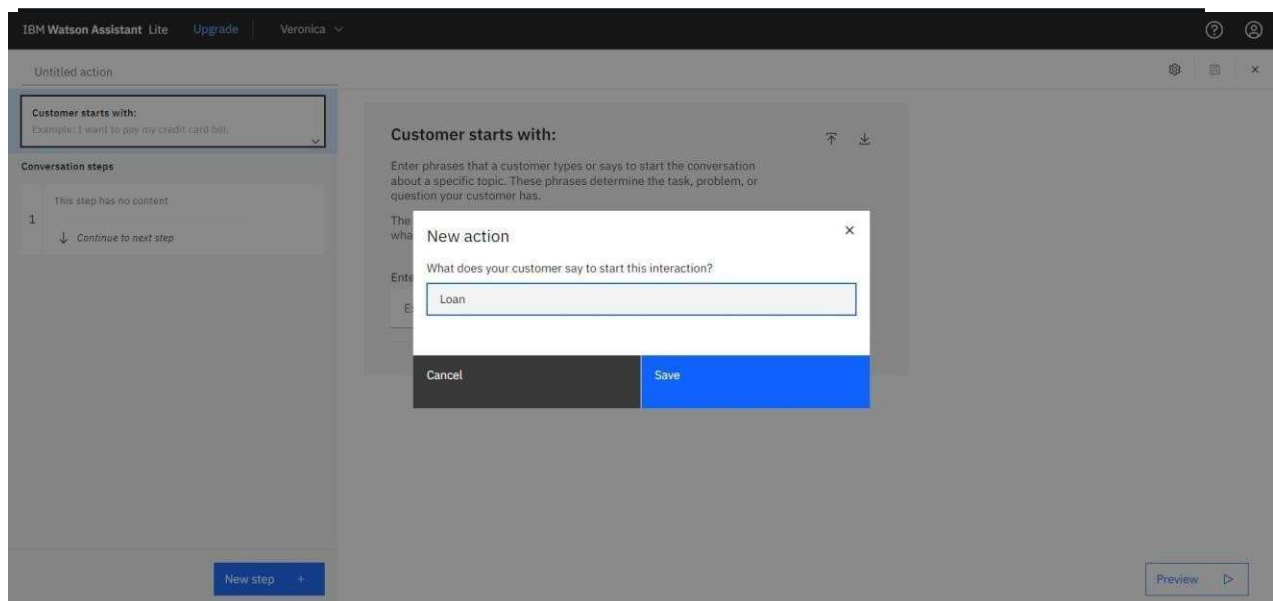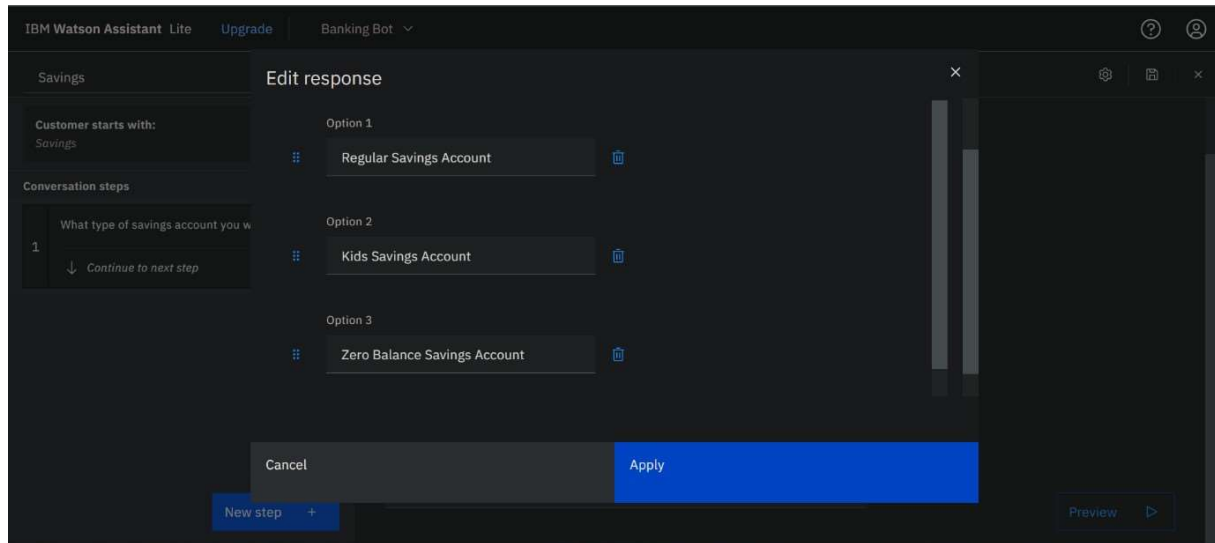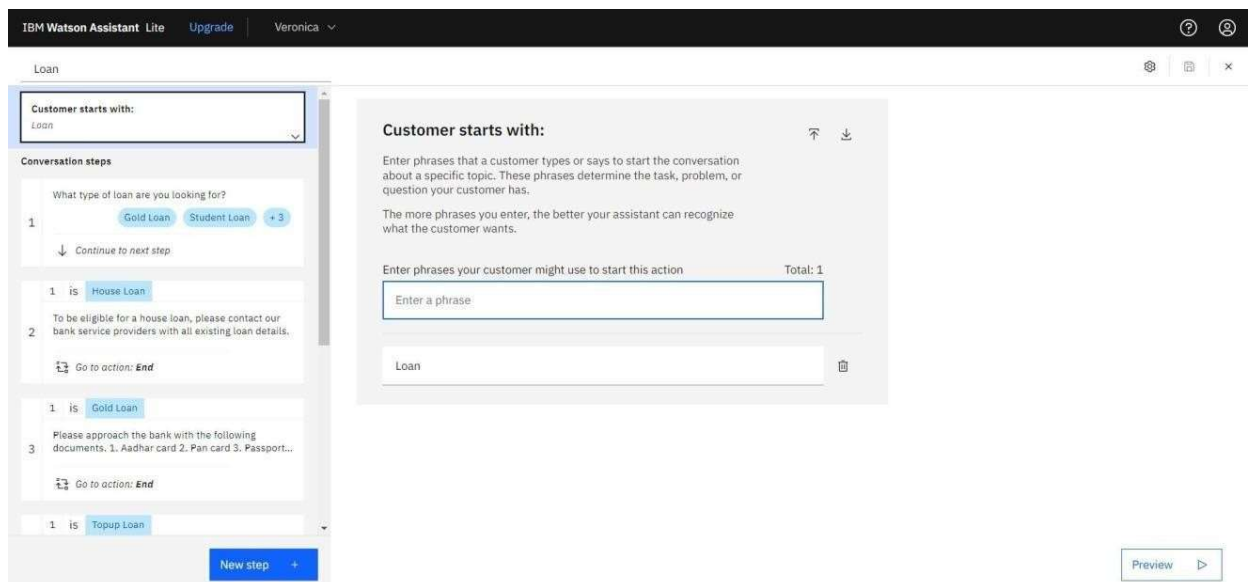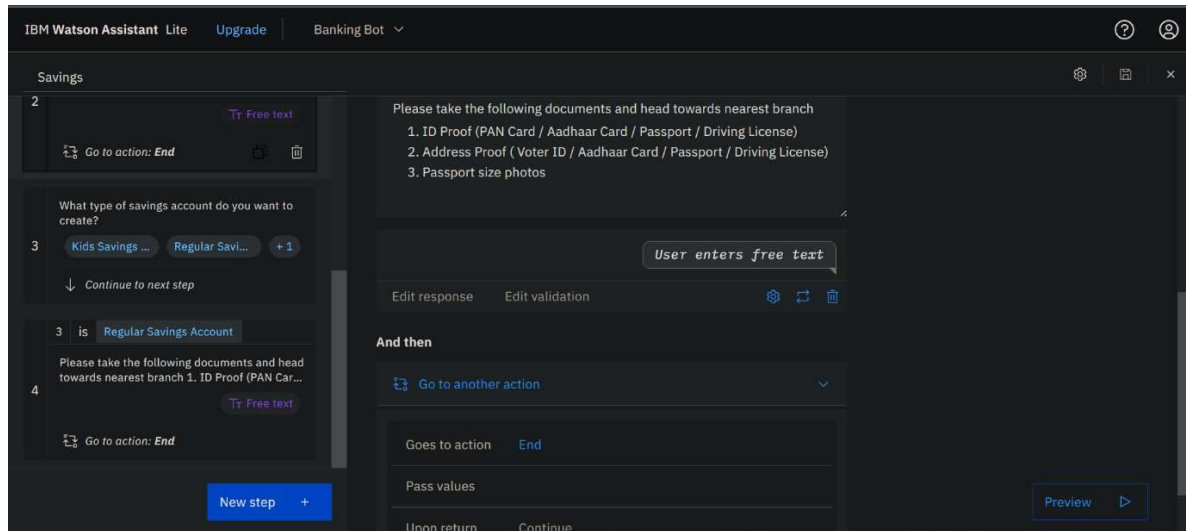
7.2 Feature 2
IBM CHATBOT:
- Our chatbot is able to guide a customer to create a bank account.(Both current and savings account)
- Our chatbot is able to answer loan queries.
- Our chatbot is able to answer general banking queries.
- Our chatbot is able to answer queries regarding net banking.

8. TESTING

8.1 Test Cases

	Test Scenarios
	Test Scenarios
1	Verify user is able to open and view chatbot UI
2	Verify user is able to interact with chatbot or not
3	Verify chatbot is able to respond to user queries immediately
4	Verify chatbot is able to provide options for user to choose various choices
	Savings Account Related Actions
1	Verify user is able to select type of savings account
2	Verify user is able to know the procedure to create savings account for selected type
3	Verify user is check the minimum balance
4	Verify user is able to find interest rate
	Current Account Related Actions
1	Verify user is able to select type of company
2	Verify user is able to know the procedure to create current account for selected type
3	Verify user is able to know about zero balance current account
4	Verify user is able to know the procedure to close current account
	Loan Account Related Actions
1	Verify user is able to choose options for selecting type of available loan policies
2	Verify user is able to know about available loan amounts
3	Verify user is able to check the loan status
4	Verify user is able to know about joint loan
	General Query Related Actions
1	Verify user is able to know about bank working days
2	Verify user is able to know about list of branches
3	Verify user is able to find the nearest branch
4	Verify user is able to know about storage locker facility
5	Verify user is able to know about currency conversion facility
	Net banking Related Actions
1	Verify user is able to know the procedure to login netbanking account
2	Verify user is able to know the procedure to change netbanking password
3	Verify user is able to choose options for selecting type of fund transfers
4	Verify user is able to know about daily transaction limit

8.2 User Acceptance Testing

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Comments	TC for Automation(Y/N)	BUG ID	Executed By
Chatbot_TC_OO1	UI	Home Page	Verify user is able to open and view chatbot UI	None	1.Enter URL and click go 2.Click on chatbot icon 3.Verify chatbot UI displayed or not	URL link	Chatbot UI is able to be viewed by user	Working as expected	Pass	-	N	-	Adithya R
Chatbot_TC_OO2	Functional	Home Page	Verify user is able to interact with chatbot or not	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window	User query	User is able to interact with chatbot easily	Working as expected	Pass	-	N	-	Prathyush Krishnen J
Chatbot_TC_OO3	Functional	Home page	Verify chatbot is able to respond to user queries immediately	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter	User query	Chatbot is able to provide instant replies for user queries	Working as expected	Pass	-	N	-	Ramkumar K
Chatbot_TC_OO4	Functional	Home page	Verify chatbot is able to provide options for user to choose various choices	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter	User query	Chatbot is able to provide options for user to choose various choices	Working as expected	Pass	-	N	-	Abhishek B
Savings_TC_OO1	UI	Chatbot	Verify user is able to select type of savings account	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to select type of savings account	Working as expected	Pass	-	N	-	Adithya R
Savings_TC_OO2	Functional	Chatbot	Verify user is able to know the procedure to create savings account for selected type	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to know the steps to create savings account for selected type	Working as expected	Pass	-	N	-	Adithya R
Savings_TC_OO3	Functional	Chatbot	Verify user is check the minimum balance	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to check the minimum balance	Working as expected	Pass	-	N	-	Adithya R
Savings_TC_OO4	Functional	Chatbot	Verify user is able to find interest rate	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to find interest rate	Working as expected	Pass	-	N	-	Adithya R
Current_TC_OO1	UI	Chatbot	Verify user is able to select type of company	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to select type of company	Working as expected	Pass	-	N	-	Prathyush Krishnen J
Current_TC_OO2	Functional	Chatbot	Verify user is able to know the procedure to create current account for selected type	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to know the steps to create current account for selected type	Working as expected	Pass	-	N	-	Prathyush Krishnen J
Current_TC_OO3	Functional	Chatbot	Verify user is able to know about zero balance current account	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to know about zero balance current account	Working as expected	Pass	-	N	-	Prathyush Krishnen J
Current_TC_OO4	Functional	Chatbot	Verify user is able to know the procedure to close current account	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to know the procedure to close current account	Working as expected	Pass	-	N	-	Prathyush Krishnen J
Loan_TC_OO3	Functional	Chatbot	Verify user is able to check the loan status	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to check the loan status	Working as expected	Pass	-	N	-	Ramkumar K
Loan_TC_OO4	Functional	Chatbot	Verify user is able to know about joint loan	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to know about joint loan	Working as expected	Pass	-	N	-	Ramkumar K
General_TC_OO1	Functional	Chatbot	Verify user is able to know about bank working days	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to know about bank working days	Working as expected	Pass	-	N	-	Abhishek B
General_TC_OO2	Functional	Chatbot	Verify user is able to know about list of branches	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to know about list of branches	Working as expected	Pass	-	N	-	Abhishek B
General_TC_OO3	Functional	Chatbot	Verify user is able to find the nearest branch	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to find the nearest branch	Working as expected	Pass	-	N	-	Abhishek B
General_TC_OO4	Functional	Chatbot	Verify user is able to know about storage locker facility	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to know about storage locker facility	Working as expected	Pass	-	N	-	Abhishek B
General_TC_OO5	Functional	Chatbot	Verify user is able to know about currency conversion facility	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to know about currency conversion facility	Working as expected	Pass	-	N	-	Abhishek B
Netbank_TC_OO1	Functional	Chatbot	Verify user is able to know the procedure to login netbanking account	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to know the steps to login netbanking account	Working as expected	Pass	-	N	-	Adithya R
Netbank_TC_OO2	Functional	Chatbot	Verify user is able to know the procedure to change netbanking password	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to know the steps to change netbanking password	Working as expected	Pass	-	N	-	Prathyush Krishnen J
Netbank_TC_OO3	UI	Chatbot	Verify user is able to choose options for selecting type of fund transfers	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to choose options for selecting type of fund transfers	Working as expected	Pass	-	N	-	Ramkumar K
Netbank_TC_OO4	Functional	Chatbot	Verify user is able to know about daily transaction limit	Chatbot is accessible	1.Click on chatbot icon 2.Type the query in the chat window 3. Press enter 4.Select the desired option	User query	User is able to know about daily transaction limit	Working as expected	Pass	-	N	-	Abhishek B

Test Report

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the AI based Discourse for Banking Industry project at the time of the release to User Acceptance Testing (UAT).
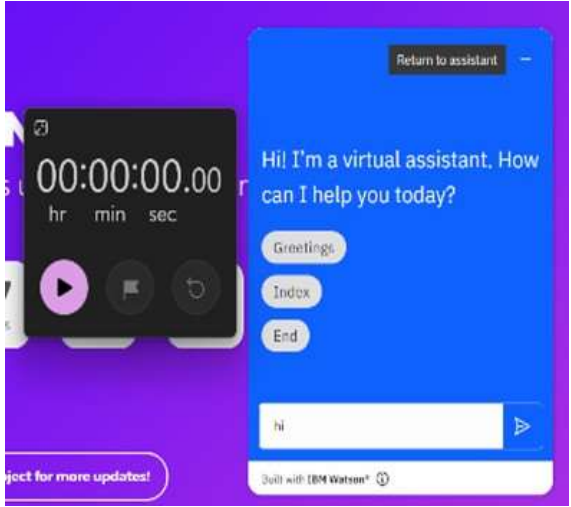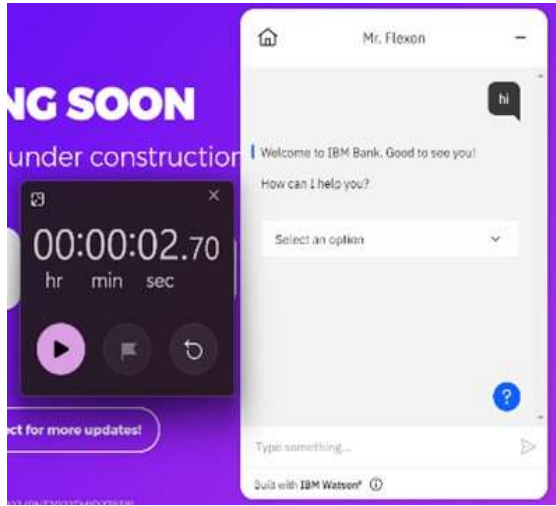
2. Defect Analysis

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	0	0	2	1	3
Duplicate	0	0	0	0	0
External	0	0	0	0	0
Fixed	0	0	2	1	3
Not Reproduced	0	0	0	0	0
Skipped	0	0	0	0	0
Won't Fix	0	0	0	0	0
Totals		0	2	2	6

3. Test Case Analysis

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	0	0	0	0
Client Application	25	0	0	25
Security	0	0	0	0
Outsource Shipping	0	0	0	0
Exception Reporting	0	0	0	0
Final Report Output	25	0	0	25
Version Control	0	0	0	0

9. RESULTS

9.1 Performance Metrics
Model Performance Testing:

S.NO.	PARAMETER	VALUES	SCREENSHOT
1.	Model Summary	The chatbot is used by the user to interact and select queries that are populated based on frequently asked questions of banking customers. There can be multiple instances of a single chatbot serving different users at the same time. It quickly responds with expected answers to frequently asked customer queries. It can be scaled as per the requirements of the bank to include answers to queries related to any new feature or service introduced by the bank.	

2.	Accuracy	Training Accuracy – 100% Validation Accuracy – 100%	

10. ADVANTAGES AND DISADVANTAGES

Advantages

1. **Round-the-clock support:** Chatbots provide 24/7 client support, so existing and potential customers can try and solve their banking problems after work hours and on weekends. This ultimately also leads to better customer experience.
2. **Enhanced productivity of bank personnel**: Not all clients' problems require the help of a staff member. Artificial intelligence may successfully deal with minor issues leaving only the most urgent and complicated cases for the human approach.
3. **More convenient mode of communication**: Chatbots may combine various functionalities that would make them convenient for customers of different age groups.

Disadvantages

1. **Internet Issues:** Chatbots will not work without the internet.If there is a network problem,chatbots may stop working and will not respond to client queries.
2. **Requirement of technical knowledge**: Users who make use of chatbots must know how to use chatbots.Otherwise, it is difficult to do interaction with chatbot.
3. **Providing unexpected answers**: Chatbots in some cases may get confused due to prolonged user inputs and may provide irrelevant answers.
4. **Inability to interpret multiple queries**: Chatbots can't understand multiple questions at a time if a user continuously posts queries to it. So it is necessary for a user to postqueries one-by-one.

11. CONCLUSION

Chatbots developed using AI are able to answer any frequently asked banking queries on account creation, loan, net banking, other services etc. It addresses the queries of customers immediately and effectively in a cost efficient manner. It eliminates the need for a massive customer care workforce and even reduces the workload of the bank employees whose efforts can be used elsewhere. AI Chatbots provides 24/7 service to clear all customer queries and guide them through all the banking processes. It can be scaled as per the requirements of the bank to include answers to queries related to any new feature or service introduced by the bank. In order to overcome the user satisfaction issues associated with banking services, chatbot will provide personal and efficient communication between the user and the bank. It is built to be the overall virtual assistant that can facilitate customers to ask banking-related questions without visiting thebank or calling up customer service centers as well as providing them with relevant suggestions.

12. FUTURE SCOPE

Chatbots help people obtain the information they need and solve their problems. The technology sector has seen a massive increase in AI development, which has led to the creation of chatbots that can help users easily find the information they need online. AI Chatbots effectively create a strong brand image. They will continue to evolve and play an important role in customer service for businesses.

1. Bots for Internal Business Communications

Chatbots can be used for various purposes, including addressing common problems, communicating with employees, and finishing HR-related tasks and transactional functions. Chatbots for websites are acting as a guide to new employees through company protocols, recording answers for screen questions, and assisting with the onboarding process for new employees. Chatbots can save time for IT desk agents and help with more complicated issues.

2. Content Marketing

Chatbots can communicate with the target market by speaking with them in complete sentences with a natural and easy-going conversational flow. Some markets use these bots to serve customer service and retail, amongst others. Chatbots can segment consumers for future marketing campaigns. This can be incredibly useful for creating more accurate target marketing. Based on the information from dialogue with chatbots, marketers can use this information to help with personalizing brand content.

3. Social Media

Chatbots have better customer interaction rates on social media. Chatbot interactions increase consumer confidence in a brand or business. Customers are informed with daily or weekly announcements about deals, events, and promotions via social media. With time, it is used for voicing opinions, ordering products and services, offering reviews, and even getting in touch with businesses.

4. Use of AI in contact centers

AI chatbots without human involvement can handle simple requests such as changing a password, requesting a balance, scheduling an appointment, etc.

13. APPENDIX

Source Code

Build PYTHON FLASK code:

app.py:

```python
from flask import Flask, render_template
app=Flak(_name_,template_folder='templates')


@app.route('/')
def home():
    return render_template(Step1.html)
if_name_=='_main_':
    app.run(debug=True)
```

Build HTML and CSS code:

Step1.html:

```html
<html lang="en">
<head>
<title>AI BASED DISCOURSE FOR BANKING INDUSTRY</title>
</head>
<body>
 <div class="main">
     <div class="navbar">
       <div class="icon">
          <h2 class="logo">BankBot</h2>
       </div>
 <div class="menu">
         <u <li><a href="#">HOME</a></li>
           <li><a href="#">SERVICE</a></li>
           <li><a href="#">CONTACT</a></li>
           <li><a href="#">ABOUT</a></li>
         </ul>
       </div>
    </div>
```

```html
<div class="content">
  <h1>AI Based Discourse for <br><span>Banking</span> <br>Industry</h1>
  <br>
    <button class="cn"><a href="#">JOIN US</a></button>
</div>
</div>
<script>
    window.watsonAssistantChatOptions = {
      integrationID: "c3bff345-f26d-47d8-94a4-459ade939da1", // The ID of this integration.
      region: "us-south", // The region your integration is hosted in.
      serviceInstanceID: "84a4d536-ad71-4db7-965b-dc28a31315e6", // 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>
</body>
</html>

<style>
  *{
  margin: 0;
  padding: 0;
}
.main{
  width: 100%;
  background: linear-gradient(to top, rgba(0,0,0,0.5)50%,rgba(0,0,0,0.5)50%),
  url("https://images.cointelegraph.com/images/1434_aHR0cHM6Ly9zMy5jb2ludGVsZWdy
  yYXBoLmNvbS91cGxvYWRzLzIwMjEtMDUvNmNmNmJlZWItM2ZjMS00OThiLTllM
  DktMzVjYzE1ODMyMGEyLmpwZw==.jpg");
background-position: 0%;
```

```css
    background-repeat: no-repeat;
    background-size: cover;
    height: 100vh;
    filter: brightness(1.5);
}
.navbar{
    width: 1200px;
    height: 75px;
    margin: auto;
}
.icon{
    width: 200px;
    float: left;
    height: 70px;
}
.logo{
    color: #fff;
    font-size: 35px;
    font-family: Arial;
    padding-left: 20px;
    float: left;
    padding-top: 10px;
    margin-top: 5px
}
.menu{
    width: 400px;
    float: left;
    height: 70px;
}
ul{
    float: left;
    display: flex;
    justify-content: center;
    align-items: center;
}
ul li{
```

```css
    list-style: none;
    margin-left: 62px;
    margin-top: 27px;
    font-size: 14px;
}
ul li a{
    text-decoration: none;
    color: #fff;
    font-family: Arial;
    font-weight: bold;
    transition: 0.4s ease-in-out;
}
ul li a:hover{
    color: #3857cf;
}
.search{
    width: 330px;
    float: left;
    margin-left: 270px;
}
.srch{
    font-family: 'Times New Roman';
    width: 200px;
    height: 40px;
    background: transparent;
    border: 1px solid #ff7200;
    margin-top: 13px;
    color: #fff;
    border-right: none;
    font-size: 16px;
    float: left;
    padding: 10px;
    border-bottom-left-radius: 5px;
    border-top-left-radius: 5px;
}
```

```css
.btn{
    width: 100px;
    height: 40px;
    background: #ff7200;
    border: 2px solid #ff7200;
    margin-top: 13px;
    color: #fff;
    font-size: 15px;
    border-bottom-right-radius: 5px;
    border-bottom-right-radius: 5px;
    transition: 0.2s ease;
    cursor: pointer;
}
.btn:hover{
    color: #000;
}
.btn:focus{
    outline: none;
}
.srch:focus{
    outline: none;
}
.content{
    width: 1200px;
    height: auto;
    margin: auto;
    color: white;
    position: relative;
}
.content .par{
    padding-left: 20px;
    padding-bottom: 25px;
    font-family: Arial;
    letter-spacing: 1.2px;
    line-height: 30px;
}
```

```css
.content h1{
    font-family: 'Times New Roman';
    font-size: 50px;
    padding-left: 20px;
    margin-top: 9%;
    letter-spacing: 2px;
}
.content .cn{
    width: 160px;
    height: 40px;
    background:#3857cf;
    border: none;
    margin-bottom: 10px;
    margin-left: 20px;
    font-size: 18px;
    border-radius: 10px;
    cursor: pointer;
    transition: .4s ease;
}
.content .cn a{
    text-decoration: none;
    color: #000;
    transition: .3s ease;
}
.cn:hover{
    background-color: #fff;
}
.content span{
    color: #3857cf;
    font-size: 65px
}
.form{
    width: 250px;
    height: 380px;
    background: linear-gradient(to top, rgba(0,0,0,0.8)50%,rgba(0,0,0,0.8)50%);
    position: absolute;
```

```css
    top: -20px;
    left: 870px;
    transform: translate(0%,-5%);
    border-radius: 10px;
    padding: 25px;
}
.form h2{
    width: 220px;
    font-family: sans-serif;
    text-align: center;
    color: #ff7200;
    font-size: 22px;
    background-color: #fff;
    border-radius: 10px;
    margin: 2px;
    padding: 8px;
}
.form input{
    width: 240px;
    height: 35px;
    background: transparent;
    border-bottom: 1px solid #ff7200;
    border-top: none;
    border-right: none;
    border-left: none;
    color: #fff;
    font-size: 15px;
    letter-spacing: 1px;
    margin-top: 30px;
    font-family: sans-serif;
}
.form input:focus{
    outline: none;
}
::placeholder{
    color: #fff;
```

```css
    font-family: Arial;
}
.btnn{
    width: 240px;
    height: 40px;
    background: #ff7200;
    border: none;
    margin-top: 30px;
    font-size: 18px;
    border-radius: 10px;
    cursor: pointer;
    color: #fff;
    transition: 0.4s ease;
}
.btnn:hover{
    background: #fff;
    color: #ff7200;
}
.btnn a{
    text-decoration: none;
    color: #000;
    font-weight: bold;
}
.form .link{
    font-family: Arial, Helvetica, sans-serif;
    font-size: 17px;
    padding-top: 20px;
    text-align: center;
}
.form .link a{
    text-decoration: none;
    color: #ff7200;
}
.liw{
    padding-top: 15px;
    padding-bottom: 10px;
```
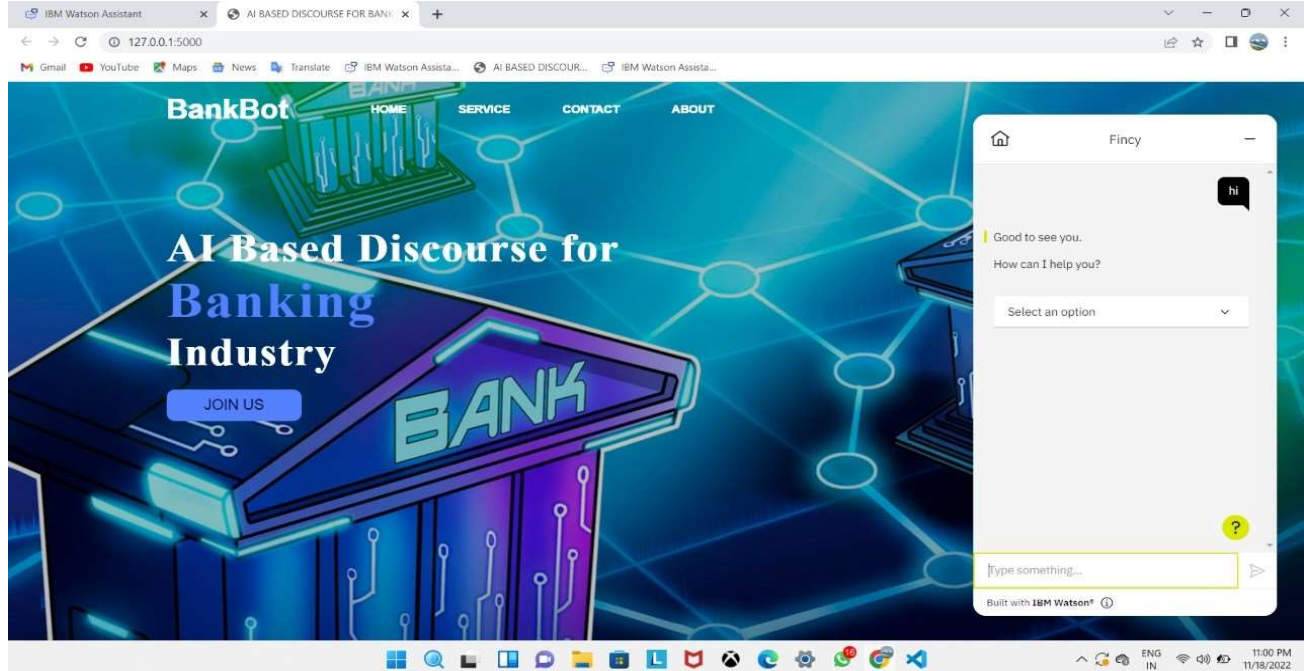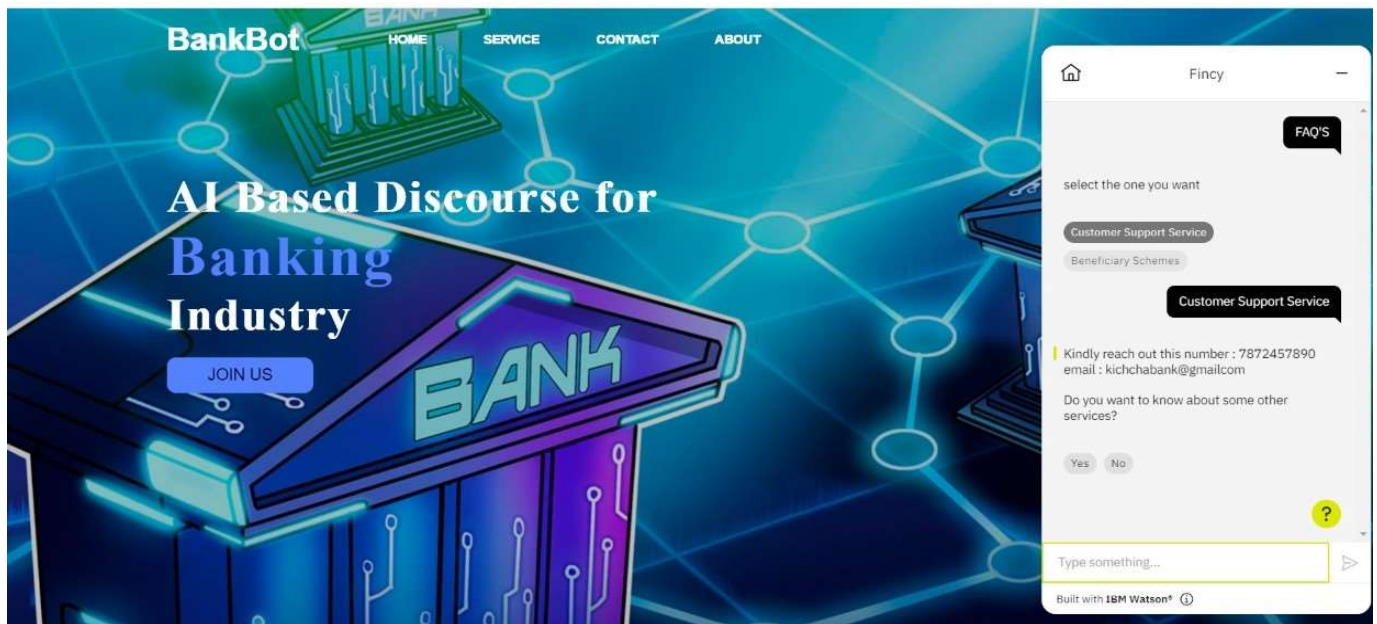
```css
    text-align: center;
}
.icons a{
    text-decoration: none;
    color: #fff;
}
.icons ion-icon{
    color: #fff;
    font-size: 30px;
    padding-left: 14px;
    padding-top: 5px;
    transition: 0.3s ease;
}
.icons ion-icon:hover{
    color: #ff7200;
}
    </style>
```

IBM CHATBOT OUTPUT:

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-2855-1658484464

PROJECT DEMO LINK:

https://vimeo.com/774094109