

# **PROJECT REPORT**

**Team ID: PNT2022TMID15597**

**Project Name : AI based discourse for Banking Industry**

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## **1. INTRODUCTION**

### **1.1 Project Overview**

The Internet Banking Industry has seen tremendous growth in recent years mainly due to the massive advancement in technology. The thing with the internet is that everyone connected to it can access almost anything around the world. The involvement of the internet in the banking sector has made it more viable and user friendly than ever before. Customers of any bank could access their account details and the transactions across the world with ease and can work with ease around any branches. 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, a 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 centres as well as providing them with relevant suggestions.

### **1.2 Purpose**

The main purpose of the chatbot is to provide the customers with all the information possible regarding any banking queries. 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 centres as well as providing them with relevant suggestions. Hence it essentially tries to eliminate the purpose of visiting a banking for basic queries and procedures.

## **2. LITERATURE SURVEY**

### **2.1 Existing problem**

The involvement of the internet in the banking sector has made it more viable and user friendly than ever before. Customers of any bank could access their account details and the transactions across the world with ease and can work with ease around any branches.

Online banking is an electronic payment system that enables customers of a bank or other financial institution to conduct a range of financial transactions through the financial institution's website. The online banking system will typically connect to or be part of the core banking system operated by a bank and is in contrast to branch banking which was the traditional way customers accessed banking services.

The problem with the above existing solution is that though it almost it lets you do every banking process virtually, it fails to deliver the information which is the core purpose of the customer visiting a bank. The customers are to be guided properly through all the procedures and make them feel like they are doing the right thing.

## 2.2 References

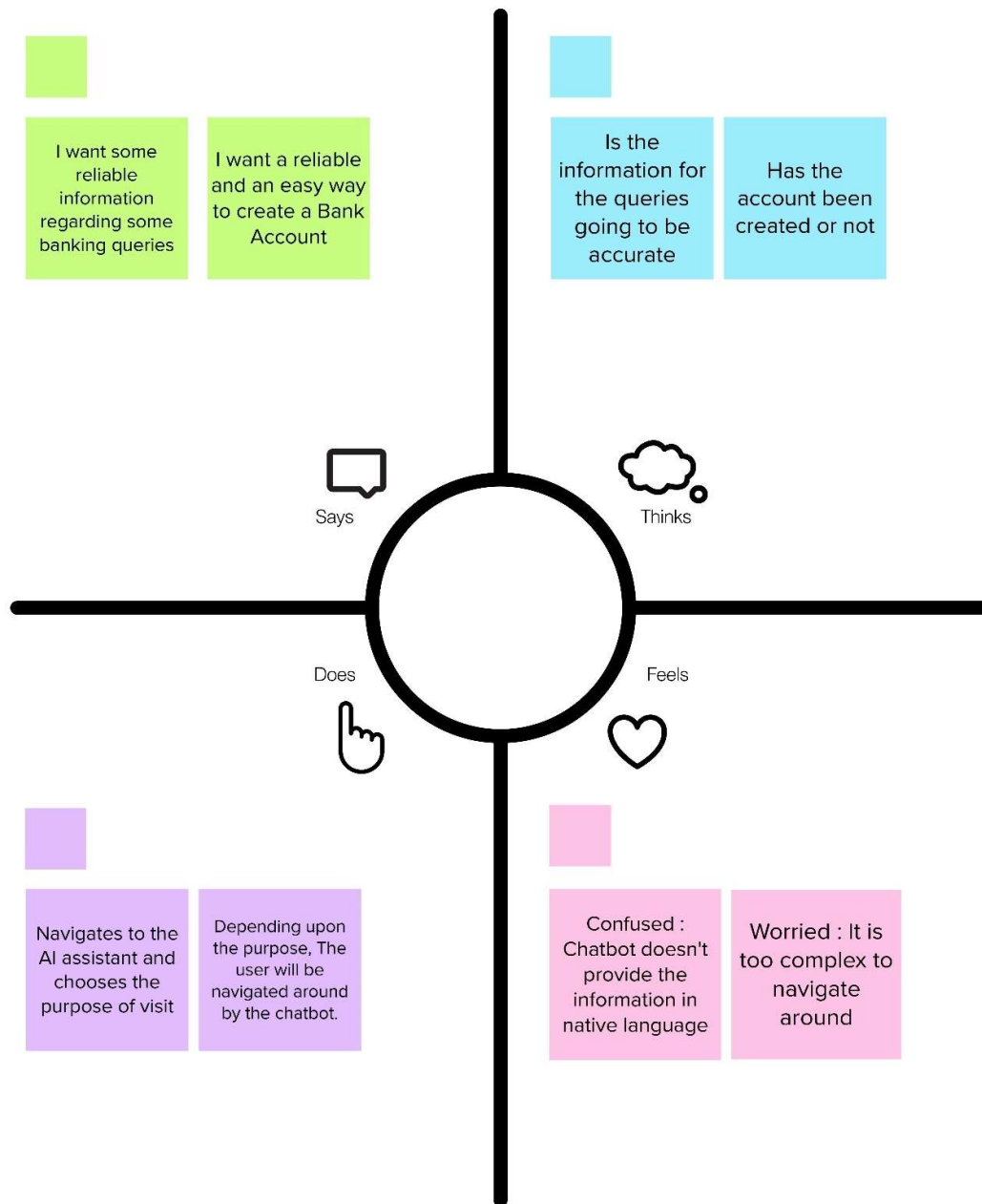
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## 2.3 Problem Statement Definition

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 a service, available 24/7, to clear all their queries and guide them through the various 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, a 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 centres as well as providing them with relevant suggestions.

### 3. IDEATION & PROPOSED SOLUTION

#### 3.1 Empathy Map Canvas



### **3.2 Ideation & Brainstorming**

Ideas laid out by each Team Member

- **AJAY KUMAR T M**

- Idea 1: Keep the conversation simple and easily understandable by Customers.
- Idea 2: Decrease the response time to the user.
- Idea 3: Build pre-requisite questions for queries regarding some type of loan.
- Idea 4: Make sure every nook and corner is covered.

- **DINESH P N**

- Idea 1: Make sure it is available 24/7
- Idea 2: The queries should be answered with clear explanation.
- Idea 3: Make sure that account creation task doesn't glitch.
- Idea 4: Collect only the required details from the customer.

- **DEVI PRASAD S M**

- Idea 1: Make sure the Bank is notified about the actions.
- Idea 2: Build pre-requisite for Bank account creation to eliminate ineligible accounts.
- Idea 3: Every query that the user can think of should be covered.
- Idea 4: The process of creating an account should be simple.

- **DINESH KUMAR G**

- Idea 1: Simplify the process of creating an account
- Idea 2: Make sure the explanation is clear.
- Idea 3: Make sure to cover every query that the user can think of.
- Idea 4: Keep the conversation easily understandable by Customers.

- **BALUMOHAN B**

- Idea 1: Make it user friendly by building the chatbot in different languages.
- Idea 2: Make sure the user is able to navigate around with ease.
- Idea 3: Every query should be answered with apt explanation.
- Idea 4: Make sure every nook and corner is covered.

### Shortlisted Ideas

- Idea 1: Make it user friendly by building the chatbot in different languages.
- Idea 2: Collect only the required details from the customer.
- Idea 3: Build pre-requisite questions for queries regarding some type of loan.

### 3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Banks are not able to resolve the queries of customers at all times related to the products or services in satisfactory way which in turn hinders the customer satisfaction. Customers need to visit banks frequently for simple queries.
2.	Idea / Solution description	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.
3.	Novelty / Uniqueness	Chatbots developed using AI should be able to answer any general 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.
4.	Social Impact / Customer Satisfaction	In order to attain 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.
5.	Business Model (Revenue Model)	Employing a chatbot will be a cost-effective solution to clear customer queries for banks. 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.

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.
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### 3.4 Problem Solution fit

Define CS, fit into CL	<b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span>	<b>6. CUSTOMER LIMITATIONS</b> <small>EG. BUDGET, DEVICES</small> <span>CL</span>		<b>5. AVAILABLE SOLUTIONS</b> <small>PLUSSES &amp; MINUSES</small> <span>AS</span>	Explore AS, differentiate
	Customers of Bank	Misunderstood the customer's query, Seamless Internet connection Outdated software compatibility		Simple banking queries can be resolved quickly. Available round the dock (24/7).	
Focus on PR, tip into BE, understand RC	<b>2. PROBLEMS / PAINS</b> <small>+ ITS FREQUENCY</small> <span>PR</span>	<b>9. PROBLEM ROOT / CAUSE</b> <span>RC</span>		<b>7. BEHAVIOR</b> <small>+ ITS INTENSITY</small> <span>BE</span>	Focus on PR, tip into BE, understand RC
	Limited response	Slower response from client agent		Guiding customer create bank account	
	Frequent Maintenance	Limited only on working days		Answer loan queries	
	Misreading of queries	Takes Longer to resolve complaints		Answer general banking queries	
	Unsuitable for senior citizens	Waiting in queue for assistance		Answer queries regarding net banking	
	Losing customer insights			Connecting with bank agents.	
Identify strong TR & EM	<b>3. TRIGGERS TO ACT</b> <span>TR</span>	<b>10. YOUR SOLUTION</b> <span>SL</span>		<b>8. CHANNELS of BEHAVIOR</b> <span>CH</span>	Extract online & offline CH of BE
	Seeking customers' doubts, A customer needs guidance.	This problem can be solved by using an automated solution, such as a chatbot, which can handle all simple queries. One could reduce their employees' workload by having a chatbot handle all of the simple customer requests. It understands human languages and assist them in text-based communication and is available seamlessly in all platforms.		<small>ONLINE</small> Instantaneously respond to the queries, Assisting clients in clearing up their doubts.	
	<b>4. EMOTIONS</b> <small>BEFORE / AFTER</small> <span>EM</span>			<small>OFFLINE</small> Following guidelines from the chatbot, Getting queries answers from chatbot.	
	BEFORE: Confused, Helplessness, Exhausted AFTER: Satisfaction, Motivated, Relaxed				

## 4. REQUIREMENT ANALYSIS

### 4.1 Functional requirement

The following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Greetings	As soon as a consumer joins the chatbot, it should greet them.
FR-2	Faster joining	Customers don't need to register in advance to use the bot; it will be available right away.
FR-3	Savings Account Creation Guide	The chatbot should be able to respond to inquiries about Kids Savings Accounts, Regular Savings Accounts, and Zero Balance Savings Accounts.
FR-4	Current Account Creation Guide	The chatbot should be able to answer questions regarding proprietorship and partnership accounts.
FR-5	Loan Query Clarification	The chatbot should be able to respond to inquiries on student loan, house loan, gold loan, top-up loan, and car loan.



FR-6	General Query Clarification	The chatbot should provide information on a branch finder, a list of nearby branches, CIBIL, storage lockers, currency conversion rules, and other subjects.
FR-7	Net Banking Clarification	The chatbot should be able to respond to inquiries regarding the features of net banking, how to sign up for it, and any issues you might be experiencing.
FR-8	Further assistance	If it was successful in solving the customer's problem or if further help is needed, the bot should inquire once more.

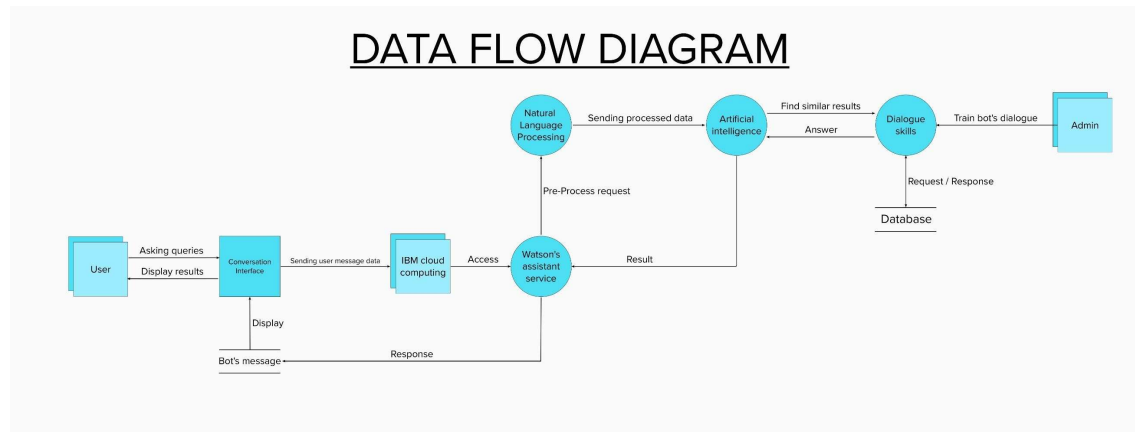
#### 4.2 Non-Functional requirements

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

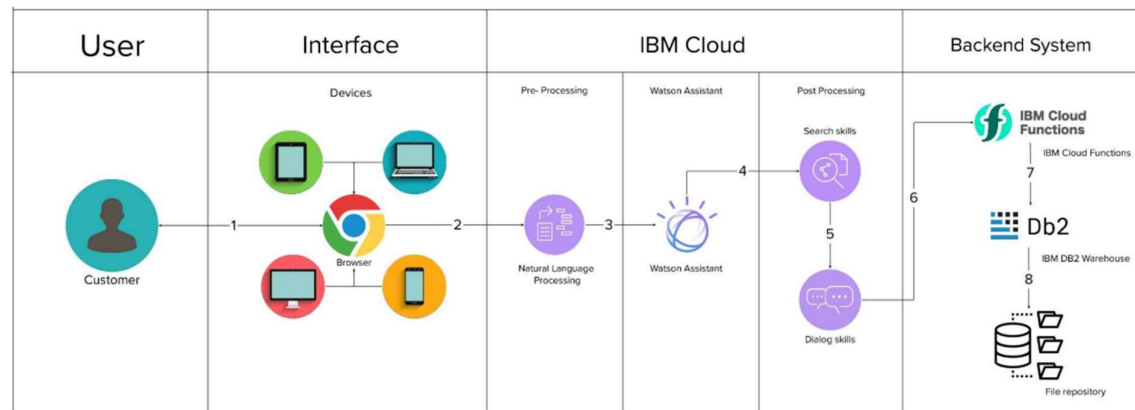
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	To answer questions and provide assistance as needed, AI chatbots interact with people in a manner that is highly natural. Giving consumers timely assistance is the main goal of this chatbot.
NFR-2	Security	The safety and privacy of consumer data is the most crucial aspect of banking. We have to make sure that the client data we collect is only accessible by your bank.
NFR-3	Reliability	Since delivering dependable performance and information to users is seen to be crucial when employing chatbot-based services, reliability is described as a user's opinion that a chatbot service has the capacity to provide the promised service dependably and accurately. Users consider the accuracy of the information supplied by chatbot services to be a key element.
NFR-4	Performance	The speed of the chatbot has to be faster than the time it would take a human to compose the reply. The chatbot should be connected to a knowledge-based database and set up to retrieve data quickly.
NFR-5	Availability	Chatbots ought to be awake all the time and not grow weary. They should always be available and ready to answer questions from guests who arrive late at night or who are just in another time zone, whether it is during the day or night.
NFR-6	Scalability	Chatbots have the ability to develop to the point where they can manage difficult questions and resolve a variety of other complex questions that can only be handled by human agents. This removes chatbots' restrictions on being useful to a certain set of individuals and boosts their capacity for managing a huge number of people at once.

## 5. PROJECT DESIGN

### 5.1 Data Flow Diagrams



### 5.2 Solution & Technical Architecture



### 5.3 User Stories

	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	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 register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register & access the dashboard with Gmail Login	Medium	Sprint-1

	Login	USN-5	As a user, I can log into the application by entering email & password	I can access my account / dashboard by Login	High	Sprint-1
	Dashboard	USN-6	As a user, I can access the chatbot in the home page or dashboard	I can access my dashboard	High	Sprint-2
Customer (Web user)	Access	USN-7	As a user, I can ask queries to virtual assistant	I can question the virtual assistance	High	Sprint-1
Customer Care Executive	Clarification	USN-8	As a user care executive, I will provide clarification for any questions that the chatbot cannot answer	I can clarify questions that chatbots can't answer	Medium	Sprint-3
Administrator	Moderation	USN-9	As an admin, I can add an inquiry and its appropriate response to the chatbot	I can add an inquiry and answers to the chatbot	High	Sprint-3
		USN-10	As an admin, I will moderate chatbot responses	I can moderate chatbot responses	Medium	Sprint-4
		USN-11	As an admin, I will update the chatbot with new questions and responses	I can add new inquiries and responses to the chatbot	Medium	Sprint-4
		USN-12	As an admin, I will maintain the chatbot's behaviour	I can maintain the chatbot's actions	High	Sprint-4

## 6. PROJECT PLANNING & 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 the Savings Account option, I can select Types of Savings Account to get details regarding documents required for creating that savings account.	4	High	Ajay Kumar T M
Sprint-1		USN-2	As a user, I can check the Interest Rates of Savings Account	4	High	Ajay Kumar T M
Sprint-1		USN-3	As a user, I can check the Minimum Balance of Savings Account	3	Medium	Ajay Kumar T M
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	Dinesh P N
Sprint-1		USN-5	As a user, I want to get details on procedure to close my Current Account	4	High	Ajay Kumar T M

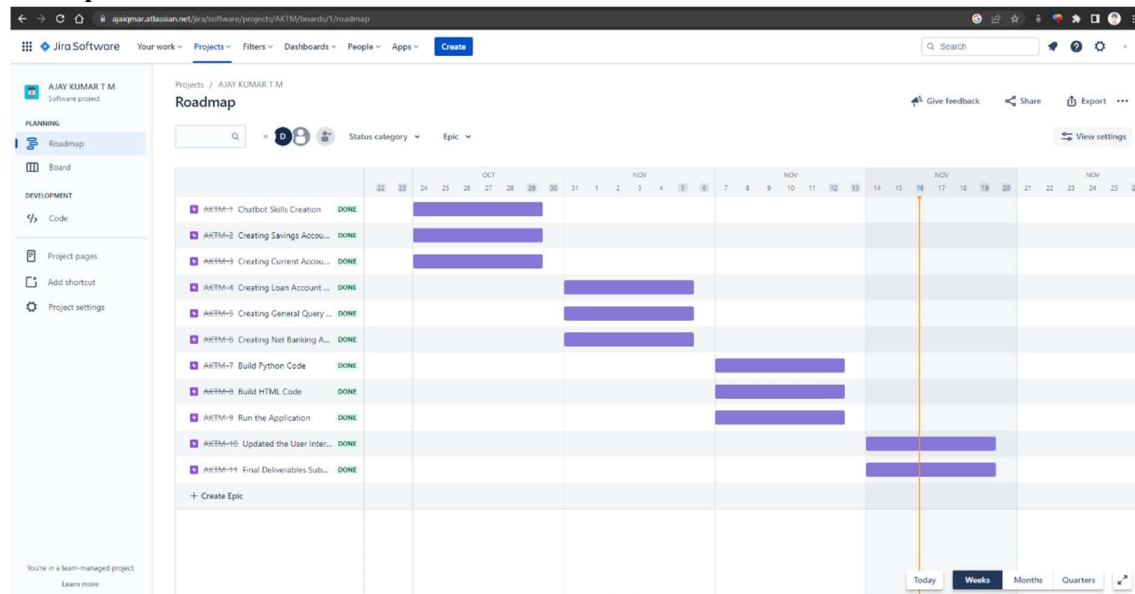
Sprint-2	Loan Account Related Actions	USN-6	As a user, I can choose the Type of Loans to know the information on choosing an essential loan scheme	3	High	Dinesh P N
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2		USN-7	As a user, I can check the Loan Amounts that can be offered for corresponding Loan Accounts chosen	3	High	Devi Prasad S M
Sprint-2		USN-8	As a user, I can check the Status of Loan for my Loan Accounts	1	Low	Devi Prasad S M
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	Dinesh P N
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	Balumohan B
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	Balumohan B
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	Balumohan B
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	Dinesh Kumar G
Sprint-2		USN-14	As a user, I want to get the procedure details for adding beneficiaries to my net banking account.	2	Medium	Dinesh Kumar G
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	Ajay Kumar T M, Dinesh P N
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	Devi Prasad S M, Dinesh Kumar G

## 6.2 Sprint Delivery Schedule

Phase	Phase Description	Week	Dates	Activity	Student Responsibility
5	<b>Project Planning Phase</b> (Milestones & Tasks, Sprint Schedules )	Week-9	17 - 22 Oct 2022	Prepare Milestone & Activity List, Sprint Delivery Plan	Submit the Project Delivery Schedule as per the standard template in GitHub

6	<b>Project Development Phase</b> (Coding Solutioning, Acceptance Testing, Performance Testing)	&	Week-10	24 - 29 Oct 2022	Project Development - Delivery of Sprint-1	Sprint-1 Delivery: Develop the Code, Test and push it to GitHub.
			Week-11	31 Oct - 5 Nov 2022	Project Development - Delivery of Sprint-2	Sprint-2 Delivery: Develop the Code, Test and push it to GitHub.
			Week-12	7 - 12 Nov 2022	Project Development - Delivery of Sprint-3	Sprint-3 Delivery: Develop the Code, Test and push it to GitHub.
			Week-13	14 - 19 Nov 2022	Project Development - Delivery of Sprint-4	Sprint-4 Delivery: Develop the Code, Test and push it to GitHub.

### 6.3 Reports from JIRA



## 7. CODING & SOLUTIONING

### 7.1 Feature 1

#### Service Selection – Lets you select the feature that you want to select and look up

The screenshot displays the IBM Watson Assistant configuration interface for a 'Greetings Action'. The left sidebar shows a list of conversation steps. Step 2, 'What type of service are you looking for?', is selected and highlighted with a blue box. The main workspace shows the configuration for this step. The 'Assistant says' section contains the text 'What type of service are you looking for?'. Below this, there are buttons for 'Edit response' and 'Edit validation'. The 'And then' section contains a 'Continue to next step' action. On the right, a 'Preview' window shows a simulated chat conversation: 'Welcome, how can I assist you?' followed by 'Greetings Action recognised', 'Welcome to IDEAL bank!!', 'What type of service are you looking for?', 'Savings Account', 'go to Savings Account Action', 'What type of savings account do you want to open?', and options for 'Regular Savings', 'Her Savings', and 'Zero - Balance Savings'.

This screenshot shows the same IBM Watson Assistant configuration interface. The left sidebar and the 'Assistant says' section are identical to the previous image. However, the 'And then' section now shows a 'Continue to next step' action. At the bottom right, there is a 'Preview' button. The 'Preview' window is not visible in this view.

## Account Pre requisites

The screenshot shows the IBM Watson Assistant interface for a 'Savings Account Action'. The left sidebar displays the 'Conversation steps' for this action, starting with a question 'What type of savings account do you want to open?' and offering options like 'Regular Sav...', 'Her Savings', and '+3'. Step 2 is highlighted, showing a 'Free text' input field and a 'Go to action: Farewell action' button. The main workspace shows the 'Assistant says' section with a list of prerequisites: '1. ID Proof (PAN Card / Aadhaar Card / Passport / Driving License)', '2. Address Proof (Voter ID / Aadhaar Card / Passport / Driving License)', and '3. Passport Size Photo'. Below this, there's a 'User enters free text' field and buttons for 'Edit response' and 'Edit validation'. The 'And then' section shows a 'Go to another action' dropdown set to 'Farewell action', with fields for 'Pass values' and 'Upon return' set to 'Continue'. A 'Preview' button is located at the bottom right.

## 7.2 Feature 2 Loan Selection

The screenshot shows the IBM Watson Assistant interface for a 'Loan Account Action'. The left sidebar displays the 'Conversation steps', starting with 'What type of loan are you looking for?' and offering options like 'Vehicle Loan', 'Home Loan', and '+3'. Step 1 is highlighted, showing a 'Free text' input field and a 'Go to action: Farewell action' button. The main workspace shows the 'Assistant says' section with the question 'What type of loan are you looking for?' and a 'Choose an action' dropdown. Below this, there's a 'User enters free text' field and buttons for 'Edit response' and 'Edit validation'. The 'And then' section shows a 'Continue to next step' dropdown. A 'Preview' button is located at the bottom right.

This block contains two screenshots. The left screenshot is a detailed view of the 'Loan Account Action' configuration in the IBM Watson Assistant interface. It shows the 'Conversation steps' on the left, with Step 1 highlighted. The main workspace shows the 'Assistant says' section with a list of prerequisites: '1. ID Proof (PAN Card / Aadhaar Card / Passport / Driving License)', '2. Address Proof (Voter ID / Aadhaar Card / Passport / Driving License)', '3. Passport Size Photo', and '4. Collateral Proof'. Below this, there's a 'User enters free text' field and buttons for 'Edit response' and 'Edit validation'. The 'And then' section shows a 'Continue to next step' dropdown. A 'Preview' button is located at the bottom right. The right screenshot is a preview of the chatbot conversation, showing the initial question 'What type of loan are you looking for?' and the options 'Vehicle Loan', 'Home Loan', and '+3'. The user has selected 'Student Loan', and the chatbot has responded with the prerequisites: '1. Student's Education History Report', '2. Student's Aadhaar Card', '3. Student's Passport Size Photo', and '4. Collateral Proof'. A 'Use the up arrow for previous messages' button is at the bottom.

Providing the information about the credentials to be submitted:

## 1) For Gold Loan

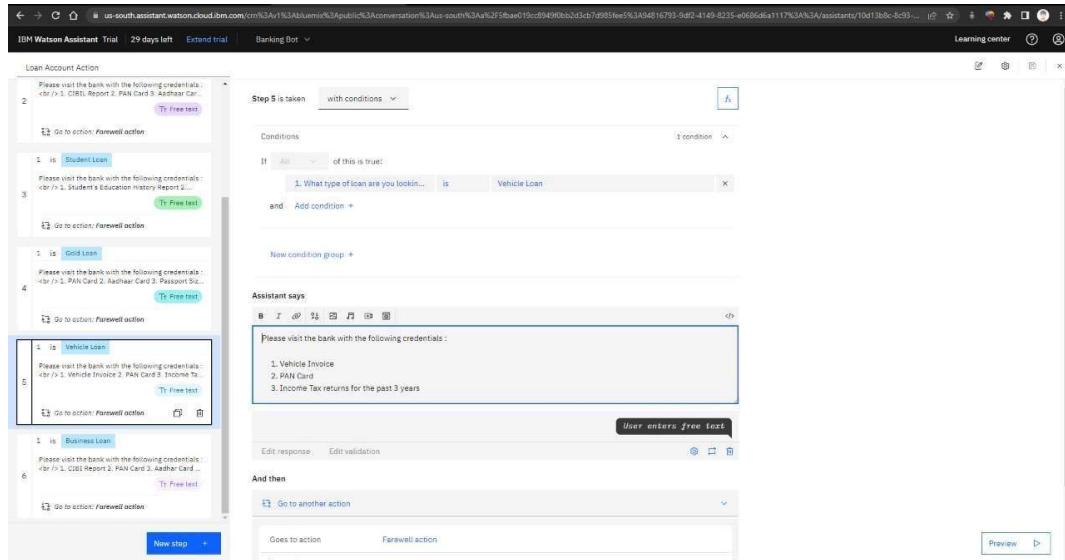
The screenshot shows the IBM Watson Assistant interface for configuring a Gold Loan action. On the left, a list of actions is visible, with 'Gold Loan' selected. The main panel displays the configuration for 'Step 4 is taken'. The conditions section shows a single condition: '1. What type of loan are you looking... is Gold Loan'. The assistant's response is a text block: 'Please visit the bank with the following credentials : 1. PAN Card 2. Aadhaar Card 3. Passport Size Photo'. Below this, the 'And then' section shows a 'Go to another action' dropdown set to 'Farewell action'.

## 2) For Business Loan

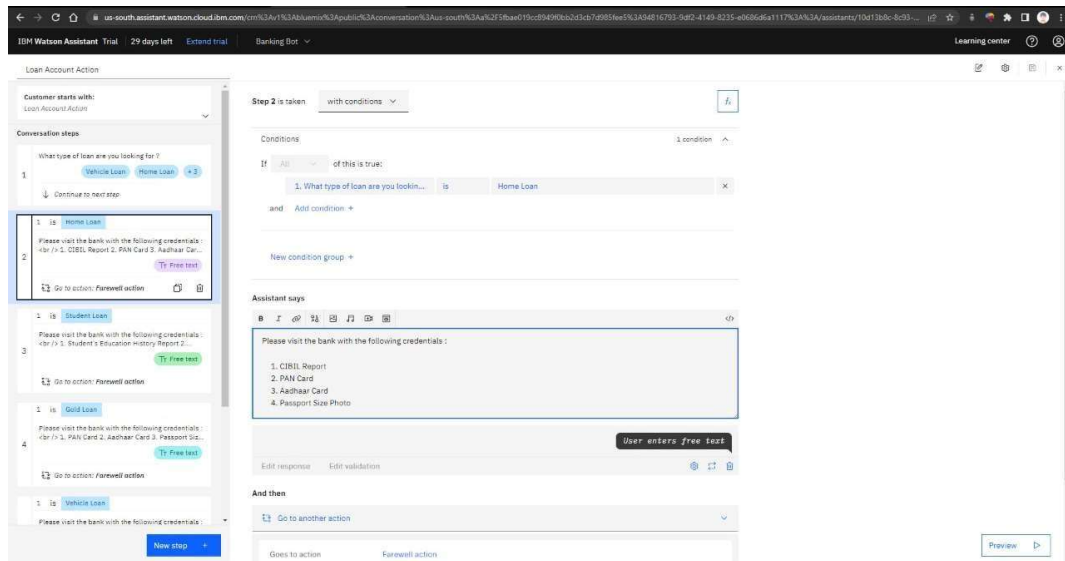
The screenshot shows the IBM Watson Assistant interface for configuring a Business Loan action. On the left, a list of actions is visible, with 'Business Loan' selected. The main panel displays the configuration for 'Step 6 is taken'. The conditions section shows a single condition: '1. What type of loan are you looking... is Business Loan'. The assistant's response is a text block: 'Please visit the bank with the following credentials : 1. CIBIL Report 2. PAN Card 3. Aadhaar Card 4. Passport Size Photo'. Below this, the 'And then' section shows a 'Go to another action' dropdown set to 'Farewell action'.



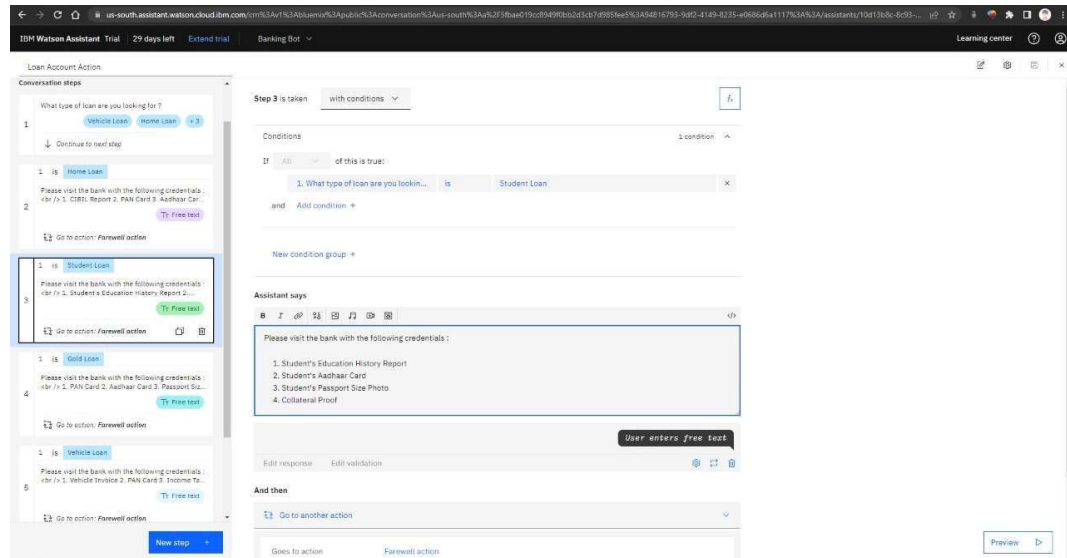
### 3) For Vehicle Loan



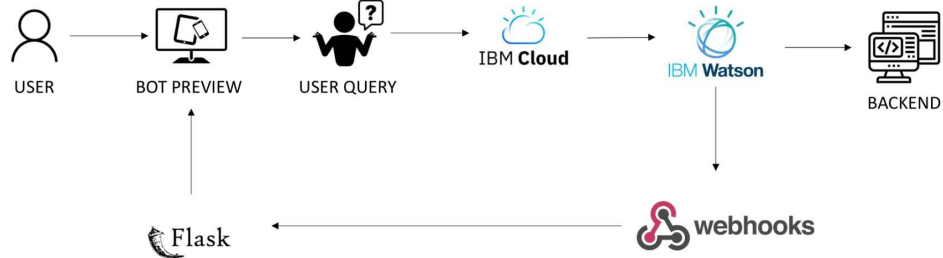
### 4) For Home Loan



## 5) For Student Loan



## 7.3 Database Schema



## 8. TESTING

### 8.1 Test Cases

S.No	Test Cases	Passed/ Failed
1.	Providing List of Queries	Passed
2.	Creating a Bank Account	Passed
3.	Prerequisites for Services	Passed
4.	Loan Offers	Passed
5.	Timings and Venue	Passed
6.	Troubleshooting Help	Passed
7.	Login/ Logout	Passed

## 8.2 User Acceptance Testing

S.No	Test Cases	Yes/ No
1.	Keyword driven	Yes
2.	Responds in manually drafted rules	Yes
3.	Manages multiple users	Yes
4.	Conversational Paradigm	Yes
3.	Learns from real interactions	No
4.	Training via historical data	No
5.	Has decision-making skills	No

## 9. RESULTS

### 9.1 Performance Metrics

## 10. ADVANTAGES

- Available 24/7 across the globe
- Direct connection with the bank agents
- No queueing in responses
- Latest queries are answered with ease
- Updated to the latest details
- Easy to setup and communicate

## DISADVANTAGES

- Limited Response Scaling
- Frequent Maintenance
- Misreading of Queries
- Connectivity Issues

## 11. CONCLUSION

The solution to almost all the querying applications has become chatbot for assistance and resolving. We believe that the same technology can be in banking queries as it was meant for that purpose. Though the bot would not be able to solve or satisfy all the queries for customer, it can certainly resolve issues that the user might be facing often and help the banking sectors maintain great relationships with their customers.

## 12. FUTURE SCOPE

The future of project lies entirely on how the customers get benefitted from the interaction and the interface. We would have to make improvements in the bot to make it as user-friendly as possible. The following areas could have a serious impact on our scope:

- i. Support for multiple languages
- ii. Low latency in fetching responses
- iii. Voice and video instructions

## 13. APPENDIX

### Source Code :

```
1. window.watsonAssistantChatOptions = {
2.   integrationID: "a3d08917-7818-4e6b-bfc5-c71426f0321d", // The ID of this integration.
3.   region: "us-south", // The region your integration is hosted in.
4.   serviceInstanceID: "94816793-9df2-4149-8235-e0686d6a1117", // The ID of your service instance.
5.   onLoad: function(instance) { instance.render(); }
6. };
7. setTimeout(function(){
8.   const t=document.createElement('script');
9.   t.src="https://web-chat.global.assistant.watson.appdomain.cloud/versions/" +
      (window.watsonAssistantChatOptions.clientVersion || 'latest') + "/WatsonAssistantChatEntry.js";
10.  document.head.appendChild(t);
11. });
```

**GitHub :** <https://github.com/IBM-EPBL/IBM-Project-24962-1659951429>

### Project Demo Link :

[https://drive.google.com/file/d/1Dqs5JXhN xuunpOD8S\\_S2EWjMwW8oEob-/view?usp=sharing](https://drive.google.com/file/d/1Dqs5JXhN xuunpOD8S_S2EWjMwW8oEob-/view?usp=sharing)