MUTHAYAMMAL ENGINEERING COLLEGE

(An Autonomous Institution)

RASIPURAM-637408, NAMAKKAL Dt.,

Ph: 04287-220837,226837

PROJECT

AI BASED DISCOURSE FOR BANKING INDUSTRY

DONE BY

TEAM ID: PNT2022TMID18803

PONNAPATI DINESH KUMAR REDDY (LEAD)

BOMMEPALLE HARSHA VARDHAN REDDY

PONNAPATI DEEPAK KUMAR REDDY

POTHUPETA BHARGAV

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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

Project Title	Algorithms used	Advantages	Disadvantages
Impact Of Online Banking Services: A Study.	Usage of Technology Acceptance Model (TAM)	A basic overview of how the system of Online banking works	Lacks the detailed explanation of the networks and clients involved.
Impact of E-Banking on Traditional Banking Services. International Journal of Computer Science and Communication Networks	Usage of B2C Disbursement On Net, Client Service on the queries, Account Management	It recommends suitable banking option for every option the user selects	No working model or a framework has been provided
An Evaluative Study on Internet Banking Security among Selected Indian Bank Customer	Analyses the customers' perceptions and awareness towards Internet banking security. Knows impact of the internet banking securities among the selected customers in Coimbatore	Gives a metric on how the services, security and the benefits that are being used in the online banking	Has no involvement of Artificial Intelligence

The Influence of Artificial Intelligence on the Banking Industry & How AI is Changing the Face of Modern Day Banks	Provides an extremely detailed overview of how the machine learning can do in helping banking customers	Findings of the influence of the AI algorithms on the fraud detection and its prevention	No particular algorithm was actually emphasized in the entire study
How Artificial Intelligence is changing the banking sector	Studies the areas where the artificial intelligence is being used by the banks. Studies about the applications of AI in use in the leading commercial banks in India: State Bank of India, HDFC, ICICI and Axis	Provision of Smart Wallets, Underwriting, Voice Assisted Banking and Smart Lending Decisions	Individual Banking solutions for every sector has been given generally for which the queries and responses can differ extensively
Utilization of artificial intelligence in finance	Studies about the application of Artificial intelligence in Banking Sector Understands the problems faced by customers while using internet banking services	Anomaly detection through pattern recognition Market Analysis through data mining	No specific usage of chatbot in the cloud or the usage of any helping service that would serve the banking customers

2.2 References

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[3]. V. Vimala (2015). An Evaluative Study on Internet Banking Security among Selected Indian Bank Customer

[4]. Kaur, Navleen & Sahdev, Supriya & Sharma, Dr. (2020). Banking 4.0: -The Influence of Artificial Intelligence on the Banking Industry & How AI is Changing the Face of Modern Day Banks‖. International Journal Of Management. 11. 577-585. 10.34218/IJM.11.6.2020.049.

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[6]. Jewandah S (2018) "How Artificial Intelligence is changing the banking sector"

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[8]. Chan Kok Thim and Eric Seah (2011) , "Optimizing portfolio construction using artificial intelligence"

[9]. Ryoji Kashiwagi (2005), "Utilization of artificial intelligence in finance"

[10]. Vidhya Jolly (2016). The Influence of Internet Banking on the efficiency and cost savings for banks' customers

[11]. Richard Selassie Bebli. The Impact of internet banking service quality on customer satisfaction in the banking sector of Ghana

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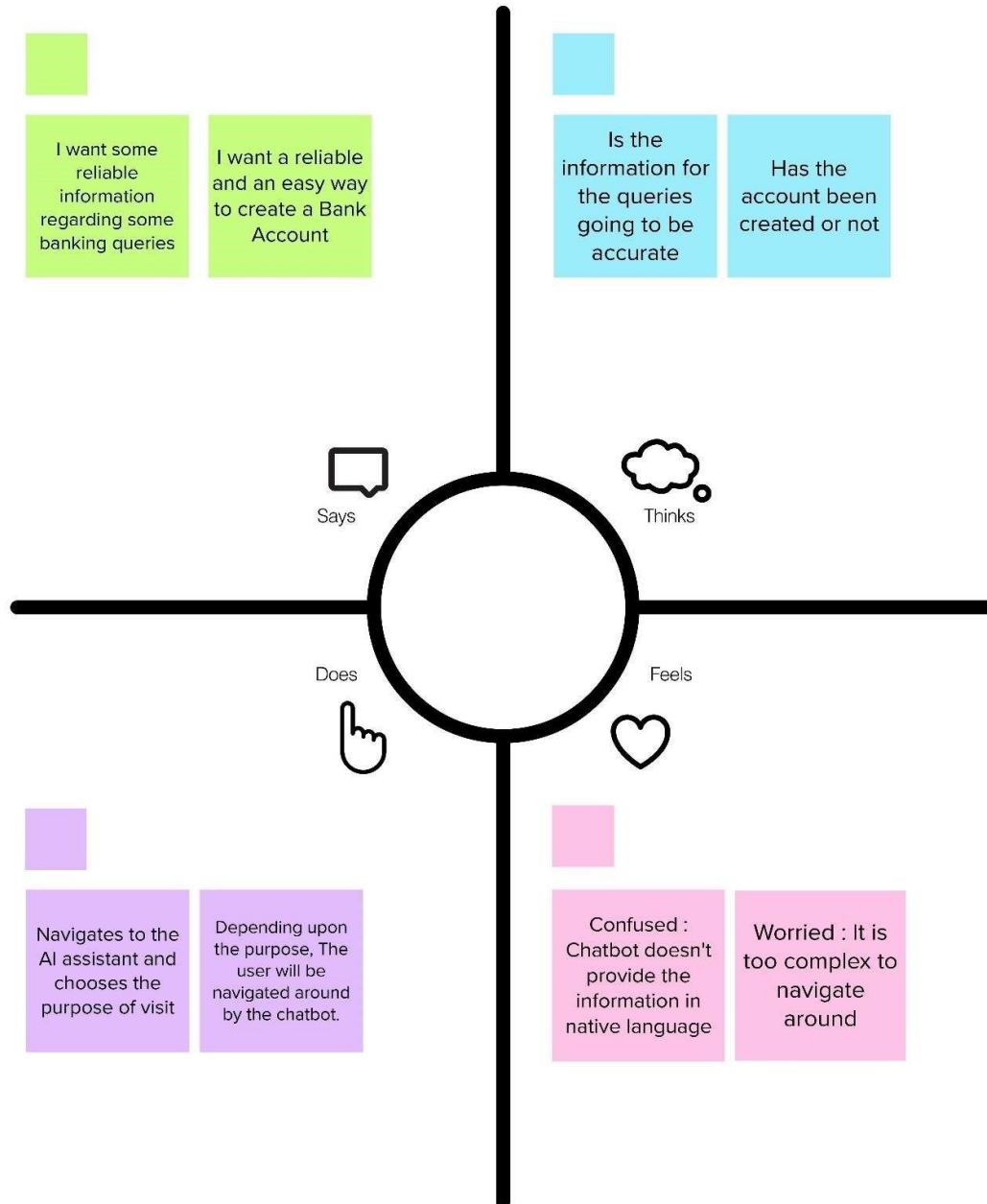
[13]. Prof. Edwin Agwu, The role of e-banking on operational efficiency of banks in Nigeria

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

Says

I want some reliable information regarding some banking queries

I want a reliable and an easy way to create a Bank Account

Thinks

Is the information for the queries going to be accurate

Has the account been created or not

Does

Navigates to the AI assistant and chooses the purpose of visit

Depending upon the purpose, The user will be navigated around by the chatbot.

Feels

Confused : Chatbot doesn't provide the information in native language

Worried : It is too complex to navigate around

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.

3.4 Problem Solution fit

1. CUSTOMER SEGMENT(S)	CS	6. CUSTOMER LIMITATIONS EG. BUDGET, DEVICES	CL	5. AVAILABLE SOLUTIONS PLUSES & MINUSES	AS
Customers of Bank		Misunderstood the customer's query, Seamless Internet connection Outdated software compatibility		Simple banking queries can be resolved quickly. Avaliable round the dock (24/7).	

2. PROBLEMS / PAINS + ITS FREQUENCY	PR	9. PROBLEM ROOT / CAUSE	RC	7. BEHAVIOR + ITS INTENSITY	BE
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.	

3. TRIGGERS TO ACT	TR	10. YOUR SOLUTION	SL	8. CHANNELS of BEHAVIOR	CH
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.		ONLINE Instantaneously respond to the queries, Assisting clients in clearing up their doubts.	
4. EMOTIONS BEFORE / AFTER	EM			OFFLINE 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 knowledgebased 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
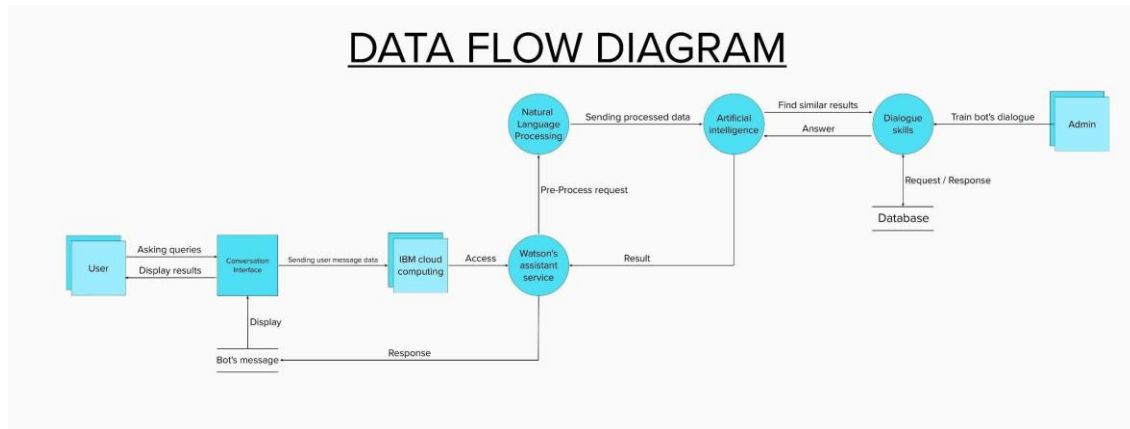
5.2 Solution & Technical Architecture
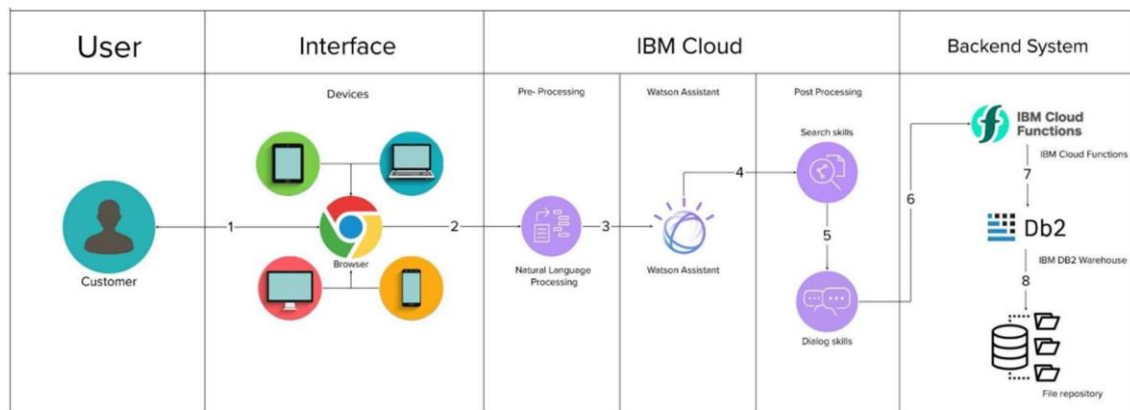
5.3 User Stories

	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	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
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	Project Planning Phase (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	Project & Development Phase (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
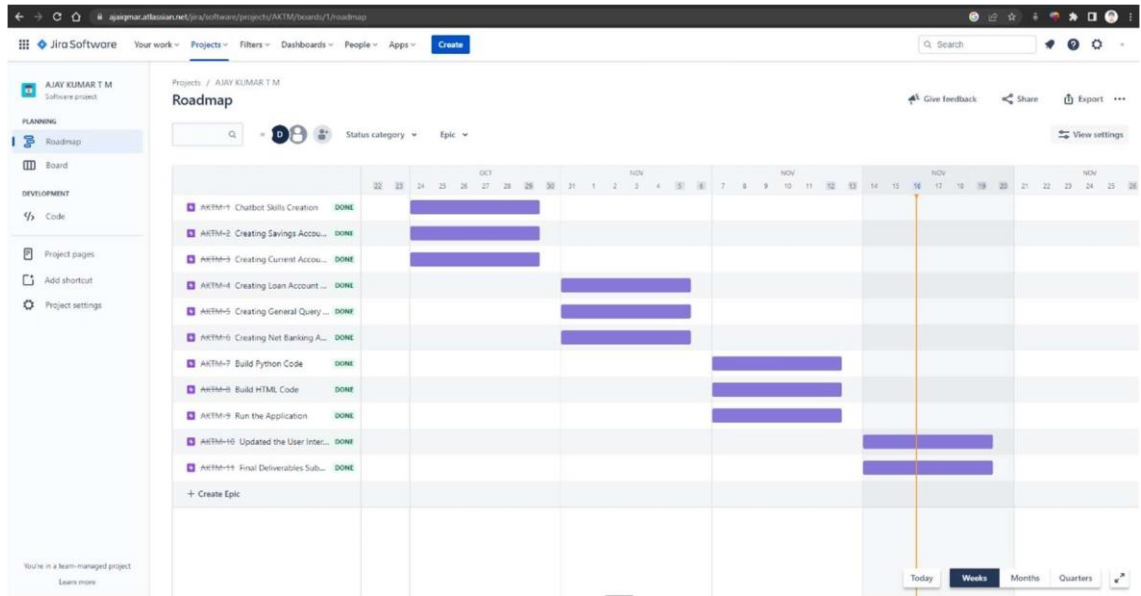
7. CODING & SOLUTIONING

7.1 Feature 1

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

Account Pre requisites

7.2 Feature 2
Loan Selection
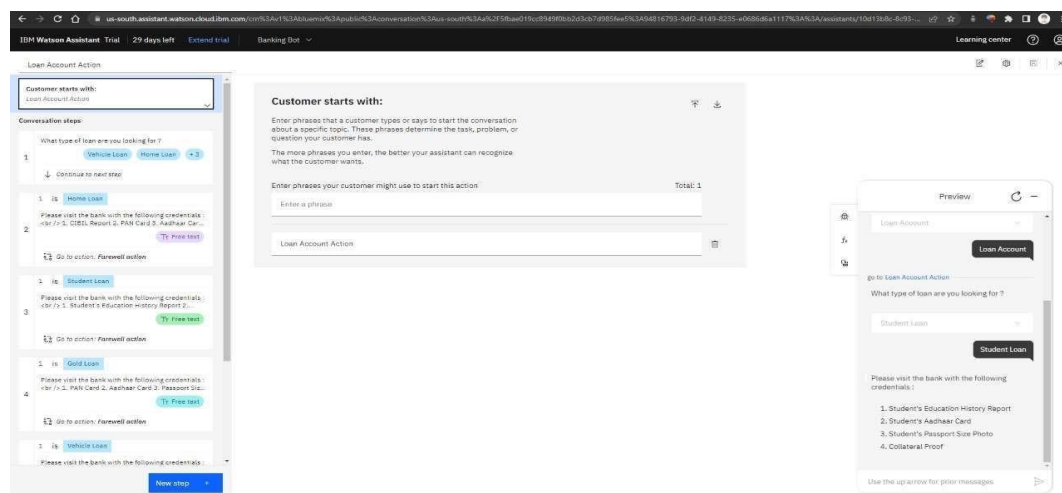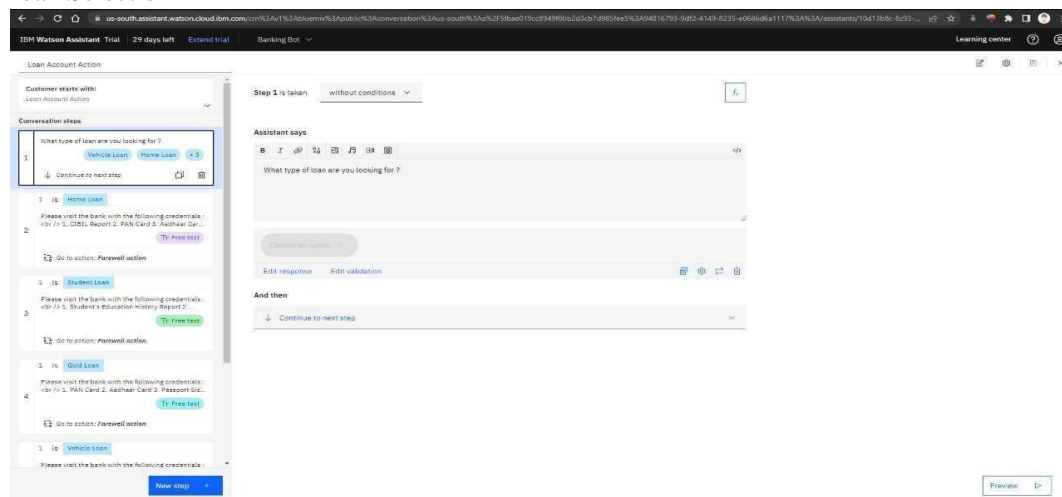
Providing the information about the credentials to be submitted:

1) For Gold Loan
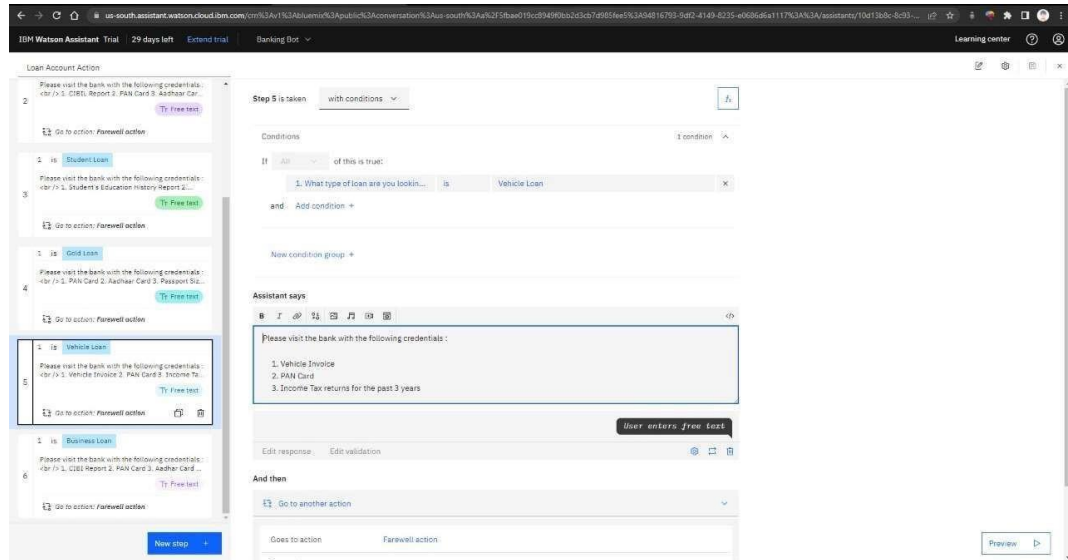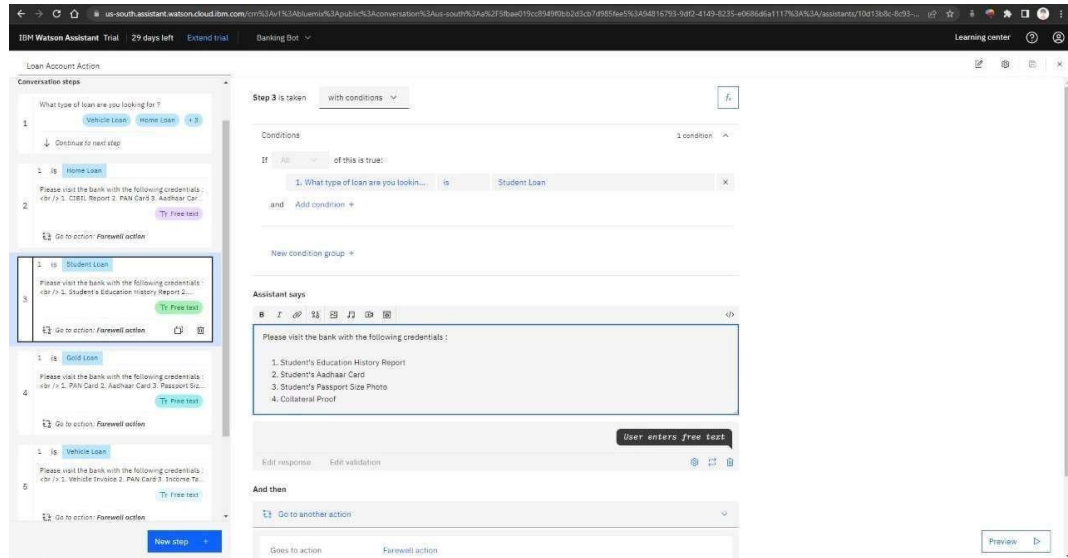

2) For Business Loan

3) For Vehicle Loan

4) For Home Loan
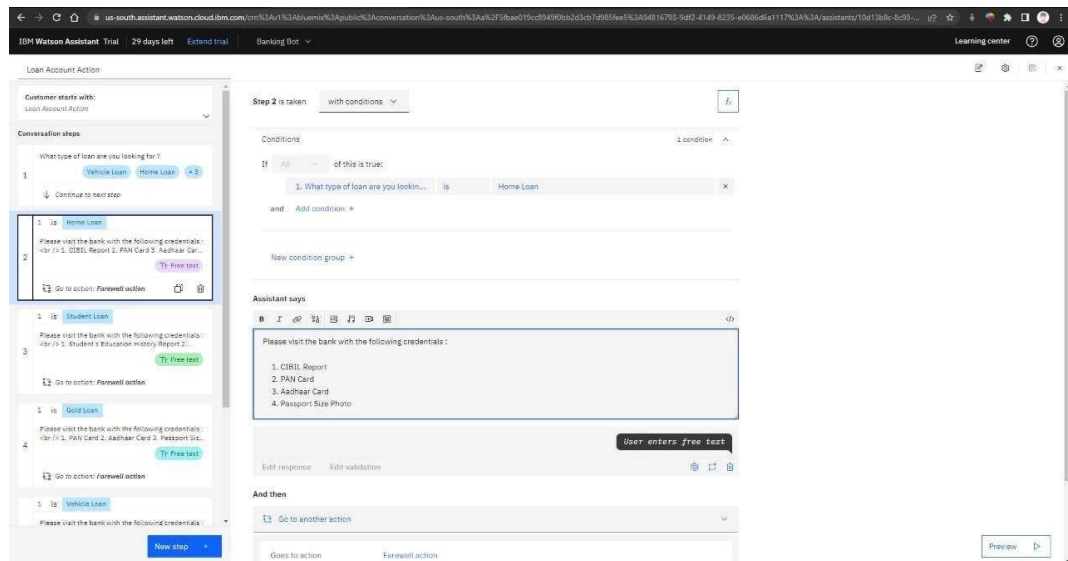
5) For Student Loan

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/1Dqs5JXhNxuunpOD8S_S2EWjMwW8oEob-/view?usp=sharing