Project Report Format

1. **INTRODUCTION**

1.1 Project Overview

A banking chatbot enables a 2-way communication between customer and the machine. This project aims to build a banking chatbot with IBM Watson Assistant which retrieves data from the IBM cloud and gives answers to customer queries via text messages in real time. This not only helps the customers in getting their answers in a shorter period of time but also allows bank to gain credibility and improve customer satisfaction.

1.2 Purpose

To achieve easy communication between banking chatbot and customers and to get their queries answered quickly, efficiently and with maximum accuracy

2. **LITERATURE SURVEY**

2.1 References

https://cloud.ibm.com/docs/watson-assistant

2.2 Problem Statement Definition

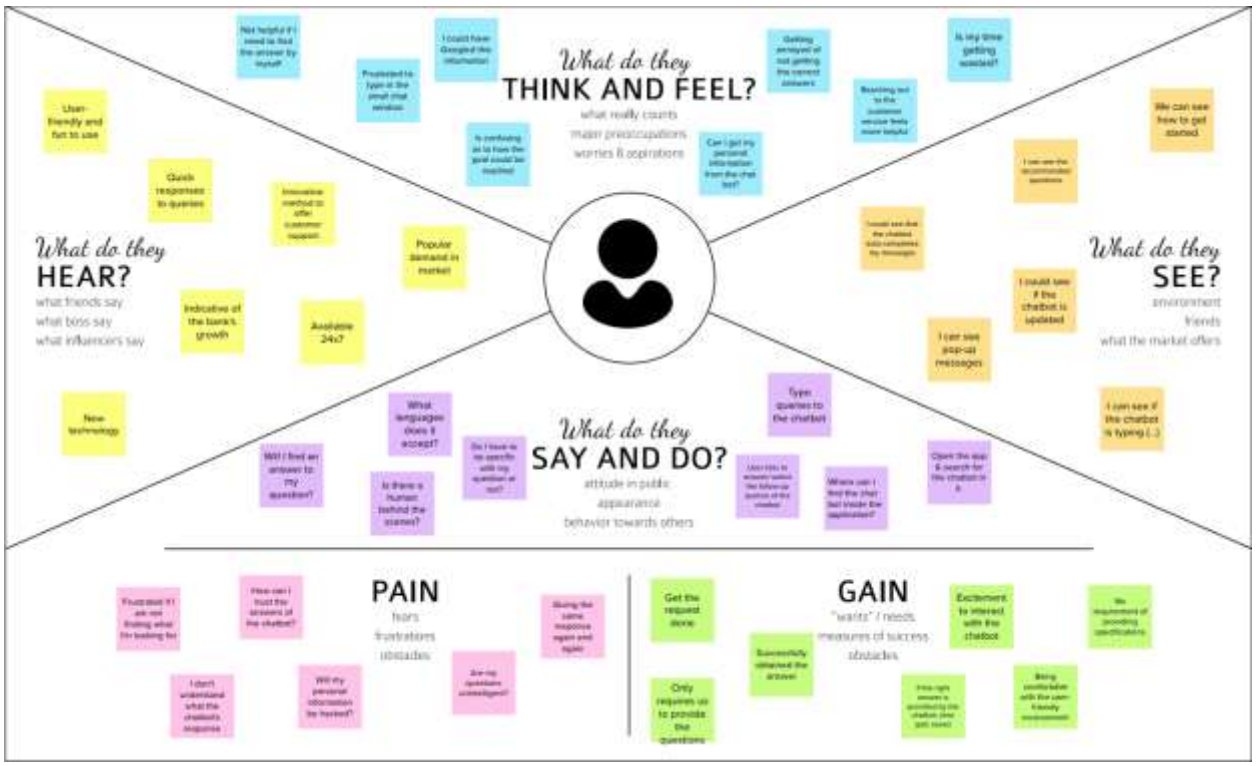
- A **Prospective Customer** needs a way to **get their banking queries answered** because **they want to explore what the bank offers.**

- An **Existing Customer** needs a way to **get their banking queries answered** because **they want quick and concise answers.**

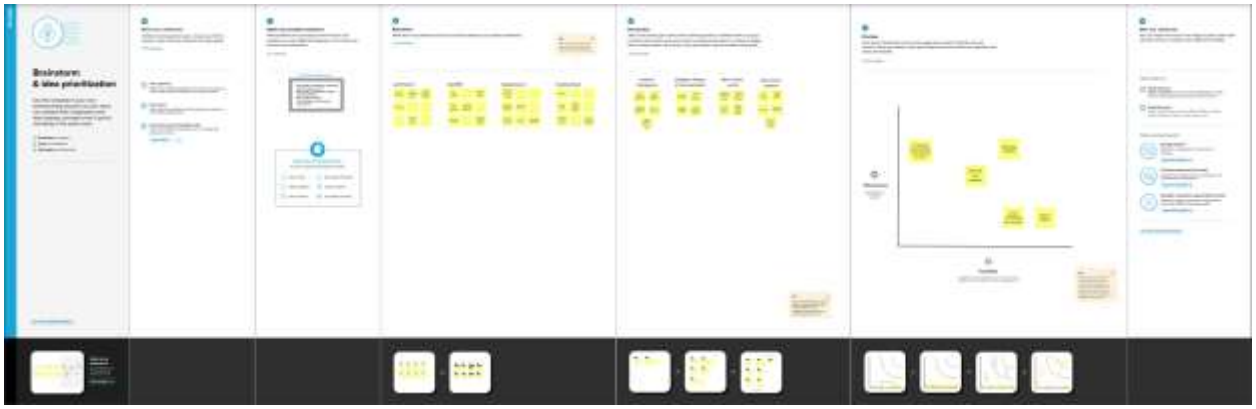
- A **Customer** needs a way to **get their banking queries answered** because **they want to avoid the hassles of talking/waiting over the phone.**

3. **IDEATION & PROPOSED SOLUTION**

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming



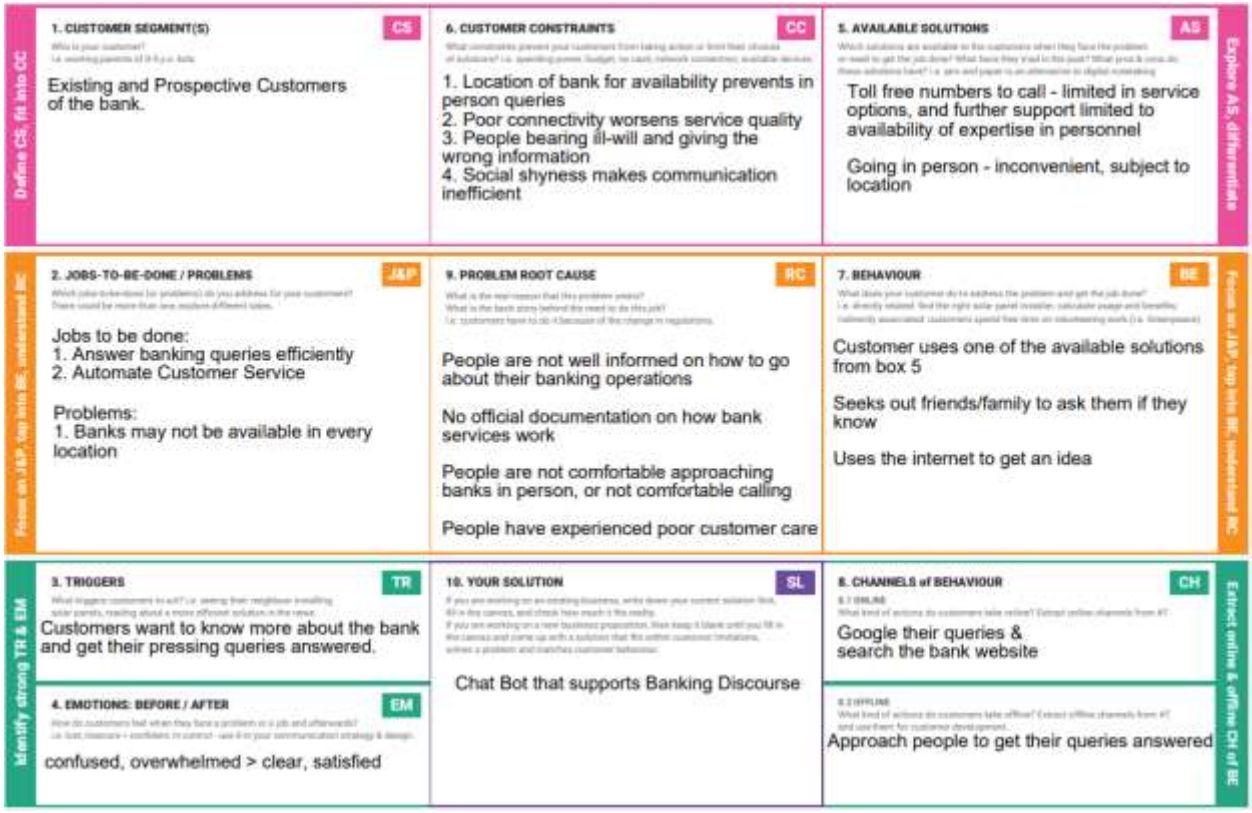
LINK:

https://github.com/IBM-EPBL/IBM-Project-17249-1659632320/blob/main/Project%20Design%20and%20Planning/Ideation%20Phase/Brain%20Storming%20%26%20Idea%20Prioritization.pdf

3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	A customer of the bank needs a way to get their banking queries answered in a quick and concise manner, while avoiding any hassles
2.	Idea / Solution description	A Chatbot that can understand the queries of the user and give appropriate answers
3.	Novelty / Uniqueness	Incorporating Data Analytics: - Frequently asked queries can be recommended to users - Related queries and answers can be recommended to users - Banks can tackle the most pressing issues with these analytics Taking feedback from users to improve the chatbot
4.	Social Impact / Customer Satisfaction	Successful implementation improves the image of the Bank, and customers are more likely to continue using their services and recommend the bank to other potential customers
5.	Business Model (Revenue Model)	- main value comes from automation of customer service via chatbot - reduces overhead costs WRT keeping personnel for customer support - improve customer retention rates, keeping business stable
6.	Scalability of the Solution	Relatively easier to scale than other technologies in the industry by simply updating codebase, improving hardware and data processing capabilites

3.4 Problem Solution fit



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Ways to approach the chatbot	It should also have predefined questions and keywords with their expected answers.
FR-2	Handling complex dialogues	It should be able to identify the intent of a question to provide an accurate answer and suggest options to confirm or resolve the issue.
FR-3	User Registration	It should allow unregistered users to register on the application and save their details to the database.
FR-4	User Confirmation	It should be able to provide confirmation notifications through either SMS or email.
FR-5	User login	Registered users should be able to login. Once login details are submitted to the database the user will be presented with a QR code implemented through Google's Two-Factor Authentication and then a unique

		code will be generated and sent to the user's mobile device.
FR-6	Getting information	The chatbot must allow users to view information about accounts held by them i.e. savings, loans, current account.
FR-7	Getting transaction details	The chatbot must allow users to view their transactions through a transaction statement sent to the users email.
FR-8	Assisting Users	The chatbot should be able to assist users with their queries and carry out appropriate actions such as scheduling appointments with finance consultants.
FR-9	Conversing with the user	The users should be able to converse with the chatbot through voice or text commands and it should understand what the user is saying with the help of natural language processing.
FR-10	Maintaining conversational state	The chatbot should be able to maintain the conversational state when the context may be unclear through previous messages and conversations.
FR-11	Providing responses	The chatbot must be able to provide text and audio responses.

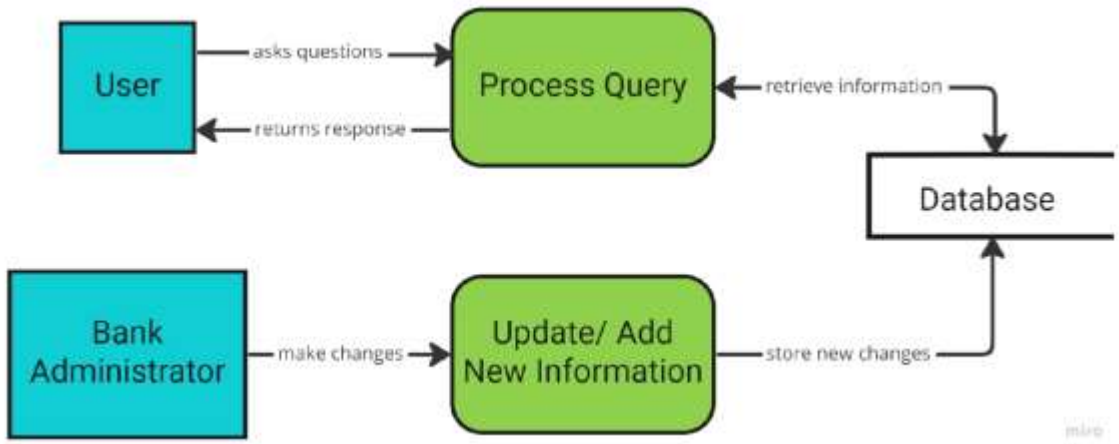
4.2 Non-Functional requirements

FR No.	**Non-Functional Requirement**	**Description**
NFR-1	**Usability**	The user should have prior knowledge as to how to use a conversational interface and what it is used for.
NFR-2	**Security**	The connection between the Web API and the programs should use HTTPS for security.
NFR-3	**Reliability**	The chatbot must perform without failure in 99% of the use-cases.

NFR-4	**Performance**	It should be simple, to-the-point information retrieval process
NFR-5	**Availability**	The chatbot must be available to the users 24/7.
NFR-6	**Scalability**	Multiple users must be able to use the chatbot at the same instant
NFR-7	**Portability**	The chatbot must be able to perform well in all environments (i.e. all operating systems and browsers).
NFR-8	**Compatibility**	Must support various versions of Android and iOS.
NFR-9	**Fast Response**	The average time for the server to respond, over the question testing set, should be less than or equal to 2 seconds.
NFR-10	**Ease of Use**	A new user will make less than 3 mistakes in 5 minutes after 5 minutes of use.
NFR-11	**Maintainability**	The Mean Time To Restore(MTTR) a system following a system failure shouldn't be greater than 10 mins.

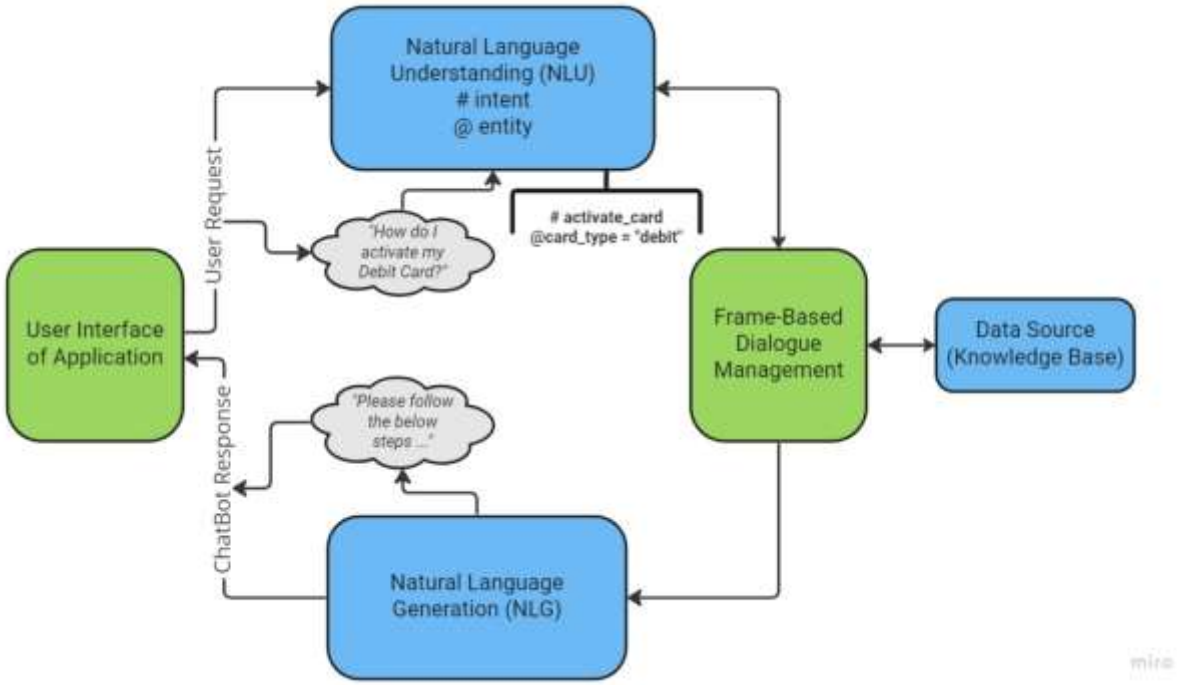
5. PROJECT DESIGN

5.1 Data Flow Diagrams

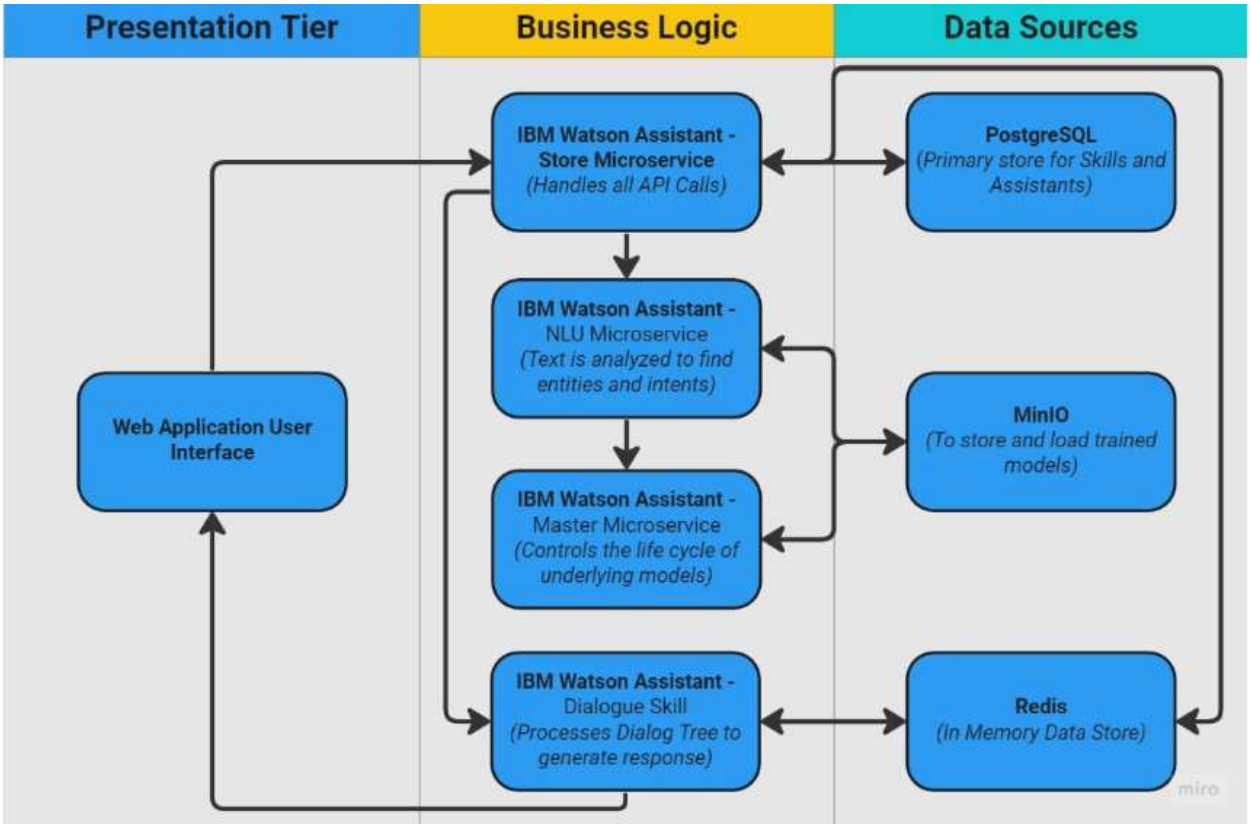


5.2 Solution & Technical Architecture

SOLUTION ARCHITECTURE:



TECHNOLOGY ARCHITECTURE:



5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer	Getting Information	USN-1	As a user, I should be able to get answers to queries on creation of a bank account so that I understand how to create a bank account	If the answers are satisfactory	Low	Sprint-1
		USN-2	As a user, I should be able to get answers to loan queries so that I can request for loans			
		USN-3	As a user, I should be able to get answers to general banking queries so that I am aware of how the bank works		Medium	Sprint-2
		USN-4	As a user, I should be able to get answers to net banking queries so that I can use the application properly			
	Natural Language Processing (NLP) & Dialogue Management	USN-5	As a user, my intent should be understood so that the answers are concise	If the expected answer is delivered without too much exposition	High	Sprint-1
		USN-6	As a user, I expect the bot to understand the context from previous messages, so that the conversational state is maintained	If the bot can recommend solutions based on previous conversation	Medium	Sprint-3
		USN-7	As a user, I expect there to be predefined questions along with answers so that common queries are answered quickly	If the bot can list FAQs for all topics	Medium	Sprint-2
		USN-8	As a user, I expect the bot to assist me by carrying out appropriate actions beyond providing answers so that I experience a holistic customer service	If the bot can schedule appointments, contact consultants, etc	Medium	Sprint-3
		USN-9	As a user, I expect the bot to take input via text and voice, so that I can use it to my convenience	If the bot can understand both text and audio input	Medium	Sprint-4
		USN-10	As a user, I expect the bot to respond with text and voice, so that I can use it to my convenience	If the bot can respond with its own voice	Low	Sprint-4
Admin	Updating Database	USN-11	As an Admin, I should have the privilege to add or modify existing chat bot data, so that the chat bot is up to date with new bank services	If the bot can answer newer queries	Medium	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	Getting Information	USN-1	As a user, I should be able to get answers to queries on creation of a bank account so that I understand how to create a bank account	3	Low	Anni
Sprint-1		USN-2	As a user, I should be able to get answers to loan queries so that I can request for loans			Gokul
Sprint-2		USN-3	As a user, I should be able to get answers to general banking queries so that I am aware of how the bank works	5	Medium	Badri, Harshithaa

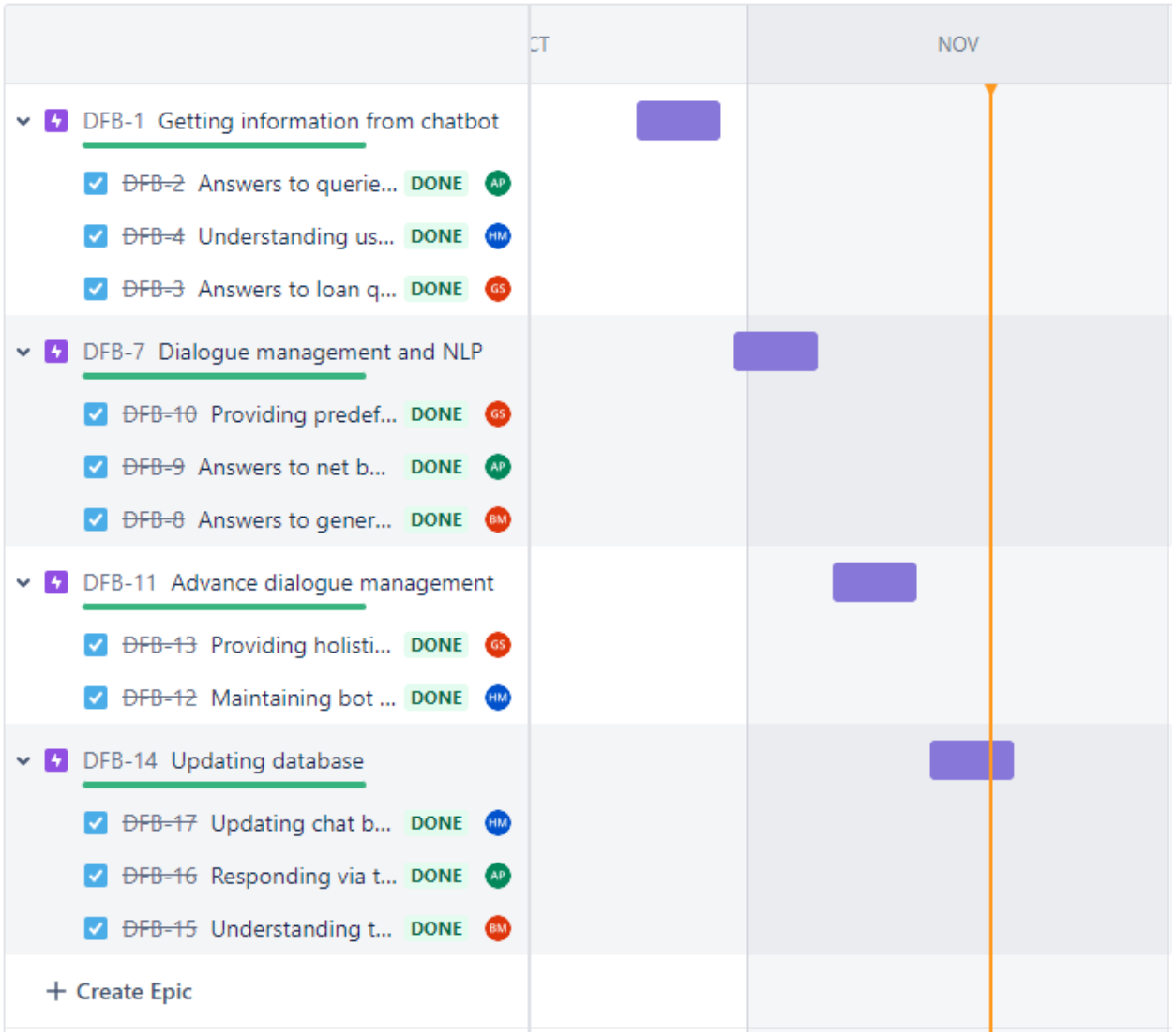
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2		USN-4	As a user, I should be able to get answers to net banking queries so that I can use the application properly			Gokul, Harshithaa
Sprint-1	Natural Language Processing (NLP) & Dialogue Management	USN-5	As a user, my intent should be understood so that the answers are concise	13	High	Anni, Badri, Gokul, Harshithaa
Sprint-3		USN-6	As a user, I expect the bot to understand the context from previous messages, so that the conversational state is maintained	8	Medium	Anni, Harshithaa
Sprint-2		USN-7	As a user, I expect there to be predefined questions along with answers so that common queries are answered quickly			Badri, Gokul
Sprint-3		USN-8	As a user, I expect the bot to assist me by carrying out appropriate actions beyond providing answers so that I experience a holistic customer service			Gokul, Anni
Sprint-4		USN-9	As a user, I expect the bot to take input via text and voice, so that I can use it to my convenience	5	Medium	Badri, Anni
Sprint-4		USN-10	As a user, I expect the bot to respond with text and voice, so that I can use it to my	3	Low	Badri, Gokul

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
			convenience			
Sprint-4	Updating Database	USN-11	As an Admin, I should have the privilege to add or modify existing chat bot data, so that the chat bot is up to date	5	Medium	Harshithaa, Anni

6.2 Sprint Delivery Schedule

TITLE	DESCRIPTION	DATE
Literature & information gathering	Literature survey on the selected project & gathering information by referring the, technical papers, research publications etc.	28 SEPTEMBER 2022
Prepare Empathy Map	Prepare Empathy Map Canvas to capture the user Pains & Gains, Prepare list of problem statements	24 SEPTEMBER 2022
Ideation	List the by organizing the brainstorming session and prioritize the top 3 ideas based on the feasibility & importance.	25 SEPTEMBER 2022
Proposed Solution	Prepare the proposed solution document, which includes the novelty, feasibility of idea, business model, social impact, scalability of solution, etc.	23 SEPTEMBER 2022
Problem Solution Fit	Prepare problem - solution fit document.	30 SEPTEMBER 2022
Solution Architecture	Prepare solution architecture document.	28 SEPTEMBER 2022
Customer Journey	Prepare the customer journey maps to understand the user interactions & experiences with the application (entry to exit).	20 OCTOBER 2022
Functional Requirement	Prepare the functional requirement document.	8 OCTOBER 2022
Data Flow Diagrams	Draw the data flow diagrams and submit for review.	9 OCTOBER 2022
Technology Architecture	Prepare the technology architecture diagram.	10 OCTOBER 2022
Prepare Milestone & Activity List	Prepare the milestones & activity list of the project.	22 OCTOBER 2022
Project Development - Delivery of Sprint-1, 2, 3 & 4	Develop & submit the developed code by testing it	IN PROGRESS.

6.3 Reports from JIRA



7. SOLUTIONING

7.1 Feature 1

Natural Language Understanding:

The questions to the chatbot can be in the form of human language and the Chatbot understands the questions and responds appropriately.

7.2 Feature 2

Option Selection

The Chatbot (when required) responds with a variety of options for the user to choose from thereby eliminating the need for the user to elaborate (and thus saving time)

7.3 Feature 3

External Support

In case the Chatbot is unable to provide an answer for the question asked, it responds with the contact of customer support, so that the user can get their queries clarified by them.

7.4 Feature 4 (not implemeted in the current version)

Incorporating Data Analytics:

- Frequently asked queries can be recommended to users
- Related queries and answers can be recommended to users
- Banks can tackle the most pressing issues with these analytics Taking feedback from users to improve the chatbot

8. TESTING

8.1 Test Cases

Link for Test Cases:

https://docs.google.com/spreadsheets/d/1RXs06cimoAALaHcz9JAhoIgx40StqePO/edit?usp=share_link&ouid=116599025181042427369&rtpof=true&sd=true

BankingBot_TC_001:

BankingBot_TC_002:

BankingBot_TC_003:

BankingBot_TC_004:

BankingBot_TC_005:

BankingBot_TC_006:

BankingBot_TC_007:

BankingBot_TC_008:

BankingBot_TC_009:

9. RESULTS

9.1 Performance Metrics

Response time (Chatbot's response time):

Ideal time = 0.5sec

Actual time = 1.0sec

10. ADVANTAGES & DISADVANTAGES

Advantages:

1.1 Fast-paced communication.

1.2 More convenient mode of communication.

1.3 Provides a personalized experience for clients .

1.4 Round-the-clock support.

1.5 Enhanced productivity of bank personnel.

Disadvantages:

1.1 Requires lot of training data.

1.2 Might leave the end-user with unanswered questions

11. PROJECT NOVELTY:

So here in our project we have added a feature where the end-user can share his feedback about the performance of the chatbot. This will provide us with a clear insight of whether the chatbot is functioning properly or if any updates are required. (We have also used this feature for the purpose of performance testing).

SCREENSHOT:

12. CONCLUSION

The Chatbot has been trained now to answer queries related to loan and the various types of loan, net banking, savings account, etc. We aim to incorporate much more features to this bot in the near future.

13. FUTURE SCOPE

- Include a voice assistant.
- Create a larger dataset for training so that the customer could get more curated answers.

14. APPENDIX

Source Code

Link:

https://github.com/IBM-EPBL/IBM-Project-17249-1659632320/tree/main/Code/venv

GitHub & Project Demo Link

GitHub Link: https://github.com/IBM-EPBL/IBM-Project-17249-1659632320

Project Demo Link: https://www.youtube.com/watch?v=wutbYrZCF-M