Project Report

AI-based discourse for Banking Industry

TEAM ID: PNT2022TMID39294

TEAM MEMBERS:

ROLE	NAME	ROLL NO
TEAM LEADER	JAGATHESWARAN. S	(422619104018)
TEAM MEMBER 1	DWARAGA. R.V	(422619104011)
TEAM MEMBER 2	JOSEPH VIKRAM. R	(422619104019)
TEAM MEMBER 3	DHIVYA. S	(422619104009)

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CHAPTER 1

1. INTRODUCTION

1.1 Project Overview

A chatbot is a computer software program that conducts a conversation via textual methods. Chatbots are programs that work on Artificial Intelligence (AI) & Machine Learning Platform. The present study advances the understanding of human-AI interactions by producing new knowledge on chatbot affordances and customer value creation.

In this project, we used Watson's assistant to create a chatbot. This chatbot has the following capabilities:

- This chatbot can guide a customer through creating a bank account.
- This chatbot can answer loan queries.
- This chatbot can be used to answer general banking queries.
- This chatbot can answer queries regarding net banking.

1.2 Purpose

In banks, at user care centres, and at inquiry desks, humans are insufficient and usually take a long time to process a single request, which results in wastage of time and also reduces the quality of user service. The main purpose of this chatbot is that users can interact by mentioning their queries in plain English, and the chatbot can resolve their queries with an appropriate response in return. The chatbot will be used to give information or answers to any question asked by the user related to banking. It is more like a virtual assistant; people feel like they are talking with a real person.

Furthermore, this chatbot is intended to provide consumers with prompt assistance while also improving the bank's and its employees' operating efficiency. Also, conversational AI in banking helps employees distribute their workload. It assists consumers in the majority of banking settings, from responding to them immediately to aiding them with anything they need. It recognises human languages and allows for text-based communication. These banking chatbots converse with humans in a very natural manner in order to handle their queries and provide support as needed.

CHAPTER 2

2. LITERATURE SURVEY

2.1 Existing Problem

      The fundamental problem with banking chatbots in customer support comes with interpreting the messages and understanding the user's intention. Unlike machines, who know the one and only possible way of saying things, people do it in a variety of ways. Another thing that needs to be considered is the style of the chatbot. The user doesn't really like to deal with an answering machine. They want a little bit more affective interaction. That means chatbots need to have some attitude. The big problem that comes with customizing and adjusting chatbot behaviour is understanding the limits of natural language processing (NLP). The current state of natural language processing is not advanced enough to tackle everything. The synonyms and the extraction of entities have been taken care of, but what about the mixing of local language and the words and slang being added to the vocabulary at a speed we are not matching with? As a result, chatbots have to deal with a lack of personality and conversational flow. Chatbots can't solve everything. Even though chatbot development challenges can be cost-effective in their operation and labour, they could be costly as they require a high level of coding.

2.2 References

ARTIFICIAL INTELLIGENCE POWERED BANKING CHATBOT (2018)

K. Satheesh Kumar, S. Tamilselvan, B. Ibrahim Sha, S. Harish

The dataset, architecture, and methodology used to create such a chatbot are all defined in this paper. The dataset was created from FAQs on bank websites. This study compares seven machine learning (ML) classification algorithms that are used to categorize input for chatbots.

Link:
https://ijesc.org/upload/4a63d52eda62397d8c051e687773e6d0.Artificial%20Intelligence%20Powered%20Banking%20Chatbot.pdf

CHATBOT IN PYTHON (2019)

Akshay Kumar, Pankaj Kumar Meena, Debiprasanna Panda, Ms. Sangeetha

Using Artificial Intelligence Markup Language (AIML) and Latent Semantic Analysis (LSA) on a Python platform, researchers present the design of a chatbot that responds to each enquiry with a sincere and accurate response.

Link: https://www.irjet.net/archives/V6/i11/IRJET-V6I1174.pdf

CHATBOT DEVELOPMENT USING PYTHON (2020)

Shreyashkar Sharma

The primary goal that will be covered in this article is the creation of a web API as well as some sample web and text messaging interfaces that show how to use API. Researchers are attempting to comprehend these chatbots and their drawbacks in this research work.

Link: https://www.studypool.com/documents/6540002/chatbot1

CONVERSATION TO AUTOMATION IN BANKING THROUGH CHATBOT USING ARTIFICIAL MACHINE INTELLIGENCE LANGUAGE (2020)

Sasha Fathima Suhel, Vinod Kumar Shukla, Sonali Vyas, Ved Prakash Mishra

This paper examines some of the most recent AI patterns and activities before offering alternate theories of change for some of the most well-liked and commonly accepted postulates of the present. based on fundamental artificial intelligence System-chatbots, also known as chatterbots, are created by structuring and working with (artificial intelligence) for this purpose. The study demonstrates how AI is always developing. There isn't enough knowledge on AI at the moment, but this study introduces a novel idea that deals with machine intelligence and illuminates the possibilities of intelligent systems.

Link:
https://www.researchgate.net/publication/344285556_Conversation_to_Automation_in_Banking_Through_Chatbot_Using_Artificial_Machine_Intelligence_Language

Banking Chatbot (B-Bot) (2021)

Dr. C. Punitha Devi, Dr. S. Geetha, N. Nagalakshmi, S. Karthiga, V. Suvedhae

The purpose of this article is to construct a chatbot that can respond to client inquiries, look up answers in the knowledge base, and offer a solution. In the end, less human work is required because the chatbot can manage the requests.

Link:

https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwitie-5qqv7AhXrTWwGHXMxCxEQFnoECA4QAQ&url=https%3A%2F%2Fwww.turcomat.org%2Findex.php%2Fturkbilmat%2Farticle%2Fdownload%2F5394%2F4501%2F10006&usg=AOvVaw2sikb8uiydKOs-LS4IFZeb

CHATBOT USING PYTHON (2022)

Susmitha Mary, Sweety Sahani

Researchers are attempting to understand these chatbots and their drawbacks in this research work. A user-submitted query or declaration that gives the user control over the displayed content

Link: https://doi.org/10.22214/ijraset.2022.43045

BANKING BOT (2018)

K. Khavya

This study covers the four fundamental bank transactions: adding and viewing a beneficiary, transferring funds, viewing the balance, and generating a small statement. Users can also post any inquiries they may have about banking activities.

Link: https://www.ijntr.org/download_data/IJNTR04070041.pdf

BANK CHAT BOT USING PYTHON (2021)

Uttam Kumar Singh, Himanshi Goyal, Monica Kumari

This paper exemplifies the chatbot, which is capable of performing every task a bank can, including withdrawing money, making deposits, and learning about the bank's various products. Every customer may communicate with a chatbot and understand what they are dealing with, which is another benefit.

Link:

https://www.proquest.com/openview/54dcf271505dd83259072714a7b92304/1.pdf?pq-origsite=gscholar&cbl=2045096

2.3 Problem Statement Definition

Traditional banks charge fees for a wide range of financial services, like checking the balance. Although traditional banks provide face-to face customer service, it sometimes takes longer to resolve customer complaints. This procedure also necessitates a slew of paperwork and bureaucracy, which can be time-consuming. Traditional banks have set once hours and days when they are open. This means you can only visit banks during this time. Banks may encounter a wide range of problems, both simple and complex. Customer service representatives are frequently overburdened, and they fail to give each customer the attention they require. This frequently results in negative experiences and may even cause them to leave.

Therefore, the goal of this project is to create a chatbot that can handle all simple queries. This banking chatbot responds to specific customer queries that are related to various loan information, answers banking queries, and answers questions regarding net banking. It also instructs the customers on how to open a savings or current account.
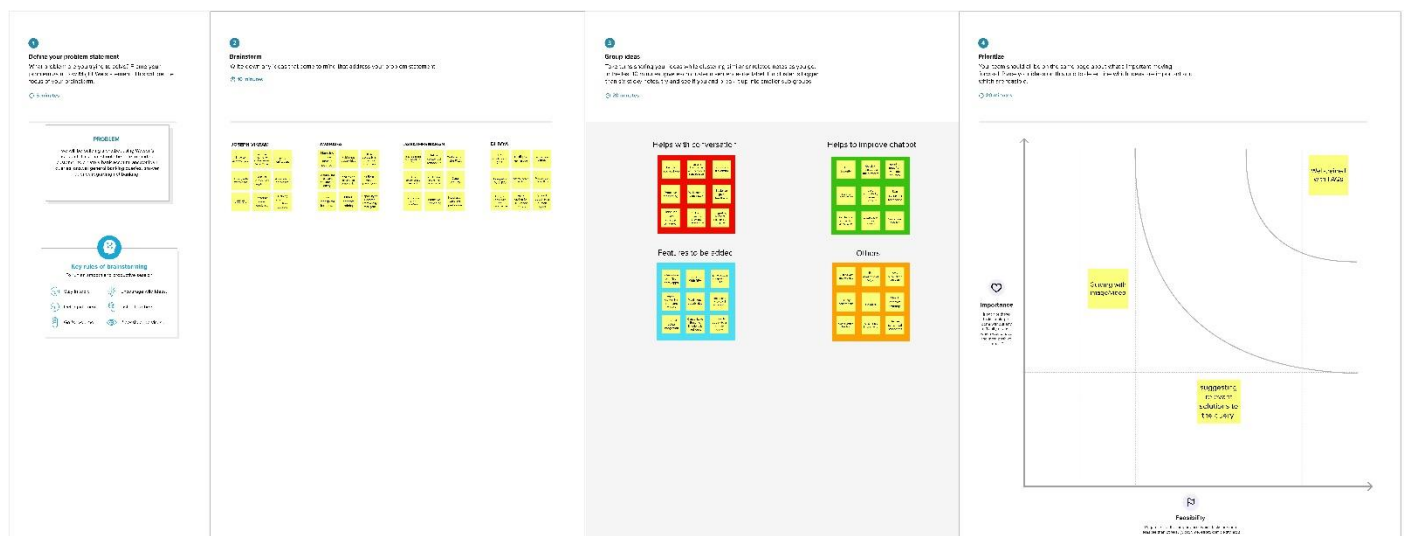
CHAPTER 3

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

3.2 Ideation & Brainstorming

3.3 Proposed Solution

S.No.	Parameter	Description
1	Problem Statement (Problem to be solved)	Traditional banks charge fees for a wide range of financial services, like checking the balance. Although traditional banks provide face-to face customer service, it sometimes takes longer to resolve customer complaints. This procedure also necessitates a slew of paperwork and bureaucracy, which can be time-consuming. Traditional banks have set once hours and days when they are open. This means you can only visit banks during this time. Banks may encounter a wide range of problems, both simple and complex. Customer service representatives are frequently overburdened, and they fail to give each customer the attention they require.
2	Idea / Solution description	This problem can be solved by using an automated solution, such as a chatbot, which can handle all simple queries. You could reduce your employees' workload by having a chatbot handle all of the simple customer requests. As a result, your employees will have more time to deal with more complex issues. AI chatbots communicate with humans in a very natural form to resolve their queries and assist them as required. The core purpose of this chatbot is to provide customers with prompt service. It understands human languages and supports them in text-based communication.
3	Novelty / Uniqueness	With automation, simple banking queries can be resolved in no time. This chat bot responds to specific customer queries that are related to various loans information, answers banking queries and answers queries regarding net banking can be easily automated with this banking chatbot. It also instructs the customers on how to open a savings or current account. Customers don't need to scroll through the website or application to search for a certain piece of information and would rather just use bot.
4	Social Impact / Customer Satisfaction	Benefiting customers in banking is providing a better customer experience. 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 leads to providing a better personalised experience for clients. Chatbots have access to the full client information even before they start the conversation process. more convenient mode of communication. Chatbots may combine various functionalities that would make them convenient for customers of different age groups. Customers can ask their questions on their convenient devices at any time and from any location, but more importantly, they can ask queries as many times as they want
5	Business Model (Revenue Model)	The chatbot is the future of digital banking. With the advent of banking chatbots, certain essential aspects of customer care and support – such as speed, access to information, and pleasant encounters – are more feasible. Chatbots in digital banking may save a lot of money each year. By adopting artificial intelligence to banking, it decreases expenses. It increases work efficiency and decreases workload. If an AI chatbot can handle a customer's queries, they won't have to wait in line for a human agent or sit on the phone wringing their hands. Agents assisted by AI chatbots may focus on addressing complicated problems while the chatbots answer basic consumer questions on a large scale. So, the number of human agents is significantly reduced due to the advantage of chatbots. This helps the bank to reduce the cost of hiring an excessive number of human agents, which is financially beneficial to banks.
6	Scalability of the Solution	The AI in chatbots is evolving from rule-based to conversational AI. The banking chatbot's scalability has been increased from simple basic bank queries and checking balances to guiding customers on how to open bank accounts. This chatbot has the potential to grow to the point where it can handle complex queries and solve a wide range of other complex queries that only human agents can handle. This increases the scalability of handling a large number of people at the same time and breaks the limitations of chatbots that are only useful to a specific group of people. Banks need a huge customer support team because of their large customer base. Unlike human agents, banking chatbots can interact with thousands of customers at a time. They can help with query resolution using AI technologies and close tickets within no time.

3.4 Problem Solution Fit

Problem-Solution Fit canvas

Purpose / Vision

Version:

1. CUSTOMER SEGMENT(S)	CS	6. CUSTOMER LIMITATIONS EG. BUDGET, DEVICES	CL	5. AVAILABLE SOLUTIONS PLUSES & MINUSES	AS
Bank's Customers		Misunderstood the customer's query, Internet access is required, Outdated Mobile Experiences.		Simple banking queries can be resolved quickly, Saves lot of time, 24/7 Availability.	

Define CS, fit into CL / *Explore AS, differentiate*

2. PROBLEMS / PAINS + ITS FREQUENCY	PR	9. PROBLEM ROOT / CAUSE	RC	7. BEHAVIOR + ITS INTENSITY	BE
Limited response		slow response from human agent		Guiding customer create bank account	
Need to be Maintained		Limited only on working days		Answer loan queries	
Misreads the customer's query		Longer to resolve complaints		Answer general banking queries	
Unsuitable for outdated customers		Waiting in queue for assistance		Answer queries regarding net banking	
Losing customer insights		Cannot able to ask queries repeatedly		Automated customer service	

Focus on PR, tap into BE, understand RC / *Focus on PR, tap into BE, understand RC*

3. TRIGGERS TO ACT	TR	10. YOUR SOLUTION	SL	8. CHANNELS of BEHAVIOR	CH
Seeking customers' doubts, A customer needed guidance.		This problem can be solved by using an automated solution, such as a chatbot, which can handle all simple queries. You could reduce your employees' workload by having a chatbot handle all of the simple customer requests. It understands human languages and assist them in text-based communication.		**ONLINE** Instantaneously responding to 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					

Identify strong TR & EM / *Extract online & offline CH of BE*

CHAPTER 4

4. REQUIREMENT ANALYSIS

4.1 Functional Requirements

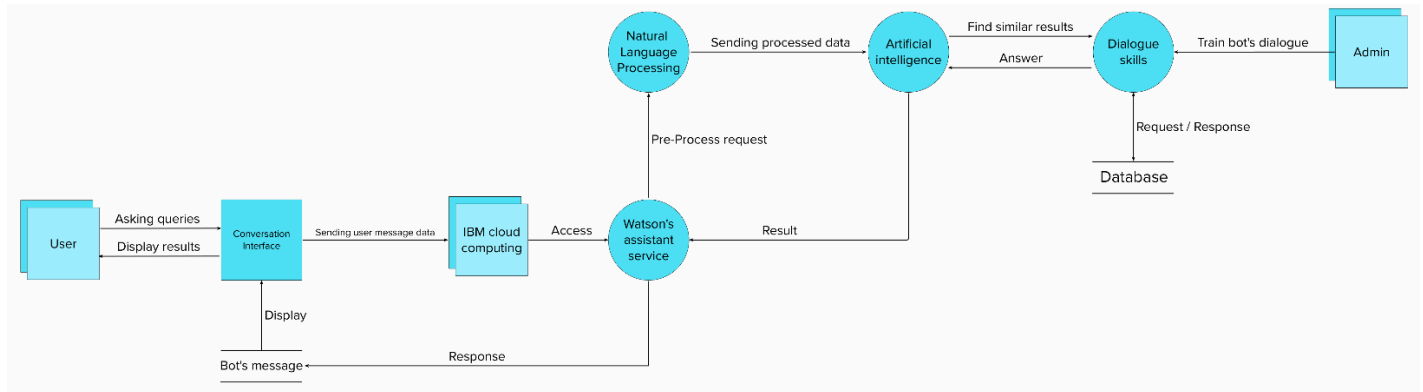| FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Greetings	As soon as a consumer joins the chatbot, it should greet them.
FR-2	Faster joining	Customers don't need to register in advance to use the bot; it will be available right away.
FR-3	Savings account creation guide	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

| FR No.	Non-Functional Requirement	Description
NFR-1	Usability	To answer questions and help 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.

CHAPTER 5

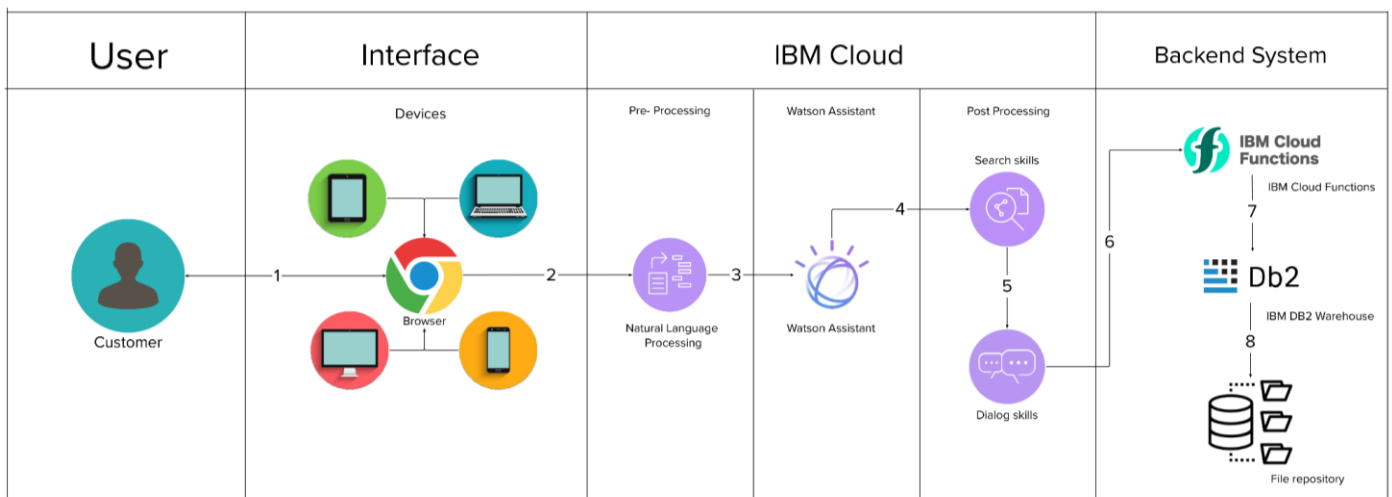## 5. PROJECT DESIGN

5.1 Data Flow Diagram

5.2 Solution & Technical Architecture

Solution Architecture
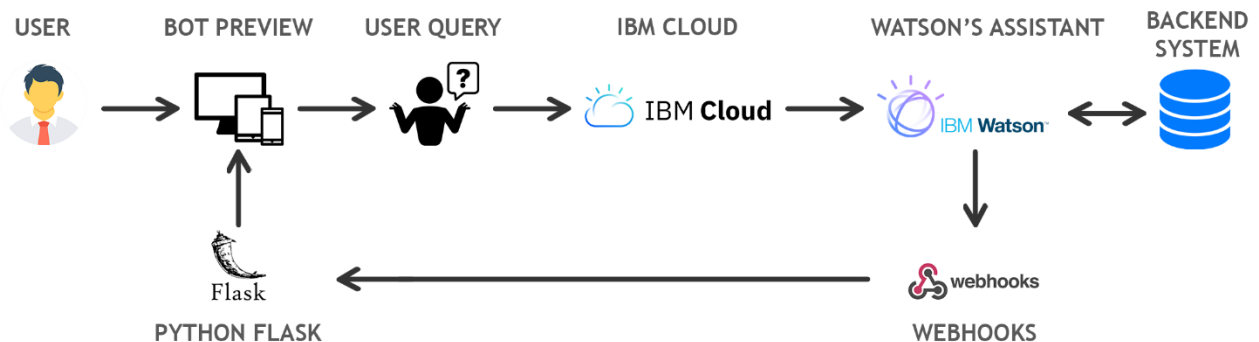
Technical Architecture

5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer	Dashboard	USN–1	As a user, I need to access the chatbot very quickly without registration	I can question the virtual assistance	Medium	Sprint–1
Customer Care Executive	Creating Skills & Assistant for Chatbot	USN– 2	As a user, I want a chatbot to be able to greet, suggest relevant queries and end of the conversation properly	I can start a conversation with chatbot	Medium	Sprint–1
Customer Care Executive	Creating Skills & Assistant for Chatbot	USN– 3	As a user, I want the chatbot to guide me through the creation of a savings account	I can inquire about opening a savings account.	High	Sprint–2
Customer Care Executive	Creating Skills & Assistant for Chatbot	USN– 4	As a user, I want the chatbot to guide me through the creation of a current account	I can inquire about opening a current account.	High	Sprint–2
Customer Care Executive	Creating Skills & Assistant for Chatbot	USN– 5	As a user, I want the chatbot to be able to answer loan queries	I can ask a chatbot about loan questions.	High	Sprint–2
Customer Care Executive	Creating Skills & Assistant for Chatbot	USN– 6	As a user, I want the chatbot to be able to answer general banking queries	I can ask a chatbot about general banking questions.	High	Sprint–3
Customer Care Executive	Creating Skills & Assistant for Chatbot	USN– 7	As a user, I want the chatbot to be able to answer queries regarding net banking	I can ask a chatbot about net–banking questions.	High	Sprint–3
Customer Care Executive	Deployment	USN– 8	As a user, I want to access the chatbot in my web browser as well as in our local browser	I can access the chatbot in my browser	Medium	Sprint–4
Administrator	Moderation	USN–9	As an admin, I will moderate the chatbot responses	I can moderate chatbot responses	Medium	Sprint–4
Administrator	Moderation	USN–10	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	Medium	Sprint–4
Administrator	Moderation	USN–11	As an admin, I will maintain the chatbot's behaviour	I can maintain the chatbot's actions	Medium	Sprint–4

CHAPTER 6

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	Dashboard	USN-1	As a user, I need to access the chatbot very quickly without registration / Create IBM Watson Assistant Service	10	Medium	DWARAGA R. V
Sprint-1	Chatbot Skills	USN-2	As a user, I want a chatbot to be able to greet, suggest relevant queries, and end the conversation properly / Create greetings, query suggestions, and end-of-conversation skills	10	Medium	JAGATHESWARAN S
Sprint-2	Chatbot Skills	USN-3	As a user, I want the chatbot to guide me through the creation of a savings account / Creating Saving Account Action	7	High	JAGATHESWARAN S
Sprint-2	Chatbot Skills	USN-4	As a user, I want the chatbot to guide me through the creation of a current account / Creating Current Account Action	7	High	DWARAGA R. V
Sprint-2	Chatbot Skills	USN-5	As a user, I want the chatbot to be able to answer loan queries / Creating Loan Account Action	6	High	DWARAGA R. V
Sprint-3	Chatbot Skills	USN-6	As a user, I want the chatbot to be able to answer general banking queries / Creating General Query Action	10	High	DWARAGA R. V
Sprint-3	Chatbot Skills	USN-7	As a user, I want the chatbot to be able to answer queries regarding net banking / Creating Net Banking Action	10	High	DHIVYA S
Sprint-4	Chatbot Deployment (HTML Website)	USN-8	As a user, I want to access the chatbot in my web browser / Build HTML Code	7	Medium	DHIVYA S

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-4	Chatbot Deployment (Python Flask)	USN- 9	As a user, I want the application to run in our local browser with a user interface / Build Python Code	7	Low	JOSEPH VIKRAM R
Sprint-4	Run the Application	USN- 10	As a user, I want to use the final product of the chatbot / Test the application	6	Medium	JOSEPH VIKRAM R

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	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

6.3 Reports from JIRA

Roadmap
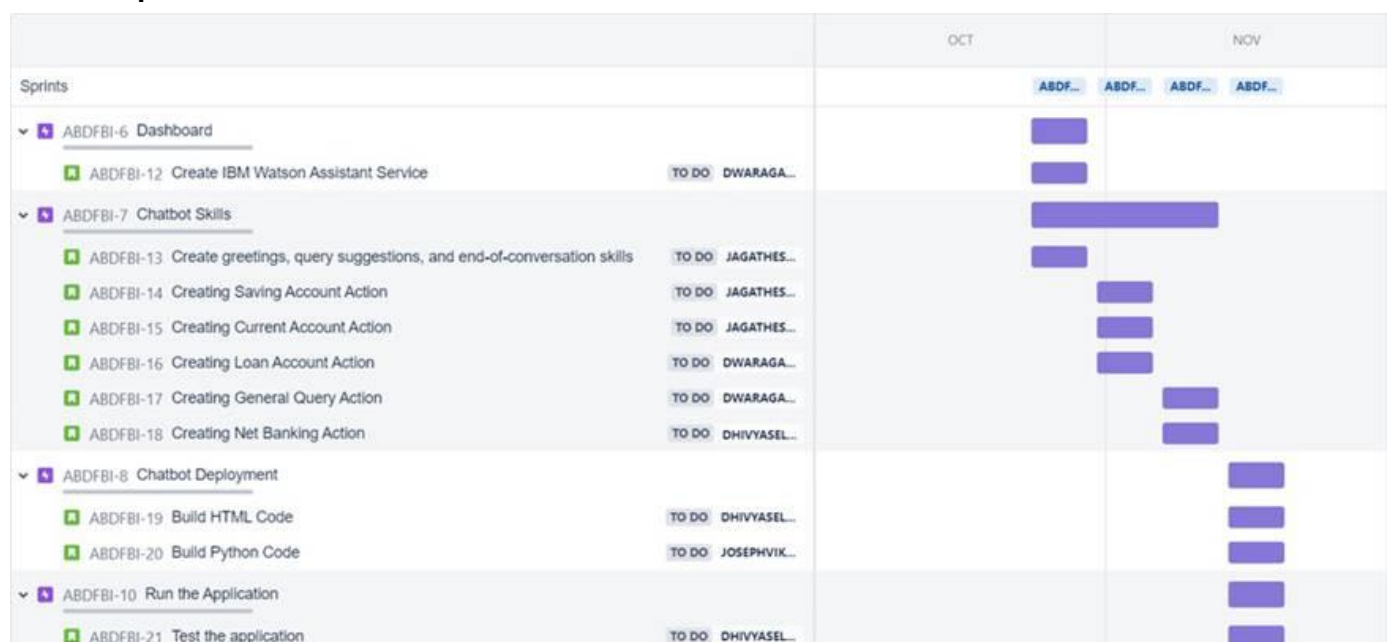
Burndown chart sprint-1

Sprint burndown chart

Sprint
ABDFBI Sprint 1 ⌄

Estimation field
Story points ⌄

···

Date - October 24th, 2022 - October 29th, 2022

Sprint goal - Create IBM Watson Assistant Service, Create greetings, query suggestions, and end-of-conversation skills.

Remaining work
Number of story points left to complete this sprint

Guideline
Ideal burn rate
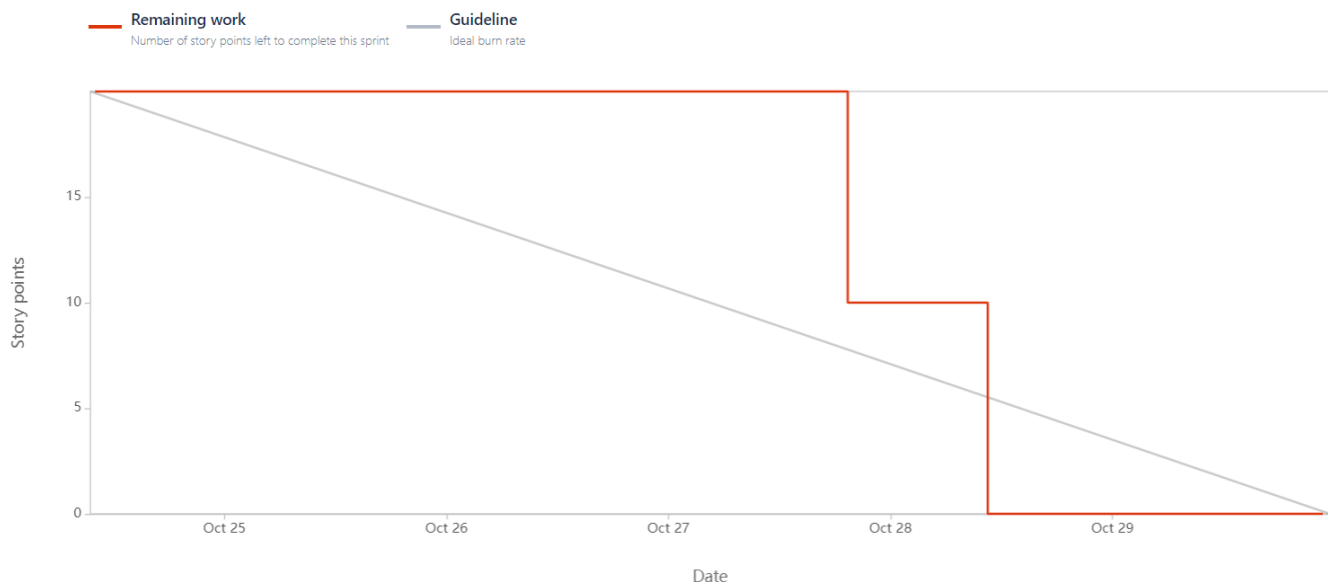
Burndown chart sprint-2

Sprint burndown chart

Sprint
ABDFBI Sprint 2 ⌄

Estimation field
Story points ⌄

···

Date - October 31st, 2022 - November 6th, 2022

Sprint goal - Creating Saving Account Action , Creating Current Account Action , Creating Loan Account Action

Remaining work
Number of story points left to complete this sprint

Guideline
Ideal burn rate
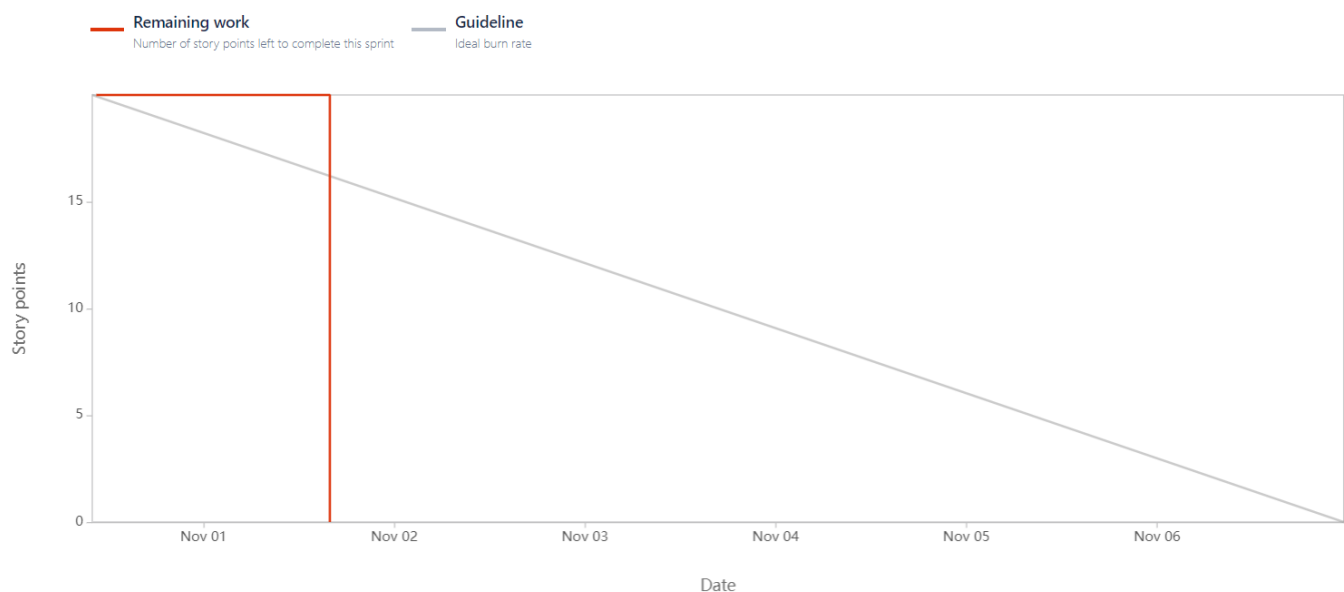
Burndown chart sprint-3

Sprint burndown chart

Sprint	Estimation field
ABDFBI Sprint 3 ⌄	Story points ⌄

•••

Date - November 7th, 2022 - November 13th, 2022

Sprint goal - Creating General Query Action, Creating Net Banking Action
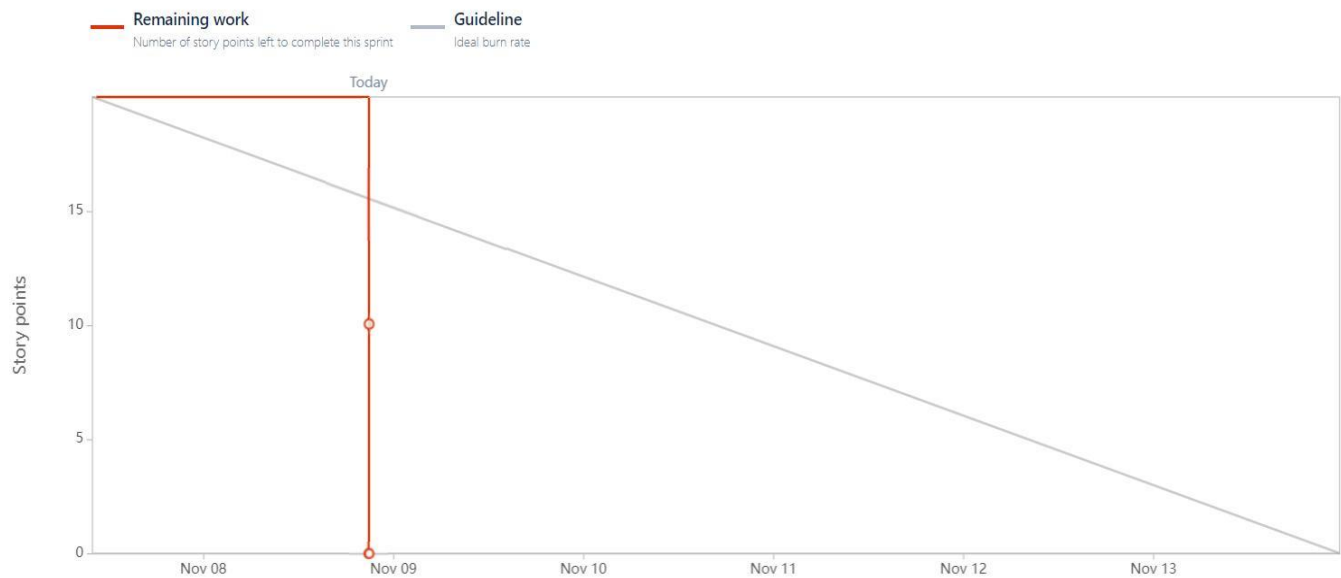
Burndown chart sprint-4

Sprint burndown chart

Sprint	Estimation field
ABDFBI Sprint 4 ⌄	Story points ⌄

•••

Date - November 14th, 2022 - November 20th, 2022

Sprint goal - Build HTML Code, Build Python Code, and Test the application.
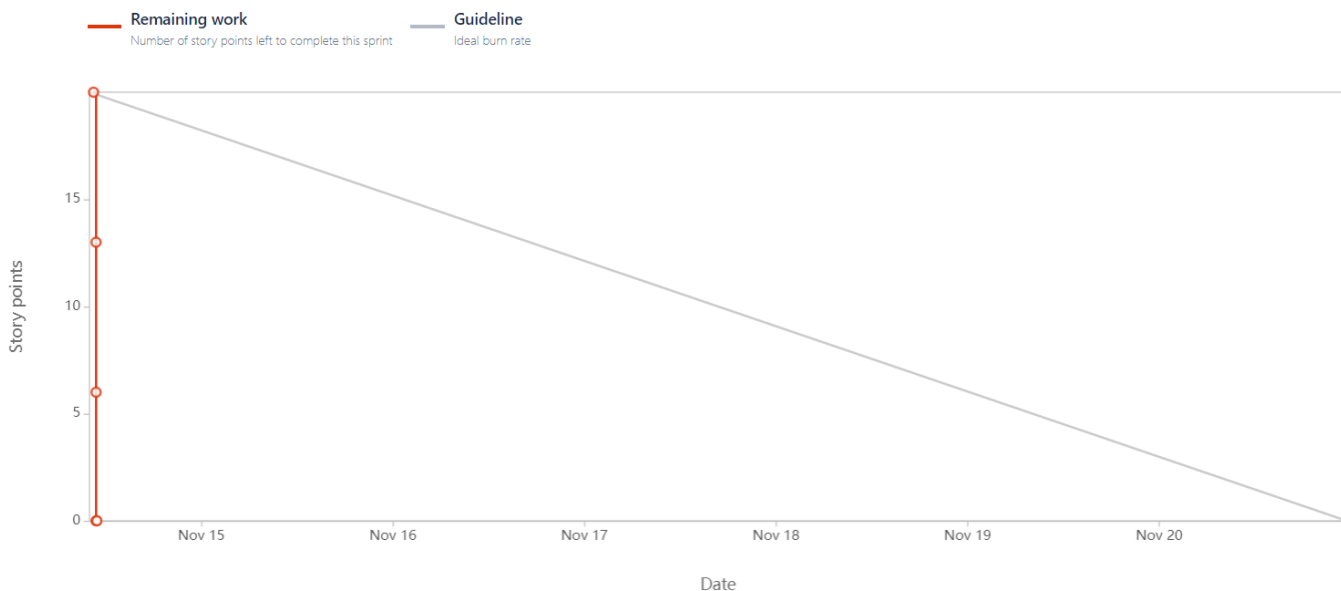
CHAPTER 7

7. CODING & SOLUTIONING

7.1 Chatbot Skills Creation

The chatbot is trained to suggest a list of FAQs, which the user can select from a drop-down list.

7.2 Saving Account Action

The chatbot is trained to assist users in opening savings accounts by presenting a variety of options in a drop-down menu.

7.3 Current Account Action

The chatbot is trained to help customers open current accounts by offering a variety of options via a drop-down menu.

7.4 Loan Account Action

The chatbot has been trained to offer customers a variety of options to clarify their loan questions via a drop-down menu.

7.5 General Query Action

The chatbot has been trained to offer customers a variety of options to clarify their general questions via a drop-down menu.

7.6 Net Banking Action

The chatbot has been trained to offer customers a variety of options to clarify their net-banking questions via a drop-down menu.

7.7 HTML & Python Code

HTML

In this project, HTML coding is solely utilised to display the chatbot, and Watson Assistant is successfully integrated with the webpage using JavaScript. Using the URL, background images were added to the webpage.

```html
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Banking Chatbot</title>
    <style>
      body{
        margin:0px;
      }
    </style>
</head>
<body>
  <img src="https://apptunix.wpenginepowered.com/blog/wp-
content/uploads/sites/3/2021/04/show-chatbots-for-banking.jpg" width= "100%"
height="100%">
  <script>
    window.watsonAssistantChatOptions = {
      integrationID: "ae0f9217-668d-4bf7-a600-5554746f8bf3",
      region: "au-syd",
      serviceInstanceID: "3588054f-8f31-4f51-977a-31b2b502e7e2",
      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>
```

Python code

Python Flask is used for hosting the Watson Assistant chatbot webpage on a local machine.

```python
from flask import Flask, render_template


app = Flask(__name__, template_folder='templates')


@app.route('/')
def bot():
    return render_template('Chatbot.html')


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

CHAPTER 8

8. TESTING

8.1 Test Cases

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	TC for Automation(Y/N)	Executed By
Chatbot_TC_04	Functional	Watson	Verify the user is able to receive a message when user say "Saving Account "	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go.	User:Savings Account	Saving Account available opt	Working as	Pass	N	JAGATHESWARAN S
Chatbot_TC_05	Functional	Watson	Verify the user is able to receive a message when user say "Regular savings	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User:Regular Savings	Regular savings account	Working as	Pass	N	JAGATHESWARAN S
Chatbot_TC_06	Functional	Watson	Verify the user is able to receive a message when the user asks, "Kids savings	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User:Kids Savings Account	Kids savings account	Working as	Pass	N	JAGATHESWARAN S
Chatbot_TC_07	Functional	Watson	Verify the user is able to receive a message when the user asks, "Zero-balance	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User:Zero-balance Savings	Zero-balance savings accoun	Working as	Pass	N	JAGATHESWARAN S
Chatbot_TC_08	Functional	Watson	Verify the user is able to receive a message when the user asks, "Current Account"	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Current Account	Current Account available op	Working as	Pass	N	JAGATHESWARAN S
Chatbot_TC_09	Functional	Watson	Verify the user is able to receive a message when the user asks, "Proprietorship"	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Proprietorship	Proprietorship	Working as	Pass	N	JAGATHESWARAN S
Chatbot_TC_10	Functional	Watson	Verify the user is able to receive a message when the user asks, "Partnership"	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Partnership	Partnership	Working as	Pass	N	JAGATHESWARAN S
Chatbot_TC_11	Functional	Watson	Verify the user is able to receive a message when the user asks, "Loan Account"	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Loan enquiry	Loan enquiry available optio	Working as	Pass	N	DWARAGA .R.V
Chatbot_TC_12	Functional	Watson	Verify the user is able to receive a message when the user asks, "House loan"	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: House loan	House loan	Working as	Pass	N	DWARAGA .R.V
Chatbot_TC_13	Functional	Watson	Verify the user is able to receive a message when the user asks, "Gold loan"	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Gold loan	Gold loan	Working as	Pass	N	DWARAGA .R.V
Chatbot_TC_14	Functional	Watson	Verify the user is able to receive a message when the user asks, "Top-up loan"	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Top-Up loan	Top-up loan	Working as	Pass	N	DWARAGA .R.V
Chatbot_TC_15	Functional	Watson	Verify the user is able to receive a message when the user asks, "Student loan"	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Student loan	Student loan	Working as	Pass	N	DWARAGA .R.V
Chatbot_TC_16	Functional	Watson	Verify the user is able to receive a message when the user asks, "Vehicle loan"	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Vehicle loan	Vehicle loan	Working as	Pass	N	DWARAGA .R.V
Chatbot_TC_17	Functional	Watson	Verify the user is able to receive a message when the user asks, "General Query"	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: General Query	General Query available opti	Working as	Pass	N	DWARAGA .R.V
Chatbot_TC_18	Functional	Watson	Verify the user is able to receive a message when the user asks, "Bank working	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Bank working days	Bank working days	Working as	Pass	N	DWARAGA .R.V
Chatbot_TC_19	Functional	Watson	Verify the user is able to receive a message when the user asks, "List of branches "	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: List of branches	List of branches	Working as	Pass	N	DWARAGA .R.V
Chatbot_TC_20	Functional	Watson	Verify the user is able to receive a message when the user asks, "Storage locker	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Storage locker facility	Storage locker facility	Working as	Pass	N	DWARAGA .R.V
Chatbot_TC_21	Functional	Watson	Verify the user is able to receive a message when the user asks, "Currency	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Currency conversion	Currency conversion facility	Working as	Pass	N	DWARAGA .R.V
Chatbot_TC_22	Functional	Watson	Verify the user is able to receive a message when the user asks, "CIBIL"	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: CIBIL	CIBIL	Working as	Pass	N	DWARAGA .R.V
Chatbot_TC_23	Functional	Watson	Verify the user is able to receive a message when the user asks, "Find a nearest	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Find a nearest Branch	Find a nearest Branch	Working as	Pass	N	DHIVYA S
Chatbot_TC_24	Functional	Watson	Verify the user is able to receive a message when the user asks, "Net Banking"	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User:	Net Banking available option	Working as	Pass	N	DHIVYA S
Chatbot_TC_25	Functional	Watson	Verify the user is able to receive a message when the user asks, "What is Net	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: What is Net Banking?	What is Net Banking?	Working as	Pass	N	DHIVYA S
Chatbot_TC_26	Functional	Watson	Verify the user is able to receive a message when the user asks, "How do I register	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: How do I register for	How do I register for Net Ban	Working as	Pass	N	DHIVYA S
Chatbot_TC_27	Functional	Watson	Verify the user is able to receive a message when the user asks, "What are the	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: What are the features	What are the features of Net	Working as	Pass	N	DHIVYA S
Chatbot_TC_28	Functional	Watson	Verify the user is able to receive a message when the user asks, "Facing errors in	Watson Assistant	1. Enter webpage address (http://127.0.0.1:5000) and click go	User: Facing errors in Net	Facing errors in Net	Working as	Pass	N	DHIVYA S
Chatbot_TC_29	UI	Dashboard	Verify that the user can access the chatbot webpage in their browser.	Browser	1. Open the anaconda prompt from the start menu.	http://127.0.0.1.5000/	HTML Code	Working as	Pass	N	DHIVYA S
Chatbot_TC_30	Functional	Server	Verify that the chatbot can be accessed locally as well.	Python	1. Open the anaconda prompt from the start menu.	python Flask.py	Python Code	Working as	Pass	N	JOSEPH VIKRAM R

Disclaimar: for "Test Scenario" , "Steps To Execute" expand the cell to see the full text.

Date	03-Nov-22
Team ID	PNT2022TMID39294
Project Name	AI BASED DISCOURSE FOR BANKING INDUSTRY
Maximum Marks	4 marks

8.2 User Acceptance Testing

Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	7	O	O	2	9
Duplicate	O	O	O	O	O
External	O	O	O	O	O
Fixed	O	3	2	2	7
Not Reproduced	2	3	2	2	9
Skipped	1	1	1	1	4
Won't Fix	O	O	O	O	O
Totals	10	7	5	7	29

Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested.

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	4	O	O	4
Client Application	29	O	O	29
Security	1	O	O	1
Outsource Shipping	2	O	O	2
Exception Reporting	5	O	O	5
Final Report Output	2	O	O	2
Version Control	1	O	O	1

CHAPTER 9

9. RESULTS

9.1 Performance Metrics

S.No.	Parameter	Values	Screenshot
1.	Model Summary	-	
2.	Accuracy	Training Accuracy - 95% Validation Accuracy - 90%	This project doesn't support any model or model-based programs. So, there is no model output to submit. The training and validation accuracy have approximate value based on NLP

CHAPTER 10

10. ADVANTAGES & DISADVANTAGES

Advantages

1. **Chatbots have 24/7 Availability** – One of the biggest benefits of using chatbots in the banking industry is that it offers 24/7 availability for your customers.

2. **Reduce costs** – Chatbot is relatively cost-effective and requires basic up-gradation or maintenance costs instead of employee remunerations. They also solve a lot more customer queries in a given time which can ultimately profit organizations.

3. **Easy to use** – Unlike banking applications, the chatbot does not require customers to download anything. They are simple to use and offer personalised features for a pleasant customer experience.

4. **Personalized Banking Experience** – Personalized services tailored to a customer's individual needs are the latest trend among customers.

5. **Enhance Customer Service** – The future of digital banking is conversational AI chatbots. With the advent of banking chatbots, certain essential aspects of customer care and support – such as speed, access to information, and pleasant encounters – are more feasible.

6. **Decreased wait times** – Chatbots don't just eliminate waits for simple questions. Since chatbots can resolve more than 91% of chats from start to finish without human intervention, they also create additional support capacity for agents handling complex issues. With chatbots handling simple customer inquiries, agents can more quickly respond to complex issues that need human intervention.

7. **Improved support efficiency** – Users prefer to interact with chatbots over human agents is their incredibly efficient support. A single AI chatbot can handle an unlimited number of chats at once, responding to each chat without delay.

8. **Answer Basic Questions** – Chatbots can answer several fundamental questions regarding the accounts of customers or banking products.

9. **Faster customer support:** Connecting to customer representatives of banks can sometimes take a long time. Chatbots can help users get the answer they want without waiting for the available customer representative.

10. **Feedback Collection** – Long feedback forms and surveys can be a nuisance to complete. A chatbot can engage customers with its natural language understanding and generation. And collect feedback with simple steps.

Disadvantages

1. **Questions must be programmed beforehand** – When customers use chatbots, they need to ask questions in specific ways to be able to get accurate answers. Chatbots can only answer questions that have been programmed previously. This downside, however, can be eliminated by connecting an effective live agent solution to your CX strategy and adding unresolved questions to your chatbot's knowledge base.

2. **Impersonal** – Most Chatbots use structured flows to provide answers. This can make the experience robotic and feel less personal. Answers that are 100% scripted, don't allow flexibility when it comes to regionalisms and different ways of asking questions.

3. **Must Keep Information Up-To-Date** – Chatbots without artificial intelligence can only provide your customers with answers to questions that they already know. It is up to you to input new information for chatbots to use. If you don't keep this information up-to-date, your chatbot may be sending incorrect messages to your customers.

4. **Technology Issues** – There can also be some technical issues when it comes to using chatbots for banking. First, chatbots require your customers to use the internet. If you have customers that do not have access to the internet or are unsure of how to use an online platform, it may not be an ideal customer service solution.

5. Chatbots are not able to give the right answer unless questions are asked exactly how they are set up to interpret user input.

6. Chatbots are not known to be able to interpret multiple questions asked at once.

7. **Higher Capacity for Misunderstanding**–When a customer's question isn't clear or is too specific, a bot may have a hard time helping, which is one of the biggest disadvantages of chatbots.

8. **Limited Functionality** – Chatbots were created to respond to simple questions that can be answered with facts. Chatbots have limited responses, so they're not often able to answer multi-part questions or questions that require decisions.

9. **Lack of human emotion and intelligence** – Chatbots still fall behind on human emotions in specific situations and can seem robotic while answering certain complex questions. Fortunately, this gap is decreasing by the day with new and advanced programs.

10. It requires the internet and as such may not be a solution for all of your customers.

CHAPTER 11

11. CONCLUSION

The latest innovations in artificial intelligence are making it possible to create chatbots that can carry on a conversation with humans even when they aren't under direct human control. This means that they will be able to respond to your questions and requests in increasingly lifelike ways. They will become more secure, capable, and versatile over time as they gain more features and capabilities. Whether you need customer service or need help behind the scenes, the AI chatbots of the future will be accessible and trustworthy communication tools. Chatbots are quickly becoming popular in the banking industry. They are not only employed to answer client questions but also to provide a variety of services. Chatbots are also becoming smarter as natural language processing and machine learning are integrated. By assisting consumers around the clock, they let banking personnel focus on other critical activities.

As a result, we can argue that chatbots have become an indispensable part of the banking system. The administrator must train the chatbot system with information about client questions and broaden the scope of its knowledge base in order to make the responses provided by the chatbot system more accurate and useful. The ultimate in user query response is the banking chatbot. Unlike banking applications, the chatbot does not require customers to download anything. It can help users get the answer they want without waiting for the available customer representative. It can answer several fundamental questions regarding the account-related queries of customers. This will help with cost efficiency and make the customer experience more real. Therefore, the future of chatbots in banking is more virtual than in-person. We can conclude that the role chatbots play in the banking sector will only continue to rise due to the constant improvements being made to their logic and the increased demand for a better customer experience.

CHAPTER 12

12. FUTURE SCOPE

Future development will include finishing the foundation and adding more chatbot features. The future system would be a first step toward implementing an intelligent question management programme capable of not only responding but also self-learning to improve itself in subsequent stages, thus not only increasing the quality of user service but also reducing human loads, increasing productivity, and, of course, increasing the number of satisfied users. It can be improved further by including multilingualism and speech recognition. As the website develops, we will be able to add many more tags to the data collection. After the conversation, the chat history of a specific user can be emailed to him or her. This can be accomplished by authorising the users and receiving their email addresses. This project is a minor endeavour to make the website more user-friendly and understandable to the user. We may also improve the chatbot by incorporating responses derived not just from the existing list of FAQs but also from a variety of other sources, such as the internet, databases, and other data sources. We may provide specific recommendations as well as demonstrations of responses in the form of photos, links, and videos.

CHAPTER 13

13. APPENDIX

Source Code

HTML

```html
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Banking Chatbot</title>
    <style>
      body{
        margin:0px;
      }
    </style>
</head>
<body>
  <img src="https://apptunix.wpenginepowered.com/blog/wp-
content/uploads/sites/3/2021/04/show-chatbots-for-banking.jpg" width= "100%"
height="100%">
  <script>
    window.watsonAssistantChatOptions = {
      integrationID: "ae0f9217-668d-4bf7-a600-5554746f8bf3",
      region: "au-syd",
      serviceInstanceID: "3588054f-8f31-4f51-977a-31b2b502e7e2",
      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>
```

Python code

```python
from flask import Flask, render_template


app = Flask(__name__, template_folder='templates')


                                        32

@app.route('/')
def bot():
    return render_template('Chatbot.html')


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

GitHub & Project Demo Link

GitHub: https://github.com/IBM-EPBL/IBM-Project-31425-1660200337

Project Demo Link: https://github.com/IBM-EPBL/IBM-Project-31425-1660200337/tree/main/Final%20Deliverables/Project%20Demo%20Video