

PROJECT REPORT

AI BASED DISCOURSE FOR BANKING INDUSTRY

Team ID: PNT2022TMID01193

TEAM MEMBERS:
VASUMITHRA S [TL] – 211419106286
PRIYANKA G [TM] – 211419106321

1.INTRODUCTION

1.1 PROJECT OVERVIEW

Everyone wants to get fast that they want. Chatbots are intelligent systems that understands user's questions and answers accordingly. Going to banks and ask questions to any bank employee, the procedure takes too much time to process a single question. So our focus is to make an intelligent assistant System that will save time of users and reduce workload of bank employees. It is like a personal assistant that user feels that they are communicating with a person. The user can ask their queries in plain text in English or in voice. According to user's query the system will process the query and generate response. To complete these tasks we have used artificial intelligence and natural language processing. The system will be usable as a web so it can be easily accessible. It can be run on the pc or mobile phones.

Keywords: Natural Language Processing, Artificial Intelligence, Banking Bot, Chat Bot

1.2 PURPOSE

- Chatbots, also known as conversational agents, are **designed with the help of AI (Artificial Intelligence) software**. They simulate a conversation (or a chat) with users in a natural language via messaging applications, websites, mobile apps, or phone.
- Industries are forced to evolve and update their practices due to technological advances and the contemporary market. The banking sector is one of the most developed sectors and is always looking for the latest technological solutions that improve its efficiency.
- Net banking websites are complex and involve navigating through numerous pages to find the information you need. Bank staff undergoes a lot of stressful situations when communicating with clients directly. Such situations can be avoided gracefully by using chatbots.
- Banking has become the part and parcel of everyone's life. Almost everyone uses the banking sector to perform their tasks. Most of the tasks are been carried out manually. Now the use of mobile and internet banking facility has reached greater heights. Chat bots is becoming trending today. They are computer programs that interact with users using natural languages.
- In this project aims to discuss the relevance of chatbots in the banking sector and explore how chatbots can be implemented using natural language processing techniques that can be used in the banking industry.

2.LITERATURE SURVEY:

2.1 Existing Problem

- ✓ This paper [1] presents the use of the RASA framework for building smart context-remembering chatbots, it also describes how Rasa NLU works and how its performance is elevated by using intent recognition and entity extraction. It also compares the accuracies of entity extraction using Rasa NLU and a NN, results show Rasa NLU performs better to extract entities when whole sentences are provided as compared to neural networks which require segmented inputs. This paper discusses Rasa by implementing a chatbot related to the finance domain, using which the users can inquire about stock-related information.
- ✓ RASA NLU can introduce a vital component in intelligent chatbot systems. We can compose the system to extract the entity after intent recognition. This can be further improved for complicated sentences and more entities.
- ✓ This paper [2] briefly discusses advancements in the field of AI and how this has led to major shifts in some organizations about how they operate. It further mentions how the banking industry has moved to use chatbots for providing an interface to customers so that they can have an assistant throughout the day for service. This paper also gauges the ability of current chatbots to provide all the services that a user needs.
- ✓ It includes several strategies for managing dialogue in the banking and finance industry based on ontology. Although further use of AI can make the chatbot not only respond to questions but also self-learning to improve itself in more stages, improving user service quality and also reducing human load.

2.2 References

- Shivkumar Goel and Nihaal Mehta A Survey on the Role of Artificial Intelligence in FinTech, *International Journal of Innovative Research in Computer and communication Engineering*, Vol.5, Issue 6, June 2017.
- S. A. Abdul-Kader and J. Woods, "Survey on Chatbot Design Techniques in Speech Conversation Systems", *(IJACSA) International Journal of Advanced Computer Science and Applications*, vol. 6, no. 7, July 2015.
- S. F. Suhel, V. K. Shukla, S. Vyas and V. P. Mishra, "Conversation to Automation in Banking Through Chatbot Using Artificial Machine Intelligence Language," 2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO), 2020, pp. 611-618, doi: 10.1109/ICRITO48877.2020.9197825.
- S. Meshram, N. Naik, M. VR, T. More and S. Kharche, "Conversational AI: Chatbots," *2021 International Conference on Intelligent Technologies (CONIT)*, 2021, pp. 1-6, doi: 10.1109/CONIT51480.2021.9498508.
- RASA NLU can introduce a vital component in intelligent chatbot systems. We can compose the system to extract the entity after intent recognition. This can be further improved for complicated sentences and more entities.
- It includes several strategies for managing dialogue in the banking and finance industry based on ontology. Although further use of AI can make the chatbot not only respond to questions but also improving user service quality and also reducing human load.

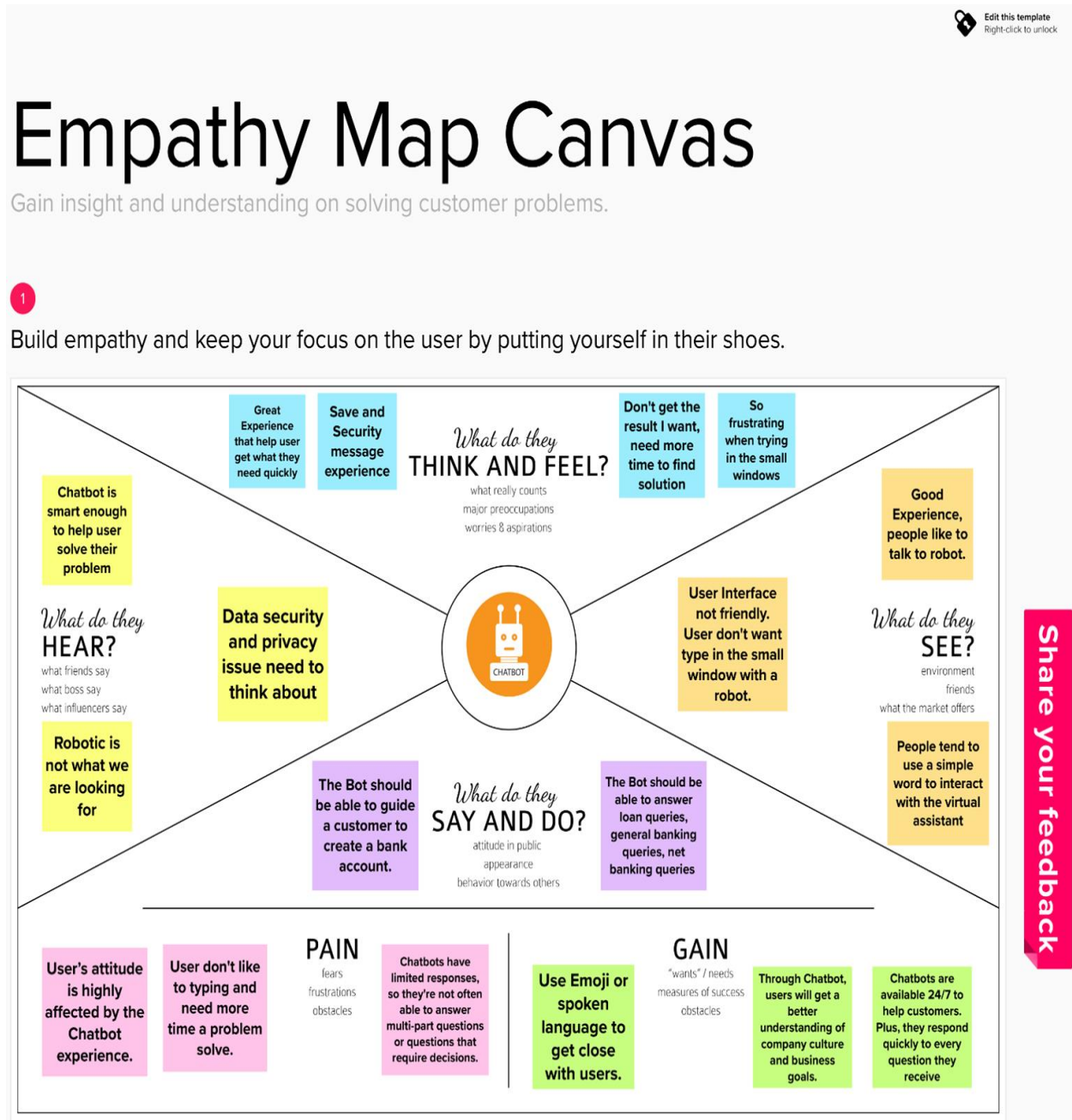
2.3 PROBLEM STATEMENT DEFINITION



Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	Customer	Recharge for my prepaid mobile	I cannot pay recharge amount	It shows like your money is not debited	frustrated as I have money in my bank account
PS-2	Customer	Make merchant payments	QR code is not scanning	The website is not responsive	I am afraid as I do not know what to do


3.IDEATION & PROPOSED SOLUTION:

3.1 EMPATHY MAP CANVAS



3.2 IDEATION & BRAINSTORMING

Step-1: Team Gathering, Collaboration and Select the Problem Statement



Brainstorm & idea prioritization

AI BASED DISCOURSE ON BANKING INDUSTRY

🕒 10 minutes to prepare
🕒 1 hour to collaborate
👥 2-8 people recommended

➔

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

🕒 10 minutes

A Team gathering
VASUMITH-RA , PRIYANKA

B Set the goal
We'll be focusing on server problems will solving in the brainstorming session.

C Learn how to use the facilitation tools
Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#) ➔

1


Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

🕒 5 minutes

PROBLEM

The bot cannot able to perform efficient for all time . There is a error while answering customer questions.
There may be server problem while asking queries.



Key rules of brainstorming

To run an smooth and productive session

😊 Stay in topic.	💡 Encourage wild ideas.
⏸️ Defer judgment.	👂 Listen to others.
🗣️ Go for volume.	👁️ If possible, be visual.

Step-2: Brainstorm, Idea Listing and Grouping

2

Brainstorm

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

10 minutes

TIP

You can select a sticky note and hit the pencil [with the sketch] icon to start drawing!

VASUMITHRA

24/7	Instant	Greater Efficiency
Sales Booster	Channel agnostic	Real Language
Simple Interface	Better Interactions	Less waiting time

PRIYANKA

Faster response	Solve queries	Predefined answers
Saves time	Customer feedback	Push Information
Fraud detection	Consistency	Clarity

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

⌚ 20 minutes

TH

Add customizable tags to sticky notes to make it easier to find, archive, or organize important ideas as they come across your mind.

Available 24/7 round-the-clock for conversation with customers

Provides instant response to any query without any delay or making the customer wait.

- Improves efficiency and reduces TAT through quick information delivery; performs mundane tasks at high speed

Provides specific user input at each point, learns from customer feedback and follow-up queries and improvises, thus enhancing the user experience

- Provides the same experience irrespective of the channel: mobile, web, etc.

Ability to seamlessly interpret languages commonly conversed in

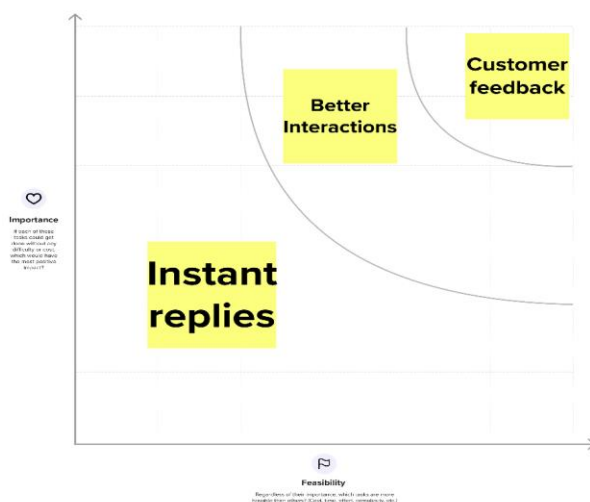
Step-3: Idea Prioritization

4

Prioritize

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

Ⓢ 20 minutes



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 single 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 centres 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 services 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 assistant 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

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) CS <small>Who is your customer? i.e. working parents of 0-5 y.c. kids.</small> Working parents of 5 year old kids Working employee	6. CUSTOMER CONSTRAINTS CC <small>What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices.</small> Misunderstood the customer's query Internet Access is required Outdated Mobile Experience	5. AVAILABLE SOLUTIONS AS <small>Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking</small> Simple Banking queries can be resolved quickly, Saves lot of Times, 24/7 Availability	Explore AS, differentiate

Focus on J&P, tap into BE, understand RC	2. JOBS-TO-BE-DONE / PROBLEMS J&P <small>Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one, explore different sides.</small> Limited Response Need to be maintained Misreads the customer's query Unsuitd for outdated customer's Losing customer insights	9. PROBLEM ROOT CAUSE RC <small>What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations</small> Slow response from Human agent Limited only on working days Longer to resolve complaints Waiting in queue for assistance Cannot able to ask queries repeatedly	7. BEHAVIOUR BE <small>What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)</small> Guiding customer create bank account Answer loan queries Answer general banking queries Answer queries regarding net banking Automated customer service	Focus on J&P, tap into BE, understand RC

Identify strong TR & EM	3. TRIGGERS TR <small>What triggers customers to act? i.e. seeing their neighbour install solar panels, reading about a more efficient solution in the news.</small> Seeking customers doubts A customer needed guidance	10. YOUR SOLUTION ST This problem can be solved by using an Automated solution, such as chatbot, which can handle all simple queries. You could reduce your employees workload by having chatbot handle all of the simple customer requests. It understands human languages and them in text based communication.	8. CHANNELS OF BEHAVIOUR CH 8.1 ONLINE <small>What kind of actions do customers take online? Extract online channels from #7</small> 8.2 OFFLINE <small>What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.</small> Online: Instantaneously responding to queries, Assisting clients in clearing up their doubts Offline: Following guidelines from the chatbots, Getting queries answers from the chatbot	Identify strong TR & EM
	4. EMOTIONS: BEFORE / AFTER EM <small>How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure > confident, in control - use it in your communications strategy & design.</small> Before: Confused, Helplessness, Exhausted After: Satisfaction, Motivated, Relaxed			

4.REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Greeting	The MIS Assistant needs the capability to accurately tell time so as it greets users appropriately.
FR-4	Help Support	1. It should also have predefined questions and keywords with their expected answers. 2. The MIS Assistant needs the ability to quickly and accurately look up the question from its templates.
FR-5	Set Remainder	The MIS Assistant needs the ability to save and display reminders as requested by the users of the system.
FR-6	Announcement	This chatbot needs the capability of broadcasting a message to all users.
FR-7	Events	This chatbot needs the capability of retrieving & displaying events for a system.

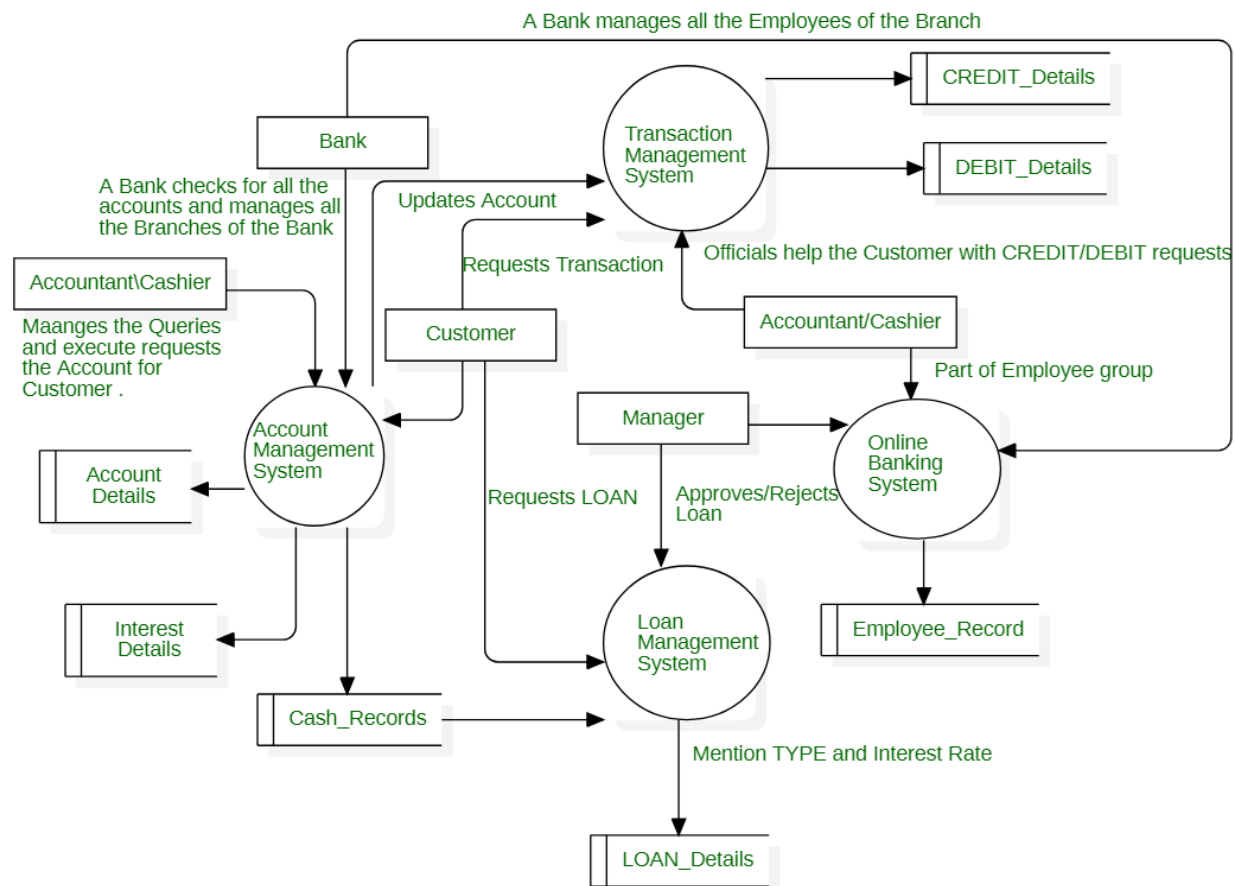
4.2 NON - FUNCTIONAL REQUIREMENTS

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Non-functional requirements or NFRs are a set of specifications that describe the system's operation capabilities and constraints and attempt to improve its functionality. These are basically the requirements that outline how well it will operate including things like speed, security, reliability, data integrity , etc
NFR-2	Security	Security is a non-functional requirement assuring all data inside the system or its part will be protected against malware attacks or unauthorized access.
NFR-3	Reliability	Non functional requirements are mostly quality-related requirements which include the areas of performance, availability, reliability, usability, flexibility, configurability, integration, maintainability, portability, and testability
NFR-4	Performance	Non functional Requirements (NFRs) define system attributes such as security, reliability, performance, maintainability, scalability, and usability. They serve as constraints or restrictions on the design of the system across the different backlogs.
NFR-5	Availability	There is no one standard definition of an Availability Non-Functional Requirement. It will be defined for each project where it needs to be specified. This principle is true of all non-functional requirements.

NFR-6	Scalability	AI adoption has grown rapidly over the past few years due to its ability to automate repetitive tasks and increase revenue opportunities. Yet many companies still struggle with how to meaningfully scale AI in financial services.
-------	-------------	--

5.PROJECT DESIGN

5.1 DATA FLOW DIAGRAMS



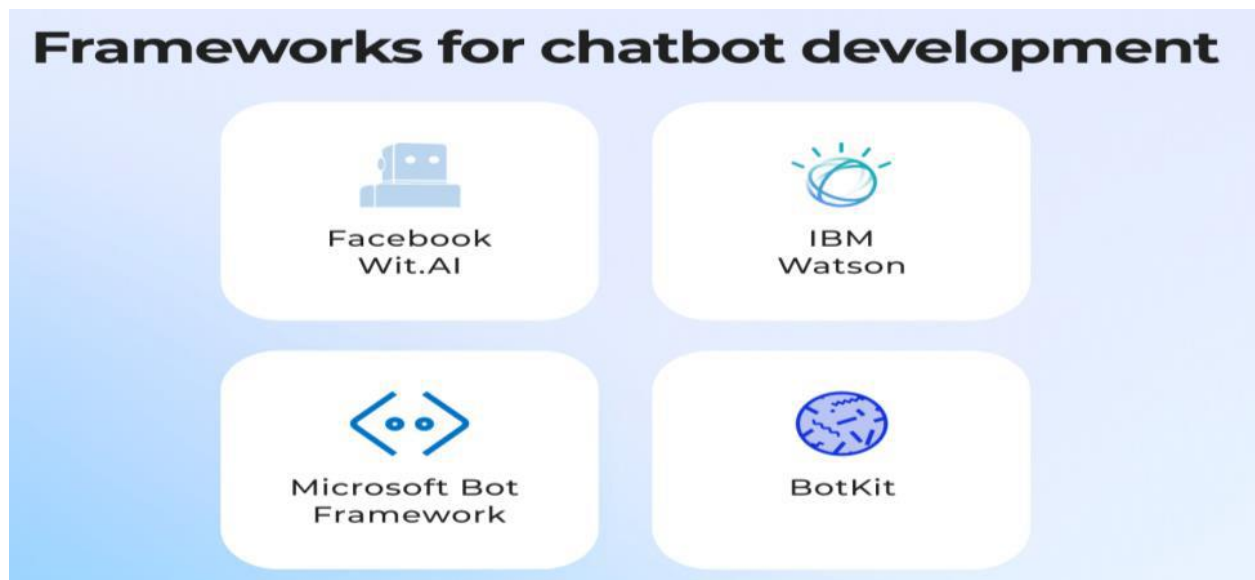
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

5.2 SOLUTION & TECHNICAL ARCHITECTURE

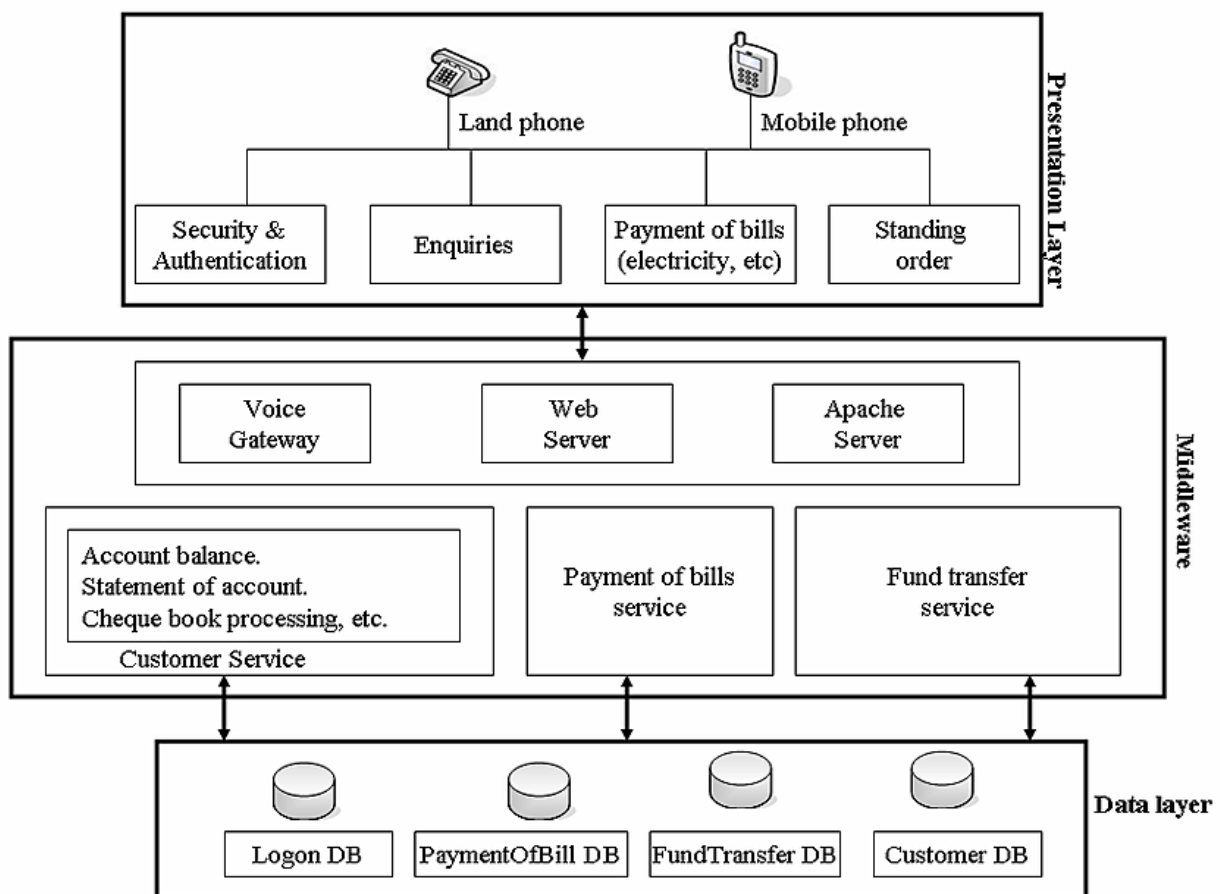
SOLUTION ARCHITECTURE:



Frameworks for chatbot development



TECHNICAL ARCHITECTURE:



5.3 USER STORIES

User Type	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
Customer (Mobile user)	Registration	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
Customer (Mobile user)	Registration	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
Customer (Mobile user)	Registration	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
Customer (Mobile user)	Login	USN-5	As a user, I can log into the application by entering email & password	I can log in & access the dashboard with email and password	High	Sprint-1
Customer (Mobile user)	Dashboard	USN-6	As a user, I can access the dashboard	I can access the dashboard	High	Sprint-1
Customer (Web user)	Registration	USN-7	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account/dashboard in web	High	Sprint-1
Customer (Web user)	Balance	USN-8	As a user, I want to check balance of my bank account	I can see the balances displayed	High	Sprint-1
Customer (Web user)	Transfer money	USN-9	As a user, I want to transfer money from my account to another bank account	I can transfer money from my account to another bank account	High	Sprint-1
Customer Care Executive	Solving query	USN-10	As a user, To continuously improve product knowledge and awareness of market trends and competitor products.	I can deal with customer issues and churning out an easy-to-follow solution.	High	Sprint-1
Administrator	Backup data	USN-11	As a Net Banking Administrator, I want to have the customer's data backed up so that I can restore it any time in case of issues	I can deal with customer's backup data	High	Sprint-1

6.PROJECT PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

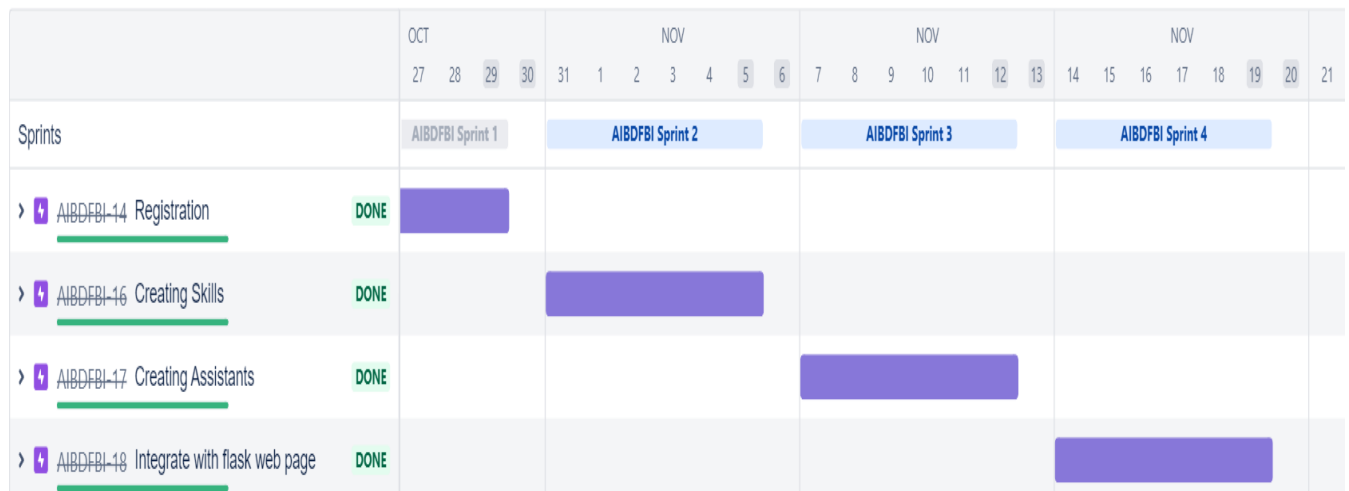
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Create IBM Service	USN-1	As a user, I can see a Watson Assistant.	1	High	Vasumithra S Priyanka G
Sprint-1	Chatbot Skills Creation	USN-2	As a user, I will see the Chatbot having banking-related skills.	1	High	Vasumithra S Priyanka G
Sprint-2	Creating Saving Account Action	USN-3	As a user, I can converse with the chatbot regarding saving account-related queries.	2	Medium	Vasumithra S Priyanka G
Sprint-2	Creating Current Account Action	USN-4	As a user, I can converse with the chatbot regarding current account-related queries.	2	Medium	Vasumithra S Priyanka G
Sprint-3	Creating Loan Account Action	USN-5	As a user, I can converse with the chatbot regarding loan account-related queries.	2	High	Vasumithra S Priyanka G

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Creating General Query Action	USN-6	As a user, I can converse with the chatbot regarding general queries.	2	Medium	Vasumithra S Priyanka G
Sprint-3	Creating Net Banking Action	USN-7	As a user, I can converse with the chatbot regarding net banking-related queries.	2	High	Vasumithra S Priyanka G
Sprint-4	Creating Assistant & Integrate With Flask Web Page (Build Python Code)	USN-8	As a user, I can see a flask web page for bank.	1	Low	Vasumithra S Priyanka G
Sprint-4	Build HTML Code	USN-9	As a user, I can web pages integrated with a chatbot.	1	Medium	Vasumithra S Priyanka G
Sprint-4	Run The Application	USN-10	As a user, I can communicate with the chatbot24*7.	1	Low	Vasumithra S Priyanka G

6.2 SPRINT DELIVERY SCHEDULE

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	26 Oct 2022
Sprint-2	20	6 Days	27 Oct 2022	05 Nov 2022	20	29 Oct 2022
Sprint-3	20	6 Days	29 Nov 2022	12 Nov 2022	20	01 Nov 2022
Sprint-4	20	6 Days	02 Nov 2022	19 Nov 2022	20	04 Nov 2022

6.3 REPORTS FROM JIRA



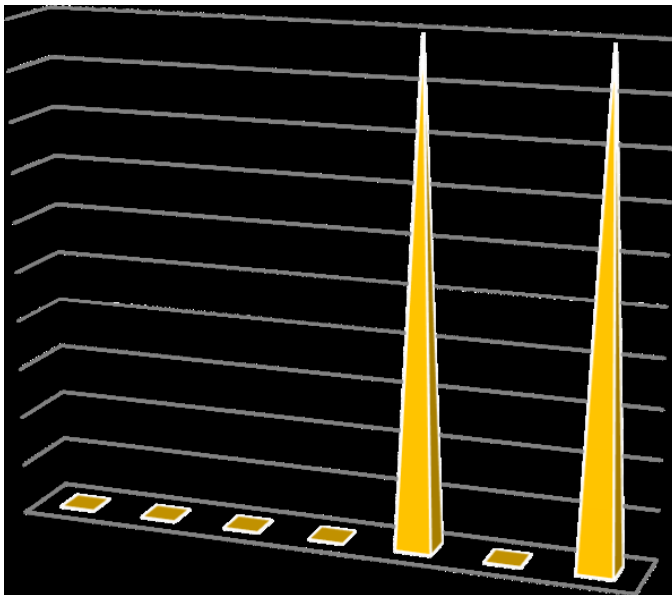
VELOCITY:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

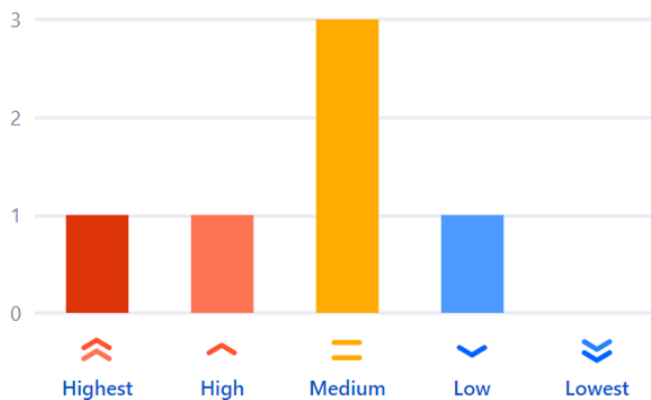
$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$

BURNDOWN CHART:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.



PRIORITY BREAKDOWN:



7.CODING & SOLUTIONING

THEORETICAL ANALYSIS:

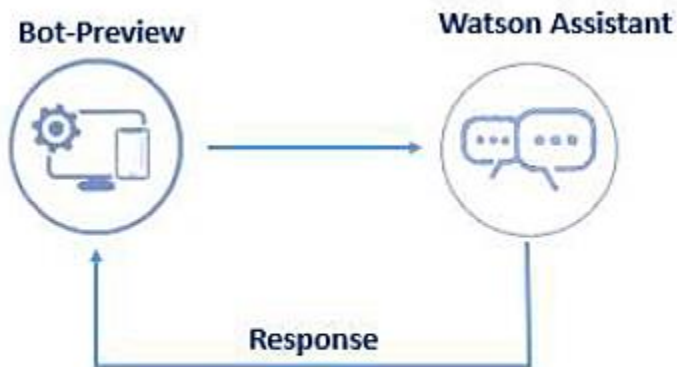
Services Used:

 IBM Watson Assistant

Watson Assistant



Technical Architecture:



Hardware / Software designing:

To complete this project, you should have the following software and packages.

Software:

- Visual studio code
- IBM Watson studio

Packages:

- Flask

FLOWCHART:

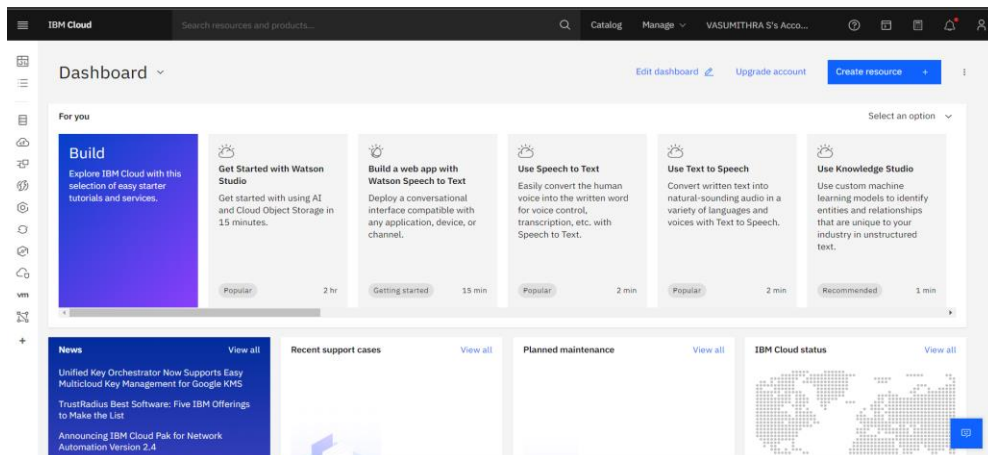
- ❄ Create IBM Services.
- ❄ Creating skills & Assistant for Chatbot.
- ❄ Creating Savings account action.
- ❄ Creating Current account action.
- ❄ Creating Loan account action.
- ❄ Creating a general query action.
- ❄ Creating a Net banking action.
- ❄ Create HTML web page.
- ❄ Integrate the Watson Assistant with Web Page.

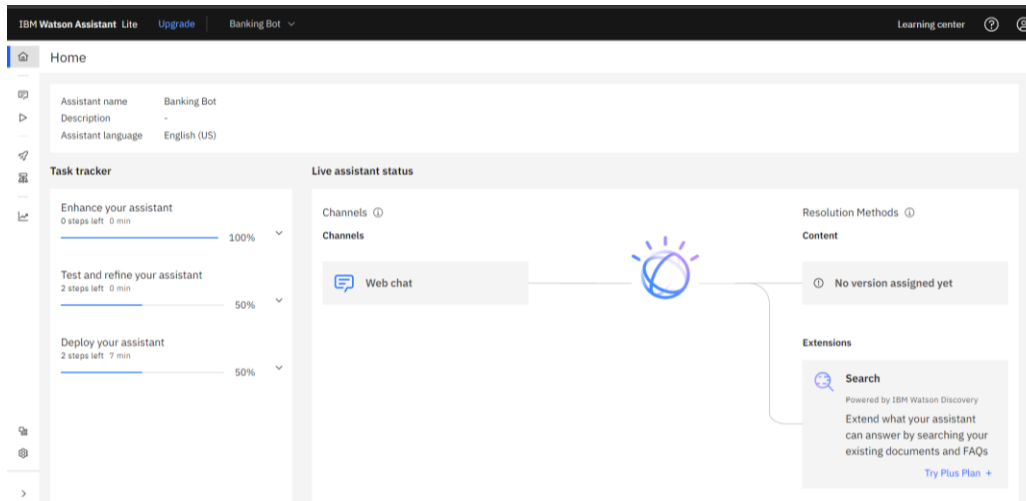
SUMMARY:

Create IBM Service:

In this activity, you will be creating the Necessary IBM service. The following are the service that you have to create.

- Watson Assistant

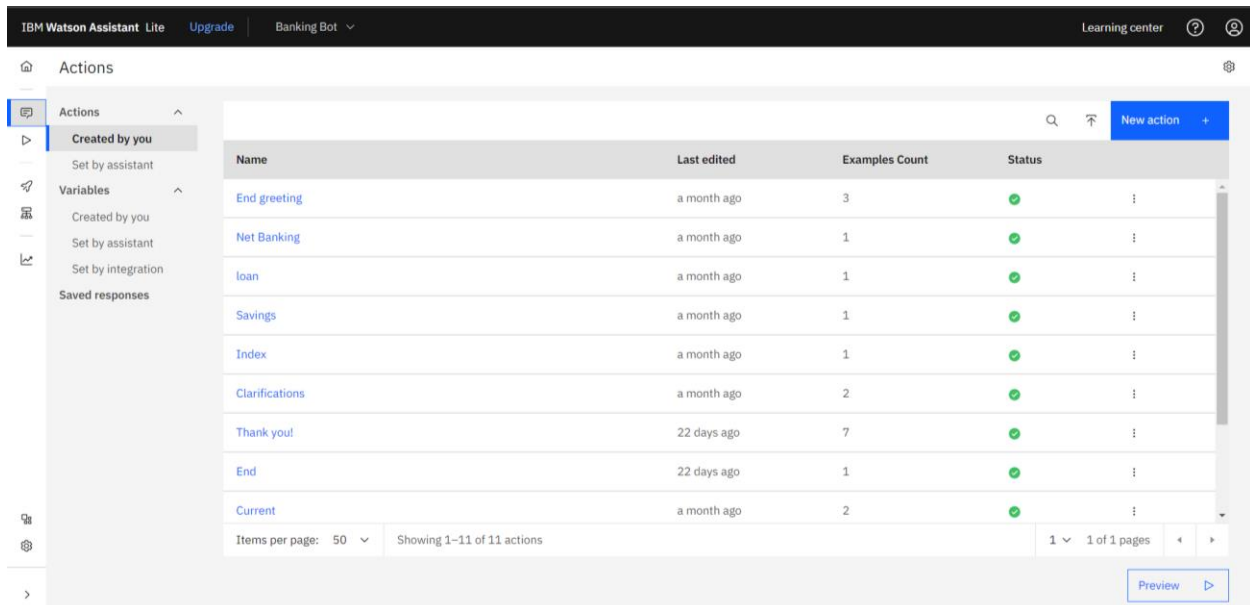


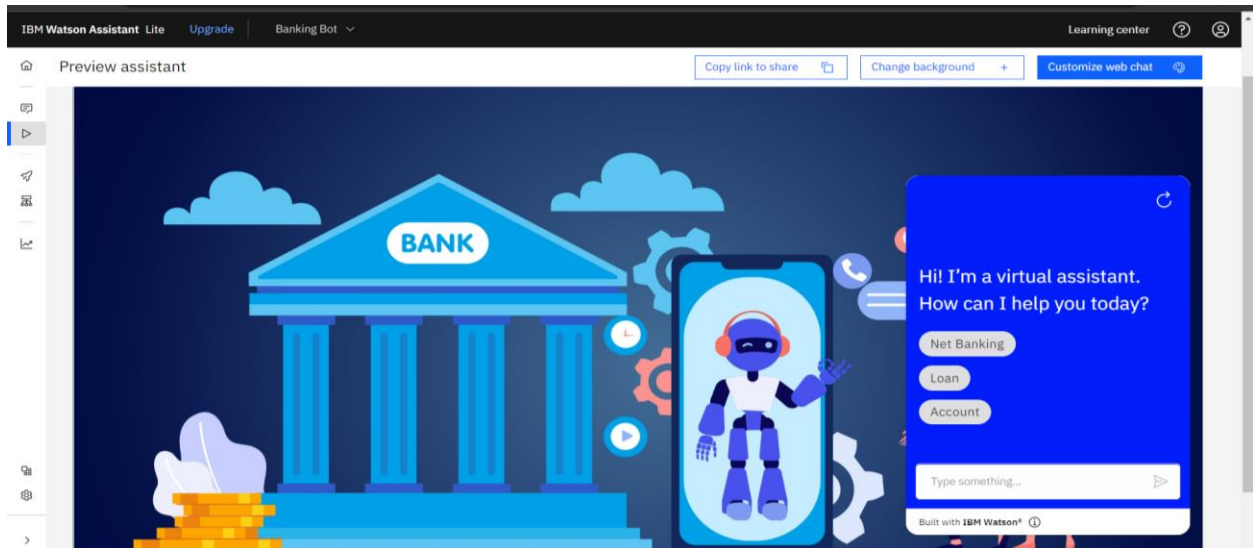


Creating Skills & Assistant For Chatbot:

Skills are nothing but actions and steps. Steps are the subset of actions where conversations are built and Assistant is used to integrate skills.

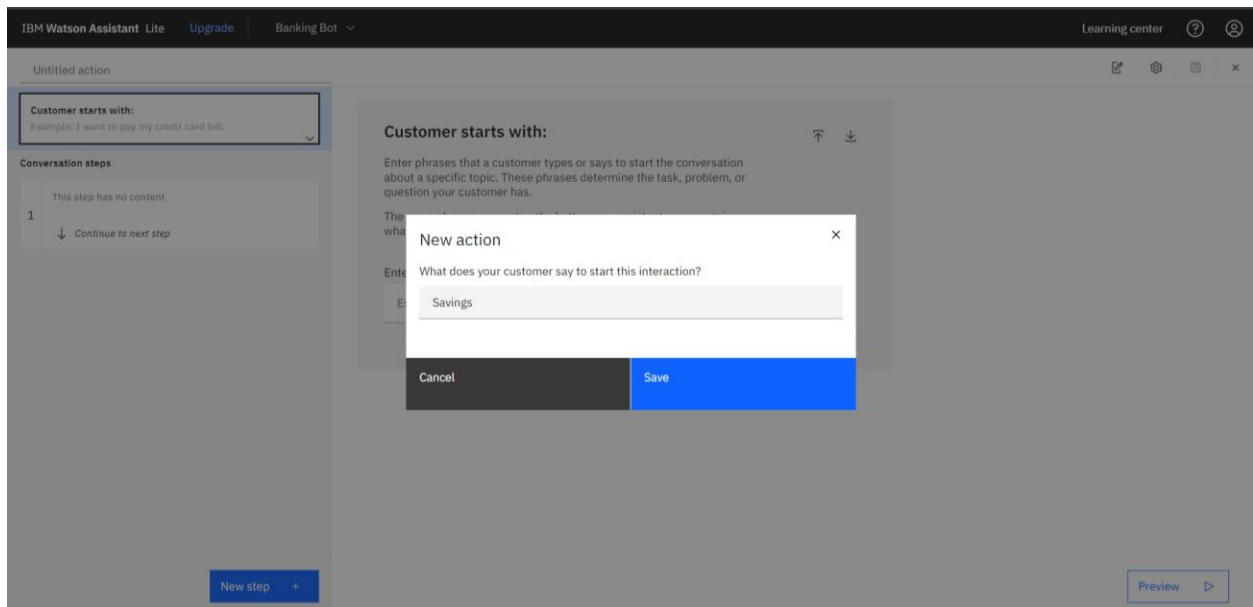
A default template chatbot is created. Need to add actions.





Creating Saving Account Action

Create a saving account in IBM Watson. Create new Action Saving.



Add steps in savings action.

The screenshot shows the IBM Watson Assistant Lite interface for configuring a 'Savings' action. The left sidebar contains a 'Conversation steps' list with three steps: 1. 'Which type of savings account do you want to create?' with options 'Zero balance...', 'Kids savings ...', and '+ 1'. 2. 'Great! Please take the following documents and head towards the nearest branch. 1. Aadhar Card ...' with a 'Go to action: End' button. 3. 'Awesome! Please take the following documents and head towards the nearest branch. 1. Aadhar Card ...' with a 'Go to action: End' button. The main area shows the 'Customer starts with:' section with a text input field 'Enter a phrase' and a 'Savings' label. A 'Preview' button is visible at the bottom right.

Creating Current Account Action

Create a new Action **Current** for the current account action.

The screenshot shows the IBM Watson Assistant Lite interface for configuring a 'Current' action. The left sidebar contains a 'Conversation steps' list with one step: 1. 'This step has no content' with a 'Continue to next step' button. The main area shows the 'Customer starts with:' section with a text input field 'Enter a phrase' and a 'Current' label. A 'Preview' button is visible at the bottom right. A 'New action' dialog box is open in the center, asking 'What does your customer say to start this interaction?' with a text input field containing 'Current' and 'Cancel' and 'Save' buttons.

Add steps in current action.

The screenshot shows the IBM Watson Assistant interface for configuring a 'Current' action. The top navigation bar includes 'IBM Watson Assistant Lite', 'Upgrade', 'Banking Bot', 'Learning center', and user icons. The main area is divided into two panels. The left panel, titled 'Current', contains a 'Customer starts with:' dropdown set to 'Current account' and a 'Conversation steps' section with three steps. Step 1 asks 'What's your company type?' with buttons for 'Partnership' and 'Proprietorship'. Step 2 is a 'Go to action: End' step. Step 3 is another 'Go to action: End' step. The right panel, titled 'Customer starts with:', provides instructions on entering phrases and a list of phrases: 'Current' and 'Current account'. A 'Preview' button is at the bottom right.

IBM Watson Assistant Lite Upgrade Banking Bot Learning center ?

Current

Customer starts with:
Current account

Conversation steps

1 What's your company type?
Partnership Proprietorship
Continue to next step

1 is Proprietorship
2 Please take the following Documents and approach the closest branch 1.Income Tax Returns of the properto...
Go to action: End

1 is Partnership
3 Please take the following Documents and approach the closest branch 1.Income Tax Returns of the all the...
Go to action: End

New step +

Customer starts with:
Enter phrases that a customer types or says to start the conversation about a specific topic. These phrases determine the task, problem, or question your customer has.
The more phrases you enter, the better your assistant can recognize what the customer wants.
Enter phrases your customer might use to start this action Total: 2
Enter a phrase
Current
Current account
Preview

Creating Loan Account Action

Loan action is created with the necessary steps.

The screenshot shows the IBM Watson Assistant interface for configuring an 'Untitled action'. The top navigation bar is the same as the previous screenshot. The main area is divided into two panels. The left panel, titled 'Untitled action', contains a 'Customer starts with:' dropdown set to 'Example: I want to pay my credit card bill.' and a 'Conversation steps' section with one step that says 'This step has no content'. The right panel, titled 'Customer starts with:', provides instructions on entering phrases. A 'New action' dialog box is open in the center, asking 'What does your customer say to start this interaction?' with the text 'loan' entered. The dialog has 'Cancel' and 'Save' buttons. A 'Preview' button is at the bottom right.

IBM Watson Assistant Lite Upgrade Banking Bot Learning center ?

Untitled action

Customer starts with:
Example: I want to pay my credit card bill.

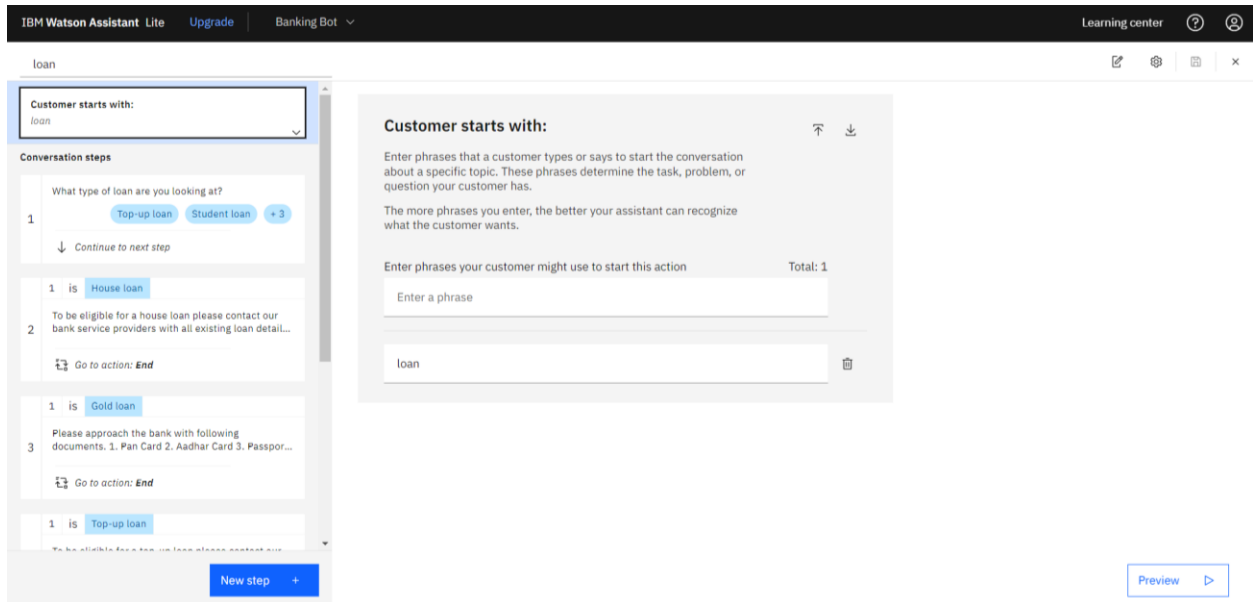
Conversation steps

1 This step has no content
Continue to next step

New step +

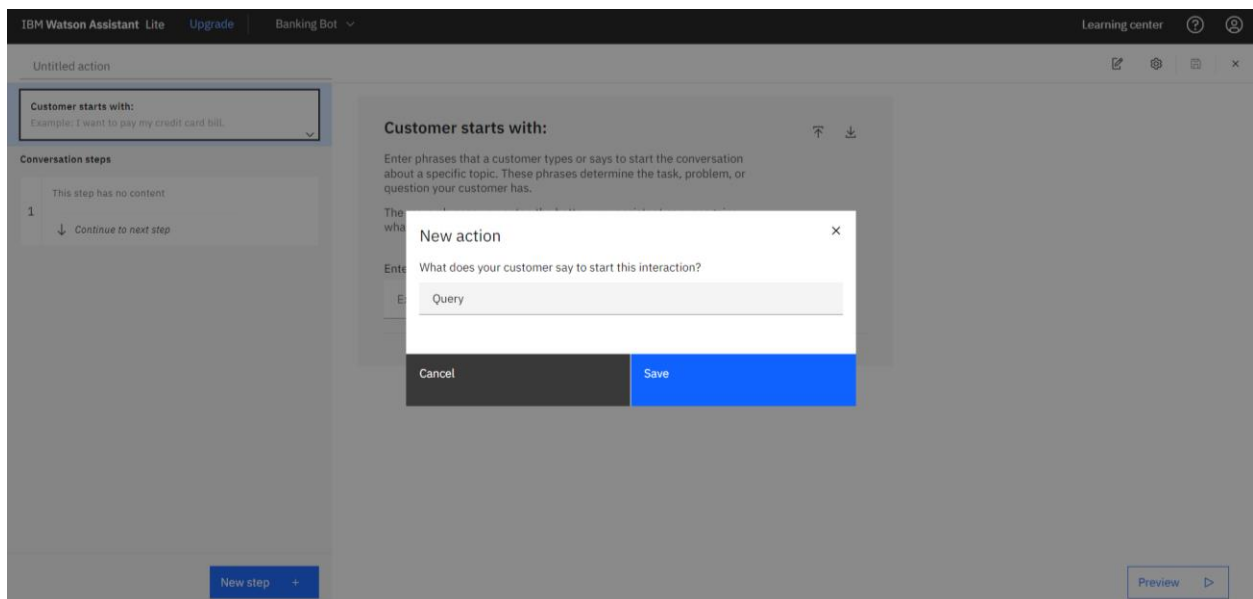
Customer starts with:
Enter phrases that a customer types or says to start the conversation about a specific topic. These phrases determine the task, problem, or question your customer has.
The more phrases you enter, the better your assistant can recognize what the customer wants.
Enter phrases your customer might use to start this interaction
What does your customer say to start this interaction?
loan
Cancel Save
Preview

Add steps in loan action.



Creating General Query Action

General **query** action is created with the necessary steps.



Add steps in Query action.

The screenshot shows the IBM Watson Assistant interface for configuring a 'Query' action. The top bar includes 'IBM Watson Assistant Lite', 'Upgrade', 'Banking Bot', and 'Learning center'. The left sidebar shows the 'Query' action selected. The main area is divided into two panels. The left panel, titled 'Conversation steps', shows a list of steps with a 'New step +' button at the bottom. The right panel, titled 'Customer starts with:', contains instructions and a text input field for phrases. A 'Preview' button is located at the bottom right.

IBM Watson Assistant Lite Upgrade Banking Bot Learning center

Query

Customer starts with:
Query

Conversation steps

Select the general queries listed below

1 Find a nearest... Bank Workin... +7

Continue to next step

1 is Bank Working Days

2 The bank is open all days from Monday to Saturday from 9 am to 3 pm ,with exception of 2nd Saturdays.

Go to action: End

1 is List of Branches

3 6TH AVENUE ANNA NAGAR, A R M BRANCHCHENNAI, ABHIRAMAPURAM,...

Go to action: End

1 is Storage locker facility

6TH AVENUE ANNA NAGAR, A R M BRANCHCHENNAI, ABHIRAMAPURAM,...

New step +

Customer starts with:

Enter phrases that a customer types or says to start the conversation about a specific topic. These phrases determine the task, problem, or question your customer has.

The more phrases you enter, the better your assistant can recognize what the customer wants.

Enter phrases your customer might use to start this action Total: 1

Enter a phrase

Query

Preview

Creating Net Banking Action

Net Banking action is created with the necessary steps.

The screenshot shows the IBM Watson Assistant interface for configuring a 'Net Banking' action. The top bar includes 'IBM Watson Assistant Lite', 'Upgrade', 'Banking Bot', and 'Learning center'. The left sidebar shows the 'Net Banking' action selected. The main area is divided into two panels. The left panel, titled 'Conversation steps', shows a list of steps with a 'New step +' button at the bottom. The right panel, titled 'Customer starts with:', contains instructions and a text input field for phrases. A 'Preview' button is located at the bottom right.

IBM Watson Assistant Lite Upgrade Banking Bot Learning center

Untitled action

Customer starts with:
Example: I want to pay my credit card bill.

Conversation steps

This step has no content

1 Continue to next step

New step +

Customer starts with:

Enter phrases that a customer types or says to start the conversation about a specific topic. These phrases determine the task, problem, or question your customer has.

The more phrases you enter, the better your assistant can recognize what the customer wants.

Enter phrases your customer might use to start this interaction Total: 1

Enter a phrase

Net Banking

Cancel Save

Preview

Add steps in Net Banking action.

The screenshot shows the IBM Watson Assistant interface for the 'Net Banking' action. The top bar includes 'IBM Watson Assistant Lite', 'Upgrade', 'Banking Bot', and 'Learning center'. The main area is divided into two panels. The left panel, titled 'Net Banking', shows a 'Customer starts with: Net Banking' dropdown and a 'Conversation steps' list. The steps include: 1. 'What queries do you have regarding net banking?' with sub-steps 'What is Net B...' and 'How do I regi...'. 2. 'What is Net Banking?' with a description of the facility. 3. 'How do I register for Net Banking?' with a description of the registration process. The right panel, titled 'Customer starts with:', provides instructions on how to enter phrases and shows a list of phrases: 'Enter a phrase' and 'Net Banking'. A 'Preview' button is located at the bottom right.

In addition to this greeting, end greeting ,index ,end and thank you actions are also created.

The screenshot shows the IBM Watson Assistant interface for the 'Clarifications' action. The top bar includes 'IBM Watson Assistant Lite', 'Upgrade', 'Banking Bot', and 'Learning center'. The main area is divided into two panels. The left panel, titled 'Clarifications', shows a 'Customer starts with: Clarifications' dropdown and a 'Conversation steps' list. The steps include: 1. 'Do you have doubts on' with sub-steps 'Moratorium' and 'Interest rate'. 2. 'Moratorium' with a description of the moratorium period. 3. 'Interest rate' with a description of the interest rate for different loan types. The right panel, titled 'Customer starts with:', provides instructions on how to enter phrases and shows a list of phrases: 'Enter a phrase', 'Doubts', and 'Clarifications'. A 'Preview' button is located at the bottom right.

IBM Watson Assistant Lite

Upgrade

Banking Bot

Learning center

Actions

Actions

Created by you

Set by assistant

Variables

Created by you

Set by assistant

Set by integration

Saved responses

Search

Filter

New action +

Name	Last edited	Examples Count	Status
End greeting	a month ago	3	✓
Net Banking	a month ago	1	✓
loan	a month ago	1	✓
Savings	a month ago	1	✓
Index	a month ago	1	✓
Clarifications	a month ago	2	✓
Thank you!	22 days ago	7	✓
End	22 days ago	1	✓
Current	a month ago	2	✓

Items per page: 50

Showing 1–11 of 11 actions

1 of 1 pages

Preview

Search

Filter

New action +

Name	Last edited	Examples Count	Status
Savings	a month ago	1	✓
Index	a month ago	1	✓
Clarifications	a month ago	2	✓
Thank you!	22 days ago	7	✓
End	22 days ago	1	✓
Current	a month ago	2	✓
Query	a month ago	1	✓
Greeting	22 days ago	4	✓

Items per page: 50

Showing 1–11 of 11 actions

1 of 1 pages

Preview

Creating Assistant & Integrate With Flask Web Page

Creating a banking bot in this activity that has the following capabilities.

1. The Bot should be able to guide a customer to create a bank account.
2. The Bot should be able to answer loan queries.
3. The Bot should be able to answer general banking queries.

4. The Bot should be able to answer queries regarding net banking.
5. With the help of this bot, you can get all the required details related to banking.

Let us build our flask application which will be running in our local browser with a user interface.

In the flask application, users will interact with the chatbot, and based on the user queries they will get the outcomes.

Build Python Code

1: Importing Libraries

The first step is usually importing the libraries that will be needed in the program.

```
from flask import Flask, render_template
```

Importing the flask module into the project is mandatory. An object of the Flask class is our WSGI application. Flask constructor takes the name of the current module (`__name__`).

2: Creating our flask application and loading

```
app = Flask(__name__)
```

3: Routing to the Html Page

Here, the declared constructor is used to route to the HTML page created earlier.

The '/' route is bound with the bot function. Hence, when the home page of a web server is opened in the browser, the HTML page will be rendered.

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

Main Function

This is used to run the application in localhost.

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

Build HTML Code

- We use HTML to create the front-end part of the web page.
- Here, we have created 1 HTML page-Chatbot.html
- Chatbot.html displays the home page which integrates with Watson Assistant.
- A simple HTML page is created. Auto-generated source code from IBM Watson Assistants is copied and pasted inside the body tag

Run The Application

- Open the anaconda prompt from the start menu.
- Navigate to the folder where your app.py resides.
- Now type the “python app.py” command.
- It will show the local host where your app is running on <http://127.0.0.1:5000/>

- Copy that localhost URL and open that URL in the browser. It does navigate me to where you can view your web page.

Source Code:

```
<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="utf-8">
<meta content="width=device-width, initial-scale=1.0"
name="viewport">
<title>Banking Bot</title>
<meta content="" name="description">
<meta content="" name="keywords">
<!-- Favicons -->
<link href="assets/img/favicon.png" rel="icon">
<link href="assets/img/apple-touch-icon.png" rel="apple-touch-
icon">
<!-- Google Fonts -->
<link
href="https://fonts.googleapis.com/css?family=Open+Sans:300,
300i,400,400i,600,600i,700,700
i|Raleway:300,300i,400,400i,500,500i,600,600i,700,700i|Poppin
s:300,300i,400,400i,500,500i,6
00,600i,700,700i" rel="stylesheet">
<!-- Vendor CSS Files -->
<link href="assets/vendor/aos/aos.css" rel="stylesheet">
<link href="assets/vendor/bootstrap/css/bootstrap.min.css"
rel="stylesheet">
<link href="assets/vendor/bootstrap-icons/bootstrap-icons.css"
rel="stylesheet">
<link href="assets/vendor/boxicons/css/boxicons.min.css"
rel="stylesheet">
```

```

<link href="assets/vendor/glightbox/css/glightbox.min.css"
rel="stylesheet">
<link href="assets/vendor/remixicon/remixicon.css"
rel="stylesheet">
<link href="assets/vendor/swiper/swiper-bundle.min.css"
rel="stylesheet">
<!-- Template Main CSS File -->
<link href="assets/css/style.css" rel="stylesheet">
</head>
<body>
<script>
    window.watsonAssistantChatOptions = {
        integrationID: "2d33609b-c061-4015-9c69-6993e984734c", //
The ID of this integration.
        region: "us-south", // The region your integration is hosted in.
        serviceInstanceID: "d06762b6-396b-4236-8512-
e118333e6832", // The ID of your service instance.
        onLoad: function(instance) { instance.render(); }
    };
    setTimeout(function(){
        const t=document.createElement('script');
        t.src="https://web-
chat.global.assistant.watson.appdomain.cloud/versions/" +
(window.watsonAssistantChatOptions.clientVersion || 'latest') +
"/WatsonAssistantChatEntry.js";
        document.head.appendChild(t);
    });
</script>
<!-- ===== Header ===== -->
<header id="header" class="fixed-top ">

```

```

<div class="container d-flex align-items-center justify-content-
lg-between">
<h1 class="logo me-auto me-lg-0"><a
href="index.html">Bot<span>.</span></a></h1>
<!-- Uncomment below if you prefer to use an image logo -->
<nav id="navbar" class="navbar order-last order-lg-0">
<ul>
<li><a class="nav-link scrollto active"
href="#hero">Home</a></li>
<li><a class="nav-link scrollto" href="#about">About</a></li>
<li><a class="nav-link scrollto"
href="#services">Services</a></li>
<li><a class="nav-link scrollto" href="#team">Team</a></li>
<li><a class="nav-link scrollto"
href="#contact">Contact</a></li>
</ul>
<i class="bi bi-list mobile-nav-toggle"></i>
</nav><!-- .navbar -->
<a href="#about" class="get-started-btn scrollto">Get
Started</a>
</div>
</header><!-- End Header -->
<!-- ===== Hero Section ===== -->
<section id="hero" class="d-flex align-items-center justify-
content-center">
<div class="container" data-aos="fade-up">
<div class="row justify-content-center" data-aos="fade-up"
data-aos-delay="150">
<div class="col-xl-6 col-lg-8">
<h1>AI Based Discourse for Banking
Industry<span>.</span></h1>

```

<h2>Chatbots for banking and finance operations.</h2>

</div>

</div>

<div class="row gy-4 mt-5 justify-content-center" data-aos="zoom-in" data-aos-delay="250">

<div class="col-xl-2 col-md-4">

<div class="icon-box">

<i class="ri-store-line"></i>

<h3>Loan</h3>

</div>

</div>

<div class="col-xl-2 col-md-4">

<div class="icon-box">

<i class="ri-bar-chart-box-line"></i>

<h3>Net-Banking</h3>

</div>

</div>

<div class="col-xl-2 col-md-4">

<div class="icon-box">

<i class="ri-calendar-todo-line"></i>

<h3>24*7 </h3>

</div>

</div>

<div class="col-xl-2 col-md-4">

<div class="icon-box">

<i class="ri-paint-brush-line"></i>

<h3>Locker</h3>

</div>

</div>

<div class="col-xl-2 col-md-4">

<div class="icon-box">

```
<i class="ri-database-2-line"></i>
<h3><a href="">Data Security</a></h3>
</div>
</div>
</div>
</div>
</section><!-- End Hero -->
<div id="preloader"></div>
<a href="#" class="back-to-top d-flex align-items-center justify-
content-center"><i class="bi biarrow-
up-short"></i></a>
<!-- Vendor JS Files -->
<script
src="assets/vendor/purecounter/purecounter_vanilla.js"></script
>
<script src="assets/vendor/aos/aos.js"></script>
<script
src="assets/vendor/bootstrap/js/bootstrap.bundle.min.js"></scrip
t>
<script
src="assets/vendor/glightbox/js/glightbox.min.js"></script>
<script src="assets/vendor/isotope-
layout/isotope.pkgd.min.js"></script>
<script src="assets/vendor/swiper/swiper-
bundle.min.js"></script>
<script src="assets/vendor/php-email-
form/validate.js"></script>
<script src="assets/js/main.js"></script>
</body>
</html>
```

8.TESTING

8.1 TEST CASES

8.2 USER ACCEPTANCE TESTING

Defect Analysis

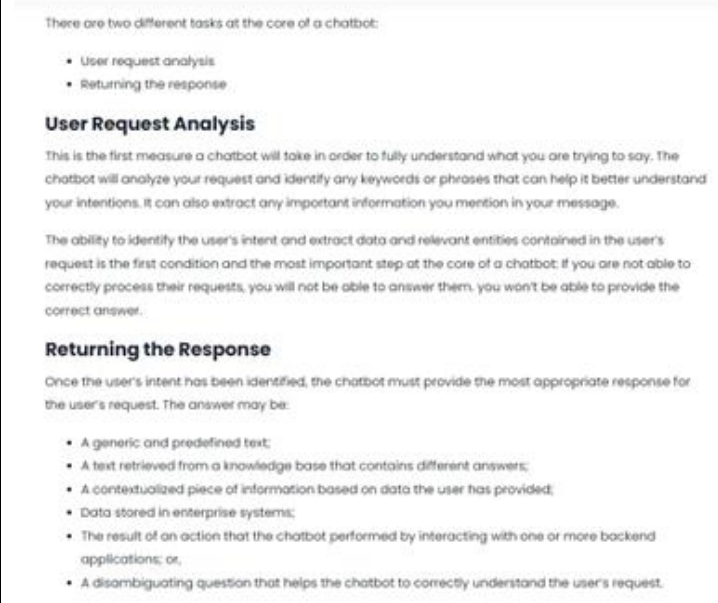
Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	1	0	0	0	1
Duplicate	2	2	0	1	4
External	2	3	0	2	6
Fixed	1	5	3	2	12
Not Reproduced	0	0	0	0	0
Skipped	0	0	0	1	0
Won't Fix	0	0	0	0	1
Totals	6	10	3	6	24

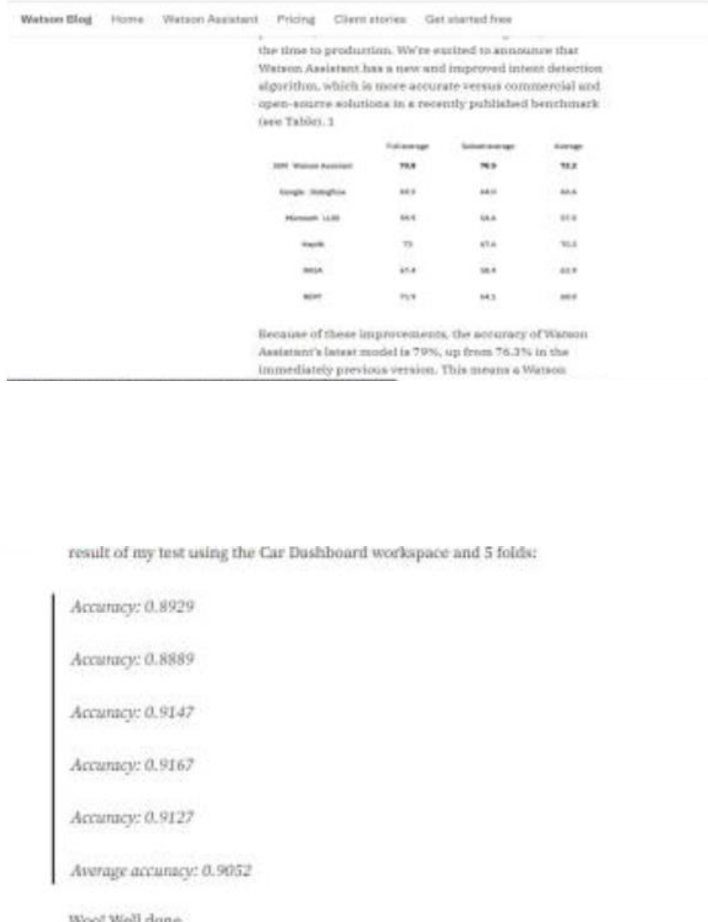
Test Case Analysis

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	1	0	0	1
Client Application	1	0	0	1
Security	1	0	0	1
Outsource Shipping	0	0	0	0
Exception Reporting	1	0	0	1
Final Report Output	1	0	0	1
Version Control	1	0	0	1

9.RESULTS.

9.1 PERFORMANCE METRICS

S.No	Parameter	Values	Screenshot
1.	Model Summary	-	 <p>The screenshot shows a document titled "Model Summary" with a light blue header. The content is organized into sections with bullet points and bold headings. The first section, "User Request Analysis", explains that this is the first measure a chatbot takes to understand user intent. The second section, "Returning the Response", lists five possible types of responses: generic predefined text, knowledge base retrieval, contextualized information, enterprise system data, or disambiguating questions.</p> <p>There are two different tasks at the core of a chatbot:</p> <ul style="list-style-type: none">• User request analysis• Returning the response <p>User Request Analysis</p> <p>This is the first measure a chatbot will take in order to fully understand what you are trying to say. The chatbot will analyze your request and identify any keywords or phrases that can help it better understand your intentions. It can also extract any important information you mention in your message.</p> <p>The ability to identify the user's intent and extract data and relevant entities contained in the user's request is the first condition and the most important step at the core of a chatbot. If you are not able to correctly process their requests, you will not be able to answer them. You won't be able to provide the correct answer.</p> <p>Returning the Response</p> <p>Once the user's intent has been identified, the chatbot must provide the most appropriate response for the user's request. The answer may be:</p> <ul style="list-style-type: none">• A generic and predefined text;• A text retrieved from a knowledge base that contains different answers;• A contextualized piece of information based on data the user has provided;• Data stored in enterprise systems;• The result of an action that the chatbot performed by interacting with one or more backend applications; or,• A disambiguating question that helps the chatbot to correctly understand the user's request.

2.	Accuracy	<p>Training Accuracy = 95.5</p> <p>Validation Accuracy= 0.8045</p>	 <p>The screenshot shows a blog post from Watson Assistant. It features a table comparing Watson Assistant's performance against Google Dialogflow, Microsoft LUIS, Haptik, and RASA. Below the table, it lists the accuracy results of a test using the Car Dashboard workspace and 5 folds.</p> <table border="1"> <thead> <tr> <th></th> <th>F1 score</th> <th>Precision</th> <th>Recall</th> </tr> </thead> <tbody> <tr> <td>IBM Watson Assistant</td> <td>79.8</td> <td>76.9</td> <td>73.2</td> </tr> <tr> <td>Google Dialogflow</td> <td>52.3</td> <td>54.0</td> <td>50.6</td> </tr> <tr> <td>Microsoft LUIS</td> <td>54.5</td> <td>58.8</td> <td>51.9</td> </tr> <tr> <td>Haptik</td> <td>75</td> <td>67.6</td> <td>70.1</td> </tr> <tr> <td>RASA</td> <td>57.4</td> <td>58.4</td> <td>53.9</td> </tr> <tr> <td>IBM</td> <td>77.9</td> <td>74.3</td> <td>69.9</td> </tr> </tbody> </table> <p>Because of these improvements, the accuracy of Watson Assistant's latest model is 79%, up from 76.3% in the immediately previous version. This means a Watson</p> <p>result of my test using the Car Dashboard workspace and 5 folds:</p> <ul style="list-style-type: none"> Accuracy: 0.8929 Accuracy: 0.8889 Accuracy: 0.9147 Accuracy: 0.9167 Accuracy: 0.9127 Average accuracy: 0.9052 <p>Wow! Well done.</p>		F1 score	Precision	Recall	IBM Watson Assistant	79.8	76.9	73.2	Google Dialogflow	52.3	54.0	50.6	Microsoft LUIS	54.5	58.8	51.9	Haptik	75	67.6	70.1	RASA	57.4	58.4	53.9	IBM	77.9	74.3	69.9
	F1 score	Precision	Recall																												
IBM Watson Assistant	79.8	76.9	73.2																												
Google Dialogflow	52.3	54.0	50.6																												
Microsoft LUIS	54.5	58.8	51.9																												
Haptik	75	67.6	70.1																												
RASA	57.4	58.4	53.9																												
IBM	77.9	74.3	69.9																												

10.ADVANTAGES & DISADVANTAGES: ADVANTAGES:

- Transforms the member experience.
- Always available to interact with your members, enabling them to get the personalized information they need, when and where they need it.
- Watson is a computer running software called Deep QA, developed by IBM Research.

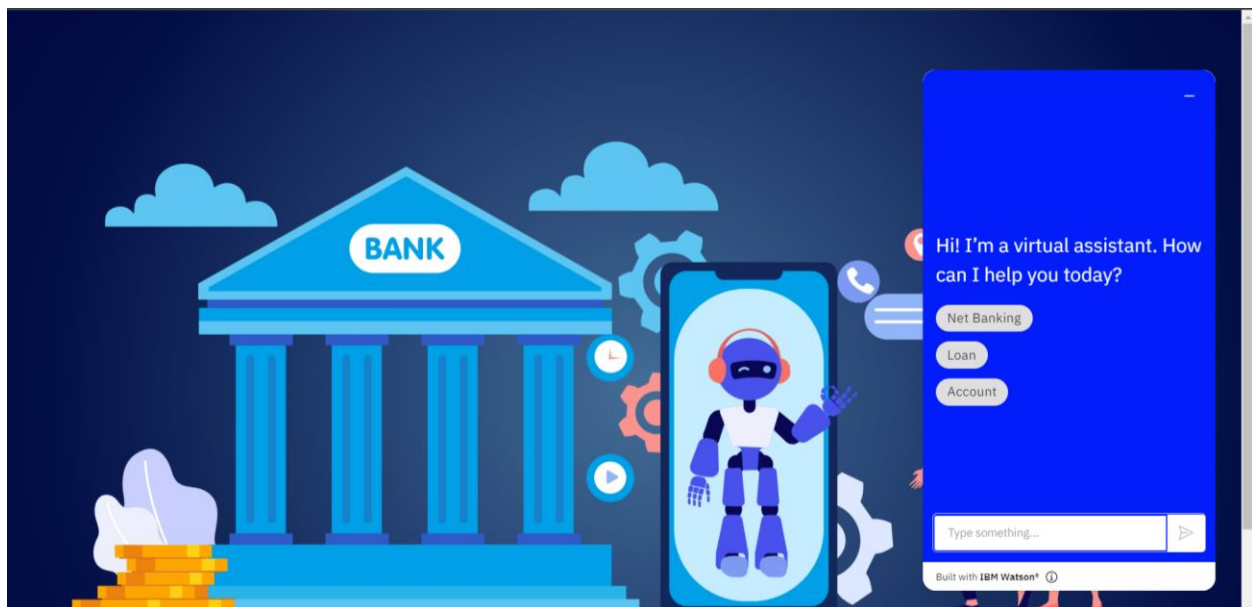
- The broader goal of Watson was to create a new generation of technology that can find answers in unstructured data more effectively than standard search technology.
- **Helps lower cost of member interactions**
- Supports your goals to deflect calls to lower-cost, self-service channels, reduce agent training, call handling time and reduce average cost per call.
- In the financial sector, Watson use is typically geared toward its question and answer capabilities. By not only answering questions, but also analyse them as well, Watson can help give financial guidance and help manage financial risk.

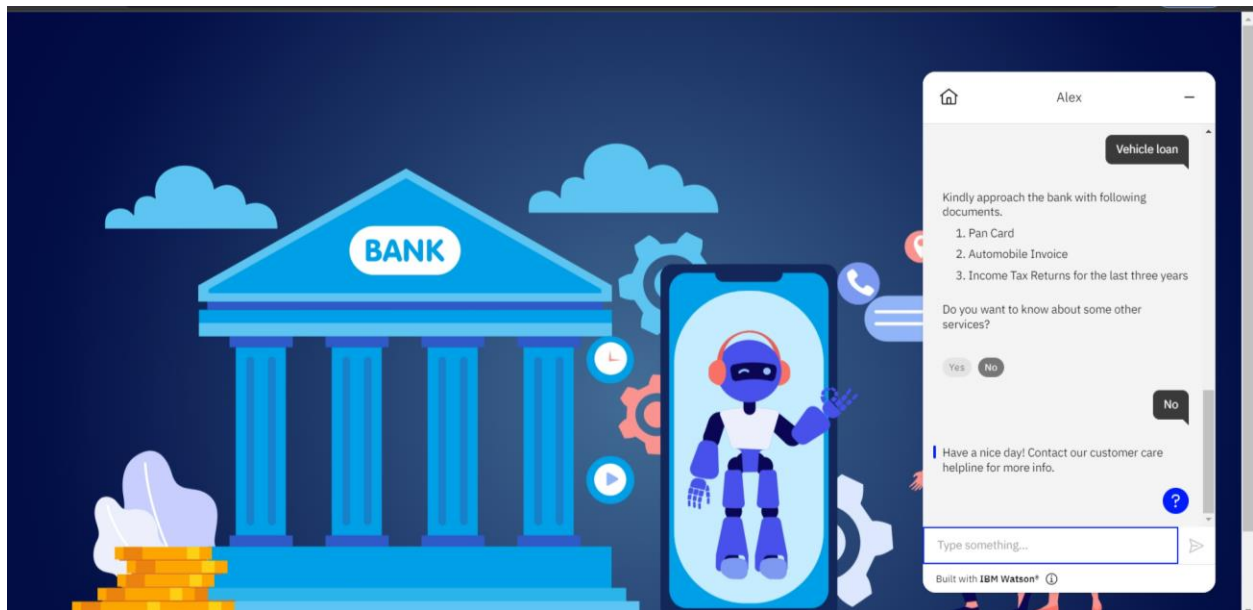
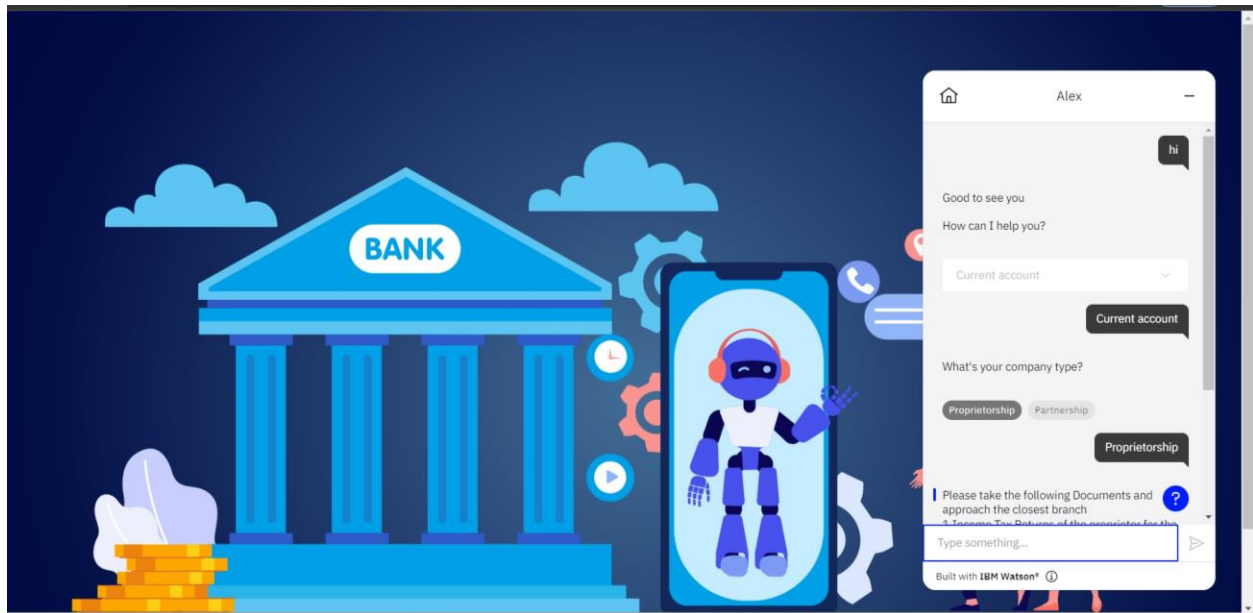
DISADVANTAGES:

- ☆ Seen as disruptive applied science
- ☆ Doesn't process structured data directly
- ☆ High switching costs and Maintenance
- ☆ Takes time to integrate Watson and it's services into a company.
- ☆ Targeting towards bigger organizations that can afford Watson.
- ☆ AI for the financial industry has a relevant high cost too. It may not be possible for all the finance companies to go for this big expensive model initially.
- ☆ An improper algorithm or command can bring unnecessary errors and wrong results.

☆ So, proper implementation of the algorithm is important.

11.CONCLUSION







Alex



Vehicle loan

Kindly approach the bank with following documents.

1. Pan Card
2. Automobile Invoice
3. Income Tax Returns for the last three years

Do you want to know about some other services?

Yes

No

No

Have a nice day! Contact our customer care helpline for more info.

?

Type something...



Built with IBM Watson® ⓘ

BANKING CHATBOT:

PREVIEW OF CHATBOT:

<https://web-chat.global.assistant.watson.appdomain.cloud/preview.html?backgroundImageURL=https%3A%2F%2Fus-south.assistant.watson.cloud.ibm.com%2Fpublic%2Fimages%2Fupx-d06762b6-396b-4236-8512-e118333e6832%3A%3A495bdb54-8670-415a-a8aa-5480cc1528ef&integrationID=2d33609b-c061-4015-9c69-6993e984734c®ion=us-south&serviceInstanceID=d06762b6-396b-4236-8512-e118333e6832>

12.FUTURE SCOPE

- 👉 The goal is to allow users and Artificial Intelligence to communicate naturally and understand complex requests. This would mean that customer service agents would be able to focus on other tasks while the AI takes care of customers' queries.
- 👉 Chatbots are changing the way businesses communicate and understand their customers. With AI, chatbots will have the ability to deliver a more personalized customer experience. It's also saving companies money through customer service, internal processes, and marketing efforts.
- 👉 AI chatbots will likely become more popular in human resources departments worldwide. This is a straightforward shift from customer service to employee service bots. HR versions are also likely to become popular soon. They may

gain ground in employee training, IT help and administrative assistance functions.

13.APPENDIX

SOURCE CODE:

<https://github.com/IBM-EPBL/IBM-Project-6882-1658841713/tree/main/AI%20BASED%20DISCOURSE%20FOR%20BANKING%20INDUSTRY/Final%20deliverables>

GITHUB LINK:

<https://github.com/IBM-EPBL/IBM-Project-6882-1658841713>

PROJECT DEMO LINK:

https://drive.google.com/file/d/1nVo7wOH0o1Zyu64f8zQukRVtCJreli_W/view?usp=share_link