Project Report

1. INTRODUCTION:

- Banks are adopting AI for finance to use face recognition and pattern recognition. In the former, instead of the traditional password-based authentication, there is the use of face recognition that can open accounts.
- In the latter, there is a development of a system that recognizes clients' emotions from their facial expressions so as to interpret their moods.
- This can be used to provide quality service such as providing emoticons. Banks are also using AI in robots as assistants.
- They are employing chat bots that can interact with customers in real-time and automate routine processes.
- A bank that uses AI in investment banking can better preserve five aspects which are its values, employment, information patterns, structure, and strategy.

1.1Project overview:

Project goals:

Here we create a chat assistant to help the customers and solve their requirements. The Chabot help to give the solution of given problem ,it explains the following procedures.

Project objectives and project scope:

- The chat boot used for resolve the queries.
- It describes the procedure.
- It explains the process steps of different kind of account.
- It easy to use and we'll designed process.

Project schedule:

5 months (July-November)

1.2PURPOSE:

4. Human-level:

This is one of the most important challenges in AI, one that has kept researchers on edge for AI Services in companies and start-ups. These companies might be boasting of above 90% Accuracy, but humans can do better in all of these scenarios. For example, let our model predict whether the image is of a dog or a cat. The human can predict the correct output nearly every Time, mopping up a stunning accuracy of above 99%.For a deep learning model to perform a similar performance would require unprecedented Fine-tuning, hyper parameter optimization, large dataset, and a well-defined and accurate Algorithm, along with robust computing power, uninterrupted training on train data and testing on test data. That sounds a lot of work, and it's actually a hundred times more difficult than it sounds. One way you can avoid doing all the hard work is just by using a service provider, for they can Train specific deep learning models using pre-trained models. They are trained on millions of Images and are fine-tuned for maximum accuracy, but the real problem is that they continue to Show errors and would really struggle to reach human-level performance.

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2. LITERACY SURVEY FOR ARTIFICIAL INTELLIGENCE IN BANKING

INDUSTRY:

Abstract:

Artificial intelligence (AI) is now widely acknowledged as one of the most important digital transformation enablers across a significant number of Industries. Artificial intelligence (AI) has the potential to facilitate enterprises. Become more imaginative, versatile, and adaptable than they have ever been. AI Is already being applied to enhance productivity and competitiveness while also driving digital transformation in a range of organizations. AI is supporting Indian Banks in upgrading their operations across the board, from accounting to sales to Contracts and cyber security.

Introduction:

Digital transformation is among the most well-known important drivers of how Businesses deliver Value to their customers in a competitive, fast-changing Business environment. Artificial Intelligence (AI) is now widely acknowledged as one of the most important digital transformation Enablers across a significant Number of industries. Artificial intelligence (AI) has the potential to Facilitate Enterprises. Become imaginative, versatile, and adaptable than they have ever been. AI is already being applied to enhance productivity and Competitiveness while also driving Digital transformation in a range of Organizations.

Literature and Synthesis:

1.Kaur, J. (2020)Pointed out that in a country like India where most of the people were using Banking transactions every day, it was important to implement technological Innovations In banking sector in order to ensure greater transparency in banking Activities and attain Financial inclusion. The study was based on the secondary Source of data and it tried to Explain the three evolution phase of banking sector, Which started from the history of Banking and ended with the nationalization and Banking reforms taken place after 1991.It Provided an outlook into the various Types of innovative banking, products and services and the electronic systems. It

2.1 Existing Problem

Not identifying the customer's use case:

- A Chabot may not be a one-size-fits-all solution for every business.
- Businesses often make the mistake of choosing the wrong type of Chabot without considering their needs and use case.
- In these cases, the Chabot does not prove to be advantageous to the business,
- Causes repeated dead-end for customers, and results in haemorrhaged money.

Not understanding customer emotion and intent:

- It is as important to express empathy via conversational AI to customers as it is to solve their problems.
- Users may be approaching the Chabot in a frustrated state, so when the Chabot fails to understand the customer queries, the situation is bound to get worse.
- While it is not possible yet to train bots to understand and act on human emotions, you can fix it by lying out and clearing labelling intents using stronger decision-trees or machine learning (ML), Natural Language Understanding, and Natural Language Processing (NLP).
- This way, you can come as close as possible to interpreting the customer's emotions and requests.

The Chabot lacks transparency:

- Boot failure and customer frustration are often brought about by not making it clear to a customer that they are interacting with a boot and not a human agent. This can skew customer expectations and cause a poor user experience.
- You can fix it by being transparent about using a bot. It can be indicated at the beginning of the chat script
- Along with the assurance that they have the option of switching to a human conversation if they want to.
- This way, the customer is aware
- of who they are conversing with and your business will see higher retention

When customers prefer human agents:

- Chat bots are making great advancements and we are more and more likely to use them. However, most of us still feel most comfortable with human agents over a bot. 54% of US customers choose to communicate more with human customer support agents than with chat bots.

- You can fix it by redirecting customers to a human agent when required. While chat bots reduce the load on the customer service agents by answering FAQs, it is vital to provide the option for human intervention. This way, Customers will feel more at ease knowing that human help is just a click away.

Lacking data collection and analysis functions:

- One major reason why chat bots fail is that we forget to regularly analyze them to improve their functioning. The work is not done once it's launched.

- You can fix it by scheduling regular check-ins to see how the Chabot is performing. First-generation bots need to be worked on. Collecting data and matching it against success metrics can help improve conversation flow, customer satisfaction, and the overall effectiveness of this relatively new technology.

2.2 Reference

- Automatic Extraction of Chabot Training Data from Natural Dialogue Corpora, Bayan Abu Shawar, Eric Atwell Chabot Evaluation and Database Expansion.
- Crowd sourcing, Zhou Yu, Ziyu Xu, Alan W Black, Alexander Rudnick
- AI BASED CHATBOT, Prof. Nikita Hatwar, Ashwini Patil,Diksha Gondane
- Data Mining: Concepts and Techniques Jiawei Han and Micheline Kamber. H. Kopka and P. W. Daly, Data Mining Practical Machine Learning Tools and Techniques Ian H. Witten Eibe Frank Mark Hall.

- https://www.google.com/search?q=Automatic+Extraction+of+Chatbot+Training+Data+from+Natural+Dialogue

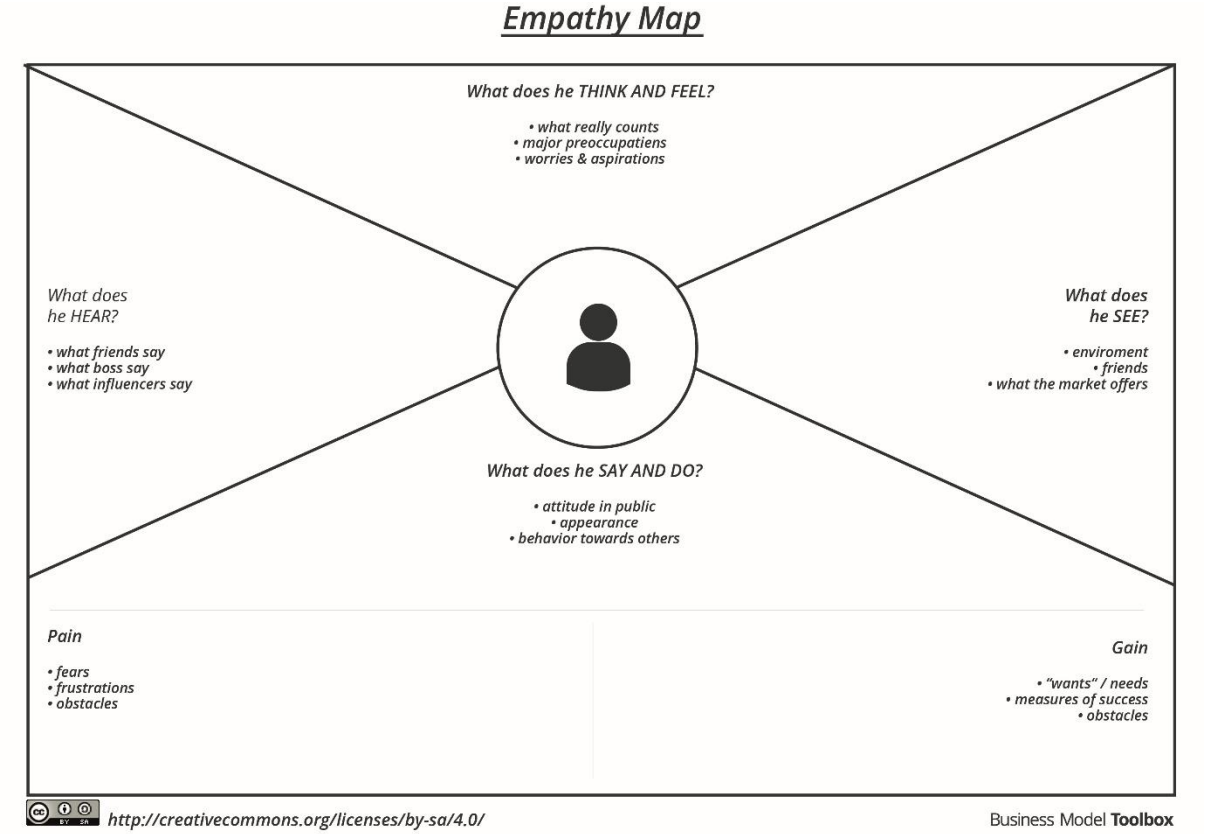
2.3 Problem Statement Definition

- In this project we introduce a chat assistant to help the customer to utilize the resource in the web application.
- In this assistant help to use the application. A banking boot project is built using artificial algorithms that analyzes User's queries and understand user's message.
- The system is designed for banks use where users can ask any bank Related questions like loan, account, policy etc.
- This application is developed for android devices.
- The system recognizes User's query and understands what he wants to convey and simultaneously answers them appropriately.
- The questions Asked by the users can be in any format. There is no specific format for users to ask questions.
- The built in artificial intelligence System realizes user's requirements and provides suitable answers to the user.
- It also uses a graphical representation of a person speaking while giving answers as a real person would do.

3. IDEATION &PROPOSD SOLUTION

3.1Empathy Map Canvas:

An empathy map is a simple, easy-to-digest visual that captures knowledge about a user's behaviours and attitudes. It is a useful tool to helps teams better understand their users. Creating an effective solution requires understanding the true problem and the person who is experiencing it. The exercise of creating the map helps participants consider things from the user's perspective along with his or her goals and challenges.



I) Values Proposition Canvas

<table>
<tr><td colspan="2">Solution Canvas</td><td colspan="2">Customer Profit Canvas</td></tr>
<tr><td colspan="2">Product service: Automatic Process
Reduce cost
Improve customerservice
Time ManagementRobot advice
Chat box</td><td colspan="2">Pain Relievers:
Bots which deliver content/service.
Chat Interface between the boot& humans.
Backend systemof content and service providers.
Platform to enable development of bots.</td></tr>
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Chat Interface between the boot & humans.
Backend system of content and service providers.
Platform to enable development of bots.</td><td>Pains:
Making Human Lazy
Unemployment
Speed Up
Erroneousbanking databases</td><td>Customer jobs:
Direct sales manager
Digital Initiative manger
Research manager
Credit risk analytics
Associate Product manager.</td></tr>
</table>

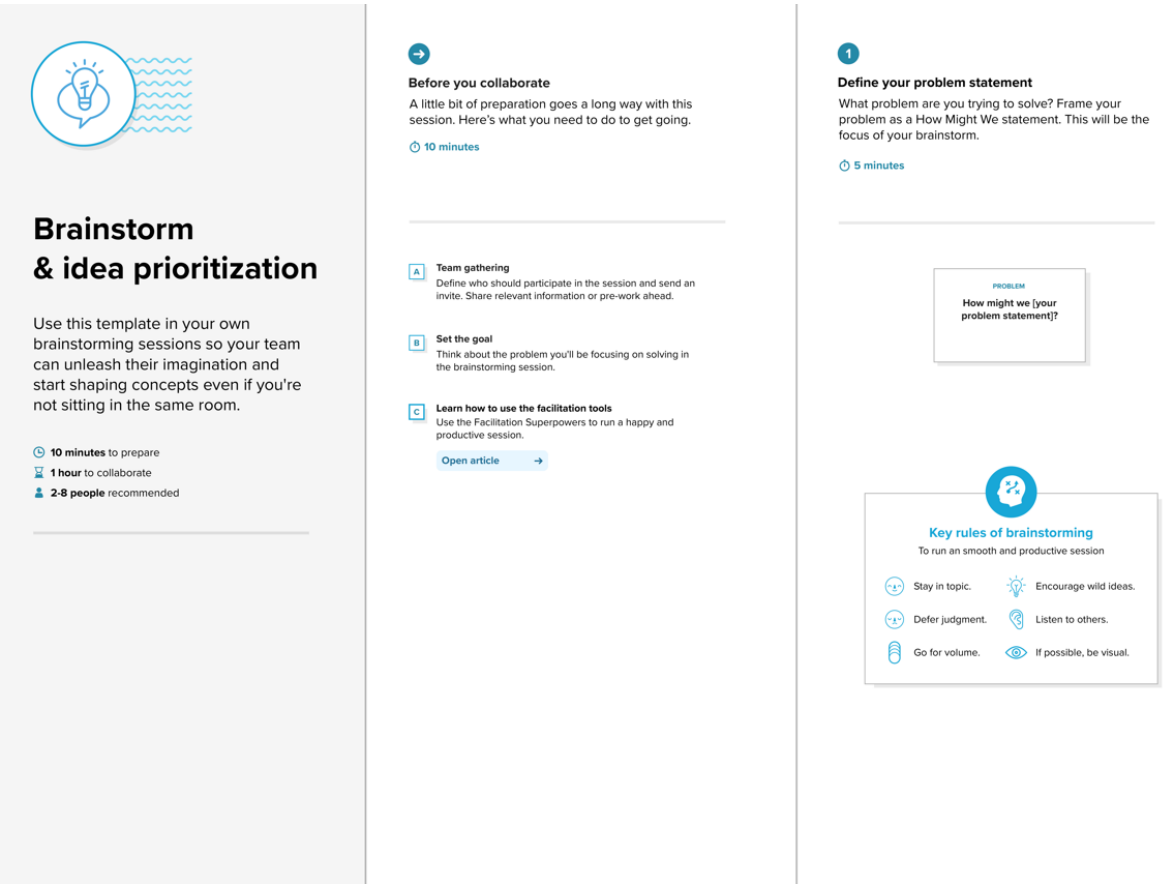
3.2Ideation & Brainstorming:

Brainstorm & Idea Prioritization Template:

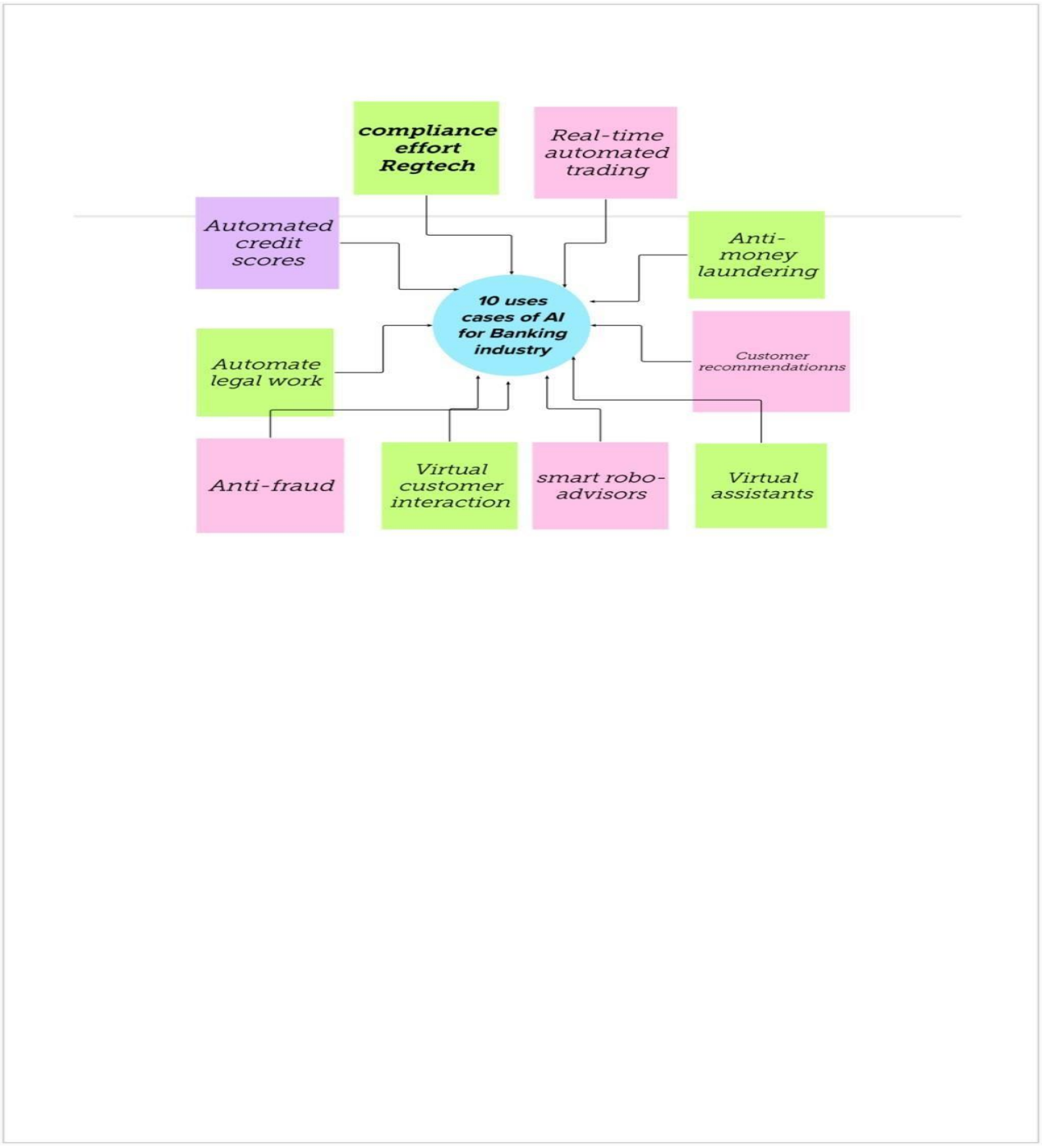
Brainstorming provides a free and open environment that encourages everyone within a team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amount of creative solutions.

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

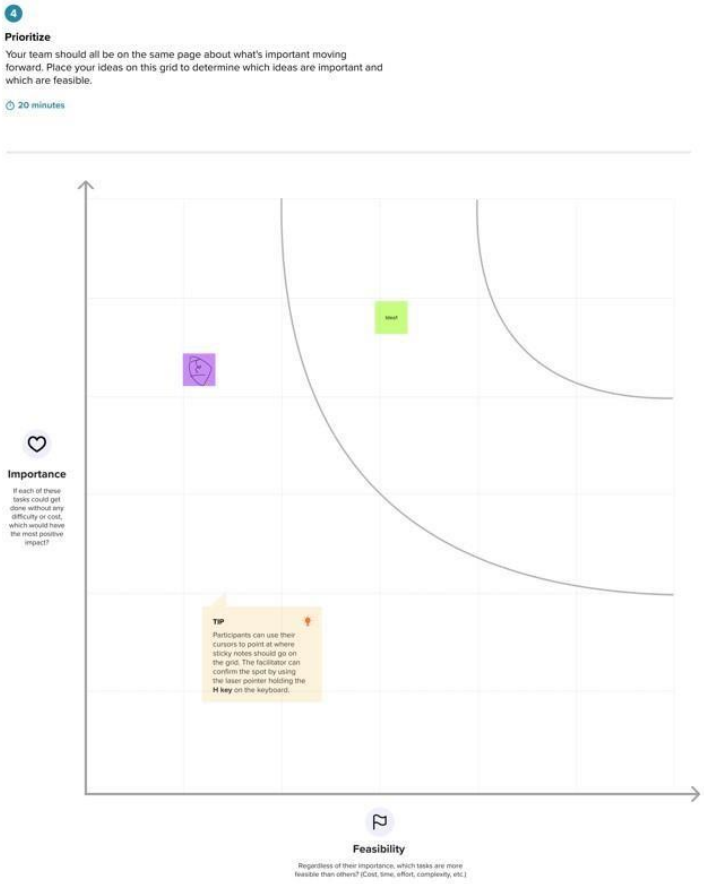
Step-1: Team Gathering, Collaboration and Select the Problem Statement



Step-2: Brainstorm, Idea Listing and Grouping



Step-3: Idea Prioritization:

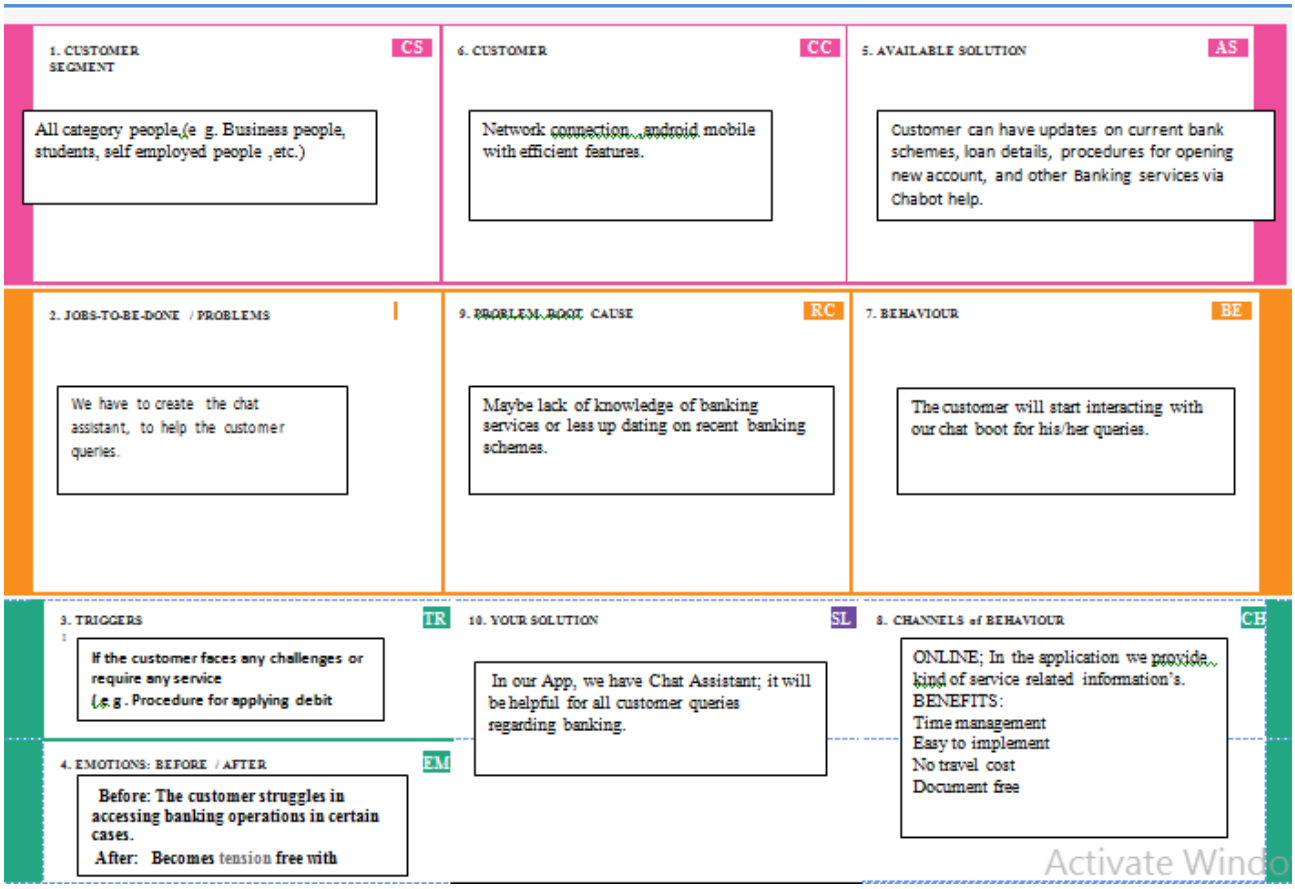


3.3 Proposed Solution:

S .No.	Parameter	Description
1.	Problem Statement (Problem to besolved)	The banking industry has been quite resistant to change ever since its beginnings. But financial services are not immune to the biggesttechnological revolution the word has attested caused by AI. Apart from being under pressure to adapt to the digital economy, banks have started to discover some really valuable AI use cases
2.	Idea / Solution description	Banks are adopting AI for finance to use face recognition and pattern recognition. In the former, instead of the traditional password- based authentication, there is the use of face recognition that can open accounts. In the latter, there is a development of a system that Recognizes clients' emotions from their facial expressions so as to interpret their moods.
3.	Novelty / Uniqueness	The role of AI in the banking industry is to enable banking services to run much more efficiently, securely and promptly, rather than taking jobs from people. The McKinsey report estimates that artificial intelligence can provide Up to $1 trillion of additional value in globalbanking each year.
4.	Social Impact / Customer Satisfaction	They help automate customer-facing operations and improve customer satisfaction.Banks that employ chat bots and other AI toolsin the future will have better cost control and an improved customer experience, gaining a Competitive edge over their rivals.
5.	Business Model (Revenue Model)	AI-based systems can help banks reduce costs by increasing productivity and making decisionsbased on information unfathomable to a human agent. Also, intelligent algorithms are Able to spot fraudulent information in a matterof seconds.

6.	Scalability of the Solution	AI-powered machines are tailoring recommendations of digital content to individual tastes and preferences, designing
		Clothing lines for fashion retailers, and even beginning to surpass experienced doctors in detecting signs of cancer. For global banking, McKinsey estimates that AI technologies could potentially deliver up to $1 trillion of additional Value each year.

3.4Proposed solution fit:



4. REQUIREMENT ANALSIS

4.1Functional Requirements:

Following are the functional requirement the proposed solution.

FR No.	Functional Requirement(Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration-Signup	First name Last name , Phone number, Username, Password , Re-enter password, Gmail-id.
FR-2	User Confirmation–Sign in	Email or username, Password
FR-3	Dashboard	Search process options.
FR-4	Chat Assistant	Chat for own queries.

4.2Non-functionalRequirements:

Following are the non-functional requirements of the proposed solution

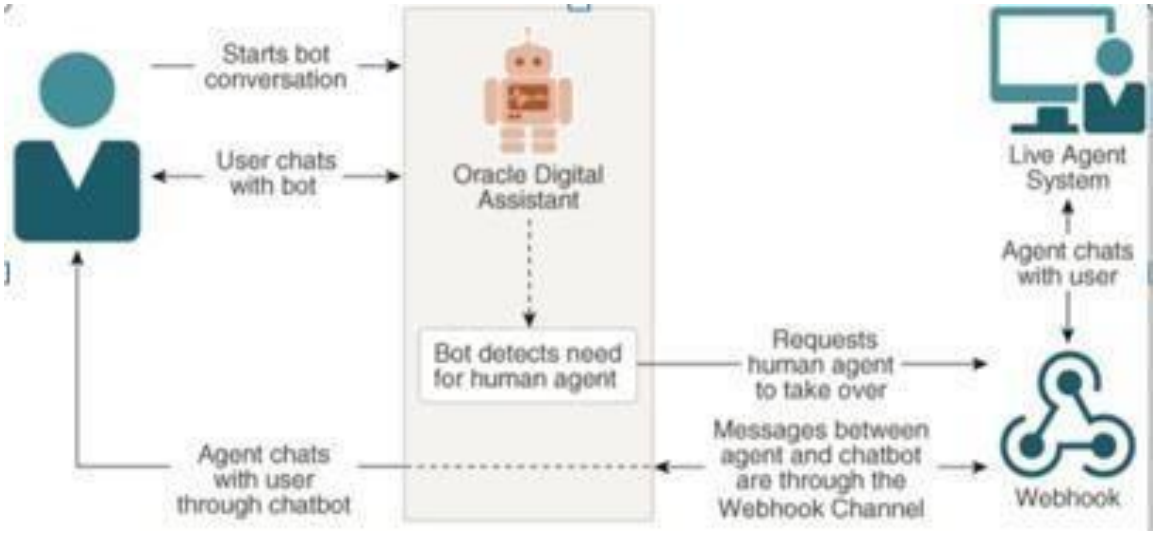
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	All most all users know how to use
NFR-2	**Friction to conversion**	Messages and play. Available in all platforms.
NFR-3	**Reliability**	It's not having the reliability of messcan view the chats.
NFR-4	**Ability to get the job done**	Menu option and built-in web viewNLP capability is a great concern.
NFR-5	**Availability**	Its available all of the platforms.
NFR-6	**Efficiency**	Simple to -the –point informationTyping slows down the input prose

5. PROJECT DESIGN

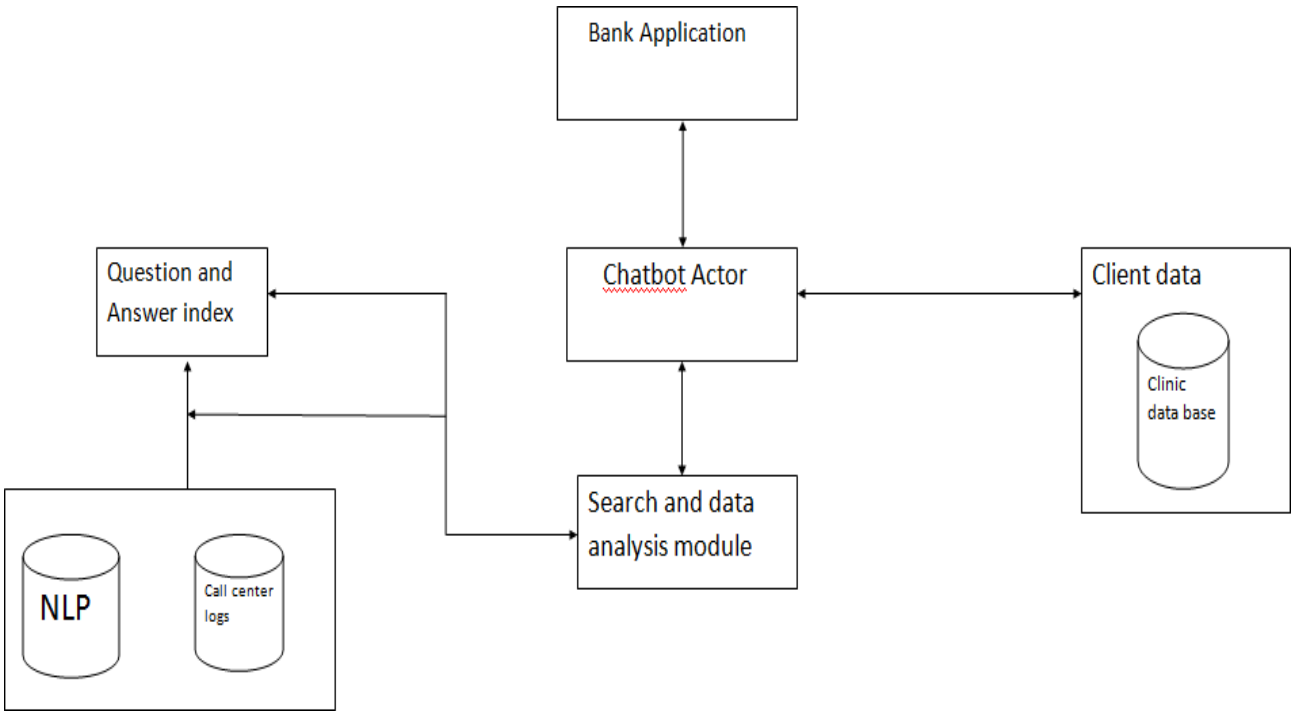
5.1Data Flow Diagrams:

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 enter sand leaves the system, what changes the information, and where data is stored.

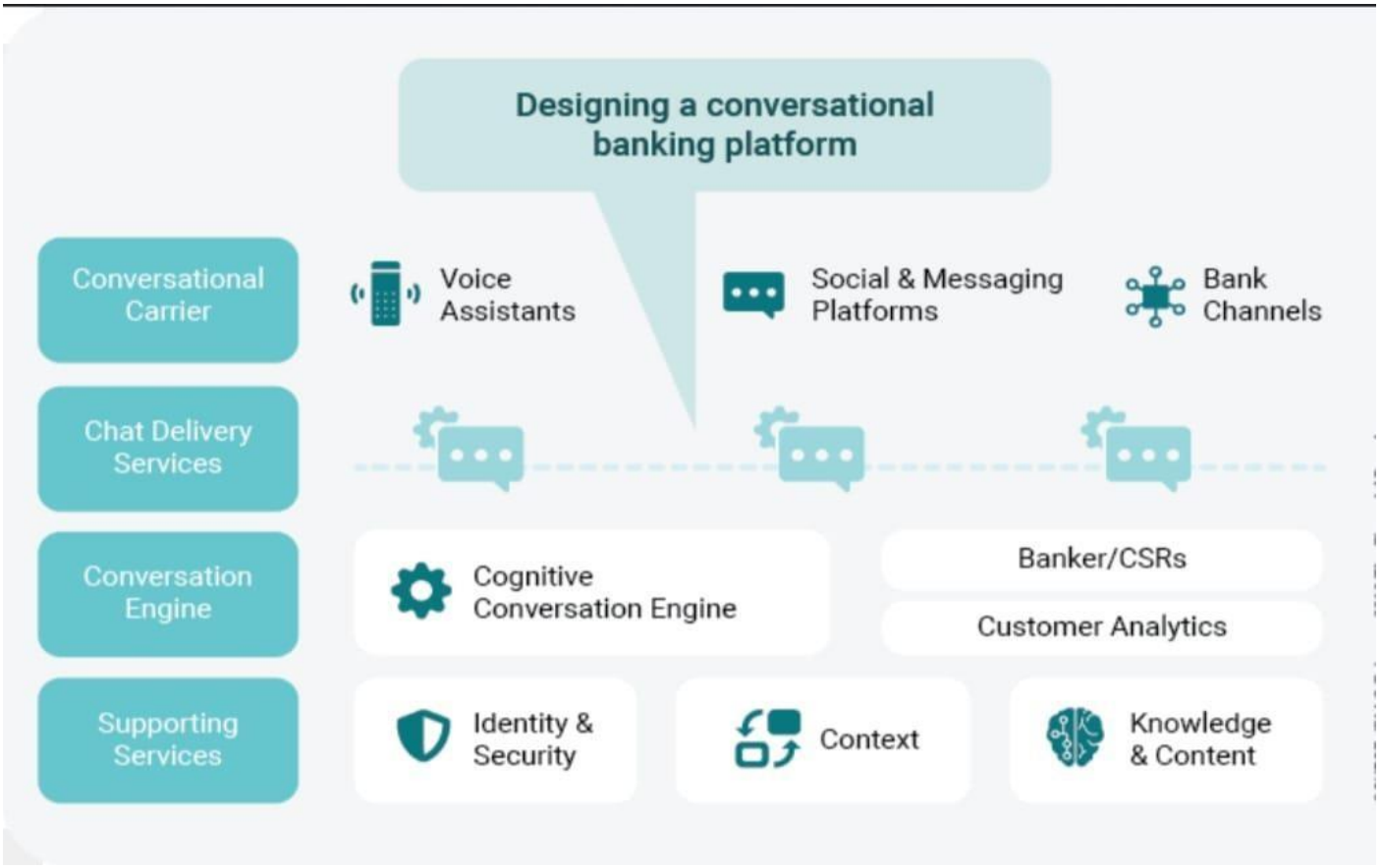
Dataflow Architecture:



Flow Diagram: Data



5.2 Solution Architecture:



5.3 User Stories:

User Type	Functional Requirement (Epic)	User Story Number	User Story/Task	Priority
Customer	Registration	USN-1	As a user, can search the bank	High
(Mobile user)			Application name, and download them mobile application.	
	Registration process	USN-2	As a user, can enter the detail share First name, Last name, Gmail id, User name, Password to create an account in the bank application.	High
	Login	USN-3	As a user, I sign in the mobile application inform requirements.	High
	Add account details	USN-4	As a user, I can add my Account number, IFSC code, Branch Name to use the bank application.	Medium
	Check Account details	USN-5	As a user I check the bank account correctly added my bank application or not.	High
	Dashboard	USN-6	As a user I view the dash board details.	High
Customer (Web user)	Dash board viewing.	USN-7	As a user I use the mobile Application.	High
Customer Care Executive	Finally chat with assistant	USN-5	As a User I want to know the recently released schemes, If I don’t know the process or how to check the schemes I will go with chat assistant.	High

6. PROJECT PLANNING & SCHEDUING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Building of Assistant	USN-1	Creation of Banking Chat bots or Assistant using IBM Watson Assistant/ As a user, I can see a Banking Assistant.	12	High	TL, M1
Sprint-1		USN-2	Understanding Customer's Banking RelatedQueries and skills/ As a user, I can see a Chat bots with Banking skills.	8	Moderate	M2,M3
Sprint-2	Modeling of Assistant	USN-3	Building action and Adding responses to Account Creation/As a user, I can see a Chat bots which helps to create an account	5	High	TL,M2
Sprint-2		USN-4	Building action and Adding responses to Banking related queries/As a user , I can seea Chat bots which helps to solve the bankingqueries.	5	High	M1,M3
Sprint-2		USN-5	Building action and Adding responses to Net Banking/As a user, I can see a Chat bots which helps to access Net Banking	5	High	TL,M3
Sprint-2		USN-6	Building action and Adding responses to Loan Queries/As a user, I can see a Chat bots which helps in Loan related Queries.	5	High	M1,M2
Sprint-3	Testing & Deployment Phase-I	USN-7	Testing the chat bots performance with the trained banking functionalities or conversations/As a user, I can know the Chat bots performance level	10	High	M1,M2

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3		USN-8	Integration of Flask webpage with the chat bootassistant to provide a framework/As a user, I can see a webpage to access the chat bot.	10	High	Prasanna M, Usha K
Sprint-4	Deployment Phase-II& Model Improvement	USN-9	Deployment of AI based chat boot for banking Industry or Running the Chat boot service/As a user, I can see and use a 24*7 banking chat bot.	15	High	Deepalakshm G, Reshma BeeviR
Sprint-4		USN-10	Improving the model efficiency whenever needed/As a user, I can see new updated chat boot in Future days.	5		Prasanna M, Deepalakshm G Usha K, Reshma BeeviR

Project Tracker, Velocity & Burn down Chart: (4 Marks)

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

Velocity:

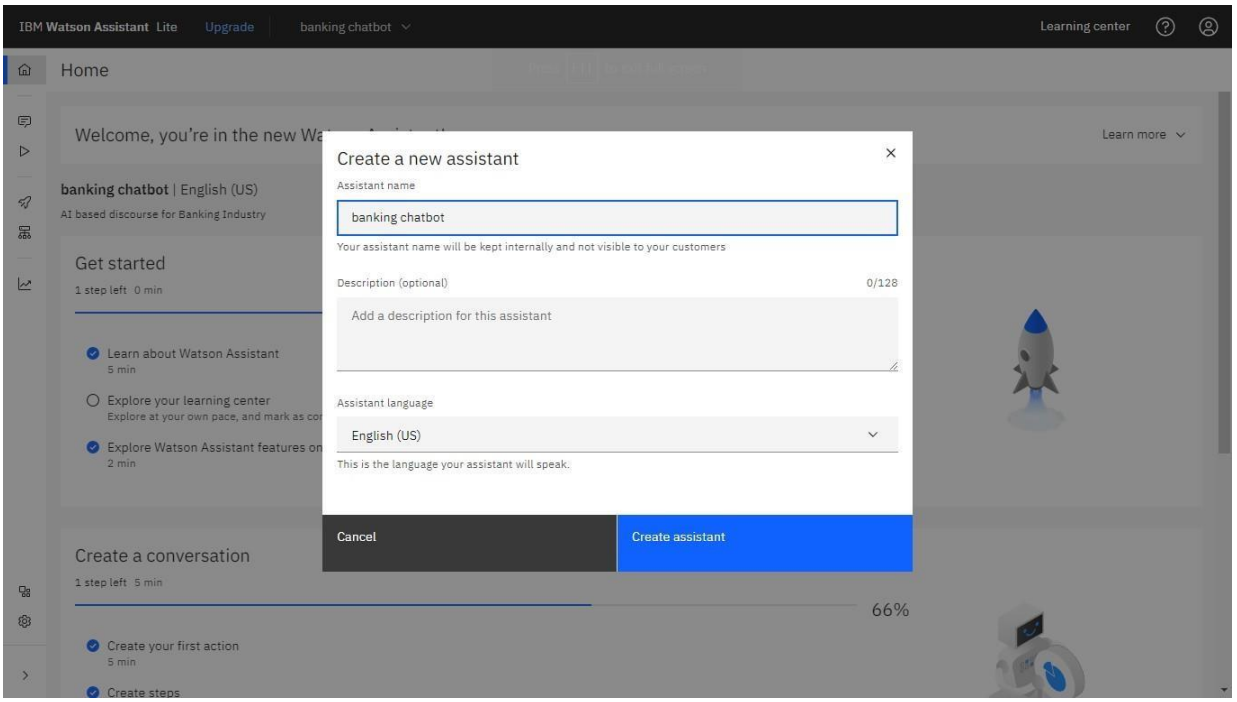
The team's average velocity (AV) per iteration unit (story points per day)

$$AV = 20/6 = 3.34$$

6.2 Sprint Delivery Schedule 1

Create IBM Service

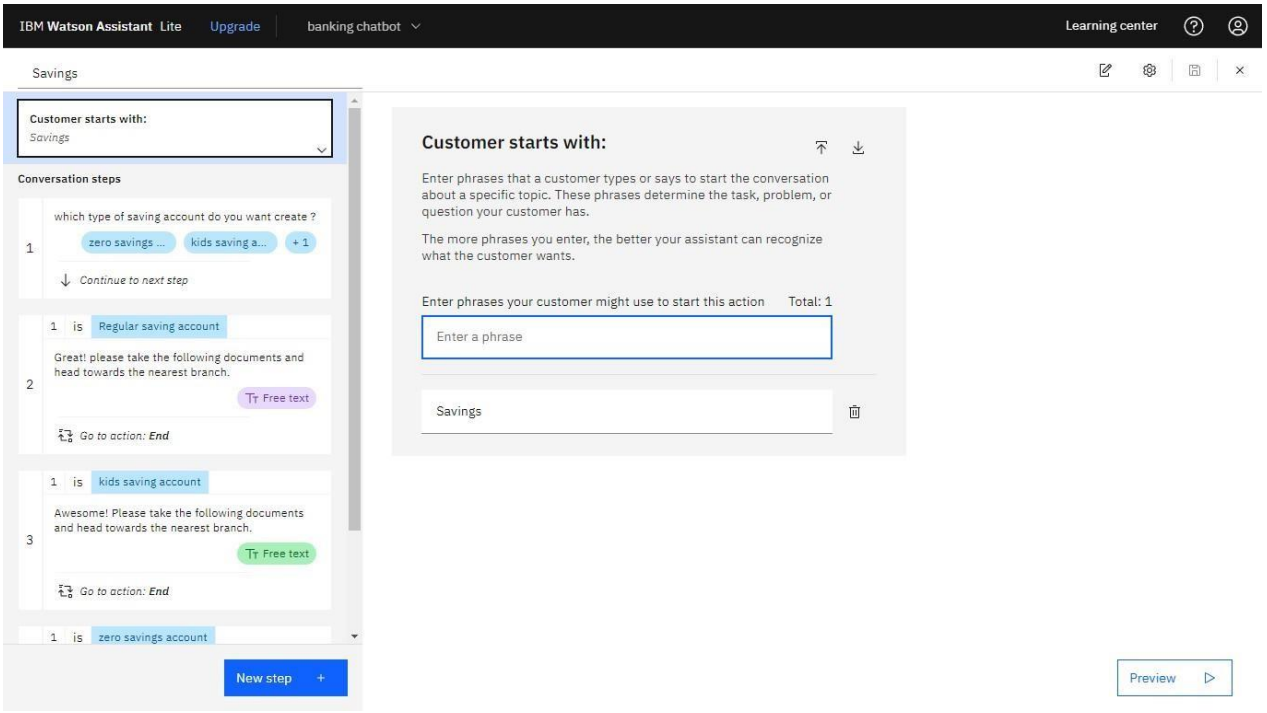
In this activity, you will be creating the Necessary IBM service. Thefollowing are the service that you have to create.



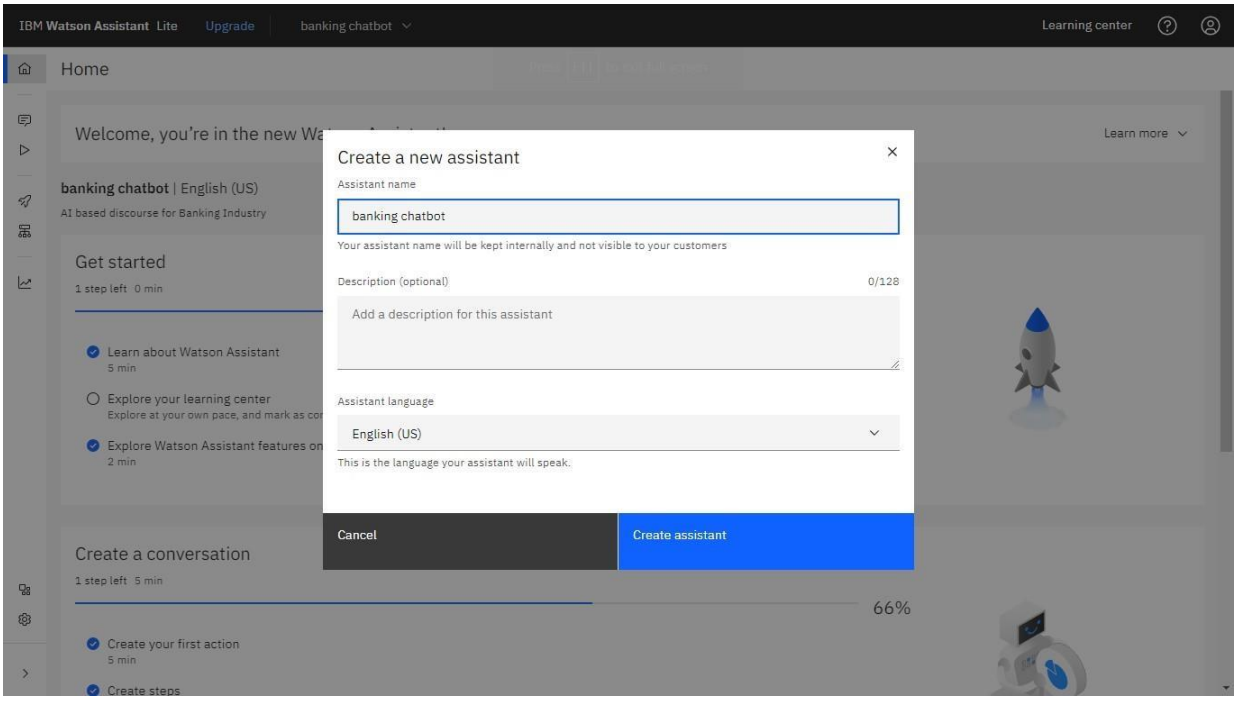
Watson Assistant

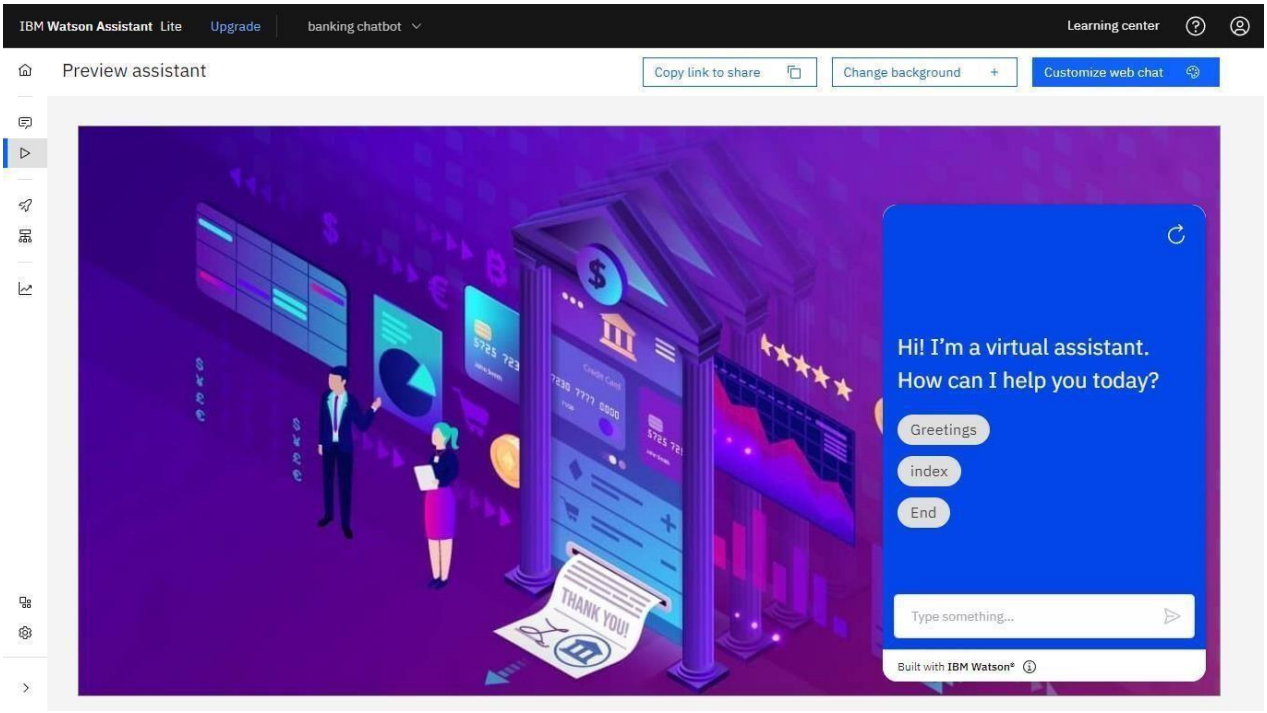
Creating Skills & Assistant For Chabot

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 Chabot is created. Need to add actions.



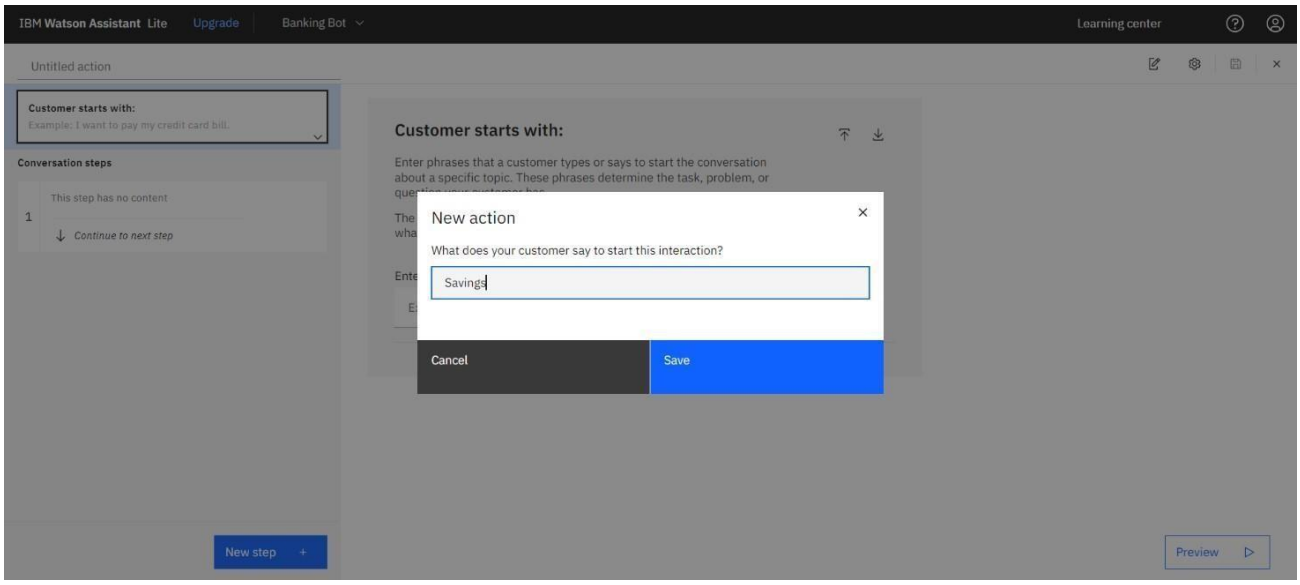


Note: No code for this project. So, I attached the screenshot and step to build it.

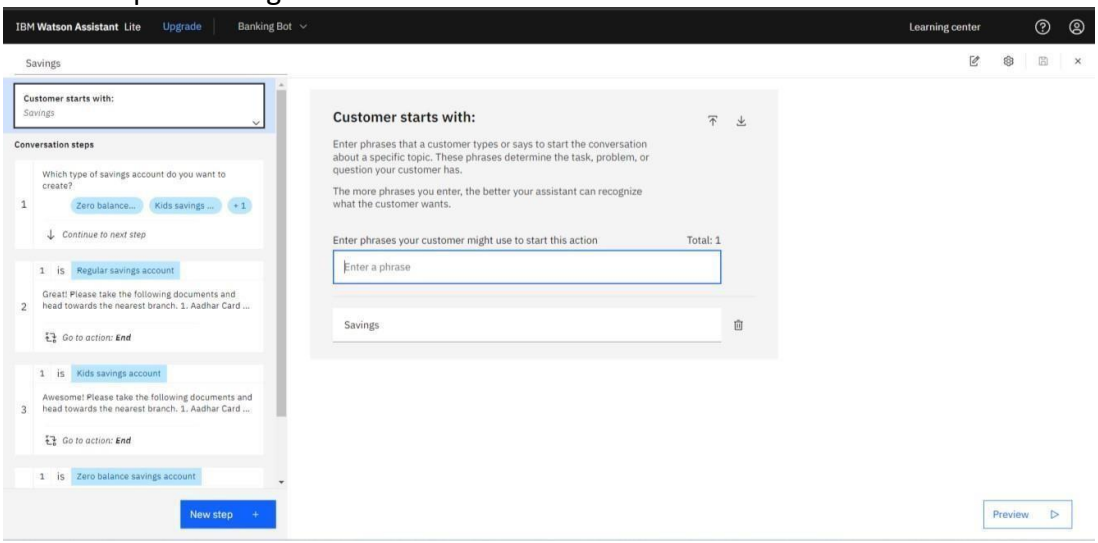
Delivery of Sprint - 2

Creating Saving Account Action

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

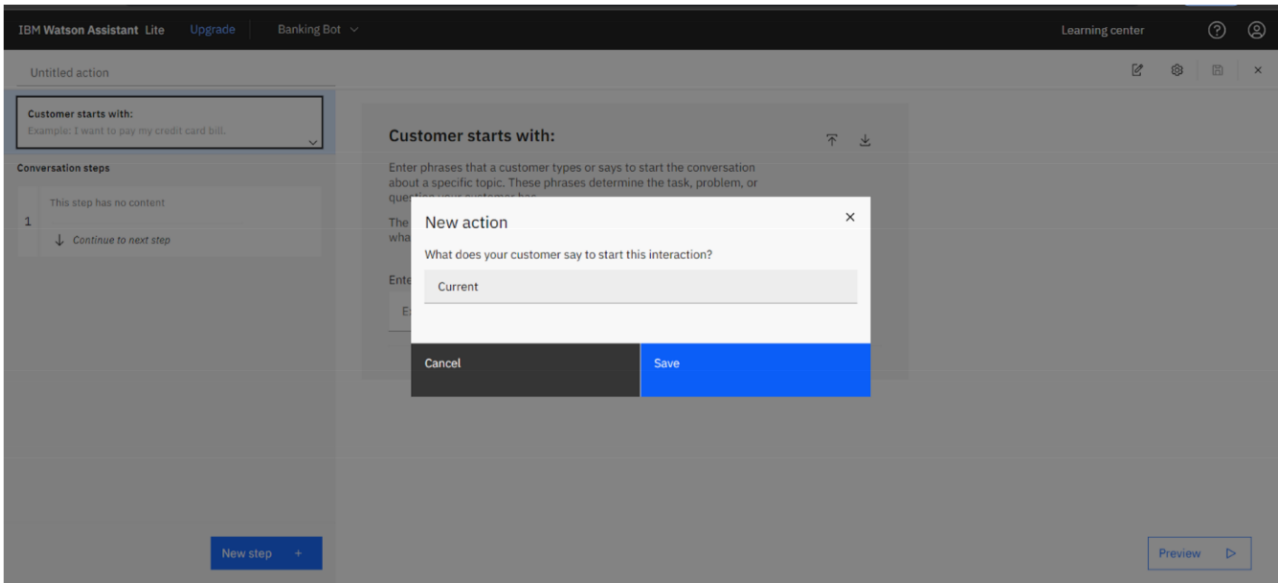


Add steps in savings action.

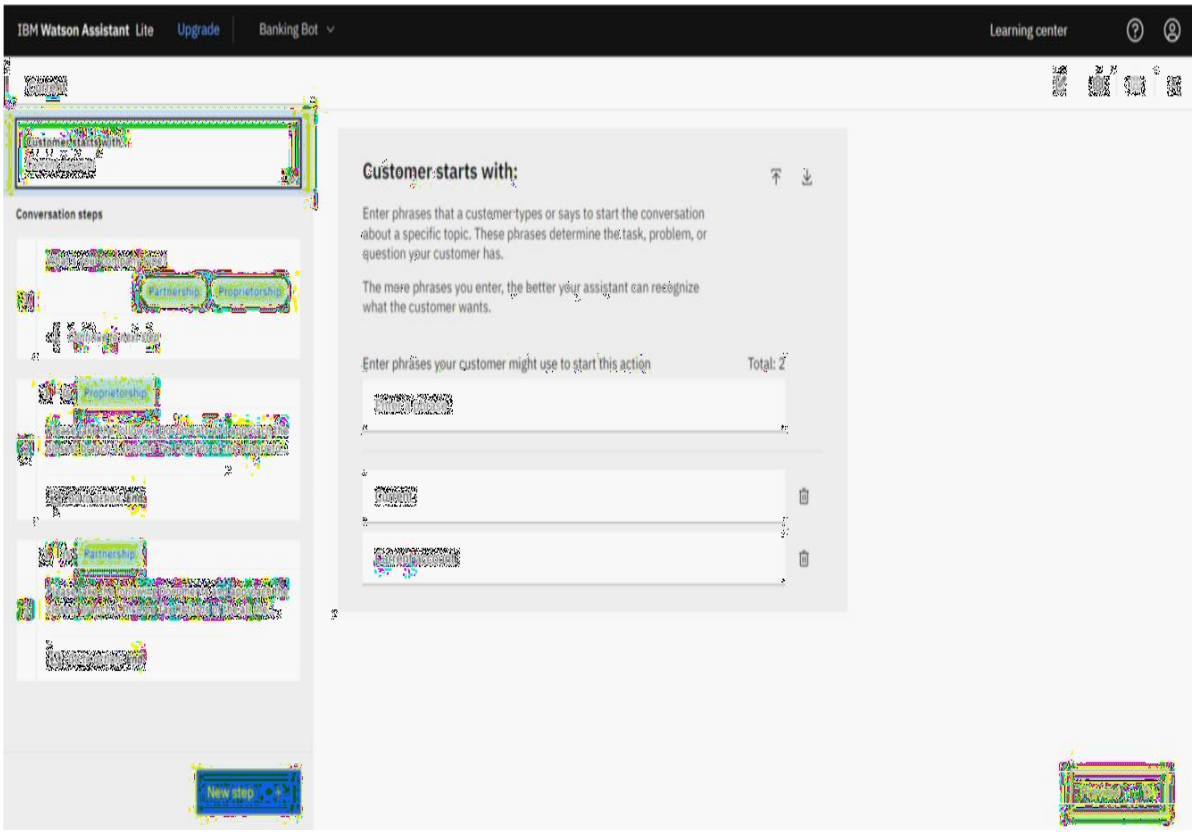


Creating Current Account Action

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



Add steps in current action.

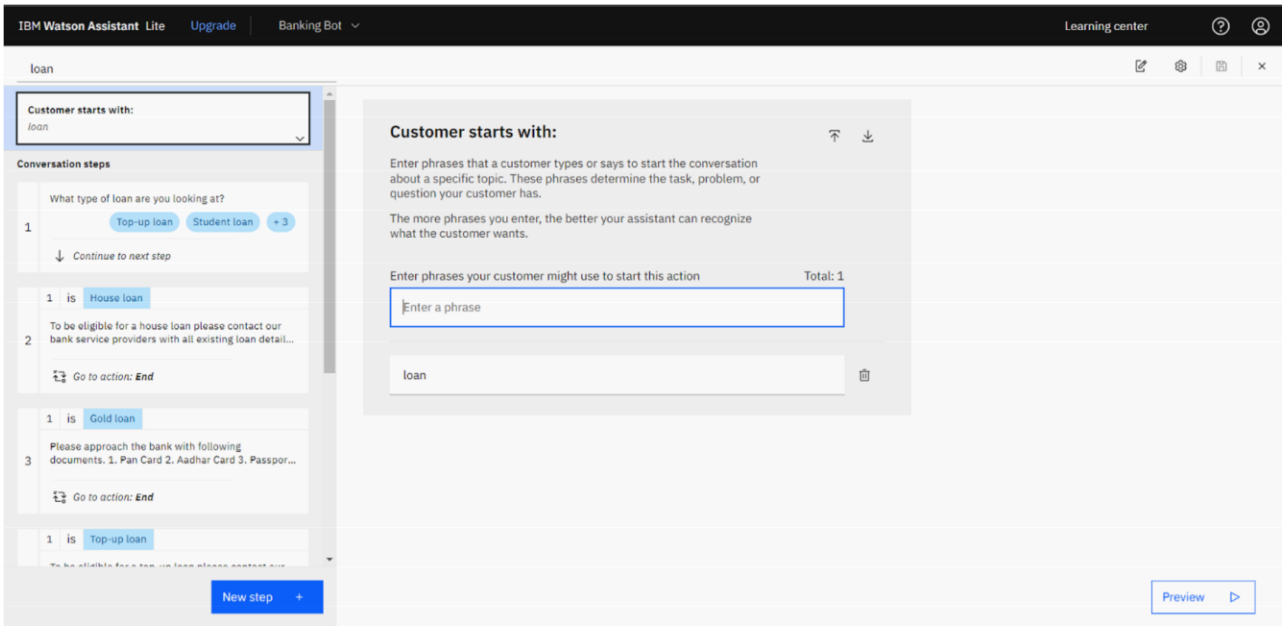


Note: No code for this project. So, I attached the screenshot and step to build it.

Delivery of Sprint - 3

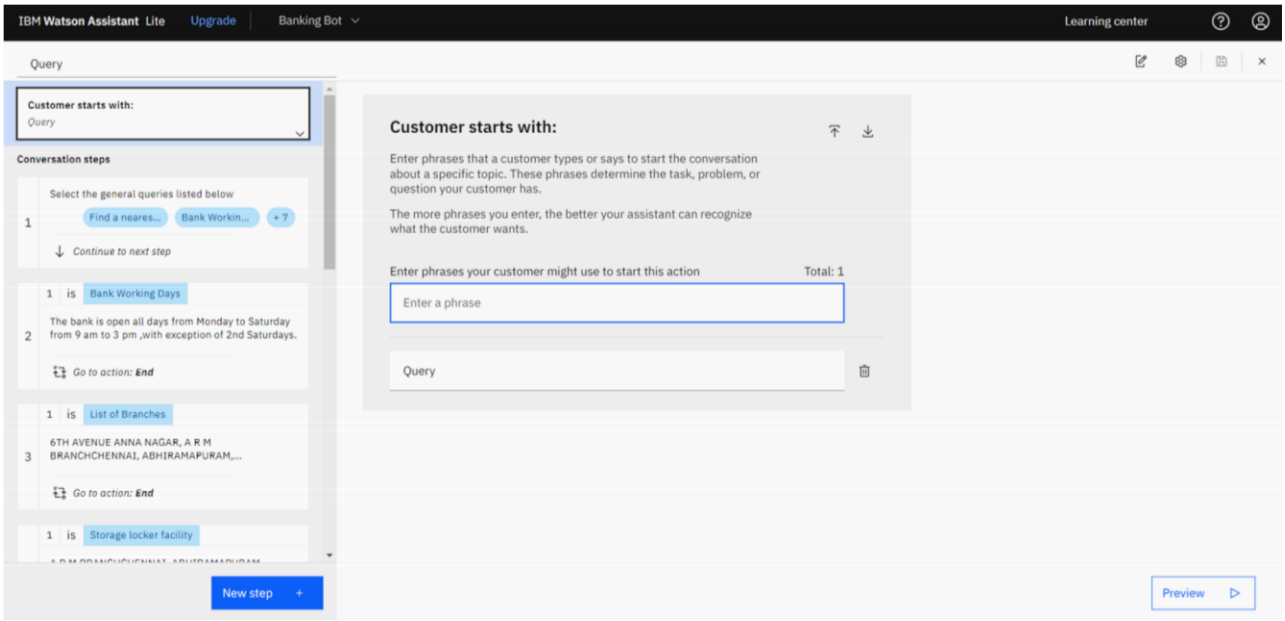
Creating Loan Account Action

Loan action is created with the necessary steps.



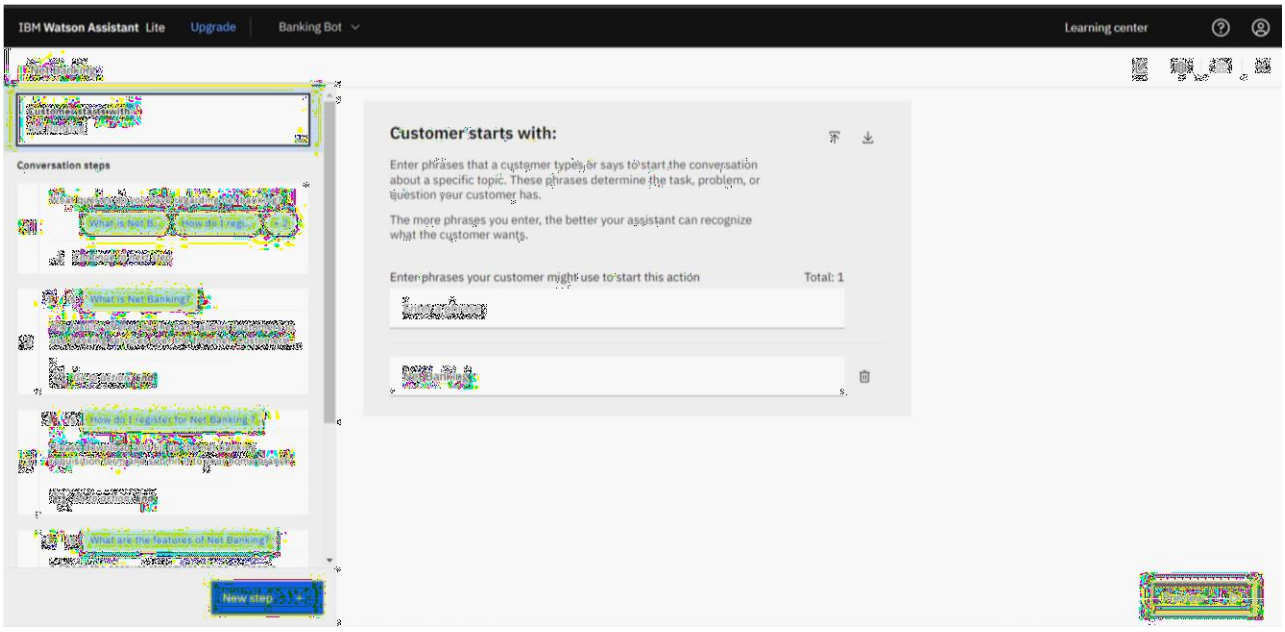
Creating General Query Action

General query action is created with the necessary steps.

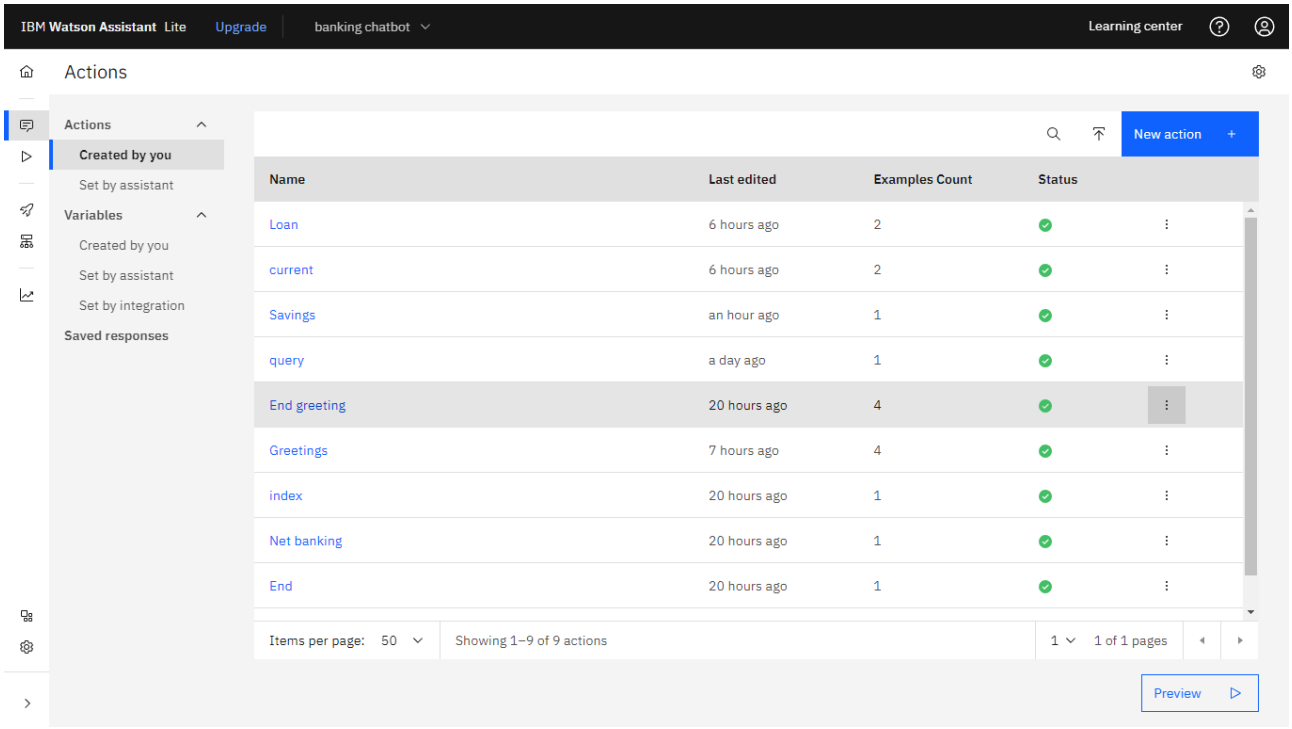


Creating Net Banking Action

Net banking action is created with the necessary steps.

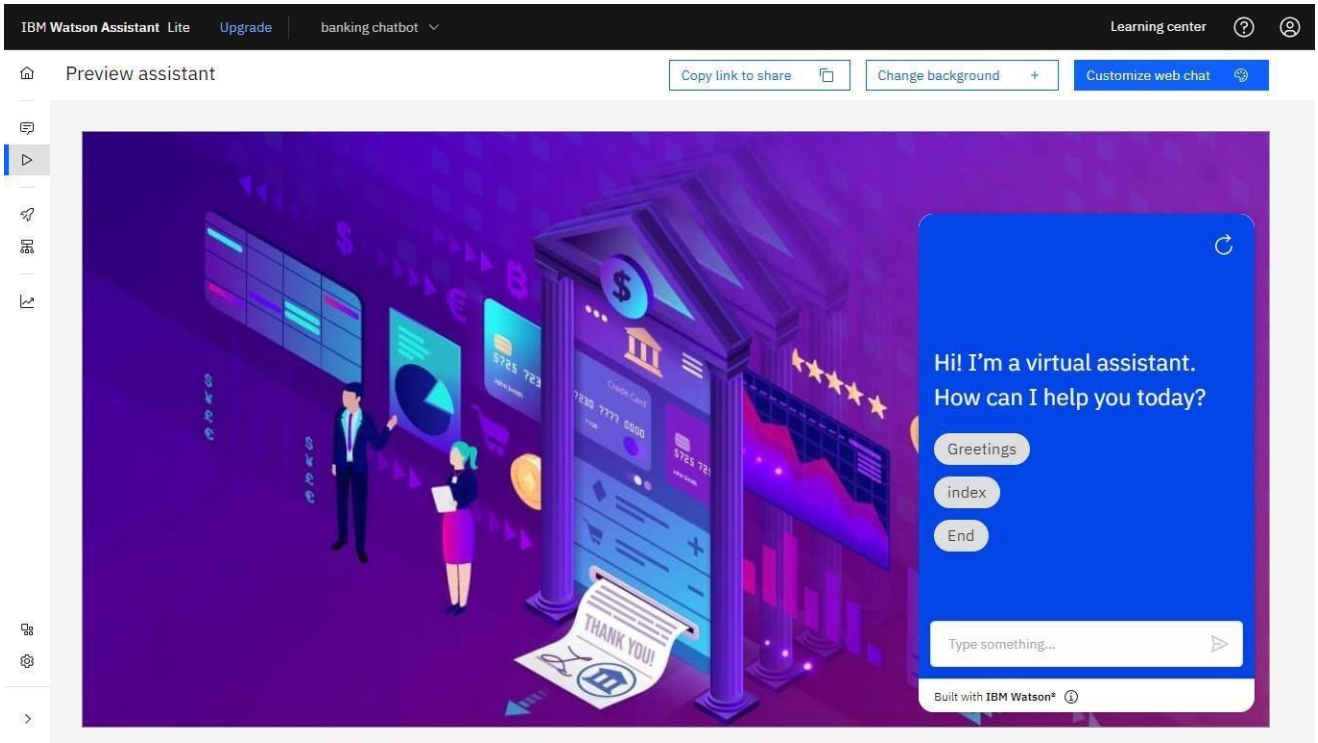


In addition to this greeting, end greeting , index and end actions are also created.



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-2502134b-bb3b-430f-b120- e8fe57254a2e%3A%3Acb842f92-6b4f-47ce-953c-919e4f22766e&integrationID=5a9d4c78-9b35-424e-ac29- 55aa62ced3f4&region=us-south&serviceInstanceID=2502134b-bb3b-430f-b120-e8fe57254a2e



Note: No code for this project. So, I attached the screenshot and step to build it.

Delivery of Sprint - 4

Creating Assistant & Integrate With Flask Web Page

You will be creating a banking boot in this activity that has the following capabilities

1. The Boot should be able to guide a customer to create a bank account.
2. The Boot should be able to answer loan queries.
3. The Boot should be able to answer general banking queries.
4. The Boot should be able to answer queries regarding net banking. 5. With the help of this boot,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 Chabot, and based on the

user queriesthey 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 class is our

WSGIapplication. 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 boot function. Hence, when the home page ofa 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 theapplication in local host.

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

Build HTML Code

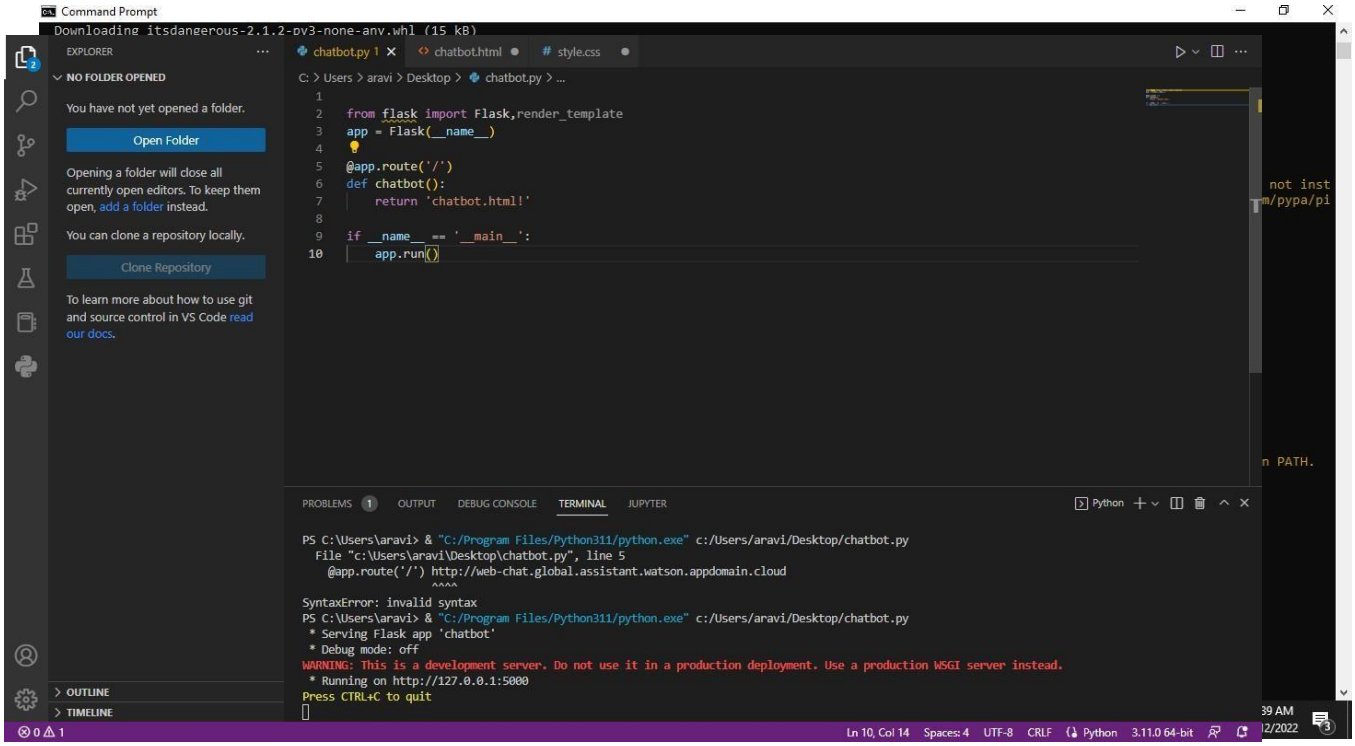
- We use HTML to create the front-end part of the web page.Here, we have created 1 HTML page-Chatbot.html
- Chatbot.html displays the home page which integrates with Watson Assistant. A simple HTML page is created. Auto-generated source code from IBM Watson Assistants is copied and pasted inside the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

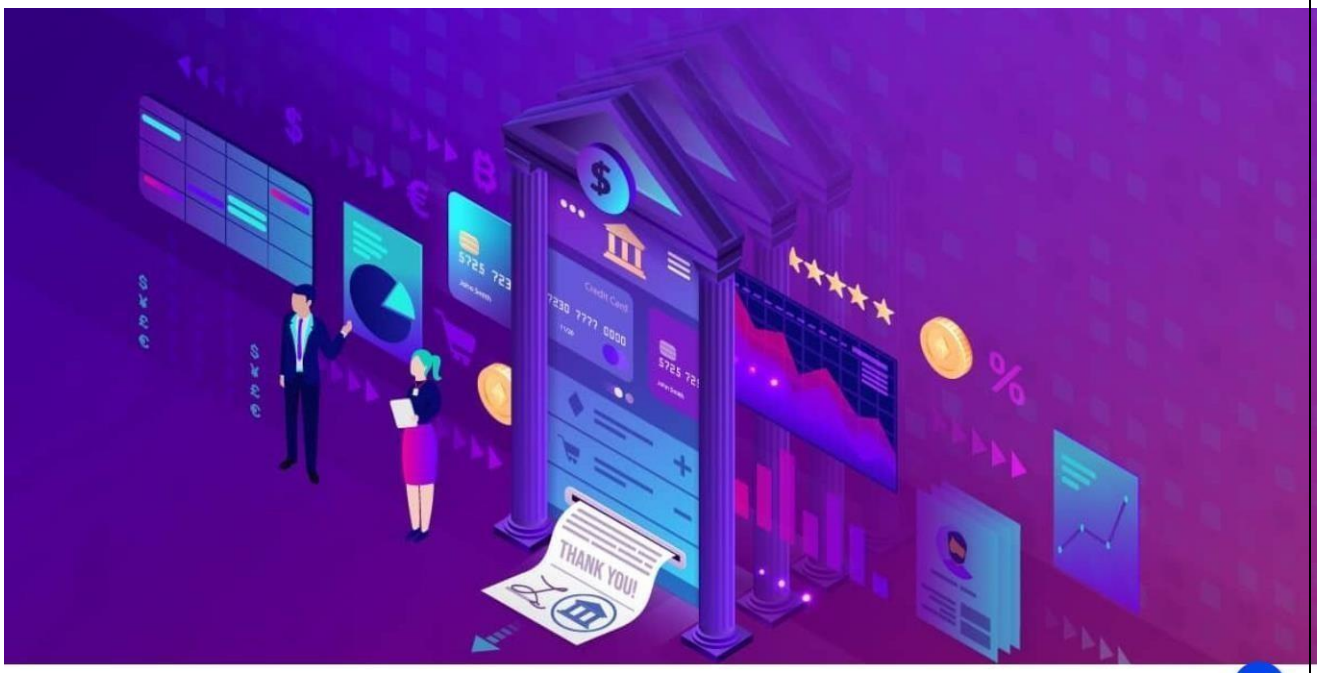
Run the Application

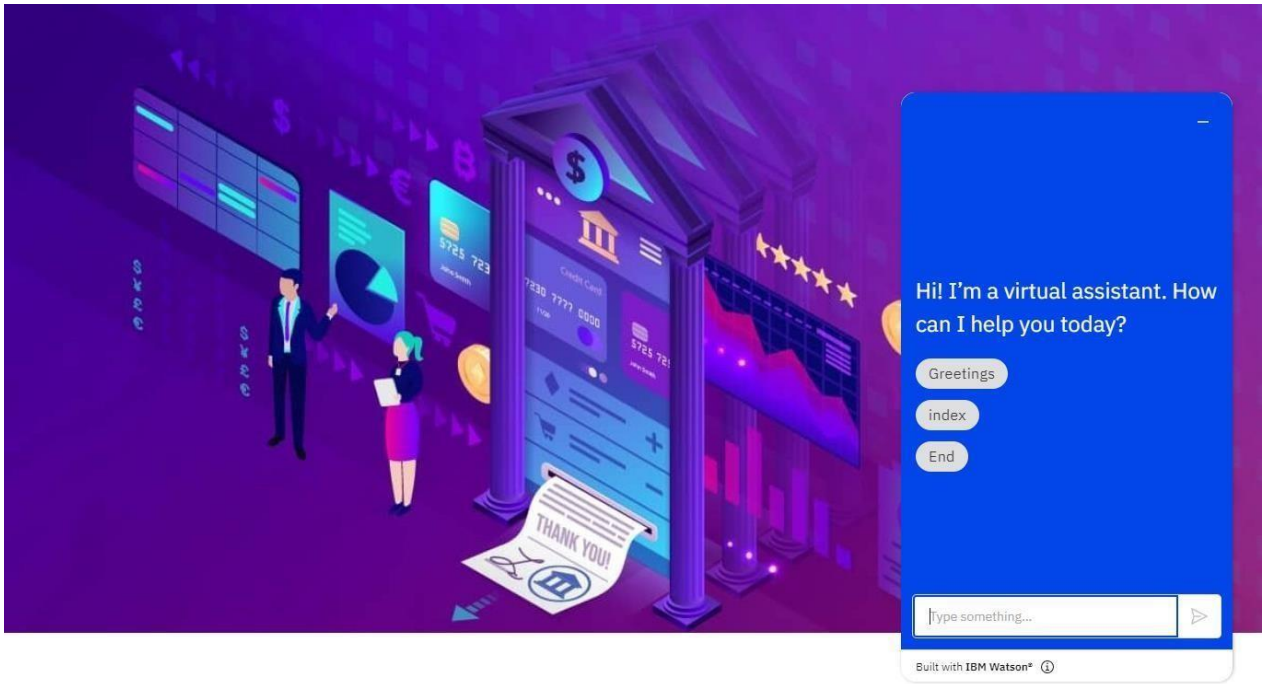
Run the application

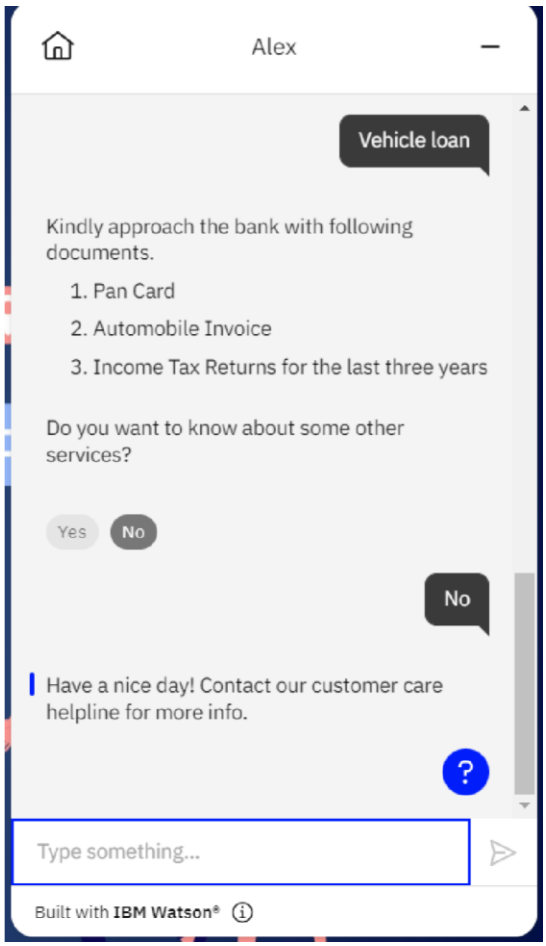
- Open the anaconda prompt from the start menu.Navigate to the folder where your app.py resides. Now type the "python app.py" command.
- It will show the local host where your app is running on http://127.0.0.1:5000
- Copy that local host URL and open that URL in the browser. It does navigate me towhere you can view your web page.

Then it will run on local host: 5000






THANK YOU!
Hi! I'm a virtual assistant. How can I help you today?
Greetings
index
End
Type something...
Built with IBM Watson®


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®

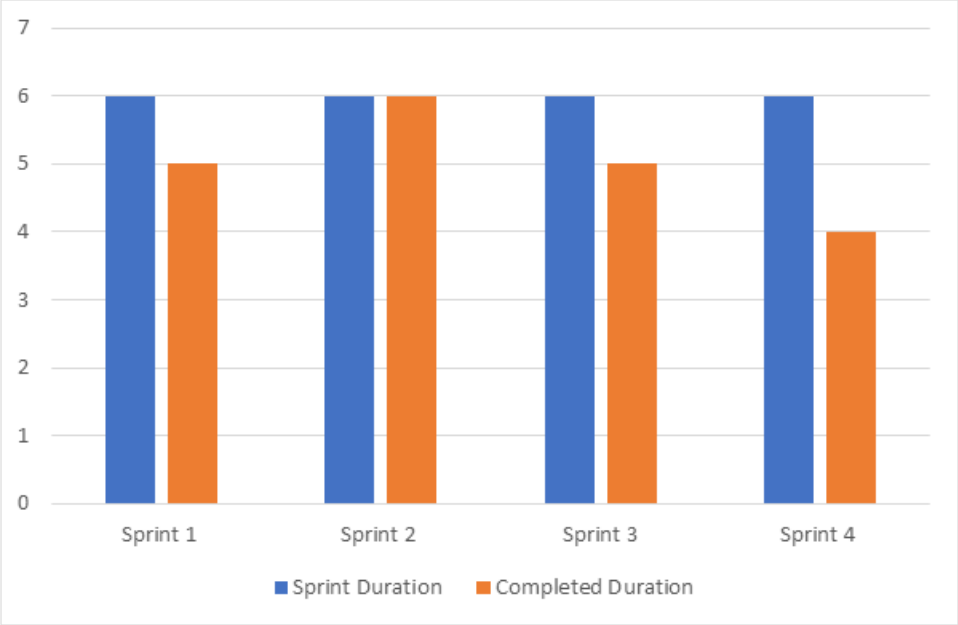
PREVIEW OF CHATBOT:

https://web-chat.global.assistant.watson.appdomain.cloud/preview.html?backgroundImageURL=https%3A%2F%2Fu s-south.assistant.watson.cloud.ibm.com%2Fpublic%2Fimages%2Fupx-2502134b-bb3b-430f-b120- e8fe57254a2e%3A%3Acb842f92-6b4f-47ce-953c-919e4f22766e&integrationID=5a9d4c78-9b35-424e- ac29-55aa62ced3f4&region=us-south&serviceInstanceID=2502134b-bb3b-430f-b120-e8fe57254a2e

Source code is attached in Final Deliverable.

Note: No code for this project. So, I attached the screenshot and step to build it.

6.3 Reports from JIRA:



7. CODING & SOLUTIONING (Explain the feature added in the project along with code)

Feature 1:

Visual Flow Builder:

Building a Chabot should be easy and hassle-free. The visual flow builder makes it possible and enables zero-code boot building. Due to which a boot can be designed directly on the platform with the help of a drag-and-drop Chabot builder.

If your business requirements are simple, you can go with the visual flow builder. You can manage your scenarios in an intuitive interface and build a powerful boot without any coding knowledge.

Live Chat Hand over:

Chat bots are advanced and smart to handle customer conversations of any nature. However, there are situations where bots fail and human intervention is needed. In such cases, a well defined fallback helps the boot to transfer the chat to the right human agent.

The fallbacks need to be defined for two scenarios: (I) when the boot finds the query complex and (ii) when users prefer to interact with the support rep.

Chabot Analytics:

Chabot analytics can help in knowing your customers in detail and leading with data. Using this feature, a business can get a deeper understanding of the customers and make better decisions.

With the Chabot analytics feature, you can get valuable insights and analyze all the chat conversations handled by your bot. It can help you measure the accuracy of the responses provided by bots to customers.

By planning a successful Chabot strategy, you can measure your boot performance and assess the growth of your business. You can leverage Chabot analytics to track relevant Chabot KPIs to make data-driven decisions and better understand the customer journey.

Key Chabot metrics to evaluate your Chabot performance:

- **Total number of users:** The total number of users who interacted with chat bots can be traced to get insights on how many customers are using your Chabot.
- **Bounce rate:** It denotes the number of users visitors who enter the website and leave without interacting with your Chabot.
- **Interaction rate** – Observing the interaction rate KPI can help you measure user engagement during conversations with your Chabot.
- **Fallback Rate (FBR)** – The fallback rate will capture insights about the scenarios where the boot is unable to gauge the user request and offer a relevant solution.

Artificial Intelligence (AI) Chat bots:

Rule-based chat bots are not able to understand the context or the intent of the human queries. On the other hand, Artificial intelligence chat bots are more advanced, can comprehend open-ended questions easily, and can improve their functionality over time.

AI-powered chat bots use NLP and machine learning algorithms to become more intelligent and can easily understand the visitor's sentiment to respond dynamically.

AI-enabled chat bots can enable dynamic and agile conversations as their function relies on boot flows that interact with each other. These chat bots are equipped to provide human-like responses as they can understand the intent and also mine previous conversations easily.

Chabot API:

A Chabot API can help you go further and achieve more than what a Chabot builder generally allows. You can rely on it to pull data from other tools such as CRM, database, etc. to boost customer conversations.

Chabot functionality can be enhanced manifold by using relevant APIs and this can also help in optimizing human resources. APIs are quite helpful when it comes to helping a Chabot fetch user data from different apps and sources to enhance interactions with customers.

Thanks to APIs, your business can make human-Chabot interaction more productive and seamless by accessing data from apps that are not part of the Chabot ecosystem.

Data Security:

No technology is totally hacking proof and chat bots are not different. They can be at risk due to various reasons including weak coding, poor safeguards, or user error.

Chat bots are now quite common across industries that handle very sensitive data and personally identifiable information. Chat bots need aggregation of data to perform optimally and they need not be vulnerable to hacking attacks.

Threats are one of two types of security risks that chat bots are susceptible to as they include malware and Dodos attacks that can hijack the system and hold you to ransom. Hackers can also expose sensitive customer data or use the vulnerabilities in the system to their benefit.

Best practices to ensure Chabot security

- **End-to-end encryption** – A Chabot design should prevent anyone other than the sender and recipient from accessing the message.
- **Authentication and Authorization** – These are the two main security processes that Chabot needs to use to ensure user identity verification and granting permission to do any task.
- **Self-destructing messages** – Chat bots need to delete the sensitive message after a period of time to prevent any misuse of sensitive information.
- **Personal scan** – This technology is used to verify an individual identity when a transaction is initiated or when there is the need to access a bank account using a Chabot.

8. TESTING

8.1 Test cases:

Testing: 1. RPA testing:

It is an advanced software testing technique that allows bots to mimic human actions and automate tasks. By leveraging RPA testing, businesses can effectively test the functional and non-functional aspects of AI chat bots.

2. Security testing:

Data security is a major concern for all enterprises. By leveraging security testing methods, businesses can test the security levels of chat bots. This testing method helps to remove security loopholes or vulnerability issues.

3. User Acceptance Testing (UAT):

User satisfaction matters a lot for businesses today. Therefore, to ensure the bots deliver a seamless CX, businesses must leverage user acceptance testing. By including end-users in the testing process, businesses get real-time feedback from users, which help to improve product quality and CX.

4. A/B testing:

It is an important software testing technique in which two different versions of the conversational boot are showcased to the user. The versions can vary in their UI, visual factors like color, text size, style, etc. User feedback is then collected to find out which version is more liked by the users. This form of testing ultimately helps businesses to release products that match the user's expectations.

5. Adcock testing:

It is an informal, unstructured software testing type performed to see if any loopholes or bugs are present in the Chabot. This software testing type aims to find out any possible defects or errors in the boot performance. Some of the Leading AI Chabot Testing Tool

1. Bottium:

It is a quality assurance framework for testing and training conversational AI. This testing framework contains two main modules, i.e., Barium Core and Barium Box. Bottom Core automates conversations with a virtual assistant whereas; Bottom Box makes test automation faster and easier. This tool has an easy-to-use interface and can be used to perform various tasks such as test management, maintenance, and reporting.

2. Boot analytics:

It is a leading conversational analytics tool for bots. It helps businesses improve human-to-boot communication by identifying bottlenecks, segmenting conversations & users, and measuring engagement. This tool helps businesses assess every key aspect of the Chabot conversation.

3. Chabot test:

It is an open-source guide that helps businesses identifies Chabot's design issues under seven categories, i.e., personality, intelligence, navigation, error-management, on boarding, answering, and understanding. This tool assesses the boot using three levels of testing, which include possible testing scenarios, scenarios that are expected, and impossible scenarios.

4. Diamond:

It is a proprietary solution that enables Chabot testing automation. This testing tool decreases testing time from hours to several minutes. It helps to generate multiple test scenarios, allows effective monitoring and faster tests execution.

5. Q box:

It is an NLP training data optimization platform that offers two options for Chabot testing; the standard test for NLP classifiers and bring your own test set. This tool uses pre-defined utterances and follows a five-step procedure that makes chat bots better.

Conclusion:

Today, customers need high-quality products with seamless 24/7 business support. Therefore, businesses are rapidly adopting AI chat bots to deliver faster responses and continuous support to customers. These interactive bots are backed by advanced technologies like AI, ML, RPA, and NLP that help bots understand the user intent and interact with them just like humans. Since high-end technologies back these bots, it is essential to test them to ensure their proper functioning and data security. Businesses should leverage AI testing from an independent QA and software testing service provider for high-quality chat bots.

UAT

The importance of assuring the quality of Chabot is very important. So, the main priority is to test that the Chabot functionality is as per requirements and goals. It is very important that user testing is done on a Chabot before releasing it to the market. Also, it is very important to test the Chabot with different users and people with different personalities.UAT should be carried out after full implementation of the boot is complete including integration of intents, entities, Smalltalk, fallback, and fulfillment.

1. Delivers immediate responses:

Chat bots can respond quickly as soon as it receives customer queries. It helps businesses meet the ever-rising customer demand for quick query resolution and deliver immediate responses in real-time.

2. Ensures 24/7 availability:

Today, customers want business services to be available 24/7 and need their queries to be solved at the click of a button. AI conversational bots resolve customer queries in real-time 24/7, which ultimately enhances CX.

3. Records valuable data:

Conversational bots record various types of data when it interacts with the users, such as customer likes, dislikes, preferences, and this information is then used by businesses to increase user engagement.

4. Delivers personalization:

AI-based bots are backed by ML and NLP technology, which helps bots learn information explicitly from past interactions. Thus, they provide a more accurate and personalized response to users.

5. Increases customer satisfaction:

AI conversational bots ensure faster delivery of responses and customized or personalized responses, which ultimately increases customer engagement and leads to customer satisfaction.

6. Ensures data Security:

AI chat boot ensures data security as it is end-to-end encrypted, authenticated, and authorized. It follows specific regulatory policies/protocols and ensures no data leak happens when a user interacts with it.

7. Uplifts brand image:

A conversational agent or boot helps businesses deliver accurate and timely responses to customers. This not only increases CX but also uplifts the brand's image.

8. Reduces costs:

Chat bots help in reducing overall costs by reducing manpower. By leveraging these bots, businesses can automate many business processes, which ultimately lead to reduced costs and enhanced CX.

8.2 User Acceptance Testing:

- UAT Initiation
- UAT Design
- UAT Execution

UAT Initiation:

The UAT initiation having three types of testing been performed in the project ,the types of testing are,

Unit testing:

Dialog unit testing (standalone Chabot)

Now that we know the Chabot knows how to interpret user input by turning user utterances into user intents, we are ready to test the dialog routing logic in our Chabot. Chat bots generally implement routing logic through contextual state and conditional branches. We can verify the routing logic implementation by sending the Chabot a series of user utterances and examining our conversational state. When using Watson Assistant there are two primary ways to examine the conversational state: the response text and context variables.

Each conversational state option has advantages and drawbacks. Response text is straightforward to evaluate; however, it may change frequently, leading to challenges in our test assertions. This can be mitigated by only doing partial matching on a response text, including matches as small as a single expected word. Context variables are easy to examine but our Chabot may not otherwise have unique state variable combinations for each unique node in the dialog. Thus, a good dialog unit testing strategy will use both.

We can use any number of unit testing frameworks to verify dialog routing logic. No matter what framework we use, each test will set up a conversational state through one or more utterances and then will verify that conversational state by examining the response text(s) and context variables.

The complexity of our unit testing depends partially on whether our Chabot is purely standalone or if the Chabot is integrated with an orchestration layer that coordinates activities with one or more other systems. Let's first start by testing dialog routing logic in a standalone Chabot, where our test can interact directly with the Chabot.

Integration testing:

INTEGRATION TESTING Integration testing (sometimes called integration and testing, abbreviated I&T) is the phase in software testing in which individual software modules are combined and tested as a group. It occurs after unit testing and before validation testing. Integration testing takes as its input modules that have been unit tested, groups them in larger aggregates, applies tests defined in an integration test plan to those aggregates, and delivers as its output the integrated system ready for system testing.

System testing:

SYSTEM TESTING Software testing is an investigation conducted to provide stakeholders with information about the quality of the software product or service under test. Software testing can also provide an objective, independent view of the software to allow the business to appreciate and understand the risks of software implementation. Test techniques include the process of executing a program or application with the intent of finding software bugs and verifying that the software product is fit for use. Software testing involves the execution of a software component or system component to evaluate one or more properties of interest. In general, these properties indicate the extent to which the component or system under test.

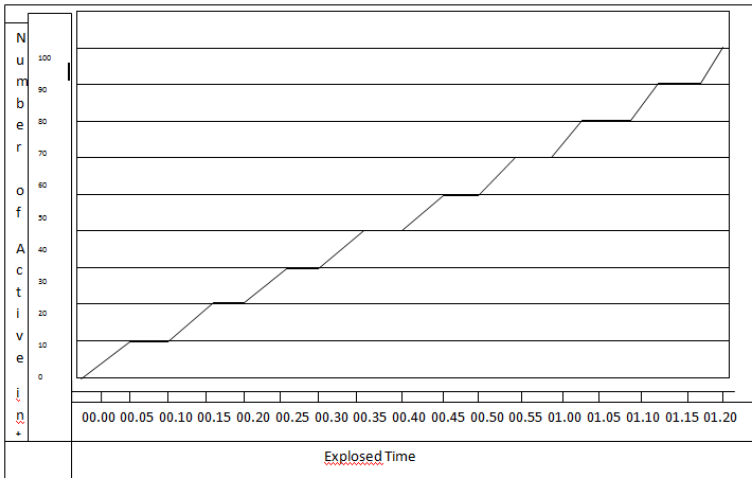
9. RESULT

9.1 Performance Metrics:

- Load Test
- Stress Testing
- Spike Testing
- Endurance Testing
- Resilience

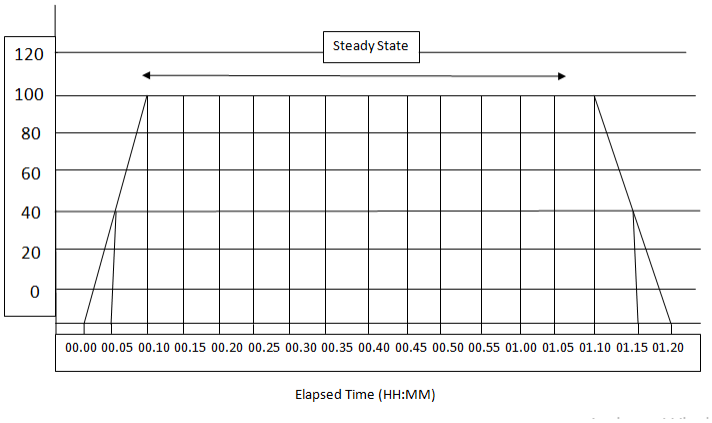
Load Test:

- This test usually simulates the current user load on the AUT.
- Usually, the peak load for the application is considered for this test.
- This test ensures that the AUT is stable and handles
- The expected peak load once the application is deployed.



Stress Testing;

- The stress test is conducted by gradually ,increasing the user load until the application breaks.
- The objective of this test is to obtain the breaking point or saturation point.
- Usually once the breaking point is attained there is a noticeable increase in errors and also there is a big increase in response time.



Spike test:

- Spike testing is considered to be a subset of stress testing.
- It is done by increasing the user load beyond the anticipated load for short periods of time.

Endurance testing;

- It is also called as Soak Test.
- This test is performed for long periods of time (8 hrs,16 hrs,1 day,3 days) with the expected user load.
- The purpose of this test is to identify performance bottlenecks like memory leaks, connection leaks etc.

10. ADVANTAGES & DISADVANTAGES

(1).ADVANTAGES:

24/7 Availability:

- One of the biggest benefits of using chat bots in the banking industry is that it offers 24/7 availability for your customers.
- People might experience problems with their accounts at any time of the day.
- If they're dealing with these problems outside of regular business hours, they may not be able to get the immediate Help they need.
- However, customers can use chat bots to answer their questions immediately.

Increased Productivity:

- Another great benefit of using chat bots is that it will increase the productivity of your other banking employees.
- Rather than having each of your employees help with frequently asked questions, you can allow a Chabot to take over all of these responsibilities.
- This allows your employees to focus on more complex queries that can help your bank run smoother.

Consistent Response Rate and Availability:

- Not only do chat bots help you maintain productivity during peak times, they also help you keep consistent response rates and times for your business.
- These bots can run smoothly whether you have high or low volumes.
- In turn, this will help you improve your customer experience because customers don't have to worry about being kept on hold for hours to get their questions answered.

(2) DISADVANTAGES

Must Keep Information Up-To-Date:

- Chat bots 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 chat bots to use.
- If you don't keep this information up-to-date, your Chabot may be sending incorrect messages to your customers.

Technology Issues:

- There can also be some technical issues when it comes to using chat bots for banking. First, chat bots 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.
- People need to be more tech-savvy to use a Chabot than to make a simple phone call or interact with a customer
- Service representative in person.

Limited Functionality:

- Chat bots were created to respond to simple questions that can be answered with facts. Chat bots have limited responses,
- So they’re not often able to answer multi-part questions or questions that require decisions.
- This often means your customers are left without a solution, and have to go through more steps to contact your support team.

11. CONCLUSION

- The future system would be a stepping stone in consuming in place an intelligent question handling program which could in next stages not just respond but self-learn to improve itself thereby increasing not just the quality of user service but also reducing human load, increase in productivity and of course increasing number of satisfied users.

12. FUTURE SCOPE

What is the Future of Chat bots?

The future of chat bots is still up in the air. What is evident, however, is that these initiatives are still in their infancy and will very certainly undergo numerous revisions before becoming widely adopted Businesses that favour one-on-one or telephone talks are now obsolete as the world of technology expands. Customers are now demanding quicker forms of communication via messenger programs. The only way to improve conversion rates in the market now is to improve customer experience. Experiences that make the lives of customers and employees more accessible, safer, more enjoyable, and, of course, more productive. As the world of social media has become increasingly influential, buyers have realized that they can contact their contacts at any time of day. Email-based messages and other messaging tools are losing their appeal because buyers cannot always get in touch with their contacts when they need to online.

1. Chat bots are Now Based on Natural Language Processing (NLP)

Businesses are researching Natural Language Processing (NLP) to be able to send accurate responses to users' inquiries. 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.

2. Bots for Internal Business Communications

Chat bots can be used for various purposes, including addressing common problems, answering customer queries, communicating with employees, and finishing HR-related tasks and transactional functions. Chabot for website has become increasingly common in the modern workplace, taking on several roles such as acting as a guide to new employees through company protocols, recording answers for screen questions, and assisting with the on boarding process for new employees. Chat bots can save time for IT desk agents and help with more complicated issues

3. Voice-Bots are also set to Help Businesses Enhance Customer Service

As customers' attention spans decrease and demand faster methods of consuming information, companies are increasingly turning to voice search and text-based messaging platforms to connect with their target audiences

4. Live Chat bots to bring a Human Touch

Chat bots are increasingly used in different sectors. They can communicate with your target market by speaking with them in complete sentences with a natural and easy-going conversational flow. Some markets that these bots serve include customer service and retail, amongst others

13. APPENDIX

13.2 GitHup & Project Demo Link

YouTube Link:

https://youtu.be/ABvrm-PeudE