PROJECT REPORT

AI BASED DISCOURSE FOR BANKING INDUSTRY

Team ID: PNT2022TMID37257

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INTRODUCTION:

1.1 Project Overview:

- ✓ 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 a lot of 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.

- ✓ Only 32% of companies in the finance industry currently use AI chatbots, and 37% are planning to start using them within 18 months said a report from Salesforce. This results in a potential growth rate of 118% which indicates the demand in the industry.

- ✓ A smart chatbot takes a query from the user in natural language and gives the appropriate response for the same. This paper 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.

1.2 Purpose:

- ✓ Banks are quickly incorporating **chatbots** into their operations to improve efficiency. Bots are assisting banks in interacting with clients at all stages of the

- ✓ customer life cycle. Using the services of an AI chatbot creation firm may offer you compelling reasons to use chatbots and make your website/app a modern classic.

- ✓ **Chatbots for digital banking** services are here to stay, and banks would be unable to function without them. Taking control of the situation now is the best course of action. Contact a reputable financial software development firm to save hours each day that can be spent on more productive tasks.

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. **Proposed solution:**

- ✓ The solution to the problem is Artificial intelligence in the banking sector makes banks efficient, trustworthy, helpful, and more understanding. It is strengthening the competitive edge of modern banks in this digital era. The growing impact of AI in banking sector minimizes operational costs improves customer support and process automation.

- ✓ Nearly 40% to 50% of financial and banking service providers are using AI in their processes to harness the power of next-generation AI capabilities. The companies believe that AI is the future of banking sector which can perform a range of banking operations in faster, easier, and more secure ways.

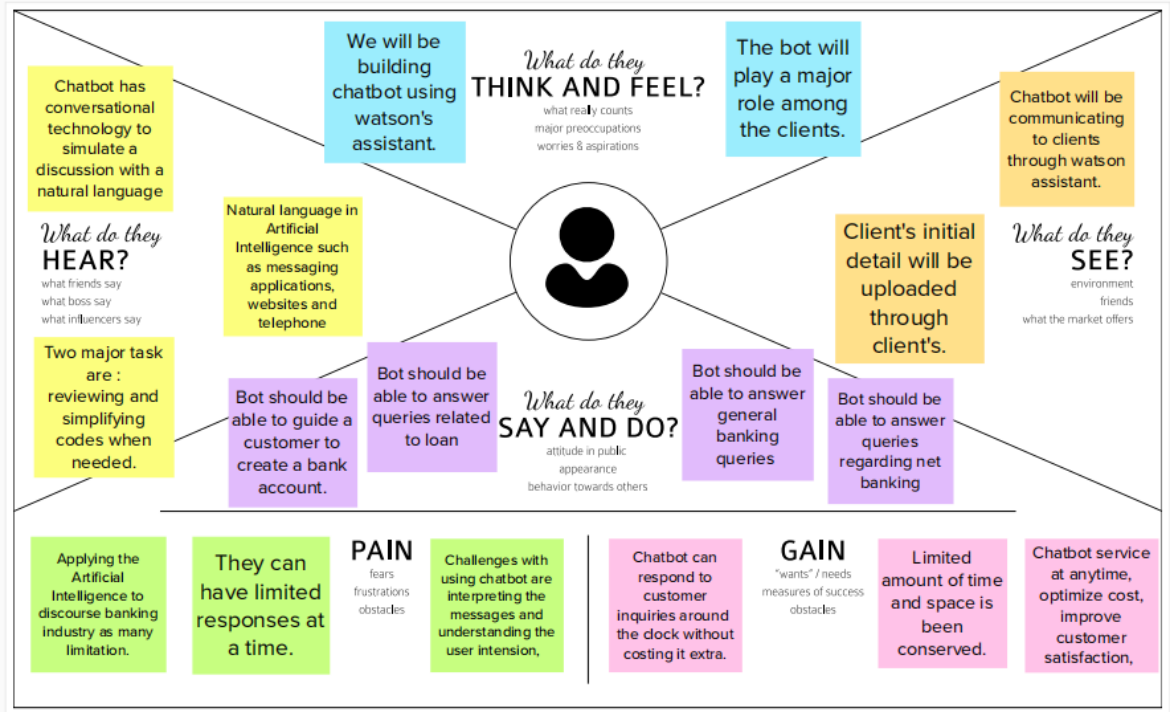
- ✓ AI banking Chatbots help customers in many ways. AI-based chatbot service for financial industry is one of the significant use cases of AI in banking sector. AI chatbots in banking are modernizing the way how businesses provide services to their customers

- ✓ AI chatbots in the banking industry can assist customers 24*7 and give accurate responses to their queries. These chatbots provide a personalized experience to users.
- ✓ AI chatbots in banking is providing a better customer experience.
- ✓ Hence, AI chatbots for banking and finance operations let banks attract customer attention, optimize service quality, and expand the brand mark in the market.

3. IDEATION & PROPOSED SOLUTION

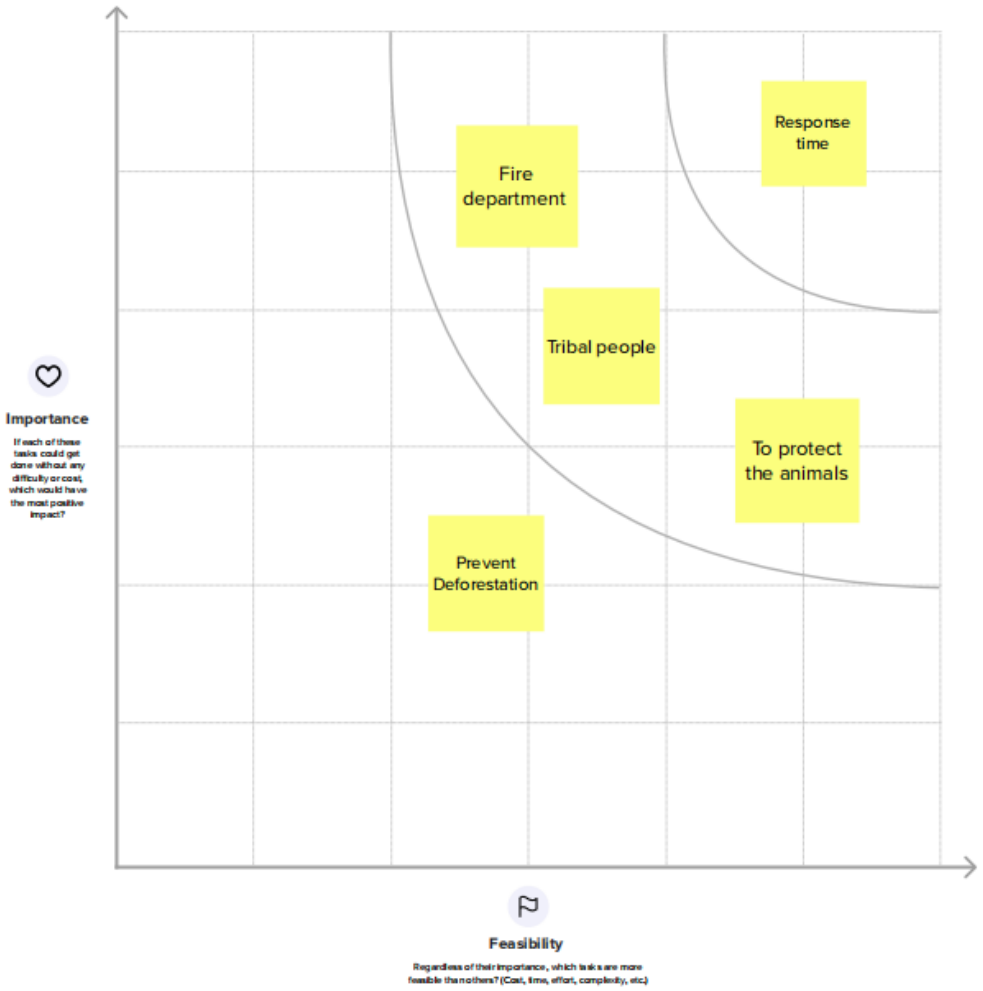
This map is created with view of the project in user's perspective, to find pain & gain points and to summarize it with a list of problem statements.

3.1 EMPATHY MAP CANVAS



3.2 IDEATION & BRAINSTORMING

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.



3.3 PROPOSED SOLUTION

S.NO.	PARAMETER	DESCRIPTION
1.	PROBLEM STATEMENT (PROBLEM TO BE SOLVED)	Students are often worried about their chances of admission to university. The aim of this project is to help students in shortlisting universities with their profiles. The predicted output gives them a fair idea about their admission chances in a particular university. This analysis should also help students who are currently preparing or will be preparing to get a better idea.

2.	IDEA / SOLUTION DESCRIPTION	It has always been a troublesome process for students in finding the perfect university and course for their further studies. At times they do know which stream they want to get into, but it is not easy for them to find colleges based on their academic marks and other performances. We aim to develop and provide a place which would give a probabilistic output as to how likely it is to get into a university given upon their details. The technology used here is Jupyter Notebook for programming using Anaconda IDE with python packages.
3.	NOVELTY / UNIQUENESS	This project is basically for the students to decide their own college without any confusion on their minds within a short period of time using this system.
4.	SOCIAL IMPACT / CUSTOMER SATISFACTION	The students enter into their dream university without any hindrance, mainly with their marks and co-curricular activities under minimal expenditure.
5.	BUSINESS MODEL (REVENUE MODEL)	The business model is in such a way that the finance of a particular student is reduced by saving the amount of the • Counselling • Reduces the Travelling cost and time • Donation given to the mediators

6.	SCALABILITY OF THE SOLUTION	University Admit Eligibility Predictor is a soothsayer of sorts where it gives you the chances of making it into a particular program in a university you like. It is a very handy feature that's specifically designed for aspirants pursuing their degree. Usually there are server traffics faced by the students but this issue is untangled in our system as we use Cloud Technology in order to store the data and retrieve it easily and quickly. The technology used here is Jupyter Notebook for programming using Anaconda IDE with python packages.

3.4 PROBLEM SOLUTION FIT

4. REQUIREMENT ANALYSIS

4.1 FUNCTIONAL REQUIREMENTS:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	**Savings Account Related Actions**	• Type of Savings Account Creation Details • Interest Rate • Minimum Balance • Debit Card • Credit Card
FR-2	**Current Account Related Actions**	• Type of Company • Current Account Closure Steps • Update GSTIN • Zero Balance Current Account
FR-3	**Loan Account Related Actions**	• Type of Loan • How long for approval • Available Loan Amounts • Loan Status • Joint Loan
FR-4	**General Queries Related Actions**	• Bank Working Days • List of Braches • Storage Locker Facility • Currency Conversion Facility • CIBIL • Find a nearest branch
FR-5	**Net Banking Related Actions**	• Login Steps • Change Net Banking Password • Daily Limit • Types of Fund Transfer • Add Beneficiary

4.2 NON-FUNCTIONAL REQUIREMENTS:

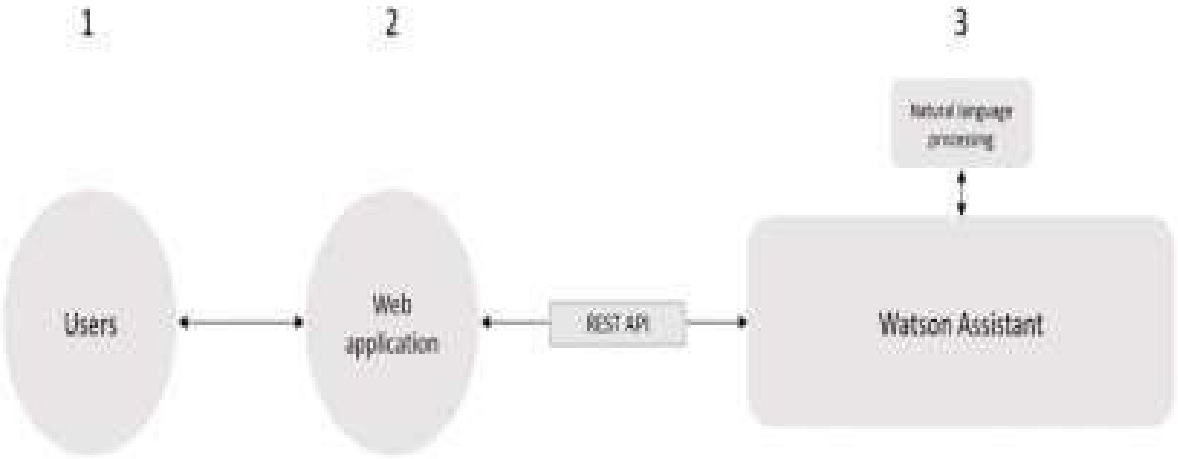
Following are the non-functional requirements of the proposed solution.

NFR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	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.
NFR-2	**Security**	The AI Chatbot maintains a confidential conversation with customers. Chatbot will provide personal and efficient communication between the user and the bank.
NFR-3	**Reliability**	Chatbots are trained very well using AI to provide solutions for the popular and frequently asked questions, thereby providing the best suited service quickly. Thus AI Chatbots has a reliable end-user experience.
NFR-4	**Performance**	AI Chatbots are a great way to overcome the limitation of workload of humans. There can be multiple instances of a single chatbot inquiring different people at the same time. Such chatbots work in real time with no need for the customers to wait. This ensures faster, easier and more efficient face-time with customers.
NFR-5	**Availability**	AI Chatbots provide 24/7 service to clear all customer queries and guide them through all the banking processes. It is available to anyone with access to the internet with basic hardware.
NFR-6	**Scalability**	AI Chatbots are helping banking industry to scale their customer service and to improve customer service satisfaction at the same time. 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.

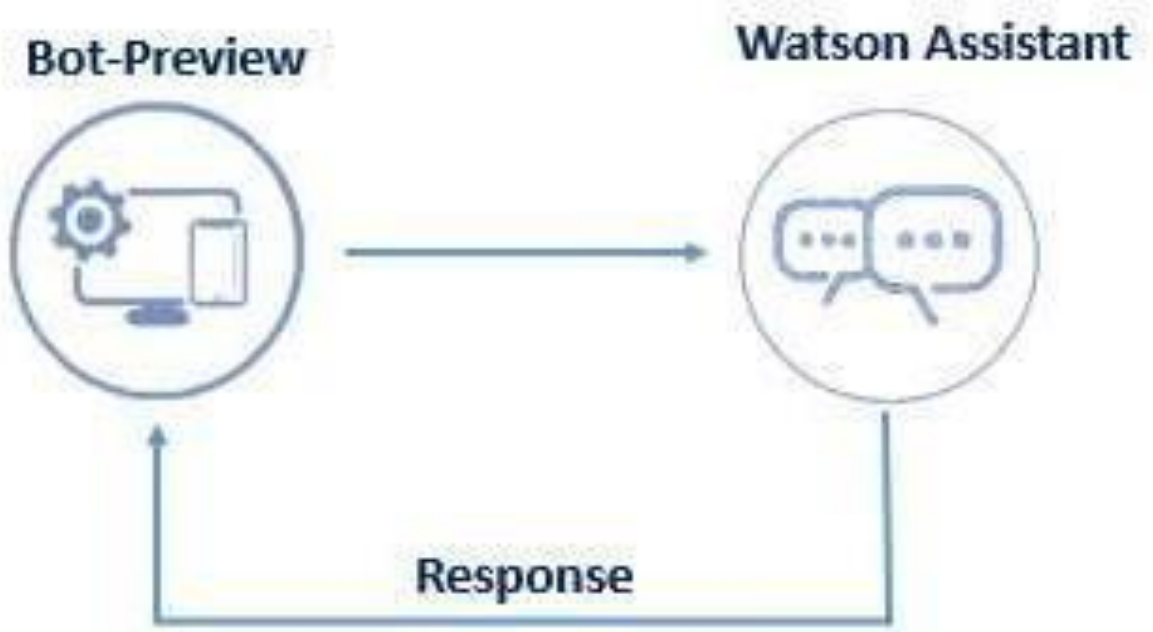
5. PROJECT DESIGN:

5.1 DATA FLOW DIAGRAMS:

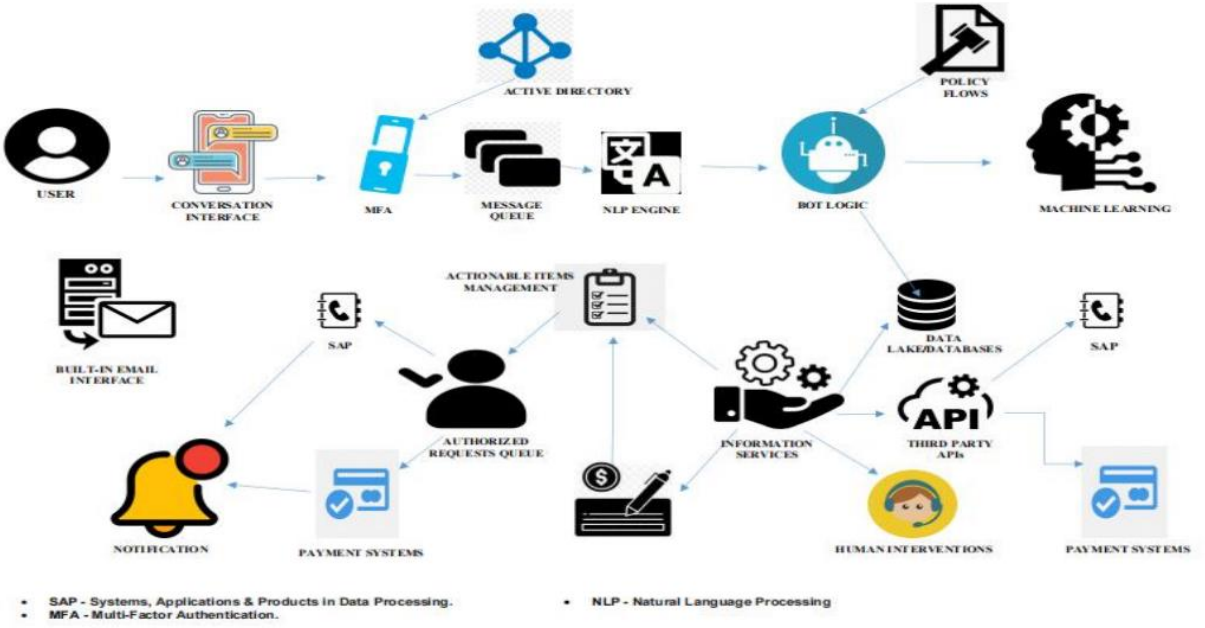
A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right
amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is
stored.



AI-based discourse for Banking Industry



5.2 SOLUTION & TECHNICAL ARCHITECTURE



5.3 USER STORIES

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority
Customer (Mobile user)	Download the database	USN-1	As a user, I can register for the application by entering my email, and password, and confirming my password.	I can access my account / dashboard	High
	Register	USN-2	As a user, I can register for the application by entering my email, and password, and confirming my password.	I can receive a confirmation email & click confirm	High
	Login	USN-3	As a user, I will receive a confirmation email once I have registered for the application	I can register & access the dashboard with Facebook Login	Low

	Querying	USN-4	User query with a chatbot for clarifications.		Medium
Customer (Web user)	The functional requirements are same as a mobile user	Same as a mobile user	Same as a mobile user	Same as a mobile user	High when compared to mobile users

6. PLANNING & SCHEDULING

6.1 SPRINT PLANNING & ESTIMATION

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

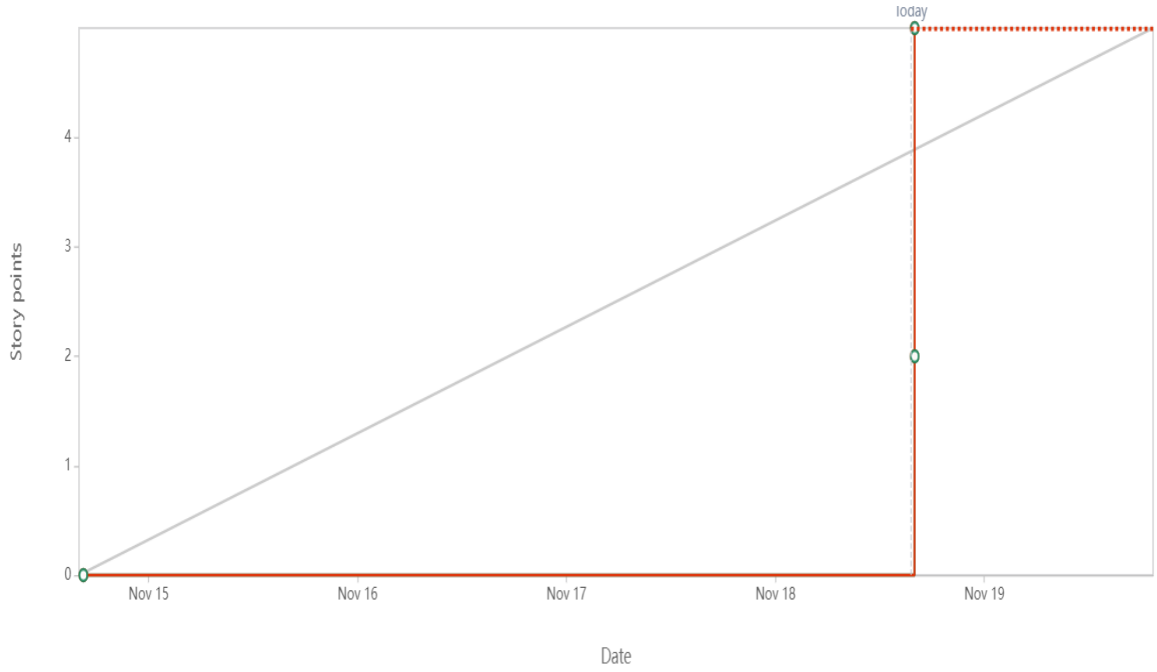
6.2 SPRINT DELIVERY SCHEDULE

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 Chatbot or Assistant using IBM Watson Assistant/ As a user, I can see a Banking Assistant.	12	High	Chaya, M.Kavita Nithya Sri
Sprint-1		USN-2	Understanding Customer's Banking Related Queries and skills/ As a user, I can see a Chatbot with Banking skills.	8	Moderate	Susmita, Chaya M.Kavita
Sprint-2	Modelling of Assistant	USN-3	Building action and Adding responses to Account Creation/As a user, I can see a Chatbot which helps to create an account	5	High	Nithya Sri Susmita

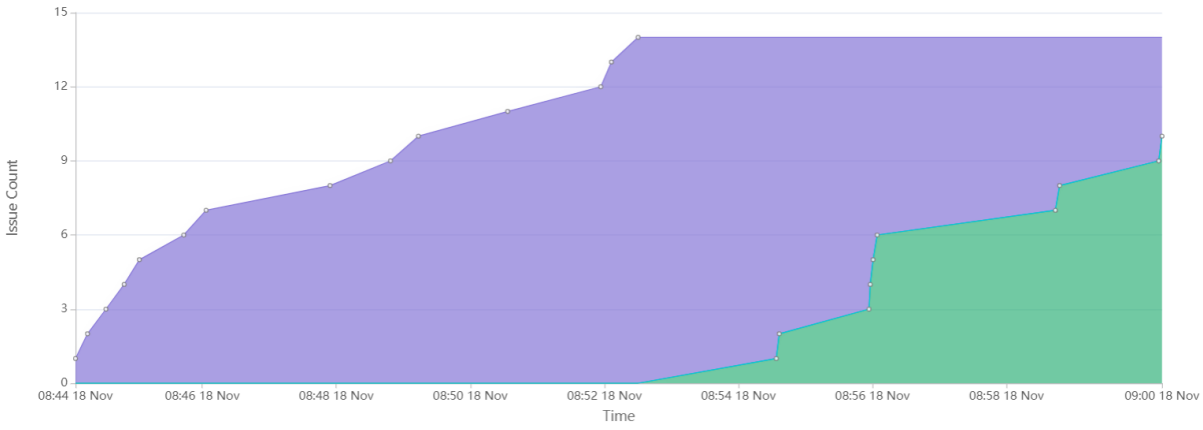
Sprint-2		USN-4	Building action and Adding responses to Banking related queries/As a user, I can see a Chatbot which helps to solve the banking queries.	5	High	Chaya M.Kavita
Sprint-2		USN-5	Building action and Adding responses to Net Banking/As a user, I can see a Chatbot which helps to access Net Banking	5	High	Nithya Sri
Sprint-2		USN-6	Building action and Adding responses to Loan Queries/As a user, I can see a Chatbot which helps in Loan related Queries.	5	High	Susmita
Sprint-3	Testing & Deployment Phase-I	USN-7	Testing the chatbot performance with the trained banking functionalities or conversations/As a user, I can know the chatbots performance level	10	High	Chaya M.Kavita, Nithaya Sri
Sprint-3		USN-8	Integration of Flask webpage with the chatbot assistant to provide a framework/As a user, I can see a webpage to access the chatbot.	10	High	Susmita Chaya Nithya Sri
Sprint-4	Deployment Phase-II & Model Improvement	USN-9	Deployment of AI based chatbot for banking Industry or Running the Chatbot service/As a user, I can see and use a 24*7 banking chatbot.	15	High	M.Kavita Nithya Sri, Chaya, Susmita
Sprint-4		USN-10	Improving the model efficiency whenever needed/As a user, I can see new updated chatbot in Future days.	5	Moderate	Chaya M.Kavita, Nithya Sri, Susmita,

6.3 REPORTS FROM JIRA

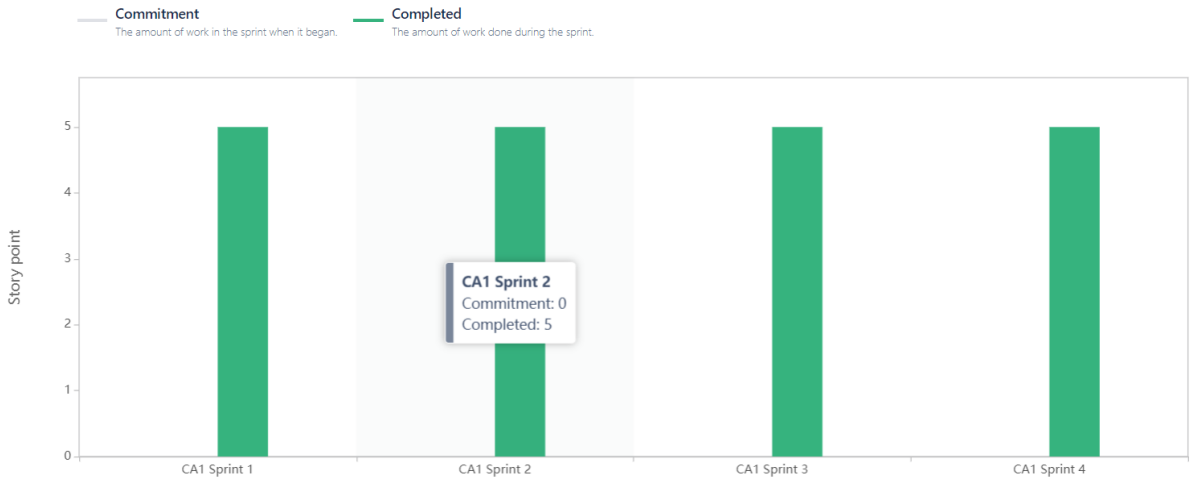
BURNTDOWN GRAPH



CUMULATIVE FLOW DIAGRAM



VELOCITY REPORT



Sprint	Commitment	Completed
CA1 Sprint 1	0	5
CA1 Sprint 2	0	5
CA1 Sprint 3	0	5
CA1 Sprint 4	0	5

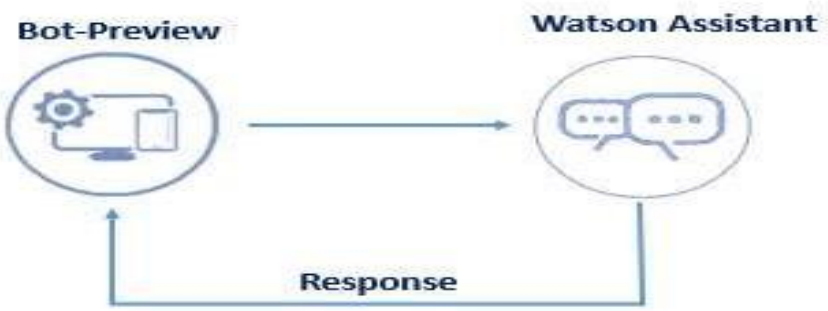
7. CODING & SOLUTIONING (EXPLAIN THE FEATURES ADDED IN THE PROJECT ALONG WITH CODE)

7.1 THEORETICAL ANALYSIS:

Services Used:

- IBM Watson Assistant

Block diagram:



Hardware / Software designing:

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

Softwares:

- Visual studio code
- IBM Watson studio

Packages:

- Flask

7.2 FLOWCHART:

To accomplish the above task, you must complete the below activities and tasks:

- Create IBM Services.
- Creating skills & Assistant for Chatbot.
- Creating Want to take a loan account action.
- Creating Queries regarding Loan account action.
- Creating a See how I can help you action.
- Creating a Python code with Flask.
- Create HTML web page.
- Integrate the Watson Chatbot with web page.

7.3 APPLICATIONS:

- Banking chatbots have all the data to predict the spending habits of customers and help them keep their finances on track.

8.TESTING

8.1 Test Cases

8.2 User Acceptance Testing

9. RESULTS

9.1 Performance Metrics

10. ADVANTAGES & DISADVANTAGES:

Advantages:

- Round-the-clock service.
- Brand Consistency.
- Increased Productivity.
- Reduced Staffing Needs.
- Consistent Response Rate and Availability.
- Helps with Fraud Prevention.
- Chats can be saved.
- Lower costs.

Disadvantages:

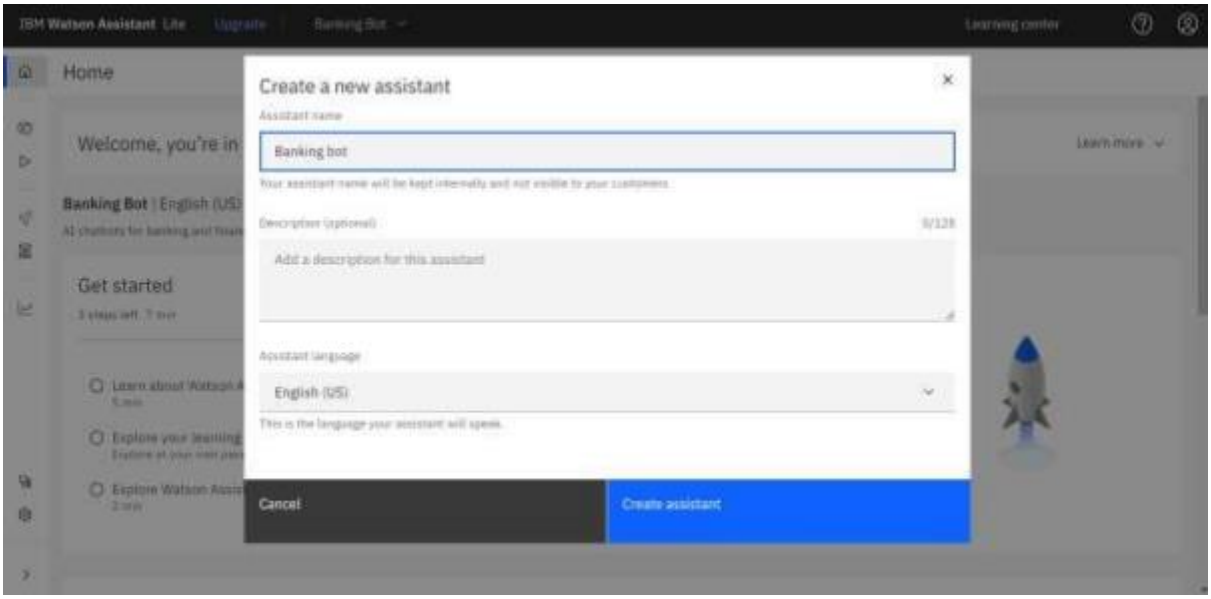
- Questions must be programmed beforehand.
- Impersonal
- Must keep information up-to-date.
- Technology issues.
- Needs additional measures to protect identities.

11. APPENDIX:

Create IBM Service

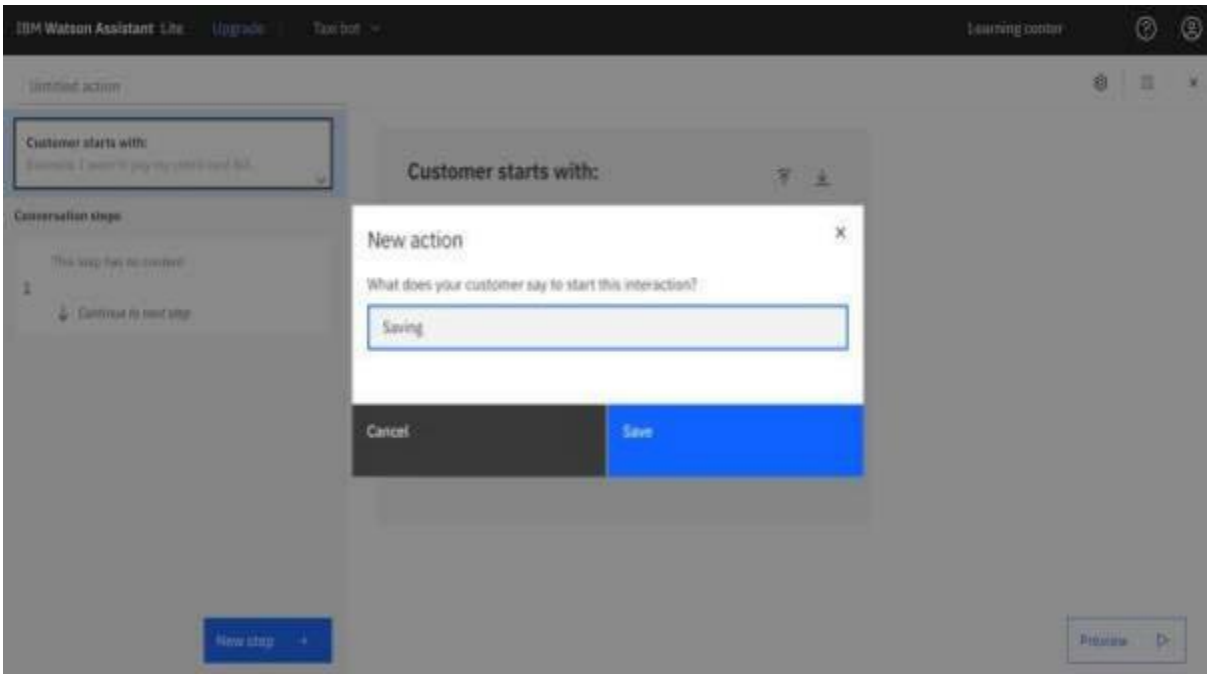
In this activity, you will be creating the Necessary IBM service. The following are the service that you have to create.

- Watson Assistant

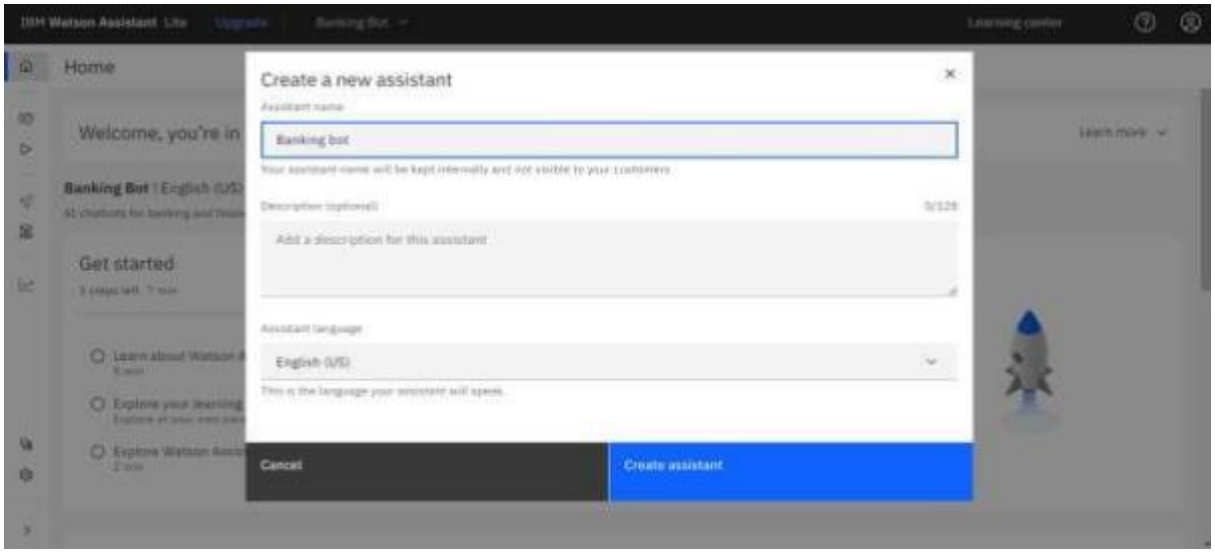


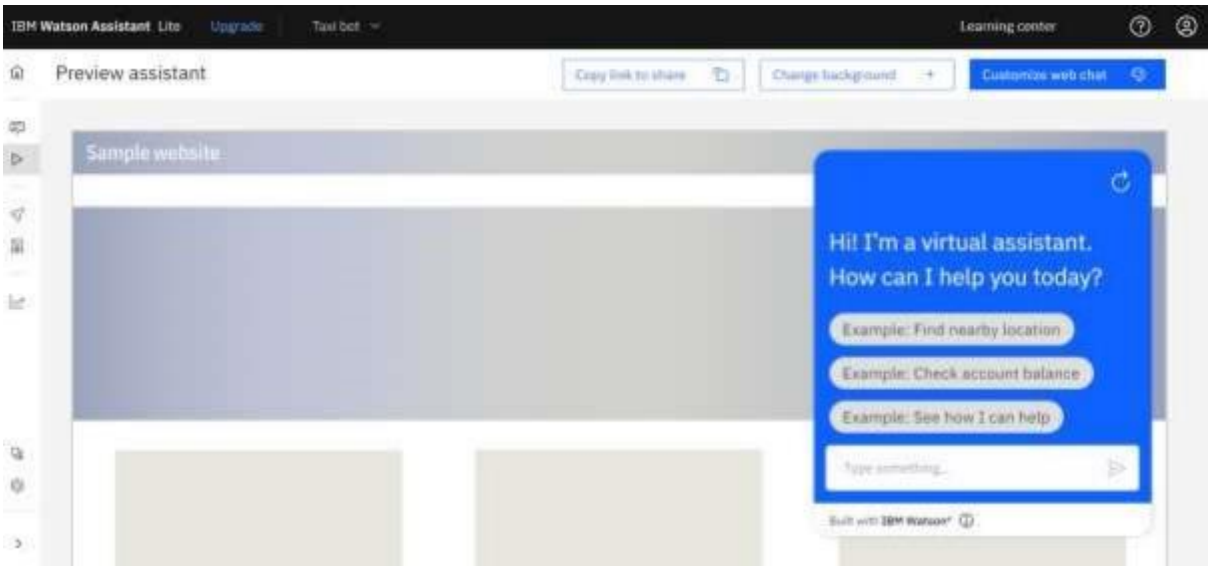
Creating Skills & Assistant For Chatbot

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



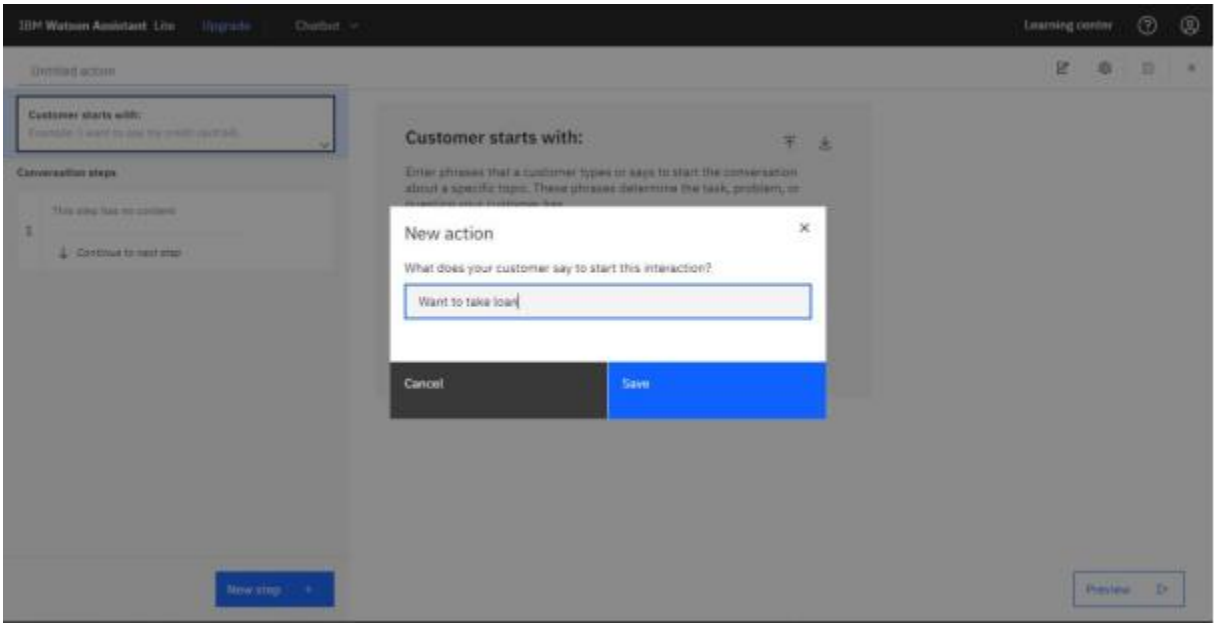
A default template chatbot is created. Need to add actions.



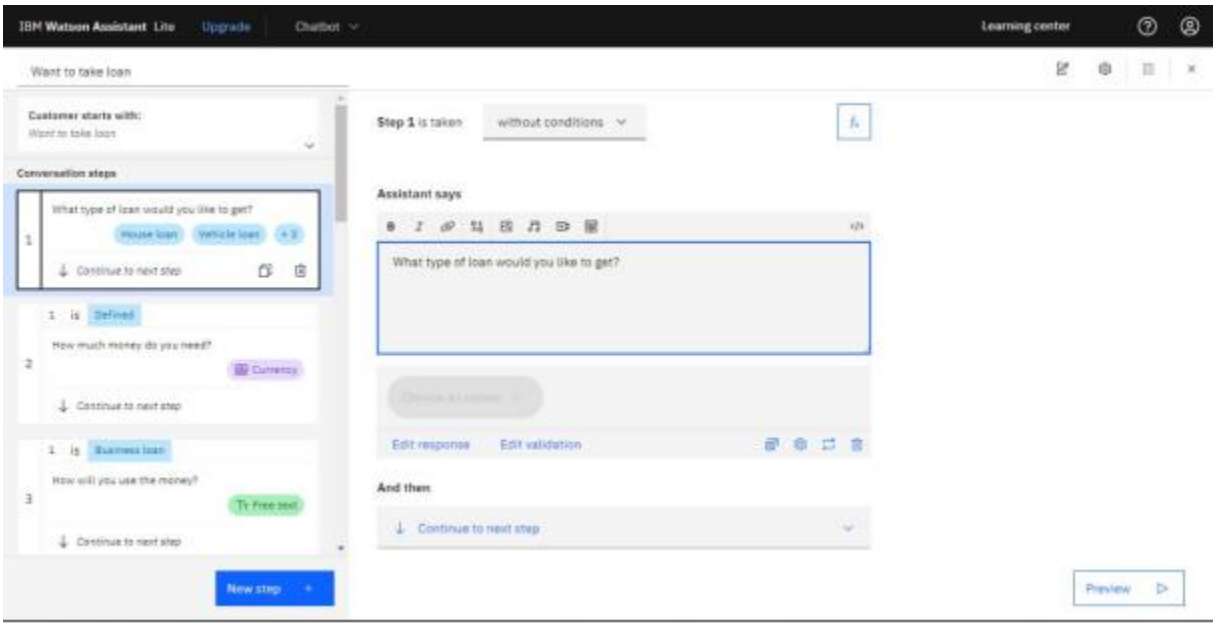


Creating Want to take Loan Action

Create a new action Want to take Loan action.

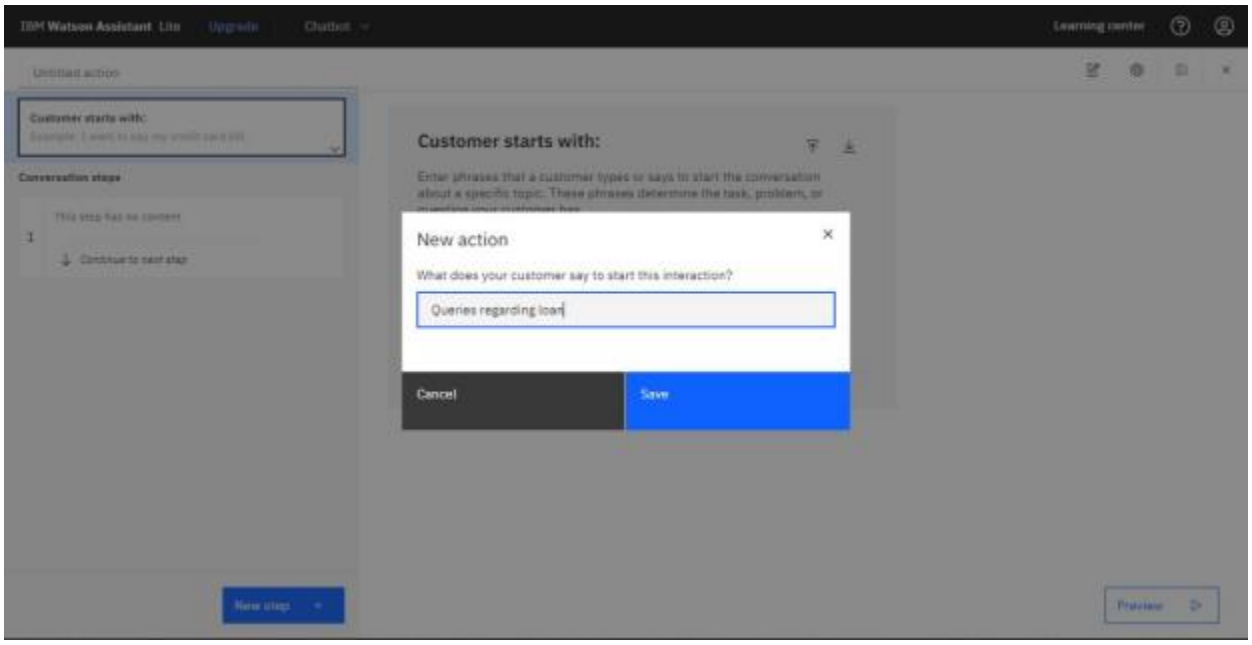


Add steps in Loan action.

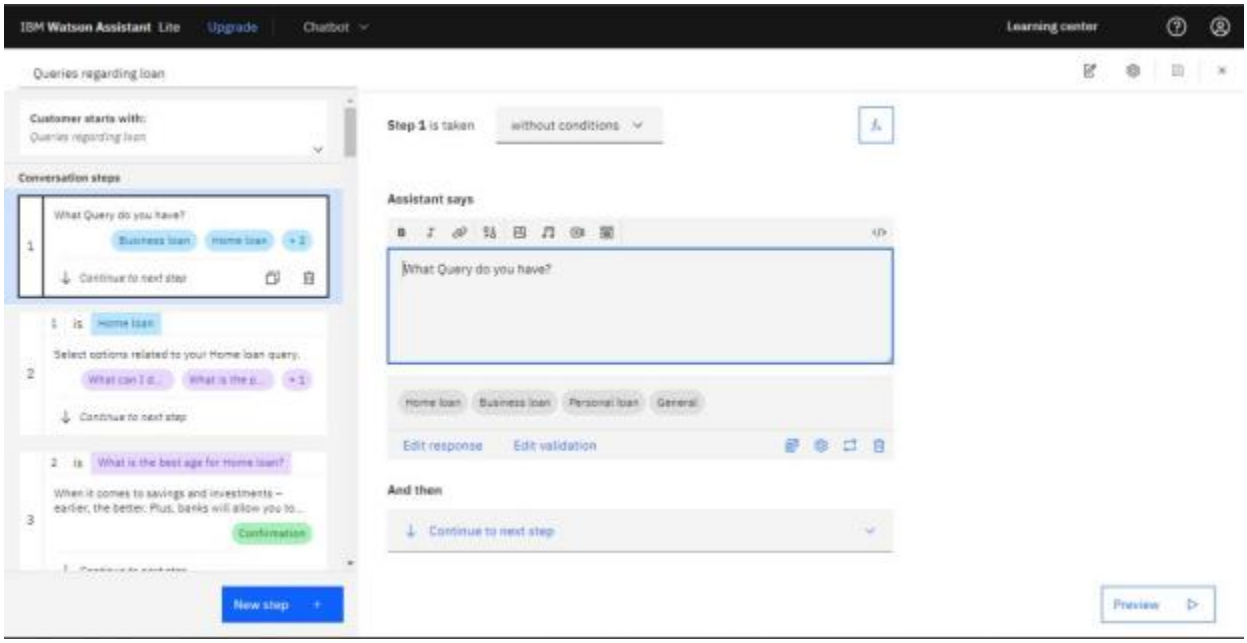


Creating Queries regarding loan Action

Create a new **Action** Queries regarding loan action.

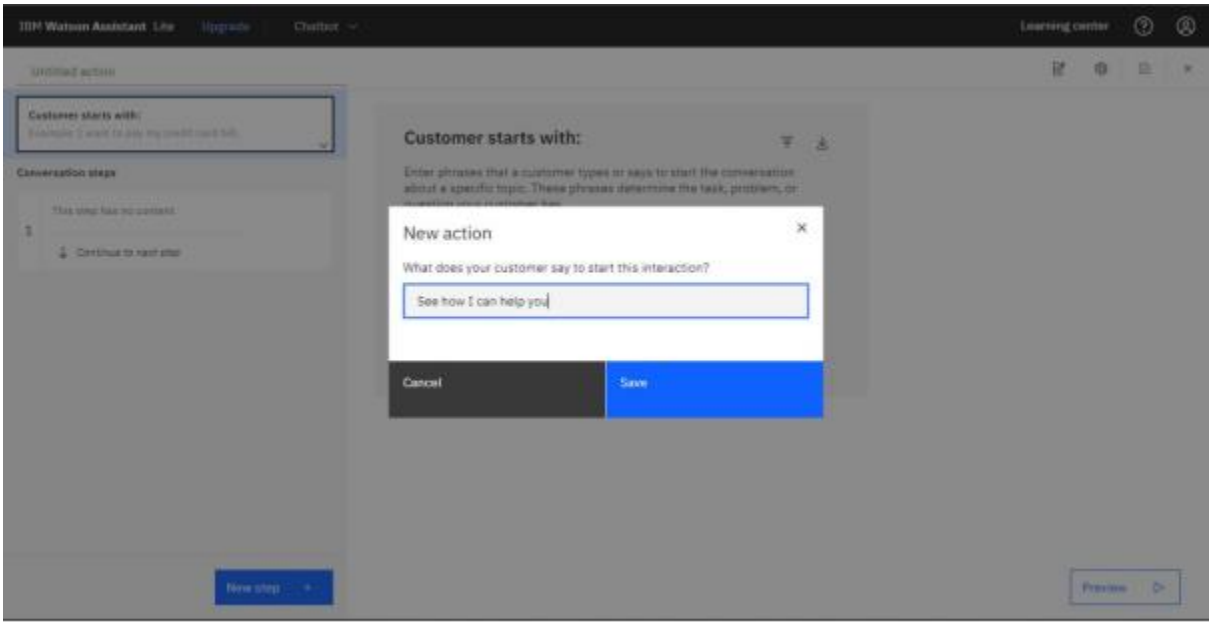


Add steps in Queries regarding Loan action.

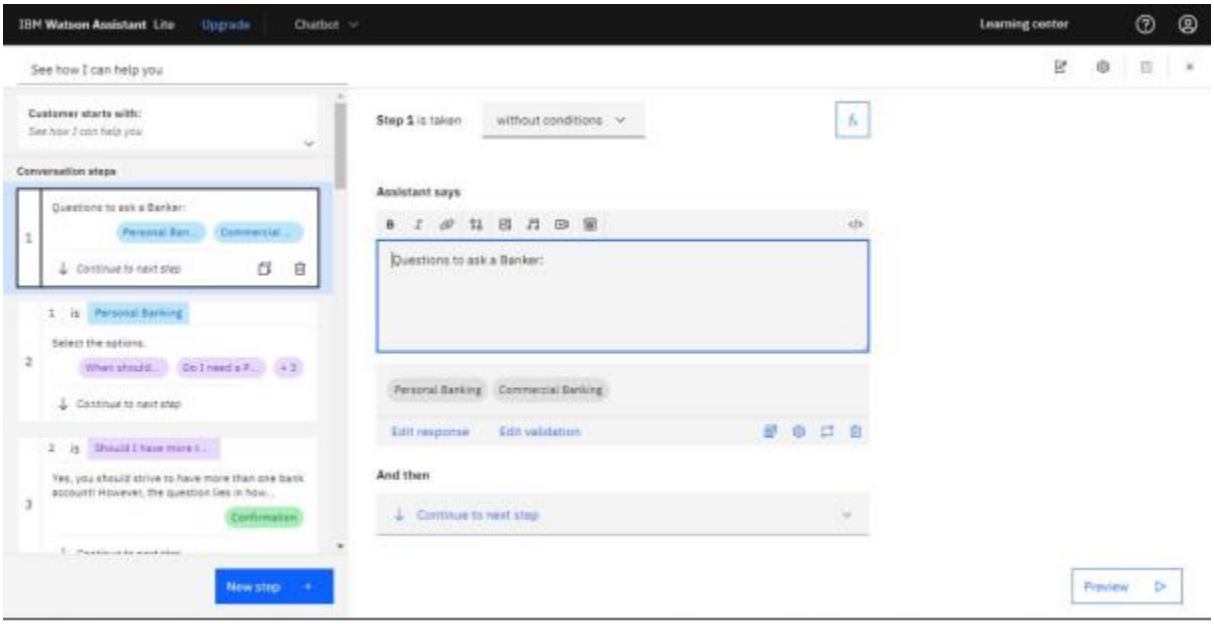


Creating See how I can help you Action

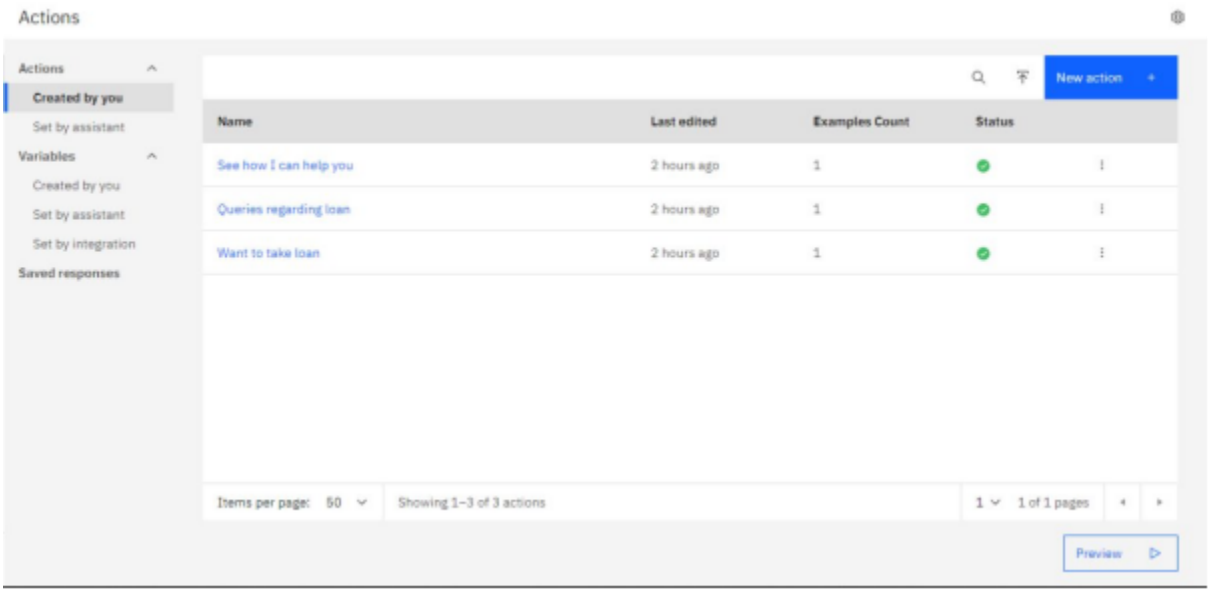
Create a new action See how I can help you action.



Add steps in See how I can help you action.



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



Creating Assistant & Integrate With Flask Web Page

You will be 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.

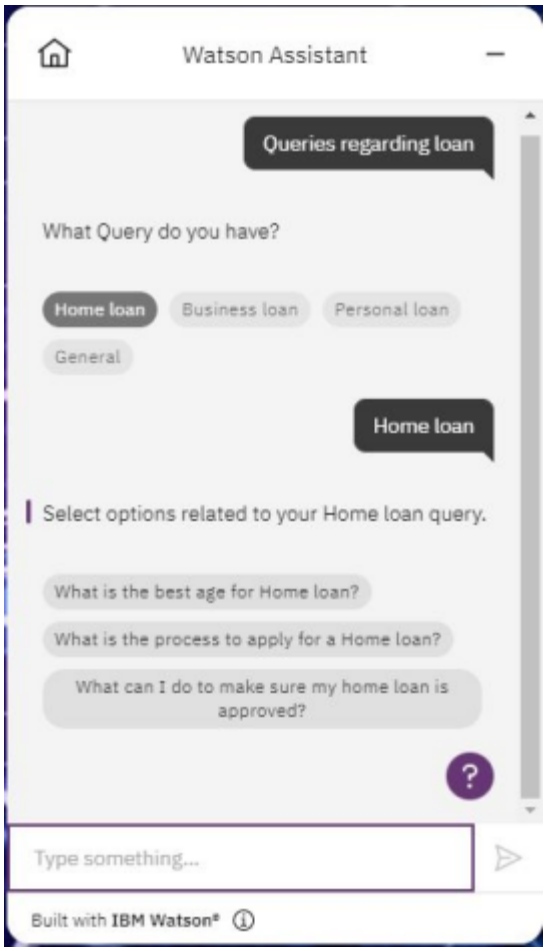
Source Code:

```
<!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>
  <link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/3.4.1/css/bootstrap.min.css">
  <style>
      body
      {
       background-image: url("../static/img/chatbots.png");
       background-size: cover;
      }
   </style>
</head>

<body>
 <script>
  window.watsonAssistantChatOptions = {
    integrationID: "5134bf61-57bd-4c92-8bc0-598a18abeb1b", // The ID of this integration.
    region: "us-south", // The region your integration is hosted in.
    serviceInstanceID: "938f0cce-9f65-4e00-bee6-3c52700a3980", // 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>
</body>

</html>
```

OUTPUT:

Hi! I'm a virtual assistant. How can I help you today?
Want to take loan
Queries regarding loan
See how I can help you
Type something...
Built with IBM Watson®

Watson Assistant
Queries regarding loan
What Query do you have?
Home loan
Business loan
Personal loan
General
Home loan
Select options related to your Home loan query.
What is the best age for Home loan?
What is the process to apply for a Home loan?
What can I do to make sure my home loan is approved?
What is the best age for Home loan?
Type something...
Built with IBM Watson®



BANKING CHATBOT:

PROJECT: https://chatbotcloudproject.000webhostapp.com/

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-938f0cce-9f65-4e00-bee6-3c52700a398d%3A%3Add85a931-9450-4ba7-8378-a88f54e7fae7&integrationID=5134bf41-57bd-4c92-8bc0-598a18abeb3b&region=us-south&serviceInstanceID=938f0cce-9f65-4e00-bee6-3c52700a398d

REFERENCE:

[1] Jiao, Anran. (2020). An Intelligent Chatbot System Based on Entity Extraction Using RASA NLU and Neural Network. Journal of Physics: Conference Series. 1487. 012014. 10.1088/1742-6596/1487/1/012014.

[2] Fathima, Sasha & Student, Suhel & Shukla, Vinod & Vyas, Dr Sonali & Mishra, Ved P. (2020). Conversation to Automation in Banking Through Chatbot Using Artificial Machine Intelligence Language. 10.1109/ICRITO48877.2020.9197825.

[3] Singh, Netra & Singh, Devender. (2019). Chatbots and Virtual Assistant in Indian Banks. Industrija. 47. 75-101. 10.5937/industrija47-24578.

[4] Petr Lorenc, "Joint model for intent and entity recognition" in arXiv:2109.03221v1 [cs.CL] 7 Sep 2021

[5] The Rasa documentation. [Online]. Available: https://rasa.com/docs/rasa/2.x [6] Django documentation. [Online]. Available: https://docs.djangoproject.com/en/4.0/

[7] Adamopoulou, Eleni, and Lefteris Moussiades. "An overview of chatbot technology." In IFIP International Conference on Artificial Intelligence Applications and Innovations, pp. 373-383. Springer, Cham, 2020.

[8] Cahn, Jack. "CHATBOT: Architecture, design, & development." University of Pennsylvania School of Engineering and Applied Science Department of Computer and Information Science (2017).

[9] Hien, Ho Thao, Pham-Nguyen Cuong, Le Nguyen Hoai Nam, Ho Le Thi Kim Nhung, and Le Dinh Thang. "Intelligent assistants in higher- education environments: the FIT-EBot, a chatbot for administrative and learning support." In Proceedings of the ninth international symposium on information and communication technology, pp. 69-76. 2018.

[10] Waterman, Chinia. 2018. "Consumer Online Banking Trends 2018". Humley. https://humleyai.com/2018/09/18/consumer-online-banking- trends-2018/.