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PROJECT IN INTELIGENT INFORMATION SYSTEMS

W2024

**CHATBOT AI(LLM) ASSISTANT**

**Project Goal:**

**Develop a intelligent LLM chatbot assistant prototype**

**Measure and collect performance based on human conversations about onboarding process**

**System(Chatbot) Goal:**  **Assist web portal users(npo managers, volunteers):   
Chatbot should consult user, provide information, and help user to use web platform (Onboarding process)**

Sub goal question check from presentation and green mark from paragraph below

**Abstract:**

**Chatbots have several types and complexity. They started from ELIZA, , developed by Joseph Weizenbaum. ELIZA simulated conversation using pattern-matching techniques and scripts but lacked real understanding, only creating the appearance of comprehension (Weizenbaum, 1966). Based on this idea was grown family of rule based chatbots.**

**Rule-based chatbot are basic and easiest in implementation chatbots. It is made to interact with users by previously determined guidelines and requirements. These solutions initiate with pre-programmed reactions upon identifying specified phrases or patterns within user input. Developers manually create and design a rule-based chatbot's rules, which specify how the bot will react to different user inputs. And that mean chatbot conversation always have strict restrictions on chat flow algoritm. User can’t interact in specific way or get/ receive information in other order. (ChatInsight 2024). In recent years, the development of neural networks and deep learning led to the creation of large language models (LLMs) such as OpenAI’s GPT series. These models, trained on vast datasets and fine-tuned for natural language understanding, can engage in coherent, context-aware conversations across a wide range of topics (Brown et al., 2020). Unlike earlier models, LLMs utilize transformer architectures, allowing for superior handling of context and generation of nuanced, human-like responses (Vaswani et al., 2017). This adaptability makes LLM chatbots particularly well-suited for tasks like volunteer onboarding, where they can guide new users by answering questions, collecting relevant information, and recommending opportunities tailored to each user’s profile and preferences.**

**MAIN REWORK GOAL:**

**ADD SUB GOALS HOW THROUGH CHAT FILL FORM FOR TASK APPLY**

**ALSO USER PROFILE FILLING**

**AND ON BOARDING PROCESS**

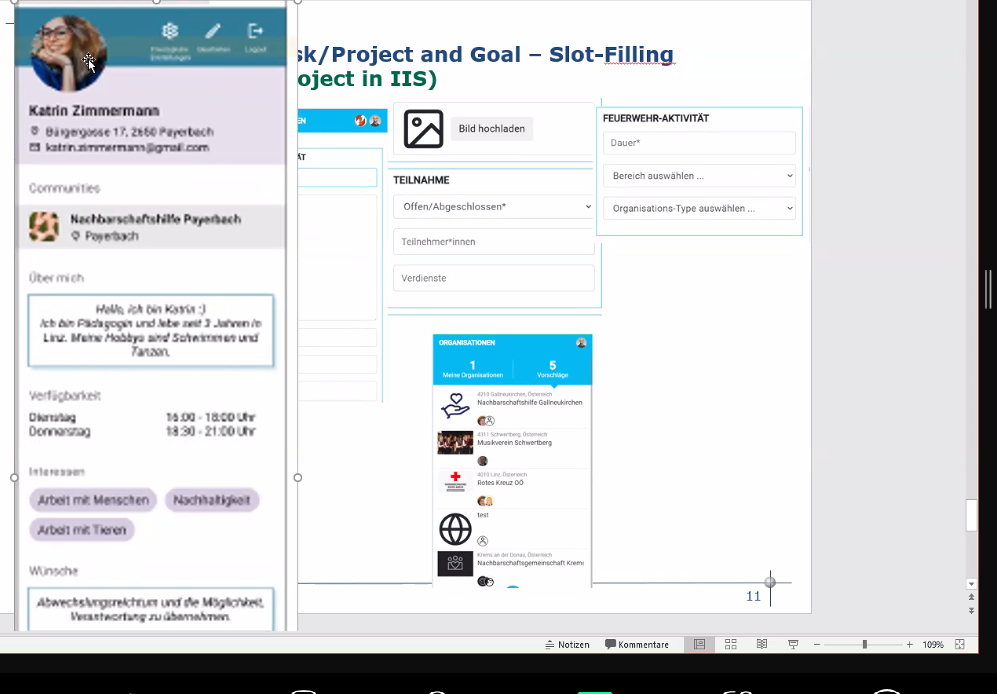
**Brief description:**

**Brief description of AIM:**

**Chatbots have evolved significantly over the years, transitioning from basic rule-based systems to sophisticated AI-powered conversational agents. Their theoretical application for websites has expanded beyond simple user interaction, enabling a new level of engagement and personalization. In the context of modern web applications, a chatbot serves not only as a means of communication but as a core component of the user experience, offering tailored services, guiding users through tasks, and providing dynamic content based on individual needs and preferences.  
  
The theoretical purpose of a chatbot for a website revolves around streamlining interaction, offering assistance, and improving accessibility. Websites often require systems that can handle common user inquiries, support complex workflows, and assist users in navigating the platform efficiently. A well-designed chatbot can act as a virtual assistant, guiding users through project( also add specific volunters information, troubleshooting steps, or even assisting with tasks like filling out forms, providing status updates, or offering personalized recommendations.  
  
One of the primary purposes of a chatbot on a website is to provide real-time volunteers support. Instead of relying on static FAQs or waiting for a human representative to become available, users can get immediate answers to their questions. The chatbot can interact in a conversational manner, making the experience feel more personal and responsive. It can address a wide range of inquiries, from basic questions about products or services to more complex issues requiring the сhatbot to access and integrate user-specific data, like purchase history or account status.**

**JP Morgan workers were encouraged to use LLM Suite for “writing, generating ideas, solving problems using Excel, summarizing documents,” among other things, according to an email sent by the bank. At JPMorgan, the chatbot could augment the work being done with “a hybrid of human and AI analysts, very similar to how the intelligence community works,” Igor Jablokov, founder and CEO of AI startup Pryon told Fortune. LLM Suite is not JPMorgan’s only AI chatbot. The bank also has two other tools known as Connect Coach and SpectrumGPT that are specific to business tasks, rather than a general purpose tool like LLM Suite. (Confino 2024) Introduction part**

**In this project, we document the design and development of a chatbot based on these LLM capabilities. Project contains the web site, which is using django framework and store authorization user profiles in Mongo database with rendering chat page. Chatbot is powered by configured Llama LLM model, which running through Ollama instance. Llama 3 was chosen as it’s significance lies in its balance of performance, cost-efficiency, and open accessibility. In Meta experimental evaluation discovered that Llama3 model performs on par with leading language models such as GPT-4. (Llama Team 2024). This project not only highlights the potential of LLMs in chatbots to enhance user interactions, but also pushes the boundaries of what is possible with AI-driven communication.**



Onboarding chat where user add some additional information as disability or age to open limited tasks as tasks for disabled or youth tasks

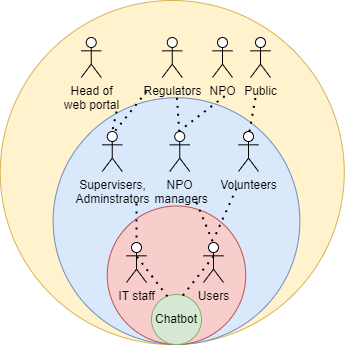
Requirements

## Summary System Description

(Prototype for) AI-assisted chatbot for Austrian volunteers web portal.

The system based on modelfile configuration shall help to users by generating answers for users input. As An Ollama Modelfile is a configuration file that defines and manages models on the Ollama platform. Create new models or modify and adjust existing models through model files to cope with some special application scenarios.(GPU-mart)The system shall have authorization before accesing chatbot

## Stakeholder Identification



### Onion diagram

### System:

### The system represents the product or solution that is being delivered by the project (Olson 2013)

### Chatbot

### Business System:

### This layer represents the Business System and entails not just the final product, but those stakeholders who interact directly with it, like operators. (ConceptDraw)

* IT staff( web master, server technician etc)
* Users

Web application:

Those stakeholders who are functional “beneficiares” according Ian Alexander. These are the other stakeholders within the organization who may not interact directly with the solution who benefit from it. (Alexander 2003)

* Volunteers
* NPO managers
* Supervisers, Administrators

Public Environment:

Those stakeholders who are wider environment in which the organization operates. This layer is populated with stakeholders who are outside the firm but who are still important. As public or various pseudo-governmental organizations has a crucial stake in most projects. (Alexander 2003)

* Head of web-portal environment
* Non Profit Organization
* Public / Citizens
* Regulators
* AI Act of European AI Office (AI Act 2024
* The Federal Ministry of Social Affairs, Health, Care and Consumer Protection
* Municipal/ Local offices and representatives of European AI Office and Federal Ministry

**Using the EARS template, document the functional requirements**

**Instructions / Guidelines**

* Req<ID> <optional preconditions> <optional trigger> the <system  
  name> shall <system response>
* Document as many requirements as you desire
  + Not all of them need to be implemented in this course

His/ her pronounces everywhere as sentences should be gender neutral

**List of functional requirements**

Authentification

**FR100:** The system shall allow user create account (registrate) for the purpose of providing conversation for every user

**FR101:** The system shall allow user to his/her login (authentificate) by entering his/her password

**FR102:** The system shall allow user change password based on his/her account

**FR103:** The system shall use Mongo db as DBMS for easier integration with other parts of web portal

Chatbot

**FR200:** The LLM-powered chatbot shall respond to user inputs in natural language.

**FR201:** The chatbot should generate an answer for every message from user input.

**FR202:** The system shall be able to understand the user's intention from their input.

**FR203:** The bot shall extract specific information (entities) from the user’s message, such as dates, names, or task information.

**FR204:** The bot shall have context management and conversation flow

**SFR2040:** The system shall maintain the context of a conversation across multiple turns, remembering prior user inputs and responses.

**SFR2041:** The system should handle ongoing conversations, where it can maintain state and carry information across multiple exchanges.

**SFR2042:** The chatbot should continuously update its internal state to reflect new information from the conversation and respond in a relevant manner based on the current state.

**SFR2043:** The system shall decide the next action (asking for more information, providing

an answer, executing a task) based on the current state.

**FR205:** The system shall h**andle misunderstandings and have adaptability**

****SFR2050:** The system shall be able to handle misunderstandings, detect when it cannot understand, and ask clarifying questions.**

****SFR2050(2nd ver):** The chatbot should recognize when it cannot fully understand a user's input and ask clarifying questions to resolve ambiguities.**

**SFR2051: The system shall adapt to individual users by learning preferences over time.**

Add specific functions requirements ask user profile registration

**List of nonfunctional requirements**

Chatbot

**NFR 200:** The LLM-powered chatbot’s architecture shall allow for updates and bug fixes to be deployed without downtime.

**NFR 201:** The system should handle a large number of concurrent users and scale efficiently without performance degradation.

Разделы

**Concept** what technologies will be used and why.

**Web** model from user

Data model

## Actors and Agents

### Primary roles (who use the system in their daily activities) in product system

|  |  |  |  |
| --- | --- | --- | --- |
| **#** | **Primary Actor** | **Type** | **Description** |
| 1 | User of chatbot | Human | Responsible for   1. autentification process before starting chat 2. entering messages and questions for defining exact topic of user interest |
| 2 | Chatbot Processing Model | AI | Provides core logic for answering on messages in natural language processing   1. Configured as chatbot assistant for Austrian volunteers portal 2. Identifying individual chat and conversation history |
| 3 | IT staff | Human | Responsible for   1. Maintenance technical equipment such as server equipment 2. Problems and bug solving 3. Help users troubles and questions with interaction to chatbot instance |

Prototyping Scenario   
Have conversation as chatbot with predefined role and knowledge specialization

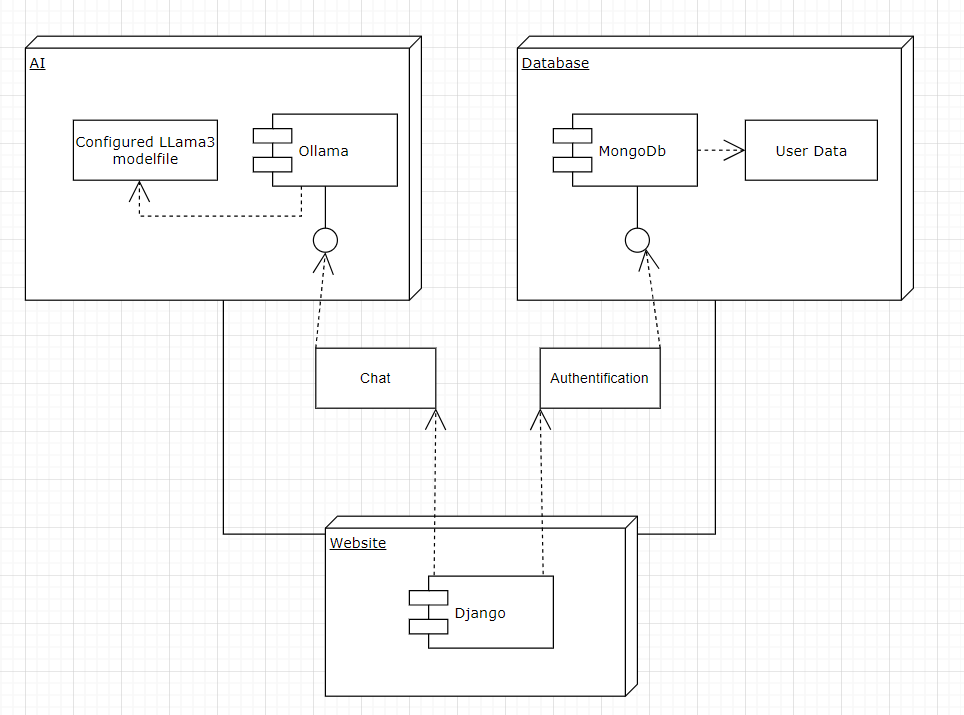
It contains Use case according template, Architecture Diagram and Screenshot examples according requirements template

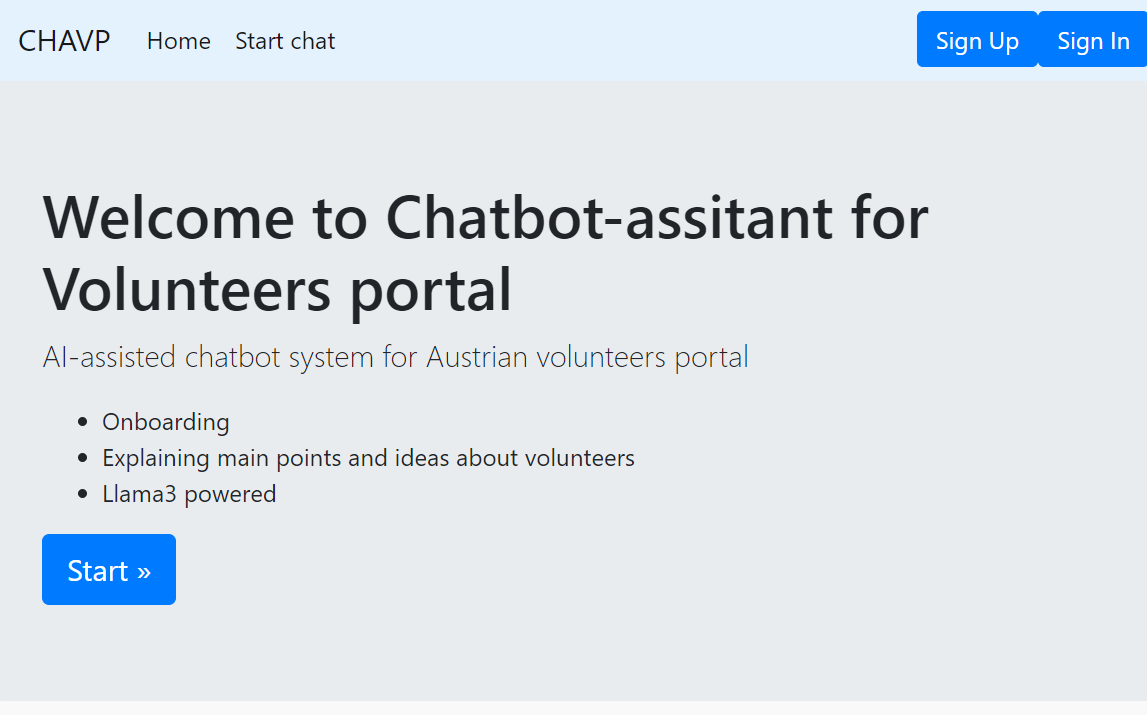
Use Case

|  |  |
| --- | --- |
| **ID** | UC100-Auth-Login |
| **Description** | User logs into app |
| **Actors** | Volunteer/NPO manager as User of chatbot |
| **Stakeholders:** | NPO managers, Volunteers |
| **Pre-Conditions** | The system has access to the intranet via the device’s WLAN access point |
| **Success end condition:** | The user is logged into the app and into the chatbot in the background |
| **Failure end condition:** | The user is not logged in and is being asked to contact support to verify credentials & permissions |

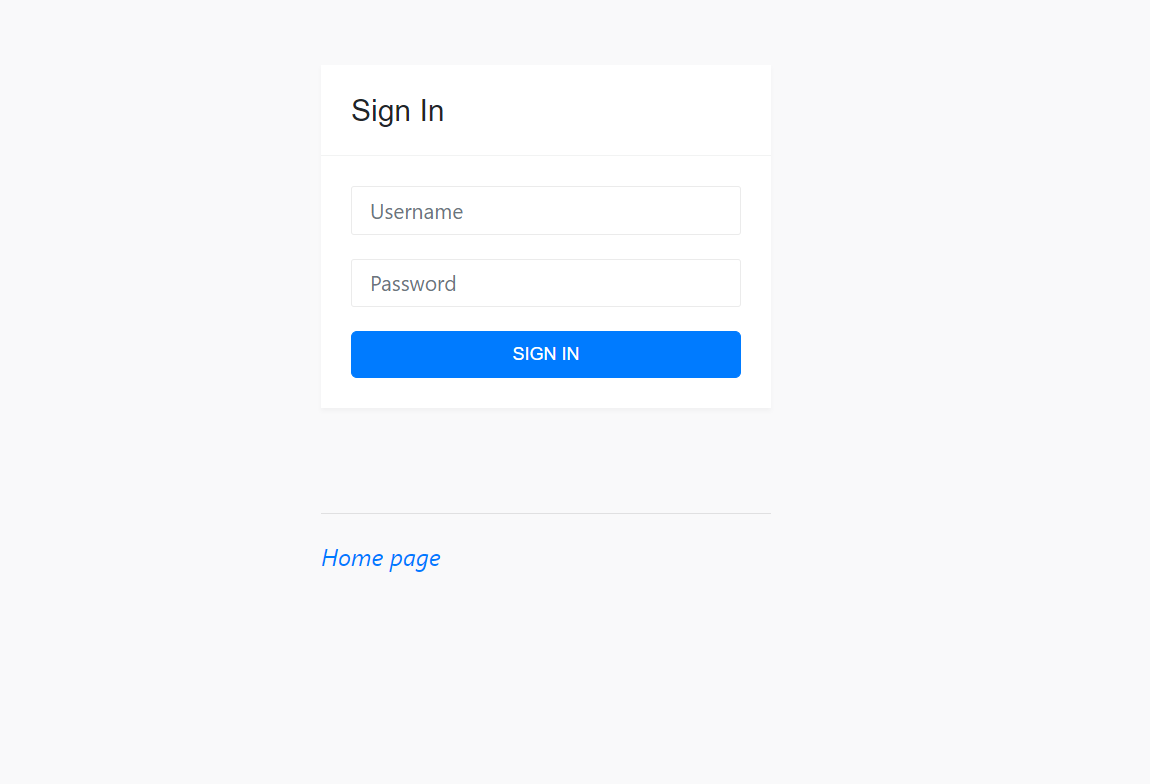
|  |  |  |
| --- | --- | --- |
| **Main Success Scenario** | | |
| 1 | The user enters his/her user info (user id, password) | |
| 2 | The user submits the user info | |
| 3 | The systems checks whether the user is permissioned to use the chatbot app | |
| 4 | The system creates a session for the user for submitting API requests LLM engine | |
| 5 | The app launches and displays the main screen/menu | |
|  |  | |
| **Alternative Scenarios** | | |
|  |  | |
| **Exception Scenario** | |  |
| 3.A1.1 | Checking the user credentials results in an authentication error (unknown/invalid user) | |
| 3.A1.2 | The system asks the user the verify credentials and to try to login again | |
| 3.A2.1 | Checking the user credentials results in an authorisation error  (user is known but not permissioned to use the app) | |
| 3.A2.2 | The system informs that permission to use the app is missing and to contact support  Before trying to log in again | |
| 4.A3.1 | The system is unable to create a session with the chatbot system API (either authentication, authorisation or general technical error) | |
| 4.A3.2 | The system asks the user to verify network connection and permissions  Inside the web application system before trying to log in again | |

Base architecture Diagram

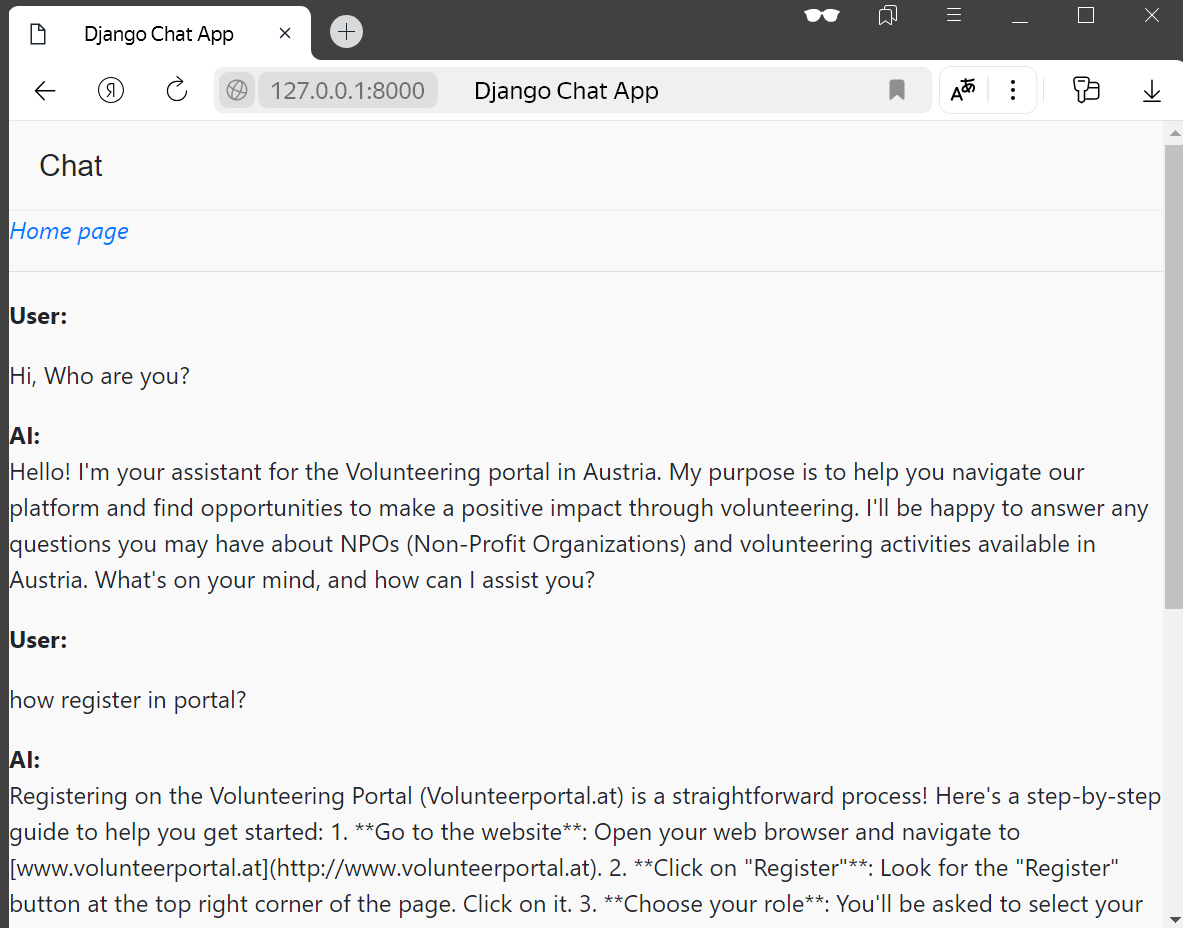




main page image



login page image



chat image

So now chatbot can answer questions and even try to generate close to reality answer when tries to answer as example register procedure.

Future steps.

For next steps of developing it could be adding difference on behavior between volunteer and npo manager like concentrating on different topics and themes.

To create task creation procedure I faced with some restrictions of LLMs as variability of answering of same question. So to create working pocedure there is need of rule based approach as in usual chatbot with button and questions with strict restrictions of rules like format of enter and etc to future conversion to JSON or XML format for sharing it to other services.

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