

## One-Day Tour Planning Application Question

### Problem Statement

Design and implement a one-day tour planning assistant that helps users create a comprehensive plan for exploring a city based on their preferences. The system should remember user preferences across the conversation to personalize future itinerary suggestions based on past interactions. The user will interact with your application through a chat interface to specify their requirements for the day trip. The application must accommodate evolving preferences as the user continues interacting, ensuring the itinerary is adjusted seamlessly.

The focus is on creating a user-specific itinerary that can be adjusted dynamically during the planning phase, accommodating new preferences and constraints introduced by the user.

### Your application must:

- **Collect User Preferences:** Ask the user for details such as the city to visit, available timings, budget, and interests (e.g., culture, adventure, food, shopping).
- **Starting Point:** Ask for a starting point, such as their hotel or any other location. If the user does not provide a starting point, consider the starting point to be the first attraction itself.
- **Recommendations for Preferences:** If the user is unsure about what places to visit or their preferences, suggest popular attractions based on the city, user interests, and budget.

**Generate an Initial Itinerary:** Provide a list of places to visit, the optimal sequence of visits, and transportation methods.

**Include the distance and travel time** from the starting point to the first attraction if a starting point is provided.

**Check Attraction Status:** Fetch details about each attraction, such as whether it is open, closed, or under renovation, and adjust the itinerary accordingly.

**Optimize Path Based on Budget:** Generate an optimized path based on the user's budget. If the budget allows for taxis, identify which segments can use taxis and adjust the itinerary accordingly to minimize travel time and maximize convenience. Make sure that the prices are accurate and realistic. Do not hard code anything.

**Dynamically Adjust Based on Additional Inputs:** Allow users to add new parameters or constraints during planning, such as lunch requirements, additional places to visit, changes in timing, etc. The Memory Agent should also ensure that user preferences, such as favorite

types of attractions or budget constraints, are remembered throughout the conversation to provide a more personalized experience.

**Generate a Visual Map(Optional) and Detailed Itinerary:** Provide an optimized map with all points of interest marked, and a detailed itinerary showing the order of visits, time allocations, and travel details.

**Weather Recommendations:** Provide weather information for the selected day and offer recommendations based on the forecast (e.g., bring an umbrella if rain is expected, suggest indoor activities if the weather is unfavorable).

**Memory :** The system must provide **personalized memory** for each user, demonstrating at least three distinct personas. Memory should be generated using LLM calls, structured as triplets in the format of Entity-Relationship-Entity, and stored in a graph database. The graph should dynamically adjust based on the available information about the current user, such as food preferences, walking habits, and preferred activities.

Using LLMs and function calls is essential, and the LLM must have memory to maintain continuity, as well as the necessary agents mentioned above.

The itinerary should be adaptable based on any new input from the user, with memory being updated accordingly to reflect the changes.

### **Your solution must use multiple LLM agents to handle different tasks, such as:**

- **User Interaction Agent:** To gather user preferences and collect required details.
- **Itinerary Generation Agent:** To generate an initial itinerary based on user preferences and inputs.
- **Optimization Agent:** To optimize travel paths based on budget, preferences, and time constraints.
- **Map Generation Agent (Optional):** To generate a visual representation of the itinerary with optimized travel paths.
- **Weather Agent:** To fetch the expected weather conditions of the region during the time of visit.
- **News Agent:** To fetch any other activity in the area that might affect the actual plan and place of visit.
- **Memory Agent:** To remember user preferences across conversations and personalize future itinerary suggestions based on past interactions. (using a vector and graph capabilities of DB).

### **Frontend and User Interaction:**

You must provide a user-friendly chat interface where the user can login and easily interact with the application. Use a framework like Streamlit or another suitable front-end

technology to allow users to chat, view their itinerary, make updates seamlessly and see previous conversation.

**Tools To be used:**

- Use Transformers, Ollama, or vLLM to create model endpoints. (based on your device compute capability)
- Use function calling using Outlines or Ollama.
- For graph db use Neo4j
- For microservices interaction use FastApi
- For creating frontend, use Streamlit or any similar for fast creation of frontend.

**Evaluation criteria :**

- Agents implementation (must include tools or function calling).
- Memory implementation.
- Persona based systems adaptation capability.
- Overall actual plan presented by the LLM and tools usage.

**What to submit:**

1. Screen recorded video of working application.
2. Code repository.

Form link is provided in README file. Please fill that up for submission, once you are done.

**What to Include in the Screen Recording and Code:**

- A functional frontend that includes a login requirement.
- Display of user chat histories.
- At least two distinct personas, with separate chats for different cities for the same user.
- The code repository should include your code as well as a README file explaining your approach.
- Code should be well-structured and appropriately commented.

## Example Interaction and Output:

### Example Chat

**User:** Hi, I'd like to plan a one-day trip in Rome.

**System :**Great! Let's get started. What day are you planning for, and what time do you want to start and end your day?

**User:** I'll be visiting on the 10th of November. I want to start at 9 AM and finish by 6 PM.

**System :**Noted. Could you tell me your interests? For example, do you like historical sites, nature, shopping, or food experiences?

**User:** I'm not really sure.

**System :** No problem! Here are some popular options in Rome:

- **Historical Sites:** Colosseum, Roman Forum, Pantheon.
- **Food Experiences:** Piazza Navona has great local food spots.
- **Relaxing Spots:** Trevi Fountain, Spanish Steps. Which of these interests you the most?

**User:** I think I like historical sites and great food spots.

**System :** Perfect! What's your budget for the day?

**User:** I have a budget of \$150.

**System :** Where would you like to start your day? You can provide your hotel or any specific location, or we can start from the first attraction itself.

**User:** I'm staying at Hotel Roma.

**System:** Since there are multiple hotels named 'Hotel Roma', could you confirm which one you are referring to? Here are some options:

- Hotel Roma (Via Roma 123)
- Hotel Roma (Piazza Roma 45)
- Hotel Roma (Near Central Station)

Please select one of the options by typing 'Option 1', 'Option 2', or 'Option 3', or provide more details.

**User:** Option 2.

**System:** Got it! Here is an initial itinerary for your day in Rome, starting from Hotel Roma (Piazza Roma 45):

- **Start Point:** Hotel Roma to Colosseum (9:00 AM - 10:30 AM)
  - Travel Time: 15 minutes by taxi
  - Entry Fee: \$15
  - **Status:** Open
- **Second Stop:** Roman Forum (10:45 AM - 12:00 PM)
  - Entry Fee: \$12
  - **Status:** Open
- **Third Stop:** Pantheon (12:30 PM - 1:15 PM)
  - Entry Fee: Free
  - **Status:** Open
- **Lunch Break:** Open time for lunch from 1:30 PM - 2:10 PM
- **Fourth Stop:** Piazza Navona (2:30 PM - 3:30 PM)
  - **Status:** Open
- **Fifth Stop:** Trevi Fountain (4:00 PM - 4:45 PM)
  - **Status:** Open
- **Final Stop:** Spanish Steps (5:15 PM - 6:00 PM)
  - **Status:** Open

Let me know if you have any specific preferences for lunch or if you'd like to add/change anything.

**User:** I'd like to have lunch at an Indian restaurant between the Pantheon and Piazza Navona, and I want it to be close by since I only have 40 minutes for lunch.

**System:** Understood! Let me find a suitable Indian restaurant nearby.

**System:**

- I've found a great Indian restaurant called "Indian Affair Rome," located just 5 minutes walking distance from the Pantheon. It fits your timing and budget well.
- **Updated Lunch Plan:** Indian Affair Rome from 1:15 PM - 1:55 PM.

**System:** Here is the **updated itinerary**:

1. **Start Point:** Hotel Roma to Colosseum (9:00 AM - 10:30 AM)
  - Travel Time: 15 minutes by taxi
2. **Second Stop:** Roman Forum (10:45 AM - 12:00 PM)
3. **Third Stop:** Pantheon (12:30 PM - 1:15 PM)
4. **Lunch:** Indian Affair Rome (1:15 PM - 1:55 PM)
5. **Fourth Stop:** Piazza Navona (2:10 PM - 3:30 PM)
6. **Fifth Stop:** Trevi Fountain (4:00 PM - 4:45 PM)
7. **Final Stop:** Spanish Steps (5:15 PM - 6:00 PM)

**System:** Also, I've checked the weather forecast for the 10th of November. It looks like it will be sunny, so no need for an umbrella, but it might be a bit chilly in the morning. I recommend bringing a light jacket.

**User:** That looks good! Can you show me a map with all these places?

**System:**

- **Map Generated:** [Interactive Map Link](Optional)
  - **Starting Point:** Hotel Roma (Piazza Roma 45)
  - **Stops in Sequence:** Hotel Roma → Colosseum → Roman Forum → Pantheon → Indian Affair Rome (lunch) → Piazza Navona → Trevi Fountain → Spanish Steps
  - **Optimized Travel Path:** Includes walking, ferry, and potential taxi options to minimize time between longer distances while staying within your budget. The system will provide recommendations for where to walk, take a ferry, or use a taxi, depending on the budget and time efficiency.