instinctools

AI-Fueled Virtual Assistant For a Travel Planner App

How upgrading their existing travel planner app by replacing a basic rule-based chatbot with a powerful AI-driven virtual agent enabled a GCC-targeted travel and hospitality agency to unlock **hyper-personalization**, resulting in a **15%** increase in booking conversions and a boost in the annual retention rate from **28% to 41%**.

Industry:
Travel and Hospitality

SOFTWARE PRODUCT DEVELOPMENT

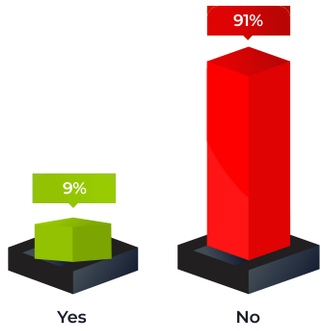
AI DEVELOPMENT

Business challenge

Just as the introduction of jet engines disrupted the travel industry in the 1950th, **generative AI** keeps thriving and upending travel planning in the same fundamental way. What's more, **conversational AI** is also gaining momentum, ushering in a new era for customer experience. With the **joint power of conversational and gen AI**, previously reactive rule-based chatbots can be replaced with intelligent and proactive virtual assistants smart enough to act on the user's behalf.

Our client, a digital **travel and hospitality agency in the GCC region**, didn't miss a bit. With a wide partner network spanning local airlines, hotels, taxi services, cultural venues, restaurants, etc., they jumped at the chance to pull ahead.

Have you ever used an all obe travel planning app?



In fact, a diagnostic survey among their customer base, including casual travelers, travel hobbyists, and digital nomads, revealed that **91% of users were juggling multiple apps to handle their trip needs, despite a strong demand for a convenient, all-in-one solution.**

Therefore, they decided to strike while the iron is hot and upgrade their existing application for managing flights, accommodations, attractions, and other actions by **replacing the in-app rule-based chatbot with Travel Ally, a frontline AI-powered travel assistant.**

The enhanced solution was supposed **to support users at every stage of their journey**, with capabilities like:

Hassle-free booking

for accommodations, restaurants, museums, amusement parks, etc.

Real-time itinerary adjustments

to unexpected situations, such as lost documents, medical emergencies, and so on.

Trip researching and planning, all in-app

from choosing a destination and flight price tracking to checking weather conditions and selecting places to visit.

Collecting and analyzing post-trip feedback

to level up next travel experience.

Instinctools' team worked side-by-side with the client's in-house IT department, bringing in hands-on machine learning and generative AI expertise to help make their big bet on hyper-personalization and customer experience pay off.

Solution

Since the client was already using **Amazon products**, such as S3, Lambda, Athena, etc., it was agreed to build on this foundation, adding SageMaker and Bedrock.

01 Deciding on the AI linchpin: multi-agent system (MAS)

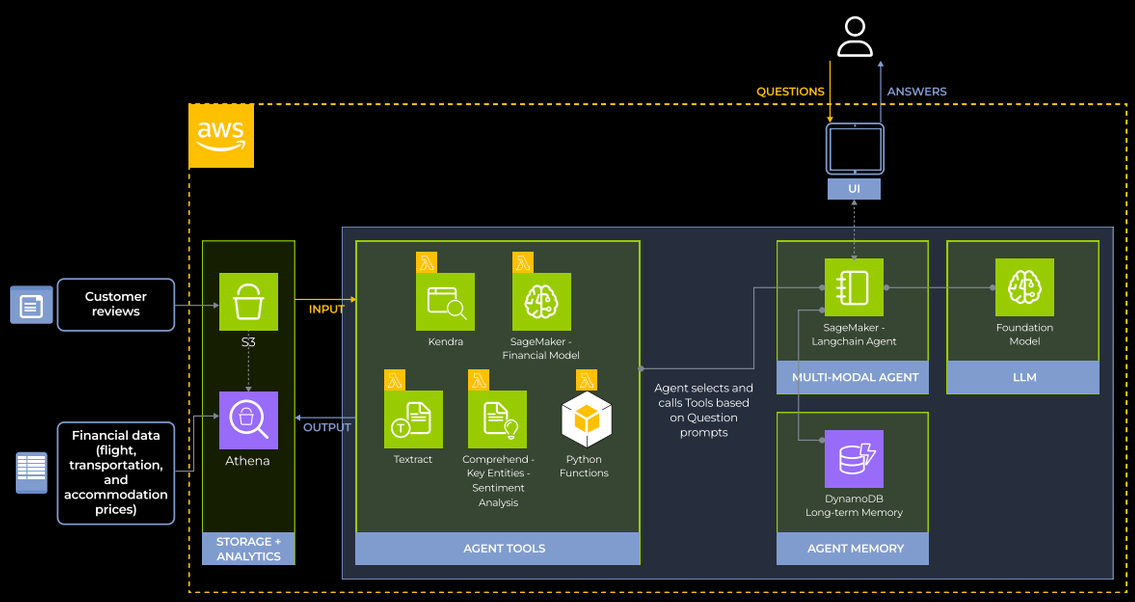
A single AI agent couldn't handle the range of tasks the client had in mind, therefore, our AI & ML team suggested a **cooperative multi-agent system (MAS)** where agents with different skill sets address different types of data and tasks.

The system was designed to process different types of data, as the specifics of the travel planning virtual assistant required agents to be well-versed in working with both **unstructured data**, such as customer reviews, and **structured tabular data**, such as financial data on flight and accommodation costs, etc.

Our technology stack included:

- **Amazon Bedrock** with a wide selection of high-performing foundational models (FMs) to access advanced AI capabilities right away, without the hassle of data preparation, model building, or infrastructure management. We opted for the open-source **Llama 2** as it excels in the precise detection of user intent.
- **Amazon SageMaker** to customize, optimize, and deploy an FM model of our choice within a fully secure ML hub that seamlessly integrates with AWS Identity and Access Management (IAM) services for access control and governance.

Here's the high-level **scheme of the solution's architecture.**



The virtual assistant follows a plan-and-execute flow: the planner maps out steps to answer the user's query, while the executor activates the agent and tools needed for the task. For example, when processing structured financial data, the assistant relies on the **LangChain framework**. When dealing with unstructured information, such as reviews, the software invokes **Amazon Kendra** and the **Python compute tool**.

02 Choosing the must-haves for the virtual assistant

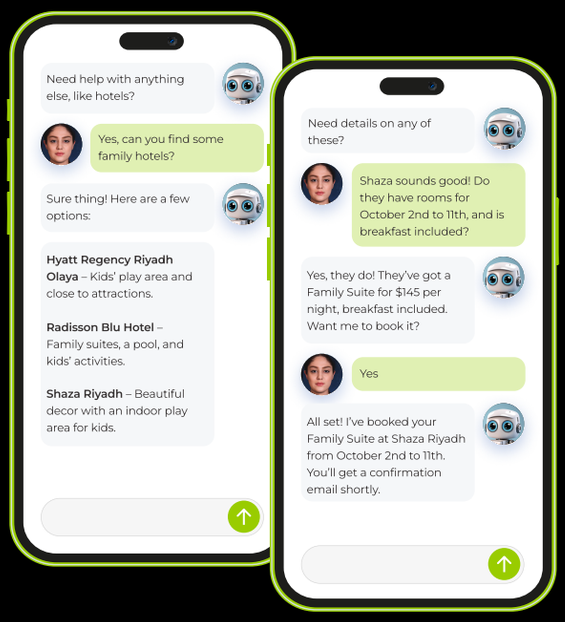
Our intelligent travel assistant helps users create end-to-end travel plans that factor in:

- Destination
- Flight and accommodation cost
- Vacation type (solo, family, business trip)
- Activity preferences

Below, there are a few examples of how Travel Ally handles conversations with a user planning a family trip across the Middle East.

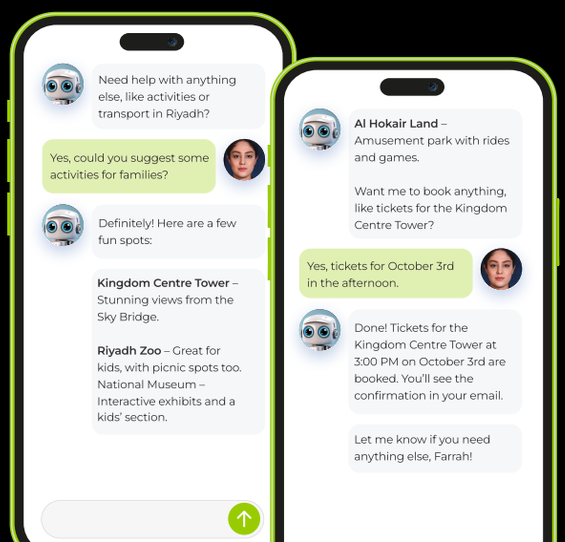
Trip preparations tend to be overwhelming, with all the research and planning to ensure a comfortable journey. Travel Ally does its best to save users from getting bogged down in different airline and hotel offerings and filling in personal information manually.

Here, Farrah gets the best-fit itinerary within minutes.

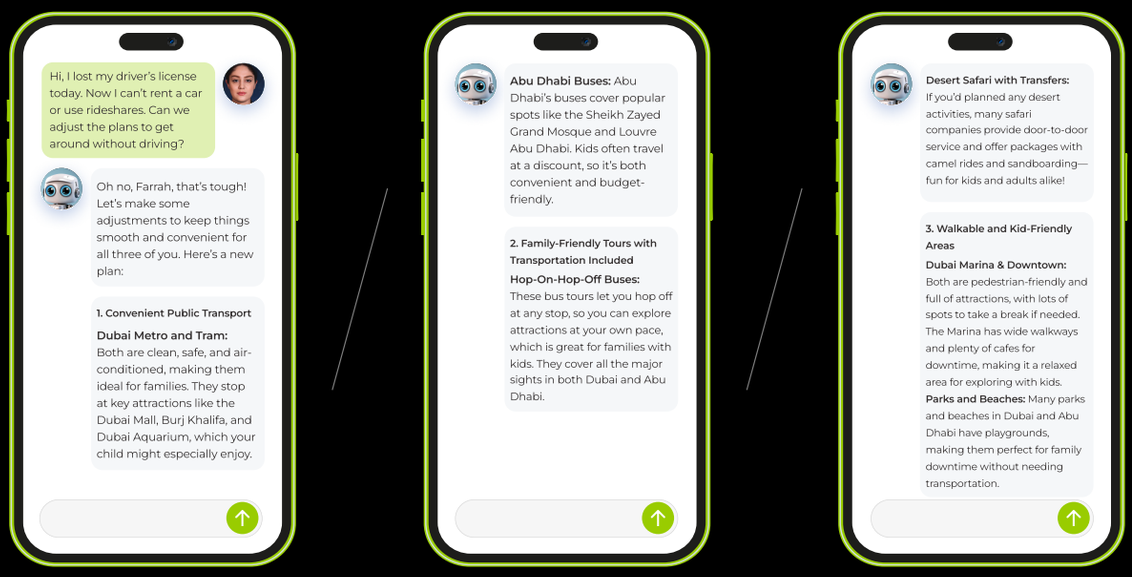


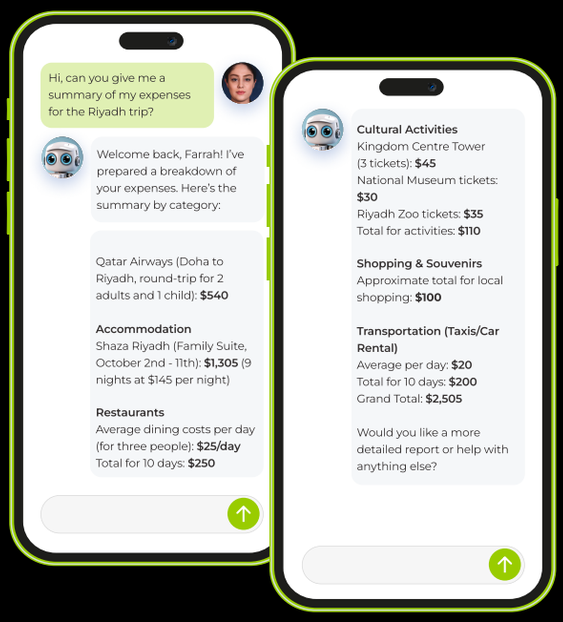
Do you have any specific requirements for accommodation options? Travel Ally got it covered.

Tailored recommendations on past-time activities are also just a query away.



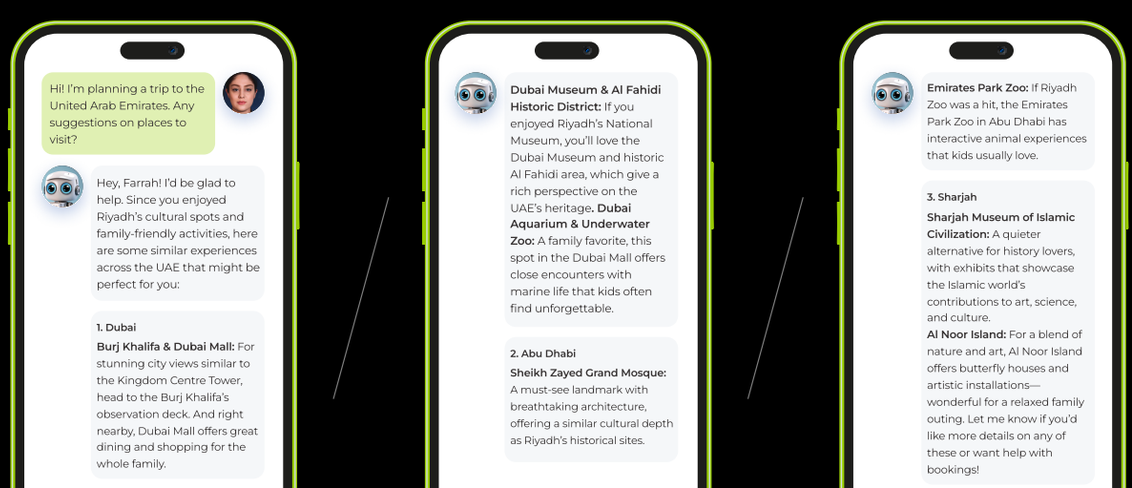
If any emergency crops up **during the trip**, Travel Ally can rearrange your plans right away.

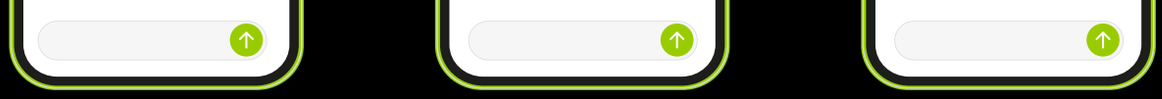




Tracking all travel-related expenses is also a walk in the park — providing a grand total is a part of **post-travel experience** and one of the top queries asked by all sub-categories of users. Travel Ally automatically counts every transaction executed by the underlying AI agents and also takes into account user queries made during the trip, such as "I went to a movie and paid for the ticket in cash, add these $15 to the expenses."

The best bit of the AI-driven virtual assistant is that it remembers previous conversations. Therefore, the user's next trip planning automatically relies on this data, **providing personalized recommendations even when not asked for them directly in the prompt.** For example, Travel Ally already remembers that Farrah travels mostly with a family and offers places to visit similar to the ones she approved for the prior journeys.





The planner was rolled out in March 2024, achieving results the client once thought were out of reach. For instance, last-minute cancellations decreased by **12%**, the average transaction value stepped up by **15%** thanks to wise cross- and upselling, and the annual retention rate spiked **from 28% to 41%**.

However, providing highly relevant, personalized responses would be impossible without optimizing the foundational model. See how we approached perfecting the assistant's output.

03 Optimizing the assistant's output with retrieval-augmented generation

Even though pre-trained models like Llama 2 are capable of answering general queries, they still call for **custom touch** to fully adapt to a particular domain. Fine-tuning is one of the LLM optimization techniques that can be run for this purpose, but it relies on the knowledge learned during training on a static set of the client's data. Meanwhile, the client wanted their system to give real-time responses based on the latest data.

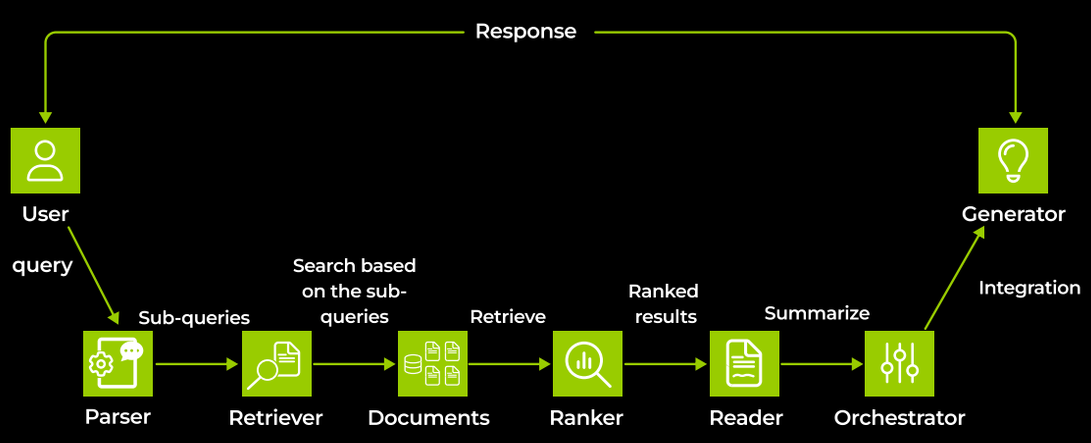
To reach this, our AI & ML experts have chosen **retrieval-augmented generation (RAG)**, as this approach allows:

- **Keeping responses fresh**, as a language model can be connected directly to any frequently updated data sources.
- **Bypassing retraining the entire model**, since the LLM can access the new data in real-time.
- **Providing answers with source attribution,** such as citations or references to sources, thus increasing the assistant's credibility.

Nevertheless, at scale, single-agent RAG can be associated with a **challenge of latency when reasoning over diverse information sources.** Therefore, we addressed the issue head-on by **setting up a multi-agent RAG flow.**

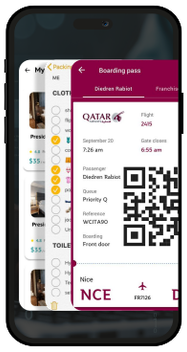
It benefits the virtual assistant in two ways:

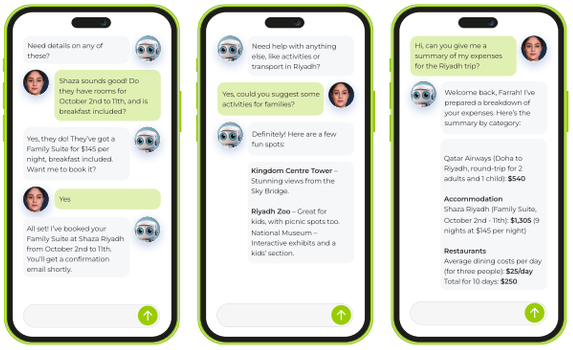
- **Asynchronous operation** reduces latency by parallelizing retrieval, so slower operations don't block faster ones.
- **Modular architecture** enables easy horizontal scaling and adding new data sources, as well as more agents to cover a broader spectrum of tasks.



Before

After





Business value

- **The very first** all-in-one AI-powered virtual assistant for seamless travel planning in the GCC region
- **13%** growth in the annual retention rate over a year
- **15%** increase in booking conversions, with users finding options that closely match their interests
- **40%** drop in the time required to complete a booking
- **12%** decrease in last-minute cancellations, as travelers feel more informed and supported
- **15%** boost in the average transaction value driven by users being presented with relevant add-ons

Client's testimonial

Hear about the project directly from the CTO:

> *Instinctools' ML experts felt like a natural extension of our in-house team. Besides hands-on experience with LLMs, they also follow a business-like approach to solving tech challenges. That contributed to the team delivering before the timeline which makes us look forward to the next projects.*

Multiplier effect

Travel and hospitality isn't the only **industry ripe for next-level customer experience with the help of generative and conversational AI.** Anywhere customer service comes into play, companies can wring value from AI-driven chatbots and virtual assistants.

Given the rapid evolution of this tech, **it's not a question of nice-to-have anymore**, but a requirement to follow if you want to meet the high expectations of today's customers.

Do you have a **similar project idea**?

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