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1 Abstract

The goal of this project is to create a holistic tourist ecosystem that integrates cutting-edge technology like artificial intelligence (AI) and mobile applications to transform the travel and tourism sector. Our goal is to establish a service-oriented software architecture that unifies multiple services offered by different tourist sector players, resulting in a smooth and personalised travel experience.

At least five recognised service providers, each providing a variety of services that address various facets of the traveler experience, shall be represented in the tourist ecosystem. These services include visitor information, reservations for eating and local attractions, as well as bookings for lodging and transportation. We will develop and construct a scalable platform that enables various services to interact cohesively and offers end users a unified and enhanced experience by utilising the concepts of service-oriented software engineering.

Our methodology entails defining and characterising services, creating the enterprise architecture, simulating business operations, and deploying specific services through the use of microservices architecture. In order to improve the system using data from actual user usage, we will also carry out service and process analytics. A fully working, executable system that showcases our design and development efforts will be the ultimate product, along with an extensive report and presentation.

2 Group Members

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3 Service Identification and Specification

3.1 Local Attractions and Museums

3.1.1 Service description: LAM001 - Flight ticket reservation

Goal:

This service allows customer to check for flight ticket availabilities and reserve one.

Preconditions:

The customer accesses to the system.

Postconditions: The system deducts one ticket from inventory and the booking information displays in the customer booking dashboard.

Assumptions: The customer must have an active phone number and an email address.

Inputs: The customer enters the following information

- From: The departure airport
- To: The destination airport
- Depart: The date of departure
- Return: The date of return
- One way/ return [Boolean] : This is an optional checkbox.

The user will check it if they want to book a round trip.

Outputs: The customer receives an email confirms the reservation.

Resources: Third-party services for flight information, secure payment gateway.

Key steps:

- Customer enters input information.
- The system displays the best flights based on several.
- Factors such as prices, number of connecting flights, time, etc.
- The customer chooses the best offer.
- The customer chooses seats, luggage bags, insurance, etc.
- The customer enter personal information: name, email, phone number.
- The customer is redirected to payment page.

- The customers enter information such as credit card information.
- A successfully booked email is sent or displays an error message if anything goes wrong.

QoS:

- Available 24/7.
- Loading time when the users first visit must less than 1s.
- Return search results within 1-3s.
- Secure payment transaction.
- Conversion rate (The number of customers booked a ticket successfully per the number of customers visit the site) is above 30

Penalty:

- Once the booking is confirmed, the customer is charged 30 percent of the ticket fees if they want to cancel the ticket. The ticket cancellation needs to be made at least 2 weeks before departure/return date.
- Once the booking is confirmed, the customer is charged 10 percent of the booked ticket fees if they want to change the departure/return date. The adjustment needs to be made at least 7 days before departure/return date. The new fees will apply according to the fee of the new ticket at the time purchase.
- In the case of flight cancellation due to the airline company, 80 percent of the ticket fees will be refunded to the customer and they will get a discount of 20 percent for the next booking.

3.1.2 Service description: LAM002 - Guided tours

Goal:

This service allows customers to explore tours in the local areas and book a tour if they are interested in.

Preconditions:

The customer accesses the system and allows the application to access their location.

Postconditions:

The system deducts one ticket from inventory and the booking information displays in the customer booking dashboard.

Assumptions:

The customer must have an active phone number and an email address.

Inputs:

The system detects the customer's location based on GPS.

Outputs:

The customer receives an email confirming that they have booked the tour successfully and related posts on the system relating to the attractions they are going to visit.

Resources:

Available tours in partnership with local travel companies.

Key steps:

- The customer visits the tour booking page
- The application asks for the permission to access the customer's location
- The application displays available tours in the area
- The customer choose a tour.
- The customer filled in information such as phone number, email, etc.
- The customer is redirected to checkout page
- The customer fills in credit card information
- The system sends the confirmation email

Qos

- Available 24/7
- Loading time when the users first visit must less than 1s
- Secure payment transaction
- Conversion rate (The number of customers booked a ticket successfully per the number of customers visit the site) is above 30

Penalty:

- Once the reservation is confirmed, the customer is charged 30 percent of the price of the tour if they want to cancel and needs to be announced at least 5 days before the tour occurs.
- Once the reservation is confirmed, the customer is charged 10 percent of the booked tour fees if they want to change the date of the tour.
- In case the tour needs to be cancelled due to inevitable factors such If the tour must be cancelled due to inevitable factors such as bad weather, the customer will get a discount of 30 percent for the next booking.

3.1.3 Service description: LAM003 - Educational content delivery

Goal:

This feature allows customer to post a review about an attraction.

Preconditions:

The customer accesses the system and allows the application to access their location.

Postconditions:

The review is stored in the system database and visible to other users.

Assumptions:

The customer has an account in the system and logged in.

Inputs:

The content of the review includes texts, images, videos.

Outputs:

A full review of an attraction.

Resources: Existing users on the system.

Key steps:

- The user logs into the system.
- The user writes their review.
- The review is stored in the system.

QoS:

- Available 24/7.
- Content is stored in the system for a long period of time
- The UI is friendly

3.2 Restaurants and Cafes

3.2.1 Service Description: RC001 - Reservations

Goal:

Provide customers with the ability to reserve tables at restaurants and cafes for specific dates and times.

Preconditions:

Customer must have access to the reservation system via website or mobile app.

Postconditions:

Reservation is confirmed, and a confirmation message is sent to the customer.

Assumptions:

The restaurant has available tables for the selected date and time.

Inputs:

- Customer Name ;string;
- Date ;date;
- Time ;time;
- Number of Guests ;integer;

Outputs:

- Reservation Confirmation ;string;

Resources:

Reservation management system, database for table availability.

Key steps:

- Customer selects date and time.
- System checks table availability.
- Reservation is confirmed and logged.

QoS factors/Contractual factors:

- Availability ;24/7;
- Response Time ;Immediate;
- Reliability ;99.9 percent uptime;

3.2.2 Service Description: RC002 - Local Cuisine Offers

Goal:

Provide information on special local cuisine offers and promotions at restaurants and cafes.

Preconditions:

Offers must be set up and active in the system.

Postconditions:

Customer receives information on available offers.

Assumptions:

Offers are current and accurate.

Inputs:

- Location ;string;
- Customer Preferences ;string;

Outputs:

- List of Available Offers ;string;

Resources:

Offer management system, local database.

Key steps:

- System retrieves active offers.
- Offers are filtered based on location and customer preferences.

QoS factors/Contractual factors:

- Customization ;Based on customer profile;
- Update Frequency ;Real-time;
- Accuracy ;100 percent of active offers;

3.2.3 Service Description: RC003 – Online Service

Goal:

Allow customers to browse menus, place orders, and make payments online.

Preconditions:

The restaurant's online service system must be operational.

Postconditions:

Orders are placed, and payments are processed.

Assumptions:

Secure internet connection and payment gateway availability.

Inputs:

- Customer Order ;order details;
- Payment Information ;payment details;

Outputs:

- Order Confirmation ;string;
- Payment Receipt ;string;

Resources:

Online ordering system, secure payment gateway.

Key steps:

- Customer browses menu.
- Customer places an order and provides payment details.

- Order is confirmed and payment is processed.

QoS factors/Contractual factors:

- Security ¡Encryption¿.
- User Interface ¡User-friendly¿.
- Support ¡24/7¿.

3.3 Tourist Information Centre

3.3.1 TIC001 - Visitor Information

Goal:

Provide appropriate and up-to-date information to tourists regarding local tourist destinations, various local activities, and general inquiries.

Preconditions: Customer accesses the system.

Postconditions:

Customer receives up-to-date information and assistance regarding their queries.

Assumptions:

Customer has access to the system preferably registered with a phone number or email address.

Inputs:

Query: ¡string¿ - The specific information the customer is seeking.

Outputs:

Customer receives the requested information through the chosen channel.

Resources:

- Up-to-date databases of local attractions and activities, customer query storing and retrieval database.
- Trained staff for query addressing.

Key steps:

- Customer accesses the system.
- Customer submits their query.
- System/staff retrieves the query and looks up to the relevant information from the database.
- Information is provided to the customer through system/email/or phone.

QoS:

- Available 24/7
- Response time to queries must be less than 1 minute

- Information accuracy rate above 99

Penalty:

None

3.3.2 TIC002 - Tour Bookings:

Goal:

Provide the booking and reservation of various tours for tourists.

Preconditions:

Customer accesses the booking system.

Postconditions:

System confirms the booking and updates the booking database and page with the details. **Assumptions:**

Customer has internet access and can provide necessary booking details.

Inputs:

- customer: string_i details of the customer.
- Tourdetails: string_i - The tour the customer wishes to book.
- Date: date_i - The date of the tour.
- Number of participants: int_i - Number of people attending the tour/event.

Outputs:

Customer receives a confirmation email or notification and booking details are updated in the system.

Resources:

- Tour details database
- Secure payment gateway

Key steps:

- Customer selects a tour from the available options.
- Customer enters the necessary details and submits the booking request.
- System processes the booking and checks availability.
- Customer completes the payment process.
- System confirms the booking and sends a confirmation email.

QoS:

- Available 24/7.

- Booking confirmation within 5 minutes.
- Secure payment transactions.
- Booking success rate above 95
- Minimal booking cancelation.

Penalty:

- 25 percent cancellation fee if canceled 3 days before the tour date.
- 10 percent change fee if the tour date is modified 7 days before the tour date.

3.3.3 TIC003 - Event Notifications:

Goal:

Inform tourists about upcoming local events, festivals, and activities.

Preconditions:

Customer has subscribed to the notification system through email newsletters, social media updates, or mobile apps.

Postconditions:

Customer receives notifications about relevant events.

Assumptions:

Customer has registered to the system via email address or phone numbers.

Inputs:

- Subscription;boolean;
- Customer signs up to receive notifications.

Outputs:

Notification ;string;- customer receives the notification.

Resources:

- Event details database
- Subscription details database

Key steps:

- Customer subscribes to event notifications.
- System gathers upcoming event information.
- Notifications are sent out to subscribers.
- Customers receive and view event notifications.

QoS:

- Available 24/7.
- Notification delivery with minimal time.
- Event information accuracy above 99

Penalty:

None

3.4 Accommodation Providers (AP):

3.4.1 1. AP001 - Room Bookings

Goal:

This service allows customers to search for available rooms and book accommodation.

Preconditions:

The customer accesses the system and provides necessary information.

Postconditions:

The system deducts one room from the inventory, and the booking information is displayed in the customer's dashboard.

Assumptions:

The customer must have an active phone number and an email address.

Inputs:

- Location `location`: The city or area where the customer wants to book a room.
- Check-in `date`: The date of arrival.
- Check-out `date`: The date of departure.
- Room type `type`: The type of room (e.g., single, double, suite).
- Number of guests `count`: The number of people staying.

Outputs:

The customer receives an email confirming the reservation and the details are shown in the dashboard.

Resources:

Integration with hotel databases, secure payment gateway, and booking management systems.

Key steps:

- Customer enters input information.
- The system displays available rooms based on filters such as price, amenities, and location.

- The customer selects a room and additional service (e.g., breakfast, airport pickup).
- The customer is redirected to the payment page.
- The customer enters payment information and confirms the booking.
- A confirmation email is sent, or an error message is displayed if an issue occurs.

QoS:

- Available 24/7.
- Initial page load time should be under 1s.
- Search results should be returned within 1-3s.
- Secure payment transactions.
- Conversion rate above 25

Penalty:

- A 30 percent fee applies for cancellations made at least 7 days before the check-in date.
- A 10 percent fee applies for changes to the booking made at least 3 days before the check-in date. Additional fees apply based on new room rates.

3.4.2 AP002 - Loyalty Schemes

Goal:

This service allows customers to enroll in a loyalty program, earn points for stays, and redeem rewards for those points.

Preconditions:

The customer has an account on the system and is logged in.

Postconditions:

Loyalty points are updated in the customer's account after a stay or service is completed.

Assumptions:

The customer provides accurate personal information.

Inputs:

- Customer ID i_{string} : Unique identifier for the customer.
- Points accrued i_{int} : Number of points earned per booking or stay.
- Rewards redeemed i_{string} : The type of reward redeemed (e.g., free night, discount).

Outputs:

The customer receives notifications about points earned and rewards redeemed via email and dashboard updates.

Resources:

Loyalty program database, integration with room booking and other service systems.

Key steps:

- The customer enrolls in the loyalty program.
- Points are automatically added after eligible transactions.
- The customer views points and available rewards in their account.
- The customer redeems points for rewards or services.
- The system confirms the reward and adjusts the point balance accordingly.

QoS:

- Available 24/7.
- Points update immediately after eligible transactions.
- Secure handling of customer data.
- User-friendly interface for managing loyalty points.

Penalty:

No penalties for customers, but points may expire if not used within a specified time frame (e.g., 2 years).

3.5 AP003 - Cultural Stays and Experiences

Goal:

This service offers customers the option to book accommodations that include cultural experiences (e.g., local tours, workshops).

Preconditions:

The customer accesses the system and expresses interest in cultural stays.

Postconditions:

The system confirms the booking and cultural experience details, which are displayed in the customer's dashboard. **Assumptions:**

The customer provides accurate contact details. **Inputs:**

- Location `location`: The area where the cultural experience is offered.
- Check-in `date`: The arrival date for the stay.
- Experience type `type`: The type of cultural experience (e.g., cooking class, historical tour).

- Number of participants int_i : The number of people participating in the experience.

Outputs:

The customer receives a confirmation email with details of the stay and cultural experience.

Resources:

Partnerships with local cultural organizations, secure payment gateways, booking systems.

Key steps:

- The customer selects a cultural stay package.
- The system displays available dates and details about the experience.
- The customer selects a package and proceeds to checkout.
- Payment information is entered and confirmed.
- A confirmation email is sent, detailing the stay and cultural activities.

QoS:

- Available 24/7.
- Cultural experiences are accurately described with high-quality images and descriptions.
- Confirmation emails are sent immediately after booking.
- Secure payment handling.

Penalty:

- A 30 percent fee applies for cancellations made at least 14 days (about 2 weeks) before the check-in date.
- A 10 percent fee applies for changes made at least 7 days before the check-in date. Additional fees may apply for experience changes.