

Travel Agency Management System

SE 406: Software Requirement And Specification Analysis

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Software Requirement & Specification Analysis of a Travel Agency

List of stakeholders of a Travel Agency

- Owner
- Members
- Travelers
- Bus owners
- Ship owners
- Hotel owners
- Resort owners
- Local guide

Viewpoints of stakeholders

We have met with the stakeholders who are playing a vital role in the entire process to get a better understanding of what they require. We collected their viewpoints regarding this system.

- **Owner**

The primary focus of the system should be traveler satisfaction, as it plays the main role in maximizing the profit. To get ahead of the other competitors, the system should be easy to use and simple so that the travelers get the comfort rather than following an overwhelming process.

- **Members**

The system must streamline the entire traveling process by bringing it all under one roof, making it exceptionally easy for travelers. The system should function as a central hub enabling each member to complete their tasks (e.g. Posting a tour plan, view profits and losses etc). As the traditional process has a lot of barriers, the system must break them down providing seamless, efficient, and personalized travel experiences for the travelers.

- **Travelers**

Travelers often complain about the problems of traditional travel agencies. For example, they have to wait for assistance, have limited access to personalized recommendations, and rely on fixed operating hours. So travelers require an automated system that will be convenient, time saving and cost-effective. They expect the system to streamline the booking process, provide instant confirmations, online check-in, and personalized recommendations. Additionally, travelers appreciate the flexibility to plan and manage their trips at any time, from anywhere, without being constrained by traditional agency hours.

- **Vendors**

The system must be easy to use, ensuring that users can navigate it effortlessly and without complications. It must be able to optimize resource allocation, such as booking rooms or seats efficiently, and minimizing waste. It must integrate the existing systems used by the vendors that are their existing APIs' to book tickets (bus, ship) and to reserve hotels. The system should provide valuable insights into traveler preferences, booking trends, and market demand, enabling them to make informed decisions to improve their offerings and marketing strategies.

- **Local guide**

The local guides would receive a notification whenever a new client wants to book them. They can accept or decline the request and the system would update the traveler accordingly. They also require real-time updates of weather, traffic status and so on to organize a tour. So the system is expected to provide real-time information and keep the guide updated. Also it is difficult to communicate with the tourists individually. So the system should enable efficient communication with travelers, allowing guides to share itinerary details, meeting points, and important updates electronically.

QFD (Quality Function Deployment)

The list below is the Quality Function Deployment, or QFD, of a Travel Agency Management System, aiming to align all the requirements needed for its development. We gathered all these requirements after consulting with all the stakeholders of this system, and organized them into normal, expected and exciting categories.

Normal Requirements

- A predefined account will be given to the admin. The administrative account will have access to the central database containing all the user's data.
- The login module will have special accounts for admins which will have a separate interface catered to their field of interests such as seeing the analytics metrics, creation or deletion of itinerary.
- Travelers will provide their personal information and traveling preferences to create their user account.
- The user can select his preferred language (English/Bangla).
- The system will show all the currently available packages to the users.
- The user can select any packages from there as it is or choose to avail only certain parts of the package such as, only ticket booking, traveling or accommodation.
- The user can also choose to fully customize their travel plan based on the facilities that the system can offer. They can opt for solo travel or travel with their own group specifying the number of members.
- The user can pay by bank transfer, MFS or in cash. The User needs to give some advance money to confirm their trip. A payment gateway will be provided to the user after selecting the desired option. The user will get an invoice via mail.

- The admin can manage tour plans and merge different travelers into traveling groups based on their destination and expected travel date.
- The admin can perform advanced search and filtering options to facilitate quick identification of specific users or user groups based on various criteria like registration date or activity level.
- There will be a Help and Support section where the user can directly contact for any queries or suggestions.
- specific travel services such as hotel reservation platforms, transportation networks (Vendor APIs') such as bus and ship booking portals, and local guides will be integrated to the system to provide a seamless booking experience.
- The system must provide insights into traveler preferences, booking patterns, and market demand.

Expected Requirements

- Users should be able to navigate through the system effortlessly, without needing extensive training or guidance.
- The interface should be responsive across various devices and screen sizes. Whether users access the system on a desktop, laptop, tablet, or smartphone, the interface should adapt seamlessly.
- The system should provide secure password storage.
- The system should provide proper data security.
- There will be a search bar where users can input certain keywords related to what they are looking for such as, destination.
- The users will have a dashboard where they can see their travel history.

- The system will provide tools for itinerary creation, including scheduling flights, booking transports, accommodations, and activities. The system will also provide estimated travel time.
- The system will offer traveler support channels (chat, email, phone) for assistance with booking inquiries, itinerary changes, cancellations, and emergencies during travel.
- The users will be able to leave reviews and ratings for accommodations, activities, and travel services, facilitating informed decision-making for other travelers.
- The system will offer real-time updates on flight statuses, delays, gate changes, traffic status, and other relevant information to help travelers stay informed and adapt their plans accordingly.
- A chatbot integrated in the travel system. It will provide instant assistance for booking, recommendations, and travel advice. It will also send notifications, suggestions that will help the user throughout the journey, making travel planning and support more efficient.
- The system will send notifications to the user if there are any exciting opportunities such as special travel offers.

Exciting Requirements

- The system will utilize user preferences and past behavior to offer personalized recommendations for destinations, accommodations, activities, and travel packages.
- The system will allow offline access to essential travel information, such as itineraries, maps, and emergency contacts, for situations where internet connectivity may be limited or unavailable.

- Ensure that the interface is accessible to users with physical impairments including support for screen readers, keyboard navigation, and other assistive technologies.
- The system will use AR technology. travelers may virtually visit hotels, attractions, and destinations with Augmented Reality (AR), providing them with a realistic overview of their trip options. They can plan their itinerary more efficiently and arrive at well-informed judgments by taking virtual tours of the places they want to visit.
- If the user scans any related image or uses his/her mobile camera, the system will provide all information regarding that image. For example, if the user holds his mobile camera at any historical structure/place, a virtual assistant will pop out and give a basic historic narration/introduction of that structure/place.
- The user may create albums with their travel pictures which can be shared to other users via a shareable link. The album will have album id, media type and media links. The album may have multiple access levels such as, only view access where other users can only view the album or Edit access where other users may add to the album or download pictures from the album.

User Story

1. Registration

Upon initiating the registration-process, the user will specify his/her user type, identifying as a traveler or as a local guide based on their intended usage of the platform. He/she will be prompted to provide their essential credentials including their username, email address, phone number, and a strong password

- Alphanumeric password containing 8 characters or more
- Combination of uppercase and lowercase letters, numbers, and symbols
- The password should not contain the username

which will be securely stored for their privacy and security. Local guides must register themselves using their credentials, but the travelers have an additional option to register using their Google or Facebook account. Once registration is completed, the system will ensure the validity of the account through both email verification and a confirmation message displayed to the user, reassuring them of successful registration.

2. Login and Authentication

Local guides and travelers can login using their registered email address and password. Travelers have an option to log in using their Google or Facebook account. On the other hand, any kind of admin account just needs the password to enter. A “Keep me logged in” feature is available for returning users, ensuring seamless login experiences. In case of forgotten passwords, a recovery mechanism (OTP sent through email or phone number) is provided. Additionally, users can enhance security by enabling two-factor authentication (2FA). These integrated security measures collectively ensure an user-friendly login experience, prioritizing both convenience and safeguarding user accounts.

3. User Account

The travelers and local guides will have the option to enhance or update their profile by updating existing information or by providing additional information such as their date of birth, gender and specific travel preferences (in case of travelers), thereby personalizing their experience on the platform to better suit their needs. They can select their preferred language(English/Bangla). They will have their own dashboard. The travelers and local guides can view their travel history and get notifications. The travelers can plan their trip using tools for itinerary creation including flight schedules, accommodations, and activities. The travelers will be notified if there are any exciting opportunities such as special travel offers. The Travelers will be able to leave reviews and ratings for accommodations, activities, and travel services, facilitating informed decision-making for other travelers. The Travelers may create a new album with their travel pictures which can be shared to other users via a shareable link. The album may have multiple access levels such as, only view access where other users can only view the album or Edit access where other users may add to the album or download pictures from the album.

4. Admin's control

A predefined admin account along with other admin accounts with defined roles will be given. Each admin will have an admin id. The super admin account will have full control over the entire system. This includes full access to the user accounts' database, with the authority to manage account details, including disabling or deleting accounts if necessary. Additionally, the super admin will have advanced search and filtering options to identify specific users or user groups based on various criteria such as registration date or activity level.

Roles of other admins include:

❖ **HR**

- HR handles HR data, monitors the activities of other admins and employee onboarding and offboarding.

❖ **Accountant**

- Accountants are tasked with managing financial data, generating reports, handling invoicing, and overseeing financial transactions within the system.

❖ **Operations Manager**

- Advanced search and filtering options facilitate quick identification of specific users or user groups based on various criteria like registration date or activity level.
- He/She can manage tour packages, from creation to deletion, modify details, and oversee bookings made by users, with capabilities to approve or reject bookings. He then confirms the payment and sends a confirmation mail. He can handle cancellations or refunds and sends a mail to the travelers regarding the cancellation or refund.
- Tools for organizing travelers into groups based on destination or travel dates are available, allowing admins to manage groups efficiently.
- Admins can also curate content displayed on the system, updating information about destinations, accommodations, activities, and travel services.

❖ **Support Agent**

- Support Agent focuses on managing traveler inquiries, and ensuring timely resolution of traveler issues or concerns.

❖ **Marketing Agent**

- Marketing Agents handle promotional content, marketing campaigns, and advertising initiatives within the platform to attract and engage travelers.
- Marketing Agent is responsible for promoting a tour package.

❖ **Analyst**

- The analyst can easily track analytics metrics such as user statistics, booking trends, user engagement and revenue figures with visual tools such as graphs and charts
- The analyst is responsible for analyzing these metrics, generating reports on booking trends, revenue figures, and traveler satisfaction scores, and providing insights for optimization and enhancement of the platform's offerings.

The super admin can handle these duties on his/her own or delegate them to others.

5. Booking

The system offers travelers a smooth browsing experience, allowing them to explore tour packages, destinations, and activities. Tour Packages will have a package name, destination, activities, services, availability, pricing. The system will utilize a traveler's preferences and travel history to offer personalized recommendations for destinations, activities, and tour packages. Users can easily find specific packages or destinations by entering keywords, dates. Travelers have the flexibility to select from various tour packages and customize their trips by choosing specific services or activities, adjusting travel dates, and modifying itinerary details to suit their preferences. They can book trips for themselves or for groups, specifying the number of participants. The travelers can also avail specific services (consisting of service name, availability and pricing) such as hotel reservation platforms, transportation networks such as bus and ship booking portals through vendor API. Using AR technology, travelers can virtually visit hotels, attractions, and destinations, gaining a realistic overview of their trip options. Real-time availability and pricing information for tour packages and activities are displayed, updating dynamically as users make selections. An integrated chatbot provides instant assistance for booking and resolves any travel related queries. Upon finalizing their bookings, travelers receive a confirmation page summarizing their details, along with booking confirmation emails containing detailed itineraries and payment invoices. The travelers can view reviews (having username, comment and rating) left by other travelers for different packages and services, contributing to an informed booking experience for all travelers.

6. Payment

To complete the payment process seamlessly, travelers are provided with step by step instructions guiding them through the process. They are offered a variety of payment options to accommodate different preferences and needs, including mobile financial services (MFS), digital wallets, bank transfers, or pay by cash, depending on their location and convenience. Flexible payment plans or installment options mentioning a certain percentage of the amount to be paid in a specified time period are available, allowing them to spread out the cost of their booking over time. Upon completion of payment, travelers receive immediate confirmation, along with a digital invoice

containing a transaction id, ensuring transparency and enabling them to keep track of their expenses with ease.

7. Travel time guidance

Travelers and Local Guides are kept well-informed with important updates sent from the admin regarding their travel itinerary, including any changes such as flight delays, cancellations etc. They will get an estimated travel time. Real-time updates such as weather conditions, traffic status will be delivered to them via email, SMS, or push notifications, ensuring minimal inconvenience. The system also sends notifications containing suggestions or information that will help the travelers in the journey. Additionally, Travelers and Local Guides will have the convenience of accessing relevant information by simply scanning any relevant image. Each image will have its own image id, format, dimensions etc.

8. Help and Support

The help and support system offers multiple channels (chat, email, phone) for travelers to access assistance with booking inquiries, itinerary changes, cancellations, and emergencies. Offline access to essential travel information (Travel map, FAQ, email, phone number) is provided for situations with limited or no internet connectivity. A live chat feature enables real-time communication with support agents for urgent inquiries, available round-the-clock to prioritize timely assistance for critical issues or emergencies. Support is offered in multiple languages to accommodate users from diverse backgrounds, ensuring accessibility and inclusivity.

Use case diagram

A use case is a list of actions or event steps typically defining the interactions between a role (actor) and a system to achieve a goal. The actor can be a human or other external system. In this modeling, use case diagram is a graphical depiction of a user's

possible interactions with a system. A use case diagram shows various use cases and different types of users the system has and will often be accompanied by other types of diagrams as well. Use case diagrams are a blueprint for the system. Due to their simplistic nature, use case diagrams can be a good communication tool for stakeholders. The drawings attempt to mimic the real world and provide a view for the stakeholder to understand how the system is going to be designed. Use case diagrams consist of actors, use cases and their relationships. The diagram is used to model the system/subsystem of an application. A single use case diagram captures a particular functionality of a system.

Primary Actor

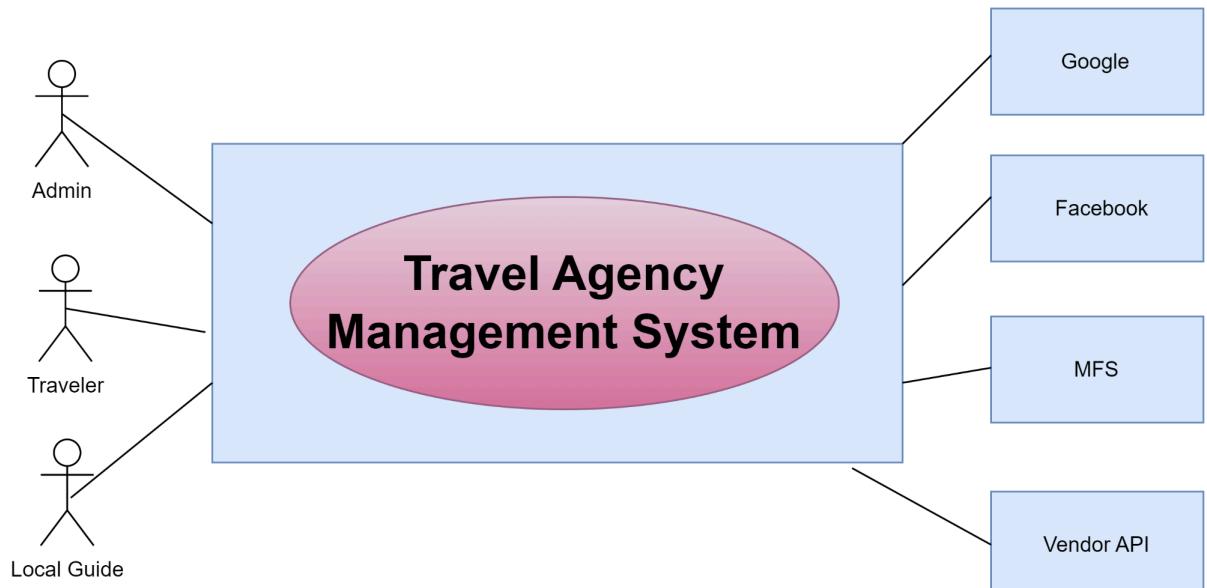
Primary actors interact to achieve required system function and derive the intended benefit from the system. They work directly and frequently with the software.

Secondary Actor

Secondary actors support the system so that primary actors can do their work. They either produce or consume information.

Level 0: Travel Agency Management System

Primary actors: Admin, Traveler, Local Guide
Secondary actors: Google, Facebook, MFS, Vendor API

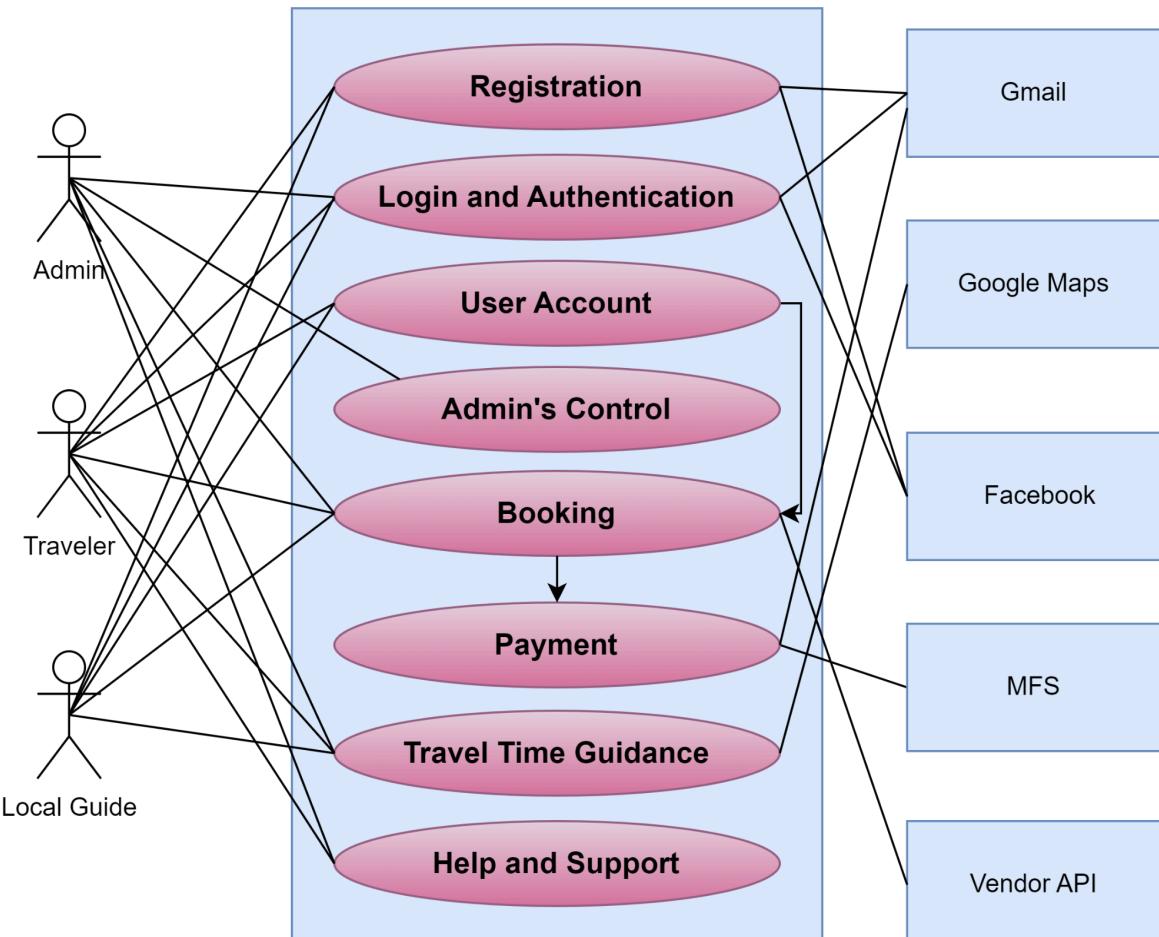


Level 0: Travel Agency Management System

Level 1: Travel Agency Management System

Primary actors: Admin, Traveler, Local Guide

Secondary actors: Gmail, Google Maps, Facebook, MFS, Vendor API



Level 1: Travel Agency Management System

Description

Registration: This module will give an interface to select user type from the travelers and local guides. Travelers and local guides can register themselves by giving their credentials like username, email, phone number and password. Additionally travelers can register themselves using Google or Facebook account. After verification if the registration becomes successful the user will receive a confirmation mail.

Login and authentication: Both local guides and travelers can log in using email and password, additionally travelers can use Google or Facebook account for login. A "Keep me logged in" feature will also be included. Password recovery method (OTP)

through email, phone number) is provided to users. Users can choose two-factor authentication for enhanced security.

User account: The user account module allows travelers and local guides to personalize their profiles, including preferences and language selection. Users have dashboards to manage their travel history, receive notifications, and plan trips with itinerary tools. They can also access special offers, leave reviews, and create shareable travel albums with various access levels. Overall, it aims to enhance user experience and facilitate informed decision-making in travel planning and sharing experiences.

Admin's control: This module establishes a hierarchical administrative system within the travel platform, with a super admin overseeing all aspects of the system and other admins assigned specific roles and responsibilities. The super admin holds ultimate control, with full access to user accounts' database and the authority to create, manage, disable, or delete accounts as needed. Advanced search and filtering options enable efficient user management. Other admins include HR, Accountant, Operations Manager, Support Agent, Marketing Agent, and Analyst, each tasked with distinct duties tailored to their roles. HR admins handle HR data and employee activities, Accountant admins manage financial transactions, Operations Manager admins oversee tour packages, bookings, and content curation, while Support Agent admins focus on traveler inquiries. Marketing Agent admins handle promotional content and campaigns, and Analyst admins track analytics metrics for optimization. The super admin can delegate tasks or handle them independently as necessary, ensuring smooth operation and management of the platform.

Booking: This module deals with all the activities related to booking a travel package or service. It allows the travelers to explore packages and services, get recommendations, assistance from the integrated chatbot, a virtual tour and choose their preferred service or package. After finalizing the travelers confirm the booking by making the payment and they receive a confirmation mail along with invoice and their travel itinerary.

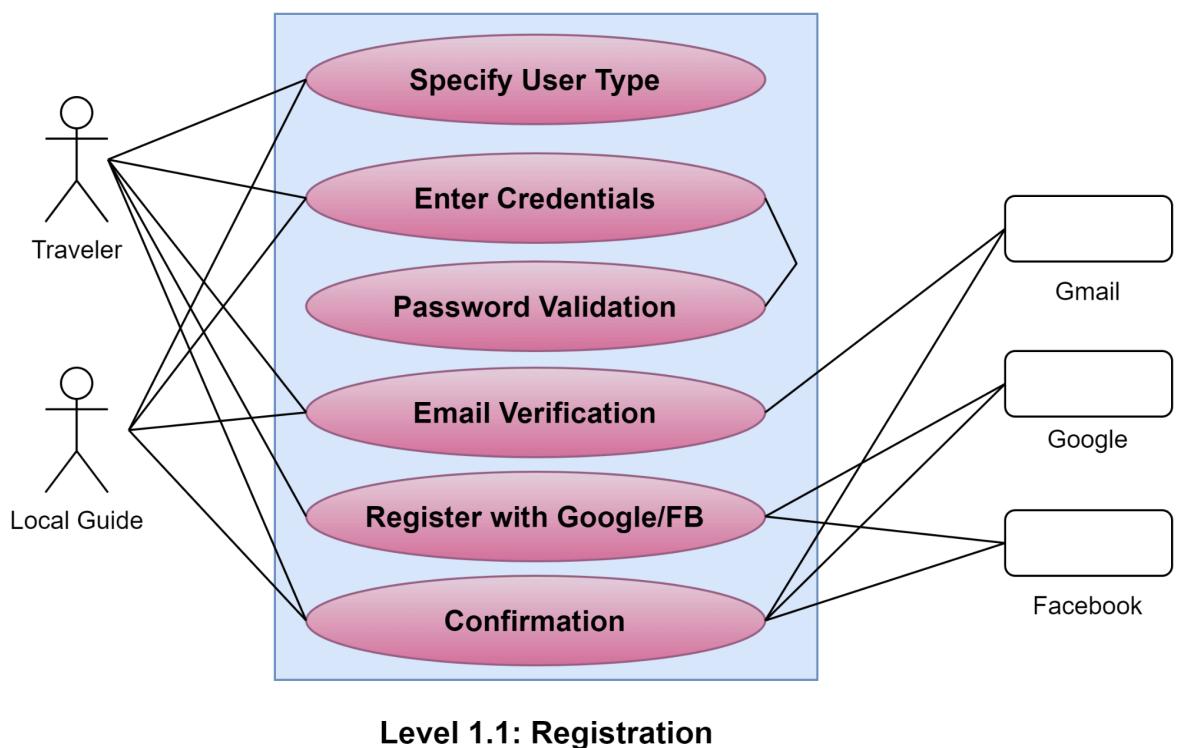
Travel time guidance: This module ensures travelers and local guides stay informed with timely updates on itinerary changes, flight statuses, and real-time weather and traffic conditions delivered via email, SMS, or push notifications. Additionally, the system provides helpful suggestions and information for a smoother journey. Users can also access relevant information conveniently by scanning specific images.

Help and support: This module will provide help and support in any urgent or emergency situations about travel or service through live chats, email or phone.

Level-1.1: Registration

Primary actors: Traveler, Local guide

Secondary actors: Gmail, Facebook, Email



Description:

Specify user type: This module give user options to specify their user type like he/she can choose an option from traveler or local guide.

Enter credentials: User will enter his/her name, email, phone number and strong password in this section to initiate registration.

Password validation: The system ensures that the password provided meets the criteria of being alphanumeric with at least 8 characters, containing a combination of

uppercase and lowercase letters, numbers, and symbols. It also checks that the password does not contain the username.

Email verification: After entering credentials, users' email addresses are verified through a confirmation email sent to the provided email address.

Registration with Google/FB: Only travelers can use this module. This module helps travelers to register through Google or Facebook.

Confirmation: After email verification the user will get a confirmation email or message of his/her successful registration.

Action and reply:

Traveler/Local guide:

Action1: Specify user type

Reply1: System will give him/her interface for selected types

Action2: Give username, email, password

Reply2: Show validity of password

Action3: Confirm credentials

Reply3: Ask for email verification

Action4: Verify email

Reply4: Sent confirmation message

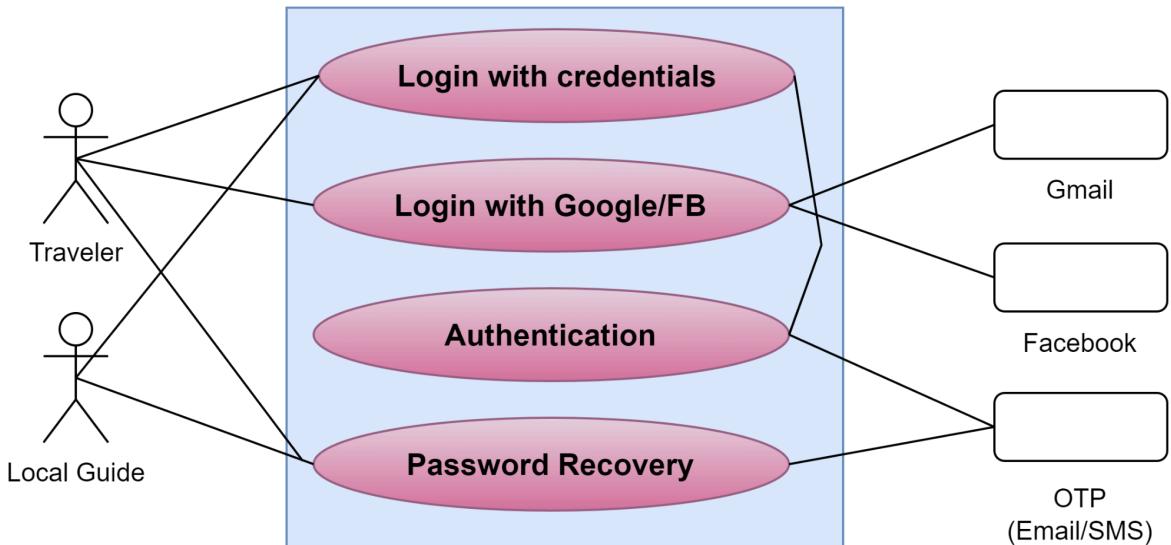
Action5: If traveler select register with Google/FB

Reply5: System will register user through Google/FB

Level-1.2: Login and authentication

Primary actors: Traveler, Local guide

Secondary actors: Google, Facebook, OTP(SMS/ Email)



Level 1.2: Login and Authentication

Description:

Login with credentials: Both traveler and local guide can login to their account with their email and password.

Login with Google/Facebook: Only travelers can login their account using Google or Facebook. In this case, travelers will be authenticated by Google or Facebook.

Authentication: After receiving proper login credentials the user(traveler or local guide) will be authenticated by the system and logged in to his/her account. If any traveler logged in using Google or Facebook then they will be authenticated through Google or Facebook. In addition if any user uses the “Keep me logged in” feature then no login or authentication needed. For additional security users can add 2-factor authentication to their account.

Recover password: This module will give users the option to recover their password if needed. For this, users need to authenticate him/herself through OTP.

Action and reply:

Admin:

Action1: Enter password for login

Reply1: System will authenticate admin via given password

Traveler:

Action1: Select Google or Facebook for login

Reply1: Authenticate traveler through Google or Facebook

Traveler and local guide:

Action1: User gives email and password for login

Reply1: System will authenticate user by matching with database

Action2: User enables “Keep me logged in” feature

Reply2: System will remember him/her for a month

Action3: User enables 2-factor authentication

Reply3: If user logs in with another device or after a certain time then the system will send him/her OTP through email or SMS.

Action4: Submit OTP

Reply4: Show verification message

Action5: Want to recover password

Reply5: System will send OTP through email/SMS

Action6: Submit OTP

Reply6: Prompted for giving new password

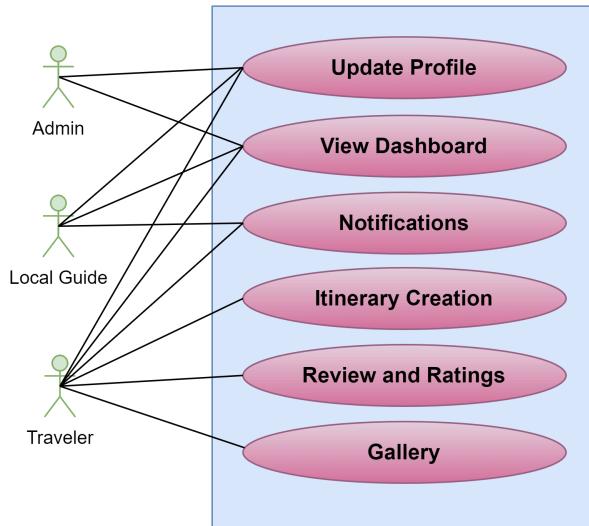
Action7: Set new password

Reply7: Successful message will be shown

Level-1.3: User Account

Primary Actors: Traveler, Admin, Local Guide

Secondary Actors:



Description:

Update Profile:

Travelers, local guides and admin can update their profiles by changing given information or adding more details like their date of birth, gender. They can choose their preferred language, either English or Bangla. Travelers can provide their travel preferences.

View Dashboard:

Travelers, local guides and admin will be able to see their dashboard which will contain their personal information. Travelers and local guides can see their travel history.

Notifications:

Travelers and local guides will get notifications about exciting travel offers.

Itinerary Creation:

The travelers can create itineraries by scheduling flights, booking accommodations, and activities according to their own preferences.

Review and Ratings:

Travelers can share their experiences by leaving reviews and ratings for accommodations, activities, and travel services.

Gallery:

Travelers can make travel albums with their pictures and share them with others using a link. They can control who sees the album: some can only view it, while others can edit it or download pictures from it.

Action and Reply

Users(Traveler, Admin, Local guide)-

Action 1: Users provide informations to update their account

Reply 1: User account is updated

Action 2: Users click the dashboard button

Reply 2: Users will be able to see their own dashboard.

Local Guide

Action 1: Local guide click the notification button

Reply 1: He/she will be able to see their notifications.

Travelers

Action 1: Traveler click the notification button

Reply 1: He/she will be able to see their notifications.

Action 2: Travelers select the “Create Itinerary” option and provide their desired flights, accommodations and activities.

Reply 2: Desired itinerary will be created.

Action 3: Travelers give reviews and ratings after the tour.

Reply 3: Reviews and ratings will be visible to other travelers.

Action 4: Travelers select the “Create Album” option and upload pictures.

Reply 4: Album will be created

Action 5: Travelers select the “Share Album” option.

Reply 5: A sharable link will be provided

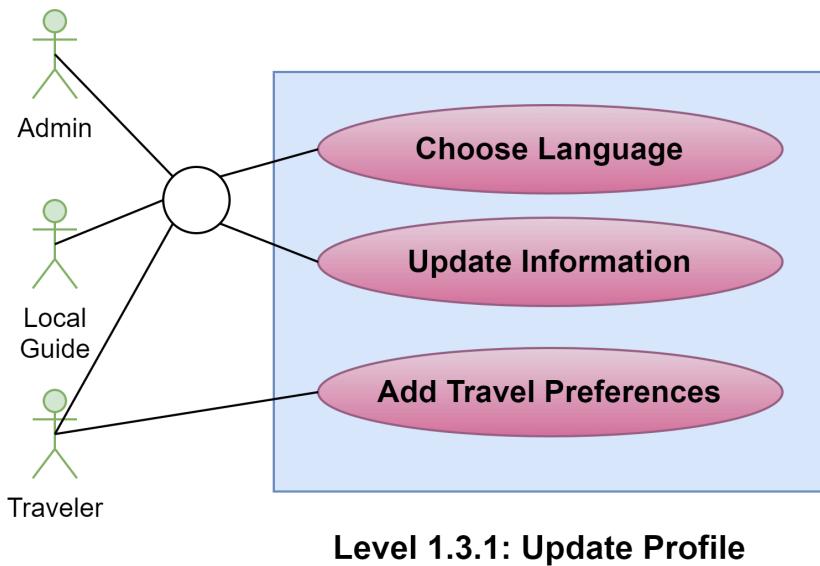
Action 6: Travelers update accessibility of the album for others.

Reply 6: Others will receive the restricted access set by the album creator

Level-1.3.1: Update Profile:

Primary Actors: Traveler, Admin, Local Guide

Secondary Actors:



Description:

Choose Language:

Admin, Local Guide and Travelers can select their preferred language(Bangla/English).

Update Information:

Admin, Local Guide and Travelers can update their existing information (i.e. name , phone number etc.) or add additional information (i.e. date of birth, blood group etc.)

Add Travel Preferences:

Travelers can add their travel preferences.

Action and Reply

Users(Traveler, Admin, Local guide)

Action 1: Users choose their preferred language

Reply 1: Selected language will be used.

Action 2: Users change existing information

Reply 2: Information is updated

Action 3: Users provide date of birth, gender etc.

Reply 3: Additional information will be added in the dashboard.

Traveler

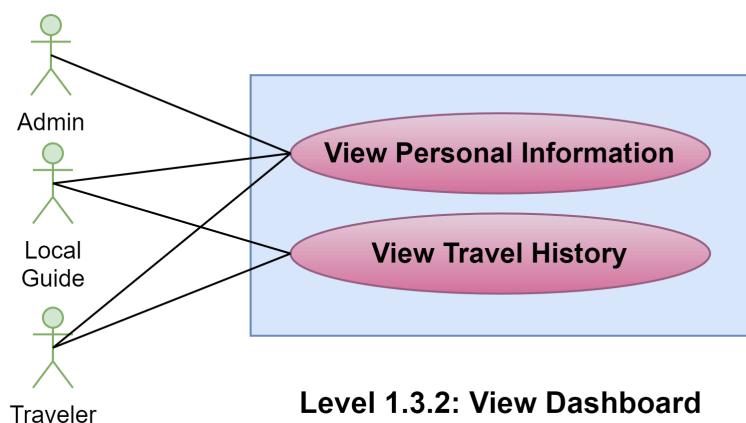
Action 1: Provides their travel preference

Reply 1: Travel preferences are updated in their dashboard

Level-1.3.2: View Dashboard:

Primary Actors: Traveler, Admin, Local Guide

Secondary Actors:



Description:

View Personal Information:

Admin, Local Guide and Travelers can view their personal information from the dashboard.

View Travel History:

Local Guide and Travelers can view their travel history from the dashboard.

Action and Reply:**Admin**

Action 1: Admin open dashboard.

Reply 1: Admin will be able to see their personal informations

Local Guide and Travelers:

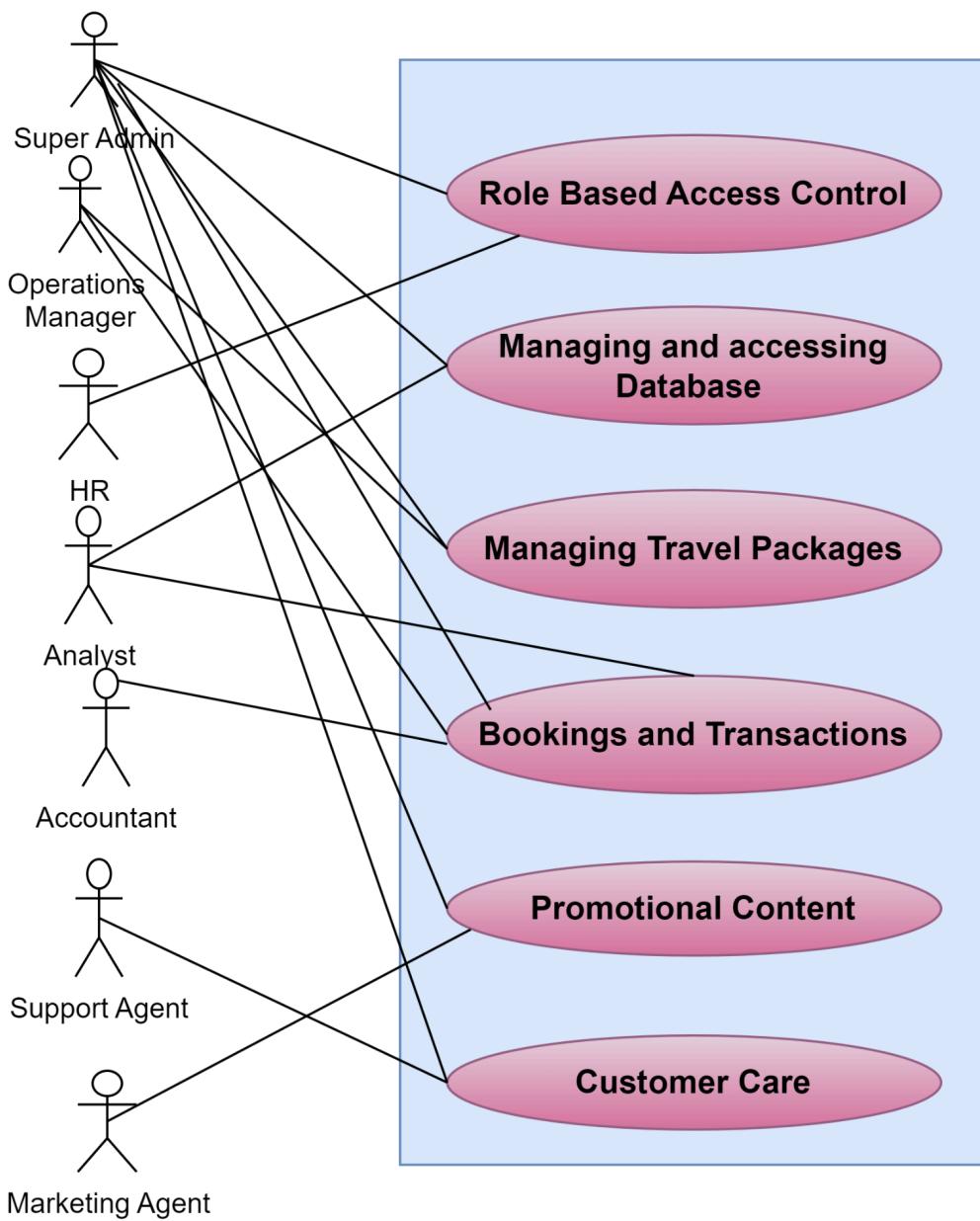
Action 1: Local Guide and Travelers open their dashboard.

Reply 1: He/she will be able to see their personal information and travel history.

Level 1.4: Admin's Control

Primary Actor: Super Admin, Other admins (Operations Manager, HR, Analyst, Accountant, Support Agent, Marketing Agent)

Secondary Actor:



Level 1.4: Admin's Control

Description

Role Based Access Control: This module deals with all the admin roles and their access levels. For further details, see the same sub module (Level 1.4.1).

Managing and accessing Database: This module allows the Operations Manager to access the user database where they can view and search database records, manage user account status such as delete/ disable account or activate a disabled account etc. The Analyst can view the entire database to analyze user based analytics metrics (Check level 1.4.2).

Managing Travel Packages: This module allows the Operation Manager to manage tour packages, from creation to deletion and modify details.

Bookings and Transactions: This module allows the Operation Manager to oversee bookings made by users, with capabilities to approve or reject bookings. He then confirms the payment and sends a confirmation mail. He can handle cancellations or refunds and sends a mail to the travelers regarding the cancellation or refund. In this module, The analyst can easily track analytics metrics such as user statistics, booking trends, user engagement and revenue figures with visual tools such as graphs and charts. The analyst is responsible for analyzing these metrics, generating reports on booking trends, revenue figures, and traveler satisfaction scores, and providing insights for optimization and enhancement of the platform's offerings. In here, accountants can manage financial data, generate reports, handle invoicing, and oversee financial transactions within the system (Check Level 1.4.4).

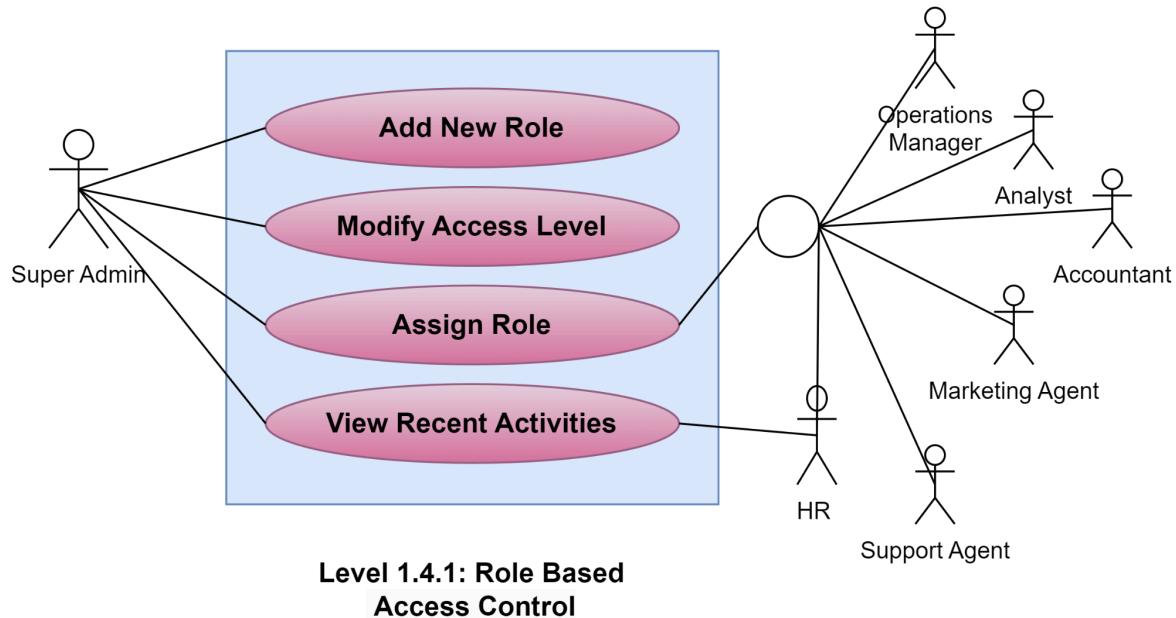
Promotional Content: This module allows the Marketing Agent to handle promotional content, marketing campaigns, and advertising initiatives within the platform to attract and engage travelers.

Customer Care: The module allows the support agent to manage traveler inquiries, and ensure timely resolution of their issues or concerns

Level 1.4.1 - Role Based Access Control

Primary Actors: Super Admin

Secondary Actors: Operations Manager, Analyst, Accountant, Marketing Agent, SupAgent, HR



Action and Reply:

Super Admin & Other admins (Operations Manager, Analyst, Accountant, Marketing Agent, HR)

Action 1: Super admin assigns the role.

Reply 1: Other admins (Operations Manager, Analyst, Accountant, Marketing Agent, Support Agent and HR) get the role.

Action 2: He/she adds a new role.

Reply 2: A new role gets created.

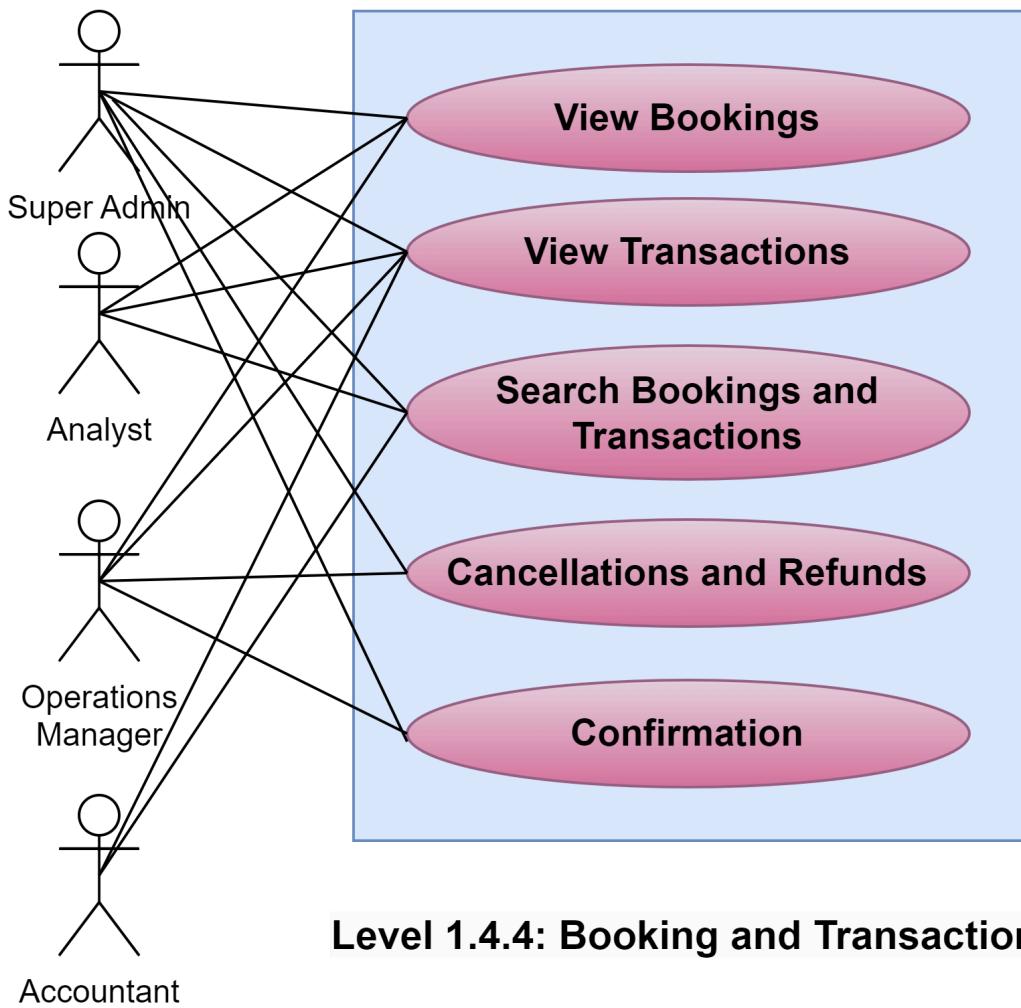
Action 3: He/she modifies the access level.

Action 4: Super admin and HR can view recent activities

Level 1.4.4 - Booking and Transactions

Primary Actors: Super Admin, Analyst, Operations manager, Accountant

Secondary Actors:



Action and Reply

Analyst

Action1: The analyst can view bookings

Action2: He can view transactions

Action3: He can search bookings and transactions to analyze **Operations Manager**

Action1: Operations Manager views Bookings and Transactions

Action2: He can search for bookings and transactions

Reply 1&2: He confirms the bookings and sends confirmation mail.

Accountant

Action 1: He can search for bookings and transactions.

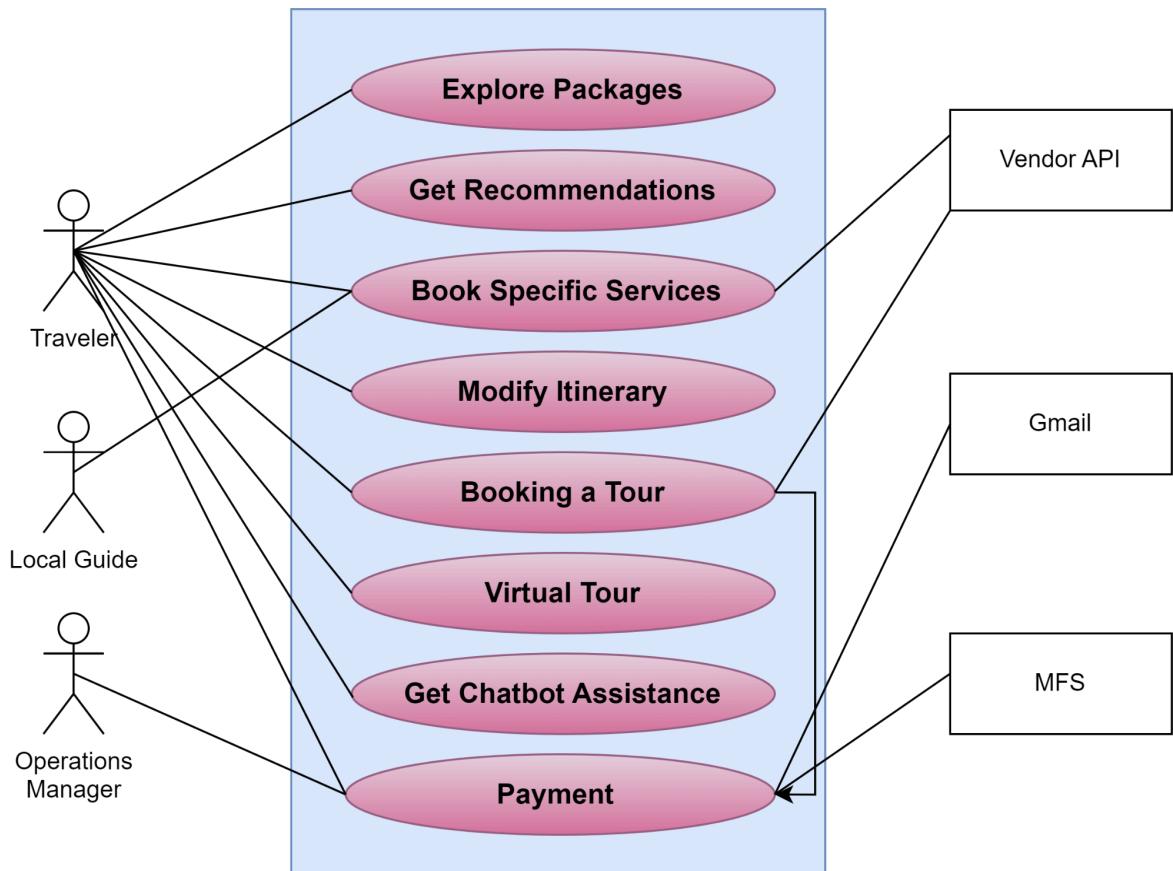
Action 2: He views the transaction

Reply 1&2: He manages financial data, generates reports, handles invoicing, and oversees financial transactions.

Level 1.5: Booking

Primary Actor: Travelers, Local Guide, Operations Manager

Secondary Actors: Gmail, Vendor API, MFS

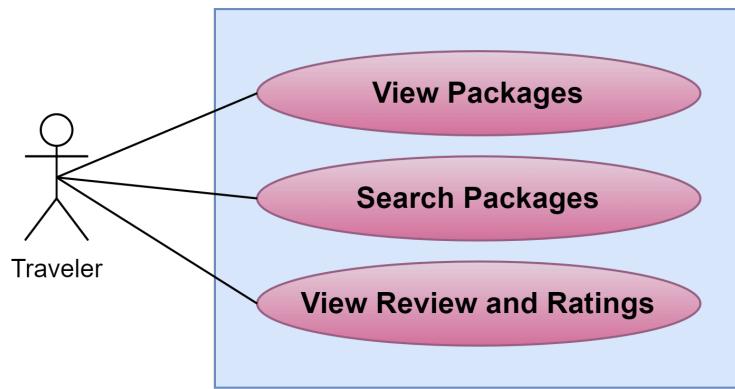


Level 1.5: Booking

Description

Explore Packages: The travelers can explore the available tour packages, both local and foreign by selecting according to their preferences. They can also search and filter packages with specific keywords, date. They can view reviews and ratings under different categories to make more informed decisions. For Further details check level 1.5.1.

Level-1.5.1:



Level-1.5.1: Explore Packages

View Packages: Travelers can explore the available tour packages, both local and foreign, by selecting according to their preferences. They can browse a variety of options, including different destinations, itineraries, and price ranges, to find the perfect package for their needs.

Search Packages: Travelers can search and filter packages with specific keywords and dates. This functionality allows users to quickly find packages that match their specific interests, such as "beach holidays," "adventure tours," or "cultural experiences," as well as narrow down options based on their travel dates.

View Reviews and Ratings: Travelers can view reviews and ratings under different categories to make more informed decisions. By accessing feedback from other travelers, users can assess the quality of the packages, accommodations, activities, and overall experience to choose a package that meets their expectations.

Get Recommendations: The travelers can get personalized recommendations for destinations, accommodations, activities, and travel packages based on their preferences and travel history.

Book Specific Services: The travelers may customize their trips by choosing specific services or activities only such as hotel booking, transportation booking (Bus and Ship) or local guides. They can book the said services directly with integrated Vendor

APIs. Available local guides get a notification if a traveler wants to book them and they may accept or decline the request after reviewing.

Modify Itinerary: The travelers may modify their itinerary details to add or update anything as they customize their travel plans.

Booking a Tour: The traveler may book any plan for themselves or for a group specifying the number of people. They can book a tour from the package plan as it is or customize their plan.

Virtual Tour: Using AR technology, the travelers can virtually visit hotels, attractions, and destinations, gaining a realistic overview of their trip options.

Get Chatbot Assistance: The travelers may chat with an integrated chatbot to get instant assistance with booking and resolve any queries they may have.

Payment and Confirmation: At the last stage of the booking process, the travelers are required to finalize the payment process. Upon payment, the travelers will receive a confirmation page summarizing their details, along with booking confirmation emails containing detailed itineraries and payment invoices.

Action and Reply

Travelers

Action 1: Chooses the “Explore Travel Plans” option

Reply 1: Redirects to the Explore packages sub module.

Action 2: Chooses the “Get Recommendations” option and selects necessary criteria

Reply 2: The system gives a recommendation for the specified criteria

Action 3: Clicks on the “Book Now” option for specific vendor services

Reply 3: Confirms Booking details with vendor API and redirects to Payment and Confirmation submodule.

Action 4: Sends a travel guide request to an available local guide.

Reply 4: Notifies and collects a response from the local guide and notifies the traveler.

Action 5: Add or update details in their itinerary.

Reply 5: Saves the updated changes.

Action 6: Clicks on “Book Now” for a tour package as it is or by customizing certain details

Reply 6: Adds the details to the traveler’s itinerary and redirects to the payment Module.

Action 7: Chooses the “Get a Virtual Tour” option

Reply 7: Starts the virtual tour.

Action 8: Chooses the “Get Chatbot Assistance” option

Reply 8: Activates the integrated chatbot.

Local Guide

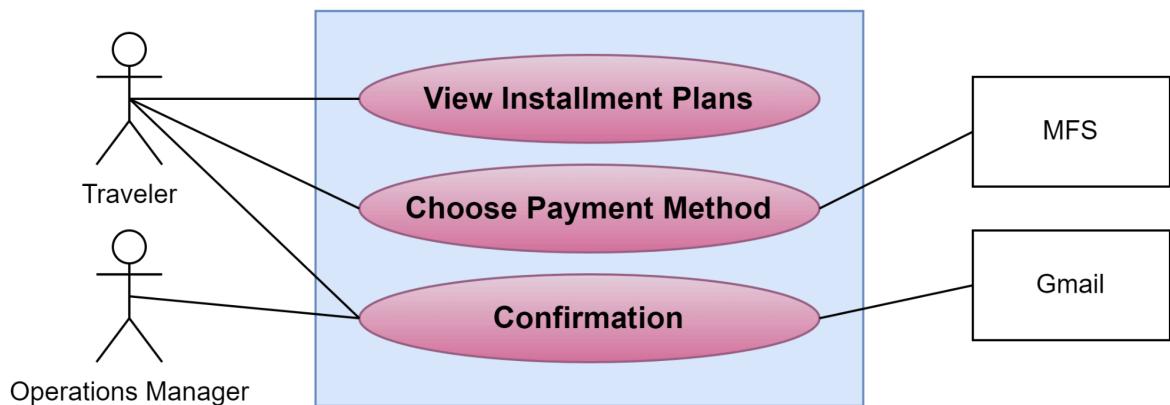
Action 1: Receives a notification that a new traveler wants to book them. Confirms or rejects the request after reviewing

Reply 1: Updates and notifies the traveler accordingly.

Level 1.6: Payment

Primary Actors: Travelers, Operations Manager

Secondary Actors: MFS, Gmail



Level 1.6: Payment

Description

View Installment Plans: The traveler can view and choose to pay in installments after reviewing the installment options which will have specified amounts and specified time period.

Choose Payment Method: The travelers can choose from a variety of payment options to accommodate different preferences and needs, including Mobile Financial Services (MFS), bank transfers, or pay by cash, depending on their location and convenience.

Confirmation: Upon completion of payment, travelers receive a confirmation mail as soon as the accountant reviews the transaction, along with a digital invoice detailing the transaction, ensuring transparency and enabling them to keep track of their expenses with ease. The accountant sends a clarification mail with detailed explanation and instructions in case of faulty transactions.

Action and Reply

Travelers

Action 1: Chooses to view installment plans for the selected package

Reply 1: Displays the available installment options

Action 2: Selects an installment plan

Reply 2: Directs the user to the Payment page

Action 3: Chooses the preferred payment option

Reply 3: Redirects to payment page via MFS API

Action 4: Makes the payment

Reply 4: Receives a confirmation mail along with invoice and a copy of the itinerary if the payment is successful or an error message otherwise.

Accountant

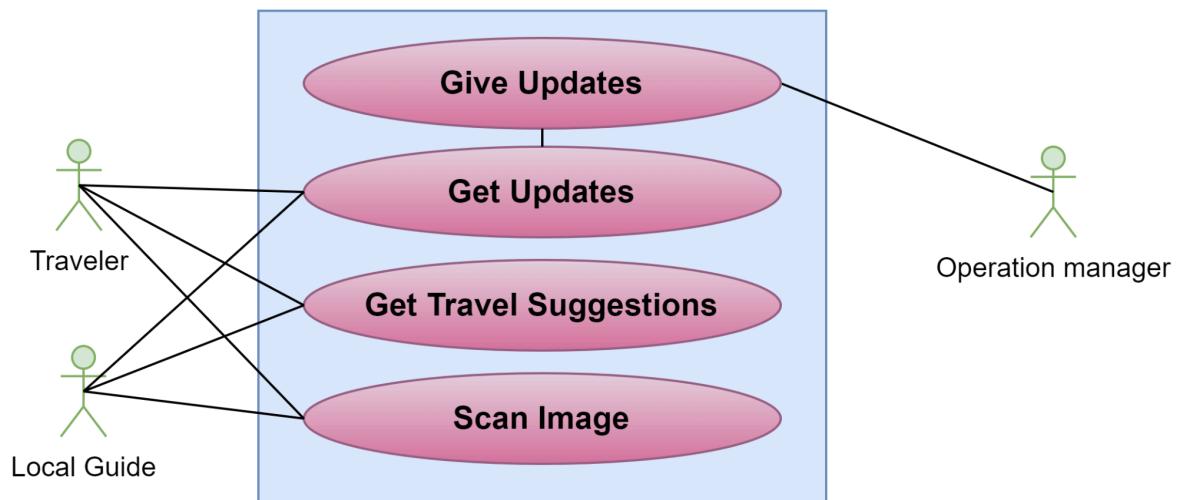
Action 1: Reviews the payment made by a traveler and issues a confirmation mail or a clarification mail based on the transaction.

Reply 1: System sends the mail and notifies the travelers accordingly.

Level 1.7: Travel Time Guidance

Primary Actor: Traveler, Local Guide

Secondary Actor: Admin, Google



Level 1.7: Travel Time Guidance

Description

Give Updates:

Admins will be able to send updates to travelers and local guides regarding any changes.

Get Updates:

Travelers and Local Guides will receive timely updates if there is any change in their travel itinerary, through email, SMS, or push notifications sent by the admin. Also they will get real-time updates on weather conditions, traffic status.

Get Travel Suggestions:

Travelers will get automated suggestions(such as “carry an umbrella” or “use sunscreen”) based on their travel plans.

Scan Image:

Travelers and Local guides can find useful information by scanning any relevant image.

Action and Reply

Travelers and Local Guide

Action 1: Check for real-time update

Reply 1: Will get real-time updates on weather conditions, traffic status.

Action 2: Traveler or Local guide chooses to view the suggestions

Reply 2: The suggestion will be displayed.

Action 3: Scan relevant image

Reply 3: A virtual assistant will pop out and give a basic narration/introduction of that structure/place.

Admin

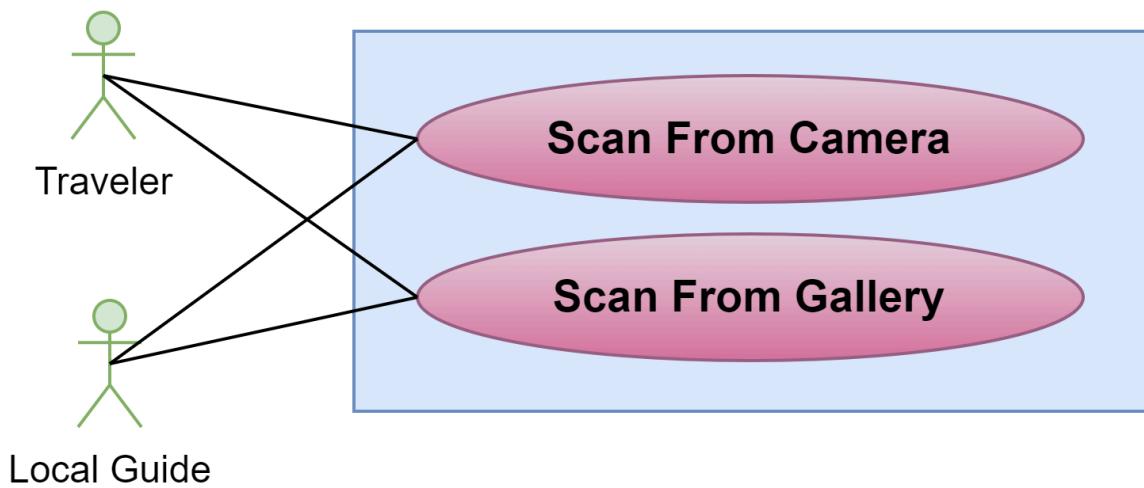
Action 1: Sends notification to travelers or local guides regarding any change in the itinerary.

Reply 1: Travelers or local guides are notified about the change

Level 1.7.4: Scan Image

Primary Actor: Traveler, Local Guide

Secondary Actor:



Level 1.7.4: Scan Image

Description:

Scan From Camera:

Travelers and Local Guides can use their mobile camera to scan relevant images and get information about the image.

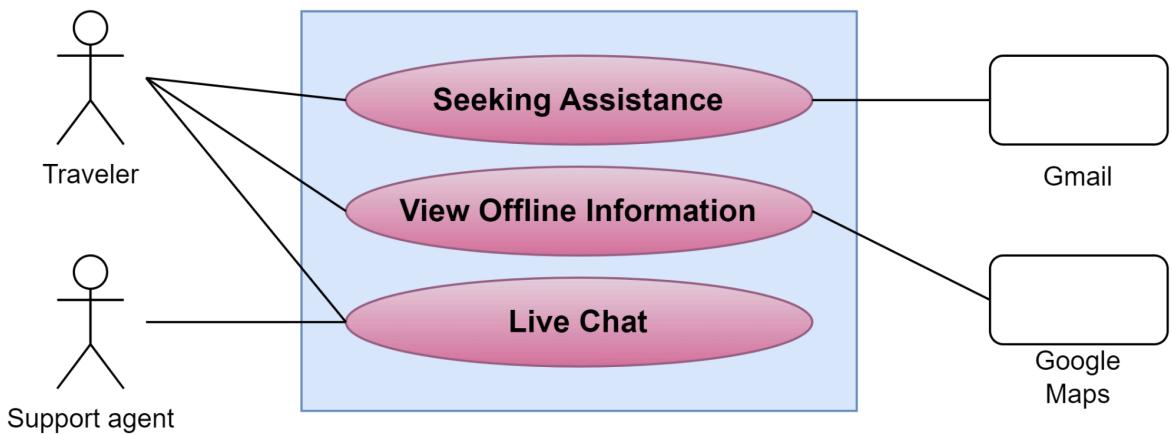
Scan From Gallery:

Travelers and Local Guides can scan photos from their gallery and get informations

Level-1.8: Help and support

Primary actors: Traveler, Support agent

Secondary actors: Google Maps, Gmail



Level 1.8: Help and Support

Description:

Seeking assistance: This module gives users the opportunity to have the option to reach out via live chat, email or phone for assistance or support with booking inquiries, itinerary changes, cancellations, and emergencies. The support will be available round the clock and in multiple languages(English, Bangla).

View offline information: This module will show the user about some important information like travel map, FAQ, contact details and phone numbers without internet connection.

Live chat: This module includes a live chat feature which enables users to chat with support Agent for urgent inquiries.

Action and reply:

Traveler/Local guide:

Action1: User will select his/her preferred option from live chat, email or phone.

Reply1: System will allocate a support agent for the user.

Action2: The user asks questions about his/her needs.

Reply2: The support agent will answer the question.

Action3: User select his/her preferred language

Reply3: The system will be changed to selected language

Support agent:

Action1: Give service through email, chat, call to the user

Reply1: System will record information about user's need

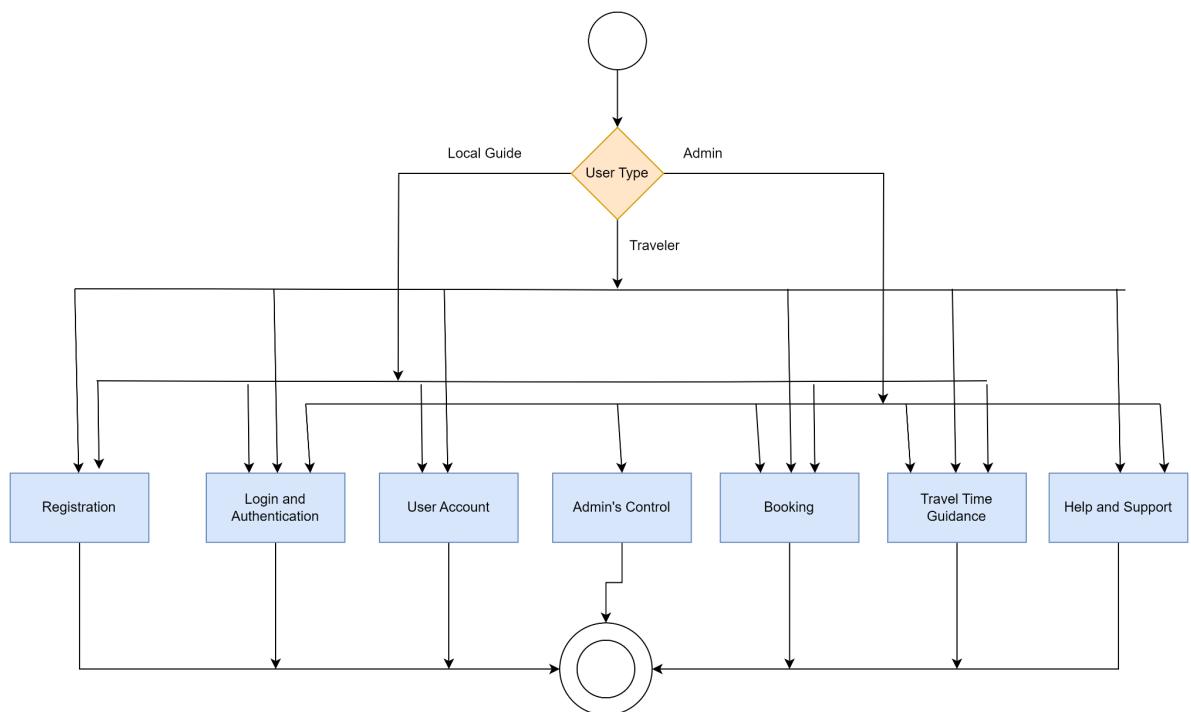
Activity diagram

Activity diagram is an important behavioral diagram in UML diagram to describe dynamic aspects of the system. Activity diagram is essentially an advanced version of flowchart that models the flow from one activity to another activity.

Level-1:

Name: Travel Agency Management System

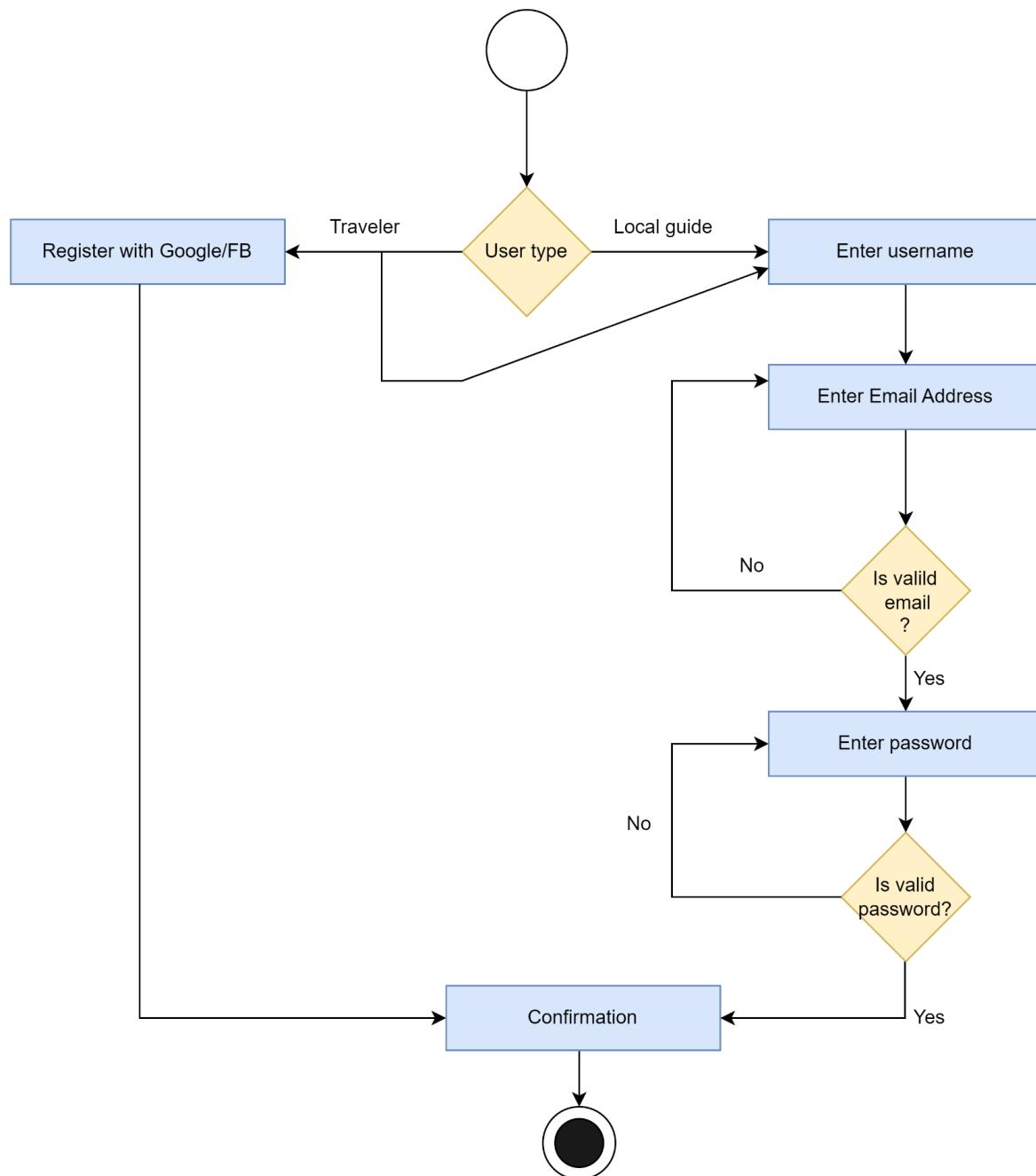
Reference: Use case diagram level-1



Level-1.1

Name: Registration

Reference: Use case diagram level-1.1

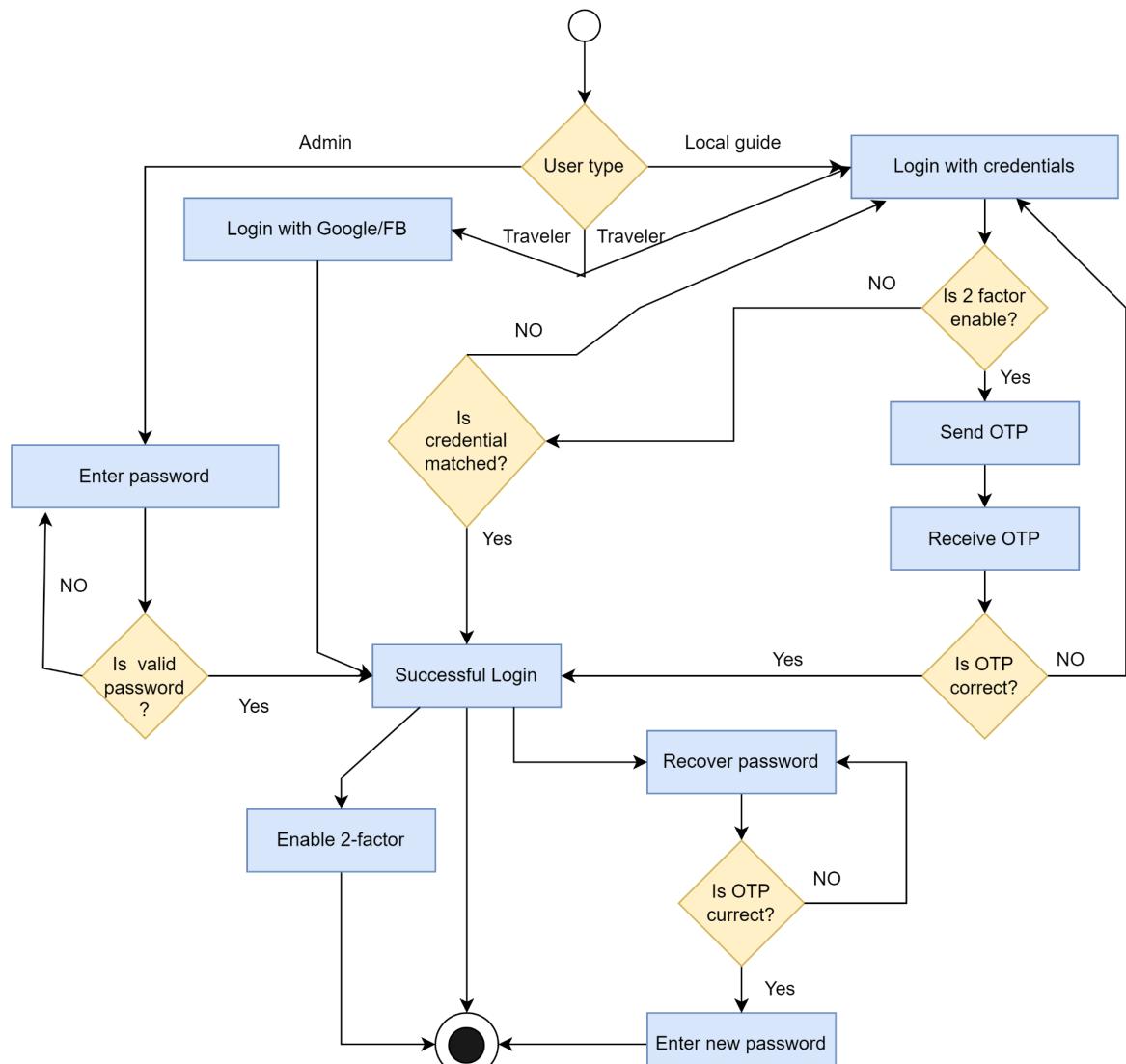


Level-1.1: Registration

Level-1.2

Name: Login and authentication

Reference: Use case diagram level-1.2

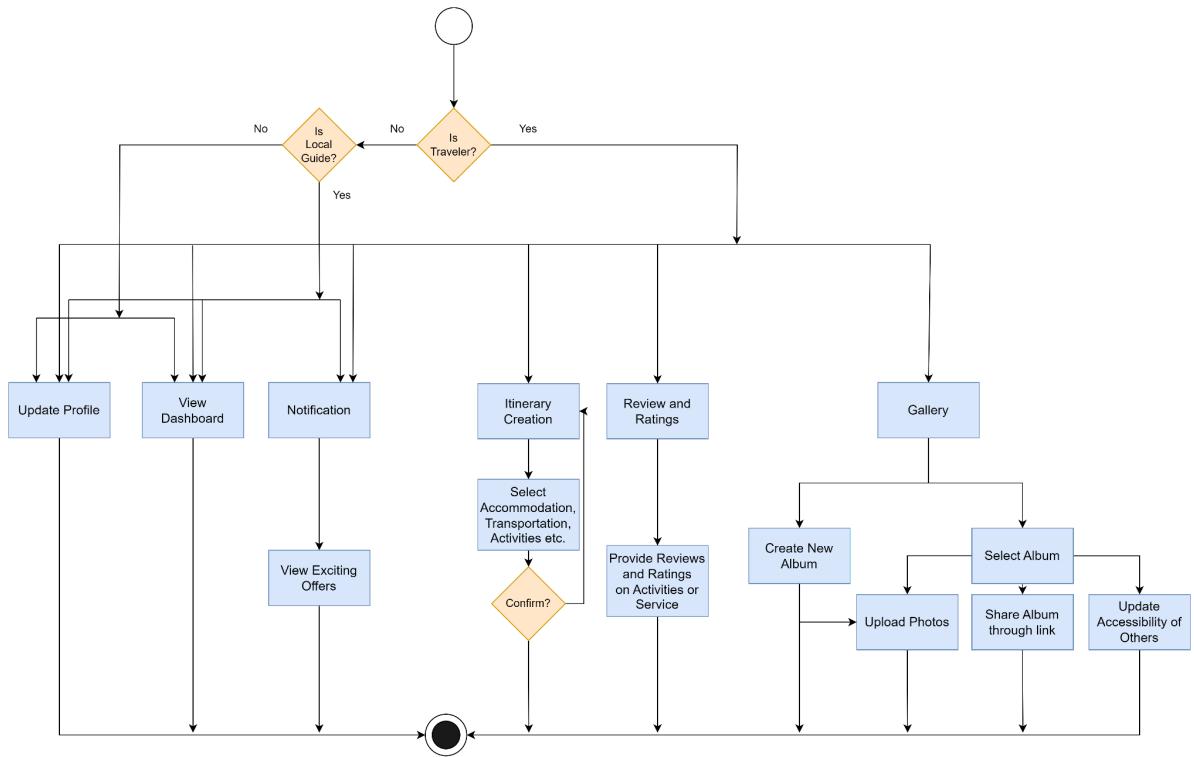


Level-1.2: Login and authentication

Level- 1.3

Name: User Account

Reference: Use case diagram level-1.3

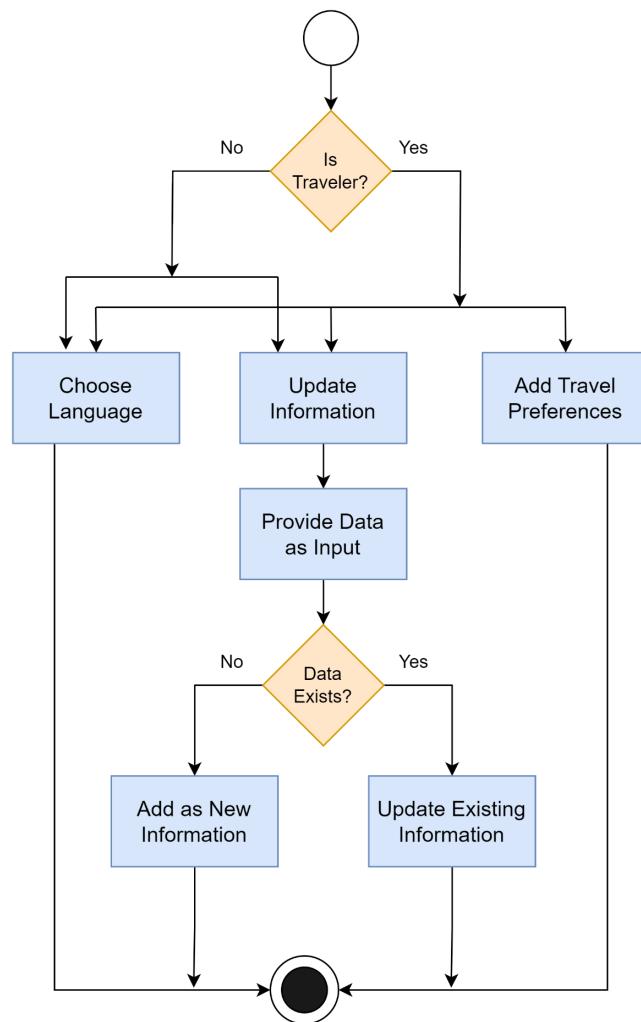


Level-1.3: User Account

Level- 1.3.1

Name: Update profile

Reference: Use case diagram level-1.3.1

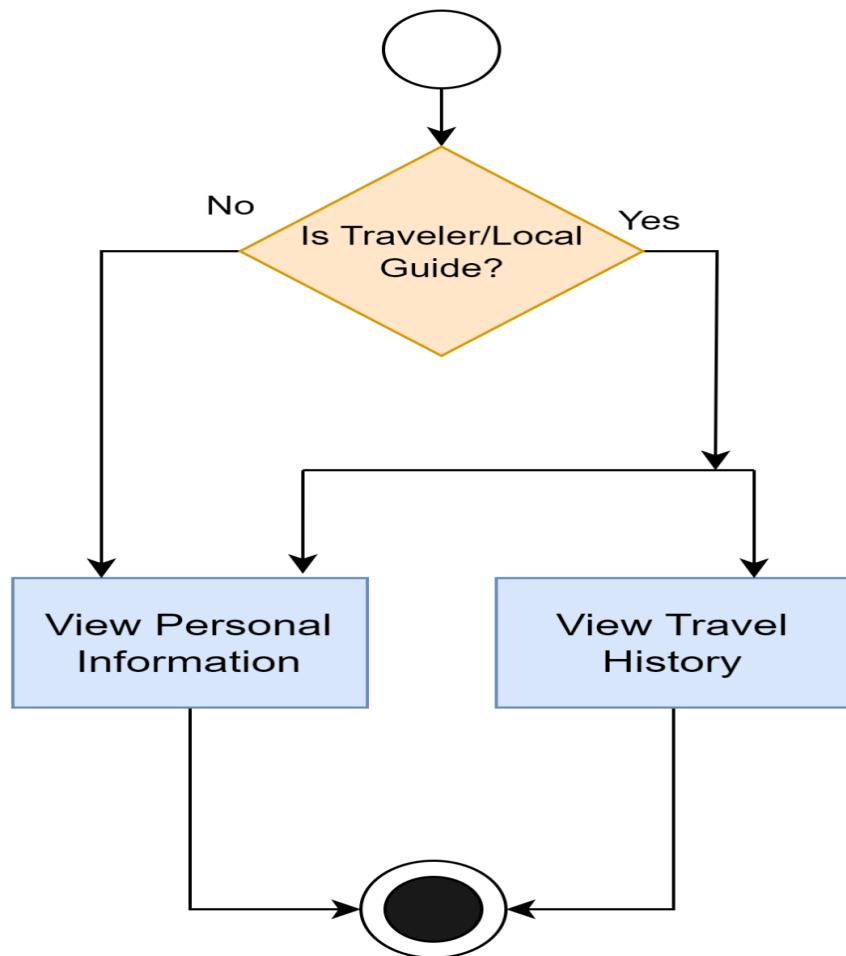


Level 1.3.1: Update Profile

Level- 1.3.2

Name: View Dashboard

Reference: Use case diagram level-1.3.2

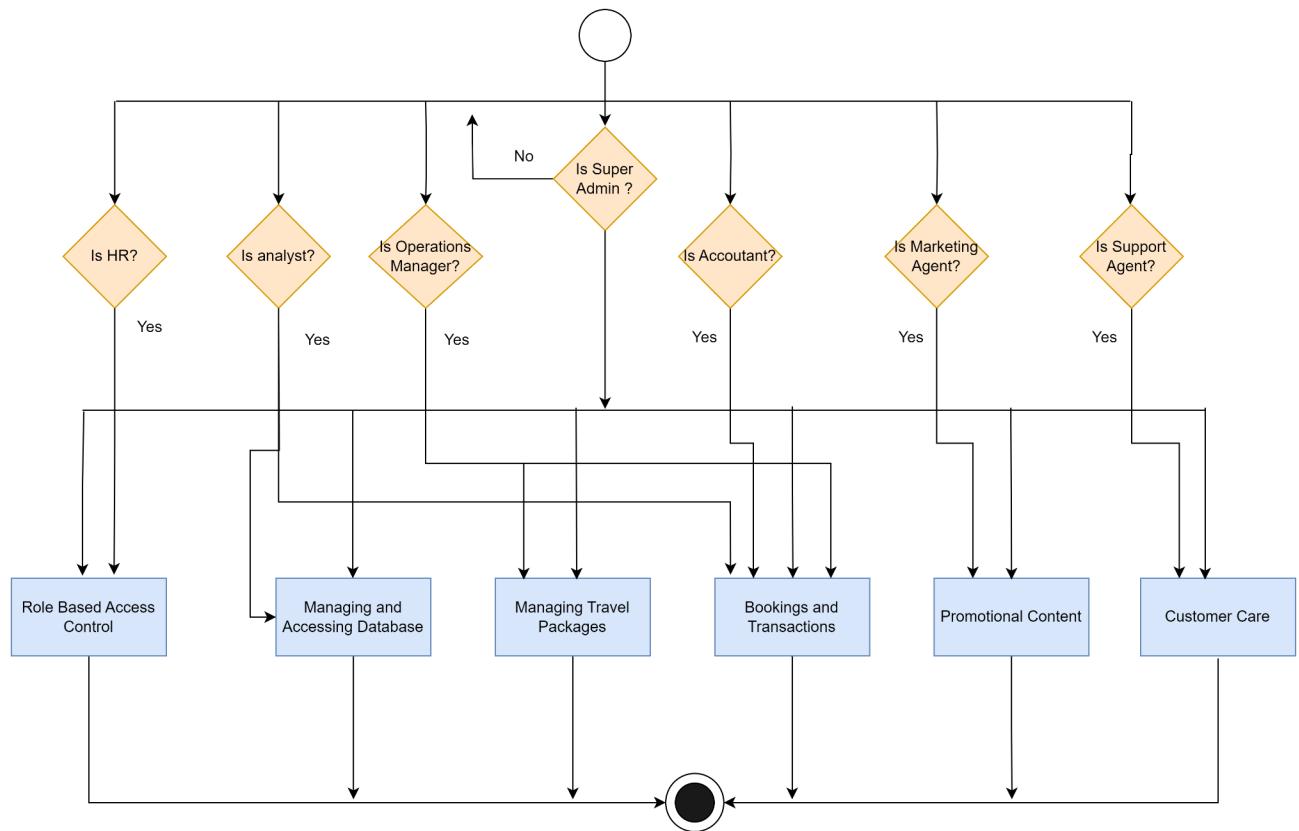


Level 1.3.2: View Dashboard

Level- 1.4

Name: Admin's Control

Reference: Use case diagram level-1.4

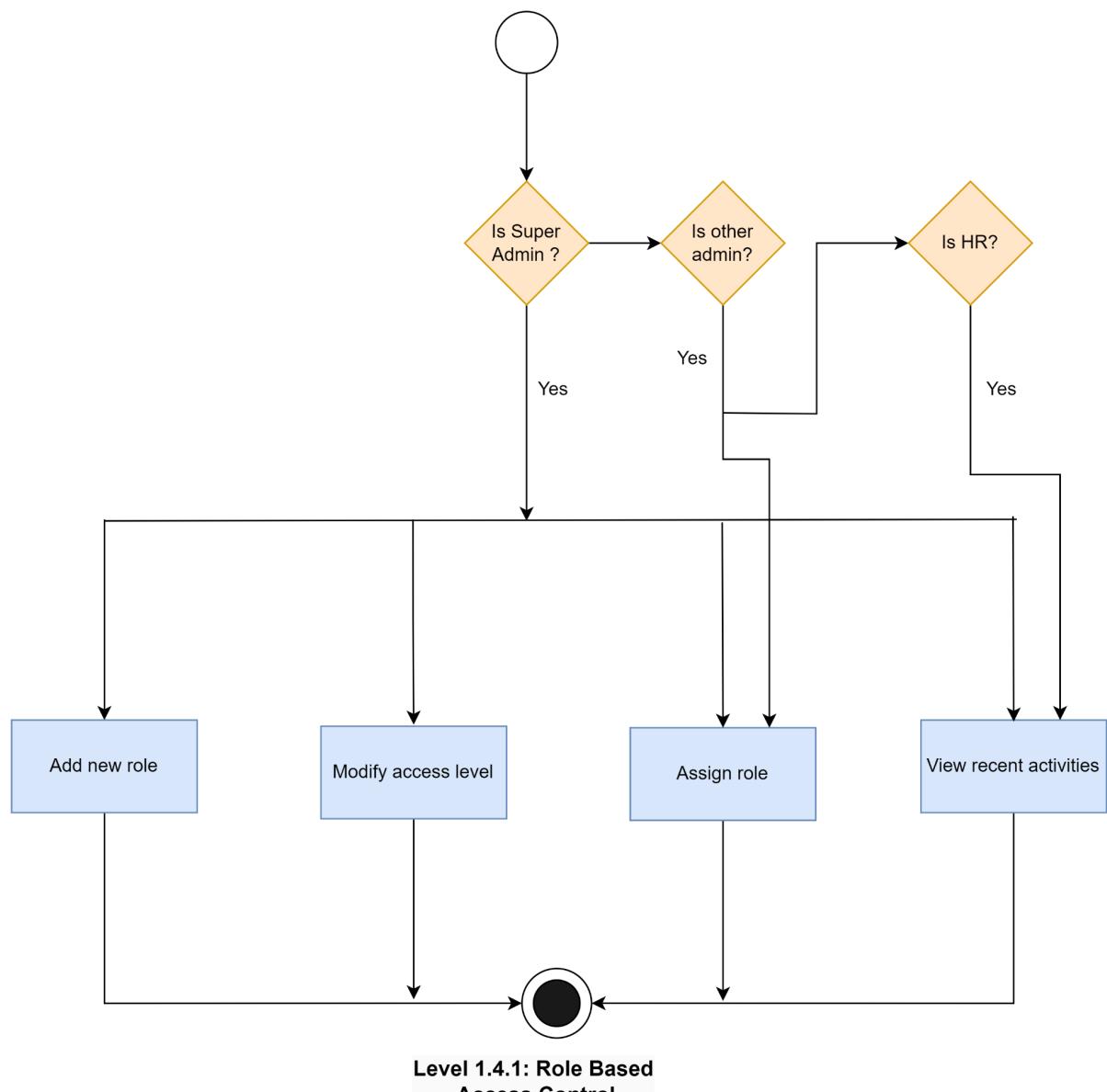


Level 1.4: Admin's Control

Level- 1.4.1

Name: Role Based Access Control

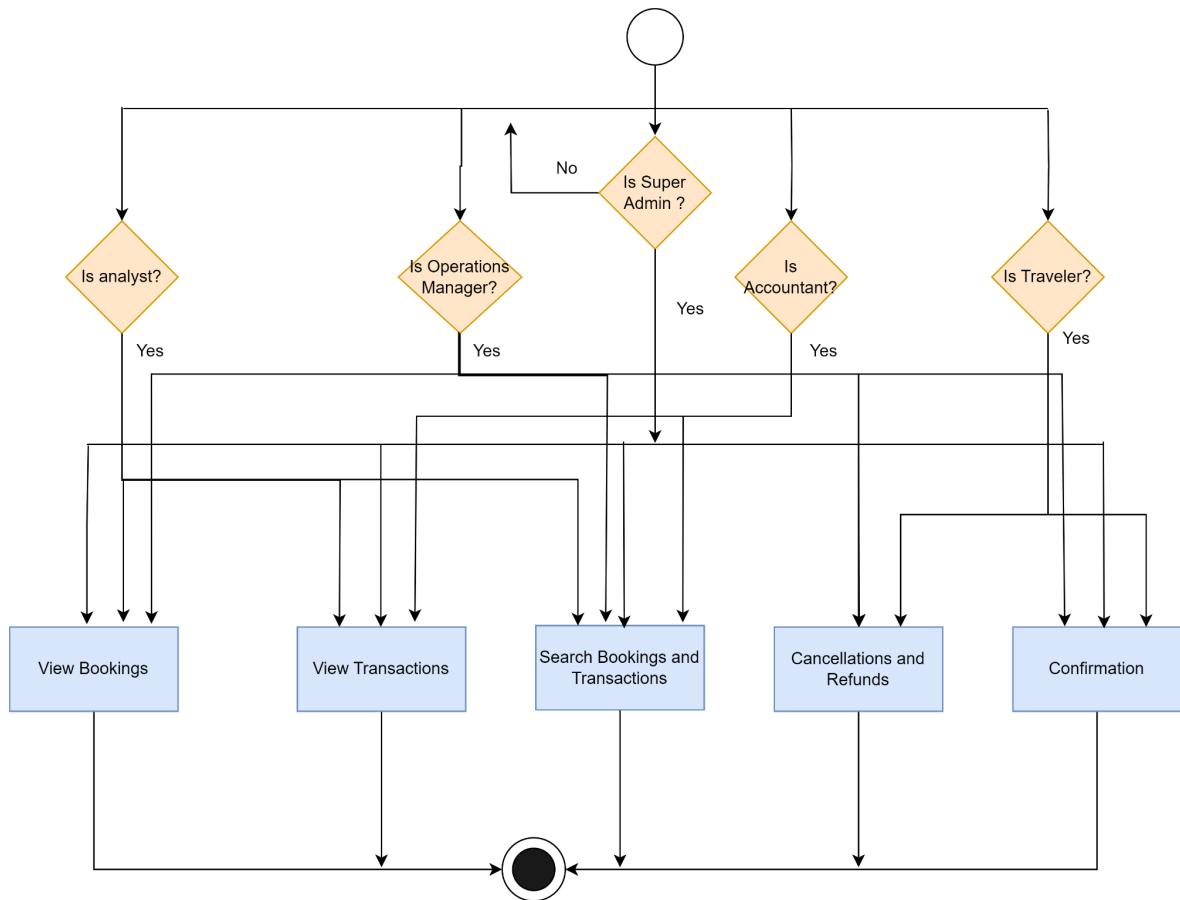
Reference: Use case diagram level-1.4.1



Level- 1.4.4

Name: Booking and Transactions

Reference: Use case diagram level-1.4.4

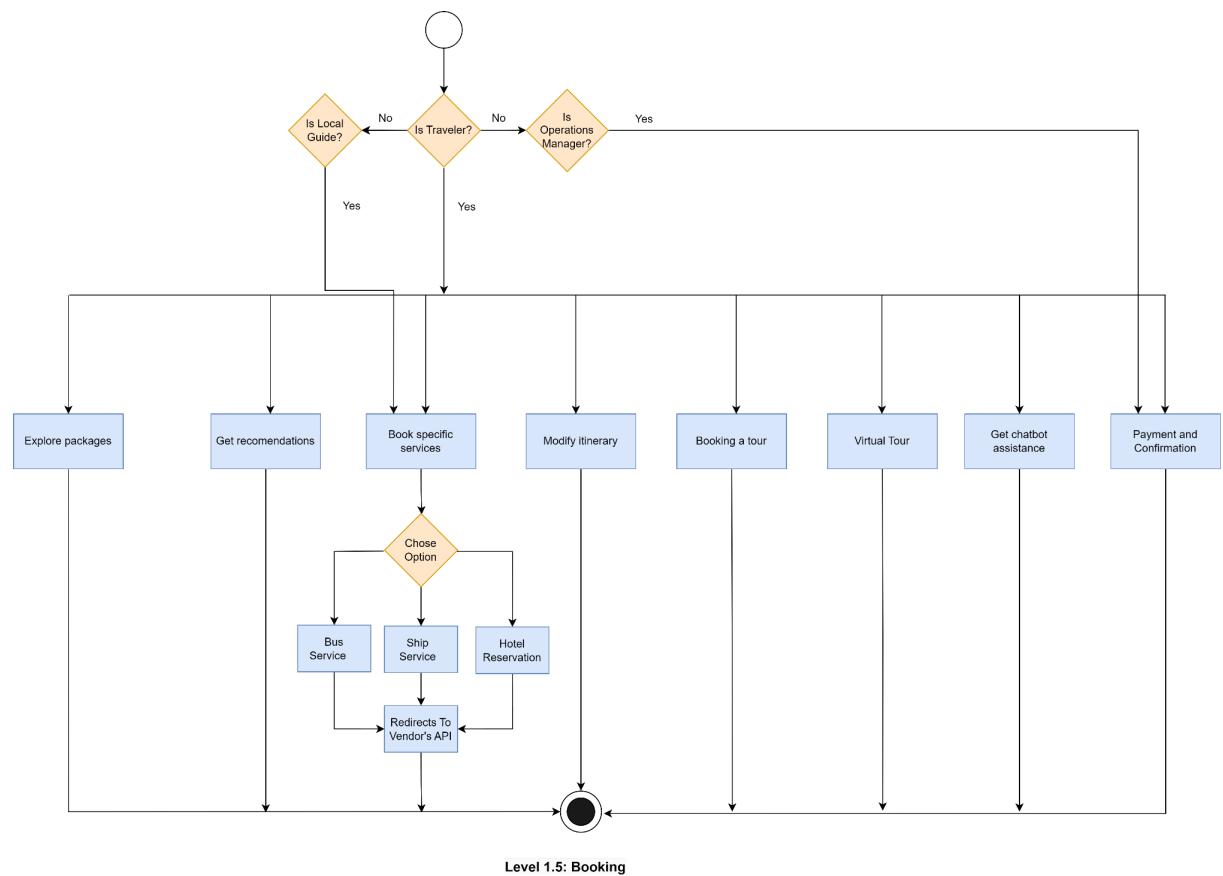


Level 1.4.4: Booking and Transactions

Level- 1.5

Name: Booking

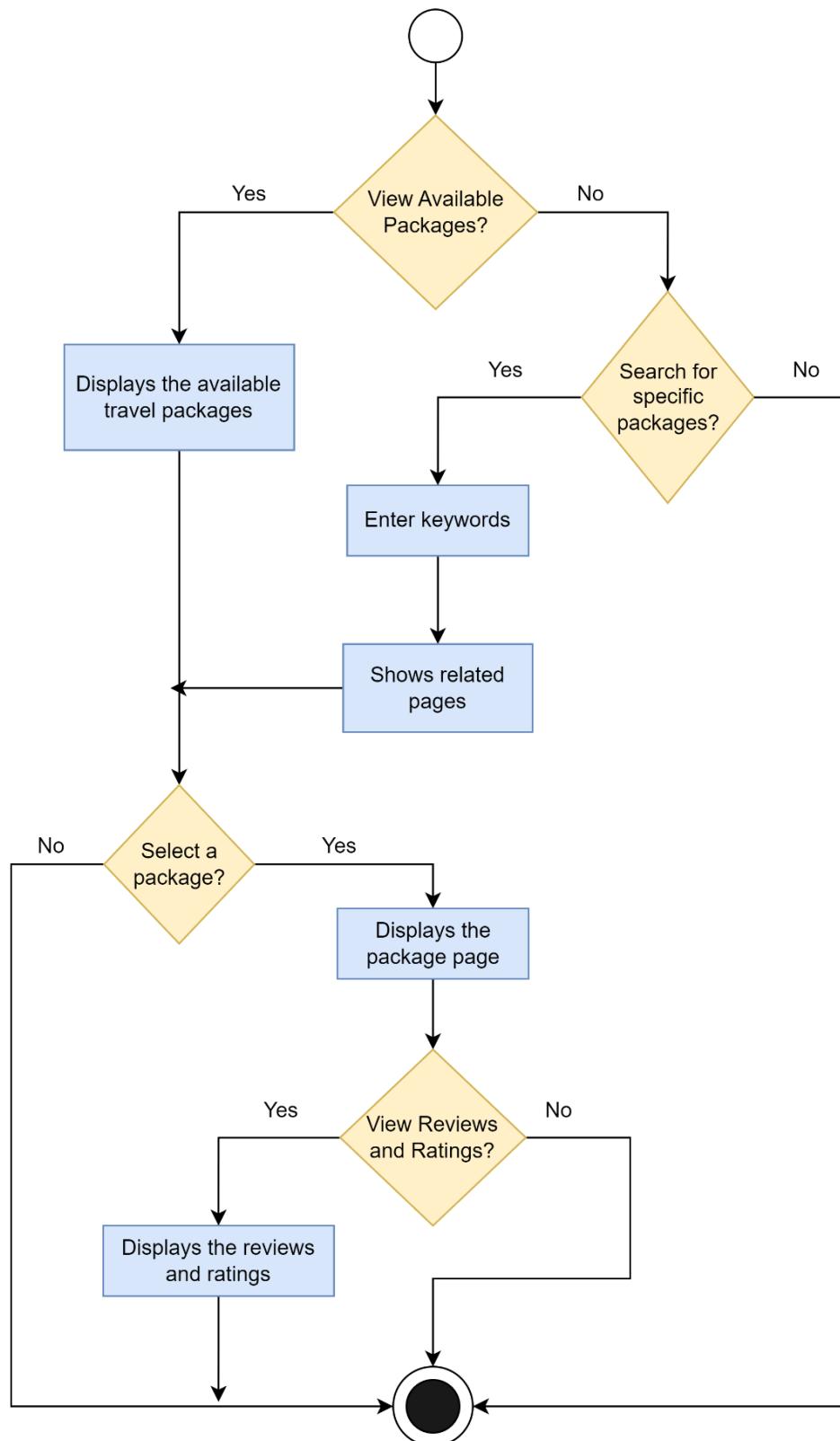
Reference: Use case diagram level-1.5



Level- 1.5.1

Name: Explore packages

Reference: Use case diagram level-1.5.1

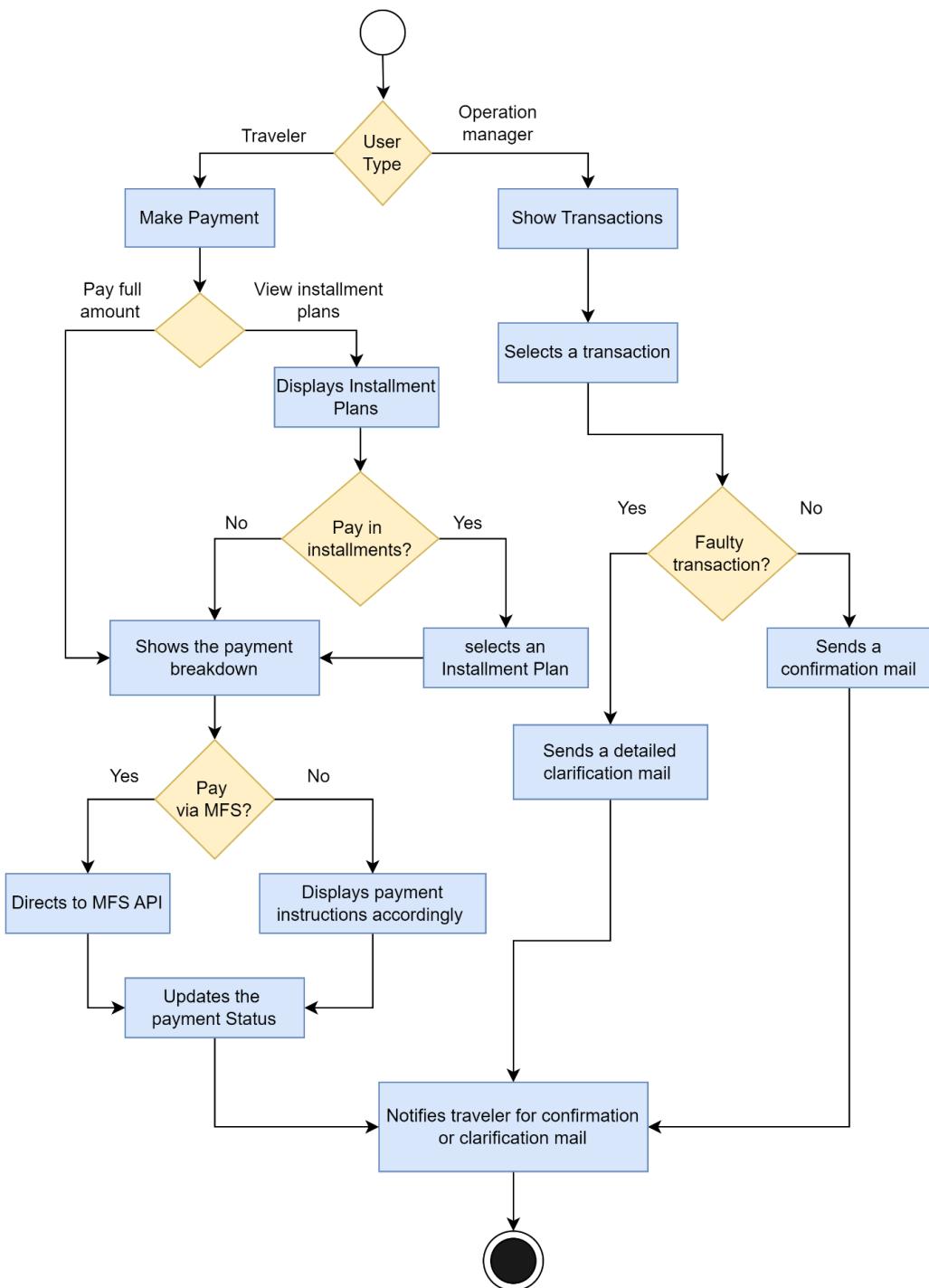


Level-1.5.1: Explore Packages

Level- 1.6

Name: Payment

Reference: Use case diagram level-1.6

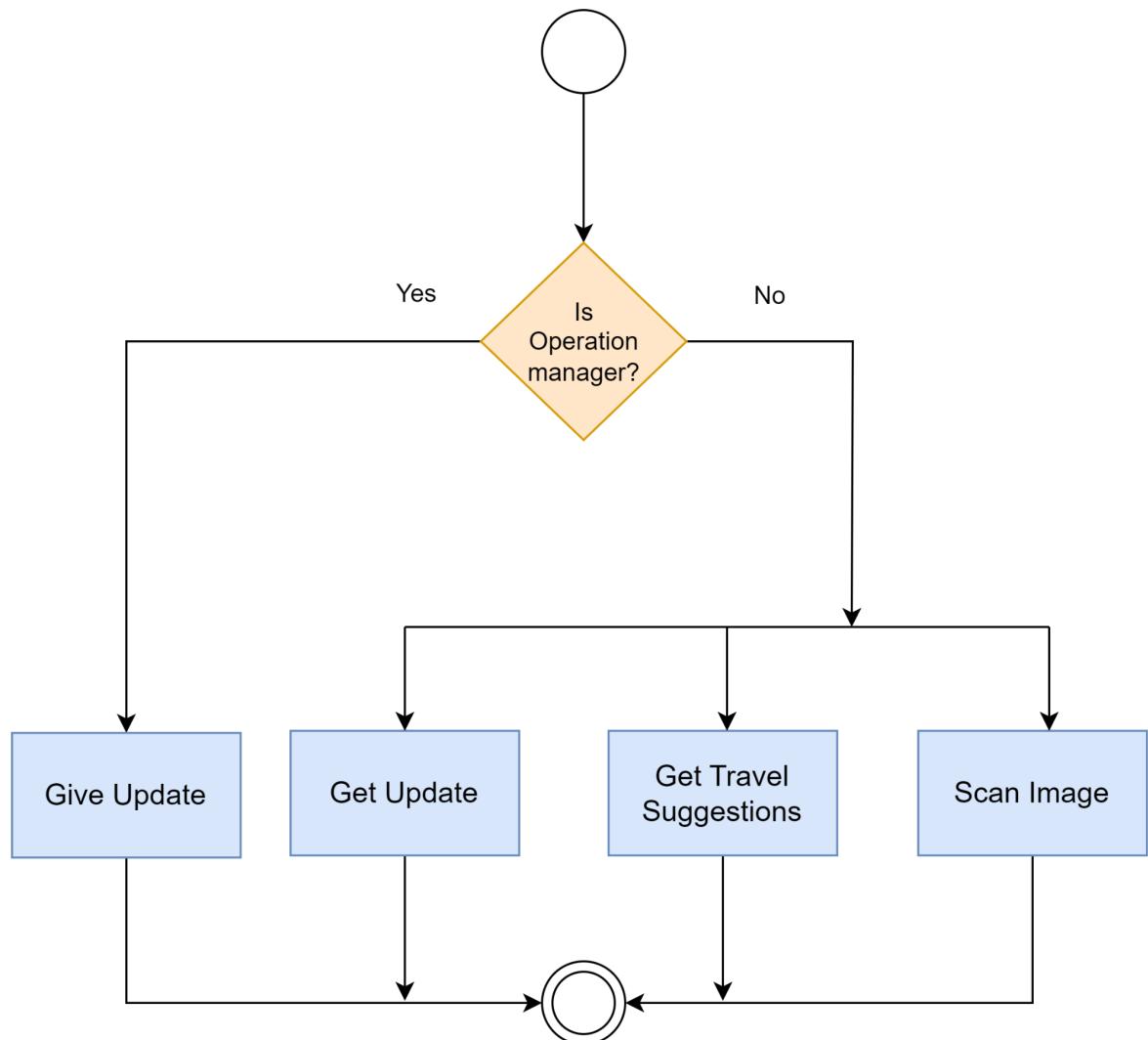


Level-1.6: Payment

Level-1.7

Name: Travel Time Guidance

Reference: Use case diagram level-1.7

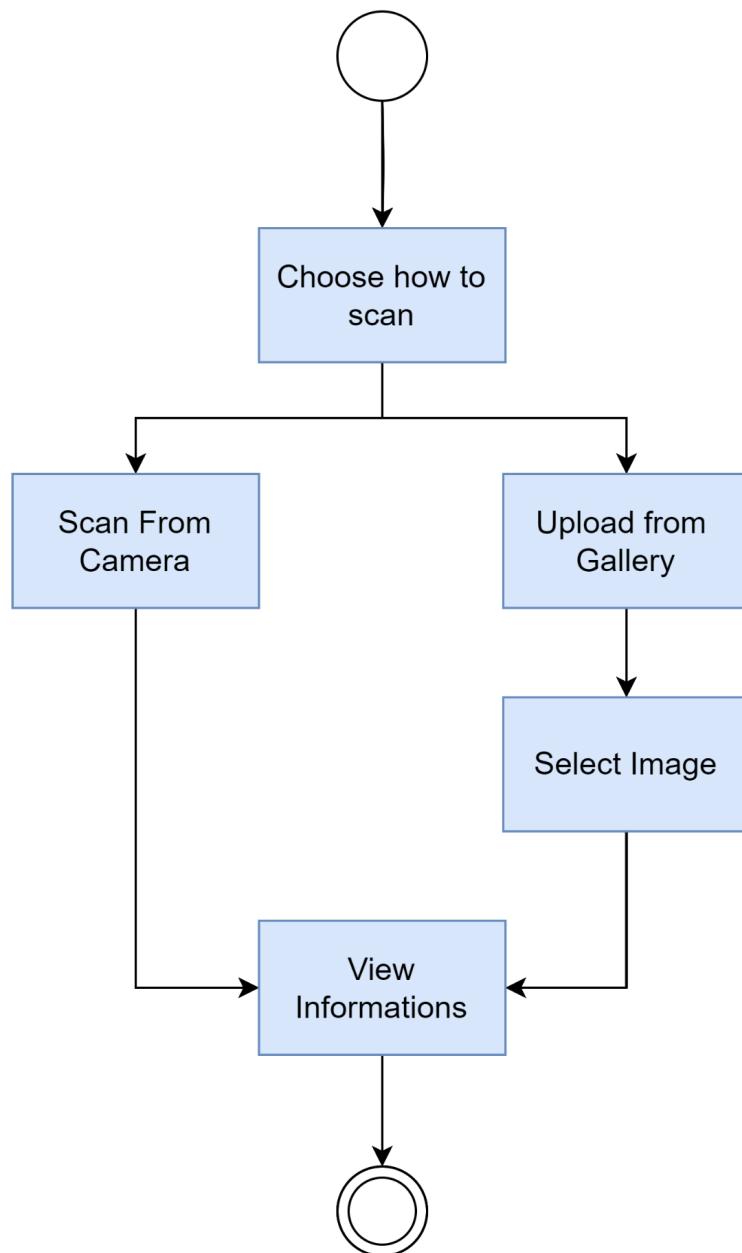


Level 1.7: Travel Time Guidance

Level-1.7.4

Name: Scan Image

Reference: Use case diagram level-1.7.4

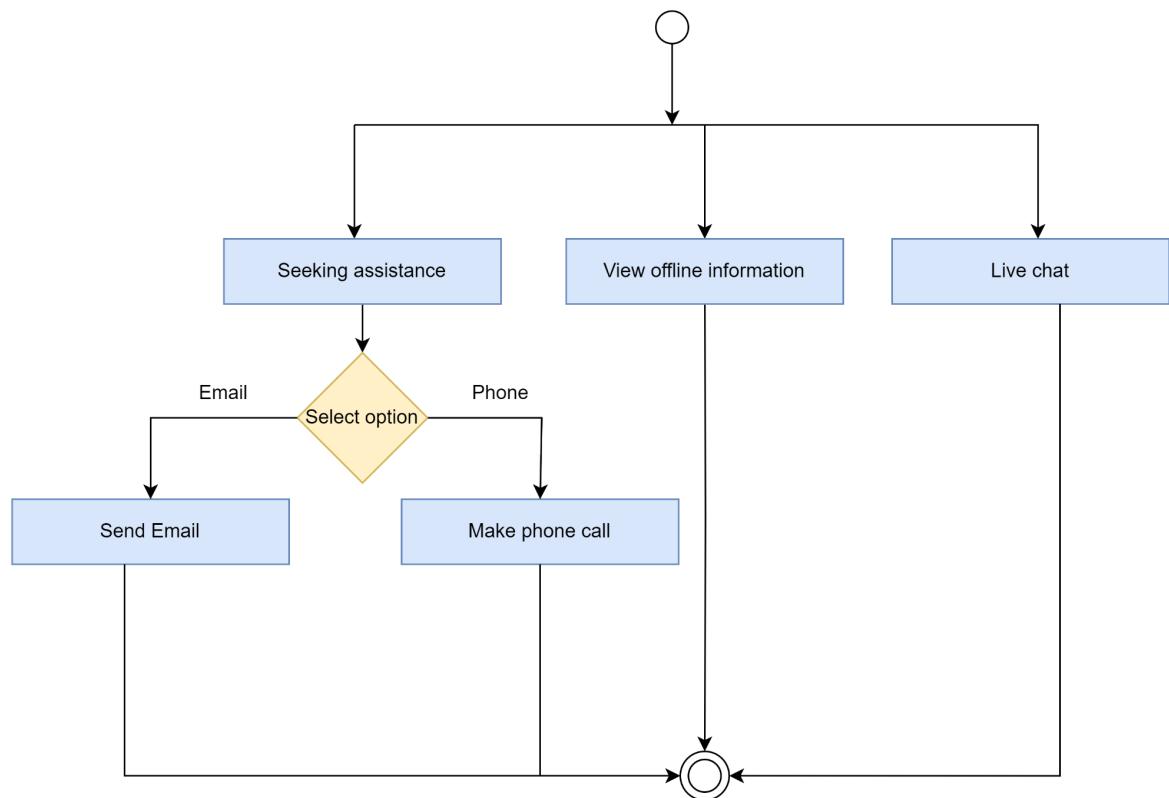


Level 1.7.4: Scan Image

Level-1.8

Name: Help and Support

Reference: Use case diagram level-1.8



Level-1.8: Help and support

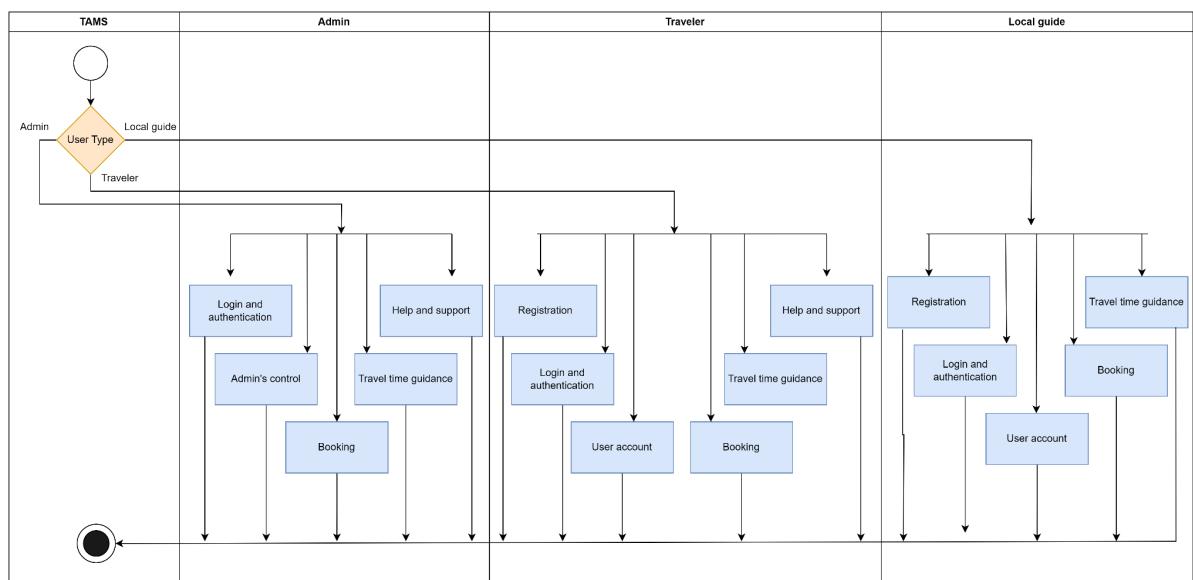
Swimlane diagram

A swimlane diagram is a type of flowchart, which diagrams a process from start to finish, but it also divides these steps into categories to help distinguish which departments or employees are responsible for each set of actions. It is based on the analogy of lanes in a pool, as it places process steps within the horizontal or vertical “swimlanes” of a particular department, work group or employee, thus ensuring clarity and accountability.

Level-1:

Name: Travel Agency Management System

Reference: Use case and activity diagram level-1

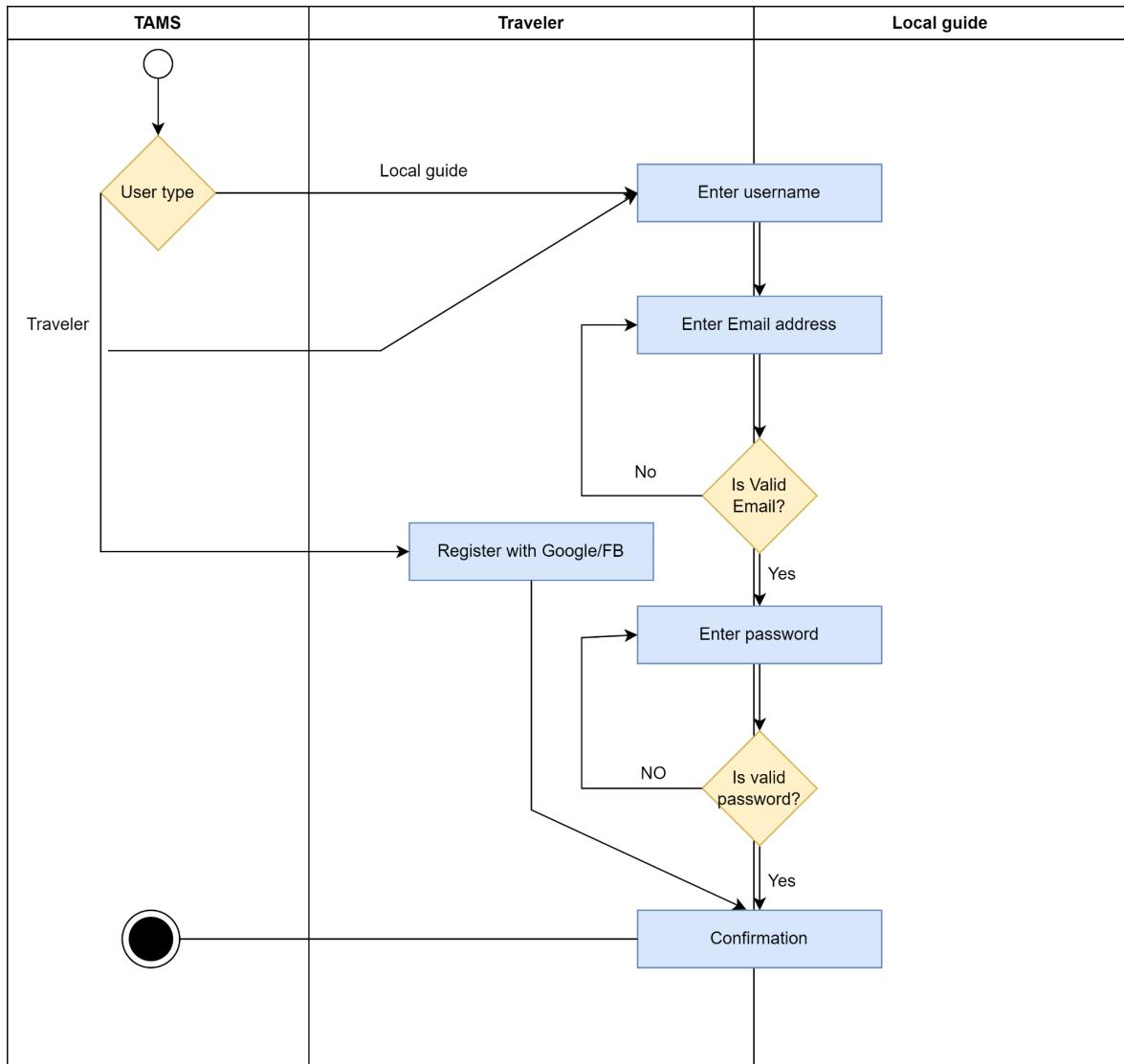


Level 1: Travel Agency Management System

Level-1.1

Name: Registration

Reference: Use case and activity diagram level-1.1

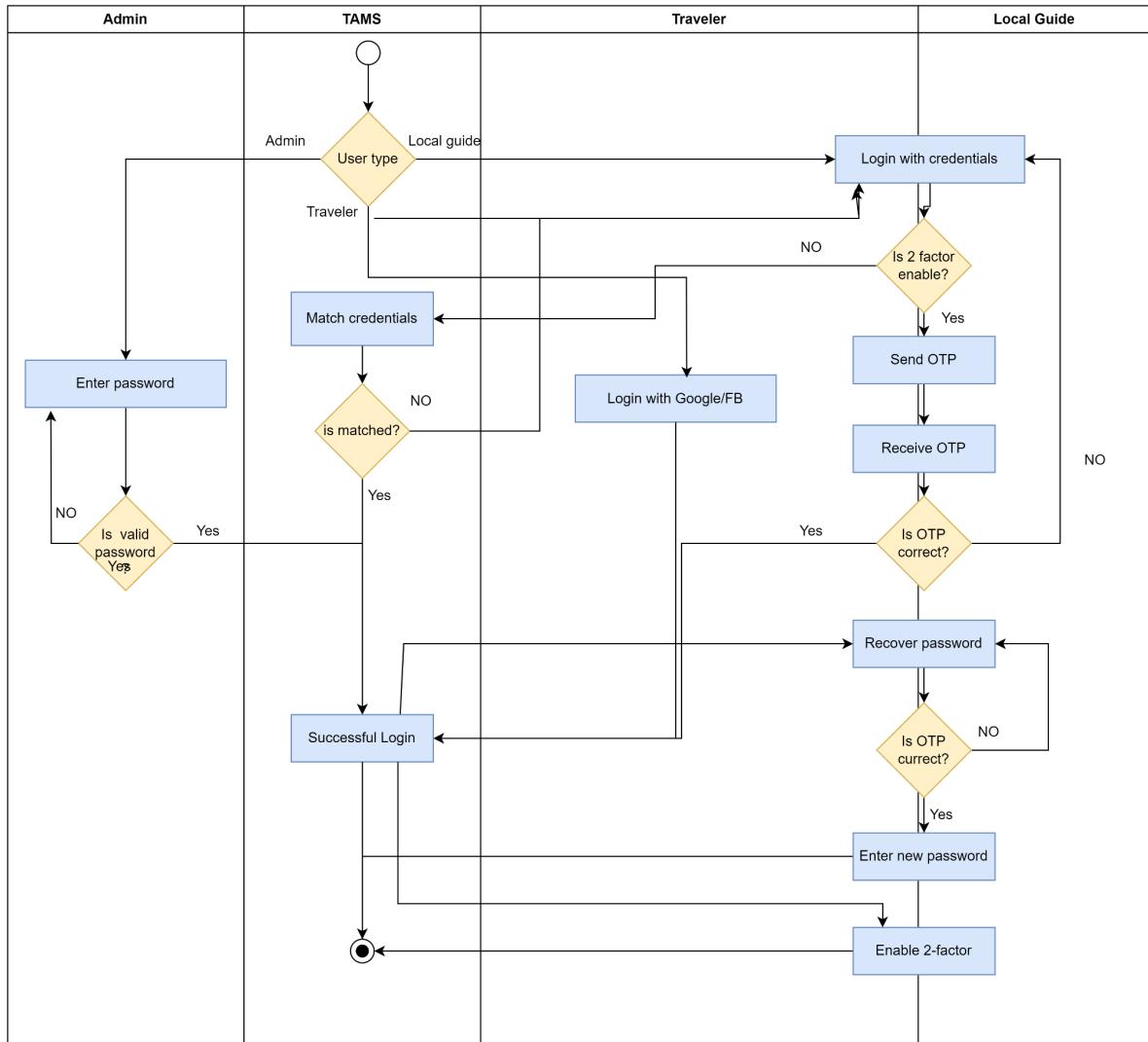


Level-1.1: Registration

Level-1.2

Name: Login and authentication

Reference: Use case and activity diagram level-1.2

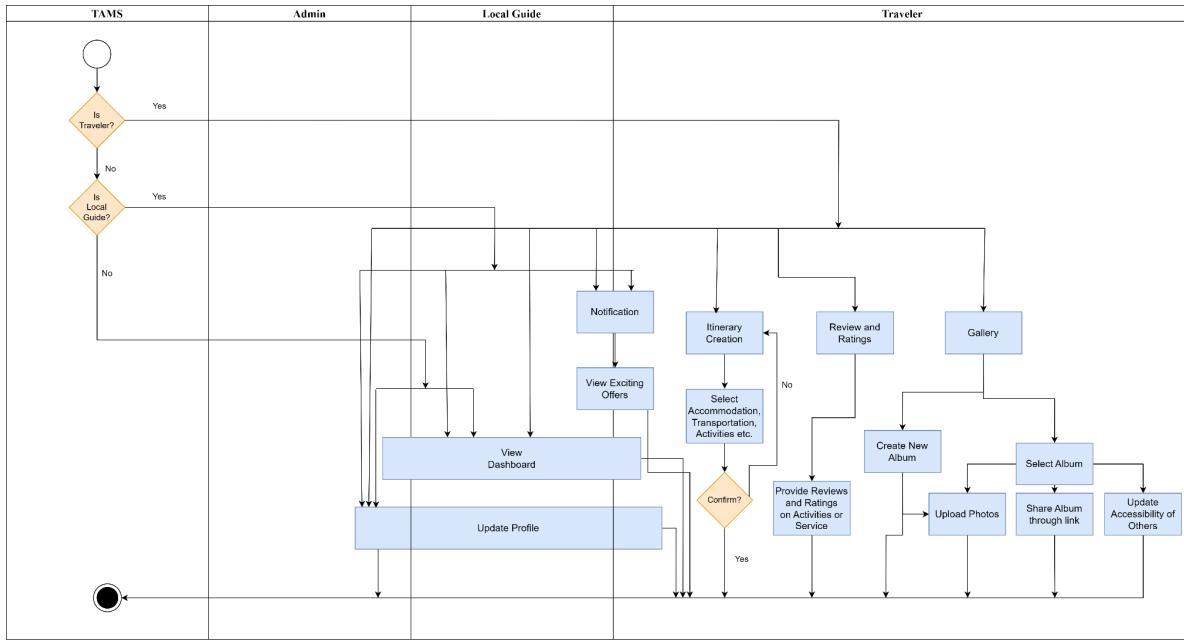


Level-1.2: Login and authentication

Level- 1.3

Name: User Account

Reference: Use case and activity diagram level-1.3

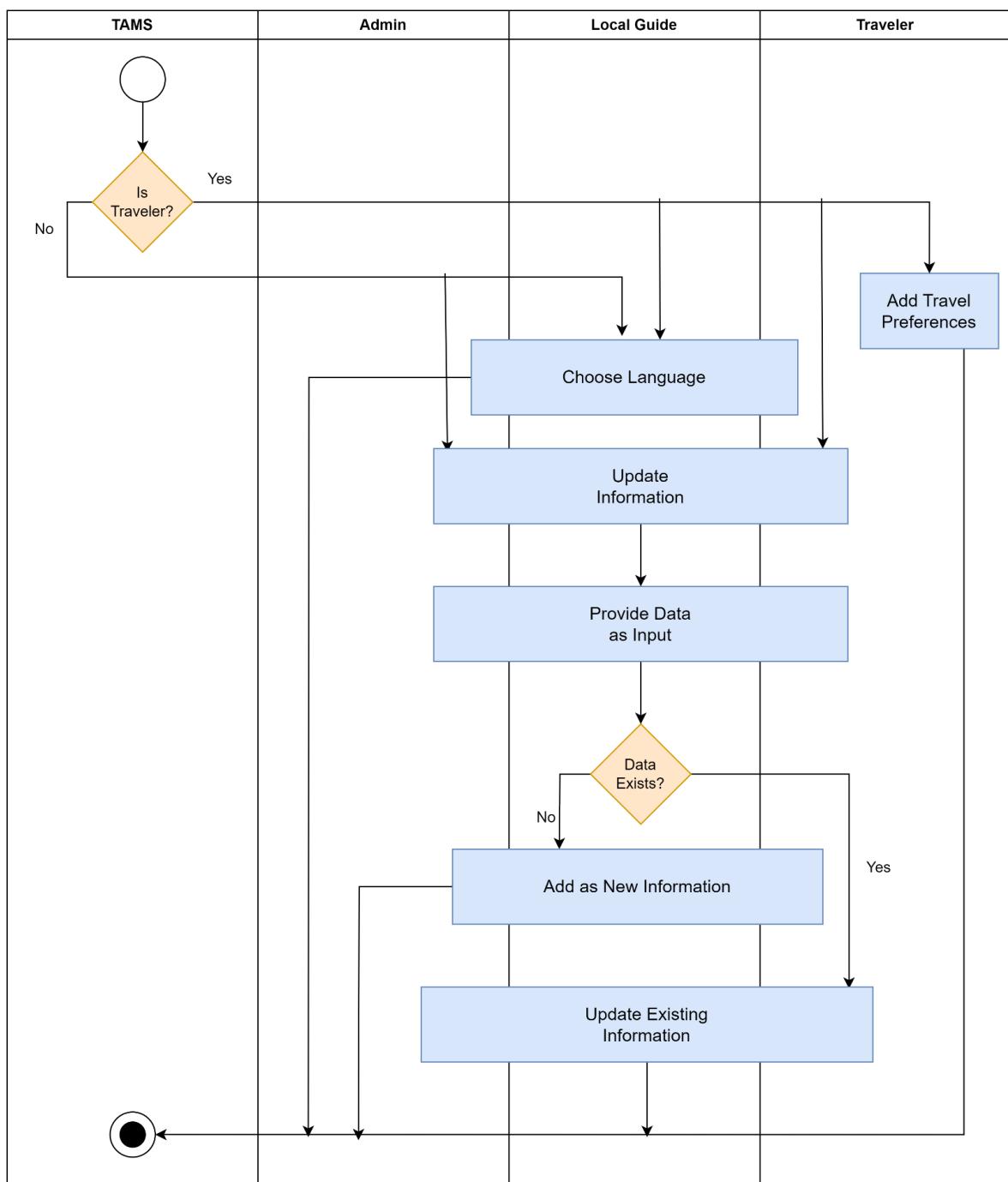


Level 1.3: User Account

Level- 1.3.1

Name: Update profile

Reference: Use case and activity diagram level-1.3.1

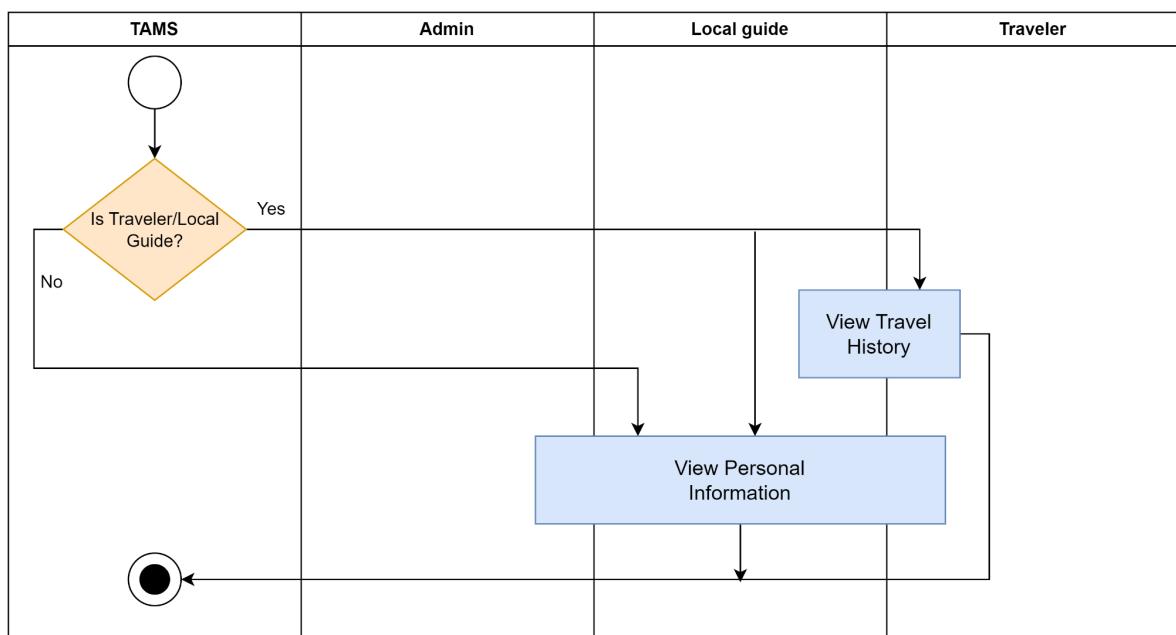


Level 1.3.1: Update Profile

Level- 1.3.2

Name: View Dashboard

Reference: Use case and activity diagram level-1.3.2

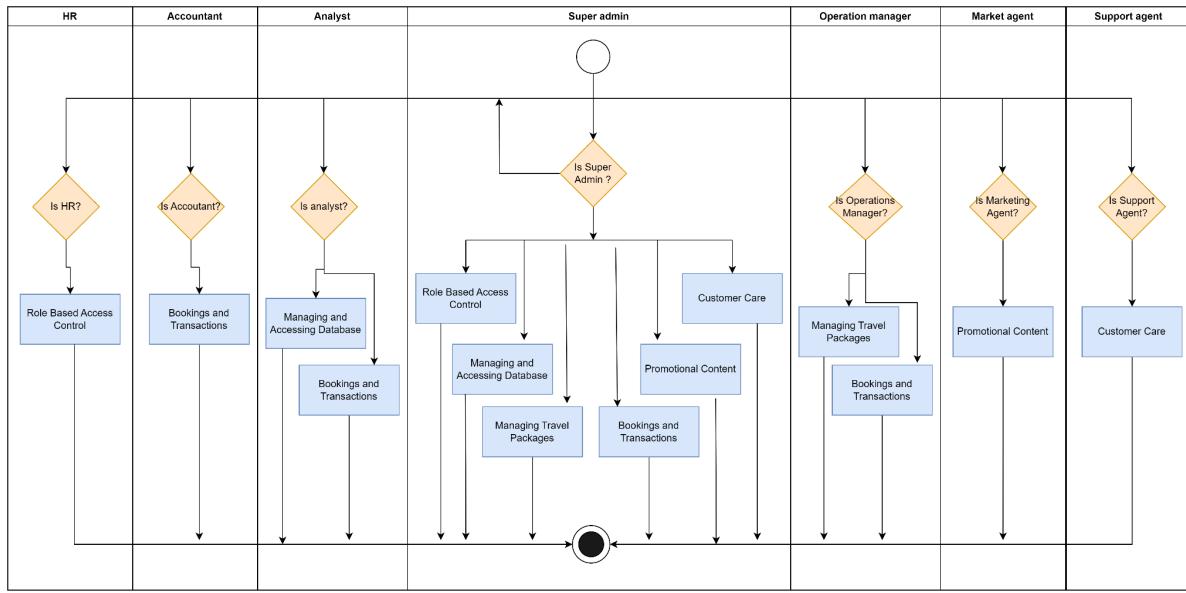


Level 1.3.2: View Dashboard

Level- 1.4

Name: Admin's Control

Reference: Use case and activity diagram level-1.4

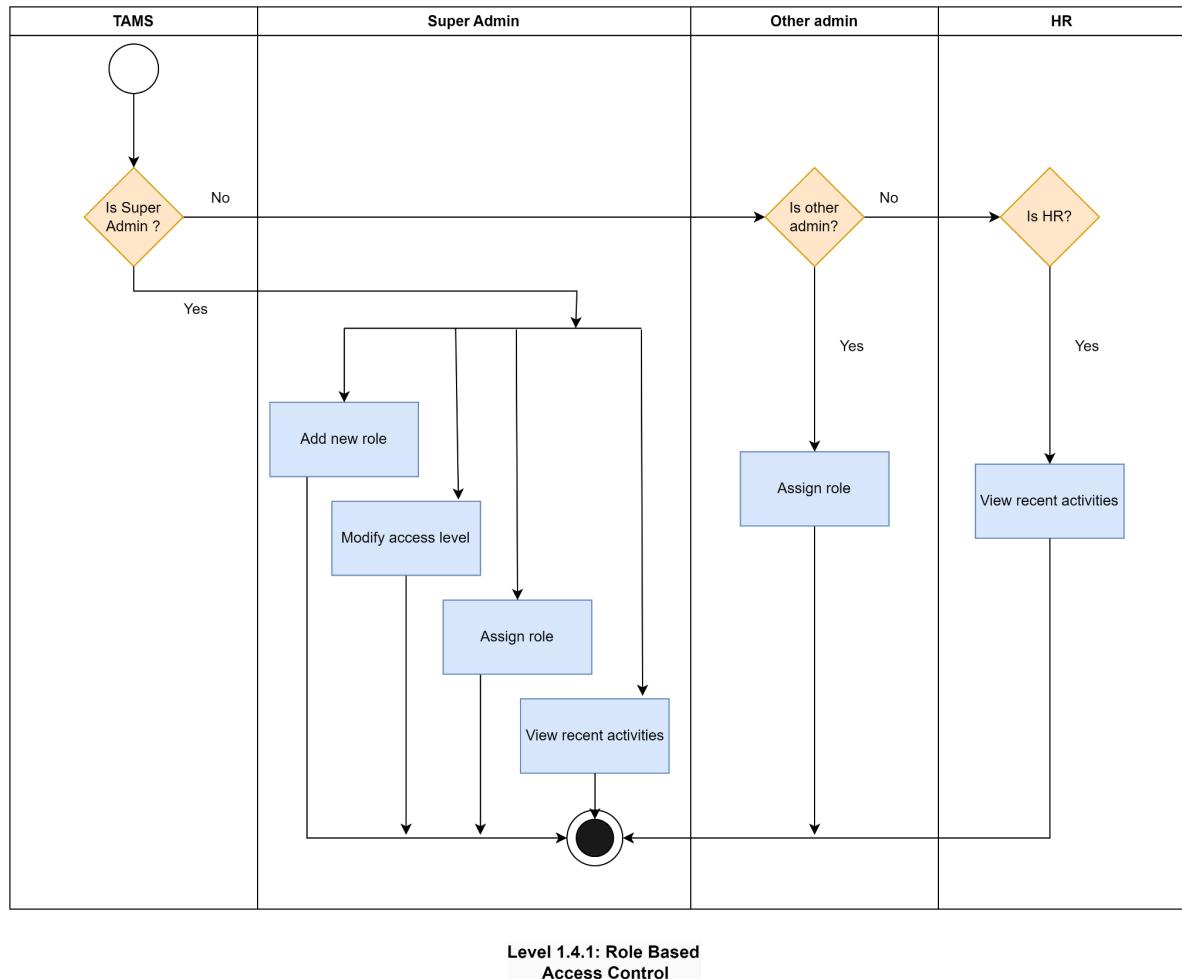


Level 1.4: Admin's Control

Level- 1.4.1

Name: Role Based Access Control

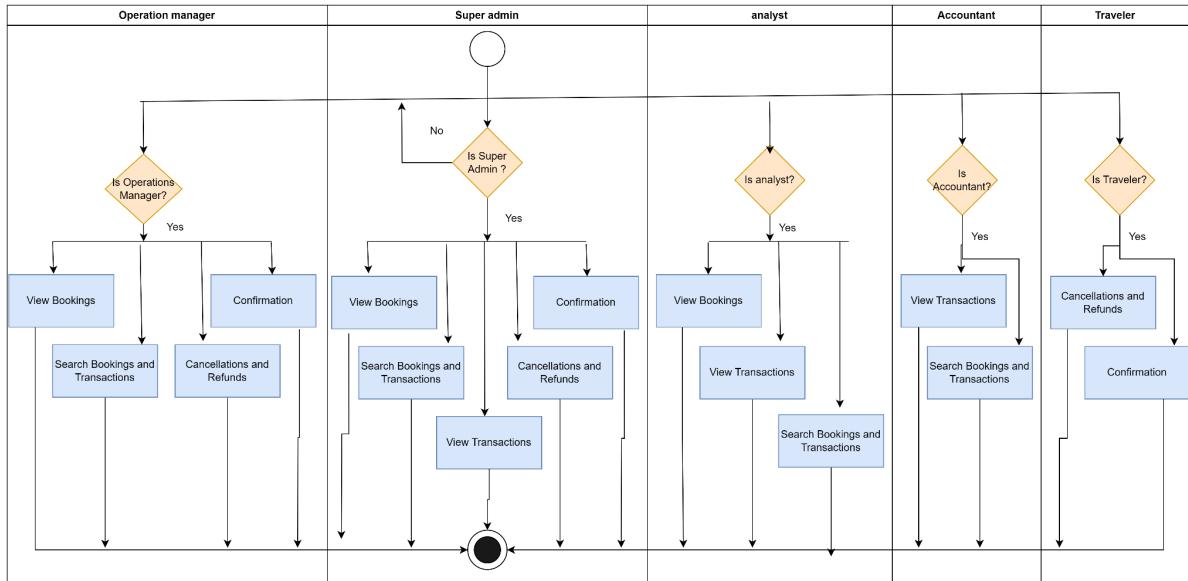
Reference: Use case and activity diagram level-1.4.1



Level- 1.4.4

Name: Booking and Transactions

Reference: Use case and activity diagram level-1.4.4

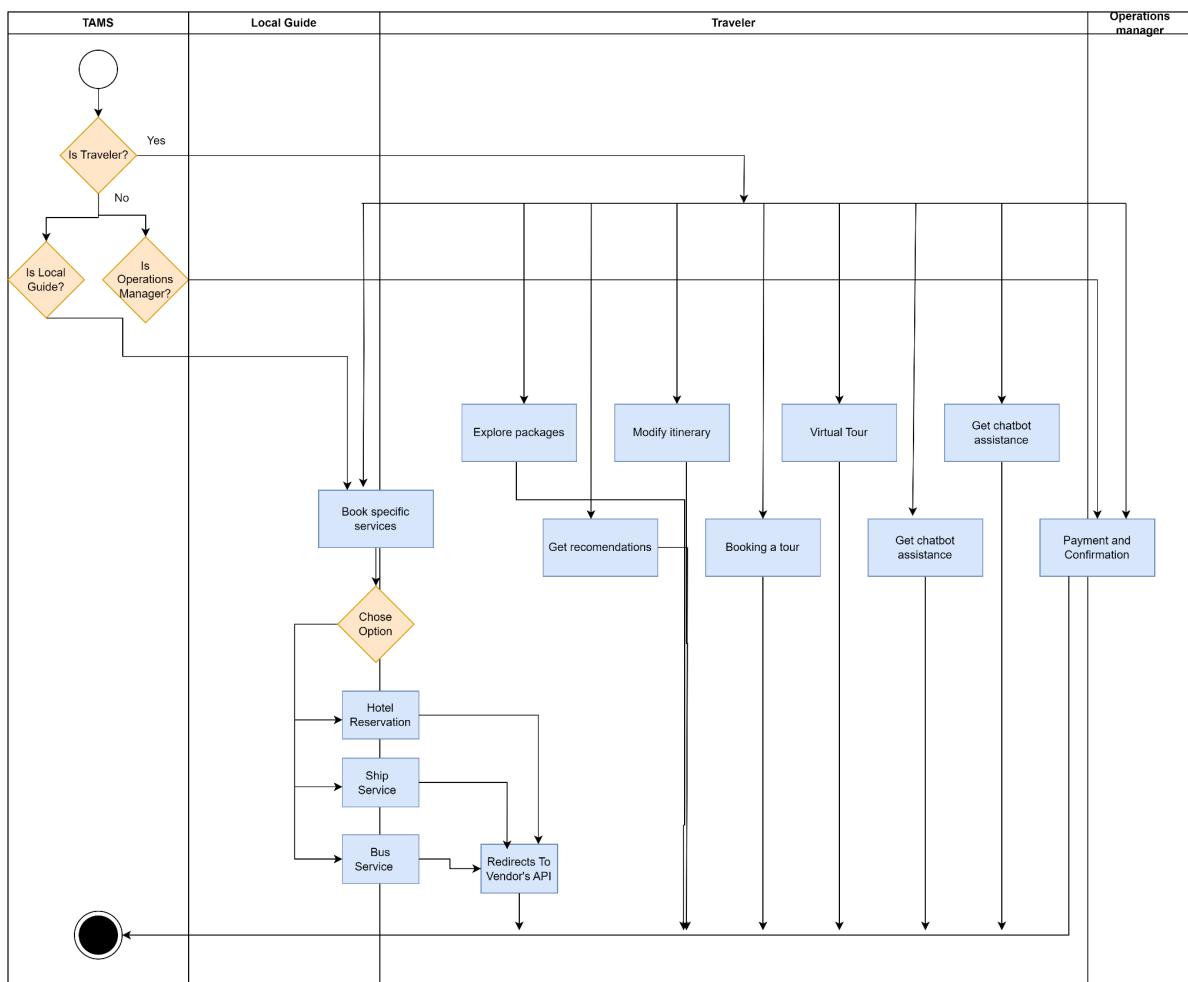


Level 1.4.4: Booking and Transactions

Level- 1.5

Name: Booking

Reference: Use case and activity diagram level-1.5

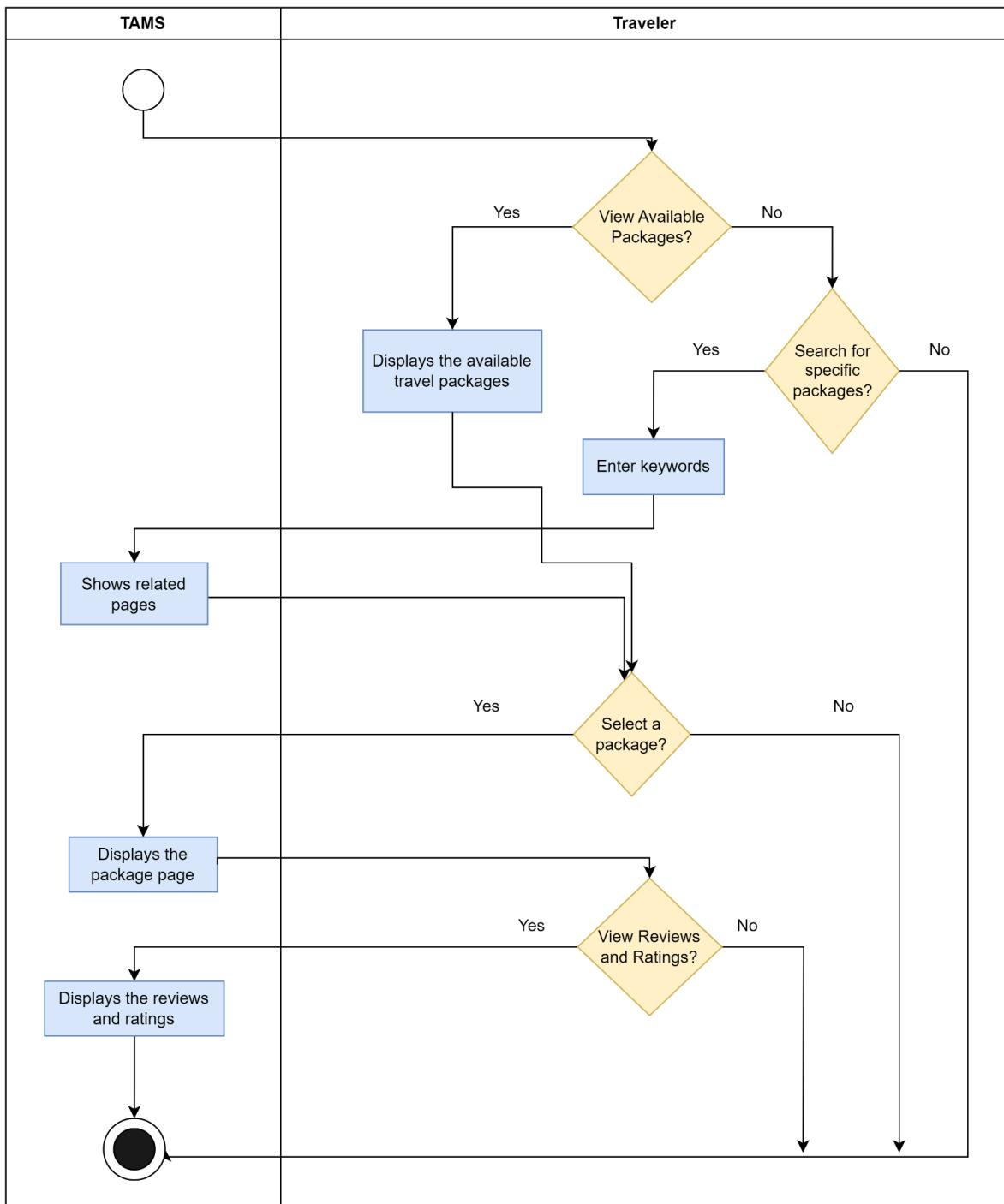


Level 1.5: Booking

Level-1.5.1:

Name: Explore packages

Reference: Use case and activity diagram level-1.5.1

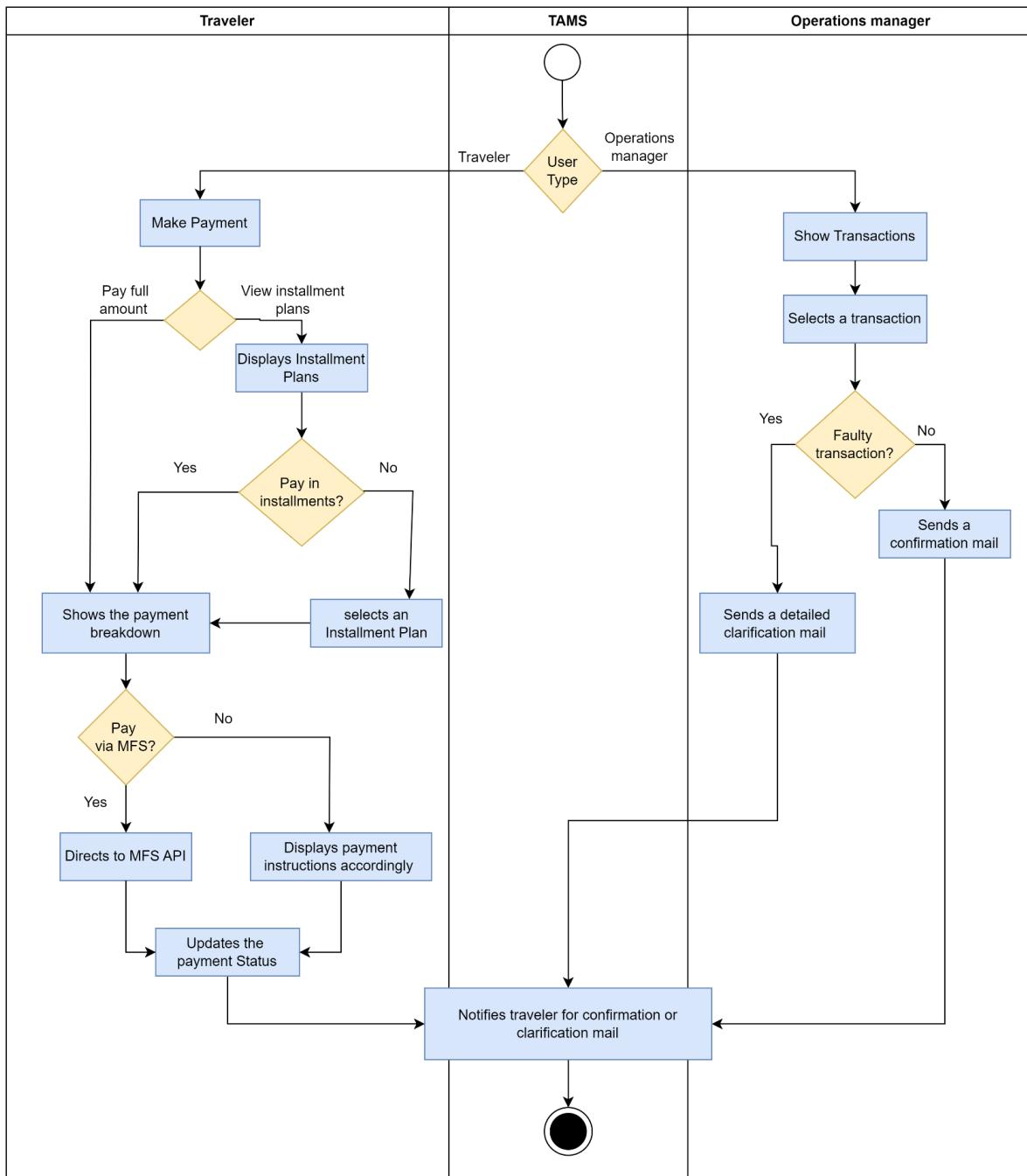


Level-1.5.1: Explore Packages

Level- 1.6

Name: Payment

Reference: Use case and activity diagram level-1.6

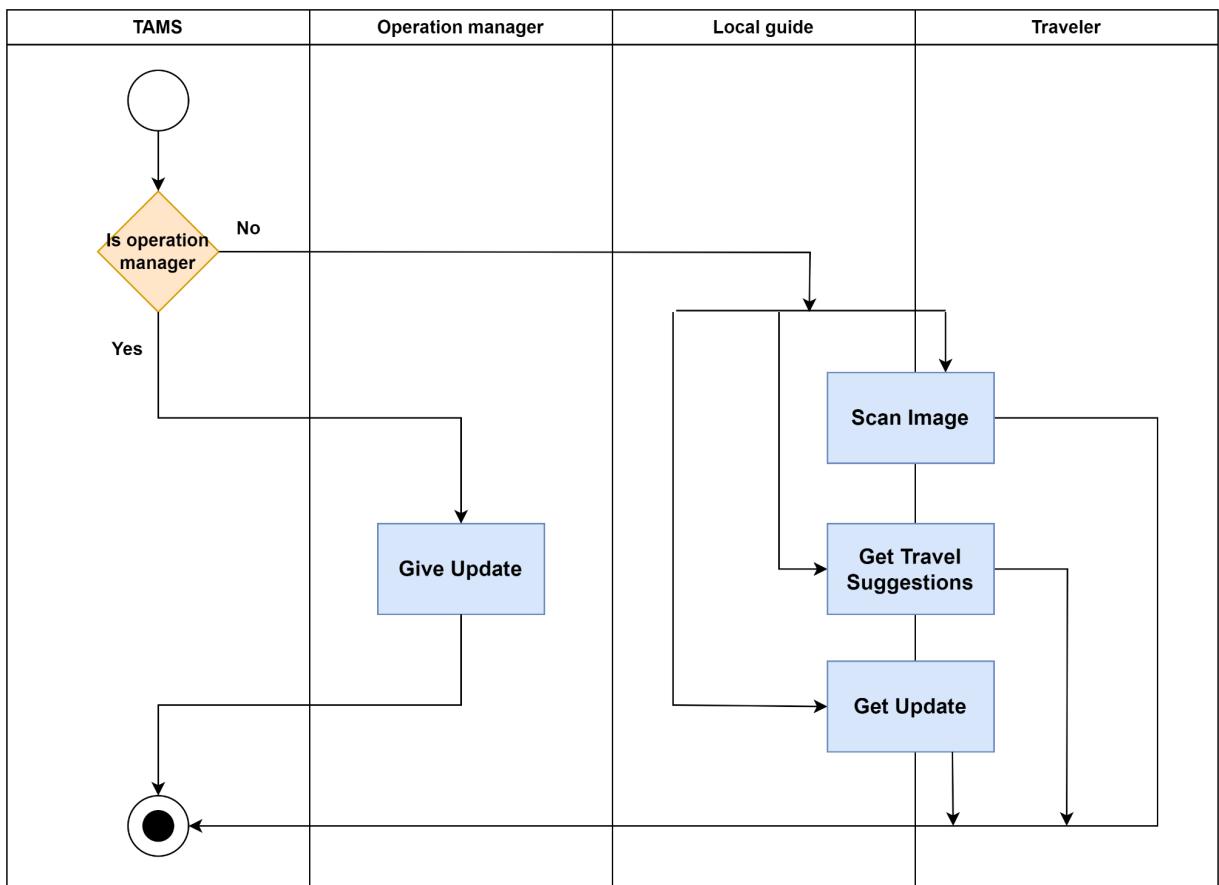


Level-1.6: Payment

Level-1.7

Name: Travel Time Guidance

Reference: Use case and activity diagram level-1.7

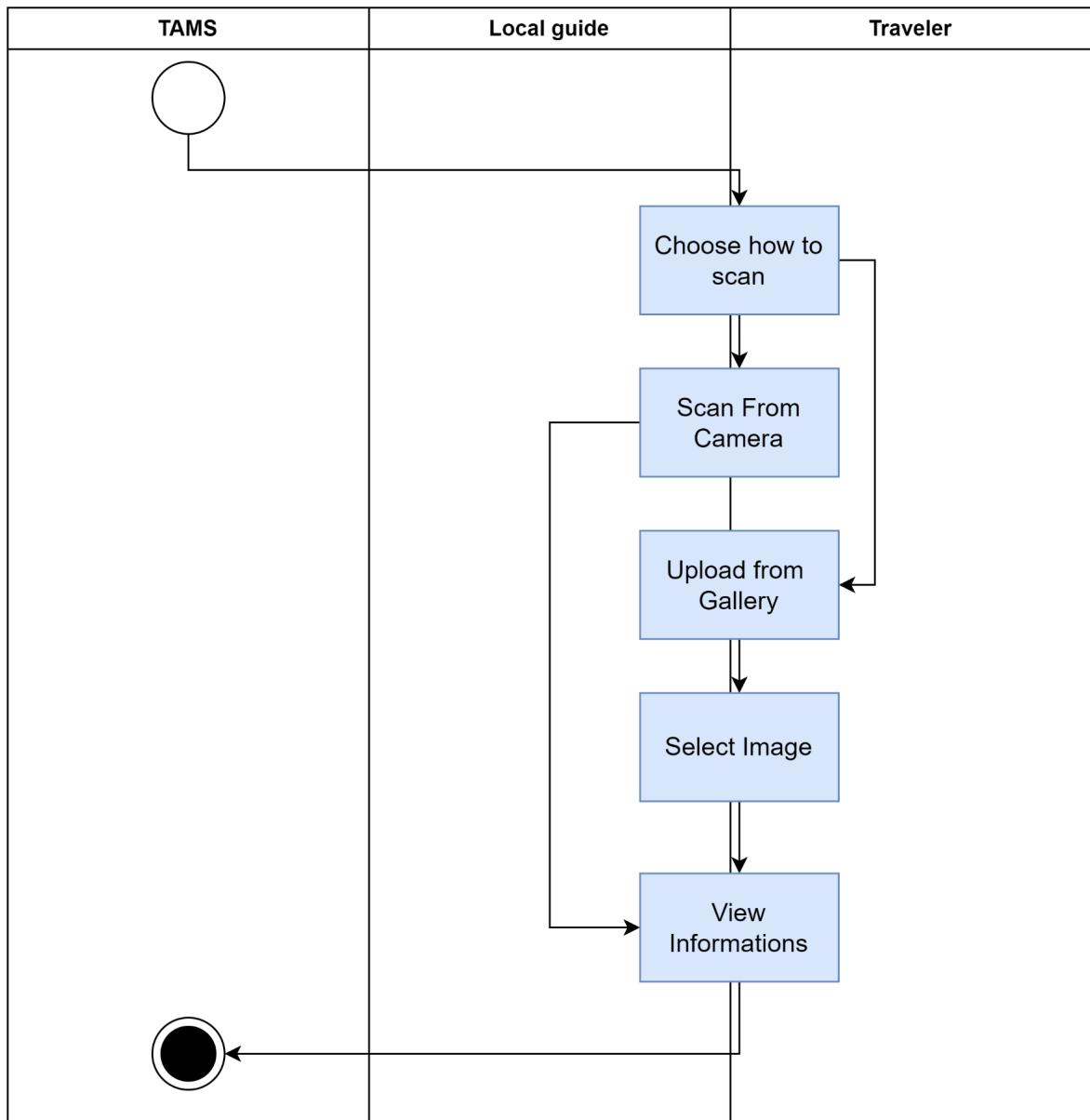


Level 1.7: Travel Time Guidance

Level-1.7.4

Name: Scan Image

Reference: Use case and activity diagram level-1.7.4

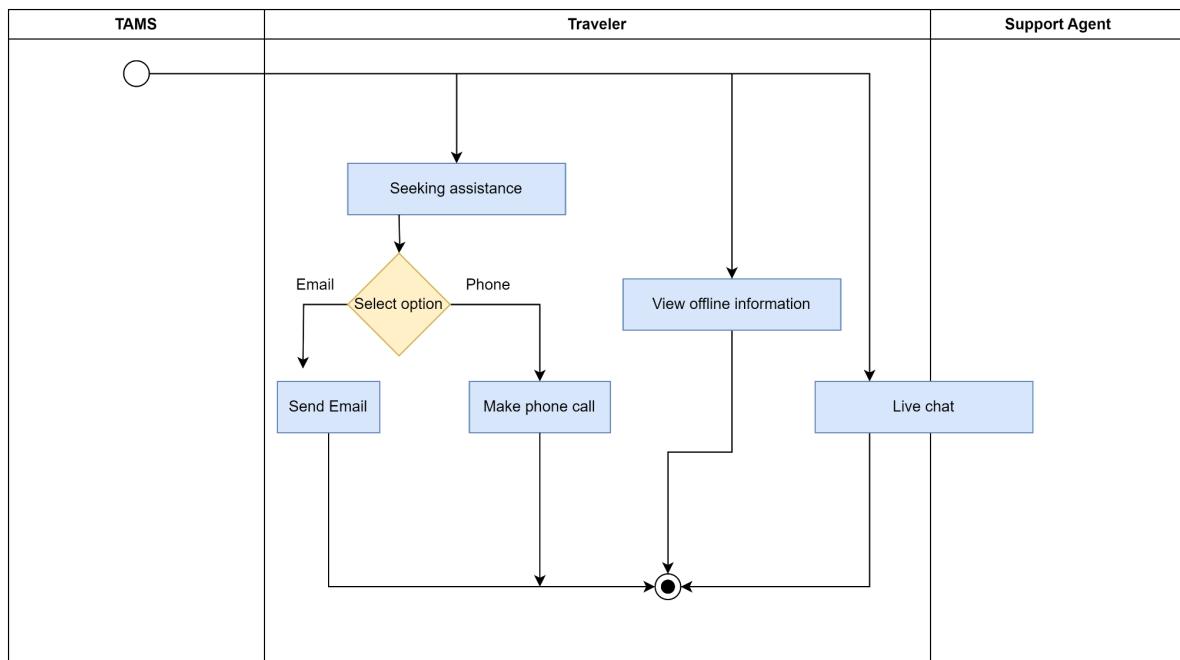


Level 1.7.4: Scan Image

Level-1.8

Name: Help and Support

Reference: Use case and activity diagram level-1.8



Level-1.8: Help and support

Data based modeling

Data Object Identification

Sl no.	Noun	P/S	Attribute
1	Registration Process	P	
2	User	S	Username, User Type, Email address, Phone Number, Password, profile, Registration Date, Activity Level
3	User Type	S	
4	Traveler	S	Username, User Type, Email address, Phone Number, Password, profile, Registration Date, Activity Level
5	Local Guide	S	Username, User Type, Email address, Phone Number, Password, profile, Registration Date, Activity Level
6	Usage	P	
7	Platform	P	
8	Credentials	P	
9	Username	S	
10	Email address	S	
11	Phone Number	S	
12	Password	S	
13	Alphanumeric Password	P	
14	Combination	P	
15	Letters	P	
16	Numbers	P	
17	Symbols	P	
18	Privacy	P	
19	Security	P	
20	Option	P	
21	Google Account	S	
22	Facebook Account	S	

23	Validity	P	
24	Account	P	
25	Email verification	P	
26	Confirmation message	P	
27	Registration	P	
28	login	P	
29	feature	P	
30	Returning users	P	
31	Recovery mechanism	P	
32	OTP	P	
33	authentication	P	
34	Two Factor Authentication	P	
35	Security measures	P	
36	convenience	P	
37	User Accounts	P	
38	Profile	S	Date of Birth, Gender, Travel preferences, Preferred Language, Travel history
39	Date of Birth	S	
40	Gender	S	
41	Travel preferences	S	
42	Needs	P	
43	Preferred Language	S	
44	Dashboard	P	
45	Travel history	S	
46	Notifications	P	
47	trip	P	
48	itinerary tools	S	
49	Itinerary	S	Dates, Transportation, Accommodation, Destination, Itinerary

			Tools
50	flight schedules	P	
51	accommodations	P	
52	activities	S	
53	opportunities	P	
54	travel offers	P	
55	Album	S	Album ID, Media Type, Media Link, Shareable link, Access levels
56	Album ID	S	
57	Media Type	S	
58	Media Link	S	
59	travel pictures	P	
60	Shareable link	S	

61	Access levels	S	
62	View	P	
63	Edit	P	
64	Admin ID	S	
65	Super admin account	P	
66	user account's database	P	
67	authority	P	
68	search and filtering option	P	
69	user groups	P	
70	registration date	S	
71	activity level	S	
72	admin	S	admin role, Admin ID, Password
73	admin role	S	
74	HR	S	admin role, Admin ID, Password
75	employee onboarding	P	

76	employee offboarding	P	
77	Accountant	S	admin role, Admin ID, Password
78	financial data	P	
79	reports	P	
80	invoices	P	
81	transactions	P	
82	identification	P	
83	Operations Manager	S	admin role, Admin ID, Password
84	creation	P	
85	deletion	P	
86	bookings	P	
87	capabilities	P	
88	refunds	P	
89	Traveler groups	P	
90	Travel dates	P	
91	content	S	
92	traveler inquiries	P	
93	traveler issues	P	
94	traveler concerns	P	
95	Marketing Agent	S	admin role, Admin ID, Password
96	promotional content	P	
97	Marketing campaigns	P	
98	Analyst	S	admin role, Admin ID, Password
99	analytics metrics	S	user statistics, booking trends, revenue figures, visual tools, Traveler satisfaction score
100	user statistics	S	
101	booking trends	S	
102	user engagement	P	

103	revenue figures	S	
104	visual tools	S	
105	graphs	P	
106	charts	P	
107	duties	P	
108	Traveler satisfaction score	S	
109	browsing experience	P	
110	Tour Packages	S	Package name, destinations, activities, availability, pricing
111	Package name	S	
112	destinations	S	
113	availability	S	
114	pricing	S	
115	preferences	P	
116	history	P	
117	recommendation s	P	
118	Search functionality	P	
119	criteria	P	
120	Services	S	service name, availability, pricing

121	service name	S	
122	keywords	P	
123	Dates	S	
124	flexibility	P	
125	groups	P	
126	number of participants	P	
127	hotel reservation platforms	P	

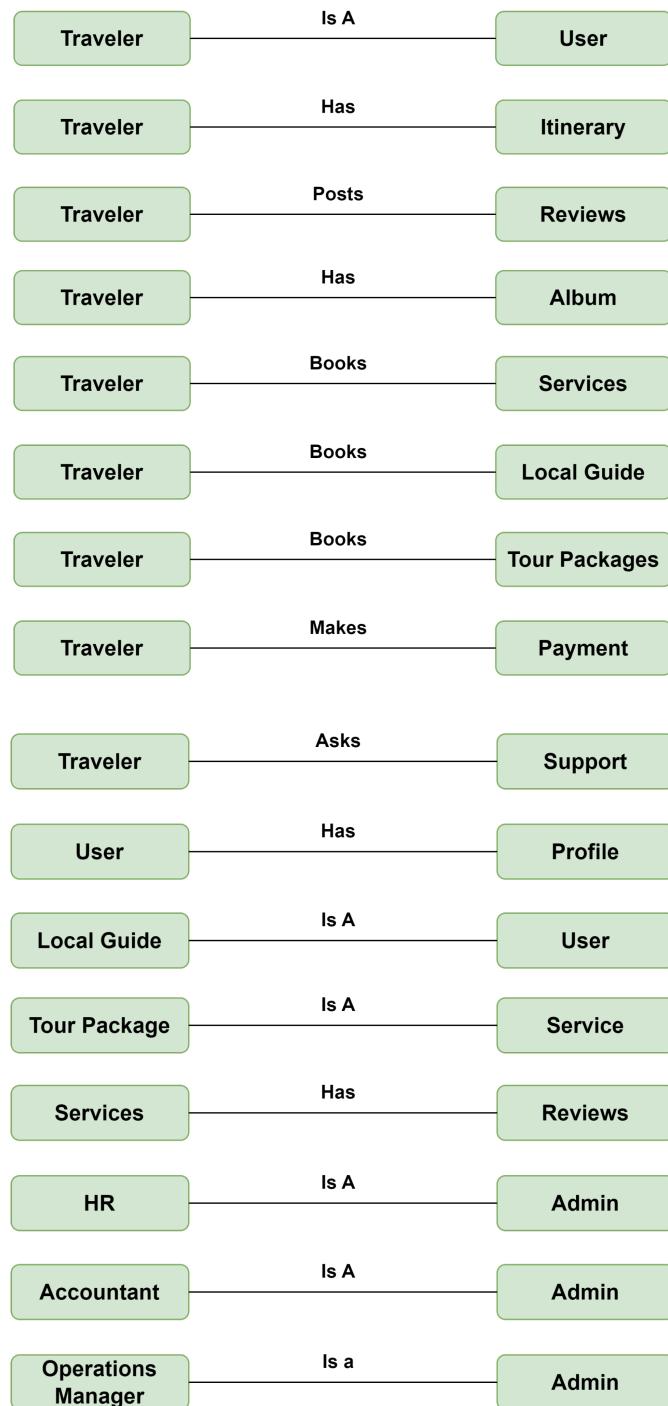
128	transportation	P	
129	Vendor API	P	
130	bus booking portal	P	
131	ship booking portal	P	
132	AR technology	P	
133	hotels	P	
134	attractions	P	
135	overview	P	
136	chatbot	P	
137	queries	P	
138	confirmation page	P	
139	details	P	
140	Reviews	S	rating, comment, content
141	comment	S	
142	rating	S	
143	changes	P	
144	reservations	P	
145	support	P	
146	emergencies	P	
147	payment process	P	
148	instructions	P	
149	payment options	S	mobile financial services,digital wallet, bank transfers, pay by cash
150	mobile financial services	S	
151	payment	S	invoices, transaction id, payment options, payment plans, booking cost
152	digital wallet	S	
153	bank transfers	S	
154	pay by cash	S	
155	location	P	
156	payment plans	S	installment options, percentage of amount, amount, time period

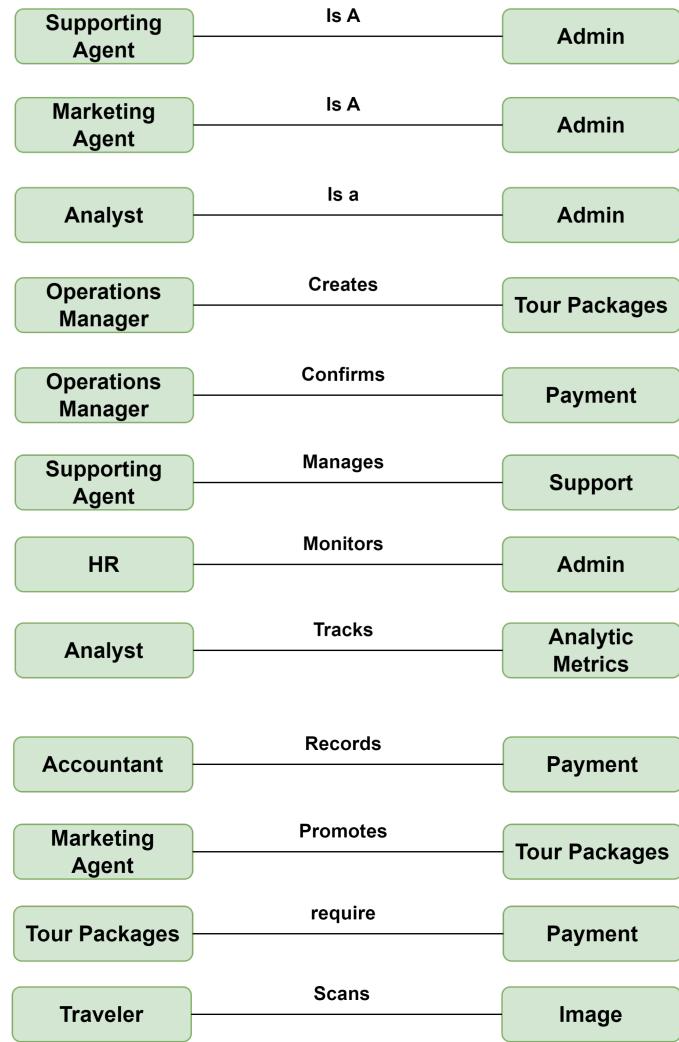
157	installment options	S	
158	percentage of amount	S	
159	amount	S	
160	time period	S	
161	booking cost	S	
162	completion	P	
163	confirmation	P	
164	transaction id	S	
165	transparency	P	
166	expenses	P	
167	updates	P	
168	Travel itinerary	P	
169	Flight delays	P	
170	cancellations	P	
171	Estimated travel time	P	
172	Realtime updates	P	
173	weather conditions	P	
174	traffic status	P	
175	SMS	P	
176	push notification	P	
177	inconvenience	P	
178	system	P	
179	suggestions	P	
180	journey	P	

181	image	P	i
182	image id	P	

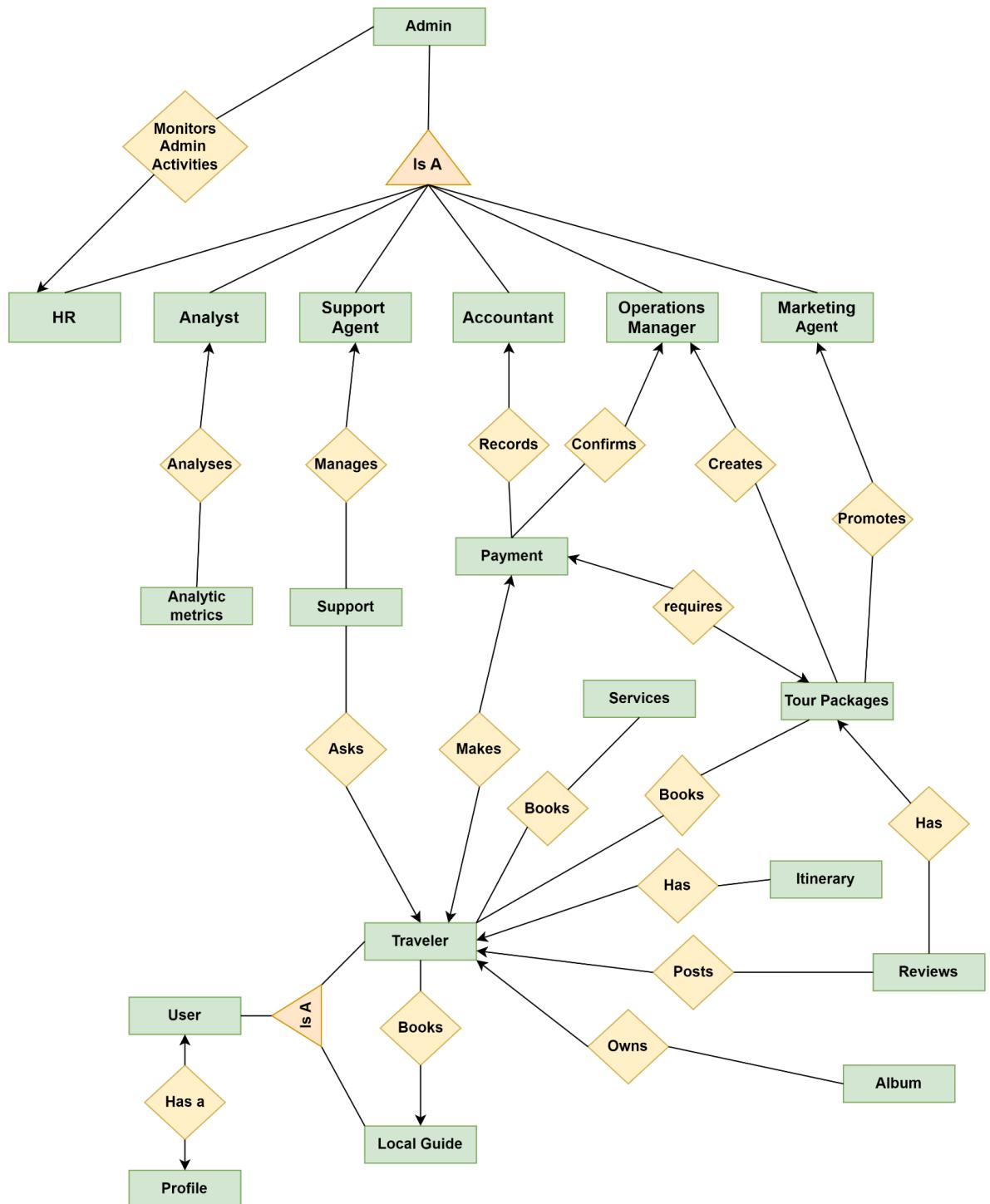
183	format	P	
184	dimension	P	
185	Travel Time Guidance	P	
186	help and support system	P	
187	channels	P	
188	chat	P	
191	booking inquiries	P	
192	offline access	P	
193	essential travel information	P	
194	Travel map	P	
195	FAQ	P	
196	situations	P	
197	Internet connectivity	P	
198	Live chat	P	
199	Real-time communication	P	
200	Support Agent	S	admin role, Admin ID, Password
201	inquiries	P	
202	round-the-clock	P	
203	assistance	P	
204	issues	P	
205	languages	P	
206	backgrounds	P	
207	accessibility	P	
208	inclusivity	P	

Relation





ER Diagram



6. Schema

Data Object	Variable
Profile	DOB date Gender Varchar (10) Preferred_Language varchar(20) Travel_Preferences Varchar (500) Travel_history Varchar (500) user_id varchar(30) [Foreign key from user]
User	user_id varchar(30) Username varchar (100), user_type varchar(50) Email_address varchar(100) Phone_Number varchar (20) Password varchar(20)
Itinerary	itinerary_ID varchar(30), traveler_id varchar(30) [foreign key from user], Tour_start_date date, Tour_End_date date, Transportation varchar(500), Accommodation varchar (500), Destination varchar (100)
Album	album_id varchar(30), traveler_id varchar(30) [foreign key from user] media_type varchar(50), link varchar (300)
Payment	traveler_id varchar(30), [foreign key from user] invoice_id varchar (30), package_id varchar(30), [foreign key from package] op_manager_id varchar(30) [foreign key

	from admin] accountant_id varchar(30) [foreign key from admin] payment_type varchar(100)
Tour Package	package_id varchar(30), Is_customized Boolean Package_name varchar(100), destination varchar(100), pricing NUMBER, package_creator_id varchar(30) [Foreign key from admin] m_agent_id varchar(30) [Foreign key from admin]
Service	service_id varchar (30), service_name varchar (100), pricing number
Package_Bookings	package_id varchar(30), traveler_id varchar(30)
Service_Bookings	service_id varchar (30) [Foreign key from Service], traveler_id varchar(30) [Foreign key from User]
Reviews	package_id varchar (30) [Foreign key from package], traveler_id varchar (30) [Foreign key from admin], content varchar(100), rating number
Support	traveler_id varchar(30) [Foreign key from User], query_id varchar(30), query varchar(300), status varchar(40), support_agent_id varchar(30) [Foreign key from admin]

Admin	admin_id varchar(30) [Foreign key from admin], admin_role varchar(40), password varchar(20)
Local Guide Bookings	Traveler_id varchar(30) [Foreign key from User], local_guide_id varchar(30) [Foreign key from User]
Analytics Metrics	booking_trends varchar(40), revenue_figures number, Traveler_satisfaction_score number analyst_id varchar(30) [Foreign key from Admin]

Class Based Modeling

Class-based modeling defines the structure of the entire system by identifying the static structure of objects in that system. A class model defines attributes and operations for the objects of each class and also the relationship between the objects, and the collaborations that occur between the classes of the systems. The elements of a class-based model include classes and objects, attributes, operations, Class-Responsibility- Collaborator (CRC) models, collaboration diagrams, and packages.

General Characteristics

Candidate classes are categorized based on the seven general classification. The analysis classes manifest themselves in one of the following ways:

- 1.** External entities
- 2.** Things
- 3.** Events
- 4.** Roles
- 5.** Organizational units
- 6.** Places
- 7.** Structures

A candidate class is selected for special classification if it fulfills three or more characteristics.

List of Nouns in the Solution Space and their General Classification:

Noun	General Classification
User Account	2,7
User	1,4,5,7
User Type	2
Traveler	1,4,5,7
Local Guide	1,4,5,7
Username	2
Email address	2,7

Phone Number	2
Password	2
Google	1
Facebook	1
OTP	2
Two Factor Authentication	3
Profile	2,5,6,7
Date of Birth	2
Gender	2
Travel preferences	2
Preferred Language	2
Dashboard	2,6,7
Travel history	2
Notifications	2,3,7
Itinerary tools	2,7
flight schedules	2
accommodations	2,6
activities	2
travel offers	2
reviews	2,3,7
travel services	2
album	2,6,7
travel pictures	2
Shareable link	2
Access levels	2
Admin	1,4,5,7
search option	3
registration date	2
activity level	2

admin role	2
HR	1,4,5,7
Accountant	1,4,5,7
financial data	2,5
reports	2
invoices	2,6,7
transactions	2,3,7
Operations Manager	1,4,5,7
tour packages	2,5,7
bookings	2,3,5,6
refunds	2,3
Traveler groups	5
Travel dates	2
Support Agent	1,4,5,7
Marketing Agent	1,4,5,7
promotional content	2
Analyst	1,4,5,7
Analytics Metrics	2
user statistics	2
booking trends	2
user engagement	2
revenue figures	2
Package name	2
destinations	2
availability	2
pricing	2
recommendations	2,3,7
service name	2
Vendor API	1

System	1,2,6,7
Virtual Tour	2
chatbot	1,2
queries	2
comment	2
rating	2
MFS (Mobile Financial Services)	1
payment	2,3
payment option	2
installment options	2
amount	2
time period	2
booking cost	2
confirmation status	3
transaction id	2
Travel Time updates	2,3,7
Flight delays	2
cancellations	2
Estimated travel time	2
weather conditions	2
traffic status	2
Help and Support system	2,3,6
Email	2
chat	2
phone number	2
itinerary	2,5,6,7
Emergencies	2,3
Travel map	2,7
inquiries	2

List of Potential Classes after General Classification:

1. User	2. Bookings
3. Traveler	4. Support Agent
5. Local Guide	6. Marketing Agent
7. Google	8. Analyst
9. Facebook	10. Recommendations
11. Profile	12. Mobile Financial Services
13. Dashboard	14. Vendor API
15. Notification	16. Help and Support System
17. Reviews	18. Itinerary
19. Album	20. Travel Time Updates
21. Admin	22. System
23. HR	24. Chatbot
25. Accountant	26. Transactions
27. Invoices	28. Tour Packages
29. Operations Manager	

Selection Criteria

Candidate classes are categorized based on the seven general classification. The analysis classes manifest themselves in one of the following ways:

1. Retained Information
2. Needed Services
3. Multiple Attributes
4. Common Attributes
5. Common Operations
6. Essential Requirements

A final class list is made after reviewing the list and merging multiple candidate classes if needed.

Potential Classes	Selection Criteria
User	1, 2, 3, 4, 5
Traveler	1, 2, 3, 4, 5
Local Guide	1, 2, 3, 4, 5
Google	6
Facebook	6
Profile	1,2,3,4,5
Dashboard	1,2,3,4,5
Notification	2,3,4,5
Reviews	1,2,3,4,5
Album	1,2,3,4,5
Admin	1,2,3,4,5
HR	1,2,3,4,5
Accountant	1,2,3,4,5
Invoices	1,3,4,5
Transactions	1,2,3,4,5
Operations Manager	1,2,3,4,5
Tour Packages	1,2,3,4,5
Bookings	1,2,3,4,5
Support Agent	1,2,3,4,5
Marketing Agent	1,2,3,4,5
Analyst	1,2,3,4,5
Recommendations	2,4,5
MFS	6
Vendor API	6
Help and support system	1,2,3,4,5
Itinerary	1,2,3,4,5
Travel Time updates	1,2,3,4,5
System	6
Chatbot	6

Analysis

We can integrate notifications as an attribute of the user Dashboard class and Reviews as an attribute of the Tour Package class, Invoice into Transactions class and consider Recommendation System as a part of System class. We can also discard Booking class as its attributes are distributed in different modules like Tour Package, System, Transactions etc. We can further classify User as a superclass of Traveler and Local Guide and HR, Accountant, Analyst, Support Agent, Marketing Agent and Operations Manager as subclasses of Admin class.

We introduce a Database class to manage all the data that needs to be stored in the database.

Class Cards

1. User

Attribute	Methods
-username -user_type -email address -phone number -password - registration_date - activity_level	+ registration() + login() + update_account_information() + Enable_2FA() + Disable_2FA() - encrypt_password() - recieve OTP() - validate_password() - confirmation()
Responsibility	Collaborator
Registration and authentication	Google, Facebook, Database
Storing and updating Account Information	Database
Displays Confirmation Message	System

2. Traveler

Attribute	Methods
Dashboard	+create_itinerary() +update_itinerary() +create_album() +add_to_album() +share_album() +browse_packages() +get_recomendations() +get_virtual_tour() +ask_AI() +get_support() +leave_review() +view_reviews()
Responsibility	Collaborator
Creating and modifying itinerary	Database
Create, share and add to albums	Database
Getting personalized recommendations	System
Browsing Packages, leave or view reviews	System
Getting a virtual Tour	System
Getting chatbot assistance	Chatbot
Get Support from the System	Help and Support System

3. Local Guide

Attribute	Methods
- service_charge	+ set_service_charge() +update_service_charge() +approving_trav_req() +decline_trav_req()
Responsibility	Collaborator

Setting and Updating service charge	
Confirm or decline booking	Booking

4. Google

Attribute	Methods
-User Account -OTP -2FA	- verify_otp() - send_2FA_notification() - generate_random_otp() - send_otp() +login_with_Google
Responsibility	collaborator
Verifying authentication	User
Sending OTP to User	User

5. Facebook

Attribute	Methods
-User Account	+ login_with_facebook()
Responsibility	collaborator
Verifies user login	User

6. Booking

Attribute	Methods
	+book_a_service() +book_a_package() +book_local_guide() - make_payment()
Responsibility	Collaborator
Book Vendor Services	Vendor API
Book Tour Packages	Database
Book Local Guide	Local Guide, Database
Making payment	Payment

7. Dashboard

Attribute	Methods
-Date of Birth -Gender -Travel preferences -Preferred Language -travel_history -notifications	+ update_profile() + view_travel_offers() + show_notifications() + clear_notifications() + view_travel_history()
Responsibility	Collaborator
Update profile content	Database
Displays dashboard content	System
Shows notifications	System

8. Database

Attribute	Methods
+ table_name	+create_table() +update() +insert() +fetch() +delete() +show_table_data()
Responsibility	collaborator
Storing , updating and managing Account Information	User, Admin
Creating and modifying itinerary	Traveler
Creating, sharing and adding to albums	Traveler
Keeping records of Tour Packages	Booking
Updating profile content	Dashboard
Providing Transactions	Accountant
Adding invoice	Payment
Creating travel groups based on bookings of similar date and destination	Operations Manager
Adding new reviews	Tour Packages
Displaying all packages or find specific packages or reviews	System
Sending Notifications to User Dashboard	System

9. Admin

Attribute	Methods

<ul style="list-style-type: none"> - admin_id - admin_role - password 	<ul style="list-style-type: none"> + assign_admin_role() + update_admin_access() + remove_admin_role() +login() +group_users() +delete_user_account() +disable_user_account() +activate_user_account()
Responsibility	Collaborator
Login using password	
Manage User Account Details	User, Database
Group users based on registration date and activity level	Database

10. HR

Attribute	Methods
	<ul style="list-style-type: none"> + monitor_admin_activity() - record_onboarding() - record_offboarding()
Responsibility	Collaborator
Monitors admin activity including onboarding and offboarding	Admin

11. Accountant

Attribute	Methods

- financial_data - reports	- generate_reports() + manage_financial_data() +view_transactions()
Responsibility	Collaborator
Manage Financial data and reports	
Oversee Transactions	Database

12. Payment

Attribute	Methods
- invoices - payment_options - installment_options - amount - time_period - booking_cost - refund - confirmation_status	+ process_payment() - manual_payment() - MFS_payment() - initiate_refund() + choose_payment_option() + choose_installment_option() - generate_invoice() - generate_record() - notify_payment_status()
Responsibility	Collaborator
Generates Invoice	Database
Handles payment via MFS	MFS
Notifies payment status	Operations Manager

13. Operations Manager

Attribute	Methods

	+manage_tour_packages() -create_package() -update_package() -delete_package() +record_booking() +send_confirmation() +send_cancellation() +handle_refunds() +create_travel_groups()
Responsibility	Collaborator
Manage Tour packages	Tour Packages, Database
Handle Booking cancellations and refunds	Payment
Record Bookings by overseeing transactions	Database
Send Confirmation or cancellation mails with refund details if needed	System
Create travel groups based on bookings of similar date and destination	Database

14. Tour Packages

Attribute	Methods
- package_name - destinations - availability - pricing - average_rating	+ set_package_name() + add_destination() + set_availability() + set_pricing() - calculate_average_rating() + display_package() +add_reviews() +show_reviews()
Responsibility	Collaborator

Add new reviews	Database
Display package, reviews	Traveler

15. Support Agent

Attribute	Methods
	+handle_inquiries() +handle_emergencies()
Responsibility	Collaborator
Monitors user emergencies and inquiries	Help and Support

16. Marketing Agent

Attribute	Methods
- promotional_content	+ update_promo_content() + promotes_package()
Responsibility	Collaborator
Promotes tour packages	
Update Promotional content on display	System

17. Analyst

Attribute	Methods
- analytics metrics - reports	+ get_analytics_metrics() + generate_reports() + use_visual_tools() - generate_graphs() - generate_charts()
Responsibility	Collaborator
Get Analytics Metrics	System
Generates Reports	

18. Mobile Financial Services (MFS)

Attribute	Methods
- payment - amount - transaction_id	+ process_payment() + view_amount() + generate_transaction_id() - validate_payment()
Responsibility	collaborator
Assist to pay bills	
Validates payment	Payment

19. Vendor API

Attribute	Methods

- travel_services	+receive_user_booking() +direct_to_vendor_gateway()
Responsibility	Collaborator
Confirms Service Bookings by redirecting to vendor gateway	Traveler

20. Help and Support System

Attribute	Methods
	+ initiate_chat() + user_inquiries() + handle_emergencies() + access_travel_map() + reply_user() + provide_support_channels()
Responsibility	Collaborator
Send replies or initiate chat with user	Traveler
Handle User queries and emergencies	Support Agent

21. Travel Time Updates

Attribute	Methods
- Flight_delays - cancellations: - Estimated_travel_time - weather_conditions - traffic_status	+ set_Estimated_travel_time() + set_flight_status() + set_weather_conditions() + set_traffic_status() + send_real_time_updates()

Responsibility	collaborator
Sends real time updates	Traveler

22. Chatbot

Attribute	Methods
- queries - response	- process_queries() - analyze_comments() +recieves_traveler_queries() +replies_traveler_queries()
Responsibility	Collaborator
Answers traveler queries	Traveler

23. System

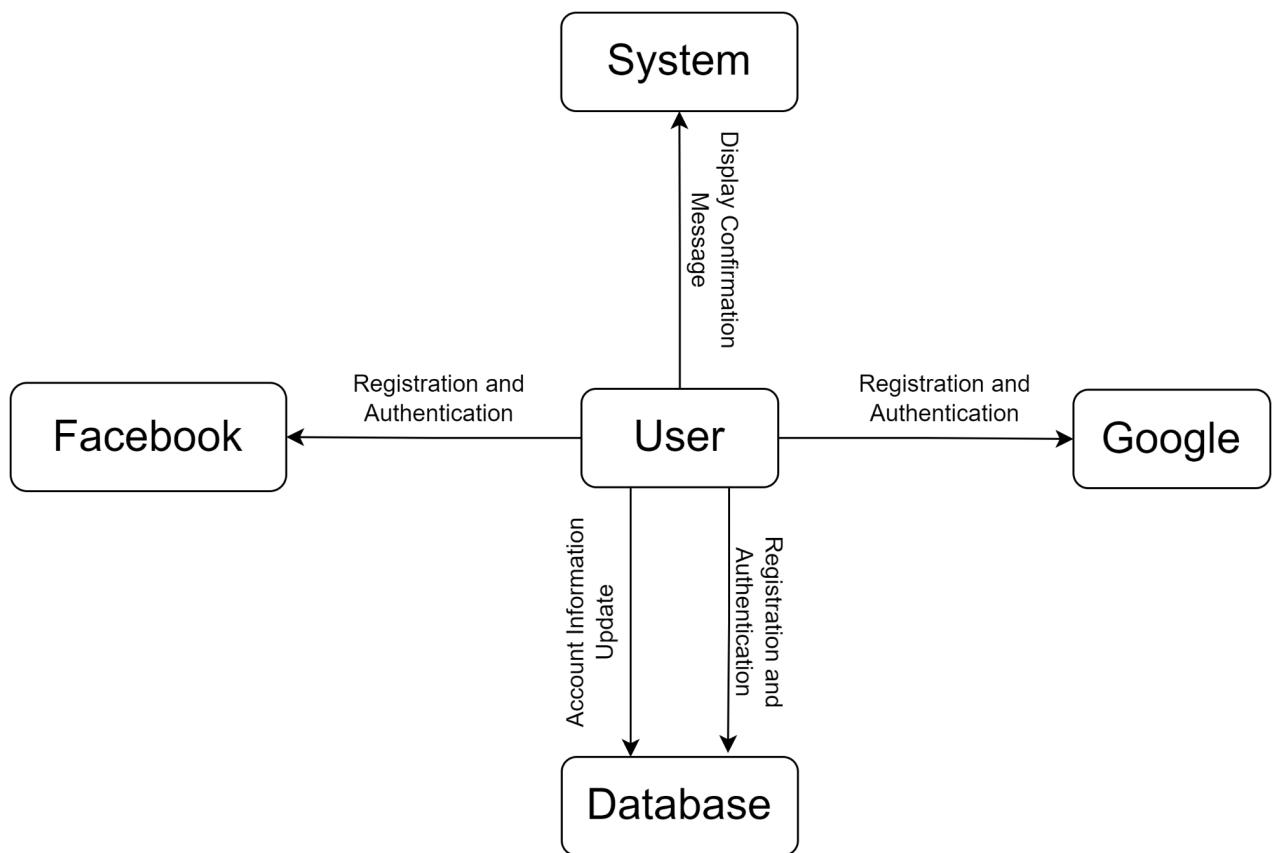
Attribute	Methods
- Tour Packages	+ generate_metrics() + generate_reccommendation() + virtual_tour() + display_homepage() + update_display_content() + explore_packages() + display_all_packages() + display_reviews + find_package() + display_confirmation_page() + display_cancellation_message() + send_notifications()
Responsibility	Collaborator
Give analytics metrics to the Analyst	Analyst
Allows User to explore travel packages, give reviews	Tour Packages

Display all packages or find specific packages or reviews	Database
Sends Notifications to User Dashboard	Dashboard

CRC-Diagram

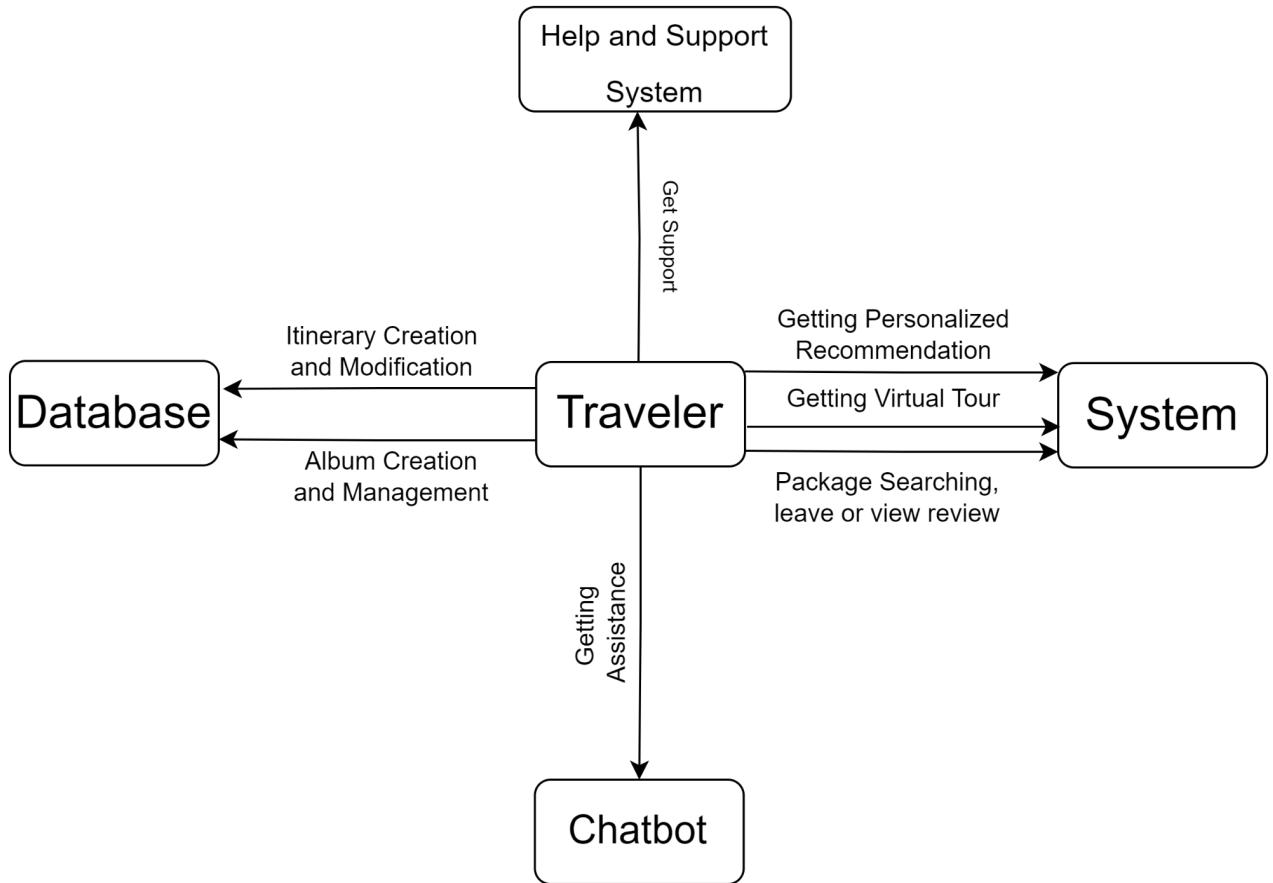
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Name: User



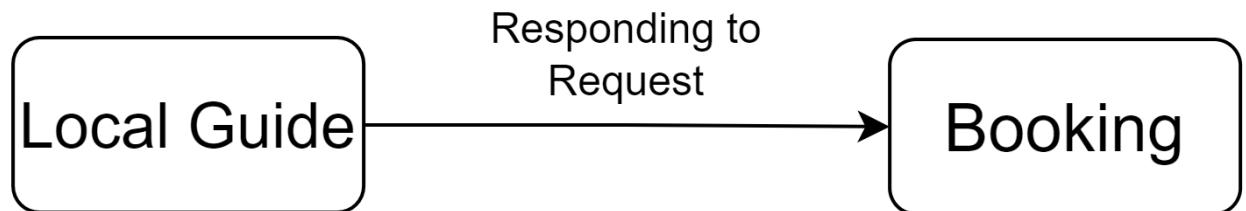
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Name: Traveler

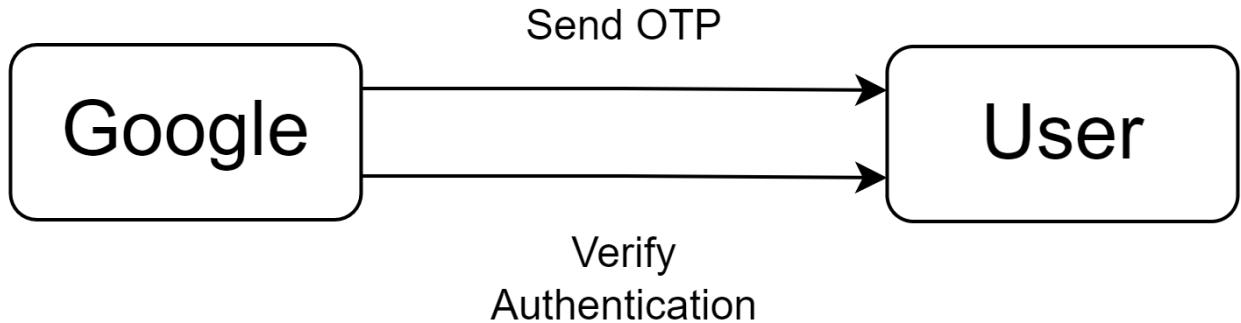


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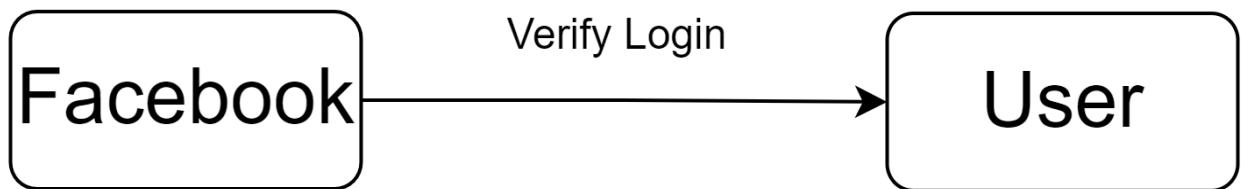
Name: Local Guide



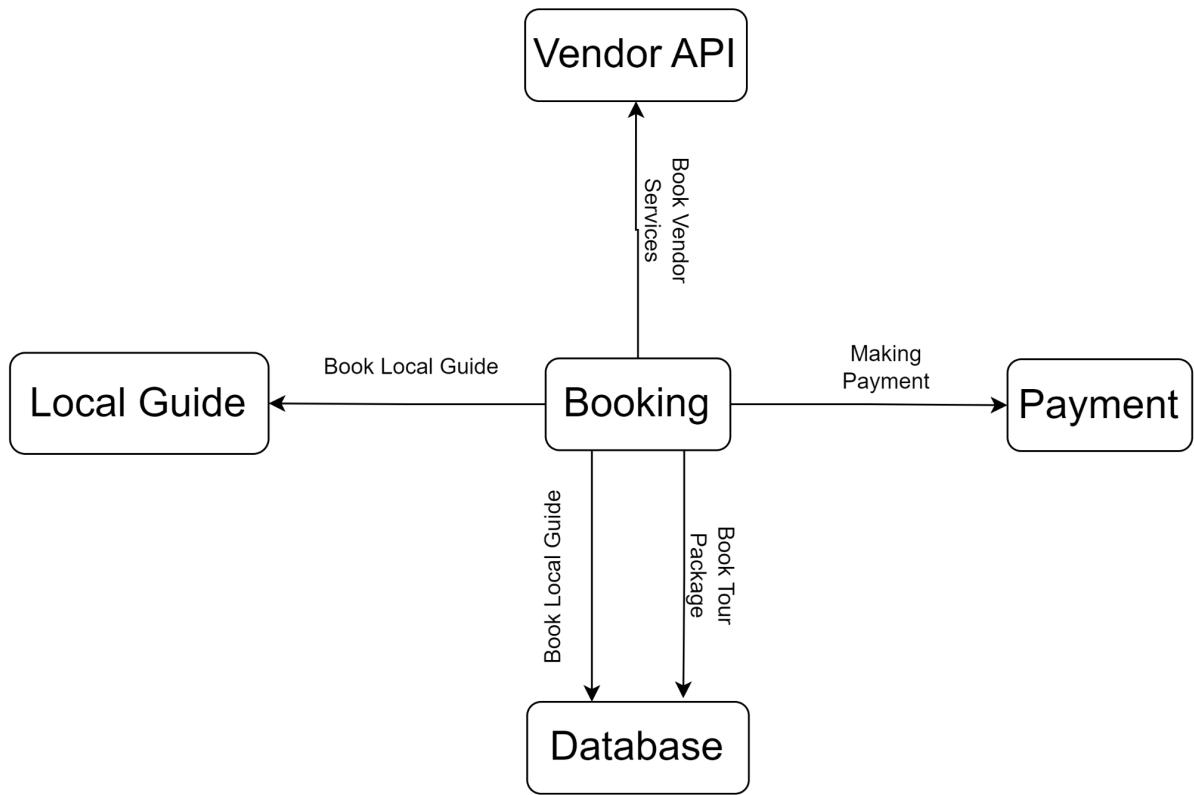
ID No: 4
Name: Google



ID No: 5
Name: Facebook



ID No: 6
Name: Booking



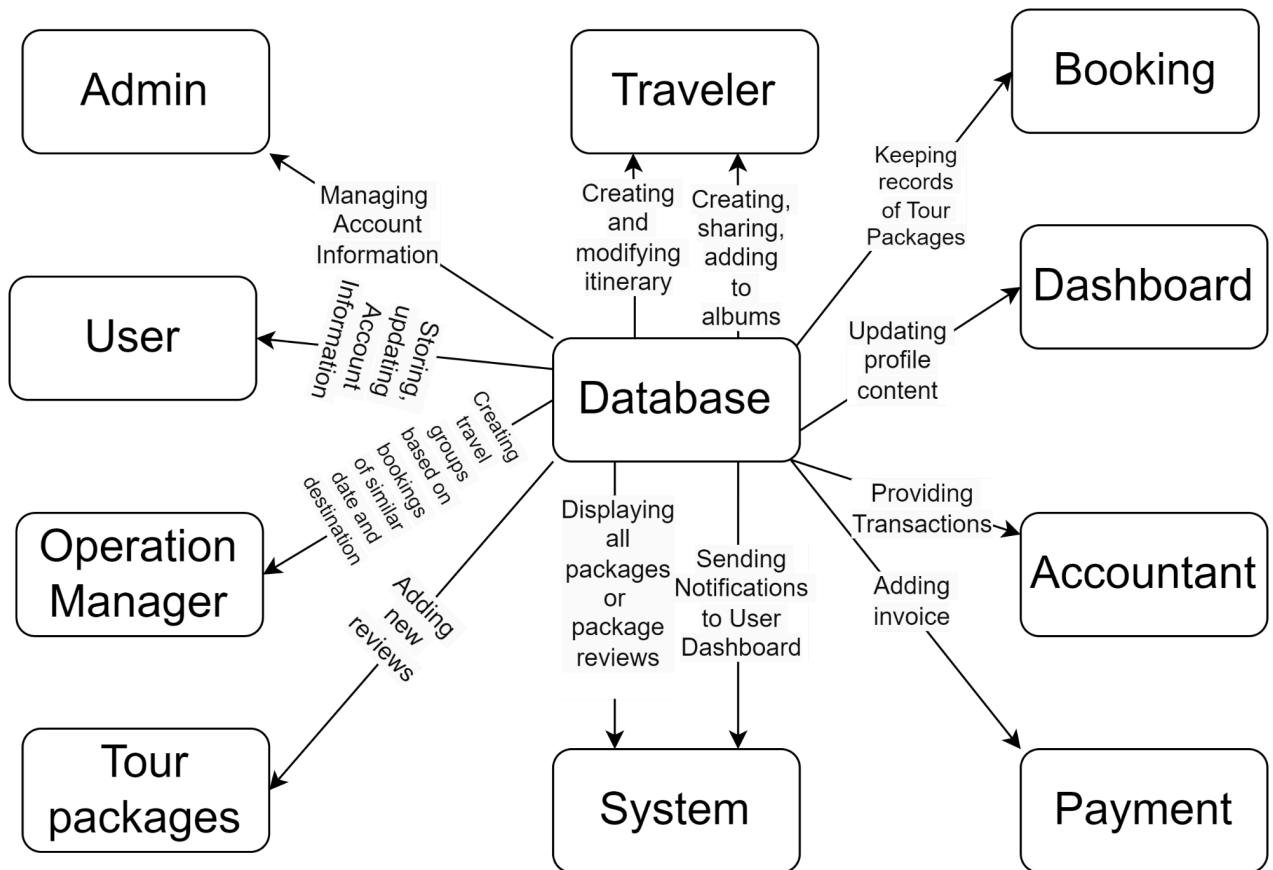
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Name: Dashboard



ID No: 8

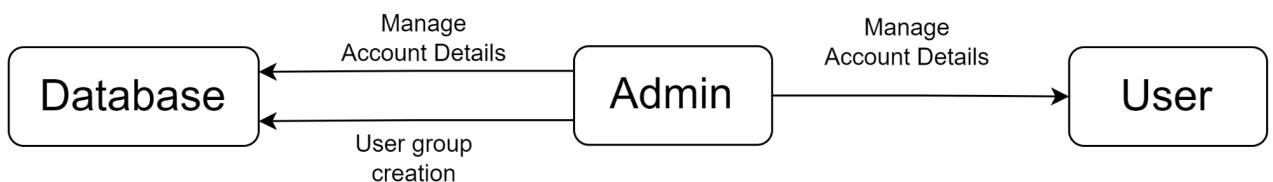
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ID-8

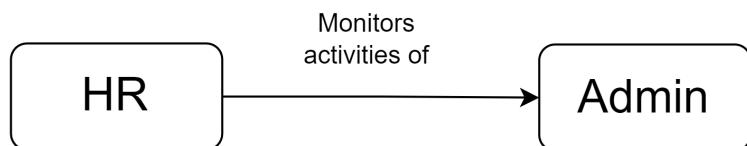
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Name: Admin



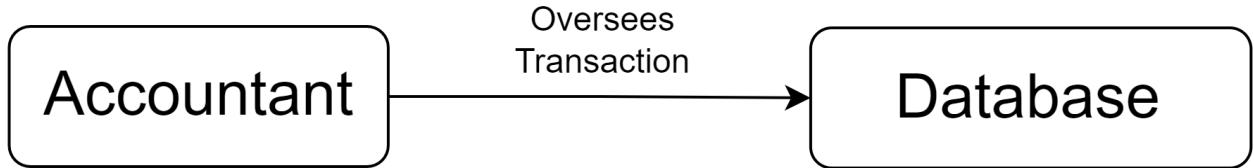
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Name: HR



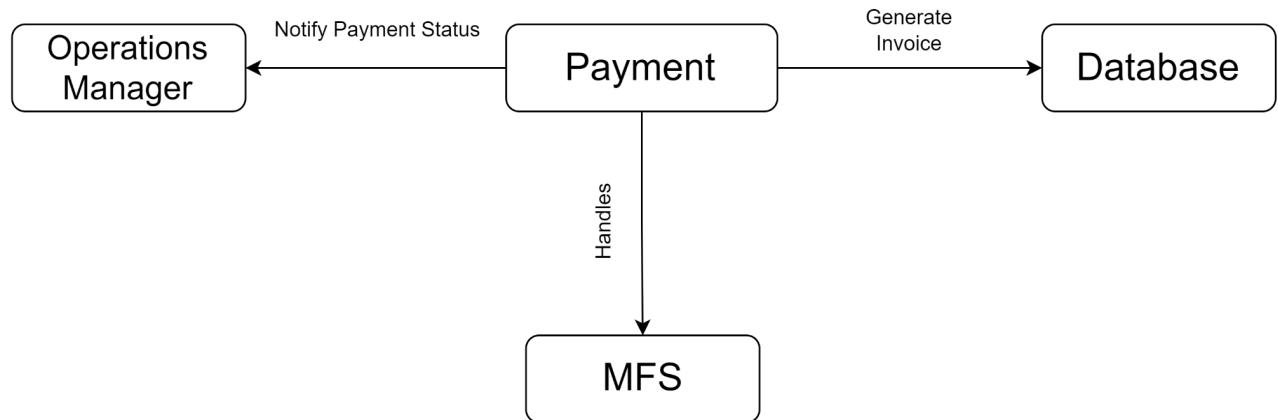
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Name: Accountant



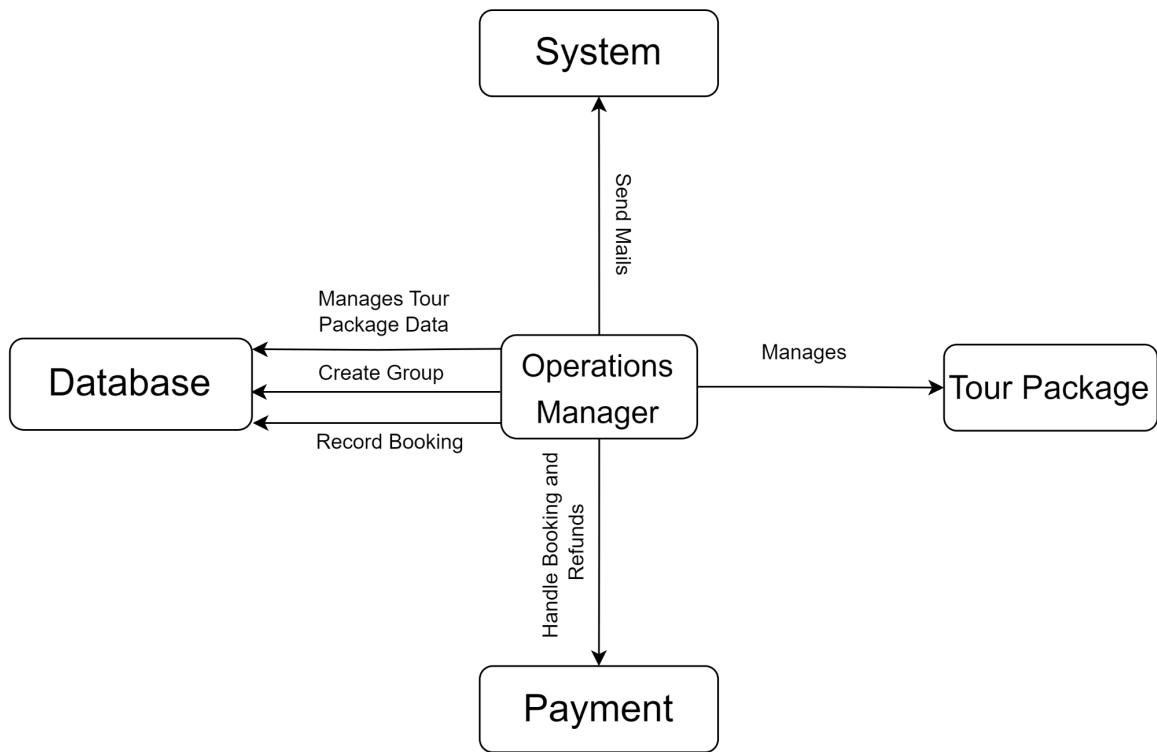
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Name: Payment



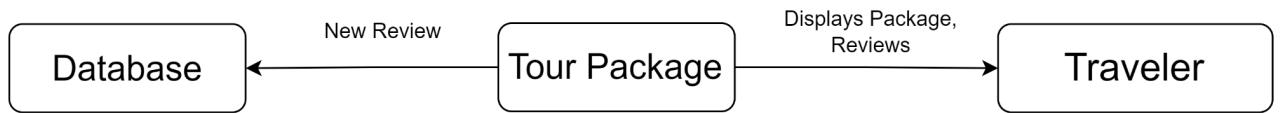
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Name: Operations Manager



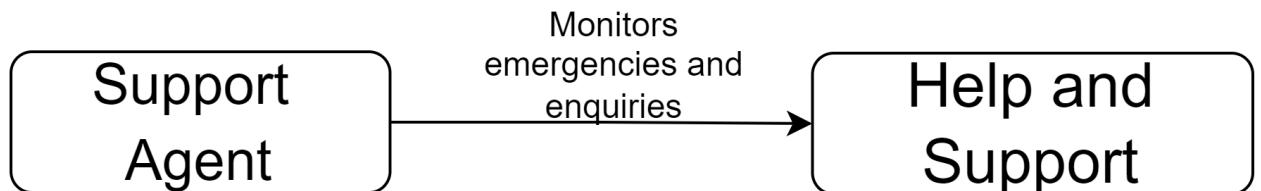
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Name: Tour Packages



ID No: 15

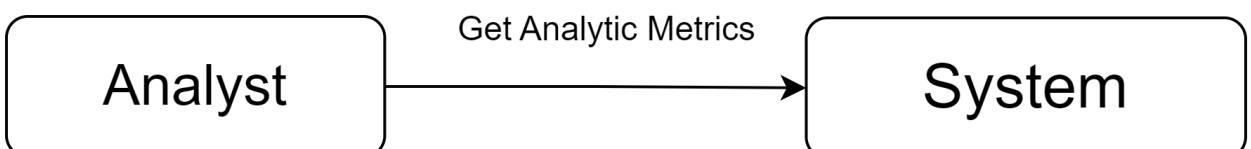
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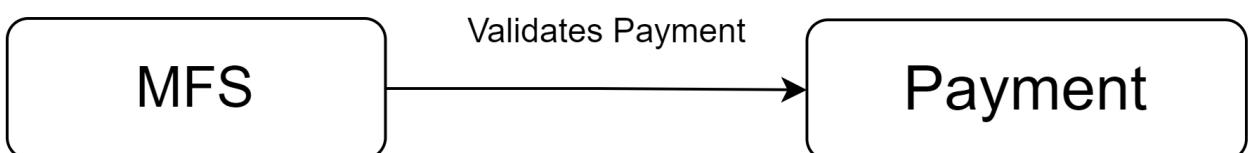
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Name Marketing Agent



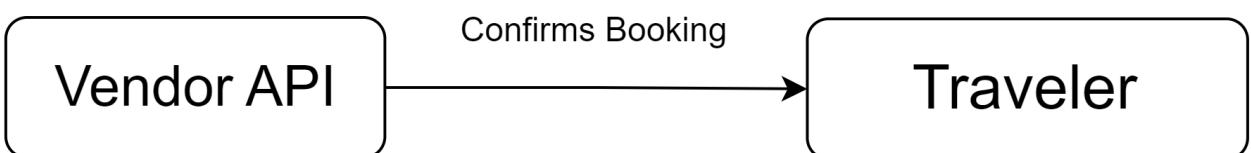
ID No: 17
Name: Analyst



ID No: 18
Name: Mobile Financial Services (MFS)

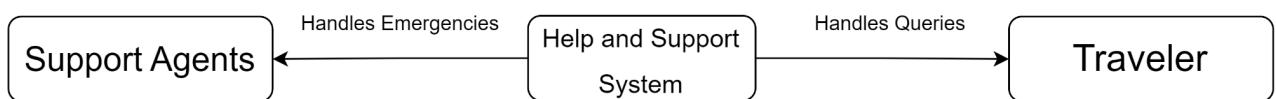


ID No: 19
Name: Vendor API



ID No: 20

Name: Help and Support System



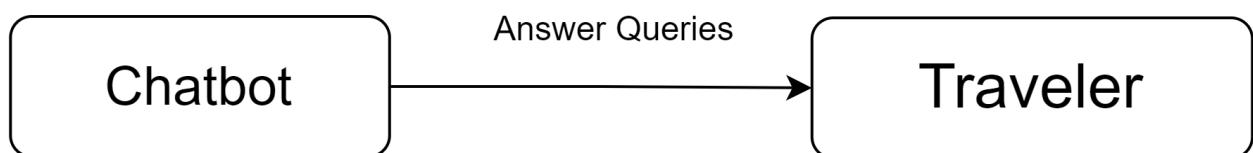
ID No: 21

Name: Travel Time Updates



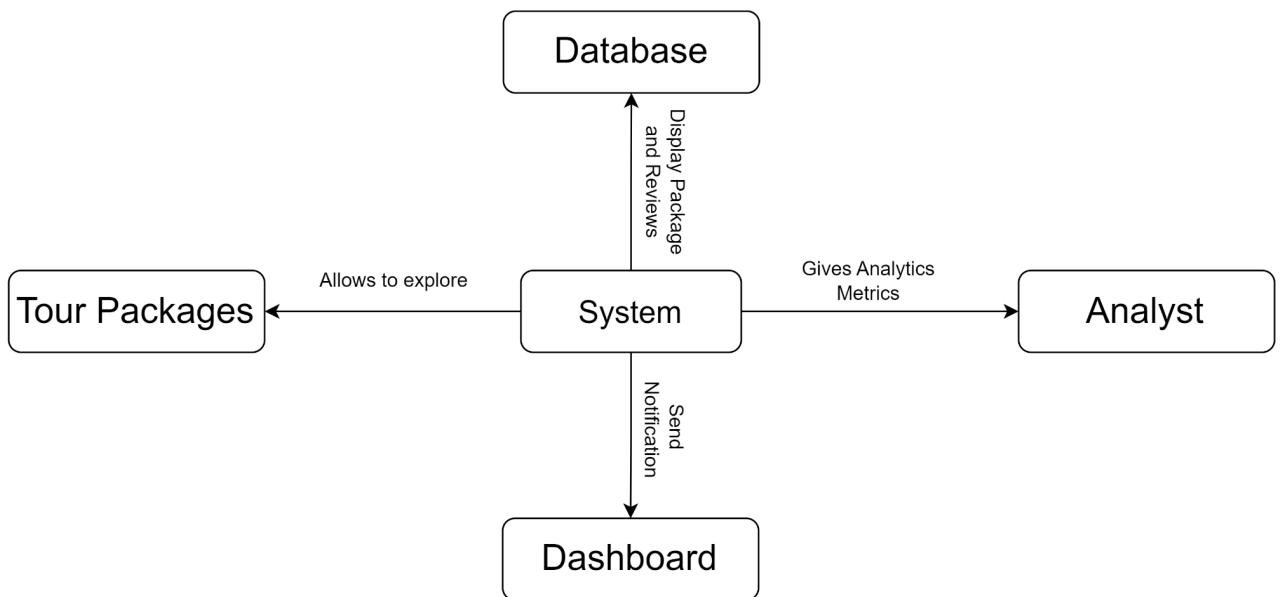
ID No: 22

Name: Chatbot



ID No: 23

Name: System



Behavioral Modeling

Event Table

Serial No	Events	Initiator	Collaborator	Associated Method
1	Initiate registration (Start)	User		+registration()
2	Specify user type	User		+registration()
3	Enter credentials	User		+registration()
4	Validate Password	User	System	-validate_password()
5	Storing account information	User	Database	+insert()
6	Display confirmation message	User	System	-confirmation()
7	Login	User	Google, Facebook	+login()
8	Enabling 2FA Authentication	User	Google	+enable_2FA()
9	Disabling 2FA	User	Google	+disable_2FA()
10	Update Profile	Dashboard	Database	+update_account_information()
11	View Travel History	Dashboard		+view_travel_history()

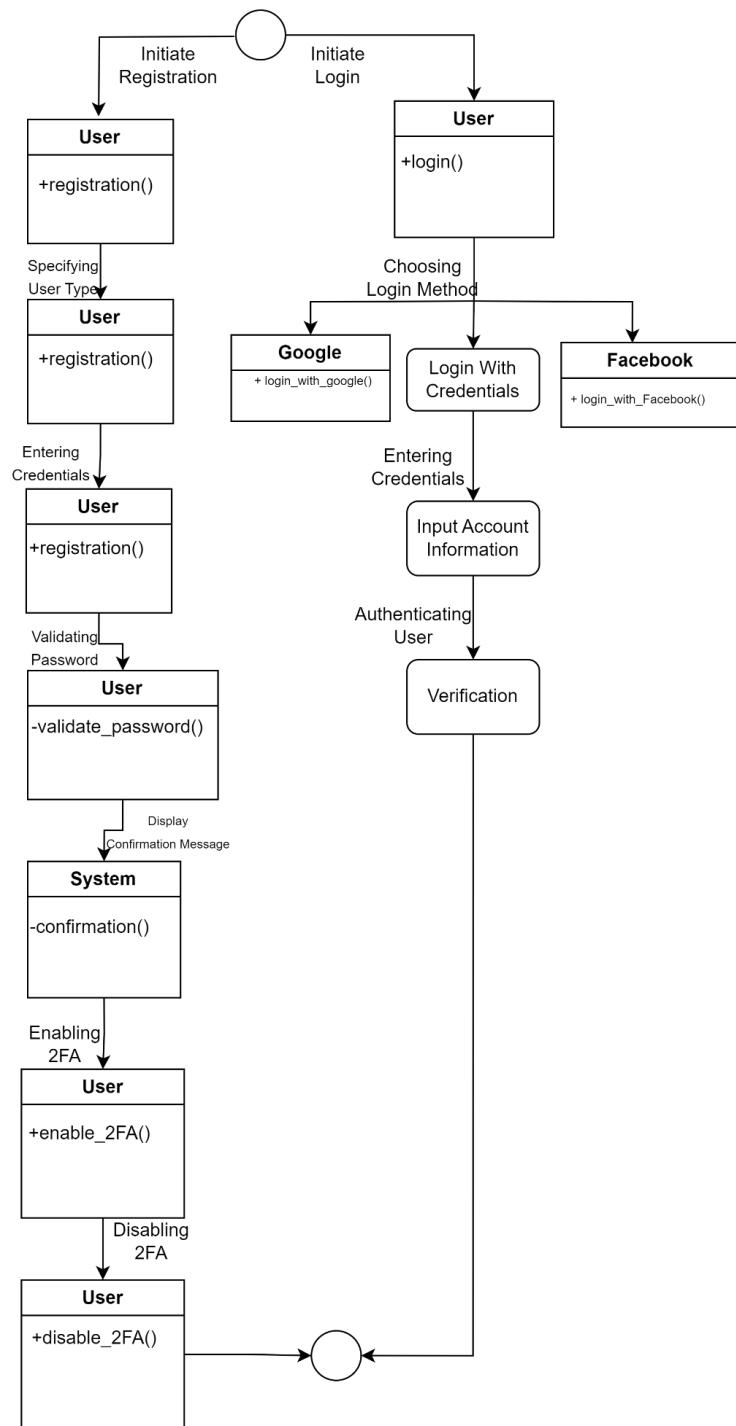
12	See Notifications	Dashboard		+show_notification()
13	Create Itinerary	Traveler	Database	+create_itinerary()
14	Update Itinerary	Traveler	Database	+update_itinerary()
15	Leave reviews and ratings	Traveler	System	+leave_review()
16	create new album	Traveler	Database	+view_review()
17	share album	Traveler	Database	+share_album()
18	Assign admin roles	Admin		+assign_admin_role()
19	Disable user account	Admin	Database	+disable_user_account()
20	Delete user account	Admin	Database	+delete_user_account()
21	Monitoring admin activities	HR	Admin	+monitor_admin_activity()
22	Managing employee onboarding	HR		-record_onboarding()
23	Managing employee offboarding	HR		-record_offboarding()
24	Managing financial data	Accountant		+manage_financial_data()
25	Generating financial reports	Accountant		-generate_reports()
26	Overseeing financial transactions	Accountant	Database	+view_transactions()
27	Creating tour packages	Operations Manager	Database	-create_package()
28	Modifying tour packages	Operations Manager	Database	-update_package()
29	Deleting tour packages	Operations Manager	Database	-delete_package()
30	Approving bookings	Operations Manager	Database	+send_confirmation()
31	Send Booking Confirmation	Operations Manager	Traveler	+send_confirmation()
32	Handling cancellations or refunds	Operations Manager	Payment	+handle_refund()
33	Sending cancellation message	Operations Manager	Traveler	+send_cancellation()
34	Creating travel groups	Operations Manager	Database	+create_travel_groups()
35	Answering traveler inquiries	Support Agent	Help and Support System	+handle_inquiries()
36	Managing emergencies	Support Agent	Help and Support System	+handle_emergencies()
37	Handling promotional content	Marketing Agent	System	+update_promo_content()
38	Promoting tour packages	Marketing		+promotes_package()

		Agent		
39	Tracking analytics metrics	Analyst	System	+get_analytics_metrics()
40	Using visual tools	Analyst		+use_visual_tools()
41	Generating reports	Analyst		-generate_graph(), -generate_charts()
42	Browse tour packages	Traveler	System	+browse_packages()
43	Display tour packages	System	Database	+display_all_packages()
44	Getting personalized recommendations	Traveler	System	+get_recomendations()
45	Searching for specific packages	System	Database	+explore_packages()
46	Booking tour package	Booking	Database	+book_a_package()
47	Booking specific services	Booking	Vendor API	+book_a_service()
48	Booking Local Guide	Booking	Local Guide	+book_local_guide()
49	Confirm or decline Booking	Local Guide	Booking	+approving_trav_req(), +decline_trv_req()
50	Get Virtual Tour	Traveler	System	+get_virtual_tour()
51	Getting chatbot assistance	Traveler	Chatbot	+ask_AI()
52	Initiate Payment	Booking	Payment	-make_payment()
53	Displaying a confirmation page	System		+display_confirmation_page()
54	Viewing reviews	Traveler	System, Database	+view_reviews()
55	Offering payment options	Payment		+choose_payment_option()
56	Providing installment options	Payment		+choose_installment_option()
57	Making Payment	Payment		-make_payment()
58	Updating payment status	Payment	Operations Manager	-notify_payment_status()
59	Issuing digital invoice	Payment	Database	-generare_invoice()
60	Delivering real-time updates	Travel Time Updates	Traveler	+send_real_time_updates()
61	Providing estimated travel time	Travel Time Updates		+set_estimated_travel_time()
62	Providing multiple channels	Help and Support System		+provide_support_channels()
63	Enabling real-time communication	Help and Support System	Support Agent	+initiate_chat()
64	Resolving Inquiries and emergencies	Help and Support System	Support Agent	+user_inquiries(), +handle_emergencies()

State Transition Diagram

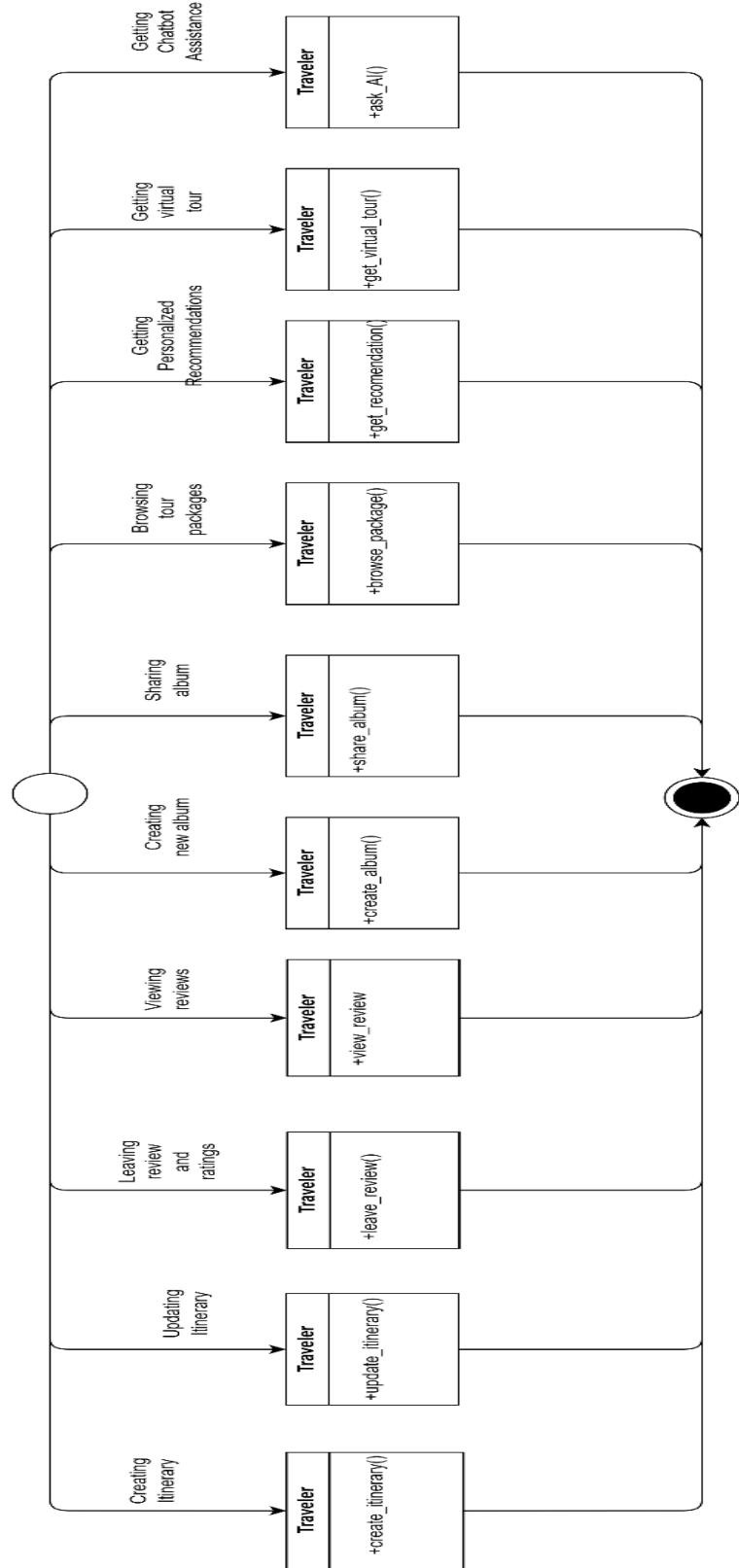
ID No: 1

Name: User



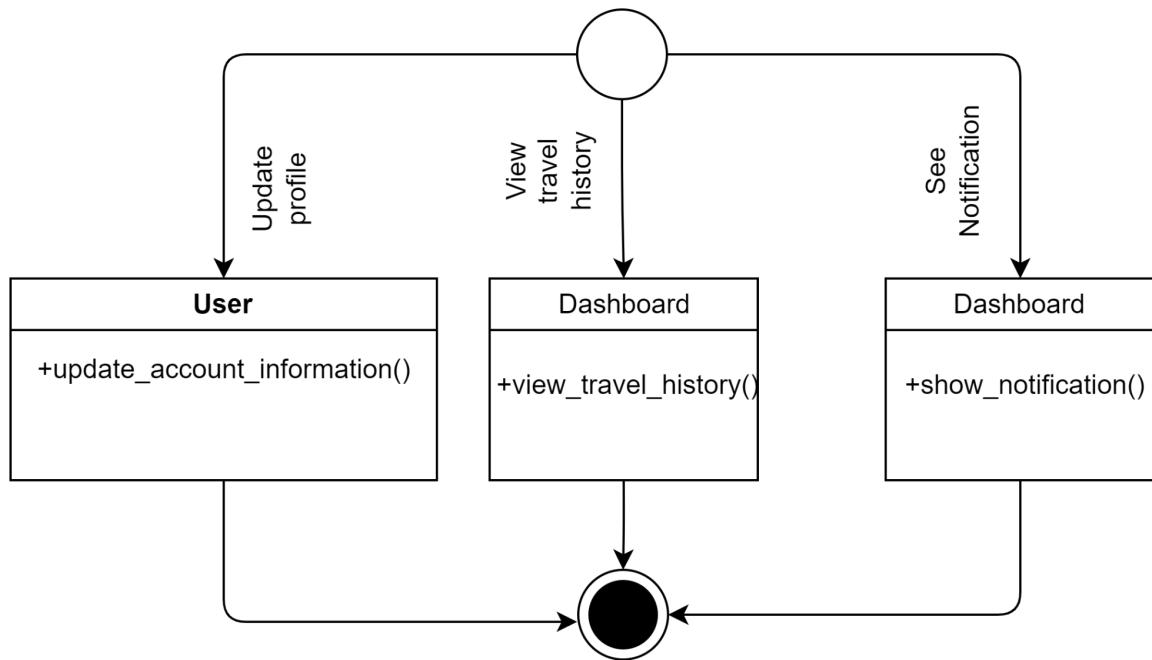
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Name: Traveler



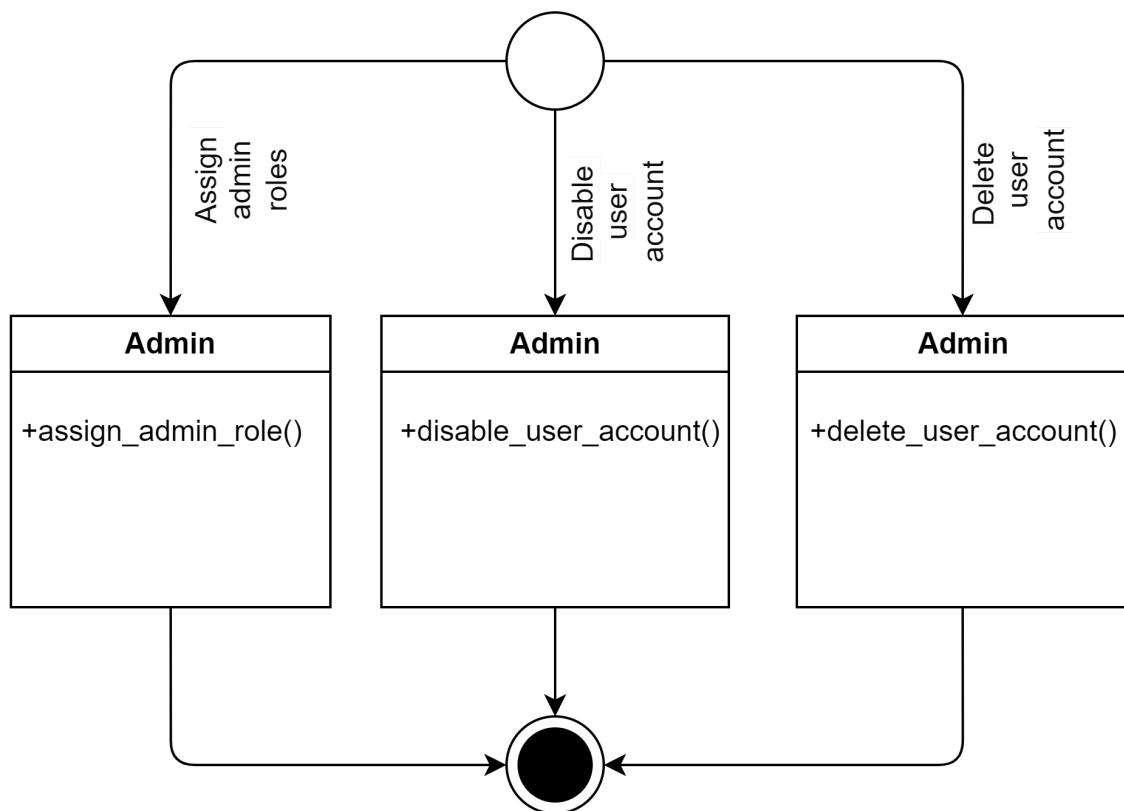
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Name: Dashboard

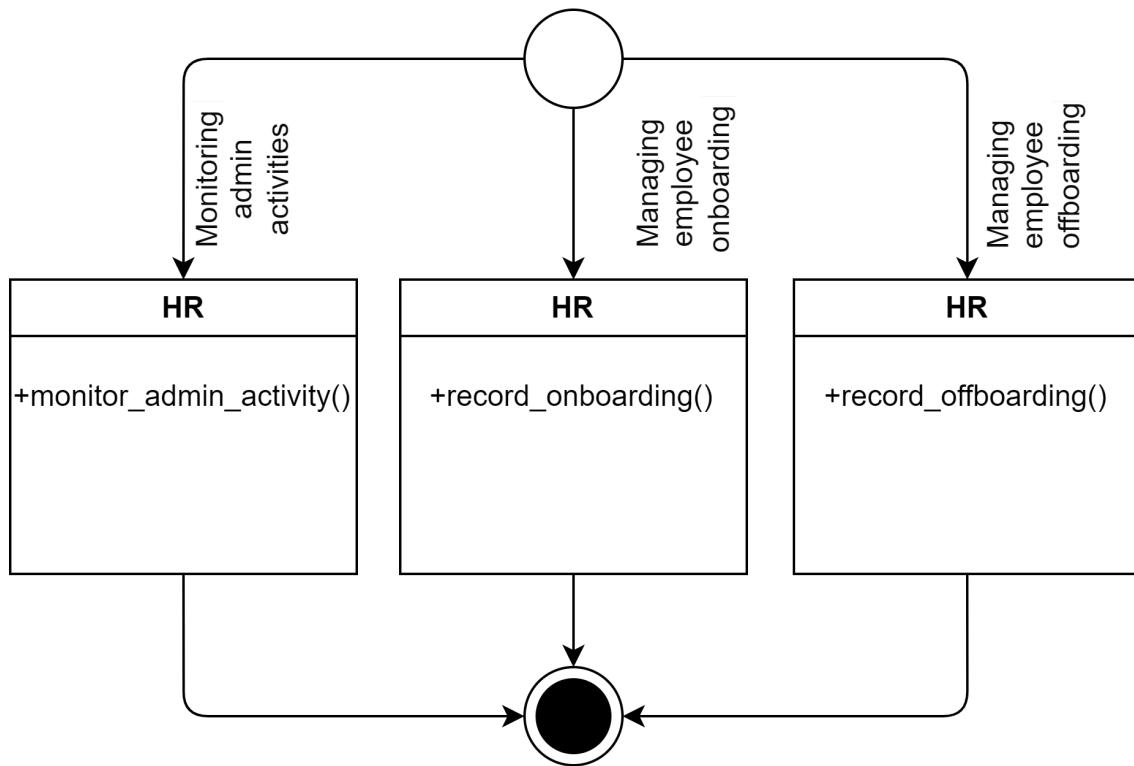


ID No: 4

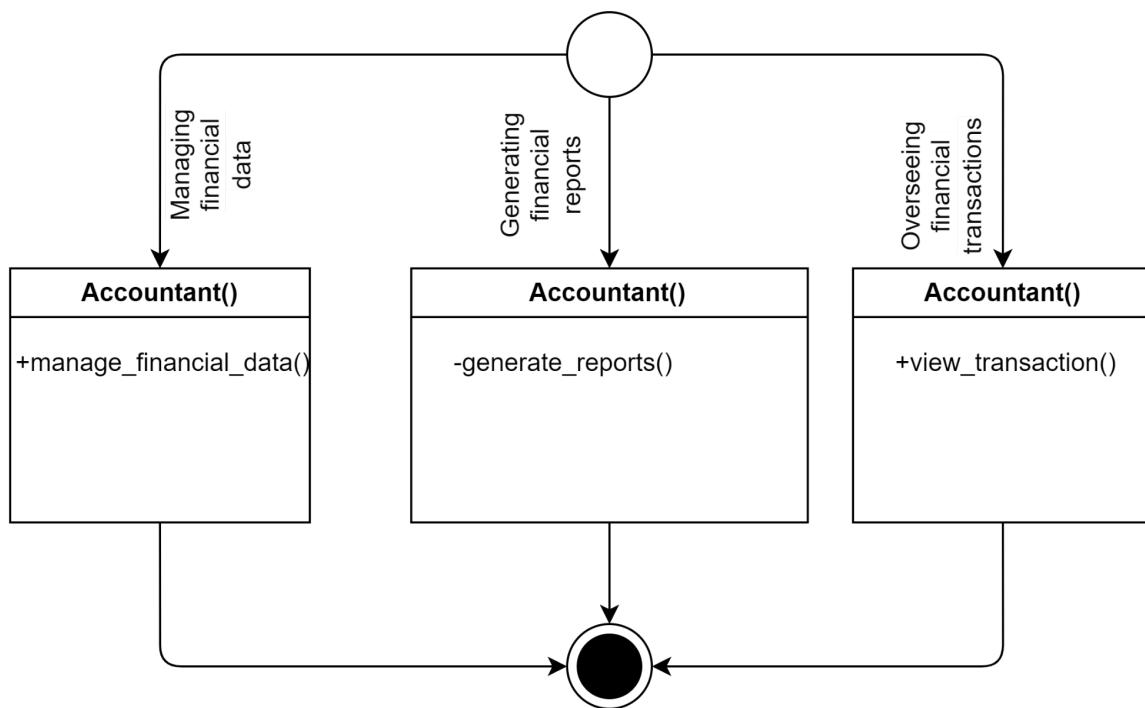
Name: Admin



ID No: 5
Name: HR

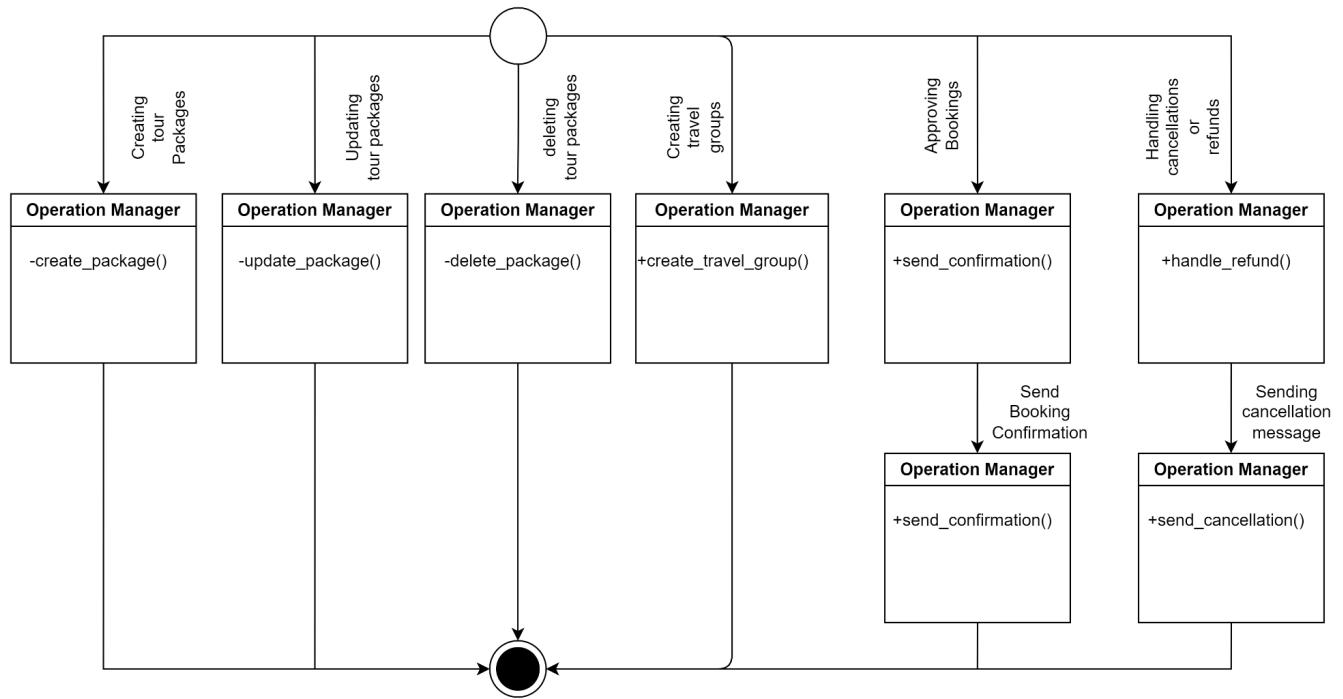


ID No: 6
Name: Accountant



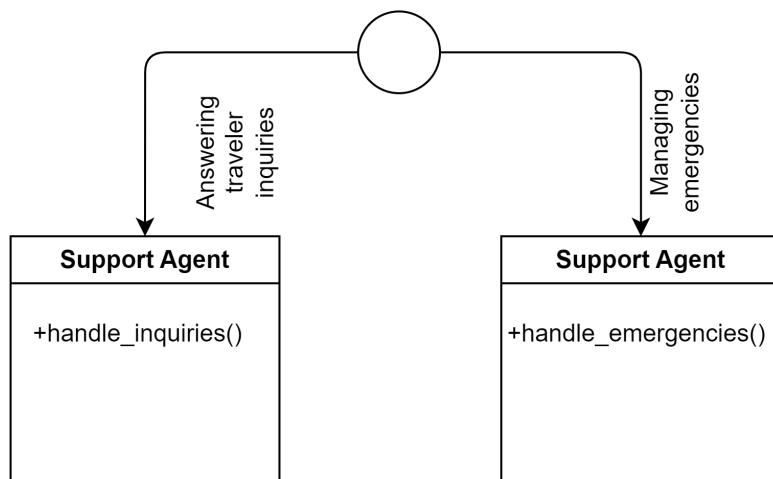
ID No: 7

Name: Operations Manager



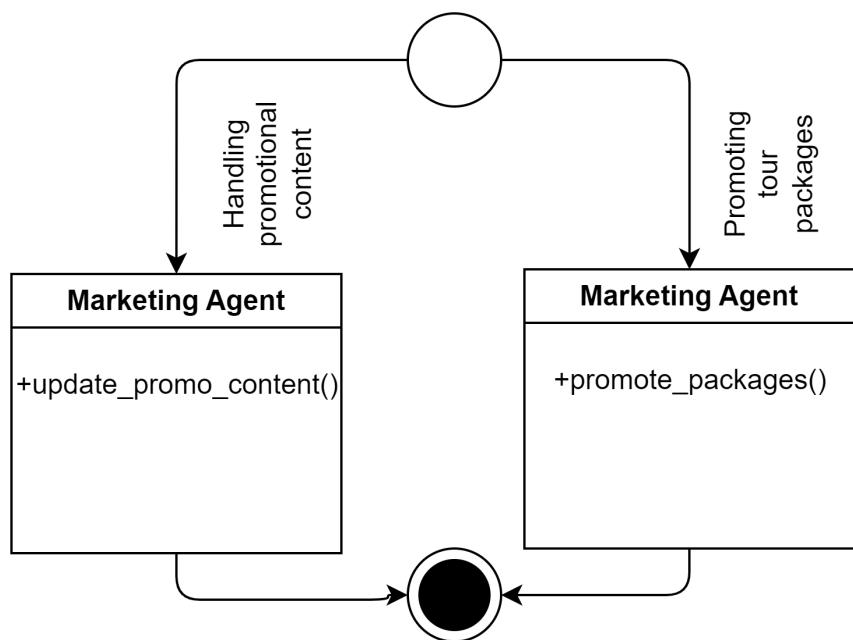
ID No: 8

Name: Support Agent



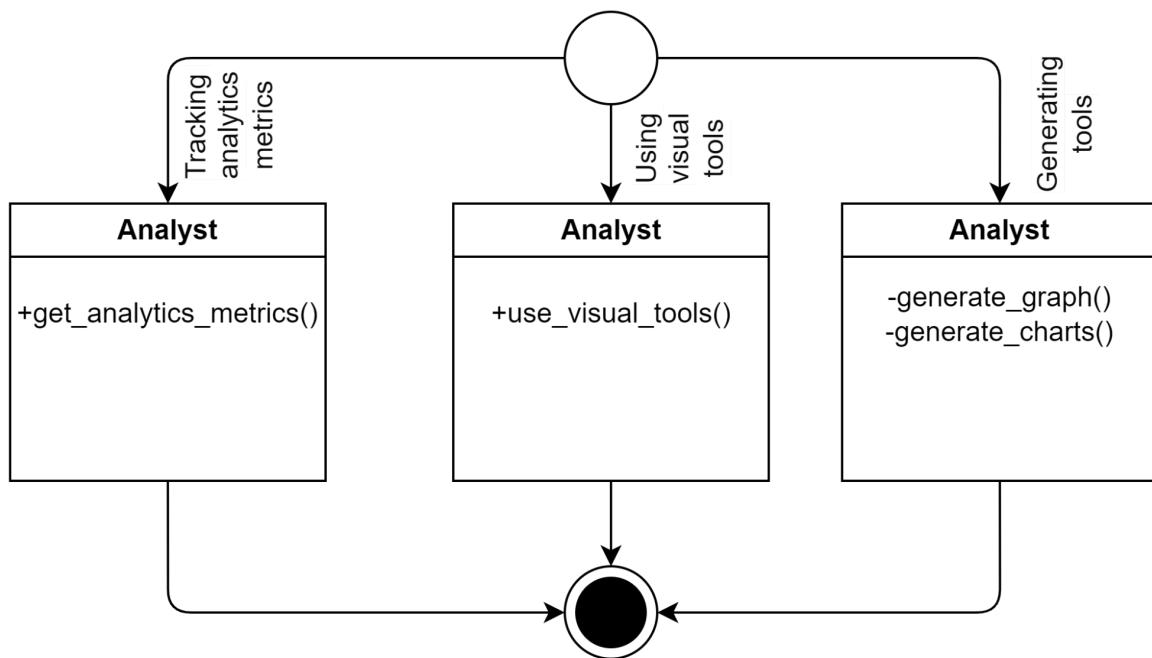
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Name: Marketing Agent

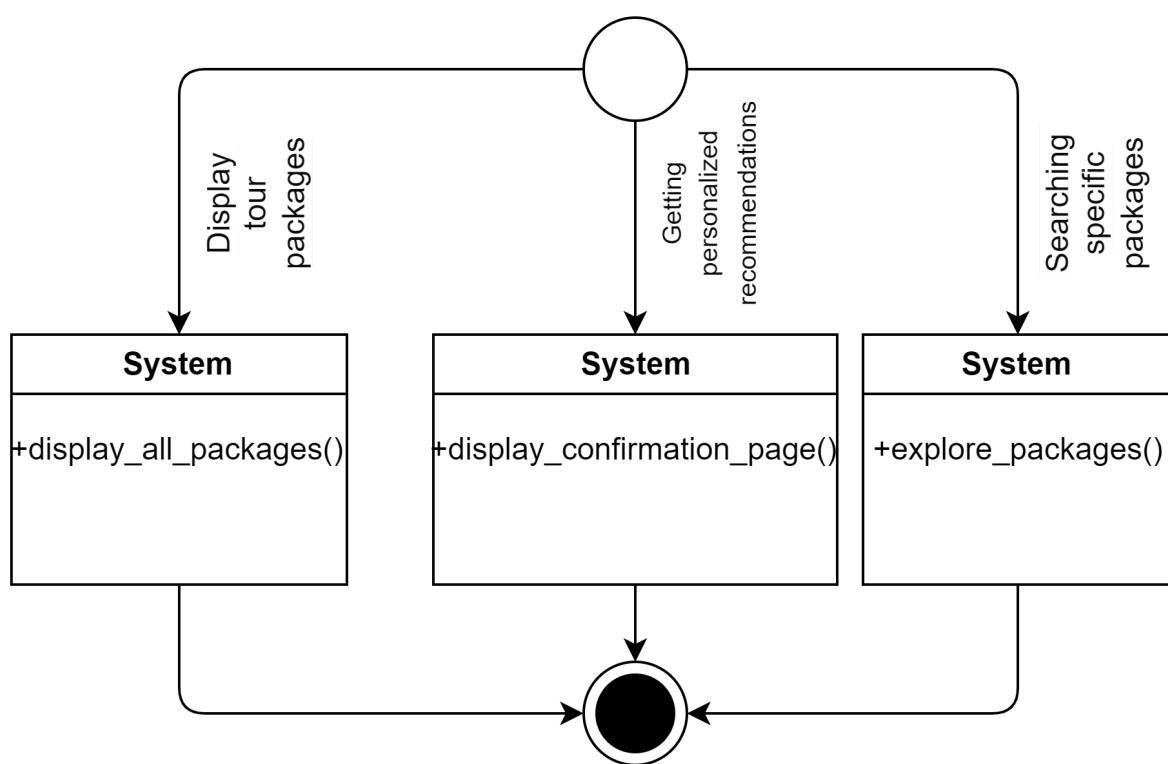


ID No: 9

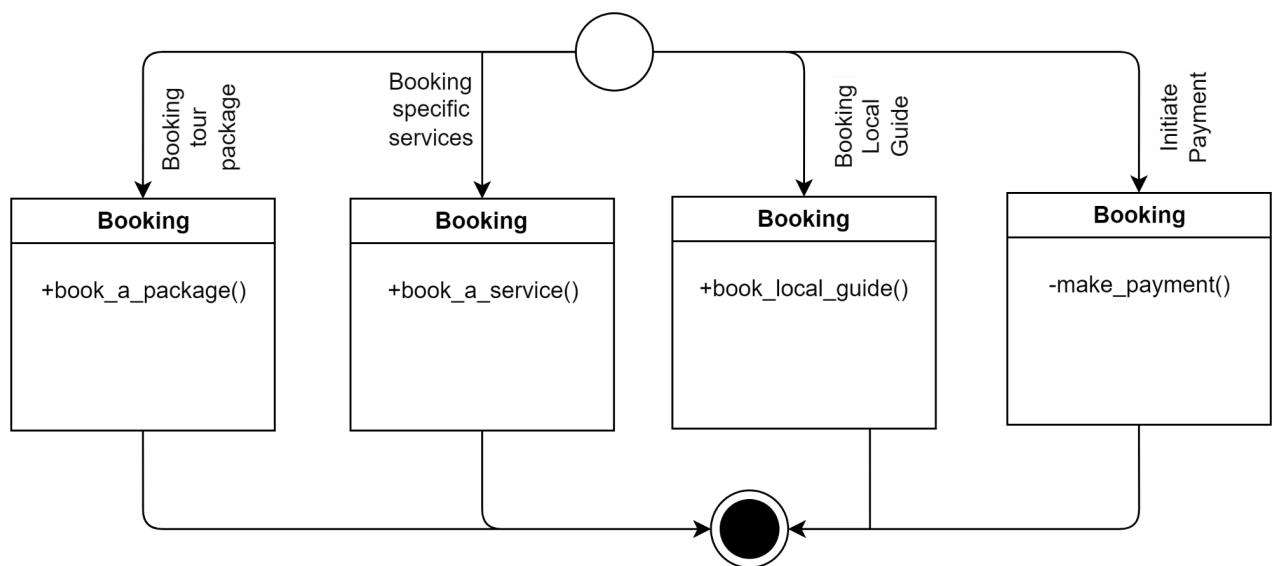
Name: Analyst



ID No: 10
Name: System

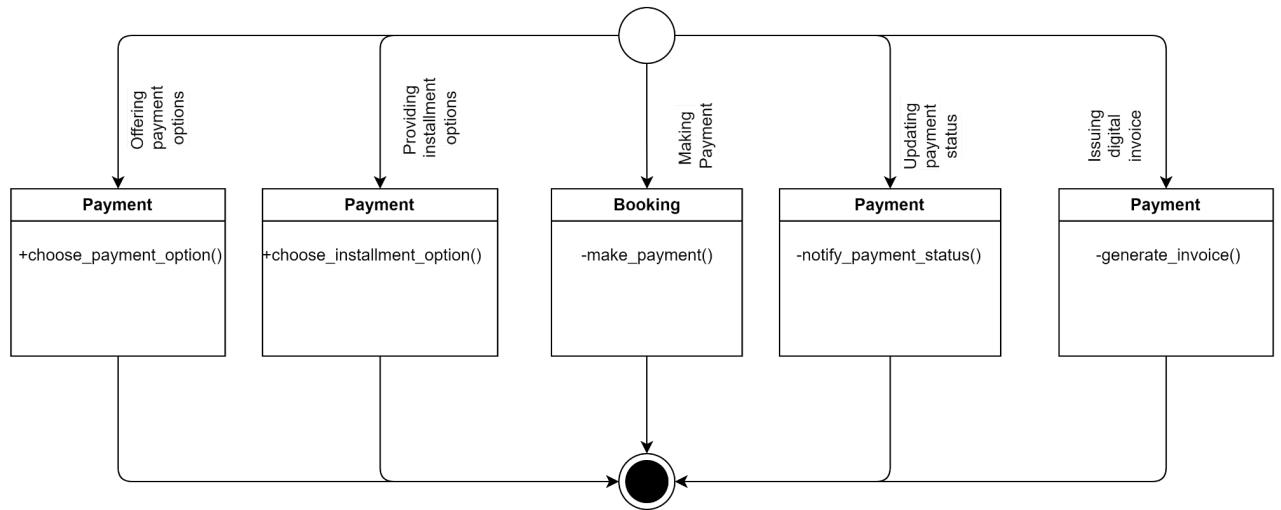


ID No: 11
Name: Booking



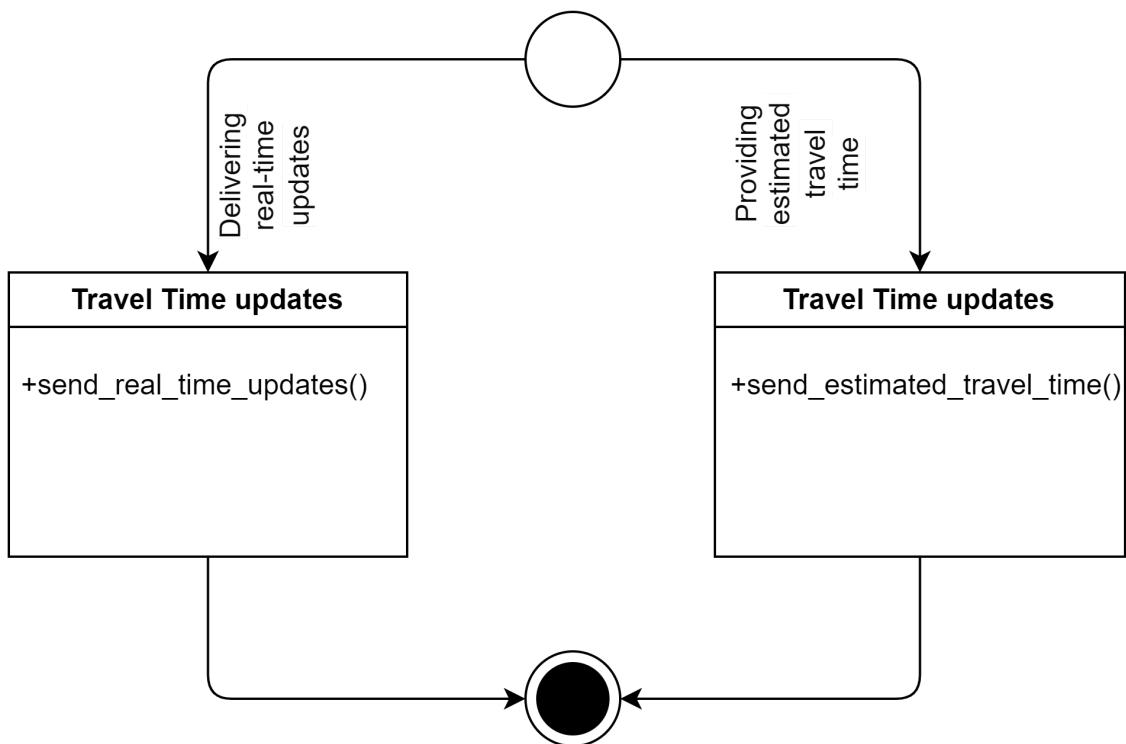
ID No: 12

Name: Payment



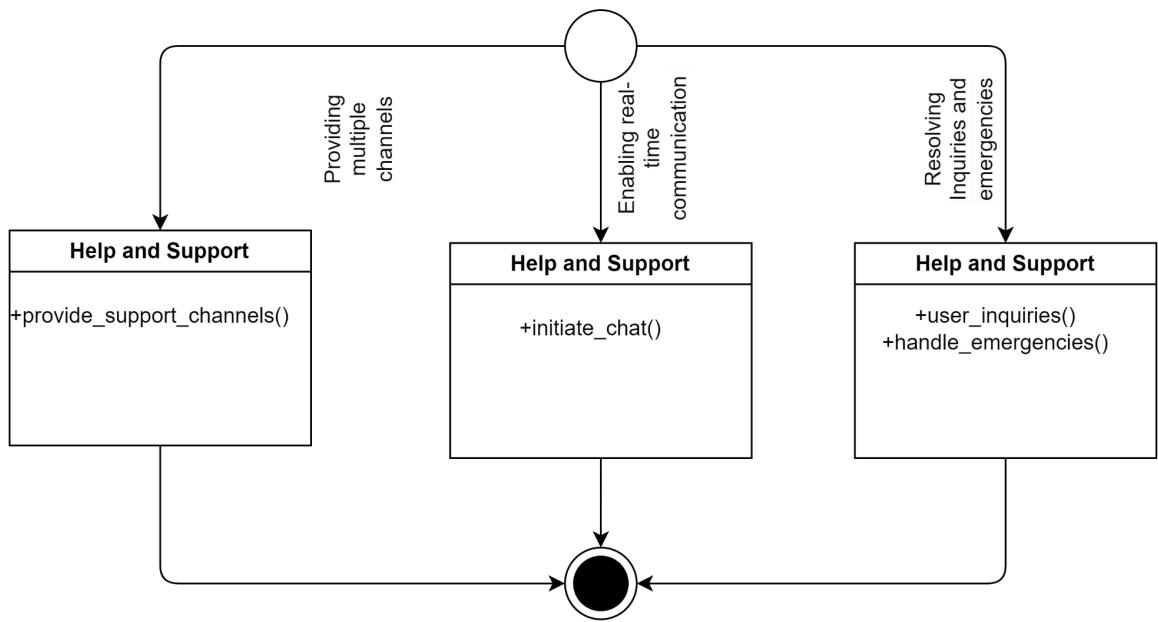
ID No: 13

Name: Travel Time Updates



ID No: 14

Name: Help and Support System



Sequence Diagram

