Bilkent University
Department of Computer Engineering

Senior Design Project
T2307
Travela

Analysis and Requirement Report

Group members
21903224, Yağmur Eryılmaz, yagmur.eryilmaz@ug.bilkent.edu.tr
21901972, Cenk Duran, cenk.duran@ug.bilkent.edu.tr
21902620, Efe Ertürk, efe.erturk@ug.bilkent.edu.tr
21902820, Çağla Ataoğlu, cagla.ataoglu@ug.bilkent.edu.tr
21903248, Efe Şaman, efe.saman@ug.bilkent.edu.tr

Supervisor
Cevdet Aykanat

13.11.2022

This report is submitted to the Department of Computer Engineering of Bilkent University in partial fulfilment of the requirements of the Senior Design Project course CS491/2.

Contents

Analysis and Requirement Report

Travela

1 Introduction

Vacations are fun, but planning them, not so much. Especially if you are responsible for planning a holiday trip that suits many people with different interests, budget and available times. This is a serious task for everyone, and on average, a person spends 10 hours planning their holiday, as the survey of Independent Newspaper claims [1]. Moreover, the results of the poll that includes more than 7800 people's opinions from 26 different countries show that over 25 percent of people think holiday planning is one of life's 'biggest stressors'. Thus, our application, "Travela" focuses on solving this problem, while being a total travel companion.

Travela is an app that provides a unique way of planning your holiday trips with your friends. With the machine learning systems we use, the app suggests the best location or route of vacation for your trip group, taking all of the group members' holiday interests, budget and time constraints into consideration. While doing that, the app also suggests to you the popular landmarks or recommended activities in your route, to make your trip well-worth. Also, you can share these holiday plans and your holiday memories on the app, and highlight the places visited in your own unique Globe. By this way, you can see your previous holidays with your most fun memories, and also your friends' too. Thus, it is also a social media app for travel lovers!

In this report, analysis of the system will be explained thoroughly. Firsty, we will mention current systems, and our products' differences from the rest. Then we will explain our system, Travela, in detail, by mentioning functional and nonfunctional requirements of the project, as well as the pseudo requirements and the constraints. Then, in part 3.5 of the report, we will demonstrate our System Models, by first listing the possible Scenarios within the app, then showing our Use-Case Model, followed by the Object and

Class Model, Dynamic Models and lastly, the User Interface. Then, in part 4 of the report we will mention Other Analysis Elements such as Consideration of Various Factors in Engineering Design, Risks and Alternatives, Project Plan, Ensuring Proper Teamwork, Ethics and Professional Responsibilities and Planning for New Knowledge and Learning Strategies.

2 Current System

Current Systems like Airbnb or TripAdvisor are vacation recommender systems for individual users. You can set flexible dates or budget for your vacation on Airbnb, create “Curated Wishlists” that are basically your vacation wishlists [2]. On the other hand, Tripadvisor recommends you to visit popular landmarks near your location or your desired vacation location, while giving you new trip ideas. As you can see, if you are planning a trip for a group of people with different interests and available time or budgets, these systems do not help at all. Our proposed system is designed to solve this issue, while covering most of the functionality of the already existing systems like recommending landmarks in a particular place, like TripAdvisor does, or enable you to create trip wishlists like Airbnb does. Moreover, current systems and apps do not have a social media aspect, most of them just function as a travel planner system. But Travela has a social media aspect as well, you can share your memories all around the world, color your globe to show the places that you have visited, or share your trip ideas, plans or routes to your followers.

3 Proposed System

3.1 Overview

Travela is planned to be both a travel companion, and a new social media platform. As for the travel companion aspect, the most important features can be named as enabling users to form travel groups via sending an invitation on the app to arrange a trip together with friends, suggesting users the most suitable vacation by taking each group members holiday interests,

budget and time constraints in mind, and suggesting suitable hotels, transportation opportunities, popular landmarks and activities in the vicinity of the travel. For the social media aspect, the most important features can be described as allowing users to see previous trips of both themselves and their friends on unique personalized Globes, create routes and plans according to their map and allowing users to post and attach photos of their trips to their world map which can be seen by the others. The features that are supported by Travela are illustrated in depth in part 3.2 “Functional Requirements" of this report.

To give the customers the best experience, it is vital to gather as much information about a user as possible, to suggest the most suitable vacations. For this reason, it is a good idea to ask the users to solve some sort of a questionnaire, involving questions like “Which of these vacations below do you see yourself in?”, and letting the user choose its own preference. Moreover, integrations with the third party applications that provide the data of nearby hotels, suitable flights or transportation opportunities, like Google hotels, Skyscanner, Amadeus, Travelport, Tripadvisor or Google map reviews will surely increase our service quality as a total travel companion.

Travela is planned to bring innovation of service and customer engagement, as the provided service and functionality of recommending vacations to a group of users by taking account their interests, is different from the already existing products on the market. Also, this app makes planning trips easier and more enjoyable, thus it can be also considered as an innovation of service that increases user experience. The innovation that is planned is also incremental, as it is not achieved by leveraging a radical technology, but it is something that fulfills a need in the market for many users. The machine learning recommender system that we plan on using is similar to the preexisting ones in terms of creating a feature matrix of a person's interests, but whenever a group is formed, these matrices will be taken into consideration together, which is a new technique, but not a radical one. Travela’s business strategy is Digital Business Optimization, which

focuses on enhancing customer experiences. Also, it provides a new way of engaging the customers in the tourism / travel planning domain, thus, it can be said that it creates a new digital business model.

As Travela is an app whose success depends on the experience of users within the app, it is essential that the recommender systems are fast and accurate. It is important to mention that the target user group is anyone that plans trips online, especially young people that try to plan holidays through an app with their friend group. Baring that in mind, having an easy and usable user interface for the target customer base is a requirement, which adds to the user experience. One should easily search for trips, form travel groups, view possible vacations for the group and view the activities around the travel route, almost intuitively and without any issue. Our goal as the Travela team is that this app is used internationally, has lots of users in holiday seasons (as it is not realistic to expect people to browse through a vacation app every day), and recognized in the market as a new social media app.

It is important to note that Travela is an intermediary application that helps people to find suitable vacations for themselves, and also, helps hotels, transportation companies, and local landmarks to find their customers. Once a group decides on their travel route, involving where to stay and which transportation unit they will use, they will be directed to actual websites of these services. For example, they will be directed to the web site of the hotel they have chosen for reservation, and the web site of the airline company for buying the seats. There is no reservation or payment functionality on Travela. The advertisements on the app will help Travela to continue giving high quality service to its customers.

3.2 Functional Requirements

3.2.1 Sign up - Login

- Allows users to sign up and login to the system by using their Google/ Facebook account or via email and password that is determined in the sign up process.

- Enables users to renew their password when it is forgotten using their email.
- Collects data from the user during the sign up process to see his/her preferences like favorite location, preferred routes or activities via a quick questionnaire.

3.2.2 Holiday Arrangement

- Enables users to send a friendship request to other users.
- Enables users to form travel groups via sending an invitation on the app to friends in order to arrange a trip together.
- Enables users to integrate their calendar hence suitable dates to the system.
- Shows the common available dates of the group members via calendar usage.
- Allows users to search destinations that they want to visit.
- Shows suitable hotels and transportation opportunities for the given dates and place.
- Allows users to share destinations and related information (hotel, transportation) with their travel group via chat feature.
- Suggests travel routes according to groups' overall preferences (budget, date) by using ML algorithms.
- Suggests activities (concerts, festivals, etc.) between the given dates in selected locations.
- Allows users to see their upcoming trips that is finalized by the travel group.
- Shows reviews and ratings of the destinations and activities.
- Shows information on which season a place is generally visited like Ibiza is often visited in summer season and Switzerland is in winter season.
- Allows users to see their current travel groups in their account.
- Enables users to create polls among their group to determine possible routes, plans, itineraries, activities, etc.

3.2.3 Social Media Aspect

- Allows users to see previous trips of both themselves and their friends in a World map, create routes and plans according to their map.
- Allows users to post photos belonging to a specific trip to their world map which can be seen from the others.
- Enables users to vote the destinations that they see in the platform as dislike,like and love.
- Enables users to rate their previous trips out of 5 to be able to collect data for suggestion algorithms and also add review for the trip.
- Enables users to delete their account if preferred.
- Allows users to take a questionnaire to his/her traveler personality.

3.3 Non-functional Requirements

3.3.1 Usability

- User interface should be understandable and not complex, also catchy to impress users.
- Headings should be in larger font size than the other parts to draw attention.
- Font size for the body should be minimum 16 px.
- Interfaces should be responsive for both mobile and web.
- Design should be made with a mobile first approach as mobile app is thought to be used more commonly.
- To apply mobile first design, for iOS the Human Interface Design should be considered and for Android Material Design should be considered [3] [4].
- While fetching data, refreshing animations should be attractive not to distract users.
- It should address all kinds of users from various ages.
- The language should be English to be universal.
- The user shouldn’t have to re-login if he/she refreshes the page.

3.3.2 Security

- Users will not be able to enter the system without a password as the app also has a social media aspect.
- Passwords will be saved in the database in an encrypted version.
- Loss of data in a possible crash should be prevented.
- Users' all previous trip data should be removed if the user deletes his/her account.
- An authentication token should be implemented to determine the specifications of a session [5].
-

3.3.3 Maintainability

- Updating the system should not affect the end user's experience for a long time.
- Encapsulation should be used to facilitate detection of problems.
- Consistent commenting method will be used to follow the process of code and make it more understandable.

3.3.4 Performance

- While logging in and logging out, the processes should not take more than 5-10 seconds.
- Navigation between pages should happen fast enough to keep users in the system and should happen at the same speed on all platforms.

3.3.5 Extensibility

- Travela should be available on multiple platforms (web, mobile).
- Travela should work well with external APIs. (Skyscanner,Google Hotels , etc.)

3.3.6 Scalability

- It is aimed to reach many people so Travela should be scalable and handle data properly.

3.3.7 Accessibility

- Travela's mobile app should be downloadable for free from the App Store or Google Play Store.
- Travelable should be easily visited through its URL.

3.3.8 Supportability

- For mobile, Travela should support iOS and Android operating systems.
- For web Travela should support Firefox, Chrome, Opera, Microsoft Edge, and Safari browsers.

3.4 Pseudo Requirements

- Application will be available on multiple platforms which are Web, Android and iOS.
- GitHub will be used for version control to track changes.
- Google Meets will be used for group meetings.
- Google Docs will be used for further reports.

3.5 System Models

3.5.1 Scenarios

1. Name: Sign up

2. Participating Actor: User

3. Entry Conditions: Web page is browsed or Travela is downloaded

4. Exit Conditions: Registration is completed or failed

5. Flow of Events:

5.1 User clicks the “Sign Up” button

5.2 User fills the registration form.

5.3 System checks the provided information if data is missing, invalid or irrelevant it gives an error, else it creates a new account.

5.4 User fills a questionnaire to mention his/her favorite location, preferred routes or activities etc.

---

1. Name: Login

2. Participating Actor: User

3. **Entry Conditions**: User should have a valid password and id

4. **Exit Conditions:** User logins to the system or the login fails

5. **Flow of Events:**

    5.1 User clicks the “Login” button

    5.2 User fills login information

    5.3 System checks the provided information if data is missing, invalid or the user does not exist. The system gives an error .

---

1. **Name:** Form travel group

2. **Participating Actor:** User

3. **Entry Conditions**:

    3.1 User should be logged in

    3.2 User should already have friends

4. **Exit Conditions:** Invitations are accepted by users who received requests

5. **Flow of Events:**

    5.1 User navigates to the Profile Page

    5.2 User clicks “Form Group” button

    5.3 User selects Friends to send an invitation and presses the “Send Invitation” button

    5.4 User clicks “Close” button when he/she is done sending invitations

    5.5 Invitations are accepted by users who received requests

---

1. **Name:** Integrate calendar (important dates) to the system

2. **Participating Actor:** User

3. **Entry Conditions**: User should be logged in

4. **Exit Conditions:** User integrates his/her calendar

5. **Flow of Events:**

User:

5.1 Switches to the profile page.

5.2 Clicks “Integrate Calendar” button.

5.3 Add suitable dates through year to the system.

5.4 Clicks “Close” button when integration is done.

---

1. Name: Arrange trip in a travel group

2. Participating Actor: Users in the group

3. Entry Conditions:

3.1 Users should be logged in to the system.

3.2 Users should be in the same travel group.

3.3 Users should already have added the suitable dates to their calendars.

4. Exit Conditions: Users are navigated to the related sites for purchasing tickets or reserve the determined place.

5. Flow of Events:

5.1 Users navigate to the profile page.

5.2 Users select the travel group that they want to have a trip with.

5.3 Each user views the common available dates of the group members via calendar integration and prefers one of the dates.

5.4 Users select a place among ML suggestions that is given by the system or according to their own poll results that is created by the users.

5.5 After selection of the place each user views and votes for the suitable hotels and transportation opportunities for the given available dates and place.

5.8 Users are navigated to the related sites for purchasing tickets or reserve the determined place.

---

1. Name: Send chat to your travel group

2. Participating Actor: Users in the group

3. Entry Conditions:

3.1 Users should be logged in

3.2 Users should be in the same travel group

4. Exit Conditions: Users are navigated to the related sites for purchasing tickets or reserve the determined place.

5. Flow of Events:

5.1 Users navigate to the profile page

5.2 Users select the travel group that they want to have a trip with

5.3 Users send a chat to that group about the trip arrangement

---

1. Name: Search places to visit

2. Participating Actor: User

3. Entry Conditions:

3.1 User should be logged in

4. Exit Conditions: "Search" button is pressed with filled textfield

5. Flow of Events:

User:

5.1 Writes a place he/she wishes to search in the TextField at the top of the Home page.

5.2 Press the "Search" button.

---

1. Name: View selected destination info

2. Participating Actor: User

3. Entry Conditions:

3.1 User should be logged in to the system.

3.2 User should be on the selected Destination page.

4. Exit Conditions: User closes the selected Destination page.

5. Flow of Events:

User:

5.1 Searches and selects a place he/wishes to view.

5.2 View Preferred season information of a destination.

5.3 Scrolls down and views the review and rating section.

5.4 Clicks the “Back” button when he/she is done viewing.

---

1. Name: View route and destination suggestions

2. Participating Actor: User

3. Entry Conditions:

3.1 User should be logged in to the system.

4. Exit Conditions: User closes the Home page.

5. Flow of Events:

5.1 User switches to Home page.

5.2 User sees the most suitable destination options in the Home page.

---

1. Name: View activity suggestions

2. Participating Actor: User

3. Entry Conditions:

3.1 User should be logged in.

4. Exit Conditions: User closes the Home page.

5. Flow of Events:

5.1 User switches to Home page.

5.2 User selects a destination.

5.5 User sees the popular activities that are done in that destination.

---

1. **Name:** Rate previous trip location
2. **Participating Actor:** User
3. **Entry Conditions:**

    :3.1 User should be logged into the system.

    3.2 User should have a previous trip that is planned through Travela.
4. **Exit Conditions:** User rates the trip location.
5. **Flow of Events:**

    User:

    5.1 Switches to the Maps page.

    5.2 Clicks to the trip that is seen in the World map.

    5.3 Clicks to the “Rate” button.

    5.4 Rates the trip location out of 5.

---

1. **Name:** Vote trip locations that is seen in Home page
2. **Participating Actor:** User
3. **Entry Conditions:** User should be logged into the system.
4. **Exit Conditions:** User rates the trip location.
5. **Flow of Events:**

    User:

    5.1 Switches to the Home page.

    5.2 Clicks to the trip that is seen in the Home page.

    5.3 Clicks to one of the “Dislike”, “Like” or “Love” buttons (like Netflix).

---

1. **Name:** See current travel groups
2. **Participating Actor:** User

3. **Entry Conditions**: User should be logged into the system.

4. **Exit Conditions:** User presses the “Logout” button or switches pages.

5. **Flow of Events:** User switches to the Profile page.

---

1. **Name:** Create polls among group

2. **Participating Actor:** User

3. **Entry Conditions**:

    3.1 User should be logged in to the system.

    3.2 User should be in a travel group.

4. **Exit Conditions:** Poll is created

5. **Flow of Events:**

    User:

    5.1 Switches to the Profile page.

    5.2 Clicks to the travel group that he/she wants to create a poll.

    5.3 Clicks to the “Create Poll” button.

    5.4 Adds questions to the poll.

    5.5 Clicks to the “Publish” button to send the poll to the group members.

---

1. **Name:** See upcoming trips

2. **Participating Actor:** User

3. **Entry Conditions**: User should be logged into the system.

4. **Exit Conditions:** User presses the “Logout” button or switch pages.

5. **Flow of Events:**

    5.1 User switches to the Trips page.

    5.2 User sees the upcoming trips that is planned by their travel groups.

---

1. **Name:** See previous trips of him/herself or his/her friends in a World map
2. **Participating Actor:** User
3. **Entry Conditions**:
    3.1 User should be logged into the system.
    3.2 User should be on the Maps page.
4. **Exit Conditions:** User presses the “Logout” button or switches pages.
5. **Flow of Events:**
    5.1 User switches to the Maps page.
    5.2 User views his/her map directly.
    5.2 If the user wants to see their friends’ previous trips.
        5.2.1 User views the friend list that is found in the Maps page.
        5.2.2 User clicks to the friend name that has their own map.
        5.3.3 User sees the related info (photo,review) of their friends.

---

1. **Name:** Send friend request
2. **Participating Actor:** User
3. **Entry Conditions**: User should be logged into the system.
4. **Exit Conditions:** Friend request is sent
5. **Flow of Events:**
    5.1 User searches for a user name which the request will be sent.
    5.2 User clicks the “Follow” button.

---

1. **Name:** Post photos belonging to the previous trips to the World map.
2. **Participating Actor:** User
3. **Entry Conditions**:
    3.1 User should be logged into the system.

3.2 User should have a previous trip that is planned through Travela.

4. **Exit Conditions:** Trip (photos) is posted to the World map

5. **Flow of Events:**

User:

5.1 Switches to the Maps page.

5.2 Clicks to the trip that is seen in the World map.

5.3 Clicks to the “Add Photo” button.

5.4 Selects the photos to be posted.

5.5 Clicks “Post” button.

---

1. **Name:** Add a review of previous trips to the World map.

2. **Participating Actor:** User

3. **Entry Conditions**:

3.1 User should be logged into the system.

3.2 User should have a previous trip that is planned through Travela

4. **Exit Conditions:** Add review to trip

5. **Flow of Events:**

User:

5.1 Switches to the maps page

5.2 Clicks to the trip that is seen in the World map

5.3 Clicks to the “Add Review” button

5.4 Writes review

5.5 Clicks “Post” button

---

1. **Name:** Delete account

2. **Participating Actor:** User

3. Entry Conditions:

:3.1 User should be logged into the system.

3.2 User should have an active account.

4. Exit Conditions: User deletes the account.

5. Flow of Events:

User:

5.1 Switches to the profile page.

5.2 Clicks to the “Settings” button.

5.3 Clicks to the “Account” button.

5.4 Clicks to the “Delete Account” button.

5.5 Confirms to delete the account.

---

1. Name: Participate in questionnaire

2. Participating Actor: User

3. Entry Conditions: User should be logged into the system.

4. Exit Conditions: User completes the questionnaire.

5. Flow of Events:

User:

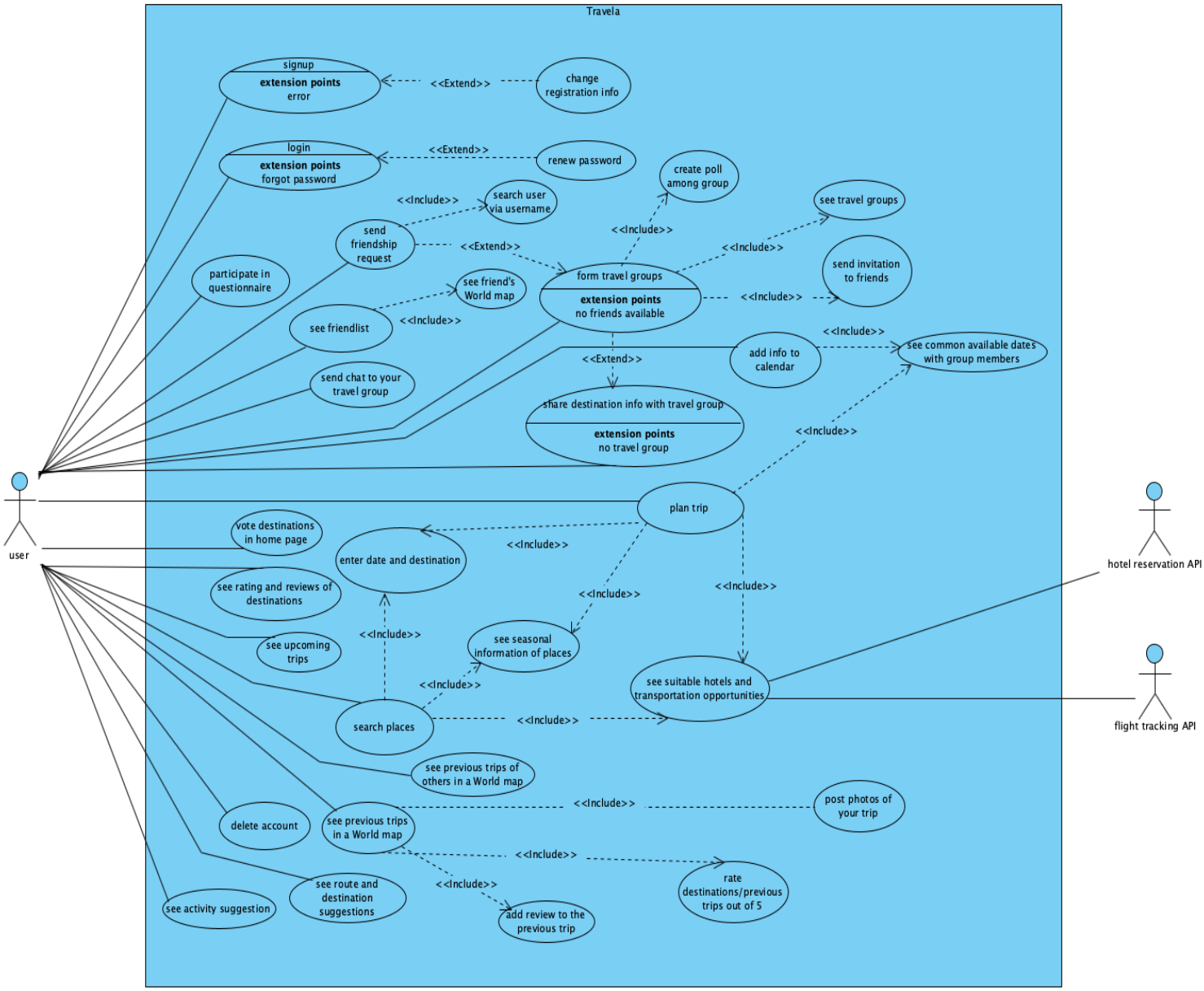
5.1 Switches to the profile page.

5.2 Clicks to the “Questionnaire” button.

5.3 Completes the questionnaire.

5.4 Clicks to the “Send” button.

3.5.2 Use-Case Model



3.5.3 Object and Class Model

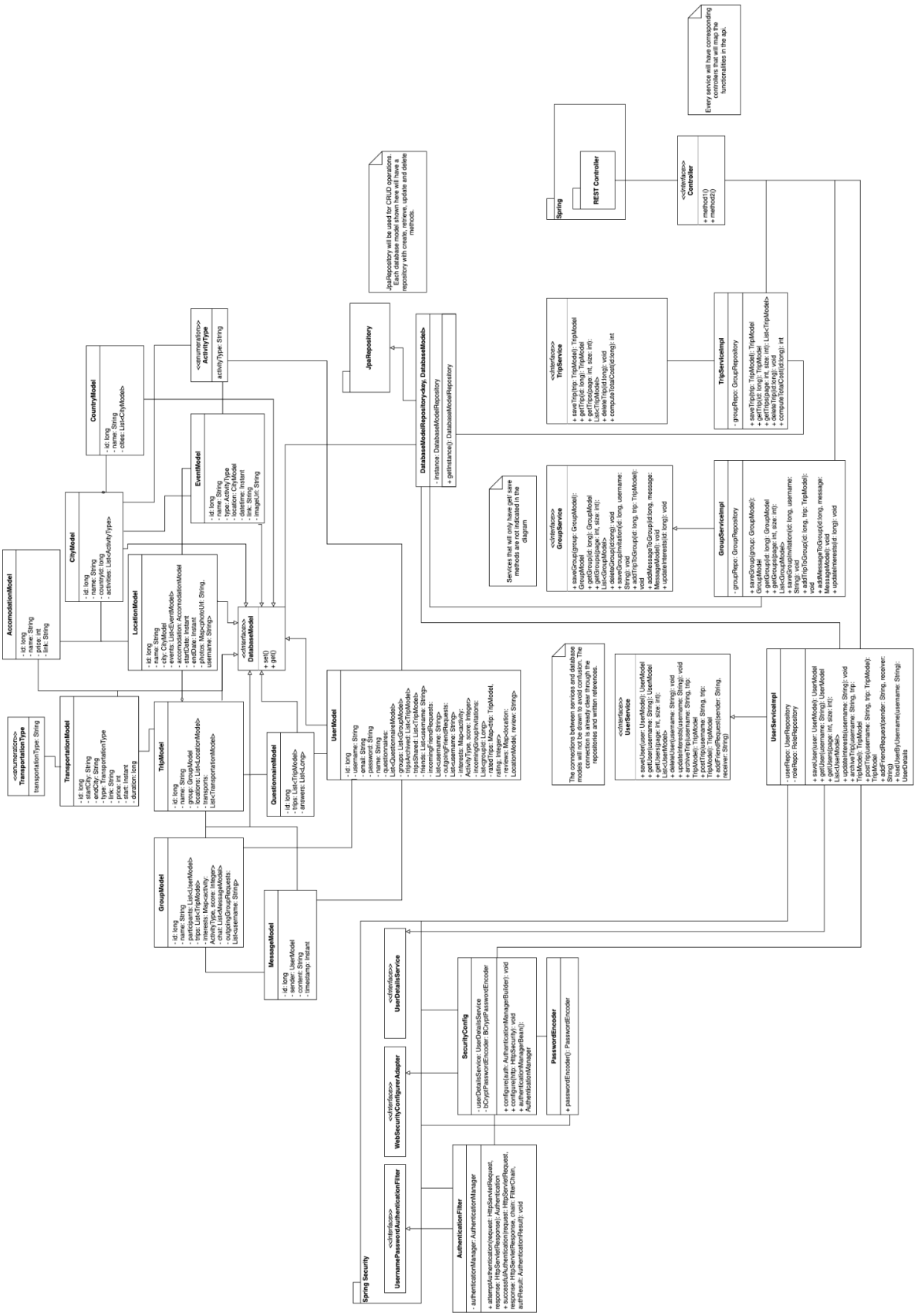


Table 1. Descriptions of classes.

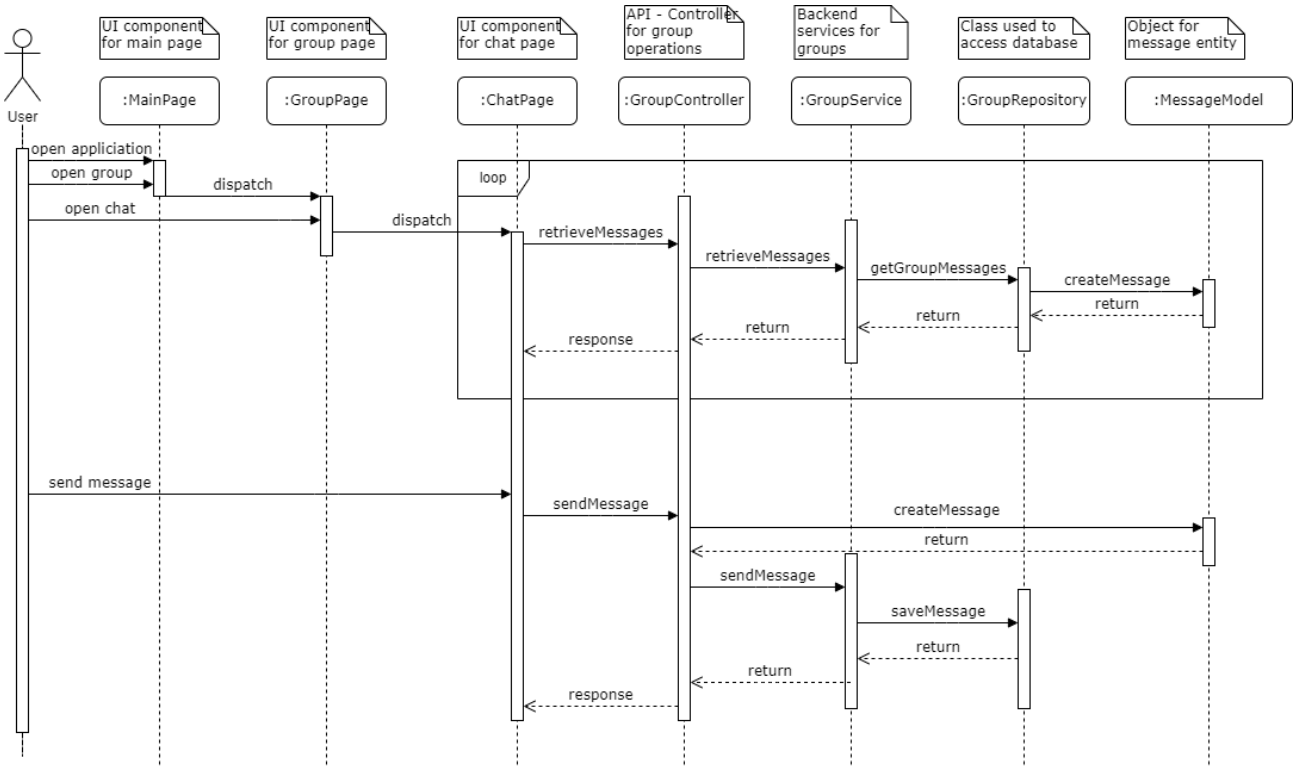
Class	**Description**
DatabaseModel	Interface for database entity models.
UserModel	Database model for user object. Stores data related to a user of the application.
GroupModel	Database model for group object. Stores data related to groups formed by users.
TripModel	Database model for trip object. Stores data related to trips added to a group (does not have to belong to a group, but mostly does)
QuestionnaireModel	Database model for questionnaire object. Stores data related to questionnaires taken by users.
LocationModel	Database model for location object. Stores data related to a location in a trip.
TransportationModel	Database model for transportation object. Stores data related to transportation between two locations.
TransportationType	Enumeration for different types of transportation.
AccomodationModel	Database model for accomodation object. Stores data related to accommodation in a location.
CityModel	Database model for city objects. Stores data related to a city that can be added as a location.
CountryModel	Database model for country object. Stores data related to a country that contains cities.
EventModel	Database model for event object. Stores data related to an event in a city.
ActivityType	Enumeration for different types of activities an event can be.
MessageModel	Database model for message object. Stores data related to a message sent to a group.
UserService	Interface for database operations related to user objects.
UserServiceImpl	Implementation of UserService.
GroupService	Interface for database operations related to group objects.
GroupServiceImpl	Implementation of GroupService.
TripService	Interface for database operations related to trip objects.
TripServiceImpl	Implementation of TripService.
JpaRepository	Third party package to be used for CRUD operations.
DatabaseModelRepository	Singleton representing the database model repository.
REST Controller	Third party package provided by Spring.
Controller	Controller for each service.

UserNamePassword AuthenticationFilter	Third party interface provided by Spring Security.
WebSecurityConfigurerAdapter	Third party interface provided by Spring Security.
UserDetailsService	Third party interface provided by Spring Security.
AuthenticationFilter	Customization of authentication filter manager from Spring Security.
SecurityConfig	Customization of security configurations from Spring Security.
PasswordEncoder	Customization of password encoder from Spring Security.

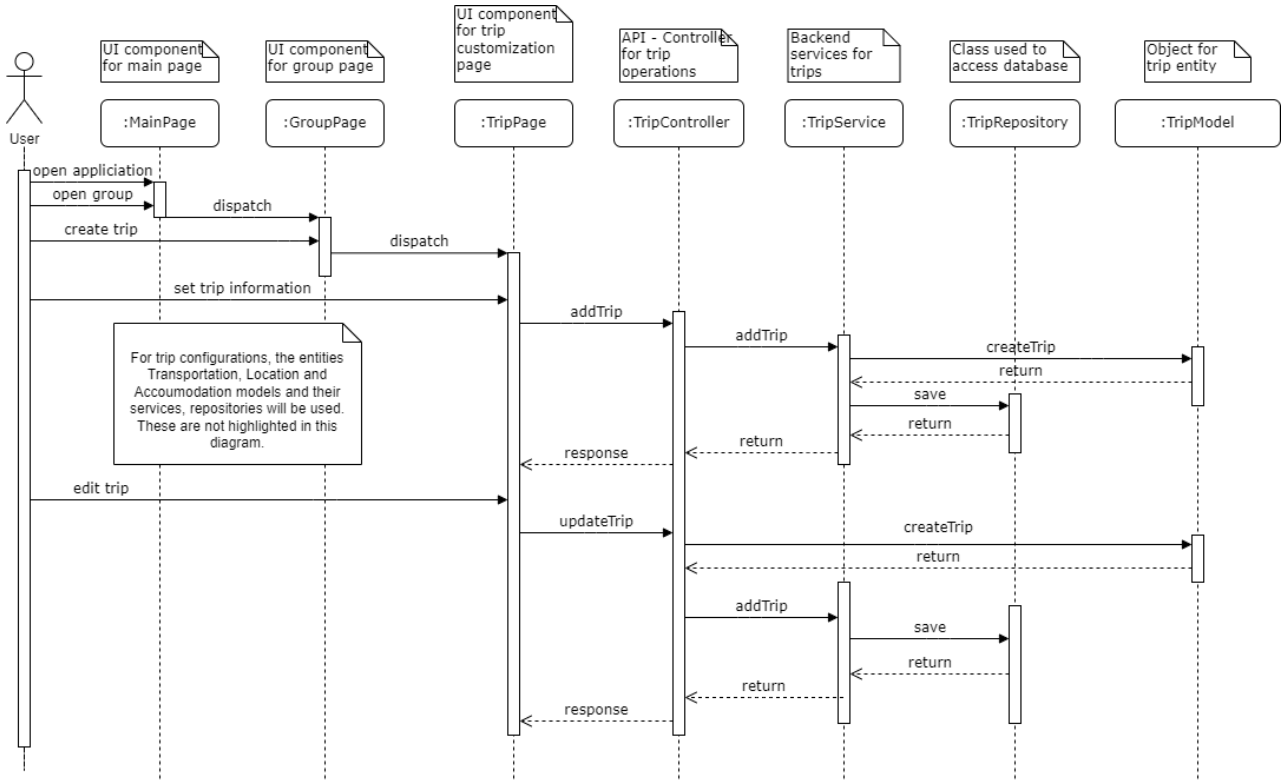
3.5.4 Dynamic Models

3.5.4.1 Sequence Diagrams

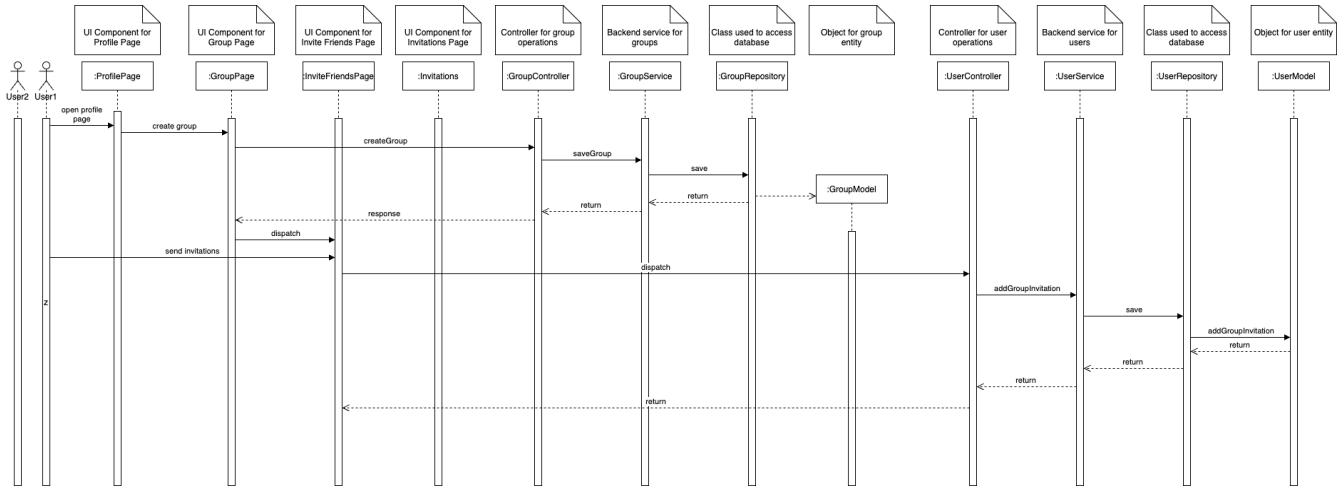
Open travel group chat and send messages



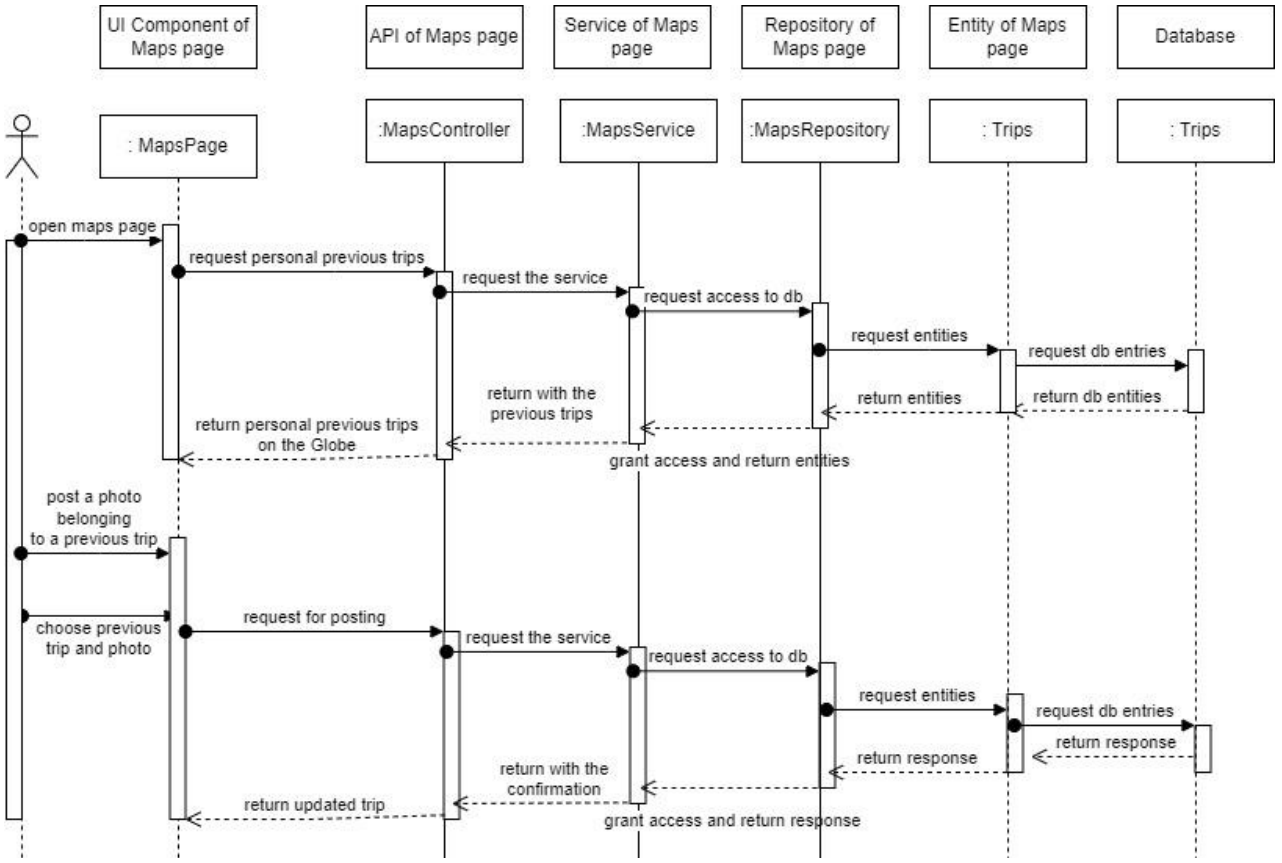
Arrange trip and edit trip



Create new group and invite friends

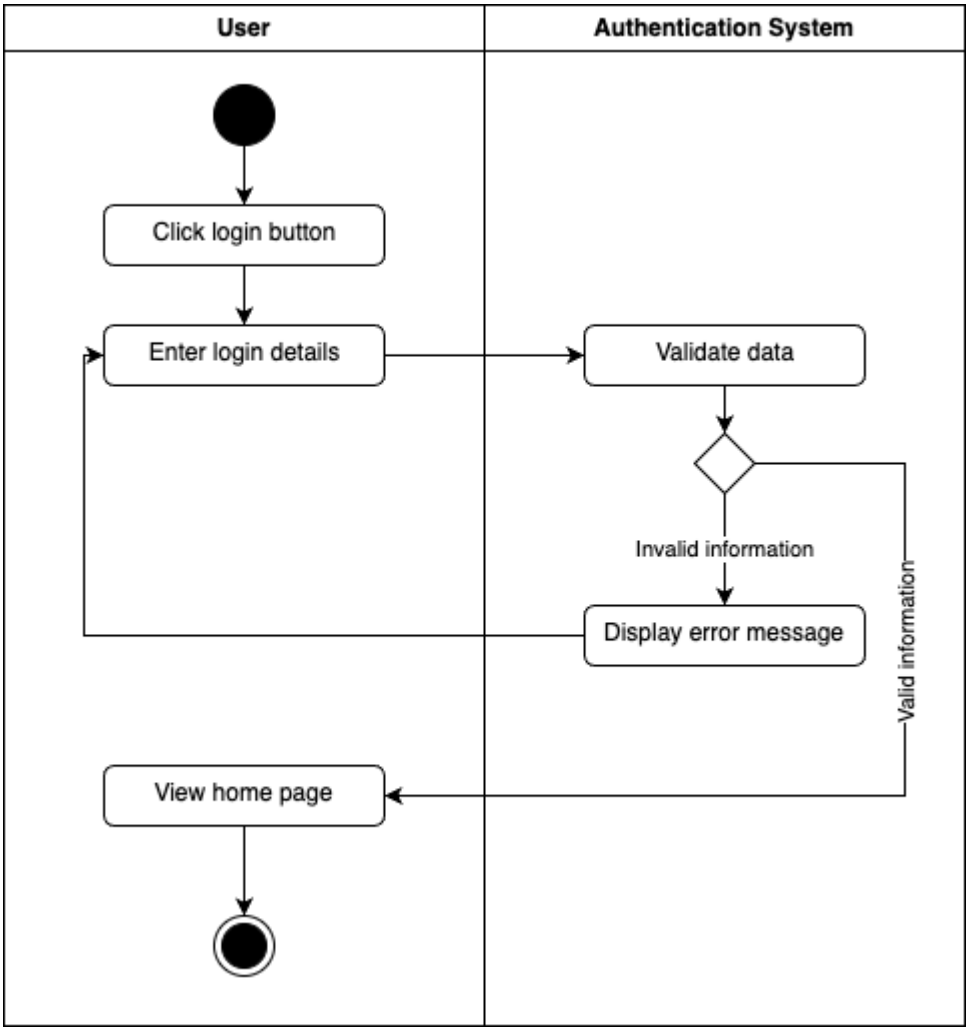


View the previous trips on globe and post photos belonging to previous trips

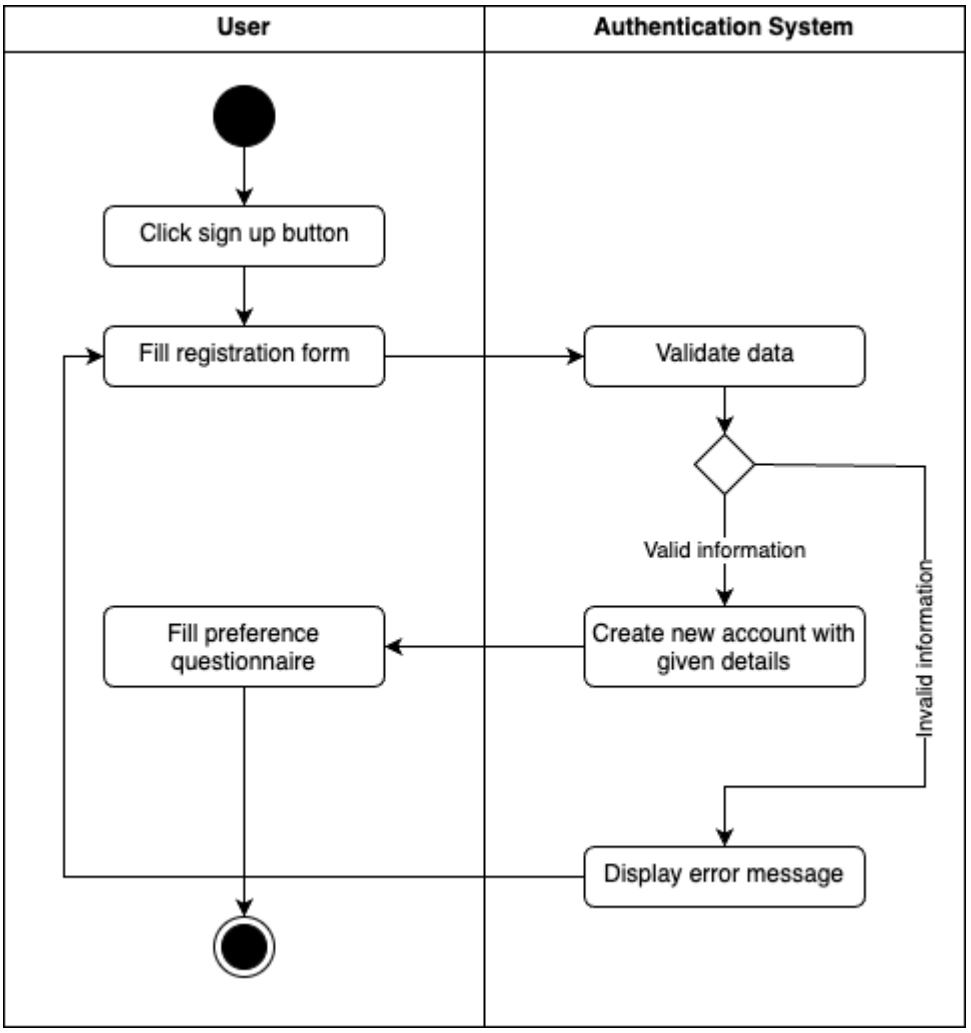


3.5.4.2 Activity Diagrams

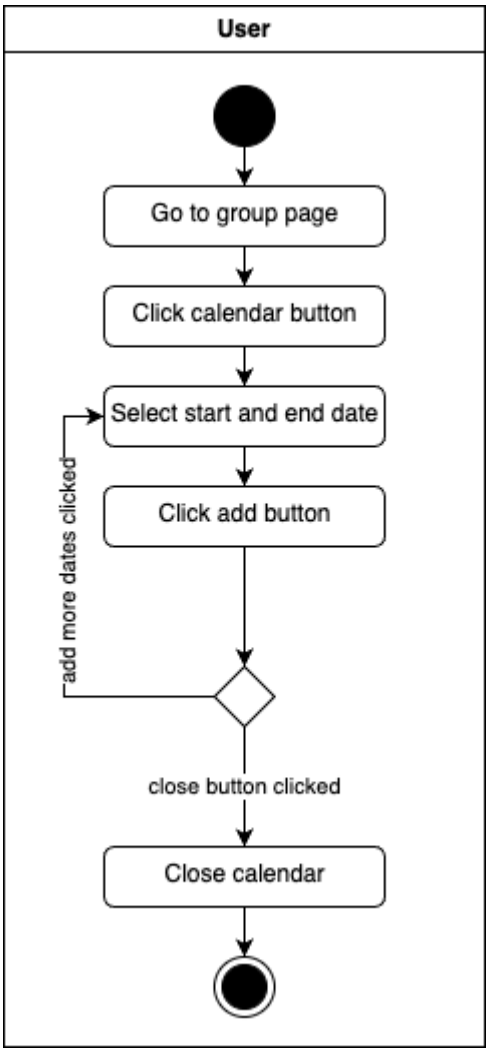
Login



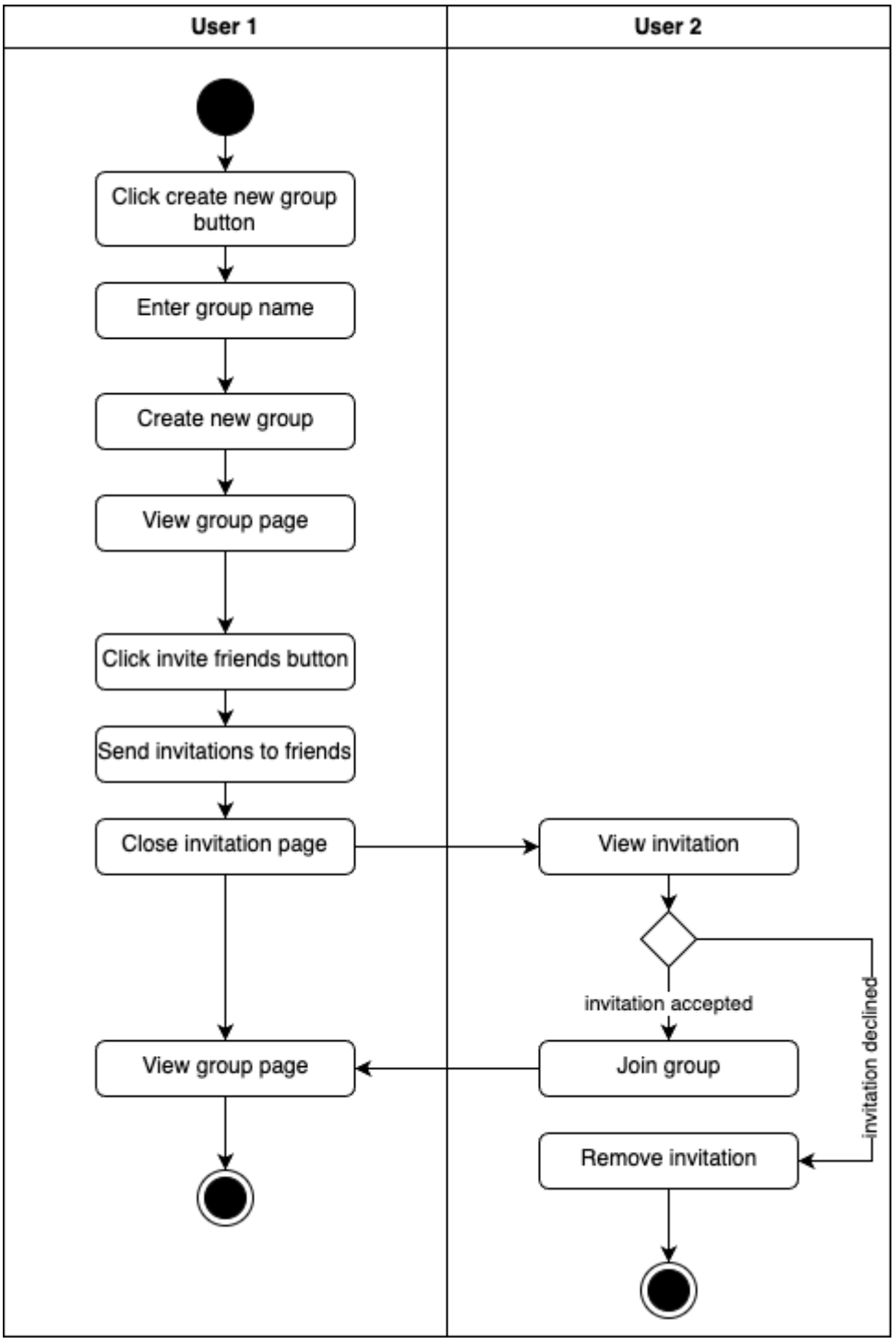
Signup


User
Authentication System
Click sign up button
Fill registration form
Validate data
Valid information
Invalid information
Create new account with given details
Fill preference questionnaire
Display error message

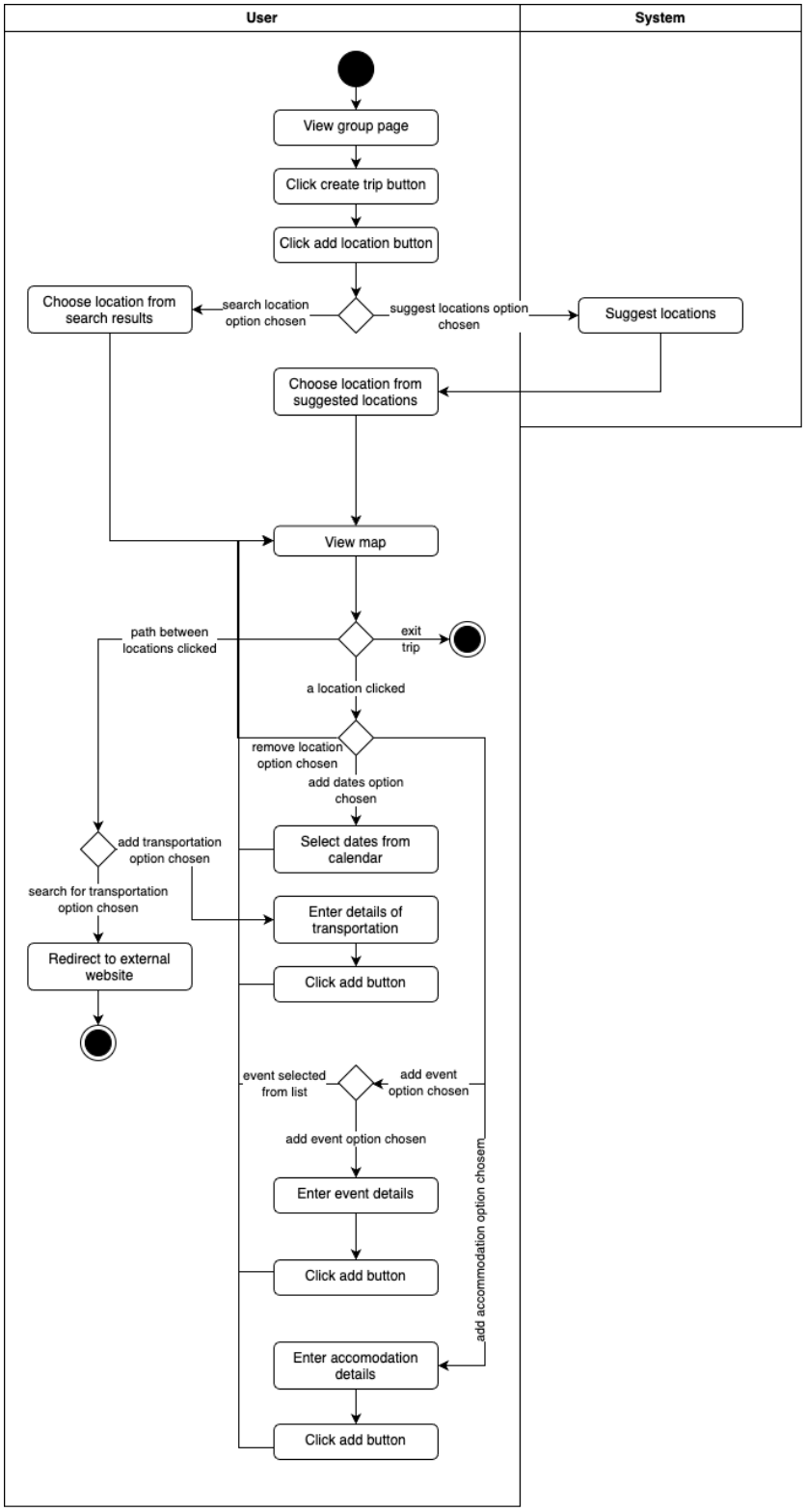
Add Available Dates



Create New Travel Group

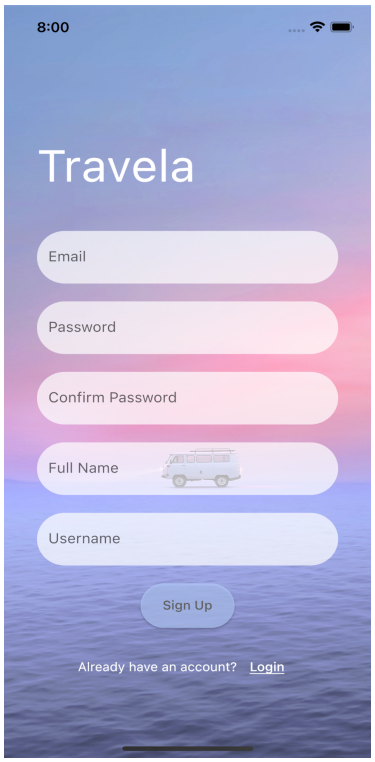


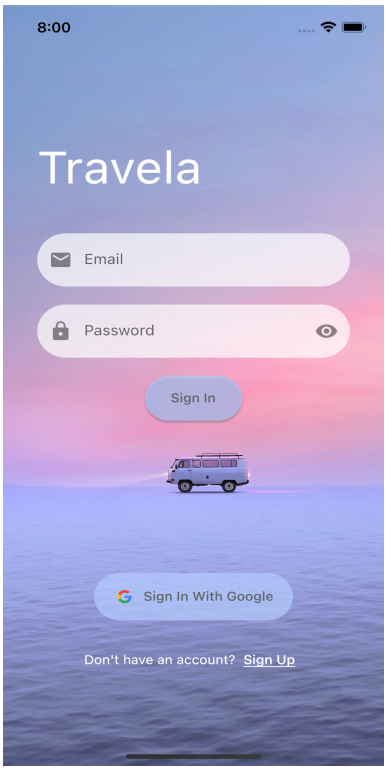
Create and Edit Trip



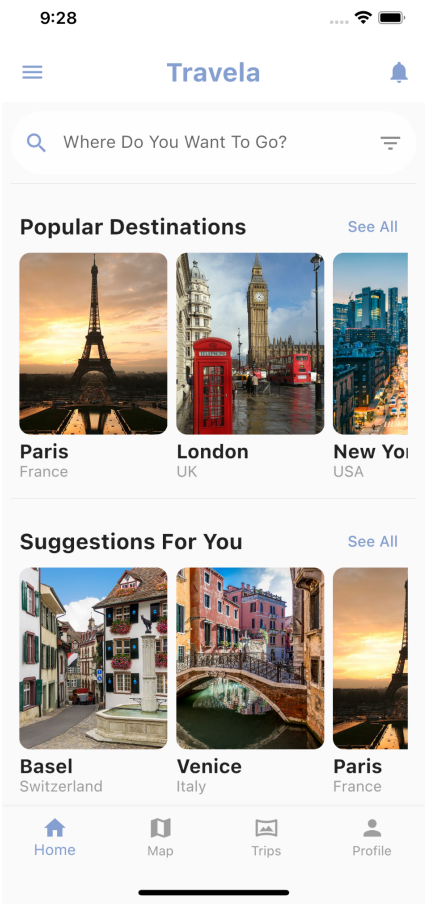
3.5.5 User Interface

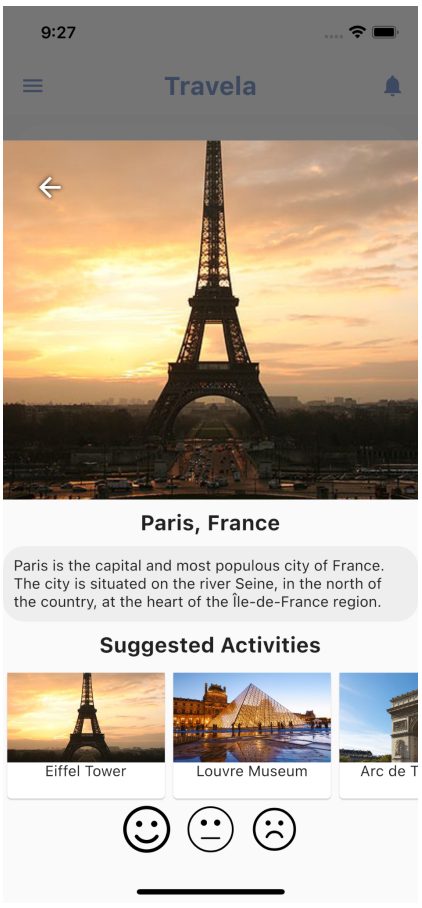
3.5.5.1 Sign Up - Login Page



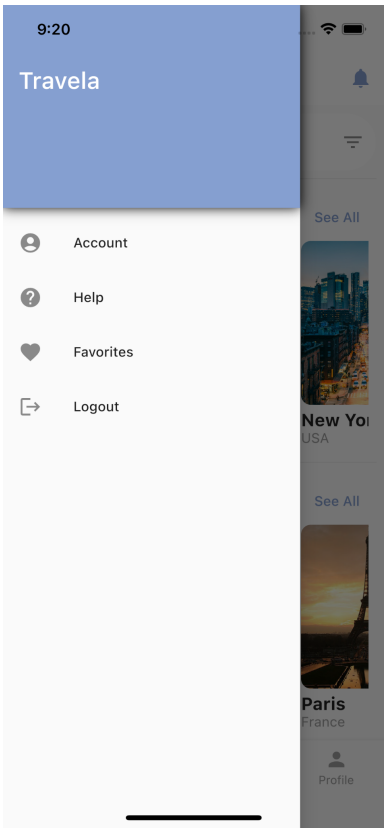


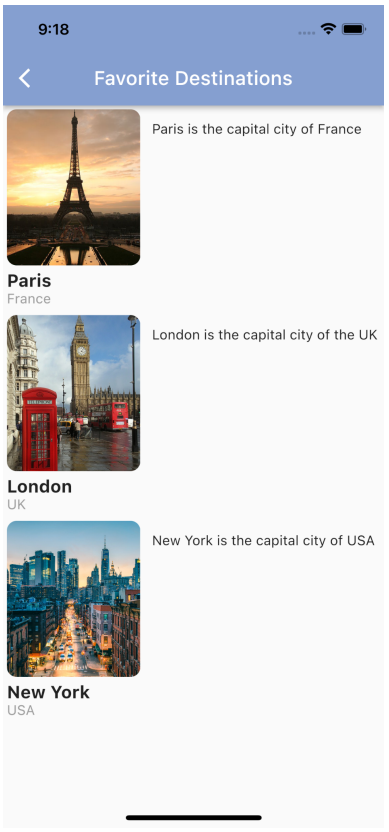
3.5.5.2 Home Page



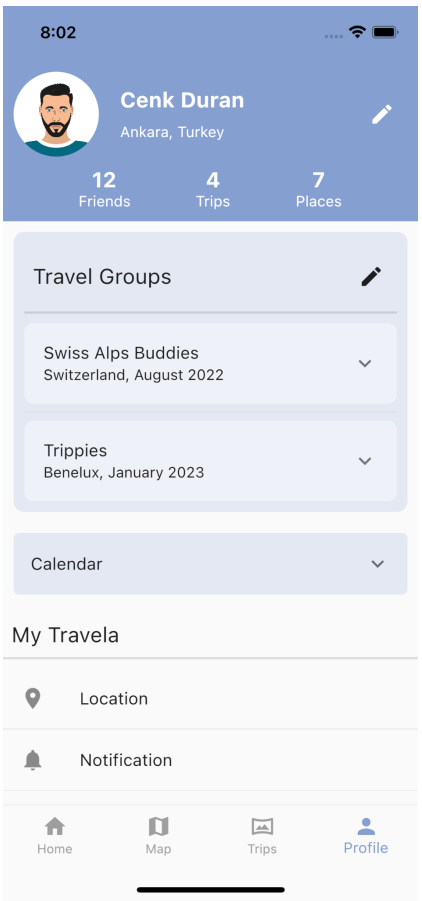


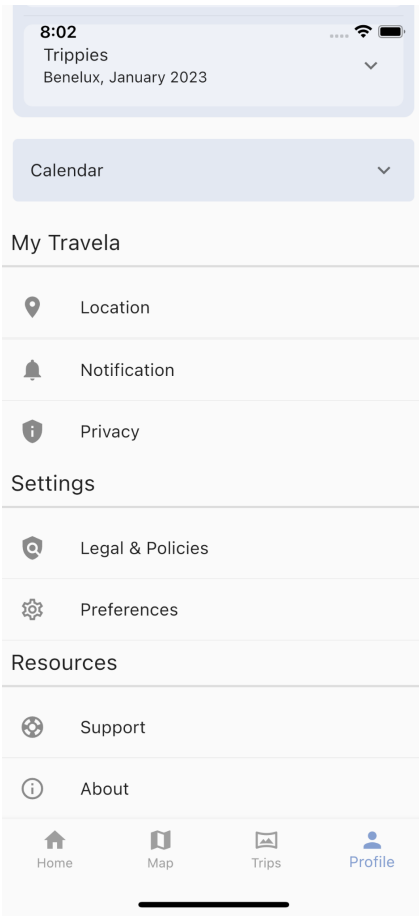
3.5.5.4 Drawer

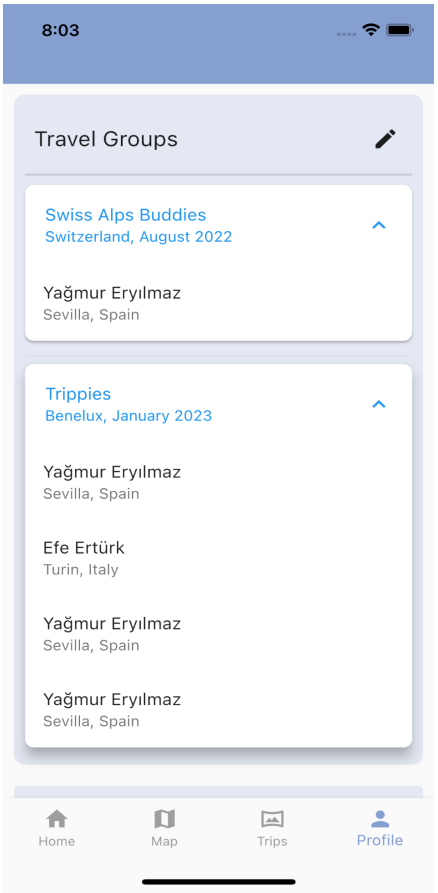


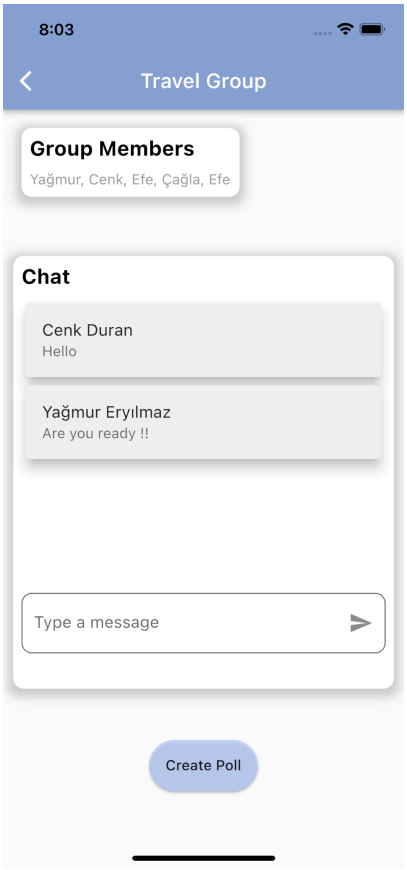


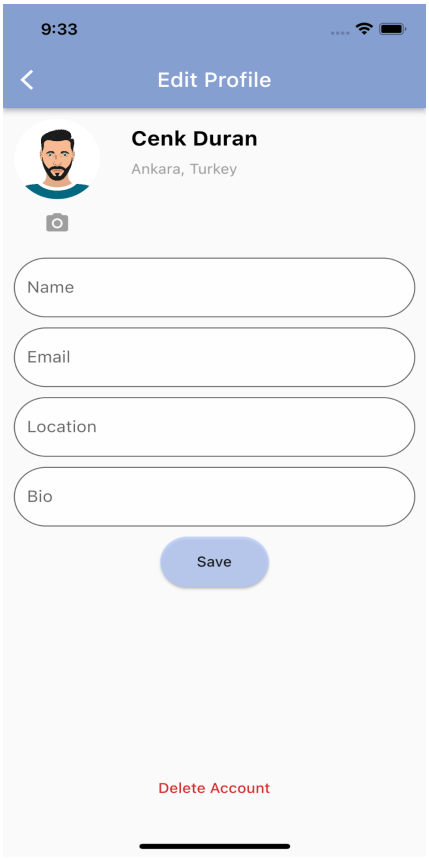
3.5.5.5 Profile Page



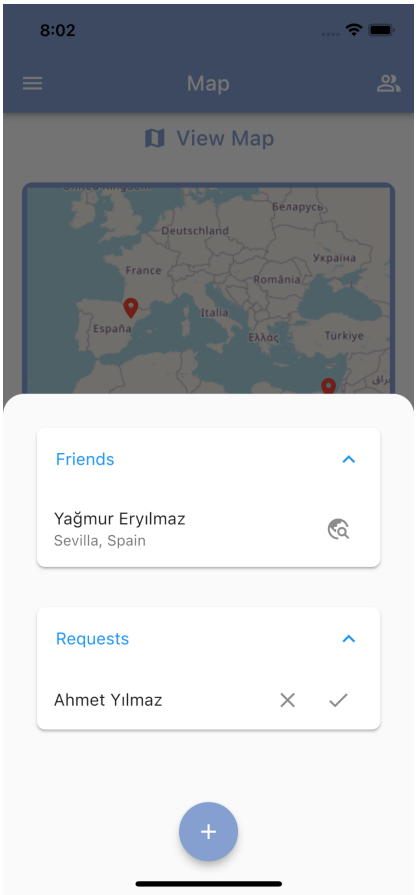


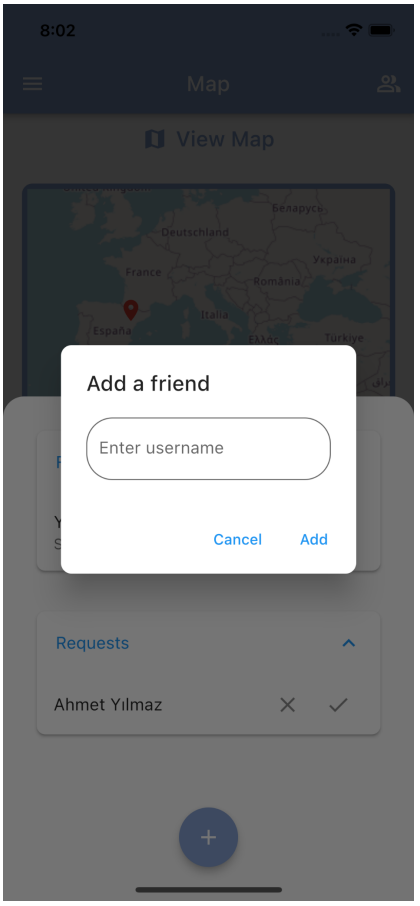




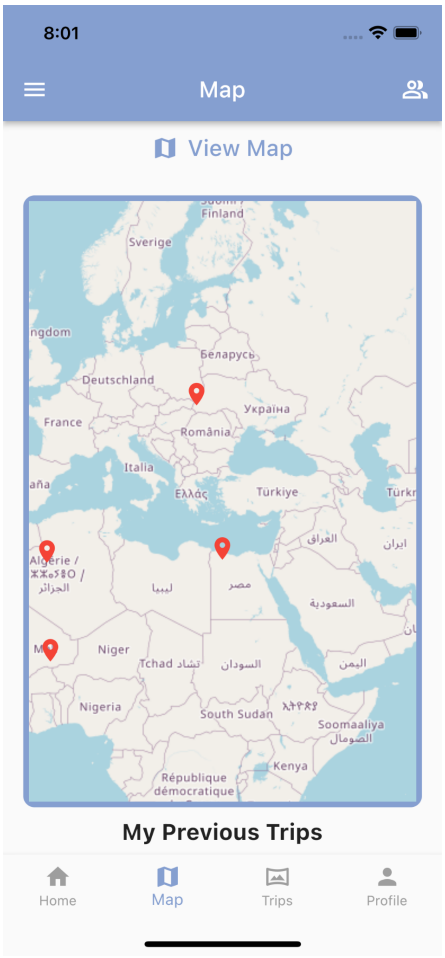


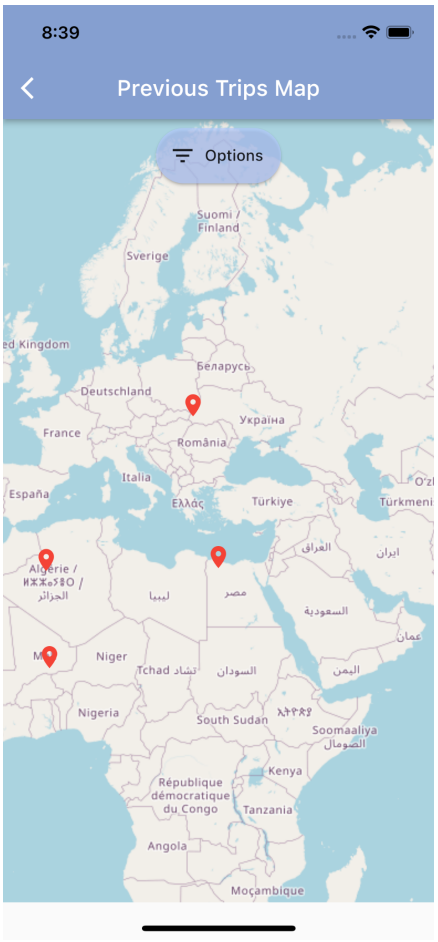
3.5.5.6 Maps Page

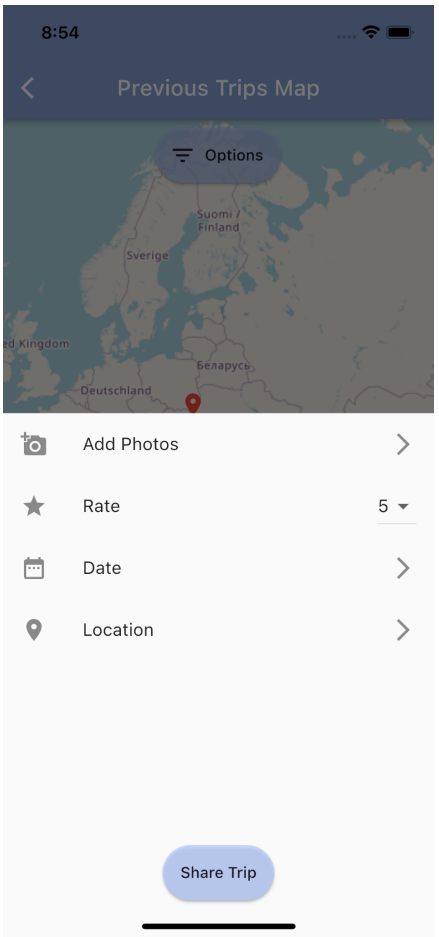




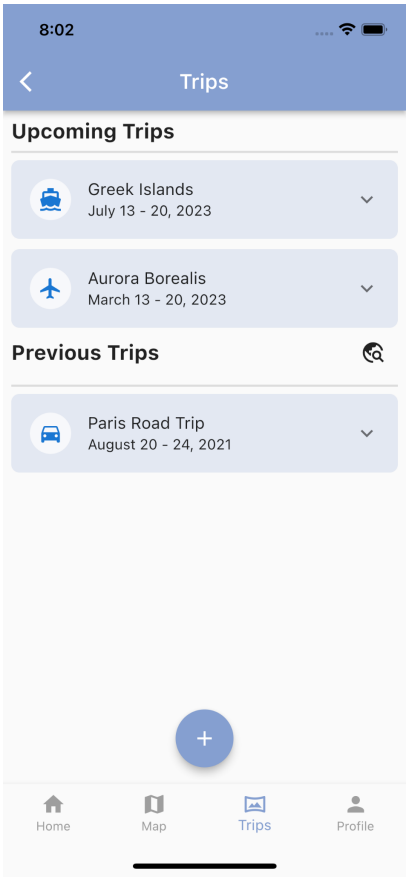
3.5.5.6.1 Seeing previous trips perform add photo and rate

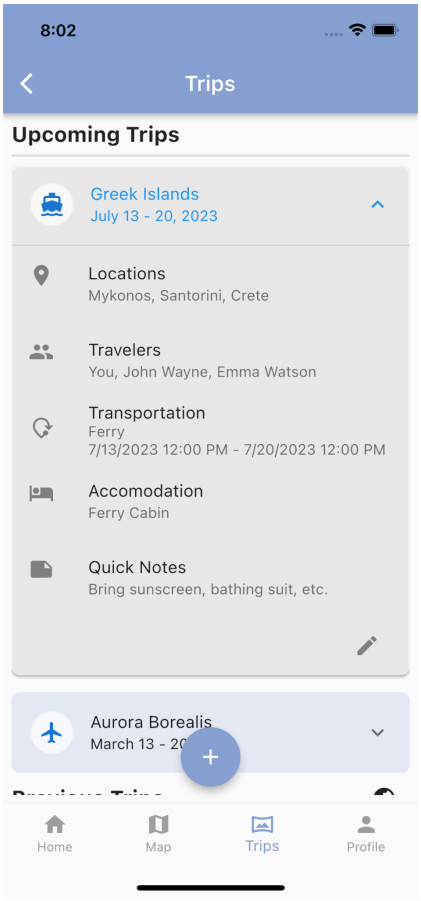




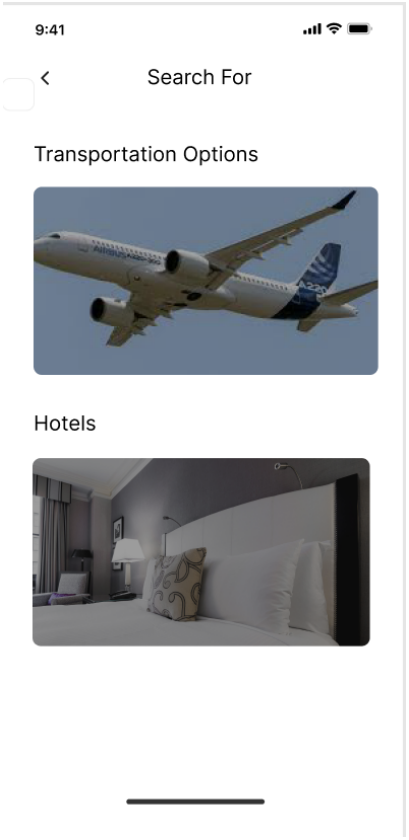


3.5.5.7 Trips Page

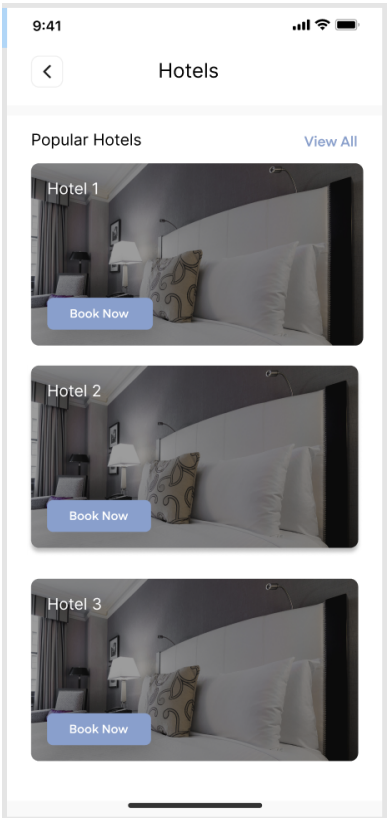




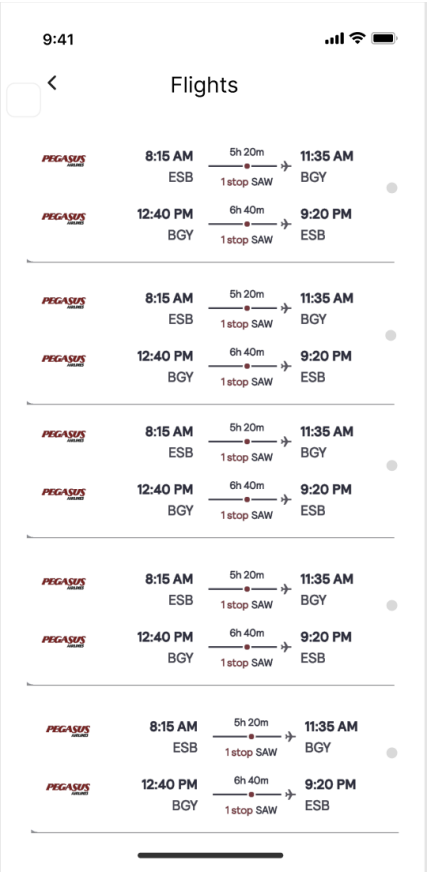
3.5.5.8 After entering date and destination to the search bar in home Page or editing an upcoming trip from trips page



3.5.5.9 Hotel Info Page



3.5.5.10 Transportation Options



4 Other Analysis Elements

4.1 Consideration of Various Factors in Engineering Design

Aesthetics

Aesthetics of a product is one of the most important things as before looking at the specifications of a product, the first thing people notice is the way the app looks. To ensure a good aesthetic feel in the first look, we will try to follow the design trends in the industry and create a modern interface.

Maintenance

To develop a sustainable and continuous product, responsive design is a crucial part as Travela will be available for many devices and platforms with different sizes. Maintaining different designs for all different platforms is not a good idea for effectiveness so our goal will be to create limited different designs when needed and responsive for all devices otherwise.

Social Factors

Any person from any gender, age, race, etc can use Travela both individually or in groups. Thus, we can say that there are no social factors directly affecting our app.

4.2 Risks and Alternatives

Like every new business idea, Travela has some risks too. Firstly, it proposes a new social media, which may have a hard time finding its customer base amongst the giant media companies like Instagram or Meta (Facebook). And one important consideration is that it is vital to provide good trip recommendation service when users sign into the app for the first time, as most of the users would download the app to plan a trip immediately. Thus, it is a challenge to crawl as much data about the users holiday interests as possible in a short amount of time and suggest possible vacation alternatives. Also, the success of recommender systems depend on third party applications and their integration with Travela such as

- Google hotels
- Google map reviews
- Skyscanner
- Amadeus
- Travelport

Due to privacy concerns of these big companies, the integration to them can be challenging. But high risk comes with great reward, the more data that Travela crawls from third party applications, the better all around trip recommendation service it provides. Alternatively, integration with other third party applications like TripAdvisor, Airbnb can be established, if the expected success cannot be achieved with the third party applications that are listed above.

4.3 Project Plan

Table 2: List of work packages

WP#	Work package title	Leader	Members involved
WP1	Project Information Form	Yağmur	Efe Ertürk, Efe Şaman, Çağla, Cenk, Yağmur
WP2	Website for project (with the document files, not the actual product)	Efe Şaman	Efe Şaman, Çağla
WP3	Project Specification Document	Efe Ertürk	Efe Ertürk, Efe Şaman, Çağla, Cenk, Yağmur
WP4	Analysis and Requirement Report	Efe Şaman	Efe Ertürk, Efe Şaman, Çağla, Cenk, Yağmur
WP5	Backend of the Project	Çağla	Efe Ertürk, Efe Şaman, Çağla
WP6	Database of the Project	Efe Ertürk	Efe Ertürk, Efe Şaman, Çağla
WP7	Machine Learning Systems of the Project	Efe Ertürk	Efe Ertürk, Efe Şaman, Çağla
WP8	Client Side of the Project	Cenk	Cenk, Yağmur, Efe Şaman
WP9	Website of the Project (actual web view of the product)	Yağmur	Cenk, Yağmur, Efe Şaman
WP10	Mobile Deployment of Project	Cenk	Cenk, Yağmur, Efe Şaman
WP11	Presentation and Prototype Demo	Çağla	Efe Ertürk, Efe Şaman, Çağla, Cenk, Yağmur

WP 1: Project Information Form			
Start date: *Oct 1, 2022* **End date:** *Oct 10, 2022*			
Leader:	Yağmur	**Members involved:**	Efe Ertürk, Efe Şaman, Çağla, Cenk, Yağmur
Objectives: *Deliver the Project Information Form, name the project, finalize the supervisor and innovation expert, and create Create a web page for the project*			
Tasks: ***Task 1.1 Name the Project*** **:** *Find a suitable name for the project*			

***Task 1.2 One paragraph description of the project* :** *Write a high-level summary of your project in the elevator pitch format.* ***Task 1.3 Finalize Supervisor & Innovation Expert* :** *Choose and finalize Supervisor & Innovation Expert that suits your project the best* ***Task 1.4 Website of the Project* :** *Create a web page for the project and put the deliverables into the webpage*
Deliverables ***D1.1:*** Project Information Form ***D1.2:*** *URL of the Web page*

WP 2: Website for project			
Start date: *Oct 1, 2022* **End date:** *Oct 10, 2022*			
Leader:	*Efe Şaman*	**Members involved:**	Efe Şaman, Çağla
Objectives: Create a *Website for project to put the document files, not the actual product*			
Tasks: ***Task 2.1 Website of the Project* :** *Create a web page for the project and put the deliverables into the webpage*			
Deliverables ***D2.1:*** Website for project			

WP 3: Project Specification Document			
Start date: *Oct 11, 2022* **End date:** *Oct 17, 2022*			
Leader:	*Efe Ertürk*	**Members involved:**	Efe Ertürk, Efe Şaman, Çağla, Cenk, Yağmur
Objectives: *Provide a brief description and requirements of the proposed project.*			
Tasks: ***Task 3.1 Write the Introduction for the project* :** *Write the introduction for the project involving description, constraints and professional and ethical issues parts* ***Task 3.2 Write Requirements of the project* :** *Write the requirements for the project involving functional and nonfunctional requirements*			
Deliverables ***D3.1:*** Project Specification Document			

WP 4: Analysis and Requirement Report			
Start date: *Oct 18, 2022* **End date:** Nov 13, 2022			
Leader:	Efe Şaman	**Members involved:**	Efe Ertürk, Efe Şaman, Çağla, Cenk, Yağmur
Objectives: *<briefly explain the objectives of this work package (3-5 sentences) >*			
Tasks:			

Task 4.1 Write the Introduction for the project **:** *Write the introduction for the project*
Task 4.2 Describe the current system **:** *Write about the current system in our domain, our differences from them*
Task 4.3 Describe the proposed system **:** *Give a detailed description of the project, involving the parts of*
3.1 Overview
3.2 Functional Requirements
3.3 Nonfunctional Requirements
3.4 Pseudo Requirements
3.5 System Models
3.5.1 Scenarios
3.5.2 Use Case Model
3.5.3 Object and Class Model
3.5.4 Dynamic Models
3.5.5 User Interface - Navigational Paths and Screen Mock-ups
Task 4.4 Mention other analysis elements **:** *Give a description of the project on the remaining analysis elements, involving the parts of*
4.1. Consideration of Various Factors in Engineering Design
4.2. Risks and Alternatives
4.3. Project Plan
4.4. Ensuring Proper Teamwork
4.5. Ethics and Professional Responsibilities
4.6. Planning for New Knowledge and Learning Strategies

Deliverables
D4.1: Analysis and Requirement Report

WP 5: *Backend of the Project*			
Start date: *14 Nov, 2022* **End date:** *15 Dec, 2022 (to be continued)*			
Leader:	*Çağla*	**Members involved:**	Efe Ertürk, Efe Şaman, Çağla
Objectives: *Build the general structure of the backend side of the project in REST API format by using Java Spring Framework*			
Tasks: ***Task 5.1 Generate the entity, repository, service, controller structure*** **:** *Create the needed entity, repository, service and controller components that are pre-determined on the class diagram. Create endpoints so that the frontend can consume the backend operations*			
Deliverables ***D5.1:*** *Backend service module*			

WP 6: Database of the Project			
Start date: *14 Nov, 2022* **End date:** *15 Dec, 2022 (to be continued)*			
Leader:	*Efe Ertürk*	**Members involved:**	Efe Ertürk, Efe Şaman, Çağla
Objectives: *Create the database component of the project and connect the database to the project*			

Tasks: ***Task 6.1 Create the database component of the project* :** Open up a database in MySQL and create the necessary tables for the project. The tables are generated automatically by the Springs annotation features, for example using “@Entitiy” or “@OneToMany” automatically generates the needed fields or tables for the project. ***Task 6.2 Connect the database to the backend project:*** *Connect the database to the backend project and do some test operations using Postman*
Deliverables ***D6.1:*** *Database component*

WP 7: Machine Learning Systems of the Project			
Start date: *14 Nov, 2022* **End date:** *15 Dec, 2022 (to be continued)*			
Leader:	*Efe Ertürk*	**Members involved:**	Efe Ertürk, Efe Şaman, Çağla
Objectives: *Design the machine learning algorithms that will be used for the vacation recommendation system, and connect it to both backend and database components*			
Tasks: ***Task 7.1 Design the machine learning algorithms* :** Design the appropriate machine learning algorithms to suggest new vacations to groups of users, while taking several users into consideration. Deep learning can be used with TensorFlow. ***Task 7.2 Connect the machine learning model to the backend and database components:*** *Connect the machşne learning model to the backend and database components and test whether it is working. Enhancements on the algorithm can be done later*			
Deliverables ***D7.1:*** *Machine learning model*			

WP 8: *Client side of the project*			
Start date: *14 Nov, 2022* **End date:** *15 Dec, 2022 (to be continued)*			
Leader:	*Cenk*	**Members involved:**	Efe Şaman, Cenk, Yağmur
Objectives: Create *client side module of the project and connect it to the backend service*			
Tasks: ***Task 8.1 Create client side module of the project* :** Create frontend services with user interfaces ***Task 8.1 Connect the client side with the backend* :** *Connect the client side with the backend and test whether the connection is successful*			
Deliverables ***D8.1:*** *Client side module of the project*			

WP 9: Website of the Project			
Start date: *14 Nov, 2022* **End date:** *15 Dec, 2022 (to be continued)*			
Leader:	*Yağmur*	**Members involved:**	Efe Şaman, Cenk, Yağmur
Objectives: *Create web view of the project*			
Tasks: ***Task 9.1 Create web view of the project*** **:***Create web view of the project so that the clients can also use Travela on a web page, without needing to download the app to their phone*			
Deliverables ***D9.1:*** *Website of the Project*			

WP 10: Mobile Deployment of Project			
Start date: *14 Nov, 2022* **End date:** *15 Dec, 2022 (to be continued)*			
Leader:	*Cenk*	**Members involved:**	Efe Şaman, Cenk, Yağmur
Objectives: *Create the mobile view of the project*			
Tasks: ***Task 10.1 Create mobile view of the project*** **:***Create mobile view of the project so that the clients can also download and use Travela on their phones via the app, without needing to using the web page*			
Deliverables ***D10.1:*** *Mobile app of the project*			

WP 11: Presentation and Prototype Demo			
Start date: *14 Nov, 2022* **End date:** *15 Dec, 2022*			
Leader:	*Çağla*	**Members involved:**	Efe Ertürk, Efe Şaman, Çağla, Cenk, Yağmur
Objectives: Prepare a presentation and a prototype demo			
Tasks: ***Task 11.1*** **Prepare a presentation and a prototype demo :** *Present the works and final version of the product*			
Deliverables ***D11.1:*** *Presentation* ***D11.1:*** *Project Demo*			

4.4 Ensuring Proper Teamwork

Teamwork is one of the most important factors that lead to success in such projects. Thus, it is important to utilize as much teamwork as possible, for the best outcomes. There are several ways of ensuring this, some examples can be seen below.

- Dividing work equally that matches the interests and specialities of the team members, in face to face or online meetings
- Scheduling and having meetings weekly
- Setting weekly/monthly goals about the project, foreseeing how much work has to be done by each individual and planning forward accordingly
- Using Google docs for enabling simultaneous work on reports
- Using Git and GitHub for the version control and enabling simultaneous work on the code
- Using a kanban board (maybe Jira) to keep track of the weekly goals and sprints
- Using communication channels such as Whatsapp efficiently, to daily update the work that has been done, or the progresses that have been made, or which tasks need more manpower to finish

4.5 Ethics and Professional Responsibilities

Even though we as students will be building the application, maintaining a professional relationship will be important. We will not only have responsibilities towards ourselves for the course, also towards each other as we are in this project together. As mentioned above, we will have meetings occasionally, and have deadlines for tasks. The timely completion of these tasks is very important and every group member is aware of this responsibility of finishing work on time. On the other hand, we as group members respect our work in other lectures and non-academic lives, hence will do our best to adjust deadlines fitting everyone’s workloads.

Also, for the ethical responsibilities that we have towards the users of the Travela, the application will profile users to enhance its suggestions. This requires training our system on personal information and preferences. As mentioned in our specifications report, our application will not share or use this information elsewhere.

Users will be allowed to delete their personal information/profiling from our system whenever they want, and the system will also delete their information if they close their account off. We will not do any profile matching, by which we mean we will not store that information to try to match it with the same user in their future uses from different instances.

Third party API's will be used, but any information shared will be anonymised to protect personal information.

Users will be able to block other profiles and report others for mis-usage/abuse. Our team will look into them and take proper actions.

4.6 Planning for New Knowledge and Learning Strategies

We plan on using a Spring Backend service and a Flutter native frontend, including both mobile and web site view. We have decoupled into backend and mobile teams, so that teams are more specialized to their domain and for example backend teams should not learn the necessary technologies like Flutter. For backend, the technologies that we plan to use is as follows

- Java
- Spring
- Maven
- MySQL database
- Postman
- Microservices
- REST API

For mobile and frontend, we plan on using the technologies

- Dart
- Flutter

- IOS Development
- Native Development

For the machine learning systems, we plan on using the technologies

- Python (Numpy, Scipy, Scikit-learn , Pandas libraries)
- TensorFlow

Moreover, we plan to implement and integrate a deep learning model for the vacation recommendation system.

Every team member is already familiar with their tasks and the technologies that we plan on using, but to acquire new knowledge if needed, we plan on using

- Online Courses like Coursera or Udemy
- Various web resources like tutorialspoint, medium, Youtube

But to be on the same page, if we have a question regarding the technologies, it is best to ask the other team members through communication channels, as some may have encountered that same problem before and their experience could be helpful. If we need to use a technology that we know nothing about, we will take online courses from coursera or udemy. If we struggle in a specific task, using internet resources could be the correct approach on learning and fixing the mistake. Also, it is best if we learn by trying and failing, and succeeding after learning from our mistakes.

5 References

[1] Knight, Rob. “Average person spends 10 hours planning their holiday, survey claims”. Independent UK. https://www.independent.co.uk/travel/holiday-booking-planning-travel-survey-tourist-a8801211.html. (Accessed: 15 Oct 2022)

[2] Lamothe , Marta. “Airbnb’s 100+ new app features: Everything you need to know”. Your Rentals. https://your.rentals/blog/airbnb-2021-new-app-features-everything-you-need-to-know/. (Accessed: 23 Oct 2022)

[3] A. Inc., “Human interface guidelines,” *Human Interface Guidelines - Human Interface Guidelines - Design - Apple Developer*. [Online]. Available: https://developer.apple.com/design/human-interface-guidelines/guidelines/overview/. (Accessed: 17 Oct 2022).

[4] “Material design for Android : android developers,” *Android Developers*. [Online] Available:https://developer.android.com/develop/ui/views/theming/look-and-feel. (Accessed: 17 Oct 2022).

[5] “What is token-based authentication?,” *Okta*. [Online]. Available: https://www.okta.com/identity-101/what-is-token-based-authentication/. (Accessed: 17 Oct 2022).