CS491 - SENIOR DESIGN PROJECT

Travimize: Optimized Travel, Personalized Experience

PROJECT ANALYSIS REPORT

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1. INTRODUCTION

Travimize is an application which tries to facilitate people's lives while making plans for their holidays. First of all, it tries to apply the optimization process for the journeys by allowing the person to visit the places they want at the shortest time. The user can first select his/her interests, the places he/she wants to visit during his holiday, and traveling options like walking, public transport,etc. By observing the opening, closing times, distance between two locations, and the choices of the user, the algorithm will provide the optimal route for the journey. By the way, users would also be able to get informed about the distance between two locations and which transportation would be fastest that would help their selection process. The application would just propose a schedule which can further be changed by the person according to his/her own desires, other plans or some schedule changes. Along with these scheduling plans, the user will be able to specify some price, eating, accommodation related choices. Accordingly, hotels and restaurants will be proposed by the application and the user can also be directed to associated websites for hotel reservations. Moreover, the user will be able to rate their plans or specifically places and can write comments which would provide feedback not only for the other customers but also to program admins. These feedback questions would be about the time spent in a specific location, if that place is open during the visit, and then future plans will be created by taking these into consideration. With the help of these evaluations, a user going to a specific location would be firstly informed about the high rated plans and then he/she may have a chance to select these previously liked plans by making some changes or applying them straightforwardly. Finally, the users would also be able to see their previous plans and may repeat or personalize it when they visit the same place again. As a result, Travimize helps people to optimize their holidays and personalize the schedules by specifying their interests at the beginning or changing them according to their desires at the end.

The type of innovation that is planned to be implemented for Travimize is service. As Travimize aims to bring a new perspective to traveling and ease the process of vacation planning, it is included in the category of service innovation that prioritizes customers and their experience. Travimize is also open to performance and functionality enhancements according to the feedback coming from its customers. The application is a radical innovation as it combines accommodation, food, transportation, and tourism industries. [1].

2. CURRENT SYSTEM

In terms of travel planning, there are several existing applications such as TripAdvisor [2], TripIt [3] and Inspirock [4]. TripAdvisor allows users to customize their trip by saving the hotels, restaurants, activities or tours that catch their attention. They can either schedule their saved items or leave them unscheduled. TripIt chooses travel-related mails from your inbox such as ticket or booking confirmation and creates the plan automatically. Rather than attractions or activities, TripIt mostly focuses on planning flights, hotels, car rentals, etc. Among these applications, Inspirock is the one that has more similarities with Travimize. According to entered destinations and dates, Inspirock comes up with plans for each day that include landmarks, parks or museums to visit for the specified destinations. It also redirects to different websites for hotel options. However, unlike Travimize, it does not consider the money range, sleep hours, walking or food preferences of the users before creating the plan. Most importantly, Travimize differs from all of the existing applications as none of them tries to achieve creating the most optimized travel plan according to the users' preferences.

3. PROPOSED SYSTEM

3.1. Overview

Travimize is a web application which facilitates the process of planning for holidays. It follows an optimization algorithm while coming up with the travel plan as it aims to provide a great travel experience for its users that can be completed at the minimum amount of time possible.

When the users open Travimize, they can log in to the application if they already have an account. Otherwise, they need to sign up first. After successfully logging in to the application, users can see their upcoming trips if they have any and they can fill out a form to send a request for a new travel plan by choosing the name their travel plan, beginning and end dates of their trip, their destination(s), their preferences for money range, sleep hours, attractions, food and walking. Based on the choices of the users, the algorithm provides the optimal route for the trip. After their travel plan is created, users can edit it by changing the time intervals, transportation

choices and activities on the daily schedules. They can also add an accommodation to their plan and visit the given link for recommended hotels.

The users can see their previous trips, leave feedback to them by filling out a form and rate them. They can add those plans to their list of favorite travel plans or share them with their friends. The application also suggests high rated plans to the users based on their location choices. They can add those plans to their favorites and share them with their friends as well. Travimize also notifies its users to remind them about their upcoming trips.

3.2. Functional Requirements

- Personalized Schedule

  Users will be able to request for a personalized traveling plan that satisfies their requests and constraints. These requests and constraints will be explained in the next bullet point. When users receive their personalized schedule, they will be able to see a plan with possible hotel options to stay at, possible restaurant options to eat breakfast, lunch or dinner at. They will also be able to see the touristic landmarks, natural beauties, historic places, museums, etc. in their plans. There will also be time slots to visit famous parks, beaches, etc. Moreover, shopping malls and other famous shopping streets and stores will be taken into consideration in the schedule if the user prefers it. They will know the temperature of every place they will visit exactly. Not only the user will be able to see at which time they will visit these places, they will also be able to get the information about how to reach those places, with which transportation vehicle, and how long it will take. They will know how much money they will need to spend for entrance fees, transportation fees, etc. In summary, the users will have an optimized traveling plan that shows where to be and what to do every minute of the day for how long their plan is.

- Constraints

  Users will determine what constraints their schedule will have. They will fill out a form before getting the traveling plan and the plan will be created according to the users' constraints and preferences. These include:

  - Where in Turkey they will go, and at most how far can a place be for them to visit.

- For how long their trip will last and between which dates they will visit.
- How many people will be traveling.
- How much money they want to spend in total for the trip (a range).
- For how long do they want to sleep a day. Minimum, maximum and ideal sleep times.
- Which transportation vehicles they prefer, or will never use. Do they have a car?
- For how long they can walk, and for how long they can climb a hill or a ramp. They can provide an average number of steps for one day.
- What type of tourist attractions they prefer. For example,
  - landmarks
  - historic places
  - shopping areas
  - famous local food
  - beaches
  - forests
  - natural parks
  - other parks
  - museums
  - religious places, etc
- What type of food they like to eat. What are their allergies? Which local foods they want to try.

- Providing necessary resources for completing the plan

  Users will be able to see possible hotel options to stay at, possible restaurant options to eat their meals at. They will also find the necessary links to the websites that they can make reservations to, or get information from.

- Modifying the personalized plan

  When the personalized traveling plan is created and displayed to users, they can modify the plan if they are not satisfied with any part of it. For example, they can request more time to visit a museum, they might not like the suggested touristic places and request for new ones. Moreover they might say that they do not want to go too far to visit a place or they can just want a calmer trip to rest. According to them, the plan will be personalized.

- Feedback for the optimized plan

  If the user chooses a plan to follow, and go on their trip, they will be able to give feedback to the plan so that next time, their plan can be better. For the feedback, they will be asked to provide information about the questions below:

  - ➔ They will be asked to rate and give a detailed review for a plan.
  - ➔ They will be asked if the suggested places they visited were open at the reserved time slot, and if the information given about the plan was correct.
  - ➔ Did they feel unsafe at any time when they were on their trip? If so, when and where?
  - ➔ Were the given time slots enough to visit the place? Did they take any longer? If so, where and how much more time did they need?
  - ➔ They will be asked if they would recommend this plan to others. And if they do not recommend it, why?
  - ➔ They will also be asked to rate and give a review to the hotels and restaurants.
  - ➔ Lastly, they will be asked if there is anything they want to add.

- Favorite schedules

  Users will be able to see available traveling plans which were made as an example, or traveling plans other people made, and recommend. They will be able to choose and personalize these plans as they wish.

- History

  Users will be able to see the old plans they created and their feedback to them.

3.3. Non-Functional Requirements

3.3.1. Usability

- The user interface should be easy to use or learn for maintaining maximum convenience and user friendliness for the target audience.
- Each component of the user interface should have a meaningful and clear name.
- The user interface should offer a guide on navigating the website for users.

- All screens must be independent of one another, with the exception of pop-ups, to prevent users from having to navigate backward through the application.

3.3.2. Robustness

- The database should be created in such a way that it can easily respond to the requests from the application.
- The database should respond to an input that is prone to errors without any issues.

3.3.3. Security

- All of the personal data of the users (name, mail, phone number, etc.) should be protected by the application.

3.3.4. Recovery

- Regular database backups are advised. Data should be saved in the event of a system failure.

3.3.5. Scalability

- The application should handle the excessive number of users logging in to the system without crashing.

3.4. Pseudo Requirements

- Spring Framework will be used for the backend development of the application.
- React will be used for the frontend development of the application.
- Relational databases will be used to store application information.

3.5. System Models

3.5.1. Scenarios

- **Sign Up**

  Actors: All users

  Entry condition:

  - Application users go to the homepage URL and click on the “Register” button.

  Exit condition:

- The user successfully registers for an account consisting of their supplied credentials, and gets redirected to the homepage.

Flow of events:

1. The user clicks on the “Register” button.
2. The user supplies a username, an email and a password.
3. After all checks are successful, the user account is created and they are redirected to the homepage.

Alternate flow of events:

A. The input(s) for the registration form are invalid.
    a. The application will display a pop-up stating the inputs that are invalid.
    b. The user will try different, appropriate credentials for registration.
    c. After all credentials are valid, the user account is created and they are redirected to the homepage.

- **Log in**

Actors: All users

Entry condition:

- Users go to the homepage URL and click on the “Login” button.

Exit condition:

- The user successfully authenticates himself/herself and can access their content.

Flow of events:

1. The user clicks on the “Login” button.
2. The user supplies the credentials they have used during account registration.
3. After successful authentication, the user is authorized to access their resources.

Alternate flow of events:

A. Incorrect credentials are supplied by the user.
    a. The application will display a pop-up stating that the username-password pair is incorrect.

b. The user will try to supply the correct pair of username and password until successful authentication.

B. Incomplete credentials are supplied by the user.
   a. The application will display a pop-up stating that the missing credentials must be completed.
   b. The user will try to supply the missing credentials until successful authentication.

- **Create a travel plan**

  Actors: All users

  Entry Conditions:

  - The user is logged in.
  - The user clicks on the “Plan a Trip” button.

  Exit Conditions:

  - The user clicks on the “Create” button and a travel plan is created.

  Flow of Events:

  1. The user clicks on the “Plan a Trip” button and a form with questions about the content and conditions of the trip appears.
  2. The user fills the form with preferences about transportation, places to see, budget, time etc. with personal choices and conditions.
  3. The user then clicks on the “Create” button and the system will create a personalized plan for the user.

  Alternate Flow of Events:

  A. Invalid or missing input in the form is provided by the user.
     a. The form displays the question with the invalid input in a red color and displays the error message above the question.
     b. The user fills in the invalid/missing inputs again.
     c. The user clicks on the “Create” button and the system will create a personalized plan for the user.

  B. Conflicting input in the form is provided by the user.
     a. The form displays an error message about conflicting inputs at the top of the form and makes the questions bold.
     b. The user fixes conflicting input.

c. The user clicks on the “Create” button and the system will create a personalized plan for the user.

- **Modify the personalized travel plan**

  Actors: All users

  Entry Conditions:

  - The user is logged in.
  - The user has an existing travel plan.
  - The user goes to his/her travel page and clicks on the “Modify” button next to the chosen travel plan.

  Exit Conditions:

  - The user clicks on the “Apply Changes” button and his/her travel plan is updated successfully.

  Flow of Events:

  1. The user clicks on the “Modify” button and the chosen travel plan switches to the editing mode.
  2. The user can edit his/her plan by adjusting the time slots reserved for a certain activity or a place, removing existing destinations from the plan, requesting for new destinations, changing the chosen restaurants, adding a new hotel and specifying the theme of the trip as calmer, more adventurous or more cultural.
  3. The user clicks on the “Apply Changes” button and his/her travel plan is updated successfully.

  Alternate Flow of Events:

  A. Adjusted time slot by the user for a certain activity or a place overlaps with the time slot of another event.
     a. The application displays a pop-up stating that there is another event during the selected time slot and an available time slot should be chosen instead.
     b. The user is returned to the editing mode and supplies an available time slot.
     c. The user clicks on the “Apply Changes” button and his/her travel plan is updated successfully.

B. No destination that satisfies the users' constraints is available.
    a. The application displays a pop-up stating that there is no destination that satisfies the given constraints.
    b. The user is returned to the editing mode and supplies valid credentials.
    c. The user clicks on the "Apply Changes" button and his/her travel plan is updated successfully.

- **Leave feedback to destinations, hotels and dining places**

  Actors: All users

  Entry Conditions:

  - The user is logged in.
  - The user selects a specific place and clicks to "Leave Feedback" button next to the chosen place

  Exit Conditions:

  - The user clicks on the "Send Feedback" button and his/her feedback is sent successfully.

  Flow of Events:

  1. The user clicks on the "Leave Feedback" button next to the chosen place.
  2. The user fills out the feedback form which is displayed as a pop-up window by writing a comment or rating the place.
  3. After all of the necessary information on the form is completed correctly, the user clicks on the "Send Feedback" button and his/her feedback is sent successfully.

  Alternate Flow of Events:

  A. Incomplete information is supplied by the user.
      a. The application displays a pop-up stating the name of the fields on the form that should be completed in order to continue.
      b. The user fills out the feedback form with complete information.
      c. The user clicks on the "Send Feedback" button and his/her feedback is sent successfully.

- **Share a route with a friend via user-supplied email**

  Actors: All users

  Entry Conditions:

  - The user is logged in.
  - The user selects a specific route, which may be one of his/her previous routes in the Travel History page or one of the proposed routes from the system in the Suggestions page.
  - The user clicks to “Share” button next to the chosen route

  Exit Conditions:

  - The user clicks on the “Send Route” button and the specified route is sent via email successfully.

  Flow of Events:

  1. The user clicks on the “Share” button next to the chosen travel plan.
  2. The user writes the email of the receiving person to the blank displayed in a pop-up window.
  3. After indicating the email address, the user clicks on the “Send Route” button and the specified route is sent via email successfully.

  Alternate Flow of Events:

  A. Email address is not written by the user.
     a. The application displays a pop-up stating the email should be written in order to continue.
     b. The user fills out the blank with the receiver's email address.
     c. The user clicks on the “Send Route” button and the specified route is sent via email successfully.

  B. Email address is written in an incorrect format
     a. The application displays a pop-up stating that the email address is written in an incorrect format.
     b. The user fills out the blank with the correctly formatted email address (the receiver’s email address).
     c. The user clicks on the “Send Route” button and the specified route is sent via email successfully.

- **Add accommodation to travel plan**

  Actors: All users

  Entry conditions:

  - The user is logged in.
  - The user has an existing travel plan.
  - The user goes to his/her edit travel page and clicks on the "Add accommodation" button.

  Exit conditions:

  - The accommodation is added to the user's plan.

  Flow of events:

  1. While the user is about to finish editing their route, he/she clicks on one of the available buttons on the page.
     A. "View Nearby Accommodation Alternatives" button
        a. The user clicks on the "View Nearby Accommodation Alternatives" button and a page with alternative accommodation options comes up.
        b. The user chooses one option and clicks on the "Redirect" button on the option.
        c. The user will be redirected to the appropriate hotel/housing searching website with the provided criteria.
        d. After the user makes a reservation for the accommodation suggestion with a third party application, he/she then will add the accommodation option to the plan by clicking on the "Add Accommodation" button and entering the name of the hotel to the application.
     B. The user clicks on the "Mark the Location on the Map" button and a map of the travel destination shows up.
        a. The user marks the preferred accommodation option on the map.
        b. The user then clicks on the "Add Accommodation" button.
  2. The accommodation is successfully added to the user's plan.

  Alternate flow of events:

A. The user marks a location that is far away from the destinations in the plan.
    a. The application displays a pop-up stating that a closer location must be chosen in order to add accommodation.
    b. The user continues to provide locations until the criteria is met.
    c. The accommodation is successfully added to the user's plan.

B. The user enters a non-existent hotel name to the application.
    a. The application displays a pop-up stating that the accommodation option that the user is trying to add does not exist.
    b. The user continues to provide hotel names until the criteria is met.
    c. The accommodation is successfully added to the user's plan.

- **Add dining place to travel plan**

  Actors: All users

  Entry conditions:

  - The user is logged in.
  - The user has an existing travel plan.
  - The user goes to his/her travel page and clicks on the "Add a restaurant" button.

  Exit condition:

  - The restaurant is added to the user route.

  Flow of events:

  1. While the user is editing their route, the button "Add a restaurant" is clicked.
  2. The user is prompted to choose the type of food they like, such as fast-food, Italian cuisine, Asian food, etc.
  3. After choosing their favored food type, the user is presented with restaurants to choose.
  4. Following the choice of the user, the restaurant is added to the route in optimal fashion.

Alternate flow of events:

A. There are no nearby restaurants of the picked type
    a. The application will display a pop-up stating that there are no applicable restaurant for the user's choice
    b. The user will be returned to the route editing page

- **Notification via user-supplied email**

Actors: All users

Entry conditions:

- The user is logged in.
- The user has an existing travel plan.
- There is one week and one day left for the planned trip.

Exit condition:

- The mail is sent to the user with the trip plan and the remaining time.

Flow of events:

1. There is one week and one day left until the trip that the user has planned.
2. The user will receive mail.

- Leave feedback to personalized travel plan

Actors: All users

Entry Conditions:

- The user is logged in.
- The user has an existing travel plan.
- The user goes to his/her travel page and clicks on the "Leave Feedback" button next to the chosen travel plan.
- Current time is later than the time of the travel plan

Exit Conditions:

- The user clicks on the "Send Feedback" button and his/her feedback is sent successfully.

Flow of Events:

1. The user clicks on the "Leave Feedback" button.

2. The user fills out the feedback form which is displayed as a pop-up window.
3. After all of the necessary information on the form is completed correctly, the user clicks on the “Send Feedback” button and his/her feedback is sent successfully.

Alternate Flow of Events:

A. Incomplete information is supplied by the user.
    a. The application displays a pop-up stating the name of the fields on the form that should be completed in order to continue.
    b. The user fills out the feedback form with complete information.
    c. The user clicks on the “Send Feedback” button and his/her feedback is sent successfully.

- **Add an existing travel plan to favorites**

Actors: All users

Entry Conditions:

- The user is logged in.
- The user views the chosen travel plan.

Exit Conditions:

- The user clicks on the “Add to Favorites” button and the chosen travel plan is added to the list of favorite travel plans of the user.

Flow of Events:

1. The user clicks on the “Add to Favorites” button next to the chosen travel plan and the chosen travel plan is successfully added to the list of favorite travel plans of the user.

3.5.2. Use Case Models

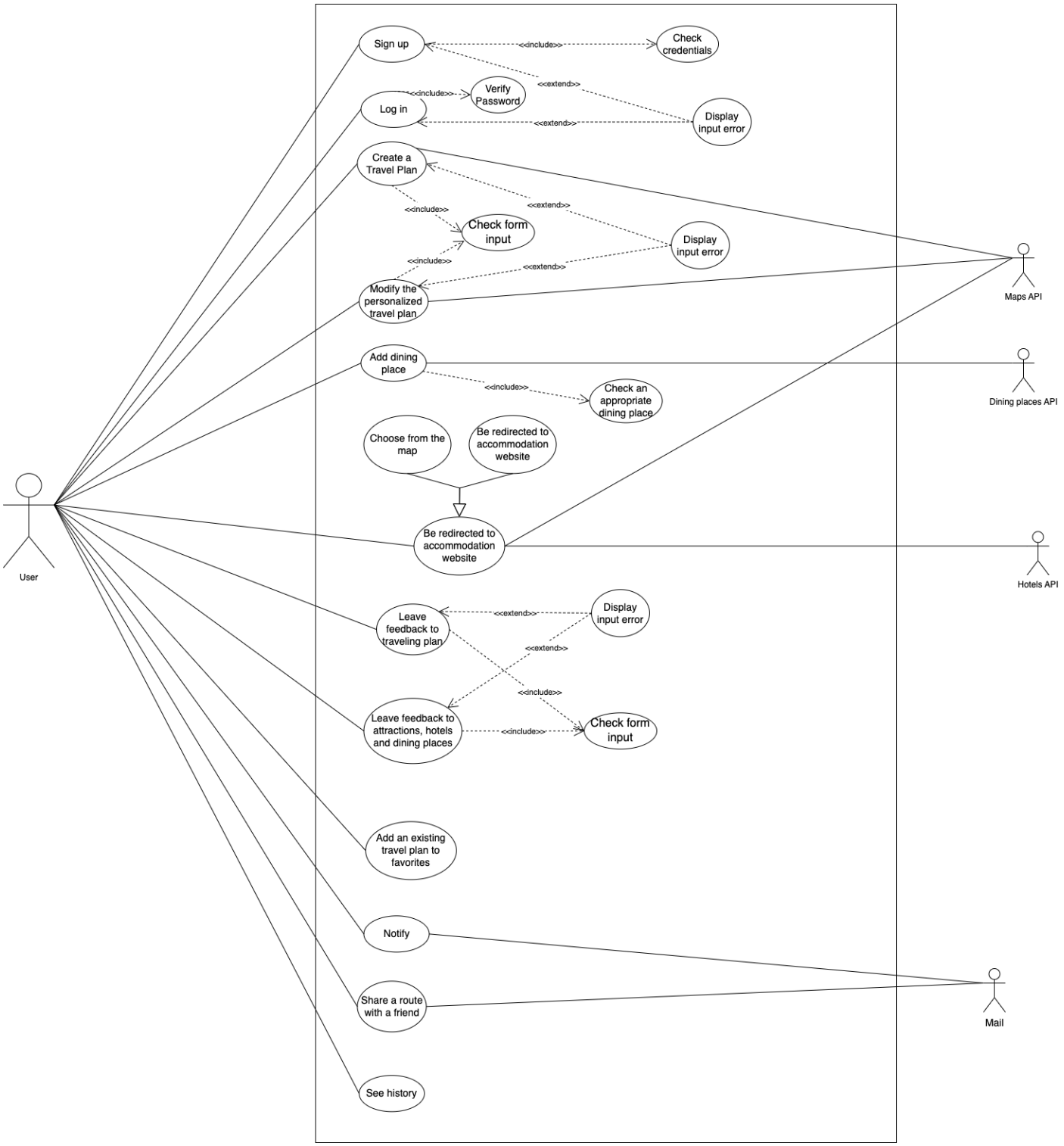

Figure 1: Use Case Diagram

3.5.3. Object and Class Models

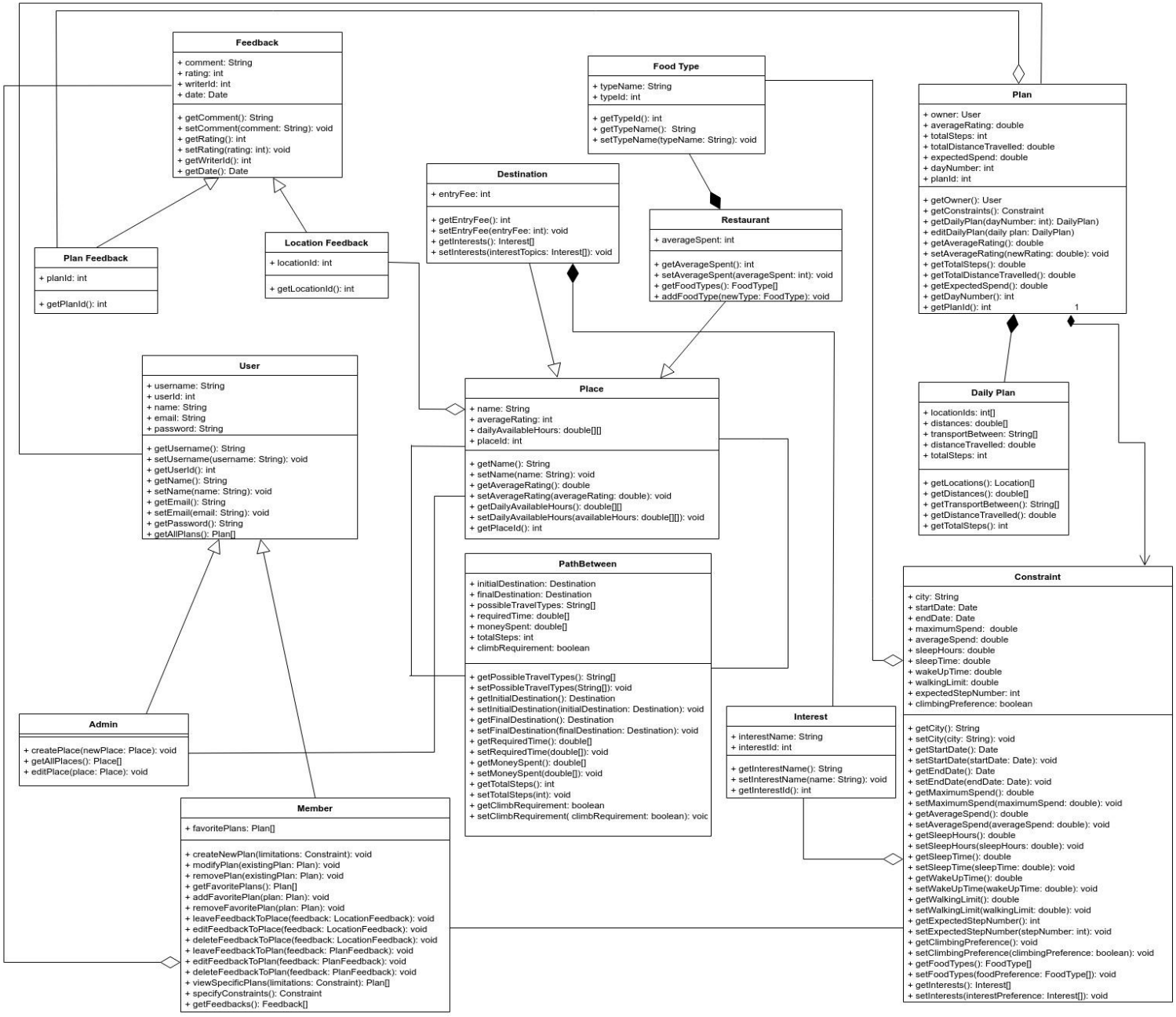

Figure 2: Class Diagram

3.5.4. Dynamic Models

3.5.4.1. State Diagrams

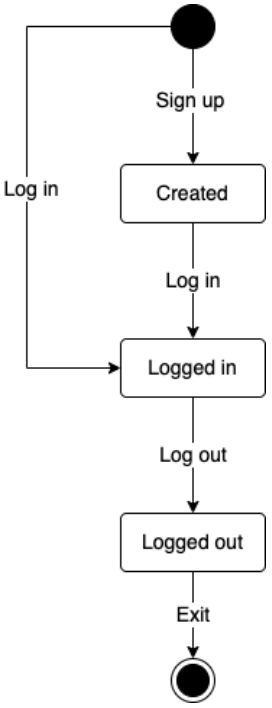

Figure 3: State diagram for login and sign up

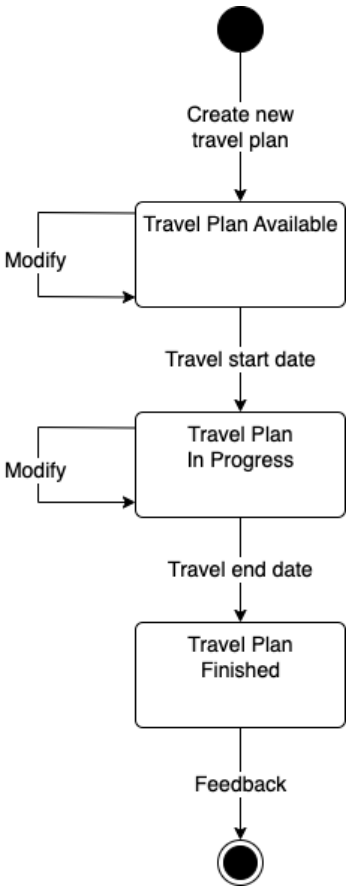

Figure 4: State diagram for creating a personalized travel plan

3.5.4.2. Sequence Diagrams

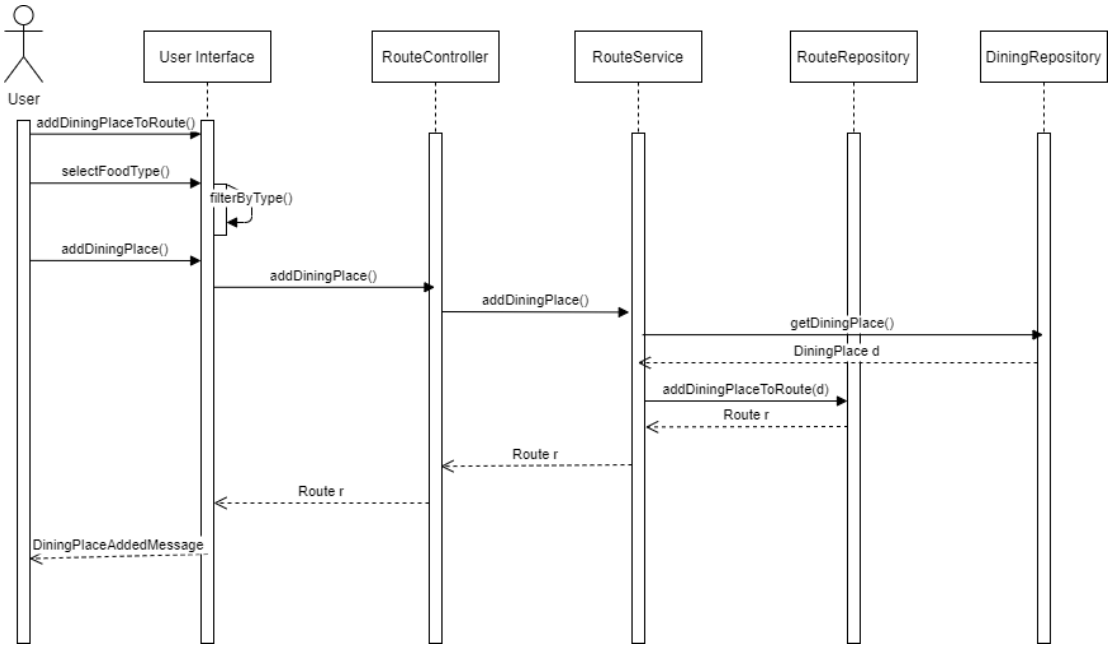

Figure 5: Sequence diagram for adding dining place to a user route

3.5.4.3. Activity Diagrams

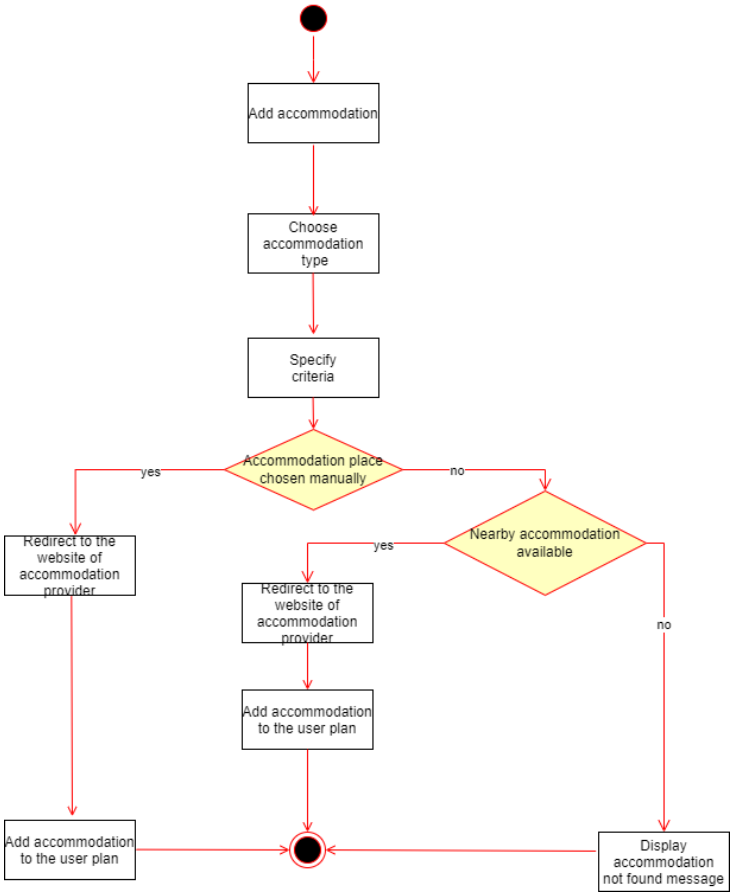

Figure 6: Activity diagram for adding accommodation to a user route

3.5.5. User Interface - Navigational Paths and Screen Mock-ups

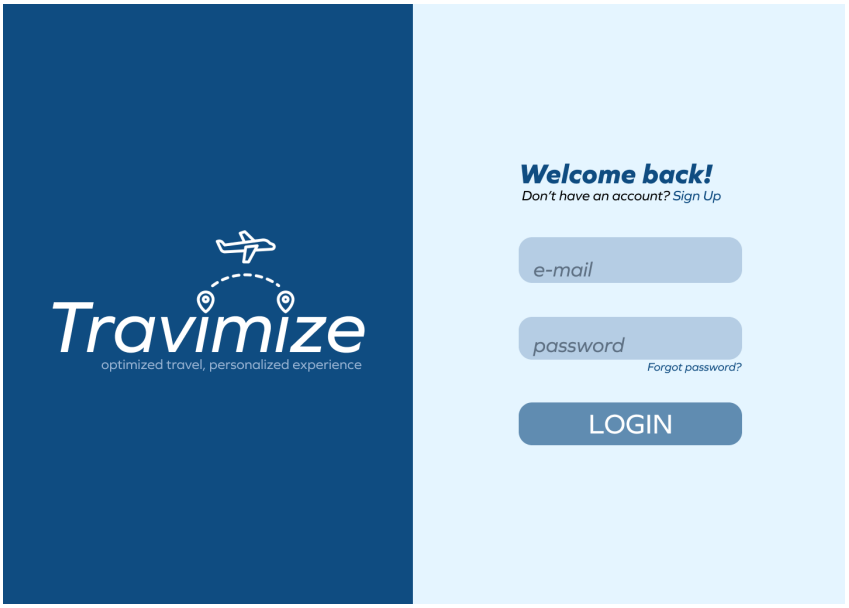

Figure 7: Login Screen

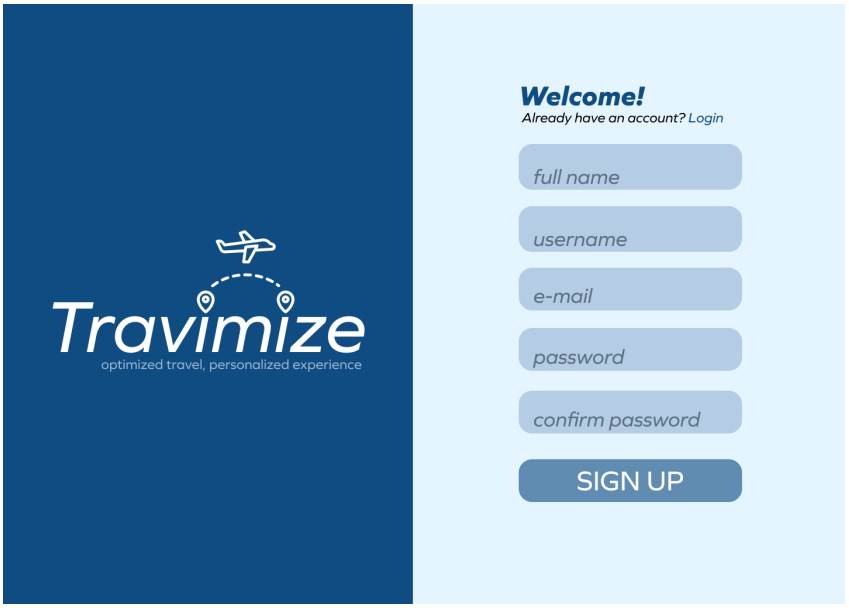

Figure 8: Sign Up Screen

Figure 9: Home Screen

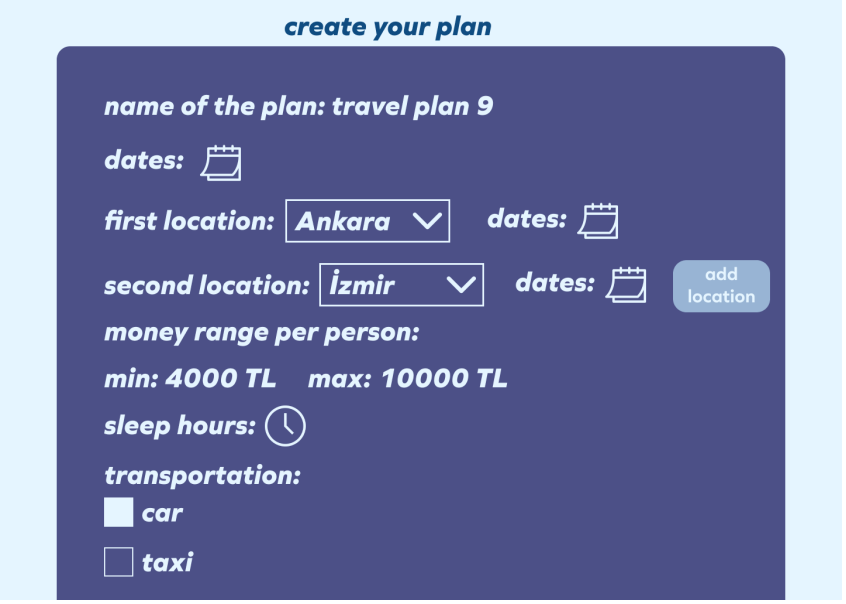

Figure 10: Screen for Creating a New Plan

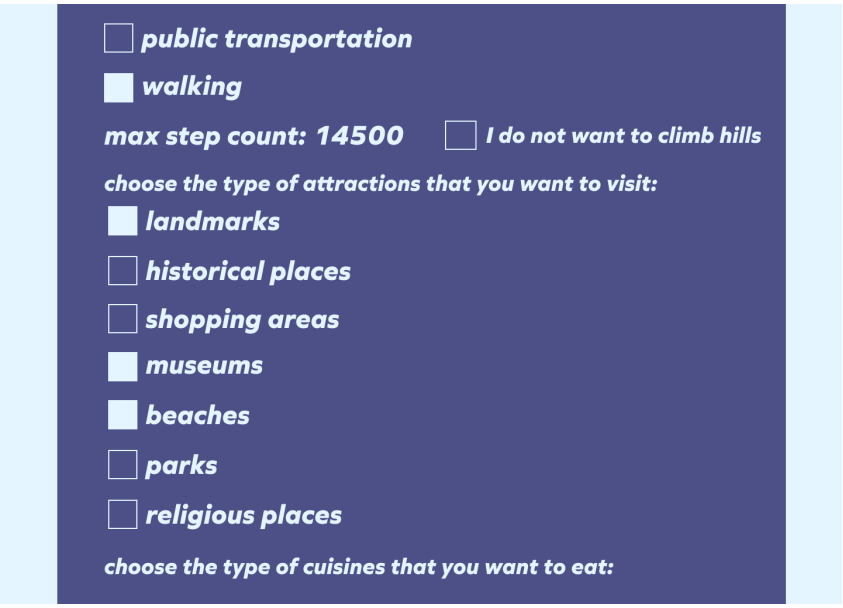

Figure 11: Screen for Creating a New Plan (after scrolling down)

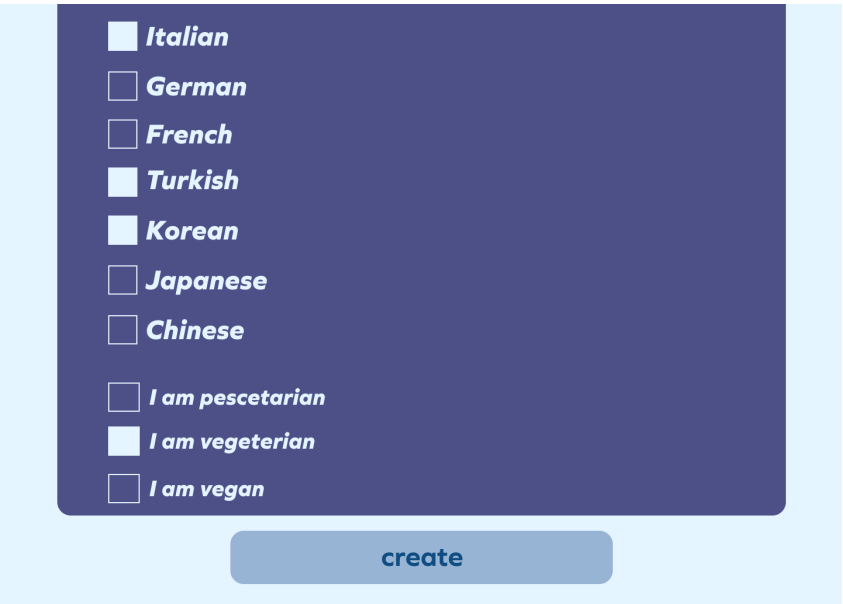

Figure 12: Screen for Creating a New Plan (after scrolling down)

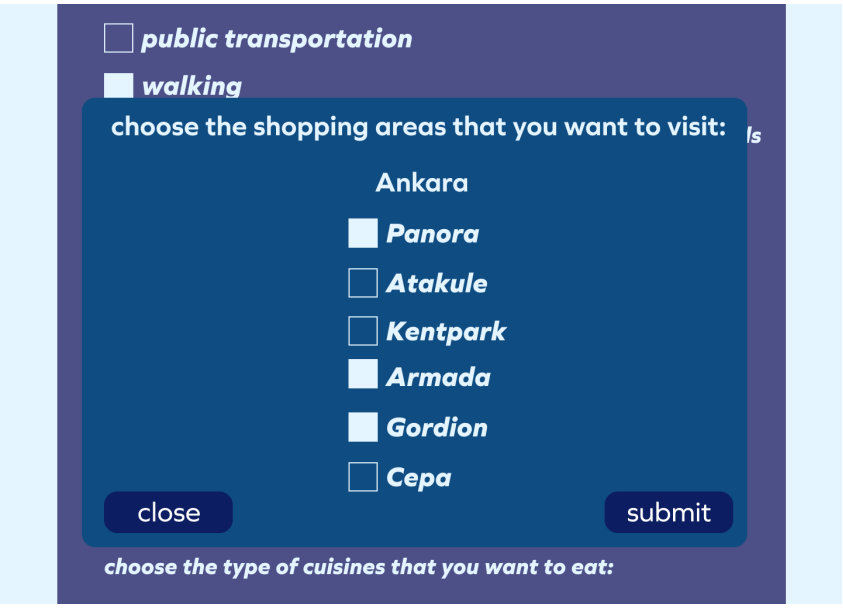

Figure 13: Pop-up Screen for Choosing Specific Places to Visit

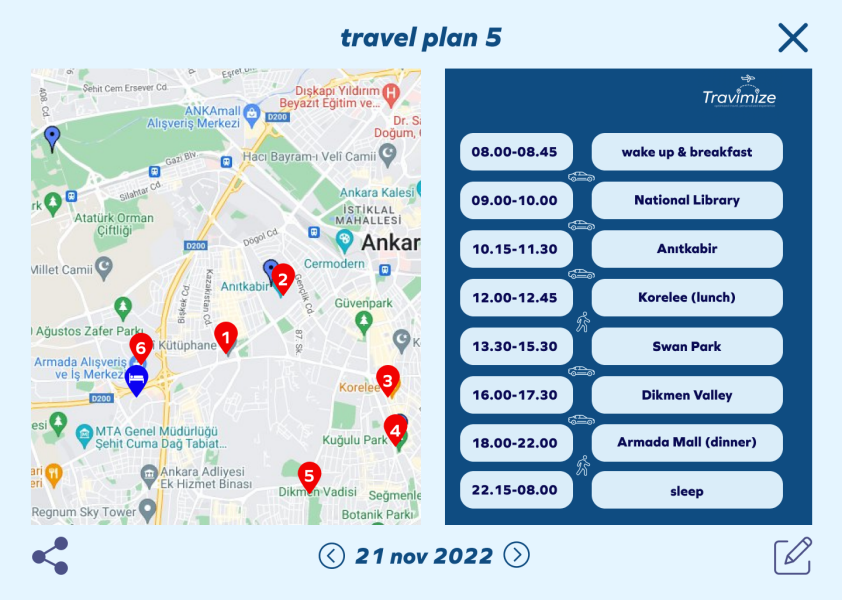

Figure 14: Screen for Viewing a Travel Plan

Figure 15: Edit Screen for a Travel Plan

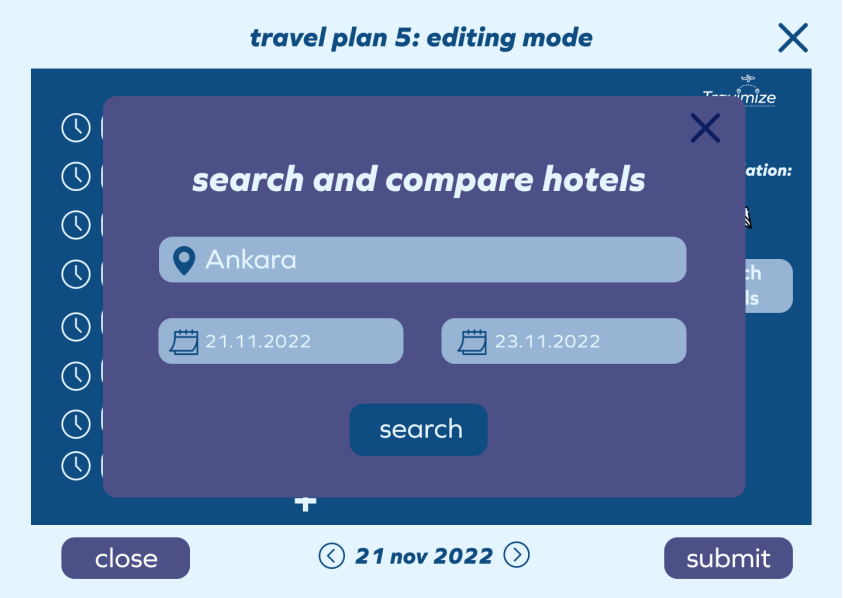

Figure 16: Pop-Up Screen for Searching Hotels

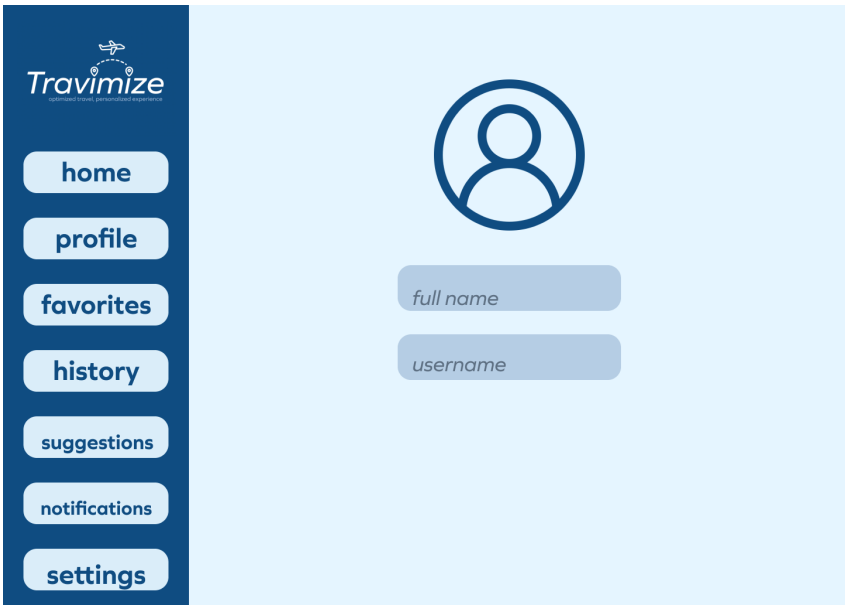

Figure 17: Profile Screen

Figure 18: Favorites Screen

Figure 19: History Screen

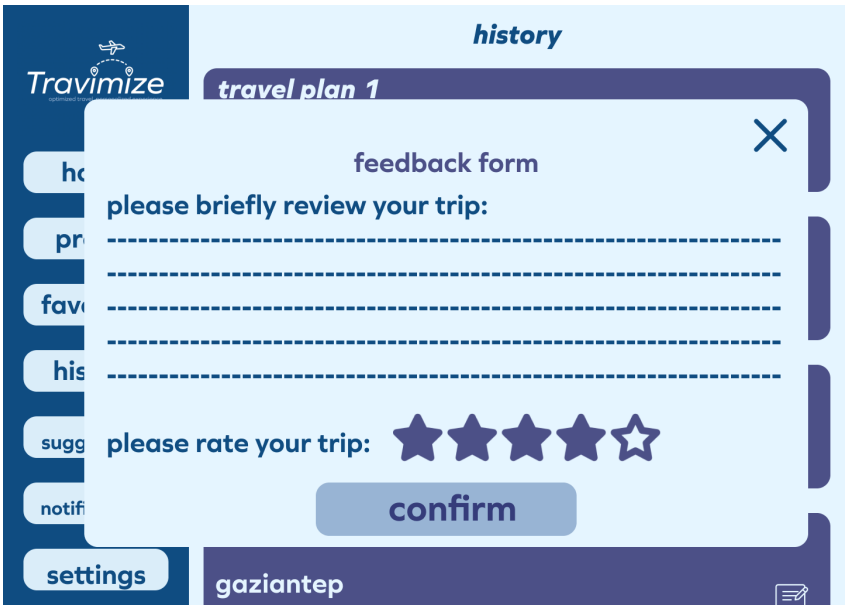

Figure 20: Pop-Up Screen for Leaving Feedback

Figure 21: Suggestions Screen

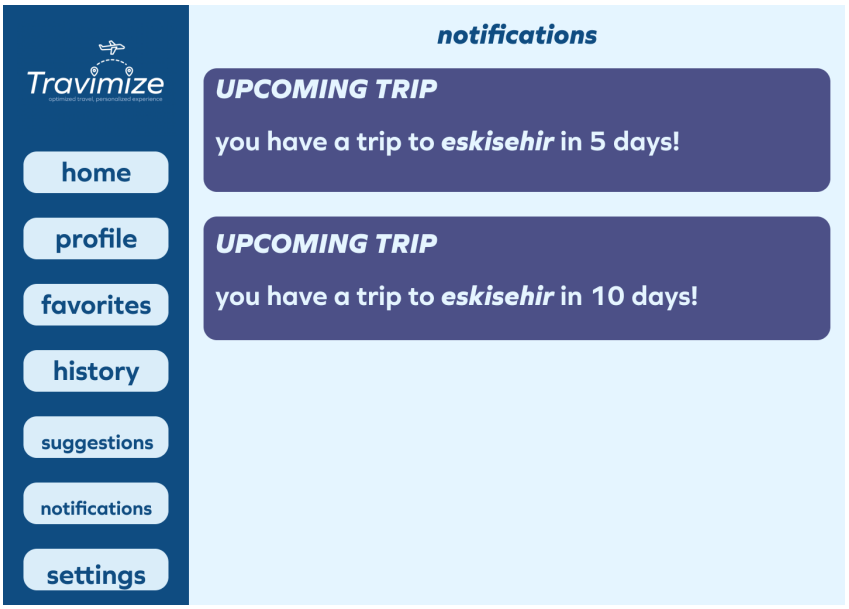

Figure 22: Notifications Screen

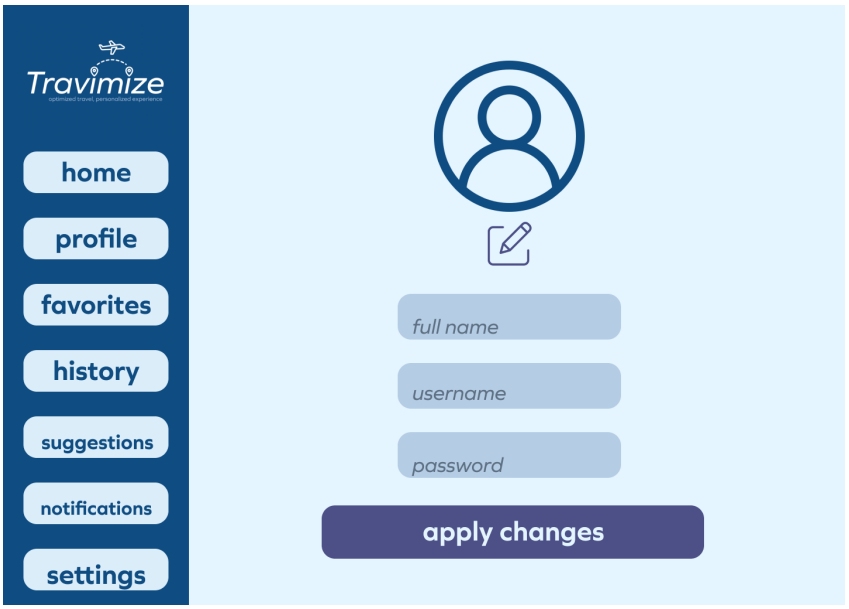

Figure 23: Settings Screen

4. OTHER ANALYSIS ELEMENTS

4.1. Consideration of Various Factors in Engineering Design

Several factors that may affect the engineering design and implementation has been thought of and are described below:

- **Public Health**

  Travimize takes public health into consideration when creating a personalized travel plan. It does not create a plan where the travelers need to walk more than humanly possible or it does not constrain their sleep under 7-8 hours to fit in more attractions to the plan. Moreover, Travimize will make sure that the travelers eat a healthy amount of meals throughout the day.

- **Public Safety**

  Travimize takes public safety very seriously since it is very easy to run into a safety problem when traveling. In order to ensure safety of its users, Travimize will not suggest attractions, restaurants, hotels, parks, or any other place whose safety is suspicious or has no comments to its users. Travimize will also collect feedback from its users after a trip has ended to make sure their trip was safe. It will use this data to create safer routes.

- **Public Welfare**

  Travimize is a free to use web application that is planned to be supported by advertisements and commissions from suggested hotels, restaurants or any other institution that profits from this web application. Moreover, Travimize will encourage

people to travel and experience new places. Not only the travelers will broaden their minds, local businesses will also benefit from the outcomes of the trips.

- **Global, Cultural and Social Factors**

  Travimize does not support global travel yet, it only supports travel plans inside the borders of Turkey. However, in the future, this application is expected to support global travel too. Travimize is not affected by cultural differences since it creates personalized plans based on the constraints the user has given. Moreover, Travimize will try to make the traveler experience as much local influence as possible. Travimize will also pave the way for its users to socialize and travel together with its "share a route with a friend" feature.

- **Economic Factors**

  Travimize will use several APIs from third parties in the implementation. Also the application will use a server and a relational database. These factors will have a cost. Currently this cost is minimal for a small number of users and can be afforded easily. However, in the future, when the application is deployed and used by many, in order for the cost to be afforded, there can be a need for sponsors and possible in-app purchases.

- **Environmental Factors**

  Travimize will check the condition of the destinations both before creating and during the travel plan. If a destination is closed, if the fees have changed or if the road to the destination is closed, the application will notify the user so that there will be no trouble for the user. Travimize will also take the weather conditions or the degree of a ramp when it schedules the user for a walk.

Table 1: Factors that can affect analysis and design.

	Effect level	Effect
Public health	5	Not threatening the health of the users will be a concern when creating a plan.
Public safety	8	Not suggesting destinations or hotels that might risk the safety of the users will be a concern when creating a plan.
Public welfare	3	Ease of reach and use of the application will be considered when putting a price on the application.
Global factors	1	Global factors will have no effect in the design.
Cultural factors	2	Travimize will try to let users experience all the cultural aspects of the destination location when creating a plan.

Social factors	3	Travimize will let users interact with other users by sharing a route with each other.
Economic factors	7	Cost affordability will be the primary concern when designing and implementing the application.
Environmental factors	5	Environmental factors will be taken into consideration when creating a personalized travel plan.

4.2. Risks and Alternatives

- **Insufficient project management**

  Designing and implementing a whole project from scratch with other people has its challenges. There are many risks that can occur throughout this process. Given time might not be enough, tasks may not be divided equally among members and members may be unable to complete a given task, there can be conflicts between team members, research about the project and implementation details can be done poorly, design of the project can be unimplementable or it can be implemented poorly etc. We are planning to prevent these risks by scheduling periodic meetings and democratic decision making.

- **Not being able to find, afford or use the required APIs**

  There is no doubt that third party APIs are needed to complete the implementation of the project. There is a need for map and route API, API to get data about hotels and restaurants, and a mail service API. These APIs can be public and free. However there is a possibility that these APIs are not free and we might not be able to find, afford, or properly use the required APIs.

- **Not being able to find data about destinations, locations, hotels etc.**

  In order to create a travel plan, we need data about destinations, attractions about a specific location in our area of interest. There are a lot of places to get these types of data, however, there is still a risk that we may not be able to find the required data.

- **Leak of user data**

  Travimize collects data about users in the application throughout different processes such as signing up or creating a travel plan. Since we have sensitive data about users, we must consider a chance of a data breach. We are planning to prevent this breach by using the security tools our chosen framework provides. However, when we have more users, the application must be scaled accordingly.

- **Not being able to implement the project as designed**

  Even though the project design process is done with long hours of thought and consideration, there is always a possibility that the implementation process will not go as smoothly as desired. Many problems can occur in this process including some of the problems talked about in the previous parts of this section. If the design cannot be implemented, the best thing to do is to modify the design until it is implementable.

- **Not being able to create a travel plan with the given constraints**

  While using Travimize, the users can give conflicting information as constraint to their to be created plan. In this case, the application will not be able to create the user's personalized plan and complete its task. The application is planned to inform the user about the input that is causing the problem and compromise with the user in order to create a plan.

- **Creating a non-applicable travel plan**

  Even if Travimize succeeds and creates a personalized travel plan for the user that satisfies all of his or her constraints, the plan can be non-applicable for the user in real life due to various reasons such as unexpected traffic or weather condition, necessity of great time management in order to follow the plan, or waiting in the line for too long. The only thing Travimize can do in this situation is to get feedback from the user to improve the future plans.

- **Not being able to suggest nearby hotels or restaurants**

  The area of interest the user chose to travel can not provide the application with sufficient options for accommodation or dining. In this situation, Travimize might not be able to suggest enough options to the user. To prevent lack of accommodation or dining, Travimize will suggest the available places even though they do not satisfy the user's constraints.

Table 2: Risks

	Likelihood	Effect on the project	B Plan Summary
Insufficient project management	Medium	The project will be completed poorly or not completed at all.	Periodic meetings, democratic decision making, periodic updates to the supervisor.
Not being able to find, afford or use the required APIs	High	Complexity and storage of the application will increase vastly.	More research for the free APIs or finding APIs for different uses and use them for our needs.

Not being able to find data about destinations, locations, hotels etc.	Medium	Lack of options when creating the travel plan.	Adding data to the application's database manually.
Leak of user data	Medium	Violation of the law, and security of the users.	Research of security tools to prevent any breach.
Not being able to implement the project as designed	High	Waste of time that is spent when designing. Waste of time to do research again.	Every possibility, tool, feature, and any other aspects of implementation is considered while designing.
Not being able to create a travel plan with the given constraints	High	Not being able to complete the purpose of the application.	The application will come to a compromise with the user by interacting with him or her with pop-ups.
Creating a non-applicable travel plan	Medium	The user will not be able to experience what was intended.	Travimize will get feedback from the user to improve the future plans.
Not being able to suggest nearby hotels or restaurants	Low	Lack of options when creating the travel plan.	Travimize will suggest the available places even though they do not satisfy the user's constraints.

4.3. Project Plan

Table 3: List of Work Packages

WP #	Work Package title	Leader	Members Involved
WP 1	Project Specifications and Analysis	Doğa Ece Ersoy	Everybody
WP 2	Pre-prototype-implementation study	Doruk Kantarcıoğlu	Everybody
WP 3	Prototype implementation	Emre Erdal	Everybody
WP 4	High Level and Low Level Design	Esra Genç	Everybody
WP 5	Complete product implementation	Kerem Erdal	Everybody
WP 6	Testing	Doğa Ece Ersoy	Everybody

Table 4: Project Plan - WP1

WP 1: Project Specifications and Analysis			
Start Date: 3.10.2022		**End Date:** 14.11.2022	
Leader	Doğa Ece Ersoy	**Members involved**	Everybody
Objectives: In this work package, our aim was to specify the project needs and functionalities, and work on the preliminary documentations such as project specification report and analysis and requirements report.			
Tasks: ● **Task 1.1: Create project website:** The website for our documents and group information was created. ● **Task 1.2 Project specification report:** The report which determined the application features and constraints was written. ● **Task 1.3 Analysis and requirements report:** The report for detailed application features and implementation details was written			
Deliverables: ● **D1.1: Project website** ● **D1.2: Project specification report** ● **D1.3: Analysis and requirements report** ● **D1.4: Group members' logbooks**			

Table 5: Project Plan - WP2

WP 2: Pre-prototype-implementation study			
Start Date: 14.11.2022		**End Date:** 21.11.2022	
Leader	Doruk Kantarcıoğlu	**Members involved**	Everybody
Objectives: This work package will be paramount for us as it will resolve many technical conflicts, practices and question marks that need resolution before starting the prototype implementation, such as framework studies, API cost calculation for map-based services (e.g. Google Maps API, AWS Location Services).			
Tasks: ● **Task 2.1 Framework studies:** Both front-end and back-end teams will explore their respective frameworks to ramp up on development. ● **Task 2.2 API choice for map-based services:** Cost and usability analysis will be conducted to choose the optimal location-providing service in the project.			
Deliverables: ● **D2.1:** Individual progress chart for members			

Table 6: Project Plan - WP3

WP 3: Prototype implementation

Start Date: 21.11.2022		**End Date:** 12.12.2022	
Leader	Emre Erdal	**Members involved**	Everybody
Objectives: This intermediate work package is for the end of fall semester prototype demonstrations. By the end of this work package, it is expected for us to produce a prototype which possesses basic functionalities of the application in a bare-bone, but also visible manner.			
Tasks: ● **Task 3.1 Develop a functioning prototype:** A viable, stable prototype to display our implementation progress needs to be produced. ● **Task 3.2 Create demo presentation:** Visuals for the demo needs to be accomplished after the prototype.			
Deliverables: ● **D3.1:** Application prototype ● **D3.2:** Demo presentation			

Table 7: Project Plan - WP4

WP 4: High Level and Low Level Design			
Start Date: 05.11.2022		**End Date:** 10.02.2023	
Leader	Esra Genç	**Members Involved**	Everybody
Objectives: The aim of this work package is to decide on High Level and Low Level design of the project to facilitate the progress of implementation. These designs may change depending on the problems we face throughout the prototype development. At the end of this work package, the Detailed Design Report would be delivered which contains both high and low level designs.			
Tasks: ● **Task 4.1 High Level Design:** We will make final decisions about services used in the project and we will create the overall architecture of project by defining submodules and their relations ● **Task 4.2 Low Level Design:** Logic inside the submodules will be determined. ● **Task 4.3 Preparation of Detailed Design Report:** According to the decisions made upon High Level and Low Level Design of the project, the Detailed Design report will be prepared by designing required diagrams and explaining in a detailed way			
Deliverables: ● **D4.1:** Detailed Design Report			

Table 8: Project Plan - WP5

WP 5: Complete product implementation			
Start Date: 01.01.2023		**End Date:** 15.04.2023	
Leader	Kerem Erdal	**Members Involved**	Everybody
Objectives: The aim of this work package is to create the web application, which would do all the proposed functions of Travimize. This task involves both the backend and frontend development of the whole product from the prototype. According to the feedback on the prototype, our discussions, and possible problems about the design goals, the development to the overall system will be done. By the deadline of this work package, we aim to have the completely working web application.			
Tasks: ● **Task 5.1 Frontend Implementation:** Further developments will be made to the UI of the prototype to handle the minor functionalities along with the major ones. Based on the analysis of the implementation and feedback taken, the UI will be designed for increased user-friendliness. ● **Task 5.2 Backend Implementation:** The backend of the project prototype will be developed for the complete application and some necessary changes will be made for the better functioning of the optimization algorithm. ● **Task 5.3 Preparation for Final Presentation:** Discussions about the demonstration of the product will be made, and final presentation will be prepared.			
Deliverables: ● **D5.1:** Web Application ● **D5.2:** Final Presentation			

Table 9: Project Plan - WP6

WP 6: Testing			
Start Date: 05.12.2023		**End Date:** 10.05.2023	
Leader	Doğa Ece Ersoy	**Members Involved**	Everybody
Objectives: In this work package, our objective is to ensure the overall correctness in system functionality. We will try to observe any errors that may be faced by the users, and make necessary changes to avoid any inconvenience for them. This work package will go on throughout the implementation process to realize any problems at the initial stage. At the end of this work package, we will obtain the latest version of the web application.			
Tasks: ● **Task 6.1 General Test:** All the features of the application will be tested by entering the system as a user and trying to apply the functionality. ● **Task 6.2 Detailed Test for Corner Cases:** Corner cases which may consider some error in the system or inconvenience of the user will be discussed and written. These cases will be tested on the application throughout the implementation process.			

Deliverables:

- **D6.1:** Latest version of the Web Application

4.4. Ensuring Proper Teamwork

Teamwork is one of the most important parts of the projects. As we are 5 people working for the product, the connection between the members is crucial to have the exact product in the given time. To create this connection and perfect teamwork, we defined various strategies. One of them is having regular meetings every week. Also, these regular meetings include face to face meetings at least once in two weeks to make a better connection and to be more accurate for the progress. Moreover, we evenly distribute the parts of the workload and work either individually or in pairs and at the end we comment on each part and edit accordingly. Now, we are using Whatsapp and Zoom for communication, Github for sharing the codes for the project and Google Drive for sharing the reports. However, during the more busy periods of writing the code for the project, we are planning to use Jira for deciding the start and end dates of specific tasks.

4.5. Ethics and Professional Responsibilities

The data protection is a critical part of the project. In our project, to keep the personal data of the user private, we are planning to store the passwords in an encrypted way. Moreover, in many countries, there are laws for data protection and in Turkey, there is KVKK to protect the private data of the users. In our application, we will not share any data of the user with a third party organization. Also, the source code of the project will be kept private with two factor authentication for our Github accounts. As it is available in many of the applications, also we will have some terms and conditions to be accepted by the users. Furthermore, we will assure the legal requirements and we will use different API's by analyzing them deeply. For the professional responsibilities, we will conduct meetings and schedule our way to the main product. We will keep our Github's private and we will contribute to the project evenly by evenly distributing the workload.

4.6. Planning for New Knowledge and Learning Strategies

Throughout the project, we will use both the systems we already know and the new systems planned to be learned. For example, none of us have used Google Maps API. We will try to take data from the API and use it inside the algorithms we will write. Mainly, we are planning to learn about this concept by reading from the books and watching related videos together with investigating other projects. We will learn

about using some optimization problem solvers such as CPLEX in more complex structures. To achieve this skill, we are planning to use books also.

5. REFERENCES

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