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Project Report

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Innovative System Design and Development II

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SMART TRIP APPLICATION

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ABSTRACT

Finding usable, clean, and available restrooms on the road is a major challenge for daily commuters, particularly women, children, and the elderly, and is commonly a health and security concern.[1] In addition, the 'WC anxiety', which is described as the phobia of not being able to go to the toilet outside, unfortunately still troubles many people today. According to Mayo Clinic, having a WC crisis can affect the quality of your sleep, which can make it difficult for you to travel and even cause a social phobia.[2] Considering these situations, this project aims to develop a mobile application that will display available restroom facilities along with ratings based on criteria such as cleanliness, occupancy, etc. provided by other users within a given range. In this article, we examine and discuss the significance of restroom applications, the rationale behind the tools we will use, and related works and their backgrounds. Furthermore, we survey the two most popular mobile application platforms, Android and iOS.

Keywords:

Ionic, Java, Angular, Mobile Application, Google Maps

ÖZ

Yolda kullanılabilir, temiz ve müsait tuvaletler bulmak, özellikle kadınlar, çocuklar ve yaşlılar olmak üzere günlük taşıtlar için büyük bir zorluktur ve genellikle bir sağlık ve güvenlik sorunudur. Ayrıca dışarıda tuvalete gidememe fobisi olarak tanımlanan 'tuvalet kaygısı' günümüzde maalesef hala birçok insanı rahatsız etmektedir. Mayo Clinic'e göre, tuvalet krizi geçirmek uykunuzun kalitesini etkileyebilir, bu da seyahat etmenizi zorlaştırabilir ve hatta sosyal fobiye neden olabilir. Bu durum göz önünde bulundurularak, bu proje, belirli bir aralıktaki diğer kullanıcılar tarafından sağlanan temizlik, doluluk vb. kriterlere göre derecelendirmelerle birlikte mevcut tuvalet olanaklarını gösterecek bir mobil uygulama geliştirmeyi amaçlamaktadır. Bu yazımızda tuvalet uygulamalarının önemini, kullanacağımız araçların arkasındaki mantığı, ilgili çalışmaları ve arka planlarını inceliyor ve tartışıyoruz. Ayrıca, en popüler iki mobil uygulama platformu olan Android ve iOS'u araştırıyoruz.

Anahtar Kelimeler:

Ionic, Java, Angular, Mobil Uygulama, Google Haritalar

1. INTRODUCTION

Today, as technology develops, people can find answers to their problems due to a lot of information on the internet, and developing technology becomes a part of our lives. However, people do not always have access to accurate information. The frequency and accuracy of applications used especially while traveling are very low. Therefore, our main goal in our project called Smart Trip Application is to ensure that people have access to accurate and secure information even while traveling and to develop a mobile application that increases the quality of life. Users' may have urgent needs during travel or maybe people with various ailments. Therefore, our application is aimed to meet the needs of people by showing the closest clean toilets according to the location. Smart Trip Application provides an interface that includes facilities with toilets and then basic needs, along with the ratings provided by other users in the given range by accessing the location information in your region. Information reliability will be ensured due to the fact that the information is constantly updated, and thus users will be able to access the right information on time and in place wherever they are. The organization of this document reflects what the relevant technologies are that we can use to build our solution.

2. LITERATURE REVIEW

2.1. Strategy Of Program

2.1.1 Advantage & Disadvantage of Existing System

In the tourism sector, news sources including newspapers, magazines, radio, and other straightforward methods that are readily accessible are the primary sources of tourist information. But the issue is that while travelers are on the move, they cannot quickly access travel information. Even if today's mobile devices are becoming more intelligent than PCs, they still have the following drawbacks: a small screen and tiny keyboard, a CPU with restricted processing power, memory with limited storage capacity, and a slow and unreliable Internet connection. Recent mobile devices frequently contain a travel guide application. However, these mobile devices' applications operate slowly as a result of constant bandwidth acquisition. As a result, using a mobile device is extremely challenging, and the amount of content that can be displayed on a mobile device's screen is constrained.

2.1.2 Basic Concept of Application

The application shows detailed texts for users on the go, whether there are clean toilets suitable for use on the route, and people can meet their needs more easily and can objectively interpret and evaluate the facilities they stop at. In addition, tourists have problems reaching places where they can meet their needs while traveling. Therefore, we intend to investigate how to set up a Smart Trip Application system to solve this problem.

2.1.3 Basic Concept of the Smart Trip Application:

The Smart Trip application aims to address the limitations of existing systems by providing detailed information about clean and accessible toilets along a user's travel route. The application allows users to easily find suitable restrooms, interpret and evaluate the facilities they encounter, and meet their needs more efficiently. The primary focus is on assisting tourists who face difficulties in accessing restroom facilities during their travels. The application intends to create a Smart Trip Application system to provide a solution to this problem.

2.2. Integration of Google Maps Information

2.2.1 Mapping Capabilities:

In the field of routing and navigation, classic algorithms such as Bellman-Ford, Dijkstra, and A* have been widely studied and applied. However, these algorithms typically work on static, predefined graphs and may not be optimally suited for the dynamic, real-world conditions that a location-based mobile application like Smart Trip Application needs to handle. These conditions can include real-time traffic, road closures, and varying routes, all of which can significantly impact the accuracy and efficiency of route suggestions. Google Maps is a widely used and trusted mapping platform that provides comprehensive location information. Integrating Google Maps into a toilet locator application can offer users a familiar and robust mapping interface for locating nearby toilets.

Consequently, we have decided to leverage the Google Maps API for our project. The Google Maps API is a well-established, robust solution for providing real-time location-based services. It includes features such as directions, distance calculation, and location search, and it incorporates real-time data, making it more suitable for our application than traditional static algorithms. Using Google Maps API also allows us to focus on the core features of our application, like restroom availability and user reviews, without reinventing the wheel for navigation and location services. Furthermore, Google Maps is a globally recognized platform with comprehensive

coverage, which will be helpful for ensuring the usability and reliability of our app across different regions and countries in the future.

2.2.2 Navigation and Directions

Leveraging Google Maps' navigation capabilities, a toilet locator application can provide directions to guide users to the nearest restroom. This feature can be particularly beneficial for individuals who are unfamiliar with the surroundings or have mobility challenges.

By integrating Google Maps information, our application can benefit from the extensive database and functionality offered by Google Maps. It provides users with accurate and reliable location data, seamless navigation, and additional features that contribute to a more comprehensive and user-friendly experience.

2.3. RELATED WORKS

2.3.1 SitOrSquat: Restroom Finder

SitOrSquat, powered by Charmin, aims to help people find public restrooms near them or where they intend to travel and includes countries other than the United States. It allows users to access and save bathroom information wherever they go. Users contribute all toilet contents. Their database currently contains over 100,000 bathrooms.[3] SitOrSquat additionally makes use of Facebook Connect. If Facebook is used to log in, using this application may send private information about the user or device to Facebook. Users of SitOrSquat can include images in their reviews. The fact that SitOrSquat is run by a well-known consumer brand makes it noteworthy. Taking a cue from related, non-bathroom-focused businesses like Yelp, encouraging smartphone users to contribute their evaluations and images of public restrooms adds a social element to the app that keeps users interested through user-generated content. The Apple App Store and Google Play for Android devices both provide free downloads of the application.[4]

2.3.2 Flush: A Public Restroom Finder App

Flush is a free application that has 190,000 public restrooms stored in its database. Mr. Ruston, one of the developers of the app, said he created the app in the hope that it would be useful for people with conditions such as Crohn's and Irritable Bowel Syndrome and would also be popular with tourists. The main purpose of the Flush application is to find the closest restroom in the current location of a person due to his/her urgent needs. It also works and it's getting harder and harder to find free restrooms. The flush Toilet Finder application was created to solve this problem. The app uses the phone's GPS to show if there are free and disabled restrooms around the world. Users can find the closest restrooms in the location they set by navigating the maps inside the application. While searching for the nearest restrooms, they can search by filters such as those that charge a fee or show whether they have access or only show places with restrooms for the disabled. In addition, when they select a restroom, they can request directions to that restroom from their location. Users can also add public restrooms that are missing from the database to the application. This application, which works even offline, can be used in emergencies even without an internet connection. In addition, this mobile application with a global database is free for IOS and Android.[5][6]

2.3.3 Yelp

Yelp is a publicly traded American company headquartered in San Francisco, California. The company has developed the Yelp.com website and Yelp mobile app. Once you access your Yelp location service, select any category and list things close to you on maps with a high rating. There is an option to comment on anything in the categories. and users can see previously made comments. To give a few examples of the categories in this mobile application, which shows almost everything nearby according to the location of the users: It can be listed as Restaurants, Home Service, Auto Repair, Dry Cleaning, Phone Repair, Bars, Hair Salons, Gyms, Massage, and Shopping. Users can sign up with their Facebook, google, apple, or e-mail accounts. The database of the application includes countries other than the United States, and the Apple App

Store and Google Play for Android and IOS devices provide free downloads of the application.[7][8]

2.3.4 Tuvaletler Bulucu

Tuvaletler Bulucu is a free-to-use application in the Play Store for Android devices. The app currently has more than 100.000 downloads while having a rate of 2 out of 5 which is a sign of a bad user experience. The app uses Google Maps API to show available locations and toilets on the map. While the application interface is looking great, the app is asking users to report a toilet place. The user must report the toilet with his e-mail, toilet location, and an optional comment. Then the report is sent for review, and no other information is asked of the user, just the location and e-mail are required to report an available toilet. Also, maybe because of the lack of the reviewing phase or data collection, there are limited places with toilets according to the app in the capital city of Turkey, Ankara. That points to the rating of the app which is relatively low compared to the other apps on Play Store because the app isn't useful or effective at all.[9]



Figure 1 : Tuvaletler Bulucu App UI

2.4. CONCLUSION

There are numerous examples of toilet finder applications available on the market. However, the goal of this project is for users to be able to access a wealth of information about specific features, such as the quality/availability of toilet paper, soap, and so on, and to make decisions based on the comments made by other users. At the same time, mobile application development tools will be used, and we hope to create an easy and useful user interface. As a result, we hope that passengers will be able to enter the toilet of their choice and choose based on their own criteria in a comfortable manner during their journey.

3. Software Requirement Specification

3.1. Introduction

This software requirements setting document aims to identify requirements for the “Smart Journey Application” co-creation project. This project provides information about how the application works and how the application is developed with this new technology. In addition, restrictions on the use of the application in SRS and information about the functions of the recommended software are given.

Smart Trip Application is a mobile application designed to assist users' activities depending on their user needs, which they can use both for travel and daily use. Our application allows users to go from their current location to the desired location by obtaining their location information, and the user can search and find the facility that will serve him best in line with his needs. By using the filtering feature, the user can see, score, and comment on high-rated and clean facilities suitable for their needs. In this way, it is possible for the users to see the facilities and toilets around them by remote calculation and to make plans.

3.1.1 Purpose

The aim of this project is to develop a smart system that aims to reach the cleanest and most comfortable ones while reaching the basic needs of the users and to integrate this system into the mobile application. Thanks to this mobile application, people will be able to see the facilities suitable for their needs, plan remotely and reach the location they will go from their own location in case of any travel. The mobile application detects where the user is, thanks to the location information requested from the users. If the user wishes, s/he can filter the facilities with the desired features by using the filtering feature, accessing the comments about these facilities, and making his/her own comments and ratings. If the user wants, s/he can start with his own location, specify the destination and switch to travel mode. During the project, various software requirements will be used so that the user can see an advanced application in the mobile application.

3.2. General Description

Various aspects of the project will be discussed in this section.

3.2.1 Product Perspective

This system consists of a mobile application and this mobile application will be used to see the toilets between the current and destination locations and their evaluations by the users. To determine the user's location, the mobile application will need to connect with a GPS application on the phone, which will then communicate with an actual GPS device. The position of the user and the restrooms, as well as the distance between them, will be provided by the GPS to the mobile application. Additionally, because this product is data-driven, it will require a place to store the data. A database will be utilized for that. In this project, Ionic and Java software tools and Google Maps library will be used.

3.2.2. Glossary

TERM	DEFINITION
Mobile Application	A software application developed particularly to run on mobile devices rather than desktop or laptop computers, such as smartphones and tablets.
Pathfinding	Drawing the shortest path between two points with a computer application.
Ionic	It is an open-source framework for mobile applications based on HTML5.
SRS	Software Requirements Specifications
User interface (UI)	The component of a software application that the user can see and interact with.

TERM	DEFINITION
Android	An open source and free mobile operating system based on Linux, developed for use on mobile devices and mobile phones.
iOS	Apple's mobile operating system originally developed for the iPhone but later used on the iPod touch and iPad.
IEEE	Institute of Electrical and Electronics Engineers

3.2.3. User Characteristics

3.2.3.1 Users

User must have an Internet and mobile phone and should know how to use it.

User can login and register.

User can see nearby toilets and their reviews.

User can rate the toilets they have used.

3.2.4. General Constraints and Assumptions

3.2.4.1 Constraints

The system interface limits the mobile application to the GPS navigation system within the mobile phone. Another limitation of the application is the Internet connection. It is essential that there be an Internet connection for the application to run because it retrieves data from the database over the Internet. The user needs to register in the system and complete the registration form in order to use the application and rate the restrooms.

3.2.4.2 Assumptions

User should be at least somewhat familiar with how to use a smartphone.

The user's device must be capable of supporting Android services.

Users must allow GPS services access.

The user's internet connection should be steady.

It is hoped that users make a proper comment and rate accordingly about the relevant toilet.

4. REQUIREMENTS SPECIFICATION

4.1 External Interface Requirements

4.1.1 User Interface

The user interface of our application will be clear and user-friendly. This application can work on both IOS and Android based mobile devices. According to their location, users will be able to see the clean restrooms nearby or the places they have chosen without filtering from the map in the interface. Our users who want to start a trip will be able to see it on the map from the starting point to the ending point. Users will be able to add places that are not in the application, but actually exist, to the application by rating.

4.1.2 Hardware Interface

This application works on all mobile devices based on IOS and Android.

4.1.3 Software Interface

In our mobile application, it is written with Ionic, which is used with Angular.Js for the front end. HTML, CSS, JavaScript programming languages are mainly used in the development process of the application and Java is used for the back end.

4.1.4 Communication Interface

IOS and Android based mobile devices must have an internet connection in order for the application to reach locations.

4.2 Functional Requirements

4.2.1 Use Case Diagrams

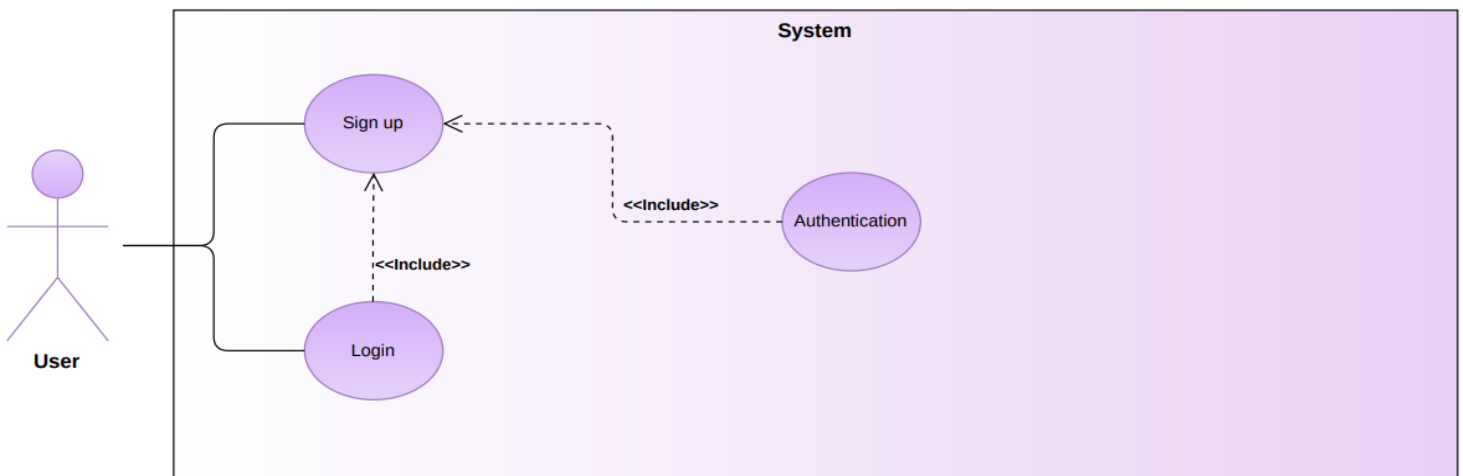


Figure 2 : Use Case Diagram

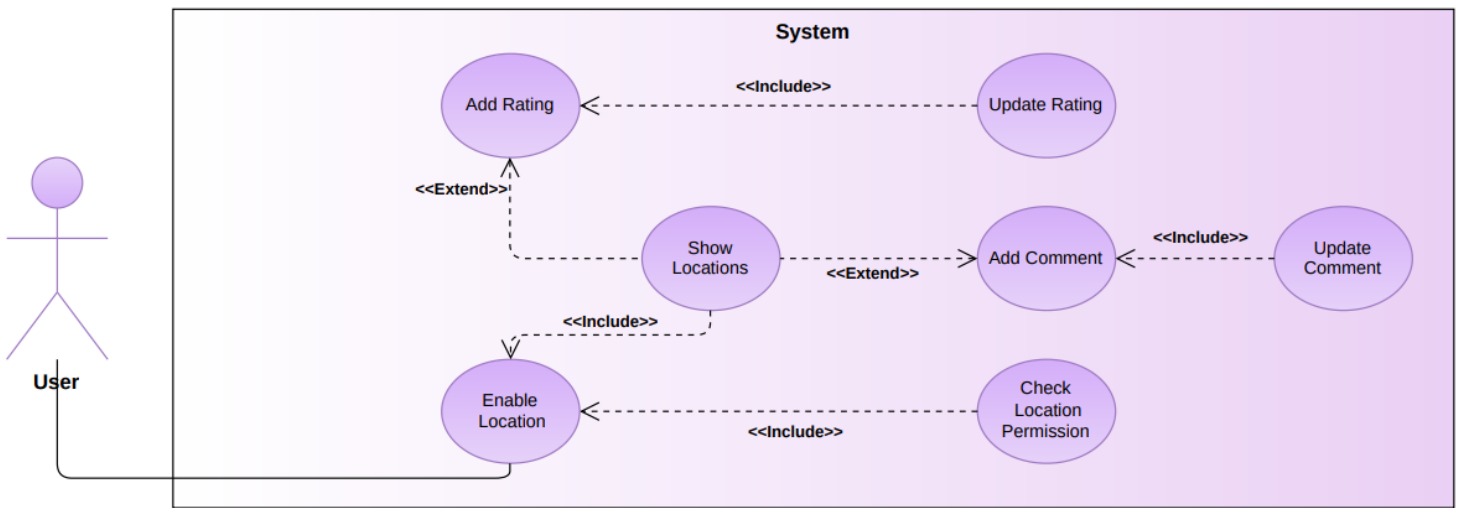


Figure 3 : Use Case Diagram

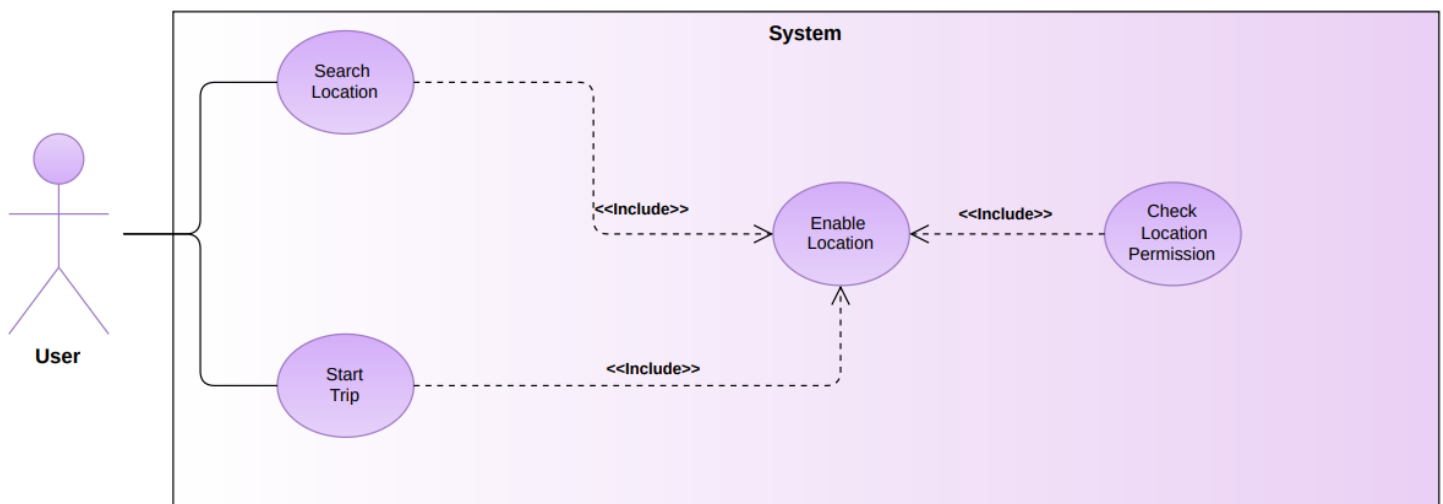


Figure 4 : Use Case Diagram

4.2.2 Use Cases

4.2.2.1 Sign Up

Use Case Number	UC-1
Use Case Name	Sign Up
Actor	User
Description	After downloading the mobile application to their phones, new users register to the application by providing the necessary information. If the registration is successful, users can log into the system and start using the application.
Precondition	The user must download the application to their phone. The user does not need to be registered with the application before. User must have their own email address or phone number for the verification code.
Scenario	<ul style="list-style-type: none">• User enters personal information such as username, e-mail on the registration screen.• User sets a password.• User verifies their information with the verification code sent to their phone or mail address.• User must agree to the terms of service and privacy policy.• The user can start using the application.
Postcondition	The user can access the login page in the application (if the user already has an account).
Exceptions	If the user enters invalid or incomplete information, the system prompts the user to renew the information with a warning. When a registered user's email is entered, the system prompts "There is a registered user for this email" If no information is entered in the boxes, a warning is given that it has not been entered.
Related Use Cases	UC-2

4.2.2.2 Login

Use Case Number	UC-2
Use Case Name	Login
Actor	User
Description	After the user registers to the application, s/he can log in to the application with her password using her e-mail address.
Precondition	User must be registered. The user must enter the correct e-mail and password.
Scenario	<ul style="list-style-type: none">• The user enters the requested e-mail and password to enter the application.• If the user is registered in the system, s/he logs into the application.
Postcondition	The user can access the main page of the application where the map will appear.
Exceptions	The user who enters incorrect information while logging in is warned by the system.
Related Use Cases	UC-3, UC-4, UC-5

4.2.2.3 Enable Location

Use Case Number	UC-3
Use Case Name	Enable Location
Actor	User
Description	The user must allow location access to use the app.
Precondition	User must be registered. The user must enter the correct e-mail and password.
Scenario	<ul style="list-style-type: none">• The user logs into the application.• The user turns on location services on his phone.• The user allows the application to access the location.• The user starts using the application.
Postcondition	If location permission is granted, user's current location will be sent to Google Maps and navigation will be started.
Exceptions	The user may try to log in and use the application without turning on the location services, in this case, the user will be prompted by the system to open the location services.
Related Use Cases	UC-5

4.2.2.4 Start Trip

Use Case Number	UC-4
Use Case Name	Start Trip
Actor	User
Description	When the user selects the destination which is facility, a travel plan is created by going to Google Maps from the application.
Precondition	The user must allow location access to the application. The user has to choose the facility they want to go to.
Scenario	<ul style="list-style-type: none">• The user selects the destination point which is facility.• The user chooses her/his needs (toilet/disabled/babycare/mosque)• The user can start his journey by clicking navigation button.
Postcondition	The user can finish the route s/he created. The user can end the journey.
Exceptions	An error message is given if the user tries to create a route without selecting the facility.
Related Use Cases	UC-3

4.2.2.5 Authentication

Use Case Number	UC-5
Use Case Name	Authentication
Actor	In system control
Description	It works like identity check. The system performs the authentication of the users on the backend.
Precondition	The user must have an internet connection. The user must open the application.
Scenario	<ul style="list-style-type: none">• The user opens the application.• Enters user information to login.• Users who are not registered by identity check are not allowed to login.
Postcondition	Registered users log in to the application.
Exceptions	Unregistered users cannot login to the system. An error message is displayed that incorrect information has been entered.]
Related Use Cases	UC-1, UC-2

4.2.2.6 Check Location Permission

Use Case Number	UC-6
Use Case Name	Check Location Permission
Actor	In system control
Description	Checks if the user has the location permission turned on.
Precondition	User needs to log in to the application. User needs to turn on the location services available on their phone.
Scenario	<ul style="list-style-type: none">• User logs into the application.• Checks if the user's location is open.• System will alert if location is off.
Postcondition	User can see the nearest places on the map according to her/his location.
Exceptions	If the user's location is not open, the system will issue a warning message.
Related Use Cases	UC-3

4.2.2.7 Add Rating

Use Case Number	UC-7
Use Case Name	Add Rating
Actor	User
Description	Users can rate the cleanliness of the restrooms in their location or instant location after starting the trip.
Precondition	User's location must be open.
Scenario	<ul style="list-style-type: none">• User logs into the application.• User turns on location services on his phone.• User starts a trip.• User rates the cleanliness of the facilities.
Postcondition	The user can finish the route s/he created. The user can end the journey.
Exceptions	By giving rating out of 5 stars to the facility they choose, the user causes the average rating to change.
Related Use Cases	UC-4, UC-8

4.2.2.8 Update Rating

Use Case Number	UC-8
Use Case Name	Update Rating
Actor	In System Control
Description	The data that users rate the facilities are updated.
Precondition	User needs to rate any facility.
Scenario	<ul style="list-style-type: none">• From the Search bar, s/he sees the facilities near the location s/he is searching for and chooses the one s/he wants to go to.• User rates the facility according to its cleanliness.• The ratio of the rated facility is updated.
Postcondition	The ratio of the rated restrooms is updated for users to see and reflected on the application screen on the facility's modal page.
Exceptions	If the user tries to rate without selecting a comment from the list of comments that can be selected, the system will give an error message.
Related Use Cases	UC-7

4.2.2.9 Show Location

Use Case Number	UC-9
Use Case Name	Show Location
Actor	In system control
Description	Facilities 1 km away from the place where the user typed in the search bar are displayed in the search bar and the location of the clicked facility is shown with a marker on the map, and facilities close to the user's location are indicated on the map.
Precondition	Access to the user's location must be open.
Scenario	<ul style="list-style-type: none">• The user turns on location services on their phone.• The closest clean toilets to the location are listed.• The user searches for which facility s/he wants to see in the search bar.• The facilities that are 1 km away from the searched location are shown on the map.
Postcondition	The location of the facilities closest to the user's location is displayed on the map.
Exceptions	If there is no facility near or according to the user's search, it will not be shown on the map.
Related Use Cases	UC-3

4.2.2.10 Add Location

Use Case Number	UC-10
Use Case Name	Add Location
Actor	In system control
Description	The locations of the facilities that are not registered in the system are automatically added to the database by the system when their marker is clicked.
Precondition	The locations of the facilities must be reached.
Scenario	<ul style="list-style-type: none">• The user turns on location services on their phone.• the user clicks on its button to see the facilities close to his location or clicks on one of the facilities close to the location he is searching for in the search bar.• If the clicked facility is not in the database, it is automatically saved by the system.
Postcondition	If the facility whose marker is clicked does not exist in the database, it is automatically loaded into the database by the system.
Exceptions	If the clicked facility database is also present, a warning "this facility is already in the dataset" is given in the console.
Related Use Cases	UC-5, UC-9

4.2.2.11 Search Location

Use Case Number	UC-11
Use Case Name	Search Location
Actor	User
Description	User roams through the map in the application. User can see toilets and locations with their ratings.
Precondition	The user must be connected to the internet. The user must turn on the location services available on their phone.
Scenario	<ul style="list-style-type: none">• The user logs into the application.• The system directs the user to the page with the map.• The user types the name of the place to see the facilities in that place.• Under the search bar, all the closest facilities that are at most 1km away from the searched place are listed.
Postcondition	The searched facilities are displayed.
Exceptions	If there is no facility close to the place the user is looking for, it cannot be displayed on the map.
Related Use Cases	UC-5

4.3 Non-Functional Requirements

This section includes non-functional requirements of the project.

4.3.1 Performance Requirements

Performance Requirements	Description
Response Time	For a better experience and design in our app, the latencies must be minimized because the speed is directly related to the real life speed. Nearby locations and current locations must be displayed within the trip road interface with a maximum delay of 2 seconds.
Error Handling	When an error occurs, user will be informed about the error and asked to check the network connection or close the application and re-open the application.
Workload	System will recommend a path and show nearby facilities while on a trip. This will require a specific algorithm and our system will solve the algorithm while keeping the latency low.
Scalability	Multiple users can use the application at the same time, system capacity will be designed to serve multiple users at once.
Application requirements	Device must have enough space for the application , and google services should be activated, also to use the application location services of the device must be activated.
Efficiency	System should calculate the closest routes with maximum performance and minimum source usage.

4.3.2 Software Quality Attributes

Software Quality Attributes	Description
Accuracy	Accuracy The locations and roads must be accurate. That means tracking and updating the locations are job of the admin and should be tracked regularly.
Reliability	Unless under an unexpected or environmental conditions, all the functionalites should be able to work.
Learnability	The system should be ease to use because the target user demographic is highly and widely populated.
Portability	The system should work on Android devices.
Extensibility	System should be open to addition of new functions, while closed to be modified.
Usability	Anyone should be able to use the application without facing any difficulties while traveling or arranging a travel.
Security	Our system should not allow any malicious or unauthorized attempts gain access.

5. Software Design Description

5.1. INTRODUCTION

5.1.1. Purpose

This software design document explains the Smart Trip Application architecture and system design. The primary goal of this document is to describe the technical vision for how the criteria in the SRS paper will be achieved. This contains the architectural aspects of the system as well as the operations that each module will conduct. The goal is to guide a design that any user reading this report may simply apply. This document's primary audience is users of Smart Trip Application, i.e. people who want to find a clean and reliable restroom when traveling.

5.1.2. Scope

Smart Trip Application is a user friendly mobile application designed to make your travel experiences more convenient and hygienic. With a focus on cleanliness, the app provides users with real-time information about clean and well-maintained toilets in their vicinity, both for users on the go and in their current location. By simply downloading the app onto their smartphones, users gain instant access to a vast database of toilet facilities, ensuring they can find a clean and comfortable restroom wherever they are. To enhance user experience, the Smart Trip Application seamlessly integrates with Google Maps, allowing users to create routes and navigate to their desired location while simultaneously identifying nearby clean toilets. By connecting with Google Maps, the app optimizes travel routes based on the user's current location, ensuring they can easily find a restroom when needed without any hassle or detours. To utilize the full functionality of the app, users are prompted to grant location access, enabling the Smart Trip Application to provide precise and accurate information about nearby clean toilets. This feature ensures that users can quickly identify the closest facilities, even in unfamiliar surroundings, saving them time and ensuring their comfort while on the move. Once registered, users can leave comments and ratings for the facilities they visit.

5.1.3. Definitions And Acronyms, Abbreviations

TERM	DEFINITION
Activity Diagram	A flowchart showing how one activity leads to another activity.
Sequence Diagram	Shows process interactions in the area of software engineering that are time-ordered.
Class Diagram	A graphical notation for building and visualizing object-oriented systems.
Software Design Description	A description of software created to facilitate analysis, planning, implementation, and decision-making.
User Interface Design	the technique designers use to construct interfaces in software or technological devices, focused on appearances or style.
Android	An open source and free mobile operating system based on Linux, developed for use on mobile devices and mobile phones.
iOS	Apple's mobile operating system originally developed for the iPhone but later used on the iPod touch and iPad.
User	Someone that uses a product or service such as Smart Trip Application.
Database	A structured collection of information or data that is often saved electronically in a computer system.
IEEE	Institute of Electrics and Electronics Engineering

5.1.4. Motivation

As travelers, we often find ourselves in unfamiliar places and in need of essential services such as restrooms or places to eat. However, locating these services can be time-consuming and stressful, especially when we are in a hurry or have specific needs. That's where our smart trip application comes in. By using our app, users can easily plan their trips and locate essential services along the way, saving time and hassle. With the ability to customize their trips based on their needs, our app helps users make the most of their travels and enjoy a smoother, more convenient experience. Whether you're a frequent traveler or just embarking on a one-time journey, our smart trip app is the perfect companion to help you navigate your way.

5.2. DESIGN APPROACH

This section of the system design includes the system's architectural design, the definition of the problem, the technologies used, user interface design. It also includes diagrams such as Class Diagram, Activity Diagram, Sequence Diagram and Data Flow Diagram.

5.2.1 Class Diagram

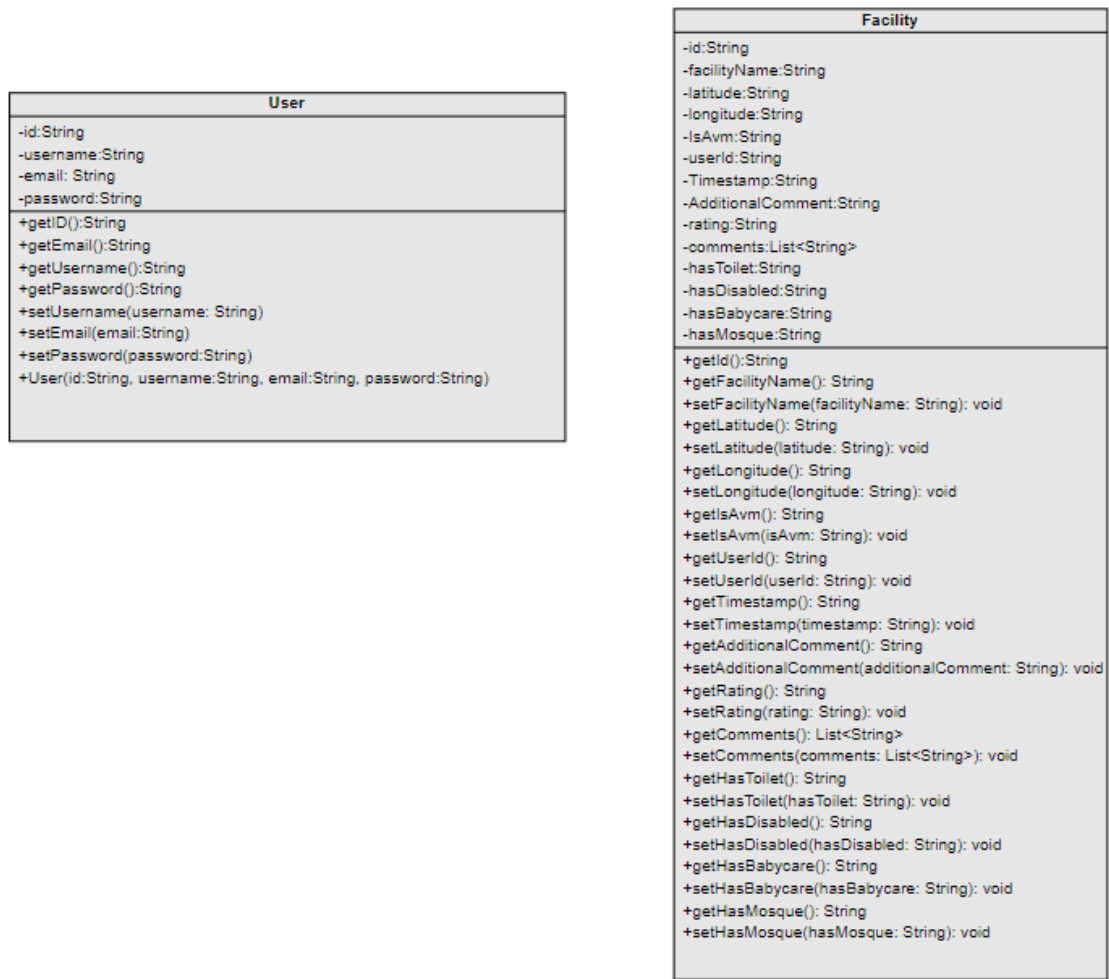


Figure 5: Class Diagram

5.2.2 Data Flow Diagram

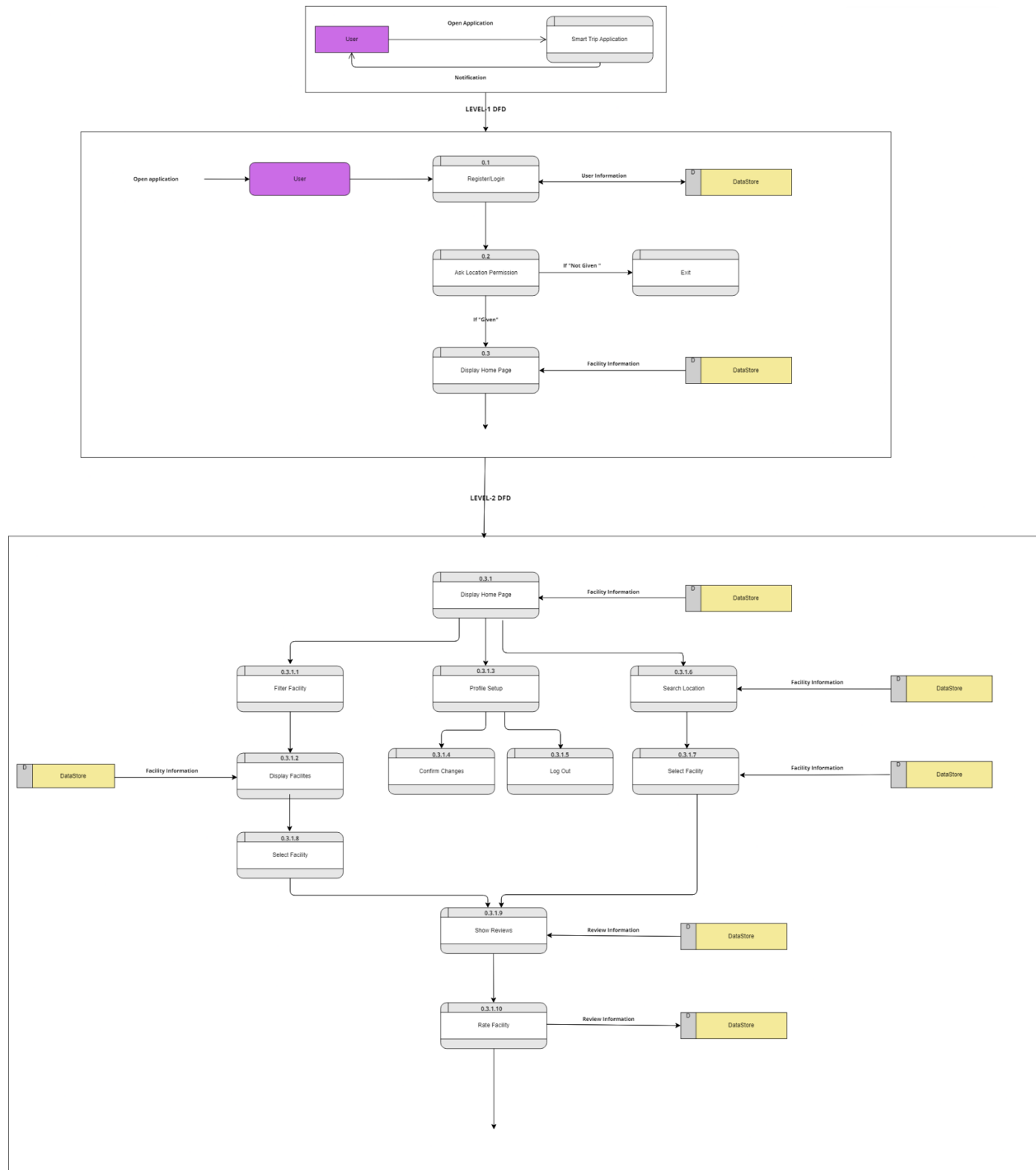


Figure 6: Data Flow Diagram

5.2.3 Activity Diagrams

5.2.3.1 Sign Up

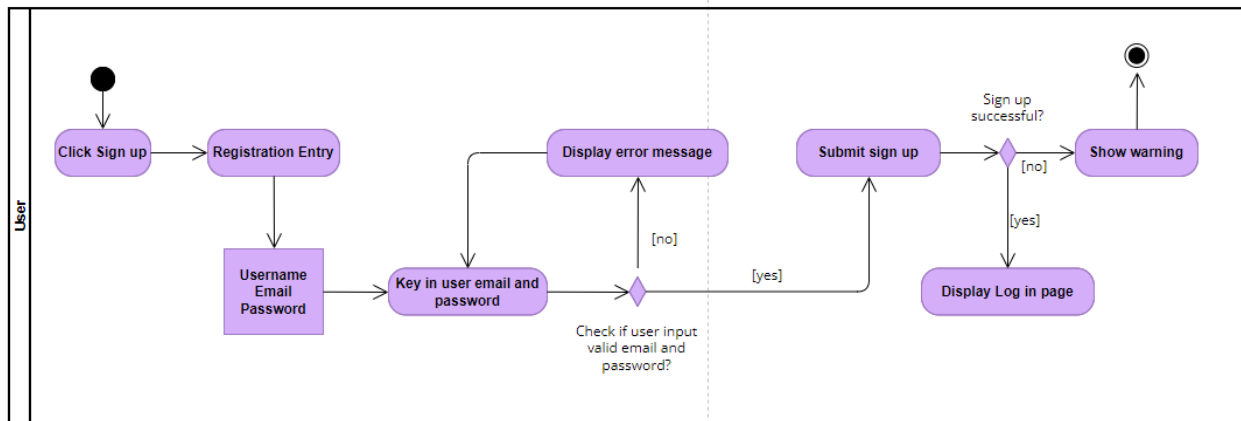


Figure 7 : Sign Up Activity Diagram

5.2.3.2 Login

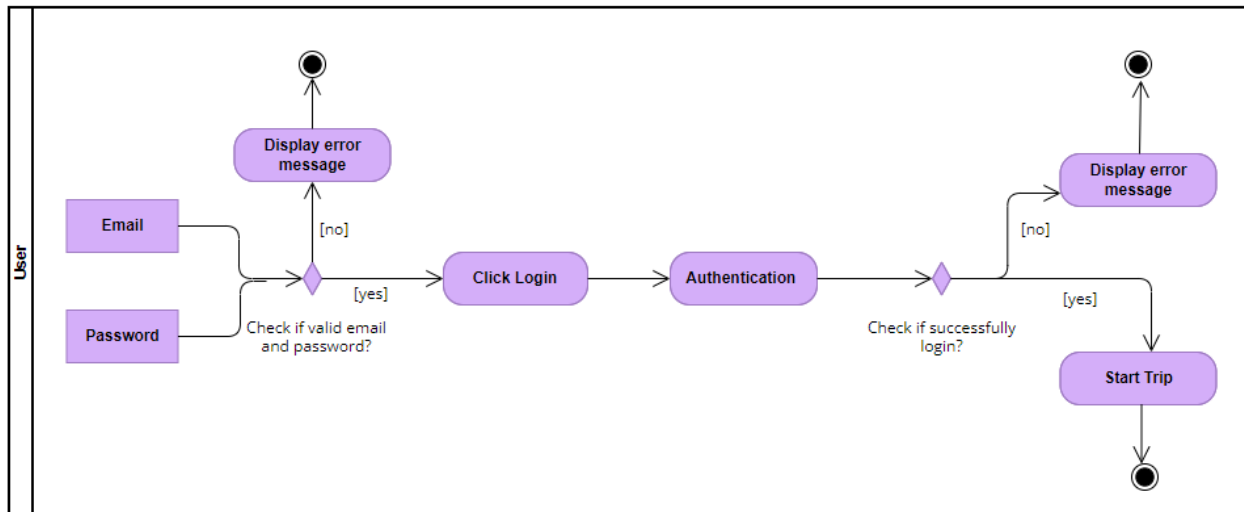


Figure 8: Login Activity Diagram

5.2.2.3 Start Trip

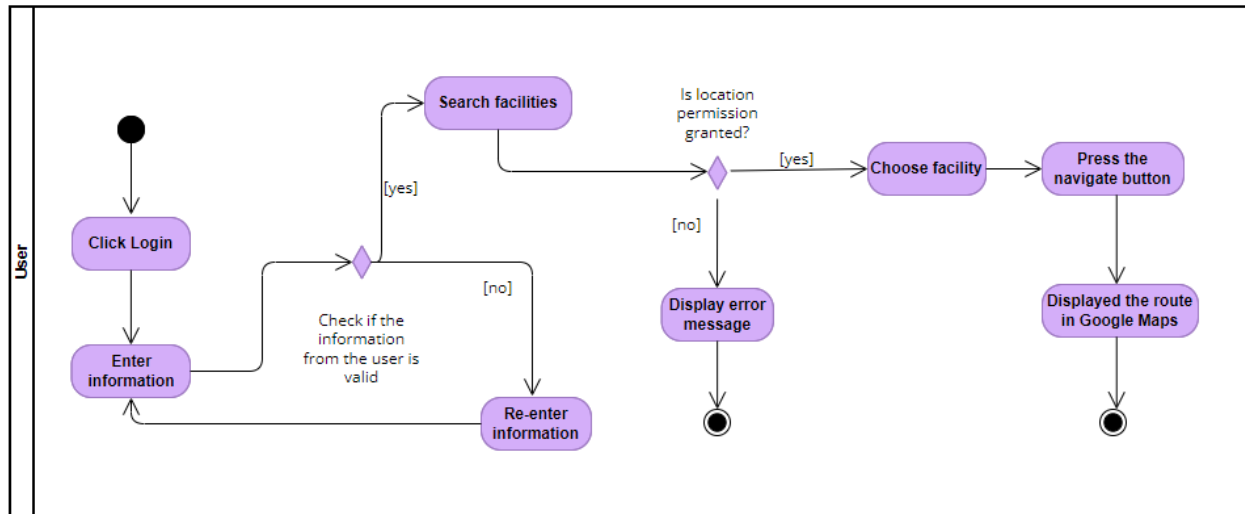


Figure 9 : Start Trip Activity Diagram

5.2.3.4 Add Rating

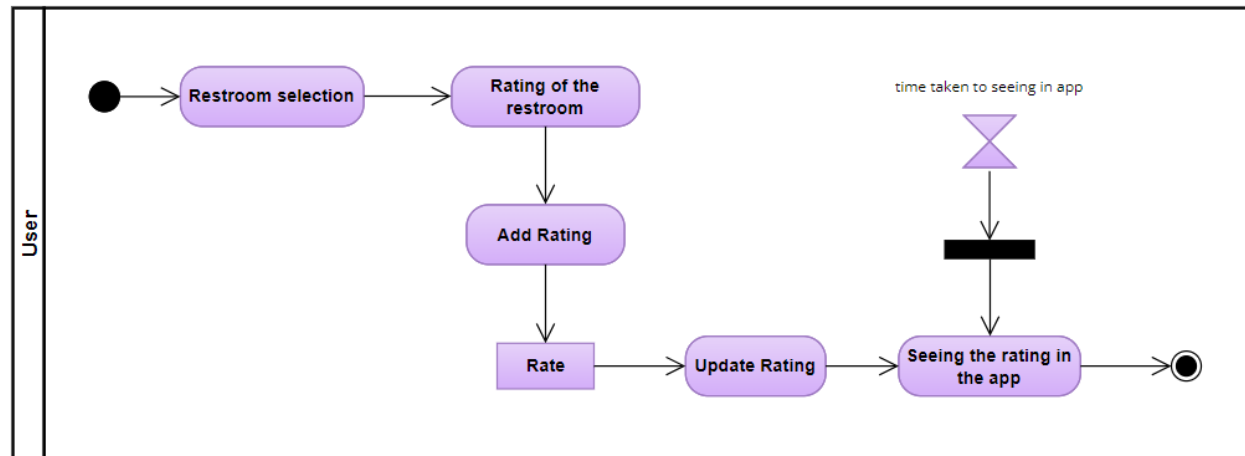


Figure 10 : Add Rating Activity Diagram

5.2.3.5 Add Location

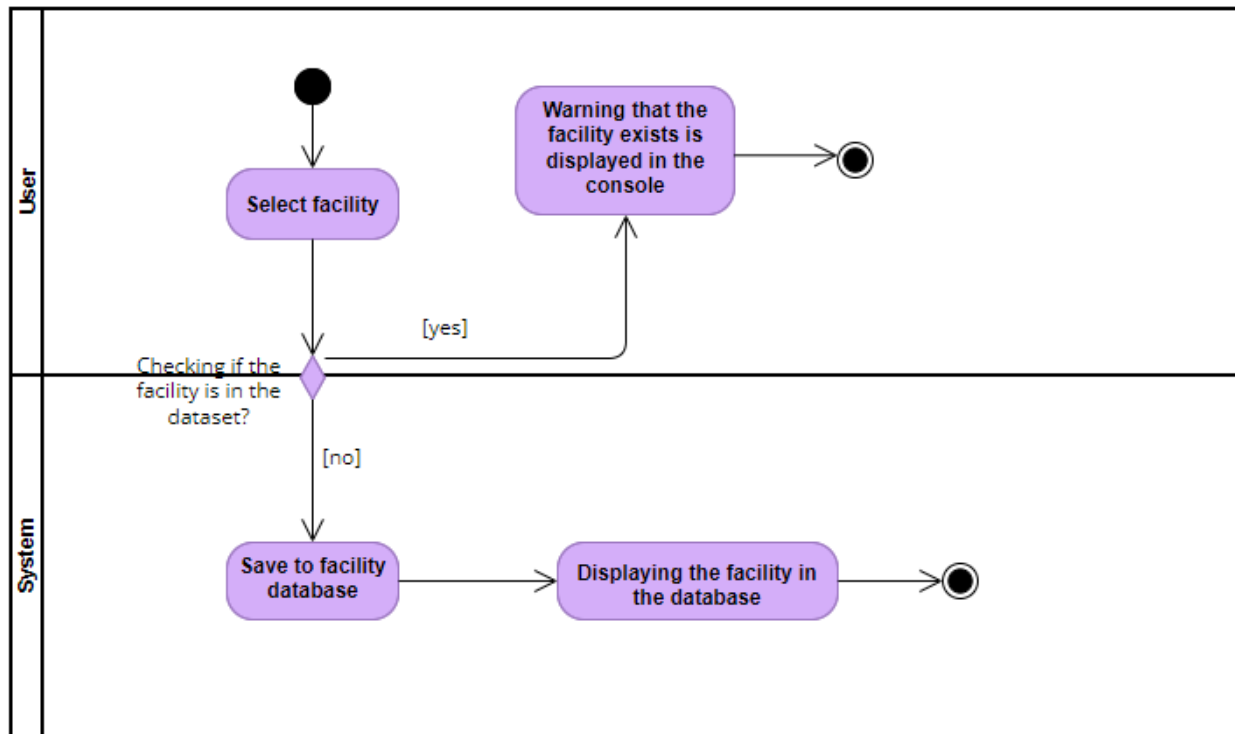


Figure 11 : Add Location Activity Diagram

5.2.3.6 Search Location

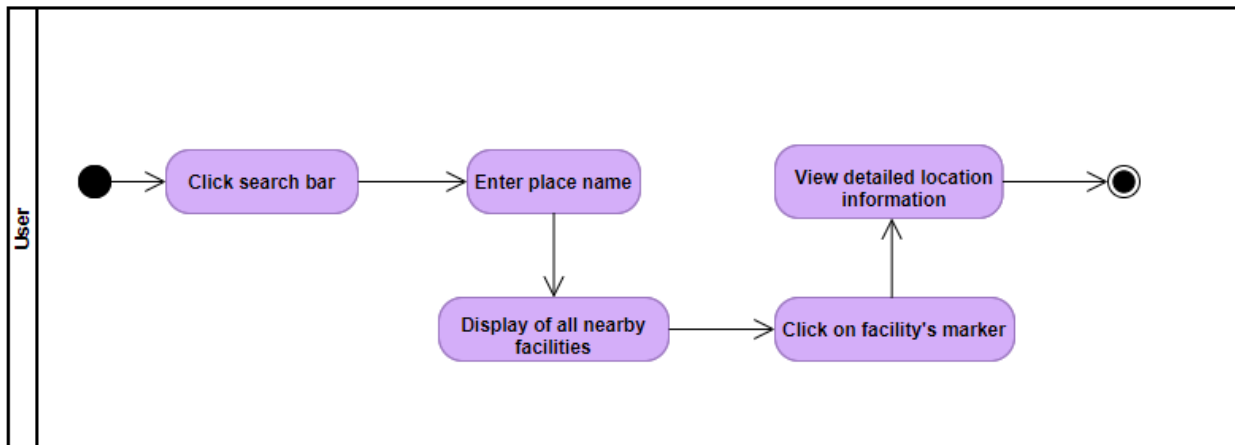


Figure 12 : Search Location Activity Diagram

5.2.4 Sequence Diagrams

5.2.4.1 Sign Up

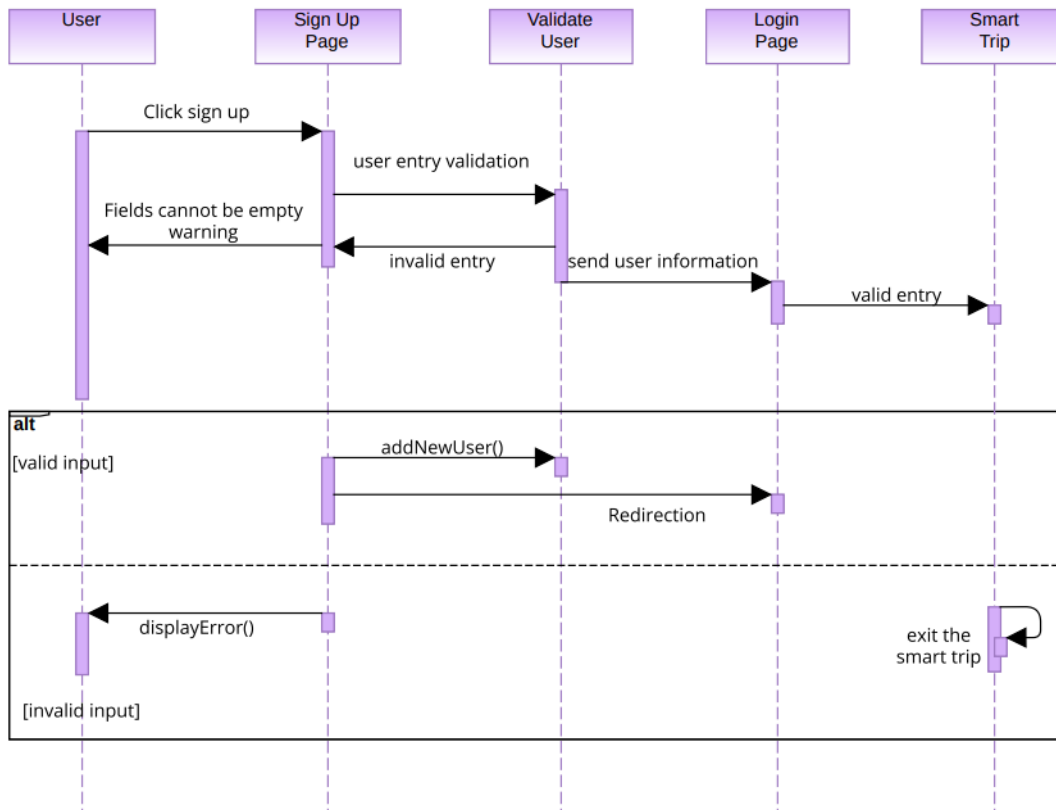


Figure 13 : Sign Up Sequence Diagram

5.2.4.2 Login

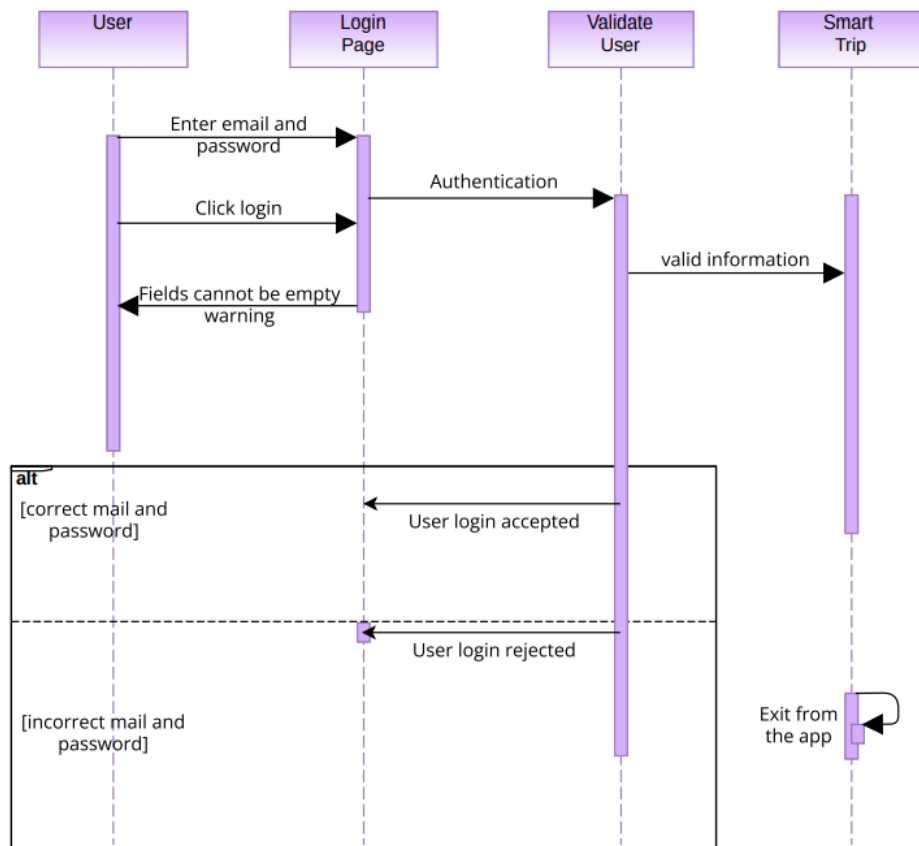


Figure 14 : Login Sequence Diagram

5.2.4.3 Enable Location

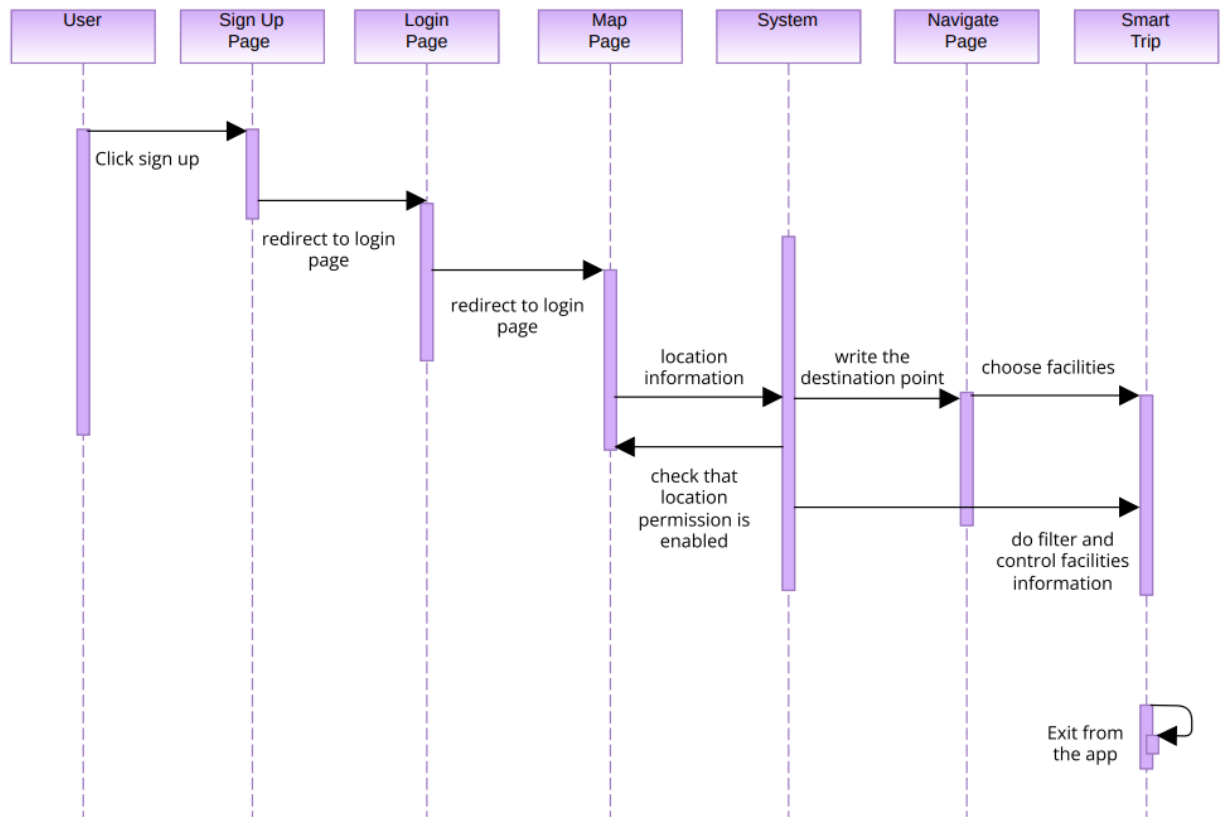


Figure 15 : Enable Location Sequence Diagram

5.2.4.4 Search Location

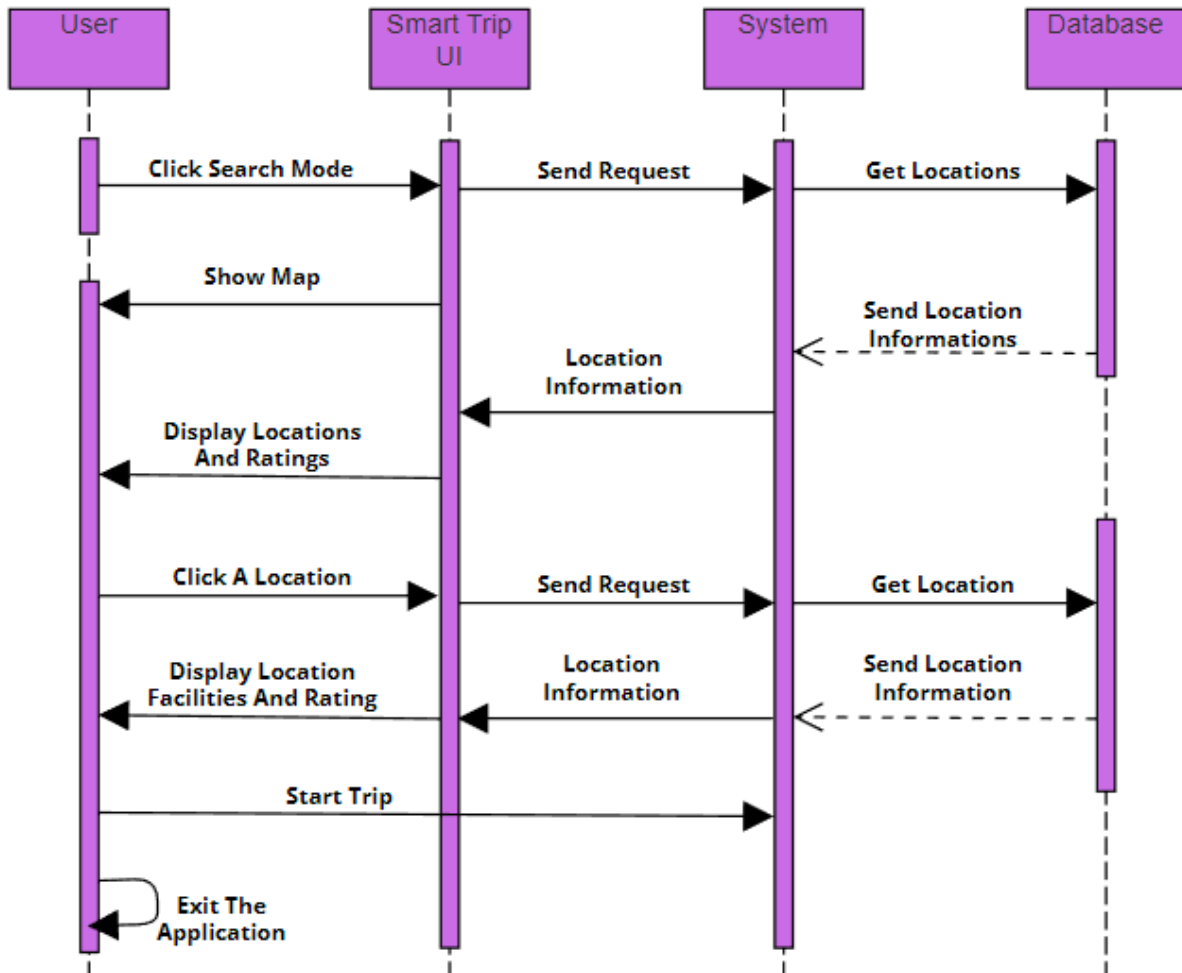


Figure 16 : Search Location Sequence Diagram

5.2.5 Database Design

5.2.5.1 AWS Overview

While considering the choice of a database solution for our application, it is crucial for us to evaluate various factors to ensure optimal performance, scalability, and ease of management. In the case of our application, AWS DynamoDB emerges as a compelling choice due to its unique features and benefits considering all the options.

AWS DynamoDB is a fully managed NoSQL database service provided by Amazon Web Services (AWS). It offers a highly scalable, flexible, and performant solution for storing and retrieving data. Here are the reasons why DynamoDB is a favorable option for our application:

Scalability: DynamoDB is designed to scale effortlessly. It can handle massive workloads and accommodate sudden spikes in traffic without compromising performance. As our application grows in terms of user base and data volume, DynamoDB can seamlessly scale to meet the demands, ensuring uninterrupted service availability.

Performance: DynamoDB delivers exceptional performance with low-latency access to data. It employs distributed architecture and automatically manages data partitioning and load balancing behind the scenes. This distributed nature allows for high throughput and fast response times, enabling our application to deliver a smooth and responsive user experience.

Fully Managed Service: DynamoDB eliminates the burden of database administration and infrastructure management. AWS takes care of all operational aspects such as provisioning, configuration, security, backups, and maintenance. This frees up our development team to focus on application logic and functionality rather than dealing with database management tasks.

Flexible Data Model: DynamoDB's NoSQL nature provides flexibility in data modeling. It allows us to store and access data in a schema-less manner, accommodating evolving application requirements and varying data structures. This flexibility enables us to adapt and iterate on our data model as our application will evolve over time.

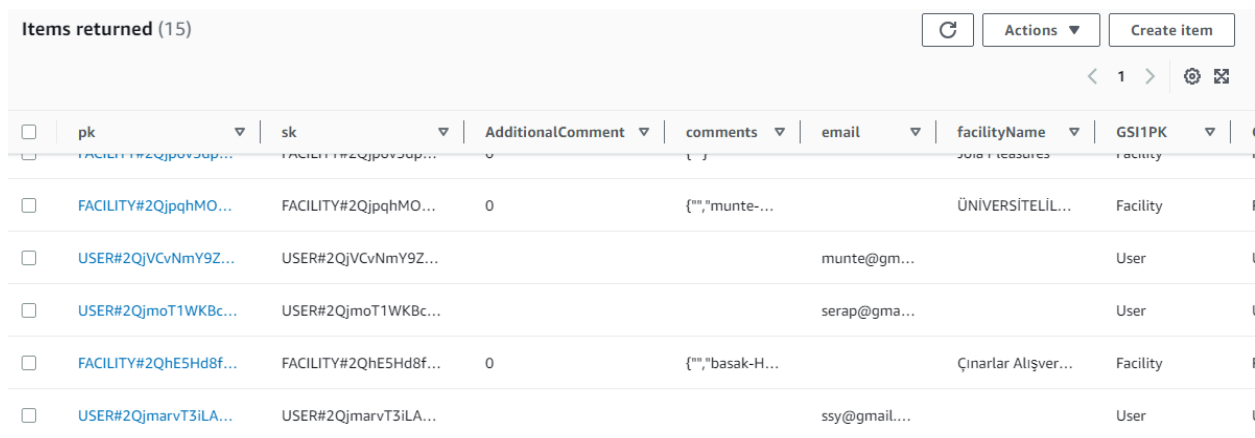
Global Distribution and High Availability: DynamoDB supports multi-region replication, allowing us to replicate data across different geographic regions. This enables us to provide low-latency access to our users around the world and enhances the overall performance and reliability of our application. Additionally, DynamoDB's built-in redundancy and data replication across multiple availability zones within a region ensure high availability and data durability.

Security: DynamoDB offers robust security features to protect our data. It supports encryption at rest and in transit, allowing us to maintain data confidentiality. With fine-grained access control through AWS Identity and Access Management (IAM), we can enforce data access policies and limit privileges to authorized entities. DynamoDB is also compliant with various industry regulations, helping us meet data privacy and compliance requirements.

Integration with AWS Ecosystem: DynamoDB seamlessly integrates with other AWS services, forming a powerful ecosystem for building scalable and efficient applications. Integration with services like AWS Lambda enables us to create serverless architectures, where we can trigger application logic based on data changes in DynamoDB. This synergy allows us to leverage AWS's vast array of services to build comprehensive and efficient solutions.

5.2.5.2 Database Table

In Amazon Web Services (AWS), a DynamoDB table is a core component of the fully managed NoSQL database service. It stores data as items, each uniquely identified by a primary key consisting of a partition key and an optional sort key. Tables are schema-less and can handle any amount of data with fast and predictable performance. The ID refers to the primary key attribute(s) that uniquely identify items within the table. It is used to access and manage individual items, allowing efficient querying and data retrieval. DynamoDB also provides options for secondary indexes, allowing additional querying flexibility. We are recording users and facilities in one table in our application.



	pk	sk	AdditionalComment	comments	email	facilityName	GSI1PK
<input type="checkbox"/>	FACILITY#2Qjppv30p...	FACILITY#2Qjppv30p...	0	{"","munte-...		ÜNİVERSİTELİL...	Facility
<input type="checkbox"/>	USER#2QjVCvNmY9Z...	USER#2QjVCvNmY9Z...			munte@gm...		User
<input type="checkbox"/>	USER#2QjmoT1WKBc...	USER#2QjmoT1WKBc...			serap@gma...		User
<input type="checkbox"/>	FACILITY#2QhESHd8f...	FACILITY#2QhESHd8f...	0	{"","basak-H...		Çınarlar Alışver...	Facility
<input type="checkbox"/>	USER#2QjmarvT3iLA...	USER#2QjmarvT3iLA...			ssy@gmail...		User

Figure 17 : Smart Trip Application DynamoDB(AWS) Database Table

5.2.5.3 Conclusion

Overall, AWS DynamoDB was an optimal choice for us because it offers a highly scalable, flexible, and fully managed NoSQL database service with strong performance, global availability, security, and seamless integration with other AWS services. These factors make it an optimal choice for building our app that requires high scalability, low latency, and flexible data models while minimizing operational overhead.

5.2.6 User Interface Design

5.2.6.1 Home Page

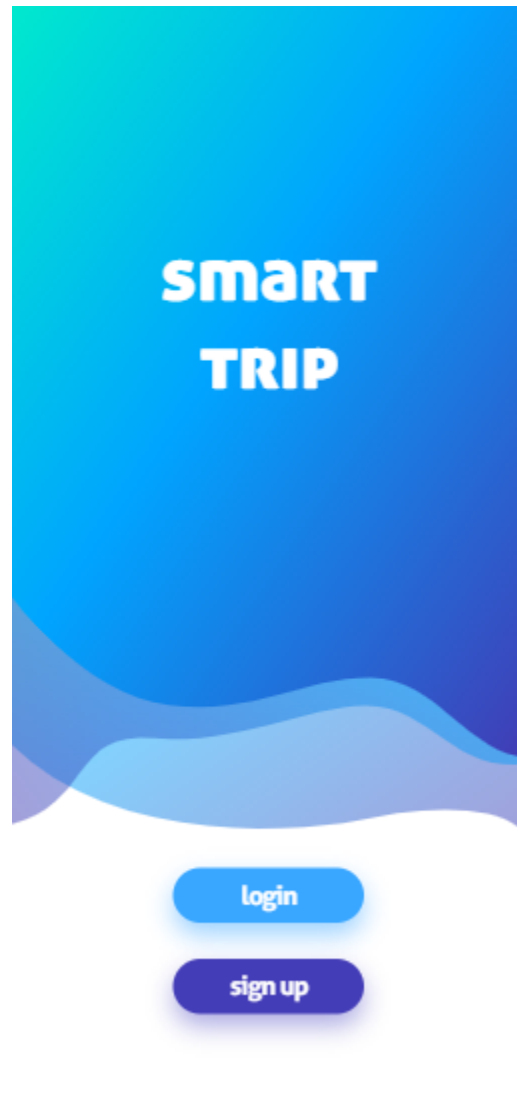
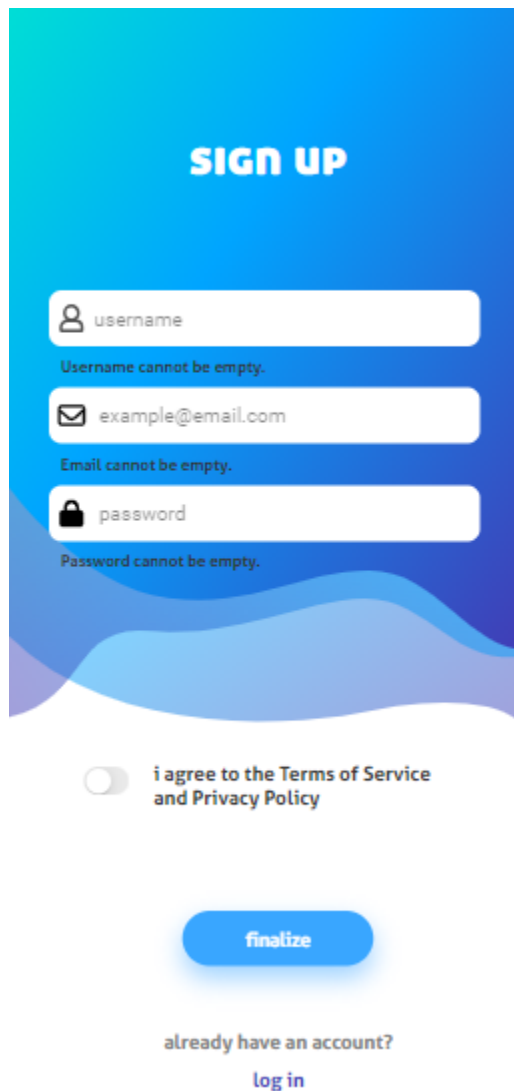


Figure 18 : Smart Trip Home Page UI

5.2.6.2 Sign up Page



The sign-up page features a blue gradient background with white text and form elements. At the top, the title "SIGN UP" is centered in a bold, white, sans-serif font. Below the title are three input fields, each with a white border and a light blue background. The first field is labeled "username" with a person icon and has a validation message "Username cannot be empty." below it. The second field is labeled "example@email.com" with an envelope icon and has a validation message "Email cannot be empty." below it. The third field is labeled "password" with a lock icon and has a validation message "Password cannot be empty." below it. Below the input fields is a toggle switch and the text "i agree to the Terms of Service and Privacy Policy". At the bottom, there is a blue button with the text "finalize" and a link "already have an account? log in" below it.

SIGN UP

Username cannot be empty.

Email cannot be empty.

Password cannot be empty.

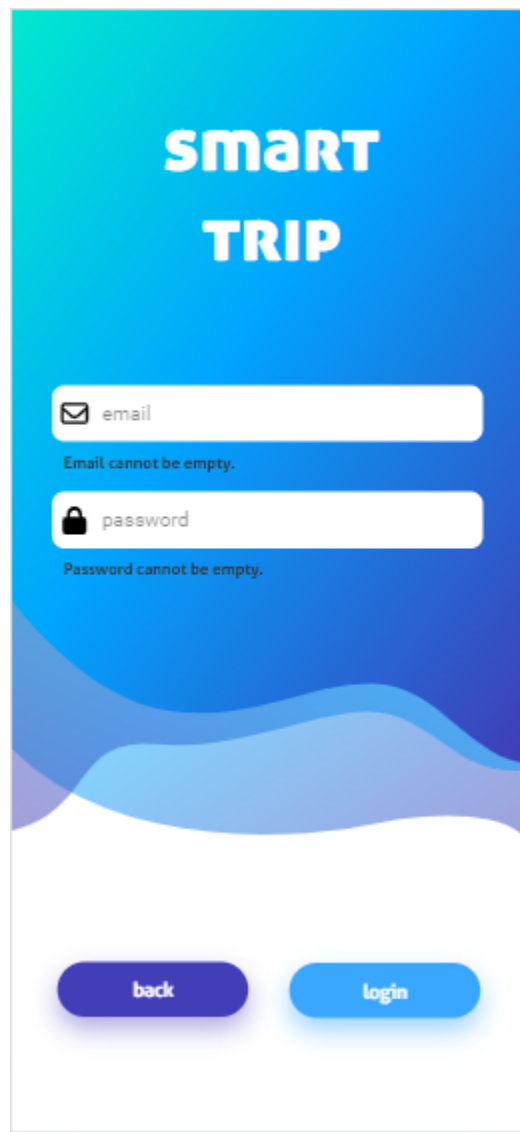
☐ i agree to the Terms of Service and Privacy Policy

finalize

already have an account? [log in](#)

Figure 19 : Smart Trip Sign Up UI

5.2.6.3 Login Page



The image shows a mobile app login screen for 'Smart Trip'. The background is a blue gradient with abstract wavy shapes at the bottom. The app name 'SMART TRIP' is at the top in white. Below it are two input fields: 'email' with an envelope icon and 'password' with a lock icon. Both fields have red error messages: 'Email cannot be empty.' and 'Password cannot be empty.' respectively. At the bottom are two buttons: a dark blue 'back' button and a light blue 'login' button.

**SMART
TRIP**

✉ email
Email cannot be empty.

🔒 password
Password cannot be empty.

back login

Figure 20 : Smart Trip Login UI

5.2.6.4 General Map Page

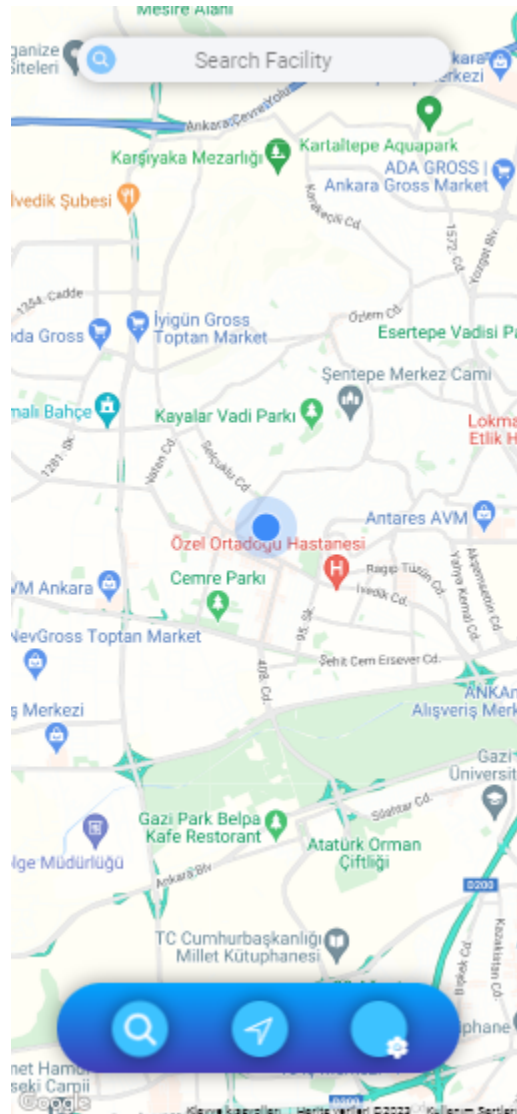


Figure 21 : Smart Trip Map UI

5.2.6.5 Choose Facilities Page

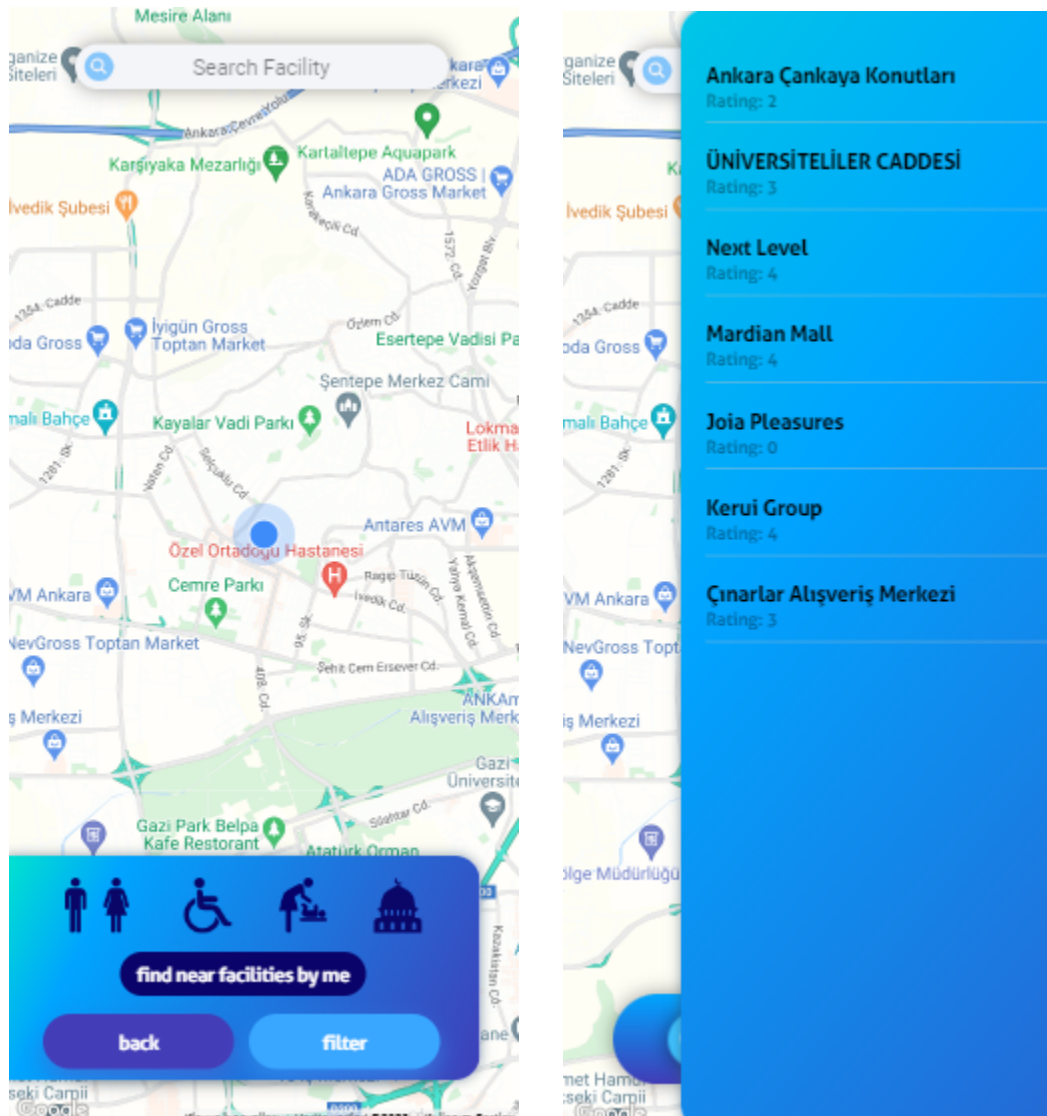


Figure 22 : Smart Trip Facilities UI

5.2.6.6 Choose Trip Mode Page



Figure 23 : Smart Trip Choose Trip UI

5.2.6.7 Search Page

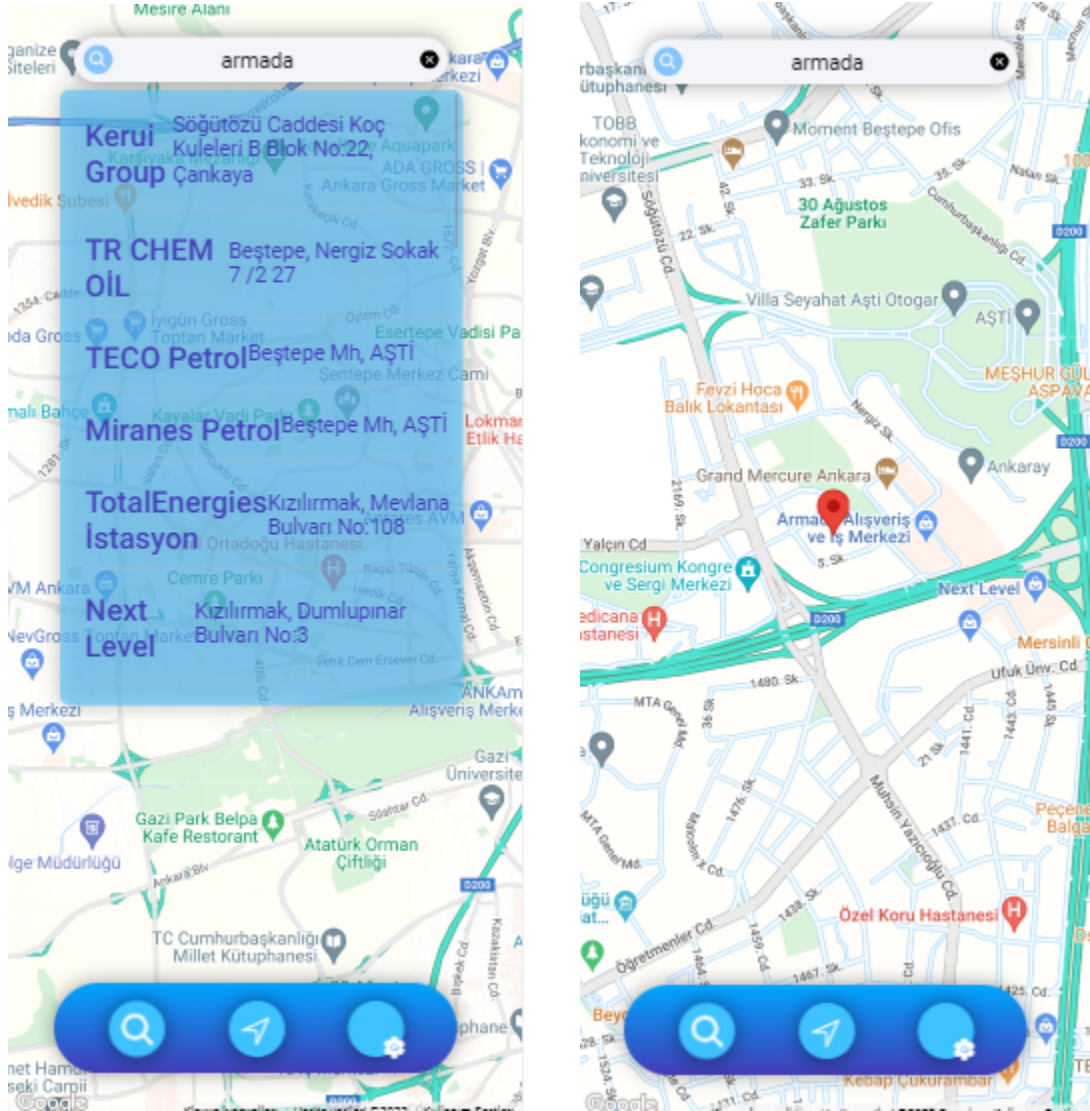


Figure 24 : Smart Trip Search UI

5.2.6.8 Profile Setup Page

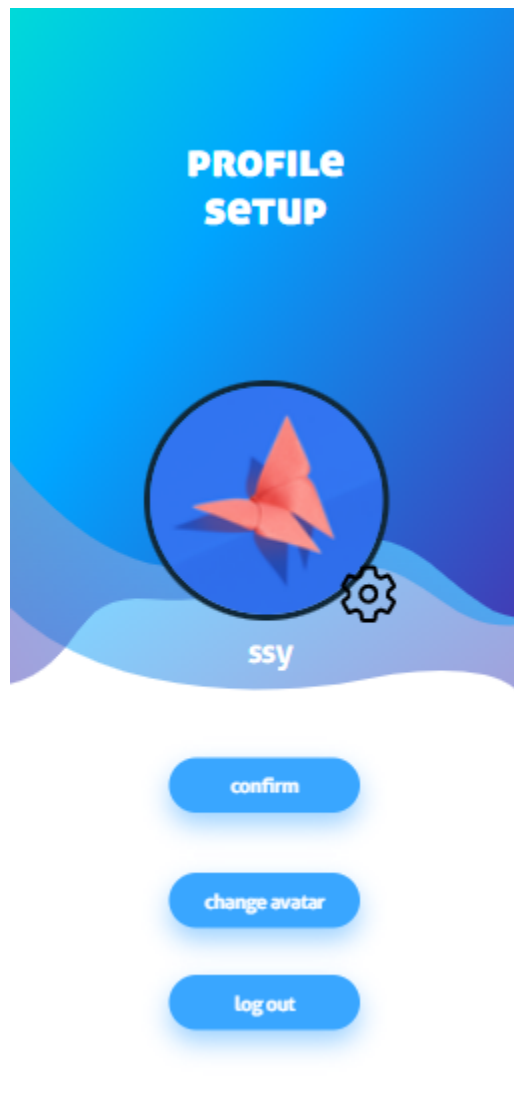


Figure 25 : Smart Trip Profile Setup UI

5.2.6.9 Rating & Comment Page

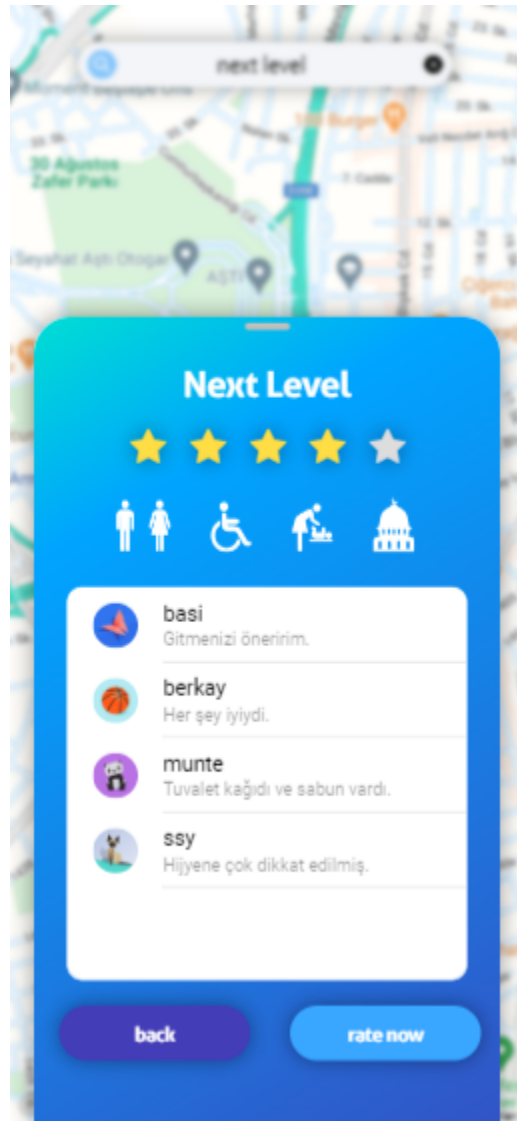


Figure 26 : Smart Trip Rating & Comment UI

6. Test Plan, Test Design Specifications and Test Cases

6.1 Introduction

6.1.1 Version Control

Version No	Description of Changes	Date
1.0	First Version	7 April, 2022
2.0	Second Version	2 June, 2022

6.1.2 Overview

The purpose of this test plan is to establish a structured approach for conducting tests on the Smart Trip application. It serves as a reference for team members, outlining which features will be tested or omitted, as well as providing details on planned test cases, workflows, and testing methods.

6.1.3 Scope

This test plan document includes test cases for Sign up, Login, Location, Ranking, Reviewing (Making and Showing Review), Navigation (Checking Location), Filtering, and Listing Facilities. This document will go over each of these functions in depth. The test requirements, test scenarios, and how tests will be passed or failed, and test scenarios are also explained in this document. The document's goal is to clarify what should be tested and how test cases should be executed.

6.1.4 Terminology

Acronym	Definition
SRS	Software Requirements Specification
SDD	Software Design Descriptions

6.2 Features to Be Tested

This section lists and gives a brief description of all the major features to be tested. For each major feature there will be a Test Design Specification added at the end of this document.

6.2.1 User Operations

User actions are actions that users are allowed to do. These processes include registration, login, profile setup. It includes seeing toilets and their locations, giving a rating, commenting and filtering.

6.3 Features Not to Be Tested

We will not be able to test the mobile application on the iOS platform because iOS can be tested only with a MacBook.

We are not going to do any test that may overuse the database since mentors from SONO provided us an AWS Student Account and this kind of account has limited access to database.

6.4 Item Pass/Fail Criteria

Exit Criteria

- 80% of the test cases are executed
- 80% of the test cases passed
- All High Priority test cases passed

6.5 References

[1] Team-11-SRS

[2] Team-11-SDD

6.6 Test Design Specifications

6.6.1 User Operations

6.6.1.1 Open Page (UO.OP)

This is the page that the user will encounter when entering the application for the first time. This page is the page where the user will log in or be directed to the sign-up screen if s/he is not registered.

6.6.1.2 Login (UO.LG)

Users enter their email and password. After clicking the log-in button, it redirects to the homepage.

6.6.1.3 Sign Up (UO.SU)

Users who want to register for the application enter their username, email, and password. Then the user presses the register button and the profile is created successfully after this process.

6.6.1.4 Add Rating (UO.AR)

Users rate the facilities out of 5 stars. These scores are kept and updated by taking their averages.

6.6.1.5 Write Review (UO.WR)

Users review the facility they have visited by clicking the review section.

6.6.1.6 Show Reviews and Ratings (UO.SR)

The reviews and ratings can be accessed by clicking the show reviews button.

6.6.1.7 Do Filtering (UO.DF)

It includes the features that the user wants to be in the location they go to (shopping mall, babysitting place, disabled toilet, etc.). The user clicks on the desired filtering feature or features and selects the save button. The eligible ones are then listed.

6.6.1.8 Allow Location (UO.AL)

The application must access the user location. Permission is requested by the operating system to access the user's location. Users allow the app to use location services.

6.6.1.9 Profile Setup (UO.PS)

Users can change their profile photo and can log out from the profile setup page.

6.6.1.10 Trip Mode Page (UO.TMP)

The general map page includes the main functionalities of the program. Viewing maps, searching facilities, routing, writing reviews/rating, profile setup button, and trip mode button are functionalities of the page. Thanks to the trip mode, after you enter the user's final destination, a direct transfer to the navigation takes place.

6.6.2 Test Cases

6.6.2.1 Open Page

TC_ID	Requirement	Priority	Scenario Description
UO.OP.01		H	Whether the login button works
UO.OP.02		H	Whether the sign up button works

6.6.2.2 Login Part

TC_ID	Requirement	Priority	Scenario Description
UO.LG.01		H	Enter valid e-mail and valid password
UO.LG.02		H	Enter invalid e-mail and valid password
UO.LG.03		H	Enter valid e-mail and invalid password
UO.LG.04		H	Enter valid e-mail and blank password
UO.LG.05		H	Enter blank e-mail and valid password
UO.LG.05		H	Whether the 'Forgot Password' works

6.6.2.3 Sign Up Part

TC_ID	Requirement	Priority	Scenario Description
UO.SU.01		H	Enter valid username, valid e-mail and valid password
UO.SU.02		H	Enter valid username, existing e-mail and valid password
UO.SU.03		H	Enter blank username, valid e-mail and valid password
UO.SU.04		H	Enter valid username, blank e-mail and valid password
UO.SU.05		H	Enter valid username, valid e-mail and blank password
UO.SU.06		H	Whether the "already have an account 'login'" button works

6.6.2.4 General Part

TC_ID	Requirement	Priority	Scenario Description
UO.AR.01		H	Add a rating
UO.WR.01		H	Add a comment
UO.SR.01		H	Show rating and review
UO.DF.01		H	List facilities by requirement filters
UO.DF.02		H	Mark near facilities by user location
UO.TMP.01		M	Trip mode
UO.AL.01		H	Allowing location services
UO.PS.01		L	Changing profile setup

7. Detailed Test Cases

7.1 UO.OP.01

TC_ID	UO.OP.01
Purpose	Whether the login button works
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	
Setup	The user must have an internet connection and open the application.
Procedure	[A01]Check your internet connection
	[A02]Open the app
	[A03]Click the login button
	[V01]Observe that the screen should switch to the login screen
Cleanup	Page refreshes

7.2 UO.OP.02

TC_ID	UO.OP.02
Purpose	Whether the sign up button works
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	
Setup	The user must have an internet connection and open the application.
Procedure	[A01]Check your internet connection
	[A02]Open the app
	[A03]Click the sign up button
	[V01]Observe that the screen should switch to the sign up screen
Cleanup	Page refreshes

7.3 UO.LG.01

TC_ID	UO.LG.01
Purpose	Enter valid e-mail and valid password
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	Sign up test cases should pass.
Setup	Database connection should be setup. A user should be created.
Procedure	[A01]Go to login page.
	[A02]Enter valid e-mail.
	[A03]Enter valid password.
	[A04] Click on the 'login' button
	[V01]Observe that the login was successful and redirected to the home page.
Cleanup	Logout

7.4 UO.LG.02

TC_ID	UO.LG.02
Purpose	Enter invalid e-mail and valid password
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	Sign up test cases should pass.
Setup	Database connection should be setup. A user should be created.
Procedure	[A01]Go to login page.
	[A02]Enter invalid e-mail.
	[A03]Enter valid password.
	[A04] Click on the 'login' button
	[V01]Observe that the login is unsuccessful and the invalid e-mail or password warning appears.
Cleanup	Page refreshes

7.5 UO.LG.03

TC_ID	UO.LG.03
Purpose	Enter valid e-mail and invalid password
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	Sign up test cases should pass.
Setup	Database connection should be setup. A user should be created.
Procedure	[A01]Go to login page.
	[A02]Enter valid e-mail.
	[A03]Enter invalid password.
	[A04] Click on the 'login' button
	[V01]Observe that the login is unsuccessful and the invalid e-mail or password warning appears.
Cleanup	Page refreshes

7.6 UO.LG.04

TC_ID	UO.LG.04
Purpose	Enter valid e-mail and blank password
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	Sign up test cases should pass.
Setup	Database connection should be setup. A user should be created.
Procedure	[A01]Go to login page.
	[A02]Enter valid e-mail.
	[A03]Enter blank password.
	[A04] Click on the 'login' button
	[V01]Observe that the login is unsuccessful and password cannot be empty warning.
Cleanup	Page refreshes

7.7 UO.LG.05

TC_ID	UO.LG.05
Purpose	Enter blank e-mail and valid password
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	Sign up test cases should pass.
Setup	Database connection should be setup. A user should be created.
Procedure	[A01]Go to login page. [A02]Enter blank e-mail. [A03]Enter valid password. [A04] Click on the 'login' button [V01]Observe that the login is unsuccessful and email cannot be empty warning.
Cleanup	Page refreshes

7.8 UO.LG.06

TC_ID	UO.LG.06
Purpose	Whether the 'Forgot Password' works
Requirements	No
Priority	H
Estimated Time Needed	1-2 min.
Dependency	
Setup	Login page should be open.
Procedure	[A01]Press 'forgot your password?' button. [A02]Enter valid e-mail address. [A03]Click send button. [V01]Observe that page please check your email for password recovery.
Cleanup	Exit

7.9 UO.SU.01

TC_ID	UO.SU.01
Purpose	Enter valid username, valid e-mail and valid password
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	
Setup	Database connection should be setup and user must be connected to the internet.
Procedure	[A01]Go to sign up page. [A02]Enter valid username. [A03]Enter valid e-mail. [A04]Enter valid password. [A04] Click on the 'finalize' button [V01]Observe that the sign up was successful and redirected to the login page.
Cleanup	Log out

7.10 UO.SU.02

TC_ID	UO.SU.02
Purpose	Enter valid username, existing e-mail and valid password
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	
Setup	Database connection should be setup and user must be connected to the internet.
Procedure	[A01]Go to sign up page.
	[A02]Enter valid username.
	[A03]Enter existing e-mail.
	[A04]Enter valid password.
	[A04] Click on the 'finalize' button
	[V01]Observe that the sign up was unsuccessful and "You have already registered with this mail." warning should appear.
Cleanup	Page refreshes

7.11 UO.SU.03

TC_ID	UO.SU.03
Purpose	Enter blank username, valid e-mail and valid password
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	
Setup	Database connection should be setup and user must be connected to the internet.
Procedure	[A01]Go to sign up page.
	[A02]Enter blank username.
	[A03]Enter valid e-mail.
	[A04]Enter valid password.
	[A04] Click on the 'finalize' button
	[V01]Observe that the sign up was unsuccessful and "Username cannot be empty." warning should appear.
Cleanup	Page refreshes

7.12 UO.SU.04

TC_ID	UO.SU.04
Purpose	Enter valid username, blank e-mail and valid password
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	
Setup	Database connection should be setup and user must be connected to the internet.
Procedure	[A01]Go to sign up page.
	[A02]Enter valid username.
	[A03]Enter blank e-mail.
	[A04]Enter valid password.
	[A04] Click on the 'finalize' button
	[V01]Observe that the sign up was unsuccessful and "Email cannot be empty." warning should appear.
Cleanup	Page refreshes

7.13 UO.SU.05

TC_ID	UO.SU.05
Purpose	Enter valid username, valid e-mail and blank password
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	
Setup	Database connection should be setup and user must be connected to the internet.
Procedure	[A01]Go to sign up page.
	[A02]Enter valid username.
	[A03]Enter valid e-mail.
	[A04]Enter blank password.
	[A04] Click on the 'finalize' button
	[V01]Observe that the sign up was unsuccessful and "Password cannot be empty." warning should appear.
Cleanup	Page refreshes

7.14 UO.SU.06

TC_ID	UO.SU.06
Purpose	Whether the "already have an account 'login'" button works
Requirements	
Priority	H
Estimated Time Needed	5-10 sec.
Dependency	
Setup	Database connection should be setup and user must be connected to the internet.
Procedure	[A01]Go to sign up page.
	[A02]Click on the 'login' button
	[V01]Observe redirected to the login page.
Cleanup	Log out

7.15 UO.AR.01

TC_ID	UO.AR.01
Purpose	Add a rating
Requirements	The user must have selected a facility.
Priority	H
Estimated Time Needed	1-2 min.
Dependency	Sign up and login test cases should be work
Setup	The review screen needs to be opened and must be connected to the Internet.
Procedure	[A01] Sign in.
	[A02] Select Facility/Toilet.
	[A03] Rate the toilet out of 5 stars.
	[A04] Press the Rate now button.
	[A05] Compare properties before and after average rating (stars).
	[A06] Check the database to see if a review has been added.
	[V01] Observe the reviews on other devices have changed.
Cleanup	Return to the general map page or log out.

7.16 UO.WR.01

TC_ID	UO.WR.01
Purpose	Add a Comment
Requirements	The user must have selected a facility.
Priority	H
Estimated Time Needed	1 min.
Dependency	Sign up and login test cases should be work
Setup	The review screen needs to be opened and must be connected to the Internet.
Procedure	[A01] Sign in.
	[A02] Select Facility/Toilet.
	[A03] Choose one of the comments.
	[A04] Press the Rate now button.
	[A05] Compare features before and after comments.
	[A06] Check the database to see if a review has been added.
	[V01] Observe the reviews on other devices have changed.
Cleanup	Return to the general map page or log out.

7.17 UO.SR.01

TC_ID	UO.SR.01
Purpose	Show rating and review
Requirements	No.
Priority	H
Estimated Time Needed	0-50 sec.
Dependency	Sign up and login test cases should work and also location access should be allowed.
Setup	The user needs to search and be connected to the internet.
Procedure	[A01] Login.
	[A02] Select Facility/Restroom.
	[A03] Press the marker that comes to the searched point.
	[A04] Compare the reviews appearing in the reviews section with those in the database
	[V01] Observe that they should match.
Cleanup	Return to the general map page or log out.

7.18 UO.DF.01

TC_ID	UO.DF.01
Purpose	List facilities by requirement filters
Requirements	No.
Priority	H
Estimated Time Needed	1-2 min.
Dependency	Signup and login should work and also UO.AL.O1 should work
Setup	Login to the application.
Procedure	[A01] Click filter button.
	[A02] Select requirements.
	[A03] Click filter.
	[V01] Observe List is popped up and facilities with given requirements are shown in the list.
Cleanup	Return to the general map page or log out.

7.19 UO.DF.02

TC_ID	UO.DF.02
Purpose	Mark near facilities by user location
Requirements	No.
Priority	H
Estimated Time Needed	1-2 min.
Dependency	Signup and login should work and also UO.AL.O1 should work
Setup	Enable location services and login to the application.
Procedure	[A01] Click filter button.
	[A02] Click find facilities near me button.
	[VO1] Observe near facilities are marked.
Cleanup	Return to the general map page or log out.

7.20 UO.AL.01

TC_ID	UO.AL.01
Purpose	Allowing Location Services
Requirements	Device must support GPS
Priority	H
Estimated Time Needed	0-50 sec.
Dependency	No
Setup	Feature requested by the operating system
	[A01] Allow location services
	[V01] Observe that allow location services
Cleanup	Exit

7.21 UO.PS.01

TC_ID	UO.PS.01
Purpose	Changing Profile Setup
Requirements	User must be logged in
Priority	L
Estimated Time Needed	1 min.
Dependency	Signup and login should work
Setup	User must be able to see general map page and click profile setup icon at the alt menu
Procedure	[A01] User clicks profile setup button
	[A02] User clicks change avatar button
	[A02.01] User confirms the changes and redirect to the general map page
	[A03] User logs out
	[V01] Observe the profile picture have changed.
Cleanup	Log out

7.22 UO.TMP.01

TC_ID	UO.TMP.01
Purpose	Trip mode
Requirements	User must be logged in
Priority	M
Estimated Time Needed	1-2 min.
Dependency	Location services must be enabled
Setup	User must be able to see general map page and click trip mode icon at the alt menu
Procedure	[A01] User enters the final destination
	[A02] User clicks trip mode button
	[A03] User is directed to the navigation
	[V01] Observe location information is correct
Cleanup	Log out

8. Test Results

8.1 Individual Test Results for User Operations

TC_ID	Priority	Date Run	Run by	Result	Explanation
UO.OP.01	H	26/05/2023	UMUT BERKAY ÜNAL	PASS	User can press login button.
UO.OP.02	H	26/05/2023	BAŞAK ÜNAL	PASS	User can press sign up button.
UO.LG.01	H	26/05/2023	UMUT BERKAY ÜNAL	PASS	User can login successfully.
UO.LG.02	H	26/05/2023	BAŞAK ÜNAL	PASS	User cannot login with invalid mail.
UO.LG.03	H	26/05/2023	SENA SİMAY YAŞAR	PASS	User cannot login with invalid password.
UO.LG.04	H	26/05/2023	MÜNTEHA NUR YAVUZ	PASS	User cannot login without entering the password.
UO.LG.05	H	26/05/2023	SENA SİMAY YAŞAR	PASS	User cannot login without entering the email.
UO.LG.06	H	26/05/2023	MÜNTEHA NUR YAVUZ	FAIL	If the user forgot his password, s/he must re-register.
UO.SU.01	H	26/05/2023	MÜNTEHA NUR YAVUZ	PASS	User can sign up successfully.
UO.SU.02	H	26/05/2023	BAŞAK ÜNAL	FAIL	User can re-register with existing mail.
UO.SU.03	H	26/05/2023	SENA SİMAY YAŞAR	PASS	User cannot register without entering username.
UO.SU.04	H	26/05/2023	MÜNTEHA NUR YAVUZ	PASS	User cannot register without entering email.
UO.SU.05	H	26/05/2023	SENA SİMAY YAŞAR	PASS	User cannot register without entering password.
UO.SU.06	H	26/05/2023	BAŞAK ÜNAL	PASS	If the user is registered, s/he can click the login button.
UO.AR.01	H	26/05/2023	UMUT BERKAY ÜNAL	PASS	User can give points for facilities.
UO.WR.01	H	26/05/2023	MÜNTEHA NUR YAVUZ	PASS	User can write a comment on the facilities.
UO.SR.01	H	26/05/2023	SENA SİMAY YAŞAR	PASS	User sees the facilities' ratings.
UO.DF.01	H	26/05/2023	MÜNTEHA NUR YAVUZ	PASS	User sees the facilities of the filtering feature s/he want.
UO.DF.02	H	26/05/2023	SENA SİMAY YAŞAR	PASS	User can access the facilities nearby according to their location
UO.AL.01	H	26/05/2023	BAŞAK ÜNAL	PASS	User must allow location access to use the app
UO.PS.01	L	26/05/2023	UMUT BERKAY ÜNAL	PASS	User can change his/her avatar
UO.TMP.01	M	26/05/2023	BAŞAK ÜNAL	PASS	User can trip by selecting the destination and departure point.

8.2 Summary Of Test Results

Priority	Number of TCs	Executed	Passed
H	20	20	18
M	1	1	1
L	1	1	1
Total	22	22	20

We have executed 22 test cases and 2 test cases are passed. Also, 20 high test, 1 medium test and 1 low test cases are passed. Exit criteria is met.

9. User Manual

Technology

Ionic Framework – A framework for building native apps using Ionic Angular

Node.js – for the frontend

Java 11 – for the backend

Micronaut - for the java

Project Structure

File -> Project Structure -> Modules -> + -> Import Module -> Select backend folder -> Import module from external model -> Select Gradle -> Finish

File -> Project Structure -> Modules -> + -> Import Module -> Select frontend folder -> Create module from existing sources -> Next -> Next -> Finish

File -> Project Structure -> Project -> Select Project SDK as Java 11

File -> Project Structure -> SDKs -> Select 11

Build Setup

```
$ npm install -g @ionic/cli #to install ionic
```

Use this if you cannot start the application using IDE

```
$ ionic serve #reload at localhost:4200
```

If necessary, do not forget to update these dependencies below

```
$ npm i ngx-star-rating --force
```

```
$ npm install --save @ionic-native/geolocation --force
```

```
$ ./gradlew shadowJar
```

Step-1: Open Page

If the user is not registered with the application, they click on the sign up page, and if they are registered, they press on the login page button to go to the relevant page.

Step-2: Sign Up

The user is directed to this page after clicking the sign up button on the home page. After filling in the required information from the user, the user presses the finalize button and now has an account. The user registers to the system by entering their username, e-mail and password information. If the user wishes, they will be able to log into the system with their Google account. They can also access the login page from this page if they have an account.

Step-3: Login

On this page, if the user has a Smart Trip account that s/he has created before, s/he can log in by pressing the login button. If no mail or password is entered yet, an error is given that it must be filled.

Step-4: Map

From this page where the user has seen the Google Maps map, they will be able to see and use the filtering, navigation, profile setup and search bar.

Step-5: Search Facility

After the user writes the location to the search bar with the keyboard, he or she will see the facilities (toilet and shopping mall) within 1 km of this location.

Step-5: Select Facility

A marker is created by pressing one of the facilities listed as a result of the search and selecting it. The user can clearly see where the facility location is. After that, the user presses on the marker, making sure to select the location she wants to go and rate.

Step-6: Facility Details Page

On this page, the user can scroll up and down to see the comments, how many average ratings they have and what content they have according to their needs (toilet, disabled, baby care, mosque)

Step-7: Rate and Review the Facility

The user, by scrolling up and down, selects the closest comments from the comments defined by default in the system, adds his/her comment, by pressing the number of stars that he/she wants to give out of 5 stars, he/she can update his/her information by selecting the rates and the features (toilet, disabled, baby care, mosque) of the disaster he/she wants to rate.

Step-8: Filter Facilities

According to the needs of toilet, disabled, baby care and mosque, the user sees the facilities that have these features as a list in the menu that will come from the side, by choosing from the buttons, and selects that location by clicking. In addition, the user, by pressing the show closest button, sees the facilities near his/her own as listed and makes the selection from the menu that will appear under the search bar.

Step-9: Profile Setup Page

By pressing the change avatar button, the user will be able to select the photo that comes randomly from the 5 photos registered in the system as the profile photo. By pressing the Confirm button, the user ensures that the change they have made is saved. The user logs out of the system by pressing the Logout button.

Step-10: Navigation

When the user presses the navigation button in the middle of the submenu of the Map page, if the location has not been selected yet, the error message will appear as in the first picture, and if the user has chosen, the selected location information is sent to Google Map and Start Trip, that is, navigation starts.

9.Conclusion

In conclusion, the smart trip application aims to provide a convenient and efficient way for travelers to plan and manage their trips. Through the requirements gathering and analysis process, we identified the key features of the application, including itinerary management and location recommendations. To support these features, we reviewed and evaluated various design patterns and API's to determine their suitability for use in the smart trip application. We also designed a basic user interface for visualization, allowing users to easily access and interact with the various features of the application. In addition, we conducted a literature review to understand the current state of the art in travel planning and management tools and to inform the design of our proposed solution. Based on our findings, we have designed a system that meets the needs of modern travelers and addresses the challenges they face in planning and organizing their trips. We believe that the smart trip application, with its advanced routing and optimization capabilities and user-friendly interface, will provide a valuable service to its users and improve their travel experiences. We look forward to continuing the development of the application and seeing it come to our smartphones.

10.Work Plan

Smart Trip Application																
Project Work Plan																
Advisor: Gül TOKDEMİR - Sono Yazılım																
Week	1	2	3	4	5	6	7	8	9	10	11	12	13	13	14	14
Starting Date	20 Feb	27 Feb	6 March	13 March	20 March	27 March	3 Apr	10 Apr	17 Apr	24 Apr	1 May	8 May	15 May	22 May	29 May	5 June
Finishing Date	26 Feb	5 March	12 March	19 March	26 March	2 Apr	9 Apr	16 Apr	23 Apr	30 Apr	7 May	14 May	21 May	28 May	4 June	11 June
Updated Project Work Plan / LR / SRS / SDD																
Test Plan Document																
Midterm-Interactive-Demo																
Final Product 1st Release																
User Manual																
Project Report / Test Results / Project Tracking Form																
Project Poster																
Updated Project Webpage																
Demo Video																
Preparing Presentation																
Presentation																
Research About Project																
Coding Java & Ionic Programming																

Figure 27 : Work Plan

REFERENCES

- [1] Clement Seroo, "WaterAid launched an innovative app launched to easily locate public toilets across Bangladesh", <https://www.wateraid.org/bd/media/wateraid-launched-an-innovative-app-launched-to-easily-locate-public-toilets-across>, 2018.
- [2] Sema Ereren, "WC krizleri", <https://www.haberturk.com/wc-krizleri-1974621>, 2018.
- [3] P&G Productions, "SitOrSquat: Restroom Finder", <https://appadvice.com/app/sitorsquat-restroom-finder/511855507>, 2012.
- [4] Robert Williams, "P&G's Charmin revamps mobile app for finding clean restrooms", <https://www.marketingdive.com/news/pgs-charmin-revamps-mobile-app-for-finding-clean-restrooms/503837/>, 2017.
- [5] "Flush: A Public Restroom Finder App", <https://apps.apple.com/us/app/flush-toilet-finder-map/id955254528>
- [6] "Flush: A Public Restroom Finder App", https://play.google.com/store/apps/details?id=toilet.samruston.com.toilet&hl=en_US&gl=US&pli=1
- [7] "Yelp", <https://www.yelp.com/>(<https://www.yelp.com/>)
- [8] "Yelp: App", <https://apps.apple.com/us/app/yelp-food-delivery-reviews/id284910350>
- [9] "Tuvaletler Bulucu", <https://play.google.com/store/apps/details?id=de.pnpq.toiletlocator>