
Software Requirements Specification

for

< Biker-X >

Version 1.7 Approved

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Revision History

| Name | Date | Reason For Changes | Version |
|-------------------|----------|--------------------------------|---------|
| Lee Xuan Hua | 15/02/22 | Add system features | 1.0 |
| Lek Jie Kai | 16/02/22 | Add nonfunctional requirements | 1.1 |
| Liau G Wayne | 17/02/22 | Add overall description | 1.2 |
| Fabrianne Effendi | 17/02/22 | Add introduction | 1.3 |
| Loh Yi Ze | 17/02/22 | Add interface requirements | 1.4 |
| Lee Xuan Hua | 3/03/22 | Update system features | 1.5 |
| Lek Jie Kai | 9/04/22 | Update SRS document | 1.6 |
| Fabrianne Effendi | 11/04/22 | Update SRS document | 1.7 |

Introduction

1.1 Purpose

This document details the software requirements of the android application “Biker-X”. It defines the feature requirements, use cases, and control flow of the application.

1.2 Document Conventions

For section 3, 4 and 5, each requirement statement will have its own priority. Otherwise, they will be assumed to inherit the priorities of higher-level requirements.

1.3 Intended Audience and Reading Suggestions

This document is intended for developers, project managers, users and testers of the application.

The “users”, refers to a potential user of the application to embark on a cycling session, track his cycling goals and connect with like minded cycling enthusiasts. The users can be new cyclists, leisure biking enthusiasts or even competitive bikers. A preferred sequence of going through the SRS will be to follow the contents listed on the content page like a book. Developers or project managers may be more interested in section 2 (Overall Description) onwards.

1.4 Product Scope

Biker-X is a mobile application that allows users to embark on biking trails, tracks users' cycling sessions and progress, and connects users with like-minded bikers. It includes features such as customised biking route recommendations, GPS tracking, tracking of cycling history and goals, viewing interactive maps with amenities, and a forum for the Biker-X community to connect with each other.

1.5 References

Ben Schneiderman's Eight Golden Rules is adopted for the application's user interface design:

<https://www.cs.umd.edu/users/ben/goldenrules.html>

2. Overall Description

2.1 Product Perspective

“Biker-X” is an extension of several current product families. It integrates Gov.sg and Google Maps APIs to provide up-to-date visualisation of Gov.sg data. The application also leverages Google Firebase to create a more personalised user experience, by storing and displaying user data such as past cycling sessions and goals. This serves to create a more holistic and intuitive cycling experience for the user.

2.2 Product Functions

Major Functions:

- Login with Google account
- Register for a Biker-X account via email
- View all amenities in full map
- Track cycling session
- View cycling history
- View and send chat messages in forums

Minor Functions:

- Filter Amenities
- Search for cycling routes
- Rate a cycling route
- Set and Edit cycling goals
- 2 hour Weather Forecast

2.3 User Classes and Characteristics

New cyclists - This class of users will most likely have a moderate frequency of use. They will use the application to plan routes using the map function and follow preset recommended routes. They are likely to use the chat forum to learn more about the sport and find other new cyclists.

Leisure biking enthusiasts - This class of users will most likely have a moderate frequency of use. They will use the application to find and embark on recommended routes, view and filter for amenities along the way, track their cycling session and progress, and chat with like-minded individuals.

Competitive bikers - This class of users will most likely have a low frequency of use. They will use the application to look for alternative cycling routes. They might also track their cycling progress and goals.

Developers – A developer's job is to consistently monitor and maintain the application. This class of users are usually well-verses and proficient in Google APIs, Android, XML and Java.

2.4 Operating Environment

The application will operate on Android phones, requiring an operating system version of Android 5.0 Lollipop (API level 21) and above. The application requires the phone to have an active internet connection to fetch data from Google Firebase. The application also requires location services to be enabled to use the Track Cycling Session function.

The application parses datasets of cycling routes, amenities and weather forecasts from data.gov.sg into Google FireBase for database management. After which, data is pulled from the Google FireBase into the application through respective DB Managers. The application also parses data of user cycling history, goals and chat messages into Google FireBase. User details and profile will be handled by Google Cloud Firestore. User login and authentication will be handled by Google Firebase Authentication.

2.5 Design and Implementation Constraints

Due to difficulty in creating accurate translations, the application is only available in the English language.

The application also utilises Gov.sg data, which is only applicable to Singapore. Thus, the application will have reduced functionalities (e.g. Amenities Map) when used in other countries. This constraint can be resolved given a larger budget to source and create similar datasets for more countries.

2.6 User Documentation

Application is designed in an intuitive and easy-to-use manner. If required, a short demo video is available at this link:

<https://drive.google.com/drive/folders/1bsqpiV6suXSDT5XNIZQt0WRSUek42vpO?usp=sharing>

2.7 Assumptions and Dependencies

An assumption here is that users are connected to the Internet and have their location services enabled. Without the aforementioned functions, many of our apps' features will be unavailable for use.

Since the application will be built using Android Studio, users are assumed to be using Android phones with at least Android 5.0 Lollipop.

3. External Interface Requirements

3.1 User Interfaces

The UI of the application was designed with the Shneiderman's eight golden rules in mind.

3.1.1 Strive for consistency

To ensure consistency across Biker-X, a set of theme colours and fonts are applied throughout the application. When designing similar situations e.g. the start, pause and stop functions of the cycling session, a standardised set of icons and colours are used. This ensures that the application remains intuitive and easy-to-use.

3.1.2 Cater to Universal Usability

The User interface (UI) of Biker-X was designed similar to many existing applications such as having navigation bars on both the top and bottom of each page. Universal and simple swipe gestures, such as swipe to navigate back, are also implemented like most applications. This ensures that users will not face steep learning curves when using our application.

3.1.3 Offer Informative feedback

Biker-X informs users on actions performed with informative feedback, allowing users to be aware of the current status at all times. An example is how when a user filters for specific amenities in the full map, the checkbox will be correspondingly ticked and unticked, alongside a change in font colour.

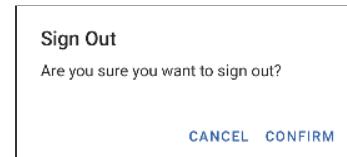
3.1.4 Permit Easy Reversal of Actions

A 'back' button is available at the top left corner of almost every page, permitting users to go back to their previous page easily.



3.1.5 Design Dialog to Yield Closure

Whenever a not-so-easily reversible action is performed, the user will be presented with additional dialogs to confirm their actions. For example, when a user clicks the sign out button, a pop-up will appear asking the user, "Are you sure you want to sign out?". The sign out procedure will be carried out only upon clicking the "Confirm" button.



3.1.6 Keep users in control

All the information required by the user to properly utilise the application is readily displayed, while user input is instantly reflected. For example, when the user updates his/her cycling goals, the UI will automatically reflect his/her new cycling goals.

3.1.7 Offer Error Handling

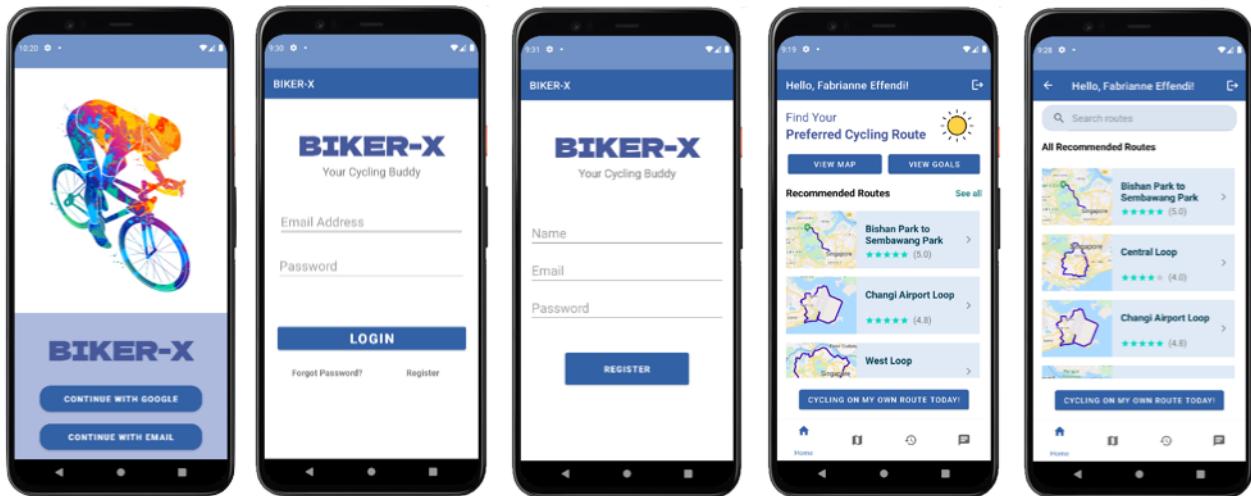
Biker-X is designed to be robust in error handling. For example, upon unsuccessful login, the user will be prompted with a clear error notification. Another example is that upon searching for a non-existent location, users will be prompted with a “Location does not exist” pop-up.



3.1.8 Reduce Short Term Memory Load

Biker-X is designed to be simple and intuitive, with the most pertinent functions (e.g. recommended routes) all available from the home page in order to capture the user's attention upon entering the app.

Below are screen captures of our app:





3.2 Hardware Interfaces

Biker-X leverages the multiple built-in hardwares in mobile devices to deliver and enrich the application experience. Sensors such as accelerometer and geomagnetic field are required for geolocation orientation during cycling sessions, while wireless connection for access to the internet is necessary to connect to online databases and APIs.

3.3 Software Interfaces

The application utilises the following APIs:

- Gov.sg API
 - Retrieves data regarding the following features:
 - Park Amenities
 - Cycling Routes
 - Weather
- Google Maps API
 - Displays amenities using markers
 - Displays cycling routes using polylines
 - Tracks user location and cycling session
- Google Firebase Firestore API
 - Stores user data such as:
 - Cycling history
 - User goals
 - Route ratings
 - Messages
- Google Firebase Authentication API
 - Verify user login credentials
 - Create user accounts

3.4 Communications Interfaces

HTTPS request protocol is used to communicate with Gov.sg API, as well as to communicate with Google Firebase.

4. System Features

4.1 Login/ Register Feature

4.1.1 Description and Priority

Users are required to log in to use the application. They have the choice to either login via a Google account or an existing email account. This feature is of a high priority as everyone who uses the application needs to be logged in to access the application features.

Priority: High (Benefit: 9, Cost: 5, Penalty: 5)

4.1.2 Stimulus/Response Sequences

4.1.2.1 Application will check if user is already logged in

4.1.2.2 If the user is logged in, the application will redirect the user to the <Home Page>. Else, the user will be asked to log in.

4.1.2.3 Users can choose to either log in with a google account or an email registered with Biker-X.

- If the user chooses Google, the application will check if the user's phone is linked to any Google account. If found, a list of detected google accounts will appear for the user to choose his desired google account from.
- If the user chooses Email. If the user is registered before, he can enter his registered email address and password and click the "login" button to login to the application.

4.1.2.4 For first-time users of the application, they can register an account by clicking on the "Register" button. They would be directed to a page to enter their name, email address and password. Subsequently, they will need to verify the registered email account before being able to log in to the application.

4.1.2.5 For users who forget their password, they can click the "Forget Password" button. The application will redirect the users to a page to enter their registered email address. A link will be sent to the email address where the users can reset their password.

4.1.2.6 On initial login, users will be prompted to enable precise or approximate location permission.

4.1.3 Functional Requirements

4.1.3.1 The user must be able to login with their Google or email account.

4.1.3.2 Upon logging in, the application must have a sign out option.

4.2 Request for location permission feature

4.2.1 Description and Priority

First time users will be prompted via a pop up window to allow the system to access their precise or approximate GPS location. Location services will be required to utilise Track Cycling Session and display nearby amenities on Google Maps.

Priority: Medium (Benefit: 9, Cost: 2, Penalty: 7)

4.2.2 Stimulus/Response Sequences

4.2.2.1 After selecting a permission option, the user will see the <Home Page>.

4.2.3 Functional Requirements

4.2.3.1 The application must request first time users for permission before accessing the user's location via GPS.

4.3 Full Map Display Feature

4.3.1 Description and Priority

Users will be able to view the full map including various amenities. Users are able to filter the relevant amenities and locations they would like to display through ticking the dropdown checklist available, and search for a particular location.

Priority: High (Benefit: 9, Cost: 8, Penalty: 9)

4.3.2 Stimulus/Response Sequences

4.3.2.1 After selecting the <View Map> button on the <Home Page> or the 'Map' icon, the user will see the <Full Map Display Page>.

4.3.2.2 User ticks relevant amenities in dropdown list

- Access points
- Bicycle racks
- Bicycle rental shops

- F&B eateries
- Fitness areas
- Playground
- Shelter
- Toilets
- Water coolers

After selecting the relevant filters in the dropdown list, the relevant nearby amenities will be displayed on the <Full Map Display Page>.

4.3.2.3 After searching for specific amenities in the search bar, the map will zoom into that area.

4.3.3 Functional Requirements

4.3.3.1 If location permission is enabled, the application will zoom in and display all the amenities near the user.

4.3.3.2 If location permission is disabled, the application must prompt the user to allow location permission once.

4.3.3.3 If location permission is disabled, the application will display a zoomed-out Singapore map.

4.3.3.4 The application must allow the user to select amenities to be displayed on the map.

4.3.3.5 The application must display the names of amenities.

4.3.3.6 The application must allow the user to search for the names of specific locations.

4.4 Cycling Session Tracking Feature

4.4.1 Description and Priority

The user will be able to track their cycling sessions using this feature. This feature should allow the user the option of pausing and stopping the cycling session after one has been started.

Priority: High (Benefit: 8, Cost: 7, Penalty: 7)

4.4.2 Stimulus/Response Sequence

4.4.2.1 Upon clicking the 'Start' button on <Start Cycling Page>, the user will be led to the <Live Cycling Progress Page>, where the distance travelled, time taken and average speed of the live cycling session will be displayed live.

4.4.2.2 Upon clicking the 'Pause' button, the distance travelled and time taken will be halted.

4.4.2.3 Upon clicking the 'Resume' button, the tracking of distance travelled and time taken will continue.

4.4.2.4 Upon clicking the 'Stop' button, the user will be led to the <Session Summary Page> where the final distance travelled, time taken and nearest bicycle parking racks will be displayed.

4.4.3 Functional Requirements

4.4.3.1 If location permission is not granted, the application must disable the start cycling session function.

4.4.3.2 The user must be able to track their current cycling session.

4.4.3.3 The user must be able to start a cycling session.

4.4.3.4 The user must be able to pause a cycling session.

4.4.3.5 The user must be able to resume a paused cycling session.

4.4.3.6 The user must be able to stop a cycling session.

4.4.3.7 The application must display the current distance travelled by the user in kilometres, to 2 decimal points of accuracy.

4.4.3.8 When the user ends the cycling session, the application must display the locations of nearest bicycle racks from the location where the user ends the cycling session.

4.5 Cycling Route Recommendation Feature

4.5.1 Description and Priority

The application will recommend the top five preset cycling routes on the <Home Page>, sorted in descending order based on user ratings. The application will display all cycling routes on the <Recommendations Page>, sorted in ascending alphabetical order.

Priority: High (Benefit: 9, Cost: 9, Penalty: 7)

4.5.2 Stimulus/Response Sequences

4.5.2.1 The user will be able to see a condensed list of top five recommended cycling routes on the <Home Page>. Upon clicking on the “See all” option, the user will see the <Recommendations Page> with the full list of recommended routes.

4.5.2.2 Upon clicking on any recommended routes, the user will see the <Start Cycling Page> showing the selected route.

4.5.2.3 Upon clicking the “Stop” button on the <Live Cycling Progress Page>, the user will see the <Session Summary Page>, and will be able to rate the cycling session using a scale of 1 to 5.

4.5.3 Functional Requirements

4.5.3.1 The application must display a list of top five recommended preset bicycle routes, sorted based on user ratings.

4.5.3.2 The application must display the user ratings of each cycling route.

4.5.3.3 The user must be able to select a preset cycling route to start a new cycling session on.

4.5.3.4 If a cycling route is selected, the application must navigate to the <Start Cycling Page> and display the suggested route.

4.5.3.5 At the end of a cycling session of a preset bicycle route, the user must be able to rate the route out of 5 stars.

4.6 Cycling History Feature

4.6.1 Description and Priority

The user is able to track the history of their cycling sessions.

Priority: High (Benefit: 9, Cost: 7, Penalty: 7)

4.6.2 Stimulus/Response Sequences

Upon clicking the ‘Cycling History’ icon, the user will be navigated to the <Cycling History Page>. For each cycling session, the particular day’s distance and average speed will be displayed.

4.6.3 Functional Requirements

- 4.6.3.1 The application must display the date and time of past cycling session
- 4.6.3.2 The application must display the distance travelled for each past cycling session in kilometres, to two decimal points of accuracy.
- 4.6.3.3 The application must display the speed of each past cycling session in kilometres per hour, to two decimal points of accuracy.

4.7 Shared Forum Feature

4.7.1 Description and Priority

The user is able to share messages and connect with like minded individuals through a shared forum.

Priority: Medium (Benefit: 4, Cost: 2, Penalty: 3)

4.7.2 Stimulus/Response Sequences

Upon clicking on the 'chat' icon, the user will be led to the <Chat Forum Page>. There, the user can see posts made by other users on the forum.

Users can click on the chat box to type and click the 'send' button to post their message.

4.7.3 Functional Requirements

- 4.7.3.1 The user must be able to post messages on a shared forum.
- 4.7.3.2 The application must be able to save messages posted to the database.
- 4.7.3.3 The application must display the associated user's name on each message.
- 4.7.3.4 The application must display the time at which each message was sent, in a 24 hour format.

4.8 Weather Forecast Feature

4.8.1 Description and Priority

Using data of the 2h weather forecast from data.gov.sg weather API, the application displays Singapore's general 2 hour weather forecast.

Priority: Low (Benefit: 2, Penalty: 2, Cost: 3).

Priority is low as this is only an additional feature for the user to check the weather before deciding if he should embark on a cycling session. All other features of the application will work and are able to be used by the user even if the weather icon is not present.

4.8.2 Stimulus/Response Sequences

Upon entering or refreshing the <Home Page>, a weather icon will be displayed based on the current 2 hour weather forecast. The weather forecast icon will be updated automatically every 2 hours.

4.8.3 Functional Requirements

4.8.3.1 The application must be able to display and update the current weather forecast every 2 hours.

4.9 Set, Edit and Track Goals Feature

4.9.1 Description and Priority

Users can input their monthly cycling distance goals and monthly cycling duration (time) goals.

Priority: Medium (Benefit: 4, Penalty: 2, Cost: 3).

Priority is medium as it depends on the user's profile and preference. New cyclists and cyclists cycling for leisure may most likely not set cycling goals. However, users like cycling enthusiasts or competitive cyclists may most likely set cycling goals.

4.9.2 Stimulus/Response Sequences

4.9.2.1 Upon clicking on the 'Edit goal' button on the <Cycling History Page> or the 'View Goals' button on the <Home Page>, the user will be led to the <Goal Tracking Page> where the user can input his monthly cycling distance goals or monthly cycling duration (time) goals. There is also a progress bar to indicate to the user how much of his monthly cycling distance goal is achieved.

4.9.2.2 Once the user fills in the monthly cycling distance or time goal, he clicks the "Submit" button. The new monthly distance goal and time goal will be updated live on the user interface. The progress bar will also be updated.

4.9.3 Functional Requirements

- 4.9.3.1 The application must allow the user to edit the goal.
- 4.9.3.2 For the monthly distance goal, the application must show the updated display of the monthly distance goal set by the user (in km, rounded off to the nearest whole number) when the user selects the “submit” button.
- 4.9.3.3 For the monthly time goal, the application must show the updated display of the monthly time goal set by the user (in hours, rounded off to the nearest whole number) when the user selects the “submit” button.

5. Nonfunctional Requirements

5.1 Performance Requirements

- 5.1.1 The application must be compatible with phones running on Android 5.0 and above.
- 5.1.2 The application must be able to continue a cycling session in the background.
 - 5.1.2.1 The application must be able to track the user's location in the background
- 5.1.3 The application must fetch cycling route data within 2s when the user requests cycling route suggestions.

5.2 Safety Requirements

- 5.2.1 The application must not require user interaction during a cycling session.

5.3 Security Requirements

- 5.3.1 The application must not access the user's location without their permission.
- 5.3.2 Users should not be able to view other users' cycling sessions.

5.4 Software Quality Attributes

- 5.4.1 90% of first-time users must be able to start a cycling session within 2 minutes of starting to use the system.

5.5 Business Rules

- 5.5.1 Each user must provide Google or email login credentials to create an account
 - 5.5.1.1 An email is considered valid when the user enters the 2-factor authentication code sent to their email into our app.

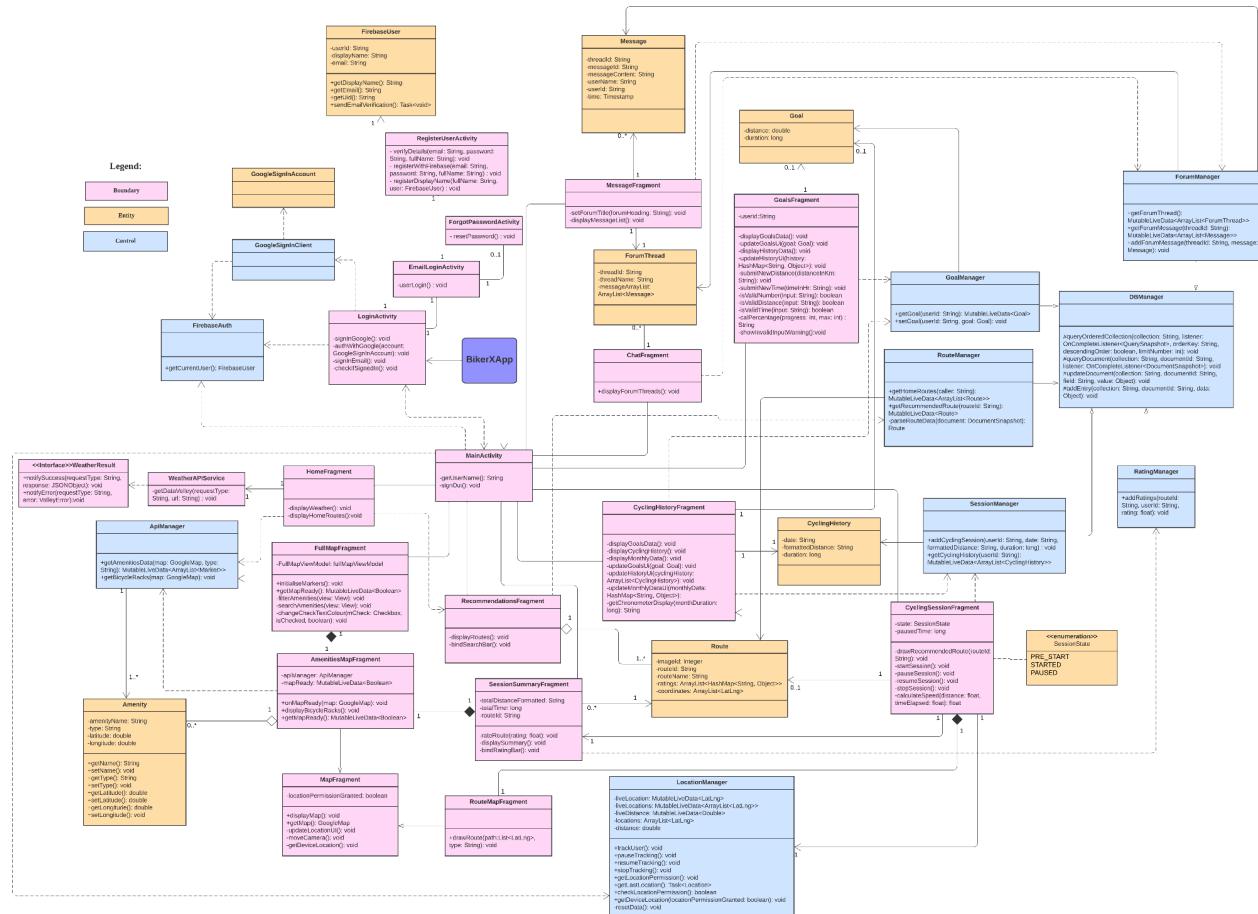
Appendix A: Glossary

<Define all the terms necessary to properly interpret the SRS, including acronyms and abbreviations. You may wish to build a separate glossary that spans multiple projects or the entire organization, and just include terms specific to a single project in each SRS.>

| Term | Description |
|-----------------|---|
| Amenities | Refers to either Access Points, Bicycle Racks, Bicycle Rental Shops, Fitness Areas, F&B Eateries, Playground, Toilet or Water Coolers. |
| Cycling session | A cycling session is started once the user starts the session and is ended once the user ends the session. Time taken, distance and speed will be saved for each session. |
| Routes | Refers to cycling paths that will be displayed in the app. Routes will be preset using data from data.gov.sg. |
| User ratings | The rating users will give for each cycling route, based on an integer range of 1 to 5, with 1 being the lowest rating and 5 being the highest rating. Average user rating for each cycling route will be calculated to 2 decimal places. |
| Benefit | How beneficial the feature will be to our app. |
| Penalty | The negative impact of not having that feature in our app. |
| Cost | The time and effort required to implement the feature. |

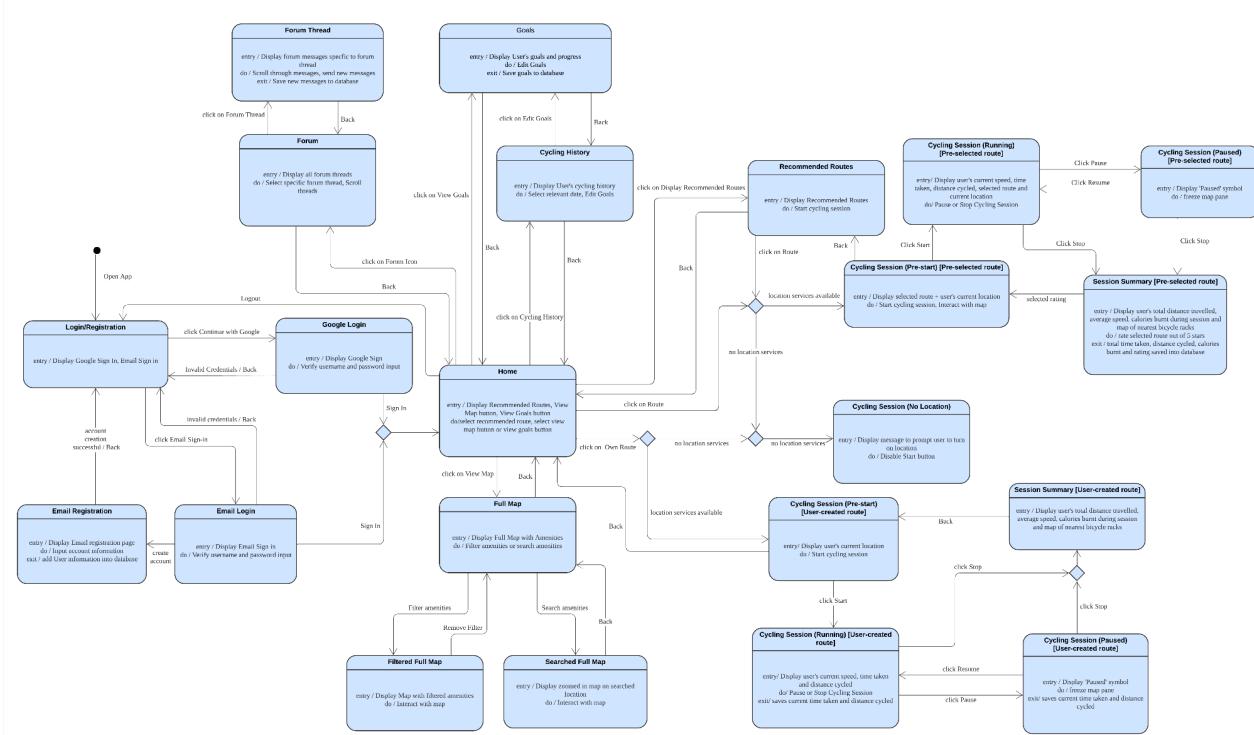
Appendix B: Analysis Models

Class Diagram



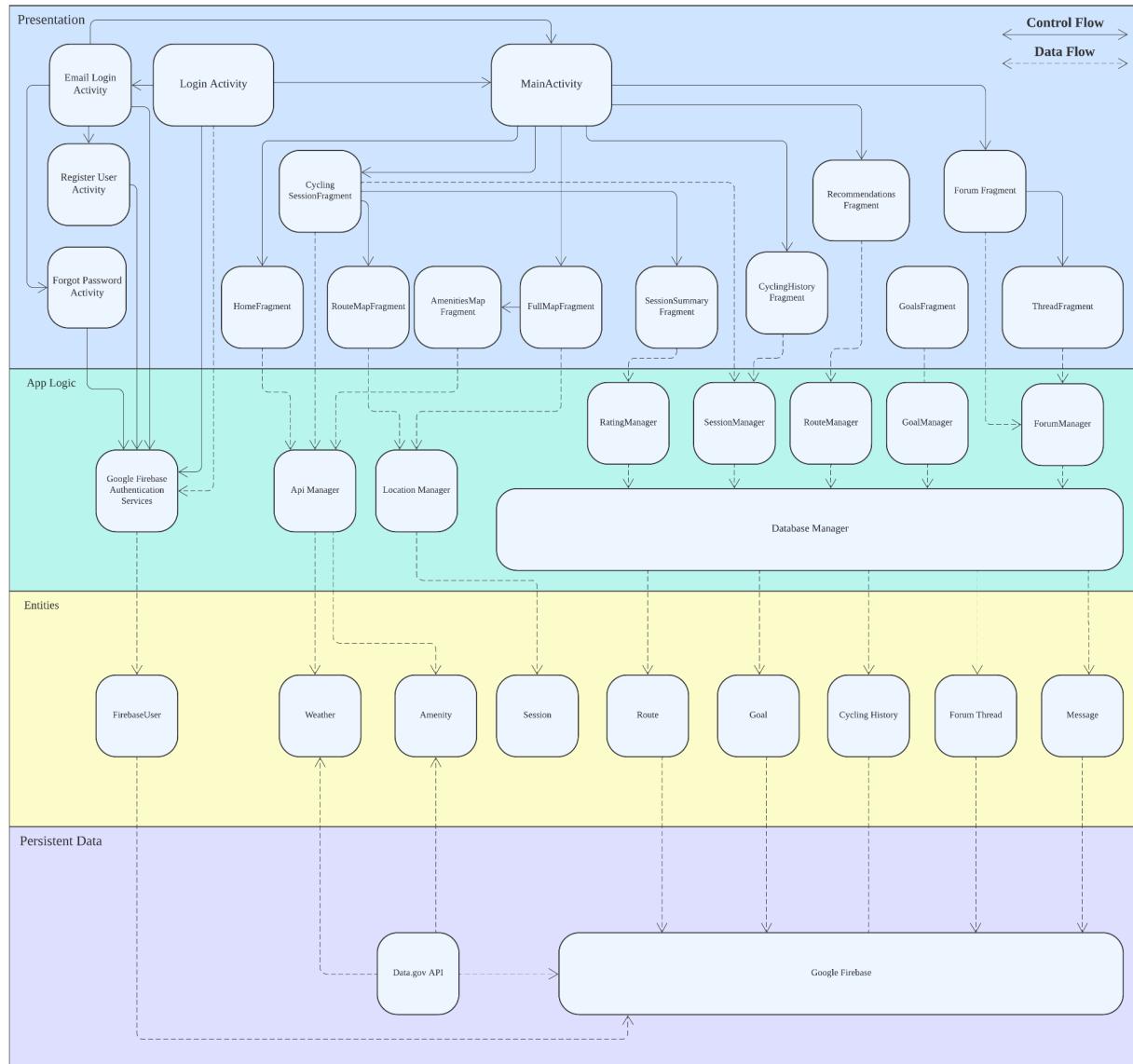
Kindly refer to the pdf document of the class diagram for a clearer view.

Dialog Map



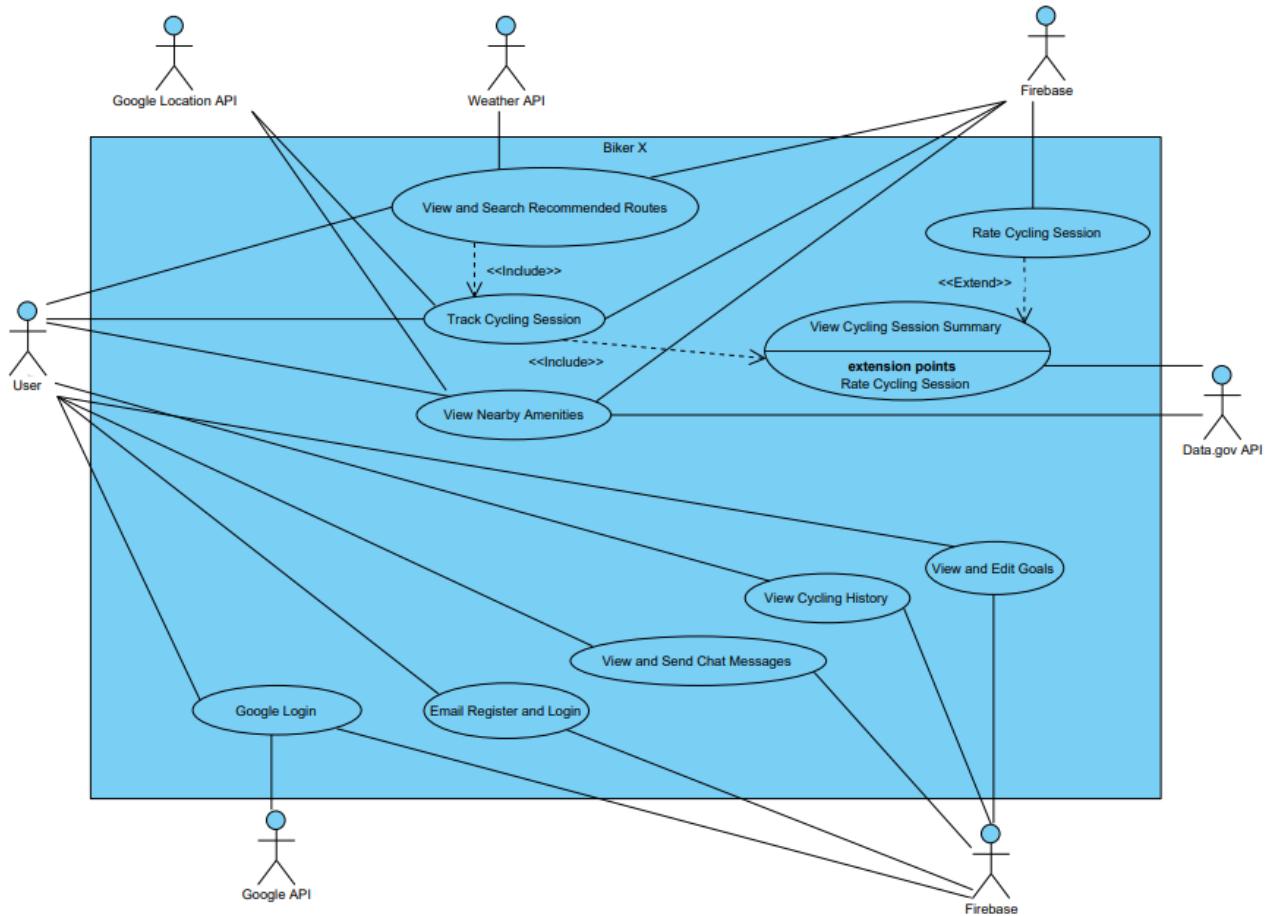
Kindly refer to the pdf document of the Dialog Map for a clearer view

System Architecture



Kindly refer to the pdf document of the System Architecture for a clearer view.

Use Case Diagram



Kindly refer to the pdf document of the Use Case Diagram for a clearer view.

Use Case Descriptions

| | | | |
|----------------|--------------|--------------------|-------------|
| Use Case ID: | 1.1 | | |
| Use Case Name: | Google Login | | |
| Created By: | Lee Xuan Hua | Last Updated By: | Lek Jie Kai |
| Date Created: | 4/2/22 | Date Last Updated: | 8/4/22 |

| | |
|-----------------|---|
| Actor: | User, Google API, Firebase |
| Description: | User will have to login to use the functionalities in the mobile app. User will be able to login with a Google account |
| Preconditions: | <ol style="list-style-type: none"> 1. User must have a valid Google account 2. Device has internet access |
| Postconditions: | <ol style="list-style-type: none"> 1. The app will display <Home Page>. |

| | |
|-----------------------|--|
| Priority: | High |
| Frequency of Use: | Low - Each time the user logs out of their account. |
| Flow of Events: | <ol style="list-style-type: none"> 1. User clicks on the “Continue with Google” button 2. App will communicate with the Google API client and display the sign-in interfaces 3. User will interact with the API sign-in interfaces 4. App will receive the status code and response from Firebase 5. App will navigate to <Home Page> and display the user’s Display Name |
| Alternative Flows: | <p>AF1: Initial launch of the mobile app</p> <ol style="list-style-type: none"> 1. App will prompt user permission to access GPS 2. User selects “Allow” or “Don’t Allow” |
| Exceptions: | EX1: If Google API returns an error status code, the user will not be signed in. |
| Includes: | NIL |
| Special Requirements: | NIL |
| Assumptions: | NIL |

| | |
|-------------------|-----|
| Notes and Issues: | NIL |
|-------------------|-----|

| | | | |
|----------------|--------------------------|--------------------|-------------|
| Use Case ID: | 1.2 | | |
| Use Case Name: | Email Register and Login | | |
| Created By: | Lee Xuan Hua | Last Updated By: | Lek Jie Kai |
| Date Created: | 28/2/22 | Date Last Updated: | 7/4/22 |

| | |
|--------------|---|
| Actor: | User, Firebase |
| Description: | <p>User new to Biker-X can register for an account using a valid email address.</p> <p>User with an email account registered with Biker-X will be able to log in.</p> |

| | |
|--------------------|--|
| Preconditions: | <ol style="list-style-type: none"> 1. User must have a valid email address. 2. User must verify their email account (by clicking on the verification link sent to their email address) when they first register an account before they are able to log in into their account 3. Device has internet access |
| Postconditions: | <ol style="list-style-type: none"> 1. The app will display <Login Page>. |
| Priority: | High |
| Frequency of Use: | Low - When a user is creating a Biker-X account via email. |
| Flow of Events: | <ol style="list-style-type: none"> 1. User clicks on the “Continue with email” button 2. App will allow the user to select the “Login” or “Register” button. 3. User clicks on the “Register” button to register for an account (for first time users) 4. User input their name, email address and password 5. App will communicate with Firebase to create a password-based account 6. App will forward a verification email to the registered email address 7. App will navigate to <Login Page> and the user input his email address and password used to register for the account. 8. User selects the “Login” button and app will navigate to <Home Page> |
| Alternative Flows: | <p>AF2: User already has an account registered with Biker-X</p> <ol style="list-style-type: none"> 1. User input their email address and password |

| | |
|-----------------------|--|
| | <p>2. App will navigate to <Home Page> if login credentials entered are correct.</p> <p>AF7: User enters a wrong password.</p> <ol style="list-style-type: none"> 1. User selects the “Forgot Password” button. 2. User inputs his email address and selects the “Reset Password” button. 3. App will send an email with a link to the registered email address for the user to reset his password. |
| Exceptions: | <p>EX1: If email entered is invalid, an error message will be displayed</p> <p>EX 2: If any textbox is left empty, an error message will be displayed to prompt the user to input values.</p> |
| Includes: | NIL |
| Special Requirements: | NIL |
| Assumptions: | NIL |
| Notes and Issues: | NIL |

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| Use Case ID: | 1.3 |
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| Use Case Name: | View and Search Recommended Routes | | |
| Created By: | Lek Jie Kai | Last Updated By: | Lek Jie Kai |
| Date Created: | 3/2/22 | Date Last Updated: | 1/3/22 |

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| Actor: | User, Weather API, FireBase |
| Description: | <p>The user can view all recommended cycling routes or search for a particular route from the list of recommended routes. The user can then select a route to start cycling.</p> <p>In addition, there will be a “Weather icon” on the home page indicating the current weather forecast (sunny, rainy or cloudy) of the day</p> |
| Preconditions: | <ol style="list-style-type: none"> 1. User logged into their account. 2. Device has internet access |
| Postconditions: | <ol style="list-style-type: none"> 1. The app will display the recommended routes for the user to select or search from. |

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| Priority: | High |
| Frequency of Use: | High - Each time the user opens the app |
| Flow of Events: | <ol style="list-style-type: none"> 1. App will retrieve the current weather from the Weather API 2. App will retrieve and display recommended routes from Firebase 3. User scrolls through the recommended routes 4. User selects one of the recommended routes 5. App will display the <Start Cycling Page> |
| Alternative Flows: | AF3: User searches for a specific route using search bar |
| Exceptions: | NIL |
| Includes: | 1.6B: Track Cycling Session (with recommended route) |
| Special Requirements: | NIL |
| Assumptions: | NIL |
| Notes and Issues: | NIL |

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| Use Case ID: | 1.4 | | |
| Use Case Name: | View and Edit Goals | | |
| Created By: | Loh Yi Ze | Last Updated By: | Lek Jie Kai |
| Date Created: | 3/2/2022 | Date Last Updated: | 8/4/2022 |

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| Actor: | User, Firebase |
| Description: | User can set and view his/her cycling goals. User can also choose to edit his/her cycling goals after setting them. |
| Preconditions: | <ol style="list-style-type: none"> 1. User is logged into their account 2. Device has internet access |
| Postconditions: | <ol style="list-style-type: none"> 1. The app will display the user's cycling goals 2. The app will display a progress bar indicating the proportion of monthly cycling distance goals achieved |

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| Priority: | Medium |
| Frequency of Use: | Medium - Dependent on how often user checks or updates his/her cycling goals |
| Flow of Events: | <ol style="list-style-type: none"> 1. User clicks on <View Goals> button on the <Home Page> 2. User's relevant data is retrieved from Firebase 3. User's cycling goals is displayed |
| Alternative Flows: | <p>AF3: User edits his monthly cycling distance goal</p> <ol style="list-style-type: none"> 1. User enters monthly distance goals and clicks on the "Submit" button. 2. System verifies the new monthly distance goal input is in the valid range of 0 to 9999. 3. If the new monthly distance goal is in the valid range, user input will be stored in Firebase. 4. User's monthly distance goal is updated and displayed. 5. Monthly distance goal progress bar is updated to indicate to the user how much of his monthly cycling distance goal is achieved. <p>AF3: User edits his monthly cycling duration (time) goal</p> <ol style="list-style-type: none"> 1. User enters monthly cycling duration (time) goals and clicks on "Submit" 2. System verifies the new monthly duration(time) goal input is in the valid range of 0 to 744. 3. If the new monthly duration(time) goal is in the valid range, user input will be stored in firebase. |

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| | 4. User's monthly duration(time) goals is updated and displayed |
| Exceptions: | NIL |
| Includes: | NIL |
| Special Requirements: | NIL |
| Assumptions: | NIL |
| Notes and Issues: | NIL |

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| Use Case ID: | 1.5 | | |
| Use Case Name: | View Nearby Amenities | | |
| Created By: | Fabrianne Effendi | Last Updated By: | Fabrianne Effendi |
| Date Created: | 4/2/2022 | Date Last Updated: | 9/4/2022 |

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| Actor: | User, Firebase, Google Maps API, Google Location API |
| Description: | User will be able to view the full map including various amenities (bicycle racks, bike rental locations, fitness areas, playground, toilets, water coolers, F&B eateries etc.). User is able to filter the relevant amenities and locations to be displayed through selecting the available dropdown checklist. |
| Preconditions: | <ol style="list-style-type: none"> 1. User is logged into his/her account 2. User has selected 'View Map' on <Home Page> or clicked the map icon at the bottom 3. User has allowed location permissions on the app |
| Postconditions: | The app will display the relevant amenities filtered or searched by user |
| Priority: | High |
| Frequency of Use: | High - Each time user wants to view the full map. |
| Flow of Events: | <ol style="list-style-type: none"> 1. App will retrieve and display user's current location using Google Location API 2. App will retrieve amenities from Firebase 3. <Full Map Page> initialises markers to display all amenities 4. User checks the relevant amenities in dropdown list <ul style="list-style-type: none"> a. Access points b. Bicycle racks |

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| | <ul style="list-style-type: none"> c. Bicycle rental shops d. F&B eateries e. Fitness areas f. Playground g. Shelter h. Toilets i. Water coolers <p>5. Map displays the relevant amenities checked by making the relevant amenities markers visible</p> |
| Alternative Flows: | <p>AF2: User searches for specific location on map using search bar</p> <ol style="list-style-type: none"> 1. Map zooms in to that specific location 2. A location marker will be added at that location |
| Exceptions: | <p>EX1: User searches for a non-existent location in search bar</p> <ol style="list-style-type: none"> 1. App will display an error message “Location does not exist” <p>EX2: If App is unable to access Google location API</p> <ol style="list-style-type: none"> 1. Displays world map, but with Singapore map showing all the amenities |
| Includes: | NIL |
| Special Requirements: | NIL |
| Assumptions: | NIL |

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| Notes and Issues: | NIL |
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| Use Case ID: | 1.6A | | |
| Use Case Name: | Track Cycling Session (no recommended route) | | |
| Created By: | Liau G Wayne | Last Updated By: | Liau G Wayne |
| Date Created: | 29/1/2022 | Date Last Updated: | 28/2/2022 |

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| Actor: | User, Google Location API, Firebase |
| Description: | User will use the app to track their cycling session using Google location services. |
| Preconditions: | <ol style="list-style-type: none"> 1. User has allowed location permissions on the app. 2. The app must be on the <Home Page>. 3. Device has internet access. |

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| Postconditions: | The app will display <Session Summary Page>. |
| Priority: | High |
| Frequency of Use: | High - Each time the user uses the app to track their cycling session. |
| Flow of Events: | <ol style="list-style-type: none"> 1. User clicks on “Cycling on my own route today!” button. 2. App will navigate to <Start Cycling Page> 3. User clicks on the “Start” button. 4. App will retrieve and display the user's current location using Google Location API. 5. App will track and display distance travelled during cycling sessions using Google Location API. 6. App will track and display time elapsed of cycling session. 7. App will calculate and display the average speed of cycling sessions. 8. User clicks on the “Stop” button. 9. App will store cycling session data in Firebase. 10. App will navigate to <Session Summary Page>. |
| Alternative Flows: | <p>AF5: User clicks on “Pause” Button</p> <ol style="list-style-type: none"> 1. App stops tracking distance and time travelled until User clicks on “Resume” Button |
| Exceptions: | NIL |

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| Includes: | 1.7: View Cycling Session Summary |
| Special Requirements: | NIL |
| Assumptions: | NIL |
| Notes and Issues: | NIL |

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| Use Case ID: | 1.6B | | |
| Use Case Name: | Track Cycling Session (with recommended route) | | |
| Created By: | Liau G Wayne | Last Updated By: | Liau G Wayne |
| Date Created: | 29/1/2022 | Date Last Updated: | 28/2/2022 |

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| Actor: | User, Google Location API, Data.gov API, Firebase |
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| Description: | User will use the app to track their cycling session using Google location services. |
| Preconditions: | <ol style="list-style-type: none"> 1. User has allowed location permissions on the app. 2. The app must be on the <Home Page> or <Recommendations Page>. 3. Device has internet access. |
| Postconditions: | The app will display <Session Summary Page>. |
| Priority: | High |
| Frequency of Use: | High - Each time the user uses the app to track their cycling session. |
| Flow of Events: | <ol style="list-style-type: none"> 1. User clicks on any Recommended Route. 2. App will navigate to <Start Cycling Page> 3. User clicks on the “Start” button. 4. App will retrieve and display the user's current location using Google Location API. 5. App will display recommended route on the map 6. App will track and display distance travelled during cycling sessions using Google Location API. 7. App will track and display time elapsed of cycling session. 8. App will calculate and display the average speed of cycling sessions. 9. User clicks on the “Stop” button. 1. App will store cycling session data in Firebase. 2. App will navigate to <Session Summary Page>. |

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| Alternative Flows: | AF6: User clicks on “Pause” Button 1. App stops tracking distance and time travelled until User clicks on “Resume” Button |
| Exceptions: | NIL |
| Includes: | 1.7: View Cycling Session Summary |
| Special Requirements: | NIL |
| Assumptions: | NIL |
| Notes and Issues: | NIL |

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| Use Case ID: | 1.7 | | |
| Use Case Name: | View Cycling Session Summary | | |
| Created By: | Liau G Wayne | Last Updated By: | Liau G Wayne |

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| Date Created: | 28/2/2022 | Date Last Updated: | 28/2/2022 |
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| Actor: | User, Data.gov API |
| Description: | User will be able to view a session summary at the end of the session, and nearby bicycle racks. |
| Preconditions: | <ol style="list-style-type: none"> 1. User has allowed location permissions on the app. 2. The user must click the “Stop” button from the <Live Cycling Progress Page>. 3. Device has internet access. |
| Postconditions: | The app will display <Session Summary Page>. |
| Priority: | High |
| Frequency of Use: | High - Each time the user tracks their cycling session. |
| Flow of Events: | <ol style="list-style-type: none"> 1. App will display time elapsed and distance travelled during the cycling session. 2. App will display nearby bicycle racks using Data.gov API and Google Location API. |

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| Alternative Flows: | NIL |
| Exceptions: | NIL |
| Includes: | 1.8: Rate Cycling Session |
| Special Requirements: | NIL |
| Assumptions: | NIL |
| Notes and Issues: | NIL |

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| Use Case ID: | 1.8 | | |
| Use Case Name: | Rate Cycling Session | | |
| Created By: | Fabrianne Effendi | Last Updated By: | Fabrianne Effendi |
| Date Created: | 01/03/2022 | Date Last Updated: | 01/03/2022 |

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| Actor: | User, Firebase |
| Description: | If the user selects a route recommendation, the user is able to rate the cycling session at the end of each cycling session. |
| Preconditions: | <ol style="list-style-type: none"> 1. User selected a recommended route for cycling session 2. User has started and ended the cycling session 3. Device has internet access |
| Postconditions: | The app will allow the user to rate the cycling session on <Session Summary Page>. |
| Priority: | Medium |
| Frequency of Use: | Medium - depends on whether user cycled a recommended route |
| Flow of Events: | <ol style="list-style-type: none"> 1. App displays rating prompt on <Session Summary Page> 2. User selects rating 3. App stores route rating in Firebase |
| Alternative Flows: | NIL |

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| Exceptions: | NIL |
| Includes: | NIL |
| Special Requirements: | NIL |
| Assumptions: | NIL |
| Notes and Issues: | NIL |

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| Use Case ID: | 1.9 | | |
| Use Case Name: | View Cycling History | | |
| Created By: | Fabrianne Effendi | Last Updated By: | Fabrianne Effendi |
| Date Created: | 01/03/2022 | Date Last Updated: | 01/03/2022 |

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| | Actor: User, Firebase |
| Description: | User will be able to track their cycling history in the <Cycling History> page. |
| Preconditions: | <ol style="list-style-type: none"> 1. User is logged into his/her account 2. Device has internet access 3. User clicks Cycling History icon |
| Postconditions: | The app will display the user's cycling history in the <Cycling History> page. |
| Priority: | Medium |
| Frequency of Use: | Medium - Dependent on how active each user is. |
| Flow of Events: | <ol style="list-style-type: none"> 1. User clicks on <Cycling History> icon 2. App will retrieve user's cycling history for the latest month and weekly goal from Firebase and display on page 3. User clicks on a particular month on <Cycling History> page 4. App will retrieve user's cycling history for that particular month from Firebase and display on the page |

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| Alternative Flows: | NIL |
| Exceptions: | EX1: If user device is not connected to the internet 1. Error message “No internet detected. Please refresh this page.” will be displayed. |
| Includes: | NIL |
| Special Requirements: | NIL |
| Assumptions: | NIL |
| Notes and Issues: | NIL |

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| Use Case ID: | 1.10 | | |
| Use Case Name: | View and Send Chat Messages | | |
| Created By: | Lee Xuan Hua | Last Updated By: | Lee Xuan Hua |

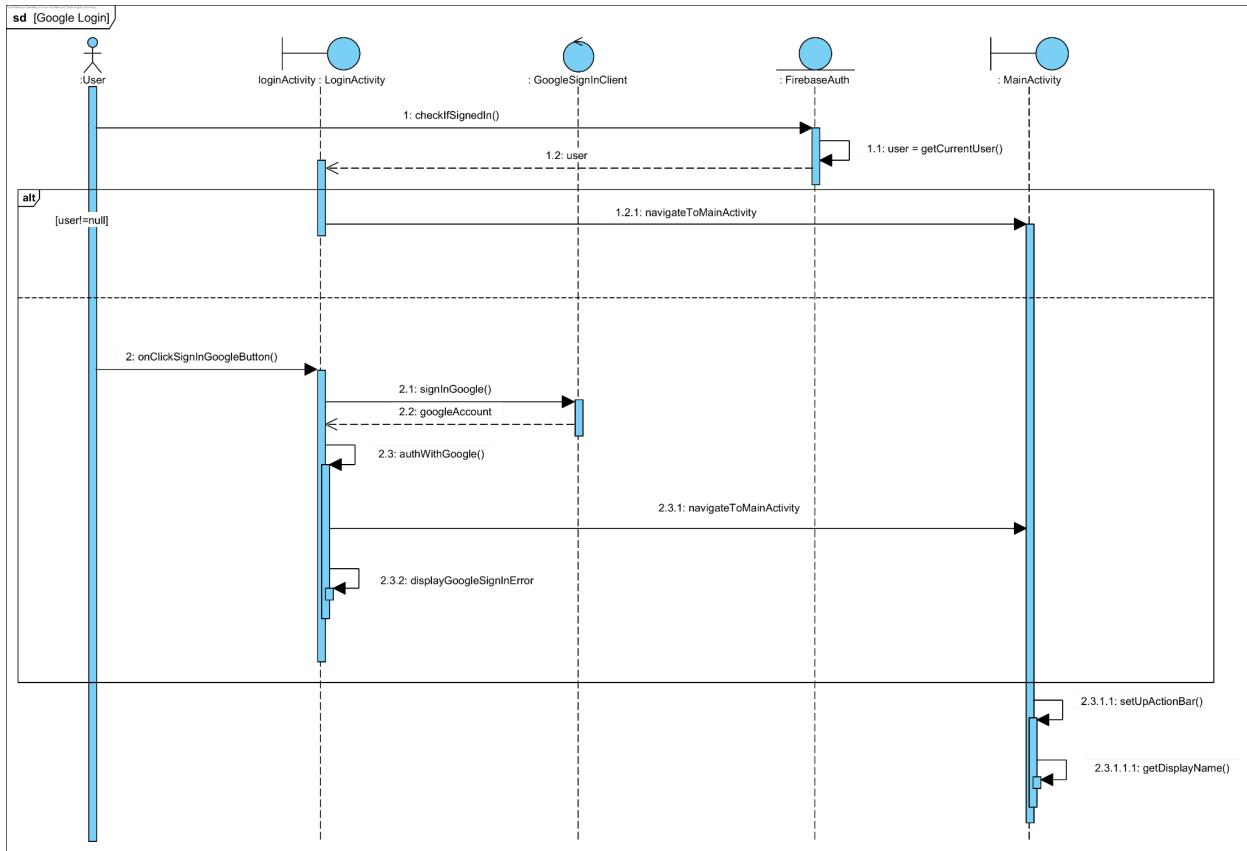
| | | | |
|---------------|----------|--------------------|----------|
| Date Created: | 4/2/2022 | Date Last Updated: | 4/2/2022 |
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| Actor: | User, Firebase |
| Description: | User will be able to follow the latest community trends and discussion, share messages and connect with like minded individuals through a forum. |
| Preconditions: | <ol style="list-style-type: none"> 1. User is logged into his/her account 2. Device has internet access 3. User clicks on the “Forums” icon. |
| Postconditions: | The app will display <Chat Forum Page>. |
| Priority: | Medium |
| Frequency of Use: | Medium - Each time the user wishes to read the forum or connect with other users. |
| Flow of Events: | <ol style="list-style-type: none"> 1. App will navigate to the <Forum Front Page> 2. App will retrieve the existing forum thread title from Firebase and display on the page 3. User clicks on a forum thread 4. App will navigate to the <Chat Forum Page> |

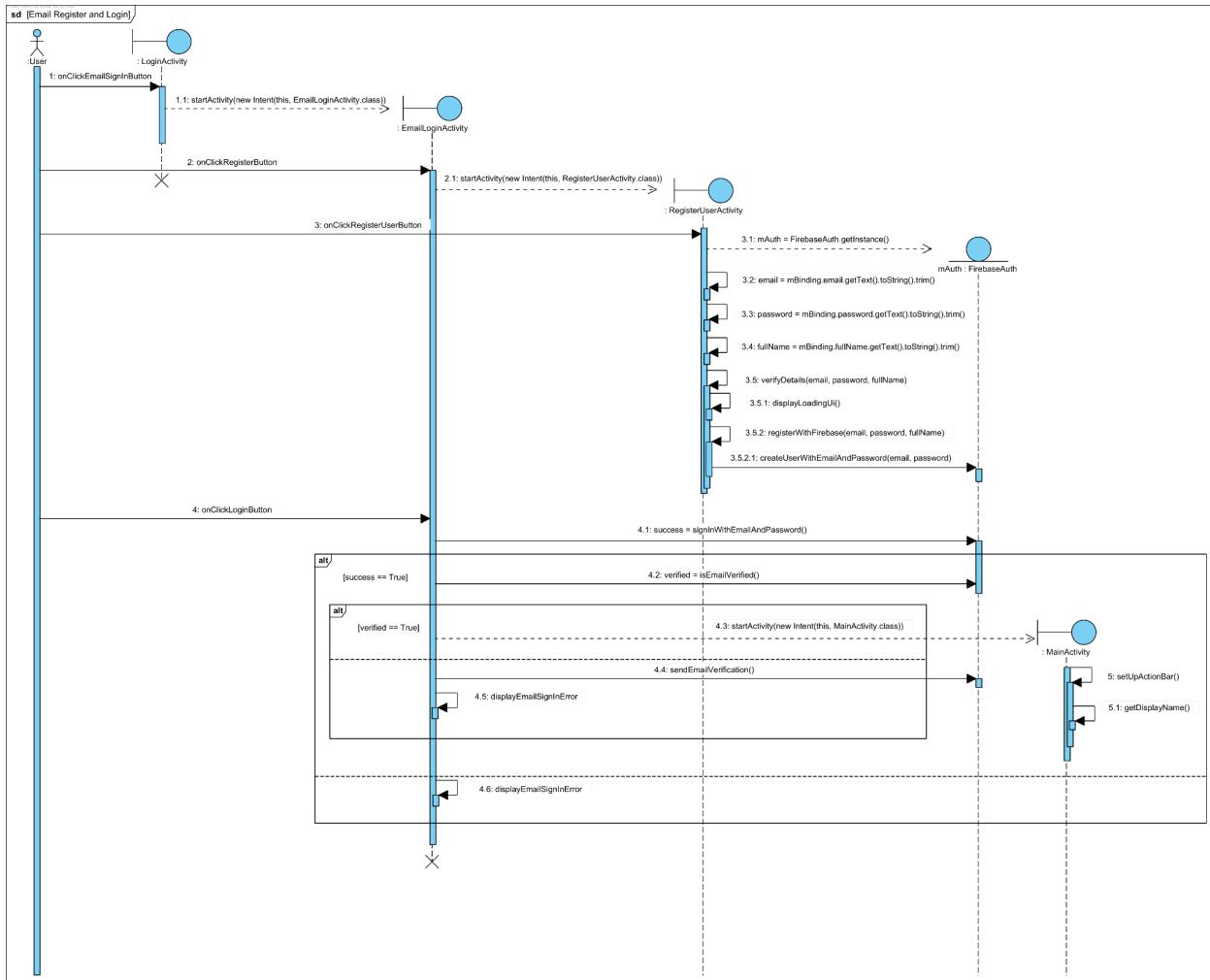
| | |
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| | <ol style="list-style-type: none">5. App will retrieve the existing forum thread comments from Firebase and display on the page6. User types and sends a message7. App will store the data in Firebase8. Step 5 will be repeated, and the display is updated |
| Alternative Flows: | NIL |
| Exceptions: | NIL |
| Includes: | NIL |
| Special Requirements: | NIL |
| Assumptions: | NIL |
| Notes and Issues: | NIL |

Sequence Diagrams

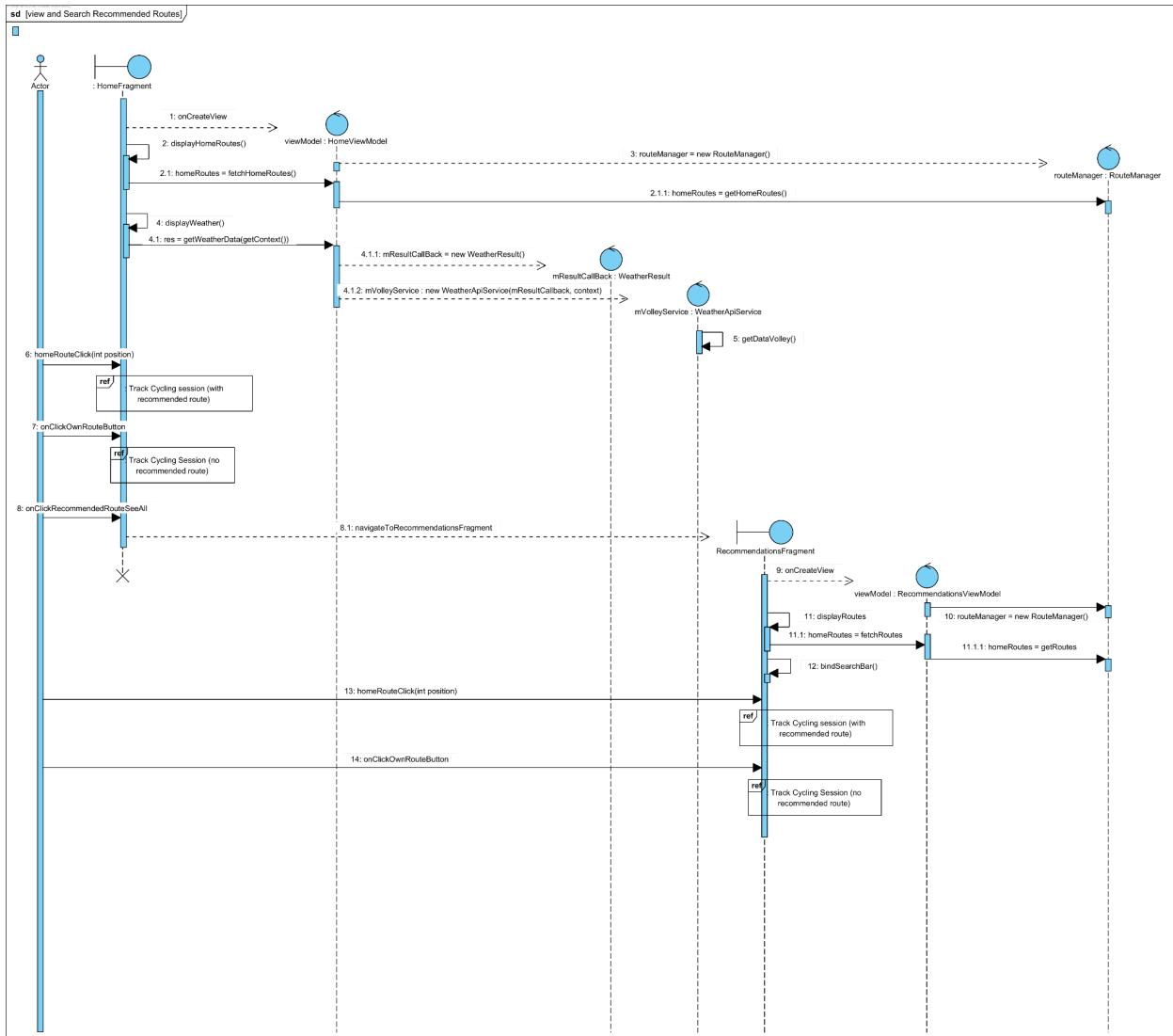
Sequence Diagram 1.1 - Google Login



Sequence Diagram 1.2 - Email Register and Login

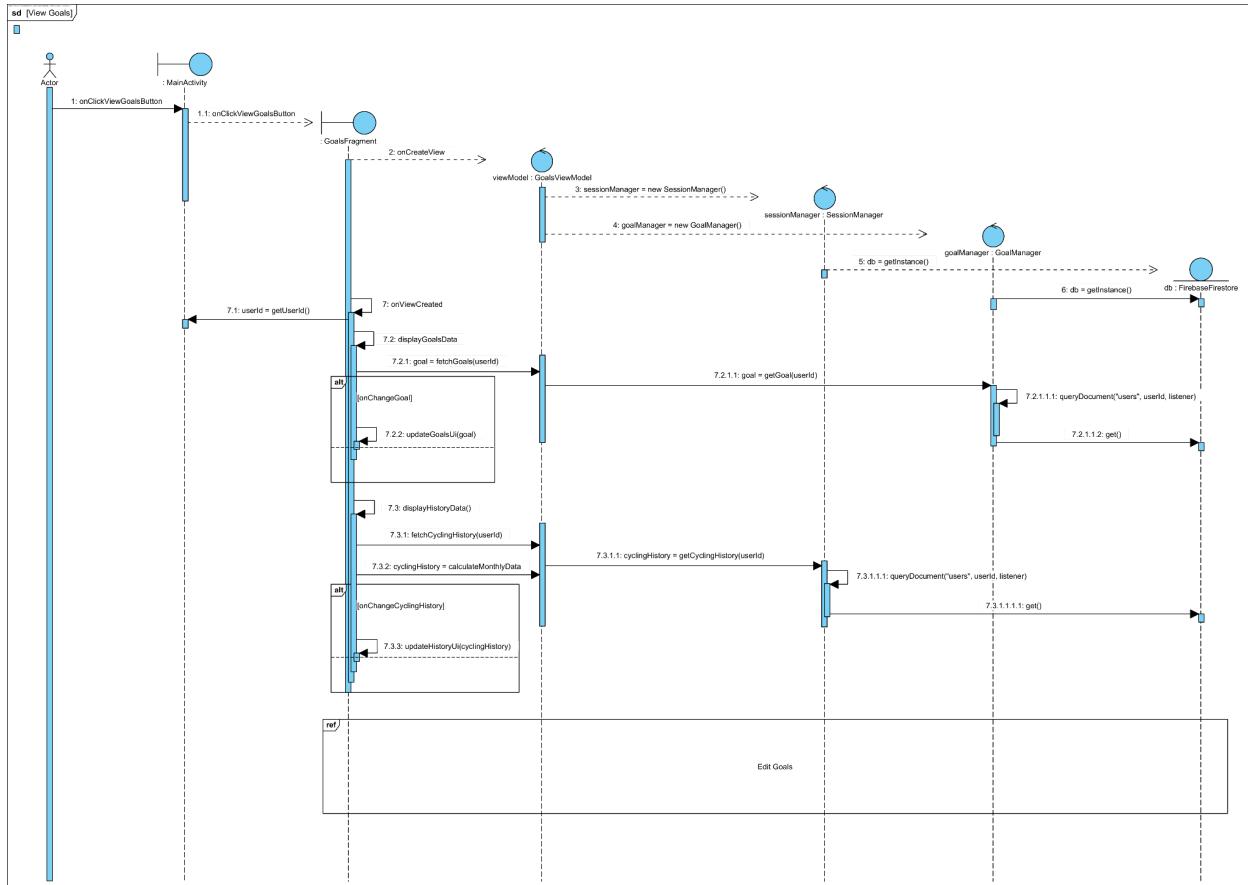


Sequence Diagram 1.3 - View and Search Recommended Routes

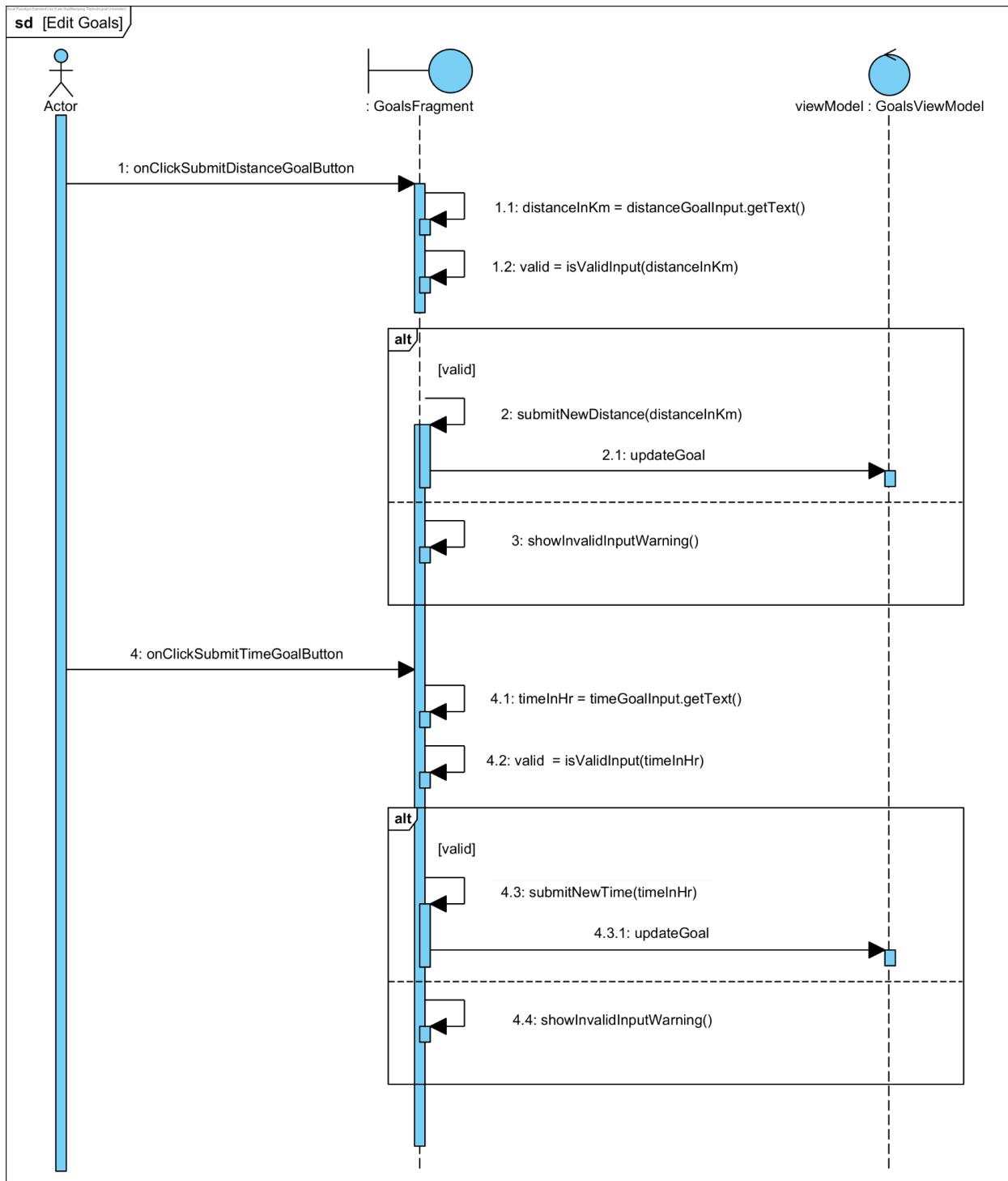


Sequence Diagram 1.4 - View and Edit Goals

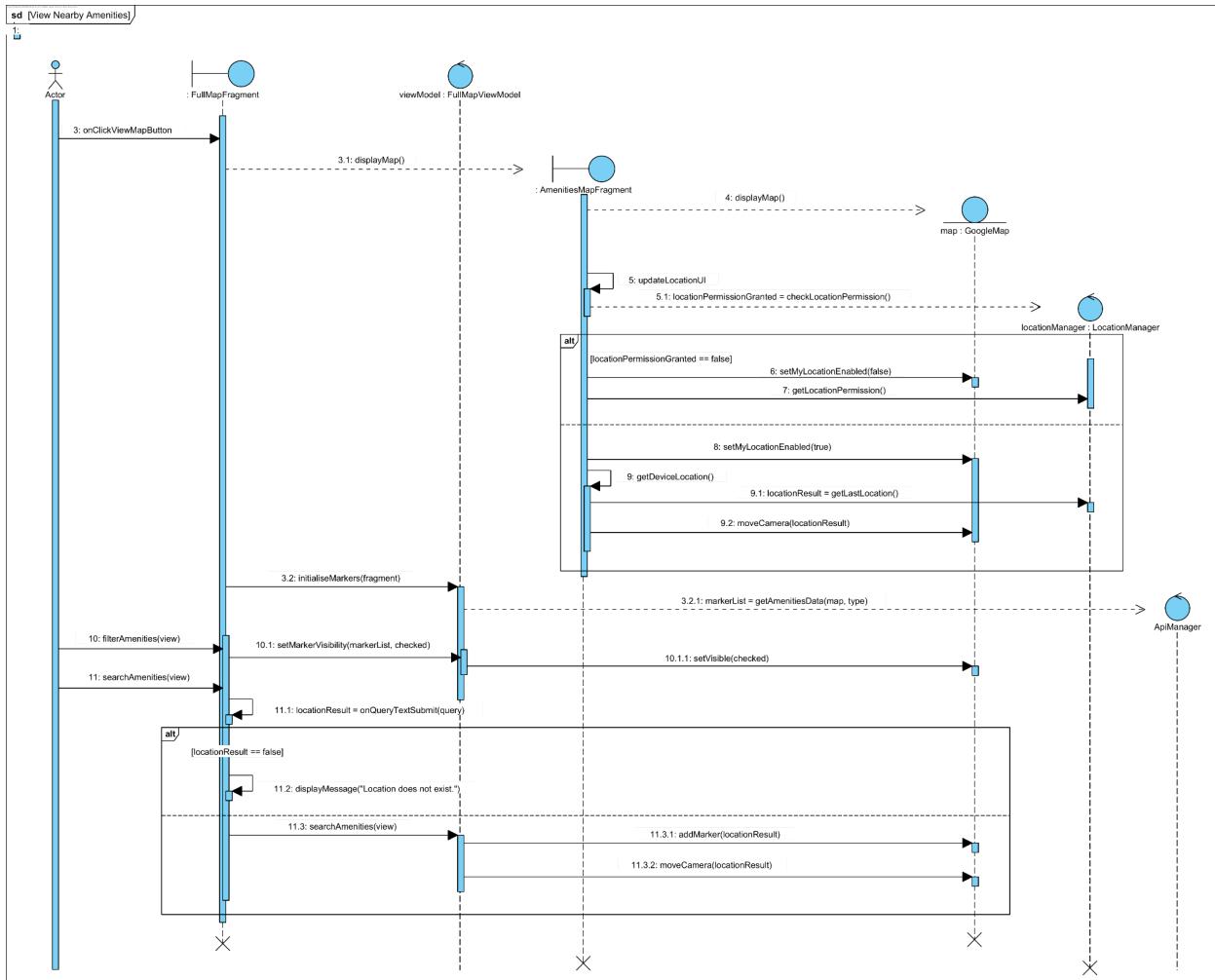
View Goals



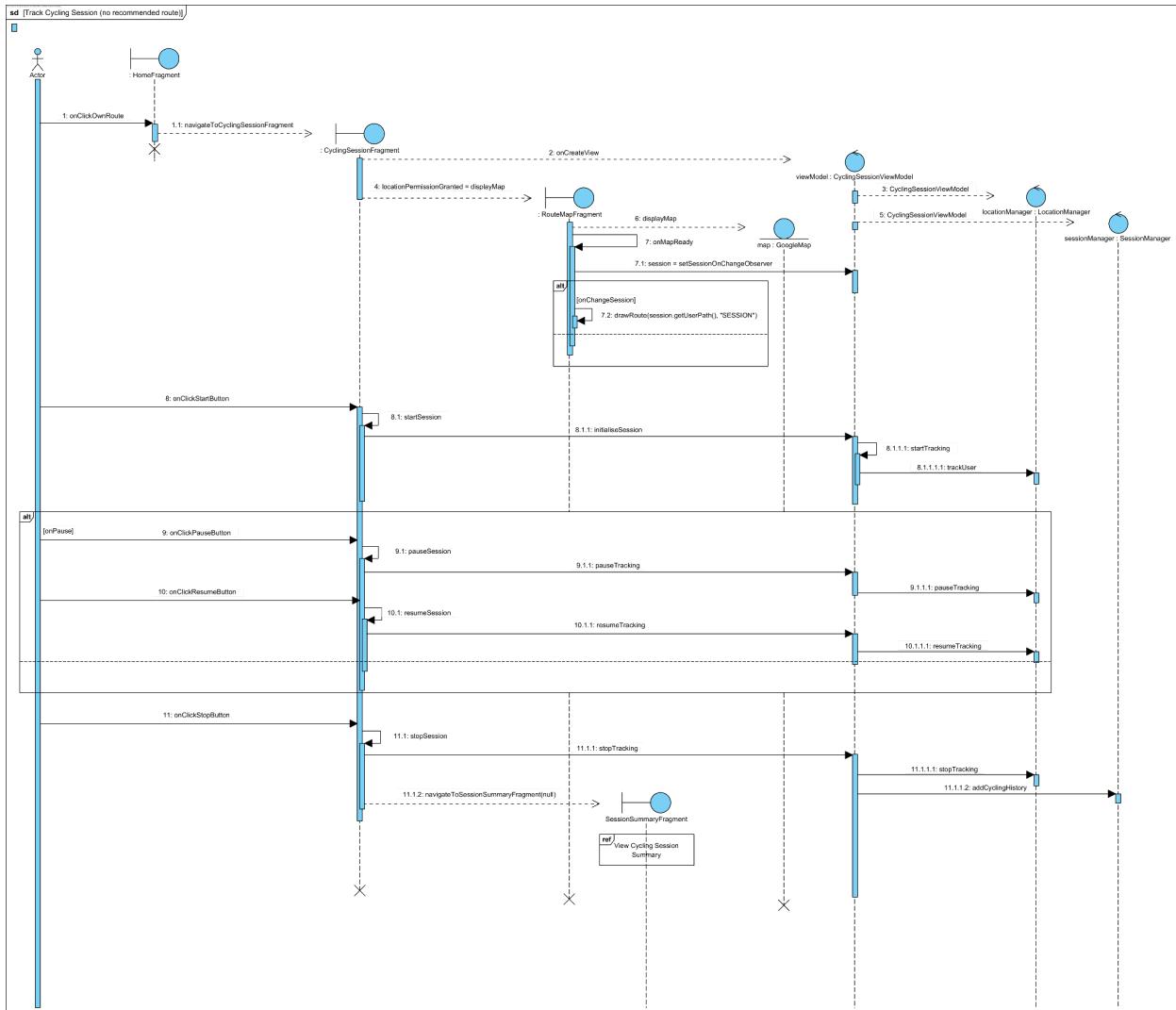
Edit Goals



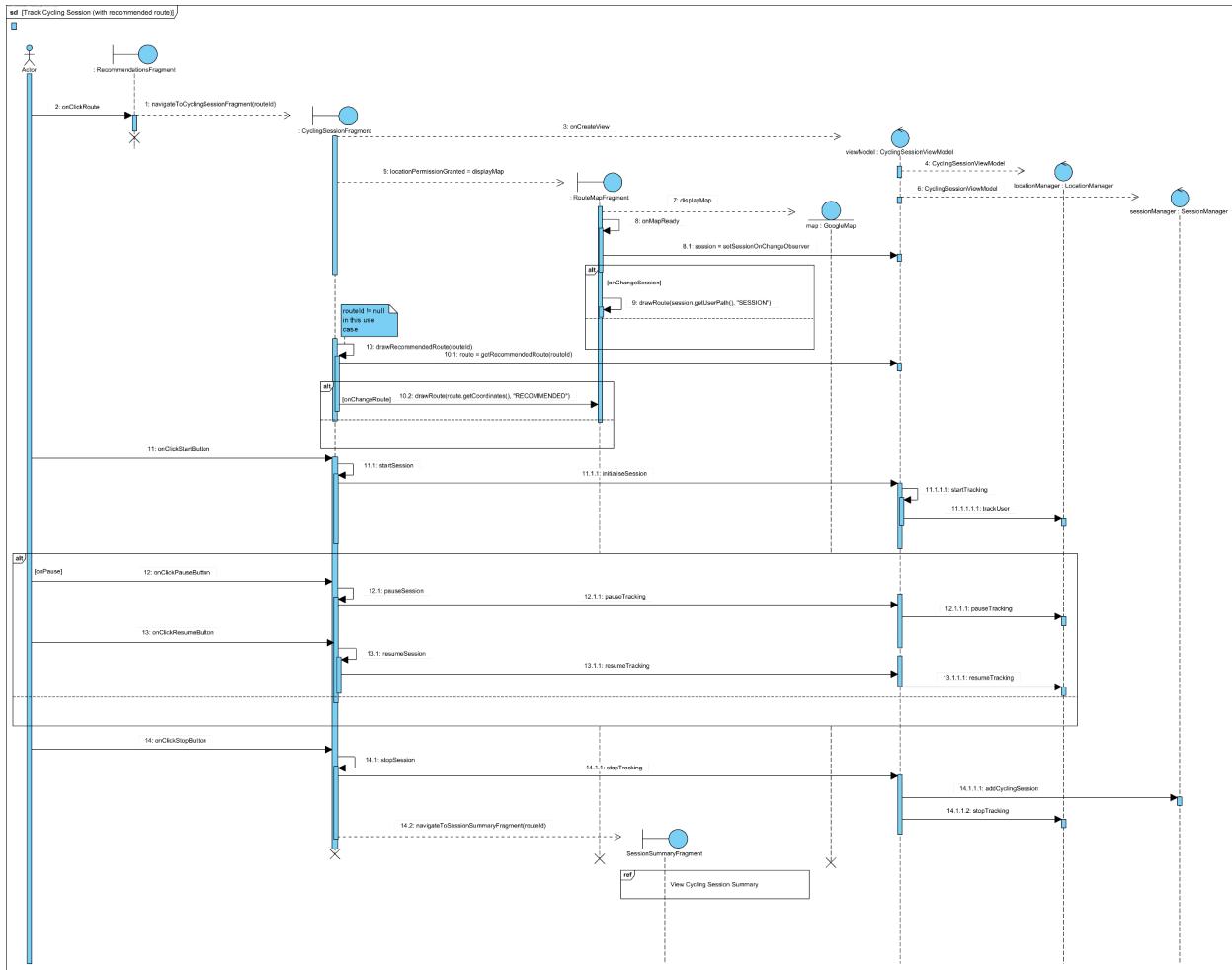
Sequence Diagram 1.5 - View Nearby Amenities



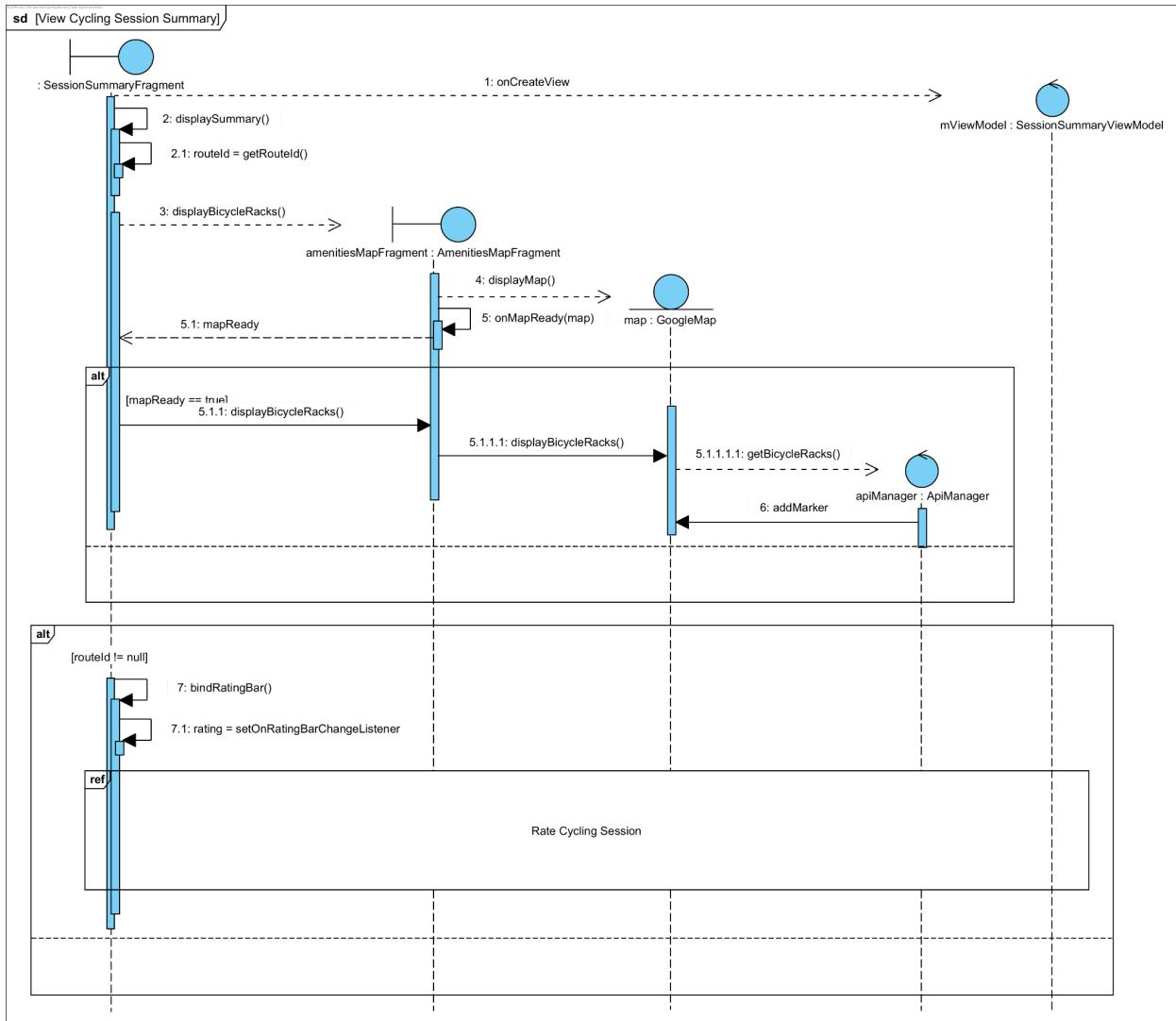
Sequence Diagram 1.6a - Track Cycling Session (no recommended route)

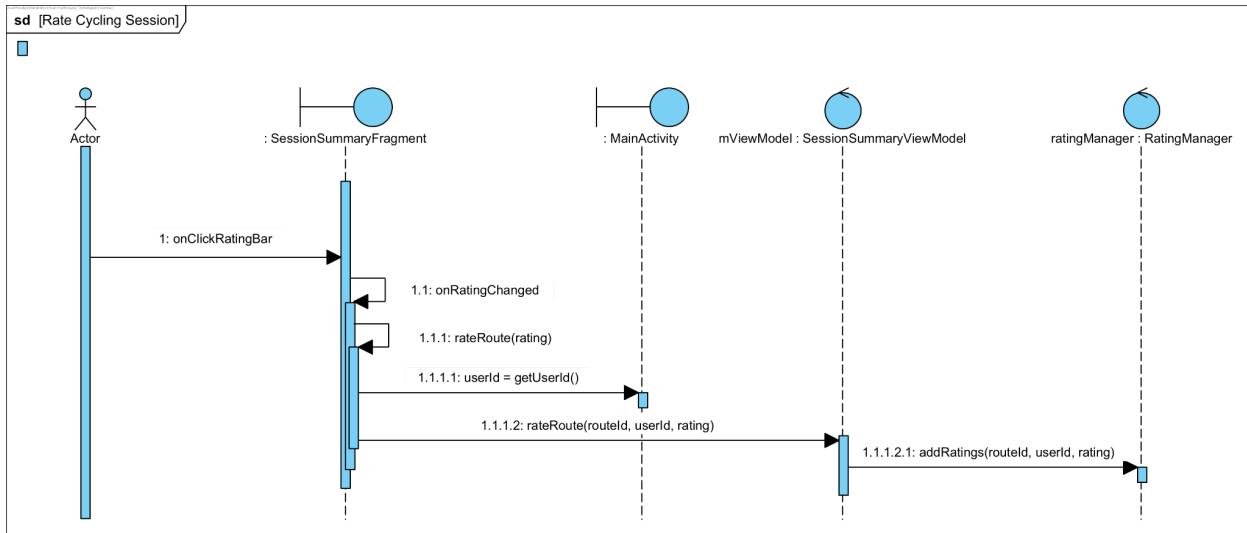


Sequence Diagram 1.6b - Track Cycling Session (with recommended route)

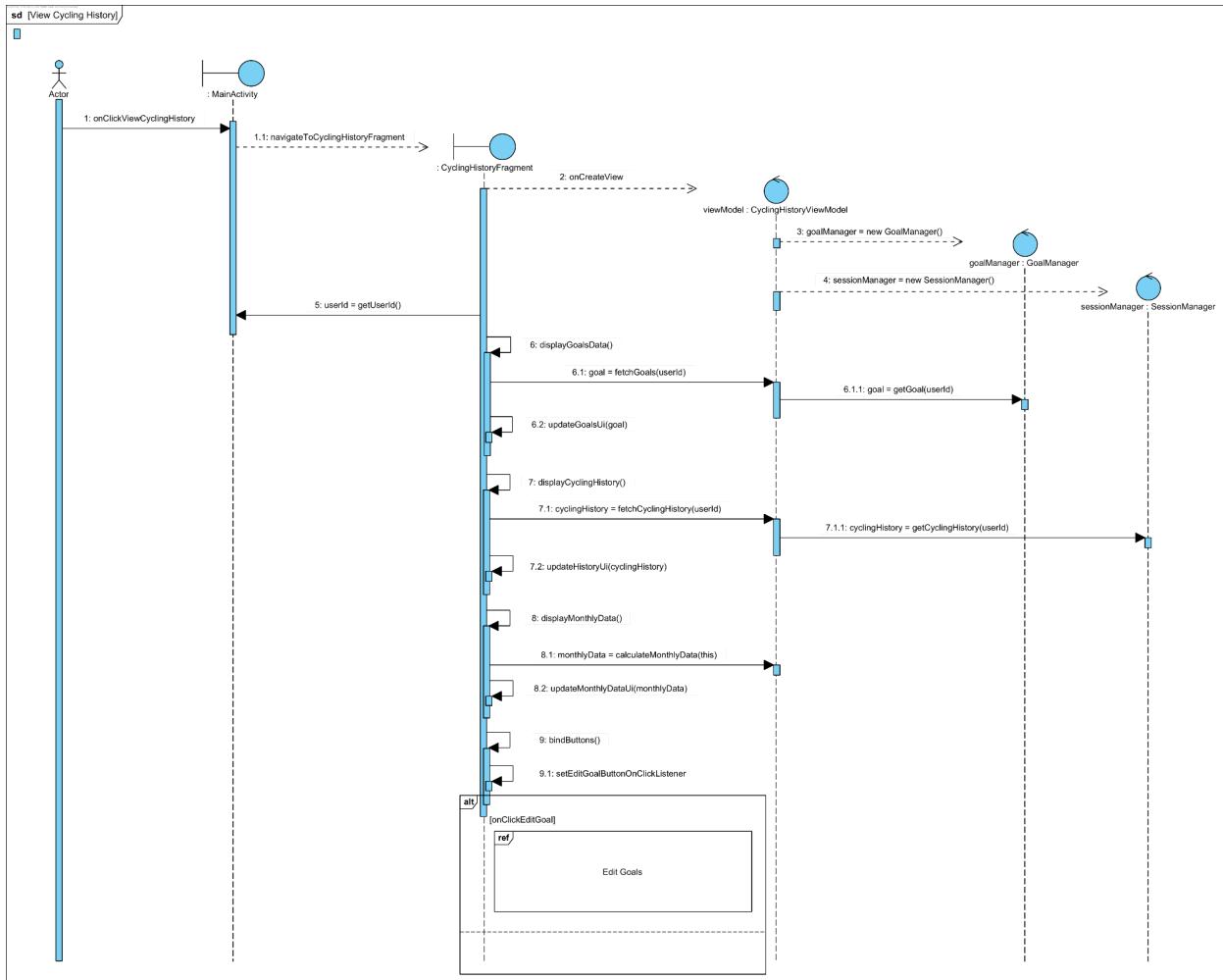


Sequence Diagram 1.7 - View Cycling Session Summary



Sequence Diagram 1.8 - Rate Cycling Session

Sequence Diagram 1.9 - View Cycling History



Sequence Diagram 1.10 - View and Send Chat Messages

