Functional Requirements

1. **The app must provide user login before accessing the app**
    - 1.1. The app must allow an existing user to log in.
        - 1.1.1. The login must prompt the user for their username.
        - 1.1.2. The login must prompt the user for their password.
        - 1.1.3. The login must be able to verify login credentials with a database.
            - 1.1.3.1. If the login credentials are valid, the app must log in the user.
            - 1.1.3.2. If the password to the username is incorrect, the app must inform the user.
            - 1.1.3.3. If the password to the username is incorrect, the app must prompt the user for a new password.
    - 1.2. The app must allow new users to register an account.
        - 1.2.1. The registration shall take in a user's display name.
        - 1.2.2. The registration shall take in a user's username.
            - 1.2.2.1. If the username is already used, the registration must re-prompt the user for a new username.
        - 1.2.3. The registration shall take in a user's password.
            - 1.2.3.1. The user must key in a password that is at least 8 characters long for it to be valid.
                - 1.2.3.1.1. If the password is invalid, the registration must re-prompt the user for a new password.
        - 1.2.4. The app shall add another account into the database after registration
    - 1.3. The app must allow users to sign out of their account.

      7.3.1 The users shall be able to tap on a 'sign out' button to sign out of their account.

      7.3.2 The users shall be shown the login page for their account after sign out.

2. **The app must be able to display a map**
    - 2.1. The map must be able to show the user's current location
        - 2.1.1. The map must show the user's current location while moving, indicated by a moving cursor on the map
        - 2.1.2. The map must show the user's current location while static, indicated by a static cursor on the map
    - 2.2. The user must be able to pan across the map to view different locations
    - 2.3. The user shall be able to zoom in and out of the map

3. **The app must be able to ask for user permission to track location**

3.1. The app must prompt the user for permission to access and track their location when location-based services are required.
3.2. The app must clearly explain why location tracking is needed, including details about how the location data will be used.
3.3. The app must include an option for the user to provide or deny permission for location tracking.
3.3.1. If the user denies permission, the app must not access the location and must handle the functionality without location data, if possible, or inform the user of limited features.

4. The app must allow users to plan for their runs

4.1. The app must prompt the user for the starting point of the run
4.1.1. Users should be able to select their current location for the run
4.1.2. Users should be able to specify a starting location through the map
4.1.3. Users should be able to specify a starting location by inputting an address
4.2. The app must prompt the user for the ending point of the run
4.2.1. Users should be able to specify an ending location through the map
4.2.2. Users should be able to specify an ending location by inputting an address
4.3. The app must prompt the user for any nearby landmarks that they might want to pass by in the running route
4.3.1. The app shall prompt the user for the landmark via a drop-down menu.
4.3.1.1. The drop-down menu shall hold every landmark within the radius of the start point and the user distance specifications
4.3.2. The user shall have the option to not choose any landmark

5. The app must be able to generate a running route for the user

5.1. The generated route must start from the given start point
5.2. The generated route must be shown in the map
5.3. A text-to-speech function must be available for route navigation
5.4. If the user specifies a landmark, the generated route must go past or nearby the landmarks specified by the user

6. The app must be able to track the user's run

6.1. Users shall be able to see their distance covered on the app while running.
6.1.1. The distance covered shall be in km.

6.2. Users shall be able to see their running summary after their run.
    6.2.1. Users shall be able to see the total time taken for the run in HH:MM:SS format.
    6.2.2. Users shall be able to see the total distance covered in km.

7. The app must allow for user navigation during the run

7.1. The app must continue to show the user's location and updated path during the run

7.2. The app must output both the text and audio navigation instructions to guide the user during the run
    7.2.1. The navigation instructions provided must be short and succinct
    7.2.2. The app must provide an audio instruction to the user 50 meters before a turn is about to be made
    7.2.3. The navigation instructions must specify which direction to turn when a turn is about to be made
        7.2.3.1. The navigation instructions must specify how sharp the turn will be for the user

8. The app must be be able to access weather information

8.1. The app must be able to access weather information on the user's current location

8.2. The app must be able to access weather information on the user's stated starting point
    8.2.1. The app must be able to access weather information on the user's starting point at the planned time of the run

9. The app must be able to generate a sheltered route for the user

9.1. The app shall recommend a sheltered pathway for the user if it is raining.

9.2. The app shall recommend a sheltered pathway for the user if it is projected to rain.
    9.2.1. The app shall inform the user that it is projected to rain when the user plans a running route.
    9.2.2. The app shall generate an alternative route with as much shelter as possible from the stipulated starting point.
        9.2.2.1. The alternative route must be shown to the user.
        9.2.2.2. The sheltered sections of the alternative route must be highlighted to the user.
        9.2.2.3. Users shall be given the option to cancel their run.

Non-Functional Requirements

1. **Performance**
   - 1.1. The application must load each page within 3 seconds.
   - 1.2. The application must respond to user actions within 2 seconds.
     - 1.2.1. The map must respond to zoom in and out actions within 1 second.
   - 1.3. The application must generate possible routes within 5 seconds.
2. **Usability**
   - 2.1. More than 95% of users should be able to complete the route selection process within 2 minutes.
   - 2.2. Each unique route generated should be traced with a different colour.
   - 2.3. Users must be provided the option of a sheltered route.
     - 2.3.1. The sheltered portion of the route should be traced with a different colour.
   - 2.4. Text-to-speech user navigation instructions must be generated within 1 second.
3. **Compatibility**
   - 3.1. Map view must be clearly viewed and compatible on a variety of mobile device models and screen sizes (e.g. Apple, Android)
4. **Privacy**
   - 4.1. The application must clearly inform users of the reasons for collecting location data.
   - 4.2. The application must obtain user consent to collect location data.
   - 4.3. Users must have the choice to disable location sharing at any time.
   - 4.4. Users must be allowed to sign out of their account at any time.
5. **Localisation**
   - 5.1. Users must be allowed to select their preferred language.
6. **Accessibility**
   - 6.1. The map interface must have appropriate labels.
   - 6.2. Users with disabilities must be able to interact with the map effectively.
     - 6.2.1. All font sizes used in the application must be at least of size 10.
7. **Accuracy**
   - 7.1. The information displayed must be accurate.
   - 7.2. The generated route must run through only accessible paths.
   - 7.3. If users allow for the collection of location data, the user's displayed live location must be within 5% of their actual location.
   - 7.4. For user navigation, upcoming changes in direction must be reported to the user when the user is 50m away from the change.
8. **Support**
   - 8.1. Proper documentation must be provided for future developers.