Functional Requirements

1. User Authentication

    1.1. Users must be able to create an account.

        1.1.1. The system will display text fields for users to enter user particulars including: Email and Password

        1.1.2. All mandatory fields must be filled in before account creation.

            1.1.2.1. The system must ensure that all fields are filled.

                1.1.2.1.1. The system will prompt the user to “Please enter both email and password” when there are unfilled fields

            1.1.2.2. The system must ensure that all fields are filled with valid data

                1.1.2.2.1. The system will prompt “Invalid email or password” when there is invalid data in the fields.

    1.2. Users must be able to log in to their accounts

        1.2.1. The system will display text fields for users to enter user particulars including: Email and Password

            1.2.1.1. The system must ensure that all fields are filled with valid account details

                1.2.1.1.1. The system will prompt “Invalid email or password” when there is invalid account details in the fields.

    1.3. Users must be able to log out of their accounts

    1.4. User must be able to use Forgot password button to recover account if they have forgotten their password

        1.4.1. The system shall ask for the user’s email address

        1.4.2. The system must send an email to the user’s email address to verify and send a reset password link

        1.4.3. After user clicks the link the system will then show a reset password page with 2 text fields to enter a new password and re-enter the new password

            1.4.3.1. User cannot use previously used passwords

2. Home Page

    2.1. The system will display a welcome back message with the user’s username

2.2. The system will display the user's run progress statistics

2.2.1. The system will display the user's total runs.

2.2.2. The system will display the user's total running time in hour, minute, second format.

2.2.3. The system will display the user's total distance ran in kilometres.

2.2.4. The system will display the user's average running speed in minute, second per km format.

2.2.5. The system will display the user's fastest running speed in minute, second per km format.

2.2.6. The system will display a graph of the user's runs.

2.2.6.1. The system will display an option to display the user's average running speed in minutes per km by runs.

2.2.6.2. The system will display an option to display the user's distance ran in km by runs.

2.2.6.3. The system will display an option to display the user's run durations in hours by runs.

2.3. The system shall display a list of 6 curated routes for the user.

2.3.1. The system will display the details of each route.

2.3.1.1. The system will display the image attached to the route.

2.3.1.2. The system will display the name of the route.

2.3.1.3. The system will display the username of the creator of the route.

2.3.1.4. The system will display the number of users that have finished the route.

2.3.1.5. The system will display the distance information of the route in kilometres.

2.3.1.6. The system will display the terrain information (urban or trail) of the route.

2.3.1.7. The system will display the estimated time of completion of the route in minutes.

2.3.2. Users can select the route to view more information.

2.3.2.1. The system will open the route in the Browse Routes page.

3. Browse Routes

3.1. Users can choose a location to search for running routes.

3.1.1. The system will display a text field for users to enter a location.

3.1.1.1. The system will suggest locations to autocomplete the user's current text input in the text field

3.1.1.2. The user will be able to select a suggested location to autocomplete the text in the text field.

3.1.2. The system will display an option for users to use their current location.

3.1.2.1. The system will prompt users if they allow the system to use their current GPS location.

3.1.2.2. The system shall show an error message "Unable to locate" when the user does not allow the system to access his/her location.

3.1.3. The system will display a list of suggested locations based on past inputs by the user.

3.2. Users can choose filters to apply to the running routes they search for.

3.2.1. The system will display filters for the users to specify the restrictions of the routes to search for.

3.2.1.1. The system will display a slider to toggle the minimum rating (from 0.0 to 5.0 in intervals of 0.5) of the running routes to search for.

3.2.1.2. The system will display a slider to toggle the maximum distance (from 0.5 km to 30 km in intervals of 0.5 km) of the running routes to search for.

3.2.1.2.1. The system will display the difficulty of the run the user is searching for as Easy, Medium, Hard or Expert.

3.2.1.2.1.1. The system will display "Easy" difficulty when the maximum distance ranges from 0.5 km to 2.5 km.

3.2.1.2.1.2. The system will display "Medium" difficulty when the maximum distance ranges from 3.0 km to 8.0 km.

3.2.1.2.1.3. The system will display "Hard" difficulty when the maximum distance ranges from 8.5km to 15.0 km.

3.2.1.2.1.4. The system will display “Expert” difficulty when the maximum distance is above 15.5km.

3.2.1.3. The system will display a radio button to toggle the terrain type (urban or trail) of the running routes to search for.

3.3. The system will display the interactive map. (refer to Functionality 8. Interactive Map)

3.3.1. The map will display a marker of the location chosen by the user on the map.

3.4. The system will display a “search” button for users to use to initiate the search for running routes.

3.4.1. The system will display a list of running routes that matches the input location and chosen filters.

3.4.1.1. The system will display the routes in order of distance from location entered

3.4.1.2. The system will display the name of the route, the username of the creator of the route, the average review rating of the route, the number of users that have finished the route, distance information in kilometres of the route, terrain information (urban or trail) of the route, and estimated time of completion of the route.

3.4.1.3. The system will display the reviews on the route.

3.4.1.3.1. The system will display the reviewer’s username, the photo they uploaded and their comments on the route.

3.4.1.3.1.1. The system will generate a blank string for blank comment reviews.

3.4.1.3.1.2. The system will generate a default photo for the review if the reviewer did not upload a photo for the review.

3.4.2. The system will show an error message “Invalid location” when the user does not input a valid location to search for.

3.4.3. The system will show an error message “Location unavailable” when the user clicks on “Use current location” but does not allow the system to access their GPS location.

4. View Route

4.1. When the user selects the route after clicking on a route in the browse page. The system will show the same route details shown on the browse page in addition to the following features:

4.1.1. The system will display the leaderboard of fastest run timings of users for the route.

4.1.1.1. The system will display the usernames of the top 3 fastest user's run timings.

4.1.1.2. The system will display the run timings of the top 3 fastest user's run timings.

4.1.1.2.1. The run timings will be displayed in hh:mm:ss format.

4.1.2. The system will show the whole route on the interactive map (refer to Functionality 8. Interactive Map)

4.1.3. The user has the option to add the route to MyRuns

4.1.4. The user has the option to start their run on that route immediately to input their review (refer to Functionality 6. Review Route)

4.2. When the user selects the route after clicking on a route in MyRuns Page. The system will show the same route details shown on the MyRuns page in addition to the following features:

4.2.1. The system will show the whole route on the interactive map (refer to Functionality 8. Interactive Map)

4.2.2. When the user toggles to the browse page the following will happen:

4.2.2.1. The system will show the same route details shown on the MyRuns page after clicking on the route in the MyRuns Page

4.2.2.2. The user can add the route to MyRuns

4.2.2.3. The user can go back to the browse filter page.

5. Custom Route Creation

5.1. The system will display the interactive map. (refer to Functionality 8. Interactive Map)

5.2. Users will be able to create a custom route.

5.2.1. The system will display a text field for users to enter a starting address.

5.2.1.1. The system will suggest locations to autocomplete the user's current text input in the text field

5.2.1.2. The user will be able to select a suggested location to autocomplete the text in the text field.

5.2.2. The system will display a text field for users to enter a destination address.

5.2.2.1. The system will suggest locations to autocomplete the user's current text input in the text field

5.2.2.2. The user will be able to select a suggested location to autocomplete the text in the text field.

5.2.3. The system will display a button for users to search for routes with the provided.

5.2.3.1. The system will display the route on the interactive map.

5.2.3.1.1. The system will display the start and end points of the route with markers.

5.2.3.1.2. The system will highlight the body of the route.

5.2.3.1.3. The user will be able to modify the address of the start and end points by dragging the markers on the interactive map.

5.2.3.2. The user will be able to select additional stop-by points for the route.

5.2.3.2.1. The system will display a text field for users to enter a stop-by point address.

5.2.3.2.2. The user will be able to create additional stop-by points by clicking on the interactive map.

5.2.3.2.3. The system will display additional stop-by points on the interactive map with markers.

5.2.3.2.4. The user will be able to modify the address of additional stop-by points by dragging the markers on the interactive map.

5.2.3.3. The system will display a text field for users to enter a name for their custom route.

5.2.3.3.1. The system will show an error message "Please enter a name for the route" when the user does not input a valid name for the route.

5.2.3.4. The system will display a radio button for the user to select the terrain type (urban or trail) of the custom route.

5.2.3.5. The system will display a button “Add New Route” to create the custom route.

5.2.3.5.1. The system will generate a running route based on the user’s specifications in 4.2.1, 4.2.2, 4.2.3.2, 4.2.3.3 and 4.2.3.4.

5.2.3.5.2. The system will store the route into the database of routes.

5.2.3.5.3. The system will add the route to the user’s ‘My Runs’ page.

5.2.3.5.4. The system will redirect the user to their ‘My Runs’ page.

6. Review Route

6.1. The system will display an input field for users to input their rating for a route.

6.1.1. Users must rate a route on a scale from 1 to 5 in intervals of 1.

6.1.2. The system will show an error message “Invalid input. Please rate the route” when the user does not input a valid rating for the route.

6.2. The system will display an input field for users to input their time taken for a route.

6.2.1. Users must provide the duration of their run for the route in hours, minutes and seconds.

6.2.2. The system will show an error message “Invalid input. Please enter a valid duration” when the user does not input a valid duration (0h 0m 0s) for the route.

6.3. The system will display a text field for users to input their comments for a route.

6.3.1. Users can input a maximum of 1000 characters for their comment.

6.4. The system will display a file upload field for users to upload an image for their route.

6.4.1. Users can upload a photo relating to the route by clicking on “Upload an image”.

6.4.2. The file uploaded must be an image file.

6.5. The system will display a button for users to escape from the review page.

6.5.1. Users can cancel the review before submitting it.

6.6. The system will display a button for users to submit their review.

6.6.1. The system will store the review into the database of reviews.

7. MyRuns Page

7.1. The system will display the interactive map. (refer to Functionality 8. Interactive Map)

7.2. The system shall display a dropbox field with choices of filters to filter the list of routes to be displayed.

7.2.1. The “All Routes” filter is the default filter and will display the list of all routes.

7.2.2. The “Reviewed Routes” filter will display only the list of routes that have been reviewed by the user.

7.2.3. The “Unreviewed Routes” filter will display only the list of routes that are unreviewed by the user.

7.2.4. The “Favourited Routes” filter will display only the list of routes that are favourited by the user.

7.2.5. The “Created Routes” filter will display only the list of routes that are created by the user.

7.3. The system shall display the list of routes the user has added to MyRuns.

7.3.1. The system will display the details of each route.

7.3.1.1. The system will display the image attached to the route.

7.3.1.2. The system will display the name of the route.

7.3.1.3. The system will display the username of the creator of the route.

7.3.1.4. The system will display the number of users that have finished the route.

7.3.1.5. The system will display the distance information of the route in kilometres.

7.3.1.6. The system will display the terrain information (urban or trail) of the route.

7.3.1.7. The system will display the estimated time of completion of the route.

7.3.2. The system will display additional information for the routes the user has already reviewed.

7.3.2.1. The system will display the reviews of the route.

7.3.2.1.1. The system will display the reviewer's username.

7.3.2.1.2. The system will display the photo uploaded for the review.

7.3.2.1.2.1. The system will generate a default photo for the review if the reviewer did not upload a photo for the review.

7.3.2.1.3. The system will display the rating for the route.

7.3.2.1.4. The system will display the comments on the route.

7.3.2.1.4.1. The system will generate a blank string for blank comment reviews.

7.3.2.2. The system will display the leaderboard of fastest run timings of users for the route.

7.3.2.2.1. The system will display the usernames of the top 3 fastest user's run timings.

7.3.2.2.2. The system will display the run timings of the top 3 fastest user's run timings.

7.3.2.2.2.1. The run timings will be displayed in hh:mm:ss format.

7.3.3. The system will display a button to review the routes the user has not reviewed.

7.3.3.1. The system will call the review route functionality when the button is clicked. (refer to Functionality 6. Review Route)

7.4. The system will display a plus shaped button attached to each route to favourite the route.

7.4.1. Users can mark a route as favourited by clicking the plus button of the route.

7.4.2. The system will mark the route as favourited.

7.5. The system will display a check mark symbol attached to each route to indicate whether the route has been favourited.

7.5.1. The colour of the check mark will be grey by default and indicates the route has not been favourited.

7.5.2. The colour of the check mark will be blue if the route has been favourited.

7.6. The system will allow the user to add routes to MyRuns when they view routes through various means as mentioned in the view routes functionalities (4.1.3 and 4.2.2.2).

8. Interactive map

8.1. The system will display an interactive map.

8.2. The user will be able to toggle the scale of zoom of the map.

8.3. The user will be able to pan the display of the map.

Non-Functional Requirements

1. Performance

    1.1. The system shall have at most 1% down time on weekly average

    1.2. The system shall be able to support at least 10 active users concurrently

    1.3. The system shall return at least 5 recommended routes within 10 seconds of a user's search

2. Reliability

    2.1. The system shall deliver identical results for identical requests, with a variance of no more than 0.01% between executions, under the same operating conditions

    2.2. Distances indicated in the system shall be accurate up to 0.5km

    2.3. Forget password email must be sent out within 1 minute of pressing the 'Send Email' button

3. Usability

    3.1. 80% of users must be able to perform any main function of the system within 5 minutes of use.

    3.2. The system must ensure that the user interface automatically adjusts to the screen size and resolution of both mobile devices (screen widths from 320px to 640px) and desktop monitors (screen widths from 1024px to 1920px)

    3.3. The system must have a consistent user interface and design language throughout

4. Security

    4.1. The system shall have at least 2 measures to prevent unauthorised access and data breaches.

    4.2. The system must implement secure session management practices, including the generation of unique session identifiers (session IDs). (Need to verify if implemented)

    4.3. All input fields must be validated

    4.4. Password stored must be encrypted

    4.5. Password must be masked with '*' in the input field

5. Scalability

5.1. The system should be able to handle an increase in users and data without performance degradation

6. Maintainability

6.1. The system shall allow developers to implement and deploy updates to any module without affecting the operation of other modules

6.2. All system updates shall be deployable with no more than 2 hours of downtime per month