Resistance Exercise Mobile App

Project Overview

In this project, we design a fitness and workout mobile app for the general user who hopes to boost physical health under a clarified instruction to lead them doing physical activity, or wants to personalize activities as their preferences. We also build it to enhance mental well-being, reduce stress and improve mood for the user through gamification to motivate them to keep exercising. We hope the client can gain valuable insights into their performance by reviewing their workout records. This app serves as a personal fitness diary, enabling users to effortlessly record their workouts, track their progress over time, and adjust suitable activities as their preferences and needs. We hope this app allows users to have control over their privacy and their workout's data as they want, to exercise safely.

Project Scope

Inclusion

Functional Requirements

Activity Management

In our mobile app design, it includes some predefined activities and provides some weekly workout plans to guide users for doing activity day by day. This app also allows users to customize the predefined activities based on their needs and preferences. For example, if some exercise doesn't have the specific equipment they need, they can modify the exercise with another equipment. Of course, users are able to personalize activities by creating them into a template list where users can edit, archive, or delete their personal activities. During customizing an activity automatically, users can define focus areas, enable or disable warm-up or stretching parts, add, replace and remove exercises, as well as reset timer for startup and resting freely. Each exercise has educational content via animation to guide users step by step.

Performance Review and History

After the user completes the activity, the app reviews their performances like how many calories burned, BMI and heart rate, and saves it as a template for future workout or for improvement of activity content. This fulfilled activity is recorded into history where users can search, edit, or delete their own activity records. Users can decide to attach a photo to their records, then share it with friends in this app. Other users who have the permission to view the record can give it a "like" that engages the "like" receiver to keep forward to do exercise. The app provides a calendar view that records the dates on which activities were completed. The workout record can also be exported in TSV format that the user may want to take notes, and that data can be imported in a predefined TSV format into the history list.

Social Features

Users must be able to follow other registered users as "friends" and view their shared workout records. Users can make up their avatar using items like sun glass, hat and so on, which can be purchased via virtual money (for the app only, not cryptocurrency).

Non-Functional Requirements

Usability

The app provides an intuitive user interface for easy navigation, including clear options for editing and customizing activities.

Exercise video must be engaging and easy to follow, ensuring users can understand exercise instructions effectively.

Security

The app must provide privacy settings that let users control who can view activity record data, such as making records public but restricting calories or heart rate data to friends only.

Portability

The app works across mobile, desktop, and laptop platforms.

Interoperability

The app allows users to integrate with third-party services like Apple Health and Google Fit to synchronize workout data seamlessly.

Maintainability

Only the admin can add or delete user accounts. The admin is able to update predefined activities and workout plans.

Exclusion

Our project doesn’t include the following features for the mobile app. First, this app can only share workout records with other users under the system without crossing any social media platforms like Whatsapps, Facebook, and so on. Second, the system can’t upload any predefined and customized activities to other users. Moreover, all workout plans are predefined and can’t be created by users, except admin. Finally, the app does not support OAuth authentication which permits users to share information about their accounts with third-party applications, users must register and log in directly without using any third-party accounts.

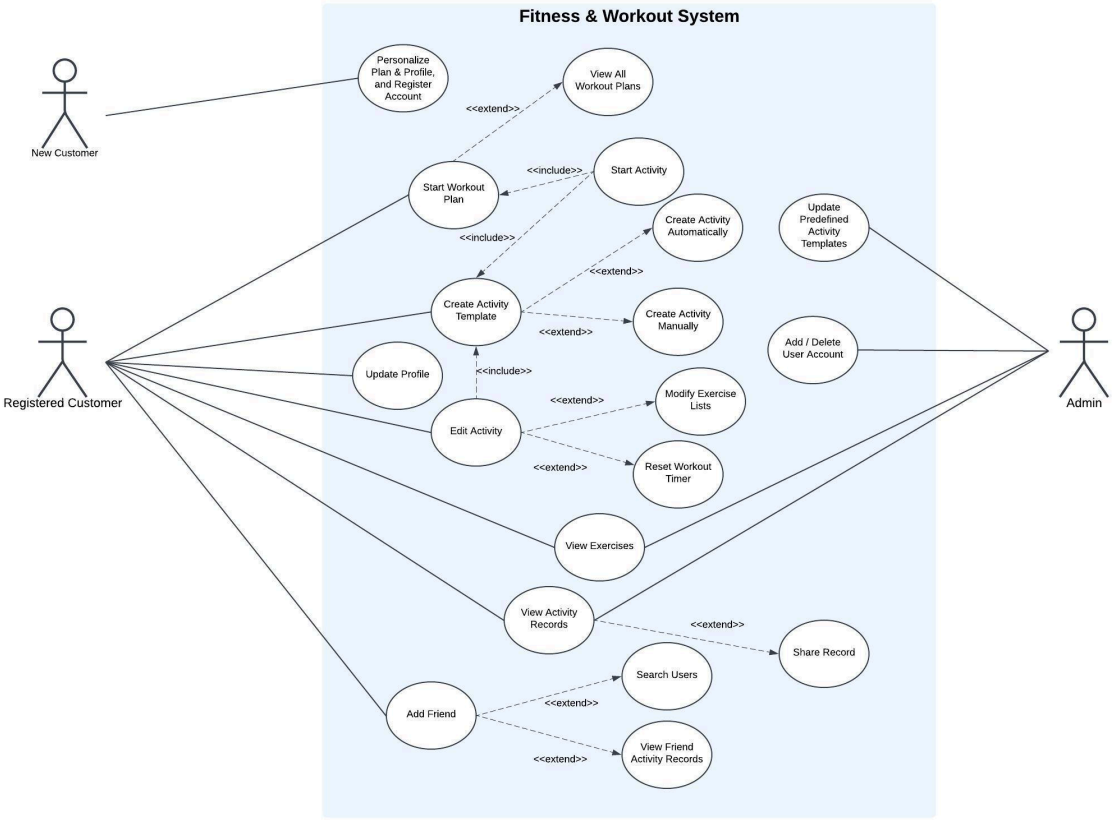
Project Objectives

In this project, we aim to design and develop a fitness and workout mobile app that meet the needs of general users who want to improve their physical and mental well-being. After deployed the app, we want to ensure that users can easily learn exercises, enjoy the activity moment according to their preferences without any pressures, stay motivated while gaining a sense of accomplishment, gain clear performance insights by reviewing detailed workout records to help them access their growth and achievements for improvement, as well as easily manage their personal data and privacy. The key objectives of the project are as follows:

- To provide clear instructions in each exercise to guide users in performing physical activities effectively, helping them boost their overall physical health.
- To enable users to personalize activities based on their individual preferences and needs, creating a tailored fitness experience.
- To enhance mental health by incorporating gamification features that reduce stress, improve mood, and motivate users to stay committed to their exercise routines.
- To build up a sense of achievement from the amount of “Like” in activity records that can engage users keep going for workout.
- To serve as a personal fitness daily by allowing users to effortlessly record their workouts, tracking their progress over time, and make adjustments to their activities as needed.
- To provide valuable performance insights to users through detailed activity records, helping them access their progress and celebrate achievements.
- To ensure user privacy and control over their workout data, enabling them to exercise safely and confidently, and modify their health data easily if something gets wrong or missing during the workout progress.

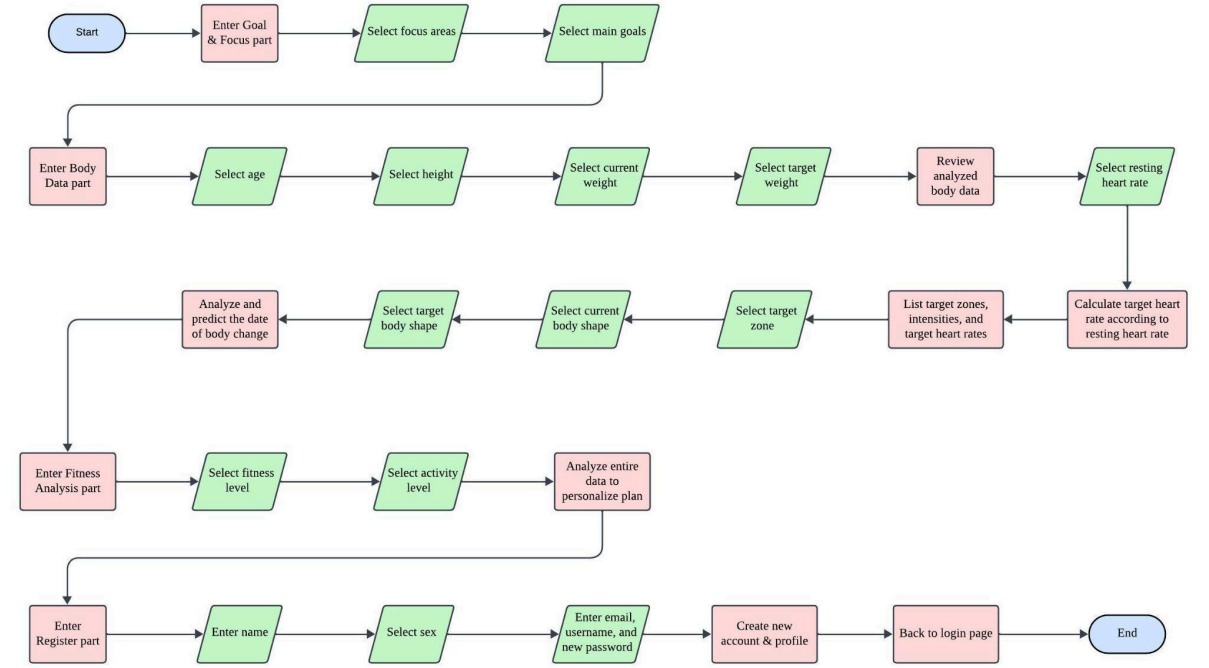
Software Design Specifications

Use Case Diagram

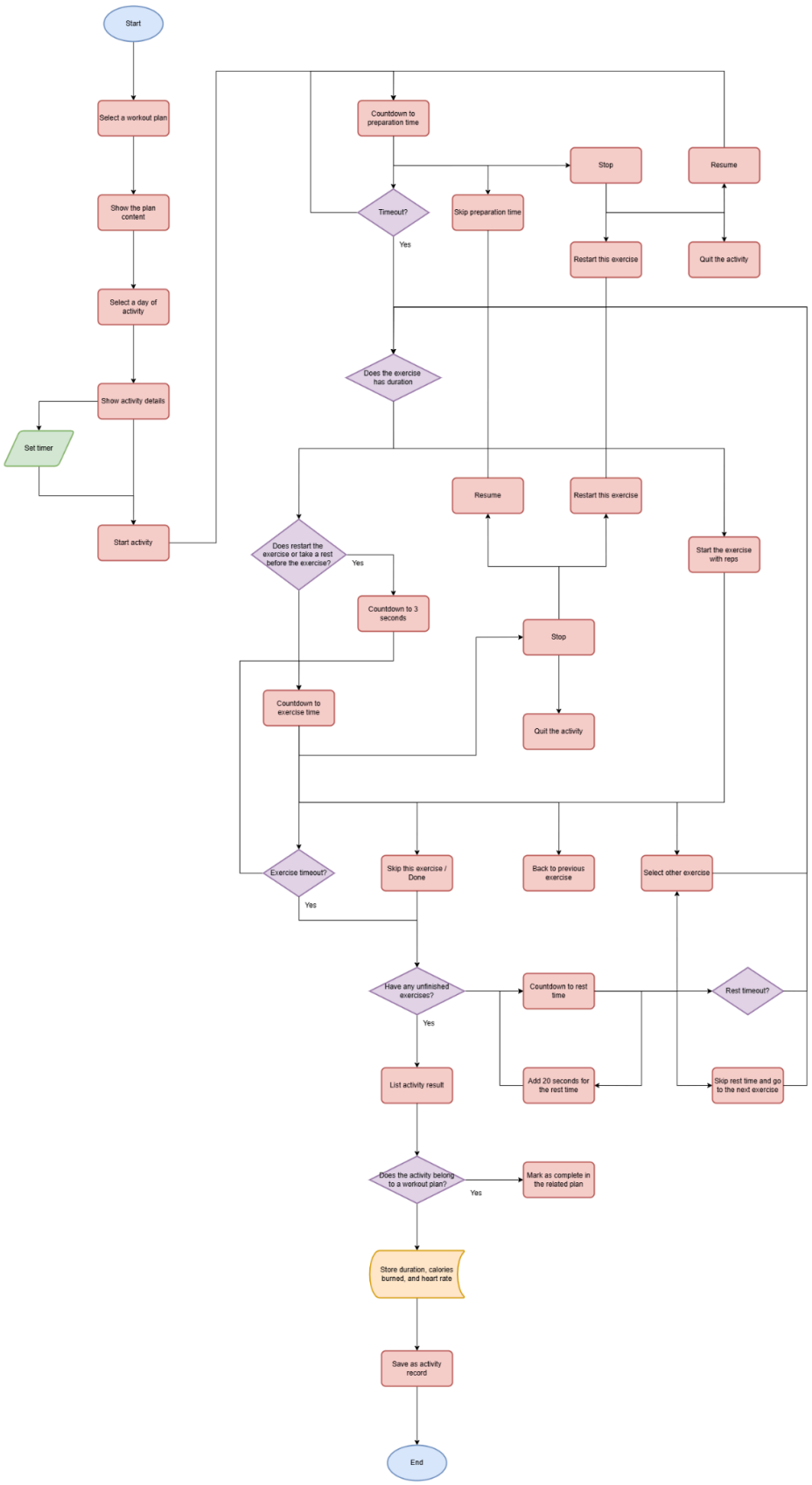


Flowcharts

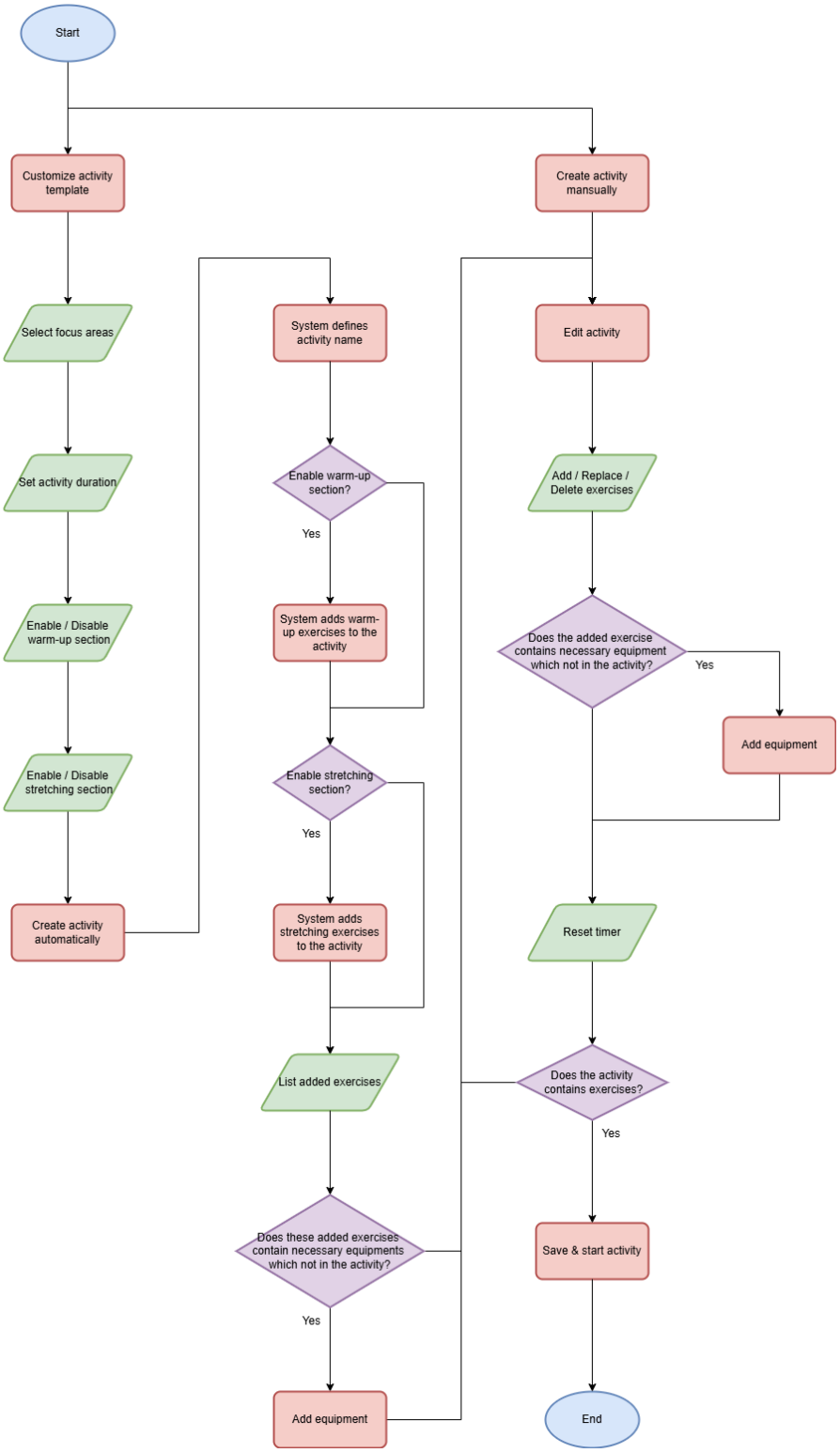
Personlize Fitness Plan & Profile, and Register Account



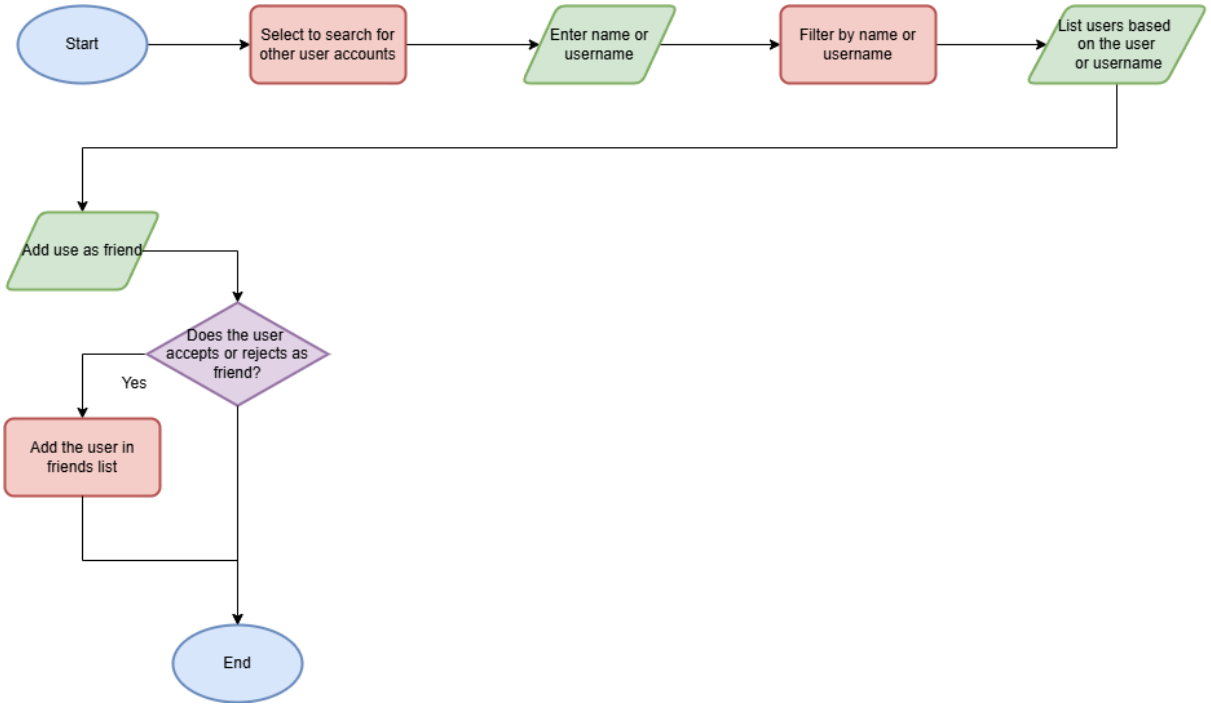
Start Activity



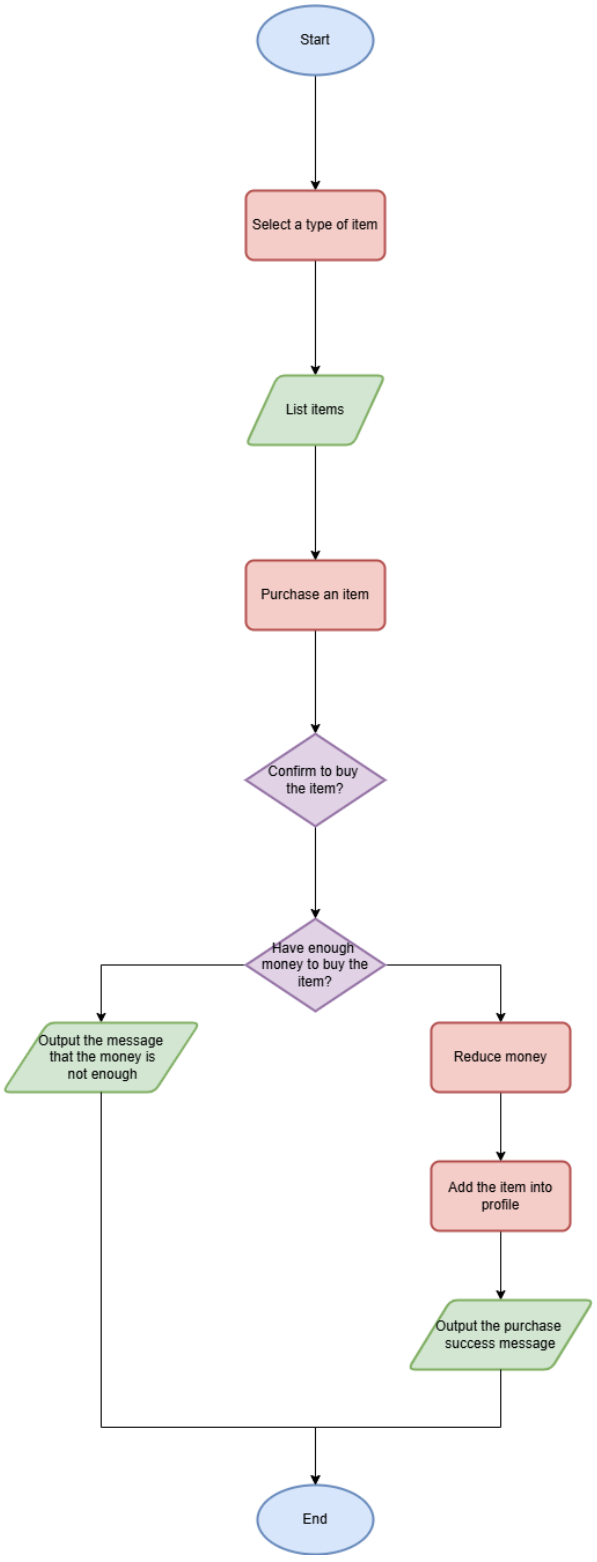
Customize Activity Template



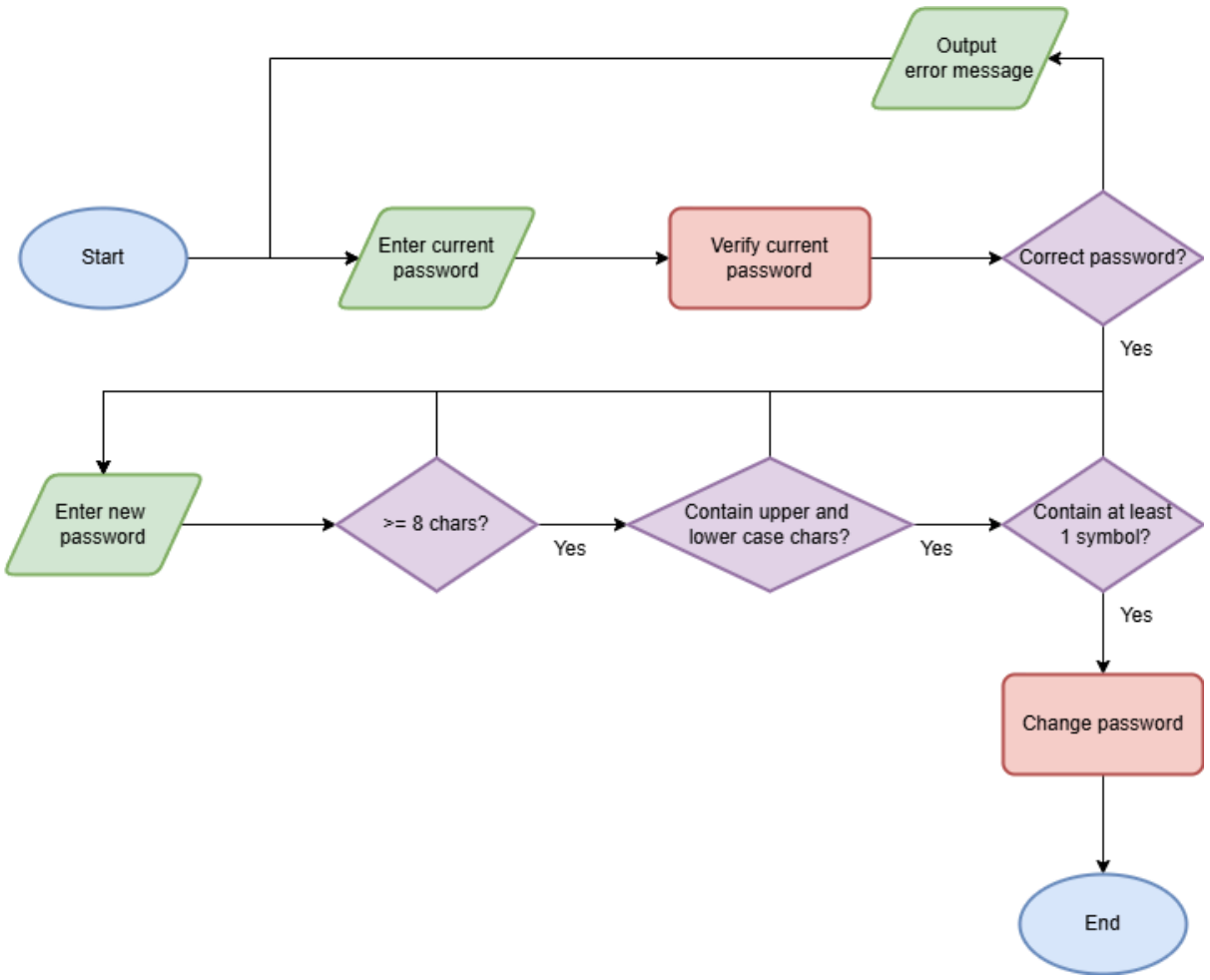
Invite Friend



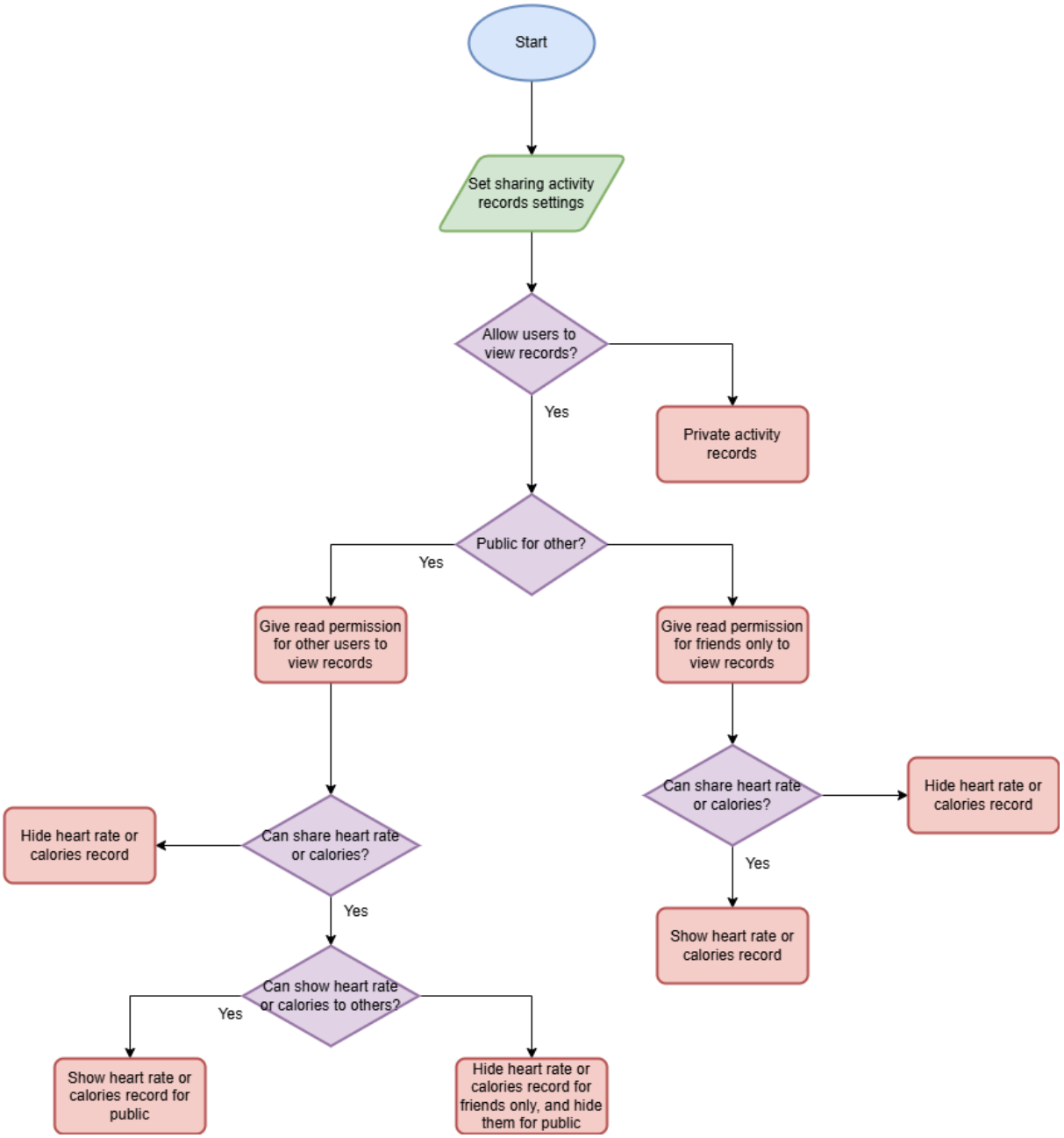
Purchase Item



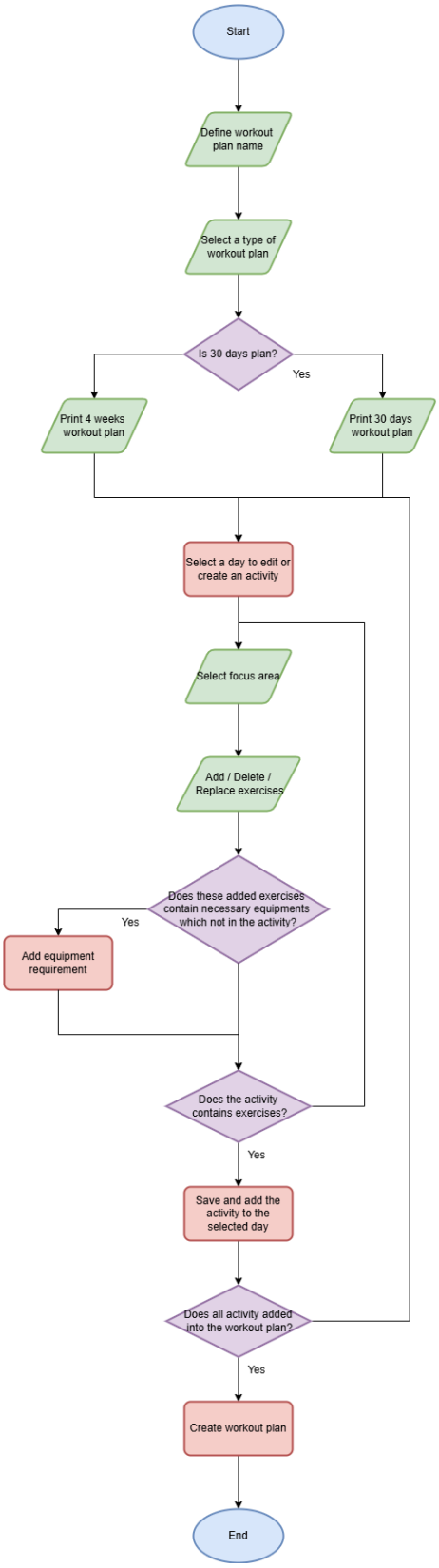
Reset Password



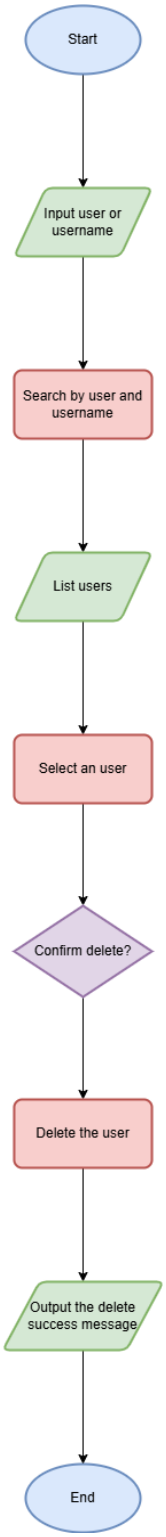
Record Data Privacy Settings



Admin Adds Workout Plan and Activities



Admins Delete User Account



Stakeholders

There are three kinds of stakeholders : The end users, the investors, the developers.

End Users

The target end users are the people that wish to play the workout exercises. They may not know the name of the exercises.

Developers

The parties that develop the apps to fulfill the requirements of the investor as well as the needs of the end users.

Investor

The investor is the one who starts the app development project.

Project Team

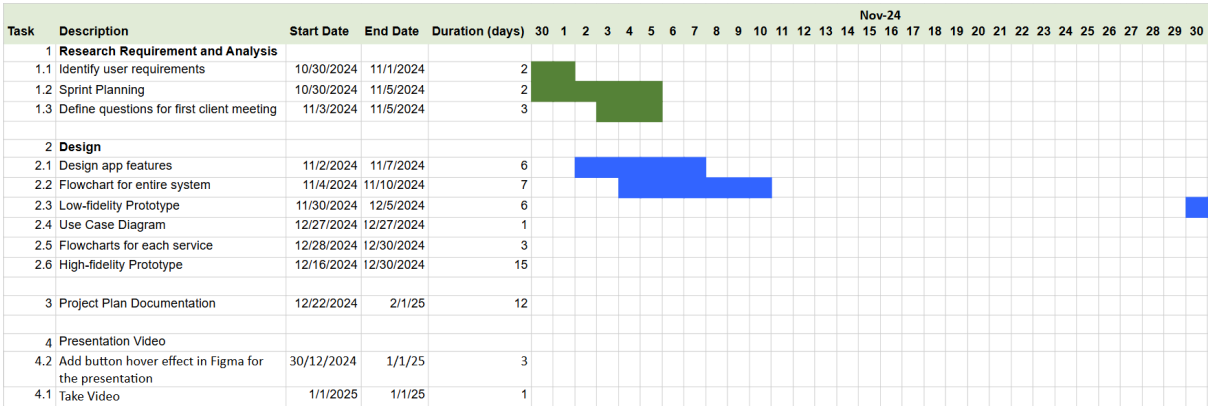
Bruce is the product owner. He makes the decision of the product scope. The project objectives are determined by him. He is responsible for proposing function requirements, designing a user case diagram and flowcharts to model system interactions, and refining UI design for intuitive navigation.

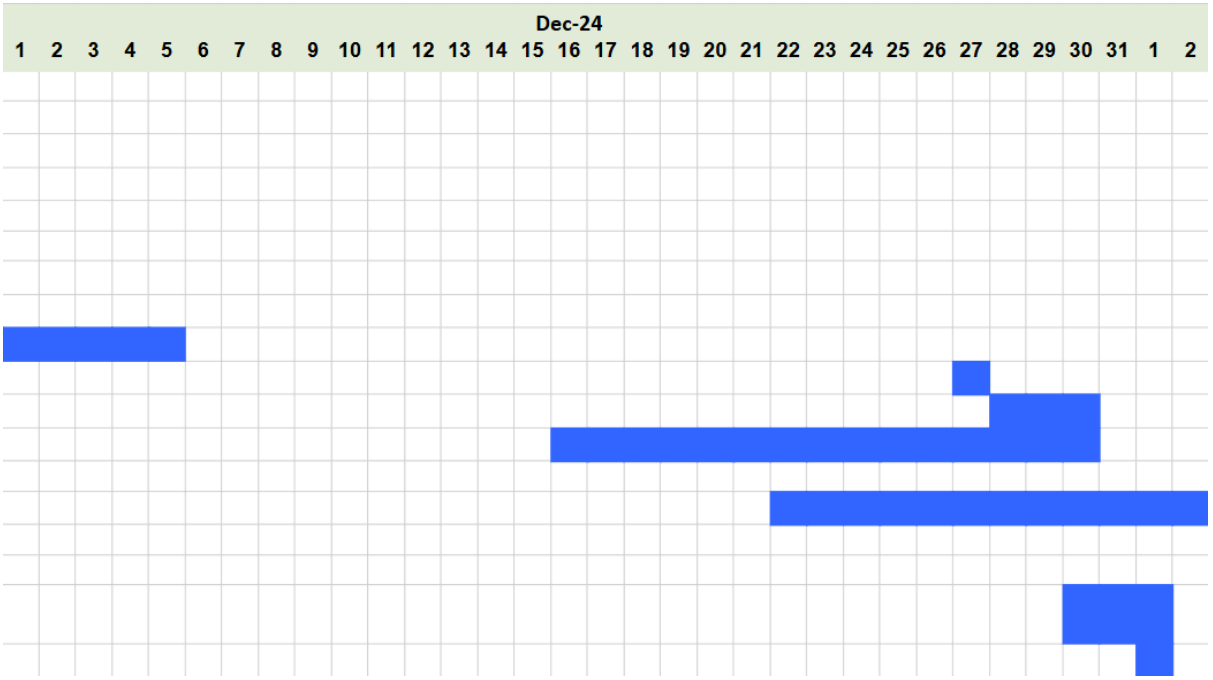
Dave is the scrum master. His responsibility is to ensure the project follows the sprint goals. Also, he makes sure the project follows the schedule planning.

Timeline

https://docs.google.com/spreadsheets/d/1IjYvhxIzBLkg2aiCIT9dgpIw3tdlZGVB/edit?usp=drive_link&ouid=103088795686433534654&rtpof=true&sd=true

Task	Description	Start Date	End Date	Duration (days)
1	**Research Requirement and Analysis**			
1.1	Identify user requirements	10/30/2024	11/1/2024	2
1.2	Sprint Planning	10/30/2024	11/5/2024	2
1.3	Define questions for first client meeting	11/3/2024	11/5/2024	3
2	**Design**			
2.1	Design app features	11/2/2024	11/7/2024	6
2.2	Flowchart for entire system	11/4/2024	11/10/2024	7
2.3	Low-fidelity Prototype	11/30/2024	12/5/2024	6
2.4	Use Case Diagram	12/27/2024	12/27/2024	1
2.5	Flowcharts for each service	12/28/2024	12/30/2024	3
2.6	High-fidelity Prototype	12/16/2024	12/30/2024	15
3	Project Plan Documentation	12/22/2024	2/1/25	12
4	Presentation Video			
4.2	Add button hover effect in Figma for the presentation	30/12/2024	1/1/25	3
4.1	Take Video	1/1/2025	1/1/25	1





Research

In the google play store, it found that if the apps only have tracking functions, they probably have a lower rating. (e.g. Sports Tracker [4.1 / 5.0], ASICS Runkeeper [4.1 / 5.0]). Those apps with high ratings (e.g.Fitness App-Muscle Gym Workout [5.0/5.0],Stronglifts Weight Lifelong Log [5,0/5,0]) can allow the user to customize the activity. As a result, our apps allow users to customize their workout plans in great detail. There are different parts of body training that we categorize. (e.g. chest \ Shoulder). Also, categorize exercises into warm-up, weight training, and stretching. There are some exercises that allow the user to choose which equipment to use (e.g. band).

Meanwhile, the sports apps on the Google Play store are specialized in one area of exercise. For example, stretching apps (e.g. Flexibility & Stretching), running apps (e.g. Zeopoxa Running), weight training apps (e.g.MuscleBooster). The differentiation of our app is that we include all of these exercises in our app. Beginners may want to do a particular exercise but do not know its name. They can then find the exercises in our app by watching the actions of the exercises.

Proposed Solution

Project’s solution

For this project, we propose designing and developing a Resistance Exercise Mobile App that caters to the needs of general users who want to improve their physical and mental health. The app combines features such as predefined workout plans, customizable activities, recorded completed activities, gamification, friending and privacy settings. The app allows users to personalize activities if they are intermediate fitness enthusiasts who understand the flow of exercises and want to make it as their preferences and needs. The app also has a detailed customized workout function as well as gamification to encourage users to keep using it during workout.

Methodologies

To make sure all these tasks are conducted stably and consistently, we use Agile Project Management to manage our sprint backlog which includes some tasks in the following Work Breakdown Structure.

Work Breakdown Structure(WBS)

1 Planning and Requirement Analysis

- 1.1 Obtain client requirements through meetings
- 1.2 Clarify client needs

2 Defining Requirements

- 2.1 Functional requirements (shown on Trello)
- 2.2 Non-functional requirements (shown on Trello)

3 Designing the Product Architecture

- 3.1 Program Design (refer to “Flowchart”)
- 3.2 UI Design (refer to Figma: https://www.figma.com/design/YgzlW25d6M77GmqhL4T23c/Computer-Science-Group-Project?node-id=0-1&t=A9QQBuVynMhCFIJ8-1)
- 3.3 Gamification Design

4 Building or Developing the Product

- 4.1 Frontend Development
  - Using Java in Android Studio.
- 4.2 Backend Development
  - Using SQLite to store users’ health data. (Details refer to “Resource Plan”>Equipment>Backend)

5 Testing the Product

- 5.1 Usability Test
- 5.2 Functional Test
- 5.3 Performance Test

6 Deployment in the Market and Maintenance

- 6.1 Establish the servers and the backend environment for deploy

Resource Plan

Human:

Development team consists of 2 persons. Bruce is the product owner. Dave is the scrum master.

Financial:

HKD680 / month for renting the cloud server

Equipment :

Frontend : Using Java in Android Studio

Backend : SQLite is used since the client had previously stated that the health data should be saved on users＇own mobile device. The flow is: use SQLite to save the user data (including health data). Then use Retrofit to send JSON. After that, use Spring Boot to receive JSON. Use MSSQL for the “Friend Management”function. Thus, SQLite and MSSQL communicate through a Spring Boot RESTful API.

Risk Management

We must predict that some task wouldn’t work or may not be fulfilled during development.

Currently, we lack the mature skills to develop an automatic system that is used to customize an activity template based on user input and system mechanism. We expect we need to consume much time to learn this technology that may cause schedule slippage. So we decide to implement it as a last task or an unnecessary task.

Another project risk is one of the key developers may unexpectedly fall ill and is unable to contribute to the project for an extended period. To make sure that another member is aware of all tasks and responsibilities, we use a project management software (Trello) to share a work board, including explaining what task was fulfilled, what the recent task was doing, and what has been modified in the task. While programming, make sure comments are written above every method, variable, and any codes for the elaboration.

On the other hand, there are security risks in programming the apps. For example, if the users’ password is stored in plain text, then anyone with access to the database can see all the passwords directly. To avoid this problem, we hash the password and the salt. This practice can avoid the rainbow table attack effectively. Therefore, the people with bad intentions do not easily get the password of the users.

Communication Plan

Maintain weekly meetings with the team and scheduled meetings with the client on a regular basis.

Use Trello to record all the sprints, minutes, to do list, ... , etc.

Use Github to sustain version control.

Quality Management

Quality Control Planning

Regularly review outcomes to ensure they meet the client's needs. The app must comply with ISO 25010 software quality standards(refer to Appendices), focusing on interaction capability, reliability, and security.

Quality Assurance

Regular sprint review in Scrum for quality assurance.

Peer review for code and design documents to ensure that the deliverables are effective and followed consistently.

Quality Control

Conduct UI/UX testing (non-functional testing) to ensure intuitive design meets client’s requirement and expectation.

Perform functional testing to ensure workout tracking work as expected.

Use automated testing to ensure no bugs and achieve user’s need and preference when creating an activity via system mechanism.

Quality Improvement

Use user feedback to refine features after the first release.

Use PDCA Cycle (Plan, Do, Check, Act) methodology.

(These 4 main components of Quality Management are with reference to https://info.docxellent.com/blog/main-components-quality-management)

Monitoring and Evaluation

Monitoring

Create a Trello kanan board for tasks and categorize them into “To Do”, “Doing”, “Done” so the development team can refer to it frequently.

Evaluation

Quick and Dirty Evaluation:

Let other people comment on the high-fidelity prototype. It is to see whether they feel the operation is inconvenient.

Usability Testing:

Let other people perform tasks to see whether they use the app as expected and improve features according to their feedback.

Budget

HKD680 / month renting the cloud server fee (“Business Server” plan). The microsoft SQL expression edition installed in this cloud server.

(https://www.communilink.net/p192-en-dedicated_server_plan.html)

Approval Process

Show the low fidelity prototype and high fidelity prototype to the client to ensure that the app features meet the client's requirement and retain improvement for the app design via client’s feedback. Let the client comment on them. We keep on communicating our ideas with our client.

Change Management

In Java programming in Android Studio, we will use the Liskov Substitution principle (LSP) to design the “Inheritances”. Therefore, use extends rather than modification, which also adheres to the principle of Open-Closed Principle(OCP). The goal is to write once and update all when dealing with changes.

Closure and Evaluation

Closure Steps

1 Final Deliveries

Ensure that all final deliveries to clients are made. Client signed the User Acceptance Test (UAT).

2 Post-implementation Review and Lessons Learned

Hold a team meeting to review the project and discuss with teammates about the lessons learned.

3 Handover to the client

Ensure that the client has all the resources they need, such as the source code, deployment manuals, instructions on how to configure the backend, and app user guide to instruct client how to use the app.

Appendices

- Reference apps design: Home Workouts, Workout Women, Strong, Habitica
- ISO 25010
  https://cdn.standards.iteh.ai/samples/35733/2ca18b477b7845a5b8cae39d6de0c098/ISO-IEC-25010-2011.pdf
- 4 main components of Quality Management

  https://info.docxellent.com/blog/main-components-quality-management

- Renting the cloud server plan

  https://www.communilink.net/p192-en-dedicated_server_plan.html

- Our Figma link (High Fidelity Prototype)

  https://www.figma.com/design/YgzlW25d6M77GmqhL4T23c/Computer-Science-Group-Project?node-id=0-1&t=A9QQBuVynMhCFIJ8-1

- Our Trello link for Sprint Backlog

  https://trello.com/b/X2IkEjjQ/group-proj-fitness-workout-mobile-app

- Our Github link

  https://github.com/hkuspace-pu/comp2003hk-2425-group10

- Youtube link of Mobile App Demo

  https://www.youtube.com/watch?v=5kT0iKV5nk4