ADVANCED PROGRAMMING FOR MOBILE DEVICES COMP09078

Abstract

Gym Buddy was created to assist those people who visit the gym regularly. It was designed for those that want a simple, easy to use app to create their own bespoke workouts.

Darren Hall, Yu-Ching Ho

19/03/2018

Contents

Background

Overview:

This app will be a gym - workout app. This will be a very lightweight app which allows users to enter in their own workout routines, and progress will be tracked so the user can see a graph chart of their own progression.

Currently, most gym apps are to help beginners start some default workout routines and has a lot of information, videos and descriptions of the exercise. However as someone who knows their routine and doesn't need the extra information, gym apps become very restrictive and bloated. Additionally, many of the android apps do not have a converter and their default weight is in pounds.

Users can provide personal details like their weight, height and BMI (body mass index). Then the user selects which day or days they would like to work out and have the option of switching between workout routines every two weeks or month or however long they select for: Workout Routine A for January, Workout Routine B for February, A for March, B for April, etc.

For each day selected, a new table will appear with as many columns and rows wanted. The only default value (which can also be changed globally) is the number of sets. An example table is shown below.

Day

No. of Sets	Repetitions	Exercise	Exercise Weight
3			
3			
3			

As the user enters in their own values, the final save will set a baseline for each exercise entered, and then users will be able to copy exercise days or create entirely new ones. The purpose of syncing with the phone's time is so each time the user opens the app, switching to the correct exercise day will be automatic and to record the daily data for each exercise.

When the user changes an exercise's number of sets, repetitions, weight, etc. the change is stored. Additionally, the user can select any two value headings to generate a plot graph, like user weight vs repetitions, or exercise weight vs time (date to date). For example – deadlifts is started off at 50kg and every two weeks, the user increases by 5kg. After two months, deadlifts will now be recorded at 70kg and the user can click to see the plot graph generated, showing their weight progression and days gone.

Requirement Analysis

Must have data tables for:

1. User age, weight, BMI automatically calculated o Option to weigh self again with a reminder notification every month or etc.
2. In KG or Lbs., but can also change weight for a singular exercise if required
3. Days going, and time on the day for notification reminder on that day
   o Notification reminder will have “yes” or “no”. If “no”, user can select which excuse like ill, lazy or enter their own excuse.
   o Syncing up with phone’s time so user won’t have to manually select the day
4. Group several exercises together as a super-set
5. Number of sets has a default value set and can be changed
6. Number of repetitions can have a default value and can be changed
7. Exercise name, weight
8. Any cell can add time in seconds or minute
9. Option to checkbox the exercise.
   o Superset exercises count as one exercise, but can edit individually.
   o When all exercises are check boxed, a “done for day” button will appear. If clicked yes, the day is saved and recorded.
10. Graph generation

Nice to have:

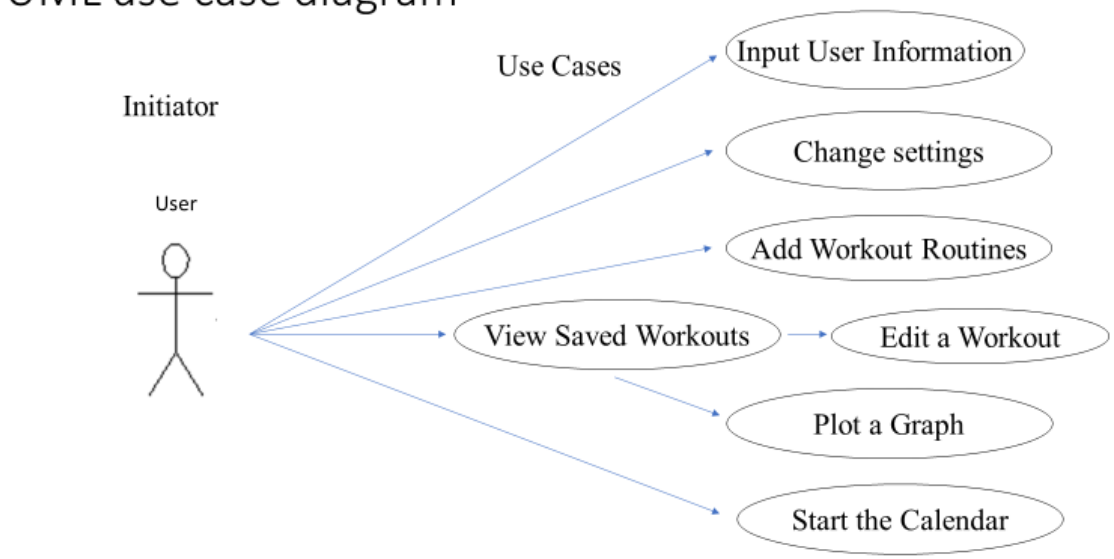
11. If user enters in a time value, can start the timer right there. Timer will have initial five second countdown.
12. When plotting the graph, the phone will be forced into horizontal or vertical view depending on how the graph is best viewed as
13. Able to zoom into the graph, click on the data values and see which day it was
14. Able to see gifs for a quick reminder of what the exercise is
    o for the most common exercises
15. Signing in with Google/Dropbox/etc. so can export the data as CSV files for backup o Backup will sync automatically

Boundaries and Project Scope

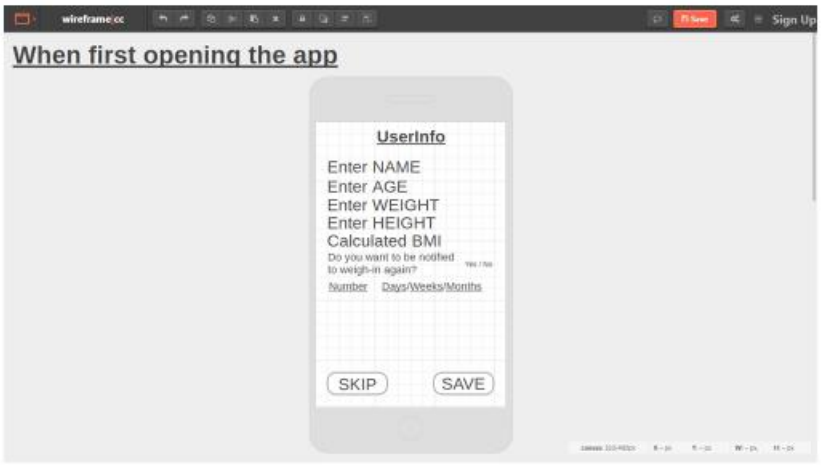
Taking into consideration our skills and notional effort, the majority of the time will be making sure the graphs and notifications work. If those are done fairly quickly, the next major task will be local and online backup, since the database will fill up very quickly and take up a lot of space on the user’s phone if precautions are not put into place.

Prototype Design

UML use case diagram



User Information



User Information Description

- The user can skip this section.
- User enters their details.
- When “weight” and “height” is entered, the BMI is automatically calculated.
- The user can choose to be notified to weigh themselves again every user-defined time period.
- The user can save any changes.

User Settings

User Settings Description

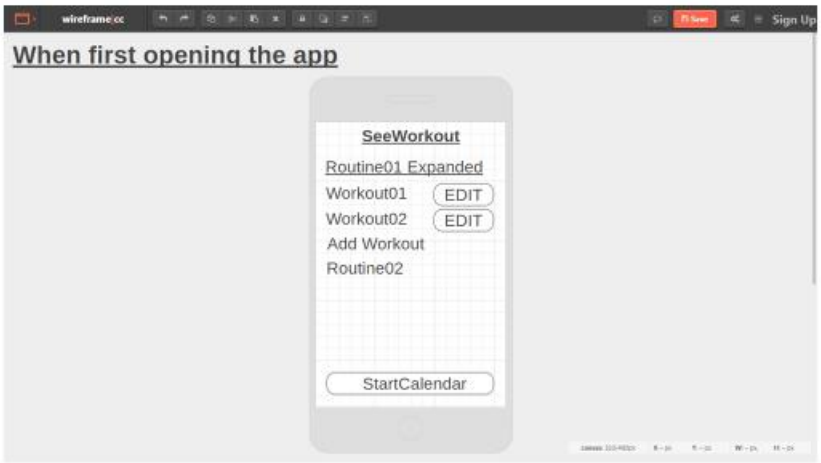
- The user can select their main weight unit. Later on in the app, the user can specify using the other unit, otherwise the default will be what the user selected.
- The default number of sets and reps is 3 and 10. However, the user can redefine the default numbers. Later on in the app, the user can delete the default number set in the cell and set a new number.
- The user can save any changes.

Adding Routines

Adding Routines Description

- The user can skip this section.
- If they do want to add a Routine, they press the “Add Routine” button. The minimum number of Routines is 2.
- After changing the name of a Routine, the user can “Edit” to move to the “View Saved Workout”.
- The user can then define how long the time period is after moving down the list of Routines.
- The user can save any changes.

View Saved Workout



View Saved Workout Description

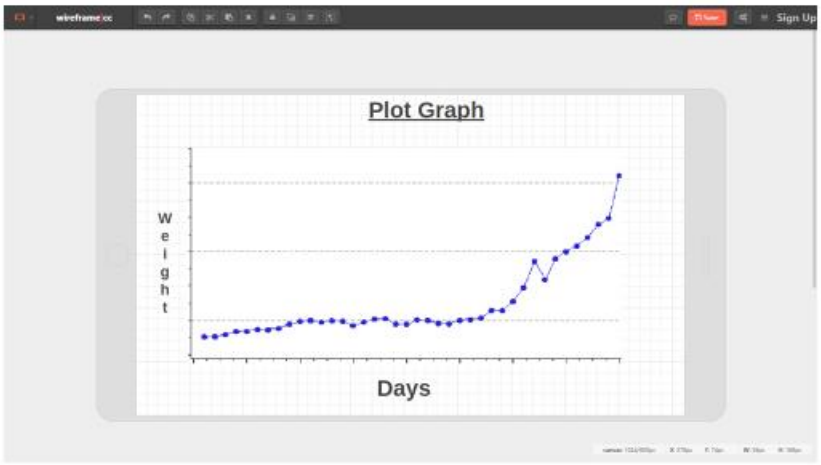
- If the user has made any Routines, the Routine names will be displayed in a collapsible menu.
- The user can open the menu and add Workouts to the Routine.
- If the user doesn't have any Routines, Workouts will just be displayed as a list.
- The can edit the name of a Workout, and press "Edit" to move onto "Edit Workout".
- When the user has all their Workouts made with days set for each one, the user can press the StartCalendar button.

Edit Workout

Edit Workout Description

- The user will see the name of the Workout.
- The user can set a day and time for this Workout to be notified.
- A pre-defined table will be set, and after entering “Edit Mode” with the Edit Button, any cell data value can be changed to suit the user’s requirements.
- In any cell, time (minutes, seconds) can be added. After all changes have been saved, the user can start the timer for a countdown to begin.
- When the user is not in “Edit Mode”, the user can select a row to “check” that it is done. The user can also press the “Workout Done” button to “check” all of the Workouts.
- When the user is not in “Edit Mode”, the user can select the “Plot Graph” button. The user can then select any two table headings for the x and y axis and move to the “PlotGraph” page.

Plot the Graph



Plot Graph Description

- After the user has selected two table headings, a plot graph will be generated.
- This is to give a visual representation of the user's progression.

Start the Calendar

Start Calendar Description

- After the user has all their Workouts made with days set for each one, the user can press the StartCalendar button.
- This will make the application read the phone's day and time and jump to the correct Workout.
- Every time the application is reopened, the correct Workout for that day will be displayed. This is so the user does not have to manually select the Workout.
- If the user has made any Routines, the application will read the date so the Routines and Workouts will update correctly.

Use-Case Diagrams

LaunchApplication
ID: 01
Actors: User
Preconditions: Application installed.
Flow of Events: 1. User taps on Application icon. 2. Application loads. 3. <<include>> UserInfo. 4. Use-Case Ends.
Post Conditions: UserInfo is displayed

UserInfo
ID: 02
Actors: User
Preconditions: Application launched.
Flow of Events: 1. Phone displays UserInfo. 2. Can skip. 3. Can enter in age, weight and height. BMI is automatically calculated. a. Choose to be notified when to be re-weighed. b. Choose number + Days, weeks, months. 4. Save. 5. Use-Case Ends.
Post Conditions: Proceed to UserSettings

UserSettings
ID: 03
Actors: User
Preconditions: UserInfo skipped or saved.
Flow of Events: 1. Select main weight unit: lbs or kg. 2. Change default number of sets from 3. 3. Change default number of reps from 10. 4. Save. 5. Use-Case Ends.
Post Conditions: Proceed to AddRoutines

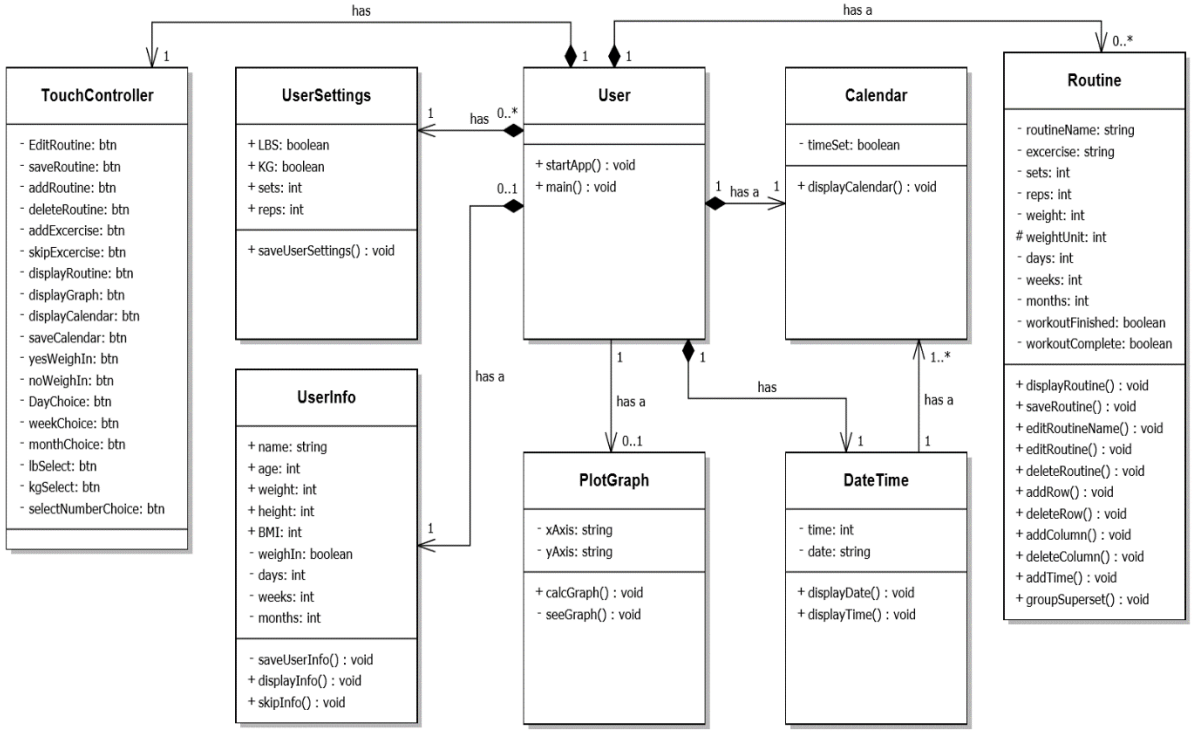
AddRoutines
ID: 04
Actors: User
Preconditions: UserSettings saved.
Flow of Events: 1. Can skip 2. Can edit name of Routine01 and add Workouts. 3. Can edit name of Routine02 and add Workouts. 4. Add new Routines and change its name. 5. Change the number of days/weeks/months for the rate to progress through the routines. 6. Save. 7. Use-Case Ends.
Post Conditions: Proceed to SeeWorkout

SeeWorkout
ID: 05
Actors: User
Preconditions: AddRoutines skipped or saved.
Flow of Events: 1. If Routines a. See Routine names b. Click to expand Routine to see Workouts. 2. See Workouts with day and time. 3. Select Workouts. a. <<include>> EditWorkout. 4. Can add Workouts. 5. Can press the StartCalendarButton when user finished editing everything. 6. Use-Case Ends.
Post Conditions: Proceed to EditWorkout or StartCalendar

EditWorkout
ID: 06
Actors: User
Preconditions: Workout selected or new Workout to add.
Flow of Events: 1. See what Routine this Workout is in. 2. See Workout table. 3. Can Edit a. Select days(s) and time of Workout, option for alarm notification. b. Edit name of Workout. c. See pre-generated table of sets, reps, exercise and weight. d. Can enter new cell data. i. Keyboard will pop-up for data entry. ii. Property cells above keyboard select to add time or change weight unit. e. Can group rows to create superset. f. Can remove columns/rows. g. Can add more columns/rows. h. Save. 4. Can tap row to "check" the Workout is finished. 5. Can click to start any timers. 6. Can click for graph. a. Select value headings to be plotted against each other. b. Confirm and generate plot graph. 7. Check to complete Workout day. 8. Use-Case Ends.
Post Conditions:

StartCalendar
ID: 07
Actors: User
Preconditions: Application installed and launched. UserInfo skipped or saved. UserSettings saved. AddRoutines skipped or saved. StartCalendarButton pressed.
Flow of Events: 1. If Application launching after exiting. a. Read system time and application's calendar. b. Jump to correct (Routine and) Workout day. 2. <<include>> EditWorkout. 3. Use-Case Ends.
Post Conditions:

Class Diagrams

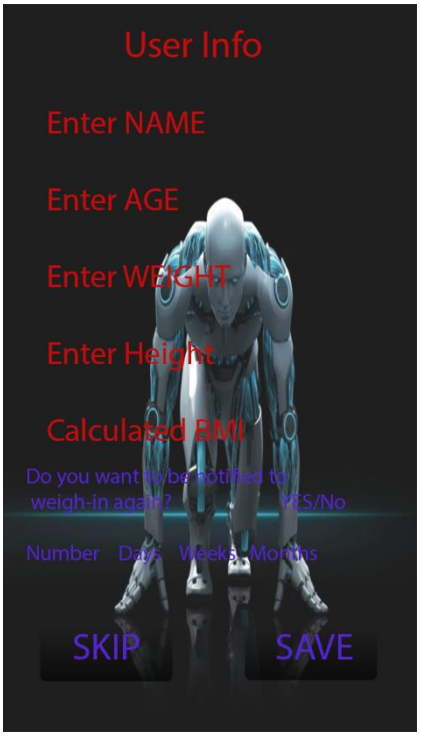


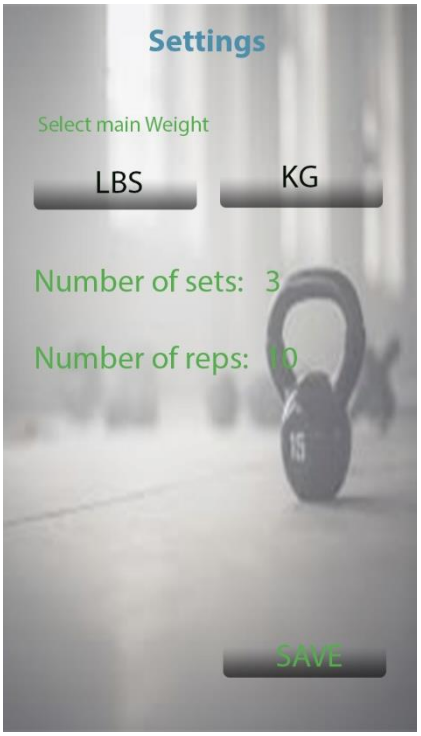
Prototype Development

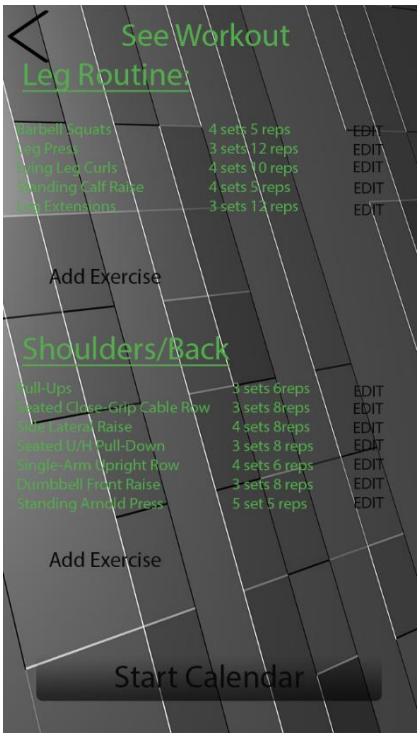
This prototype was developed using the Invision application. This enabled us to be able to build a prototype that allowed the application to flow as it was intended. This prototype has a URL link that can be used to view the prototype and see the work we put into this project.

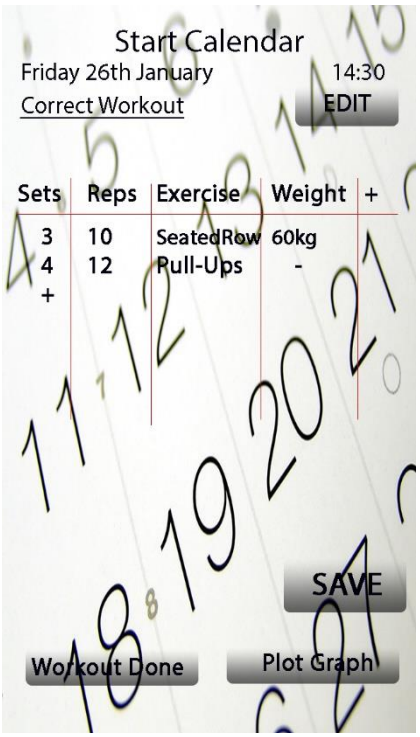
Link: https://projects.invisionapp.com/m/share/JS71321314335D

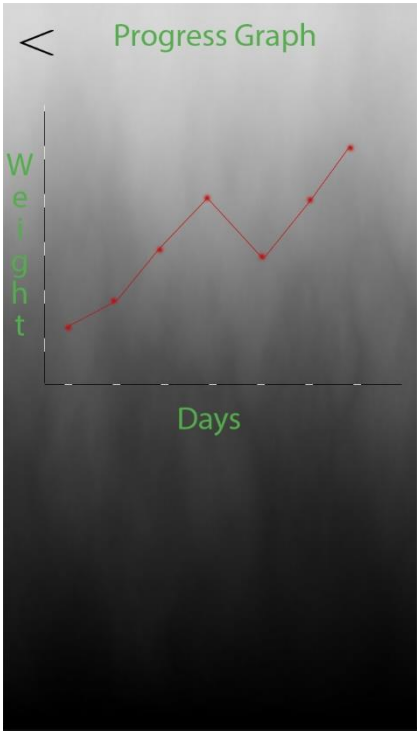
Screenshots from Prototype

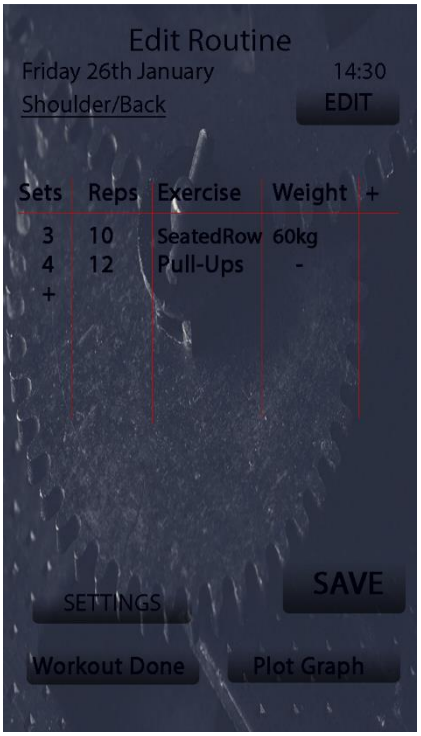





See Workout
Leg Routine:
Barbell Squats 4 sets 5 reps EDIT
Leg Press 3 sets 12 reps EDIT
Lying Leg Curls 4 sets 10 reps EDIT
Standing Calf Raise 4 sets 5reps EDIT
Leg Extensions 3 sets 12 reps EDIT
Add Exercise
Shoulders/Back
Pull-Ups 3 sets 6reps EDIT
Seated Close-Grip Cable Row 3 sets 8reps EDIT
Side Lateral Raise 4 sets 8reps EDIT
Seated U/H Pull-Down 3 sets 8 reps EDIT
Single-Arm Upright Row 4 sets 6 reps EDIT
Dumbbell Front Raise 3 sets 8 reps EDIT
Standing Arnold Press 5 set 5 reps EDIT
Add Exercise
Start Calendar


Start Calendar
Friday 26th January
14:30
Correct Workout
EDIT
Sets Reps Exercise Weight +
3 10 SeatedRow 60kg
4 12 Pull-Ups -
+
SAVE
Workout Done
Plot Graph


Progress Graph
Weight
Days


Edit Routine
Friday 26th January
14:30
Shoulder/Back
EDIT
Sets Reps Exercise Weight +
3 10 SeatedRow 60kg
4 12 Pull-Ups -
+
SETTINGS
SAVE
Workout Done
Plot Graph

Android Studio

Gym Buddy was developed using Android Studio, this choice was made as we both have had previous experience with this software. Android Studio is Android's own official IDE. This means it was purpose built for Android to help aid developers create high quality Android applications specifically for Android devices. Android Studio has many features that make app development easier, some of these are:

- Instant Run
- Intelligent Code Editor
- Fast and feature-rich Emulators

The emulators that come built-into Android Studio allow applications to be developed for various types of devices like tablets, smartphones, android wear, and android televisions. Emulators allow testing of the application on all these different devices without the need to purchase any of them.

SQLite

This application involves storing data, we decided to use SQLite for this and although there are many alternatives to the one we used, we found this one worked in-line with Android. SQLite is an open source SQL database that will allow you to store data to a text file on a device. This allows each user to store their own details on their own devices which allows no risk to data integrity working this way. Android Studio comes with SQLite already built-in, and supports relational database feature.

Testing

Design and Testing Plans

The Functionality list:

- Create list of gym exercises
- Store them in a database to be retrieved whenever needed
- Function to calculate the users BMI
- Group exercises together for the day gym is visited
- User can generate their own bespoke exercise and store it within the database
- User can add specific weight to their gym exercise
- User can add number of reps and sets to the routine
- Default reps and sets available, but can be changed to user specification
- Graph generation of user's own details
- Add further exercises into each day specified
- Delete any exercises that need removed from the routine

These are the list of the functions that were intended to be part of the overall application. Most of these functions have been implemented, however there are a few that were unable to be added due to time complexity. These changes bear no overall effect on the functionality of Gym Buddy.

Use-Case Comparisons

There are some differences throughout the Use-Case diagrams, as to what was developed in the application.

- The user can add data to a routine, but instead of storing them as routine names, we felt it best to store them through days if the week.
- There was no need to have update for a specific exercise, as there were only small amounts of data to be altered. We decided this was an unnecessary feature.
- Delete was moved to the table view, and we had a delete button beside every item that was created. This was added programmatically rather than using the XML format. This allowed easier integration to the application, where connection to the SQLite database was mandatory.
- The settings page was an unnecessary option, as we found most gymnasiums work in Kilograms when it came to their weights selection. Removing this was best to avoid any confusion.
- The view for each routine doesn't have any connection to a calendar, this was mainly due to time complexity. This feature will most likely be featured if more time were permitted.
- The BMI calculator functions correctly, however in the Use-Case diagram it was required to notify the user on weigh in days. Giving them options for an alarm to be set. This feature would have been linked in with the calendar, which would be added if time had permitted.
- The last thing that time did not permit was the Plot Graph Feature This would have been a feature that would have been implemented if time had permitted. This optional feature could be added to the application later.

White Box Unit Testing

Action Performed	Expected Results	Actual Results	Any Errors? Yes/No	Changes required to solve errors	Remarks	Was it Rectified? Yes/No
Click on the application icon	Application opens to splash screen for 3 seconds then loads the menu screen	Application opened to the splash screen, after 3 seconds it loaded the menu screen	No	n/a	n/a	n/a
Click the workout button	Loads up previously entered gym exercises	List of gym exercises appear on the page in a table view	No	n/a	n/a	n/a
Click on the dropdown menu	The menu drops down for selection	The menu dropped down	No	n/a	n/a	n/a
Select a day from the dropdown menu	The day selected will result in the table showing information for that day only	All data on the table was shown	Yes	The link between each day in the dropdown needs to be linked to the specific day from the database.	All data can be seen. Need to add this function at a later date.	No
Hold finger on the screen and move up and down	Enables scroll view of the gym exercises	Page moves up and down, allowing all exercises to be viewed	no	n/a	n/a	n/a
Press the delete button on a row	Deletes the exercise	The exercise got deleted	No	n/a	n/a	n/a
Press back arrow	Loads up the Menu screen	Menu screen loaded	No	n/a	n/a	n/a
Press the Add or Update my Workout button	Edit workout page loads	Edit workout page loaded	No	n/a	n/a	n/a
Press the dropdown menu for Day	All days of the week dropdown	All days of the week appeared in the dropdown menu	No	n/a	n/a	n/a

Press a Day in the dropdown menu for Days	The day will be selected	Day pressed appeared as a result in dropdown closing	No	n/a	n/a	n/a
Press the exercise text	Keyboard should appear	The keyboard appeared	No	n/a	n/a	n/a
Enter an exercise	The text entered should appear in the text box	Text did appear in the textbox	No	n/a	n/a	n/a
Enter an exercise that has a large number of characters	The table layout will fill the first line and take a new line to continue the rest on another	The long list of characters pushed the layout of the table out of proportion.	Yes	Add a restriction to the number of characters, or an alternate solution	This will need to be fixed if time permits	No
Press the number in the Reps option	The number pad should appear	The number pad appeared	No	n/a	n/a	n/a
Enter a different number in the Reps option	Number should change to the number selected	Number typed is now entered	No	n/a	n/a	n/a
Press the weight option	The number pad drops down below	The number pad appeared	No	n/a	n/a	n/a
Enter a number into the number pad	The number entered should appear in the weight selection box	The number entered appeared in the weight section	No	n/a	n/a	n/a
Press the add button	The data entered above should be added to the list, and a toast message should indicate the data was added.	The data was added to the list, and the toast message appeared	No	n/a	n/a	n/a

Press the view routine button	The table of entered exercises should be displayed	The list of data entered was displayed in a table view	No	n/a	n/a	n/a
Press the calculate BMI button	The page to calculate BMI should appear	The BMI page was loaded	No	n/a	n/a	n/a
Press the enter weight line	The number pad should appear below	The number pad appeared below	No	n/a	n/a	n/a
Enter a weight into the number pad	The number should appear in the weight line	The number appeared in the weight line	No	n/a	n/a	n/a
Press the enter height line	The number pad should appear below	The number pad appeared below	No	n/a	n/a	n/a
Enter a weight into the number pad	The number should appear in the height line	The number appeared in the height line	No	n/a	n/a	n/a
Press the calculate BMI button	The BMI calculations should be calculated and the results appear on the screen. Also, the toast message should show to indicate what category your BMI results are sitting at.	The BMI result showed below the screen in decimal form. Also, the toast message no showed what no category my no BMI was sitting in.	no	n/a	n/a	n/a

Black Box Unit Testing

Black box testing is when the user testing the application does not know the internal structure / design / implementation. The application was handed to two external people and this was the feedback:

Action Performed	**Remarks**
Clicked on the application icon	The three buttons could be more spread out around the phone.
Clicked the BMI button	n/a
Calculating BMI	Could put the BMI result in a different place so it is easier to see. Should add a “back button”.
Clicked the add workout button	Instead of “add or update”, could also put “create” so it would be clearer on what the button is for.
Selected the dropdown day	n/a
Added data to routines.	There could be a dropdown menu for the common exercises. The “reps” and “sets” data can also be edited. It wasn’t clear what weight unit it was.
Clicked the add button	The data could clear when the “add button” is pressed. Although this feature could be kept because then the current data could be added to more than one day.
Viewing the Workout Table	It is a bit squashed together. The option to select the day does not work. Should add a “back button”.
Other comments:	It is very nicely laid out, simple, clear, easy to use and very lightweight.

Resources

Books

Hello, Android: Introducing Google’s Mobile Development Platform (Pragmatic Programmers): Ed Burnette, ISBN-10: 1934356565

Effective Java Second Edition, Joshua Bloch, ISBN-10 0321356683

Data Structures and the Java Collections Framework, William. J. Collins ISBN 9780470482674

Software

http://nclass.sourceforge.net/

https://www.invisionapp.com/

https://www.adobe.com/uk/products/photoshop.html

http://sqlitebrowser.org/

https://developer.android.com/studio/index.html