Initial Document: A Multifunctional Fitness Application & Vertical Jump Height Calculator

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Contents

Chapter 1

Introduction

This document will outline the plan for development of a functional codebase for a fitness application. This process, herein referred to as "the project" is different to the application(s) produced as a result. The main difference is that the project is not concerned with the deployment, maintenance and future updates of the fitness application and no additional academic benefit is gained from creating the infrastructure or platform-specific functionality. This is to say that the creation of **both** a mobile and a web application is not needed for the project but makes up a core offering of the product for end users following deployment.

A **mobile** application will be produced during the project, which will have 2 main use cases:

1. A user will be able to pay (via monthly installments or upfront) for a fitness plan; where they can monitor, make notes and track their progress and routine via a calendar.

2. A user can create their own fitness plan by producing their own routine using available exercises on the app - the additional functions such as the calendar remain the same.

1.1 Motivations

The motivation for the project began following an initial consultation with a Californian NBA-level basketball athletic trainer who was looking for a bespoke application to reduce his business expenses. Initially, 4 days of planning and a 40-minute discussion took place before the business decided that the costs associated with building this platform are not a priority for the time being.

In the process of considering the development of said fitness platform, I spoke to developers working with smaller high-level sports trainers regarding the technology used and their clients future plans. At this time fitness influencers Krissy Cela and Jack Bullimore had proven the concept a year earlier with the rollout of "Tone and Sculpt" - grossing over GBP 1 million in the 8 months following its January 2019 release [1]. My initial desire to pursue a project in this space grew more after hearing the story and approach taken by "Tone and Sculpt" on the Diary of a CEO podcast [2].

In the world of athletic sports there is currently no viable, consistent and widely used means of measuring vertical leap besides the Vertec. Prices on these devices can be as high as £500 and cheaper alternatives commonly found at a youth/amateur level - that involve markings on walls - don't allow for an approach jump (without the risk of hitting the wall). This is being mentioned because a large motivation for the jump calculator functionality is to allow an easy and accessible means of measuring a users vertical leap progress. Naturally, the use of a smartphone for measurement is not completely accurate but will provide sufficient consistency (given the user's setup) and this can be used to monitor improvement.

From a trainers' perspective, using PDFs to release fitness plans is cumbersome and involves finding a suitable workflow and rollout. Further to the fact that they're easily copied and distributed. Existing white label mobile app solutions to these issues don't offer much customization beyond simple re-branding; many don't support video. Following discussion with fitness trainers in various countries (including the USA, UAE and UK) I concluded that this is something that needs to be addressed. Many robo-fitness apps exist for end users, but few include real trainers and even less give freedom to the administrator.

In summary, the motivation for the project is to give a customizable fitness planning solution to those interested in monitoring their training. This solution should be usable by administrators (trainers/teams), average "gym go-ers" and highly trained athletes alike. The global fitness app market size was valued at USD 4.4 billion in 2020 and is expected to expand at a compound annual growth rate (CAGR) of 21.6% from 2021 to 2028 [3]. We can see that the total addressable market is huge and set to grow quickly, if this is any indicator of the volume of potential users looking for a fitness solution then the proposed project should prove tremendously useful at solving the aforementioned problems.

1.2 Overview & Aims

The projects aims include the following - some of these aims will be broken down into succinct functional and non-functional requirements in Chapter 3:

- The ability for a user to plan their workouts on a calendar.
- The ability for a user to track the progress of a workout.
- The ability for a user to measure their vertical leap using their phone.
- Allow users to keep track of their progress in relevant areas such as weight, strength measurements etc. more efficiently than traditional methods.
- Allow trainers to comfortably deliver fitness plans to clients without a steep technical learning curve.

The core overview of the project is that we're looking to develop a mobile application that allows a user to register an account before having the ability to follow/create a fitness plan and provide relevant tools for consistency and the successful reach of a users goals (irrespective of their background). The project aims to focus on the end user[1] however considerations will be made for the complete implementation of an administrator role (time permitting).

The project is concerned with the ability to solve both parties problems through the development of the application, but the primary focus is on the development of the core functionality and the vertical jump calculator. From a business perspective we can consider the jump calculator the unique selling point of *the product* and a complex component of *the project*.

[1]The user training using the app

Chapter 2

Project Research

We've previously seen that "Tone & Sculpt" is an existing similar application on the market. Below we'll consider other background research on existing systems and their functionality.

The bulk of fitness mobile applications fall into 2 categories:

1. Applications which allow fitness enthusiasts to monitor their training and nutrition - the market leaders in this space (by monthly active users) are "Fitbit" and "My Fitness Pal" (as of March 2018) [4].

2. Applications which allow trainers to facilitate the delivery of programmes either by partnering with the development company or white labelling software. These are apps focused on trainers more than end users - the most notable player in this emerging market would be "TrueCoach", who raised USD 2.6 million in seed round funding before being acquired by TSG (Transaction Services Group) in April 2020 [5]. Estimated revenue over USD 1.2 million (from 20k users) for 2021 [6].

We can see the main difference in these groups are that the focus of the former is B2C (business-to-consumer) services whereas the latter focus on B2B (business-to-business; often acting as SaaS companies). This is an important distinction as *the project* is looking to combine elements of both and so the following research will reflect this.

We'll also look at vertical jump calculators and the mathematics involved in developing something of that nature.

2.1 Existing fitness application systems

We'll look at 4 systems, 2 from each of the aforementioned application groups. Here it is worth mentioning that some apps are on the borderline such as "Centr by Chris Hemsworth". The app follows a B2C approach but is marketed and part-owned by Chris Hemsworth, with his trainers being the facilitators of programmes and nutrition plans. A similar approach to the aforementioned "female-focused Tone & Sculpt". Because cases like these are not relevant to the application being built for the project, we will not look in any depth at these.

For each of these systems we'll be looking at:

- A typical user story for the given application.
- A high-level breakdown of the system(s) functionality.
- A look at the technology in use (where possible).

We'll then compare the applications (in pairs) to see any unique features and to understand which functions are seemingly core to a positive user experience in the fitness application space.

2.1.1 MyFitnessPal

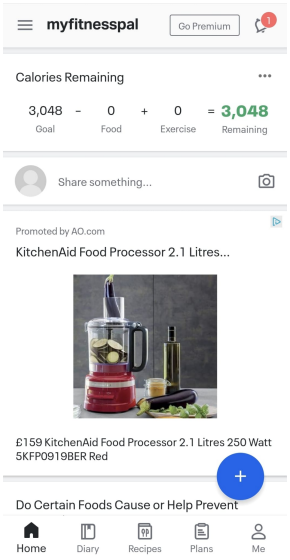

Figure 2.1: Homepage feed

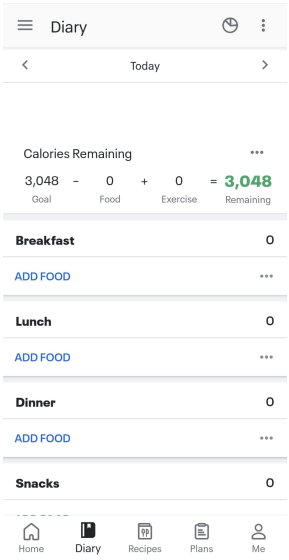

Figure 2.2: Food diary & calorie counter

User Story

"As a fitness enthusiast, I sign up to the app via email. I wake up every day and log my breakfast by scanning barcodes for my food. This is accounted for in my daily food tracking (Fig. 2.2). After breakfast I create a new workout based on advice from my community or homepage, I search for the exercises involved and log my workout later on in the day (Fig. 2.5)."

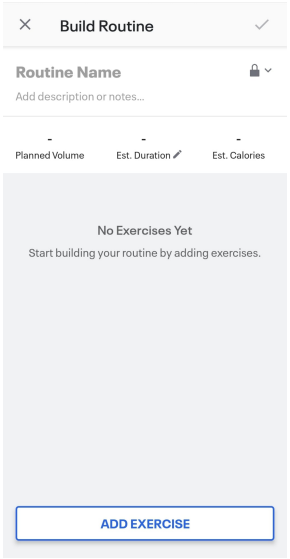

Figure 2.3: Custom workout routine

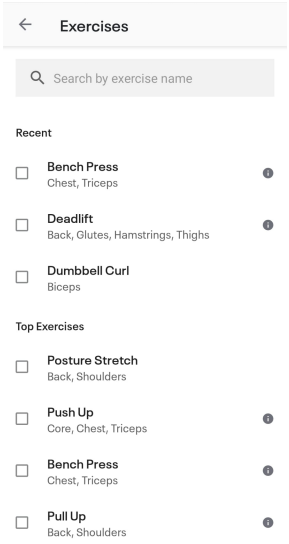

Figure 2.4: Selecting exercises

Figure 2.5: The custom workout routines in MFP

Features/Functionality

MyFitnessPal includes all of the following features:

- Estimate calories burned given a set of exercises/a routine.
- Track food intake via barcode scan or recipe input.
- Track water.
- Workout plans provided by MFP.
- Track weight.
- Create custom workout plans from existing exercises.
  - Exercises don't include video/images and no ability to add custom exercises.
  - These can be shared publically to dashboard.

- Count steps (using compatible devices).
- Add friends and send/receive messages.
- Community tab (requires separate signup).
- Export progress as CSV.
- Meal and weight tracking reminders (via push notifications).
- Set workout/week, minutes/workout and "calories burned" goals.
- Discover recipes/meal plans via community and MFP suggestions.

Technology Stack

MyFitnessPal uses the following technologies according to Stackshare [7]:

- React (a JavaScript framework for creating cross-platform applications)
- Cloudflare (for web infrastructure)
- NginX (for server side use)
- Vanilla JavaScript and CSS + libraries (jQuery, Bootstrap)

Various other technologies are being used on the server-side but for *the project* we are primarily concerned with the technology used for the application as opposed to the backend infrastructure.

2.1.2 Fitbit

Fitbit is the app that accompanies many of the Fitbit brands' hardware products, their first movers advantage was likely a large contributor towards their large market share (in 2018)[1] in the application space. The functionality of their hardware products (which had been the standard for fitness tracking wearables) is enhanced through use of the app. The research will consider the application alone and disregard any wearable-specific functionality.

[1] Q3 2020 wearables market share = 2.6%[8]

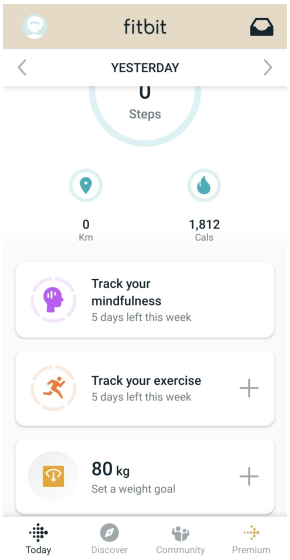

Figure 2.6: Dashboard

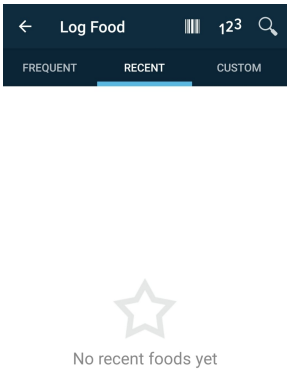

Figure 2.7: Food log screen & features

User Story

"As a professional athlete I wake up, go through guided meditation on my Fitbit calendar before weighing myself (Fig. 2.6). I then log my breakfast and eat (Fig. 2.7), followed by my commute to practice and logging my sport and duration (Fig. 2.8)."

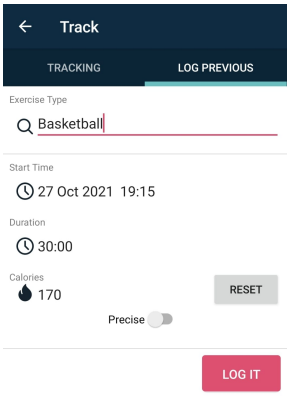

Figure 2.8: Using exercise search & log

Features/Functionality

Fibit includes all of the following features:

- Guided meditation (w/ simple week-calendar scheduling).
- Guided video workout plans (w/ simple week-calendar scheduling).
- Guided programmes (for meeting targets in health, not just fitness).
- Challenges (1-10 people, gamifying targets).
- Water tracking.
- Food tracking.
- Track exercise (only by sport/activity, no custom option and no individual exercises/routines).
- Step counter.
- Community feed and groups.
- Add friends and send/receive messages.

Technology Stack

Fitbit uses the following technologies according to Stackshare [9]:

- JavaScript(and Ember.js) for the front end.
- Fastly (for cloud content delivery)
- Redis (for middle layer and database caching)
- Node.js (for producing backend APIs)
- Java (and Spring) for the non-mobile applications
- MySQL (for the backend database(s))

Fitbit is cross-platform and multifunctional, thus there will be some technologies not in use by the mobile app we are researching. It's unlikely Spring is in use, but the use of JavaScript (w/ Node.js) for the front and backend is common in current world of software. It's highly likely the whole system is using a microservice architecture where components maybe used in several places.

2.1.3 Comparing MyFitnessPal and Fitbit

2.1.4 TrueCoach

TrueCoach provide a cross-platform system that includes a web application. We'll be considering the mobile app provided for end users and making reference to the functions available to administrators in the process. They provide a mobile app for each of these use cases - "**TrueCoach for Clients**" and "TrueCoach Connect" for trainers.

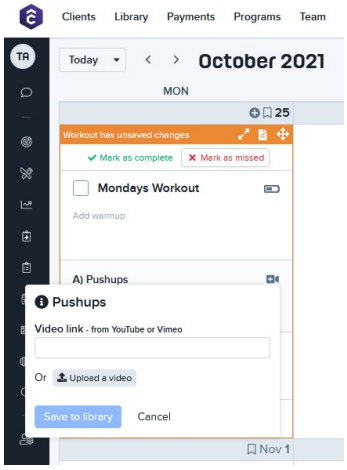

Figure 2.9: Trainer using web app to set clients workout(s).

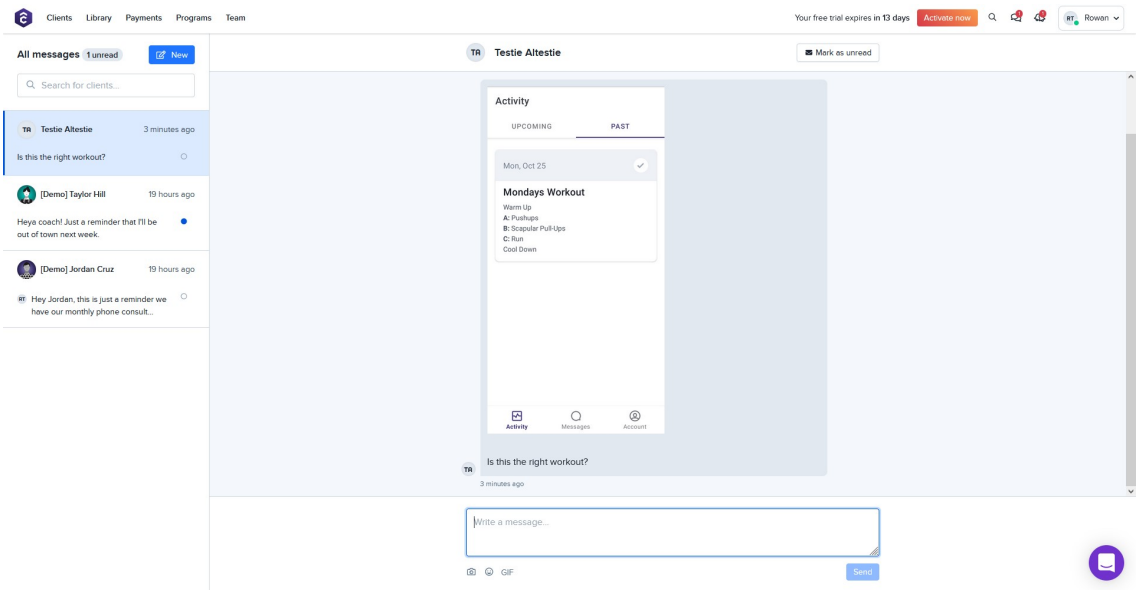

Figure 2.10: Trainer using web chat to manage clients.

User Story

"As a new gym go-er, I work remotely with my trainer (Fig. 2.12) to refine my training technique(s). I follow instructional videos before marking my workouts as complete and monitoring my progress via goals & challenges (Fig. 2.13). For advice I can view documents and progress photos in my settings page (Fig. 2.14)."

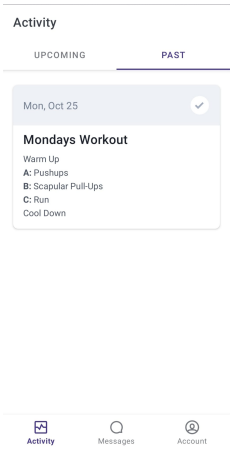

Figure 2.11: Viewing workouts (upcoming/past).

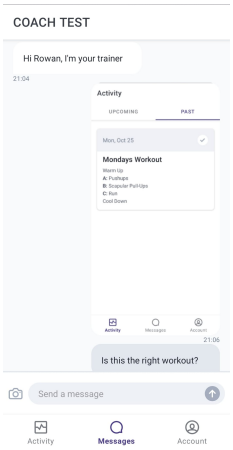

Figure 2.12: Instant messaging with a trainer.

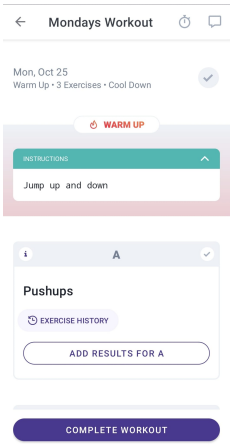

Figure 2.13: Logging a workout.

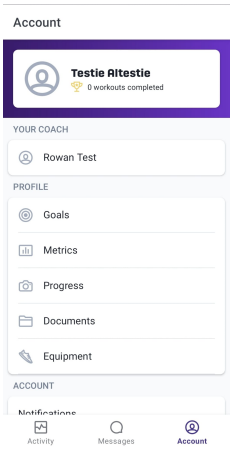

Figure 2.14: Viewing settings.

Above, "Testie Altestie" represents an end user and "Rowan Test" is the trainer. We can see the functions available to the user are dependent on the workouts uploaded/scheduled by the trainer using their interface (web application in this case).

Features/Functionality

"TrueCoach for Clients" includes all of the following features:

- Track coach's release of phased training (upcoming/past workouts).
- Log workouts (w/ notes).
- Timer & stopwatch function for tracking timed exercises.
- Video breakdowns of exercises (w/ rich text instructions).
- Instant messaging w/ trainer (including multimedia uploads).
- Tracking of progress via trainer-set goals & metrics.
- Progress and additional documents (outbound link to web app).
- Create account via invite link from trainer.

TrueCoach covers a lot of needs for a user, and we can see in Fig. 2.12 the relevant tools for the trainer to facilitate these workouts. They are administrators of their clients and they're the means by which a user gets login credentials. Trainers can upload relevant videos (Fig. 2.9) and documents, as well as provide metrics to measure users progress.

Technology Stack

Stackshare (as used for the previous apps) is not useful in this case, so the following conclusions have been drawn following the decompilation of the TrueCoach APK [10].

- Kotlin & Java (for Android development)
- AWS Amplify (for backend deployment)
- Firebase (for push notifications)

After decompiling and opening the class files using dex2jar and JD-GUI, I found that the application is not using a cross-platform JavaScript framework as is standard in modern times. The app is using the recommended native language of Kotlin[2] and Java for all data objects and frontend display.

[2]Learn more: android development documentation

2.1.5 Exercise.com

Exercise.com are the company providing the white-labelled solution behind PJFPerformance. We'll be using the **PJFPerformance** app to analyse their application.

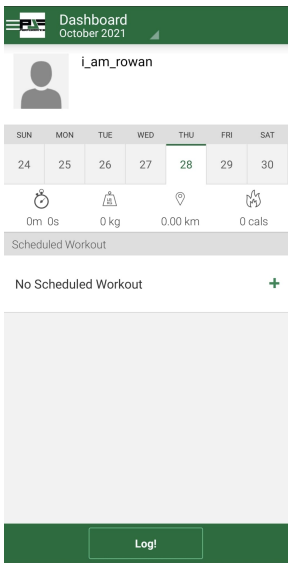

Figure 2.15: Home dashboard

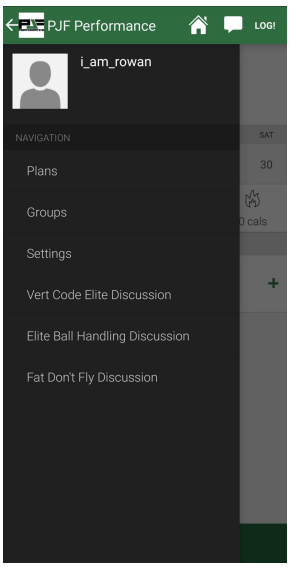

Figure 2.16: Sidebar menu options

2.2 Existing vertical jump calculators

2.2.1 Maths behind calculating vertical jump using video

2.2.2 FitnessMeter - Test & Measure

2.2.3 What's My Vertical?

2.2.4 My Jump 2

- HoopsGeek App
- Old ass iphone app
- MyJump2 itunes
- MyJump2 in use
- Maths

- Detailed maths courtesy of thehoopsgeek - legend

Chapter 3

Requirements

Chapter 4

Technology Stack & Considerations

Chapter 5

Project Plan

Chapter 6

Summary

Bibliography

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