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Fitness Friend



Group 12 Members

Jose Villamor-Delgado
Cody Goodman
Jie Huang
Kyle Raucci
Florian Pranata

Contents

1. Customer Statement of Requirements	4
1.1 The Current Need for Fitness.....	4
1.2 Health Data Analysis	5
1.3 Making Fitness Fun.....	5
1.4 Making Fitness Affordable	6
1.5 Ease of Use	6
2. Glossary of Terms.....	7
3. System Requirements Analysis.....	7
3.1 Functional Requirements Table	7
3.2 Non-Functional Requirements Table	8
3.3 On Screen Appearance Requirements	9
4. Functional Requirements	10
4.1 Stakeholders.....	10
4.2 Actors and Goals.....	11
4.3 Use Cases UC - 1: Visitor Registration (REQ -10)	11
4.4 Use Case Diagram.....	13
3.5 Use Case Traceability Matrix	13
5. User Effort Estimation	14
5.1 Use Case Effort Estimation.....	14
5.2 Use Case Effort Classification	15
6. Domain Analysis.....	15
6.1 Domain Concept Definition Table.....	15
6.2 Association Definition Table	15
6.3 Attribute Definition Table.....	16
6.4 Domain Traceability Matrix	16
6.5 Mathematical Models.....	18
6.6 System Operation Contracts	20
7. Interactive Diagrams	21
9. System Architecture and System Design	25
a. Architectural Styles	25

b. Identifying Subsystems	25
c. Mapping Subsystems to Hardware	25
d. Persistent Data Storage.....	26
e. Network Protocol	26
f. Global Control Flow	26
g. Hardware Requirements.....	27
10. Algorithms and Data Structures.....	27
10.1 Algorithms	27
10.2 Data structures	27
14. References	29
Summary of Changes	30
Functional Requirements	30
Use Cases	31
User Interface.....	31
Domain Analysis & Rest of Report	31
Contribution Breakdown.....	32

1. Customer Statement of Requirements

1.1 The Current Need for Fitness

There are many reasons for which people strive to improve their health and fitness level, unfortunately there are equally as many reasons for which these same people do not reach their goals. Regardless of the reason for setting health and fitness goals, everyone could benefit from a system that addresses the most common deterrents that people face while trying to improve their health by embarking on a fitness program or regimen. A system that minimizes these deterrents would allow an individual to remain more focused on achieving their health goals. Some common problems faced when committing to improving one's fitness are listed below.

- Self consciousness and insecurity
- Lack of health knowledge
- Lack of motivation
- Gym and training costs

There are currently two solutions commonly available to address these issues. The first being joining a gym and hiring a trainer. Although this addresses many of the listed issues by providing the knowledge and motivational skills of a trainer, this solution can often be costly and often requires the participant to maintain regular appointments with a trainer and make routine trips to the gym. The main alternative to this is to utilize at home training exercises such as P90X, Insanity or simply jogging and eating right on your own. This alternative is often more cost effective and allows an individual to train in the comfort and security of their own home or around their neighborhood. The biggest drawbacks to this alternative is that without professional knowledge it can be difficult for someone to monitor their own progress and make effective changes to their diet and workout regimen. Even with the use of health monitoring devices and diet trackers it can be difficult and inconvenient for an individual to compile and analyze their fitness data on their own. What would really help in making fitness goals more easily attainable would be a single product that could bring together all the benefits of both solutions without the drawbacks. Such a product should do all or most of the following.

- Make fitness fun
- Make fitness affordable
- Make fitness easy to track
- Make it easy to analyze tracked data
- Provide relevant information and fitness suggestions based on progress and tracked data
- Make important health data easily and readily available

1.2 Health Data Analysis

As stated previously there are an assortment of monitoring devices capable of providing a user with various health and fitness data such as the Motorola Motoactv (right). While technology has been rapidly improving, the capabilities of such devices are expanding and can monitor and record data regarding everything from heart rate, to hours slept, to the amount a person perspires. Despite this improvement in medical technology, most of these devices are design to provide nurses and doctors with data on patients under their direct care.

It is less common to have these devices directly provide the user with data on their own health, mainly because the user is unlikely to know the best course of action to take based upon such data. What would be very useful to health and fitness conscious consumers would be a system that in a sense cuts out the need for regular check ups by not only providing the user with pertinent data but providing professional analysis of long and short term data and making health and fitness suggestions based on a combination of recorded data and user inputs. For example the system may suggest, that a user whose breaths per minute sharply rises with their number of steps take, should exercise more often to increase their stamina. Another example would be combining a user provided symptom such as Chronic Fatigue Syndrome (CFS), with a long history of having less than 5 hours of sleep per night, to suggest that the person consider changing one's sleep schedule to ensure a greater amount of sleep per day.



1.3 Making Fitness Fun

One of the most common reasons people fail to reach their fitness goals is a lack of motivation due to the large amount of effort fitness often requires for small increments of progress. Often people lose their motivation because they do not immediately begin to see results and decide that the large amount of effort is not worth the incremental gains. Two things people often look for when embarking on a fitness regimen are a way to make fitness fun and a way to track small improvements in order to keep one's self motivated. One common way to do this is to work out in pairs or groups in order to observe each other's progress and to keep each other motivated, however this is sometimes difficult if friend's and partner's schedules do not perfectly line up. With today's heavy presence of social networking sites and mobile apps everyone uses sites such as Facebook and Twitter to tell their friends about everything from the meals they eat to the movies they go see. Being able to directly share fitness data and progress with friends on these social networking sites could potentially be a great motivator, allowing friends, family, coworkers, etc to post supporting comments to help maintain motivation. These social networking sites could also easily be used to turn fitness into a game amongst friends by providing a platform on which friends can compete with each other and brag or comment about their progress. Simple games could be created from data logged by various health monitoring devices such as pitting a group of friends against each other to see who can jog the longest distance in an hour, day, week, month, etc.

1.4 Making Fitness Affordable

One misconception that usually occurs is that people think that the only way to get fit is to exercise at the gym. Most of the time, this misconception turns people away from improving their fitness level, due to the monthly membership payment which is normally very costly, especially in the case of using a personal trainer. What most people often do not know is, maintaining the regularity along with a consistent diet is definitely enough to make running the most efficient way to improve fitness level. What we need is a system that can help people analyze their exercise routine and give useful feedbacks to help people reach their fitness goals, so that it can substitute the presence of a trainer. By providing such system, we believe we are able to offer significant benefits to general people, not only by just helping people get fit properly, but also cut down their expenses for such a simple goal of getting healthy. With just one health monitoring device and our application downloaded on their smartphone, we believe they can easily exercise and improve their health without even worrying about not progressing towards their fitness goal.

1.5 Ease of Use

When it comes to using a device, people will prefer a system that is simple and does not require too much of manual input. We are aware that a complicated system usually fails to appeal customers and provokes negative user experience, thus removing the software off the competition. Being easy to use is arguably one of the most important factors in making great software, regardless of how many functions the software offers, how sophisticated the system is, or even how beautiful the user interface looks. Obviously, our intention is to make software which is simple and easy to use without sacrificing any key functions, because we want our software to be used by not only the young generation, but everyone.

Our proposed system requires virtually no user manual input. We believe that this is very important to us, as we strive for great accessibility. As we said before, we want our software to be used by everyone, even physically disabled people. Given the fact that our software works in tandem with a health monitoring device, the user is only required to wear the device and set up their fitness goals, for example, their target weight. Our software will actively track, analyze, and provide instantaneous information about user's progress. It will also constantly give useful feedbacks via notification, making it easy for user to receive suggestion to their training regime.

2. Glossary of Terms

Diet Trackers

A device that measures the amount of calorie intake and calories burned.

Heart Beat

A number of heartbeats per unit of time, typically expressed as beats per minute(bpm).

Symptom

Subjective evidence of disease or physical disturbance.

Chronic Fatigue Syndrome(CFS)

severe, continued tiredness that is not relieved by rest and is not directly caused by other medical conditions.

Personal Trainer

A fitness professional involved in exercise prescription and instruction. They motivate clients by setting goals and providing feedback and accountability to clients.

System

A set of health monitoring device, application, and user interface working together as a group.

User Experience (UX or UE)

User experience involves a person's emotions about using a particular product, system or service.

3. System Requirements Analysis

3.1 Functional Requirements Table		
ID	Priority Weight	Requirement
REQ - 1	5	System keeps a database for all users and their data
REQ – 2a	5	System can receive input from health monitoring device
REQ – 2b	5	System can receive manual input from user
REQ - 3	5	System generates scores to rate a user's fitness activity
REQ - 4	4	System can generate graphs to display progress in a time frame
REQ - 5	4	System allows users to challenge each other, winner is determined by side-by-side comparison of scores earned in specified time frame
REQ - 6	3	System keeps track of user rankings based on fitness scores
REQ - 7	3	System calculates user's percentile ranking based on fitness scores
REQ - 8	2	Users can share their fitness scores/graphs to social networking sites
REQ - 9	1	Users can login
REQ - 10	1	Users can register an account

3.2 Non-Functional Requirements Table

ID	Priority Weight	Requirement
REQ -11	5	System must keep user data secure
REQ - 12	4	System must display data and analysis in clear, easy to read formats
REQ - 13	4	System interface must be simple and easy to use
REQ – 14	4	System must prevent dictionary attacks on user login
REQ - 15	3	System should be self sufficient and require minimum maintenance

3.3 On Screen Appearance Requirements

This system consists of two working on-screen appearances that work in the same way but can be used on cross-platforms. The main on-screen appearance requirement is for the website which must abide by the rules and programming languages of html, css, javascript, and php. On the other platform, the android app must meet the requirements of the programming language of java.

1. Home/Main Page – gives the user the ability to create an account, view details about the webpage, log into their respective accounts

2. Refresh - allow user to refresh page if page is unresponsive or needs to load new information.

3. Login

a. New user - allows someone to register as a new user. Takes user to the Registration page.

b. Current members - allows users login to their data.

c. Lost password/username - sends request to system to verify user and create new password or retrieve username account.

d. Old members - those who deleted their account could retrieve and restore old accounts

4. Registration – Allows new users to register into the database and create an account.

a. Disclaimers, permissions and User Agreements

b. User information registration

5. Performance tracking – users' on screen output of their data and how well they are doing compared to the average user.

6. Account Setting - add/modify changes to account settings and/or information about user

7. Help - FAQ, send feedback, ask for help from administrators

8. About App - users can find more info (links) about health, training and tips, also information about how to use the app

4. Functional Requirements

4.1 Stakeholders

- Athletes
- Professional Sports Leagues
- Fitness Trainers
- Medical Practitioners
- Medical Device Companies

Each of the stakeholders listed above could have their respective fields significantly impacted by the development and implementation of our system. Ultimately our completed system should provide athletes with a way to not only track their workout and fitness progress but also to stay motivated. Athletes and various departments of professional or even amateur sports leagues could utilize our system to track the progress of the athletes participating in league to provide fitness statistics on the athletes. The challenge a friend, and ranking aspects of the system would allow coaches and team managers to make informed decisions on who they should play in what situation by providing them with a clear ranking system that can be used to rank their players in order of best fitness.

In a similar fashion, fitness trainers and medical practitioners can utilize this system as an efficient way of tracking their client or patients fitness activities without having to rely on the patient's word which is not always reliable.

Medical device companies would be directly impacted by our system in a business sense, if our system were to be widely used and implemented, demand for health/fitness monitoring devices would increase. The widespread use of a system such as ours would be of great interest to companies that design, make, sell, and promote the use of health monitoring devices.

4.2 Actors and Goals

Actor	Goals
User – a registered user of the system	To improve their own fitness and health To track their workout progress To compare their workout stats with friends
Database	To store user input data To retrieve user input data To facilitate comparison and analysis of user data
Monitoring Device	To track and record various aspects of a user's health To allow easy efficient uploading of user's health data
Social Network	To provide client with a platform to share data with friends
Visitor – Unregistered User	To explore system capabilities To view software product information

4.3 Use Cases

UC - 1: Visitor Registration (REQ -10)

Initiating Actor: Visitor

Actor's Goal: To create a client account

Participating Actors: Database

Precondition: Visitor provides a currently unused username/password combination

Postcondition: A new client account with the given username/password is created

Flow of Events for Main Success Scenario:

- 1 → User Navigates to registration page
- 2 ← User is prompted to provide username, password, email address
- 3 → User provides username, password, email address
- 4 ← System checks for username availability, and password/email address validity
 **If invalid password/email or unavailable username → return to 2
- 5 ← System creates and stores new user account to database

UC – 2: User Login (REQ - 9)

- A user is able to login to their account by providing a valid username and password combination
- A user that provides an invalid username and password combination more than 5 times will be temporarily locked out of the system (Derived From REQ – 16)

UC - 3: View Data and Ranking (REQ – 1, REQ – 6, REQ – 7, REQ – 3)

- User is able to view previously entered data
- User is able to view current ranking as compared to all other users in database

- User is able to view their percentile ranking compared to all other users in database

UC - 4: Upload Data From Device (REQ – 2a)

Initiating Actor: User

Actor's Goal: To store data from recent workout

Participating Actors: Database, Monitoring Device

Precondition: User is logged in and has data file from the monitoring device available.

Postcondition: Data from file is stored in user's account

Flow of Events for Main Success Scenario:

- 1 → User navigates to data upload page.
- 2 → User selects data file directory
- 3 → User clicks upload button
- 4 ← System receives data file upload
- 5 ← System stores data from file to database under user's account

UC – 5: Manual Data Input (REQ – 2b)

- Allows user to input data manually rather than uploading a file from a monitoring device

UC – 6: Challenging a Friend (REQ – 5)

Initiating Actor: User

Actor's Goal: To challenge another user to see who has earned a better score in a specified time frame

Participating Actors: User2, Database, Social Network

Precondition: Users are logged in, and have data uploaded for specified time frame

Postcondition: Users' scores are compared side by side and a winner is chosen

Flow of Events for Main Success Scenario:

- 1 → User navigates to challenge friend interface
- 2 → User enters username to be challenged
- 3 ← System notifies challenged user
- 4 → Challenged user accepts challenge
- 5 ← System shows users' data side by side
- 6 ← System calculates and displays scores
- 7 ← System chooses a winner based on scores

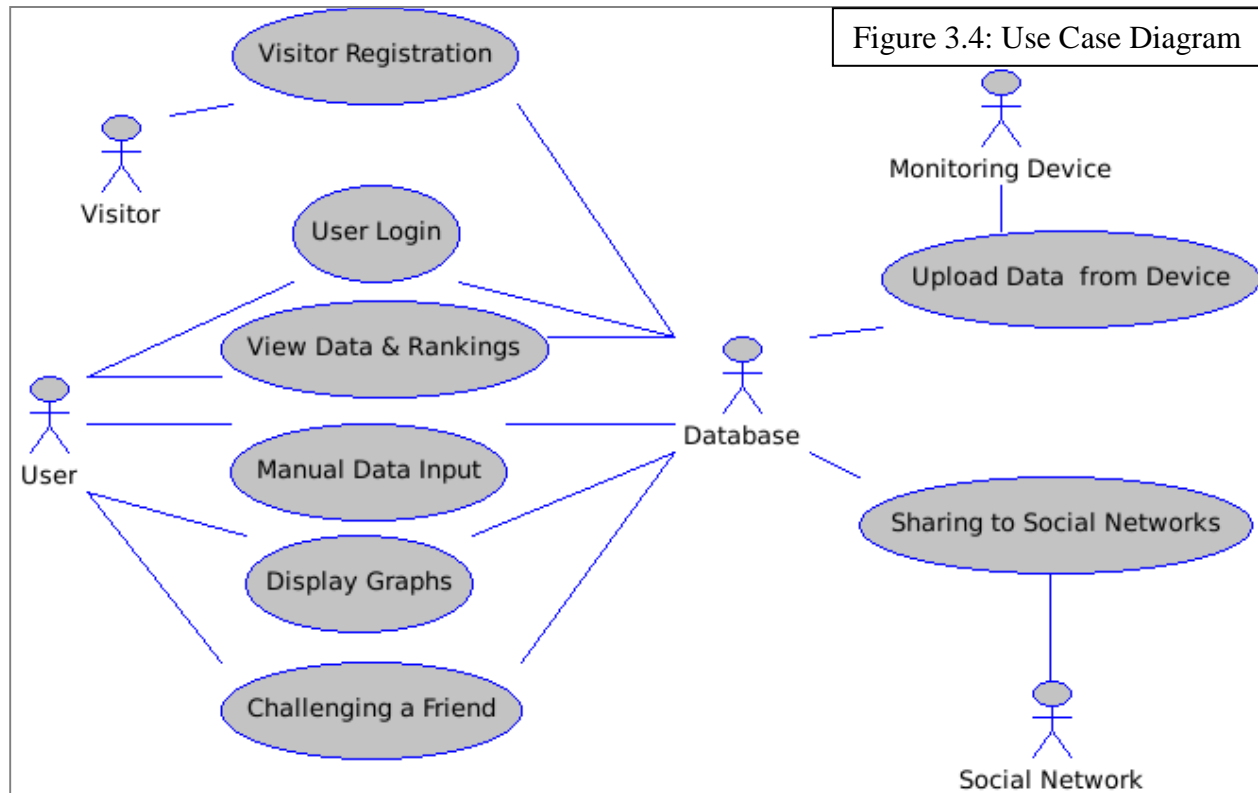
UC – 7: Sharing to Social Networks (REQ – 4, REQ – 8)

- Allow a client to share fitness data to a linked social networking site
- Allow a client to share generated graphs/tables to a linked social networking site

UC – 8: Display Graphs (REQ – 4)

- Allows user to view a graph of their workout progress within a specified timeframe

4.4 Use Case Diagram



3.5 Use Case Traceability Matrix										
REQ#	1	2	3	4	5	6	7	8	9	10
UC-1										X
UC-2									X	
UC-3	X		X			X	X			
UC-4		X								
UC-5		X								
UC-6					X					
UC-7				X				X		
UC-8				X						

5. User Effort Estimation

5.1 Use Case Effort Estimation

UC – 2: User login

Assumption: User is starting at website homepage.

Navigation: Data entry fields are on homepage no navigation required

Data Entry:

- Click username field
- Enter username (roughly 4- 16 keystrokes)
- TAB → password field
- Enter password (roughly 4 – 16 keystrokes)
- Press “Enter” or “Return” key, or click login button

UC – 4: Upload Data from Device

Assumption: User has already performed login procedure

Navigation: From home page (4-10 clicks)

- Click “upload data”
- Browse to file location (roughly 1-6 clicks)
- Click “ok”
- Click “upload” or press enter key

UC – 6: Challenging a Friend

Assumption: User has already performed login procedure.

Navigation: From home page (1 click)

- Click “Challenge a Friend”

Data Entry: (1click, 4-16 keystrokes, 1 enter/click)

- Click “username” (to be challenged) field
- Enter friend’s username (roughly 4-16 keystrokes)
- Click “Send Challenge” or press enter key

5.2 Use Case Effort Classification

Use Case	Description	Category	Weight
UC – 1	One click, three data entry fields	Simple	5
UC – 2	One click, two data entry fields	Simple	5
UC – 3	One click	Simple	5
UC – 4	4 – 10 clicks, slightly complex interface	Average	10
UC – 5	2 clicks 5 data entry fields	Average	10
UC – 6	One click, one data entry field	Simple	5
UC – 7	3-6 clicks, two data entry fields slightly complex	Average	10
UC – 8	2 clicks	Simple	5

6. Domain Analysis

6.1 Domain Concept Definition Table

Responsibility	Type	Concept	Use Case
Create new user account	D	User Account Creator	UC – 1 Visitor Registration
Verify User login information is correct		Login Verifier	UC – 2 User Login
Display user's data and rankings	D	User Account Viewer	UC – 3 View Data and Ranking
Upload data from health monitoring device	D	Device Data Up-Loader	UC – 4 Upload Data From Device
Receive and store new data input from user	D	Account Data Manager	UC – 5 Manual Data Input
Conduct user challenges	D	Data Comparator	UC – 6 Challenging a Friend
Post client data/graphs/tables to social networks	D	Social Network Sharing Interface	UC – 7 Sharing to Social Networks
Generates and Displays graphs based on user inputted data	D	Graph Generator	UC 8 – Display Graphs
Keeps track of user rankings / leader boards	D	Rankings Monitor	UC – 3 User Views Data and Rankings

6.2 Association Definition Table

Concept Pair	Association Description	Association Name
User Account Creator	User Account Creator utilizes the login verifier to	User Registration

Login Verifier	check if given username/password combination is valid and currently available.	
Account Data Manager Device Data Up-Loader	Data Analyzer and Account Data Manager both allow the system to receive input data from the user	Data Input
Graph Generator User Account Viewer	Both concepts allow the user to track their progress by viewing previously entered data in different forms	Progress Tracking

6.3 Attribute Definition Table

Concept	Attributes	Attribute Description
Account Data Manager Device Data Up-Loader User Account Creator User Account Viewer Login Verifier	Data Access and Storage	Read/Write from/to database
Graph Generator Rankings Monitor	Data Analysis	Performs operations on existing data
Social Network Sharing Interface	Social Networking Interface	Facilitates interactions between system and social networks
Admin Account Manager	Account Settings Interface	Utilities for technical services

6.4 Domain Traceability Matrix

Use Case	Domain Concept								
	User Account Creator	Login Verifier	User Account Viewer	Device Data Uploader	Account Data Manager	Data Comparator	Social Network Sharing Interface	Graph Generator	Rankings Monitor
UC:1	X								
UC:2		X							
UC:3			X						X
UC:4				X					
UC:5					X				
UC:6						X			
UC:7							X		
UC:8								X	

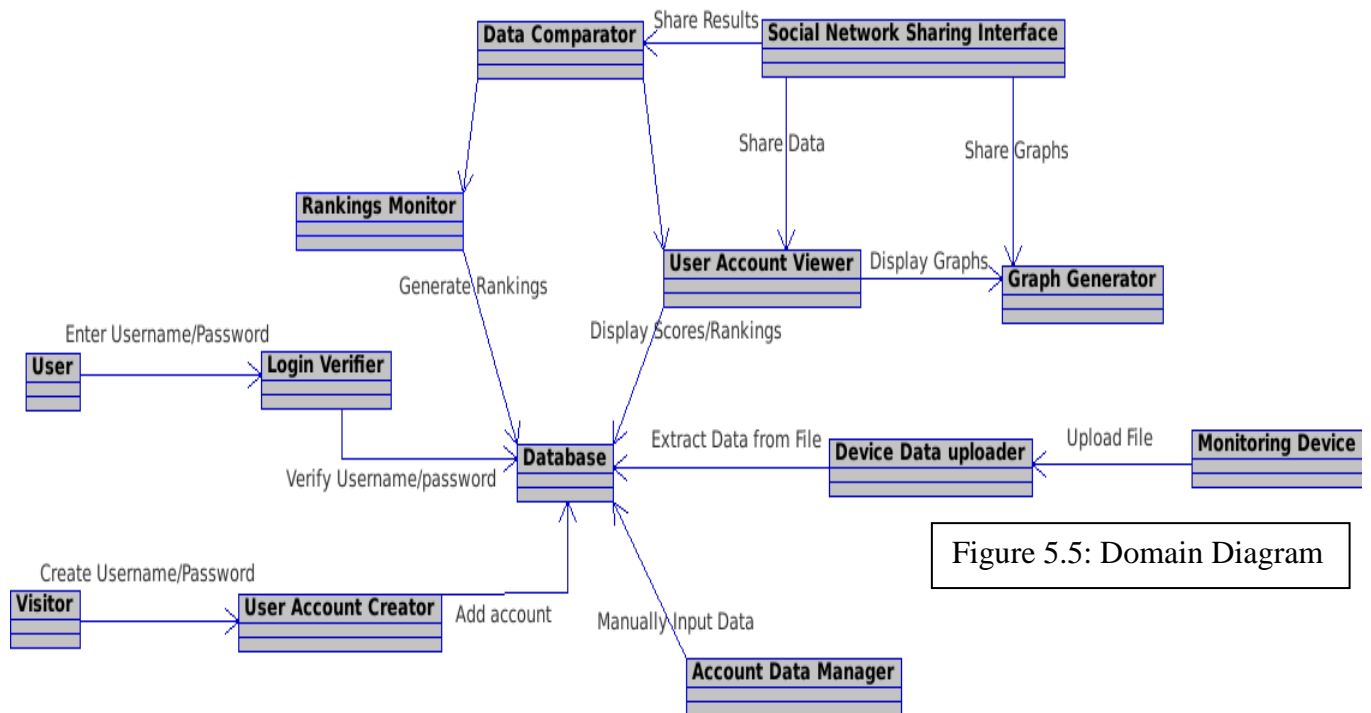


Figure 5.5: Domain Diagram

6.5 Mathematical Models

For manually inputting user data, calories burned can be calculated by using the following equations.

Equations for calculating calories burned from heart rate. ¹

Male: $((-55.0969 + (0.6309 \times \text{HR}) + (0.1988 \times \text{W}) + (0.2017 \times \text{A}))/4.184) \times 60 \times \text{T}$

Female: $((-20.4022 + (0.4472 \times \text{HR}) - (0.1263 \times \text{W}) + (0.074 \times \text{A}))/4.184) \times 60 \times \text{T}$

where

HR = Heart rate (in beats/minute)

W = Weight (in kilograms)

A = Age (in years)

T = Exercise duration time (in hours)

$$\text{Cardio points} = \left\lceil \frac{\text{calories burned}}{30} \right\rceil$$

The rationale for cardio points equation is a normalization of the score. Since exercise is often used by many to lose weight we decided to use the amount of calories burned for healthy weight loss as a baseline for our scoring system. Typically recommended healthy weight loss is 1-2 pounds per week. A one pound loss in weight requires a 1000 calorie/day deficit and since the average person takes in 2000 calories per day, 3000 calories must be burned to lose one pound per week. Our equation gives a score of 100 for 3000 calories burned per day.

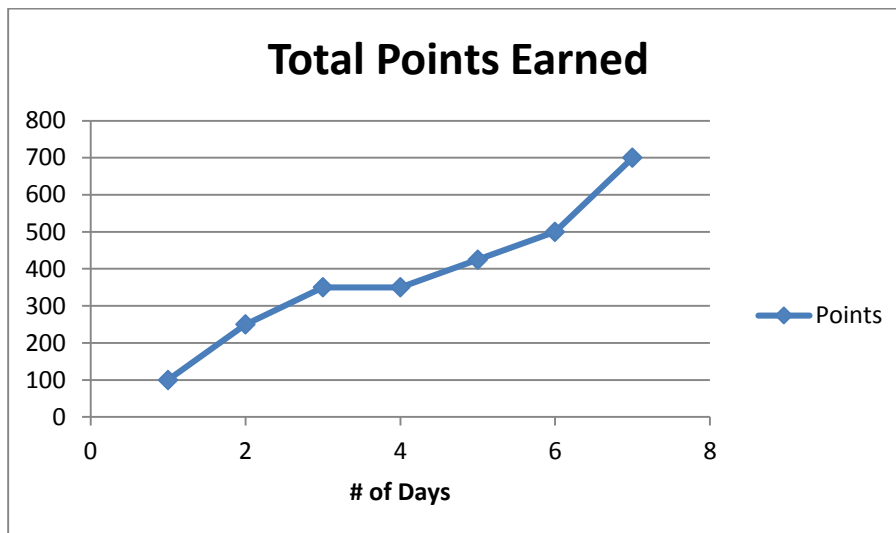
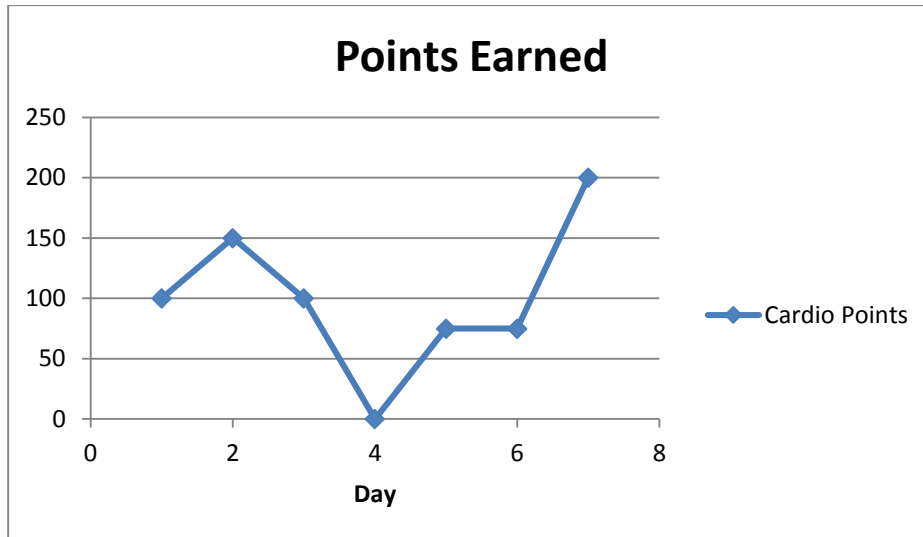
Monthly leader boards will be generated by summing the amount points earned within the month.

Lifetime leader boards will be maintained by taking an average of each users' monthly scores.

$$\text{Percentile Rank} = \frac{\text{Total number of users} - (\text{ranking} - 1)}{\text{Total number of users}} * 100\%$$

Graphical Representations will be displayed as Total Points Earned vs. Time and as Points Earned Per Day vs. Time

Example Plots:



6.6 System Operation Contracts

User Account Creator (UC – 1)

Responsibilities

- Create an account for a new user (register a visitor)

Preconditions

- User chose a username that is currently not in use
- User chose a valid password
- User provided a valid email address
- User's email address is not currently linked to an existing account

Post conditions

- A new account with the user supplied information is created

Device-Data Uploader (UC – 4)

Responsibilities

- Update user account with data from health monitoring device

Preconditions

- User has utilized a health monitoring device to generate health data
- User connected health monitoring device to their computer
- User can browse to health monitoring device's data file
- User is logged in

Post conditions

- User's account is updated on the database with the data from their health monitoring device's data file

Data Comparator (UC – 6)

Responsibilities

- Display data of challenging and challenged user
- Display scores of challenging and challenged user

- Declare a winner of the challenge

Preconditions

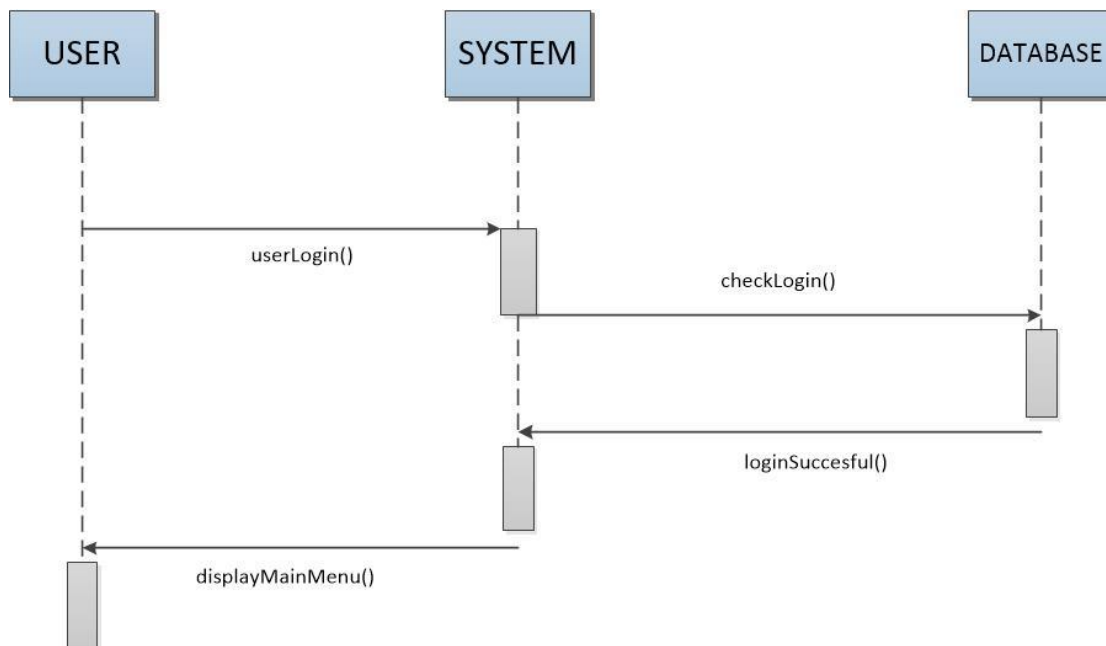
- Users must be logged in
- User (1) challenged user (2)
- User (2) accepted challenge

Post conditions

- Side by side comparison of data is displayed on both users' screens
- Side by side comparison of scores are displayed on both users' screens
- Winner and loser are declared on screen

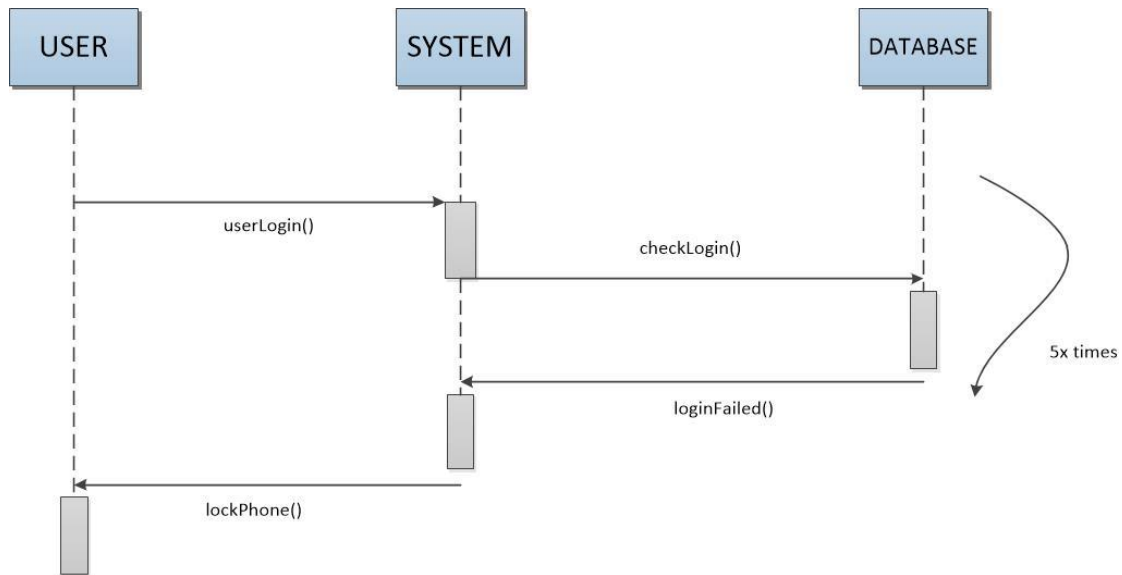
7. Interactive Diagrams

UC – 2: User Login



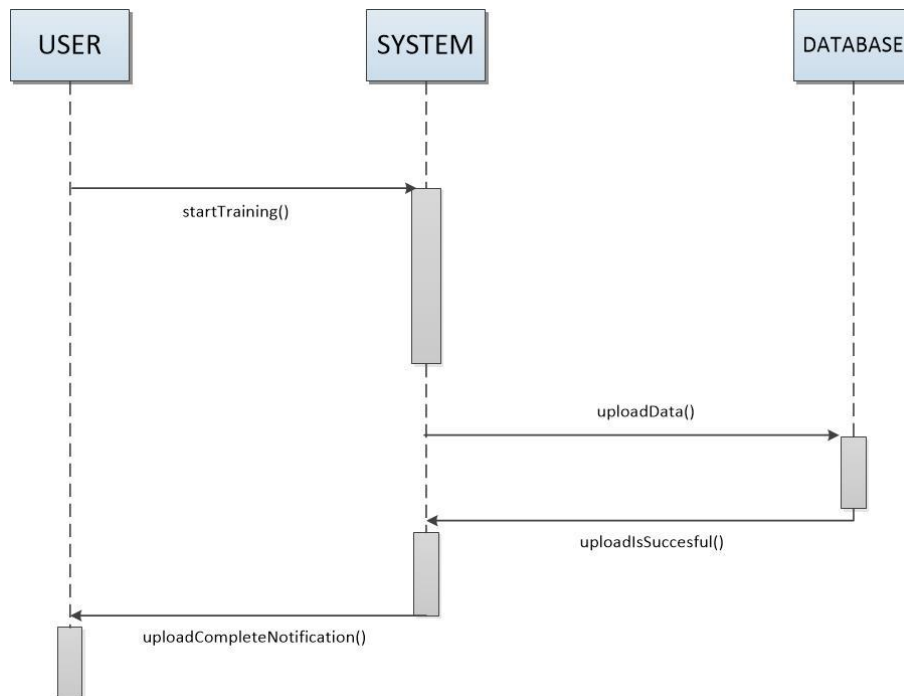
When users login, it must be checked with the database to make sure it is proper and is in the database. Then after it is successful, the user is returned to a main screen for the logged in user.

Alternate Case



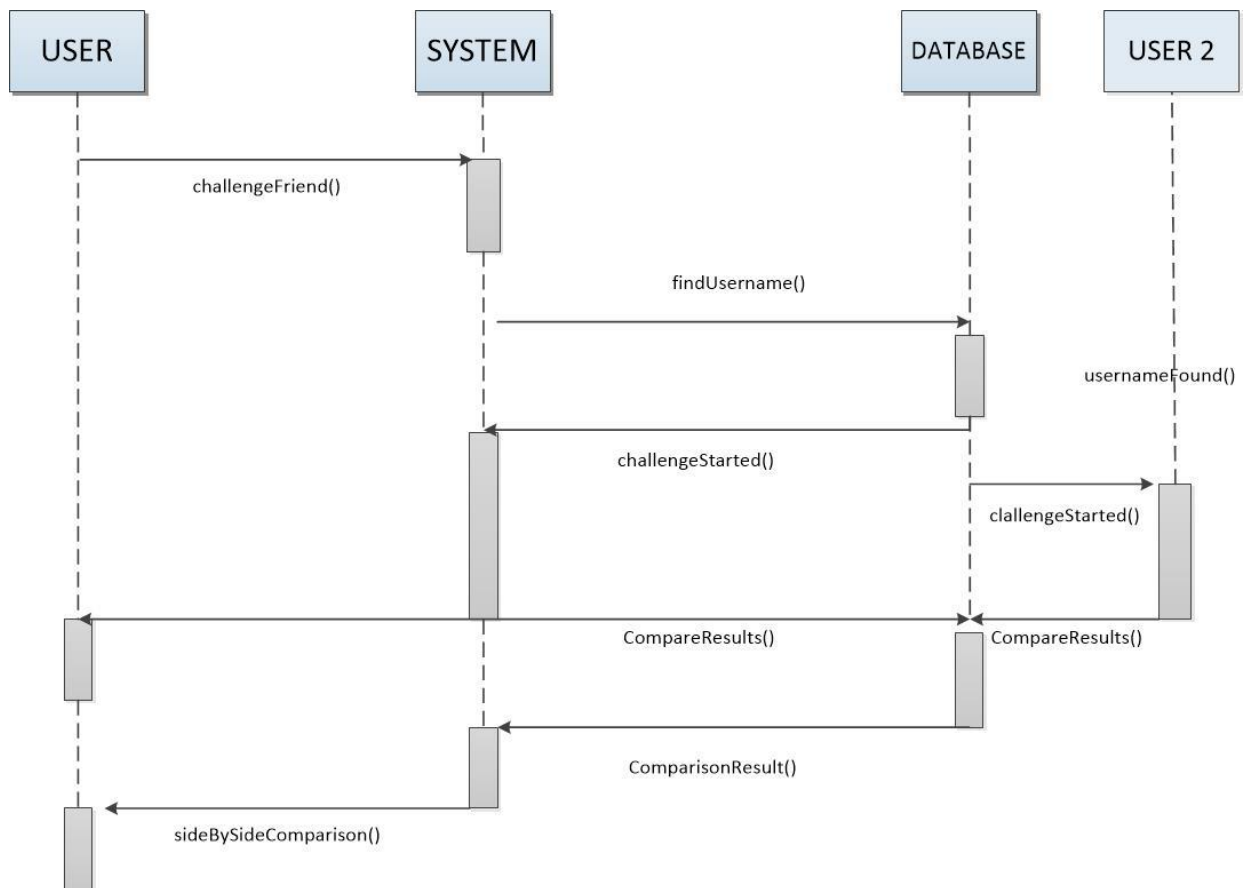
User is asked to log into the system and is then checked with the database for proper login information. The user is allowed 5 times to log in successfully, if not, the screen will return login failure and make user wait a few minutes to login.

UC – 4: Upload Data from Device



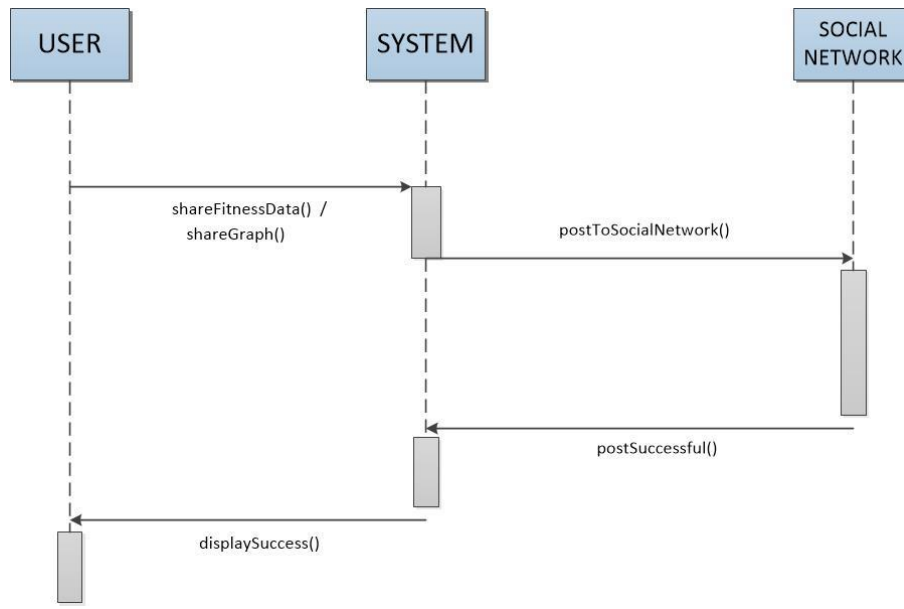
User sends data to the system, the system then uploads the data to database, the database then sends feedback to system then to clients.

UC – 6: Challenging a Friend



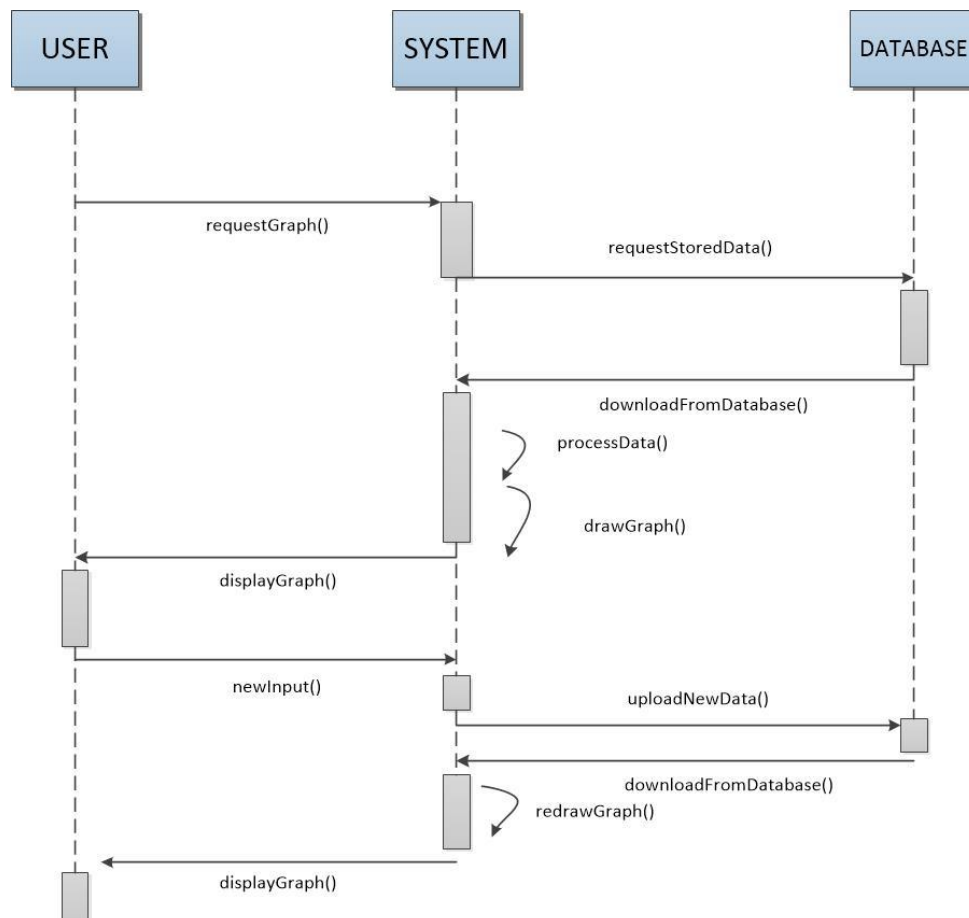
User challenges a friend / another user by typing his/her username, which is then sent to the database for username lookup. If the username does exist, challenge will be started and after some period of time, workout results from both users will be sent to server for comparison. Lastly, the comparison will be sent to the users to display the winner of the challenge.

UC – 7: Sharing to Social Networks



Clients gives access for the system to share the information about the client’s workout and posts to social medias, when successful, the client will be notified it was successful.

UC – 8: Display Graphs (REQ – 4)



Clients request for their data in a graph form, the system then requests database to retrieve the data about the client and process the data and creates a graph. The graph is then displayed to the client side and if the client has new information on their fitness/workout, they can send new/updated information to system and then the system will recreate a new/updated graph and is then displayed to clients.

9. System Architecture and System Design

a. Architectural Styles

Our system uses the Client/Server style of architecture. This model provides our system with centralized data storage as well as allowing multiple user accounts access and provide data to the database. The client side of the system runs on the client's own machine such as a computer or mobile device. This side handles all the local procedures such as logging in and accessing the database. On the other hand, the server side of the system, which is a MYSQL server, handles the data storage in one place for data analysis and processing, whilst also provides user a secure place for data storage itself. The client/server system also reduces the workload of client machines by having the server do all the data processing. This system also makes it easy to share user workout score with other users, or even challenge another user to a workout competition. Updating the system algorithm, along with other software updates, is also made easier with the Client/Server style. However, a centralized system will generate high amounts of traffic for the server side of the system; thus we will need a reliable server that can handle the workload of the traffic.

b. Identifying Subsystems

The system is split into a client side subsystem and a server side subsystem. The client side consists of user interface and data input, while the server side system contains the information and database of each client's data. The client side uses a web browser to access the client side system (html, php), which allows the user to create account, upload data of their progress, and view other users' scores. Same thing goes to the android app that serves as a companion app. It consists of user interface and data processing; it allows the user to create an account, log into their account, and view leaderboard of his/her friends. The server side system takes the data that comes from the client side system and inputs into a database in MySql and stores the data.

The server side allows the user to add, manipulate or adjust their information.

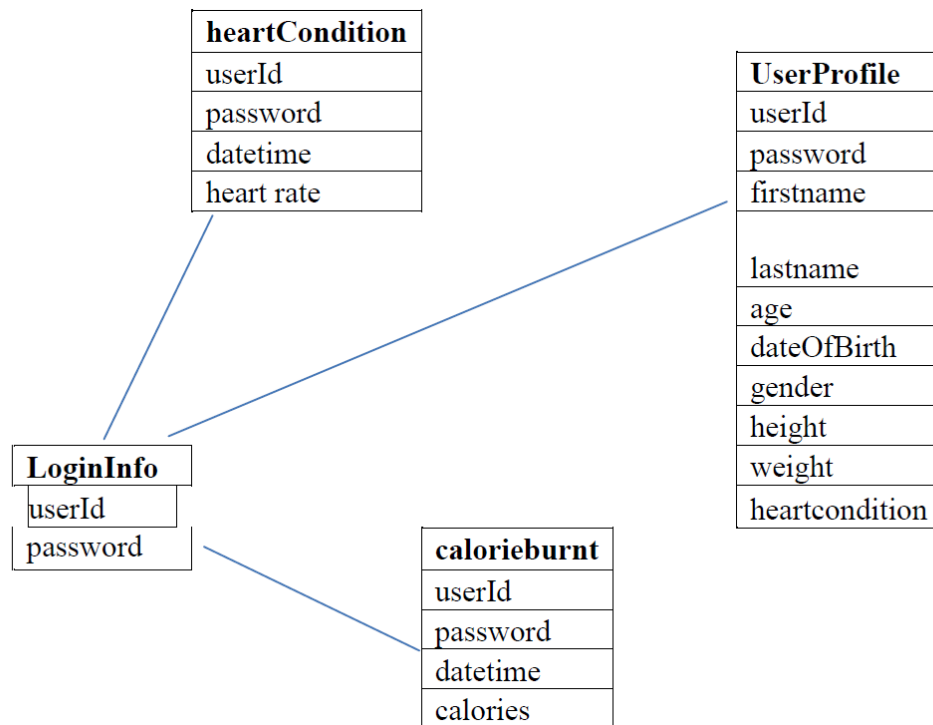
c. Mapping Subsystems to Hardware

There are two needed subsystems, a client side (computer/phone) and a server side. The server will store the database and information of clients while the client side computer will allow the user to access their account, upload their data, and retrieve information they want to look at. The client side could

run on multiple computers/phones and the server side can only be accessed by authorized personals.

d. Persistent Data Storage

The client's data must be stored in a database on a server in MySQL. The user's information and health related information will be stored in an array in the database. The following shows the information the array will store of different clients.



e. Network Protocol

Our system has a central server, which is hosted through Apache HTTP. Requests to access information in the databases, which is MySQL, are done through php.

f. Global Control Flow

Biometric Health Monitoring is an event-driven system. What this means is that, after user creates his/her account, user will be able to do every function implemented in the software in random order. After setting up his/her exercise routine, user can do any implemented function at any given time, such as upload a new data from device, challenge another user, or share their exercise results to connected social network.

g. Hardware Requirements

The software will require the use of a monitoring device such as Motorola Actv watch. The mobile application will require a mobile device such as a phone or tablet that runs on the Android platform. The mobile application and web service will require an internet connection to access the social media aspect of the software.

10. Algorithms and Data Structures

10.1 Algorithms

The only algorithms implemented in our system's design are basic sorting algorithms used to sort users' scores to generate rankings.

10.2 Data structures

The system utilizes the array data structure in order to store, and sort user data. The use of arrays allows for straight forward and efficient sorting used to generate relative user rankings based on the scores they receive from their workout logs.

13. History of Work, Current Status, and Future Work

We created a table to show our project milestones along with its respective completion date.

First report	February 22 nd
Second report	March 15 th
Start of app & website development	March 22 nd
Website launch	March 30 th
Demo 1	April 2 nd
First report revision	April 29 th
Full report	May 5 th

Initially we wanted to create a health monitoring program that serves as a virtual assistant for users to work out properly, with an optional professional review if the user chooses to have such review. But after the feedback we received at first demo we found out that the product was not appealing enough so we decided to change the core idea of our project. We decided to make a

program that not only serves as a health monitoring program, but also takes the workout results to one estimated score that represents how hard they have been working out.

We currently do not have nor plan to implement many functions to our product, taking everything into account. We are very undermanned and from the beginning of the project it has been virtually only three of us putting effort onto the project.

Right now what we have is a working client-server connection and data processing. User can log into/create their account, and upload their workout results from main menu. We are still trying to work on our scoring, leaderboard system, and also calories-burnt graph.

14. References

- 1) **"Adult Obesity Facts."** *Cdc.gov*. Centers for Disease Control and Prevention, 13 Aug. 2012. Web. 08 Oct. 2012. <<http://www.cdc.gov/obesity/data/adult.html>>.
- 2) **"Google Code University: Android."** *Code.google.com*. Google, n.d. Web. 23 February 2013. <<http://code.google.com/edu/android/index.html>>.
- 3) **"Heart Diseases & Disorders."** *Hrsonline.org*. Heart Rhythm Society, n.d. Web. 23 Feb. 2013. <<http://www.hrsonline.org/Patient-Resources/Heart-Diseases-Disorders>>.
- 4) **"Heart Rate."** *Wikipedia*. Wikimedia Foundation, 10 Aug. 2012. Web. 23 Feb. 2013. <http://en.wikipedia.org/wiki/Heart_rate>.
- 5) McGee, Marianne Kolbasuk. **"11 Telemedicine Tools Transforming Healthcare."** *Informationweek*. InformationWeek, 23 Mar. 2012. Web. 23 Feb. 2013. <<http://www.informationweek.com/healthcare/mobile-wireless/11-telemedicine-tools-transforminghealt/232602982>>.
- 6) **"Wearable Wireless Medical Devices to Top 100 Million Units Annually by 2016, ABI Research."** *Wearable Wireless Medical Devices to Top 100 Million Units Annually by 2016, ABI Research*. Business Wire, 17 Aug. 2011. Web. 08 Oct. 2012. <<http://www.businesswire.com/news/home/20110817006223/en/Wearable-Wireless-Medical-Devices-Top-100-Million>>.

Math Equation Reference

¹ Calories burned from heart rate: <http://www.shapesense.com/fitness-exercise/calculators/heart-rate-based-calorie-burn-calculator.aspx>

Equations Derived by LR Keytel, JH Goedecke, TD Noakes, H Hiiloskorpi, R Laukkanen, L van der Merwe, and EV Lambert

Summary of Changes

The purpose of this section is to clearly state the changes made in the project.

Functional Requirements

The following Functional requirements have been removed in order to tighten the scope of the project. Our original project was too ambitious especially now that our group consists of only three members, some requirements were cut from the project in order to focus on the more significant ones.

REQ – 2a	5	System can access, and compare user data
REQ – 2b	5	System can retrieve, and display user data
REQ – 2c	5	System can analyze and modify user data
REQ – 2d	5	System can receive input and store new data from user
REQ – 3a	5	System can calculate calories burned from user data
REQ – 3b	4	System can generate graphs and tables from user data
REQ – 3c	4	System can monitor calorie intake v.s. calories burned
REQ - 7	3	User is allowed to change login information and settings
REQ - 8	2	Administrator can access user data and account information
REQ - 9	2	Administrator can delete or restrict user accounts
REQ - 10	2	User can share data, graphs and tables to Social Networks
REQ – 11a	1	User can grant data access to other users
REQ – 11b	1	User can request data review from users labeled as health professionals

The above requirements were replaced with the following

REQ – 2a	5	System can receive input from health monitoring device
REQ – 2b	5	System can receive manual input from user
REQ - 3	5	System generates scores to rate a user's fitness activity
REQ - 4	4	System can generate graphs to display progress in a time frame
REQ - 5	4	System allows users to challenge each other, winner is determined by side-by-side comparison of scores earned in specified time frame
REQ - 6	3	System keeps track of user rankings based on fitness scores
REQ - 7	3	System calculates user's percentile ranking based on fitness scores

This change in functional requirements allows us to focus more on the competitive aspect of our system that is designed to keep users entertained and motivated to use the system. The focus of the update project (as can be seen by the functional requirements) is the generation of

scores/rankings based on a user's workouts and a challenge system that allows a user to go head to head with their friends.

Use Cases

Our project's use cases have been updated to reflect the changes in the functional requirements. Use cases involving the old professional review concept, as well as some administrative use cases such as banning/restricting accounts etc. have been removed and replaced or updated by use cases such as **Challenging a Friend**.

User Interface

The user interface section has been overhauled to reflect the changes we made and to more clearly demonstrate the user interface being implemented in our design.

Domain Analysis & Rest of Report

The rest of the report has been updated by adding/removing/editing concepts in order to reflect the changes made to our functional requirements and use cases.

Contribution Breakdown

Contribution Breakdown Report #3			
Task	Cody	Florian	Jie
Summary of Changes	100	0	0
Customer Statement of Requirements	70	30	0
Glossary of Terms	0	100	0
System Requirements	50	30	20
Functional Requirements Specification	100	0	0
Effort Estimation	100	0	0
Domain Analysis	100	0	0
Interaction Diagrams	0	80	20
Class Diagram & Interface Specification	100	0	0
System Architecture & System Design	0	50	50
Algorithms & Data Structures	100	0	0
User Interface Design & Implementation	0	50	50
Design of Tests	90	10	0
History of Work	0	100	0
References	10	0	90
Project Management	50	0	50