SEM5640 Group Project
Aber Fitness
Requirements Specification

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CONTENTS

1. INTRODUCTION

1.1 Purpose of this Document

This document describes the requirements for the Software Engineering Masters Group Project 2018-2019 for SEM5640.

1.2 Scope

This requirements specification describes a distributed computer-based system to gather and manage activity data, health challenges and a sports league for a community. The application will support the collection and processing of activity data and ways for different communities to set challenges and to process the results of the challenge. These requirements describe new software systems that need to be developed.

1.3 Objectives

The objectives of this document are:

- To describe the background to the SEM5640 group project application (Aber Fitness Project).
- To provide details of the criteria that the group project product must meet.
- To describe the types of interaction with the system which must be supported.
- To describe the technologies that must be used to implement the system.

2. GENERAL DESCRIPTION

2.1 Product Perspective

It is proposed to develop a new application, Aber Fitness, to encourage fitness and promote engagement with sport amongst members (users) of the application. It would provide the following features:

- Gathering activity data. Processing that data and making it available to other parts of the system.
- Providing a Dashboard for users, providing graphs and the ability for a user to set and monitor goals.
- Set challenges related to activity data, e.g. number of steps in a day or distance covered in a week.
- Manage a sports league and booking of facilities for the games.
- Provide updates to users to keep them engaged in the challenges and the sports leagues.

Devices to track and monitor activity have become popular in recent years. The devices have included pedometers that are clipped to someone's body or put in a pocket. More recently, smart watches have become a popular way to provide pedometer and other activity data. These devices produce data that can help people to understand their current levels of activities and encourage people to improve their activity levels over time.

Organisations also have an interest in encouraging their staff to be more active. As an example, Aberystwyth University has coordinated health initiatives for staff in recent years, including Travel the World initiative [3]. The Travel the World initiative recorded distance travelled based on steps, swimming and cycling. The system displayed a simple league table, organised by individual staff and groups of staff in a department.

The Travel the World initiative relies on manual data entry to the system. Given the increase in the number of people using personal health devices to record data, there is the opportunity to have a system that is also capable of extracting data from these devices. Such devices include the Fitbit®, Apple Watch® and mobile phones[1].

The system has tried to motivate members by giving information about where they would reach given the distance they had recorded in the system. That individual information was available when a member was logged in to the system. There were also weekly progress updates based on the overall distance travelled by the members. The weekly updates were emailed to all members by the person running the system, however sometimes these were not sent out. There is the opportunity to automate this in order to engage the members more often.

Aber Fitness will advertise availability and allow members to book facilities for the games or matches to be played.

A system will be created to enable users to create and run sports ladders.

[1] Fitbit is a registered trademark of Fitbit Inc. Apple Watch is a registered trademark of Apple, inc.

2.2 Product Operation

The application will be a server-based application that stores and manages activity data for a community. There will be facilities to support three types of data entry:

- Reading of data from 3rd party servers. For this work, a demonstration will show access to Fitbit data.
- Accept data from devices that contain electronic activity data, e.g. mobile phones that are linked to smart watches.
- Accept manual entry of data.

The application will hold the data for the members. There will be groups, e.g. staff in a department, or a group of friends. Activity data can be reported for the individual members and for the different groups.

The application will provide a mechanism to create challenges. For example, a challenge could be issued to all staff and students for distance challenge over the next three days.

There will be a mechanism to keep participants engaged. These mechanisms will be aimed at personal motivation and wider community motivation. These can include sports ladders, a challenge table for the activity data and communications sent to participants.

2.3 Investigation into message sharing

The project will also investigate and demonstrate the possibility of using the SignalR [4] service to encourage user participation. This could be by sending out updates about challenges and progress in the sports ladder.

The aim of this work will be to investigate the opportunities and demonstrate these as part of the work. The output will be code that demonstrates the potential as part of the other development on the project. There will also be an appendix to the main project report that discusses what has been investigated and evaluate what additional work, if any, would be required to fully integrate such functionality.

2.4 Technology

It has been decided that the application will be developed as a set of cooperating micro-services. This is an architecture style that is intended to allow for the set of services provided by Aber Fitness to be added to easily (as is anticipated) and for services to be upgraded or modified easily with least disruption to the overall service. The services will be written using .NET Core and Java EE.

Figure 1 shows a suggested arrangement of services within the system.

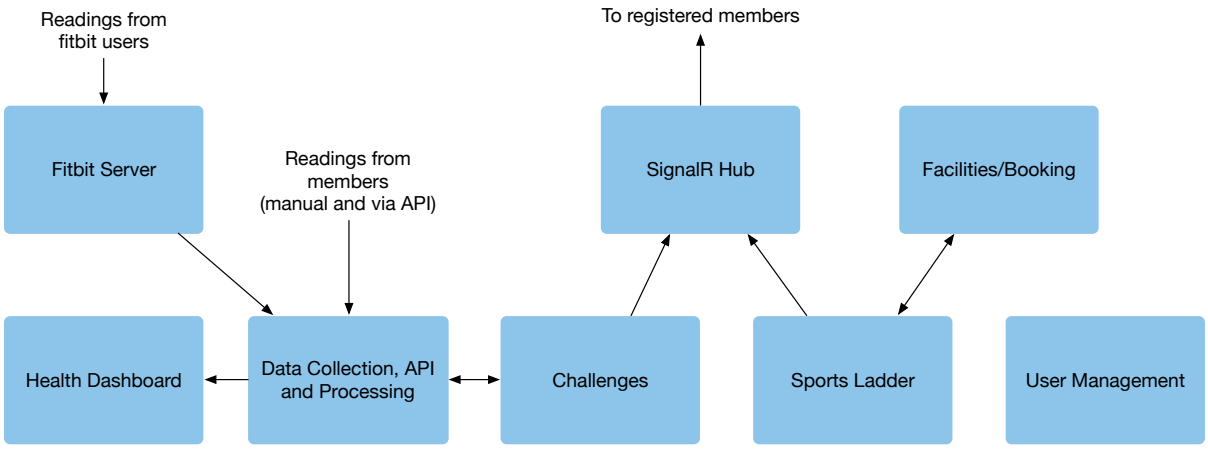

Figure 1: Proposed microservices and possible interactions

2.5 User Characteristics

The software will need to be accessed from many different sites by different categories of users.

- **Member** – This user is someone who will provide data to the system, either in an automated way or using manual entry. Members will also take part in the Sports Ladders.
- **Coordinator** – This user can set challenges and create Sports Ladders.
- **Administrator** – This user is responsible for managing the system and maintaining the data.

A single user can be in one or more of these user categories.

3. SPECIFIC REQUIREMENTS

3.1 Functional Requirements

This section lists the key functional requirements for the systems.

3.1.1 Data Gathering and Storage

The functional requirements for the data gathering aspects are:

- **DG-FR1 – Management of participants in the system**
  The system will provide a way to add members into the system and allow them to be associated with a specific group. The group will have a name. For example, a group for a university situation might be 'Computer Science Department'. A participant is a member of a single group. It is possible to change the group name and it is possible to change the group a participant is associated with.
- **DG-FR2 – Activity data**
  The system will record different categories of activity data. This will require step data and should provide the ability to add other categories such as swimming data, cycling data and flights of stairs data. The system will provide a mechanism for an administrator to setup which categories of data can be stored for a community.
- **DG-FR3 – Linking a participant to a server-based data source**
  The system will provide a way for a member to setup a link to access data from a server-based data source. For this application, the system will allow participants to obtain data from Fitbit servers. Each participant will authorise the system to access data from these servers, using a Web API available from Fitbit [1].

  The system needs to support the situation where the member authorises data collection from these services. It also needs to manage removal of that permission. The system can allow a participant to remove the association with one of the services, e.g. Fitbit. It also needs to handle the situation where the participant instructs the remote service to remove the authorisation to access the data.
- **DG-FR4 – Obtaining data from the server-based data source**
  The system will arrange to collect data from the server-based data sources on a regular basis. This will take account of the mechanisms available from the different APIs to do this.
- **DG-FR5 – Receiving data from other devices**
  The system will define a web service that can receive data electronically from other devices. An example is to allow a program on an Apple iPhone to obtain activity and health data from the participant's device, using HealthKit [2], and then send this to the server.

  Note: This system only needs to provide a web service that can receive health data. The system does not need to include an iPhone application for this project.
- **DG-FR6 – Receiving manual input of data**
  The system should allow members to manually enter data values for all of the different categories.
- **DG-FR8 – Removing data for a participant**
  The member can choose to remove an item of data, or a range of data, from their personal record. An administrator also has the ability to remove items of data for members. When data is removed, a note is recorded so that the participant can find out if and when this happened.

- **D-FR9 – Administrator access to data**
  Administrators will be able to see and edit all of the data in the system. The system will provide an audit trail for any accesses that an administrator makes to the system. This audit data can be viewed but not removed. The data will be available in case any participants are concerned about who is reviewing their detailed information.

3.1.2 User Management

The overall system will require to manage authentication and authorisation.

- **UM-FR1 – Authentication and authorisation**
  The system will authenticate users and manage access to the functionality based on the different user types.

3.1.3 Health Dashboard

The functional requirements for the Health Dashboard are:

- **HD-FR1 – Review data for a member**
  The system will allow member to review their data held on the system. This can be for the past month or for some other period selected by the participant. The presentation of data will include graphs to show progress over the month.
- **HD-FR2 – Set goals and view progress**
  The system will allow a member to set and update personal goals, e.g. a daily step count or distance travelled in a week. The system can show the member their progress against recent data.

3.1.4 Challenges

The functional requirements for the challenges are:

- **C-FR1 – Create a challenge**
  The system will provide a way for a coordinator to create a challenge. A challenge will have a goal, e.g. number of steps, and a time, e.g. on Saturday and Sunday this week.
- **C-FR2 – Join a challenge**
  Members can view the list of challenges and choose to join the challenge.
- **C-FR3 – Activity during a challenge**
  A challenge has a start and end time. Activity that is recorded during that time will count towards the challenge.
- **C-FR4 – Closing the challenge**
  When the time for the challenge has passed, the result will be declared and shared with the different members. A message stating the outcome of the challenge will appear on each members' information page on the site. A communication will also be sent to members to share the results.

3.1.5 Booking System

Individual members, and the Sports Ladder will make use of a Booking System. There are currently two venues that can be booked: The Old Sports Complex and The King's Road Sports Centre. The facilities available at each venue are shown in Table 1.

Venue	Type	Name
The Old Sports Complex	Squash	Court 1
	Squash	Court 2
The King's Road Sports Centre	Squash	Court 1
	Tennis	Court 1
	Tennis	Court 2

Table 1: List of facilities that can be booked

Facilities can be booked for one-hour slots by any members.

The functional requirements for the Booking System are:

- **BS-FR1 – Facilities**
  Administrators should be able to manage the set of facilities, adding or removing venues, activities and specific facilities.
- **BS-FR2 – Availability**
  Administrators should be able to book facilities for specific periods as a way of removing their availability. This might be done to allow maintenance in the facility.
- **BS-FR3 – Booking**
  Members should be able to browse availability and book facilities.

3.1.6 Sports Ladders

Sports Ladder are a basis for friendly challenging of fellow members who play a game. The functional requirements for Sports Ladders are:

- **SL-FR1 – Creating**
  An administrator can create a ladder that members can join. Each ladder is for a specified sport.
- **SL-FR2 – Joining**
  Members should be able to register to join the ladder and give a small profile of themselves as a member of the ladder. The profile might include a general indication of their availability to play. For example, "I can play on any week day lunch time 13:00 to 14:00, except Wednesdays." The profile might also indicate a preferred location, e.g. "I cannot reach the Old Sports Complex in this time during my lunch hour, so I can only play at the King's Road Sports Centre.
- **SL-FR3 – Profile Update**
  Any ladder member should be able to edit their profile at any time.
- **SL-FR4 – Suspension**
  Any registered ladder member should be able to indicate they wish to suspend their participation in the ladder. Subsequently, they should be able to end this suspension. Suspension might be due, for example, to injury or absence for a period of time. A ladder member who is suspended cannot be challenged. Any outstanding challenges at the time of suspension are automatically conceded.
- **SL-FR5 – Current Ladder**
  Any ladder member should be able to browse the whole ladder at any time. This view should show all members in their current positions and show all outstanding challenges. It is anticipated that the ladder may involve up to 200 members.
- **SL-FR6 – View Member**
  Any ladder member should be able to view the profile of any other member. The details shown

should include the other member's current ladder position, any outstanding challenges and the results of the member's last 5 matches.

- **SL-FR7 – Challenge**
  Any ladder member should be able to challenge any member who is up to 5 places above them on the ladder. A member will always have a choice of 5 other members to challenge, unless the member is already in one of the top 5 positions on the ladder, when the number will be fewer. Any members in suspension should be visible on the ladder above them but should not be counted in that number. A challenger can only be challenging one member at a time, and a member may only be challenged by one other member at a time. The opportunity to challenge should not be available to a member who has issued an outstanding challenge and it should not be possible to challenge a member who has an outstanding challenge against them.

- **SL-FR8 – Scheduling**
  When a challenge is issued, the challenger should be able to select a time and a squash court for the match, using availability data from the Booking System. This will book the court in the challenger's name for that time. A communication will be sent to both members to provide full details of the match.

- **SL-FR9 – Response to a challenge**
  A member who is challenged should be able to take one of 3 actions on the site, following the challenge: i) accept the challenge; ii) concede the match (this will operate as if the match were lost) iii) respond to the challenger requesting a change of time and/or venue.

- **SL-FR10 – Expiry**
  If no response is made within 3 days or if no match result is reported within 7, the challenge is considered by the system to be conceded and members are free to challenge and be challenged again.

- **SL-FR11 – Result**
  After a match, the loser must record the result through the system. The members are then free to challenge and be challenged.

- **SL-FR12 – Removal**
  An administrator must be able to remove a member from the ladder at any time. Any outstanding challenge of the member would be considered conceded. Any challenge by the member would be considered withdrawn.

3.1.7 Engagement

The functional requirements for engagement are:

- **E-FR1 – Current rankings**
  The system will provide tables that show the current rankings for the current situations:
  - Ranking per group, based on the different categories of activity data. For example, ranking by department, based on step, swimming and cycling data.
  - Ranking by participant for each of the different categories of activity data.

- **E-FR2 – Individual Progress**
  The system will show progress to a participant, based on a calculation of overall distance from the activity data. Any step, swimming and cycling data will be used to calculate the distance. The data will be reported to the user as number of miles and kilometres travelled.

- **E-FR3 – Weekly Updates**
  The system will send out regular communications to members to update them on their own progress and that of their group. The frequency can be set by the administrator but could be from minutes to weeks.

- **E-FR4 – Missing readings Updates**
  The system will detect if a member hasn't updated their information recently. A communication will be sent to the member to encourage them to enter data. The period can be set by the administrator, but typically this would be one day.

3.2 External Interface Requirements

This section lists general interface requirements for the systems.

- **EIR1 Appearance**
  The system should be developed as a set of microservices. There should be a suitable User Interface that allows access to the different facilities. User access to the service is typically through a web interface that can be accessed through modern web browsers.
- **EIR2 Internationalised interface**
  The system should be internationalised so that the user interface can be available in different languages. English and Welsh should be supported in this version of the system. For delivery, only English language localisation need be provided.

3.3 Performance Requirements

For this prototype, there are no specified performance or reliability requirements.

3.4 Design Constraints

The following design constraints must be met.

- **DC1 Use of Java EE**
  At least one of the microservices must be written in Java EE.
- **DC2 Use of .NET**
  At least one of the microservices must be written in ASP.NET Core.
- **DC3 Use of web services**
  The web service to receive data from mobile devices, e.g. phones, must be a RESTful web service. The mechanism to communicate between different microservices must be RESTful.
- **DC4 Reuse of 3rd party software**
  Use of existing 3rd party libraries for parts of the solutions is encouraged. Please note that your client has said that there is possibility of licensing the system under a commercial licence or a licence such as the Apache licence. Your group would need to check the licence terms for the 3rd party software and discuss with your manager before committing to the use of any 3rd party software.
- **DC5 Use of Docker**
  The services are to be deployed to the Docker facilities for testing and demonstration. The group(s) will be provided with access to Docker, hosted on University machines.

4. References

[1] Fitbit, “Developer Web API” (Online) https://dev.fitbit.com/build/reference/web-api/ [Accessed 16th October 2018]

[2] Apple Inc. “HealthKit” (Online) https://developer.apple.com/healthkit/ [Accessed 16th October 2018]

[3] Aberystwyth University (2018) Travel the World (Online) https://travel.aber.ac.uk/travel/ (Accessed 16th October 2018).

[4] Microsoft (2018) ASP.NET Core SignalR (Online) https://github.com/aspnet/SignalR (Accessed 16th October 2018).

DOCUMENT HISTORY

Version	Date	Changes made to document	Changed by
1.0	2018-10-15	Initial Draft	NST
1.1	2018-10-16	Adjustments to the product perspective and the ladder specification	NWH
1.2	2018-10-16	Clarification of ladder terminology.	NST
1.3	2017-10-16	Status set to release.	NST