School of Electronics and Computer Science

INFO6005 - Application Development Report

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1 Introduction

OptiCaff is a revolutionary way of managing a user's caffeine level whilst respecting and reacting to their daily activities. OptiCaff is a smartphone application built for Android. Features include: Tracking the user's caffeine levels, suggesting the optimal time for caffeine consumption to fit around their schedule, locating the nearest caffeine vendor, and detailing the recommended beverage options provided. OptiCaff also features a competitive element where users compete with each other to appear on the leaderboard listing the most optimal caffeine consumers.

1.1 Project Problem

In this modern age, peoples lives have become increasingly active, making tiredness a likely side effect. Consuming caffeine has become a popular way of managing this for many people [15]. Despite its usefulness, the fact remains that caffeine is still a drug and can have adverse effects if misused [17]. Using caffeine effectively is a difficult skill to master, requiring logging the caffeine content of each beverage in addition to consumption time and then performing complex calculations to ascertain the optimum time for the next caffeinated beverage. OptiCaff aims to solve this problem by monitoring a users caffeine intake in addition to their timetabled activities so that consumption suggestions work in harmony with the users routine. In addition to this it also points the user to the closest place to purchase their desired beverage to minimise their detour.

1.2 Project Audience

The initial target audience of OptiCaff are people who visit the University of Southampton Campus on a regular basis.

1.3 Project Goals

The goals of this project are to produce a prototype with the following functionality:

1. Obtain and use linked data detailing caffeine sources within the University of Southampton.
2. Integrate the user's schedule
3. Monitor users caffeine intake and predict the optimum time for their next consumption.
4. Provide a leaderboard to rank users based on how well they maintain their caffeine level within the optimum range during their scheduled events.
5. Approximate the users position and locate the closest appropriate caffeine sources to them.

1.4 Project Scope

This is a prototype application to showcase the main features and to illustrate what the full application will look like. The prototype produced will implement the following key features of consuming caffeine, performing calculations based on a users timetable, give directions to the nearest appropriate caffeine source, and ranking on the leaderboard. This application will use researched averages for the caffeine content of drinks as opposed to storing individual data for each one and will make assumptions for the average man and woman in terms of optimum caffeine intake.

2 Project Conceptualisation & Monetisation

This section details the ideas that were conceived and the justifications for the final idea coupled with its monetisation potential.

2.1 Acceptance Criteria

It was decided from the early stages that the application would use the University of Southampton's open linked data (see section 3.1.1 relating to its internal organisations). The focus of this data would be the points of service (e.g cafes, vending machines) that sell caffeine in and around the University. After establishing the data sets a number of ideas of how to best utilise this data were discussed. In order to establish the most valuable idea, each potential solution was weighed against certain aspects:

- **Uniqueness Factor:** Is it a new novel idea and if so how?
- **Monetisation Potential:** Is there the potential to monetise it?
- **User Interest:** Will it retain users on a long term basis as opposed to just on a novelty?

2.2 Ideas

The three ideas that were contemplated are listed below. Table 1 details their weighting against the acceptance criteria:

- **Caffeine Finder:** Allows users to find the nearest available caffeine vendors to them at any given time.
- **Caffeine Notify:** Buzzes and notifies the user when they pass caffeine vendors.
- **OptiCaff:** Tracks users caffeine levels, and suggests and locates caffeine vendors at an appropriate time for the next caffeinated beverage. Incorporates a leaderboard for users to compete with one another over maintaining optimum caffeine levels.

Table 1: Table of Potential Ideas

Idea	Uniqueness (U)	Monetisation (M)	User Interest (I)	U	M	I
Caffeine Finder	Includes University vendors and vending machines.	Pitchable to caffeine vendors and can advertise within.	Easy to retain the information, so no need for reuse.	✔	✔	✘
Caffeine Notify	Alerts the user to caffeine rather than them searching for it.	No benefit to vendors, also users unlikely to pay for it.	Easy to leave on in the background.	✔	✘	✔
OptiCaff	Combines different elements to provide a new level of service.	Pitchable to caffeine vendors and can advertise within.	Schedules/Caffeine levels differ daily, therefore reusable.	✔	✔	✔

2.3 Final Choice - OptiCaff

OptiCaff was chosen as the final idea as it fulfilled all three of the criterion listed above. It has the unique factor not through its individual ideas but through the combination of these into a multifunctional app that not only allows you to monitor your caffeine consumption, but to locate places that sell caffeine and tie the two together to optimise your caffeine consumption. In addition to this it has the competitive element which aids in capturing and retaining user interest as well as boosting monetising potential.

3 Background Research & Analysis

3.1 Application Research & Analysis

This section details the research behind the data used in OptiCaff, including the data source, calendar data and the caffeine calculations that will be used in the prototype.

3.1.1 Data Source

OptiCaff uses the Open Data Service from the University of Southampton [2] to retrieve the relevant information for the application. This service provides open linked data about some of the administrative information regarding the university. It also provides a SPARQL Endpoint [12] (a service which facilitates users querying a knowledge base using the SPARQL query language) [11]. OptiCaff utilises this with a few specialist queries, and combined with user preferences can provide the user with a wide selection of caffeine choices around campus.

3.1.2 Calendar Research & Analysis

OptiCaff's initial objectives included the use of university timetables to schedule caffeine level notifications. 'SUSSED' is the University of Southampton's student portal that displays a student's timetable. Using this web portal is currently the only way to obtain a student's timetable given that it's not freely available as open data or through an API. Another University of Southampton produced application, iSoton, has been able to do this process showing that it is possible. Further investigation however has shown that this is not a trivial process.

Instead an alternative solution is to use Android Calendar which synchronises to make calendar systems [1]. Overall given the prototype nature of this application and ability to use Google Calendar in a much simpler fashion it was decided that OptiCaff would use Android Calendar.

3.1.3 Caffeine Research & Analysis

In order to provide the caffeine management element of this application, the different levels of caffeine that appear in beverages and its effect on human beings needed to be researched. This section details the caffeine levels and decay rate that have been used in OptiCaff.

Given the vast range of different caffeinated products and the limited time to produce a prototype application, it was decided that the products displayed by OptiCaff would be grouped into four different types of drink, and each type would be allocated an average caffeine content. Below is a table showing these totals, which were obtained these sources [19] [20] [23].

Drink Category	**Average Caffeine Content (mg)**
Tea	40
Coffee	54
Energy Drinks	80
Soft Drinks	34.5

In addition to calculating the level of caffeine obtained from a specific product, it was also important to work out the optimum caffeine levels and how long it would take the caffeine to "decay" within the body so that the next caffeine consumption time could be predicted. For the purposes of the prototype, OptiCaff uses optimum caffeine levels of between 100mg and 200mg. The half life of caffeine ranges between 2.5 and 4.5 hours [27] [26]. 4 hours was chosen as the number to use in OptiCaff and was calculated using the half life formula detailed in [28].

3.2 Market Research & Analysis

This section details the market research analysed for OptiCaff. The Coffee market was researched as were the mobile development platforms. Finally the potential competitors to OptiCaff are detailed and analysed to see if any of them offer a similar user experience.

3.2.1 Coffee Research & Analysis

Coffee consumption in the United Kingdom has steadily increased over the past decade. In particular the past five years have seen an explosive increase, there are several theories as to why this is the case. Firstly, instant coffee shops have become more common on our high streets. Companies such as Starbucks and Costa have been opening more stores as more citizens have been buying instant coffee; this doesn't show any signs of slowing down either as Starbucks have recently announced 300 new stores to be opened over the next five years [21].

Secondly, these brands have contributed to the newfound 'coolness' that is associated with coffee [24]. Lastly, there is evidence that the economic climate has played a part in coffee's rise. Also known as the 'lipstick effect', Britons have been unable to afford expensive treats for themselves so they have been spending on cheaper treats, a good example of which is coffee [22]. This research is important to OptiCaff because it shows that the coffee industry is on the rise, and it would not make business sense to invest in a declining industry.

3.2.2 Mobile Platform Research

OptiCaff's purpose heavily lent itself to being a mobile application. There are various mobile operating systems that OptiCaff could be deployed on: Google's Android, Apple's iOS, Blackberry's RIM and Windows Mobile.

The Smartphone Operating System statistics from June 2011 showed Android and Apple dominating the market at present (shown in figure 1). Therefore these two platforms were considered.

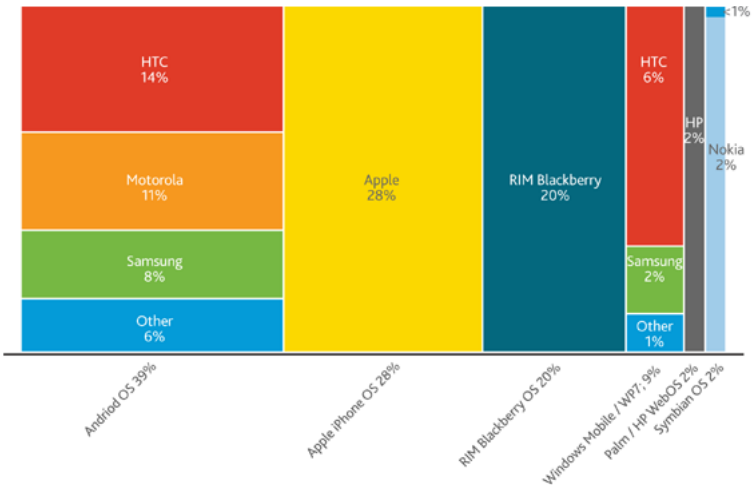

Figure 1: Manufacture Operating System Share Smartphones June 2011 [7]

The following elements were considered in regards to which platform to use: language, development requirements and popularity of the apps for that operating system.

Programming Language

- iOS for iPhone requires applications to be written in Objective C [8].
- The Android Operating System requires applications to be written in Java [3].

Development Requirements

- The only IDE available for developing iPhone applications is XCode which relies on having Apple's iOS SDK installed [9]. Both of these are only available to Apple Mac Computers.
- Android doesn't require any special hardware to develop an application. The Android SDK is freely available and its recommended development environment Eclipse [18] is also free.

Application Popularity

- Apple's App Store is currently the more popular at 25 billion downloads [14]
- Google Play (Android's market place) was reported to have reached 10 billion downloads in December 2011 [13].

It was decided that for the prototype application, Android would be the simpler option for the following reasons:

- Android uses Java. All members of the team are experienced in Java development and one member has experience in Android Development.
- Android can be developed on any platform which is useful as the group uses a combination of Mac, Linux and Windows.
- Google Play may be less popular than Apple's app store, however it still holds a large user base and it was decided that ease of development was a higher priority for the prototype.

3.2.3 Gamification Research & Analysis

A common issue for new apps is user retention; a method of increasing this is Gamification [6]. Gamification is the practise of adding game-like elements to something that is not already a game, e.g. a to-do list [5]. There are ways in which gamification can be applied to OptiCaff.

1. Use of achievements or awards. Achievements are used to recognise when a player has fulfilled certain conditions when playing a game (e.g OptiCaff could award achievements to the users that remain in the optimum caffeine range for 3 hours).
2. Use of leaderboards. A leaderboard would show the users that are the best at using OptiCaff in a specified way, (e.g. showing users who stay in the optimum range for the longest time.

Based on this research, it was decided that OptiCaff would use leaderboards as a method of gamification, provided that it is done safely. This is because leaderboards can link all of OptiCaff's users turning it into a multiplayer game. Obviously, as with any game there would be the potential to cheat by pressing the button without actually consuming the caffeine, but this still doesn't detract from the fun element. One of the dangers of gamification is extreme behaviour, OptiCaff will not reward behaviour that is potentially dangerous, e.g. rewarding the user that has the highest caffeine intake.

3.2.4 Monetisation Research & Analysis

It is more challenging to profit from Android Applications compared to Apple iOS Applications according to a report from Distimo, an app store analysis company [16]. The report suggests several methods to maximise the money earned.

1. 80% of paid applications have been bought less than 100 times.
2. The profits of in-app advertising vary greatly, depending on user base size.

3. It is common in app stores/marketplaces to have a paid version of an app alongside a free version. There is no difference in the functionality of the app, though the paid version does not display advertisements.

Based upon these three points it has been decided that OptiCaff would be developed as a free and paid version, containing advertising in the free version. The next logical step after gaining a significant user base would be to pitch the application to caffeine vendors for funding in exchange for favouring their points of service within the application.

3.2.5 Competitors Research & Analysis

This section details both the direct and indirect competitors to Opticaff and ascertains if any of them offer a similar user experience.

Caffeine Finder is a BlackBerry application, and is a direct competitor of OptiCaff. Caffeine Finder directs a user to the nearest restaurant or café, give the address and even display reviews of the destination if available. There are however several negative points regarding this application:

- BlackBerry has a small screen compared to Android phones and iPhones.
- The application doesn't inform the user of the optimum time to consume caffeine.
- A user may already be tired before they think to check Caffeine Finder which is something OptiCaff will try and prevent.
- The application was released in 2005 and has not been updated regularly since that time, this is shown by reports that it is not fully compatible with newer operating systems.

Caffeine Zone 2 Lite is a free iPhone application that tracks the amount of caffeine in the body, OptiCaff will also have caffeine tracking.. Making Caffeine Zone 2 Lite a direct competitor, although OptiCaff offers a superior service for the following reasons:

- OptiCaff offers a complete solution, Caffeine Zone 2 Lite only tells the user when they should have caffeine, it doesn't tell the user where they can get a caffeinated drink.
- The alerts generated do not consider the user's schedule, OptiCaff will look at the user's calendar to see if they require an earlier warning for caffeine to accommodate their schedule.
- Caffeine Zone 2 Lite is focused on being an educational tool for caffeine use. This is in contrast to OptiCaff which will prioritise providing a service.

One of the issues of using open data is that the data itself can be considered an indirect competitor of OptiCaff. It could be possible for another product to be created using the same data set, this means that OptiCaff could have more potential competitors than it would if it used closed data.

Table 2 summarises the competitive edge of Opticaff, illustrating how it combines the key features of its competitors into a superior all encompassing service:

Table 2: Table of Opticaff's Competitors

	Caffeine Finder	Caffeine Zone	Caffeine Data	Opticaff
Does this app allow you to locate caffeine sources?	✔	✘	✔	✔
Does this app help you to manage caffeine content?	✘	✔	✘	✔
Does this app help you to manage caffeine content in relation to your day's activities?	✘	✘	✘	✔

4 Implementation

This section details the Implementation of OptiCaff and is located in the Google Code repository [1]. The current to do items [2] and future work [3] are also located in the repository.

The external libraries used in the implementation of this project are located within the Appendix A.

4.1 Architecture

The overall architecture of OptiCaff is shown in figure **??**.

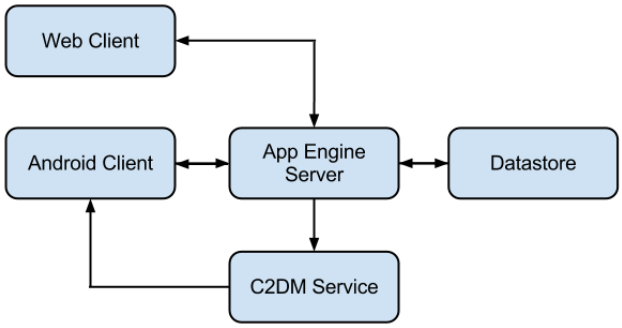

Figure 2: Architecture Diagram [10]

Google's App Engine Connected Android Architecture [10] which is based upon the client server model is used in OptiCaff. It allows OptiCaff to use a central database for storing caffeine related information which can be managed independently of open data sources. This removes the reliance on the providers of this data and explains why the results of the SPARQL queries that are run on the endpoints are stored. This also speeds up the process of delivering results to the users by not needing to perform these queries for every request. The specific advantages provided by this architecture are automatic handling of:

- Communications between the service and the application.
- Authentication and user accounts.

This also provides the means to notify users using Cloud to Device Messaging (C2DM).

4.2 Android

This application has been developed for Android 4.0, Ice Cream Sandwich. OptiCaff was developed for this version due to the introduction of the official calendar API which is not in any previous versions of Android. This was necessary for OptiCaff to obtain a user's event information. In addition to this, Ice Cream Sandwich is the first version of Android where Google have specified a recommended styling guide for designing applications.

OptiCaff is structured using the Model View Controller (MVC) design pattern, this allowed the packaging of the application code into various components which could then be worked on by different individuals independently and concurrently.

4.3 User Interface

This section details the design considerations that were made prior to constructing the user interface.

[1] `http://code.google.com/p/rich-2012-cafe/`
[2] `https://code.google.com/p/rich-2012-cafe/wiki/TODO`
[3] `https://code.google.com/p/rich-2012-cafe/wiki/FutureWork`

4.3.1 Design Considerations

When implementing the user interface, it was desirable that the design of the application was consistent with the Android 4.0 design ideology. To achieve this, the Android design and style guide was referenced, which outlines some of the key aspects of an Android 4.0 application, and some of Google's design decisions made throughout the OS. This included decisions such as universal behaviour of the back button, should preferences be handled using a separate fragment or activity, and interaction and navigation of the different sub-activities of our application.

Later versions of Android make use of an action bar which is implemented across all Android 4.0 applications as a way of providing a consistent method for navigation. This has therefore been included within OptiCaff with a main logo and icons which can be used to navigate between the different viewpoints.

The user interface was designed so there were different activities for the different viewpoints available. There was one main activity for the home screen, and then activities for the map, graph, leaderboard, and the settings were implemented using the newer preference fragment class, which would match the preferences theme of the system. The "Up" navigation option was implemented only on settings, as it is the only part of the application that is not a top level activity. Therefore all of the other activities make use of the back navigation instead, due to the lack of a hierarchy between the different viewpoints. Tapping on the OptiCaff logo in the top left corner will always take you back to the default home view.

There are certain key design principles that have been outlined by Google in their style guide, that have been implemented in OptiCaff. Making sure that the important information is easily accessible, and the most important options and features can be accessed from the main home screen, providing an overview of events and the next time they should take caffeine. In the app structure they stress how the main home view should not just be a navigation menu, but instead stating the importance of "making content the centrepiece of your start screen", which this satisfies.

4.3.2 Final Design

Figure 3 details the main screens of each activity section in Opticaff.

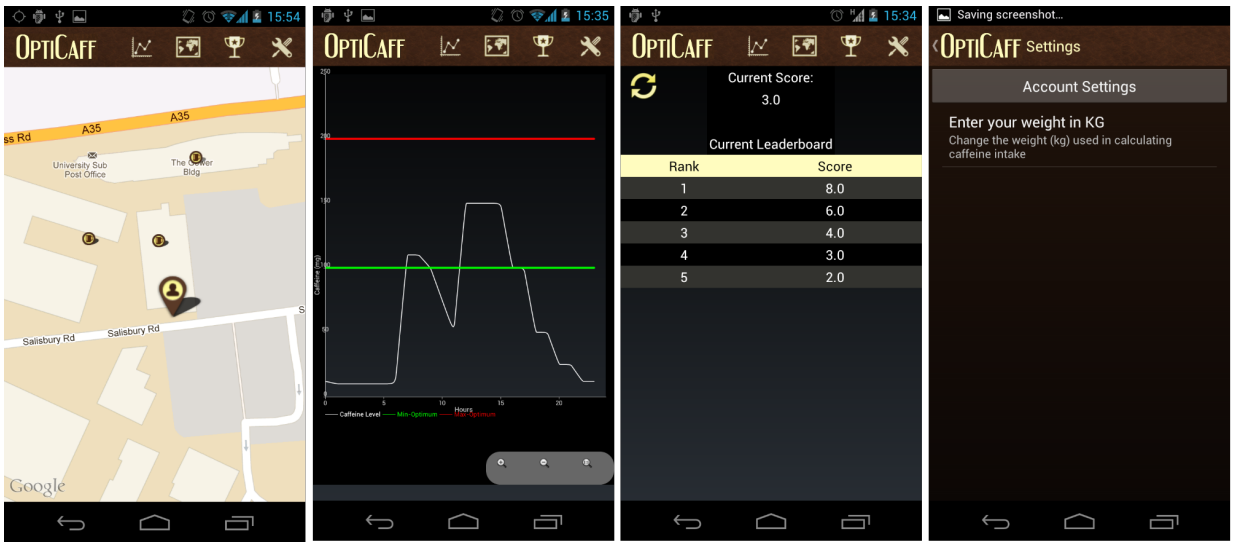

Figure 3: Activities: Maps, Graphs, Leaderboard & Settings

(a) Map Screen
This screen uses the well known pointers utilised in popular map applications to illustrate the user's location. The nearest caffeine vendors are shown in small brown circles around the map to

give the user a visual idea of their proximity and direction.

(b) Graph Screen
This screen shows the user's caffeine levels over time throughout the day. This enables the user to easily see if they are staying within their optimal levels. The colours red and green are used to signal the minimum and maximum boundaries of the user's optimum caffeine range. The colours used in the representation of the user's optimum range (minimum and maximum line) follow a universal concept of red meaning bad and green meaning good.

(c) Leaderboard Screen
This screen allows the user to see their current score and to compare it with other using the application. Putting the user's score at the top in large text allows them to immediately assess whether they are achieving a good score through the use of positive and negative symbols.

(d) Settings Screen
This screen allows users to change their settings. It is currently very simplistic as the prototype required minimal settings. The available settings provide a description of what each setting does and where possible an example value and user entered validation (i.e. the weight setting allows only positive numbers to be entered).

4.4 Google App Engine

The GAE backend was implemented in Java and is split into a number of components: the Datastore and Remote Procedure Call (RPC) service. This decision was made due to the framework demanding the use of Google App Engine, which members of the team had previous experience using before and provided a free globally accessible data server which can be used by clients.

4.4.1 Datastore

The first component is the database, which is implemented using GAE's iteration of Java Data Objects (JDO). See Appendix B for the structure of the datastore. The JDO datastore is used because it allows both the Android application and datastore to use the same Java objects and provides the means to transfer and use data easily.

4.4.2 RPC Service

The RPC service acts as an interface to the datastore for the Android Application. This service contains a number of RPC methods which perform query actions on the datastore to provide information such as top 5 players on the leaderboards, and nearest caffeine source locations. This has been used because it provides an abstract interface between the client software and the datastore which handles authentication automatically.

4.5 Implementation Issues

When developing the UI, the different activities were initially implemented in 'fragments', with one main container activity managing all of them. Unfortunately this caused issues when the map was implemented, as due to some incompatibilities between the MapActivity class in android and the new Fragment classes, there were problems when trying to contain what was viewed as an activity, within a fragment. This meant that different parts of OptiCaff were implemented as different activities.

5 Project Management & Tools

5.1 Project Management

This section details how the project was managed, the roles of the different group members and the methodologies that were used.

5.1.1 Team Roles

The following roles were outlined for this project and assignments are shown in Table 3:

- **O**rganiser - Oversees project and time management
- **D**eveloper - Develops the application
- **U**sability Expert - Manages User Interface and HCI (Human Computer Interaction)
- **R**esearcher - Researches background information
- **P**resenter - Presents pitch & manages presentation

Table 3: Table detailing Team Roles

Team Member	Roles	Description
Adam Costello	**R, P**	Adam coordinated with Craig on the Presentation, and worked with Sami on documentation and research.
Mike Elkins	**U, D**	Mike coordinated with Pratik to design and build the User Interface section of the application along with other sections.
Jonathan Harrison	**O, D**	Jonathan organised the team and made sure tasks were completed in a timely manner. He also worked with Sami on the backend element of the application.
Sami Kanza	**R, D**	Sami coordinated with Jonathan on the backend of the application, she also worked with Adam on the documentation and research section, focusing on the caffeine research.
Pratik Patel	**U, D**	Pratik worked with Mike to design and build the User Interface section of the application along with other sections.
Craig Saunders	**P, D**	Craig worked on the core app functionality in addition to working with Adam on the Presentation section.

5.1.2 Team Organisation

The team decided that bi-weekly meetings would be appropriate for the project. In each meeting the progress made between then and the previous meeting was stated, any problems that needed solving were raised and then the tasks for the next meeting were divided up. The nature of these meetings were similar to a SCRUM [25] daily standup.

5.2 Group Methodologies

The team decided to implement several agile-based techniques to aid with the application development process. The development areas have been broken down into individual tasks (stories) to simplify the process. An iterative development process was also adopted, with the base of the application built first, followed by a gradual development of its features.

Pair Programming is another agile technique that the team used. The application development was initially split into three areas: Database development/SPARQL querying, map interface and GPS positioning/directions, and the application UI. Each section had two team members assigned to it, and each pair worked together to combine skillsets, therefore producing superior results.

5.3 Tools & Techniques

This section details the tools used by the team to aid with project management and development.

5.3.1 Version Control

There were several version control mechanisms we could have used. Git and SVN were both considered, with potential to store the code on UGForge, Google Code or Github etc. In the end the group chose to use SVN Google Code. SVN was chosen primarily due to the fact that all team members had experience with it. OptiCaff is hosted on Google Code; the reason this has been used is because it provides features such as repository and source code control, which is vital to a large project with more than one member. In addition it facilitated writing documentation within the repository with the provided wiki pages, whilst also providing issue tracking.

5.3.2 Development Tools

The development tools used in OptiCaff's production were the Android SDK tools [3]. The recommended development environment suggested by Android was Eclipse [18] accompanied by the ADT (Android Developer Tools) plugin [4]. Given the groups overall familiarity with Eclipse and it's additional useful plugins for version control (see section 5.3.1) this was used as our IDE of choice.

6 Future Work

OptiCaff has a great potential for future work. This section details some of the ways in which it could be extended/improved:

- **Improved Calendar Integration:** This system currently uses calendars synchronized to a users phone, it would be useful to extend this to include university timetables so that events such as lectures don't need to be manually input.

- **Adding Favourite Locations:** Adding favourite products and locations would enable the user to customise the caffeine suggestions provided by the application. For example if the user only liked tea and coffee but not energy drinks then that would be taken into account and they might be advised to consume caffeine more regularly as they favour drinks with a lesser caffeine content.

- **Accurate Caffeine Levels:** For the purposes of the prototype Opticaff only used average values for the four categories of caffeinated beverages (coffee, tea, soft drinks and energy drinks) and assumed an average size for each beverage. An improved OptiCaff would list each product's correct caffeine content.

- **Advanced Leaderboard Functionality:** Currently within the prototype there is a leaderboard for the optimum caffeine levels. The finished application would increase the competitive edge by adding: history of scores, mapping caffeine levels to events (e.g I was the most productive in this lecture) and adding friends/groups so that users could compete directly with people in similar circumstances.

- **Adaptation to other Universities:** Given that this system uses Android Calendar to verify the users daily activity, and that the system has been built to import data from a set of SPARQL about the caffeine locations; adapting this application for multiple universities would not take very long. The users would continue to add their timetable data in as before, and a new set of queries would be built for that university. This would enable OptiCaff to be pitched to various university establishments for minimum additional development time.

- **Adaption to Specific Coffee Chains:** Based on similar principles as the idea above, this application could be adapted to a specific coffee chain such as Costa or Starbucks if they gave Opticaff access to their location and product data. This would then enable the app to be used by anyone who was a fan of caffeine or indeed these specific stores as large chains such as these have branches all over the country.

7 Evaluation

7.1 Product Evaluation

Four out of the five goals set in the initial planning stages were achieved, and one of them was partially achieved. Table 4 details this.

Table 4: Table Evaluating Requirements

No.	Requirement	Met	Description
1	Obtain and use linked data detailing caffeine sources within the University of Southampton.	Yes	All points of service that are listed as providing caffeine are used within our system.
2	Integrate the user's schedule	Partially	As discussed earlier in section 3.1.2 accessing the timetable data from SUSSED wasn't a simple task so Google Calendar was used instead. This means that the users have to input their own timetable data, however it meets the requirement of using calendar data.
3	Monitor users caffeine intake and predict the optimum time for their next consumption.	Yes	Opticaff works out the caffeine decay rate (based on the calculations specified in section **??**) and based on the users timetabled events makes a prediction for the best time to consume the next caffeinated beverage.
4	Provide a leaderboard to rank users based on how well they maintain their caffeine level within the optimum range during their scheduled events.	Yes	A basic leaderboard has been implemented that ranks users based on their caffeine consumption.
5	Approximate the users position and locate the closest appropriate caffeine sources to them.	Yes	The positional values of all the caffeine points of service are stored by OptiCaff. By using GPS the users location can be determined also and then they can be directed to the appropriate destination.

This shows that OptiCaff was very successful in meeting its necessary aims.

7.2 Team Evaluation

The group feel that they worked well together as a team. Everyone participated and fulfilled at least the two roles they were assigned at the beginning of the project. The bi-weekly meetings were regularly attended to with additional sessions when necessary. The project met its requirements and was delivered on time for the deadline.

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Appendicies

A External Libraries

- **Jena Library:** http://incubator.apache.org/jena/index.html
- **AChartEngine Library:** http://www.achartengine.org/

B Data Store Object Table

Table 5: Table detailing System Objects

Name	Purpose	Example
CaffeineSource	Models a location that sells caffeine.	Avenue Cafe.
CaffeineProduct	Models product (name, type, caffeine mg).	Red Bull Can
CaffeineSourceProduct	Adds location pricing to product.	Red Bull/Avenue Cafe.
OpeningTime	Models opening times for a location.	Monday's: 8:00 to 19:00. 00:00:00 16/4/12 to 23:59:59 15/6/12.
LeaderboardScore	Models user's leaderboard score.	