Android Application for the Hook Hockey

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Abstract

The foundation for this project was originated after a discussion with the owner and founder of the hook hockey, a website devoted to Leinster and Irish field hockey which aims to publish news content covering all areas of the game from International to schools level.

The hook hockey originally founded as a blog in 2007 was the first comprehensive reporting site which provided news content on a consistent basis to the Irish hockey community. In 2009 the original blog was upgraded to a website called “hookhockey.com”. The website has helped generate an even larger audience as new features and a wider scope for hockey news became accessible.

With the rapid growth of mobile and tablet technology there has been increased demand for an application which delivers not only the current functionality of the hook hockey website but new features which are in line with the recent developments in mobile and tablet technology.

The core of this project was to develop an android application which delivers an aesthetically pleasing news feed, a club database and a match reporting system for ordinary users of the application.
Declaration

I hereby declare that this project is entirely my own work and that it has not been submitted as an exercise for a degree at this or any other university.

__________________________________________      ___________________
                      Name                                                              Date
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I would like to thank my supervisor Dr Mary Sharp for her continued reliability and guidance through this project. I would also like to thank my family and friends for all your help and support.
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Chapter 1-Introduction

1.1 Motivation

Field hockey is one of the largest participated amateur sports in Ireland. There are currently 47 clubs, 223 teams and several thousand hockey players that are registered under the Leinster Hockey Association alone [12]. Since 2007 the hook hockey website has been the only consistent news publisher of hockey news within Leinster. Media coverage of field hockey within Ireland has been comparatively poor with other sports considering the numbers involved within the game. To put things into perspective the hook hockey which is a non-profit organisation acquired on average 200’000 page views a month and over 1.1million page views in total over the course of the 2012/2013 season. Thanks to generous funding and volunteering from the Leinster hockey community the hook hockey has consistently upgraded its features and enhanced its website to meet its user’s demands. However, with the advancements in technology specifically with smart phones, tablets and web-enabled devices there has been a rapid increase in numbers accessing the website via mobile and tablet technology.

Currently, the website comes with a mobile optimised version of the site but the client is not pleased with it along with many of the users. According to the hook hockey's analytics for 2013, it shows 63% of its users accessed its website via mobile. From a business perspective it has opened up many opportunities for developments on the current website not only to help publish news content but generate new features which will encourage users to interact with the application. Developing these features and improving the hook hockey in-line with recent technology and having the opportunity to work directly with a client is a leading motive in why a decision was made to undertake this project.

From a computer science perspective it has opened an opportunity to analyse the strengths and weaknesses of the current mobile application and help create a solution to these problems. The android mobile platform was used as the core resource to develop
the application for this project.

1.2 Background

Originally founded as a blog in 2007 the hook has developed into a website with many functions and features. The current website provides news content on the highest Leinster men's and women's leagues all down to school level. The hook hockey has always been fully reliant on players, spectators and volunteers sending them match reports which they then edit and publish on the website.

The incredible wide scope of reporting the hook undertakes means acquiring information such as results and match reports are becoming increasingly difficult to obtain especially with lower profiled games. In the current status the hook hockey receives its match reports over several forms of communication. These include voicemail, text message and twitter. The client explained that there are many problems with these current modes of communication as much of the data is highly unstructured1 see (Chapter 1-Requirements).

The client also mentioned that the current website lacked a club database which provides information on each specific club. This was something that was very important to note in considering the objectives for the projects as accessing critical information about a club via a mobile browser is currently very time consuming. The general method to obtain such club information is by navigating through a non-mobile optimised club website to find the information.

After discussing with the client a conclusion was drawn that it would be very efficient if all the clubs had their information in one area which was easily accessible.

The hook hockey website also provides league tables and a fixtures/results feature as well as many other features such as video highlights, interviews, podcasts which were all

1Unstructured Data refers to information that is not organized in a predefined manner.
discussed but were put out of scope in relevance to the development of the application.

1.3 Current mobile site

With recent developments, the website has come with a mobile optimised version of the site. Before discussing objectives as to how to build on the current website, the client raised explained that many current issues of the site have come under much scrutiny. These issues include navigation through the site, its visual aspects and the content of the website.

1.3.1 Navigation

The current site proves very difficult to navigate through as many of the features available on the mobile site are hard to reach. Users are sent down an unclear path and in some cases four or five clicks to reach their final destination, from figure [1.1] it shows there is little guidance given to a user on the home screen.

Figure 1.1 Home Screen of current mobile site

1.3.2 Visual aspects
Another issue raised was the visual aspect of the site. Currently the website boasts high quality photography but has yet to be incorporated effectively within the mobile site, from figure [3] it shows the content only fills half the screen size and has a poor visual effect on the display. Another visual issue with the current mobile site is that the news feed only provides raw text, an improvement here would be the attachments of thumbnails on each unique news article.

Figure 1.2 Screen on opening of news article

1.3.3 Content
Due to the makeup of developing a web based mobile app the content and its current features are limited to a news feed and a drop down menu which provides links to results, fixtures and league tables

1.3.4 Summary
As a result of overall poor usability of the website twitter has become the major distribution tool for the hook hockey’s news published. The hook hockey currently has four thousand followers on twitter and tweets links which direct followers to the news articles via their profile. In combination of the growing dominance of Twitter and the current issues raised, a large majority of the users access the news articles via the hook hockey's twitter page.

In consideration of the analysis from the current web site a list of requirements were
drawn up with a client representing the hook hockey. These requirements were to solve the issues raised and help develop the hook hockey further.

1.4 Waterfall Model

The waterfall model is an approach which maps out the development life cycle of a software project. It divides the project into phases, these can be seen below in figure [1.3]. Typically the outcome of one phase acts as the input for the next. Phases don’t overlap, in other words the next phase is only started when the set of goals for the previous phase have been achieved.

This is a very old model which was introduced by (Royce 1970) and some analysts believe it is considerably outdated.

There were many advantages of using this model for the project however. Firstly the approach is very simple to understand, each phase has specific deliverables and gave a clear path to the overall objective of the project. Secondly, it works well for projects where the requirements are clearly understood between the client and the author.

Considering the time constraint it was unrealistic to change the design or requirements. For these reasons it was clear that the waterfall approach would best suit this project.

Figure 1.3 Phases of the waterfall model
1.5 Requirements

In consideration of a deep analysis for the current website and how to best solve the issues, a number of requirements were drawn up with the client after much deliberation. These include three main functional requirements\(^2\) and several non-functional requirements\(^3\).

1.4.1 Functional Requirements

The project has three core functional requirements to provide which are listed below.

1.4.1.1 News feed

The first requirement was a news feed feature which is compatible and user friendly for both tablets and smart phones.

1.4.1.2 Match reporting feature

Secondly a match reporting feature which allows general users to send information about a match directly to the hook hockey. The non-functional requirement worth mentioning here is that the data sent should be at least semi-structured when it reaches its destination. Which means easy and fast for the receiver to interpret.

1.4.1.3 Club list

The third and final functional requirement determined was a feature which displayed a list of all the clubs registered under the Leinster Hockey Association. The list would provide unique individual content for each club including key contact details, which can be accessed offline.

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\(^2\) Defines specific functions.

\(^3\) Specifies the basis that can be used to judge the operation of a system, rather than individual behaviours.
1.4.2 Non Functional Requirements

Several non-functional requirements were determined which are directly related to the performance of the system from a broad perspective.

1.4.2.1 Maintainability
First and foremost the hook hockey is a non-profit organisation so maintainability was a key non-functional requirement. This meant the system developed should be easily maintained, cope with such changes in the environment and reluctant to faulty behaviour.

1.4.2.2 Portability
The app should be usable on a range of different android platforms, taking into consideration the varying screen sizes.

1.4.2.3 Resilience
This means that the application should provide and maintain an acceptable level of service in the unfortunate scenario of a major fault. In other words major features should not be reliant on other non-related features to work.

1.4.2.3 Flexibility
The app should be open to integrate other websites and social media sites. Most notably a user should be able to successfully navigate through the hook hockey's current website without leaving the app. Social media sites should also be effectively integrated.

1.4.2.4 Navigation
A major requirement determined was an effective user interface in the application which should be clear and concise to help a user easily navigate his/her way through the application. A requirement linked to this was to develop the interface with a welcoming homepage which displayed shortcuts and clearly labels the route to desired destinations.
1.5 Technical Approach

The hook hockey app was programmed as an Android application, primarily using the language Java. The reasoning behind this was for a number of factors. Firstly the ease at which it is possible to publish an application on the Android market. Secondly the growing market share that the Android market possess over its rivals see figure 1.4. Finally the resources available to Android developers that assist in guidance for developing Android applications. Many of these resources came from websites such as “developer.android.com” & “stackoverflow.com”

![Smartphone market share worldwide](image)

Figure 1.4 Smartphone market share worldwide Dec 2011-Dec 2012[19]

There was a steep learning curve to climb in order to develop such an application as the author has had little experience with Android development until this project. The Android SDK was used which provides the API libraries and developer tools necessary to build, run and test apps for Android.

XML was used to define the logical structure of the user interface element of the
application. The Android SDK provides a comprehensive XML vocabulary that corresponds to the View classes and subclasses, such as those for widgets and layouts [1]. The XML was especially important for the development of this app as the requirements have a huge emphasis on a user friendly interface which is presented acceptably over a range of android platforms and screen sizes [2]. Developing the app through IOS was also discussed with the client but taking all factors into consideration it was concluded that Android was the best option. Developing an iOS is something which was discussed but is out of scope for this project and mentioned further in the future work section in chapter 4.
Chapter 2 - System Design

Introduction to Design 2.1

After deliberation with the client and a core set of requirements were determined which are discussed in chapter 1, the project entered its next stage of the process. The following chapter will examine the user interface of the system as well as how the systems architecture will be designed, it will also cover the implementation of the user interface.

System Architecture 2.2

The system architecture is an overall design and structure given to a project. It was important for this project that a system was constructed which was easily maintainable for the client. For this reason the application stores all the data locally as android provides “internal storage”. Internal storage means that memory on the android devices phone is used to store relevant data [14]. The remaining data that is needed for application such as news content and twitter feeds are taken from network connections.

User Interface 2.3

This section of the report will deal with the area by which the user interacts with the computer. It may be called “UI” or simply an “interface”. The overall objective is to create an interface which is user friendly.
User Interface Background 2.3.1

Broadly speaking the main objective was to make sure the interface was coherent. A major non-functional requirement of “navigation” was fundamental to the client’s needs. On consideration of this a decision was made to use a tab layout as it would suit the application best.

The application contains many functions and features so the author felt using the tab layout would clearly distinguish each feature and give users a clear path to their destination. Each tab is then individually dealt with as the development progresses through the functional requirements. The tabs represent each function that the application provides for the user, this helped to separate the tasks when developing the source code.

Mock ups 2.3.2

Very rough paper prototypes were initially drawn up. The author then used balsamiq mock-up software to display a more vivid representation of how the initial design would look.

These mock ups were presented back to the client which were discussed over, it gave the client a clearer picture of the application and the procedure on implementing the features discussed in the requirements. As the design is further examined later on in this chapter it will show the mocks which were presented to the client.

Using balsamiq mock-up software was extremely simple to work with and suited well as it was able to efficiently produce mock ups quickly in order to show to the client.

“Balsamiq is a wire framing and mock up tool with a high focus on usability. Quickly come up with mock ups and easily share them with your clients.” [3]

The client was overall happy with the original mock ups as the final design was very similar to the initial mock ups produced. The client did however request a few small adjustments which were expected. See figures in section (UI Design-2.3.6) of this report which will comprehensively deal examine the mock-ups produced.
User Interface Design 2.3.3

Work finally began on developing the user interface by using the Android SDK which provides a XML vocabulary. Due to the fact that the components all have different characteristics the author will deal with the final design of each main layout separately.

Home tab 2.3.3.1

This layout was designed to show a welcoming home screen when the user opens the application. The initial mock up shown in figure 8 below shows both a simple Facebook and Twitter link along with the 5 tabs across the bottom of the screen.

![Mock-up of home screen](image)

Figure 2.1 Mock-up of home screen

The client was happy with the mock up as the final design can be seen in figure 9 below. The few areas that caused issues when developing the XML document was creating a screen that was visually aesthetic over a range of screen sizes especially with the inclusion of image buttons [4]. Images were found difficult to manage when developing the XML document across the application as they don't adjust in accordance with screen
sizes.

Over this layout and for the majority of the following layouts discussed in this chapter the application used “match parent” as the value to represent the views in the XML. This meant that the views in the activity got adjusted according to the size of the mobile or tablet screen in use. This helped cater for a full range of screen sizes. This is shown below in a snippet of the source code.

```xml
android:layout_width="match_parent"
android:layout_height="match_parent"
```

Figure 2.2 Code snippet of XML used

The final design of the home screen can be seen below in figure 9

Figure 2.3 Final design of UI Home screen
One new feature implemented for the home tab was a shortcut to view league tables. From analysing the Google analytics of the current website, the client mentioned that the league tables were very popular and accounted for many of the site visits. For this reason a League table web view was implemented which slides across the original screen when activated as shown below in Figure 2.4. It then allows the user to scroll down the web-view which shows all the Leinster club league tables. The web-view was taken directly from the original hook hockey website [5]

![Fig 2.4](image-url)  
Figure 2.4 Slide out view of League Tables via Home Screen
**News tab 2.3.3.2**

The news tab layouts mock-up which was presented to the client was originally geared towards a phone screen size as seen in figure 2.5. The mock up shows a basic scroll view of news articles.

![Image of News Tab Mock-up](image)

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**Figure 2.5 Mock-up of News Tab**

After presenting the mock-up and discussing with the client an agreement was had that implementing two news functions that cater for tablets and smart phones would best suit. The client found that the original web-view of the hook hockey is visually acceptable for tablets so on initial opening of the tab it shows a web-view as seen below in figure 2.6.
Figure 2.6 Final design of News Tab (UI)

Figure 2.7 Slide out view showing list of website feeds
A button was added at the bottom of the page which activates the slide menu, similar to the league tables in the home screen tab. This button was titled “Click Here For News Feed”. On activating this button the menu slides across showing a list of five different news feeds. As the parser was developed which dealt with simple RSS feeds a decision was made that it would be convenient to add options for the user to choose not only the hook hockey news feed but a collection of other websites which deal with the Munster and Ulster regions of hockey along with the national website. This can be seen above in figure 2.7.

When a user clicks one of these buttons it then activates the parser which takes in the feed from that unique website and presents a list of the most recent articles along with a link to that article, this will be further discussed in chapter 3. As seen below in figure 14 the display is currently very text heavy. An aspect which is planned on adding is a thumbnail feature, at the moment the website feed does not have a thumbnail tag but the client has agreed to add one when posting each article for the upcoming season. This aspect of the parser will be discussed in both chapters 3 & 4.

![Image of the slide menu with news feeds]

*Figure 2.8 Content extracted from RSS feed*
Clubs tab 2.3.3.3

The club tab was designed to facilitate users that required information about any club registered under the Leinster Hockey Association. Currently there is no mobile application or mobile optimized site that freely allows users to access club information. Users generally look for club information during match days when they are physically at the match or on route to one. An example would be where a player is looking for the location of the pitch when they are on the road. Another example would be a where a contact number is needed during a match situation for an emergency.

The clubs tab shows a scroll view of all the hockey club registered in Leinster. The mockup seen below in figure 2.9 shows the unique club profile when the club is selected from the list.

![Figure 2.9 Mock-up of Club profile](image)

A class called “ContactsActivity” was created which extends ListActivity this basically shows a list view of items within an array\(^4\). In this case these items were the hockey clubs.

---

\(^4\) An array is a systematic arrangement of objects
Three main activities were added when a user clicked on a club’s profile page. A call button was implemented which dials a club’s contact number when pressed, a pitch location button was added which activates Google maps and brings you directly to the club’s pitch location see figure 2.10 and finally an email button was added which opens up an email activity that has the club’s email address automatically filled in.

![Google map locates hockey pitch](image)

Figure 2.10 Google map locates hockey pitch

Another slide menu was added that shows the unique twitter account of the club, this is shown in figure 2.11 below. The reason the twitter feed was added is because the majority of clubs within Leinster update their feed regularly with important information and use it as a means of sharing club news.

A separate XML document was developed for each club as many of them had different
features. For example many of the clubs don’t have twitter so instead the clubs websites was used as a slide out feature.

Figure 2.11 Slide out view of unique clubs Twitter feed

Match Reporting tab 2.3.3.4

As it was briefly mentioned in chapter 1, the client is heavily reliant on information sent in by players, supporters and volunteers. The client explained that voice mails were sometimes difficult to interpret and rarely did someone leave their name as a source of the information. He then discussed text messaging saying he received unstructured text which was frustrating to read through his phone. Similarly sometimes twitter was used but as characters are limited to 140 characters it doesn't cover much ground. He mentioned email was the best form of communication as he could access them on his
computer and was always left with an email address he could respond to. Taking these factors into consideration a feature was developed which allows a user to enter specific information into each text box as you can see in figure 2.12. These include, home team, away team, final score, goal scorers, match report and other notes. Once the information was entered and the “Send Match Report” button is clicked, it activates an email activity which shows pre-set data in the body of the email which gives heading to the text entered by the user as seen below in figure 2.12. The email address is filled in automatically so the user just has to click “send” to send on the match report to the hook hockey. By doing this it gave structure to the information sent to the hook hockey.

Figure 2.12 Match Reporting Tab
More tab 2.3.3.5

The more tab is another list-view of an array of classes as seen below in figure 22, similar to the one used for the clubs tab. Each feature is represented by its own class. For the majority of the features when a user clicks them it shows the current web-view taken from the relevant section of the hook hockey website.

![Figure 2.13 More Tab (UI)](image)

The results and fixtures feature however was slightly modified as another XML document was created which shows a scroll view of buttons representing all the club leagues within Leinster hockey. This can be seen below in figure 23. This suits very well for smart phones as the current mobile web app is very hard to navigate through. This design gives users a clearer picture of all the different divisions’ fixtures/results that are available. When a user clicks on his/her desired division button, a web-view then shows the relevant information as seen below in figure 24.
Summary of User-Interface 2.3.4

Developing the interfaces for each area within the application was a very time consuming task. One of the main problems encountered was the addition of images and visual graphics. Images don’t resize from their original dimensions to suit different screen sizes. For this reason such images had to be removed from the application to make sure the main functions weren’t affected. The application initially had unique images for each club in the contacts list. This was removed after much deliberation because many of the images had different dimensions, this area could be looked in the futures work but the client wasn’t overly fussy about this aspect.
Chapter 3 - Implementation

Introduction to implementation 3.1

This chapter will focus on the main features of the application that were developed in the programming language Java and briefly mentioning the software used to assist this. Similar to chapter 2 the author will deal with each feature separately to discuss the implementation of the application. The core features examined will be the home screen, news feed, the match reporting system, and club contacts.

Software Used 3.2

For the development of this project Eclipse IDE was used along with the Android Development plug-in as the primary software. The ADT extends Eclipse and allows the construction of android based project. This also comes with an XML editor which was used in the implementation of the user interface- see chapter 2. The Android SDK package also runs emulators for android devices which assisted in testing and evaluating the finalised application on a wide range of android tablets and smart-phones.

“Eclipse is an integrated development environment. It contains a base workspace and an extensible plug-in system for customizing the environment. Written mostly in Java, Eclipse can be used to develop applications.” [5]

“The Android SDK provides you the API libraries and developer tools necessary to build, test, and debug apps for Android.” [6]
Tab Layout 3.3

The first step taken was to create a main activity that extends TabActivity. Android by default provides a class called TabHost[8]. TabHost holds two children; a set of tab labels that is used for navigation and a frame layout that displays the contents of the page. This would best suit the design layout and give a backbone to the application where the contents of each tab will be dealt with separately.

Home Tab 3.3.1

The home screen tab has a simple design with two buttons: Twitter and Facebook, along with a slide out view which displays the current league tables—see figures 9 & 10. The class named Home Activity implements an OnClickListener class which is used for a callback\(^5\) to be invoked when a view is clicked.

For the Twitter and Facebook buttons a simple switch statement was used in order for the program to recognize and execute the related activity. I found using switch statements across my whole program very beneficial because it can give a number of possible execution paths and can easily be altered to cater for more or less functions.

For the slide out view which is implemented throughout the program an animation program taken from GitHub[9] was modified and used to implement the feature.

News Tab 3.3.2

The news tab provides two alternate views as discussed in chapter 2. The web-view as seen in figure 12 is implemented for tablet users. The alternative view shown in figure 13 is another slide out view which presents a list of the top hockey sites in Ireland covering all of the regional leagues. This view is implemented for smart phones users with smaller screen sizes.

To extract the content needed from the html sites to show in the application a decision was made to take the RSS feed from each of the websites.

An RSS “Rich Site Summary” often dubbed as Really Simple syndication uses a much

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5 Callback is a piece of executable code that is passed as an argument to other code
standardised structured way of presenting information. It is essentially an XML formatted plain text which is understandable to read both by humans and computers. It contains structural meta-data\(^6\) such as the title, publishing date, description and body of the content. Each unique article that is published contains all its information within an item tag, for example: `<item>...</item>.

Within the item tags contains several tags which represent the data that was mentioned earlier such as title, date etc. This can be seen below in an example of the hook hockey RSS feed which shows the contents contained within an item tag [10]

```
<item>
  <title>
    Quartet of Pool A sides tussle for two spots in dramatic IHL fifth round
  </title>
  <link>
  </link>
  <comments>
  </comments>
  <pubDate>
    Fri, 28 Mar 2014 10:33:58 +0000
  </pubDate>
  <dc:creator>Stephen Findlater</dc:creator>
  <description><![CDATA[
    Four sides battle it out to complete the Irish Hockey League finals weekend line-up with men's Pool A the only group still up for grabs with Pembroke, Lisnagarvey, Three Rock and Cookstown locked in direct battle; men's and women's IHL weekend preview
  ]]></description>
  <content:encoded>...</content:encoded>
</item>
```

Figure 3.1 RSS feed taken directly from Hook Hockey

---

\(^6\) A set of data that describes and gives information about other data.
For the purpose of the application the following information was needed to be extracted from these RSS documents; “title”, "link”, “pubDate” and “description”. To do so, a parser was built which extracts such information and presents it on the application as seen in figure 2.8.

**Parsing background 3.3.2.1**

A parser application breaks data into smaller elements for easy translation into another language. It receives input through a sequence of tokens or program instructions. For this project two major XML parsing models were examined which are the streaming event based parser and the tree based parser.

*Streaming event based parser*

The event based API uses callbacks to report parsing events back to your application. As the XML document is streamed into the parser your handler is called depending on important events. So in this case the tags “title”, ”link”, “pubDate”,“description” along with start of document and end of document.

*Tree based parser*

A tree based API maps the XML document into an internal tree structure. Methods are then used to determine child and parent elements of the nodes as well as extracting the content contained within. With this model it allows the option to modify the tree and create a new XML. Shown below in figure 3.2 is an overview of the two models.
Figure 3.2 Overview of Event parser & Tree Parser [15]

Parser Implementation 3.3.2.2

After examining both models a decision was made to construct an event based parser. Mainly for the reasons that it requires less code and less memory. Building a tree based parser would be extremely memory intensive, and navigation through such documents or needing to manipulate them was not needed for the purpose of the application. The objective is very straightforward and it simply requires an extraction of information under certain tags.

The first step taken was analysing the feed which was mentioned above, the parser was extracting title, link, description, date and URL so a class representing an item was
created which contained those attributes. Certain methods were then used in order for the parser to extract data from each different tag.

Android provides the method getChild within the element class that obtains the child element from “TITLE” as seen below. The setEndTextElementListener was then used which basically sets a listener for the end of this text element. These two methods that are underlined are critical for the extraction of the information and can seen below in a snippet of the code used which deals with the TITLE tag.

```java
item.getChild(TITLE).setEndTextElementListener(
    new EndTextElementListener() {
        public void end(String body) {
            currentMessage.setTitle(body);
        }
    });
```

Figure 3.3 Snippet of Java source code which extracts the title tag

A main class was then constructed which takes in an array from the parsed information by using the callback function. A list activity was then created which displays a list of all the items contained within the array. From here the addLinks method was used which is available through the android API, this method scans the text provided and turns it into a clickable link. This method was used for the URL tag. The final view can be seen in figure 2.8.

The main problem encountered when constructing the parser was in relation to the core body of text within the contents tags. It contains complex text that references images which meant it wasn't readable or presentable to show within the application. For this reason a URL link was used which directs users to the relevant web page. This removes the user from the application to a browser and is an aspect which is discussed under future work in chapter 4.
Another aspect which has yet to be incorporated is the inclusion of a thumbnail feature which represents each unique news article in the list view. This is something which the client has agreed to implement in for the new season in 2014/2015. This will be discussed under future work in chapter 4.

**Clubs Tabs 3.3.3**

In accordance with the design mentioned in chapter 2 a feature was created to implement the main functions. The list-view is simply an array of the different clubs. Each club is represented by a unique class. Within the class has the three main activities which are the call activity, map activity and email activity. To implement these activities a switch statement\(^7\) was created with three cases that all contain intents. An intent is an operation of an activity given some data. As seen below the first intent named “locate” represents the pitch location function. Using ACTION_VIEW which opens up the google maps activity, the longitude and latitude coordinates of the pitch are added in which are labelled below. The second two cases are both similar in structure as they both contain data and an activity.

\(^7\) A type of selection control mechanism
Figure 3.4 Java source code showing a switch statement

The clubs unique twitter feed is also implemented in a slide out feature along with the text-views in the XML which contains key contact details. The clubs tab is semi functional offline.
Match Reporting Tab 3.3.4

For the match reporting feature a main class was constructed which used an intent to start an email activity. Pre-set data was used which gives structure to the information that is sent on via email. The data here is represented by a String variable named “message”. The Android API provides a method called putExtra which enables extra data to be added to the intent. When startActivity is called it starts the intent and opens an email activity which can be seen in figure 2.12. The code snippet below shows the constructing of the method onClick.

```java
public void onClick(View v) {
    // TODO Auto-generated method stub
    convertEditTextVarsIntoStrings();
    String emailaddress[] = { emailAdd };
    String message = "";

    + " (HOME TEAM):" + homeTeam + " " + " (AWAY TEAM):" + awayTeam + " "
    + " (FINAL SCORE):" + finalScore + " " + " (GOALSCORERS):"
    + report + " " + " (REPORT):" + scorers + " "
    + " (OTHER NOTES):" + otherNotes;

    Intent emailIntent = new Intent(android.content.Intent.ACTION_SEND);
    emailIntent.putExtra(android.content.Intent.EXTRA_EMAIL, emailaddress);
    emailIntent.putExtra(android.content.Intent.EXTRA_SUBJECT,
            "HOCKEY MATCH REPORT");
    emailIntent.setType("plain/text");
    emailIntent.putExtra(android.content.Intent.EXTRA_TEXT, message);
    startActivity(emailIntent);
}
```

Figure 3.5 Method which pre-set data on an email activity
Evaluation 3.4

This application was successfully tested by using the Android SDK package which is capable of emulating a range of mobile and tablet devices. The display of the user interface is aesthetic and adjusts accordingly over a wide range of screen sizes. The application is fully functional on all tablets and smart-phones that run android. It ticks all the boxes for navigation as the tabs allow fast access through the features provided and most features can be accessed through minimal clicks which improves the usability of the application. The application is simple to use which makes it user friendly over a wide scope of users that have different levels of technology backgrounds.

Whilst testing was carried certain features required their devices to be updated as the application uses Gmail and Google maps. This is an issue which is easily resolved by the user updating their device.

Offline Functionality 3.4.1

Using the application without connectivity to the Internet fully disables certain features, including the news and match report features. There has been discussion with the client to create a database that stores the news feeds within their android device and allows users to access the most recently updated news articles, this will be mentioned in the future works. Currently the tabs screen is the only functional feature offline but does provide important information for users who are on the road or at a hockey match with limited access to wifi.

Summary 3.4.2

Currently the application has only been fully tested by the author and the client. A large scale evaluation cannot be completed until the application goes live at the beginning of the 2014/2015 season. From here an examination of the analytics can be gathered to help develop a full evaluation.
Chapter 4 - Conclusion

Authors Comment 4.1

The overall goal of this project was to develop an android application for the hook hockey in accordance with the main requirements set out by the client. Based on this, I believe the project was successful. The application provides users with fully functional features that are assessable with relative ease from a interface which is very user friendly. Although the android application has been completed in such a way that allows full functionality it has yet to be tested on a larger scale. After meeting with the client he is happy for the application to go live in time for the 2014/2015 season which begins in September. We agreed that it would be beneficial to develop the application further over the summer period and improve the application which will be discussed in the futures work section.

Difficulties faced 4.2

Although deemed an overall success, the application was not without its flaws. Throughout the course of designing and implementing this application there were many challenges encountered along the way. High level description is one that views the system as a whole, and low level descriptions deals with smaller components of the system. In this section difficulties will be examined for both levels.
High level 4.2.1

This application was designed in strict accordance to the client’s requirements, therefore it was essential to keep in close communication at all times with the client and have a clear understanding of the client’s objectives.

A major challenge encountered was the time constraint the project was under. A lot of features and functionality were developed for the application so a huge amount of time and effort was needed in producing the source code. Also in relation to time, there were small issues which required contacting the client and therefore caused a delay by waiting for the client’s response. For this reason it was essential that the client was fully aware of the requirements and the direction which the application will be developed.

A final challenge which was faced from a high level perspective was the steep learning curve which had to be climbed. A huge amount of time and effort went into learning the overall syntax of certain programming languages which allowed the production of an application that directly correlates with the client’s requirements.

Low Level 4.2.2

There was a lot of code produced in order to reach the required level of functionality which resulted in a lot of problems to overcome.

Extracting data successfully from the websites proved to cause the most difficulty, the main body of content for each news article included references to images which meant I couldn't extract the content. For this reason I could only extract the URL link to each specific article.

For the clubs tabs a huge amount of time was spent acquiring the longitude and latitudes of every club in Leinster along with their twitter handle, email addresses and contact numbers. This data was hugely important and added significant value to the application as it the first database of such information.
Future Work 4.3

This application has provided an opportunity for further work. Throughout the project the author has mentioned some possible future improvements. These will be examined thoroughly in this section.

For the upcoming season the client has agreed to add a thumbnail tag which would allow the parser to handle images. This would visually enhance the current news feed as each article would have its unique image.

There is also huge room for improvement with the visual aspects of the club profiles. The intention here is to clean up the interface and add an image gallery for each of the clubs profiles.

In 2015/2016 we will see the amalgamation of the regional hockey leagues in Ireland to create an Irish Hockey League. This is an opportunity to widen the scope of the current application. The increase of information would mean a larger database would have to be created. Using a database management system such as MySql it would cater for the increased volume of data required. The overall goal is to create an application which provides the Irish hockey community with all the current information regarding news, club content and anything hockey based.

With the popularity of apple technology, there is future work required to develop an iOS application to cater for these users.
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