Adapting Access Aber making use of native Android functionality.

Final Report for CS39440 Major Project

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This report was submitted as partial fulfilment of a BSc degree in
Computer Science (G400)

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Declaration of originality

In signing below, I confirm that:

- This submission is my own work, except where clearly indicated.

- I understand that there are severe penalties for plagiarism and other unfair practice, which can lead to loss of marks or even the withholding of a degree.

- I have read the sections on unfair practice in the Students' Examinations Handbook and the relevant sections of the current Student Handbook of the Department of Computer Science.

- I understand and agree to abide by the University's regulations governing these issues.

Signature ....

Date ....

Consent to share this work

In signing below, I hereby agree to this dissertation being made available to other students and academic staff of the Aberystwyth Computer Science Department.

Signature ....

Date ....

Acknowledgements

I would like to thank myself for all my hard work.

Cheers.

Abstract

The aim for this project was to provide an alternative android native application to the current Access Aber web application, while also improving on the groundwork laid out by the initial work. This was done due to the help it can provide to users who are visiting the University as well as providing at least some assistance to those with disabilities. Aberystwyths campus can be a hard place to navigate and the benefits provided from a mobile device can benefit users to a large degree.

The application was developed for the android OS using the Android Studio IDE and relies heavily upon the Google Maps API. It provides a range of services to the user, some of which were brought over from the existing application and improved, some new. These include route finding around campus, user refined display's of building locations, route plotter with application compatible outputs and a location based help system.

This dissertation covers the original analysis, requirements, design and implementation of the project as well as details on the testing and design decision made throughout the development.

The conclusion is an android application which met its original requirements specification and adds further complexity to the initial web version of the project. This includes route grading and the representation of this along with an extendable solution to route finding using Google Maps and graph searching techniques.

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Chapter 1

Background & Objectives

This section should discuss your preparation for the project, including background reading, your analysis of the problem and the process or method you have followed to help structure your work. It is likely that you will reuse part of your outline project specification, but at this point in the project you should have more to talk about.

Note:

- All of the sections and text in this example are for illustration purposes. The main Chapters are a good starting point, but the content and actual sections that you include are likely to be different.

- Look at the document on the Structure of the Final Report for additional guidance.

1.1   Background

What was your background preparation for the project? What similar systems or research techniques did you assess? What was your motivation and interest in this project?

1.2   Analysis

Taking into account the problem and what you learned from the background work, what was your analysis of the problem? How did your analysis help to decompose the problem into the main tasks that you would undertake? Were there alternative approaches? Why did you choose one approach compared to the alternatives?

There should be a clear statement of the research questions, which you will evaluate at the end of the work.

In most cases, the agreed objectives or requirements will be the result of a compromise between what would ideally have been produced and what was felt to be possible in the time available. A discussion of the process of arriving at the final list is usually appropriate.

1.3   Research Method

You need to describe briefly the life cycle model or research method that you used. You do not need to write about all of the different process models that you are aware of. Focus on the process model or research method that you have used. It is possible that you needed to adapt an existing method to suit your project; clearly identify what you used and how you adapted it for your needs.

Chapter 2

Experiment Methods

This section should discuss the overall hypothesis being tested and justify the approach selected in the context of the research area. Describe the experiment design that has been selected and how measurements and comparisons of results are to be made.

You should concentrate on the more important aspects of the method. Present an overview before going into detail. As well as describing the methods adopted, discuss other approaches that were considered. You might also discuss areas that you had to revise after some investigation.

You should also identify any support tools that you used. You should discuss your choice of implementation tools or simulation tools. For any code that you have written, you can talk about languages and related tools. For any simulation and analysis tools, identify the tools and how they are used on the project.

If your project includes some engineering (hardware, software, firmware, or a mixture) to support the experiments, include details in your report about your design and implementation. You should discuss with your supervisor whether it is better to include a different top-level section to describe any engineering work.

Chapter 3

Results and Conclusions

This section should discuss issues you encountered as you tried to implement your experiments. What were the results of running the experiments? What conclusions can you draw from these results?

During the work, you might have found that elements of your experiments were unnecessary or overly complex; perhaps third party libraries were available that simplified some of the functions that you intended to implement. If things were easier in some areas, then how did you adapt your project to take account of your findings?

It is more likely that things were more complex than you first thought. In particular, were there any problems or difficulties that you found during implementation that you had to address? Did such problems simply delay you or were they more significant?

If you had multiple experiments to run, it may be sensible to discuss each experiment in separate sections.

Chapter 4

Critical Evaluation

Examiners expect to find in your dissertation a section addressing such questions as:

- Were the requirements correctly identified?

- Were the design decisions correct?

- Could a more suitable set of tools have been chosen?

- How well did the software meet the needs of those who were expecting to use it?

- How well were any other project aims achieved?

- If you were starting again, what would you do differently?

Such material is regarded as an important part of the dissertation; it should demonstrate that you are capable not only of carrying out a piece of work but also of thinking critically about how you did it and how you might have done it better. This is seen as an important part of an honours degree.

There will be good things and room for improvement with any project. As you write this section, identify and discuss the parts of the work that went well and also consider ways in which the work could be improved.

Review the discussion on the Evaluation section from the lectures. A recording is available on Blackboard.

Appendices

Appendix A

Third-Party Code and Libraries

If you have made use of any third party code or software libraries, i.e. any code that you have not designed and written yourself, then you must include this appendix.

As has been said in lectures, it is acceptable and likely that you will make use of third-party code and software libraries. The key requirement is that we understand what is your original work and what work is based on that of other people.

Therefore, you need to clearly state what you have used and where the original material can be found. Also, if you have made any changes to the original versions, you must explain what you have changed.

As an example, you might include a definition such as:

Apache POI library The project has been used to read and write Microsoft Excel files (XLS) as part of the interaction with the clients existing system for processing data. Version 3.10-FINAL was used. The library is open source and it is available from the Apache Software Foundation [2]. The library is released using the Apache License [1]. This library was used without modification.

Appendix B

Code samples

2.1   Random Number Generator

The Bayes Durham Shuffle ensures that the psuedo random numbers used in the simulation are further shuffled, ensuring minimal correlation between subsequent random outputs [6].

```c
#define IM1 2147483563
#define IM2 2147483399
#define AM (1.0/IM1)
#define IMM1 (IM1-1)
#define IA1 40014
#define IA2 40692
#define IQ1 53668
#define IQ2 52774
#define IR1 12211
#define IR2 3791
#define NTAB 32
#define NDIV (1+IMM1/NTAB)
#define EPS 1.2e-7
#define RNMX (1.0 - EPS)

double ran2(long *idum)
{
  /*----------------------------------------------------*/
  /* Minimum Standard Random Number Generator           */
  /* Taken from Numerical recipies in C                 */
  /* Based on Park and Miller with Bays Durham Shuffle  */
  /* Coupled Schrage methods for extra periodicity      */
  /* Always call with negative number to initialise     */
  /*----------------------------------------------------*/

  int j;
  long k;
  static long idum2=123456789;
```

```
    static long iy=0;
    static long iv[NTAB];
    double temp;

    if (*idum <=0)
    {
      if (-(*idum) < 1)
      {
        *idum = 1;
      }else
      {
        *idum = -(*idum);
      }
      idum2=(*idum);
      for (j=NTAB+7;j>=0;j--)
      {
        k = (*idum)/IQ1;
        *idum = IA1 *(*idum-k*IQ1) - IR1*k;
        if (*idum < 0)
        {
          *idum += IM1;
        }
        if (j < NTAB)
        {
          iv[j] = *idum;
        }
      }
      iy = iv[0];
    }
    k = (*idum)/IQ1;
    *idum = IA1*(*idum-k*IQ1) - IR1*k;
    if (*idum < 0)
    {
      *idum += IM1;
    }
    k = (idum2)/IQ2;
    idum2 = IA2*(idum2-k*IQ2) - IR2*k;
    if (idum2 < 0)
    {
      idum2 += IM2;
    }
    j = iy/NDIV;
    iy=iv[j] - idum2;
    iv[j] = *idum;
    if (iy < 1)
    {
      iy += IMM1;
    }
```

```
    if ((temp=AM*iy) > RNMX)
    {
      return RNMX;
    }else
    {
      return temp;
    }
}
```

Annotated Bibliography

[1] Apache Software Foundation, "Apache License, Version 2.0," http://www.apache.org/licenses/LICENSE-2.0, 2004.

   This is my annotation. I should add in a description here.

[2] ——, "Apache POI - the Java API for Microsoft Documents," http://poi.apache.org, 2014.

   This is my annotation. I should add in a description here.

[3] H. M. Dee and D. C. Hogg, "Navigational strategies in behaviour modelling," *Artificial Intelligence*, vol. 173(2), pp. 329–342, 2009.

   This is my annotation. I should add in a description here.

[4] S. Duckworth, "A picture of a kitten at Hellifield Peel," http://www.geograph.org.uk/photo/640959, 2007, copyright Sylvia Duckworth and licensed for reuse under a Creative Commons Attribution-Share Alike 2.0 Generic Licence. Accessed August 2011.

   This is my annotation. I should add in a description here.

[5] M. Neal, J. Feyereisl, R. Rascunà, and X. Wang, "Don't touch me, I'm fine: Robot autonomy using an artificial innate immune system," in *Proceedings of the 5th International Conference on Artificial Immune Systems*.   Springer, 2006, pp. 349–361.

   This paper...

[6] W. Press *et al.*, *Numerical recipes in C*.   Cambridge University Press Cambridge, 1992, pp. 349–361.

   This is my annotation. I can add in comments that are in **bold** and *italics and then other content.*

[7] Various, "Fail blog," http://www.failblog.org/, Aug. 2011, accessed August 2011.

   This is my annotation. I should add in a description here.