CS/SE Individual Practical 2011/2012

Stephen Gilmore, School of Informatics

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Introduction

The requirement for the third year individual practical is to create an app implemented in Java and XML for the Android phone. The purpose of the app is to assist the many visitors who come to the Informatics Forum in Edinburgh. Every year the Informatics Forum plays host to numerous academic conferences, workshops and symposia; industrial and commercial trade shows and meetings; public lectures; and social events. These events are attended by delegates who have travelled to the Informatics Forum from all over Scotland, the UK, Europe, the USA, Asia and further afield. The purpose of the Forum app is to help these delegates and attendees find the Informatics Forum and plan their visit.

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Your Forum app should tell visitors useful, accurate practical information which will make it easier to find the Informatics Forum even if they have never been to Edinburgh before, or Scotland, or the UK. Your app should help visitors locate the Informatics Forum when they are nearby, travelling on foot, and using a map. It should also help them to get within reasonable walking distance according to their preferred mode of transport. For example, your app might tell users about buses which run near the Forum, about local taxi firms, and give general directions on how to get to the Informatics Forum if starting from Edinburgh Waverley train station, or Edinburgh airport. Remember that users have different preferences and different budgets and so some people might like to take a taxi direct to the front door and others might like to take a bus and walk a bit in order to experience the beautiful city of Edinburgh.

The app should encourage travel by public transport, so details about car parks and parking regulations near the Forum are not required.

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Visitors whose involvement with activities at the Informatics Forum lasts for a day or so might want to know about restaurants, cafes or sandwich shops near to the Forum where they could get lunch or dinner. The key point here is that these restaurants or other eateries should be close to the Forum, preferably within easy walking distance. An exhaustive list of every restaurant or cafe in Scotland is not helpful, because this includes too much irrelevant information. The information held on restaurants or cafes might vary but it should include the address, and might include a phone number or a website address if it is necessary to book a table there. You may also have additional data such as cuisine (Indian, Italian, Japanese, Scottish, etc) but it is not necessary to have restaurant reviews as you might find on the TripAdvisor website (http://www.tripadvisor.co.uk/).

Visitors who are staying longer would appreciate information about hotels near to the Forum. Again, less is more here, in the sense that a list of five hotels near the Forum is more useful than a list of 500 hotels in Scotland (because the user of the app would have to filter this list to find the hotels near the Forum). The information held on hotels may vary, but it should include the address, and might include a phone number or a website address.

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The app should be *centred on the Forum* in the sense that restaurants, cafes and hotels can be categorised as being five minutes walk away from the Forum, 10 minutes walk away and 15 minutes walk away. Anything beyond 15 minutes walk away can be regarded as too far away to be of sufficient interest to be included in the app. (For example, if someone has the goal of popping out at lunchtime to buy a sandwich then recommending a sandwich shop 45 minutes walk away is hardly very useful—and walking is the only sensible option because people are not likely to want to have to take a bus to the sandwich shop and get a bus back to the Forum.) Of course different people walk at different speeds and so the notion of "15 minutes walk away" varies between users. Nonetheless, we will try to estimate how far away from the Forum things are. Websites such as Google Maps and http://walkit.com give estimates of how long it takes to walk between two locations.

The postcode for the Forum is EH8 9AB so much of the data which you need for the app can be collected by a number of simple Internet searches such as "hotels near EH8 9AB", "restaurants near EH8 9AB" and "cafes near EH8 9AB". This information can also be supplemented by your own local knowledge.

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Up to this point the content of the Forum app has seemed to be entirely static, and so it could just as well be implemented as a static HTML page or a PDF document. However, the environment around the Forum is *not* static and cafes, restaurants, and even hotels come and go. For this reason it should be possible to update the data on the app to:

- delete the information about a cafe, restaurant or hotel entry; or
- add information about a cafe, restaurant or hotel.

Other updates to the list could be useful also. For example, some users might like to rate restaurants or hotels that they have been to so that they can remember to visit them again the next time that they come to the Informatics Forum.

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Other practical information can be included in the app also. For example, visitors from other countries might like to know about the currency they should bring, the type of electrical power sockets that we have, the weather, and anything else which you think might be useful. The website https://www.wiki.ed.ac.uk/display/ConferenceLocalInfo contains useful tips and information such as this.

Frequently asked questions

- I've never programmed in Java before and I don't know what XML is. What should I do?
 - First, check that you're on the right course. If so, then buy a textbook and read it.
- I don't have an Android phone. I've never written an app before. How can I do this practical?
 - You don't need to have an Android phone to do this practical exercise. The software which you develop will run on an emulator which is freely available for Windows, Mac OS X, and GNU/Linux platforms. The necessary software is pre-installed on the Informatics Scientific Linux DiCE machines. There is no expectation that you have written an app before: you will learn how to do this in the course of this practical.
- What is the point of this app? All of this information is readily available via a Google search. Why would anyone use this?
 - The necessary data is available via a Google search, but it is not organised in the way that we would like (i.e. not centred on the Forum). Plus, the information is downloaded onto the user's phone and will still be available when they go offline.
- Looking this up on a phone is stupid. Why not have a proper application downloadable onto a laptop?
 - People do not always take their laptop with them when they travel. In contrast, their telephone is almost invariably in their pocket. Remember also that this app is designed to be used outdoors while walking or while at a train station or bus stop. It is a lot more convenient to get out your phone at a bus stop than to get out your laptop.
- This is a totally lame practical. I have zero interest in this. Can I make an app about kickboxing instead?
 - No, not for this practical. We need all students to work on the same problem in order to make a fair assessment of the submissions and award them an appropriate mark based on the effort which they put into the practical, their creativity, and the ingenuity of their solution. However, for the fourth year individual project you *can* propose your own topic for the project so if it would make your life complete to create an app about kickboxing then you only have to wait until next year to do this.
- Java is so last century. Can I implement my app in Ruby/Python/Scala/Objective C/Go instead?
 - No, not for this practical. We need all students to be working in the same programming language in order to make a fair assessment. Again, such a restriction does not apply to the fourth-year individual project so you can use that as an opportunity to gain marketable new language skills. However, Java is not an arbitrary choice. Java is the most widely used programming language for the Android platform and there are many more Java language resources available online to learn Android development from than for any other language. For sound educational reasons, we believe that the choice of Java as the development language should help most students to complete this practical successfully.

- Nobody is making the real serious money out of Android. Can I implement my app for the iPhone/Windows Phone 7 instead?
 - No, not for this practical. We need all students to be working on the same platform in order to make a fair assessment. Again, the fourth-year individual project is your friend. Specifically in this case, we do not think that the Forum app has any potential commercial value and would only ever be a free app on any platform.
- Phones are so Noughties. The buzz is all about tablets now. Can I design my app for an Android tablet instead? I'll still be programming in Java and XML.
 - No, not for this practical. Tablets have features which phones do not support. Here also, this would not allow us to make an unbiased assessment of the solutions submitted by students on the course because students designing for tablets may have been able to leverage resources which were not available to students designing for phones.
- How is this the CS/SE <u>Individual</u> Practical? How is it <u>individual</u> if everyone has to make the same app in the same language on the same platform? Why isn't this called the CS/SE <u>One-Size-Fits-All</u> Practical instead?
 - The problem is the same for everyone, but your solution should be unique to you. You design your app and you decide what is included and what is not. Each individual student should produce a different, individual app. (Also, the name distinguishes this practical from the System Design Project group practical. You do not work in a group in this practical: you work as an individual.)

Part 1

CS/SE Individual Practical 2011/2012

Stephen Gilmore, School of Informatics Issued on: Friday 23rd September, 2011 Date of this revision: Thursday 29th September, 2011 Deadline: Thursday 27th October, 2011 at 16:00

1.1 Introduction

This is an assessed practical exercise. It is worth 25% of the marks of the Individual Practical. It represents roughly 25 hours of work. The work which you submit for assessment should be your own although you may make use of any part of any publicly-available Java and Android source code which you find useful. (This means that you can make use of code from tutorials which are available on the Android web site, and others. This is re-use, which is a good thing, not plagiarism, which is a bad thing.)

1.2 Description

Part one of the individual practical requires you to submit your Android application as a preview version or an alpha version¹ of the software which is to be delivered for part two of the individual practical. It is understood that your software at this stage will necessarily be incomplete, in the sense that necessary functionality will be missing, and that it will not have been comprehensively tested, with the consequence that there may be some errors or problems with the application which are fairly easy for the user to discover. However, this preview or alpha version of your application will prove that you have started work on the practical and that you are getting to grips with the Android technology and learning some of the new concepts which you need for Android development. Further, an alpha version gives the evaluator a rough impression of what the finished product could be like. For these reasons, you are to submit an alpha version of your Android application.

¹An "alpha release" is an early version of a software application released in order to get feedback from evaluators. (Later versions are called "beta releases", "release candidates", and then "releases".)

1.3 What to submit

You are to submit the directory which contains your Android project. This should be a working Android application which can be compiled using Eclipse and executed on the Android emulator. Further, your application should clearly be related to visiting the Informatics Forum. For example, the application might be a list of hotels and/or restaurants which the user can browse, or search, but it is not expected that you will have very advanced functionality beyond this, such as the ability to add or delete entries, rate them, or locate them on a map.²

You do not need to write any accompanying documentation for this part of the practical. You are not required to submit other documentation for your project, such as design documents, UML documents³, or user documentation.

1.4 How to submit

First, get your code on the School of Informatics DiCE computer system, copying it from your own laptop as necessary. If your project is in a folder called *ForumApp* then you should submit it for the ip part 1 using the command

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You do not need to use the name *ForumApp*, choose any other name for your Android application that you wish.

1.5 Assessment

Part one of the individual practical is worth 25% of the marks for the course. It is assessed on a pass or fail basis. You will be judged either to have passed part one of the practical or to have failed it. Thus you will either get all of the 25% for part one or get nothing. In advance of submission, the course lecturer is available to give advice on whether or not your application would pass the test for part one of the practical. Just ask after the course lecture. If you're wondering about this, then perhaps others are as well.

1.6 Deadline

The deadline for this practical exercise is

Thursday 27th October, 2011 at 16:00

1.7 Frequently Asked Questions and Clarification

- I want to explain which parts of my application are not finished. Can I submit documentation along with Part 1?
 - Yes, if you wish to then you can do this. If doing so then please supply either a plain text README file, or a printable PDF document.

 $^{^{2}}$ However, if you have done more than this then that is perfectly OK. The more that you have done for Part One then the less that remains to do for Part Two of the practical.

³UML documents will not be required for Part Two either.

Part 2

CS/SE Individual Practical 2011/2012

Stephen Gilmore, School of Informatics Issued on: Friday 23rd September, 2011 Date of this revision: Thursday 29th September, 2011 Deadline: Thursday 15th December, 2011 at 16:00

2.1 Introduction

This is an assessed practical exercise. It is worth 75% of the marks for the Individual Practical. It represents roughly 75 hours of work. The work which you submit for assessment should be your own although you may make use of any part of any publicly-available Java and Android source code which you find useful. (This means that you can make use of code from tutorials which are available on the Android web site, and others. This is re-use, which is a good thing, not plagiarism, which is a bad thing.)

2.2 Description

Part 2 of the individual practical requires you to submit the finished version of your Android application. This should be a working Android application which can be compiled using Eclipse and executed on the Android emulator.

Your application should assist the user with travelling to the Informatics Forum and finding hotels and places to eat nearby. Key aspects of this problem include the following:

- It should be possible to find the address of the Forum using your app. (It is "Informatics Forum, 10 Crichton Street, Edinburgh EH8 9AB.")
- It should be possible to find information on how to travel to the Forum from Edinburgh Waverley train station and from Edinburgh Airport.
 - For example, to obtain relevant information about buses and taxi services.
- It should be possible to browse lists of restaurants and cafes and lists of hotels near the Forum.
- It should be possible for users to update these lists based on their preferences and tastes, and to remove out-of-date information, or add new entries into the lists.

- It should be possible for users to rate hotels and places to eat.
 - For example, using a star system on a scale from one to five stars.

2.3 Extra credit

The requirements listed in the section above illustrate the core functionality which is required from your application. A well engineered solution which addresses all of the above requirements should expect to attract a very good or excellent mark. Additional credit will be awarded for additional useful features which are *not* on the above list. Thus, if you have time remaining before the submission deadline and you have already met all the requirements listed above then you can attract additional marks by being creative, conceiving of new features which can helpfully be added to the application, and implementing these.

If you have added additional features to your implementation in order to attract extra credit then you should be sure to document these features if they are not immediately evident from normal use of your application. The purpose of this part of the practical exercise is to allow you to exercise your own creativity and deliver a solution which is uniquely your own.

2.4 Assessment

Part 2 of the individual practical is worth 75% of the marks for the course. Your mark will be expressed as a percentage given as an integer between 0 and 100. Thus it is not possible to score more than 100% and it is not possible to score less than zero. The mark which counts for the course is not the mark for Part 2 but the weighted sum of the mark for Part 1 and the mark for Part 2.

To get your final mark for the IP, multiply your mark for Part 1 by 0.25 and multiply your mark for Part 2 by 0.75, and add these together. E.g.

$$100\% \times 0.25 + 52\% \times 0.75 = 64\%$$

2.5 Assessment criteria

This practical exercise will be assessed in terms of the completeness of the solution to the problem, the quality of the Java and XML code produced, and the ingenuity and craftsmanship which have gone into designing a good and robust solution to the problem.

- For example, all other things being equal, an app which allows users to add and delete entries for hotels, cafes and restaurants should expect to receive more marks than an app which does not allow this.
 - A more complete solution will get more marks.
- All else being equal, an app which when loaded into Eclipse reports static analysis errors (called "Java Problems" in Eclipse and displayed in the Problems View) should expect to attract fewer marks than one which does not.
 - Sloppy development style ignoring compiler warnings will lose marks.
- Additionally, all else being equal, an app whose code contains examples of poor Java programming style (such as empty catch statements) should expect to attract fewer marks than an application in which Java exceptions are handled gracefully.

- Poor programming style will lose marks.
- Finally, all else being equal, an application which contains logging statements (using the class android.util.Log and generating calls to Log.d or other methods) would expect to attract more marks than an equivalent application without logging (because the version with logging is more maintainable).
 - Including logging will gain marks.

2.6 What to submit

You are to submit the directory which contains your Android project. Your work will be assessed by compiling and executing your application so you must ensure that all source code and project files needed to compile your application are submitted.

You are to write accompanying documentation for this part of the practical. Please create a folder in your Android project called **doc** and place your documentation inside this folder. You should use this document to record:

- any special instructions for running your application,
- any parts of your application which are not finished or have non-obvious functionality, and
- any additional features of your application of which you are duly proud.

Include screenshots showing your app loaded and working in the Android emulator.

Please supply your documentation either as a DOC or DOCX file, or a printable PDF document. Documents in other formats may be ignored.

2.7 How to submit

First, get your code on the School of Informatics DiCE computer system, copying it from your own laptop as necessary. If your project is in a folder called *ForumApp* then you should submit it for the ip part 2 using the command

You do not need to use the name ${\it ForumApp}$, choose any other name for your Android application that you wish.

2.8 Deadline

The deadline for this practical exercise is

Thursday 15^{th} December, 2011 at 16:00

2.9 Marking

Your submitted coursework will be marked within four (semester) weeks of submission. (This is the period of time approved by the School of Informatics for a class of over 50 students.) That is, marked work should be returned to you by Thursday of week 4 of the second semester. For 2011/2012 this means Thursday 9th February, 2012.

We will try to meet this deadline but – for good reasons – students sometimes get deadline extensions meaning that their submitted coursework is not available to mark starting at Thursday 15^{th} December, 2011 at 16:00. This can delay the return of marked coursework.

2.10 Frequently Asked Questions and Clarification

- Should I put comments in my code?
 - Yes. All else being equal, a submission with comments will attract more marks than one without comments.
- My code generates warnings. Can I just acknowledge these by putting a comment in the code.
 - That will let the markers know that you know about the problem which causes the warning but a better fix would be to rewrite the code so that it *doesn't* produce warnings.
- Are all warnings equally serious? Can't some be ignored?
 - Some warnings are more serious than others but ignoring the ones which you think are not serious may cause you (or others maintaining your code) to ignore the warnings which actually are serious. Warning messages ("Java problems") are the first impression which your code gives to others who look at it. You should try to make a good first impression.
- Can I reuse other apps, source code examples and open-source software in my app?
 - Yes, you are encouraged to do this. Examples and tutorials are made available on-line in order that people can use them and learn from them.
- Can I use the sensors on the phone? E.g. for GPS.
 - If you wish, but remember that your code will be tested on an emulator which does not have sensors so these it cannot be determined that these features are working and hence they are unlikely to attract many marks. On balance, your time might be better spent working on other features of the app.
- Is there a coding standard or package naming convention which must be adhered to?
 - No particular coding standard has been identified. However, you should try to be consistent, and to give meaningful and helpful descriptive names to packages, classes and methods.

- What is the earliest version of Android which this app should be compatible with?
 - Backwards compatibility has not been identified as a requirement—we don't mind if your code doesn't run on old phones. You are recommended to design your app for the current ('Honeycomb') release of Android in order to access up-to-date features, bug fixes and improvements.
- Am I required to use the latest version of the Android emulator?
 - No. Emulators add a large overhead to running your app so it may be that the latest version of the emulator runs very slowly on your laptop or home PC. If this is the case then you can consider running an earlier version of the emulator which is smaller and lighter.
- Is the configuration of an emulator for marking known? If so, could you possibly post its specifics?
 - The exact specification of the emulated device will not be released, so you should be guided by your own experience and judgement in trying to produce a practical solution to the problem. Bear in mind that you are designing for a range of devices and do not optimise your app for a single specific device.
- Are there any restrictions on memory (e.g. can we use external storage)?
 - With regard to external storage there is a judgement call to be made here. For example, few users would think it reasonable if your app required a 32Gb SD card.
- How will this practical be marked?
 - Submissions for the Individual Practical are evaluated using the following process:
 - 1. The accompanying documentation is read for instructions on how to use the app. – Submissions with insufficient documentation will lose marks here
 - 2. The Eclipse project is imported into an instance of the Eclipse platform and inspected for errors or warnings ("Java Problems")
 - Submissions with errors or static analysis warnings will lose marks here
 - 3. The project is launched as an Android application and run on the emulator - Submissions which fail to install or launch will lose marks here
 - Requiring files to be pushed onto the emulator will lose marks here
 - 4. The app is evaluated in user mode by searching for content
 - Submissions which have insufficient content will lose marks here
 - 5. Evaluation continued by adding and deleting content
 - Submissions which fail to add or delete content will lose marks here
 - Producing "Application has unexpectedly quit" errors will lose marks here
 - 6. Other additional features of the application will be explored
 - Submissions with useful additional features will gain marks here
 - 7. The Java source code will be inspected for good programming style
 - Submissions with insufficient logging will lose marks here
 - Submissions with too few comments will lose marks here
 - Submissions with blocks of commented-out code will lose marks here