Software Engineering Large Practical

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About

- The Software Engineering Large Practical is a 20 point Level 9 course which is available for Year 3 undergraduate Informatics students including those on joint degrees.
- It is not available to visiting undergraduate students or students in Year 4 or Year 5 of their undergraduate studies.
- It is not available to postgraduate students.
- Year 4, Year 5 and postgraduate students have other practical courses which are provided for them.

Scope

- The Software Engineering Large Practical consists of one large design and implementation project, done in three parts.
- The first part consists of a proposal document specifying functional and non-functional requirements on the project.
- The second part is a design document, presenting the plan of the implementation work which will realise the design.

The third part is the implementation. This should be a well-engineered implementation of the previously-supplied design.

Course timing

	Deadline	Out of	Weight
Part 1	16:00 on Friday 14th October	0/1	0%
Part 2	16:00 on Friday 11th November	100	50%
Part 3	16:00 on Wednesday 21st December	100	50%

▶ Please note that Part 1 of this practical is for *feedback only*.

- Parts 2 and 3 are equally weighted and constitute the assessment for the Software Engineering Large Practical.
- There is no exam paper for this course.

SELP 2016/2017

- The requirement for the Software Engineering Large Practical is to use the Android Studio development environment to create an app implemented in Java and XML for an Android device.
- The app implements a mobile game which allows users to make words by grabbing letters which are distributed around the University of Edinburgh's Central Area.
- Inspired by the games *Pokémon GO* and *Scrabble*, the game is called *Grabble*.

- I don't have an Android device. I've never written an app before. How can I do this practical?
 - You don't need to have an Android device 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. There is no expectation that you have written an app before: you will learn how to do this in the course of this practical. You may also need to learn more about Java programming.

A typical map



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A typical map (zoom in)



A typical map (zoom in)



Rules of the game

- Letters are collected by visiting their location.
- There is a different set of letters for each day of the week.
- Letters can only be collected once each day. (I.e. having visited a location to collect a letter it is not possible to move away from that location and then move back again to collect the letter a second time.)

Object of the game

- The object of the game is to make seven-letter words out of the letters which have been collected.
- Each letter has a point value associated with it and a score is assigned to a word by summing the scores of the letters in the word.
- The point value of each letter is given below: more commonly-occurring letters have lower values and less commonly-occurring letters have higher values.

Α	В	С	D	Е	F	G	Н	I	J	K	L	M
3	20	13	10	1	15	18	9	5	25	22	11	14
Ν	0	Р	Q	R	S	Т	U	V	W	Х	Y	Z
6	4	19	24	8	7	2	12	21	17	23	16	26

What constitutes a word?

- For the purposes of the game, a seven-letter sequence of characters is considered to be a word if it appears in the Official Grabble Dictionary 2016, available on-line at http://www.inf.ed.ac.uk/teaching/courses/selp/ coursework/grabble.txt
- The Official Grabble Dictionary 2016 will not be updated during this practical exercise so it is fine to download it and install it directly in your app.
- However, the dictionary will remain available at the above address throughout so you can access the online version from your app if you wish to do this instead.
- The dictionary has 23,869 entries, all of which are seven-letter words.

Letter maps

- There is a Grabble Letter Map for each day of the week, made available in the Keyhole Markup Language (KML) format used by Google Earth and other geographic visualisation software.
- The letter map for Sunday is available at:
 - http://www.inf.ed.ac.uk/teaching/courses/selp/ coursework/sunday.kml
- The maps for other days are at the same address in KML files called monday.kml, tuesday.kml, and so on.

Loading maps online

The day of the week when the app is started determines the map which is loaded. This map remains in use until play ends. It is not necessary to replace one map with another at midnight, if the game is being played then.

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Unlike the Official Grabble Dictionary 2016, any Grabble Letter Map may be updated at any time so it is important to use the on-line version to ensure that you are looking at the correct version of the map. Downloading and bundling these maps with your application would not achieve the desired result.

Contents of a letter map

Each letter map contains 1,000 points numbered from 1 to 1,000, each with an uppercase letter attached. The letters have been chosen at random and distributed at random. No letter occurs significantly more often than the others.

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A KML document is a list of Placemarks. Each Placemark contains a name giving the unique numerical identifier of the place, a description giving the letter which is available here, and a Point. A Point has coordinates in the format $\langle longitude, latitude, height \rangle$ where the height is always 0 in our maps, and thus can safely be ignored.

Example letter map

```
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://www.opengis.net/kml/2.2">
 <Placemark>
   <name>Point 1</name>
   <description>N</description>
   <Point>
     <coordinates>-3.191445668466,55.943001656138,0</coordinates>
   </Point>
 </Placemark>
 <Placemark>
   <name>Point 1000</name>
   <description>Z</description>
   <Point>
     <coordinates>-3.18622191177665,55.944533100987,0</coordinates>
   </Point>
 </Placemark>
</kml>
```

Getting "near" to a letter

- In designing your game you should decide how near a Placemark the player physically needs to be before they can be considered to have "grabbed" that letter.
- GPS-based devices cannot determine your true location perfectly but the Android LocationManager API at least attempts to determine the accuracy of its estimated location.

Bonus features

- In addition to the game features described above you should design and implement some *Bonus Features*, which set your app apart from others.
- These may be enhancements which are intended to make the game more interesting to play, or more rewarding, causing the user to play more frequently, or for longer sessions.
- What the bonus features are is up to you but you could consider enhancements in areas such as:
 - scoreboards and statistics on play;
 - setting goals such as word targets or distance targets;
 - autocompletion or spelling correction of words;
 - play modes (beginner, advanced, expert); or
 - user interface modes (night mode, battery-saver mode).
- You are not limited to the items above; this list is only to prompt you to think about your own bonus features.

Software Engineering aspects

This practical helps you to develop three useful Software Engineering skills:

- using version control systems: you are to use the Git version control system to manage the source code of your application—learning how much and when to commit code is a useful skill;
- writing automated tests: you are to write automated tests for your code and submit these together with the source code of your application; and
- writing readable source code: the Java source code which you submit will be inspected for clarity and readability (as well as correctness) so you should try to write clear, easy-to-read code.

- Can I develop my app on my laptop?
 - Yes. You are strongly encouraged to do this because it will encourage you to investigate the Android SDK and related libraries. Of course, we recommend taking regular, well-organised backups.

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- Can I develop my app on my laptop?
 - Yes. You are strongly encouraged to do this because it will encourage you to investigate the Android SDK and related libraries. Of course, we recommend taking regular, well-organised backups.

Can I implement my app in Ruby/Python/Scala/C# 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.

- Do I have to develop in Android Studio? I much prefer Eclipse/Emacs/vi etc.
 - You are required to submit an Android Studio project so we strongly recommend developing in Android Studio for this practical exercise.

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- Do I have to develop in Android Studio? I much prefer Eclipse/Emacs/vi etc.
 - You are required to submit an Android Studio project so we strongly recommend developing in Android Studio for this practical exercise.
- Do I have to use Git? I much prefer Subversion/Mercurial/Darcs etc.
 - Yes. Git is the chosen version control system for this practical because it is supported by Android Studio. However, please note that we are using a *local* Git repository only: do not upload your code to GitHub or BitBucket where anyone can see it!

- Is there a specified device for this practical or a specified Android version?
 - No. You can choose an Android device and an Android version. If you have an Android device then you could choose a suitable specification for that device, to allow you to test your app on a real device. If you do not have an Android device then choose the emulator for a relatively recent device and a relatively recent version of the Android platform.