Software Engineering Large Practical

Stephen Gilmore

Wednesday 18th September, 2013

School of Informatics

About this lecture

- This is an introductory lecture explaining one of this year's large practicals.
    - Artificial Intelligence Large Practical (AILP) — described elsewhere
    - Computer Science Large Practical (CSLP) — described elsewhere
    - Software Engineering Large Practical (SELP) — described here
- These slides and a more detailed handout will be available from the course web page after the lecture.
    - `http://www.inf.ed.ac.uk/teaching/courses/selp/`
- Please ask questions at any time.

Restrictions

- The SELP is a third-year undergraduate courses. It is only available to third-year undergraduate students.
- The SELP is not available to visiting undergraduate students, or to fourth-year undergraduate students and MSc students, who have their own individual projects.
- Third-year undergraduate students should choose **at most one** large practical, as allowed by their degree regulations.
  - On most degrees a large practical is compulsory.
  - On some degrees (typically combined Honours) you can do the System Design Project instead, or additionally.
- See the Degree Programme Tables (DPT) in the Degree Regulations and Programmes of Study (DRPS) for your degree for clarification.
  - `http://www.drps.ed.ac.uk/13-14/dpt/drps_inf.htm`

About these courses

- The Software Engineering Large Practicals is an individual programming project.
- It involves developing an app for a mobile phone.
- It runs throughout the first semester.
- It is assessed by coursework only — no examination paper.

How is this different from other courses?

Because the Software Engineering Large Practical is on a larger scale than the programming courseworks which you have done previously there is:

- a set of requirements (rather than a specification);
- a design element to the course; and
- more scope for creativity.

The large practicals try to prepare you for

- The System Design Project (in the second semester)
- The Individual Project (in fourth year).

How much time should I spend?

100 hours, all in Semester 1, of which

- 8 hours lecture/demonstrating
- 92 hours practical work, of which
    - 70 hours non-timetabled assessed assignments
    - 22 hours private study/reading/other

How much time is that really?

You can think of this as approximately one day per week in first semester.

- you work 7 hours in one day (9:00–5:00, say, with an hour for lunch)
- there are 13 weeks remaining in first semester (Week 2 to Week 14)
- $7 \times 13 = 91$ hours

Managing your time

It is unlikely that you will want to arrange your work on your large practical as one day where you do nothing else, but one day per week all semester is the **amount** of work that you should do for the course.

Scheduling work

Course lecturers have been asked not to let deadlines overlap Weeks 11–14 because students are expected to be concentrating on their large practical in that time.

Deadlines

The SELP is in two parts:

Part 1	Thursday 24th October, 2013 at 16:00
Part 2	Thursday 19th December, 2013 at 16:00

Part 1 is **zero-weighted**. This submission is **formative**: you will receive feedback on Part 1 but this does not contribute to your mark for this practical.

Part 2 is **worth 100%** of the marks. This submission is **summative**: you will receive an assessment for Part 2 which tells you your mark for this practical.

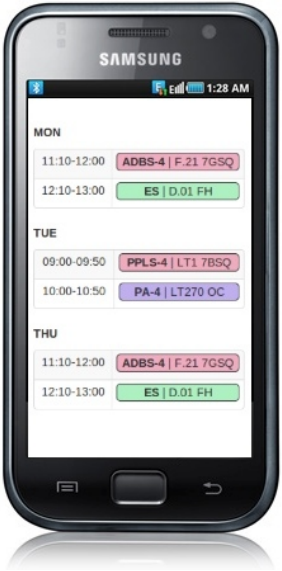
Scheduling work

- It is **not** necessary to keep working on the project right up to the deadline.
- For example, if you are travelling home for Christmas you might wish to submit the project early.
- In this case you need to ensure that you **start** the project early.
- The coursework handin is electronic so it is possible to submit remotely.

Early submission credit: a decision to be made

- In order to motivate good project management, planning, and efficient software development, the SELP reserves marks above 90% for work which is submitted **early** (specifically, one week before the deadline for Part 2).
- Work submitted less than a week before the deadline does not qualify as an early submission, and the mark for this work will be capped at 90%. Thus, the mark may be 90%, but it may not be higher than this.
- Note: submitting late is **not** an option!

The SELP is available in two versions



MON

11:10-12:00 ADBS-4 | F.21 7GSQ

12:10-13:00 ES | D.01 FH

TUE

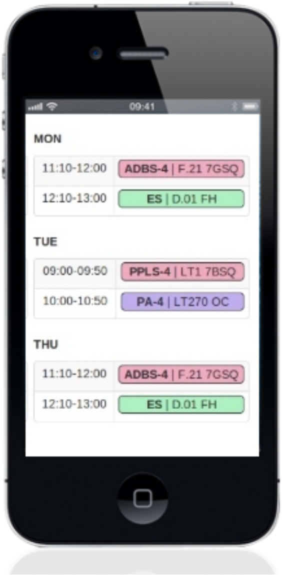
09:00-09:50 PPLS-4 | LT1 7BSQ

10:00-10:50 PA-4 | LT270 OC

THU

11:10-12:00 ADBS-4 | F.21 7GSQ

12:10-13:00 ES | D.01 FH



MON

11:10-12:00 ADBS-4 | F.21 7GSQ

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TUE

09:00-09:50 PPLS-4 | LT1 7BSQ

10:00-10:50 PA-4 | LT270 OC

THU

11:10-12:00 ADBS-4 | F.21 7GSQ

12:10-13:00 ES | D.01 FH

The Software Engineering Large Practical

- **[if Android]** The requirement for the Software Engineering Large Practical is to use the Eclipse development environment to create an app implemented in Java and XML for the Android phone.
- **[If iPhone]** The requirement for the Software Engineering Large Practical is to use the Xcode development environment to create an app implemented in Objective-C for the iPhone.
- The purpose of the app is to allow School of Informatics students to access the timetable information for their lecture courses more conveniently.

Another decision: which version of SELP?

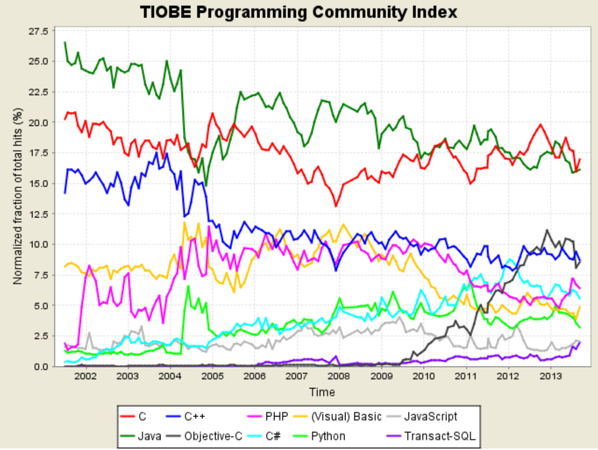
- Android phones are programmed in Java: a language you know already. Android development is supported on the Eclipse platform. Eclipse is freely available for Windows, Mac and Linux machines.
- The iPhone is programmed in Objective-C: you probably do not know this language already. iPhone development is supported on the Xcode platform. Xcode is freely available for Mac OS X, but not Windows or Linux.
- Note: other phone platforms are **not** an option!

Why do the iPhone & Objective-C version?

- Increases your employability by adding another programming language to your CV.
- You might simply prefer the iPhone to Android phones.
- Learning a new programming language deepens our understanding of computer science.
- Using Objective-C exposes us to concepts which we would not see in Java or Haskell.
- Objective-C is becoming more popular so we can keep up with trends in programming languages.

The Objective-C Programming Language

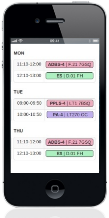
By some measures of programming language popularity, Objective-C is thought to be the world's third or fourth most popular language (behind C and Java, similar to C++).



How will we test this?

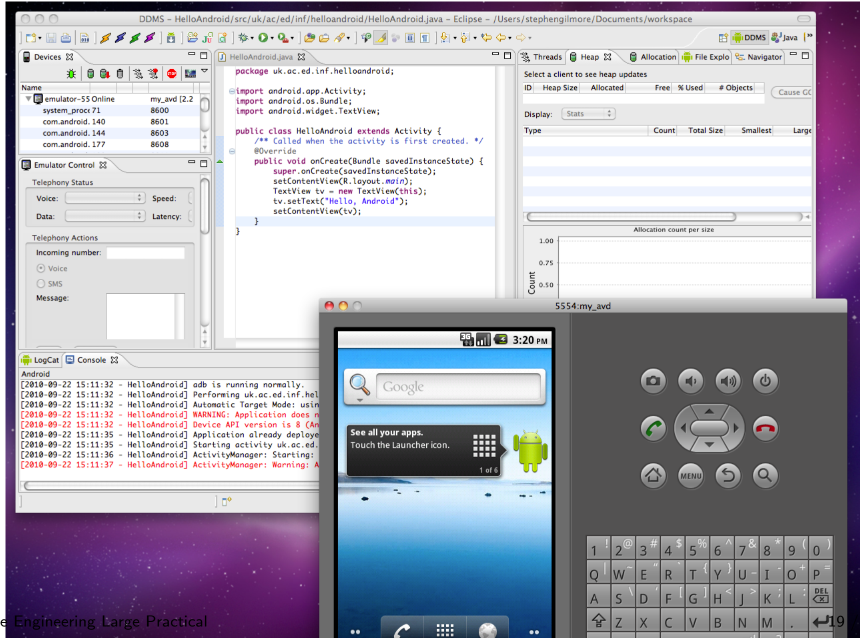
SAMSUNG
1:28 AM
MON
11:10-12:00 ADBS-4 | F.21 7GSQ
12:10-13:00 ES | D.01 FH
TUE
09:00-09:50 PPLS-4 | LT1 7BSQ
10:00-10:50 PA-4 | LT270 OC
THU
11:10-12:00 ADBS-4 | F.21 7GSQ
12:10-13:00 ES | D.01 FH

You might not have an Android phone, but that's OK. We will use an Eclipse-based emulator to run our code. The emulator runs on Windows, Linux, Ubuntu and Mac OS X.


09:41
MON
11:10-12:00 ADBS-4 | F.21 7GSQ
12:10-13:00 ES | D.01 FH
TUE
09:00-09:50 PPLS-4 | LT1 7BSQ
10:00-10:50 PA-4 | LT270 OC
THU
11:10-12:00 ADBS-4 | F.21 7GSQ
12:10-13:00 ES | D.01 FH

You might not have an iPhone, but that's OK. We will use the iOS simulator to run our code. The simulator runs on Mac OS X.

Android development with Eclipse



DDMS – HelloAndroid/src/uk/ac/ed/inf/helloandroid/HelloAndroid.java – Eclipse – /Users/stephengilmore/Documents/workspace

Name		
emulator-55 Online		my_avd [2.2
system_proc	71	8600
com.android.	140	8601
com.android.	144	8603
com.android.	177	8608

HelloAndroid.java

```
package uk.ac.ed.inf.helloandroid;

import android.app.Activity;
import android.os.Bundle;
import android.widget.TextView;

public class HelloAndroid extends Activity {
    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.main);
        TextView tv = new TextView(this);
        tv.setText("Hello, Android");
        setContentView(tv);
    }
}
```

Select a client to see heap updates

ID	Heap Size	Allocated	Free	% Used	# Objects

Display: Stats

Type	Count	Total Size	Smallest	Large

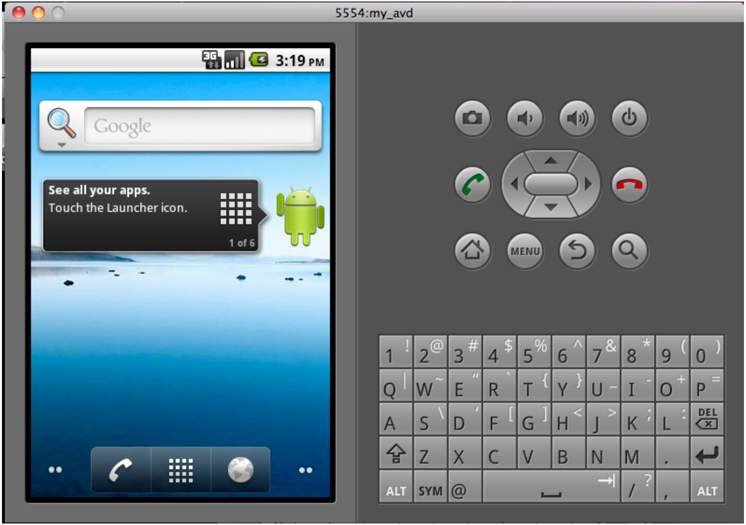
Console: Android

```
[2010-09-22 15:11:32 - HelloAndroid] adb is running normally.
[2010-09-22 15:11:32 - HelloAndroid] Performing uk.ac.ed.inf.hel
[2010-09-22 15:11:32 - HelloAndroid] Automatic Target Mode: usin
[2010-09-22 15:11:32 - HelloAndroid] WARNING: Application does n
[2010-09-22 15:11:32 - HelloAndroid] Device API version is 8 (An
[2010-09-22 15:11:35 - HelloAndroid] Application already deploye
[2010-09-22 15:11:35 - HelloAndroid] Starting activity uk.ac.ed.
[2010-09-22 15:11:36 - HelloAndroid] ActivityManager: Starting:
[2010-09-22 15:11:37 - HelloAndroid] ActivityManager: Warning: A
```

5554:my_avd

See all your apps.
Touch the Launcher icon.
1 of 6

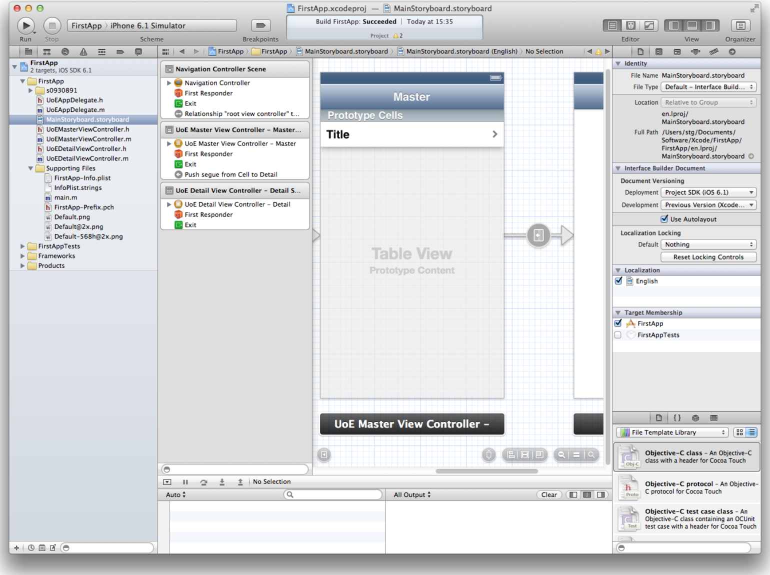
The Android emulator



5554:my_avd

See all your apps.
Touch the Launcher icon.
1 of 6

iPhone development with Xcode



FirstApp.xcodeproj — MainStoryboard.storyboard

Build FirstApp: Succeeded | Today at 15:35

Project ⚠2

FirstApp > FirstApp > MainStoryboard.storyboard > MainStoryboard.storyboard (English) > No Selection

Identity

File Name MainStoryboard.storyboard

File Type Default – Interface Build...

Location Relative to Group

en.lproj/MainStoryboard.storyboard

Full Path /Users/stg/Documents/Software/Xcode/FirstApp/FirstApp/en.lproj/MainStoryboard.storyboard

Interface Builder Document

Document Versioning

Deployment Project SDK (iOS 6.1)

Development Previous Version (Xcode...

☑ Use Autolayout

Localization Locking

Default Nothing

Reset Locking Controls

Localization

☑ English

Target Membership

☑ FirstApp

☐ FirstAppTests

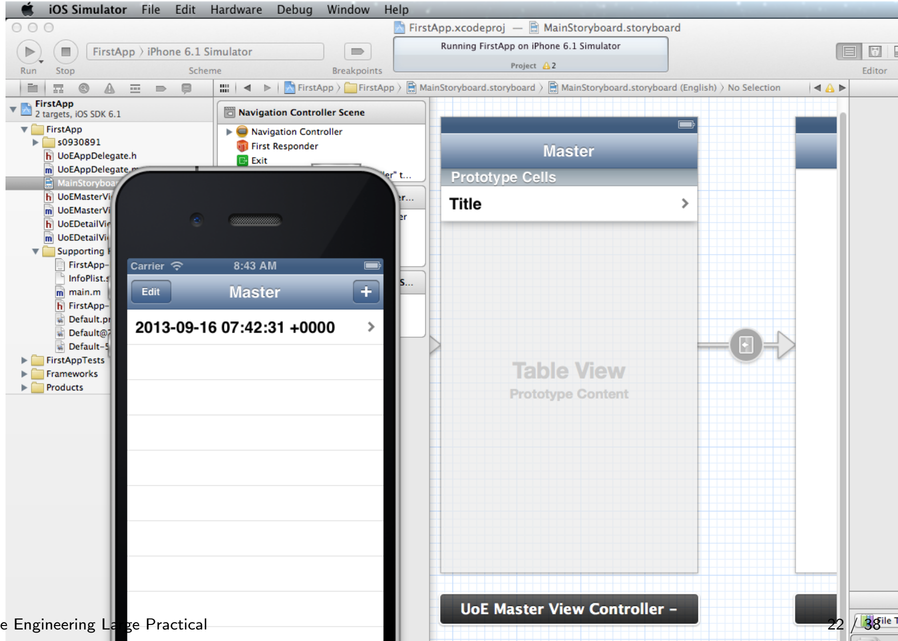
File Template Library

Objective-C class – An Objective-C class with a header for Cocoa Touch

Objective-C protocol – An Objective-C protocol for Cocoa Touch

Objective-C test case class – An Objective-C class containing an OCUnit test case with a header for Cocoa Touch

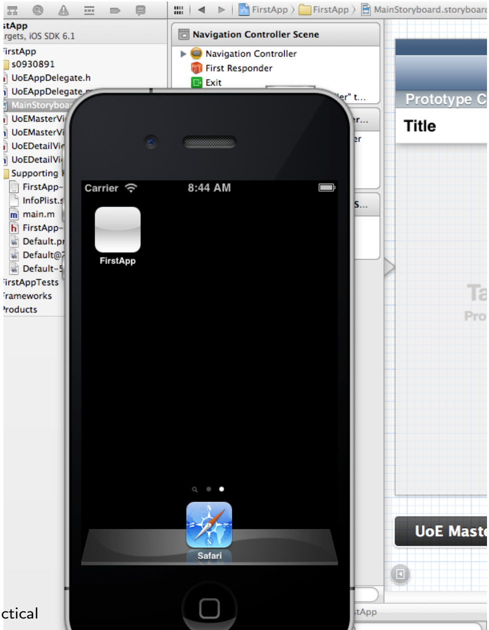
The iOS simulator



Running FirstApp on iPhone 6.1 Simulator

2013-09-16 07:42:31 +0000

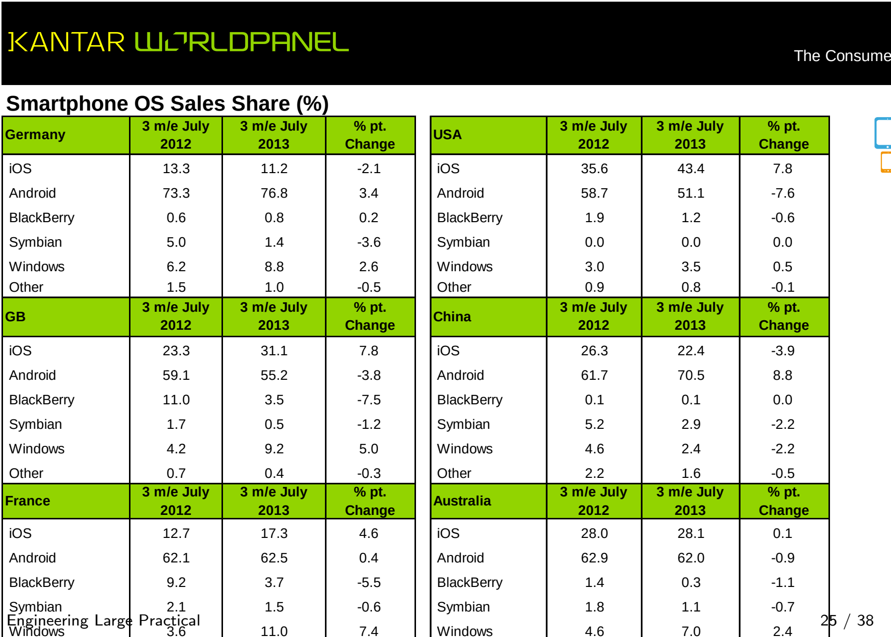
The iOS simulator



Industrial relevance of the SELP

- Employers like to see evidence of practical skills acquisition, and use of state-of-the-art tools.
- **[if Android]** The Software Engineering Large Practical uses the state-of-the-art Android Development Toolkit in Eclipse, as used by professional developers targeting the Android phone.
- **[if iPhone]** The Software Engineering Large Practical uses the state-of-the-art Xcode development environment, as used by professional developers targeting the iPhone.

Smartphone sales worldwide (as at July 2013)



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The Consume

Smartphone OS Sales Share (%)

Germany	3 m/e July 2012	3 m/e July 2013	% pt. Change
iOS	13.3	11.2	-2.1
Android	73.3	76.8	3.4
BlackBerry	0.6	0.8	0.2
Symbian	5.0	1.4	-3.6
Windows	6.2	8.8	2.6
Other	1.5	1.0	-0.5

GB	3 m/e July 2012	3 m/e July 2013	% pt. Change
iOS	23.3	31.1	7.8
Android	59.1	55.2	-3.8
BlackBerry	11.0	3.5	-7.5
Symbian	1.7	0.5	-1.2
Windows	4.2	9.2	5.0
Other	0.7	0.4	-0.3

France	3 m/e July 2012	3 m/e July 2013	% pt. Change
iOS	12.7	17.3	4.6
Android	62.1	62.5	0.4
BlackBerry	9.2	3.7	-5.5
Symbian	2.1	1.5	-0.6
Windows	3.6	11.0	7.4

USA	3 m/e July 2012	3 m/e July 2013	% pt. Change
iOS	35.6	43.4	7.8
Android	58.7	51.1	-7.6
BlackBerry	1.9	1.2	-0.6
Symbian	0.0	0.0	0.0
Windows	3.0	3.5	0.5
Other	0.9	0.8	-0.1

China	3 m/e July 2012	3 m/e July 2013	% pt. Change
iOS	26.3	22.4	-3.9
Android	61.7	70.5	8.8
BlackBerry	0.1	0.1	0.0
Symbian	5.2	2.9	-2.2
Windows	4.6	2.4	-2.2
Other	2.2	1.6	-0.5

Australia	3 m/e July 2012	3 m/e July 2013	% pt. Change
iOS	28.0	28.1	0.1
Android	62.9	62.0	-0.9
BlackBerry	1.4	0.3	-1.1
Symbian	1.8	1.1	-0.7
Windows	4.6	7.0	2.4

What did we learn from this data?

- iOS and Android phones account for the majority of sales in Germany, the USA, GB, China, France and Australia.
- In all of these territories, more Android phones are sold than iOS phones, and more iOS phones are sold than phones running other operating systems.
  - This is true for Italy and Spain as well, but not currently true in Mexico where the order is: i) Android; ii) Windows; iii) Blackberry; and iv) iPhone.
- We conclude that we are working with popular mobile phone development technology and hopefully acquiring useful, marketable skills in the course of this practical.

What is the app to do?

- The School of Informatics publishes a timetable of lectures and tutorials during the academic year.
- There are nine slots during the day where lectures and tutorials can be timetabled throughout the five days of the working week (although the lunchtime slot is very rarely used).
- Because the timetable includes information for first-, second-, third-, fourth- and fifth-year students there may be multiple entries for each slot.
- The timetable for the current academic year includes between zero and five entries in each slot.
- Each entry specifies the name of the course and the appropriate year group (sometimes one specific year group, sometimes several).
- Each entry also includes the location of the course lectures.
- A small number of entries contain a free-text comment such as “Week 1 only” or “Weeks 3 & 6 only”.

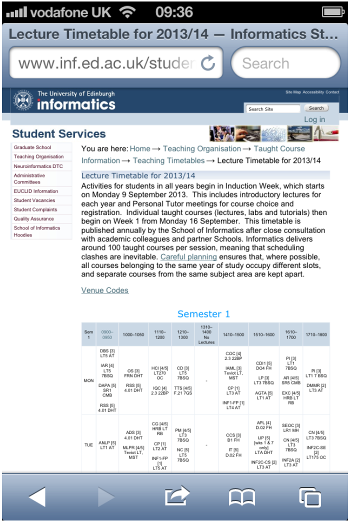
What is the app to do?

- In order to fit all this information into the timetable, names of lecture courses are replaced by short letter codes, as are the names of the lecture theatres and course venues.
- This arrangement has a number of advantages. It is compact, and relatively easy to maintain.
- Against this, it has a number of disadvantages. The use of codes for course titles and course venues makes the resulting timetable somewhat cryptic and hard to use for students who do not know the codes.
- A typical entry reads

  CDI1 [5]
  DO4 FH

- The course venue codes are listed on a separate page and the lecture course codes are listed on yet another page, in the sortable list of courses.

Reading this information on a small screen


vodafone UK
09:36
Lecture Timetable for 2013/14 — Informatics St...
www.inf.ed.ac.uk/studer
Search
The University of Edinburgh
informatics
Site Map Accessibility Contact
Search Site
Search
Log in

Student Services

- Graduate School
- Teaching Organisation
- Neuroinformatics DTC
- Administrative Committees
- EUCLID Information
- Student Vacancies
- Student Complaints
- Quality Assurance
- School of Informatics Hoodies

You are here: Home → Teaching Organisation → Taught Course Information → Teaching Timetables → Lecture Timetable for 2013/14

Lecture Timetable for 2013/14

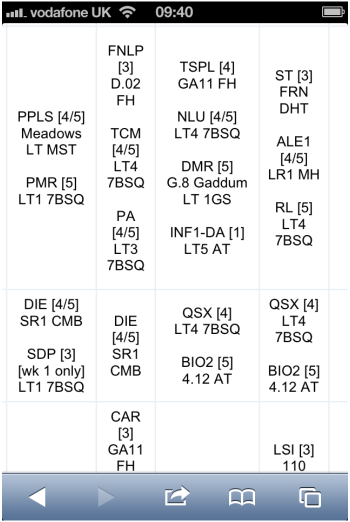
Activities for students in all years begin in Induction Week, which starts on Monday 9 September 2013. This includes introductory lectures for each year and Personal Tutor meetings for course choice and registration. Individual taught courses (lectures, labs and tutorials) then begin on Week 1 from Monday 16 September. This timetable is published annually by the School of Informatics after close consultation with academic colleagues and partner Schools. Informatics delivers around 100 taught courses per session, meaning that scheduling clashes are inevitable. Careful planning ensures that, where possible, all courses belonging to the same year of study occupy different slots, and separate courses from the same subject area are kept apart.

Venue Codes

Semester 1

Sem 1	0900–0950	1000–1050	1110–1200	1210–1300	1310–1400 No Lectures	1410–1500	1510–1600	1610–1700	1710–1800
MON	DBS [3] LT5 AT IAR [4] LT5 7BSQ DAPA [5] SR1 CMB RSS [5] 4.01 DHT	OS [3] FRN DHT RSS [5] 4.01 DHT	HCI [4/5] LT270 OC IQC [4] 2.3 22BP	CD [3] LT5 7BSQ TTS [4/5] F.21 7GS	-	COC [4] 2.3 22BP IAML [3] Teviot LT, MST CP [1] LT3 AT INF1-FP [1] LT4 AT	CDI1 [5] DO4 FH LP [3] LT3 7BSQ AGTA [5] LT1 AT	PI [3] LT1 7BSQ AR [4/5] SR5 CMB EXC [4/5] HRB LT RB	PI [3] LT1 7 BSQ DMMR [2] LT3 AT
TUE	ANLP [5] LT1 AT	ADS [3] 4.01 DHT MLPR [4/5] Teviot LT, MST	CG [4/5] HRB LT RB CP [1] LT2 AT INF1-FP [1] LT5 AT	PM [4/5] LT3 7BSQ NC [5] LT5 7BSQ	-	CCS [3] B1 FH IT [5] D.02 FH	APL [4] D.02 FH IJP [5] [wks 1 & 7 only] LTA DHT INF2C-CS [2] LT3 AT	SEOC [3] LR1 MH CN [4/5] LT3 7BSQ INF2A [2] LT3 AT	CN [4/5] LT3 7BSQ INF2C-SE [2] LT175 OC

Default: text is too small



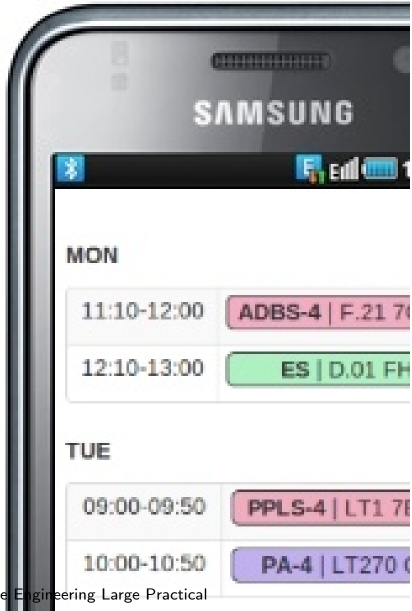
PPLS [4/5] Meadows LT MST PMR [5] LT1 7BSQ	FNLP [3] D.02 FH TCM [4/5] LT4 7BSQ PA [4/5] LT3 7BSQ	TSPL [4] GA11 FH NLU [4/5] LT4 7BSQ DMR [5] G.8 Gaddum LT 1GS INF1-DA [1] LT5 AT	ST [3] FRN DHT ALE1 [4/5] LR1 MH RL [5] LT4 7BSQ
DIE [4/5] SR1 CMB SDP [3] [wk 1 only] LT1 7BSQ	DIE [4/5] SR1 CMB	QSX [4] LT4 7BSQ BIO2 [5] 4.12 AT	QSX [4] LT4 7BSQ BIO2 [5] 4.12 AT
	CAR [3] GA11 FH		LSI [3] 110

Zoom: cannot see headers

Additional problems with the current design

- Further, the timetable is not personalise-able in any way. Even when you know that you are only interested in third year courses there is no way to filter the timetable to see only the third year courses.
- Once you have chosen the subset of courses that you are actually taking you cannot then hide the courses which you are not taking in order to be able to see a timetable which is just right for you.
- Added to this, the timetable is not searchable in any convenient way. For example, if you want to know the times for the Computer Communications and Networks course then you have to first visit the sortable list of courses to find the code for this and then return to the timetable page and search for this code.
- Then if you want to get directions to the lecture theatre you need to look at the code on the timetable page then look it up on the page explaining venue codes and follow the link there to find the map to the lecture theatre.

The solution: a mobile phone app



MON

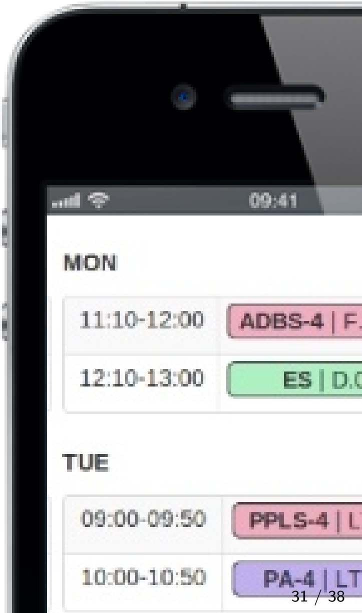
11:10-12:00 ADBS-4 | F.21 7

12:10-13:00 ES | D.01 FH

TUE

09:00-09:50 PPLS-4 | LT1 7E

10:00-10:50 PA-4 | LT270 (



MON

11:10-12:00 ADBS-4 | F.

12:10-13:00 ES | D.(

TUE

09:00-09:50 PPLS-4 | L

10:00-10:50 PA-4 | LT

Timetable information in XML format

```
<?xml version="1.0" encoding="UTF-8"?>
<timetable>
   <semester number="1">
      <week>
         <day name="Monday">
            <time start="09:00" finish="09:50">
               <lecture>
                  <course>DBS</course>
                  <years>
                     <year>3</year>
                  </years>
                  <venue>
                     <room>LT5</room>
                     <building>AT</building>
                  </venue>
                  <comment />
               </lecture>
               <lecture>
                  <course>IAR</course>
                  <years>
```

Venue information in XML format (buildings)

```
<?xml version="1.0" encoding="UTF-8"?>
<venues>
   <building>
      <name>7BSQ</name>
      <description>7 Bristo Square</description>
      <map>http://www.ed.ac.uk/maps/buildings/bristo-square</map>
   </building>
   <building>
      <name>7GS</name>
      <description>7 George Square, Psychology</description>
      <map>http://www.ed.ac.uk/maps/buildings/psychology-building
   </building>
   <building>
      <name>24BP</name>
      <description>24 Buccleuch Place</description>
      <map>http://www.ed.ac.uk/maps/buildings/buccleuch-place</ma
   </building>
   ...
```

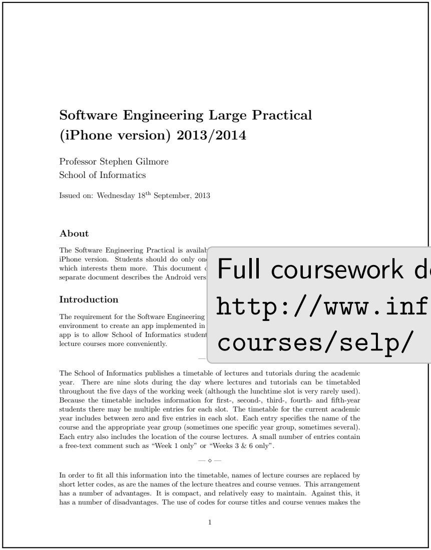
Venue information in XML format (rooms)

```
   ...
   <room>
      <name>SR2</name>
      <description>Seminar Room 2</description>
   </room>
   <room>
      <name>SR3</name>
      <description>Seminar Room 3</description>
   </room>
   <room>
      <name>GFEH</name>
      <description>Ground Floor Exam Hall</description>
   </room>
   <room>
      <name>DHR</name>
      <description>Room 3.11 David Hume Room</description>
   </room>
</venues>
```

Course information in XML format

```
<?xml version="1.0" encoding="UTF-8"?>
<list>
  <course>
    <url>http://www.inf.ed.ac.uk/teaching/courses/ale1</url>
    <name>Adaptive Learning Environments 1 (Level 11)</name>
    <drps>http://www.drps.ed.ac.uk/13-14/dpt/cxinfr11069.htm</d
    <euclid>INFR11069</euclid>
    <acronym>ALE1</acronym>
    <ai>AI</ai>
    <cg>CG</cg>
    <cs />
    <se />
    <level>11</level>
    <points>10</points>
    <year>10</year>
    <deliveryperiod>S2</deliveryperiod>
    <lecturer>A Alcorn</lecturer>
  </course>
  ...
```

Software Engineering Large Practical



Software Engineering Large Practical
(iPhone version) 2013/2014

Professor Stephen Gilmore
School of Informatics

Issued on: Wednesday 18th September, 2013

About

The Software Engineering Practical is availab
iPhone version. Students should do only one
which interests them more. This document c
separate document describes the Android vers

Introduction

The requirement for the Software Engineering
environment to create an app implemented in
app is to allow School of Informatics student
lecture courses more conveniently.

The School of Informatics publishes a timetable of lectures and tutorials during the academic year. There are nine slots during the day where lectures and tutorials can be timetabled throughout the five days of the working week (although the lunchtime slot is very rarely used). Because the timetable includes information for first-, second-, third-, fourth- and fifth-year students there may be multiple entries for each slot. The timetable for the current academic year includes between zero and five entries in each slot. Each entry specifies the name of the course and the appropriate year group (sometimes one specific year group, sometimes several). Each entry also includes the location of the course lectures. A small number of entries contain a free-text comment such as “Week 1 only” or “Weeks 3 & 6 only”.

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In order to fit all this information into the timetable, names of lecture courses are replaced by short letter codes, as are the names of the lecture theatres and course venues. This arrangement has a number of advantages. It is compact, and relatively easy to maintain. Against this, it has a number of disadvantages. The use of codes for course titles and course venues makes the

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Full coursework description available today at `http://www.inf.ed.ac.uk/teaching/courses/selp/`

Questions?

Ask now or email `Stephen.Gilmore@ed.ac.uk`

What happens next?

- Assuming there is enough interest for the iPhone version of the SELP to run then starting next week we will run alternative versions of the lectures for the two versions of the practical.
- If you are doing the **Android** version of the SELP then go to Forrest Hill Room B1 on Wednesdays from 12:10–13:00.
  - These lectures will be about Android development on Eclipse with Java.
- If you are doing the **iPhone** version of the SELP then go to Appleton Tower Room 2.14 on Fridays from 12:10–13:00.
  - These lectures will be about iPhone development on Xcode with Objective-C.