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1 Overview

Welcome to the COS790. This is a Special Topics course which focuses on Mobile and Ubiquitous Computing. This is a very broad and exciting field which is growing rapidly in importance. I hope you will enjoy the course.

1.1 Purpose of Module

The purpose of this module is to enable you to fulfill the responsibilities of developer or software architect within the domain of mobile and ubiquitous computing.

1.2 Description

The course will look at technologies, software architectures and frameworks for mobile and ubiquitous computing including the Internet of Things (IoT). Topics covered in this course include mobile application development, networking for mobile and ubiquitous computing, component frameworks, distributed computing, wireless sensor networks, the Eclipse Open IoT Stack, architectures and middleware for mobile and distributed computing, scalable persistence infrastructures, and big data processing.

1.3 Prerequisites

The requirements for entry into the honours programme are the only requirements for this course.

1.4 Related modules

Modules which complement this module include Parallel and Distributed Computing (COS786), Software Architecture – SE II (COS731), the Artificial Intelligence Course modules (COS710 and COS711), the Computer and Information Security modules (COS720 and COS721), Data Mining (COS-781) and Computer Networks (COS-781).

2 Contact details of instructors and support staff

<table>
<thead>
<tr>
<th>Course coordinator</th>
<th>Academic administrator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Fritz Solms</td>
<td>Mrs. Elmarie Willemse</td>
</tr>
<tr>
<td>Office: IT 4-38</td>
<td>IT 4-18</td>
</tr>
<tr>
<td>Telephone number: 012 420 2547</td>
<td>012 420 2547</td>
</tr>
<tr>
<td>Email address: <a href="mailto:fsolms@cs.up.ac.za">fsolms@cs.up.ac.za</a></td>
<td><a href="mailto:ewillemse@cs.up.ac.za">ewillemse@cs.up.ac.za</a></td>
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</tbody>
</table>

3 Organisation

This section discusses the practical way in which the course is conducted.
3.1 Module web site


3.2 Announcements

Announcements will be made regularly through the course portal. It is important that candidates regularly (at least weekly) visit the course portal to check for new announcements and new material which is made available.

3.3 Lectures

Lectures are presented on Fridays, 18h30 - 20h10.

3.4 Course project

Candidates will be required to do a project evolving around analyzing and documenting a software architecture. The deliverables include

- an architectural description of an architecture of a software system, and
- a presentation where the architectural decisions made are critically discussed.

3.5 Interaction with instructors

Students are welcome to contact the lecturer either via email or telephonically in order

- raise questions,
- discuss any issues they may have with the course, or to
- make an appointment to see the lecturer.

The following times are preferable:

- Directly after the COS-790 lecture (no prior arrangement needs to be made)
- 17h30-18h30 (with prior arrangement)

4 Study material

4.1 Prescribed

This course does not have a prescribed text book. Candidates will receive course notes as well as an extensive list of supplementary reading material. The reading material will have to be critically discussed in short presentation sessions. All material will be made available for download through the course portal.
4.2 Additional references

Candidates would benefit from reading some of the following texts. It is, however, not required that Students must buy these books nor is it required that these texts must be read:

- Any Android development book,

5 Assessment

The semester mark will be made up as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester Test (Friday, 11 Sep, 18h30–20h30)</td>
<td>20%</td>
</tr>
<tr>
<td>Course project</td>
<td>30%</td>
</tr>
<tr>
<td>Exam</td>
<td>50%</td>
</tr>
</tbody>
</table>

6 Schedule

6.1 Lectures

The course will cover a variety of topics within the field of mobile and ubiquitous computing including, but not restricted to, the following:

- Opportunities and Challenges in mobile and ubiquitous computing.
- Mobile application development with a focus on Android
- Virtualization technologies for mobile devices
- Protocols used in mobile and ubiquitous computing
- OSGI and its relevance to mobile and ubiquitous computing
- Wireless sensor networks
- Internet of things
- The Eclipse Open IoT Stack
- Middleware for mobile and ubiquitous computing
- Scalable persistence architectures
- Big Data Processing
- An industry perspective
6.2 Course project

Students must form groups of 2-3 students and propose, design, develop and demo a proof-of-concept application within the space of mobile and ubiquitous computing. The application could be

- a mobile device application (e.g. an Adroid, IOS or cross-platform application),
- an IoT application (e.g. developed using the Eclipse Open IoT Stack),
- a distributed OSGI application,
- an RFID application, and so on.

The proposed project should have

- a novel and interesting problem you are solving,
- make use of at least one sensor or actuator (this could be any of the sensors built into a mobile phone),
- a limited and well defined scope requiring between 50 and 70 hours per person (thus between 150 and 210 hours for a 3-person team).

Applications could be

- an interesting gesture control application,
- introducing IoT in the home,
- an application using geo-positioning or tracking,
- an innovative idea for a health care application,
- an interesting idea for communications.

The application does not have to be built and documented to production levels and should focus on the core idea/novelty/technical challenge, demonstrating that the core technical challenge has been solved.

6.2.1 Project schedule

<table>
<thead>
<tr>
<th>Due date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Aug</td>
<td>Project Proposal Submission</td>
</tr>
<tr>
<td>10 Aug</td>
<td>Project go ahead notification</td>
</tr>
<tr>
<td>13 Aug</td>
<td>Git repository details provided to lecturer</td>
</tr>
<tr>
<td>20 Aug</td>
<td>Software Architecture Design Spec</td>
</tr>
<tr>
<td>18 Sept</td>
<td>Mid-Project Demo</td>
</tr>
<tr>
<td>6 Nov</td>
<td>Final Demo</td>
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