Reactive Android Development

CS 4593 (undergraduate)
& CS 5463 (graduate)

Summer 2016

Course Instructor

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Course Meetings: TR 6:00 - 7:55
Office Hours: TR 5:00 - 6:00

Prerequisites

CS2233 Application Programming
CS3443 Discrete Mathematical Structures

Required Textbooks

1. Getting Started with Android Studio
   http://developer.android.com/develop

2. Blackheath, Stephen & Jones, Anthony Functional Reactive Programming
   https://www.manning.com/books/functional-reactive-programming


Course Outline

Mobile development is a peculiar form of distributed computing. Much of the state and, often, much of the processing must take place on the server. The application running
on the mobile device must give the appearance of responsiveness and persistent state even when access to the server is intermittent. In this course, we will use the challenges of Android development as a vehicle for exploring the use of reactive programming. Originally emerging from the functional-programming world, reactive programming has drawn increasing interest for use in imperative languages due to Microsoft’s reactive extensions and a number of Java implementations, most notably NetFlix’s RxJava.

Homework & Quizes

There are a handful of small homework assignments and in-class quizzes to ensure that key concepts are solidly understood before applying them to the projects. The quizzes should take only thirty minutes and will cover the material of the homework turned in in the previous week. They serve mainly to encourage everyone to keep up and make up a relatively small percentage of the grade because the hands-on experience of the projects is more reflective of the mastery of the material.

Projects

The primary focus of the course will be a pair of projects. Or, arguably, a single project divided into two phases. In the first phase, we will develop an non-trivial android application in the standard way. That is, using the Android API as documented in the tutorials and reference at [http://developer.android.com](http://developer.android.com).

The second phase will consist of refactoring the project from phase one (a working version of the phase one codebase will be available for any who are not confident of their implementation) to use either the RxJava or Sodium reactive frameworks. The most significant product of this second phase is an experience report on the relative merits of the traditional and reactive approaches.

Each student will be responsible for turning in their own unique version of the projects, but collaboration is strongly encouraged – particularly during the second phase.

Participation

In addition to the “fun part” of Android development, a large part of this course is exploring the reactive programming paradigm and much of that is subjective. About 25% of the lecture time will be dedicated to instructor-facilitated collaboration. During this time, it is important to capture any topics that cause friction either for you or for your collaborators to inform the experience report for the second project phase. For those who prefer online interaction, there is also a class discussion board.
Course Goals

1. To develop familiarity with the challenges presented by mobile computing: Maintaining a responsive application with distributed state and intermittent network access.
2. To explore reactive-programming frameworks as a means of addressing those challenges.

Course Topics

1. Android Development
2. Distributed Computing
3. Reactive Programming Frameworks
4. (Elementary) Temporal Logic

Grading Scheme

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation</td>
<td>10%</td>
</tr>
<tr>
<td>Homework</td>
<td>10%</td>
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<tr>
<td>Project Phase 1</td>
<td>30%</td>
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<tr>
<td>Project Phase 2</td>
<td>40%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10%</td>
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</tbody>
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Examination Schedule

- Quiz 1: Week 3
- Quiz 2: Week 5
- Quiz 3: Week 7
- Project Presentation: Final-Exam Period

No makeup exams will be permitted.

This Syllabus is provided for informational purposes regarding the anticipated course content and schedule of this course. It is based upon the most recent information available on the date of its issuance and is as accurate and complete as possible. I reserve the right to make any changes I deem necessary and/or appropriate. I will make my best efforts to communicate any changes in the syllabus in a timely manner. Students are responsible for being aware of these changes.