CS 395: Scalable Microservices: Overview (Part 1)

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Learning Objectives in this Lesson

• Understand the course topics & logistics
  • Course philosophy
  • Course contents
  • Structure of the lecture material
Course
Philosophy
Course Philosophy

• There’s a growing need for software developers who can write concurrent & parallel microservices for a range of computing platforms
  - e.g., mobile devices, laptops, desktops, & cloud environments
Course Philosophy

- Demand is driven by software/hardware infrastructure advances

See [www.gotw.ca/publications/concurrency-ddj.htm](http://www.gotw.ca/publications/concurrency-ddj.htm)
Effective techniques & practices for developing concurrent & parallel microservices are *not* best learned through generalities & platitudes.

“Sitting & thinking” is not sufficient...
Course Philosophy

• Instead, it’s better to see *by example* how these programs can be made
  • *easier* to write & read,
  • *easier* to maintain & modify,
  • *more* efficient & resilient
by applying time-proven software patterns & object-oriented, functional, & reactive design & programming techniques

This course involves lots of hands-on software development & testing!
Summary of the Course Contents
Summary of Course Contents

• Key Java frameworks

Streams

- filter(not(this::urlCached))
- map(this::downloadImage)
- flatMap(this::applyFilters)
- collect(toList())

Structured Concurrency

Assumes knowledge of Java object-oriented & functional language features
Summary of Course Contents

- Key Java parallelism frameworks
- Modern web programming platforms

**Spring WebMVC & WebFlux**

Reactive Stack
Spring WebFlux is a non-blocking web framework built from the ground up to take advantage of multi-core, next-generation processors and handle massive numbers of concurrent connections.

<table>
<thead>
<tr>
<th>Netty, Servlet 3.1+ Containers</th>
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<tbody>
<tr>
<td>Reactive Streams Adapters</td>
</tr>
<tr>
<td>Spring Security Reactive</td>
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<tr>
<td>Spring WebFlux</td>
</tr>
</tbody>
</table>
| Spring Data Reactive Repositories
  Mongo, Cassandra, Redis, Couchbase |

Servlet Stack
Spring MVC is built on the Servlet API and uses a synchronous blocking I/O architecture with a one-request-per-thread model.

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<td>Servlet API</td>
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<td>Spring Security</td>
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<td>Spring MVC</td>
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| Spring Data Repositories
  JDBC, JPA, NoSQL  |
Summary of Course Contents

• Key Java parallelism frameworks
• Modern web programming platforms
• Patterns for parallel programming

See www.dre.Vanderbilt.edu/~Schmidt/POSA
Summary of Course Contents

• Key Java parallelism frameworks
• Modern web programming platforms
• Patterns for parallel programming
• We assume you know (or can quickly learn) modern Java, IntelliJ, & Git

See item #12 at github.com/douglascraigschmidt/CS395/wiki/CS-395-FAQ
Structure of the Lecture Material
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- This course has three main modules

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<td>Software Patterns</td>
<td>• Concurrent &amp; parallel programming &amp; communication patterns</td>
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  • Each part is a single lecture

Screencasts of each sync lesson “part” & PDF versions of the slides will be uploaded Brightspace
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      - Each part is composed of segments
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• 1st exam will be on Tuesday, February 7th

All exams are “closed book/note/Internet” & are given on Brightspace
Structure of the Lecture Material

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  • 1st exam will be on Tuesday, February 7th
  • We strive to hand back & review exams at the start of next class

One of the benefits of a smaller class ;-)
Structure of the Lecture Material

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  - We strive to hand back & review exams at the start of next class

I recommend studying for exams by reviewing slides & watching screencasts available on Brightspace, as well as the “Frequently Made Mistakes” videos
There *may* be a cumulative final exam that covers all the lectures.

The focus will be on the last week(s) of the semester.
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