CMSC433 - Programming Language Technologies and Paradigms

Introduction

Course Goal

To help you become a better programmer

- Introduce advanced programming technologies
- Deconstruct relevant programming problems
- Solve them using the advanced technologies

Topics

- Concurrency
- Distributed programming
- Cloud computing
- Event-based programming

Concurrency

- We'll look at systems with
  - Multiple threads of control
  - Implementing multiple tasks
  - On a single machine
- Implementation technology
  - java.lang.Thread
  - java.util.concurrent.*
  - Other supporting classes

Distributed Programming

- We'll look at systems with
  - Multiple threads of control
  - Implementing multiple tasks
  - On multiple machines
- Technology
  - Java
  - Java RMI
  - Hadoop / Google MapReduce

Event-based Programming

- We'll look at systems with
  - A single thread of control
  - Implementing multiple tasks
  - On a single machine
- Implementation technology
  - java.nio.*
  - Android

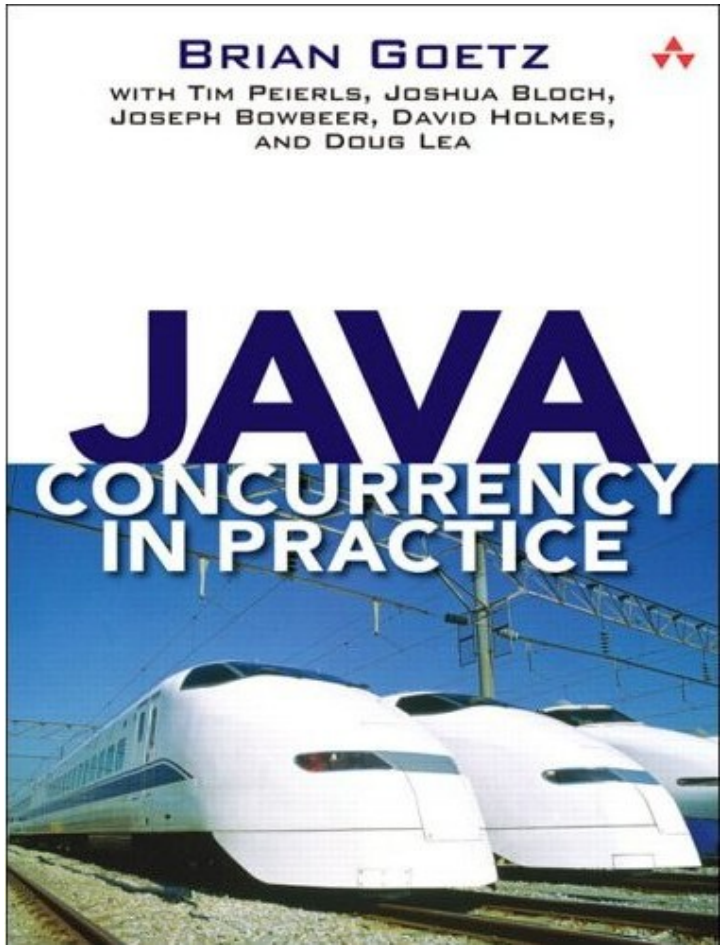
Other Special Topics

- Let’s hear from you

Style

- Interaction
  - This is your course: what do you want to learn?
- Discussion
  - Not just professor/TA to student, but student to student, with regard to ideas, techniques, and solutions
- Learn by doing
  - If you don't put effort into the programming projects, you will learn very little

Optional Textbook



- Download & investigate source code examples
  - www.javaconcurrencyinpractice.com

Additional Reference Materials

- Lots of resources
  - Many on-line and free
- Will point out more during semester
- Find your own
  - If you copy code from any resource, acknowledge it

Projects

- Five projects
- You will write projects mostly from scratch
- I encourage you to write and share your own test cases

Project Submission

- Projects due at Midnight (23:59:59) on due date
  - By Unix time of day
  - You must submit a good-faith effort
    - You can be **failed** for the course if you do not
  - Late submission up to 9am the next morning
    - Score is multiplied by 0.8 (it is generally not in your best interest to submit late)
  - Only last submission will be graded!

Project Grading and Class Accounts

- Will use the CS Submit Server
- Linux lab accounts will be available
  - Can use your own campus accounts for course work
- Course grades and accounts will be managed using grades.cs.umd.edu
  - All linked from course web page resources

Software

- The TA and I will mostly be using:
  - **Java 1.7**
  - **Eclipse**
  - **Junit 4+**
- If you can, please bring your laptop to class so we can examine source code examples together

Exams

- Midterm: March 12th
- Final: Monday, May 15th, 8:00 am-10:00 am

Tentative Grading Scheme

	#	% each	% total
Projects	5	10	50
Mid-terms	1	25	25
Final	1	25	25

Discussion and Questions

- Class forum
  - Web-based discussion pages
  - Can post to forum from off-campus
  - Linked from course web page
- Post questions, pointers to resources, test cases.
  - Will be monitored by professor and TA
  - Use good judgment. Discussion is fine, but never post code or pseudo-code that gives away exact solution approaches

Office Hours

- Professor Adam Porter, aporter@cs.umd.edu
  - 4125 AVW
- TA: Khoa Ha, khoaha@terpmail.umd.edu
  - Office hours in 4103 AVW
- Office hours posted on course web page

Excused Absences

- Religious holidays or other personal conflicts
  - Let us know *as soon as you can*
- Medical and other emergencies
  - Must provide documentation stating what dates/times you were incapacitated
  - Self reporting is *not* sufficient

Stay up to Date

http://www.cs.umd.edu/class/spring2015/cmsc433

Contains:

- Announcements
- Lecture notes
- Project assignments
- Resources
- And more!

A Single-Threaded Logging Server

- Logging server
  - Accepts records from client
  - Writes record to client-specific file

Let's Look at the Code

- Organization
  - Utils
    - DataRecord.java
    - MsgHandler.java
  - Client
    - ClientSimulator.java
  - Server
    - LoggingServerCore.java
    - SingleThreadedServer.java

Ungraded Assignment

- Download the code from the course Lecture page
- Read and understand how it works
- Run this code and observe its performance
- Assuming the ClientSimulator is fixed
  - What factors account for the program's running time?
  - What possibilities might exist to speed things up?