TESTING CONCURRENT AND PARALLEL SOFTWARE

Lecture slides for 1DL570 course
(March – May 2017)
Course content

- Introduction to concurrency errors and their characteristics
- Techniques for detecting concurrency errors
  - static analysis
  - testing
  - model checking
- Tools for detecting errors in programs
- Applying tools and techniques to realistic programs
Learning outcomes

At the end of the course, you should be able to:

• explain and identify common types of problems in concurrent and parallel programs

• apply different techniques for testing concurrent programs for various correctness properties

• use tools for testing and debugging programs

• employ methodologies and strategies for software testing in order to cover all relevant parts of program functionality and correctness
Course structure

- This year’s course is organized in five modules
- Given by two instructors:
  - **Kostis Sagonas** (modules 1, 3, and 5)
  - **Bengt Jonsson** (modules 2 and 4)
- Each module has:
  - 2-3 lectures (with slides on the site) and a “lab”
  - a corresponding assignment (done individually)
- In addition, there will be:
  - papers to read and discuss
  - a “bonus” assignment
Overview of the first module

• Introduction to concurrent programming and concurrency errors
• Basic definitions
• Data races: survey of main techniques
• Study of characteristics of concurrency bugs
• Dynamic data race detection
  – lockset, happens-before, vector clocks, hybrid techniques
• Deadlocks