departamento de informática
FACULDADE DE CIÊNCIAS E TECNOLOGIA
UNIVERSIDADE NOVA DE LISBOA

Concurrency and Parallelism
(Concorrência e Paralelismo – CP 11158)

Masters in Computer Science

(Mestrado Integrado em Eng. Informática)

2013-14

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Survey

- Please take a few minutes and answer a small survey for Concurrency and Parallelism

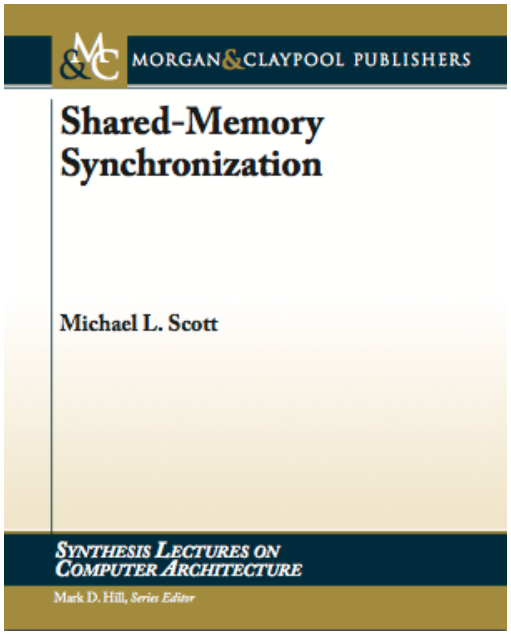
Thank you!

Administrivia — Basic Info

- Lectures and Labs
  - João Lourenço <joao.lourenco@fct.unl.pt>
- Class hours
  - Lectures: Wednesday @ 10:00 @ 3.1/Ed.VII
  - Labs: Wednesday @ 12:00 @ Lab 123/Ed.II
    Monday @ 14:30 @ Lab 112/Ed.II
- Office hours
  - Monday @ 11:00 – 12:00
- Office location
  - CITI · Building II · Room P2/9

Administrivia — Basic Info

- Textbook
  - Shared-Memory Synchronization
    Michael L. Scott
    Synthesis Lectures on Computer Architecture 2013 8:2, 1-221
    Morgan&Claypool Publishers
    ISBN: 9781608459568 paperback
    ISBN: 9781608459575 ebook



- Class web page @ CLIP
  - All assignments, handouts, [lecture notes,] on-line
- Discussion forum: Google Groups
  - https://groups.google.com/d/forum/cp11158-2013-14
  - Share your experiences and difficulties
  - Share ideas, not solutions

Course Goals

- Knowledge:
  - To identify the models used for problem solving in multiprocessors;
  - To know the paradigms used in the development of algorithms for multiprocessors;
  - To evaluate the correction and performance of concurrent and parallel algorithms;
  - To know the languages, libraries and tools used in the development of concurrent and parallel programs
- Application:
  - Partitioning a problem to execute it efficiently on a multiprocessor;
  - To use the C and Java language for developing concurrent applications;
  - To make contact with the tools used in the development of a concurrent and parallel application, during the design, implementation, debugging and deployment stages.

Sylabus

- The basics
  - Atomicity and synchronization
- Architectural background
  - Taxonomy of multiprocessors, Cores and caches, Memory consistency, Atomic primitives, Practical spin locks, Barriers, Barrier algorithms, Busy-wait synchronization
- Efficiency and Correctness
  - Speedup, Amdhal's Law, Safety, Liveness, Memory models, Data races, Atomicity violations, Deadlocks, Livelocks, Supporting tools
- Atomicity and Synchronization
  - Reader-writer locks, Semaphores, Monitors, Other language mechanisms
- Non-blocking techniques and algorithms
  - Queue, List, Hash-tables, …
- Transactional Memory
  - Software TM, Hardware TM, Challenges
- Parallel programming
  - Problem decomposition, Parallel algorithms: mapreduce, sorting, searching

Lab classes

- Groups of 2 students
  - **ALL** exceptions require explicit authorization
- First weeks
  - Development of small programs and experiments to understand the concepts from lectures
- Project 1
  - Concurrency: synchronization and correctness
- Project 2
  - Parallel programming and performance evaluation

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Administrivia — Grading

- Grading
  - [2 x 35%] two tests (individual) [≥ 8.5 points]
  - [2 x 15%] two projects (group) [≥ 8.0 points]
  - [extra 10%] participation in lectures and labs
  - Final grade ≥ 9.5 points => APPROVED

Administrivia — Grading

- Grading projects
  - [50%] paper on the project (written report)
  - [30%] passing tests / demonstration / discussion
  - [20%] design and coding style
- Distribution of work in group
  - I don't care who does what, as long as everybody does something technically relevant / meaningful for the project
    - Work division must be reported in the paper/report
  - Any attempt of fraud => all groups members fail the course immediately

Administrivia — Methodology

- Feel free to ask questions in/out classes
  - Teacher, colleagues, google group
- Fell free to answer questions from colleagues
  - Help finding the solution ≠ giving the solution

- Cite any code that inspired your code
  - As long as you cite what you used, it's not cheating
  - Worst case I will deduce some points if it undermines the assignments

Administrivia – Key Dates

- Tests
  - Nov 13th @14:30, Dec 13th @14:00
- Projects distributed / due
  - TBD

3 project due "sliding" days

Planning

- Tests
  - Nov 13th @14:30
  - Dec 13th @14:00
- Projects
  - TBD

Week	Date	Lab P2	Lecture	Lab P1
1	9 Sep	—	1	1
2	16 Sep	1	—	—
3	23 Sep	—	2	2
4	30 Sep	2	3	3
5	7 Oct	3	4	4
6	14 Oct	4	5	5
7	21 Oct	5	6	6
8	28 Oct	6	7	7
9	4 Nov	7	8	8
10	11 Nov	8	9 T1	9
11	18 Nov	9	10	10
12	25 Nov	10	11	11
13	2 Dec	11	12	12
14	9 Dec	12	—	— T2

3 project due "sliding" days

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The END