



MVP

Welcome

Alexandre David

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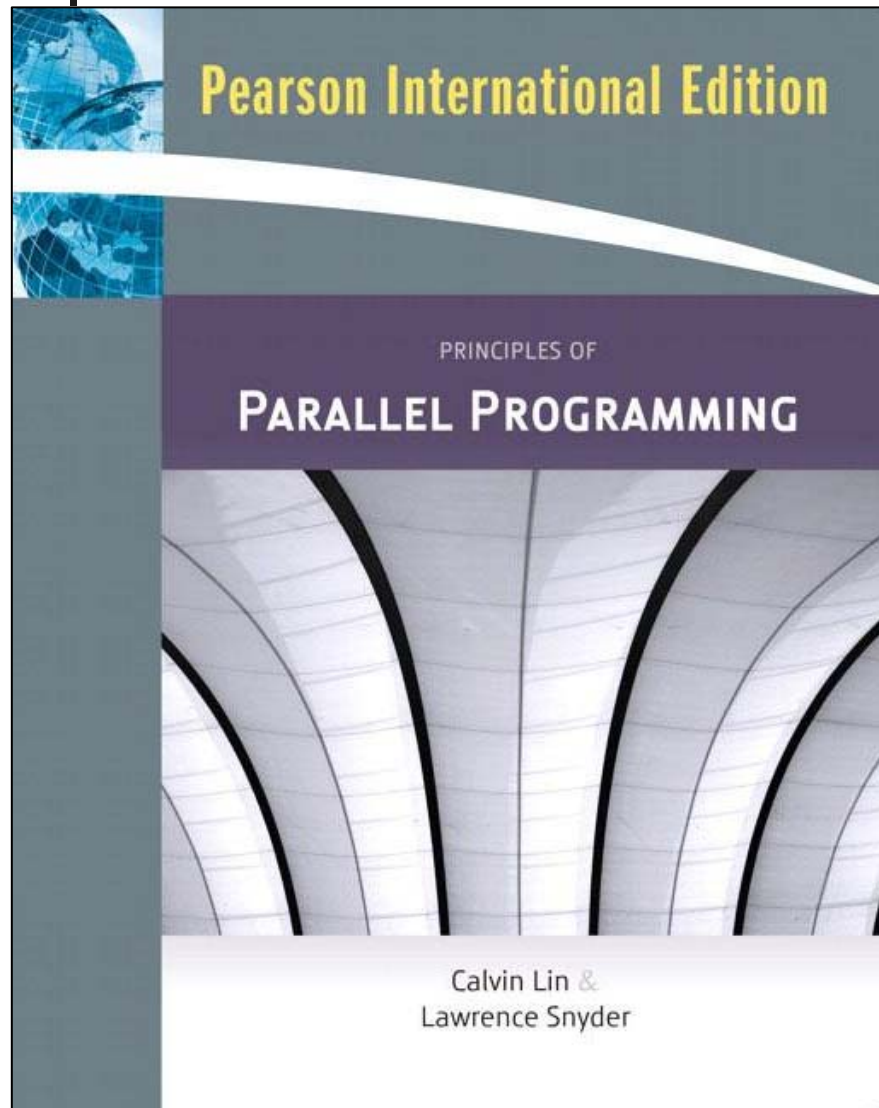
adavid@cs.aau.dk



Presentation of the Course

- Parallel Computing
 - Little on parallel hardware
 - Mostly on parallel algorithms and design
- Models for Parallelism
- Tools for Parallelism (MPI, pthreads, OpenMP...)
- 15 lectures, 3x30 min + exercises

Course Book



- *Principles of Parallel Programming.*
- Recent and accessible book.
- Follow the suggested order + complements on topics not covered.
- New book, updated course. Still not an easy course.
- *Chapter 2 from Intel Threading Building Blocks – copy.*



Course & Assignments

- Lectures will be alternated between theory & practice.
- Assignments:
 - 5 assignments, 4 first compulsory.
 - Model: complete them until they are good.
 - Careful: Do not accumulate delay.
 - 2 weeks for completing every assignment.
 - Examination through assignments.
 - Exercise sessions for doing the assignments.
 - *Little* extra time for writing down ~ preparing for an exam.



Goals of the Course

- Design, analysis, and implementation of parallel algorithms.
 - Principles of parallel algorithm **design**.
 - **Modeling** of parallel programs.
 - **Tools** such as MPI, pthreads, and OpenMP.
 - Some examples.
 - Matrix multiplication/inversion.



A Few Questions



- Do we need parallelism?
- How do you specify and coordinate concurrent tasks?
- What are the pitfalls of parallel programming?
- Are there standards?
- Do you need to accelerate applications?
- Why do you need to think differently?



Trends in Hardware

- Everything points towards parallelism from multi-core, hyper-threading, multi-threads, superscalar, ... technologies.
 - Do you know these buzz words?
- Because
 - Limits to continue to increment performance with single processors.
 - Other constraints like heat, complexity, yields, etc...



Arguments for Parallelism

- Computational power:
 - Moore's law.
 - Translating transistors into useful OPS.
- Memory/disk speed:
 - Performance/yr: CPU +40%, DRAM +10%.
 - How to feed data?
 - What are the problems?
 - Design of core i7.
- Parallel platforms: larger aggregate cache+bandwidth+IPC...

