INTRODUCTION TO PARALLEL AND DISTRIBUTED COMPUTING

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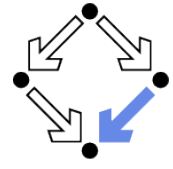


Various Aspects

Goal: application of concurrency to speed-up computations.

- Multi-core processors, multi-processors, computer clusters.
- Shared memory and distributed memory programming.
- Task parallel and data parallel algorithms.
- Strategies for parallel program design.
- Performance measures and analysis.

Various interrelated aspects (many of which we will discuss).

Course Topics

- Parallel Architectures
- *Auto-Parallelization and OpenMP and Cilk Plus*
- Performance Analysis
- *Multi-Threaded Client/Server Programming*
- Parallel Program Design
- *The Message Passing Interface MPI*
- Distributed Memory Algorithms

An overview of abstract development principles and *concrete programming models*.

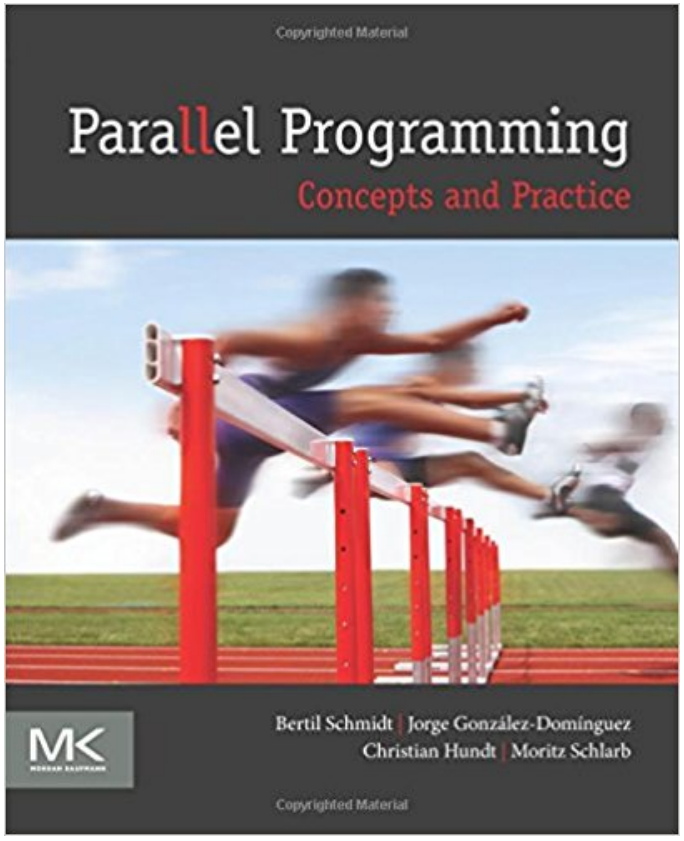
Organization and Grades

- Moodle Course
  - Materials and links.
  - Forums for announcements and Q&A.
  - Submission of assignments.
- Four Assignments on Programming/Benchmarking
  - Automatic parallelization.
  - Shared memory programming in OpenMP or Cilk Plus.
  - Multi-threaded/networked programming in Java.
  - Distributed memory programming in MPI.

No exam, grade will be entirely based on assignments.

Literature

Bertil Schmidt et al. *Parallel Programming: Concepts and Practice*, Morgan Kaufmann, 2017.



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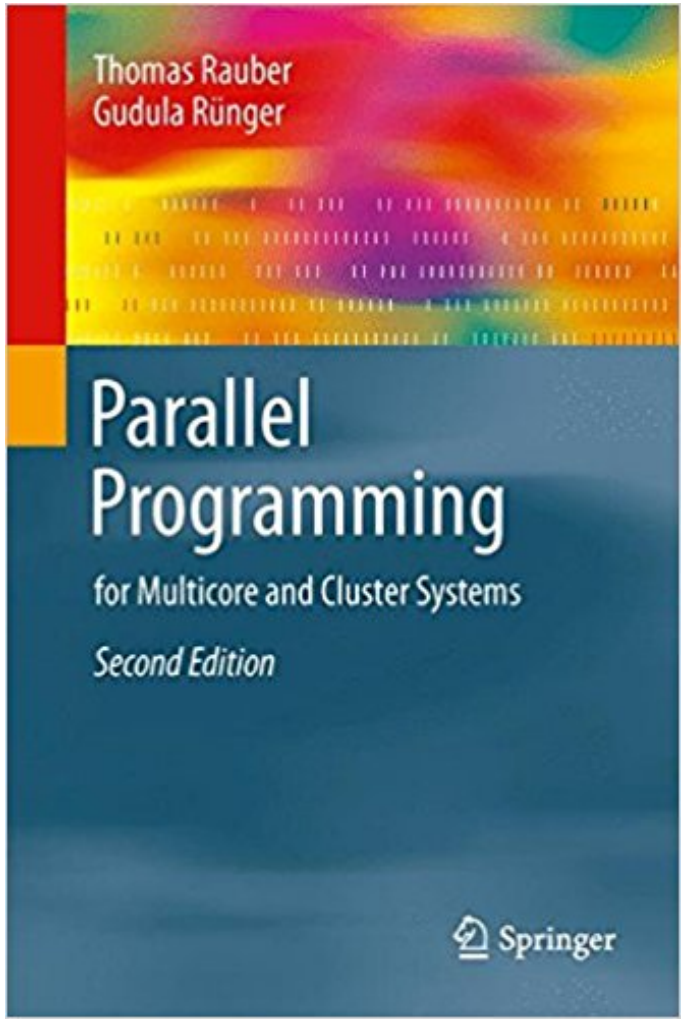
Thomas Rauber and Gudula Rünger, *Parallel Programming: for Multicore and Cluster Systems*, Second Edition, Springer, 2013.



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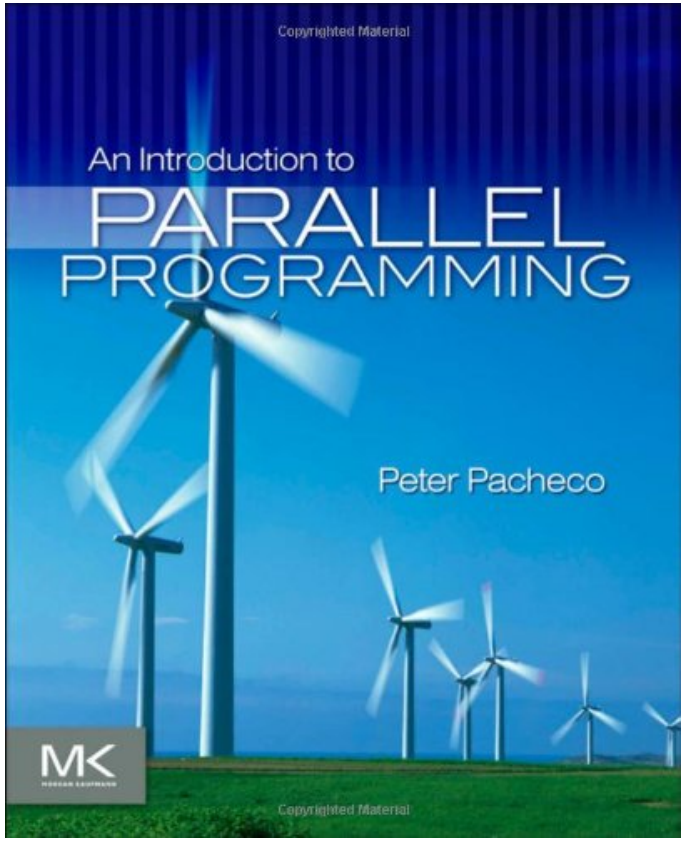
Peter Pacheco, *An Introduction to Parallel Programming*, Morgan Kaufmann, 2011.



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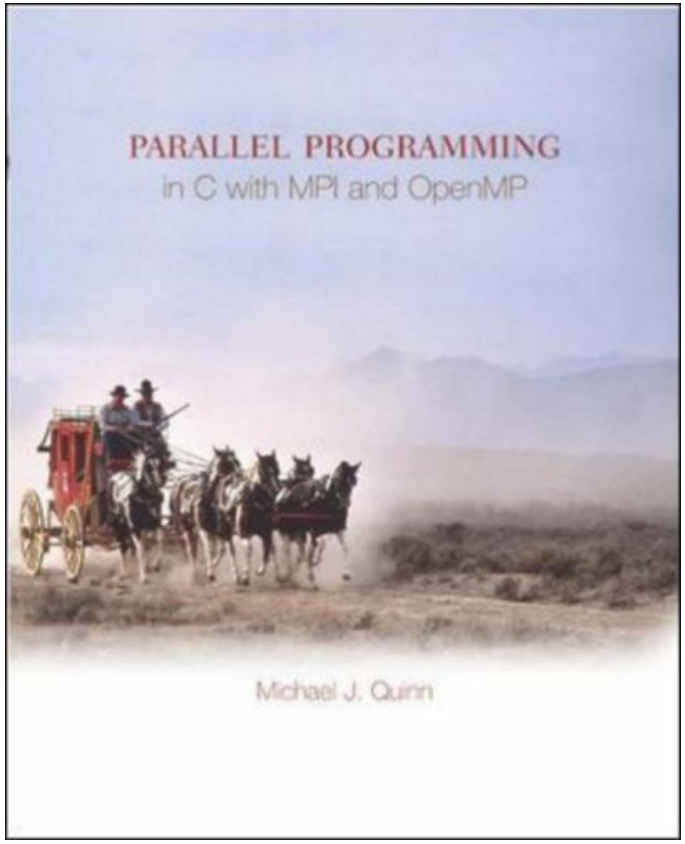
Michael J. Quinn, *Parallel Programming in C with with MPI and OpenMP*, McGraw-Hill, 2003.



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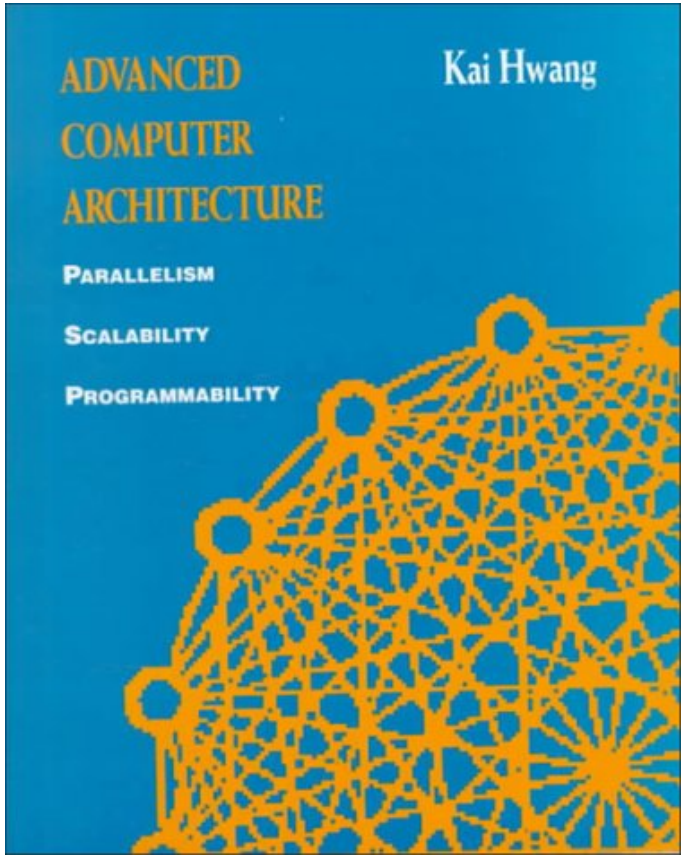
Kai Hwang, *Advanced Computer Architecture — Parallelism, Scalability, Programmability*, McGraw-Hill, 1993.



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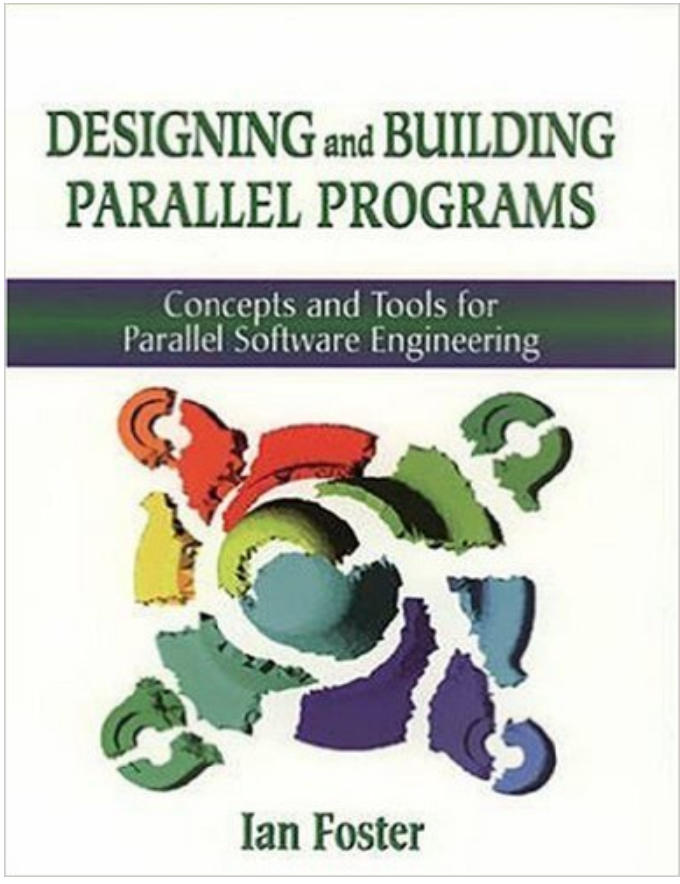
Ian Foster, *Designing and Building Parallel Programs*, Addison-Wesley, 1995.



Free online version at `http://www.mcs.anl.gov/~itf/dbpp`.