Advanced Computer Architectures

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Topics

Hardware
- Networks of single computers – multicomputers (MIMD)
- Tightly coupled CPUs – vector computers and SIMD
- Pipeline processing

Software
- Programming of Networks/MIMD computers
- Programming of Vector- and SIMD computers
- Automatic parallelization/vectorization vs. parallel programming languages / libraries
Textbook: Parallel Processing, 2004

I Fundamentals
1. Introduction
2. Classifications
3. Petri-Networks
4. Parallel Processing Concepts
5. Network Structures

II Asynchronous Parallelism
6. Structure of a MIMD System
7. Synchronization and Communication in MIMD-Systems
8. Problems with Asynchronous Parallelism
9. MIMD-Programming Languages
10. Coarse-Grained Parallel Algorithms

III Synchronous Parallelism
11. Structure of a SIMD System
12. Communication in SIMD-Systems
13. Problems with Asynchronous Parallelism
14. SIMD-Programming Languages
15. Massively Parallel Algorithms

IV Other Models of Parallelism
16. Automatic Parallelization and Vectorization
17. Non-Procedural Parallel Programming Languages
18. Performance of Parallel Systems

Recommended Reading
- Parallel and Distributed Programming Using C++, Cameron Hughes, Addison Wesley Longman, 2003
- H. El-Rewini, T. G. Lewis and, Distributed and Parallel Computing, Manning, Greenwich CT, 1998

Contents
1. Fundamentals
2. Petri-Nets
3. Asynchronous Parallelism
4. Synchronous Parallelism
5. Performance of Parallel Systems
6. Automatic Parallelization/Vectorization

Intranet
http://robotics.ee.uwa.edu.au/courses/adv-comp-arch