



MAX PLANCK INSTITUTE  
FOR DYNAMICS OF COMPLEX  
TECHNICAL SYSTEMS  
MAGDEBURG



COMPUTATIONAL METHODS IN  
SYSTEMS AND CONTROL THEORY

# Scientific Computing II

## Parallel Methods

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Computational Methods in Systems and Control  
Theory (CSC)

Max Planck Institute for Dynamics of Complex  
Technical Systems



# Preface

# Why are you here?



### Characterization

A parallel computer is a

- collection of processing elements
- communicating and
- cooperating

for the fast solution of a large problem.

### ■ Pseudo Parallelism, or Multitasking

modern operating systems simulate parallel execution by time slicing



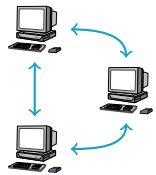
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### ■ Distributed Memory

Computations executed on single unit with exclusive memory each



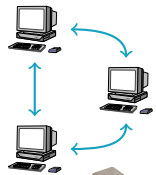
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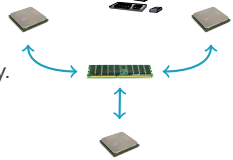
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### ■ Shared memory

Several computational units share a common main memory.





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- race conditions,
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- deadlocks,
- data interdependence,
- blocking problems on hardware level.