Design of Parallel and High-Performance Computing

Fall 2013
Lecture: Amdahl's Law

Instructor: Torsten Hoefler & Markus Püschel
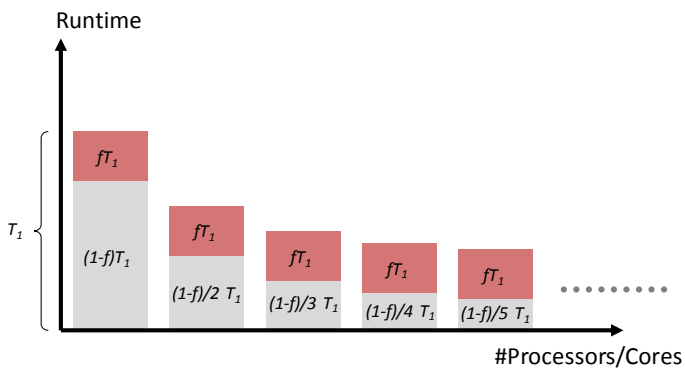**TA:** Timo Schneider

ETH
Eidgenössische Technische Hochschule Zürich
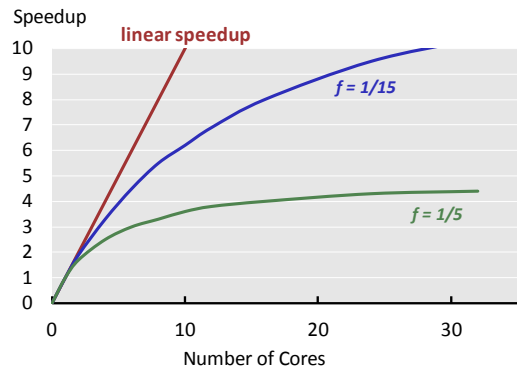Swiss Federal Institute of Technology Zurich

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Overview

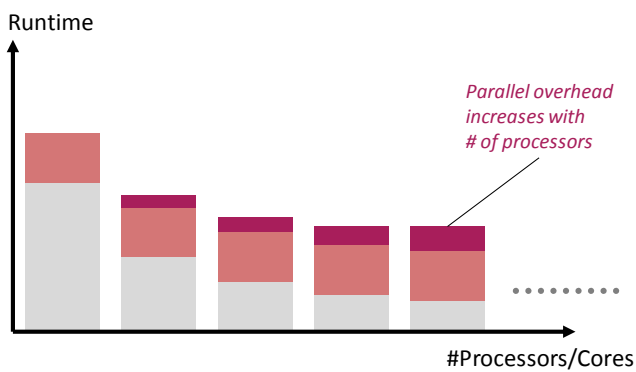- **Plots related to Amdahl's Law and variants**
- **See associated notes on course website**

Amdahl's Law: Runtime

Amdahl's Law: Speedup

Runtime With Parallel Overhead

Parallel overhead increases with # of processors

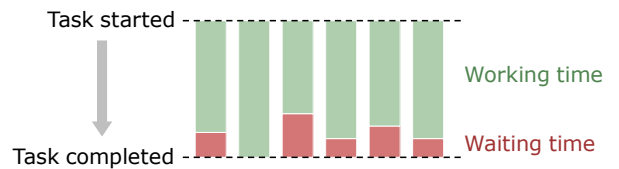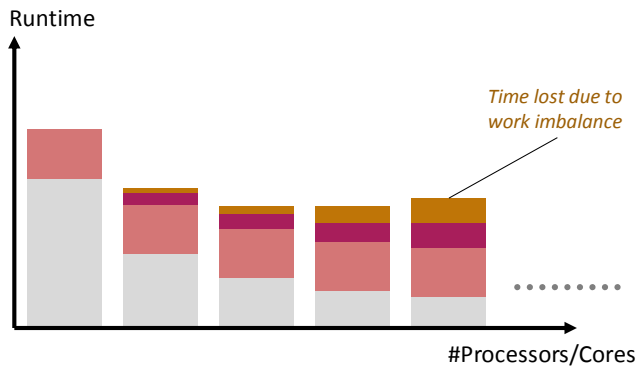## Other Issue: Load Balancing

- **Amdahl's Law assumes that the computation divides evenly among the processors**
- **Processor waiting time is another form of overhead**

Runtime With Parallel Overhead And Work Imbalance

Runtime

Time lost due to
work imbalance

#Processors/Cores

Real Speedup Graphs Look Often Like This

linear speedup

Speedup

Number of Processors