Closing Session

Introduction to High Performance Computing 2021

Dr. Tim Cramer

Our Support Offerings

IT Center & JARA-CSD Support

General & Effective Usage of HPC Systems at RWTH

- Service for Tier-2 system, Tier-3 system, and hosted clusters
- Account creation, login, usage, batch system, installation of software, …
- Performance analysis and optimization
- Extensive training (e.g., PPCES & aiXcelerate events) and documentation
- Guidance and advice regarding the project-based access

Collaboration with FZ Jülich within JARA Center for Simulation and Data Science (JARA-CSD)

- Cross-sectional group “Parallel Efficiency”
- Performance and correctness analysis of parallel programs
- Development of performance and correctness tools
  - MUST (correctness), Score-P (measurement), Scalasca (analysis)

3rd-party Funded Projects

Performance Optimisation and Productivity

European Centre of Excellence in HPC

www.pop-coe.eu

- Parallel application performance audit and plan
  - Analysis measuring a range of performance metrics to assess quality of performance
  - Further performance evaluation to identify root causes of issues found
- Proof-of-concept: experiments with customer codes to demonstrate actual benefits of proposed optimizations

Process-oriented Performance Engineering

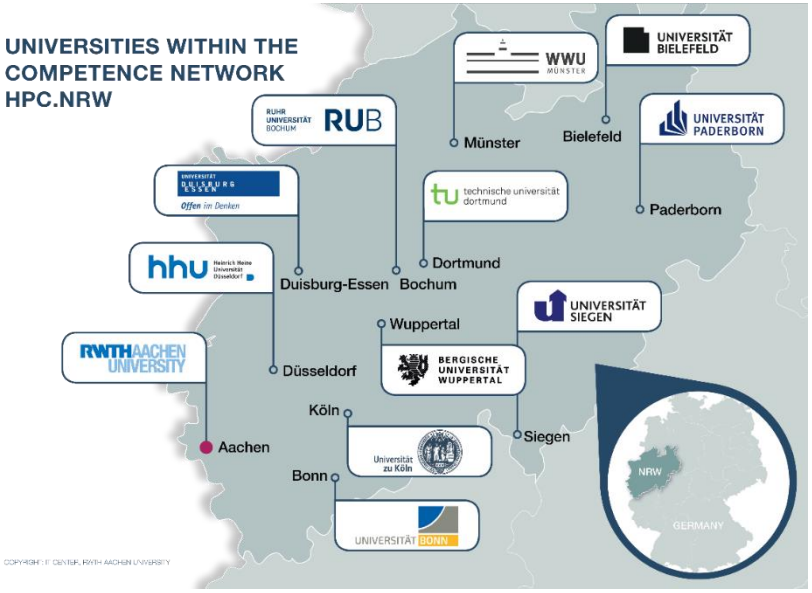
- Structured performance engineering process: systematic bottleneck-centric performance analysis and optimization
- Job monitoring & analysis: automatic light-weight performance profile and bottleneck analysis for all applications running on the HPC system
- HPC wiki: central web offering, knowledge base

3rd-party Funded Projects cont.

HPC.NRW **Competence Network** https://hpc.nrw

Project Goals

- Establishing HPC consulting services
  - Consulting
  - Training
  - Tutorials
  - Workshops
- Provision of similar software environment in NRW
- Structured provision of HPC resources for Tier-2 and Tier-3 centers in NRW
- Online tutorials for OpenMP, Linux, Gprof (incl. Youtube videos) available: https://hpc-wiki.info/hpc/Category:Tutorials



In cooperation with: DIGITALE HOCHSCHULE NRW

Founded by: Ministry of Culture and Science of the German State of North Rhine-Westphalia

HPC Wiki

https://hpc-wiki.info/hpc/OpenMP_in_Small_Bites/Worksharing

Log in

HPCWIKI

Page | Discussion | Read | View source | View history | Search HPC Wiki

rwth-aachen.de

- Basics
  - All entries in Basics
  - Getting Started
  - Shell
  - ssh
  - File Transfer
  - Modules
  - Scheduling Basics
  - HPC-Dictionary
  - How to Google
- Tutorials
  - All entries in Tutorials
  - OpenMP
  - Gprof
  - Linux in HPC
- HPC-User
  - All entries in User
  - Compiler
  - Batch-Scheduler
  - Parallelization
  - OpenMP Usage
  - MPI Usage
  - NUMA
  - FAQ Batch Jobs
- HPC-Dev
  - All entries in Dev
  - OpenMP
  - MPI
  - Performance Engineering
  - Performance Pattern

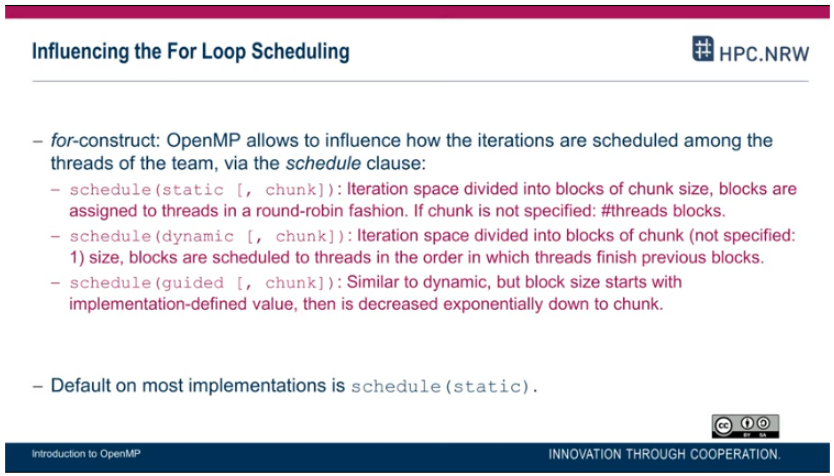
Worksharing (OpenMP)

OpenMP in Small Bites/Worksharing

Contents [hide]

This video shows the concept of OpenMP worksharing, loop scheduling and synchronization mechanisms. After this tutorial session the programmer already has knowledge about the most common used OpenMP constructs and API functions. How the scoping of data is controlled is introduced in the part on Data Scoping.

Video



(Slides as pdf)

Quiz

1. What is most commonly used worksharing construct in OpenMP to distribute work among loop interations? [Collapse]

○ Click and submit to see the answer

Tutorial	
Title:	OpenMP in Small Bites
Provider:	HPC.NRW
Contact:	tutorials@hpc.nrw
Type:	Multi-part video
Topic Area:	Programming Paradigms
License:	CC-BY-SA

Syllabus

1. Overview
2. **Worksharing**
3. Data Scoping
4. False Sharing
5. Tasking
6. Tasking and Data Scoping
7. Tasking and Synchronization
8. Loops and Tasks
10. Task Scheduling
11. Non-Uniform Memory Access

Follow Up Event

PPCES 2021

March 22nd to 26th 2021

Parallel Programming in Computational Engineering and Science 2021

- Week-long event with in-depth parallel programming
  - OpenMP
  - Message Passing Interface (MPI)
  - Machine Learning
- Still seats available

→ Register here until Tuesday, March 16:

https://www.itc.rwth-aachen.de/ppces