Parallel Programming of High-Performance Systems
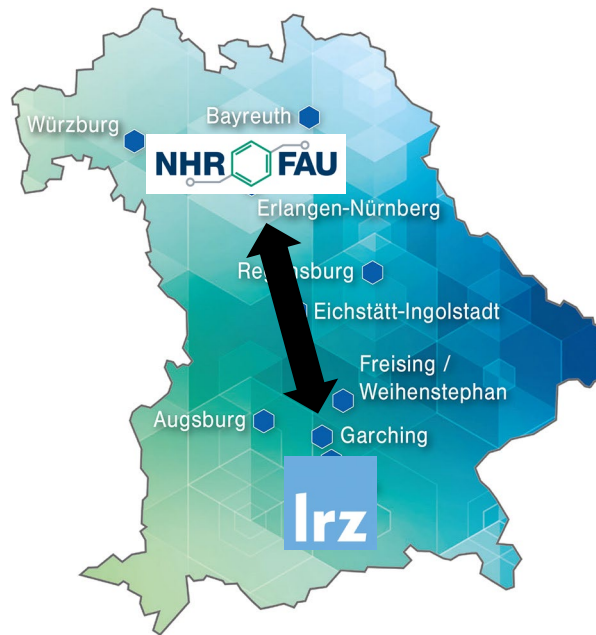
A collaborative course of NHR@FAU and LRZ Garching
20. – 22.2.2024

High Performance Computing

Information

- **Topics covered include:**
    - HPC Intro, Systems in Germany
    - Elements of MPI and OpenMP
    - OpenMP in Depth
    - MPI in Depth
    - Basic Computer Architecture: Shared Memory
    - Basic Computer architecture: Distributed Memory
    - Profiling Tools
    - Benchmarking and Data Presentation
    - Performance Pitfalls
- **Hands-On Session:**
  Every day, interleaved with lectures

Lecturers

- Lecturers:

    - Ayesha Afzal, NHR@FAU
    - Dr. habil. Georg Hager, NHR@FAU
    - Dr. Volker Weinberg, LRZ
    - Dr. Markus Wittmann, NHR@FAU

Tentative Schedule (all Times in CET)

Day 1	
10:30 - 11:00	Welcome & Introduction (VW)
11:00 - 11:45	HPC Introduction, Systems in Germany (GH)
11:45 - 12:15	Hands-On: Logging in, working with code examples
12:15 – 13:15	Lunch Break
13:15 - 15:00	Elements of OpenMP and MPI (VW)
15:00 - 15:15	Coffee Break
15:15 - 16:15	Hands-On: OpenMP and MPI basics
16:15 - 17:00	Basic Computer Architecture: Shared Memory (GH)

Tentative Schedule (all Times in CET)

Day 2	
09:00 - 10:45	OpenMP in Depth (MW)
10:45 - 11:00	Coffee Break
11:00 - 12:00	Hands-On: OpenMP
12:00 - 13:00	Lunch Break
13:00 - 13:45	Basic Computer Architecture: Distributed Memory (GH)
13:45 - 14:30	MPI in Depth (I) (AA)
14:30 - 14:45	Break
14:45 - 15:30	MPI in Depth (II) (AA)
15:30 - 17:00	Hands-On: MPI (and OpenMP)

Tentative Schedule (all Times in CET)

Day 3	
09:00 - 10:00	Profiling Tools (AA)
10:00 - 10:45	Hand-On: Profiling with gprof
10:45 - 11:00	Coffee Break
11:00 - 12:00	Hands-on: Profiling with ITAC
12:00 – 13:00	Lunch Break
13:00 - 13:30	Benchmarking and data presentation (GH)
13:30 - 14:00	Performance pitfalls and how to spot them (GH)
14:00 - 14:30	Hands-On
14:30 - 14:45	Coffee Break
14:45 - 15:45	Hands-On
15:45 - 16:00	Wrap-up & adjourn

Course Webpage

- "Moodle" is a learning management platform at NHR@FAU

- http://tiny.cc/PPHPS

- Further information on:
  - Agenda
  - Slides
  - Exercises
  - Survey

And now …

Enjoy the course!