
Agenda, Parallel Programming Workshop (5 days), at HLRS

Day 1

- 08:30 Begin
- 08:30 Registration
- 09:00 **Introduction**
- 09:15 **Parallel Architectures and Programming Models**
- 10:15 Coffee break
- 10:30 **Message Passing Interface (MPI), Introduction**
- 10:40 Overview
- 11:15 Process Model
- 11:55 Process Model (practical)
- 12:45 Lunch
- 13:45 Messages and Point-to-point Communication
- 14:25 Messages and Point-to-point Communication (practical)
- 15:15 Coffee break
- 15:30 Nonblocking Communication
- 16:15 Nonblocking Communication (practical)
- 16:45 Coffee break
- 17:00 Collective Communication
- 17:45 Collective Communication (practical)
- 18:00 End

Social event after the course: **Guided city walk + Dinner** in a Swabian restaurant (on a self-paying basis)

Day 2

- 08:30 Begin
 - 08:30 **Shared Memory Parallelization with OpenMP**
 - 08:30 Overview
 - 09:00 Execution model
 - 09:30 Execution model (practical)
 - 09:50 Coffee break
 - 10:05 Worksharing directives
 - 10:55 Worksharing directives (practical)
 - 11:20 Coffee break
 - 11:35 Data environment
 - 11:55 Data environment (practical)
 - 12:05 Summary
 - 12:25 Pitfalls
 - 12:45 Lunch
 - 13:45 Pitfalls (continued)
 - 14:35 Coffee break
 - 14:50 **Verifying an OpenMP Parallelization with the Intel Inspector XE**
 - 15:25 Verifying an OpenMP Parallelization with the Intel Inspector XE (practical)
 - 15:50 Heat example
 - 16:10 Heat example (homework)
 - 16:10 Coffee break
 - 16:25 **OpenMP-4.0 Extensions**
 - 17:10 **Computer room tour and CAVE visualization demo (Uwe Wössner, handout only)**
 - 18:30 End
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Day 3

- 08:30 Begin
- 08:30 **Parallelization of Explicit and Implicit Solvers**
- 09:45 Coffee break
- 10:00 **Message Passing Interface (MPI) - continued**
- 10:00 Groups & Communicators
- 10:20 Groups & Communicators (practical)
- 10:45 Probe, Persistent Requests, Cancel
- 11:00 Coffee break
- 11:15 Virtual Topologies
- 11:45 Virtual Topologies (practical)
- 12:15 Error Handling
- 12:30 Lunch
- 13:30 Parallel File I/O - Basics
- 14:00 Parallel File I/O - Basics (practical)
- 14:30 Coffee break
- 14:45 Parallel File I/O - Fileviews
- 15:15 Parallel File I/O - Fileviews (practical)
- 15:45 Parallel File I/O - Access Methods
- 16:15 Coffee break
- 16:30 **Parallel Performance Analysis and profiling**
- 17:00 **Parallel Debugging (Christoph Niethammer)**
- 17:30 Parallel Debugging (Christoph Niethammer) (practical)
- 17:55 Short break
- 18:00 The New Fortran Module mpi_f08
- 18:30 End

Day 4

- 08:30 Begin
 - 08:30 **Message Passing Interface (MPI) - continued**
 - 08:30 One-sided Communication
 - 09:15 One-sided Communication (practical)
 - 09:45 Coffee break
 - 10:00 Shared Memory One-sided Communication
 - 10:45 Shared Memory One-sided Communication (practical)
 - 11:15 Coffee break
 - 11:30 Memory Models and Synchronization Rules
 - 12:10 Memory Models and Synchronization Rules (practical)
 - 13:00 Lunch
 - 14:00 **Particle based domain decomposition (Martin Bernreuther)**
 - 14:45 Coffee break
 - 15:00 **Message Passing Interface (MPI) - continued**
 - 15:00 Collective Communication, advanced topics
 - 15:25 Collective Communication, advanced topics (practical)
 - 15:45 Coffee break
 - 16:00 Virtual Topologies, Neighborhood-communication
 - 16:10 Virtual Topologies, Neighborhood-communication (2nd+3rd practical)
 - 16:40 **MPI Parameter Tuning (Rainer Keller, HfT)**
 - 17:25 **Access to the federal high-performance computing-centers**
 - 18:00 End
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Day 5

08:30 Begin

08:30 **Parallel programming models on hybrid systems / MPI + OpenMP**

10:00 Coffee break

10:15 **Message Passing Interface (MPI) - continued**

10:15 Re-numbering on Clusters, Inter-Communicators, ...

10:45 Re-numbering on Clusters, Inter-Communicators, ... (practical)

11:05 Coffee break

11:20 Derived Datatypes

11:55 Derived Datatypes (practical)

12:35 Lunch

13:35 Derived Datatypes - Resizing, long counts, ...

14:15 Derived Datatypes - Resizing, long counts, ... (practical)

14:35 Coffee break

14:50 MPI and Threads

15:05 Process Creation and Management

15:20 Other MPI features

15:35 Short break

15:40 Best practice

16:10 MPI-Summary

16:15 Summary, Q&A

16:30 End
