4-Day-Course — ZDV, University of Mainz — 1st day

Content

MPI on beginners' level

1. MPI Overview

2. Process model and language bindings

3. Messages and point-to-point communication

4. Nonblocking communication 📄 `1-4` `5-9` `10-14` `15-18`

Schedule

08:30 Local registration

09:00 Welcome

09:15 Lectures and exercises on MPI
(including some breaks)

13:00 Lunch break

14:00 Lectures and exercises on MPI
(including some breaks)

18:00 Final end

Social event

4-Day-Course — ZDV, University of Mainz — 2nd day

Content

MPI on beginners' level – continued 📄 `1-4` `5-9` `10-14` `15-18`

6.(1) Collective communication

Shared memory parallelization with OpenMP 📄

Overview 📄

Execution model 📄

Worksharing directives 📄

Worksharing – continued (Tasks …) 📄

Data environment 📄

Heat example (homework) 📄

Summary 📄

Pitfalls 📄

Shared memory parallelization with OpenMP

Verifying an OpenMP Parallelization
with the Intel Inspector XE `ZIH D2 ppt` `login`

Schedule

08:45 Local registration

09:00 Lectures and exercises on MPI
(including some breaks)

10:45 Lectures and exercises on OpenMP
(including some breaks)

13:00 Lunch break

14:00 Lectures and exercises on OpenMP
(including some breaks)

17:30 Verifying an OpenMP Parallelization
with the Intel Inspector XE

18:00 Optional:
Exercises with the Intel Inspector XE

18:00/18:30
Final end without/with the exercise

4-Day-Course — ZDV, University of Mainz — 3rd day

Content

MPI on intermediate level 🗒️ `1-4` `5-9` `10-14` `15-18`

7. Error handling

8. Groups & Communicators, Environment Management

(1) MPI_Comm_split, intra- & inter-communicators

(2) Advanced topics (short talk)

9. Virtual topologies

(1) A multi-dimensional process naming scheme
(2) Neighborhood-communication + MPI_BOTTOM
(no practical)
(3) Optimized re-numbering (short talk)

12. Derived datatypes

(1) transfer any combination of typed data

19. Heat example

MPI on beginners' level – continued (Fortran users only)

5. The New Fortran Module mpi_f08 🗒️ `1-4` `5-9` `10-14` `15-18`

Schedule

08:45   Local registration

09:00   Lectures & exercises on interm. MPI
(including some breaks)

13:00   Lunch break

14:00   Lectures & exercises on interm. MPI
(including some breaks)

17:30   For Fortran participants only:
Additional lecture + exercises on
the mpi_f08 module/interface

18:00   Final end

4-Day-Course — ZDV, University of Mainz — 4th day

Content

Advanced MPI 🗒️ `1-4` `5-9` `10-14` `15-18`

10. One-sided Communication

11. Shared Memory One-sided Communication

(1) MPI_Comm_split_type & MPI_Win_allocate_shared
(2) MPI memory models and synchronization rules (no pract.)

Short tour through

6.(2) Advanced topics on collective communication
12.(2) Advanced topics on derived datatypes (title slide)
13. Parallel File I/O (title + 5 slides)
14. MPI and Threads (title +1 slide)
15. Probe, Persistent Requests, Cancel (title + 3 slides)
16. Process Creation and Management (title + 3 slides)
17. Other MPI features (regular 4 slides)

18. Best practice

MPI Summary

Shared memory parallelization with OpenMP

OpenMP-4.0 / 4.5 / 5.0 Extensions `7A omp 4.5`

Schedule

08:45   Local registration

09:00   Lectures & exercises on advanced MPI
(including some breaks)

13:00   Lunch break

14:00   Lectures & exercises on advanced MPI
(including some breaks)

16:45   For OpenMP users – optional:
OpenMP-4.0 / 4.5 / 5.0 Extensions

18:00   Final end

Other options / for self-study:

Parallel Architectures and Programming Models 🗒️

Parallelization of Explicit and Implicit Solvers 🗒️

Parallel Performance Analysis and profiling `16(X)`