






5-Day-PTC-Course — *Beginners* — 1st day (Monday)

Content

MPI on beginners' level

1. MPI Overview
2. Process model and language bindings
3. Messages and point-to-point communication
4. Nonblocking communication     

Schedule

- 08:30 Local registration
(verification of the COVID status, seating)
- 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)
- 17:40 Additional slot for self-studying,
further exercises, Q&A
- 18:00 Final end









5-Day-PTC-Course — *Beginners* — 2nd day (Tuesday)

Content






MPI on beginners' level – continued

- 6.(1) Collective communication

Shared memory parallelization with OpenMP

- Overview 
- Execution model 
- Worksharing directives 
- Worksharing – continued (synchron.) 
- Data environment 
- Heat example (homework) 
- Summary 
- Pitfalls 

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

5. The New Fortran Module mpi_f08     

Schedule

- 08:45 Local registration / seating
- 09:00 Lectures and exercises on OpenMP
(including some breaks)
- 13:00 Lunch break
- 14:00 Lectures and exercises on OpenMP
(including some breaks)
- 17:00 Additional slot for self-studying,
further exercises, Q&A
- 17:05 **For Fortran participants only:**
Additional lecture + exercises on
the mpi_f08 module/interface
- 18:00 Final end

5-Day-PTC-Course — *Intermediate* — 3rd day (Wednesday)

Content

MPI on intermediate level



- 7. Error handling
- 8. Groups & Communicators, Environment Management
 - (1) MPI_Comm_split, intra- & inter-communicators
- 9. Virtual topologies
 - (1) A multi-dimensional process naming scheme
- 12. Derived datatypes
 - (1) transfer any combination of typed data
 - (1) transfer any combination of typed data – continued
 - Solution of Exercise 2
- 10. One-sided Communication

Shared memory parallelization with OpenMP

Verifying an OpenMP Parallelization with the Intel Inspector XE



(The optional exercises require the installation of Intel compiler + Intel Inspector)

Schedule

- 08:45 Local registration / seating
- 09:00 Lectures & exercises on interm. MPI (including some breaks)
- 13:00 Lunch break
- 14:00 Lectures & exercises on interm. MPI (including some breaks)
- 17:00 Verifying an OpenMP Parallelization with the Intel Inspector XE
- 18:00 Final end

5-Day-PTC-Course — *Advanced* — 4th day (Thursday)

Content

Advanced MPI



- 11. Shared Memory One-sided Communication
 - (1) MPI_Comm_split_type & MPI_Win_allocate_shared
 - (2) MPI memory models and synchronization rules
- 6.(2) Advanced topics on collective communication
- 9.(2) Neighborhood communication + MPI_BOTTOM

Guest lecture:

MPI Parameter Tuning (Prof. Dr.-Ing. Rainer Keller, University of Applied Science Esslingen)



Shared memory parallelization with OpenMP

OpenMP-4.0 / 4.5 / 5.0 Extensions



Schedule

- 08:45 Local registration / seating
- 09:00 Lectures & exercises on advanced MPI (including some breaks)
- 12:30 Lunch break (30 min. earlier!)
- 13:30 Lectures & exercises on advanced MPI (including some breaks)
- 16:00 Guest lecture
- 17:00 OpenMP-4.0 / 4.5 / 5.0 Extensions
- 18:00 Final end

5-Day-PTC-Course — *Advanced* — 5th day (Friday)

Content

Advanced MPI



13. Parallel File I/O

- (1) Basics
- (2) Fileviews
- (3) Access Methods

8.(2) Advanced topics on communicators

12.(2) Advanced topics on derived datatypes (title slide)

9.(3) Optimization through reordering

Short tour through

- 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

Summary

Schedule

08:45 Local registration / seating

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

13:00 Lunch break

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

17:00 Final end