

Preliminary Agenda 2021/JSC

Day 1: 8:45 - 18:00

08:45 Login to ZOOM (and establishing the break-out rooms)
09:00 Welcome
09:15 Lectures and exercises on intermediate/advanced MPI (including some breaks)
13:00 Lunch break
14:00 Lectures and exercises on intermediate/advanced MPI (including some breaks)
18:00 End

Day 2: 8:45 - 18:00

08:45 Login to ZOOM (and establishing the break-out rooms)
09:00 Lectures and exercises on intermediate/advanced MPI (including some breaks)
13:00 Lunch break
14:00 Lectures and exercises on intermediate/advanced MPI (including some breaks)
17:30 For Fortran participants only:
 Additional lecture + exercises on the mpi_f08 module/interface
18:00 End

Day 3: 8:45 - 17:30

08:45 Login to ZOOM (and establishing the break-out rooms)
09:00 Lectures and exercises on advanced MPI (including some breaks)
12:30 Lunch break (30 Min. earlier than on previous days)
13:30 Best practice and MPI summary, Q&A
14:15 Break
14:30 Lectures and exercises on advanced OpenMP 4.0, 4.5 and 5.0 + Q&A
16:00 Break
16:15 Lectures and exercises on race-condition detection
17:30 Final end

Content (preliminary, the numbers refer to MPI course chapters)

Prerequisites: MPI on beginners' level

(Prior to the course, you may use the course material to recapitulate your knowledge)

Distribute memory parallelization with MPI

1. MPI Overview
2. Process model and language bindings
3. Messages and point-to-point communication
6. (1) Blocking collective communication

Shared Memory Parallelization with OpenMP Version 3.1

Day 1: MPI on intermediate level

Message Passing Interface (MPI)

4. Nonblocking communication
6. (1) Collective communications (*short tour / recap*)
(2) Advanced topics on collective communications
8. Groups & Communicators, Environment Management
(1) MPI_Comm_split, intra- & inter-communicators
(2) Advanced topics on communicators (*short tour*)
9. Virtual topologies
(1) A multi-dimensional process naming scheme
(2) Neighborhood communication + MPI_BOTTOM

Day 2: MPI on intermediate/advanced level

Message Passing Interface (MPI) - continued:

10. One-sided Communication
11. Shared Memory One-sided Communication
(1) MPI_Comm_split_type & MPI_Win_allocate_shared
12. Derived datatypes
(1) transfer any combination of typed data
15. Probe, Persistent Requests, Cancel (*short tour*)
12. (2) Advanced topics on derived datatypes

Only for Fortran programmers:

5. The New Fortran Module mpi_f08

Day 3: MPI & OpenMP on advanced level

Message Passing Interface (MPI) - continued:

11. (2) Shared Mem. One-sided Communication: MPI memory models & synchronization rules
7. Error handling

Short tour through

13. Parallel File I/O
14. MPI and Threads
16. Process Creation and Management
17. Other MPI features

9. (3) Virtual topologies: Optimization through reordering (talk only)
18. Best practice

Summary

Shared Memory Parallelization with OpenMP: Advanced topics

OpenMP-4.0, 4.5 and 5.0 Extensions

Verifying an OpenMP Parallelization with the Intel Inspector XE