



प्लाज़्मा अनुसंधान संस्थान
Institute for **Plasma Research**



Parallel Computing Workshop at IPR (Online)

April 13th – 15th, 2021



About the Workshop

This workshop is to help you in making the transition from running your serial codes on your laptops or workstations to running them on the cluster architecture using the parallel capabilities of the cluster. A fair amount of programming experience in any programming language is required.

This workshop spans 3 half days and will provide an introduction to high-performance computing (HPC) at IPR. This workshop will introduce the fundamental concepts of message-passing (MPI) and shared memory (OpenMP) programming models. The optimization tools for understanding the performance of parallel applications will also be covered.

Course Moderator: HPC Team

The workshop lectures and hands-on exercises will be provided and taken by experts from Locuz Inc.

All the sessions will be online through JITSi.

Q & A

If you have a question, you must submit it in the JITSi chat window. Moderator will ensure all the questions are addressed during or after the session. Moderator may ask to put your question directly to the speaker in some cases using your mic.

You should NEVER use the mic to interrupt the session and keep the mic muted.



AGENDA

Day 1 -- April 13th, 2021: (Lectures and Labs)

- 9:30AM - 9:45AM: Welcome (Moderator)
- 9:45AM - 10:00AM: Introduction to High Performance Computing at IPR (Moderator)
- 10:00AM - 11:30AM: OpenMP Programming with OpenMP
 - a) Execution Model
 - b) OpenMP Constructs
- 11:30AM - 12:30PM: OpenMP Performance Tuning using Intel VTune Profiler
- 12:30PM - 1:30PM: Processor Cores Underutilization: OpenMP Serial Time

Day 2 -- April 14th, 2021: (Lectures and Labs)

- 9:30AM - 10:15AM: Version Control using Git
- 10:15AM - 11:30AM: Distributed Computing with MPI
 - a) MPI Introduction
 - b) Point-to-point Communication
 - c) Collective Communication
- 11:30AM - 12:00PM: Profiling MPI Applications
- 12:00PM - 12:30PM: Optimize Vectorization using Intel Advisor
- 12:30PM - 1:30PM: Analyze Vectorization and Memory Aspects of an MPI Application

Day 3 -- April 15th, 2021:

- 9:30AM - 11:30AM: Introducing oneAPI and DPC++
- 11:30AM - 12:30PM: Migrate Your Existing CUDA Code to DPC++ Code
- 12:30PM - 1:30PM: Intel VTune Profiler



Other Info

- Participants should have an account on the ANTya cluster and ensure a working connection from their Laptops/Desktops.
- Participants will be given access to IPR's HPC Cluster, ANTya for the hands-on exercises during the workshop.
- All the material of the workshop is available at <https://github.com/mkhpc/hpctraining>
- Participants can email any query/issue related to the workshop to hpcteam@ipr.res.in
- For details about ANTya Cluster
 - IPR/TR-566/2020:
http://cdmserver.ipr.res.in/TECHNICAL%20RE/Technical%20Reports/TR-566_2020.pdf (available in IPR Library)
 - GANANAM (‘गणनम्’) Newsletter monthly issue: <https://www.ipr.res.in/ANTYA/>

Let's begin😊!