5-DAY WORKSHOP* ON

High Performance Computing

ORGANIZED BY:

Supercomputing Centre

Indian Institute of Technology (BHU), Varanasi

**In offline mode, breakfast and lunch will not be provided.*

Background

High-Performance Computing (HPC) is a cornerstone of modern research, engineering, and industry, enabling rapid processing of vast data and complex computations. It drives breakthroughs in fields like climate modeling, genomics, drug discovery, finance, and advanced manufacturing. As data volumes grow and simulations become more intricate, the demand for powerful computing and efficient algorithms rises. Workshops on HPC equip researchers, engineers, and IT professionals with essential skills in HPC architectures, parallel programming, and optimization, empowering them to solve complex problems, boost productivity, and innovate in their fields.

Key Areas

The major areas from the HPC domain that will be covered are as follows:

1. **Overview of HPC**
2. **Shared Memory Parallelism with OpenMP**
3. **Distributed Memory Parallelism with MPI**
4. **Point to Point Communication**
5. **Collective Communication**
6. **Intel tools and code Optimization Training**
7. **Nvidia (CUDA and OpenACC)**
8. **Deep Learning Fundamentals**
9. **Convolutional Neural Networks**
10. **Distributed Training Concepts**
11. **HPC and AI convergence**
12. **Lab Session for each topic**

About IIT (BHU), Varanasi

Indian Institute of Technology (Banaras Hindu University), Varanasi is a public engineering institution located in Varanasi, Uttar Pradesh, India. Founded in 1919 as the Banaras Engineering College, it became the Institute of Technology, Banaras Hindu University in 1968. It was designated an Indian Institute of Technology in 2012. IIT (BHU), Varanasi has 15 departments and 3 interdisciplinary schools.

Supercomputing Centre, IIT(BHU) Varanasi

Supercomputing Centre, a high-tech facility provisioned under the National Supercomputing Mission hosts PARAM Shivay, a high-performance supercomputer that aims to enhance the research capabilities of India's educational and research institutions by providing them with advanced computational resources. This is the first HPC system to be deployed at IIT(BHU) Varanasi under the NSM build approach. It boasts the highest number of external users, including an approved project under NSM Apps. Please visit the Super Computing Center website for more details: https://www.iitbhu.ac.in/cf/scc

Co-ordinator:

Prof. Ravi Shankar Singh

Coordinator, Super Computing Center

Indian Institute of Technology (BHU), Varanasi.

Who Can Apply?

Faculties, Research scholars, motivated students, staff from IIT(BHU) and BHU — including both IT and non-IT backgrounds — are invited. A basic background in coding with languages like C, C++, or Python, along with a fundamental understanding of AI and machine learning, is recommended for this course. Familiarity with basic Unix commands will be beneficial.

No Registration Fee

How to Register?

Participant Registration:

1. Click on the registration link and fill the necessary details: Click Here
2. A limit of 50 participants is imposed in order to address the operations aspects. A confirmation e-mail with workshop details will be sent to the selected applicants.
3. Attend the workshop on the specified date and schedule as per the communication, else you will not be entitled to receive the participation certificate.

Important Dates

Registration Start Date: October 31, 2025
Registration End Date: November 7, 2025
Workshop Dates: November 10, 2025 - November 14, 2025

Mode of selection

Selection of participants will be done by the Coordinator, Supercomputing Centre by taking into consideration various operational factors and a limit of 50 participants.

Venue Details

UG Lab1,
Department of Computer Science and Engineering, IIT(BHU), Varanasi, India.

Program Schedule(*Offline*)

Duration	Session Name
Day 1 – 10th November 2025	
9:00AM – 10:30AM	Inauguration cum Introduction of HPC
11:00AM – 12:30PM	Introduction to OpenMP - Shared Memory Parallelism with OpenMP
2:00PM – 5:00PM	Lab Session: Shared Memory Parallelism with OpenMP
Day 2 – 11th November 2025	
9:00AM – 10:30AM	Introduction to MPI - Distributed Memory Parallelism with MPI
11:00AM – 12:30PM	Point to Point Communication and Collective Communication
2:00PM – 5:00PM	Lab Session: Distributed Memory Parallelism with MPI
Day 3 – 12th November 2025	
9:00AM – 10:30 AM	GPU programming with Nvidia - CUDA and OpenACC
11:00AM – 12:30PM	Intel tools and code optimization
2:00PM – 5:00PM	Lab Session: CUDA, OpenACC and Intel Tools
Day 4 – 13th November 2025	
9:00AM – 10:30AM	Fundamentals of Deep Learning and Environment Setup
11:00AM – 12:30PM	Convolutional Neural Networks & Distributed Training Concepts
2:00PM – 5:00PM	Hands-on Lab: Implementing & Scaling CNNs on Multi-GPU and Multi-Node Clusters
Day 5 – 14th November 2025	
9:00AM – 10:30AM	HPC and AI convergence
11:00AM - 12:30PM	Lab Session: HPC and AI convergence
2:00PM – 5:00PM	Quiz based on topics covered in these sessions Cum Valedictory

Certification

Participants are required to attend all sessions. E-certificates will be issued to participants only on successful participation in the program.

For further assistance, please contact:

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