A Short Course on

HPC, BigData and AI

Architectures, Programming Models and Languages, Algorithms and Applications, BigData, AI and Deep Learning

20 – 24 January 2020

Supercomputer Education and Research Centre (SERC)

Indian Institute of Science (IISc), Bangalore, India

Background: High performance computing has been prevalent in many traditional scientific domains including climate modelling, computational fluid dynamics, design of materials, cosmology simulations, physics, mechanical and aerospace engineering simulations and also in modern-day data science, BigData, machine learning and AI based applications. Large parallel or supercomputing systems with up to 2 mega (10^6) processing elements are built to cater to the ever-increasing computing demands of these applications. These systems are highly heterogeneous with different kinds of processing elements, e.g, CPUs and GPUs. It is important to have the skills to program the combined power of such multiple processing elements for fast processing of the applications.

Supercomputer Education and Research Centre (SERC) of Indian Institute of Science (IISc) is a premier supercomputing or high performance computing Centre in the country offering diverse kinds of supercomputing services. It is a 24/7 data center facility and hosts several supercomputing platforms viz. (a) SahasraT, a Cray XC-40, 1+ Petaflop supercomputer (b) DGX-1, an NVIDIA high-end solution for AI/DL based workloads. It also hosts a range of graphic workstations and visualization systems. It also provides services for parallel software management and offers high performance computing consulting services to the domain scientists. Since September 2019, these facilities are open to Academic Institutions and Industry throughout the country.

SERC is also actively engaged in training and education in High Performance Computing (HPC) thereby disseminating knowledge in HPC to the practitioners and contributing to the building of a healthy HPC ecosystem in the country. It offers periodic courses in different topics of HPC including:

- introduction to parallel computing
- parallel programming models
- different kinds of parallel architecture
- MPI/OpenMP/CUDA programming
- parallel algorithms and applications
- profiling, debugging and optimization
- system administration of large-scale clusters
- deep learning and AI in HPC
- HPC in Industry
- hands-on exercises

Note: See page 2 for topics covered in this edition.
These courses are offered as either two-day or five-day courses.

As part of the periodic training schedule, SERC is conducting its next five-day course during 20-24 January, 2020.

Course objective:

To introduce the fundamentals of parallel computing including parallel architectures, programming models and commonly used parallel programing constructs/libraries/languages, AI/Deep learning and BigData and to present motivating algorithms and applications to real-world problems. Programming labs will provide experience in using the parallel programming and AI-related constructs..

Course Content:

- Introduction to parallel computing architectures, parallelization principles
- Programming models, MPI, OpenMP
- Parallel algorithms, libraries and applications
- Introduction to AI/Deep Learning stack and BigData
- Real-world HPC applications
- Profiling, debugging
- Short programming labs on MPI, OpenMP, AI/Deep learning
- Programming Environment on Cray XC-40

Note that the emphasis of the course is to cover the breadth of topics at introductory levels. The hope is that the attendees, after the initiation in the course, will be motivated to dive into the depths of the areas related to their work or research. For schedule, please visit: http://www.serc.iisc.ac.in/serc-workshops/

Who will benefit from the course: Students, faculty from academic and technical institutions, and staff from Government and industry. This course is intended for beginners wanting to get exposed to the parallel computing fundamentals.

Prerequisites: Participants must possess basic programming knowledge in C/C++/Fortran, familiarity with linux commands, Vi/Vim editor and working in Command-line Linux environment.

Course dates and venue:

Course Dates: **20-24 January 2020 (9:30 am – 5:30 pm)**

Venue: Supercomputing Education and Research Centre (SERC), Indian Institute of Science, Bangalore, India.

Course Faculty:

R Govindarajan, Akhila Prabhakaran, Aditya K Swamy, Filbert M, J. Lakshmi, Sathish Vadhiyar (SERC), Yogesh Simmhan (CDS, IISc), N Balakrishnan (AE, IISc), technical managers from Industry

Registration:

Attending this course is ONLY by registration. The total number of participants for the course is limited to 100 with a reservation of 70 for the IISc personnel and 30 for the personnel from other Institutions. Registrations in both these categories will be accepted on a first-come first-served basis.

IISc Personnel: Registrations are free. Registration link: https://bit.ly/SERC-2020Jan

Other organizations: Registration fee is

- Rs 5000 plus 18% GST for personnel from Government organizations.
- Rs 10000 plus 18% GST for personnel from Industry.
- Please register for the course online at the following link: : http://iisc.online/shortterm/home.html

Last date for registration is **January 13, 2020.**

Accommodation: Academic participants from outside Bangalore may request accommodation (on PAYABLE basis) on campus at the time of registration. If available, organizers will confirm accommodation subsequently. Cancellation charges applicable as per Guest House rules. Participants of this category are requested to contact office.serc@iisc.ac.in for booking requests immediately after their registrations are confirmed.