



## Workshop on HPC Clusters and Parallel Computing

Organized by

Centre for Development of Advanced Computing, Pune

At

SIT, JNU, Delhi

Mar 03 – Mar 06, 2008

### Day 1: Mar 03, 2009 [HPC clusters]

Time (Hrs)	Lecture/Hands-on Session
09:30 – 10:00	➤ Introduction of the plan of course
	<b>Tea Break - 15 min</b>
11:15 – 13:00 Room #2	<b>Understanding HPC Clusters and its components</b> <ul style="list-style-type: none"><li>➤ Cluster computing basics</li><li>➤ Rocks cluster basics</li><li>➤ Storage management</li></ul> <b>Linux Cluster Administration ( with Demonstration )</b> <ul style="list-style-type: none"><li>➤ Stopping and starting cluster</li><li>➤ Adding extra rolls to cluster</li><li>➤ Rebuilding compute nodes</li><li>➤ Installation of libraries and compilers</li></ul>
	<b>Lunch Break - 1 hr</b>
14:00 – 16:00 Room #7	<b>Hands-on Session:</b> Linux user level commands, administration commands
	<b>Tea Break – 15 min</b>
16:15 – 17:30 Room #7	<b>Hands-on Session:</b> Linux bash scripting



## Workshop on HPC Clusters and Parallel Computing

**Day 2:** Mar 04, 2009 [HPC Clusters]

<b>Time (Hrs)</b>	<b>Lecture/Hands-on Session</b>
09:30 – 10:15 Room #7	<b>Installing and configuring user applications on Linux cluster</b> <ul style="list-style-type: none"><li>➤ How to install applications from source code</li><li>➤ Setting up of users' environment for parallel computing</li></ul>
10:15 – 11 :15 Room #7	<b>Understanding Schedulers</b> <b>Job Submission and Monitoring through Schedulers</b> <ul style="list-style-type: none"><li>➤ How scheduler works</li><li>➤ Components of scheduler</li><li>➤ Sun Grid engine Scheduler</li><li>➤ Sun Grid Engine job submitting scripts</li><li>➤ Monitoring resources available on clusters</li><li>➤ Monitoring job status</li><li>➤ Submitting parallel and serial jobs</li></ul>
<b>Tea Break - 15 min</b>	
11:30 – 12:00 Room #2	Overview of Parallel Computing
12:00 – 13:00 Room #2	Distributed Memory Parallelism with MPI (Point-to-Point Communication)
<b>Lunch - 1 hr</b>	
14:00 – 16:00	<b>Hands-on Session:</b> Parallel Programming using MPI Point to Point Communication (in FORTRAN and C)
<b>Tea Break – 15 min</b>	
16:15 – 17:30	<b>Hands-on Session :</b> Submission & Monitoring of jobs through a Scheduler



## Workshop on HPC Clusters and Parallel Computing

**Day 3: Mar 05, 2009 [Parallel Computing]**

Time (Hrs)	Lecture/Hands-on Session
09:30 – 10:15 Room # 2	MPI Collective Communication
10:15 – 10:45 Room #2	Parallel Algorithmic Paradigms
<b>Tea Break - 15 min</b>	
11:00 – 12:00 Room #2	<b>Case Study:</b> Parallelization of Matrix Multiplication
12:00 – 12:30 Room #2	Profiling and Analysis of codes ( to identify opportunities for parallelism )
12:30 – 13:00 Room #2	Performance metrics, Scalability & Speed-up Analysis of codes
<b>Lunch Break - 1 hr</b>	
14:00 – 16:00	<b>Hands-on Session:</b> Parallel Programming using MPI Collective Communication (in FORTRAN and C)
<b>Tea Break – 15 min</b>	
16:15 – 17:30	<b>Hands-on Session:</b> Parallel Programming using MPI Collective Communication (in FORTRAN and C) ( contd ...)

**Day 4: Mar 06,2009 [Parallel Computing]**

Time (Hrs)	Lecture/Hands-on Session
09:30 – 10:45	Shared Memory Parallelism with OpenMP
<b>Tea Break - 15 min</b>	
11:00 – 11:45	Shared Memory Parallelism with OpenMP (contd...)
11:45 – 12:15	Mixed Programming with MPI & OpenMP
12:15 – 13:00	<b>Discussion</b> with participants on their applications
<b>Lunch - 1 hr</b>	
14:00 – 16:00	<b>Hands-on Session:</b> Shared Memory Programming using OpenMP (in FORTRAN and C)
<b>Tea Break – 15 min</b>	
16:15 – 17:30	<b>Hands-on Session:</b> Shared Memory Programming using OpenMP (contd...)