The Abdus Salam International Centre for Theoretical Physics

Advanced School in High Performance Computing Tools for e-Science - joint DEMOCRITOS/INFM-eLab/SISSA-ICTP activity

Organizer(s): Directors: Stefano Cozzini, Axel Kohlmeyer, Roger Rousseau
Trieste - Italy, 05 - 16 March 2007

Venue: Adriatico Guest House Kastler Lecture Hall

Final programme

WEEK 1: INTRODUCTORY TOPICS -

Monday, 5 March, Linux (Room:Adriatico Guest House Kastler Lecture Hall)

5 March 2007

08:30 - 10:00 (Room: Adriatico Guest House (Lower Level 1))
Registration & Administrative Formalities

10:00 - 10:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

10:30 - 10:45 **S. Cozzini, A. Kohlmeyer, R. Rousseau**
Welcome Address and Introduction to Course Goals

10:45 - 11:45 **S. Cozzini** / *CNR-INFM/Democritos, Trieste*
Introduction to HPC. Questions

11:45 - 12:45 **J. Montoya** / *SISSA, Trieste*
Basic Linux commands and Shell scripts. Questions

12:45 - 14:00 (Room: Adriatico Guest House Cafeteria)
--- Lunch Break ---

14:00 - 15:00 **R. Rousseau** / *SISSA, Trieste*
More about Linux, Networking, Basic Configuration of Workstation, NFS, NIS. Questions

15:00 - 15:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

15:30 - 18:30 (Room: Adriatico Guest House Informatics Lab.)
Laboratory Session: Installing & Setting up your own Linux Workstation

18:30 - 19:00 (Room: Adriatico Guest House Informatics Lab.)
Homeworks: Answer simple tests update your blog

Tuesday, 6 March, Basic Concepts of Scientific Programming (Room:Adriatico Guest House Kastler Lecture Hall)

6 March 2007

09:00 - 10:00 **S. Cozzini** / *CNR-INFM/Democritos, Trieste*
Floating Points Numbers: How to work with them correctly and efficiently

10:00 - 10:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

10:30 - 11:30 **G. Diaz Toro** / *Univ. de Los Andes, Merida, Venezuela*
From Source Code to Executable: Preprocessing/Compiling/Linking. Questions

11:30 - 12:30 **A. Kohlmeyer** / *Univ. of Pennsylvania, Philadelphia, USA*
Using Makefiles to build and test codes on Multiple Platforms

12:30 - 12:40 **M. Verissino Alves** / *I.C.T.P., Trieste*
Wget: A Tool for Downloading on Slow Networks

12:40 - 14:00 (Room: Adriatico Guest House Cafeteria)
--- Lunch Break ---

14:00 - 16:00 (Room: Adriatico Guest House Informatics Lab.)
Laboratory Part 1: Installing the GNU, PGI & Intel Compiler Packages

16:00 - 16:10 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

16:10 - 18:30 (Room: Adriatico Guest House Informatics Lab.)
Laboratory Part 2: Test the Compilers & play with FP Numbers

19:00 - 21:00 (Room: Adriatico Guest House Cafeteria)
RECEPTION

Wednesday, 7 March, Optimization of Code (Room:Adriatico Guest House Kastler Lecture Hall)

7 March 2007

09:00 - 10:00 **R. Rousseau** / *SISSA, Trieste*
Storage Performance Hierarchy and how this affects Performances. Questions

10:00 - 10:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

10:30 - 11:30 **S. Cozzini** / *CNR-INFM/Democritos, Trieste*
Using Compilers and Profilers to Optimize your Code for Performance

11:30 - 12:30	**R. Rousseau** / *SISSA, Trieste* **Performance Libraries for Mathematical Application**
12:30 - 14:00	(Room: Adriatico Guest House Cafeteria) --- Lunch Break ---
14:00 - 16:30	(Room: Adriatico Guest House Informatics Lab.) **Laboratory Part 1: Optimize simple codes provided by Lab. Measure memory hierarchy speed**
16:30 - 17:00	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---
17:00 - 19:00	(Room: Adriatico Guest House Informatics Lab.) **Laboratory Part 2: Optimize a black box code provided by Lab. Compare performances of different optimized libraries on matrix multiplication**

Thursday, 8 March, Introduction to Parallel Programme (Room:Adriatico Guest House Kastler Lecture Hall)

8 March 2007

09:00 - 10:00	**R. Rousseau** / *SISSA, Trieste* **Hardware/Software for Parallel Computing with Linux**
10:00 - 10:30	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---
10:30 - 11:30	**S. Cozzini** / *CNR-INFM/Democritos, Trieste* **Introduction to MPI, Part 1**
11:30 - 12:30	**A. Kohlmeyer** / *Univ. of Pennsylvania, Philadelphia, USA* **Introduction to MPI, Part 2**
12:30 - 14:00	(Room: Adriatico Guest House Cafeteria) --- Lunch Break ---
14:00 - 16:30	(Room: Adriatico Guest House Informatics Lab.) **Laboratory Part 1: Test Simple MPI Programs on a Single Processor**
16:30 - 17:00	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---
17:00 - 19:00	(Room: Adriatico Guest House Informatics Lab.) **Laboratory Part 2: Set up Mini Clusters to Test MPI on True Parallel Machines**

Friday, 9 March, Special Topics (Room:Adriatico Guest House Kastler Lecture Hall)

9 March 2007

09:00 - 10:00	**R. Rousseau** / *SISSA, Trieste* **How to find the best resources for your Application**
10:00 - 10:30	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---

10:30 - 11:30	**S. Cozzini** / *CNR-INFM/Democritos, Trieste* **Introduction to Open MP**
11:30 - 12:30	**P. Calucci** / *SISSA, Trieste* **Queues systems and how to use Torque/Maui**
12:30 - 14:00	(Room: Adriatico Guest House Cafeteria) --- Lunch Break ---
14:00 - 15:00	**A. Kohlmeyer** / *Univ. of Pennsylvania, Philadelphia, USA* **Error Messages and Debugging**
15:00 - 16:30	(Room: Adriatico Guest House Informatics Lab.) **Laboratory Session: OpenMP examples Use of OpenMP threaded libraries**
16:30 - 17:00	(Room: Adriatico Guest House Cafeteria) --- Coffee Break ---
17:00 - 19:00	(Room: Adriatico Guest House Informatics Lab.) **Laboratory Session: Use real parallel machines to run MPI benchmarks**

Saturday, 10 March, No Lectures,
Labs available to participants to complete or repeat exercises from the previous days and work on their own software
(Room:Adriatico Guest House Informatics Lab.) (**Saturday**)

Sunday, 11 March, No Lectures,
Labs available to participants to complete or repeat exercises from the previous days and work on their own software
(Room:Adriatico Guest House Informatics Lab.) (**Sunday**)

WEEK 2: ADVANCED TOPICS -

Monday, 12 March, Parallel Applications and Clusters (Room:Adriatico Guest House Kastler Lecture Hall)

12 March 2007

09:00 - 09:15	**R. Rousseau** / *SISSA, Trieste* **Introduction to Week 2: How to work**
09:15 - 10:45	**A. Kohlmeyer** / *Univ. of Pennsylvania, Philadelphis, USA* **Advanced MPI tutorial**
10:45 - 11:15	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---
11:15 - 12:00	**N. Paklovic** / *Ruder Boskovic Institute, Zagreb, Croatia* **Cluster in Box**
12:00 - 13:30	(Room: Adriatico Guest House Cafeteria) --- Lunch Break ---

13:30 - 14:30 **M. Baricevic** / *CNR-INFM/Democritos, Trieste*
Installation procedures for clusters

14:30 - 16:00 (Room: Adriatico Guest House Informatics Lab.)
Laboratory work: Hardware - Installation Procedure for a Cluster Master Node, Software 1 - first meeting and group/sub-unit formation, Software 2 - Participants work on their own projects with help of Tutors

16:00 - 16:30 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

16:30 - 19:30 (Room: Adriatico Guest House Informatics Lab.)
Laboratory work continues

Tuesday, 13 March, I/O Issues (Room:Adriatico Guest House Kastler Lecture Hall)

13 March 2007

09:00 - 10:30 **A. Kohlmeyer** / *Univ. of Pennsylvania, Philadelphia, USA*
I/O Part 1: I/O Issues in HPC and Introduction to Parallel Filsystem

10:30 - 11:00 (Room: Adriatico Guest House Cafeteria)
--- Coffee Break ---

11:00 - 12:30 **S, Cozzini,CNR-INFM/Democritos, Trieste;** / *R. Murri, EGRID ICTP Project, G. Diaz, Cecalcula ULA Merida*
Short tutorial on GRID computing

12:30 - 14:00 (Room: Adriatico Guest House Cafeteria)
--- Lunch Break ---

14:00 - 14:30 **S. Fiore** / *SPACI Consortium & Univ. of Salento, Lecce*
GReIC Project: Towards Grid-DataBase Management System

14:30 - 15:30 (Room: Adriatico Guest House Informatics Lab.)
Laboratory work: Hardware - Install and benchmark a small 10 server, ..- Software 1/2: - participants work on their own projects with help of Tutors

15:30 - 16:00 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

16:00 - 19:30 (Room: Adriatico Guest House Informatics Lab.)
Laboratory work continues

Wednesday, 14 March, QUEUE SYSTEMS/GRID etc.. (Room:Adriatico Guest House Kastler Lecture Hall)

14 March 2007

09:00 - 09:45 **P. Calucci** / *SISSA, Trieste*
Setting up Queues systems (TORQUE + Maui)

09:45 - 10:30 **E. Cohen** / *Mellanox, Israel*
Mellanox Infiniband Overview

10:30 - 11:00 (Room: Adriatico Guest House (Lower Level 1))
--- Coffee Break ---

11:00 - 12:00	**G. Diaz** / *Univ. de Los Andes, Merida, Venezuela* **Again on GRID computing: a few general concepts**
12:00 - 13:30	(Room: Adriatico Guest House Cafeteria) --- Lunch Break ---
13:30 - 14:30	
14:30 - 15:30	**Laboratory work: - Hardware: - High speed network instalation and benchmarking:INFINIBAND .....- Software 1/2: participants work on their own projects with help of Tutors**
15:30 - 16:00	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---
16:00 - 19:30	**Laboratory work continues**

Thursday, 15 March, HPC in Developing World (Room:Adriatico Guest House Kastler Lecture Hall)

15 March 2007

09:15 - 09:50	**E. Ofori** / *AITI-KACE, Accra, Ghana* **Setting up and maintaining HPC resources in West Africa**
09:50 - 10:20	**A. Balaz** / *Institute of Physics, Belgrade, Serbia* **HPC experiences in South East Europe**
10:20 - 10:50	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---
11:00 - 11:30	**B. Sundaram** / *JNCASR, Bangalore, India* **HPC in India**
11:30 - 12:00	**G. Diaz Toro** / *Univ. de Los Andes, Merida, Venezuela* **HPC in Latin America**
12:00 - 12:30	**J. Intsiful** / *UK Met. Office, Exeter, UK* **HPC resources/initiatives for climate simulation in Africa**
12:30 - 14:00	(Room: Adriatico Guest House Cafeteria) --- Lunch Break ---
13:30 - 15:30	(Room: Adriatico Guest House Informatics Lab.) **Laboratory work:.. - Hardware: - High speed network installation and benchmarking: myrinet, Software 1/2: participants work on their own projects with help of tutors**
14:00 - 14:30	**EU-IndiaGrid team**
14:30 - 15:00	**ROUND TABLE DISCUSSION: SETTING UP HPC/GRID TRAINING IN THE DEVELOPING WORLD... - work will be done in small groups, based on geographical area, each one chaired by school staff from that region.**
15:30 - 16:00	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---
16:00 - 19:30	(Room: Adriatico Guest House Informatics Lab.) **Laboratory work continues**

Friday, 16 March, Dialogue with Participants (Room:Adriatico Guest House Kastler Lecture Hall)

16 March 2007

09:00 - 10:30	**Presentations from Participants**
10:30 - 11:00	(Room: Adriatico Guest House (Lower Level 1)) --- Coffee Break ---
11:00 - 11:30	**Presentations by Participants**
11:30 - 12:00	**A. Gervaso** / *Exadron- Eurotech, Udine* **Virtual Clusters: the Eurotech approach**
12:00 - 14:30	(Room: Adriatico Guest House (Terrace)) --- Buffet Reception offered by EUROTECH ---
14:30 - 15:30	**Directors of the Workshop: Concluding Remarks, Handling out of the Certificates**