Iowa High Performance Computing Summer School

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University of Iowa

2523 UCC Training Room
University of Iowa
1-3 June 2011

Thank you

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Ben Rogers	Information Technology Services
Glenn Johnson	Information Technology Services
Mary Grabe	Information Technology Services
Greg Johnson	Information Technology Services
Amir Bozorgzadeh	Information Technology Services
Bill Whitson	Purdue University

and

National Science Foundation

Rosen Center for Advanced Computing, Purdue University

Great Lakes Consortium for Petascale Computing

Outline

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- Welcome and Introductions
- Aims of this Summer School
- Comments
- Getting Online

Faculty

The IHPC 2011 Summer School is taught by four faculty members

Professor Gregory Howes

Department of Physics and Astronomy, University of Iowa

Professor Bill Dorland

Department of Physics, University of Maryland

Professor Suely Oliveira

Department of Computer Science, University of Iowa

Professor Christian Ott

Theoretical Astrophysics, California Institute of Technology

Welcome and Introductions

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- Students from a wide range of departments:
  - Chemistry
  - Chemical and Biochemical Engineering
  - Civil and Environmental Engineering
  - Computer Science
  - Center for Global and Regional Environmental Research
  - Management Sciences
  - Mathematics
  - Mechanical Engineering
  - Physics and Astronomy
  - Psychiatry

- Please Introduce yourselves:
  - Name
  - Department
  - Academic Status and Year (ex. graduate student, 3rd year)
  - High Performance Computing Experience
  - Research Topic

Aims of this Summer School

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To enable you to apply parallel computing to your own research

General Comments:

- Much of this material may be familiar to you

- We plan to explain things from a very basic level to make sure this group from such diverse backgrounds can follow

Comments

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A few comments before we get started are in order:

1) Terminology: Terminology in this field is *not* standardized.
   - This field is new and evolves rapidly.

2) HPC is valuable to a wide range of fields:
   - Many examples I use will come from the field of physics.
   - I will try to present the specific problems in a relatively abstract way so that you can consider them simply mathematical problems to be solved.

3) Software (programming) vs. Hardware (computers):
   - I am not going to talk a lot about different hardware options, but will focus on the software side, specfically how to design and implement parallel algorithms.

Comments

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4) Common approaches vs. Exhaustive coverage:

-This will not be an exhaustive review of all possible HPC approaches

- I will focus on the most important and widely used approaches

- In particular, we will talk a lot about MPI, OpenMP, and CUDA

5) Specificity vs. Generality:

- I will try to strike a balance between specific examples, which are often most illuminating, vs. general considerations which may apply to a more wide variety of HPC applications

Getting Online

Each participant has accounts set up on several computers:

University of Iowa, Research Services:

- Helium

  200 compute nodes (1600 cores)

  `helium.hpc.uiowa.edu`

- Detailed information for running on Helium is available at

https://www.icts.uiowa.edu/confluence/display/ICTSit/User+Documentation

Rosen Center for Advanced Computing, Purdue University:

- Moffet: SiCortex 5832

  756 compute nodes (4536 cores)

  `moffett.rcac.purdue.edu`

- Detailed information for running on Moffett is available at

http://www.rcac.purdue.edu/userinfo/resources/moffett/newuser.cfm

- See handout for information on getting online and submitting both interactive and batch jobs

IHPC 2011 Course Website

The website with all of the IHPC 2011 Materials can be found at

http://www.physics.uiowa.edu/~ghowes/teach/ihpc11/index.html