

Assignment #1

Due: 3/4/2012

1. An Application of Parallel/Distributed/Grid/Cloud Computing

- Document an application of parallel/distributed/grid/cloud computing on solving challenging problems in the past two years (2010, 2011). Your document should minimally include the following sections:
 - Problem description
 - Difficulties (or why using the technology selected)
 - Computing facility
 - No. of processors, amount of memory, ...
 - Computational resources used
 - How long did it take to solve the problem
 - Amount of memory consumed, amount of disk space used, etc.
 - Reference
 - Results (e.g. animations, images)

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1. An Application of Parallel/Distributed/Grid/Cloud Computing

- Hint: the following URLs may help
 - <http://www.top500.org>
 - <http://www.psc.edu/>
 - <http://www.sdsc.edu/>
 - <http://www.osc.edu/>
 - <http://www.ncsa.uiuc.edu/>
 - Or other supercomputer centers in the world
- An example is given at
<http://vo-1.ct.ntust.edu.tw/Courses/PA/01-Example/>

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2. Programming warmup

- a) Please review/preview the following programming concepts in C/C++:
 - a) **Pointer**
 - <http://cplusplus.com/doc/tutorial/pointers/>
 - b) **Preprocessor directives**
 - <http://wwwcplusplus.com/doc/tutorial/preprocessor/>
 - c) **Dynamic 1D and 2D array allocation, use, and deallocation**
 - <http://rando.org/tutorials/c/dynamic.php>
 - <http://www.learncpp.com/cpp-tutorial/65-multidimensional-arrays/>
 - <http://www.parashift.com/c++-faq-lite/freestore-mgmt.html#faq-16.16>

2. Programming warmup

- b) For each of the three topics (pointer, pre-processor directive, and 1D/2D memory management), give at least one example source code. For each of the source code you hand in, please give proper comments showing your understanding on the topic.

3. Reading Assignment

- Chapter 2, “Thinking Parallel”, of “Intel Threading Building Blocks: Outfitting C++ for Multi-core Processor Parallelism”.
- After reading, you should be able to understand:
 - Difference between: 1) data parallelism, 2) task parallelism, and 3) pipelining.
 - Definition of “embarrassingly parallel”?
 - Speedup and scaling
 - Amdahl’s Law vs. Gustafson’s observations
 - The difference between a thread and a process?
 - Synchronization
 - *Threads: thread-safe, mutual exclusion and locks, deadlock, race condition.*
 - *Abstraction, Patterns*
- **You will be asked these questions later in the course ...**

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