

Advanced Scientific Computing Workshop

Friday, February 21, 2014 - Friday, July 18, 2014

Scientific Program

Schedule

<div class="level2">

February 21, 2014: Welcome, Install session, Motivation (IPP, Astro, ITP), System aspects (ISG)

February 28, 2014: Software Carpentry - Software design best practices, basics of software projects, versioning, profiling ,...

March 1, 2014: Software Carpentry - Programming techniques

June 26+27, 2014: More specific high performance computational aspects

July 14+15, 2014: Aspects of more scientific relevance, with particular weight on particle physics and astrophysics.

Preliminary contents

Day 1 - HIT E 51

Welcome

Install session

<div class="level5">

Give participants the opportunity to install the software / libraries they'll need for the rest of the workshop, help provided.

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Motivation

<div class="level5">

Show nice examples from everyday work in IPP, ITP and Astro, how to speed up a naive program, visualization examples...

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System aspects

<div class="level5">

<div class="li">

fat node vs. NUMA vs. cluster vs. cloud vs. GPGPU</div>

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single core vs. multithread vs. multicore vs. multihost</div>

<div class="li">

I/O bound vs. CPU bound vs. Mem bound, high cost of IPC</div>

<div class="li">
local storage vs. NFS vs. SMB</div>

<div class="li">
job control/queueing system: condor, torque...</div>

<div class="li">
communication: MPI, TIPC...</div>

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choice of programming language (Python might just not be the best choice in all cases..)</div>

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file formats, checkpointing...

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Day 2+3 - HIT E 51 - 40 people max
Advanced tools and programming

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<div class="li">
revision systems (git)</div>

<div class="li">
make</div>

<div class="li">
python</div>

<div class="li">
advanced shell programming</div>

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testing etc.

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Day 4+5

High Performance Aspects

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OpenMP</div>

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Usage of MPI</div>

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some GPU introduction, and possibly optimization for GPU</div>

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Visualization

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Day 6+7

Scientific methods in our communities

Algorithms and methods used for data analyses relevant for IPP and Astro

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Monte Carlo Generation": How to write your own MC generator; including efficient integration, sampling phase space etc.</div>

<div class="li">

"Multivariate analyses tools" ; principles and statistical analyses tools available; particular SW implementations, libraries, TMVA; examples and some hands-on;</div>

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Unfolding: algorithms: usage and implementations in HEP; image processing; specific examples and hands-on</div>

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Data mining, BigData</div>

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