Evaluation of parallel applications used in high energy physics

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Based on the work of S. Jarp, A. L., J. Leduc, A. Nowak
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About CERN

- CERN is the the European Organization for Nuclear research in Geneva
- Leadership in the particle physics research, based on accelerators, with LHC apparatus (operation started in 2008)
- Computing resources
  - About 40'000 cores on-site
  - 324 sites connected in GRID, with more than 150'000 cores

About Openlab

- A framework for evaluating and integrating cutting-edge IT technologies or services in partnership with the industry
  - Early access to alpha and beta technologies, still years away from the market
- Runs in 3 year phases
  - Currently Phase 3 [2009-2011]: HP, Intel, Oracle, Siemens
  - Phase 4 [2012-2014]: already in preparation!
- The Intel collaboration is driven by the Platform Competence Center
  - Advanced hardware and software evaluations and integrations
    - CPUs and platforms: Xeon EP and EX, Atom, Itanium
    - Intel software tools
  - Performance monitoring and optimization, multi-threading and many core studies

Multi- and many-core activities

- Simple and real applications used as benchmarks; prominent examples:
  - Alice trackfitter and trackfinder: data acquisition (online)
  - Multi-threaded Geant4: experimental simulation (simulation)
  - ROOT Maximum likelihood fit: data analysis (offline)

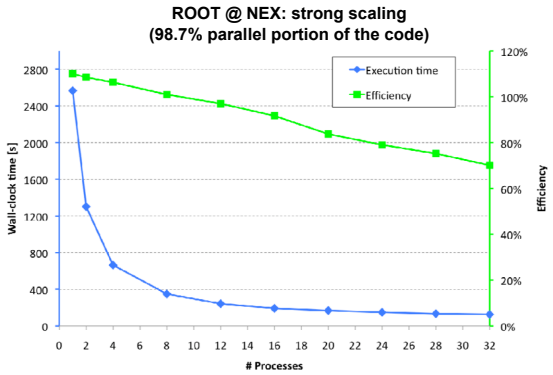
Results

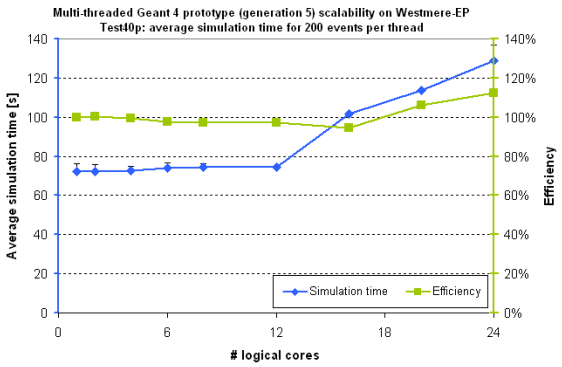
- Recently evaluated Nehalem-EX and Westmere-EP
  - Nehalem-EX
    - Core increase reflected in performance
    - 29.7x speedup on MT Geant4
    - 3x more HEPSPEC06 than the tested Dunnington
    - 11%-60% more throughput elsewhere
  - Westmere-EP
    - 50% core increase but HEPSPEC06 only 32% up
    - 10%-23% performance per Watt improvement
  - SMT advantage between 10% and 28%

  (See published papers at Openlab webpage for more details. Intel whitepapers in preparation)

- Soon: evaluation of Westmere-EX and SandyBridge-EP

- Evaluation of Knights Ferry
  - Very interesting ISA and architecture
    - Porting of the code work in progress
    - Preliminary results are very promising
  - Testimonial provided for launch with Kirk S.





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