Performance Evaluation and Analysis Consortium (PEAC) End Station

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Overview

The PEAC End Station provides the performance evaluation and performance tool developer communities access to the Department of Energy Leadership Computing Facility (LCF) systems at Oak Ridge and Argonne National Laboratories. The consortium goals are:

1. System evaluation
   - Evaluate the performance of LCF systems using standard and custom micro-, kernel, and application benchmarks.
2. Performance tools
   - Port performance tools to LCF systems, making these available to National Center for Computational Sciences (NCCS) and Argonne Leadership Class Facility (ALCF) users, and further develop the tools so as to take into account the scale and unique features of these LCF systems.
3. Performance characterization and prediction
   - Validate the effectiveness of performance characterization methodologies, modifying them as necessary to improve their utility for predicting resource requirements for production runs on the LCF systems.
7. Application analysis and optimization
   - Analyze performance and help optimize current and candidate LCF application codes.
9. Performance and application community support
   - Provide access to other performance researchers who are interested in contributing to the performance evaluation of the LCF systems or in porting complementary performance tools of use to the NCCS and ALCF user communities. Also provide access to application developers who wish to evaluate the performance of their codes on the LCF systems.

all while adhering to the "Golden Rules" of the performance community:

i. Low visibility (no production runs!)

ii. Open and fair evaluations

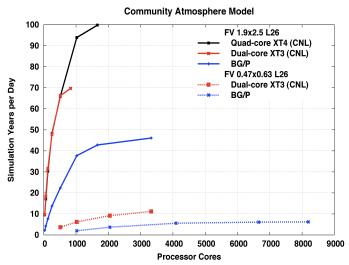
iii. Timely reporting

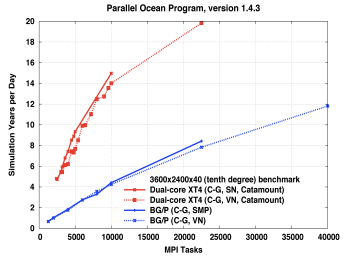
Focus in CY08

- **New architectures:** quad-core Cray XT4, quad-core IBM BG/P
- **Increased scale:** >30,000 cores at NCCS, >30,000 cores at ALCF
- **Evolving system software:** message-passing libraries, parallel I/O, new programming paradigms
- **Application codes:** New applications, evolving applications (new science capabilities and scenarios), increased scale.
- **Performance prediction:** performance modeling of NCCS and ALCF Pioneer applications, and extrapolation to proposed next generation LCF architectures.

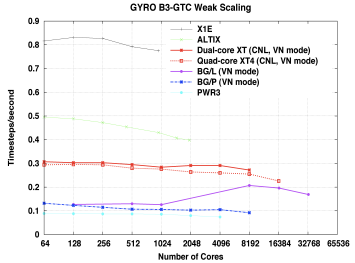
Status (9/3/08)

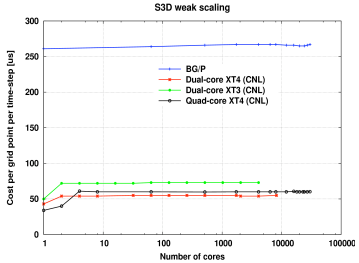
- 61 NCCS users (25 active), consuming 367,447 processor-core hours on Cray XT4 (9% of allocation)
- 45 ALCF users (11 active), consuming 3,157,188 processor-core hours on IBM BG/P (80% of allocation)
- Contributing to
  - 13 publications (including two SC08 papers) and numerous oral and poster presentations
  - 5 performance tool code releases: PAPI (2), Scalasca, TAU (2)
  - Performance data for (at least) 17 full application codes, drawn from biology, climate/weather, fusion, CFD/combustion, groundwater, and astrophysics.
  - Example data for Community Atmosphere Model (strong scaling, hybrid MPI/OpenMP parallelism) and for Parallel Ocean Program (strong scaling, MPI-only)





  - Example data for GYRO gyrokinetic turbulence simulation code (courtesy M. Fahey) and for S3D turbulent combustion simulation code (courtesy R. Sankaran), both weak scaling, MPI-only.





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