HPCC AWARDS CLASS 1: PERFORMANCE

HPCC BENCHMARKS

HPL
This is the widely used implementation of the Linpack Toward Peak Performance benchmark. It measures the sustained floating point rate of execution for solving a linear system of equations.

STREAM
A simple benchmark test that measures sustainable memory bandwidth (in GB/s) and the corresponding computation rate for four vector kernel codes.

RandomAccess
Measures the rate of integer updates to random locations in a large global memory array.

PTRANS
Implements parallel matrix transpose that exercises a large volume communication pattern whereby pairs of processes communicate with each other simultaneously.

FFT
Calculates a Discrete Fourier Transform (DFT) of very large one-dimensional complex data vectors.

_b_eff
Effective bandwidth benchmark is a set of MPI tests that measure the latency and bandwidth of a number of simultaneous communication patterns.

DGEMM
Measures the floating point rate of execution of double precision real matrix-matrix multiplication.

FIND OUT MORE AT http://www.hpcchallenge.org
**PROJECT GOALS**

- Provide performance bounds in locality space using real world computational kernels
- Allow scaling of input data size and time to run according to the system capability
- Verify the results using standard error analysis
- Allow vendors and users to provide optimized code for superior performance
- Make the benchmark information continuously available to the public in order to disseminate performance tuning knowledge and record technological progress over time
- Ensure reproducibility of the results by detailed reporting of all aspects of benchmark runs

**SUMMARY OF HPCC AWARDS**

**CLASS 1: Best Performance**
- Best in G-HPL, EP-STREAM-Triad per system, G-RandomAccess, G-FFT
- There will be 4 winners (one in each category)

**CLASS 2: Most Productivity**
- One or more winners
- Judged by a panel at SC14 BOF
- Stresses elegance and performance
- Implementations in various (existing and new) languages are encouraged
- Submissions may include up to two kernels not present in HPCC
- Submission consists of: code, its description, performance numbers, and a presentation at the BOF

**LOCALITY SPACE OF MEMORY ACCESS IN APPLICATIONS**

- **SPATIAL LOCALITY**
- **TEMPORAL LOCALITY**
- **APPLICATIONS**
  - Computational Fluid Dynamics
  - Radar Cross Section
  - Traveling Salesperson
  - Digital Signal Processing

**FEATURE HIGHLIGHTS OF HPCC 1.4.3**

- Increased the size of scratch vector for local FFT tests that was missed in the previous version (reported by SGI)
- Added Makefile for Blue Gene/P contributed by Vasil Tsanov
- Released in August 2013

**HPCC RESULTS PAGE**

**KIVIAT CHART WITH RESULTS FOR THREE DIFFERENT CLUSTERS**

- **Dalco** Opteron/QsNet Linux
  - Cluster AMD Opteron
  - 64 procs – 2.2 GHz
  - 1 thread/MPI process (64)
  - QsNetII
  - 11-04-2004

- **Cray** XE1 AMD Opteron
  - 64 procs – 2.2 GHz
  - 1 thread/MPI process (64)
  - RapidArray Interconnect System
  - 11-22-2004

- **Sun** Fire V20z Cluster AMD Opteron
  - 64 procs – 2.2 GHz
  - 1 thread/MPI process (64)
  - Gigabit Ethernet, Cisco 6509 switch
  - 03-06-2005