# HPCCHALLENGE

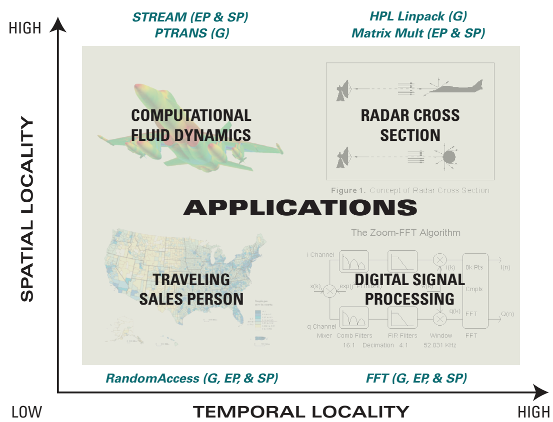
## PROJECT GOALS

- 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

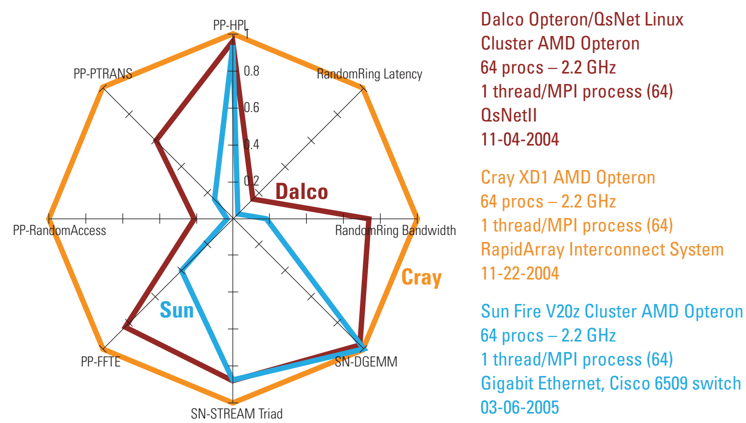
## FEATURE HIGHLIGHTS OF HPCC 1.4.2 RELEASED OCTOBER 2012

- Increased sizes of scratch vectors for local FFT tests to account for runs on systems with large main memory (reported by IBM, SGI and Intel).
- Reduced vector size for local FFT tests due to larger scratch space needed.
- Added a type cast to prevent overflow of a 32-bit integer vector size in FFT data generation routine (reported by IBM).
- Fixed variable types to handle array sizes that overflow 32-bit integers in RandomAccess (reported by IBM and SGI).
- Changed time-bound code to be used by default in Global RandomAccess and allowed for it to be switched off with a compile time flag if necessary.
- Code cleanup to allow compilation without warnings of RandomAccess test.
- Changed communication code in PTRANS to avoid large message sizes that caused problems in some MPI implementations.
- Updated documentation in README.txt and README.html files.

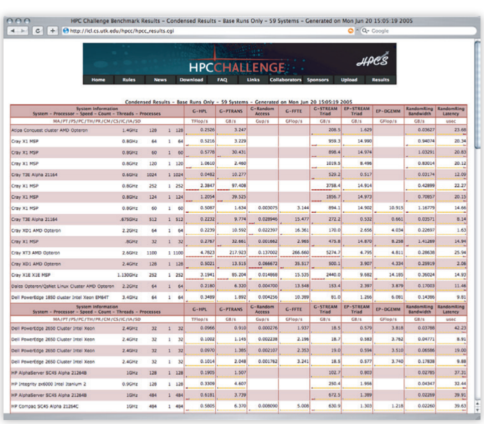
### LOCALITY SPACE OF MEMORY ACCESS IN APPLICATIONS




### KIVIAT CHART WITH RESULTS FOR THREE DIFFERENT CLUSTERS




### HPCC RESULTS' PAGE




## 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 SC12 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

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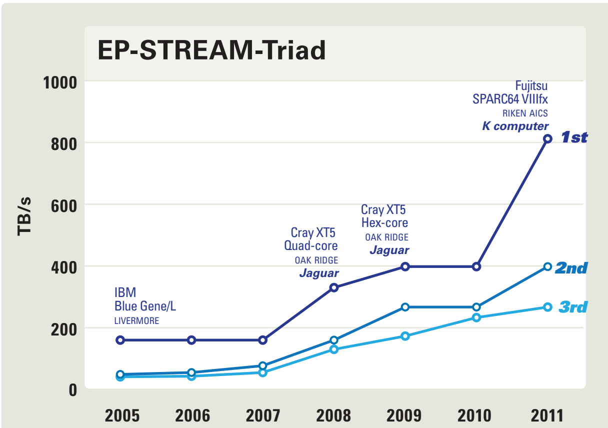
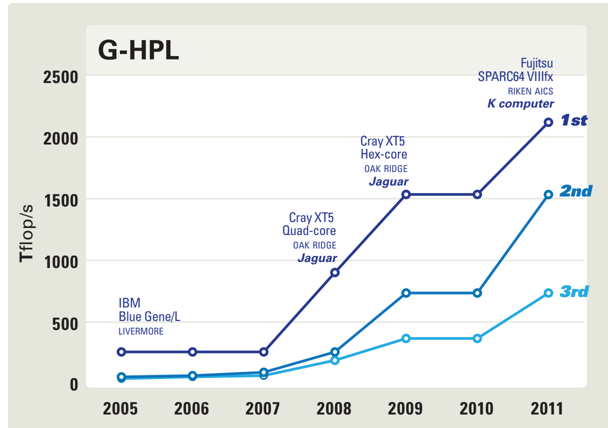
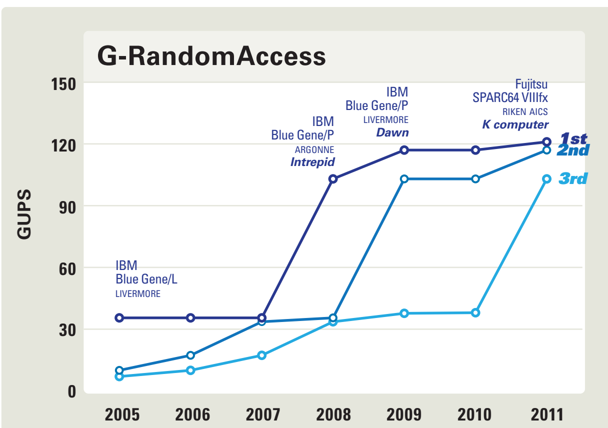
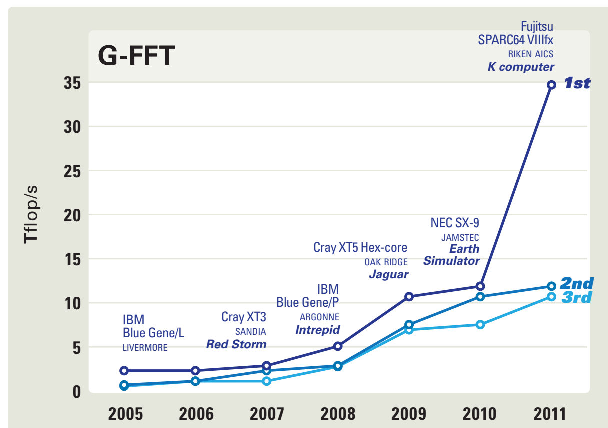
# HPC CHALLENGE

## HPCC AWARDS CLASS 1: PERFORMANCE




## HPCC BENCHMARKS

### HPL
This is the widely used implementation of the Linpack TPP 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 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 vector.

### 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.

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