

20 Years - Unleashing the Power of HPC

SC05

2005 Chair
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GATEWAY TO DISCOVERY

2005

Notable Systems first mentioned this year in the proceedings:

- IBM p655
- Cray XD1
- SRC MAPstation
- ASCI Purple
- Apple XServe
- NEC SX-8
- Cray X1E
- NASA Columbia

Notable Processors

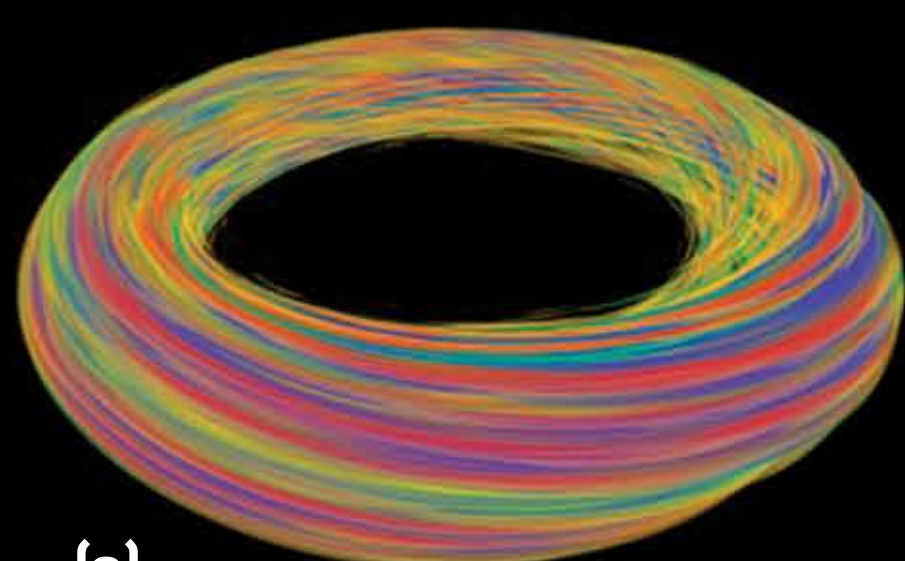
- ATI 9800XT and X800XTPE
- IBM PowerPC G4 and G5
- Intel Pentium M
- NVIDIA GeForce 7800 and 7800 GTX

Noteworthy Architecture Topics

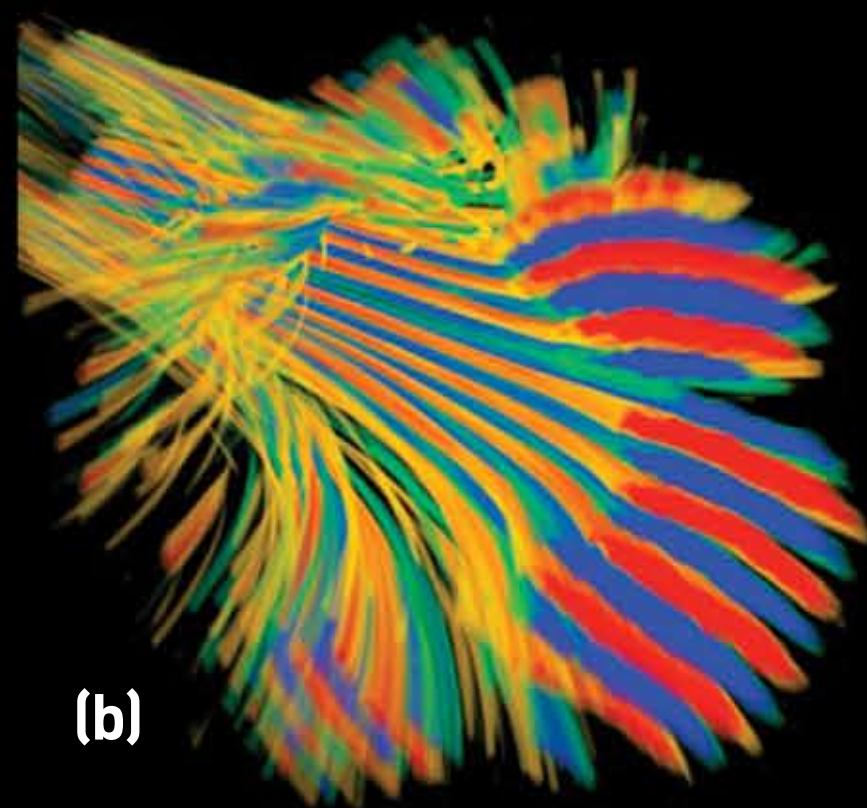
- Dynamic voltage and frequency scaling for power savings
- FPGAs for high performance linear algebra
- Opto-electronic interconnects
- Studying parallel programmer productivity
- Improving MPI performance through underlying protocols

Notable Operating Systems

- Apple OS X

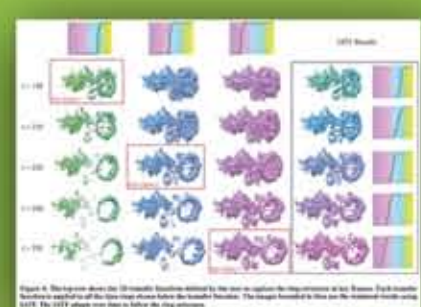


(a)

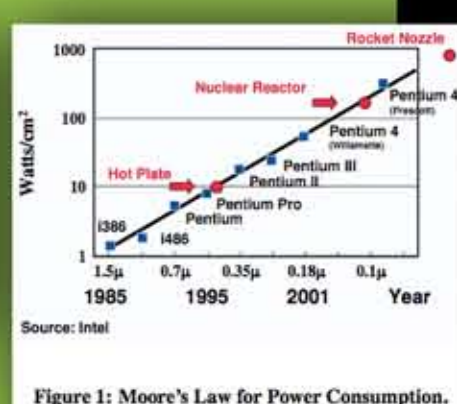


(b)

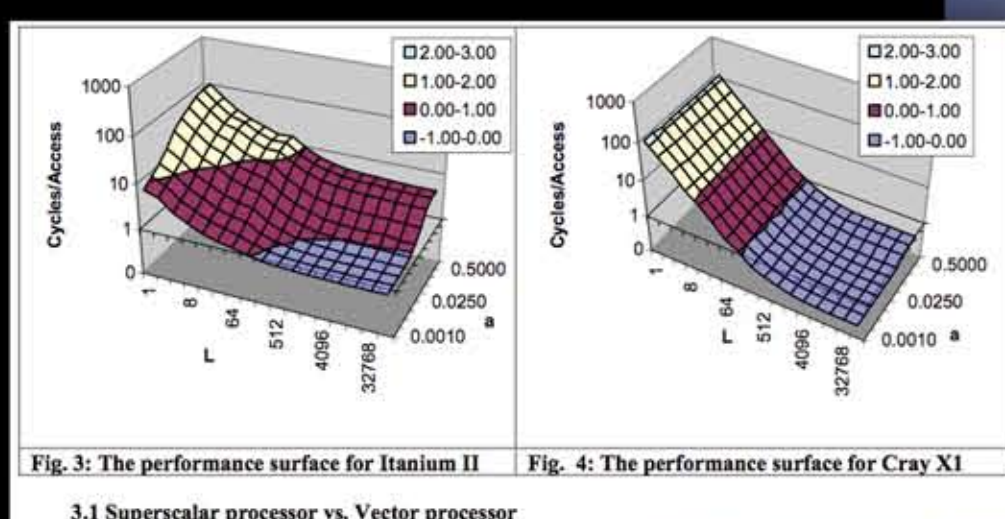
Advance volume visualization of the electrostatic potential field created by the plasma particles in a GTC simulation. Figure (a) shows the whole volume, and (b) a cross-section through a poloidal plane where the elongated eddies of the turbulence can be seen.



Intelligent Adaptive Feature Extraction



Power Densities



3.1 Superscalar processor vs. Vector processor

Apex Map tool characterization of quantitative memory use

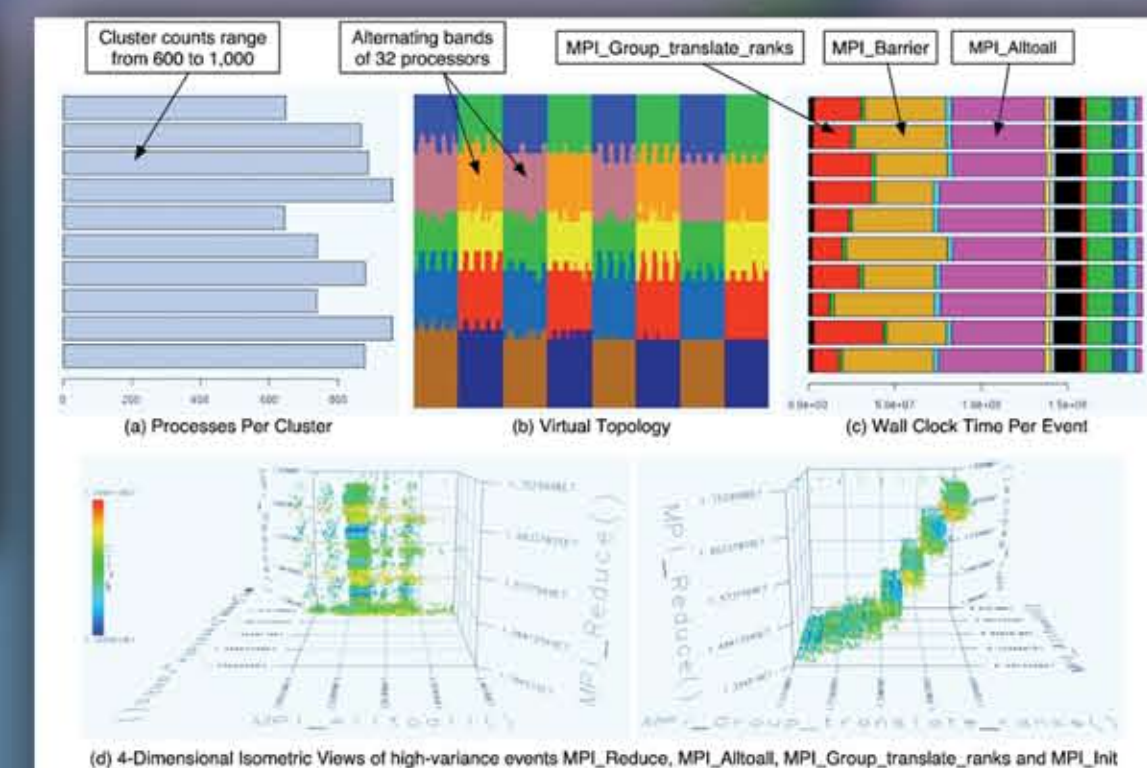


Figure 5. These figures show the relationship between threads of execution when executing Miranda on BG/L. For clustering on execution time with $k = 10$, the histogram in (a) shows a relatively small variation for cluster membership counts, and the graphic in (b) shows the virtual topology of the 8192 processes organized arbitrarily in 32 rows of 256 processes. The alternating bands of behavior are clearly visible as the viewer progresses from left to right, bottom to top, from processor 1 to processor 8192. (c) shows the average behavior for each cluster. Although the clusters are not ordered, with careful viewing it should be obvious that there are two groups of behavior for MPI.Alltoall, and a negative linear relationship between MPI.Group.translate_ranks and MPI.Barrier. (d) shows a 4 Dimensional Scatterplot of Miranda events after modifications were made to the source code. The events shown were selected because these events have the most variance within their range, weighted by percentage of total execution, across the 8K processors.

PerfExplorer in use

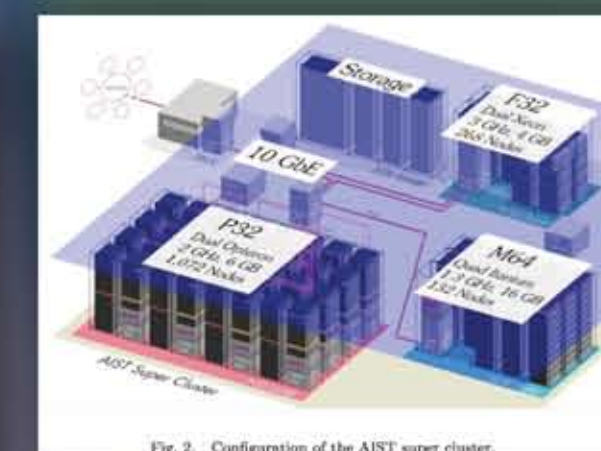


Figure 2. Configuration of the AIST super cluster.

AIST Super-Cluster