

# 20 Years - Unleashing the Power of HPC

# 2006

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## 2006

**Notable Systems first mentioned this year in the proceedings:**

- IBM SP5
- Cray Black Widow
- Cray XT3
- Cray Red Storm

### Notable Processors

- AMD Opteron 244 and 280
- Intel Pentium 4-M and Pentium D
- NVIDIA 7900 GTX
- Sun UltraSPARC IV
- IBM CellBE

### Noteworthy Architecture Topics

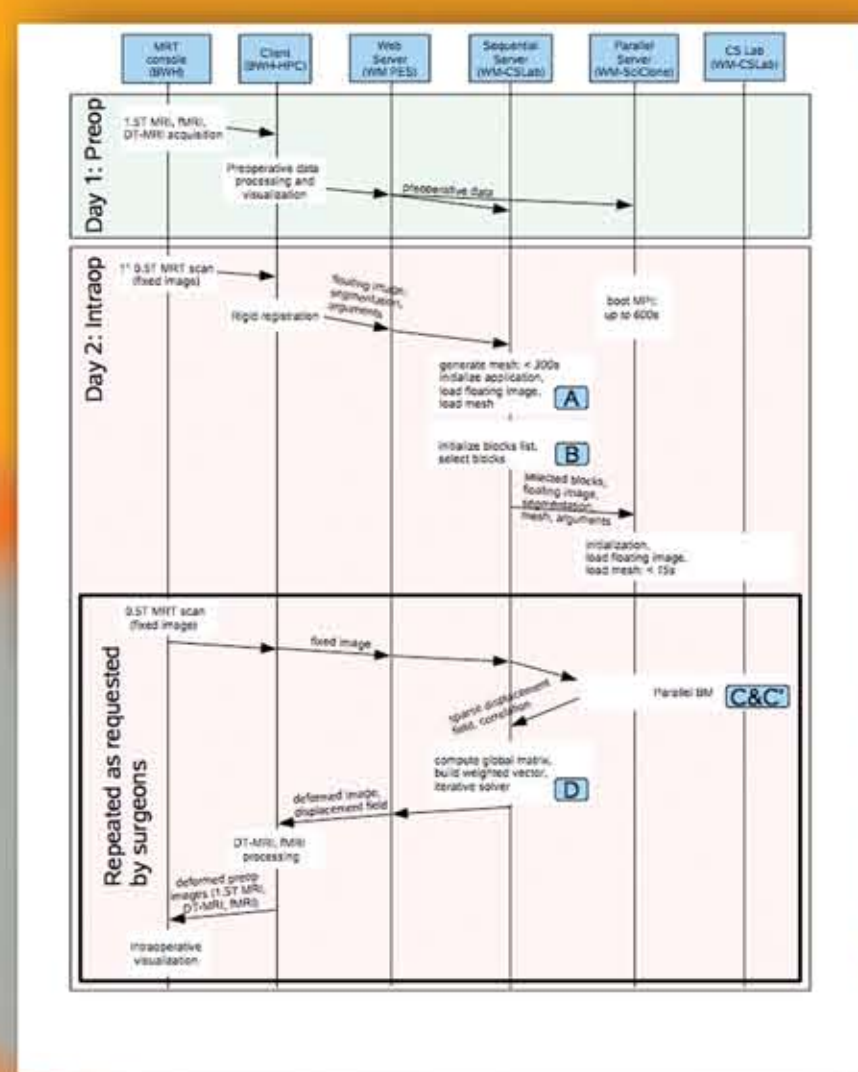
- Ad hoc grid clusters
- Vectorization for improved energy efficiency
- Adaptive frequency and voltage scaling in communications phases
- Quantifying computation and communication overlap

### Notable Operating Systems

- Microsoft Windows XP Professional

### Notable Programming Languages

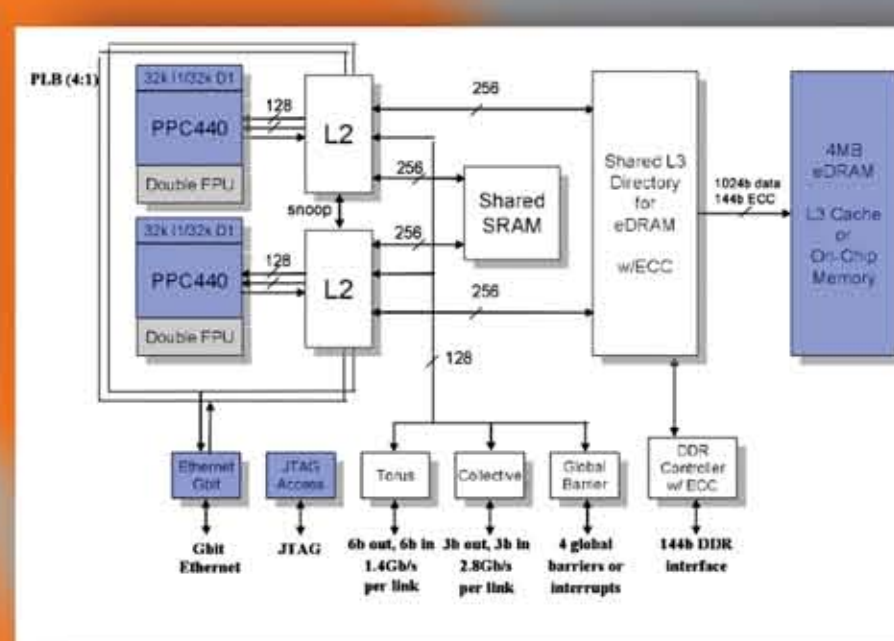
- Sequoia



Processing steps for Image Guided Neurosurgery

	Blue Gene/L	Red Storm	Purple	ASCI Q
Year introduced	2005	2005	2005	2002
Processor Core	Power PC-440	Opteron	Power5	Alpha EV8
Clock Speed	700 MHz	2.0 GHz	1.9 GHz	1.25 GHz
Peak Core Perf	2.8 GF/s	4 GF/s	7.6 GF/s	2.5 GF/s
Memory/Node	512 MB	1 GB	32 GB	8 GB
Peak Link Uni-BW	175 MB/s (6 links)	3.8 GB/s (6 links)	2 GB/s (2 links)	320 MB/s (2 links)
Node OS	Light-weight kernel	Light-weight kernel	Full AIX	Full Tru64
Cores/node	2	1	8	4
Node count	65,536	16,368	1,536	2,048
Network Topology	32x32x64 Torus	27x16x24 Mesh	Fat Tree (4-ary)	Fat Tree (4-ary)
Total Memory	32 TB	10 TB	49 TB	16 TB
System Peak	360 TF/s	41.5 TF/s	93 TF/s	20 TF/s

Comparison of several ASCI systems.



BlueGene/L computer node ASIC

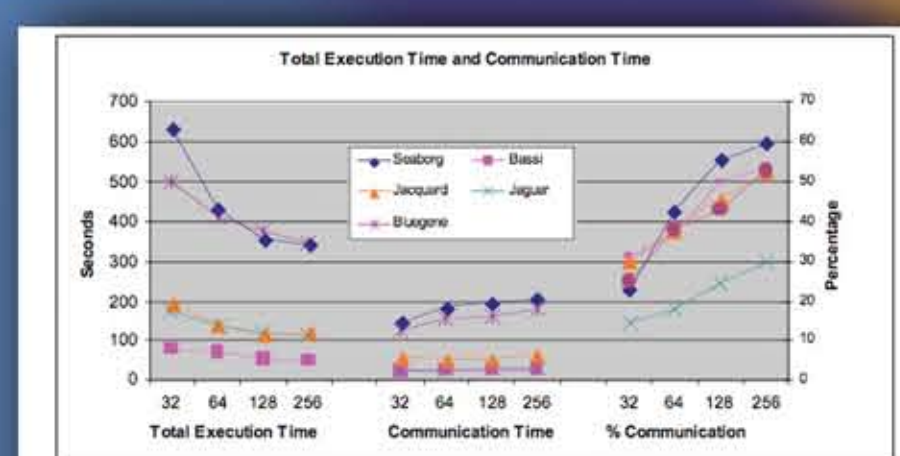
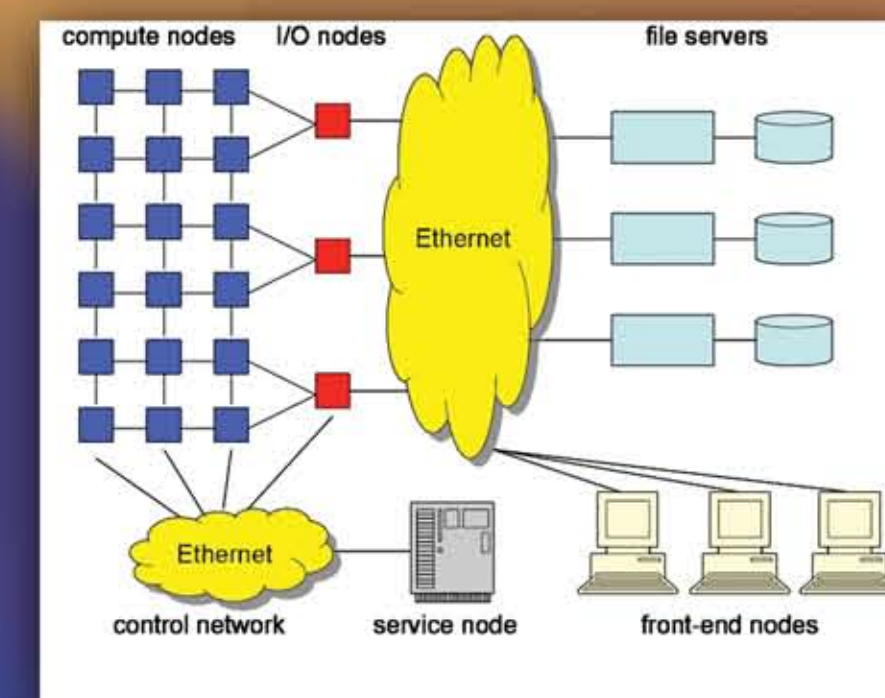


Figure 3: Total execution time, absolute, and relative communication time of BeamBeam3D. Times are given in seconds on the left and % of times on the right vertical axis.



High-Level view of a Blue Gene/L system

Optimizing a high energy physics code on several systems