

Red Storm Update

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SOS 11

Key West, Florida

June 12 - 14, 2007

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

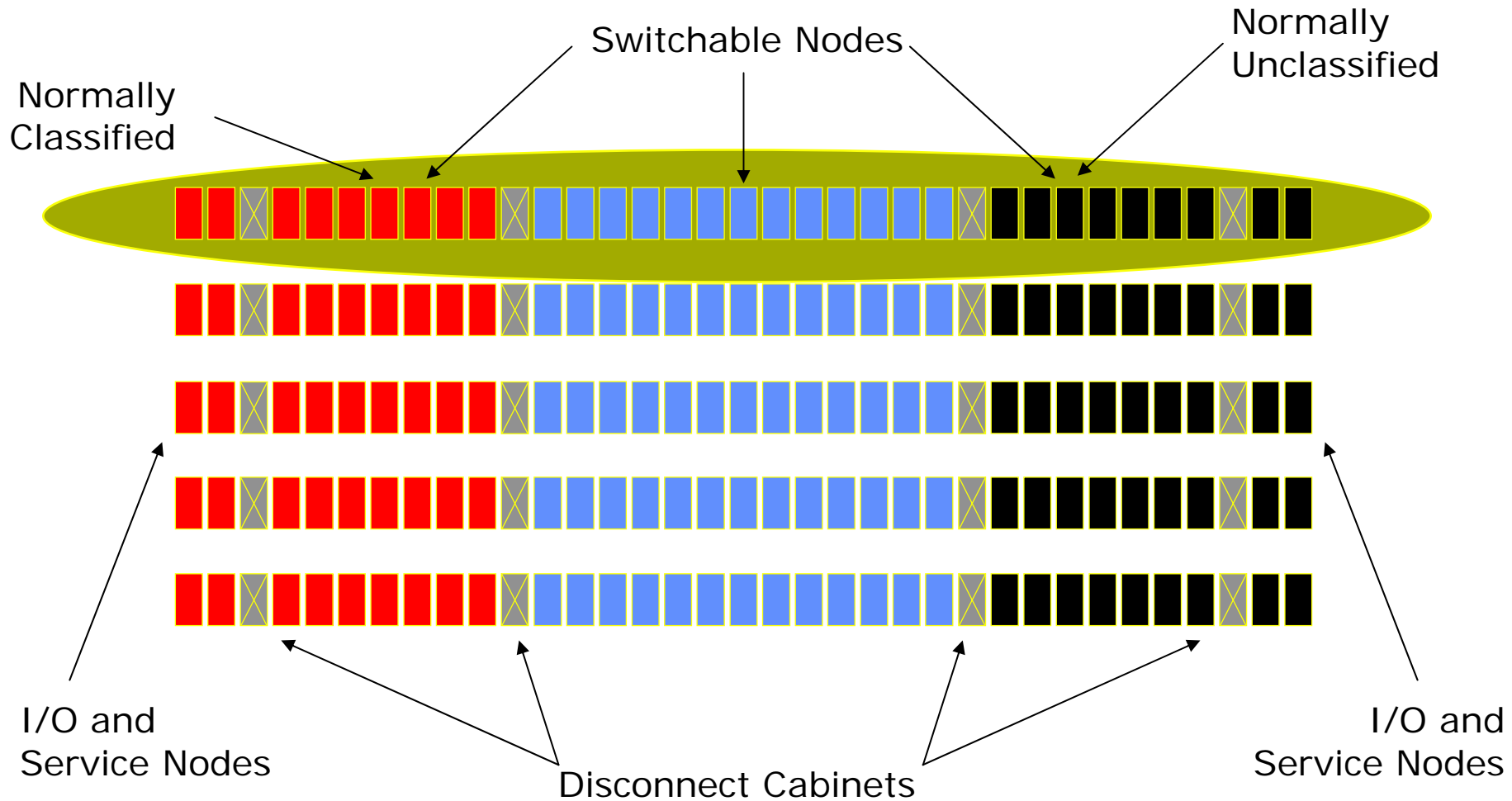




Upgrade Changes

- **SeaStar 2.1 NIC/Router Chips**
 - 2 x Injection Bandwidth
- **5th Row (25% more compute and service nodes)**
- **Dual Core Opterons**
 - 2.5 x More Compute Processors
 - 20% Higher Clock Rate
- **New OS's (Linux 2.6, CVN)**
 - Virtual node model — 1PE or 2PE / node
- **New File Systems**
 - Lustre 1.4 on Linux 2.6
- **Complete: mid-November, 2006**

Upgraded Red Storm Layout (27 x 20 x 24 Compute Node Mesh)



Disk storage system
not shown



Upgraded Red Storm





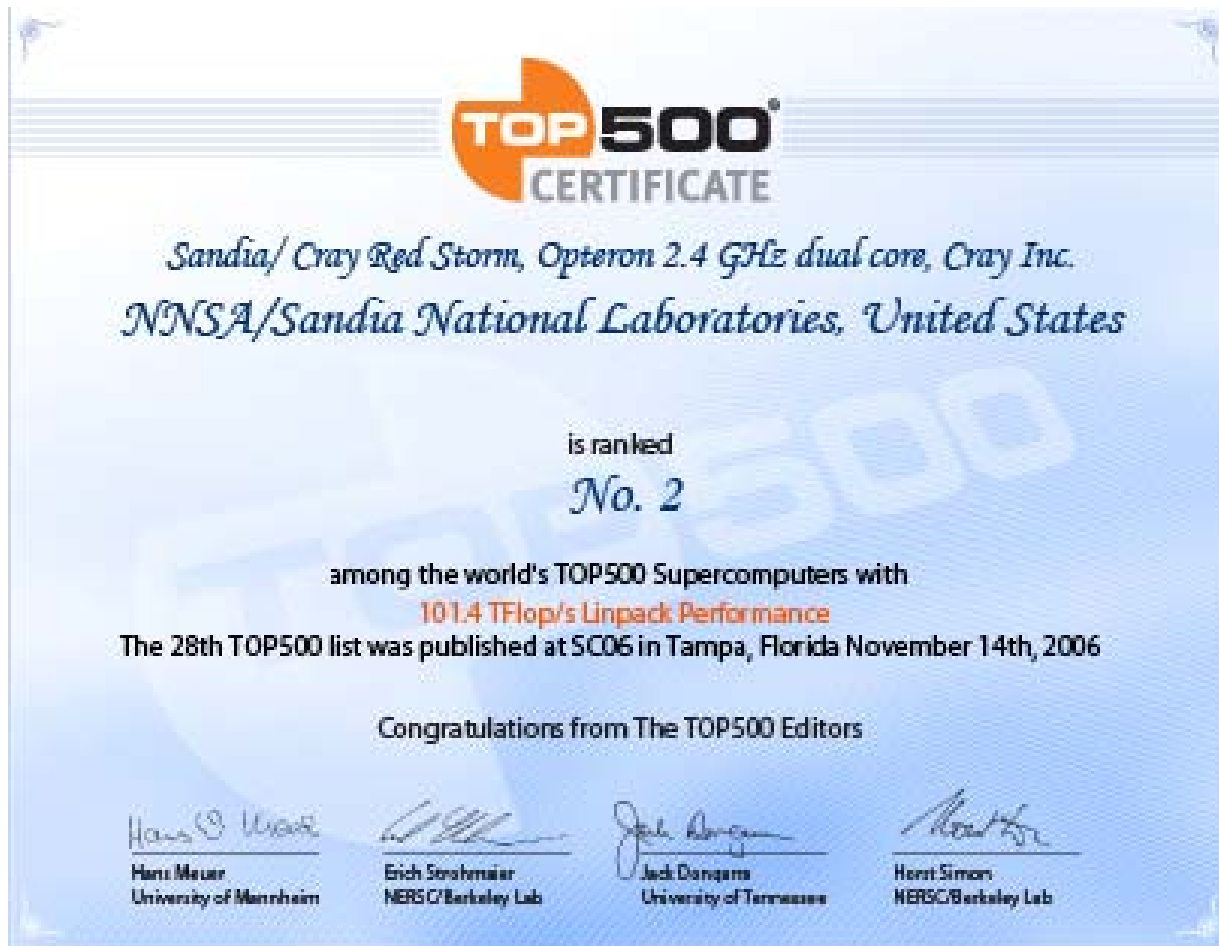
Red Storm Comparison

	Red Storm (initial operations)	Red Storm (post-upgrade)
Theoretical Peak Performance (Compute Nodes Only)	41.47 TF	124.42 TF
HPL Performance	36.19 TF	101.400 TF
Compute Nodes / Processors	10368 / 10368	12960 / 25920
Service and I/O Nodes / Processors	256 + 256 256 + 256	320 + 320 640 + 640
Processor	2.0 GHz Opteron	2.4 GHz Dual Core Opteron
Total Memory (TB)	33.38	39.19
System Memory B/W (TB/s)	55.2	82.9
Topology	27 x 16 x 24	27 x 20 x 24
Bi-Section B/W (TB/s)	3.7, 6.2, 8.3	4.6, 6.2, 10.4
Power / Cooling (MW)	1.7	2.5
System Size	~3100 ft ²	~3800 ft ²

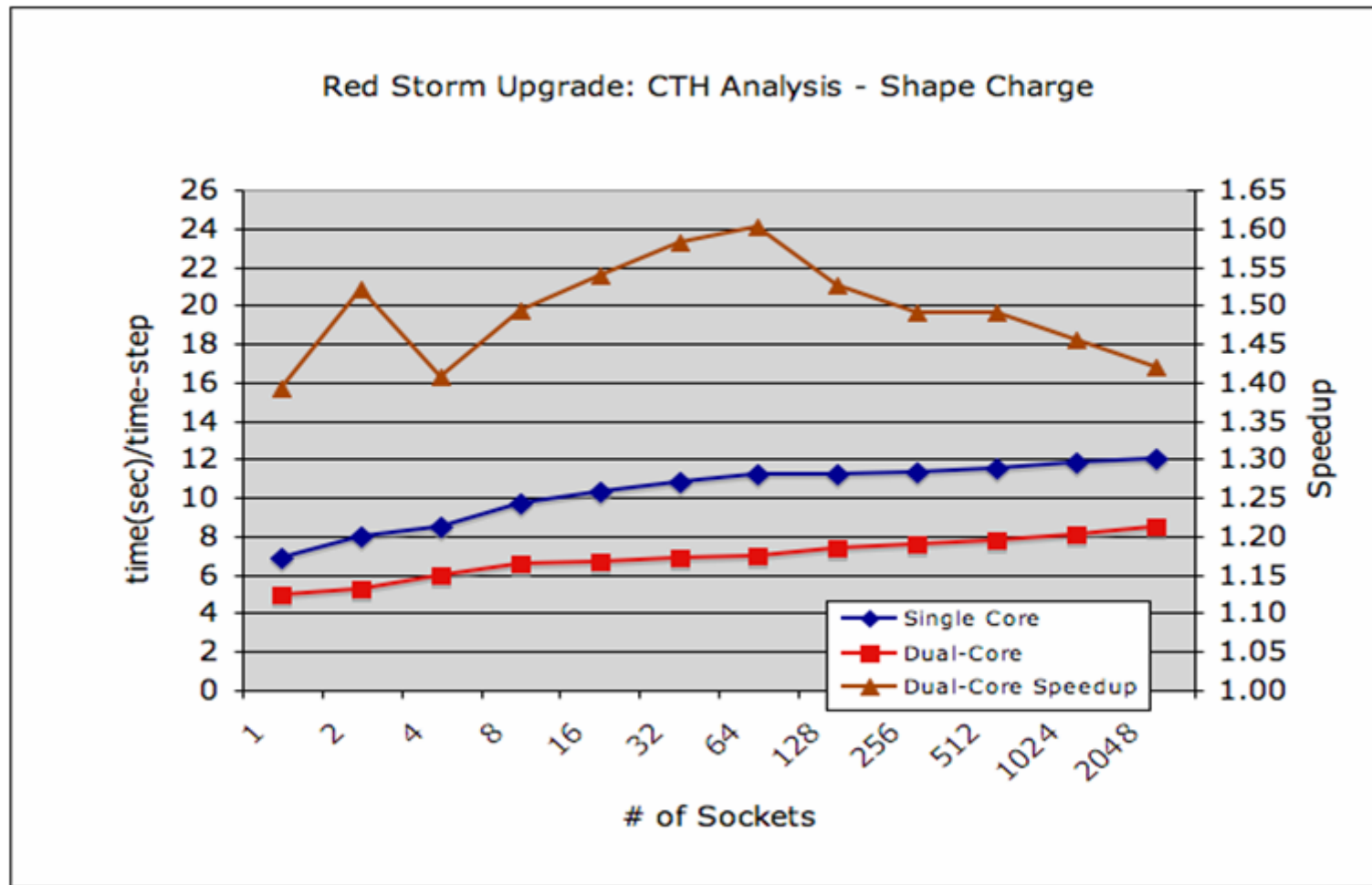


Some Performance Data

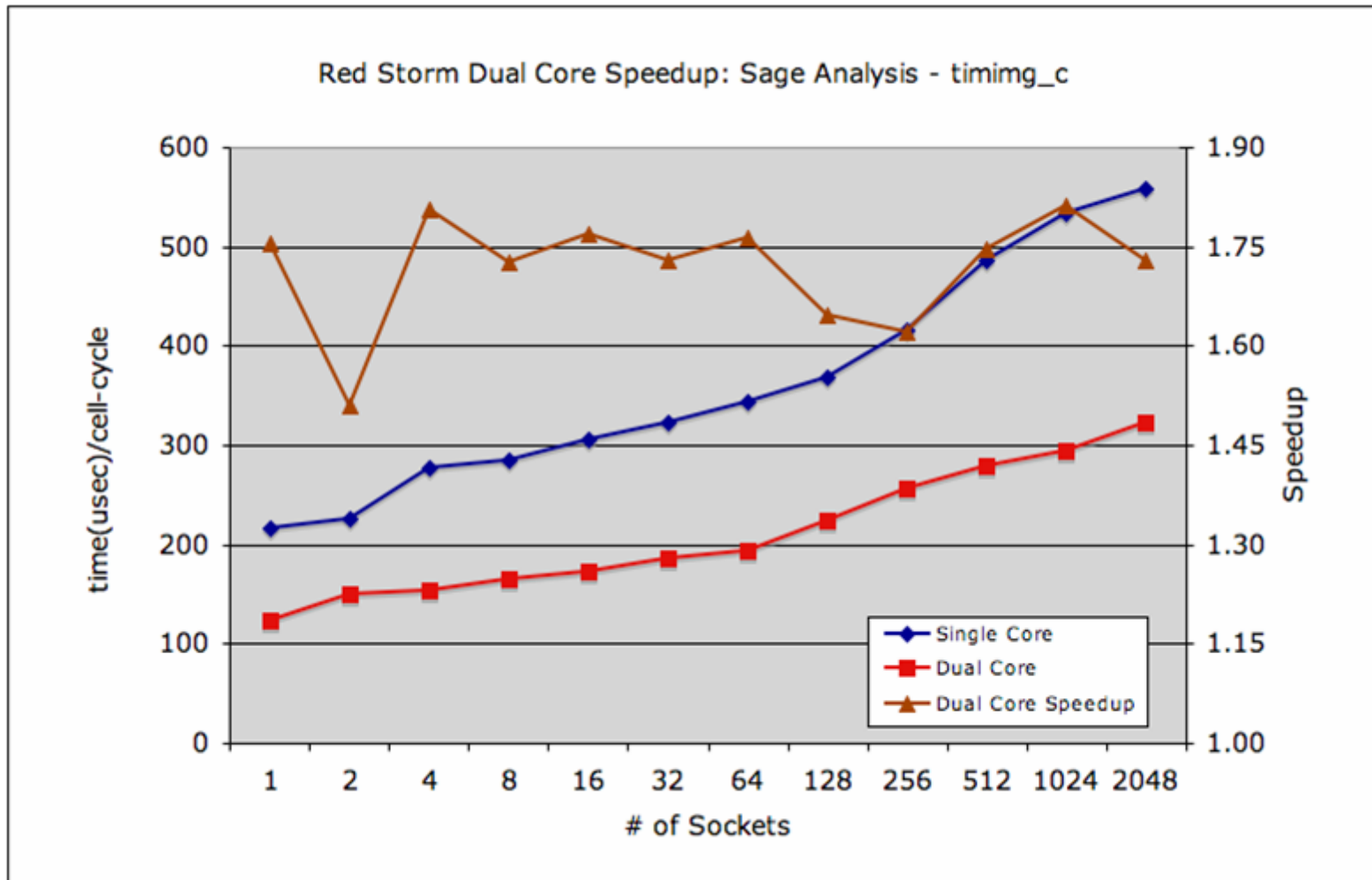
#2 on Top 500 list at 101.4 TF



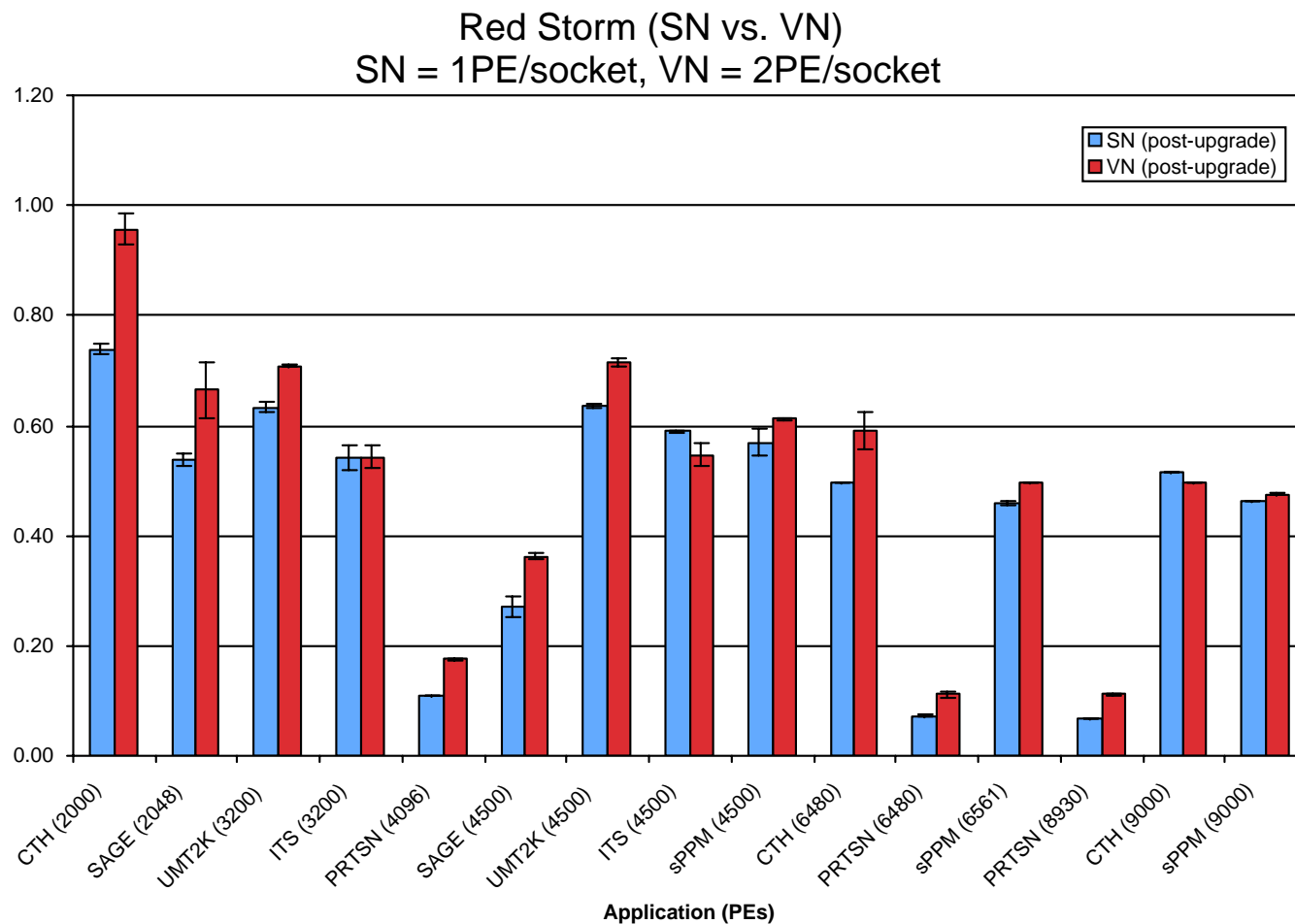
Single Core Versus Dual Core



Single Core Versus Dual Core



Single Core Versus Dual Core





John Daly's Production Work

- Recent results have shown that for John's application we are getting a large fraction of the second core.
 - John's application code runs on 3000 dual core nodes in the same time as 5000 single core nodes. This means that he is getting about 70% efficiency out of using the second core.



Red Storm Upgraded to ~500TF

- **Upgrade Existing System to Quad Core XT4 Specifications**
 - Replace all Compute Boards
 - 2.4 GHz AMD Opteron Quad Core Processors
 - New DDR2 Memory (>75 TB)
 - Replace Power Supplies
 - Replace Cabinet Cooling Fans
 - Reuse Seastar Mezzanines, L0s, Cabinets, Cables, PDUs, etc.
- **A Few System Parameters**
 - ~500 TF
 - >75 TB of Memory
 - >1 PB of Disk Storage
- **Timeframe - Early 2008**



Red Storm Impact

- **Cray and Sandia with the support of NNSA/ASC have created one of the most successful new supercomputers ever.**
- **There are now 17 sites with Red Storm / XT3 / XT4 computer systems.**

Red Storm / XT3 / XT4 Sites Worldwide

ARMY/HPC

AWE (England)

CSC (Finland)

CSCS
(Switzerland)

DOD/ERDC

EPSRC (UK)

JAIST (Japan)

NERSC

ORNL

PSC

SNL

SS-634 (non-US)

SS-635

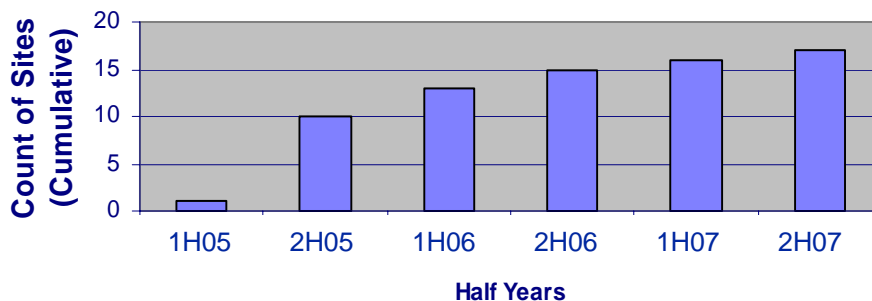
SS-643

SS-661

U of Tokyo (JST)

U of Western Australia

Number of XT3/XT4 Sites Worldwide



TFLOPS available Worldwide

