Pleiades Configuration Details

Category: Pleiades

Pleiades Hardware Summary

- 184 racks: 64 Harpertown, 20 Nehalem, 72 Westmere, 2 Westmere+GPU, and 26 Sandy Bridge
- 11,920 nodes
- 129,024 CPU cores + 32,768 GPU cores
- 237 TB total memory
- 1.79 petaflops theoretical peak performance (CPU) + 43 teraflops (GPU)

Hostnames

The hostname of each of the 11,920 Pleiades compute nodes (accessible only through PBS jobs) is based on the physical rack and individual rack unit (IRU) it resides in and its node position in the IRU. There are 4 IRUs in each rack. For Harpertown, Nehalem, and Westmere, there are 16 nodes per IRU. For Sandy Bridge, there are 18 nodes per IRU.

For the Harpertown, Nehalem, and Westmere racks, each rack is controlled by a rack leader, while for Sandy Bridge every two racks are controlled by a rack leader. The hostnames of each group of 144 (2 racks x 4 IRUs x 18 nodes) Sandy Bridge nodes reflect their control by the same rack leader.

The hostnames are:

- Harpertown nodes - r[1-64]i[0-3]n[0-15]
- Nehalem nodes - r[161-170,177-186]i[0-3]n[0-15]
- Westmere nodes - r[129-160,171-176,187-218, 219, 221-222]i[0-3]n[0-15]
- Sandy Bridge nodes - r[3xx]i[0-7]n[0-17], where 3xx are *odd* numbers between 301-311 and 317-329.

Processor, Memory and Network Subsystems Statistics

Below are detailed configuration statistics for the processor and memory subsystems for all Pleiades compute nodes:

Pleiades Processor, Memory, and Network Subsystems Statistics

Architecture	ICE 8200EX	ICE 8200EX	ICE 8400EX	ICE X

	Processor			
CPU	**Harpertown** Quad-Core Xeon E5472	**Nehalem-EP** Quad-Core Xeon X5570	**Westmere** 6-Core Xeon X5670/X5675 (r221-222)	**Sandy Bridge** 8-core Xeon E5-2670
Newest Instruction Set	SSE 4.1	SSE 4.2	SSE 4.2	AVX
Hyper-Threading	N/A	ON	ON	ON
TurboBoost	N/A	ON	ON	ON
CPU-Clock	**3.00 GHz**	**2.93 GHz**	**2.93/3.06 (r221-222) GHz**	**2.6 GHz**
Maximum Double Precision Floating Point Operations per Cycle per Core	4	4	4	**8**
# of Cores/node	8	8	12	16
Total # of Nodes	4,096	1,280	4,672	1,872
Total # of Cores	32,768	10,240	56,064	29,952
Total Double Precision TFlops	393	120	658	623
	Memory			
L1 Cache	Local to each core; Instruction cache: 32K Data cache: 32K; Associativity: 8 ; Cache line size: 64 B	Local to each core; Instruction cache: 32K Data cache: 32K; Associativity: 4 (Instruction) or 8 (Data); Cache line size: 64 B	Local to each core; Instruction cache: 32K Data cache: 32K; Associativity: 4 (Instruction) or 8 (Data); Cache line size: 64 B	Local to each core; Instruction cache: 32K Data cache: 32K; Associativity: 8; Cache line size: 64 B
L2 Cache	12MB on-die for the Quad-Core; 6MB per core pair; shared by the two cores. L2 Cache speed: 3 GHz Associativity: 24; Cache line size: 64 B	256 KB per core; Associativity: 8; Cache line size: 64 B	256 KB per core Associativity: 8; Cache line size: 64 B	256 KB per core; Associativity: 8; Cache line size: 64 B

L3 Cache	N/A	8 MB shared by the four cores; Associativity: 16; Cache line size: 64 B	12 MB shared by the six cores; Associativity: 16; Cache line size: 64 B	20 MB shared by the eight cores; Associativity: 20; Cache line size: 64 B
TLB	local to each core	local to each core	local to each core	local to each core
Default Page Size	4 KB	4 KB	4 KB	4 KB
Memory/Core	**1 GB; DDR2**	**3 GB; DDR3**	**2 GB; DDR3**	**2 GB; DDR3**
Total Memory/node	8 GB; nodes in r32 at 16 GB	24 GB	24 GB; 17 nodes at 48 GB; 4 nodes at 94 GB	32 GB
Memory Speed and Bandwidth	1600 MHz; 25.6 GB/sec read 12.8 GB/sec write	1333 MHz; 3 channels; 32 GB/sec read/write	1333 MHz; 3 channels; 32 GB/sec read/write	1600 MHz; 4 channels; 51.2 GB/sec read/write
QuickPath Interconnect	N/A	6.4 GT/s or 25.6 GB/sec	6.4 GT/s or 25.6 GB/sec	8.00 GT/s or 32 GB/sec
Inter-node Network				
IB Device on node	4x DDR HCA; 20 Gbits/s	4x DDR HCA; 20 Gbits/s	4x QDR HCA; 40 Gbits/s	4x FDR dual-port IB Mezzanine card; 56 Gbits/s
IB Switches between nodes	4x DDR; 20 Gbits/s	4x QDR; 40 Gbits/s	4x QDR; 40 Gbits/s	4x FDR; 56 Gbits/s

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