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China Upgrading Milky Way 2 Supercomputer to 95 Petaflops

September 19, 2017 by Rich Brueckner   Leave a Comment

Update: *Jack Dongarra from the University of Tennessee has published a first-hand report on the Tianhe-2A supercomputer.*

We have some breaking news from the IHPC Forum in Guangzhou today. Researchers in China are busy upgrading the MilkyWay 2 (Tianhe-2) system to nearly 95 Petaflops (peak). This should nearly double the performance of the system, which is currently ranked at #2 on TOP500 with 33.86 Petaflops on the Linpack benchmark. The upgraded system, dubbed Tianhe -2A, should be completed in the coming months.

Items	Milkyway-2	Milkyway-2A
Nodes & Performance	16,000 nodes with Intel CPU + KNC 54.9 Petaflops (peak)	17792 Nodes with Intel CPU + Matrix-2000 94.97 Petaflops (peak)
Interconnection	10 Gpbps, 1.57 microsecond latency	14 Gbps, 1 microsecond latency
Memory	1.4 PB	3.4 PB
Storage	12.4 PB, 512 GB/s	19 PB, 1 TB/s
Energy Efficiency	17.8 MW, 1.96 Gflops/W	~18 MW, >5 Gflops/W
Heterogeneous Software	MPSS for Intel KNC	OpenMP/OpenCL for Matrix 2000

Details about the system upgrade were presented at the conference opening session. While the current system derives much of its performance from Intel Knights Corner co-processors, the new system swaps these PCI devices out for custom-made 4-way MATRIX-2000 boards, with each chip providing 2.46 Teraflops of peak performance.

According to tweets posted by Satoshi Matsuoka, the upgraded system is impressive in that it is only 2+years in making design-to-board, with 80,000 chips for the upgrade.

Further details include:

- 2 nodes per board pair, with each node comprising a Matrix-2000 card + Xeon from TH2
- 199 racks interconnected by multi-layer fat tree topology, with a bisection bandwidth of 161TB/s
- Memory DDR4-2400 8 channels. Stream BW 96GB/s(62.5%), while 2.2TF(90.2%) so huge 23:1 FLOPS/BYTE ratio. Linpack at 4096 nodes 13.98TF(64.0%)
- Between chips on card, no coherency but DMA. Core rumored to be in-order ARM but w/proprietary 256-bit vector extension, very much like KNC

We will report more on this story as details become available.

Satoshi Matsuoka tours the upgraded Tianhe-2A system, so new as to not yet have a revised nameplate

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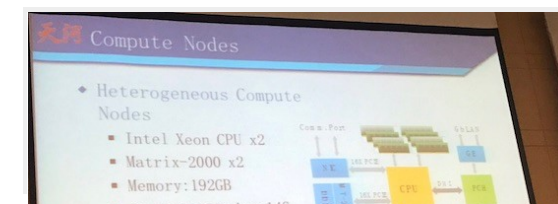
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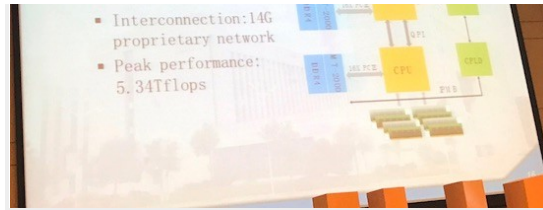
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