High Performance Computing

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Interconnect Solutions Leadership – Software and Hardware

Comprehensive End-to-End Interconnect Software Products

Comprehensive End-to-End InfiniBand and Ethernet Hardware Products

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<th>ICs</th>
<th>Adapter Cards</th>
<th>Switches/Gateways</th>
<th>Metro / WAN</th>
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Proud to Accelerate Future DOE Leadership Systems ("CORAL")

5X – 10X Higher Application Performance versus Current Systems
Mellanox EDR 100Gb/s InfiniBand, IBM POWER CPUs, NVIDIA GPUs

Mellanox EDR 100G Solutions Selected by the DOE for 2017 Leadership Systems
Deliver Superior Performance and Scalability over Current / Future Competition
Mellanox Accelerated World-Leading HPC Systems

Connecting Half of the World’s Petascale Systems (examples)
System Example: NASA Ames Research Center Pleiades

- 20K InfiniBand nodes
- Mellanox end-to-end scalable FDR and QDR InfiniBand
- Supports variety of scientific and engineering projects
  - Coupled atmosphere-ocean models
  - Future space vehicle design
  - Large-scale dark matter halos and galaxy evolution
- Leveraging InfiniBand backward and future compatibility

High-Resolution Climate Simulations
Entering the Era of 100Gb/s

**Adapters**
- ConnectX-4
- 100Gb/s Adapter, 0.7us latency
- 150 million messages per second
- (10 / 25 / 40 / 50 / 56 / 100Gb/s)

**Switch**
- SwitchIB
- 36 EDR (100Gb/s) Ports, <90ns Latency
- Throughput of 7.2Tb/s

**Interconnect**
- Copper (Passive, Active)
- Optical Cables (VCSEL)
- Silicon Photonics
ConnectX-4: Highest Performance Adapter in the Market

InfiniBand: SDR / DDR / QDR / FDR / EDR

Ethernet: 10 / 25 / 40 / 50 / 56 / 100GbE

100Gb/s, <0.7us latency
150 million messages per second

OpenPOWER CAPI technology
CORE-Direct technology
GPUDirect RDMA
Dynamically Connected Transport (DCT)
Ethernet offloads (HDS, RSS, TSS, LRO, LSOv2)
Enter the World of Scalable Performance – 100Gb/s Switch

Switch-IB: Highest Performance Switch in the Market

7th Generation InfiniBand Switch
36 EDR (100Gb/s) Ports, <90ns Latency
Throughput of 7.2 Tb/s
InfiniBand Router
Adaptive Routing

Analyze

Store
Mellanox QSFP 100Gb/s Cables

Complete Solution of 100Gb/s Copper and Fiber Cables

Copper Cables  VCSEL AOCs  Silicon Photonics AOCs

Making 100Gb/s Deployments as Easy as 10Gb/s
Mellanox HPC-X™ Components and Accelerators

- Mellanox ScalableMPI - Message Passing Interface based on Open MPI
- Mellanox ScalableSHMEM - One-sided Communications Library
- Mellanox ScaleableUPC – Berkeley UPC parallel programming language library
- Mellanox MXM – Messaging Accelerator optimized for underlying hardware
- Mellanox FCA – Fabric Collectives Accelerator supporting MPI-3
- Profiling Tools …IPM, Benchmarking Tools….and MORE…
Mellanox Delivers Highest Application Performance

ANSYS Fluent 15.0.7 Performance
(Benchmark: eddy_417k)

- Dell PowerEdge, FDR InfiniBand, Intel Xeon 2680v2 at 2.8GHz
- Cray XC30, Aries interconnect, Intel Xeon 2690v2 at 3GHz

HPC-X™ Delivers World Record Performance!
Higher Performance With 1/3 of The Compute Infrastructure
HPC-X Performance Advantage

58% Performance Advantage!

21% Performance Advantage!

20% Performance Advantage!

OpenFOAM Performance (Lid-driven Cavity)

STAR-CCM+ Performance

CPMD Performance (Si3x2 Inp-1)

Enabling Highest Applications Scalability and Performance
HPC-X Performance Advantage – LS-DYNA

17% Performance Advantage!

LS-DYNA Benchmark
(3 Vehicle Collision)

Performance (Jobs/Day)

Number of Nodes

0 50 100 150 200 250

8 16 32

Open MPI  HPC-X

HPC-X™ Performance for Commercial FEA
Mellanox Interconnect Advantages

- Mellanox solutions provide a proven, scalable and high performance end-to-end connectivity
- Flexible, support all compute architectures: x86, Power, ARM, GPU, FPGA etc.
- Standards-based (InfiniBand, Ethernet), supported by large eco-system
- Higher performance: 100Gb/s, 0.7usec latency, 150 million messages/sec
- HPC-X software provides leading performance for MPI, OpenSHMEM/PGAS and UPC
- Superior applications offloads: RDMA, Collectives, scalable transport
- Backward and future compatible

Speed-Up Your Present, Protect Your Future
Paving The Road to Exascale Computing Together
Thank You