Leading Supplier of End-to-End Interconnect Solutions

Server / Compute

Switch / Gateway

Storage Front / Back-End

Virtual Protocol Interconnect
56G IB & FCoIB

10/40/56GbE & FCoE

Virtual Protocol Interconnect
56G InfiniBand

10/40/56GbE

Comprehensive End-to-End InfiniBand and Ethernet Portfolio

ICs

Adapter Cards

Switches/Gateways

Host/Fabric Software

Cables

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Mellanox in the TOP500

- InfiniBand has become the de-facto interconnect solution for HPC
  - The most used interconnect on the TOP500 list – 224 systems

- InfiniBand connects 10 out of 23 of the world’s sustained Petaflop systems

- The most used interconnect solution in the TOP100, TOP200, TOP300, TOP400
  - Connects 52% (52 systems) of the TOP100 while Ethernet only 4% (4 system)
  - Connects 54% (108 systems) of the TOP200 while Ethernet only 12.5% (25 systems)
  - Connects 49.7% (149 systems) of the TOP300 while Ethernet only 25% (75 systems)
  - Connects 46% (184 systems) of the TOP400 while Ethernet only 34% (136 systems)

- Mellanox FDR InfiniBand is the fastest interconnect solution on the TOP500
  - Used in 45 systems on the TOP500 list – more than double since the June 2012 list
  - Connects the fastest InfiniBand-based supercomputers – 2.9 Petaflops (LRZ), 2.6 Petaflops (TACC)
Mellanox InfiniBand Paves the Road to Exascale

PetaFlop
Mellanox Connected
Mellanox 56Gb/s FDR Technology
FDR InfiniBand Features and Capabilities

Performance / Scalability
- 56Gb/s bandwidth
- <0.7usec latency
- PCI Express 3.0
- InfiniBand Routing and IB-Ethernet Bridging

Reliability / Efficiency
- Unbreakable Link Technology
- Forward Error Correction
- Link quality auto-sensing
- Link Level Retransmission
- Link bit encoding – 64/66
- Lower power consumption
FDR Application Benchmarks Highlight ROI

- Computational Fluid Dynamics
- Oil and Gas Reservoir Simulation
- Molecular Dynamics
- Weather and Earth Sciences

Up to 32% ROI on equipment/operating costs
Connect-IB

Architectural Foundation for Exascale Computing
Connect-IB: The Exascale Foundation

- A new interconnect architecture for compute intensive applications
- World’s fastest server and storage interconnect solution
- Enables unlimited clustering (compute and storage) scalability
- Accelerates compute-intensive and parallel-intensive applications
- Optimized for multi-tenant environments of 100s of Virtual Machines per server
Connect-IB Performance Highlights

- World’s first 100Gb/s InfiniBand interconnect adapter
  - PCIe 3.0 x16, dual FDR 56Gb/s InfiniBand ports to provide >100Gb/s

- Highest InfiniBand message rate: 137 million messages per second
  - 4X higher than other InfiniBand solutions
New innovative transport – Dynamically Connected Transport service

- The new transport service combines the best of:
  - Unreliable Datagram (UD) – no resources reservation
  - Reliable Connected Service – transport reliability
- Scale out for unlimited clustering size of compute and storage
- Eliminates overhead and reduces memory footprint
- Interconnect resources requirement is constant, not influenced by number of nodes
Mellanox ScalableHPC

Accelerations for Parallel Programs
Mellanox ScalableHPC Accelerate Parallel Applications

**MXM**
- Reliable Messaging Optimized for Mellanox HCA
- Hybrid Transport Mechanism
- Efficient Memory Registration
- Receive Side Tag Matching

**FCA**
- Topology Aware Collective Optimization
- Hardware Multicast
- Separate Virtual Fabric for Collectives
- CORE-Direct Hardware Offload

**InfiniBand Verbs API**
Accelerator and GPU Offloads
GPU Direct RDMA (previously known as GPU Direct 3.0)
- Enables peer to peer communication directly between HCA and GPU
- Dramatically reduces overall latency for GPU to GPU communications
Thank You