Performance Analysis of iSCSI & iSER in MPIO environment

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Agenda…

- iSCSI introduction.
- iSCSI implementation Vs today's Hardware
- RDMA introduction
- What is iSER (iSCSI Extension of RDMA)
- Hardware Platforms used
- Performance Data & Comparison
- Summary
iSCSI introduction..

- Internet Small Computer Systems Interface
- Emerging Storage Area Networking Technology
- Allows block-level access to storage devices, such as disks, over a computer network.
- Use TCP/IP Stack of the host OS
- Has two modules “initiator” & “target”

**Advantages**

- Leverages the existing LAN(Ethernet) infrastructure
- Less expensive, hence reduce the TCO (Total cost of ownership)
iSCSI implementation Vs today's Hardware

- Evolution of 10 gigabit Ethernet
- Availability of RNIC

Disadvantage of Today’s Software iSCSI
- Can’t utilize the 10gigabit bandwidth
- Data-copy overhead in standard TCP/IP layer
- All the Processing & interrupt handling done at host’s CPU.
What is RDMA?

- **DMA:** "Direct Memory Access." This is a hardware mechanism in modern computers that allows some I/O devices to directly transfer blocks of data into main memory without the intervention of the CPU.

- **RDMA:** "Remote Direct Memory Access." This technology takes DMA a step farther,
  - Allows a remote device/computer to perform a DMA transfer across a network
  - Avoid constant CPU intervention on either end of the transfer
  - Help to achieve faster data transfer
What is iSER (iSCSI Extension of RDMA)

- New Standard defined by IETF
- Use RDMA technology to create session and transfer data
- It’s a hardware assisted technology
- Follow most of the SCSI standard. Minimal change in SCSI command
- Can avoid the data-copy overhead of the TCP/IP layer of the host.
- Take advantage of 10 gigabit Ethernet
iSER Stack

- UNH-iSCSI
- UNH-iSER
- OFAI
- iWARP
- TCP
- IP
- Ethernet
Experimental Setup...

**Hardware**
- Two IBMx3650 machines
- Two Chelsio RNIC
- Optic Fibre Cables

**Software**
- Red Hat Enterprise Linux 5.3
- Chelsio Driver: 1.3.1.9  Firmware: 7.4.0
- OFED 1.4.1
- UNH-iSER2.2
## Performance Data & Comparison

<table>
<thead>
<tr>
<th>Trial</th>
<th>No of Threads</th>
<th>Block Size (KB)</th>
<th>Non-RDMA Transfer Rate (MB/s)</th>
<th>RDMA Transfer Rate (MB/s)</th>
<th>Impact on throughput</th>
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</thead>
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</table>

Approximately 20% performance improvements while using RDMA compared to non-RDMA transfer.
Performance Comparison Chart

- **Non-RDMA Transfer Rate (MB/s)**
- **RDMA Transfer Rate (MB/s)**

The chart compares the transfer rates for different block sizes (2KB, 4KB, 8KB, 16KB, 32KB) between Non-RDMA and RDMA methods.
Summary...

- Performance is the main criteria for selecting the storage solution
- With Evolution of 10 gigabit Ethernet, users want high performance & cost effective storage access.
- iSER technology can meet the expectation of industry.
- Our analysis shows over all 20% performance improvement while using RDMA compare to normal software iSCSI
Thank You!!!

Question???