Global Shipping Company Chooses InfiniBand to Maximize Data Center Efficiency and Increase Processing Capabilities, while Dramatically Reducing Costs

Challenge

A Fortune 100 company that provides an extensive portfolio of shipping transportation, e-commerce and business services wanted to reduce the total-cost-of-ownership related to maintaining tens of dispersed data centers, while simultaneously reducing the time needed to process the millions of invoices that these data centers receive each day.

The company's current distributed infrastructure consists of a small data center in each location which stores invoices for that country. These data centers have presented a number of challenges: their existing architecture and technology infrastructure make it expensive and time consuming to scale them. This has limited the company's ability to meet the demands of the growth in invoices. Consolidating these data centers and employing faster and more efficient technology would allow the company to keep pace with these demands while also cutting the costs associated with maintaining these operations.

Solution

Mellanox® Technologies, a leading supplier of end-to-end connectivity solutions for data center servers and storage, worked closely with the customer, and with Hewlett Packard and Oracle, to develop a proof-of-concept for a modular database cluster solution which utilizes Mellanox InfiniBand technology, HP servers and Oracle Database Real Application Cluster (RAC) in a consolidated data center.

Oracle RAC supports the deployment of a single database across a cluster of servers, providing superior fault tolerance, performance and scalability with no application changes necessary. It offers customers continuous uptime for database applications; on-demand scalability; lowered computing costs; and record-breaking performance.
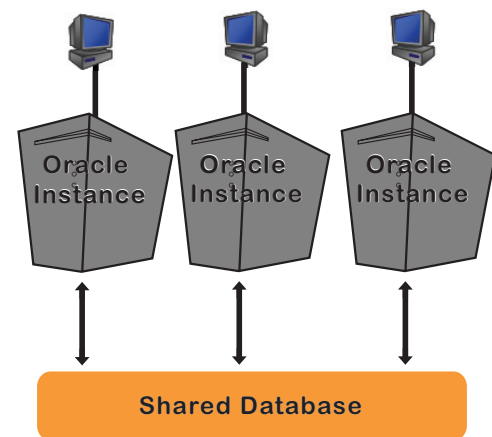

By combining HP multi-core, multi-CPU servers; Mellanox InfiniBand QDR (40Gb/s) technology (which consists of the ConnectX family of products); the Mellanox InfiniScale switches family of products; and the Oracle 11g Database RAC configuration, the shipping and logistics company was able to get the maximum performance and ROI from its data center infrastructure. Oracle Database 11g RAC utilizes Reliable Datagram Sockets (RDS), a high-performance, low-latency connectionless protocol for delivering datagrams. Compared to 10GbE, InfiniBand is a lossless fabric that enables much higher speed (40Gb/s) server-to-server communication at a lower latency (1usec application latency). As such, running RDS over InfiniBand provides much higher performance compared to 10GbE, which results in substantially lower TCO (as described below).

Proof of Concept Configuration & Results

The hardware configuration of the proof-of-concept (POC) includes six database machines that were based on fully populated HP DL580 G5 servers. For storage connectivity, each

server had a Fibre Channel Adaptor connected to a Fibre Channel switch. For Inter Processing Communication (IPC), each server was using 40Gb/s InfiniBand or 10GbE.

■	10GbE Network
■	10GbE Network
■	InfiniBand Network
■	4Gb Fibre Channel Network
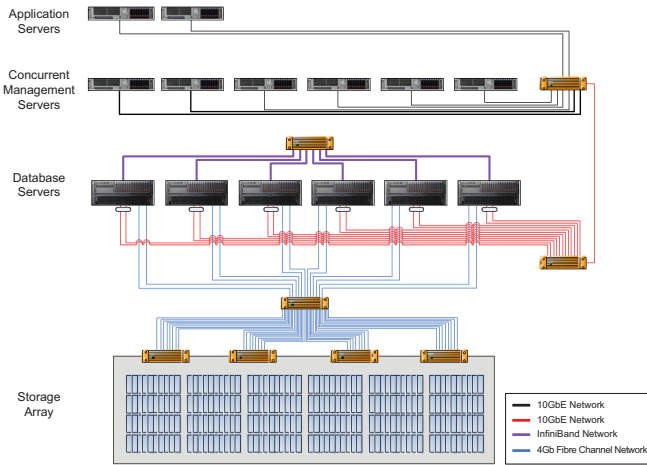
During the POC, a set of invoices was stored and processed twice: once using each of the InfiniBand 40Gb/s and 10GbE configurations. The results show that when InfiniBand was used, the number of invoices processed per second was higher by 63 percent compared to the configuration that was based on 10GbE.

Activity	Duration	Records	TPS
InfiniBand Interconnect			
Invoice Load	0:06:01	9,899,635	27,423
Invoice Process	1:54:21	9,899,635	1,443
Invoice Total	2:00:22	9,899,635	1,370
10GigE Interconnect			
Invoice Load	0:05:21	7,196,171	22,418
Invoice Process	2:17:05	7,196,171	875
Invoice Total	2:22:26	7,196,171	842

TCO Analysis

By implementing a solution based on InfiniBand technology, the customer was able to maximize the efficiency of their data center while significantly increasing their processing capabilities, ensuring greater reliability and scalability.

By running Oracle RAC 11g over InfiniBand, no I/O bottlenecks were observed, and the customer experienced a very efficient system. All cores fulfilled their I/O needs without delay, resulting in the faster processing of invoices. Using InfiniBand at a speed of 40 Gigabits per second, CPU efficiency was 20 percent higher; storage traffic throughput was 43 percent higher than a 10GbE-based solution; and 63 percent more transactions per second were processed compared to 10GbE. These results show that, when InfiniBand is used, only 4 servers are needed to do the same job that, with 10GbE, requires 10 Servers.

Due to the reduced number of servers and significantly less number of Oracle 11g RAC licenses, the TCO of the InfiniBand solution has the potential to save the customer approximately $2.6 million in hardware, maintenance, database and energy costs over a period of four years compared to a 10GbE solution.

TCO Saving over 4 years

-$2,676,278+

■ 10GE ■ InfiniBand
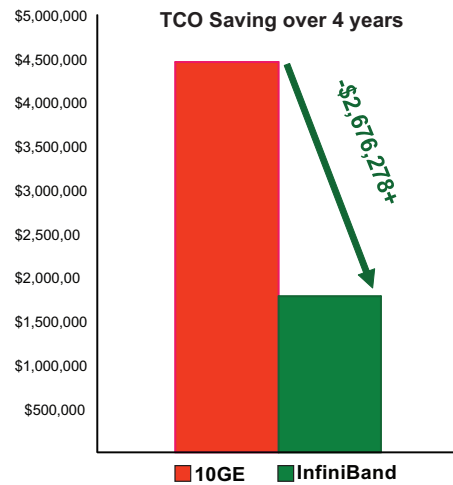
Finally, should the customer continue to experience rapid growth in invoice processing, the modularity of the configuration has the flexibility to scale easily, and is more reliable because the workload is distributed amongst the cluster.

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