TOPSPIN®

DISTRIBUTED DATABASES

BENEFITS

- Improve database scalability and high availability at lower cost
- Leverage ease and economics of standard server and I/O building blocks
- Reduce horizontally scaled database connections by 30 percent

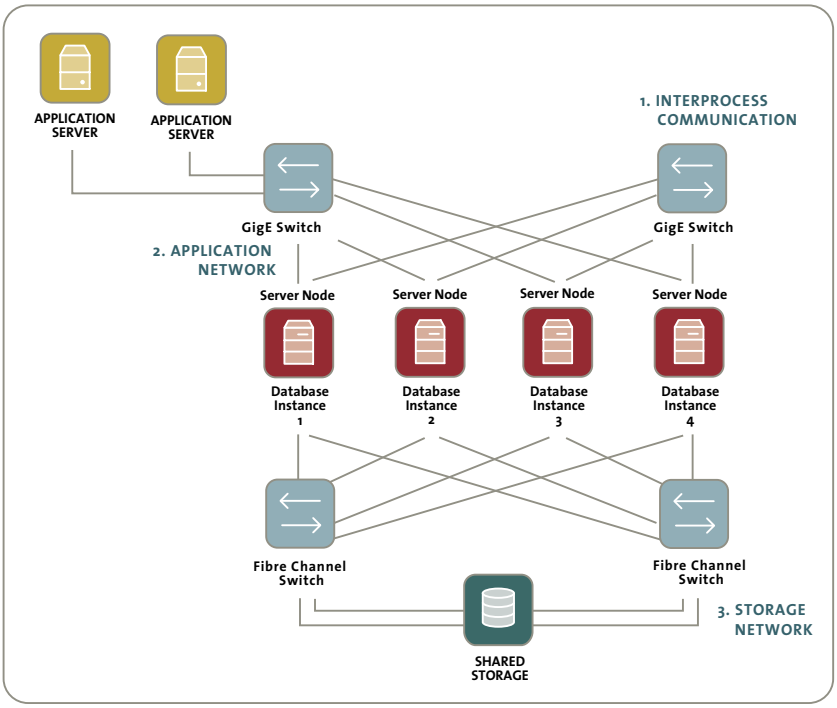
DISTRIBUTED DATABASES SUCH AS ORACLE 9I REAL APPLICATION CLUSTER OR IBM DB2 PARALLEL EDITION PROMISE CUSTOMERS BETTER SCALABILITY AND HIGHER AVAILABILITY ON INDUSTRY-STANDARD HARDWARE. UNFORTUNATELY, WITH TODAY'S INTERCONNECT TECHNOLOGIES, THOSE PROMISES REMAIN LARGELY UNREALIZED. BURDENED BY LOW BANDWIDTH, HIGH LATENCY, AND OVERHEAD, THE CLASSIC INTERCONNECTS HAVE PREVENTED DISTRIBUTED DATABASES FROM SCALING TO MEET THEIR FULL POTENTIAL. UNTIL NOW.

The Topspin Switched Computing System is a new network infrastructure expressly designed for distributed databases. This intelligent fabric accelerates database server speed to 10 Gbps and slashes latency by an order of magnitude, resulting in better performance with much lower cost while enabling plug-and-play interoperability with legacy systems and databases.

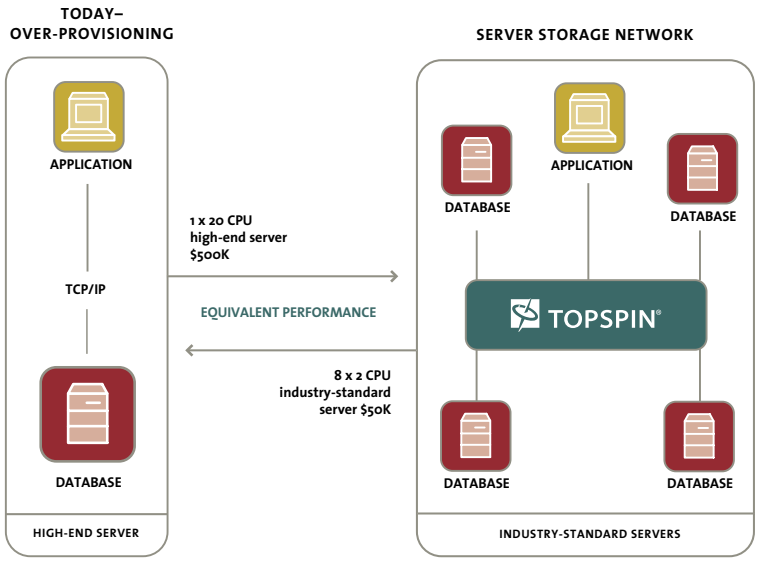
THE PROBLEM

There are three major sources of pain in today's distributed database deployment:

1. Inter-process Communication—For communication between the database nodes in a cluster, scalability is limited by slow inter-process communication due to low bandwidth, high latency, and CPU overhead. This restricts the number of servers that



Distributed Database Pain Points



Improve Price/performance with Topspin and Standards-based Components

can be effectively clustered together with adequate performance. Today, the limit is typically four servers.

2. Application Network—For communication between the application tier and the database tier, performance is limited by CPU overhead on database and application servers due to TCP/IP and OS overhead. This results in significant wasted capacity.

3. Storage Network—For connecting the database servers to their storage resources, scalability is limited by physical I/O capacity. Today, to support inter-process communications, application tier interconnect, and storage interconnect, each with redundancy, six network interface cards are used, occupying six PCI slots. As server nodes move to smaller packaging (e.g., 1U servers), there are typically not enough I/O slots to support all of these interconnects.

THE SOLUTION

The Topspin Switched Computing System offers a 10Gbps, low-latency fabric to address each of these pain points—with one solution.

1. Remote Direct Memory Access (RDMA)—With Switched Computing, servers can write data directly between each other's memory spaces, bypassing OS and TCP overhead. This results in much higher bandwidth and lower latency, speeding up any communication between nodes, such as a distributed lock manager or time to scan tables in parallel. This dramatically improves scalability and performance on existing platforms.

2. Centralized TCP Offload—Switched Computing provides TCP offload for the entire database infrastructure. Using a transparent protocol with existing socket APIs, communications between clients and servers bypass OS and protocol overhead as well, freeing up significant CPU cycles across the network which can be applied to more important business needs.

3. Unified Fabric—Because the underlying fabric can be used for networking, inter-process communication (IPC), and storage simultaneously, the number of host adapters can be reduced to just one (includes redundant second port). By creating virtual storage and network adapters in each server, traffic can be aggregated and load-balanced across virtual interfaces, providing for peak loads and improving high availability.

EXPECTED RESULTS

With the Topspin Switched Computing System, IT managers can finally scale industry-standard components, achieving the performance of high-end proprietary servers with the economics of industry-standard servers. Rather than over-size and waste, data centers can right-size and scale. With this ability to scale granularly, management costs can be reduced significantly. Equivalent application performance can be achieved—with fewer CPUs—at a 10X cost savings.

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