EMULEX

SOLUTIONS BRIEF

CONNECTIVITY

Turbo-charge Oracle® Databases with Emulex 16G Fibre Channel HBAs

The best database HBAs offer increased performance, lower power requirements, full offload for T10-P1 data integrity, streamlined management and industry-leading reliability

At a Glance

Oracle database deployments rely on storage area networks (SANs) for flexible storage solutions to meet performance, scalability and availability requirements. With the new Emulex LightPulse® 16Gbps Fibre Channel (16GFC) host bus adapter (HBA), Oracle database applications and data warehousing operations can take advantage of the faster link speed for increased I/O and accelerated response times. Moreover, the entire SAN fabric benefits from higher availability and reduced power requirements with the faster HBA. This is especially important for Oracle deployments in virtualized or cloud environments.

Products

- Emulex LightPulse 16GFC HBA (LPe16000 and LPe16002)
- Emulex OneCommand™ Manager
- Emulex OneCommand Vision

Solution Benefits

- Higher link speed allows for faster I/O
- Superior application response time
- Backward compatibility with 8GFC and 4GFC infrastructure, with single driver and management solution, ensures highest return on investment (ROI) and flexibility, and minimizes qualification overhead
- GreenState™ power efficiency delivers reduced power footprint to lower operational expense (OpEx)—up to 3x superior Input/Output Operations per Second/Watt (IOPS/W)
- End-to-end data integrity with BlockGuard™ hardware offload supports the T10 Protection Information (T10-PI) standard to protect against silent data corruption, without the 30-40% performance tax incurred by other firmware-based T10-PI solutions

16GFC for Oracle Users

In 2009, the ANSI INCITS T11 committee completed work on the 16GFC standard. 16GFC accelerates high-density virtualization by doubling the number of ports that can be virtualized and reducing the number of physical ports and cables required by half. In fact, 16GFC is required for a properly balanced solution stack combining the latest multi-core processors, expanded memory and high-speed storage such as solid-state disk (SSD) drives. With its bullet-proof reliability and over 11 million FC ports deployed, Emulex delivers the benefits of 16GFC with its LightPulse LPe16000 series Fibre Channel HBAs, built to meet the needs of Oracle users as they look to maximize their database and data warehouse throughput.

Higher performance

Oracle users with on-line transaction processing (OLTP) applications need the advantages of the Emulex 16GFC HBA. The higher performance is ideal for the high transaction Oracle database environment, where 16GFC delivers significantly higher IOPS—with Emulex, Oracle users can possibly achieve a million IOPS on a single port! The higher link rate delivers faster read/writes, thus the processor doesn't have to wait as long to complete a transaction.

In fact, migrating from 8GFC to 16GFC HBAs delivers many other significant performance advantages. Emulex lab tests comparing the Emulex 8GFC HBA with the 16GFC HBA reveal substantial general performance benefits that would be helpful to Oracle users, including data that shows the LPe16000 delivers a maximum of:

- Up to five times IOPS improvement over 8GFC HBAs
- Twice the data throughput (MB/s) compared to 8GFC HBAs
- Half the application response time compared to 8GFC HBAs

Emulex is the preferred HBA for high performance database environments—eight of the top 10 Transaction Processing Performance Council-C (TPC-C) world records have been reached with Emulex!

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Emulex proven reliability

In survey after survey, the number one concern of end users is *reliability*. Emulex is synonymous with quality. With over 11 million ports installed worldwide and partnerships will all the leading server and storage vendors, Emulex is the clear choice for reliable, quality connectivity. In a recent survey of 710 Fibre Channel customers,* greater than 97% of the IT organizations stated that they were either satisfied or very satisfied with the initial product quality and the long-term reliability of Emulex HBAs. Emulex was the first company to deliver a Fibre Channel HBA, is the choice of large enterprise organizations worldwide and has a solid adapter architecture, software stack and industry-leading management application.

End-to-end data integrity

Oracle and Emulex have been leading innovation in end-to-end data integrity. In response to customer and regulatory compliance requirements, most vendors are developing application data integrity solutions around the T10-PI (DIF) standard. Designed to prevent silent data corruption through end-to-end check sums, the full ecosystem of T10-PI enabled storage, HBAs, operating systems (OS) and applications is quickly emerging.

Emulex has implemented the T10-PI standard on its LightPulse 16GFC HBA with its BlockGuard feature. With unique hardware-offload support for T10-PI, Emulex HBAs provide data integrity without the 30-40% performance tax that current firmware-based solutions provide today. With Emulex, Oracle users are future-proofed for the time when they may choose to enable data integrity.

Increased ROI with Emulex

Because each LPe16000 delivers two times the performance compared to 8GFC adapters, fewer HBAs are required to handle the same workload. Furthermore, cable and device management is much easier. Fewer cables are required to support an increased number of applications and virtual machines (VMs). With structured cabling costs up to $300/port, each cable reduction saves money and reduces OpEx and the amount of infrastructure to manage.

Emulex OneCommand Manager further increases ROI by reducing the overhead of managing multiple generations of HBAs as well as OneConnect™ Universal Converged Network Adapters (UCNAs) running different protocols (FC, Fibre Channel over Ethernet [FCoE], iSCSI, and Ethernet network interface card [NIC]). Through a single console, OneCommand Manager controls all Emulex HBAs and UCNAs within the Oracle environment. In the recent Emulex customer satisfaction survey, 60% of the end users who use OneCommand Manager use it at least once a month, if not daily. It is no wonder that OneCommand Manager is so popular, as Oracle customers can get twice as much done in half the time compared to other adapter management applications.

Lower power consumption

Power efficiency is an integral part of all Emulex Fibre Channel HBA designs. Emulex has embraced maximum performance through efficient cooling by designing its high performance LightPulse 16GFC HBAs with passive cooling devices for optimum performance in a broad range of server environments. By upgrading to the Emulex 16GFC HBA, data center managers see up to three times improvement in application throughput per watt (IOPS/W). Moreover, 16GFC reduces the number of switch ports required which can also reduce the overall fabric size for greater power savings.

Emulex delivers:

Superior historical HBA performance[1] for faster Oracle transaction processing

- 37% better dual-port scalability, delivering the highest data throughput on both channels for optimum server performance, as well as power and cooling efficiency
- Advanced CPU utilization for better application and system performance—chosen to power the #1 fastest database system in latest TPC-C[2]

Higher availability for reliable Oracle application uptime

- Industry's most reliable HBA based on actual field return data
- 30% higher reliability over nearest competitor
- More than 10 million hours mean time between failure (MTBF) with over 11 million ports shipped

Extensive knowledge of security for piece of mind

- End-to-end data integrity with support for the T10-PI standard, protecting against silent data corruption as data traverses the system from the OS all the way to the disk array

[1] Based on competitive tests with the 8GFC HBA. 16GFC HBA testing is underway.
[2] TPC-C Benchmark Report, December 2010

* Emulex Customer Satisfaction Survey, September, 2011, with participation by 710 companies with Fibre Channel environments.

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Key HBA Features

Table 1 provides a summary of the key features of the Emulex 16GFC HBA and how Oracle users take advantage of the feature.

LPe16000 Feature	Oracle User Benefit
Focus on speed	**High performance**—By managing performance, storage traffic can flow at optimum levels, giving Oracle enterprises the required system performance.
Reduced latency	**High performance**—Since Oracle workloads are not always a constant stream of data, but rather bursty segments of data, the computer is actually doing multiple things. It's trying to process data, moving data in and out of memory, and it's trying to update it to and from the storage devices. By reducing the time it takes to get data in and out of the storage device, Emulex 16GFC HBAs help the computer spend more time on processing the data, thus helping the overall transactions per second just due to lower latency performance. With Emulex 16GFC HBAs, Oracle users can move typical OLTP bursty data much more quickly.
GreenState power efficiency	**High availability and reliability**—There is a direct correlation between heat and device longevity. Overheated parts generally exhibit a shorter lifespan and lower system performance. The 16GFC HBA enables low power breakthroughs, including GreenState power management, allowing selective dynamic hibernation, advanced thermal and power instrumentation, and a configuration with less than 3 watts per port. **Reduced OpEx**—Cooling costs are reduced.
Scalable	**Investment protection**—Oracle SAN environments are dynamic. To that end, Emulex Fibre Channel HBAs, management tools, device drivers and firmware are designed to provide the greatest degree of scalability and flexibility. Increases in the numbers of virtual HBAs and simultaneous transaction contexts (XRIs) provide a safe growth environment for organic growth and cloud transition.
Common driver model	**Investment protection and reduced OpEx**—A single driver binary works with all supported generations of Emulex LightPulse Fibre Channel HBAs for a given OS platform. This approach simplifies management, requiring IT administrators to only deploy a single driver across Emulex 4GFC, 8GFC and 16GFC HBAs.
Single management console	**Reduced OpEx**—Comprehensive control of Emulex Fibre Channel HBAs within a centralized, cross-platform framework, combining flexible remote-management options with secure access control is a hallmark of OneCommand Manager. Through a single console, SAN administrators can manage all Emulex Fibre Channel HBAs, leveraging either in-band (over the Fibre Channel link, an exclusive feature of Emulex) or out-of-band (over the LAN) options and a host of automation features that reduce deployment and management costs significantly over other HBAs. With support for iSCSI, FCoE and NIC protocols, OneCommand Manager also manages Emulex OneConnect UCNAs for the Oracle converged network environment.
Fast deployment	**Reduced OpEx**—Historical testing on the 8GFC HBAs show that administrators can get twice the adapter management functionality, deploying HBAs in half the time compared to other management solutions. In an Oracle enterprise setting with hundreds, or even thousands, of adapters, this productivity advantage is significant.
Reduced cabling	**Increased ROI**—Enables more Oracle applications and virtual machines to run on a single server and Fibre Channel port
BlockGuard offload support	**High performance data integrity**—Emulex's exclusive BlockGuard technology provides end-to-end data integrity with 40% higher performance than typical firmware implementations of T10-P1 due to hardware offload capability.
SSD support	**High performance**—For SSDs attached to a SAN, Emulex delivers reliable and high performance connectivity to enable fast and reliable storage tiering and burst caching with its LightPulse 16GFC HBA.
Certified Oracle stack	**Investment protection**—With Oracle certification, Oracle users are assured of a no-risk, high availability and supported solution.

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Increase Oracle I/O Performance and Availability

The award-winning Emulex OneCommand Vision I/O Management application helps Oracle data centers maintain the highest level of application performance and availability while maximizing utilization of existing resources. I/O Performance and Availability Service (IPAS) takes OneCommand Vision to the next level—essential for Oracle environments.

Summary

The LightPulse 16GFC HBA continues Emulex's tradition of delivering reliable, high performance, scalable and manageable connectivity. Having won virtually every 16GFC design win at OEMs across the world, data centers will take advantage of the Emulex LPe16000 series Fibre Channel HBAs on any platform in any country. As data centers migrate business critical applications, like databases, into cloud environments, Emulex will ensure maximum performance and reliability.

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