

DATA DRIVEN GLOBAL VISION CLOUD PLATFORM STRATE
ON POWERFUL RELEVANT PERFORMANCE SOLUTION CLO
VIRTUAL BIG DATA SOLUTION ROI FLEXIBLE DATA DRIVEN

WHITE PAPER

Unleash Oracle Performance With Flash Storage Accelerate Your Database to Get the Most From Your Applications

By Hitachi Data Systems

February 2014

Contents

Executive Summary	3
Introduction	4
HUS VM All Flash Array: Lightning Performance for Oracle.....	3
The Need for Speed.....	4
Hitachi Data Systems: The Right Choice for Oracle	8
Hitachi Storage: Closing the Performance Gap.....	8
Hitachi Unified Storage VM.....	8
Hitachi Unified Compute Blade 2000	9
Hitachi Unified Compute Platform Select for Oracle Databases	9
Summary	10
Resources.....	11

Executive Summary

Enterprise organizations demand increasing performance for the business-critical applications running on Oracle databases, and need to consider flash storage systems to provide these performance improvements. With superior performance to hard disks, flash storage is proving its value in the enterprise.

Hitachi provides flash-based storage systems to deliver the performance of flash, while addressing some of the durability and reliability challenges that can be unique to flash storage. With a reliable flash storage platform from Hitachi, you can unleash the Oracle performance for your business-critical applications, delivering better service throughout the enterprise.

Benchmarking is an independent company that benchmarks Oracle platforms for price-performance ratio using a unique benchmark methodology. The company recently evaluated the Hitachi Unified Storage VM (HUS VM) all-flash array, and found that HUS VM provides superior performance for Oracle environments. And because the HUS VM is built with the robust Hitachi enterprise storage technology, you get scalable, efficient, manageable and consistent high performance.

This paper examines how HUS VM all-flash array delivers consistent high performance across a wide range of real-world Oracle database configurations. It increases the number of transactions processed and enables faster decision-making across the enterprise.

Introduction

Oracle database performance is critical to meeting enterprise demands. Regardless of your industry, chances are good that your Oracle databases provide the foundation for your business-critical applications. And with the growing demand for more information in shorter time frames, it is no surprise that optimizing Oracle performance is key to providing the application performance your organization needs to succeed. Providing a high-performance Oracle environment enables faster business decisions, better customer service, and higher transaction rates.

However, to optimize Oracle environments, enterprise storage performance needs to keep pace. Here lies the challenge. While high-performance server environments continue to deliver ever-increasing performance gains, enterprise storage hasn't matched the performance gains. As a result, there is a widening performance gap between servers and storage. When storage performance suffers, you are not getting the most from your applications, which can impact both your revenue from business transactions and your competitiveness from business analytics. Faster storage gives business leaders faster access to the information they need to make informed business decisions.

Hitachi Unified Storage VM All-Flash Array: Lightning Performance for Oracle

HUS VM all-flash array is designed for organizations that seek to accelerate the performance of their business-critical Oracle databases and applications. With integrated Hitachi Accelerated Flash (HAF), HUS VM delivers faster access to Oracle data. Your business-critical Oracle applications benefit from improved response times. And with the increased performance that Hitachi Accelerated Flash delivers, you can gain cost savings through consolidation. Consolidate Oracle databases and applications in a smaller data center footprint, lowering operating cost while improving application performance throughout the organization.

With industry-leading storage virtualization, HUS VM centralizes storage for critical applications and provides shared services for all Hitachi or 3rd-party storage systems through a central management interface.

Hitachi Accelerated Flash (HAF) features a new flash module built specifically for the most demanding enterprise-class workloads. HAF features innovative Hitachi-developed embedded flash memory controller technology. It is designed to achieve higher performance, increased durability and greater capacity, compared to the commodity solid-state drives found in competitive systems. Hitachi flash acceleration software speeds I/O processing to boost flash device throughput.

Hitachi Accelerated Flash

Hitachi Accelerated Flash is a unique flash technology, developed by Hitachi. HAF builds on the flexibility, performance, reliability and common management attributes already well-known and appreciated in traditional Hitachi storage. HAF is purpose-built to provide consistently high performance for enterprise workloads.

With processing power to remove housekeeping tasks from the I/O path, the infamous “write cliff” is eliminated. An extended ECC reduces the refresh rate, and buffering and compression eliminate excessive writes. Further, global wear leveling management balances NAND cell use patterns. All of these capabilities increase the flash array’s endurance for years of operating life.

In addition, the Hitachi flash controller can support higher storage densities than traditional solid-state disk (SSD) configurations. The smallest capacity flash module drive (FMD), the physical equivalent of an SSD, supports 1.6TB. Flash module drives also support 3.2TB, which represents a 4x increase over commodity 800GB solid-state drives that translates into significant density savings.

The Need for Speed

Your business demands high performance from your mission-critical Oracle applications. Demand the same performance from your storage. Benchware, an industry leader in providing independent benchmarks of Oracle performance, demonstrated that HUS VM all-flash array provides the speed you need for the most demanding Oracle storage environments.

Benchware used the HUS VM all-flash array and Hitachi Compute Blade (CB) 2000 server as the reference platform to evaluate the performance of the Oracle database. See Figures 1-6.

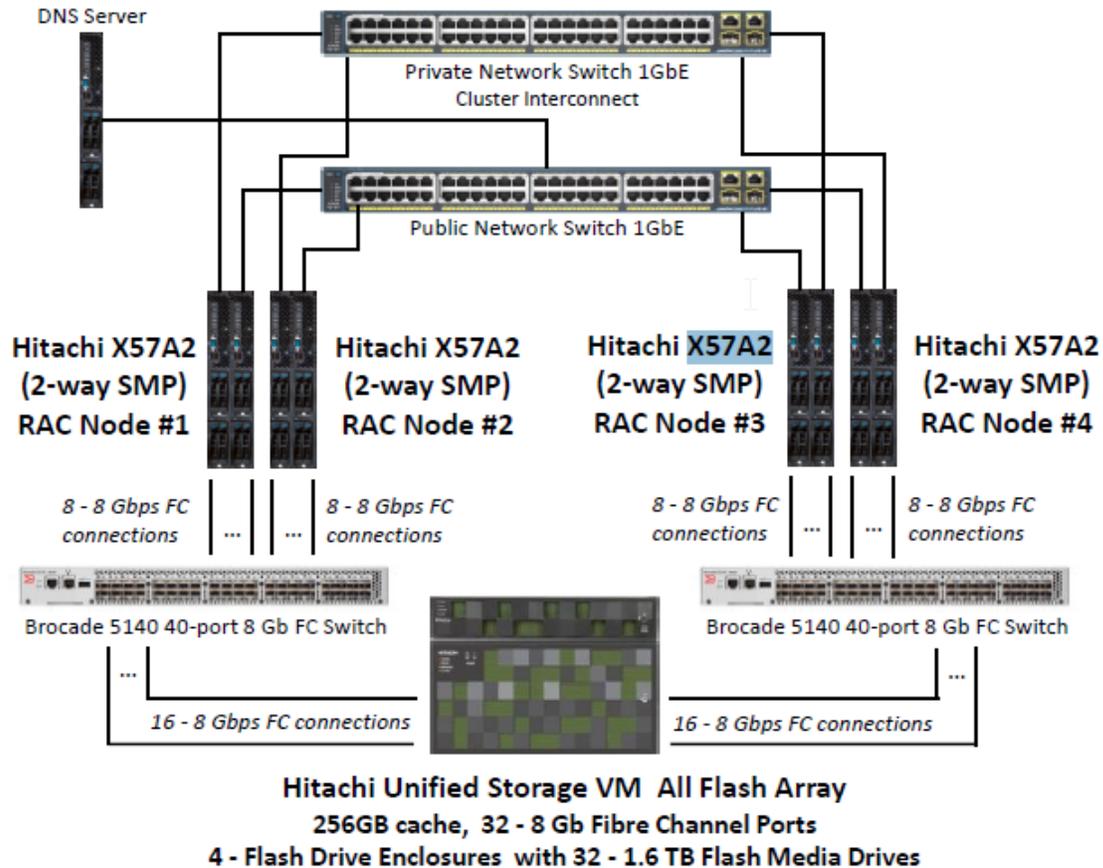


Figure 1. HUS Reference Platform With CB 2000

Using the HUS VM reference platform with the Hitachi Compute Blade 2000, Benchware achieved outstanding Oracle I/O performance in benchmarks for both sequential and random I/O operations. This benchmark utilized a system architecture available from HDS in a converged platform, the Hitachi Unified Compute Platform Select for Oracle Database.

Oracle storage performance: random read

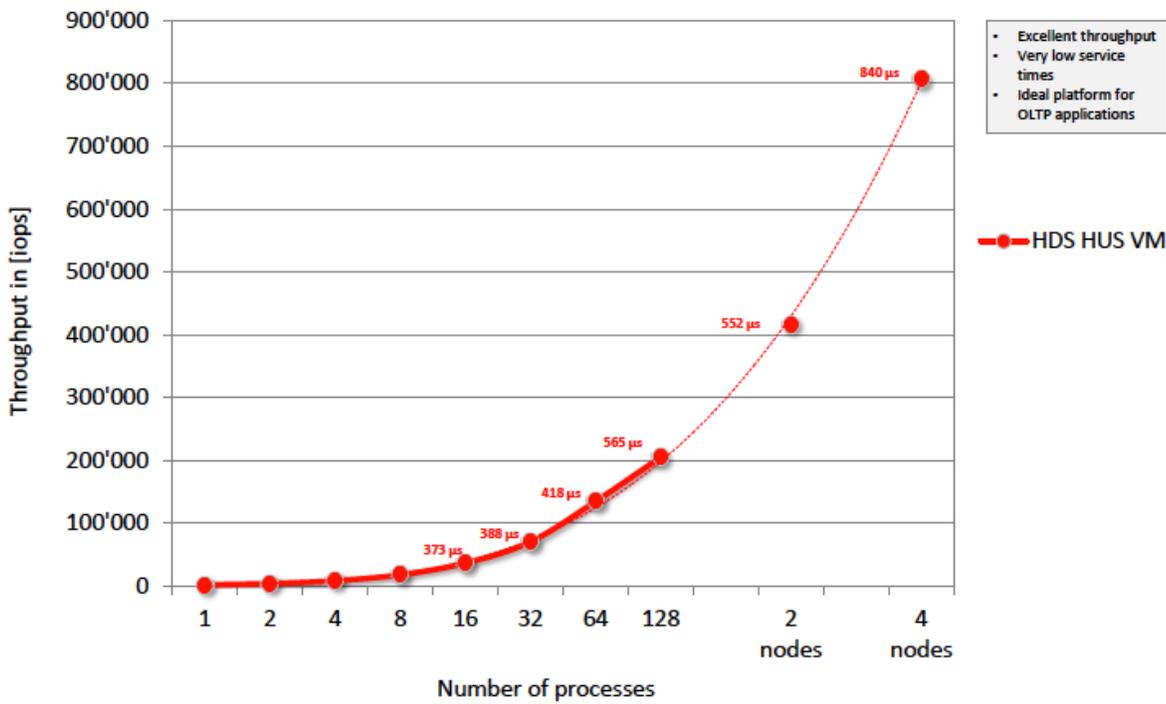


Figure 2. Oracle Storage Performance: Random Read

HUS VM achieves a high 806,000 IOPS for 8KB random read miss operation while maintaining below 1ms response time. Benchware scales the number of parallel processes within a single node from 1-128 and then adds 2 nodes and 4 nodes for a total of 512 parallel processes.

Oracle storage performance: sequential read, single process

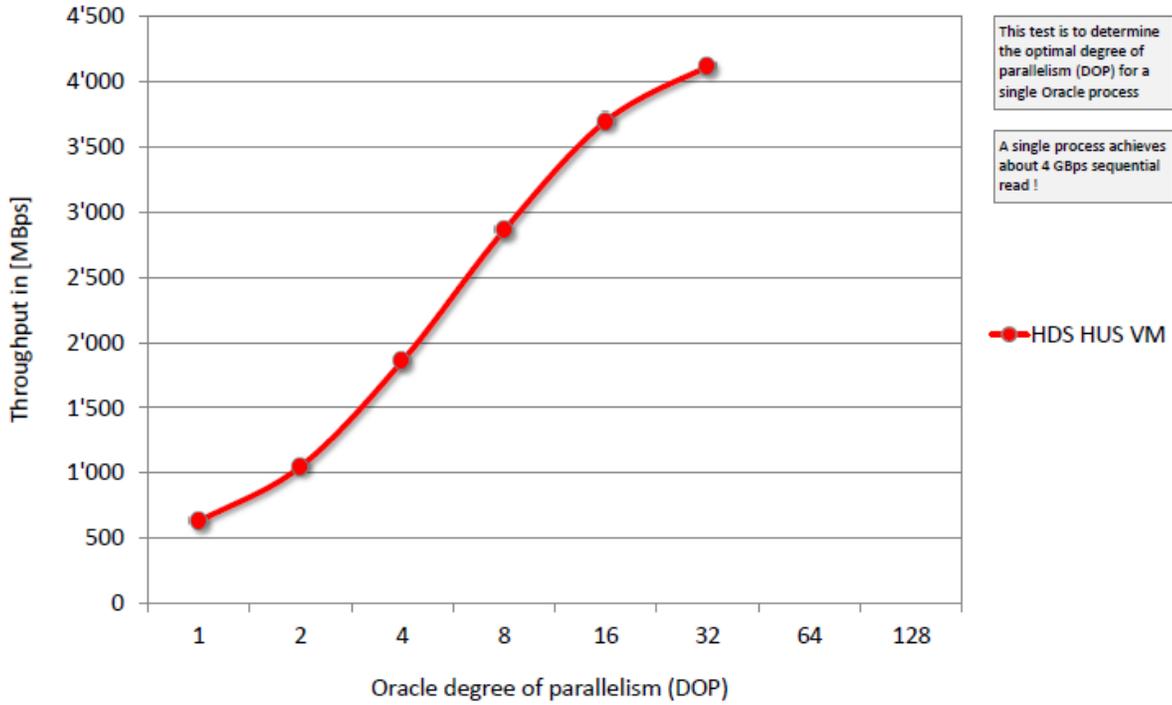


Figure 3. Oracle Storage Performance: Sequential Read, Single Process

Oracle storage performance: sequential write

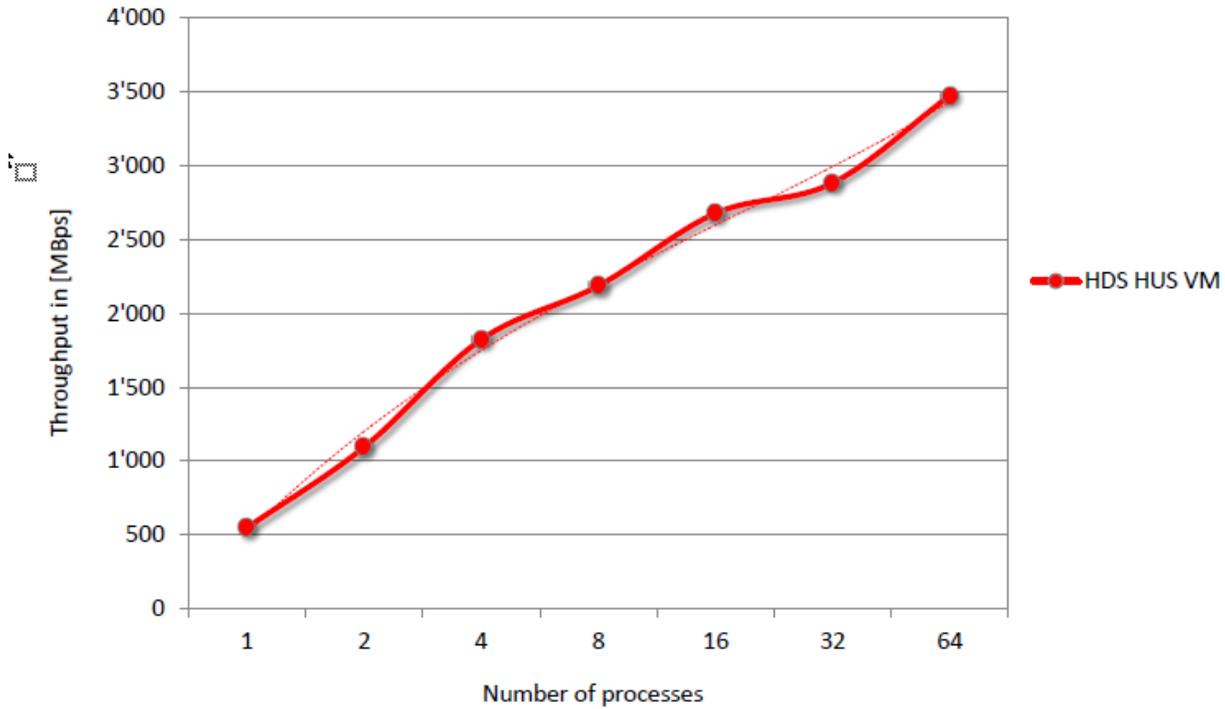


Figure 4. Oracle Storage Performance: Sequential Write

I/O performance is crucial to your Oracle environment, but so is database performance. Benchware also examined Oracle database loading and OLTP transaction performance on the HUS VM all-flash array, and found that Hitachi flash storage delivers superior performance.

Database transactional load, single process, different transaction size

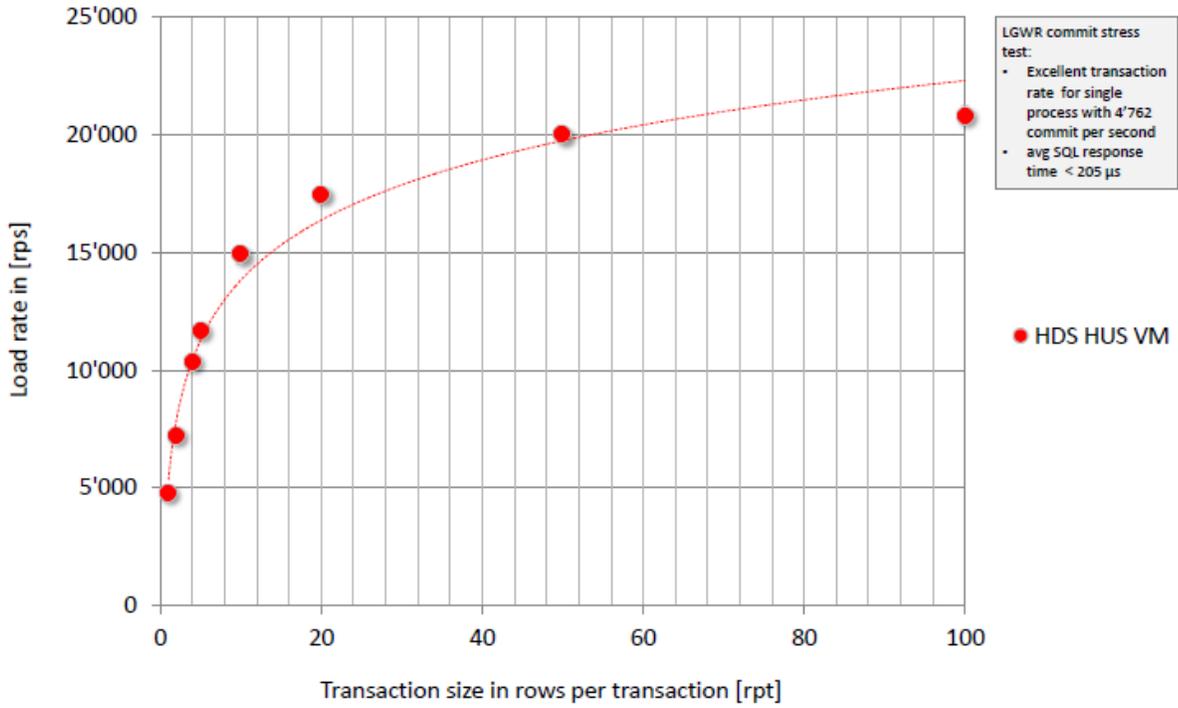


Figure 5. Database Transactional Load, Single Process, Different Transaction Size

Oracle OLTP select performance, 1 row per transaction

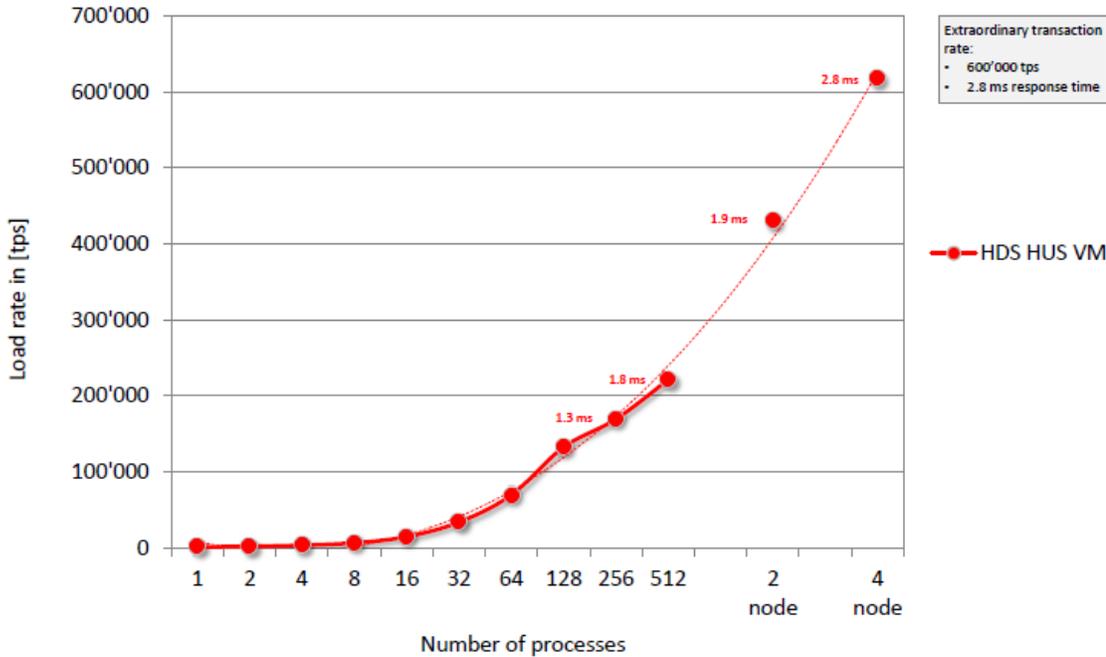


Figure 6. Oracle On-Line Transaction Processing (OLTP) Select Performance, 1 Row per Transaction

Oracle on HUS VM All-Flash Array Benchmarks

[READ MORE](#)

Storage performance is essential not only for overall Oracle database performance, but also for system management tasks like backup, recovery and archiving. Because Oracle adapts to its host operating system and load to maximize performance, evaluating Oracle storage performance requires looking at many different performance aspects. These aspects can range from input/output operations per second (IOPS) to transactions per second in a wide variety of scenarios. In evaluating the HUS VM all-flash array, Benchware saw outstanding Oracle performance across the board, giving you top-flight application performance for your most critical data. See Tables 1 and 2.

TABLE 1.

Random read	806,000 IOPS
Response time	0.840 ms
Random write	532,985 IOPS
Response time	1 ms
Sequential read	18.5GB/sec
Sequential write	6.4GB/sec

TABLE 2. BENCHMARK REPORTS HUS VM DATABASE PERFORMANCE

OLTP throughput: select transaction	617,000 transactions per second
OLTP response time	2.8 ms
OLTP throughput: update transaction	120,000 transactions per second
OLTP response time	14 ms
Uncompressed data load: OLTP insert	549,000 rows per second
Uncompressed data load: bulk load	2,840,000 rows per second

Hitachi Data Systems: The Right Storage Choice for Oracle

Hitachi Unified Storage VM all-flash array provides proven performance for the most demanding Oracle environments. But while performance is crucial for your business critical applications, you want a storage vendor that has demonstrated expertise with Oracle environments. Hitachi Data Systems has over 20 years of experience with enterprise Oracle environments. Nine of the top 10 U.S. commercial banks, 8 of the top 10 U.S. insurance companies, and the top 3 U.S. telecommunications companies run Oracle on Hitachi storage.

Not only does Hitachi provide superior performance for Oracle environments, but it also provides management and optimization tools developed specifically for Oracle, such as:

- Storage Evaluator for Database analysis tool from Hitachi Data Systems allows for peak optimization of Oracle storage space.
- Storage virtualization allows HUS VM to manage heterogeneous, externally attached storage systems, which can be redeployed, migrated or utilized more easily and effectively.
- Hitachi Dynamic Provisioning software works well with Oracle Automatic Storage Management (ASM) in accurately managing capacity and providing superior performance, utilizing wide striping on the storage system.
- Hitachi Dynamic Tiering software automatically places the right data on the highest performing or most cost-effective media at the right time.
- Hitachi Storage Adapter for Oracle Enterprise Manager allows database and storage administrators to monitor and manage their storage infrastructure from within Oracle Enterprise Manager. It provides real-time visibility into utilization, availability and performance metrics and enables database and storage administrators to optimize their storage infrastructure for Oracle database applications.
- Hitachi Storage Adapter for Oracle Recovery Manager (RMAN) allows your administrators to manage storage backup and recovery from within Oracle Enterprise Manager Grid Control System. The solution provides out-of-the-box integration to Oracle Recovery Manager and Oracle Enterprise Manager Grid Control System.

- HUS VM is also available in Hitachi Unified Compute Platform (UCP) Select for Oracle Database. This solution is available in a scale-up configuration for Oracle single instance deployments or a compute cluster that can run Oracle Real Application Clusters (RAC). Hitachi has created a high availability reference architecture supporting Oracle Data Guard on UCP Select.

UCP Select
Oracle RAC
Lab
Validation

READ NOW

Hitachi Storage: Closing the Performance Gap

As the gap between processor performance and storage performance continues to grow, enterprises need a storage solution that helps close the performance gap. They need a solution that enables high performance for business-critical applications to satisfy business demands. While flash storage holds the promise of superior performance, enterprises need a storage solution that provides the performance of flash, with the reliability, scalability and manageability of traditional enterprise storage.

Hitachi Data Systems leads the way with the Hitachi Unified Storage VM all-flash array.

Hitachi Unified Storage VM

Hitachi Unified Storage VM is an entry-level enterprise storage platform that combines storage virtualization services with unified block, file and object data management. This versatile, scalable platform offers a storage virtualization system to provide central storage services to existing storage assets. Its centralized end-to-end storage management for all virtualized internal and external storage also simplifies IT tasks and improves overall storage service levels.

Hitachi Compute Blade 2000

Hitachi Compute Blade 2000 is an enterprise-class blade server platform. It offers logical partitioning that extends the benefits of high-performance, high-density blade computing and virtualization to more areas of the enterprise data center. This blade server integrates network, power and server resources into a single, space efficient, flexible solution.

Hitachi Unified Compute Platform Select for Oracle Databases

This benchmark utilized a system architecture available from HDS in a converged platform. UCP Select for Oracle Database has been engineered specifically for Oracle workload requirements, high performance, responsiveness and mission-critical reliability. UCP Select for Oracle Database is available in a scale-up configuration for Oracle single-instance deployments or a compute cluster that can run Oracle RAC.

Summary

Organizations of all sizes and in all industries make increasing performance demands of Oracle environments. However, the current I/O gap between server and storage performance has proven to be a formidable challenge to overcome. Businesses need high-performance Oracle storage environments to enable faster decision-making and maximize server utilization and data center efficiency.

Benchmarking has proven in rigorous tests how HUS VM all-flash array provides superior performance on your Oracle database infrastructure to meet the most demanding application performance requirements.

With HUS VM, you get the superior performance you've been looking for with the scalability and reliability that make HDS an industry leader. With more than 20 years of Oracle experience, HDS brings unparalleled expertise and storage planning management tools to make your Oracle database applications meet the growing demands of your enterprise.

Resources

Oracle on HDS HUS VM All-Flash Array Benchmark Report

http://www.benchmark.ch/fileadmin/template/downloads/Benchmarks/2013_HDS_UCP_HUS_STO_DBS_Benchmark_EN_4.2_.pdf

Hitachi Accelerated Flash: An Innovative Approach to Solid-State Storage

<http://www.hds.com/assets/pdf/hitachi-white-paper-accelerated-flash-storage.pdf>

Evaluator Group - Hitachi Unified Storage VM: All-Flash Solution

<http://www.hds.com/assets/pdf/hitachi-unified-storage-vm-all-flash-solution.pdf>

Hitachi Unified Compute Platform Select for Oracle Databases

<http://www.hds.com/assets/pdf/hitachi-ucp-select-for-oracle.pdf>

Hitachi Unified Compute Platform Select for Oracle Database With Hitachi Unified Storage VM and Hitachi Accelerated Flash Using a N+1 Cold Standby Server and Oracle Real Application Clusters: Reference Architecture Guide

<http://www.hds.com/assets/pdf/hitachi-ucp-for-oracle-database-with-hus-vm-and-hitachi-accelerated-flash.pdf>

Hitachi Unified Compute Platform Select for Oracle Database With Hitachi Unified Storage VM and Hitachi Accelerated Flash Using N+1 Cold Standby and Oracle Real Application Clusters Certification: Lab Validation Report

<http://www.hds.com/assets/pdf/hitachi-ucp-select-for-oracle-db-with-hus-vm-and-hitachi-accelerated-flash.pdf>

Deploy Hitachi Unified Compute Platform Select for Oracle Database Using Oracle Database 11g R2 Enterprise Edition in a Medium-Sized Solution: Reference Architecture Guide

<http://www.hds.com/assets/pdf/deploy-hitachi-ucp-select-using-oracle-database-11g-r2-enterprise-edition.pdf>

Deploy Hitachi Unified Compute Platform Select for Oracle Database Using Oracle Database 11g R2 Enterprise Edition in a Medium-Sized Solution Implementation Guide

<http://www.hds.com/assets/pdf/deploy-hitachi-ucp-select-for-oracle-database-in-medium-sized-solution.pdf>

Hitachi Compute Blade 2000

<http://www.hds.com/assets/pdf/hitachi-white-paper-compute-blade-2000.pdf>



Hitachi Data Systems

Corporate Headquarters
2845 Lafayette Street
Santa Clara, CA 96050-2639 USA
www.HDS.com community.HDS.com

Regional Contact Information
Americas: +1 408 970 1000 or info@hds.com
Europe, Middle East and Africa: +44 (0) 1753 618000 or info.emea@hds.com
Asia Pacific: +852 3189 7900 or hds.marketing.apac@hds.com