

Hyperconverge Oracle: Support Business-Critical Apps with Ease



Introduction

The siloed nature of traditional infrastructure makes it difficult for IT teams to deliver and manage Oracle applications with the flexibility today's tech-savvy users demand.

SOLUTION OVERVIEW

Learn how hyperconverged infrastructure (HCI) powered by VMware® vSAN™ makes it easy to streamline workflows and achieve greater agility—specifically on Oracle workloads, it provides your critical applications with the highest performance, application availability, and flexibility—all while driving down costs.

CUSTOMER CASE STUDY

Union Hospital, a not-for-profit healthcare system based in Terre Haute, Indiana, used vSAN to solve growing challenges around performance, storage, and cost. With data storage requirements increasing, it didn't make sense for the hospital to invest in more physical storage. In the case study, you'll get a closer look at how they turned to VMware for a virtual solution that saved them money, improved performance, and kept data and users secure.



HYPERCONVERGED INFRASTRUCTURE FEATURED WORKLOAD

Oracle on VMware vSAN

Oracle on VMware vSAN

Modern infrastructure delivers a powerful new operating model for your critical applications

UNIQUE CAPABILITIES

Adopt a simplified, more efficient operational model:

- **Unified management from edge to core to cloud** – Use VMware vCenter® to manage all your Oracle workloads centrally with the same tool, regardless of where the application runs, including the public cloud.
- **Run Oracle on the HCI industry's largest ecosystem** – Run vSAN on more than 500 ReadyNodes or VxRail, an appliance jointly engineered with Dell Technologies. vSAN also has native services with AWS and IBM Cloud.
- **Storage policy-based management (SPBM) simplifies operations** – Define desired outcomes for your Oracle workloads, and apply storage policies to achieve performance, protection, and space efficiency objectives.
- **vSAN native encryption** – Secure Oracle Database with the industry's first native, FIPS 140-2 validated HCI encryption solution.

Deliver your Oracle application needs with HCI powered by vSAN

Virtual environments can sometimes be subject to unwanted limitations within a data center, forcing organizations to run applications within the constraints of the devices, solutions, and architecture that make up the environment. Due to these limitations, organizations have traditionally procured expensive, purpose-built infrastructure that led to the creation of silos, and required hardware expertise and highly manual, inefficient management and maintenance processes.

In response, many companies have been turning to hyperconverged infrastructure (HCI) to simplify operations and lower TCO on standardized x86-based hardware. VMware vSAN™ is an HCI software solution natively integrated with VMware vSphere®, the market-leading hypervisor. HCI clusters powered by vSAN allow administrators and application owners to deploy and run their solutions tailored to the needs of the application.

Oracle Database is a leading relational database management system used in business-critical applications. Oracle running on a cluster powered by vSAN provides high performance, application availability, and operational flexibility while driving down costs to meet the demands of an organization for today and tomorrow.

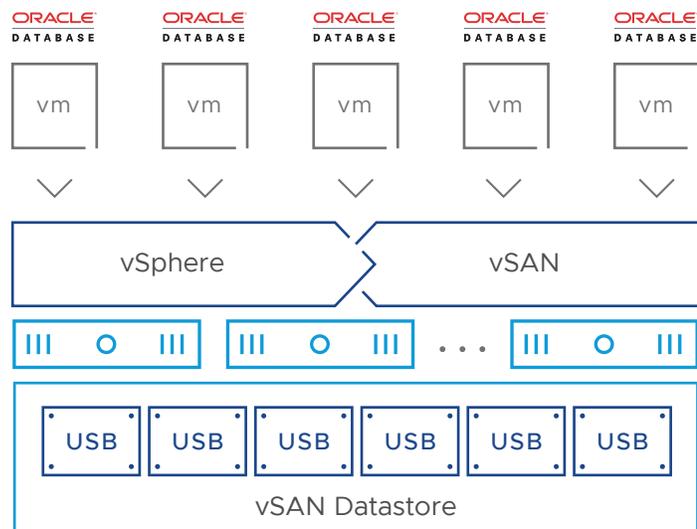


FIGURE 1: Oracle running on a vSAN cluster.

QUICKLY ADAPT TO EVOLVING BUSINESS REQUIREMENTS

- Adopt and integrate the latest hardware technologies, such as Intel Optane SSD, into a cluster.
- Scale up or out incrementally as needed.
- Maintain full independence of storage from demands of other clusters. Just as with compute and memory, vSAN storage is a cluster resource that remains independent from other clusters.

Increased agility through SPBM

vSAN was built around the idea of assigning storage-related settings on a per-VM basis, or even a per-virtual disk basis. This level of control allows for an administrator to be prescriptive to the specific Oracle server based on its role in the data center. You can easily increase the level of failures to tolerate on one Oracle server, while applying policies that focus on limiting I/O resources for another Oracle server. This allows for a prescriptive level of control that is not possible with other approaches.

High performance through native hypervisor integration

The performance of an Oracle server can play a key part in delivering performance to business-critical applications. To meet the service-level requirements of an application, the underlying platform must deliver consistent performance under a variety of conditions. vSAN achieves this in part through a distributed object storage system directly integrated into the hypervisor.

Providing the native storage services directly into the hypervisor avoids the management complexity, I/O inefficiencies, and CPU amplification commonly found in other HCI solutions that use virtual appliances to provide storage services. This native integration allows hypervisor- and cluster-level activities—such as snapshots, VMware vSphere High Availability, and VMware vSphere Distributed Resource Scheduler™—to be fully aware and compatible with vSAN. Running Oracle workloads on the vSAN platform enables administrators to run more VMs per host with more consistent performance while maintaining the operational capabilities found in other vSphere clusters.

Optimize storage efficiency through granular controls

Some databases are used for highly transactional and repeating processes, while others are used for large data warehouses that might reflect less transactional activity but require much more storage capacities. vSAN allows the prescriptive space efficiency settings on a cluster-wide, per-VM, or per-VMDK basis.

For example, if a certain Oracle VM (or even a specific virtual disk) is particularly sensitive to latency and performs many high-volume continuous writes, it could benefit from a specific policy causing that data to be stored in resilient, low-impact mirrors instead of an erasure coded set (this is referred to as vSAN RAID 1 vs. vSAN RAID 5/6).

Conversely, development, testing, and staging systems could be configured in the more space-efficient erasure coded fashion. Additionally, the data could be striped across more disks within the cluster to increase engagement and drive greater performance. Such changes can be made in real time without the costly maintenance windows involved in rebooting or migrating VMs.

Scale in parallel with applications for consistent performance

Application scaling is an important concept as it allows the application to scale up or out to meet the growing demands of an organization. Some Oracle use cases require large amounts of CPU, memory, and high-performance storage.

vSAN allows for hosts to be scaled up and clusters to be scaled out to meet workload demands. For example, storage can be grown incrementally by adding a disk or two to each host, smaller disks can be replaced for larger ones, or more hosts can be added to a cluster. This means that vSAN storage performance and capacity can grow incrementally and predictably as the demands and quantity of the databases grow.

LEARN MORE ABOUT ORACLE AND vSAN

- [Virtual Blocks](#) – The VMware blog site for all topics related to storage and availability
- [StorageHub](#) – The one-stop location for all documentation on storage and availability, including existing [Oracle on vSAN reference architectures](#)

Resilience

Oracle provides application-level high availability through Oracle RAC and disaster recovery with Oracle Data Guard, which can be used to complement the enterprise-class resiliency features within vSAN. The user-customizable storage-level resilience is built directly into vSAN, which is suitable for even the most demanding requirements. You can easily choose levels of failure protection defined by a storage policy, and simply apply it to a VM or virtual disk. vSAN protects beyond the disk to create resiliency at the node and cluster level, assuring your key Oracle data is well protected from many possible failure events.

vSAN is self-healing. In case of failures, it attempts to re-establish the full compliance of the storage protection policies assigned to the affected VM. It performs resynchronization actions automatically, all while maintaining a fair balance of resynchronization and guest VM traffic to ensure the Oracle servers are able to maintain sufficient levels of performance at all times.

Summary

- The OLTP performance of Oracle Database on vSAN is excellent thanks to the rapid innovation in vSAN software and next-generation hardware.
- vSAN SPBM allows granular control for different Oracle Database disks to provide a balance between space efficiency and performance.
- Adaptive resynchronization in vSAN helps deliver consistent performance while maintaining data resiliency, a key tenet for critical Oracle Databases.
- vSAN is an HCI platform capable of delivering scalability, resiliency, availability, and high performance to Oracle Database environments.



FEATURED CUSTOMER CASE STUDY

Union Hospital


 A photograph of a modern hospital building with a large sign that reads "UNION HOSPITAL" and "EMERGENCY" below it. The sign is white with red and blue accents. The building has many windows and a modern architectural style.


INDUSTRY

HEALTHCARE

LOCATION

TERRE HAUTE, INDIANA

KEY CHALLENGES

- Expensive to replace aging storage solution.
- Performance could not keep up with increasing workloads.
- Latency issues impacted delivery of patient services.
- Ongoing system maintenance was costly.

SOLUTION

Virtual SAN is hyperconverged storage from VMware for virtual machines. It delivers storage for virtualized applications with a scale-out architecture leveraging x86 servers and server-side flash. This drastically lowers TCO while providing a high performance and scalable storage solution.

BUSINESS RESULTS

- Fast database performance sped up application response times
- Budget-friendly scale-out expansion eliminated need for costly storage upgrades
- Easy-to-manage solution reduced maintenance cost

Union Hospital Addresses Storage, Performance, and Cost Concerns with VMware Virtual SAN Solution

Faced with aging hardware and maxed-out resources, Union Hospital had to decide whether to replace its existing storage system or migrate to a completely different platform. After evaluating solutions from several vendors, it chose to purchase the VMware Virtual SAN™ product. The decision saved money, solved key application performance challenges, delivered scalability, and freed up operational resources, positioning Union Hospital for future expansion.

Founded in 1892, Union Hospital is a not-for-profit healthcare system based in Terre Haute, Indiana, that provides care to residents of the Wabash Valley, regardless of income. It operates 2 hospitals and 18 clinics in Indiana and Illinois, with more than 330 healthcare providers. For five years, Union Hospital and Union Hospital Clinic have been recognized by Hospitals & Health Networks magazine's "Most Wired Hospitals" survey for excellence in information technology.

The Challenge

In 2012, Union Hospital began taking a close look at its data storage requirements. At the time, it was relying heavily on a NetApp storage system, which was aging, decreasing in capacity, and causing performance-related concerns.

"We had reached the end of life on our NetApp and on our HP storage," explains Chad Elliott, network systems consultant at Union Hospital. "We were running out of storage resources. There really wasn't any more horsepower to get out of the system. We were hitting a wall."

The IT organization had a complex environment made up of products from a range of vendors. Although NetApp was the primary storage platform, the hospital's IT team also relied on HP, Citrix, and Cisco products.

The system struggled to keep up with the loads required by Union Hospital's mission-critical applications, such as GE Healthcare's Centricity solutions for electronic medical records (EMR), practice management, and imaging and Siemens Soarian Clinicals for lab work, patient orders, and charting. The organization's more than 3,000 users experienced long application launch times, sluggish page refreshes, slow reporting,

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CHAD ELLIOT
NETWORK SYSTEMS CONSULTANT
UNION HOSPITAL

VMWARE FOOTPRINT

- VMware Virtual SAN
- VMware vSphere

APPLICATIONS VIRTUALIZED

- GE Healthcare Centricity EMR
- GE Healthcare Centricity practice management solution
- GE Healthcare Centricity PACS
- Siemens Soarian Clinicals
- Oracle Database
- Microsoft SQL Server

significant latency, and occasional system crashes, all of which negatively impacted the quality of patient services. It also was becoming more costly to manage the NetApp system as it aged, as much as \$500,000 per year.

It became clear that an upgrade was required, and one was scheduled for summer 2014.

In 2013, GE Healthcare announced that it would start supporting virtual platforms for its Centricity applications. So, together with Joink, a Terre Haute-based Internet service provider and virtualization partner, Union Hospital set out to evaluate whether a Virtual SAN solution made sense.

“We looked at other vendors off and on, but most of those other vendors seemed to be relatively new to market,” Elliott explains. “And with hardware storage array purchases, we were looking at over a million-dollar investment. The intention was not to budget a forklift replacement but to ease over from traditional storage to a virtual solution.”

The Solution

“Based on our preliminary testing,” Elliott says, “we decided to pursue Virtual SAN.”

The VMware Virtual SAN product offers several benefits compared to other solutions. Union Hospital already had an existing VMware vSphere® environment, which had just been migrated to new Cisco UCS C-Series servers. “We were able to take that UCS investment and build on it with additional hardware instead of buying something new,” Elliott says. “We had also upgraded to 10 Gigabit Ethernet, so it was already there and ready for Virtual SAN.”

The VMware Virtual SAN solution is scalable, which is a big advantage. “With other monolithic SANs, you have to buy all you need right now, but you can buy Virtual SAN in chunks and scale linearly,” notes Chad Killion, technical manager of client services at Joink. “Together, we decided that it would be most advantageous, both for cost and for performance, to go with Virtual SAN because they could grow it as needed, one node at a time. It kind of blew our minds to experience something this innovative with storage.”

Moving to the Virtual SAN environment would also allow Union Hospital to consolidate its system, rather than having to use products from multiple vendors for a single solution.

Joink and Union Hospital were confident in the ability of VMware to support the solution. “VMware has an excellent reputation, and its support services have always been excellent,” says Elliott. “It’s the support by which I measure all other companies’ support because it’s always gone above and beyond. Even though we were extremely early adopters of Virtual SAN, we were confident VMware would deliver.”

The solution went live in March 2014 at half the cost of a NetApp replacement. The results have been everything Union Hospital expected and more.

Business Benefits

Bobby Andreae, network systems consultant and Citrix administrator at Union Hospital, started the migration onto the VMware Virtual SAN environment. “The new Virtual SAN has performed tremendously faster. Application launch times went from approximately 30 seconds to less than 10 seconds in most cases, sometimes even closer to 5 seconds. We also were able to achieve more than 53,000 IOPS on Virtual SAN, when we were previously seeing around 900.”

When Elliott and his team tested the Centricity EMR system for one of the hospital's clinics, reports that had taken 30 minutes to run were taking just 5 minutes. "We actually had clinics calling us up to say how much faster the apps were running once they were in a pure Virtual SAN environment," says Elliott.

Accessing patient records and retrieving appointment data was critical for the doctors, nurses, and medical staff. Earlier latency issues slowed down the Oracle database and the Centricity SQL Server database. It was common to see latency as high as 200 milliseconds throughout the day, but now it's often under 1 millisecond, resulting in very fast response times for patient database operations.

The new system can also support more concurrent sessions. "We can host a significantly higher number of Citrix users on a virtual Citrix XenServer of comparable specs versus our old environment," Andreae says. "Generally we would reach a ceiling of 40 users and then we would start seeing issues. We've had more than 85 users in this new environment with no reports of performance degradation."

Union Hospital found an unexpected advantage to migrating over to the Virtual SAN solution: reclaimed resources in the data center. The addition of Cisco UCS servers in 2013 combined with the launch of the VMware Virtual SAN solution in 2014 freed up more than 100 copper ports and 1 blade in two core Cisco routers in Union Hospital's data center. "We probably gained back years on our capacity in our data center. We were running out of space, but now we have room to grow without having to invest in more equipment," Elliot says.

All of this performance, scalability, and storage improvement comes without an increase in system maintenance, which is a plus for Elliott and his team. "Managing Virtual SAN has proven to be about as simple as it can get. You add some disks, you claim those disks, and you're done," notes Killion. "It's less than a tenth of what I have to do on NetApp. I would go so far as to say that managing Virtual SAN is kind of an oxymoron."

Since launching the Virtual SAN solution, Union Hospital has added two nodes and doubled the number of disks on each node for a total of 74TB of raw storage space. The response has been so positive that everyone wants their projects on the Virtual SAN environment. "It seems like the more things we migrate to Virtual SAN, the more people are asking to be on it," Killion says.

Looking Ahead

The move to a pure VMware Virtual SAN environment will continue. Union Hospital has plans to add at least one node per quarter and eventually to migrate everything off of its existing external storage arrays. "Being able to scale in smaller chunks makes it easier to get budget approval," says Elliott. "The migration has bought us time. We were able to see a performance increase with the new system and some relief on the old system. But our goal is to completely phase in Virtual SAN for all our applications."

Elliott is excited about the future Virtual SAN roadmap. "It seems that VMware has bet heavily on this and sees the opportunity for people like us to be able to bite off storage in small chunks. It's a game changer."