Oracle ZFS Storage Appliance
Ideal Storage for Virtualization and Private Cloud

Support 10x more VMs per storage system (compared to conventional NAS filers), while reducing cost and complexity and improving performance.

Data center managers have learned that virtualization environment SLAs can live and die on the behavior of the storage supporting them. Oracle ZFS Storage Appliance is rapidly becoming the storage system of choice for some of the world’s most complex virtualization environments—for three simple reasons: a cache-centric architecture combining DRAM and Flash that is ideal for multiple and diverse workloads, a sophisticated multithreading processing environment that easily handles many concurrent data streams, and unparalleled analytics visibility into complex consolidation environments. These features combine to provide a powerful breakthrough solution for deploying storage behind virtualization and private cloud computing.

The Value of Having the Right Storage for Virtualization and Private Cloud Computing

Private cloud computing extends the benefits of virtualization by increasing the efficiency of server and storage utilization: reducing costs, improving operational efficiency, and optimizing data center rack and floor space. This changes the way data center managers think about storage, shifting the conversation to: how many virtual machines (VMs) can I run on each storage system and can its performance excel in random, mixed workloads generated by unpredictable VM utilization? It’s no longer a problem of increasing connectivity to get to better utilization; but instead, it’s about how much a system (with thin provisioning, for example) can be pushed beyond 100 percent of its raw capacity. Nor is it a matter of adding more storage systems to gain a performance advantage, it’s about finding a system that can handle virtual I/O peaks with ease.

How much does the storage you choose impact your virtualization scale and meet performance expectations? Oracle IT ran on NetApp filers with 250 VMs per filer. To achieve its consolidation goals and support its extensive virtualization environment, Oracle IT moved to Oracle ZFS Storage Appliances and found that the number of VMs jumped to 2,300 per ZFS Storage Appliance — with processing headroom to spare. Today, the new Oracle ZFS Storage Appliance ZS3 Series can simultaneously boot as many as 16,000 VMs in under 7 minutes.
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DRAM-centric architecture dramatically increases the number of VMs you can deploy per system, lowering costs and increasing efficiency.

- True symmetric multiprocessing (SMP) OS prevents system from being overwhelmed by VM threads and boot storms.
- DTrace Analytics provide VM-level visibility into business-critical workloads to resolve performance issues.

Scalable Performance, Efficiency and Reliable Data Protection

The keys to using Oracle ZFS Storage Appliance for private cloud and virtualization workloads are:

- **Highly Scalable Performance to Support Increased VM Density**: Heavily virtualized environments have thousands of VMs with simultaneous and diverse workloads stressing the storage environment—generating many hundreds of threads. Oracle ZFS Storage Appliance has a mature, highly threaded symmetric multiprocessing (SMP) operating system that takes full advantage of up to 80 processor cores per system (on the ZS3-4). Competitors don’t offer highly scalable SMP operating systems, or this level of multithreading capabilities.

- **High Performance for Better Boot Storm Management**: Larger caches and an intelligent caching architecture (Hybrid Storage Pool, a feature of Oracle ZFS Storage Appliance) combine massive dynamic random access memory (DRAM), solid-state drives (SSDs), and the ZFS file system. This architecture prevents the typical saturation of resources caused by intense concentration of I/O in virtual desktop and VM environments and delivers fast reads and writes critical for the high performance needed to meet the challenges posed by random I/O workloads. Oracle ZFS Storage Appliance handles boot storms better than other systems because it serves up to 90% of I/O out of DRAM, which allows boot images and hot data to be served more efficiently.

- **Highly Granular Insight to Increase VM Performance**: DTrace Analytics, another built-in capability of Oracle ZFS Storage Appliance, enables administrators to quickly determine why a particular VM is slow, or which VM is making the other VMs slow. This granular level of analysis can prevent a company from having one or two VM users corrupt a multi-thousand 10,000-VM system by identifying the performance issue to user No. 43 on VM No. 948 as the culprit, for example. This kind of visibility in a highly virtualized environment makes Oracle ZFS Storage Appliance very appealing. No other vendor offers anything close to this level of granular analysis, and it’s vital to operating VM environments at scale. When comparing storage analytics in a head-to-head test with the competition, Strategic Focus found that workload diagnosis took 73 percent less time with 19 percent fewer steps to achieve that analysis.

Improving Operational Efficiency

Consolidation increases risk. Prior to the deployment of a virtualization initiative, the day-to-day tasks associated with sustaining availability were labor intensive, complex, and difficult. These critical tasks are dramatically simplified with Oracle ZFS Storage Appliance’s easy-to-use management interface, which takes the guesswork out of maintaining a reliable storage environment for virtualized applications. Oracle ZFS Storage also offers a full-featured RESTful management API and integrates with critical orchestration environments like OpenStack and Oracle Enterprise Manager to further streamline operations.
A Single Solution for Multi-Hypervisor or Single Hypervisor Environments

Key capabilities such as thin provisioning, compression, and deduplication work in concert with hypervisors like Oracle VM, Microsoft Hyper-V, and VMware on the Oracle ZFS Storage Appliance. They eliminate duplicate data blocks, compress data, and allocate the amount of storage being consumed by users compared to over-allocation that wastes valuable storage capacity and leads to filer sprawl and increases capital costs.

The savings from the use of these features further extend to operational costs as they were found to be superior to the competition during a head-to-head comparison conducted by the Strategic Focus. In the study, the Oracle ZFS Storage Appliance took 73 percent less time to manage and troubleshoot.

Data services such as snapshots and clones provide instant, and optionally unattended, backups that can be used in the short term for recovery of business-critical data. Third-party backup/recovery solutions (like Symantec OST) that are already integrated with the Oracle ZFS Storage Appliance provide an all-important long-term backup and recovery solution leveraging Oracle StorageTek tape solutions for the cloud computing storage architecture.

Maximizing VMware VMs Availability with Oracle ZFS Storage Appliance

Oracle ZFS Storage Appliance integrates with VMware Site Recovery Manager, vSphere client, and VAAI NAS features for easy administration of infrastructure-as-a-service (IaaS) and platform-as-a-service (PaaS) environments.

VMware vMotion allows applications running in VMs to remain available during scheduled outages by migrating VMs that host business-critical applications from one application server to another without disruption. The Oracle ZFS Storage Appliance interoperates seamlessly with VMware vMotion to maintain connectivity with key data in file systems in NFS, iSCSI, and Fibre Channel environments.

VMware further extends this efficiency with a feature called Storage vMotion that migrates storage connectivity from one Oracle ZFS Storage Appliance to another without disruption. These capabilities work to maintain high availability by making business-critical applications and their associated storage portable, thereby keeping applications running and improving productivity.

Finally, Oracle ZFS Storage Appliance works with VMware's Dynamic Resource Scheduler (DRS) to support real-time expansion or contraction of computing environments dependent on key performance indicators.
Highly-efficient Oracle VM environments with the Oracle ZFS Storage Appliance

Oracle ZFS Storage Appliance integrates and inter-operates with Oracle VM both for server virtualization and private cloud computing, including single pane of glass provisioning using the Oracle VM Storage Connect feature. A key example of the value provided by these integrations is an Oracle VM feature called Live Migration that enables data migration from one server to another. Oracle ZFS Storage Appliance integrates seamlessly with Oracle VM Live Migration to maintain access to data. Oracle VM, in concert with Oracle ZFS Storage Appliance, can also be used to migrate Oracle Real Application Cluster (RAC) and Oracle RAC One Node databases. Oracle RAC One Node databases can migrate across virtual nodes in a cluster using its Online Database Relocation feature. Oracle RAC databases can also be relocated by adding and dropping database instances. Oracle ZFS Storage Appliance provides the required shared access to the database files, enabling seamless interoperability and delivering operational efficiencies in storage while working in concert to maintain business-critical application availability.

Conclusion

Oracle ZFS Storage Appliance offers compelling architectural, performance, and VM analytic advantages when compared to competing storage solutions. As Oracle ZFS Storage Appliances become increasingly integrated with the features and functions of today’s private cloud and virtualization environments, they have become the clear choice for private cloud consolidation.

For more information regarding Oracle ZFS Storage Appliance, visit:


For more information regarding Oracle virtualization, visit:


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