



VIRTUALIZATION WITH THE SUN ZFS STORAGE APPLIANCE

A COST EFFECTIVE STORAGE CONSOLIDATION SOLUTION THAT REDUCES INFRASTRUCTURE COSTS, IMPROVES PRODUCTIVITY AND SIMPLIFIES DATA CENTER MANAGEMENT.

KEY FEATURES

- Shadow Migration feature facilitates Storage Consolidation into the Virtualization Environment.
- Data Protection features such as snapshots, clones and replication.
- Storage Provisioning made easy with point and click shares/mount points and Thin Provisioning.
- Storage Efficiency features such as Thin Provisioning, Compression and Clones.
- Storage Analytics enabled by dTrace that provides observability into business critical storage workloads executing in Virtual Machines.

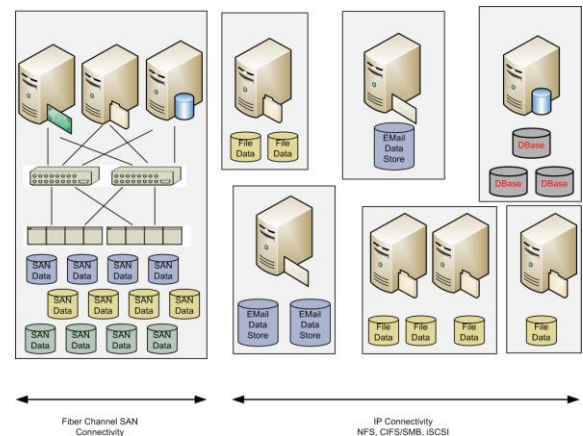
KEY BENEFITS

- All features included with no extra license fees.
- Instant recovery of data using snapshots and clones as well as Microsoft Volume Shadow copies.
- Savings in power and cooling and capital outlay for storage with storage consolidation efficiencies.
- Improve data center and business application productivity that quickly goes to your bottom line.
- Key integration with selected virtualization operating systems improves virtual machine migration, performance and data availability.

Datacenter sprawl is one of the larger challenges faced today by datacenter managers. Over time applications, servers and storage can create numerous unique architectures across the information technology (IT) infrastructure. This can introduce complexity, increase cost and compromise business critical application performance and availability.

The Value of Virtualization to Storage Consolidation

The key solution to data center application server sprawl today is server consolidation in the form of virtualization, because it can dramatically reduce data center costs and inefficiencies. Server consolidation in this paradigm is consolidating server compute resources that are distributed throughout the IT architecture and gathering them together to reside in one or more virtualized server platforms. The customer can choose from many virtualization solutions to resolve server sprawl. Oracle offers an enterprise grade virtualization platform called Oracle VM or OVM. There are others such as VMWare and Microsoft Hyper-V, both of which are ubiquitous in the Windows environment. Regardless of the solution, as you seek to resolve server sprawl issues what naturally comes next in the design is how to deploy storage in a virtualized environment. What many data center managers have discovered is that business critical data is usually what governs how applications are architected and deployed in the IT infrastructure. For an effective Server Consolidation outcome,



IT Architecture before Server and Storage Consolidation.

Storage Consolidation often occurs simultaneously with the goal of avoiding issues associated with islands of data such as storage manageability and data protection issues which can compromise business critical application availability and performance, introduce complexity and inflate cost. Prior to server and storage consolidation into a virtualization architecture for example, servers and storage are often deployed in such a way as that over time one business critical application often lacks storage or processing capacity while another has more than enough. While virtualization addresses the server related issues, the lack of a common storage platform with powerful data protection, provisioning and storage management features contributes to users duplicating copies of files and data, inflating the storage capacity requirement. This can often place data

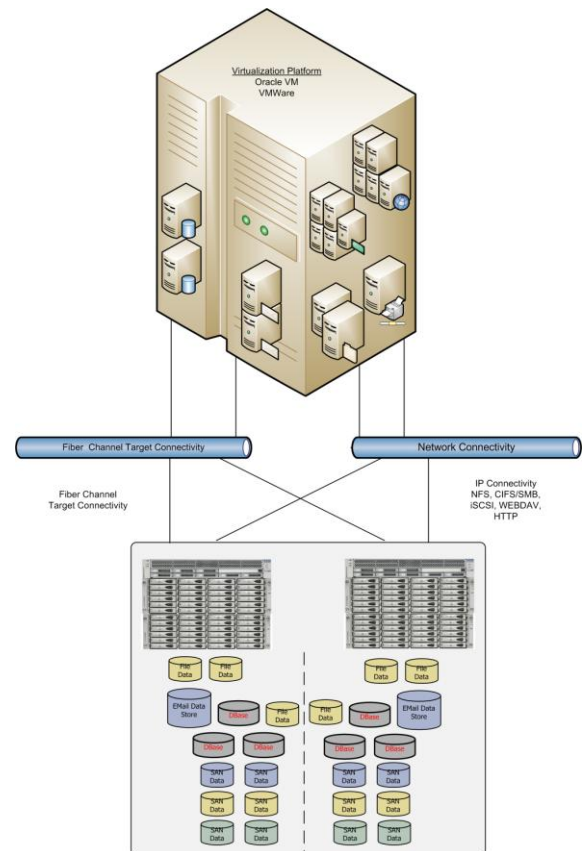
availability at risk affecting the reliability of business critical applications. Often, inefficiencies in this approach can cause storage overbuy which unnecessarily increases the capital budget and inflates ongoing power and cooling costs.

Sun ZFS Storage Appliance in a Virtualization Deployment

Oracle's Sun ZFS Storage Appliance is an ideal platform to deploy a storage consolidation solution in a virtualization environment. Your business critical applications running in your virtualization environment can benefit from powerful data protection and provisioning features.

These include features such as snapshots, clones, replication as well as compression and thin provisioning which efficiently manage capacity, reduce duplicate data and provide instantaneous backup and recovery of data while facilitating the longer term backup and recovery of data without loss of application and data availability. This contributes to improvements in productivity and reduces the need to unnecessarily purchase storage while dramatically reducing power and cooling costs.

Simplifying deployment of business critical data in a virtualization environment is critical and Sun ZFS Storage Appliance



IT Architecture after Server and Storage Consolidation.

provides a key feature

called Shadow Migration which reduces risk during the storage consolidation effort and can, as an Oracle OnDemand IT Manager described, “migrate a client as fast as the (data) share can be created” depending, of course, on the size of the data being migrated.

Operational efficiency is one of the critical goals when deploying virtualization and benefits with the profound insight offered by DTrace Analytics which provides key insight into business critical storage workloads running in virtual machines, keeping business critical applications up and available. Key insights offered by DTrace include ZFS Storage Appliance system activity from the kernel, to the virtual machine, the application, and out to the network.

Simplifying Storage in a Virtualization Environment

A key design concept to consider in your Virtualization deployment is how you can simplify the management of applications and their associated data in what might appear to be a increasingly complex infrastructure. When deploying and consolidating your storage in a virtualization environment, Sun ZFS Storage Appliance simplifies day to day

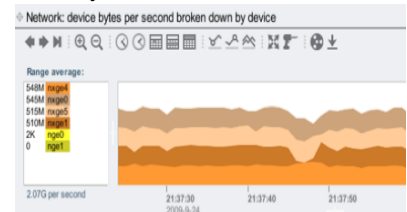
tasks associated with protecting data, preserving storage capacity, managing mission critical applications and executing reliable daily backup procedures and restores. Provisioning and management are dramatically simplified in the ZFS Storage Appliance with an easy-to-use management interface that takes the guesswork out of system installation, configuration, and tuning. In addition, the built-in suite of software data services and communication protocols eliminates add-on software evaluation and procurement hassles. DTrace analytics software provides the industry's only comprehensive and intuitive analytics environment. Administrators are provided with tools to quickly and intuitively identify and diagnose system performance issues, and perform capacity planning.

Reliable Data Protection

Protecting data is a key element in virtualization architecture. With Sun ZFS Storage Appliance data services such as snapshots and clones provide instant, unattended, backup and recovery. These services are also support in the Microsoft Windows environment via Microsoft Volume Shadow Copy services in the iSCSI environment. Data protection tasks are further extended and simplified with built-in ZFS based replication and depending on the virtualization platform, are integrated into virtual machine migration services.

Business Critical Virtual Machine Storage Observability

The easy to use and understandable user interface of the Sun ZFS Storage Appliance enables rapid familiarity due to the simplicity it offers in managing data, applications and day to day data center tasks. For example, business critical applications running in guest virtual machines with their associated storage workloads are easily managed using dTrace Analytics which gives unprecedented visibility to bottlenecks and other issues that might exist in the virtualization storage and application infrastructure. Business critical applications in their respective virtual machine environments can be observed instantly and a drill down feature can be used to see exactly where issues might be hindering business critical application productivity such as over taxed disks and files, an offending data base client, real time disk capacity and CPU utilization along with numerous other metrics.

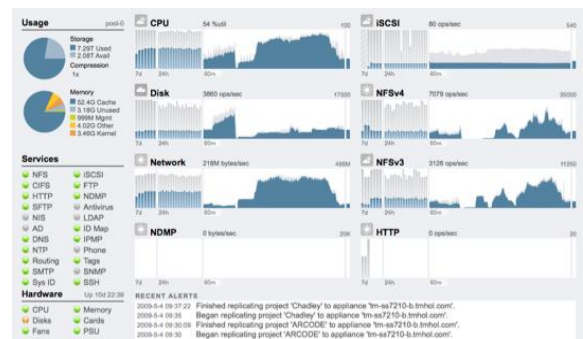


DTrace Storage Analytics.(Partial/Typical)

Flexibility, Speed and Performance

The success of your virtualization deployment is highly dependent on perceived application performance and a smooth, uneventful implementation. Performance is a multi-faceted concept and with the Sun ZFS Storage Appliance it means not only storage performance but also speed to deployment, application productivity and rapid familiarity.

Storage performance with Sun ZFS Storage Appliance is provided by a breakthrough technology



Sun ZFS Storage Appliance Dashboard.

known as the Hybrid Storage Pool enabled by Flash SSD and the ZFS File System. Sophisticated file system algorithms enhance client read performance by pre-staging data into in-memory cache or DRAM as well as Flash based Read-SSD, which can further improve IOP performance for guests virtual machines. Virtualization operating systems make extensive use of synchronous Write I/O and as such guest virtual machines can automatically benefit from Write Flash SSD to enhance write performance. This is because when a write is received by Sun ZFS Unified Storage, data is immediately cached in highly reliable Flash SSD whereupon the virtual machine based business critical application is notified immediately that the Write I/O has been completed. Striping as well as mirroring SSD, works to enhance data protection for data in flight and can further improve application performance.

Speed to deployment into a virtualization storage environment is all about reducing risk while moving data from islands of storage to one or more Sun ZFS Storage Appliance platforms that in turn have connectivity to one or more virtualization platforms. Shadow Migration is a feature built-in to Sun ZFS Storage Appliance that provides automated migration of data from legacy platforms to Sun ZFS Storage Appliance. This speeds deployment because there is virtually no down time required during the migration of data, depending on the amount of data per application, to the consolidated storage paradigm as the Sun ZFS Storage platform takes care of many of the details that would otherwise increase risk and consume deployment time and labor.

A Cost Effective Storage Consolidation Solution

One of the key goals in deploying a virtualization architecture is reducing cost. The ZFS Storage Appliance delivers superior performance and simplicity at up to 30 percent less cost than traditional solutions by using cost-effective components and providing a rich set of built-in, all inclusive software features. Key data services that enhance your ability to manage and protect data in an operating virtualization environment such as snapshots, clones, replication, compression, thin provisioning, Shadow Migration and more, are included with no additional licenses. Other key features include comprehensive protocol support such as NFS, CIFS, FC, IB and iSCSI. All of these features come together to reduce your capital as well as operational expenditures. For example during the virtualization and storage consolidation deployment you can leverage thin provisioning, compression and in-line de-duplication to improve storage efficiencies reducing the amount of storage you would otherwise have to purchase. This avoids the awkward situation where some business critical applications are under-capacity while others are over-capacity, allowing you to avoid unnecessary capital storage costs. This pays forward to reduce power and cooling costs not only with the efficient power/cooling technology inherent in Sun ZFS Storage but simply put, less storage means you don't require the power and cooling you would have otherwise consumed with more HDDs.

For More Information visit the following:

For more information regarding Sun ZFS Storage Appliance visit:

<http://www.oracle.com/us/products/servers-storage/storage/unified-storage/index.html>

For more information regarding the Sun ZFS Storage Appliance Simulator visit:

<http://www.oracle.com/us/products/servers-storage/storage/unified-storage/index.html>

Under Downloads, click, "Download Oracle's Sun Unified Storage Simulator" and follow the directions.

Contact Us

For more information about Sun ZFS Unified Storage or Oracle VM, visit oracle.com or call +1.800.ORACLE1 to speak to an Oracle representative.



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