



SUN STORAGE 7000 UNIFIED STORAGE SYSTEMS

IT'S TIME TO CHANGE YOUR STORAGE

Presenter's Name

Presenter's Title

Presenter's Company

Sun Storage 7000 Unified Storage Systems

Agenda

- The Sun Storage 7000 Unified Storage Systems
- Product Features
- Sun Storage 7000 Unified Storage System Solutions
- Getting Started/Next Steps

Today's Business Problems

Traditional Storage Solutions Are Not Meeting These Challenges

Proprietary



Huge Barrier to Exit



Slow Innovation



Rapid Data Growth



Unsustainable Costs



Complex Management



Introducing the Sun Storage 7000 Unified Storage System...



Radically SIMPLIFYING
the way you manage your
storage with breakthrough
SPEED, SCALE and COST
SAVINGS

Speeding Up, Simplifying, and Cutting Costs for Thousands



- Saved customer \$50M of storage costs and 6,500 days of management time in the first 6 months after shipping
- Achieving broad market adoption across multiple industries
- Signed up over 100 new partners in the first 60 days after launch
- Fastest ramping Storage product ever from Sun

Sun Storage 7000 Unified Storage Systems

Bringing Simplicity to Enterprise Storage



• Sun Storage 7110

- 8 GB RAM
- Up to 14x300GB SAS 10K-rpm Drives
- Up to 4 TB
- 2RU package



• Sun Storage 7210

- 32 GB and 64 GB options
- Up to 142 TB
- Hybrid Storage Pool I/O Acceleration
- Write Flash/SSD options for higher performance



• Sun Storage 7310 Cluster**

- 16 GB (up to 64 GB) per controller
- Up to 96 TB
- Hybrid Storage Pool I/O Acceleration
- Read/Write Flash/SSD options for higher performance



• Sun Storage 7410 Cluster**

- 16 GB, 64 GB and 128 GB options per controller
- Up to 288 TB*
- Includes cluster software
- Hybrid Storage Pool I/O Acceleration
- Read/Write Flash/SSD options for higher performance

Provides support for unified file and block data protocols, including a rich set of data services

* Up to 576 TB with software update

**Cluster Optional

Radically Simplify the Way You Manage Your Data

Root Cause Issues in Minutes Not Hours



- Easy to analyze and optimize your storage system
- Most comprehensive self-healing storage system
- Rapidly diagnose, troubleshoot and resolve issues to minimize impact on your business
- Quick to install and configure storage

Providing Unprecedented Storage Analytics

- Automatic real-time visualization of application and storage related workloads
- Simple yet sophisticated instrumentation provides real-time comprehensive analysis
- Supports multiple simultaneous application and workload analysis in real-time
- Analysis can be saved, exported and replayed for further analysis.
- Built on DTrace instrumentation
 - > NFSv3, NFSv4, CIFS, iSCSI
 - > ZFS and the Solaris I/O path
 - > CPU and Memory Utilization
 - > Networking (TCP, UDP, IP)



Instant Visibility into Key Questions

“What is CPU and Memory Utilization?”

“How much storage is being utilized?”

“How is disk performing? How many Ops/Sec?”

“What Services are active?”

“Which applications/users are causing performance issues?”



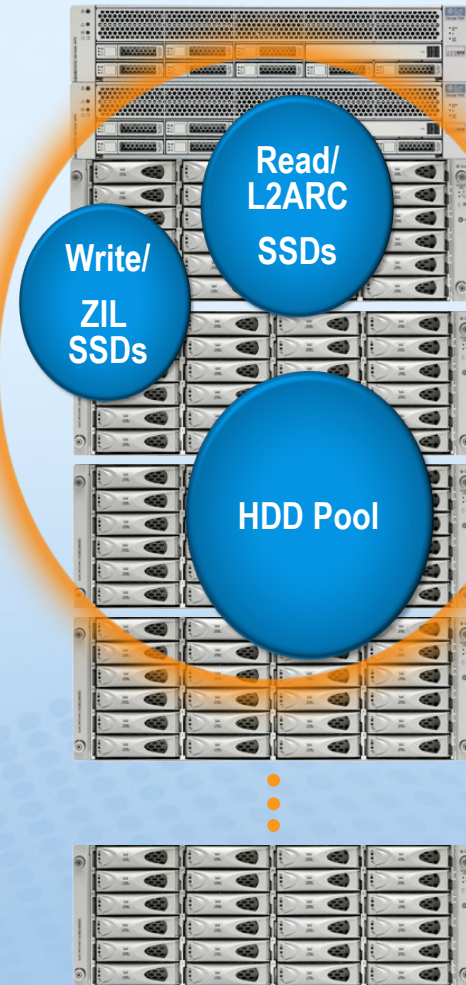
You Grow Fast; Sun Storage 7000 Unified Storage Systems Scale Faster



- With ZFS Hybrid Storage Pool technology, and use of SSDs, performance scales with capacity
- Adapt to evolving application environments and storage requirements
- Sun Storage 7000 series includes a comprehensive data services suite at no additional cost (no added licensable upgrades)

Most Scalable Storage System Design

- Hybrid Flash Storage Pools
 - > Data is intelligently placed in DRAM, Flash or Disk
 - > Transparently managed as one storage pool
 - > Optimizes \$/GB and \$/IOP performance
- Enterprise Grade Flash
 - > 3-5 year lifetime



ZFS Hybrid Storage Pool

Sun X4250 Storage Server Example

Configuration A

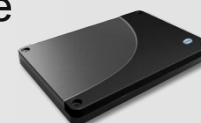


(7) 146GB 10,000 RPM SAS Drives

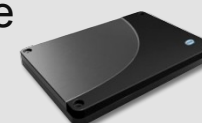
Configuration B

- 4 Xeon 7350 Processors
- 32GB FB DDR2 ECC DRAM
- OpenSolaris with ZFS

(1) 80G SSD Cache Device



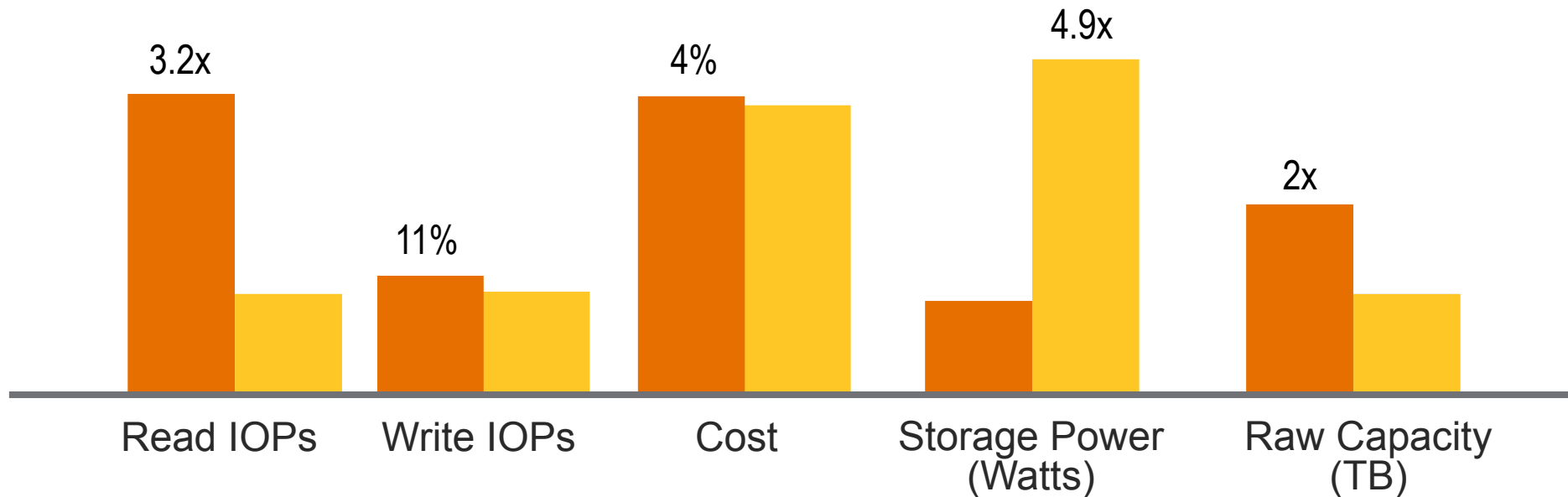
(1) 32G SSD ZIL Device



(5) 400GB 4200 RPM SATA Drives

ZFS Hybrid Pool Example

Based on Actual Benchmark Results



■ Hybrid Storage Pool (DRAM + Read SSD + Write SSD + 5x 4200 RPM SATA)

■ Traditional Storage Pool (DRAM + 7x 10K RPM 2.5")

Sun Storage 7000 Unified Storage Systems vs. the Competition

	Sun Storage 7410 (aka Amber Road)	NetApp FAS 3170	EMC NS80
Data Services*	Included	Fee Based	Fee Based
Flash Optimized	Yes	Not Available	Not Available
DTrace Analytics	Yes	Not Available	Not Available
Power Consumption	2524W	6426W	6975w
RAID Rebuild	Minutes	Hours	Hours
Space	12RU	45RU	43RU
Grand Total	\$221,000	\$894,000	\$554,000

Breakthrough Storage Economics



- Gain up to 75% cost savings
- No additional software license fees
- 4x less power consumed
- Reduce break/fix calls and enjoy a Single Point of Contact (SPOC) with Sun Services

Full Complement of Storage Software

Included with the System at No Additional Cost

Data Protocols

- NFS v2, v3 and v4
- CIFS
- iSCSI
- HTTP
- WebDAV
- FTP/SFTP/FTPS
- NDMP v3/v4

Data Services

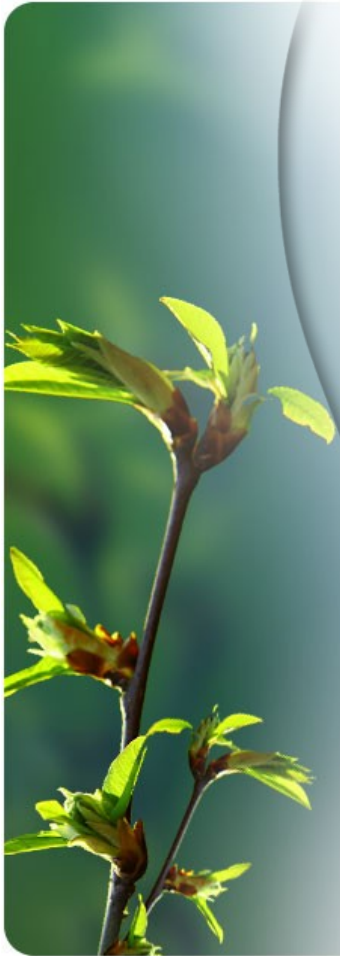
- Flash Hybrid Storage Pool
- RAID-Z (5)
- RAID-Z DP (6)
- Mirroring
- Striping
- Active-active Clustering
- Remote Replication
- Antivirus via ICAP Protocol
- Snapshots
- Clones
- Compression
- Thin Provisioning
- End-to-End Data Integrity
- Multi-Path I/O
- Fault Management
- Microsoft VSS/Shared Folders

Management

- DTrace Analytics
- Dashboard
- Role-Based Access Control
- NIS LDAP & AD Alerts
- Phone Home
- SNMP
- Scripting
- Upgrade
- Hardware View
- Advanced Networking
- Workflow Automation

Sun Storage 7000 Unified Storage Systems

Broad ISV Community Support



The Ideal Storage Platform for a Wide Range of Infrastructure Solutions

Database

Web Infrastructure & Content Management

Back Up & Data Protection

Windows Consolidation & Virtualization

HPC

Business Continuity & Disaster Recovery

Windows File Services & Infrastructure

Open Archive

Cloud Computing/ Storage

Sun Storage 7000 for HPC



- Unified Storage for Sun compute cluster and parallel grid computing
- Effective for MCAE and CFD applications
- High performance shared data access
- I/O performance accelerated via Hybrid Storage Pool
- Storage management and administration simplified
- New storage economics for HPC storage

High Performance File Based Throughput for HPC

Sun Storage 7000 for Web 2.0 Content Management




- Enables rapid growth in rich media/Web content
- Rapid innovation enables adaptable storage
- Streaming I/O accelerated via Hybrid Storage Pool
- Simple storage management and administration
- New economic paradigm reduces cost

Low Cost Scalability for Exploding Data Volumes

Best Storage Platform for Windows Server Consolidation Using VMware

Sun Storage 7000 NFS Offers New Dimension of Efficiency

- 
- Simplify thin-provisioning of VM files on NFS with a mouse click and save disk space and operations time
 - Enhance SLA by detecting and removing bottlenecks in VM clients and disks with DTrace Analytics for NFS
 - Accelerate VM cache performance on NFS with optimized Flash drives for read and write operations
 - Minimize deployment budget 3-6 times for storage by choosing NFS and avoiding expensive SAN components

Sun+VMware: Unbeatable combination for Windows Consolidation sun.com/vmwstorage

Sun Storage 7000 for Windows File Sharing



- Create shares and access user files simultaneously and across multiple operating systems (Windows, Unix, Mac O/S, Linux)
- Optimize and troubleshoot peak share access performance (user logins) by 50%
- Add a large number of users and shares with minimal impact to performance
- Increase hard-dollar savings by at least 50% with no additional licenses

Unprecedented levels of performance and simplicity for Windows file sharing environments.

Results According to Our Customers

Business Issues

- Implement a flexible storage solution for customer data
- Ensure scalability for future growth
- Maximize the cost-effectiveness of storing data
- Minimize power consumption

Business Results

- Delivered rapid scalability for multiple protocols
- Avoided proprietary solutions and vendor lock-in
- Saved money thanks to free software licenses
- Reduced energy consumption



“Thanks to Sun Open Storage, EasySpeedy can cost-effectively scale data storage on demand to meet the needs of customers. What is more, the platform helps minimize power consumption and makes day-to-day management simple.”

--Peter Lerche,
Chief Executive Officer,
EasySpeedy

Results According to Our Customers

Business Issues

- High operations/sec (IOPs), tiny IOP size (average 8-15K) storage needs
- Desire to move from expensive closed storage
- Desire for improved visibility for reduced time to resolution of storage performance issues

Business Results

- Easy to use, but powerful management tools
- Increased performance
- Reduced cost through consolidation of services



“OpenSolaris on an Open Storage platform like the Sun Storage 7000 is a powerful framework for us because it liberates us to get the performance and flexibility we need - not just the ones we can afford. The Sun Storage 7000 software expands this freedom to everyone who doesn't have the time or inclination to build an array themselves.”

Jason Williams,
COO/CTO,
DigiTar

Results According to Our Customers



“As a data protection, retention and discovery software and services provider, we believe the Sun 7000 series delivers a very attractive value proposition with very good high availability characteristics and presents a very simple, straightforward management model. It represents refreshing and original insights into reducing storage complexity and cuts through layers of fossilized storage technology thinking...”

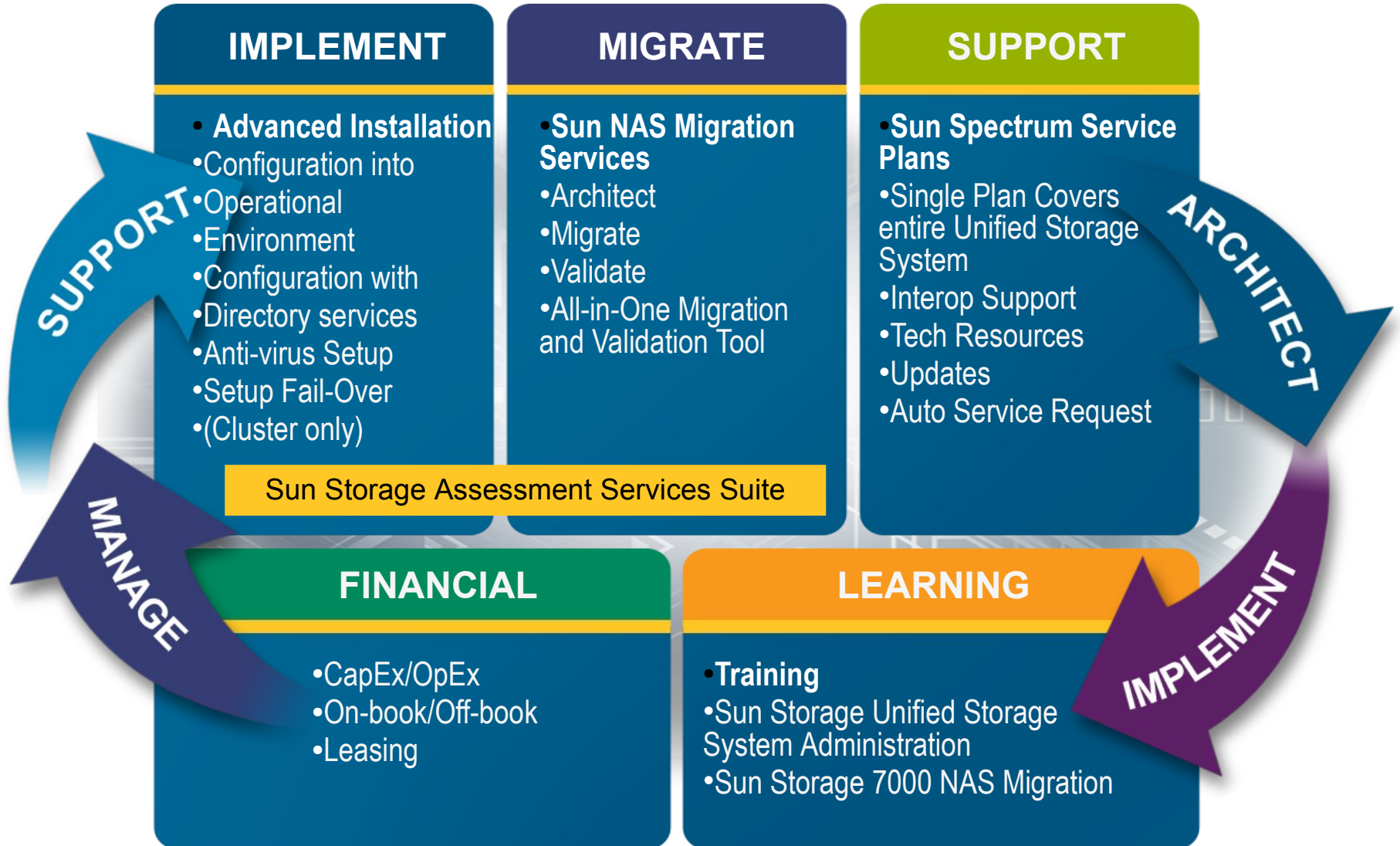
David Allen
Senior Vice President & CTO
i365, a Seagate Company



“For a start-up, data integrity and fault recovery are special problems as the staff and budgets are small. The manageability and fault management of [the Sun Storage 7000 Unified Storage Systems] meet this challenge in a small, dense package. The result for us has been a better solution with less investment in time and technical training.”

Mark Niedzielski
Infrastructure Manager
OurStage, Inc

Sun Services Expertise



Unified Storage Data Migration Service

NetApp NAS
EMC NAS



Sun StorageTek
5000 series



Sun Storage 7000
Unified Storage Systems

Features

Service Sizing Tool

Migration of data security information from existing NAS system to Sun Storage 7000 series

Trained Services Experts and Proven Practices

Benefits

- Sizes raw data migration, time to migrate, and cost of migration allowing you to plan the migration around your business needs
- Quickly migrates data and speeds ROI
- Ensures data integrity with advanced data validation
- Provides a quick, complete, and non-disruptive migration resulting in a faster time to market and accelerated ROI
- Ensures optimal performance and ongoing
- Reduces costs of performing migration internally

Learn More



Get Informed!

- Visit sun.com/unifiedstorage and sun.com/flash
- Download and experience the virtual versions of the Sun Storage 7000 Unified Storage Systems and test drive for yourself
http://www.sun.com/storage/disk_systems/unified_storage/resources.jsp
- Read more customer testimonials:
http://www.sun.com/storage/disk_systems/unified_storage/customers.jsp
- Contact your local Sun representative or authorized reseller

Get Open!

- Try and Buy Sun storage products at
<http://www.sun.com/tryandbuy>
- Get Solaris for data management today at
<http://www.sun.com/solaris/>
- Get a Sun Storage Assessment and find out how you can nearly double your data storage capacity in the same footprint



Thank You.

The Network is the Computer.™

Presenter's Name

Presenter's Title

Presenter's Company

Appendix



Storage 7410



Usage

pool-0



Storage
 5.02G Used
 251G Avail
Compression
 1x



Memory
 941M Cache
 12.2G Unused
 108M Mgmt
 698M Other
 2.11G Kernel

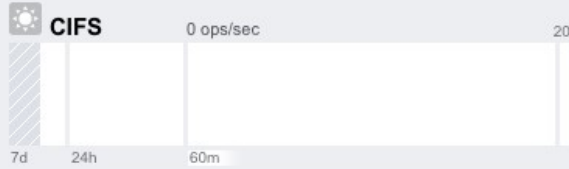
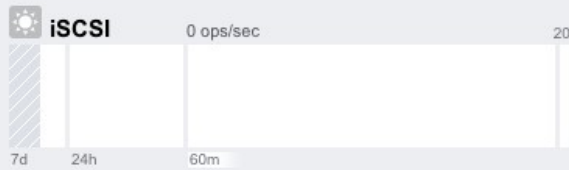
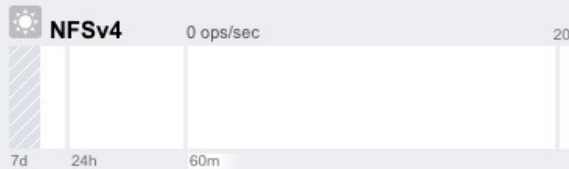
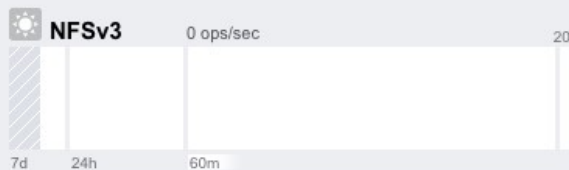
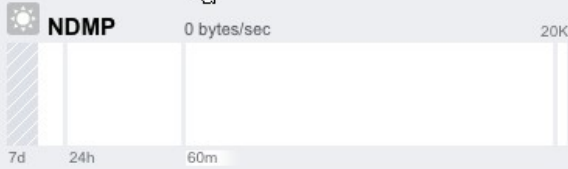
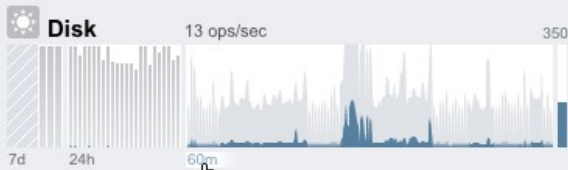
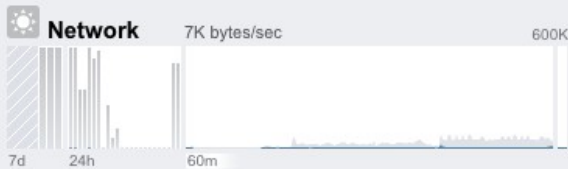
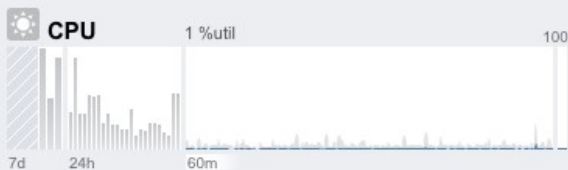
Services

- NFS
- CIFS
- HTTP
- Antivirus
- LDAP
- ID Map
- IPMP
- Routing
- SNMP
- Sys ID
- iSCSI
- FTP
- NDMP
- NIS
- AD
- DNS
- NTP
- Phone
- Tags
- SSH

Hardware

Up 3d 01:25

- CPU
- Disks
- Fans
- Memory
- Cards
- PSU



RECENT ALERTS

- 2008-10-8 12:05:56 Finished replicating project 'test_project2' from appliance 'loader.sf.fishpong.com'.
- 2008-10-8 12:05:52 Began replicating project 'test_project2' from appliance 'loader.sf.fishpong.com'.

Configure external storage.

ABORT

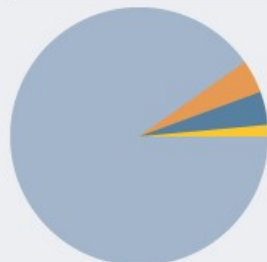
COMMIT

Configure Storage

<< Step 2 of 2 >>

Configure available storage using a replication profile.

Storage Breakdown



Data	39.4T
Parity	1.82T
Reserved	640G
Spare	1.82T

Disk Breakdown

Data + Parity	46 disks
Spare	2 disks
Log	0 disks
Cache	5 disks

Data Profile : Cache Profile

TYPE ▲	NSPF	AVAILABILITY	PERFORMANCE	CAPACITY	SIZE
Double parity RAID	No	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	32.2T
Double parity RAID, wide stripes	No	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	39.4T
Mirrored	Yes	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	20.6T
Mirrored	No	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	20.6T
Striped	No	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	43.0T

Data profile: Double parity RAID, wide stripes

RAID in which each stripe has two disks for parity, and for which wide stripes are configured to maximize for capacity. Wide stripes can exacerbate the performance effects of double parity RAID: while bandwidth will be acceptable, the number of I/O operations that the entire system can perform will be diminished. As with double parity RAID, the presence of cache can mitigate the effects on read performance.



Projects

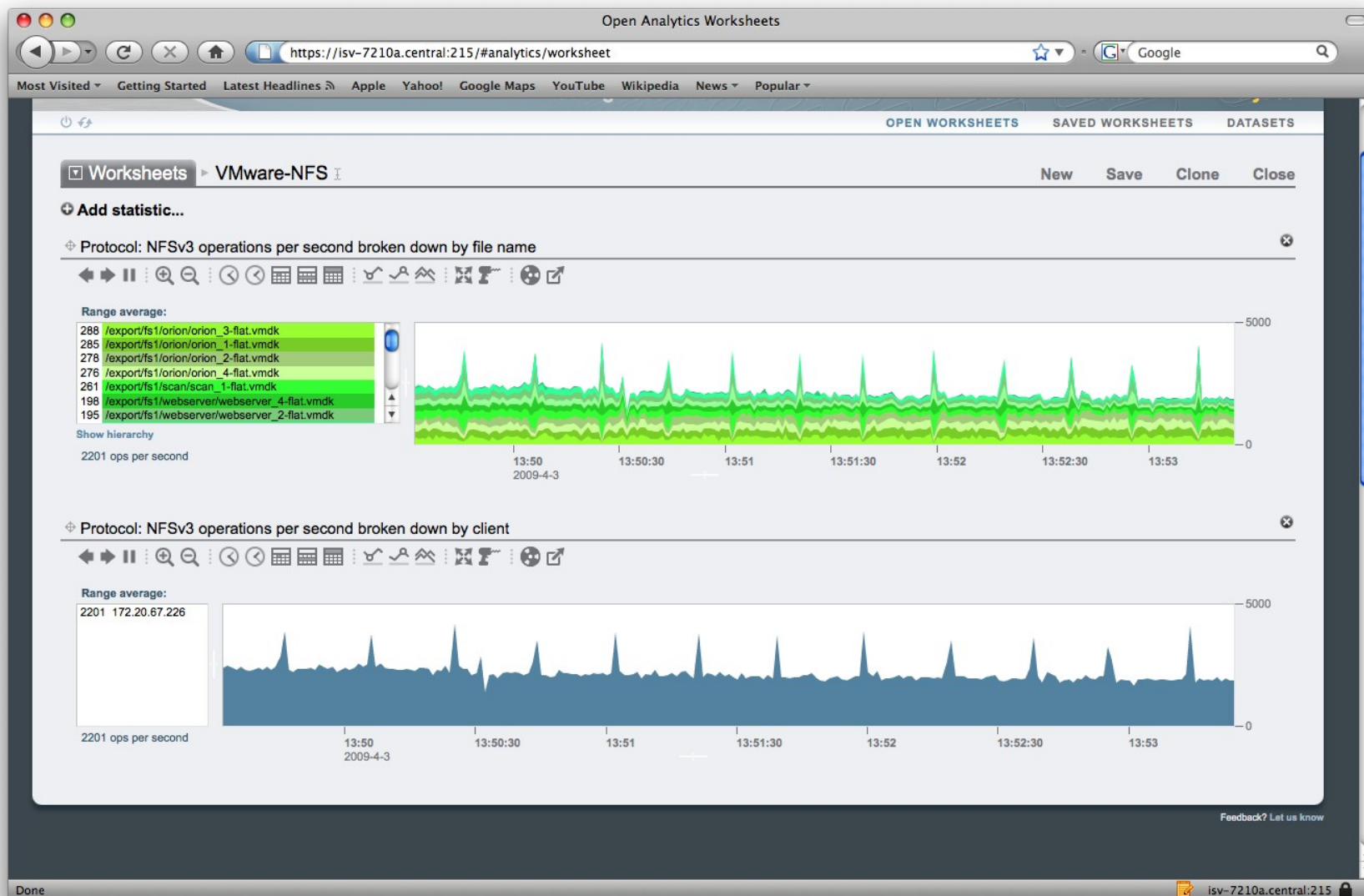
13 Total
Add... ALL ▶

- aleventhal
- bcantrill
- bgregg
- bpjewski
- cmcguire
- default**
- dpacheco
- eschrock
- gprice
- jweinberger
- kwesolowski
- mshapiro
- tpatrick

▶ All Projects

⊕ Filesystems LUNs 13 Total 🔍

NAME ▲	SIZE	MOUNTPOINT	
aleventhal / hw_eng	18K	/export/hw_eng	
bcantrill / analytx	18K	/export/analytx	
bgregg / dashbd	18K	/export/dashbd	
eschrock / akschrock	18K	/export/akschrock	✎ 🗑
bpjewski / access_ctrl	18K	/export/access_ctrl	
cmcguire / deadbugs	18K	/export/deadbugs	
default / filesys01	5G	/export/filesys01	
dpacheco / replic8	18K	/export/replic8	
eschrock / akschrock	18K	/export/akschrock	
gprice / oyoyoy	18K	/export/oyoyoy	
jweinberger / iscsitgt	18K	/export/iscsitgt	
kwesolowski / clustron	18K	/export/clustron	
mshapiro / scales	18K	/export/scales	
tpatrick / iconspix	18K	/export/iconspix	



File Sharing For Windows

Windows Gets Better with the Sun Storage 7000

Windows Administration Tasks	Sun Storage 7000	Other Vendors
Transparent & seamless file sharing across protocols (CIFS/NFS)	Yes	Difficult
Trouble shoot and optimize to peak share performance	Yes (Dtrace Analytics)	Trial and Error
Simply and cost effectively add users and shares with minimal impact to performance	Yes (Hybrid Storage Pool)	No
Significantly reduce time for remote file access & collaboration	Yes (Hybrid Storage Pool)	No
Windows data services (Snapshot, replication, compression)	Included (No license keys required)	Optional for fee data services & key management required

Windows Consolidation - Virtualization

VMware Gets Better with the Sun Storage 7000

VMWare Administration Tasks	Sun	Other Vendors
Observe and optimize VM performance	Yes	No
Reduce time to deploy & manage in virtual environments	Yes (NFS & Hybrid Storage Pool)	Complexity with FC & expensive 15K drives
Reduce multiple VM creation times	Yes (Hybrid Storage Pool, space saving snapshot/clones)	No
Increase VM space efficiency savings	Yes (Built-in compression, snap/clones, upcoming de-dup)	No
Virtualization data services (Snapshot, replication, compression, de-dup)	Included (No license keys required)	Optional for fee data services & key management required

Sample Configuration Comparison

75% Lower Costs with the Sun Storage 7000

	Sun Unified Storage 7140C (46TB)	NetApp FAS3170A (46TB)
Total Hardware (Cluster Config)	\$221,000	\$555,860
Software:		
NFS	No additional cost	\$80,240
CIFS	No additional cost	\$74,700
Snapshot/Restore	No additional cost	\$22,500
Snapshot Clones	No additional cost	\$31,880
Remote Replication	No additional cost	\$100,400
HTTP	No additional cost	\$17,500
Total Software	\$0	\$327,220
Overall Total	\$221,000	\$883,080
Savings with Sun Unified Storage	\$662,080	
% Savings	75.0%	

Sun Storage 7110 Unified Storage System



The Sun Storage 7110 Unified Storage Systems deliver enterprise features at entry-level pricing for companies who require simple ways to manage their storage up to 4 TB.

- **Enterprise Features at Entry Level Prices**

- > Best price per footprint
- > Scales to 4TB in 2U
- > Same Enterprise Software

- **Quad-Core 1.9 Ghz Opteron Platform**

- **8GB RAM**

- **16x2.5" SAS drives**

- > 14 data and 2 system drives
- > SAS: 146GB and 300GB 10K-rpm

- **4x Gigabit Ethernet Ports**

- **Options**

- > 10Gb-E and 1 Gb-E NICs, FC/SCSI HBA options for Backup/Restore

It's Storage Made Easy

Sun Storage 7210 Unified Storage System



Designed for companies with high-density and space-saving requirements, the Sun Storage 7210 Unified Storage System provides dramatically easier ways to manage and scale storage up to 142 TB.

•Highest Storage Density

- >48TB in a single 4U
- >Up to 142TB with optional two J4500
- >Most economical savings in space and energy consumption

•Dual Quad-Core 2.3 Ghz Opteron Platform

- >32GB, 64GB RAM options
- >LogZilla SSD option for higher performance
- >Up to 48 TB raw capacity

•4x Gigabit Ethernet Ports

•Expansion Options: 10GB-E and 1GB-E NICs, FC/SCSI HBA options

•Scalability: 250/500 GB and 1TB HDDs, 142 TBs

Set Up and Configure in a Matter of Clicks

Sun Storage 7310 Unified Storage System



Designed for companies requiring mission-critical entry storage, the Sun Storage 7310 Unified Storage System delivers simplified management, performance, efficiency, and seamless expansion to meet your growing needs up to 96 TB.

- **Multi-dimensional Scalability**

- > Scale 10TB-96TB
- > Scale computational power
- > Scale performance with SSD

- **Up to Two Quad-Core 2.3 Ghz Opteron Platform**

- > 16GB RAM (up to 64GB)
- > High-speed SSDs for caching
- > LogZilla – Up to four 18GB SSD
- > ReadZilla – Up to six 100GB SSD, per controller
- > 10Gb-E and 1Gb-E NICs, FC/SCSI HBA options

- **Scalability: 1TB SATA HDD, 96 TB**

Performance Tuning Without the Guess Work

Sun Storage 7410 Unified Storage System



The Sun Storage 7410 Unified Storage System is ideal for enterprises requiring mission-critical storage and provides dramatically easier and faster ways to manage and scale your storage up to 288 TB.

- **Multi-dimensional Scalability**

- > Scale 12TB-576TB
- > Scale computational power
- > Scale performance with SSD

- **Two/Four Quad-Core 2.3 Ghz Opteron Platform**

- > 16, 64 and 128GB RAM options
- > High-speed SSDs for caching
- > LogZilla – Up to four 18GB SSD
- > ReadZilla – Up to six 100GB SSD
- > 10Gb-E and 1Gb-E NICs, FC/SCSI HBA options

- **Scalability: 1TB SATA HDD, 576 TB**

Performance Tuning Without the Guess Work

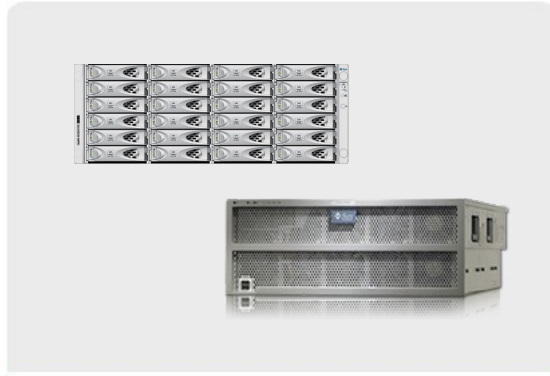
Sun's Open Strategy

General Purpose Systems + Open Source Software = Lower Costs



Open Servers

- Open Source reduced costs and vendor lock-in
- Scale out architectures brought new economics
- Commoditization brought increased competition
- Differentiation from innovative product design and packaging



Open Storage

- Follows same server trend
- General purpose systems will drive storage costs down
- Robust Open Source software will further reduce costs
- Simple data administration
- Revolutionary analytics
- Open architectures will free users from vendor lock-in



Open Archive

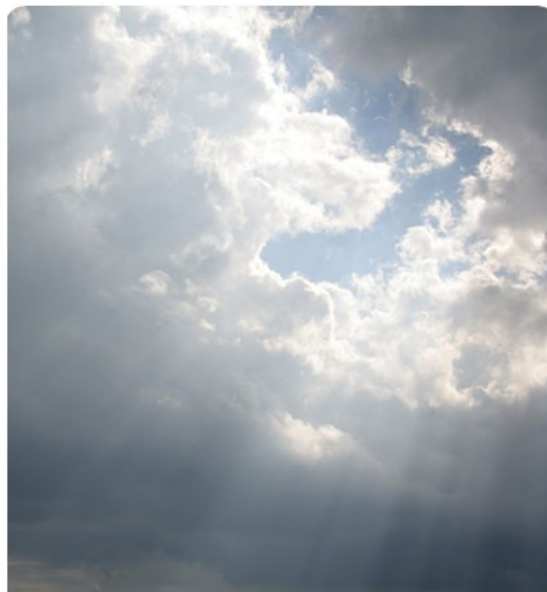
- Archive products built from open architectures
- Using general purpose systems that drive down costs
- Seamless integration with existing environments
- Leading Sun Archive software now open sourced

Open Storage Delivers:

Freedom from Lock-in and Global Community Efforts of 1000s



**Simplified Data
Management**



**Breakthrough
Economics**



**Dynamic Scale
for Your
Infrastructure**

Why Applications Don't Perform

Waiting for Data



- Today's **Multi-Core, Multi-Socket** application server design are increasingly held back by slow storage
- When requesting data, the server spends **most of its time waiting for storage**
- Application performance **remain** sluggish regardless of the Server CPU horsepower
- The traditional remedy of adding more expensive **DRAM may no longer suffice** as data sets double ever 2 years

Turbo Charged Applications

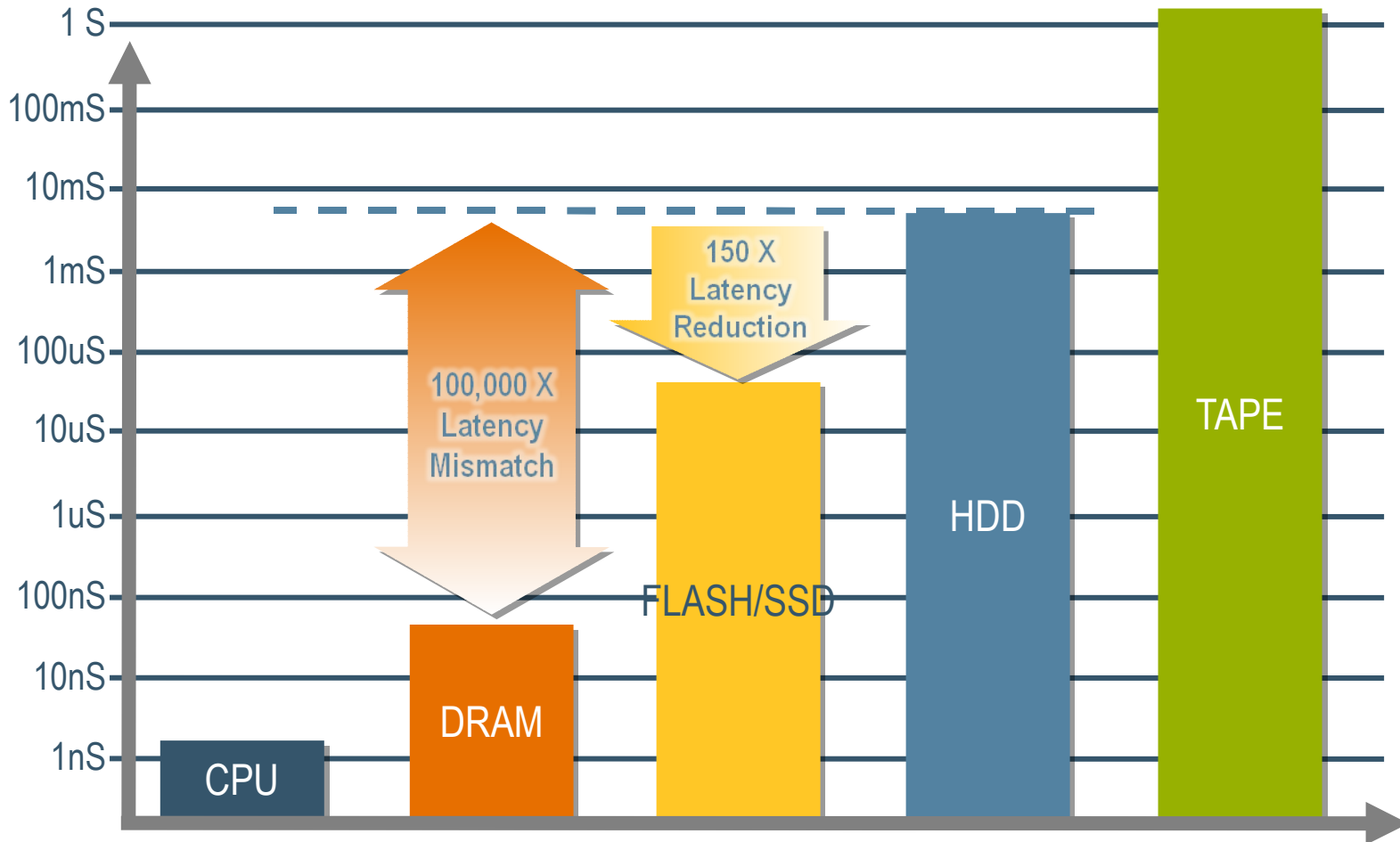
SSDs Eliminate Storage Bottlenecks



- Today's **Multi-Core, Multi-Socket** application server design are now served by **High Performance SSDs**
- The server **no longer wastes time** waiting for data
- Application **performance is as high** as the Server CPUs horsepower
- No longer need to remedy sluggish storage performance by adding expensive **DRAM**
- Bottom Line: **Improved end user experience, faster results and Better ROI**

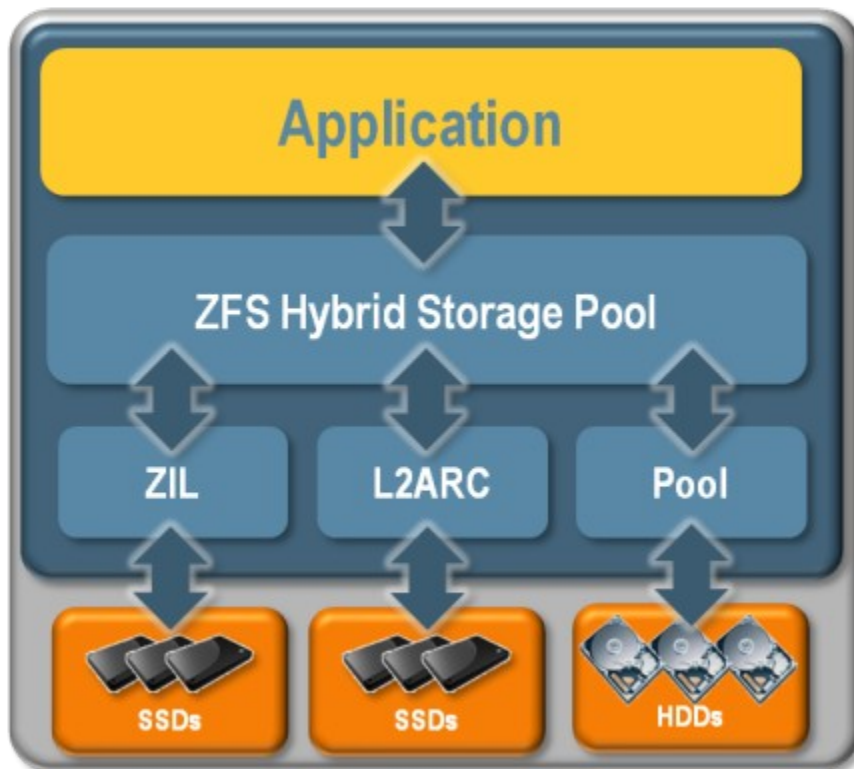
Latency Comparison

Bridging the DRAM to HDD Gap



ZFS Turbo Charges Applications

The Hybrid Storage Pool Data Management



- ZFS automatically:
 - Writes new data to a very fast SSD pool (ZIL)
 - Determines data access patterns and stores frequently accessed data in the L2ARC
 - Bundles IO into sequential lazy writes for more efficient use of low cost mechanical disks
 - Now shipping in OpenSolaris and coming soon in Solaris 10

Sun Storage 7000 Unified Storage Systems



Freedom from Proprietary Lock-In

- Built purely from industry standard and open source components
- Sun and OpenSolaris community promotes a rapid and safe adoption of new computing technologies
- OpenSolaris Storage Operating System capitalizes on commodity multi-core technology improving efficiency

Freedom from Excessive TCO Costs

- Support and Services costs reduced by leveraging standard building blocks without specialized hardware
- Higher performance at lower power and cooling levels means fewer systems with lower cost of operations

Freedom from License Fees

- Storage Features are built-in to the software payload using OpenSolaris and ZFS without incremental costs
- Unified Storage Features and Pricing are independent of Storage Capacity