

DataDirect[™]
N E T W O R K S

Web Object Scaler

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S2A9900



WOS and IRODS Data Grid

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Innovating in Storage

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DDN Firsts:

- ✓ Streaming ingest from satellite with guaranteed bandwidth
- ✓ Continuous service to air for a major network
- ✓ Guaranteed QOS for Supercomputers
- ✓ 10GB/s Storage Controller
- ✓ Storage Controller to support >1PB of data
- ✓ Controller with embedded application VM

**And the first storage system designed from
The ground up for scientific collaboration – WOS!**



The WOS initiative

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- Understand the data usage model in a collaborative environment where data is shared and studied but not modified.
- Build a simplified data access system with a minimum of layers.
- Completely eliminate the concept of FAT and extent lists.
- Reduce the instruction set to only PUT, GET, and DELETE.
- Add the concept of locality.

Storage should improve collaboration

- ... Not make it harder
- Minutes to install, not hours
- Milliseconds to retrieve data, not seconds
- Replication built in, not added on
- Instantaneous recovery from disk failure, not days
- Built in data integrity, not silent data corruption

A match made in...

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iRODS

- Ease of Access
 - » 35 clients
- Secure access controls
- Policy based data management

WOS

- Simplicity
- Scalability
- Reliability with Replication
- Policy based deterministic data placement and redundancy



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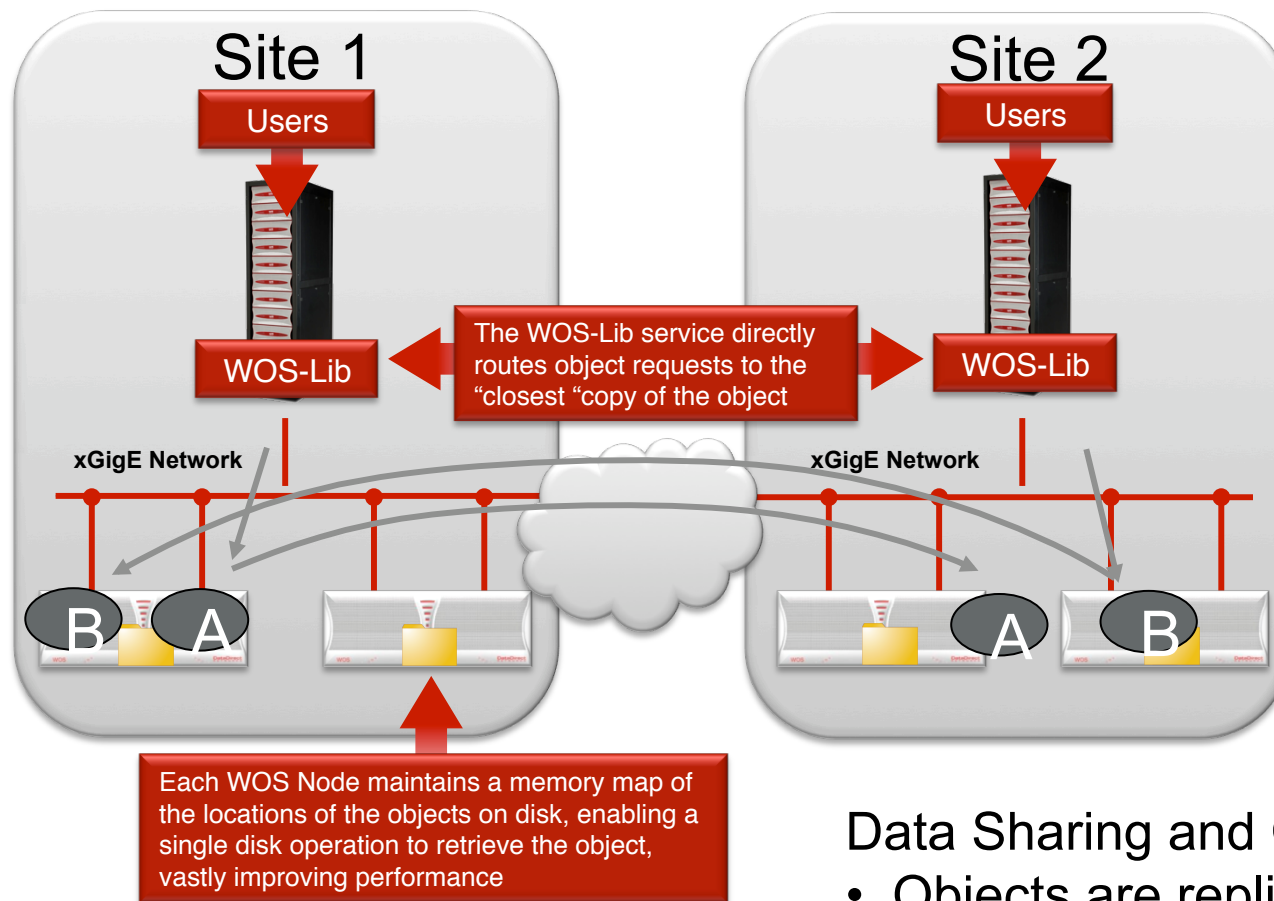


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**Managed
Collaboration**

The Power of Intelligent Storage

Data Locality & Collaboration



Key Features

- Up to 4-way replication, local &/or remote
- Disaster protection
- Single namespace across all replicas
- Data locality
- Intelligent data placement

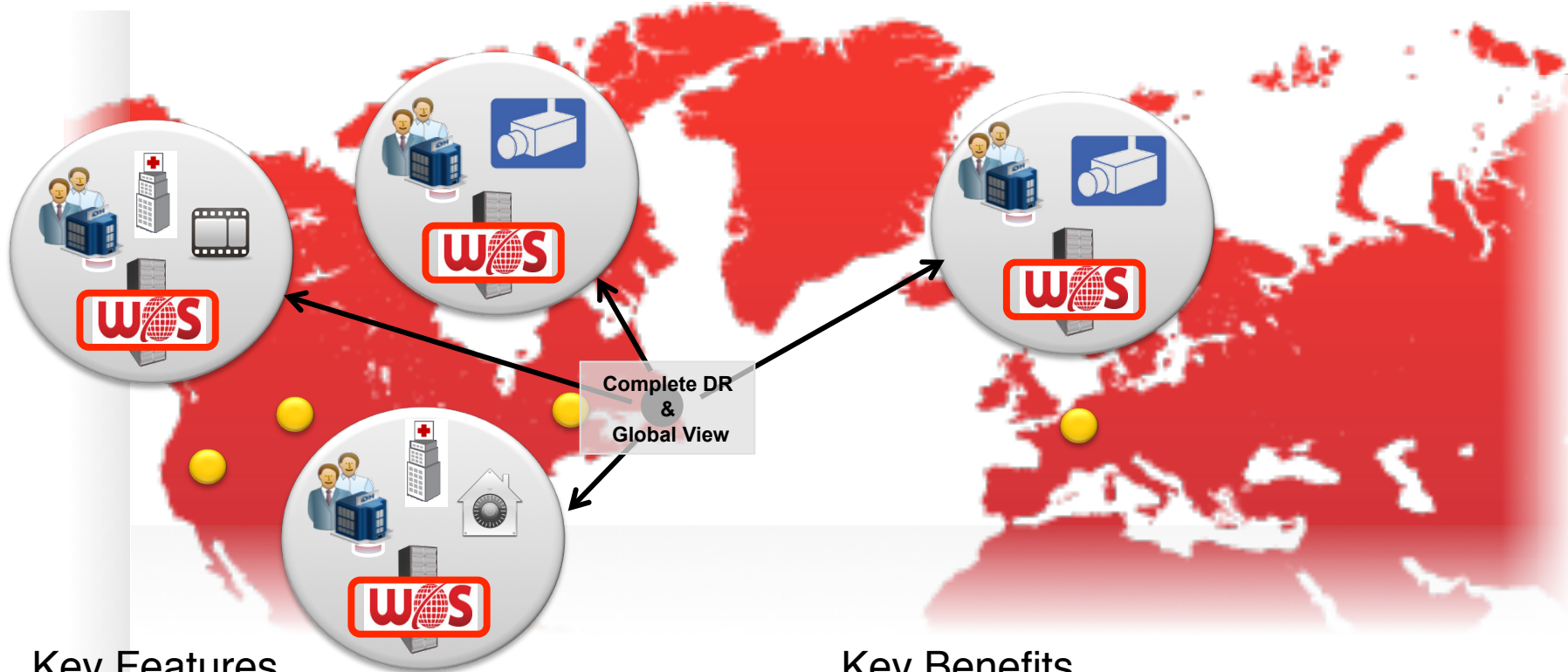
Data Sharing and Collaboration

- Objects are replicated across sites per policy
- All replicas have the same object ID
- Users always access "closest" object⁶

The WOS Scale-Out

Global View, Local Access

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Key Features

- Replication across all 4 sites
- Users have access to data globally
- Users always access closest data

Key Benefits

- Enables global collaboration
- Increases performance & productivity via data locality
- No risk of data loss

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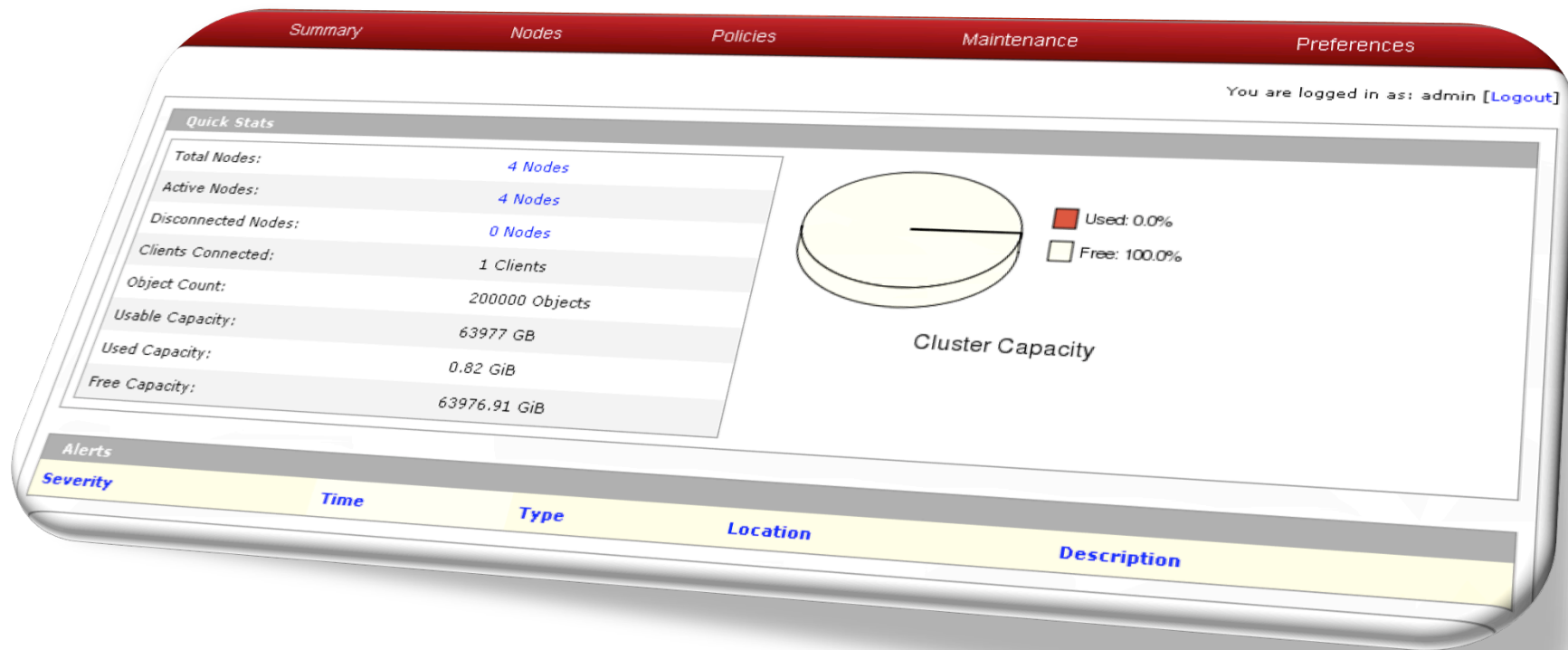
Static display such as editing mode or printed slides will not convey anything meaningful due to the interactive nature of this slide.

Superior IRODS performance

- Traditional Storage Is Performance-“Expensive”
 - » Expend excess disk operations
 - 5-12 Disk Operations per File Read
 - » Multiple levels of translation and communication
 - metadata lookups and directory travelling
 - extent list fetches
 - RAID & block operations
- WOS Delivers Performance Through Simplicity
 - » None of the constructs of traditional systems
 - » Single-Disk-Operation Reads, Dual-Operation Writes
 - » Reduced latency from SATA Disks since seeks are minimized
 - » Millions of file/ops per second with ¼ of the disks

Simple Interface

- Designed with a simple, easy-to-use GUI
- **“This feels like an Apple product”**
 - » *Early customer quote during WOS Beta*



Node Performance

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- Read and Write Throughput, WOS6000

File Size	FRPS	Read MB/sec	FWPS	Write MB/sec
64K	10,560 (SAS)	692 (SAS)	4,400 (SAS)	288 (SAS)
	4,400 (SATA)	288 (SATA)	1760 (SATA)	115 (SATA)
1024K	660 (SAS)	692 (SAS)	660 (SAS)	692 (SAS)
	660 (SATA)	692 (SATA)	660 (SATA)	692 (SATA)

- Read and Write Throughput, WOS1600

File Size	FRPS	Read MB/sec	FWPS	Write MB/sec
64K	2933 (SAS)	192 (SAS)	1173 (SAS)	77 (SAS)
	1173 (SATA)	77 (SATA)	469 (SATA)	31 (SATA)
1024K	330 (SAS)	346 (SAS)	330 (SAS)	346 (SAS)
	330 (SATA)	346 (SATA)	330 (SATA)	346 (SATA)

Intelligent WOS Objects

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Sample Object ID (OID): ACuoBKmWW3Uw1W2TmVYthA

WOS Signature

A random 64-bit key to prevent unauthorized access to WOS objects

WOS Policy

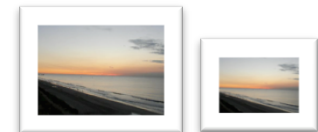
Eg. Replicate Twice; Zone 1 & 3

WOS Checksum

Robust 128-bit MD5 checksum to verify data integrity during every read.

User Metadata
Key Value or Binary

Object = Photo
Tag = Beach



thumbnails

Full File or
Sub-Object



WOS is the simple solution for IRODS environments

- WOS is a flat, addressable, low latency data structure.
- WOS creates a “trusted” environment with automated replication.
- WOS is not an extents based file system with layers of V-nodes and I-nodes.
- IRODS is the ideal complement to WOS allowing multiple client access and an incorporation of an efficient DB for metadata search activities.

The background of the slide features a repeating pattern of the DataDirect Networks logo and the text "S2A9900". The logos are rendered in a dark red color, while the text "S2A9900" is in a lighter red. The overall color scheme is a gradient of reds, from dark to light.

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Thank You

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