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Business Development Manager EMEA

OpenFabrics Workshop
Paris
June 22-23, 2006

InfiniBand based storage target

Tuesday, 27 June 2006

Proven data protection™

Founded in Feb. 2000 by Veterans of Cheyenne Software which was acquired by CA for $1.2B in 1996

Headquartered in Melville, New York
- ▸ 300 (US/Asia/Europe) professionals and growing
- ▸ Global Sales and Support Infrastructure (15 in-country offices)

Providing Network Storage <u>Software</u> to Optimize the Availability (Data Protection) of Business-Critical Data

Targeting Enterprise and SMB market
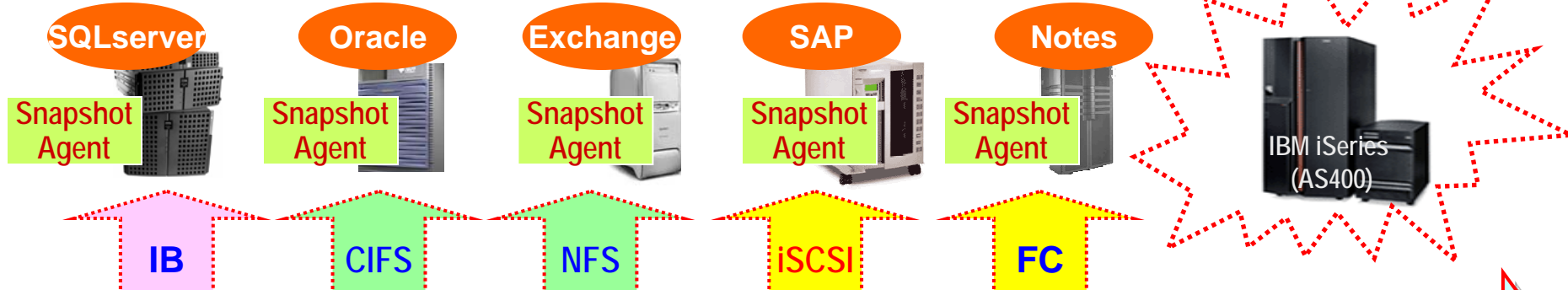- ▸ Proven Solution Deployed by over 2,000 Active Customers
- ▸

Innovative Technology OEMed by Major Industry Players
- ▸ EMC, HP, IBM, Intel, McData, Sun/StorageTek, Huawei-3Com, HIT

Public Company (NASDAQ:FALC) with $37M cash, no debt
- ▸ Continuing Profitability & Positive Cash Flow since Q4-2004

FalconStor's Unified Storage Architecture

SQLserver | **Oracle** | **Exchange** | **SAP** | **Notes** | IBM iSeries (AS400)

Snapshot Agent | Snapshot Agent | Snapshot Agent | Snapshot Agent | Snapshot Agent

IB | **CIFS** | **NFS** | **iSCSI** | **FC**

"Protocol-Independent" Host Connectivity Layer
100% modular

Comprehensive Storage Services
- Snapshot
- Mirroring
- TimeMark
- Replication
- Zero-Impact-Backup

WORM Disk | **NAS Disk** | **iSCSI Disk** | **FC Disk** | DLT | LTO

100% modular

"Hardware-Agnostic" Storage (Disk, Tape) Abstraction Layer
I/O Load Balancing, Controller/Path Fail-Over/Fail-Back
100% modular

Proven data protection™
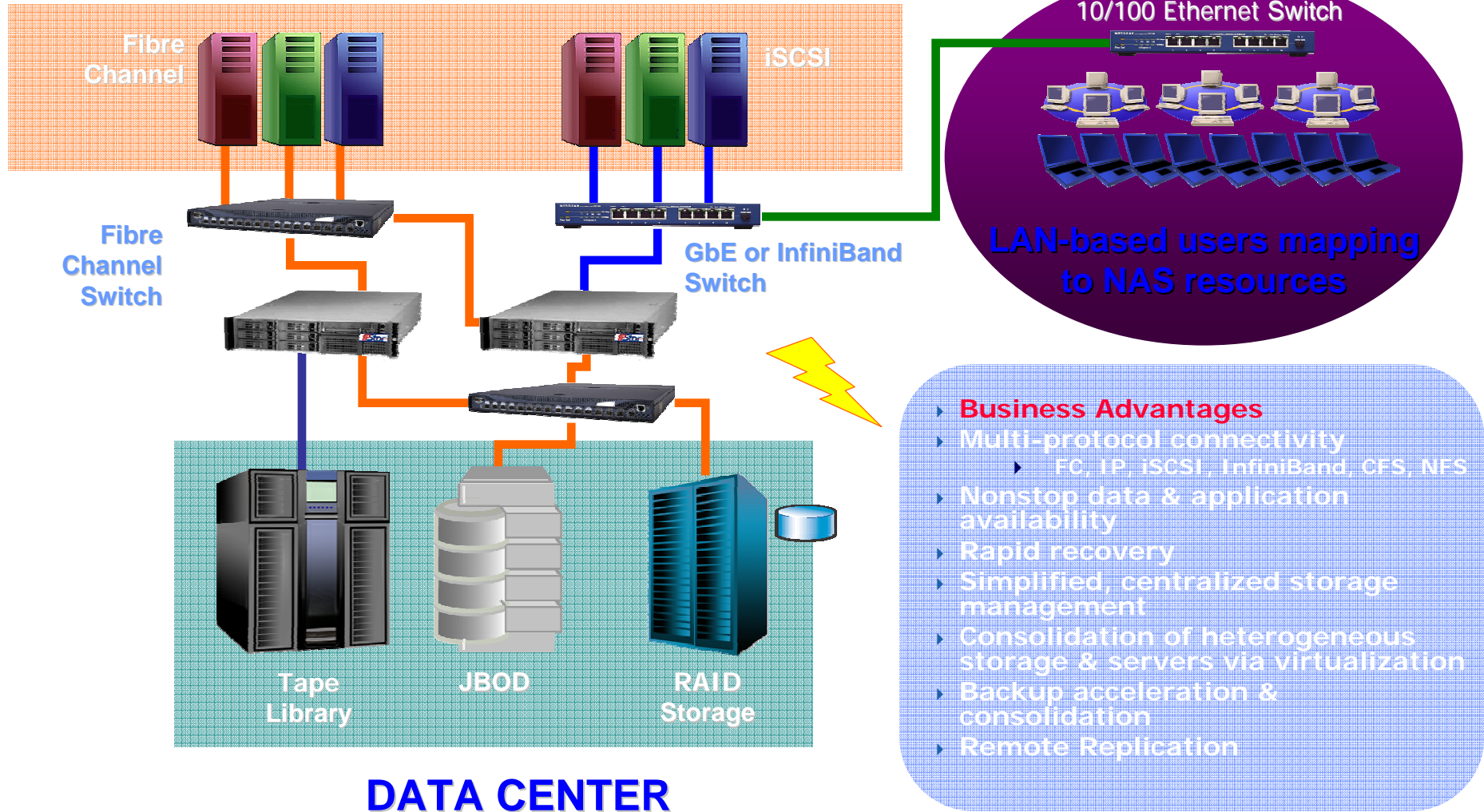
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FalconStor
Software

APPLICATION SERVERS
(Email, Web, Database, etc.)
Windows, Unix, Linux, NetWare, Macintosh, etc.

Fibre
Channel

iSCSI

10/100 Ethernet Switch

Fibre
Channel
Switch

GbE or InfiniBand
Switch

**LAN-based users mapping
to NAS resources**

Tape
Library

JBOD

RAID
Storage

‣ **Business Advantages**
‣ **Multi-protocol connectivity**
   ‣ FC, IP, iSCSI, InfiniBand, CFS, NFS
‣ **Nonstop data & application availability**
‣ **Rapid recovery**
‣ **Simplified, centralized storage management**
‣ **Consolidation of heterogeneous storage & servers via virtualization**
‣ **Backup acceleration & consolidation**
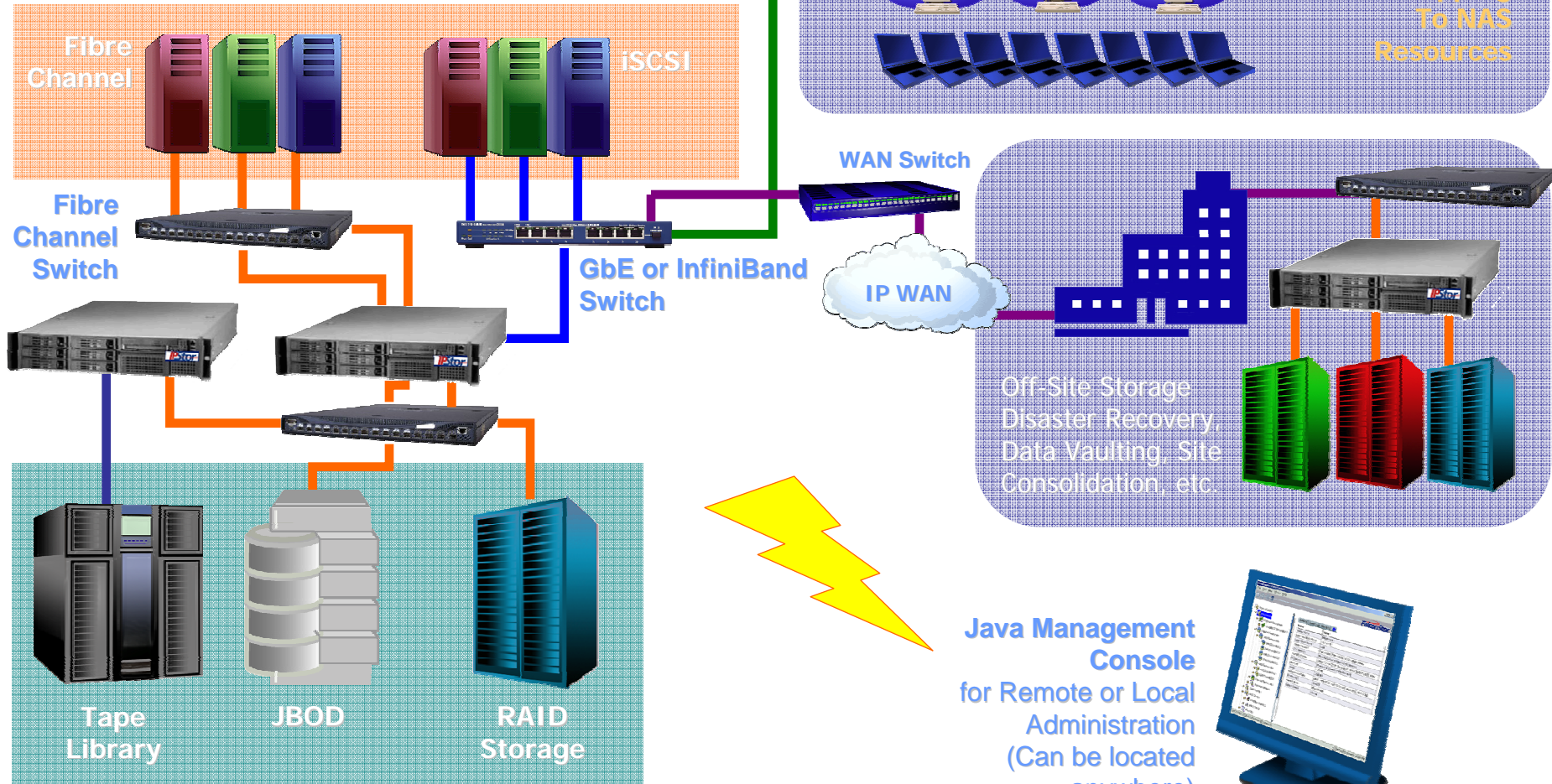‣ **Remote Replication**

DATA CENTER

FalconStor®
S o f t w a r e

APPLICATION SERVERS
(Email, Web, Database, etc.)
Windows, Unix, Linux, NetWare, Macintosh, etc.

10/100 Ethernet

LAN-based Users Mapping To NAS Resources

Fibre Channel

iSCSI

WAN Switch

Fibre Channel Switch

GbE or InfiniBand Switch

IP WAN

Off-Site Storage, Disaster Recovery, Data Vaulting, Site Consolidation, etc.

Tape Library

JBOD

RAID Storage

Java Management Console
for Remote or Local Administration (Can be located anywhere)

DATA CENTER

iSCSI over InfiniBand

Proven data protection™

▸ **Add InfiniBand support to existing iSCSI based product lines**

▸ **Leverage InfiniBand's high Performance**

▸ **Leverage iSCSI management tools**

FalconStor®
Software

- ▸ **Data Path – Over InfiniBand Verbs/CMA**
  - ▸ High Bandwidth, Low Latency, RDMA

- ▸ **Control Path – Using iSCSI headers**
  - ▸ Discovery, naming, security, error-recovery, booting, etc.

- ▸ **Leverages on the wide adoption of iSCSI**
  - ▸ OS code and storage products
  - ▸ Management tools and standard interfaces
  - ▸ Standardization, Testing and protocol maturity
  - ▸ End-user training

InfiniBand solutions leverage the iSER (iSCSI RDMA) protocol, and FalconStor's IPStor software has been optimized for iSER to harness its advanced capabilities.

iSER brings significantly greater performance to iSCSI and leverages the protocol's existing comprehensive management capabilities, allowing heterogeneous storage environments to utilize a single protocol and management infrastructure.

iSER over 10 Gbps (SDR) and 20 Gbps (DDR) InfiniBand delivers markedly better performance than Fibre Channel at significantly lower costs.
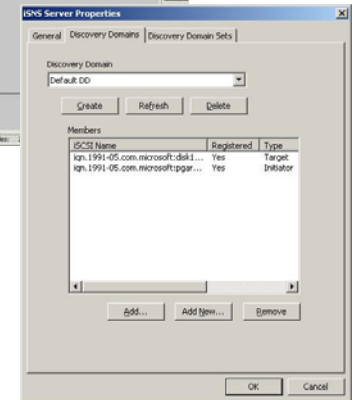
Storage management is critical

Tivoli

Microsoft

"95% of the Global 3,500 firms surveyed complained that their main problem with storage was that it was hard to manage. A further illustration of the management problem came from the 45% which said it was their biggest storage expense."
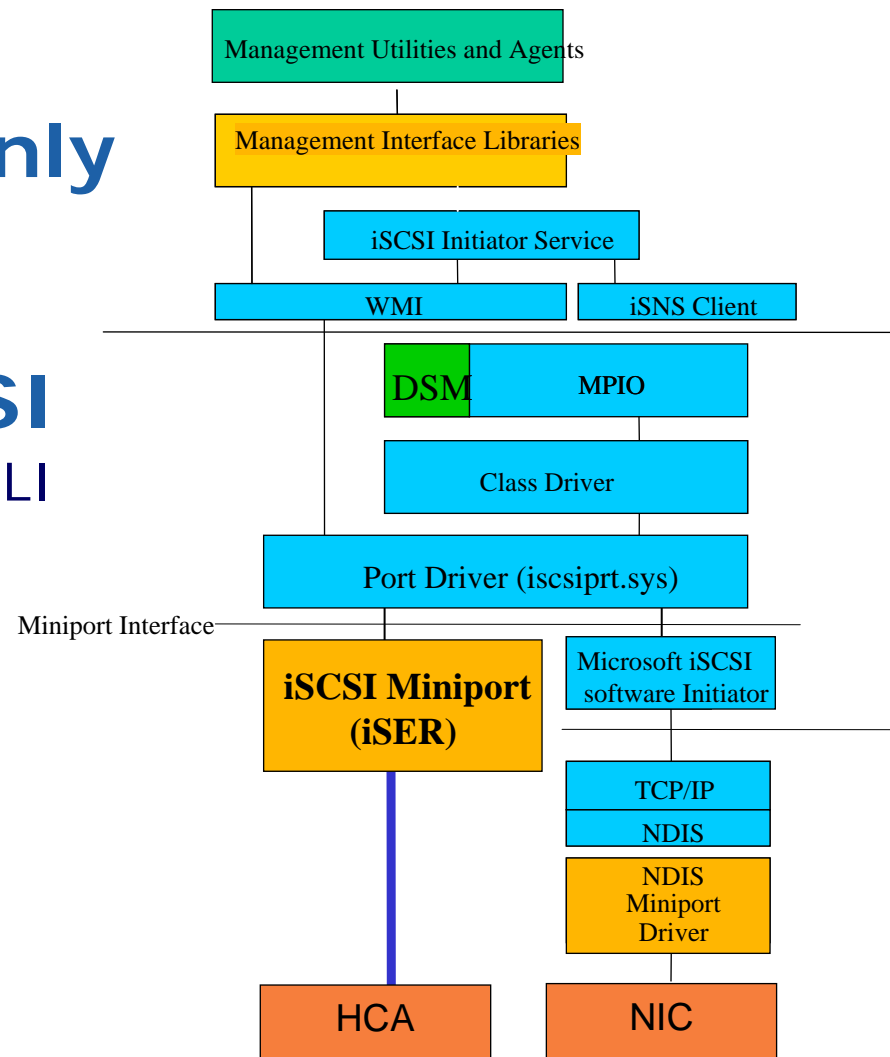
Forrester Research

Transparent integration examples

Use iSER with existing storage management tools

▸ Coexists with FC tools through transparency and standard mappings
▸ Leverage on OS built in iSCSI Management support for Initiators
▸ Interoperable with iSCSI and iSNS management and provisioning tools
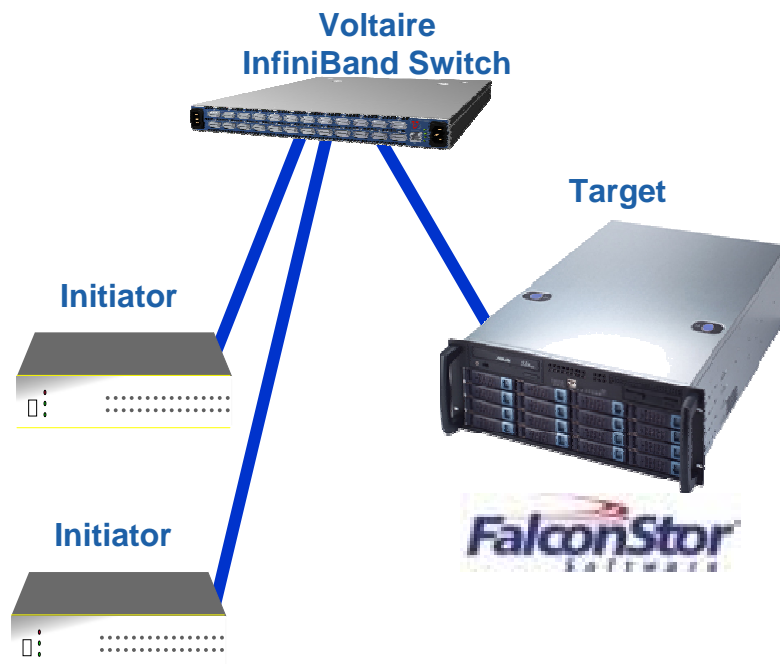
FalconStor® Software

iSER miniport driver only deals with transport
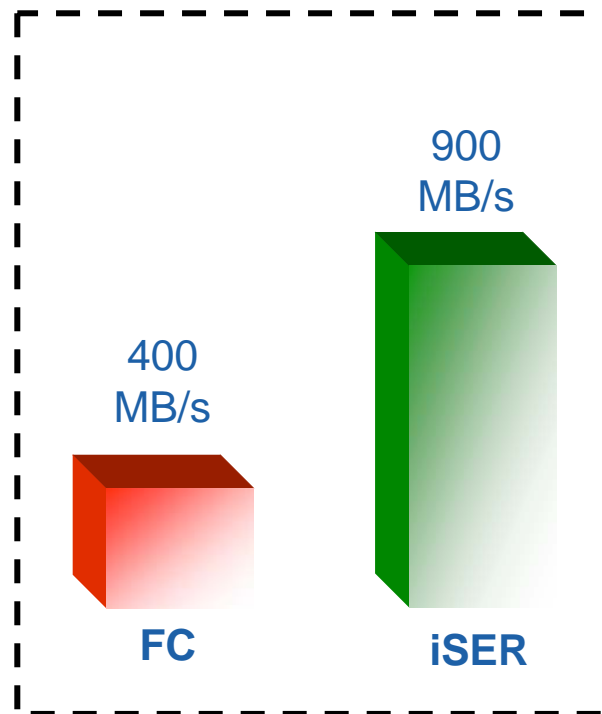
Leveraging on MS iSCSI

- ▸ Management with common CLI and GUI, storage explorer
- ▸ iSNS services for discovery, security, and notifications
- ▸ Active Directory
- ▸ Session management
- ▸ MPIO

Management Utilities and Agents

Management Interface Libraries

iSCSI Initiator Service

WMI | iSNS Client

DSM | MPIO

Class Driver

Port Driver (iscsiprt.sys)

Miniport Interface

iSCSI Miniport (iSER) | Microsoft iSCSI software Initiator

TCP/IP

NDIS

NDIS Miniport Driver

HCA | NIC

Performance

Voltaire InfiniBand Switch

Target

Initiator

Initiator

400 MB/s

900 MB/s

FC

iSER

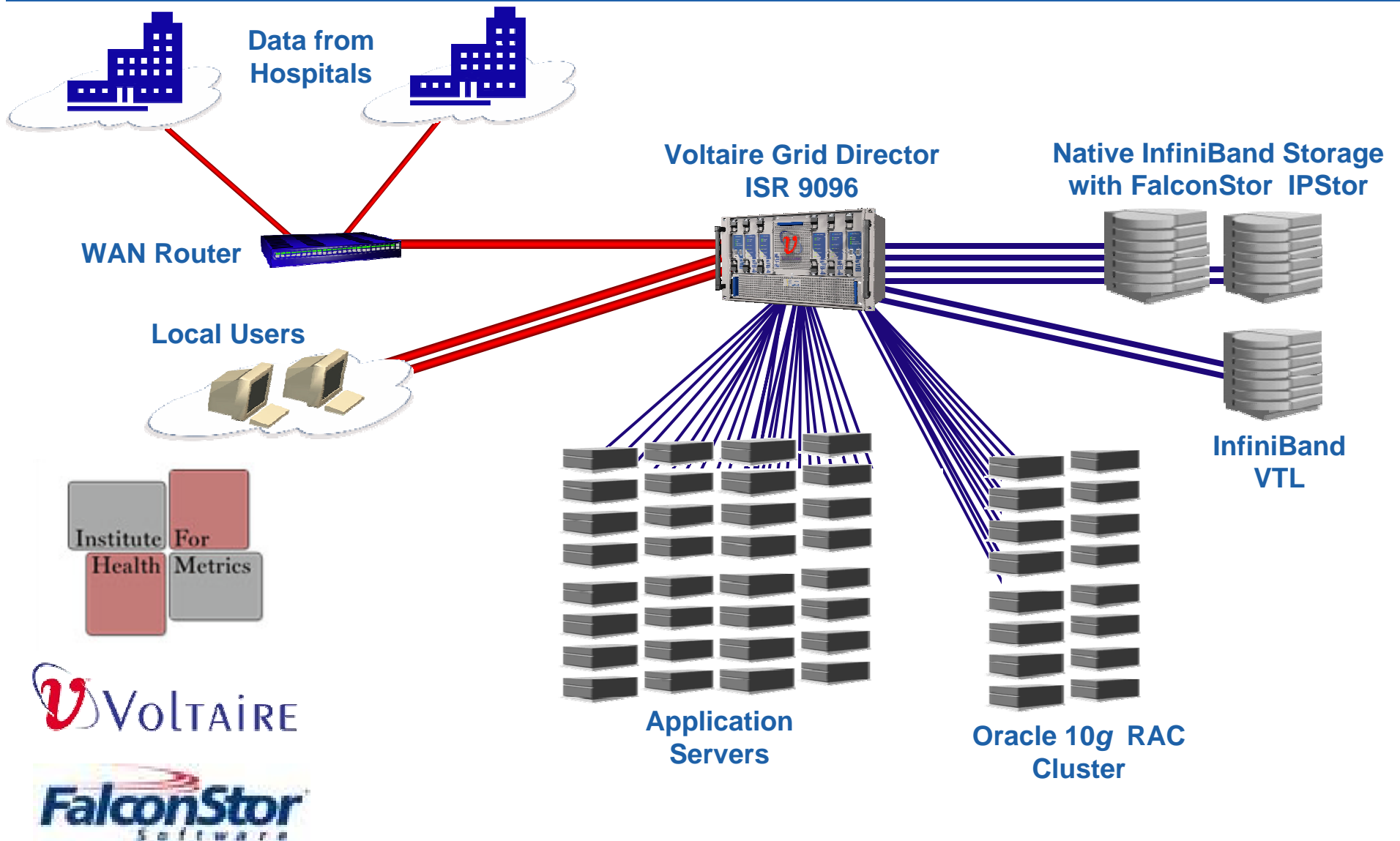**Delivering unprecedented cost/performance, leveraging on industry standard components**

Enterprise Customers

▸ Database configurations

– Double storage performance

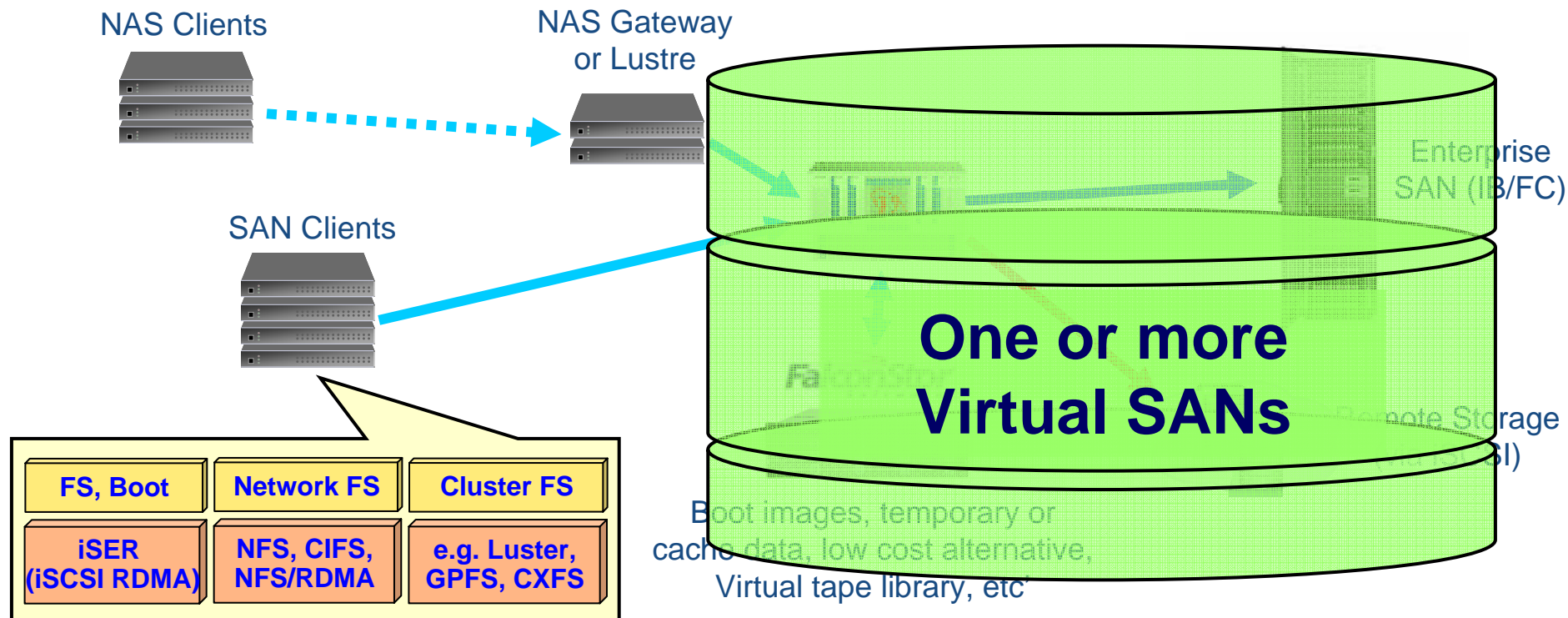– Reduce Storage costs by using off-the-shelf building blocks

▸ Backups and DRP systems

HPC Customers

▸ Leverage your InfiniBand infrastructure for clustering and storage access

▸ Large scale grids and clusters will now have direct access to an InfiniBand SAN

▸ No need for expensive FC HBAs

FalconStor Software

Data from Hospitals

WAN Router

Local Users

Voltaire Grid Director ISR 9096

Native InfiniBand Storage with FalconStor IPStor

InfiniBand VTL

Application Servers

Oracle 10*g* RAC Cluster

Institute For Health Metrics

Voltaire

FalconStor Software

FalconStor Software

NAS Clients

NAS Gateway
or Lustre

SAN Clients

Enterprise
SAN (IB/FC)

One or more
Virtual SANs

Remote Storage

Boot images, temporary or
cache data, low cost alternative,
Virtual tape library, etc

FS, Boot	Network FS	Cluster FS
iSER (iSCSI RDMA)	NFS, CIFS, NFS/RDMA	e.g. Luster, GPFS, CXFS

Boot images and temporary/cached data served from a storage appliance, can be backed up in enterprise storage, improve storage access and reduce costs

Heterogeneous storage can be mapped to VSANs via iSCSI (iSNS)

Advanced Data Management Solutions

High Performance Grid Backbone™ Solutions

iSCSI

InfiniBand

Thank You!

Any Questions?

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