Campus Days
14.-16. januar 2010

Session W-12

Datacenter Storage og virtualiseringsløsninger

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Windows Server 2008 R2

Microsoft TechNet

Session Objectives And Takeaways

- Session Objective(s):
  - Describe the use of Hyper-V with the Dell iSCSI Target
  - Describe the use of Failover Clustering with Hyper-V and the Dell iSCSI Target
  - Describe the use of Cluster Shared Volumes in Windows Server 2008 R2 with the Dell iSCSI Target

Notes

- The are many Virtualization options out there.
  We focus on **Hyper-V** here.

- There are many Clustering options out there.
  We focus on the **Failover Clustering** feature included with Windows Server 2008 R2 here.

- There are many iSCSI Initiator options out there.
  We focus on the **Microsoft iSCSI Initiator** included with Windows Server 2008 R2 here.

- There are many iSCSI Target options out there.
  We focus on the **Dell iSCSI Target.**

Agenda

1. Basic Considerations
2. Hyper-V with the Dell iSCSI Target
3. Failover Clustering with Hyper-V and the Dell iSCSI Target
4. Cluster Shared Volumes with the Dell iSCSI Target
5. Summary
6. Q&A

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1. Basic Considerations

Before we focus on the Dell iSCSI Target, a few basics on Hyper-V so you can understand the scenario

1.0. Basic Considerations

- All the usual options
  - Direct-Attach, FC SAN or iSCSI SAN?
  - How many spindles?
  - SATA, SAS, FC or SSD?
  - What RAID level?
  - Standalone or Clustered?
- Plus lots to decide specifically for Hyper-V
  - VHD (Virtual Hard Drive) file or pass-through disk?
  - Fixed-size, dynamic or differencing VHD files?
  - Virtual IDE, Virtual SCSI or iSCSI to child?

1.1. Options for Hyper-V (table 1)

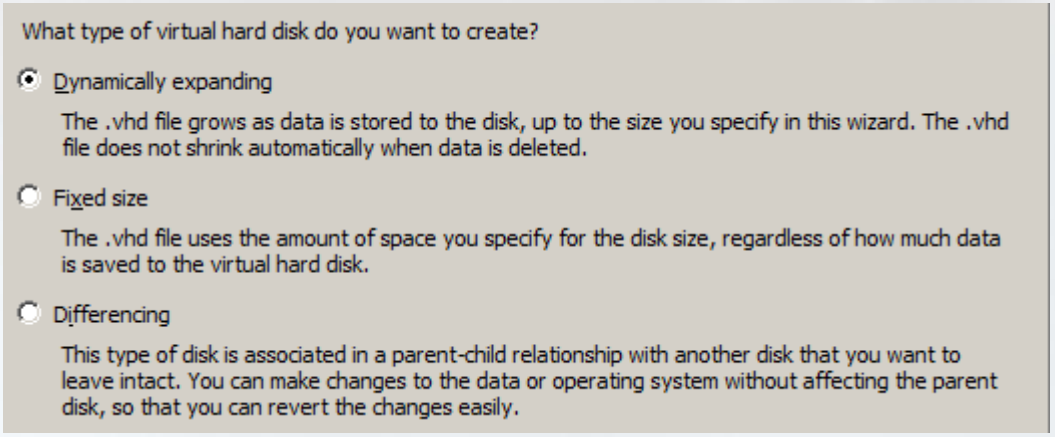
How storage is exposed to the parent partition

	VHD file on Parent Partition	Pass-through disk on Parent Partition	Exposed Directly to Child as iSCSI
DAS (Direct-Attach)	X	X	
FC SAN	X	X	
iSCSI SAN	X	X	X

1.2. Options for Hyper-V (table 2)

Different types of VHD files

	Fixed-size	Dynamically Expanding	Differencing
Pre-allocated disk space	X		
Saves disk space		X	X
Files might grow during writes		X	X
Common base VHD			X



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1.3. Options for Hyper-V (table 3)

How storage is exposed to the child partitions

	Exposed to Child as Virtual IDE	Exposed to Child as Virtual SCSI	Exposed directly to Child as iSCSI
Additional Software on Child	Integration Components (optional)	Integration Components	iSCSI initiator
Child sees disk as	Virtual HD ATA Device	Msft Virtual Disk SCSI Disk Device	MSFT Virtual HD SCSI Disk Device
Child max disks	2 x 2 = 4 disks	4 x 64 = 256 disks	Not limited by Hyper-V
Child hot add disk	No	Yes	Yes

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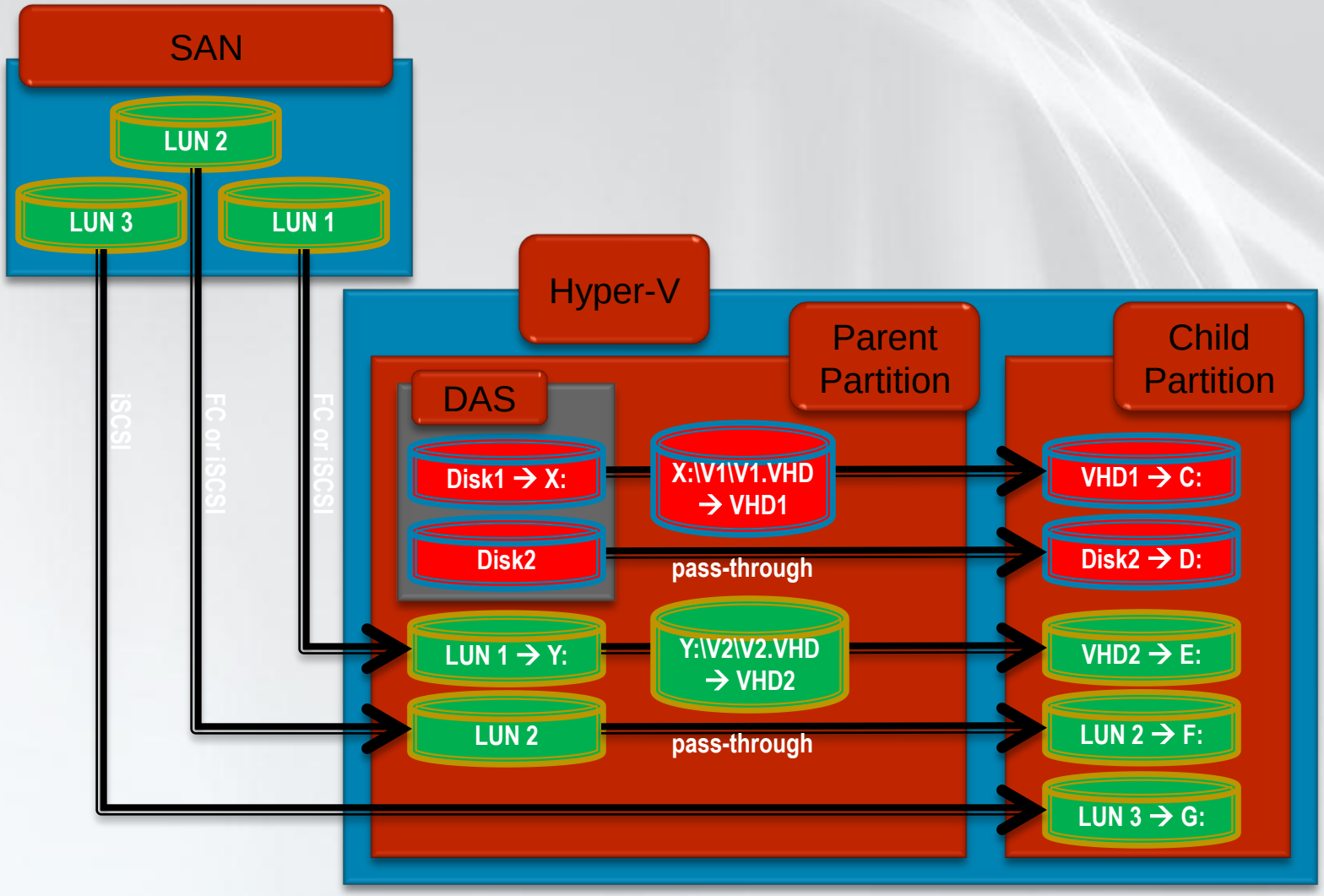
1.4. Options for Hyper-V



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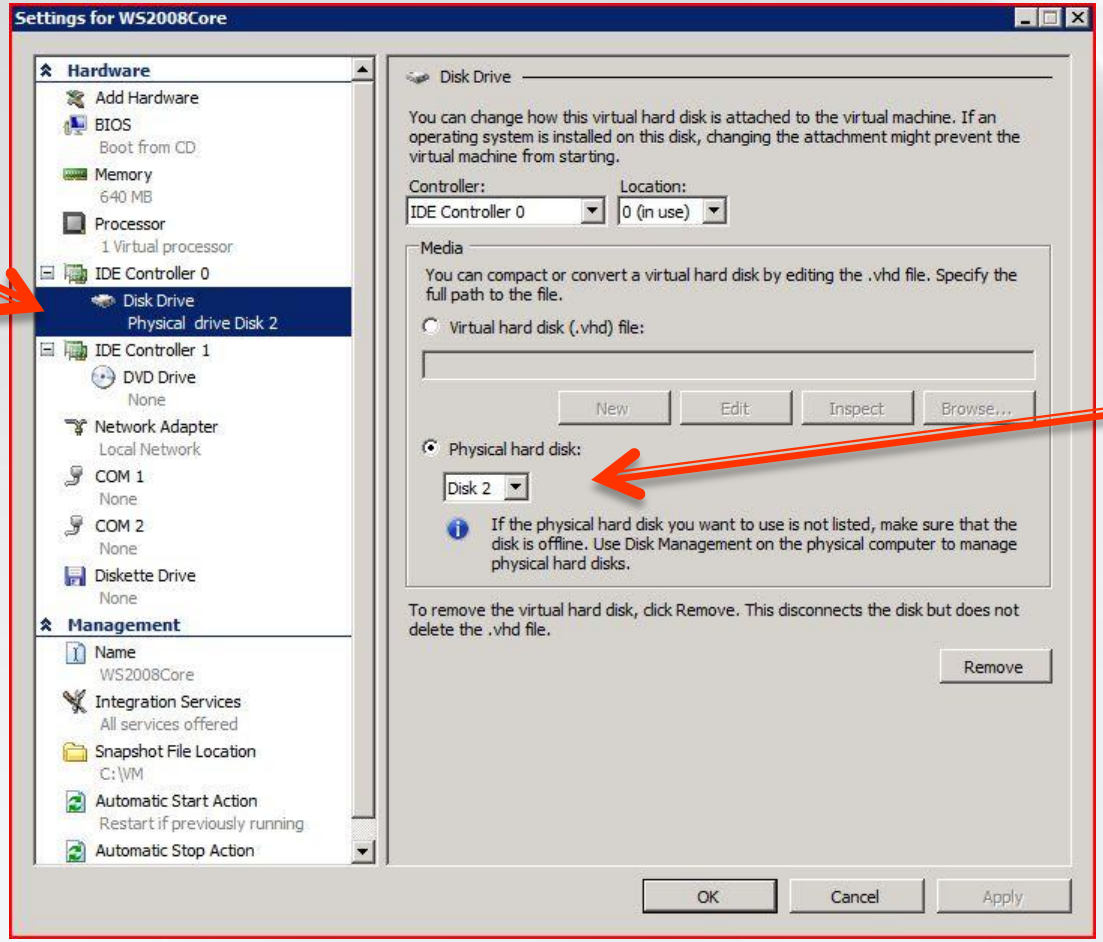
1.5. Configuration Screenshots

Virtual IDE



Pass-through disk

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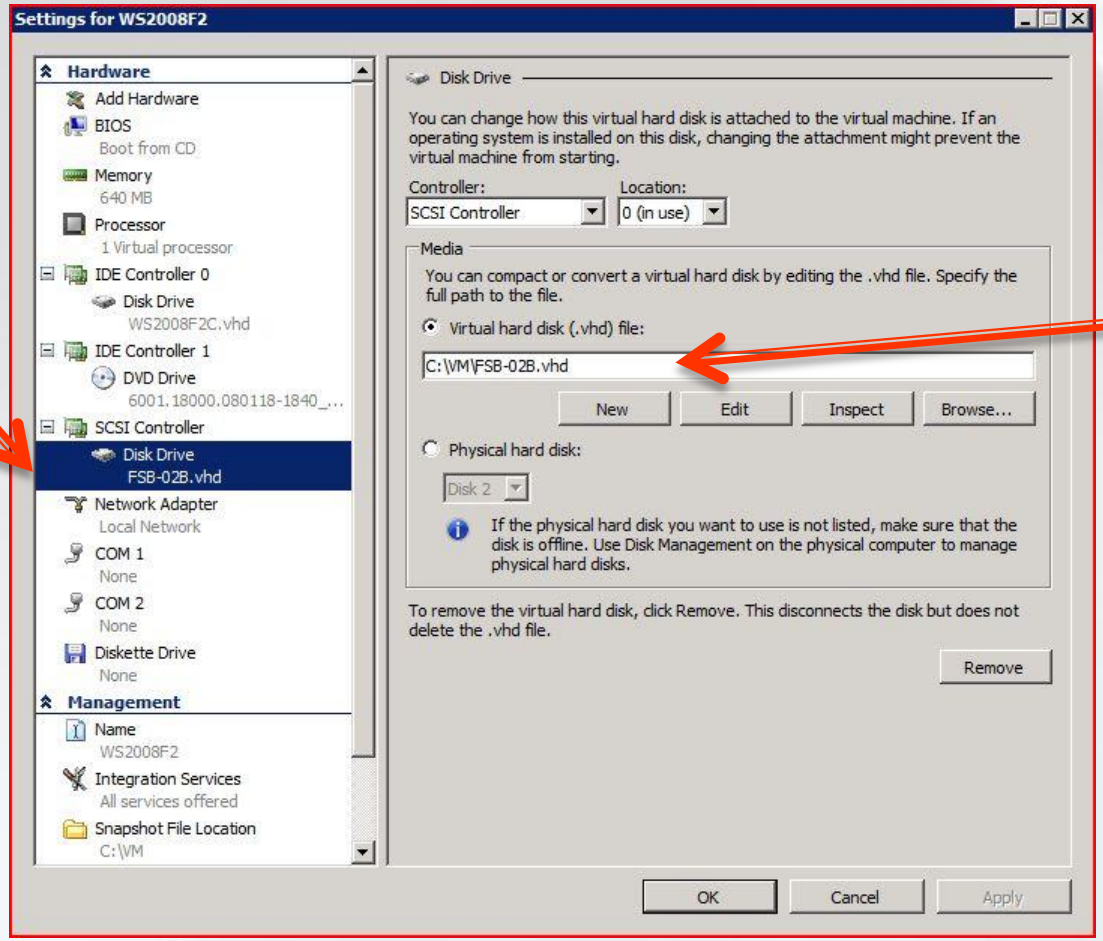
1.5. Configuration Screenshots

Virtual SCSI

VHD File



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2. Hyper-V with Dell iSCSI Target

Understanding how to use the Dell iSCSI Target in conjunction with the Hyper-V role in Windows Server 2008 R2

Microsoft

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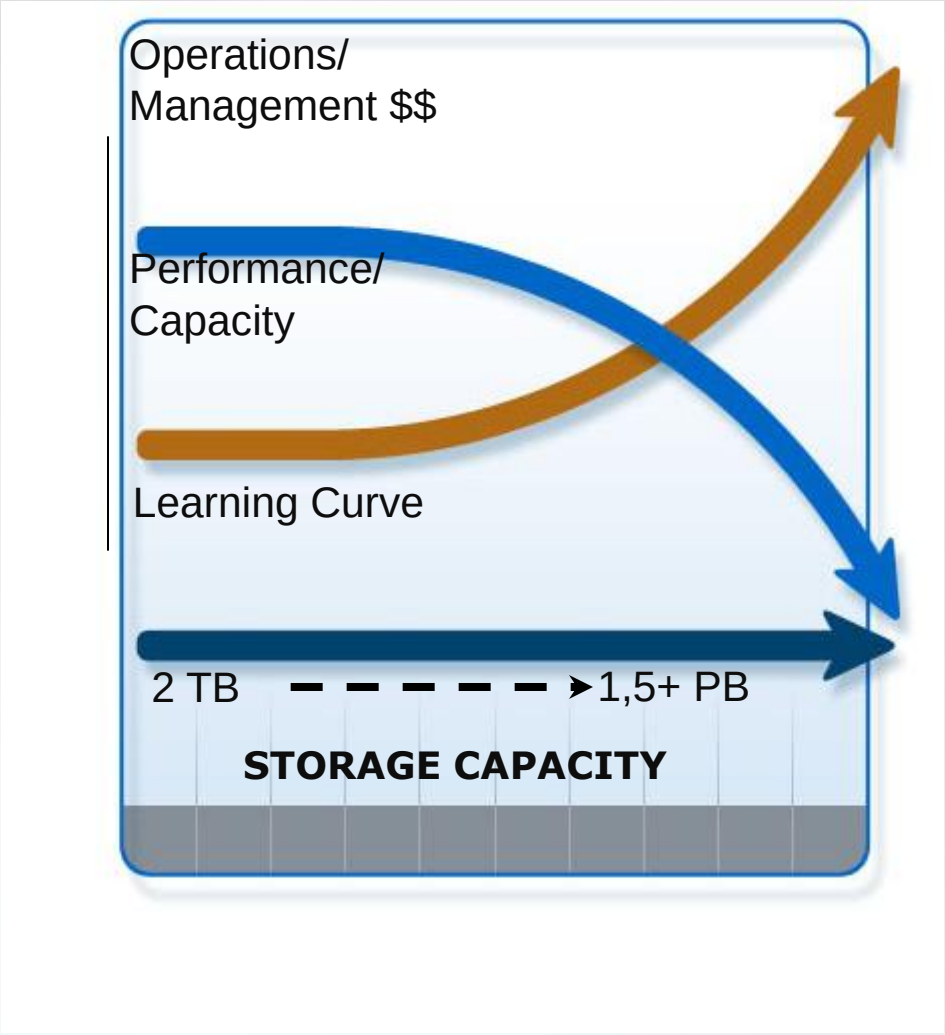
EqualLogic PS Series Storage

products, Advanced Features, Services & Solutions

Lars Bo Iversen | Storage Specialist

EqualLogic Vision: Storage that Manages Itself



- Non-disruptive growth
  - Add capacity any time
  - Transparent to servers: no downtime
- High performance scaling
  - Linear scaling
- Self-managing
  - System rebalances automatically as it grows
  - System tunes automatically in response to workload
- Integrated, all-inclusive feature set

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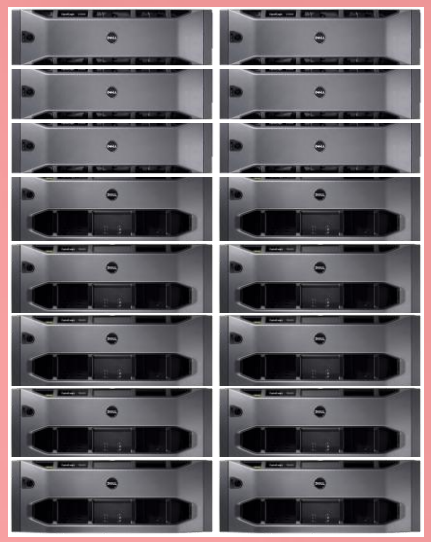
Equallogic PS Series

Simplify your storage

PS6000 Series

Powerful.
Virtual.
Enterprise.



For Large Organizations &
Data Center Deployments

PS4000 Series

Simple.
Capable.
Affordable.

For remote/branch
offices & SMB

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Equallogic Peer Storage

Drive Types

PSxx00S
SSD
50GB, 100GB

PSxx00XV
SAS 15K RPM
300GB, 450GB, 600GB

PSxx00X
SAS 10K RPM
300GB, 450GB, 600GB

PSxx00E
SATA 7.2K RPM
250GB, 500GB, 1TB

PS6000
16 drives
4x1GB or 2x10GB ports
16 arrays in a Group




PS6500
48 drives
4x1GB or 2x10GB ports
16 arrays in a Group


PS4000
16 drives / 2 GB ports
2 arrays in a Group



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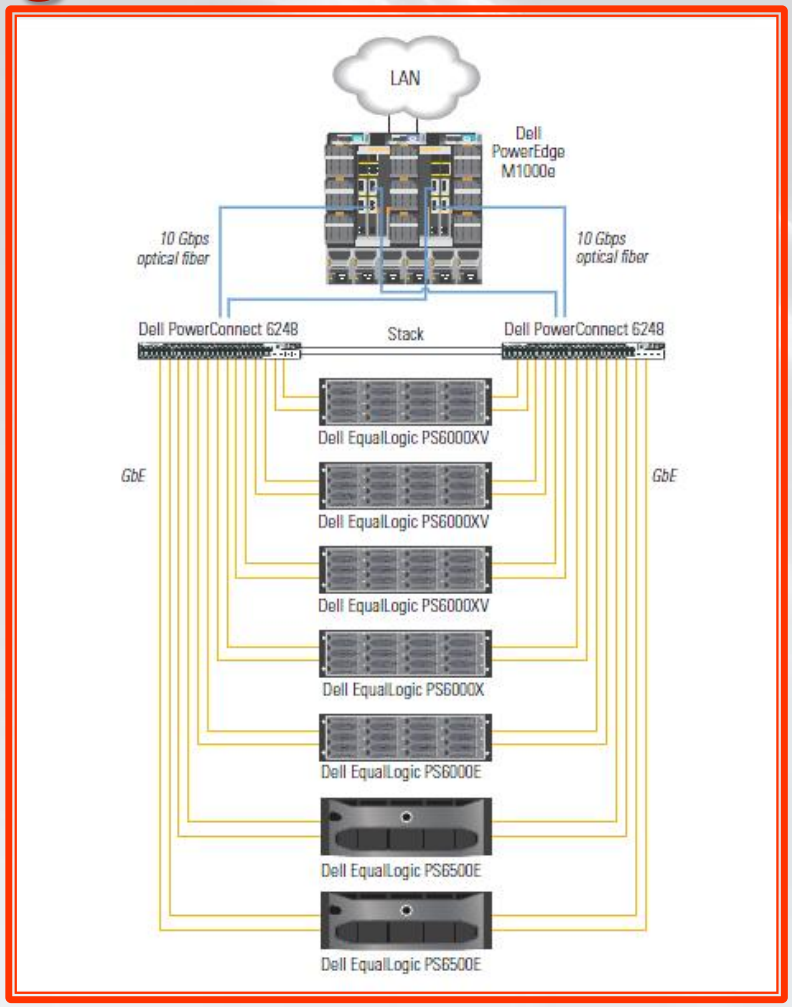
Benefits of Dell EqualLogic in a 10GbE environment

- **Investment Protection**
  - Utilize Existing 1GbE models with future 10GbE PS Series
- **Simplify & Scale**
  - Easily introduce new networking into your virtual data center
- **Enhanced Consolidation ROI**
  - Reduced OPEX with simplified cabling, unified network management and standards based technologies



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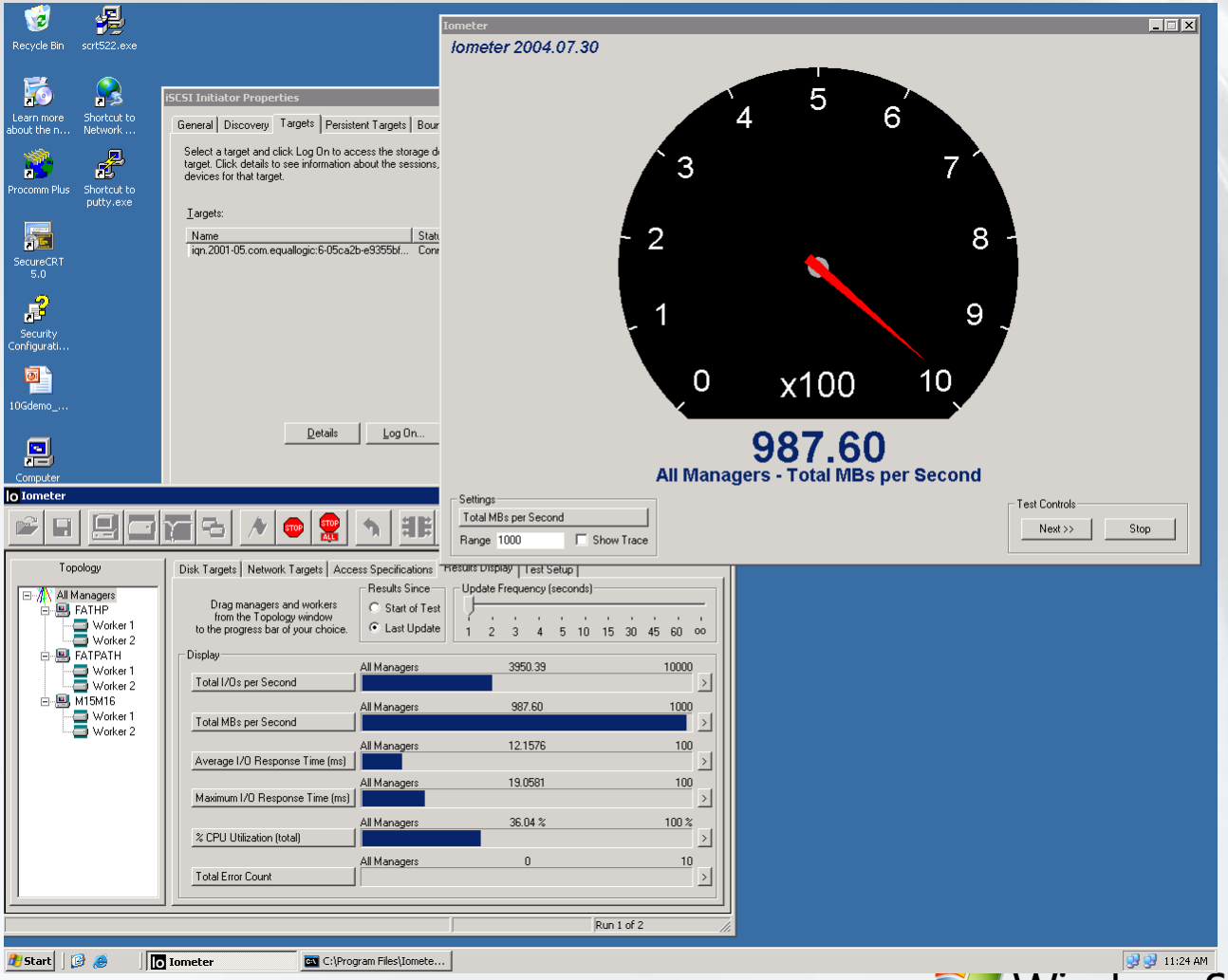
10Gb Controller

Sequential workload



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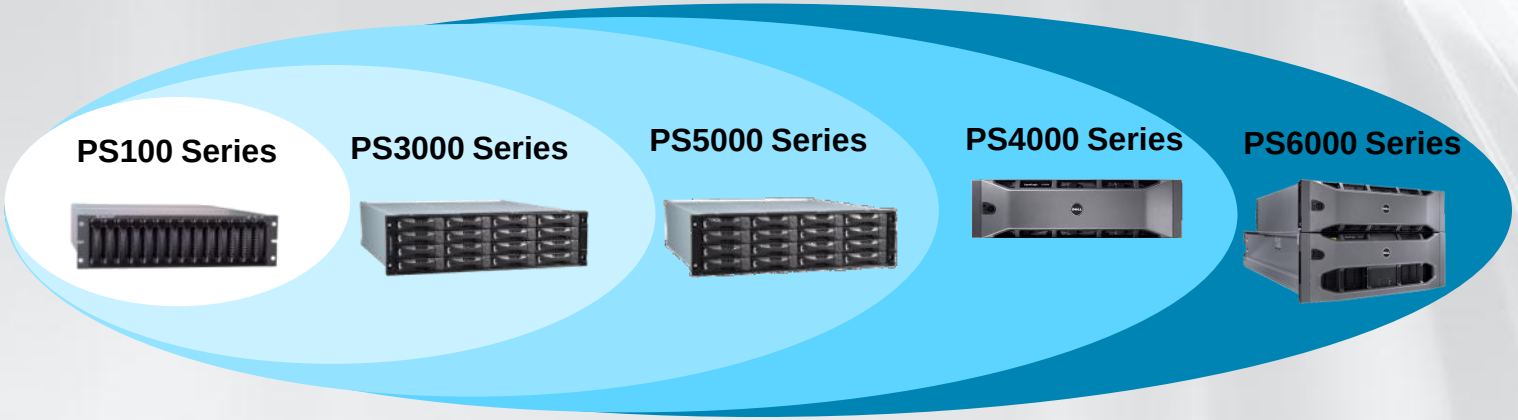
SEAMLESS SAN EXPANSION

CONTINUOUS SOFTWARE ADVANCEMENTS

Single Multi-Generational SAN



Continuous Advancements of
<u>All-inclusive</u> Firmware & Software

- Core Data Protection
- Auto-Snapshot Manager/Microsoft® Edition (ASM/ME)
- Thin Provisioning
- Vmware® Site Recovery Manager
- Auto-Snapshot Manager/ Vmware® Edition (ASM/VE)
- SAN Headquarters
- ASM/ME for Hyper-V™
- Vmware® vStorage

2004 → Windows Server 2008 R2

PS Series Comprehensive Data Management

All-Inclusive with NO Additional Costs

BASE SOFTWARE FEATURES

Management

- ☑ Instant on 'set-up' manager
- ☑ Group manager
- ☑ Rapid provisioning
- ☑ Roles-based management

Data Protection and Availability

- ☑ RAID 5, **6**, 10, and 50
- ☑ Automatic RAID placement
- ☑ Multi-path / IO support

Maintenance

- ☑ Phone home
- ☑ Enclosure monitoring system
- ☑ Performance monitoring

ADVANCED SOFTWARE FEATURES

Storage Virtualization

- ☑ Complete SAN virtualization
- ☑ Thin provisioning
- ☑ Auto-load balancing
- ☑ Automatic storage pools & tiering
- ☑ Array evacuation

Data Protection and Recovery

- ☑ Writeable snapshots
- ☑ Multi-volume snapshots
- ☑ Instant restore / cloning
- ☑ Multi-way replication for disaster recovery

Multi-Group Monitoring

- ☑ SAN HeadQuarters (SAN HQ) event & performance monitoring

Server Management Integration

- ☑ VSS and VDS Providers
- ☑ Automatic MPIO Connection Management
- ☑ Auto-Snapshot Manager/ Microsoft® Edition
  - ➢ Hyper-V™, Exchange®, SQL Server and Windows® file systems data, now including MSCS
- ☑ Auto-Snapshot Manager/
  - ➢ Hypervisor-aware SAN-based snapshots, clones and replication for rapid recovery
  - ➢ Selective VM restore
  - ➢ Advanced MPIO integration

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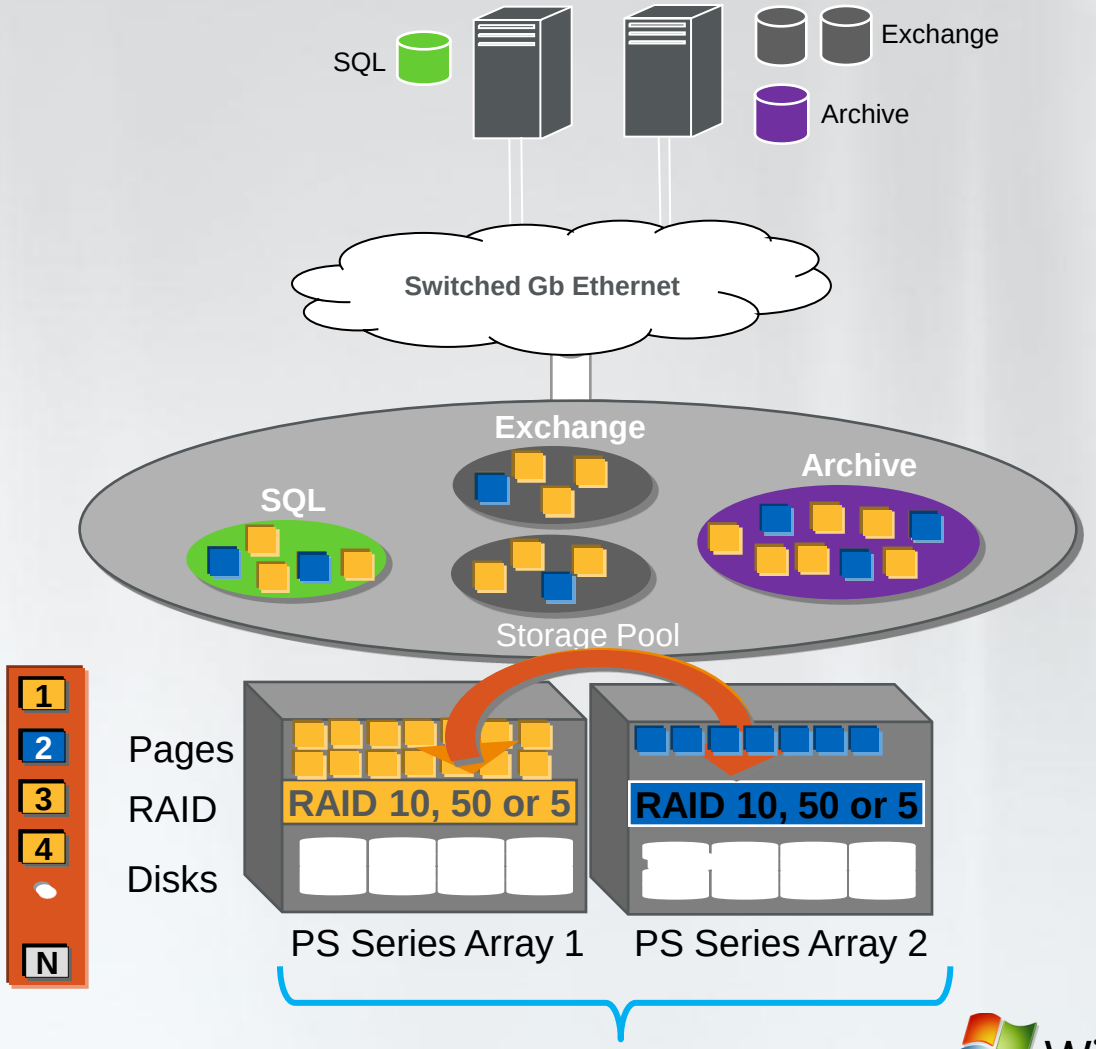
PS Series Architecture

Virtualized peer storage



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Automatic and transparent load balancing across arrays

Single-View Management

Single SAN Manager – Any Size, Any Form

Group Manager — Simple Intuitive GUI

SAN Virtualizer

System Load Balancer

Volume Manager

Enclosure Monitoring System — in-depth SAN reporting

Storage Configuration Assistant — best practice hints and clues

Multiple Storage Pool Creation — online volume movement between pools

Data Replication Control

Rapid Provisioning

Reducing time to Storage Deployment

Instant Volume Creation

1. Name
2. Size
3. Snapshot size
4. Security

Online Volume Modification

- Clones
- Snapshot
- Replication
- Volume expansion

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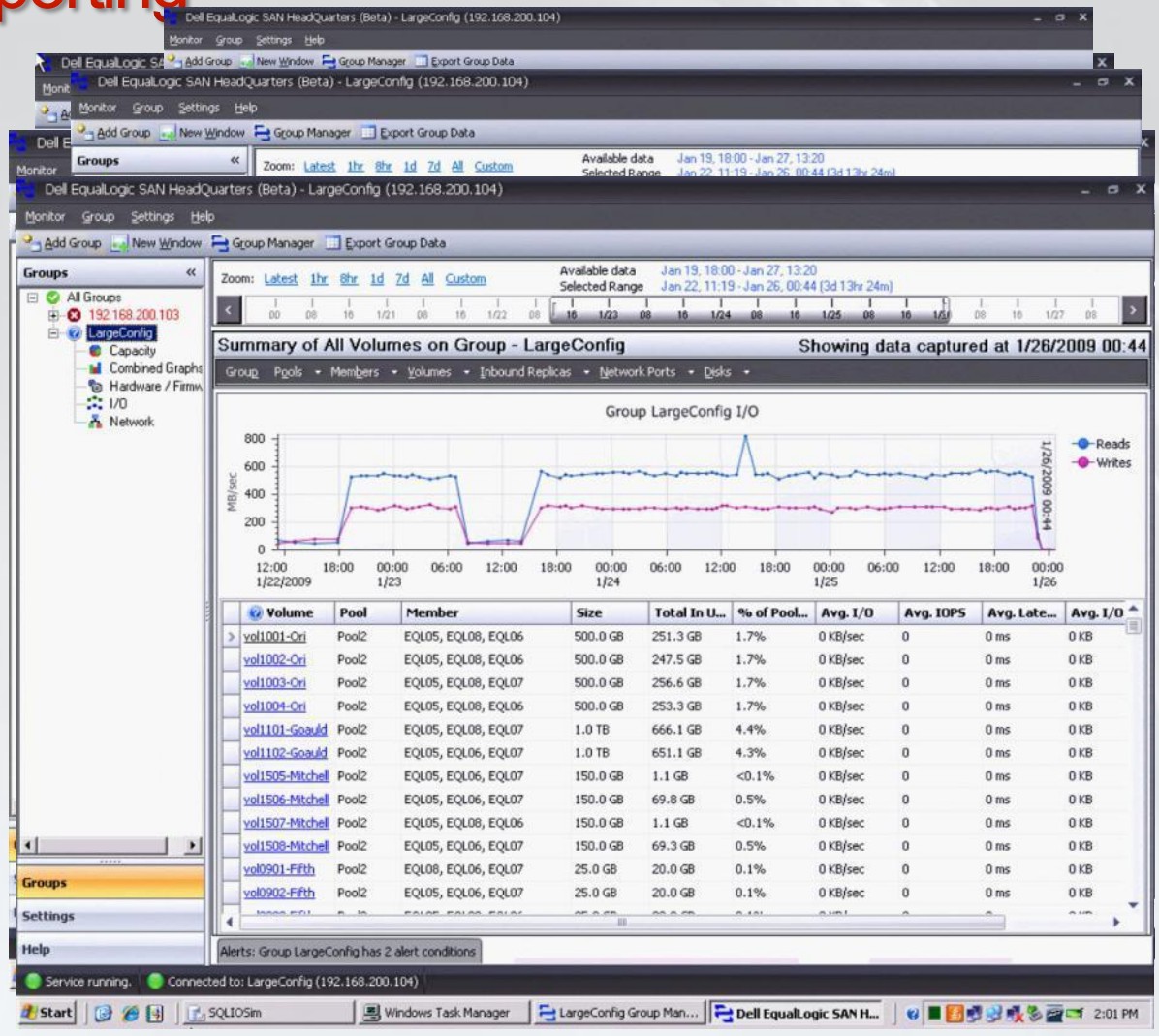
EqualLogic SAN HeadQuarters
Rich historical Reporting

- Capacity
  - Overall Capacity
  - Thin Provisioned space
- I/O Performance
  - IOPS
  - I/O in kb/sec
  - Latency
- Network Data
  - Network Link Throughput
  - Active ports/Slowest port
- Member Hardware and Configuration
  - Pool
  - Status/RAID Policy
- Volumes Data
  - Pool
  - Binding



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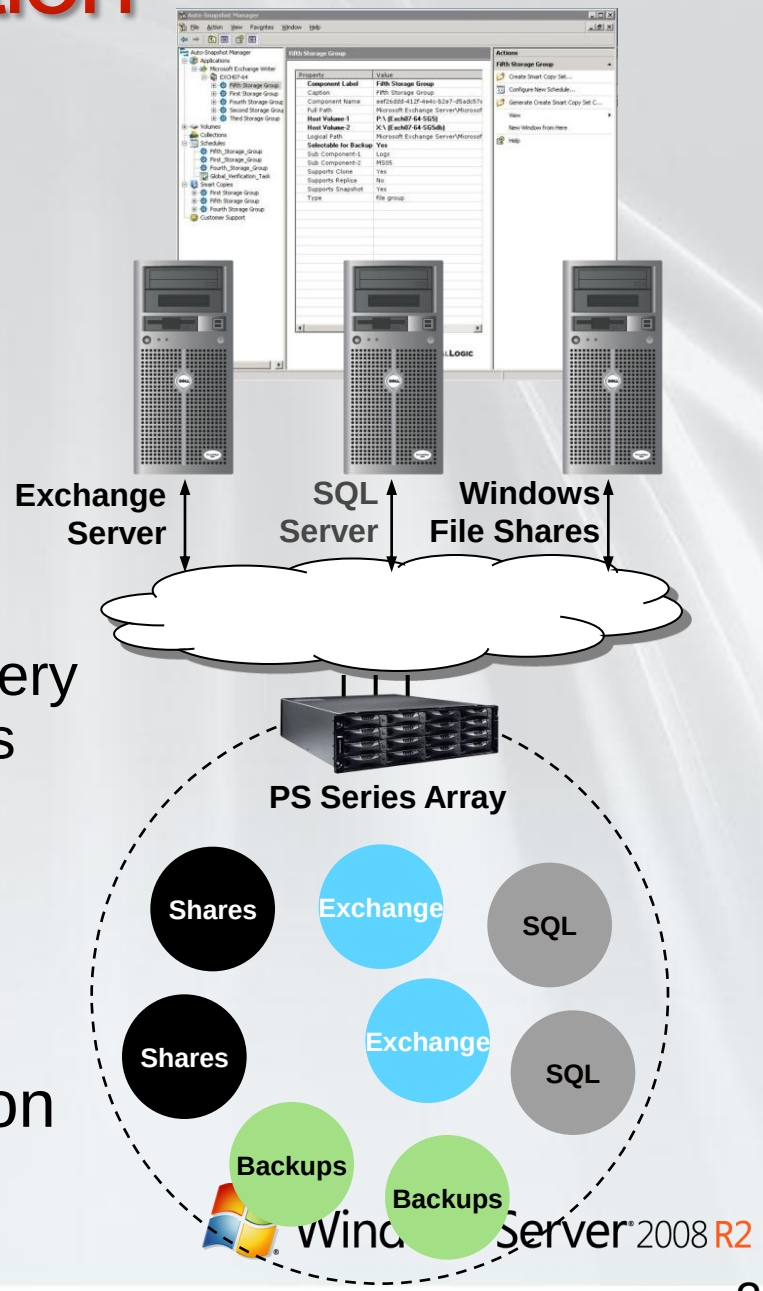
Application Data Protection
Auto-Snapshot Manager Microsoft Edition

Integrated with Microsoft® Volume ShadowCopy Service

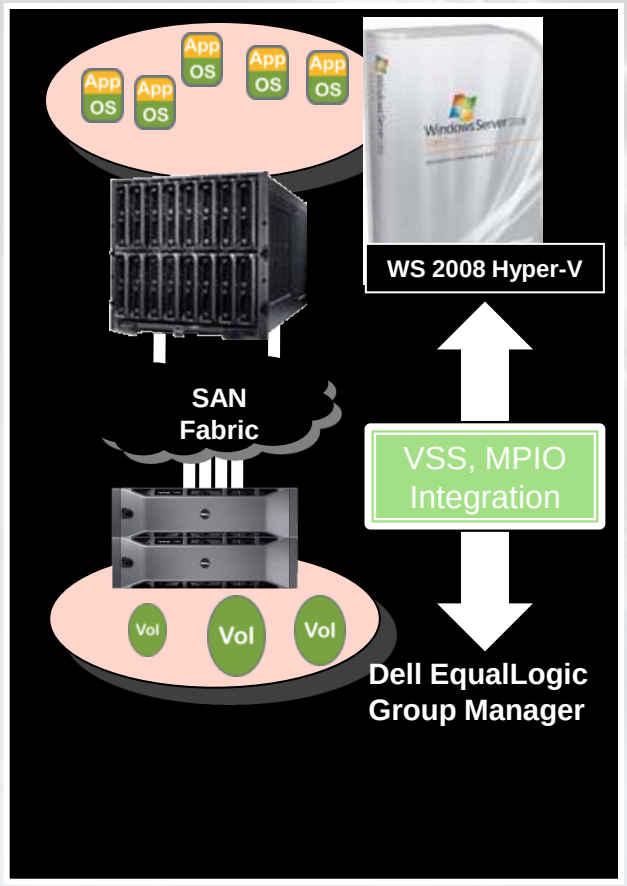
- Application aware protection
  - SQL, Exchange®
  - Hyper-V™
- Delivers powerful and flexible
  - Data protection and rapid recovery
  - Test/Development environments
  - Selective restore of application objects
- Available at no extra charge

Simplify IT: Spend less time managing and protecting application data



Introducing ASM/ME Smart Copy for Microsoft Hyper-V

- Newest Addition to Auto Snapshot Manager/Microsoft® Edition
- Tightly integrated with Volume Shadow Copy Services (VSS)
  - Uses Hyper-V™ VSS protection and recovery capabilities
- Create and manage Smart Copy Snapshots for point-in-time copies of Hyper-V™ Virtual Machines
- Rapid restoration of Hyper-V™ Virtual Machines



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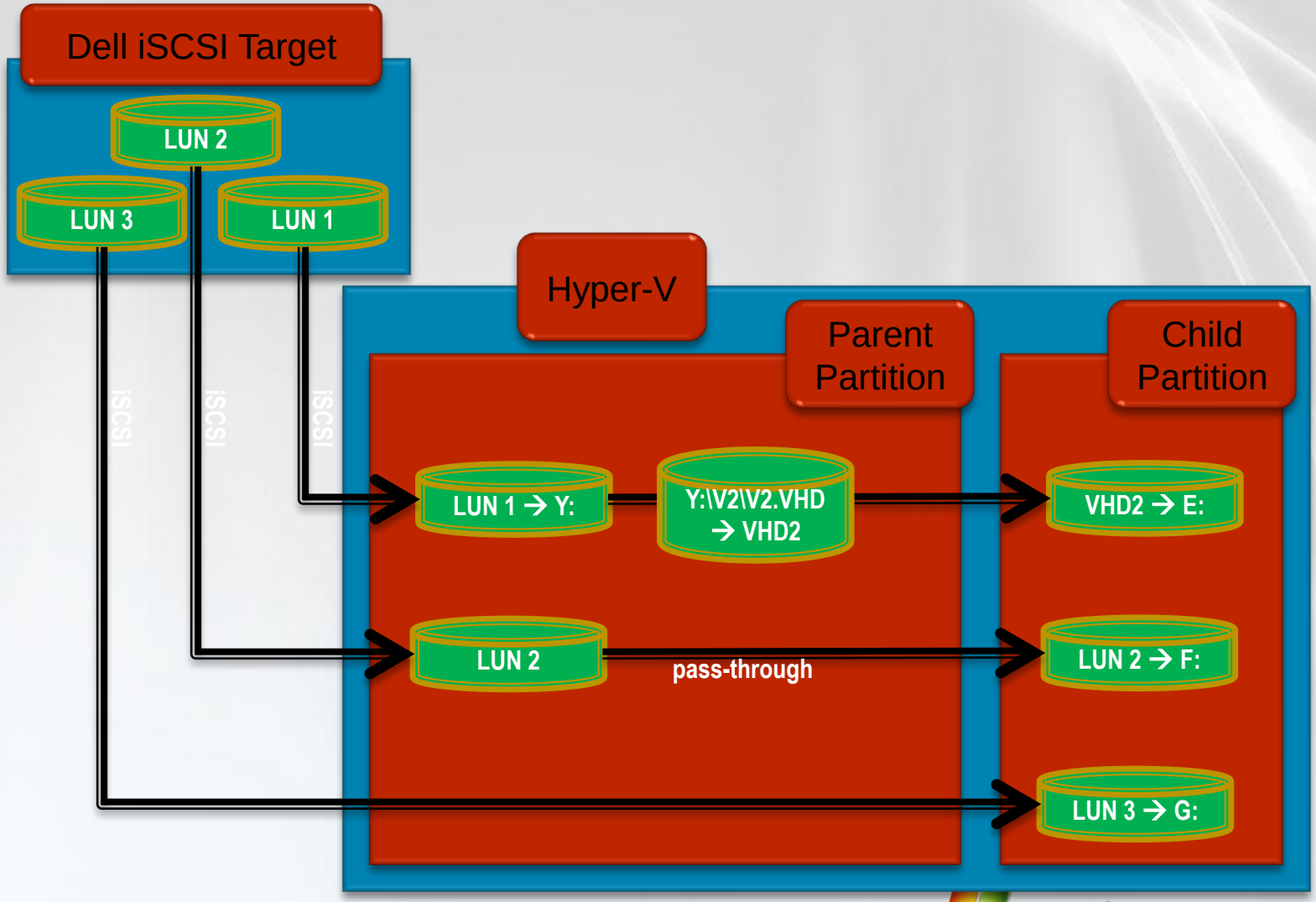
iSCSI directly to child



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2.5. Comparing the three options

Using the Microsoft iSCSI Software Target with Hyper-V

Feature	iSCSI to Parent, VHD file	iSCSI to Parent, Pass-through	iSCSI directly to Child
Easier to manage from parent	X		
Easier to manage from child			X
Expanding/Differencing VHDs	X		
Hot add disk with Hyper-V V1			X
Hot add disk with Hyper-V V2	X*	X*	X
Hyper-V VHD snapshots on Parent	X		
iSCSI Target VSS snapshots on Parent	X	X	
iSCSI Target VSS snapshots on Child			X
Backup with Hyper-V VSS Writer			
Child-based Failover Clustering			X
Child boot from disk (no third party tools)	X**	X**	

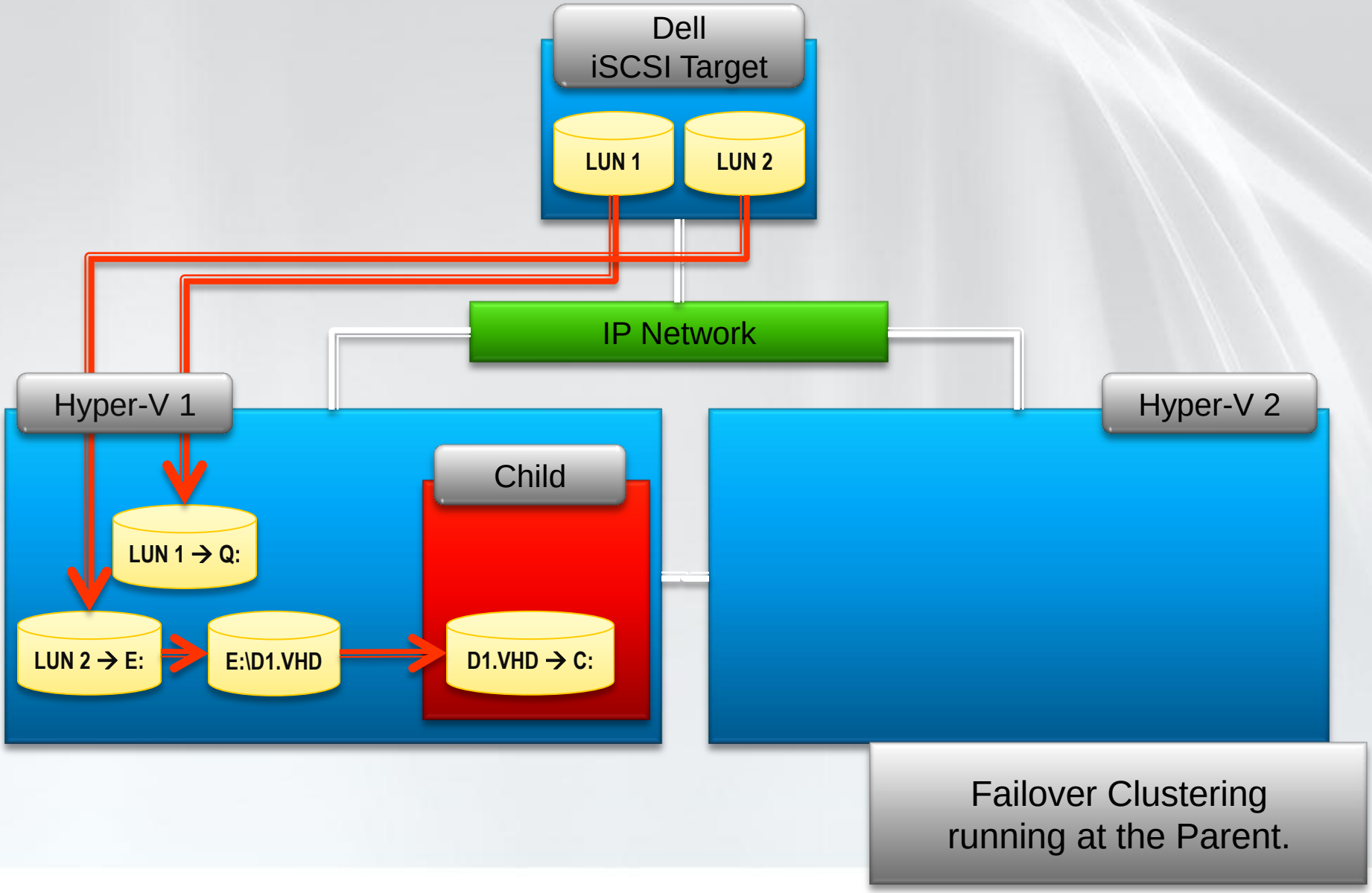
Microsoft

Windows Server 2008 R2

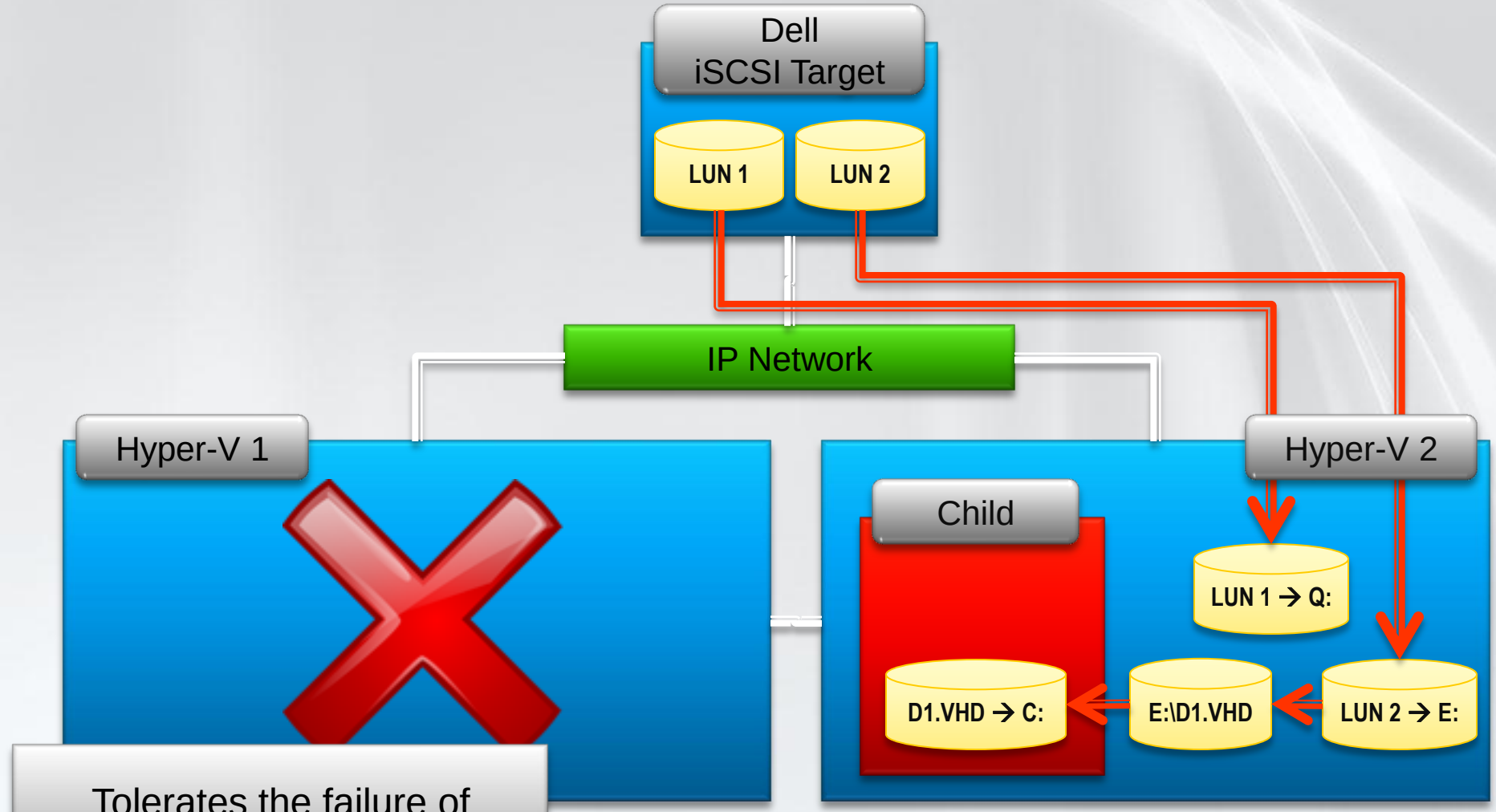
3. Failover Clustering with Hyper-V and iSCSI Target

Understanding how to use the Dell ISCSI Target in conjunction with the Failover Cluster and the Hyper-V role in Windows Server 2008 R2

3.1a. Parent-based, two physical servers (before)



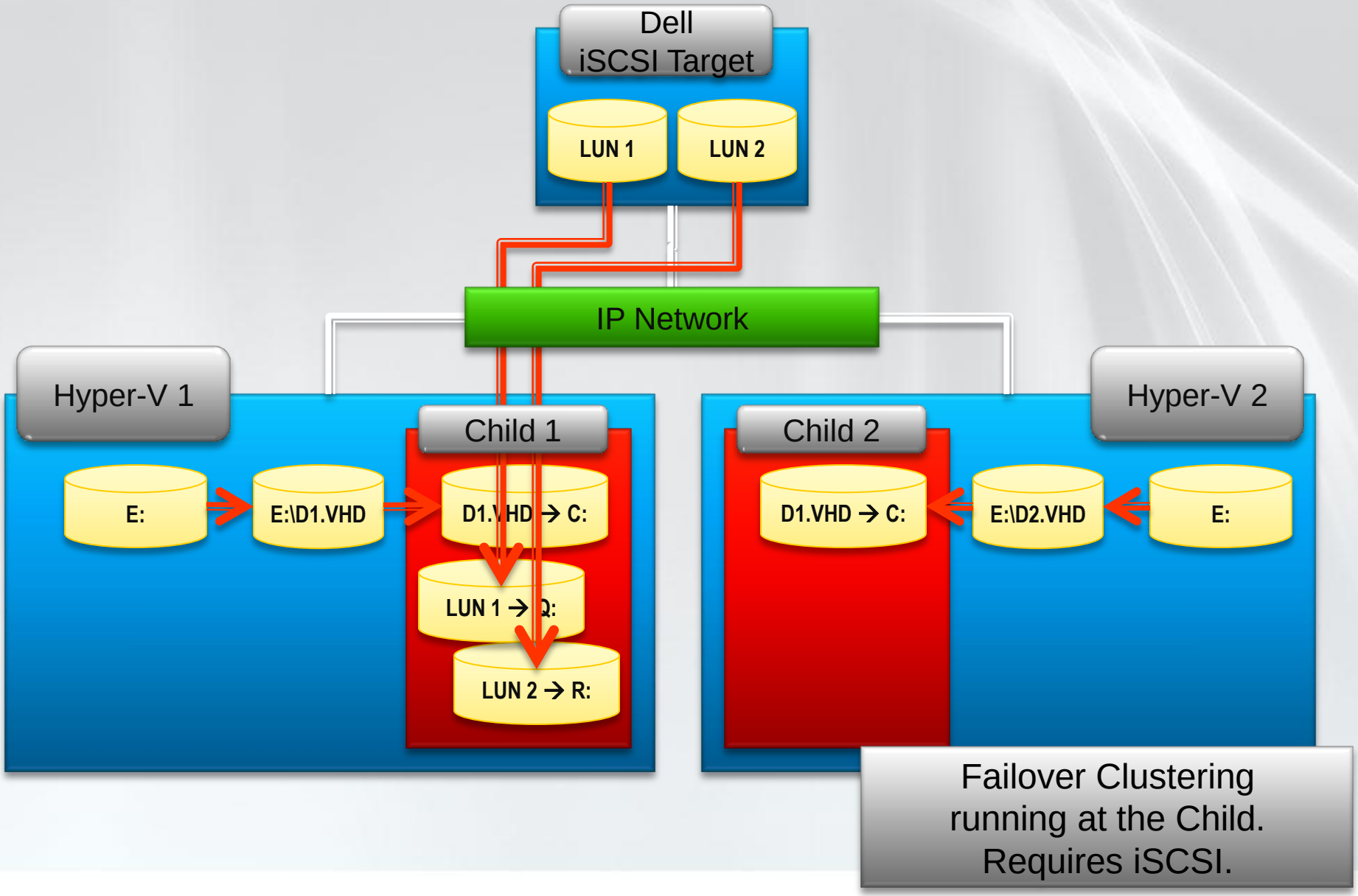
3.1b. Parent-based, two physical servers (after)



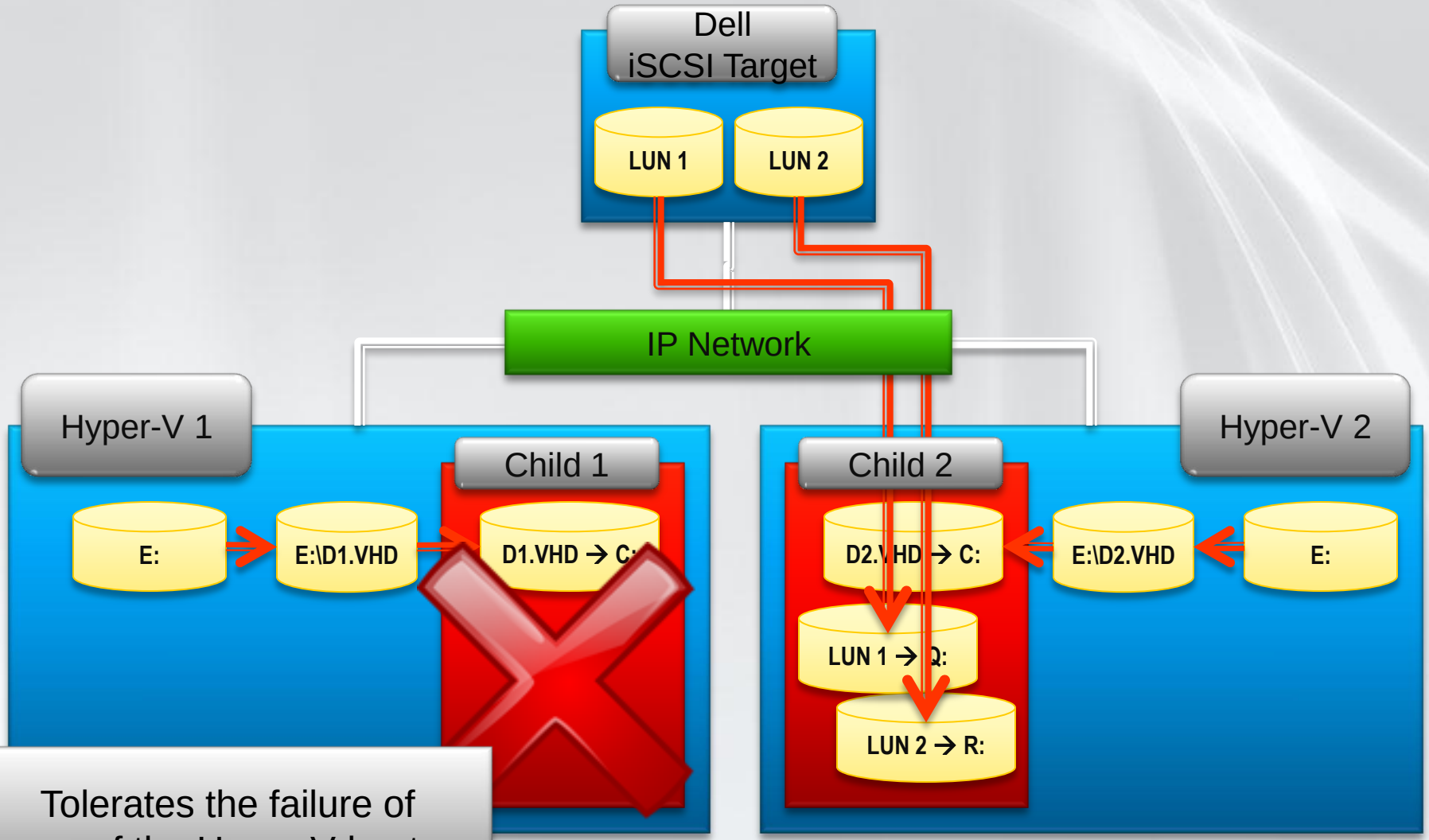
Tolerates the failure of one of the Hyper-V hosts (physical computer)

Windows Server 2008 R2

3.2a. Child-based, two physical servers (before)



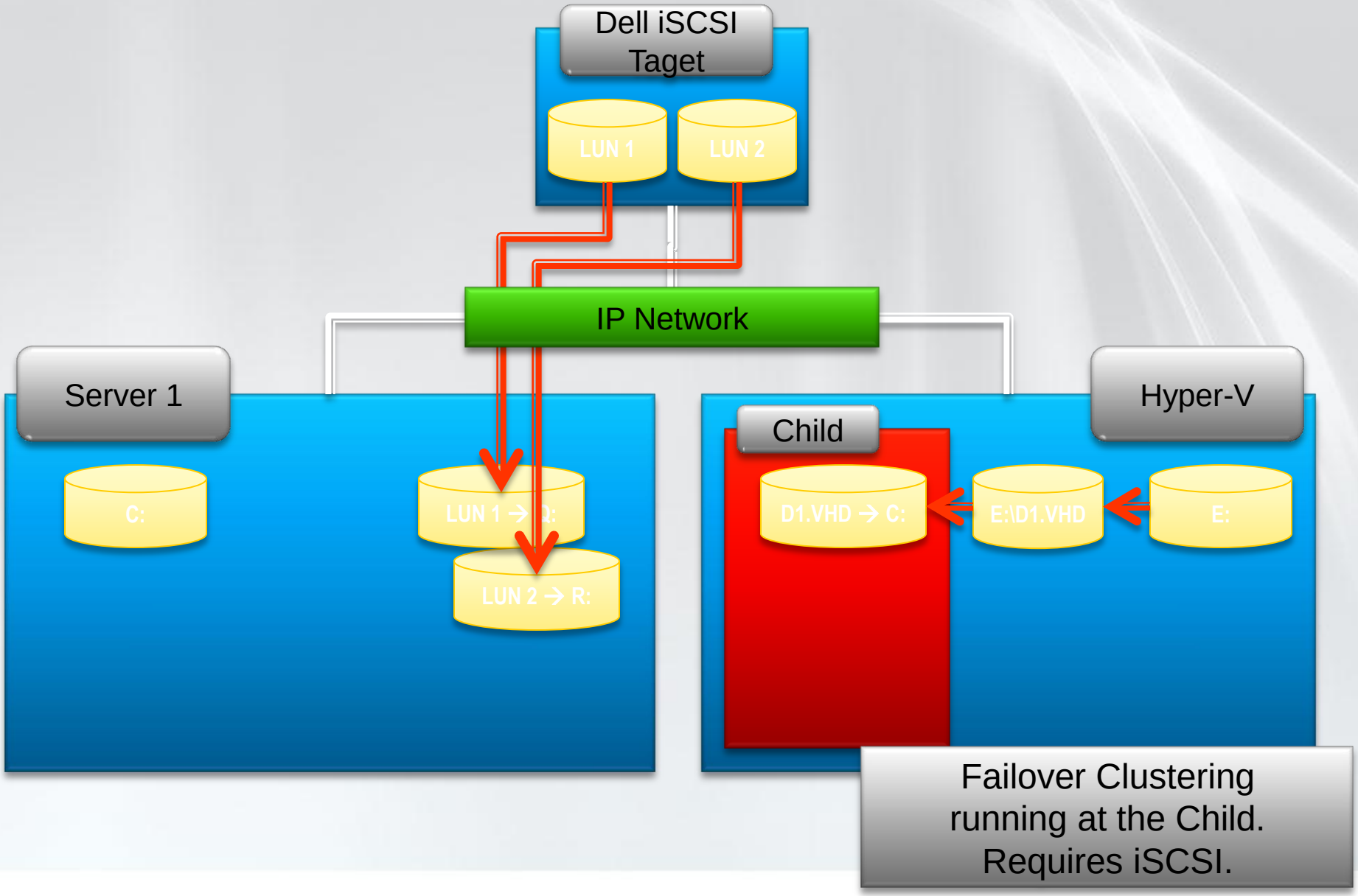
Dell iSCSI Taget



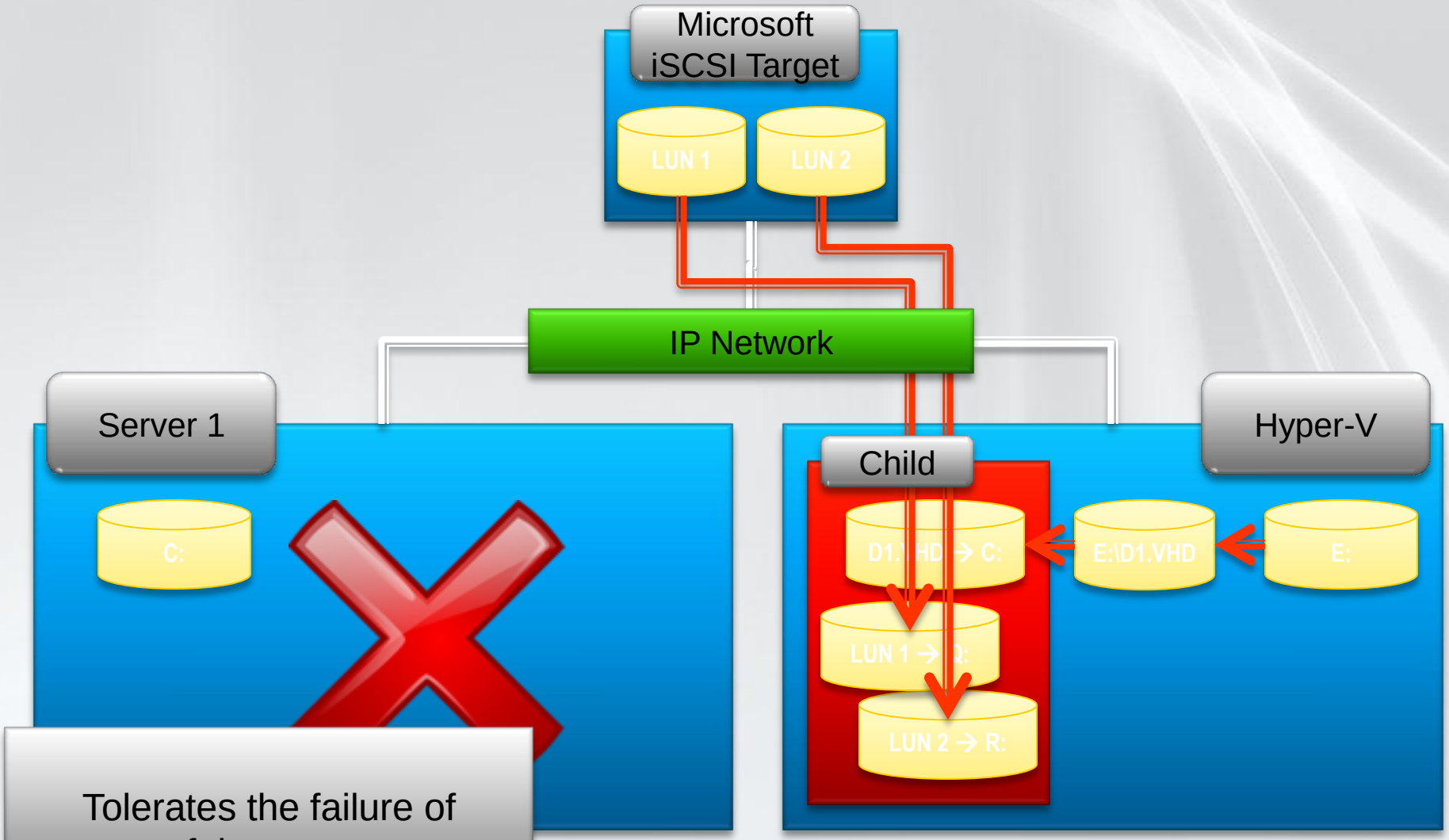
Tolerates the failure of one of the Hyper-V hosts (physical computer)

Windows Server 2008 R2

3.3a. Mixed Physical/Virtual (before)



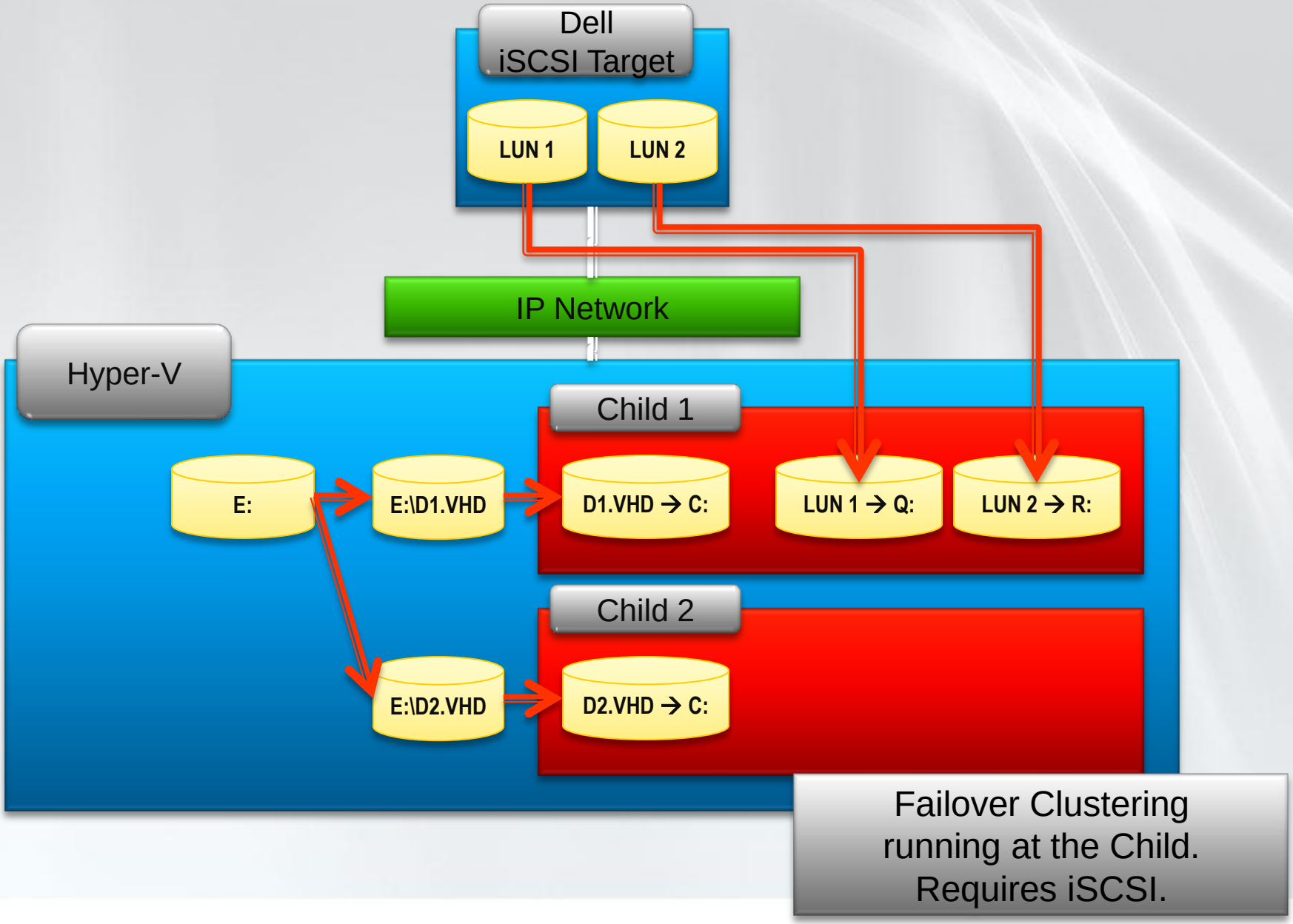
3.3b. Mixed Physical/Virtual (after)



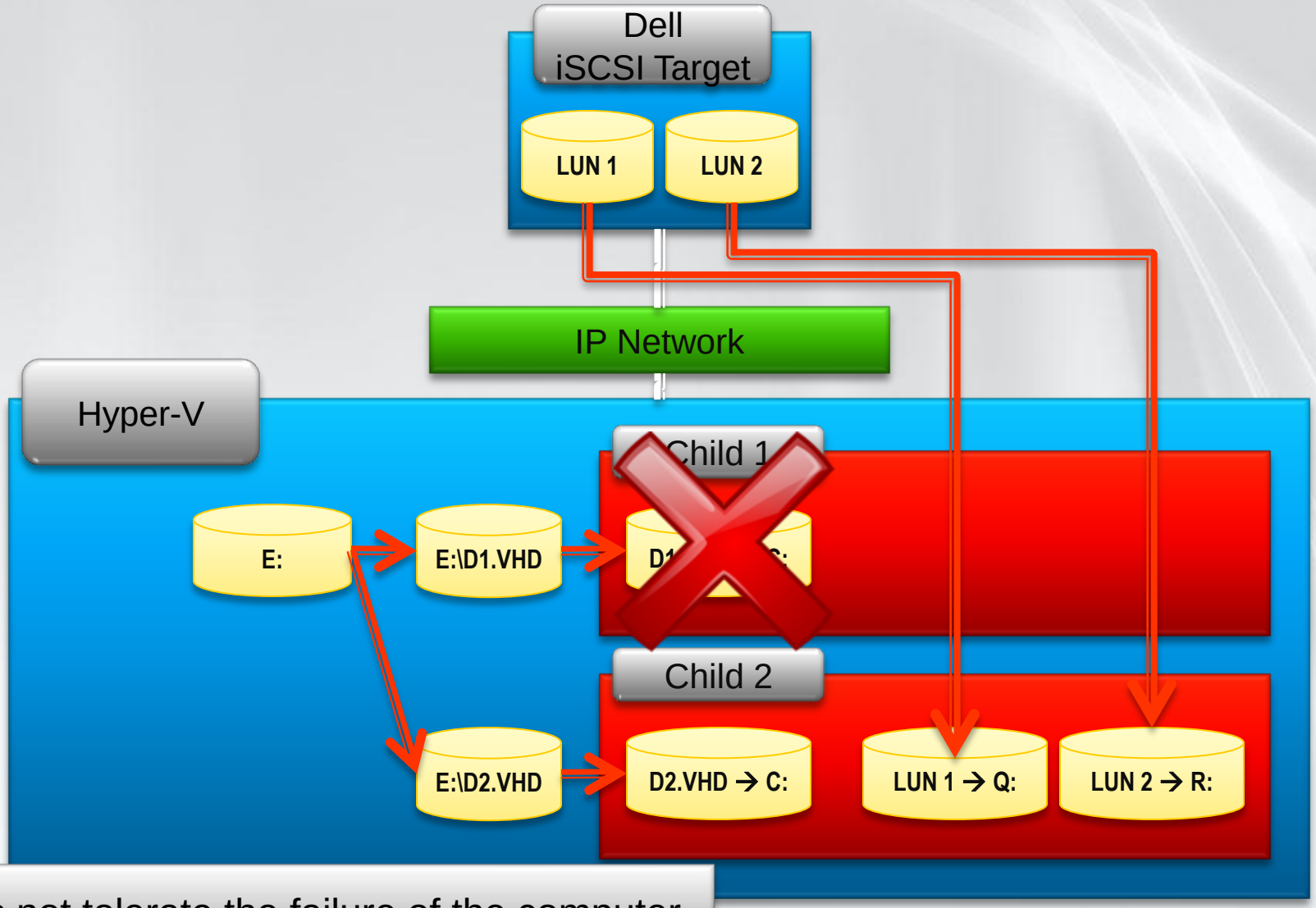
Tolerates the failure of one of the computers

Windows Server 2008 R2

3.4a. Child-based, one physical server (before)



3.4b. Child-based, one physical server (before)



Does not tolerate the failure of the computer.
Good for testing, learning, demos.

Windows Server 2008 R2

Microsoft

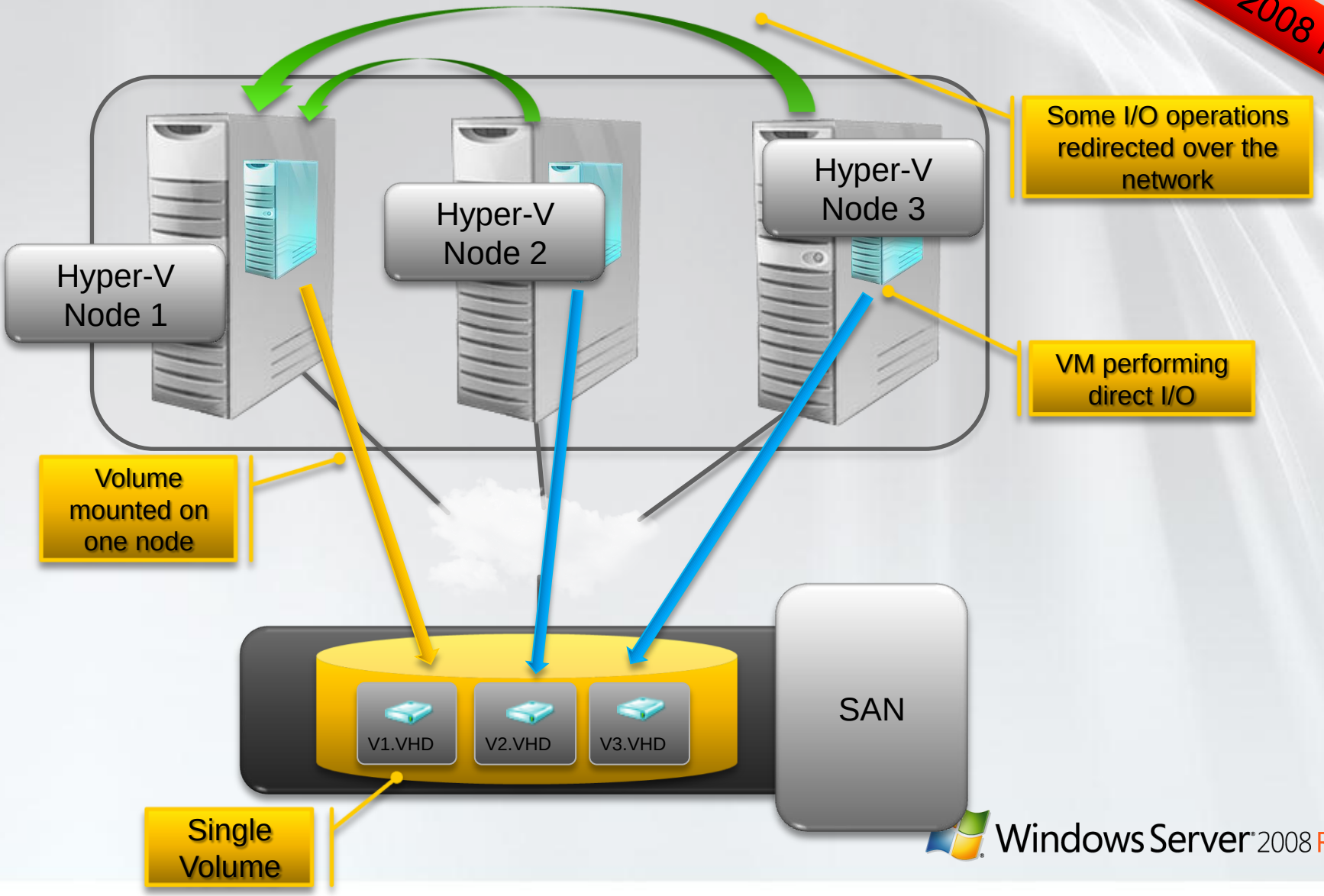
Windows Server 2008 R2

4. Cluster Shared Volumes with the Dell iSCSI Target

Understanding the Cluster Shared Volumes feature of Windows Server 2008 R2, when combined with Hyper-V and the Dell iSCSI Target

4.0. Cluster Shared Volumes

Windows Server 2008 R2



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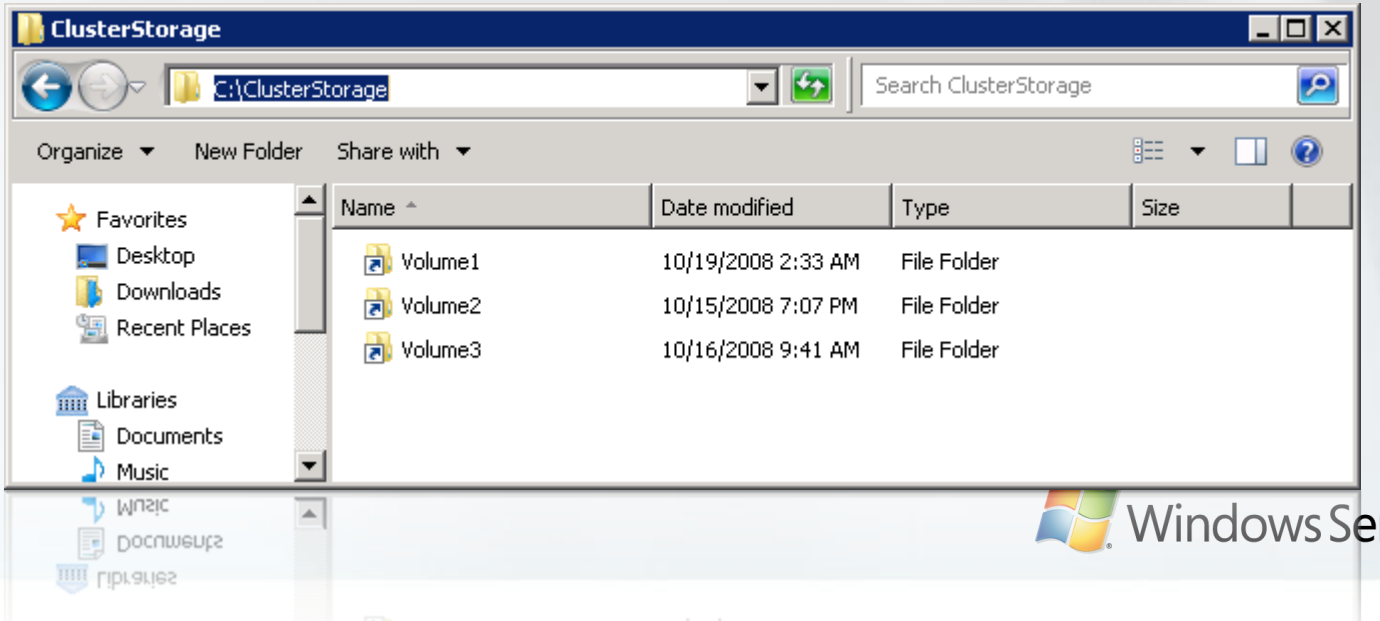
4.2. Single Name Space

Windows Server 2008 R2

- CSV provides a single consistent file name space
  - Files have the same name and path when viewed from any node in the cluster
  - CSV volumes are exposed as directories and subdirectories under the “ClusterStorage” root directory
    - C:\ClusterStorage\Volume1\<*root*>
    - C:\ClusterStorage\Volume2\<*root*>
    - C:\ClusterStorage\Volume3\<*root*>



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4.3. Compatibility

Windows Server 2008 R2

- No special hardware requirements
- No file type restrictions
- No directory structure or depth limitations
- No special agents or additional installations
- Uses well-established NTFS file system

It just works!

Windows Server 2008 R2

4.4. Coordinator Node

Windows Server 2008 R2

- Windows Server 2008
  - 1 node owns the disk resource
  - 1 node accesses the disk
- Windows Server 2008 R2
  - 1 node owns the disk resource, the Coordinator node
  - Every node accesses the CSV disk
  - The Coordinator manages CSV disk access

4.5. Options for Hyper-V

When using the Dell iSCSI Target including the additional option with Cluster Shared Volumes

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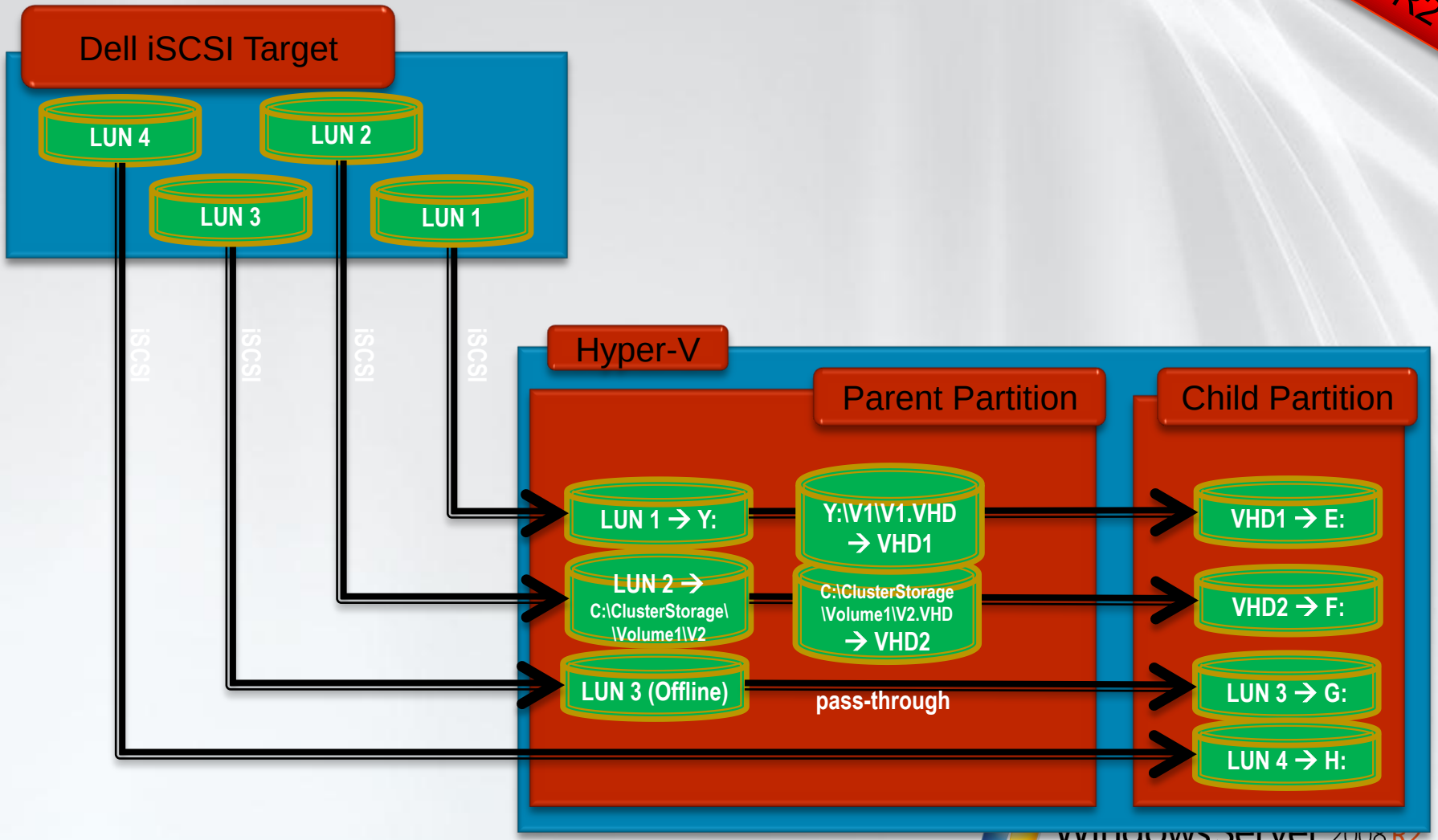

5. Summary

- Dell offers iSCSI Storage (Equallogic) which can be used to provide storage for Hyper-V
- There many Failover Clustering Options when you combine Hyper-V and the Dell iSCSI Target
- Windows Server 2008 R2 introduces a new option: Clustered Shared Volumes, which also can be combined with the Dell iSCSI Target and Hyper-V

Campus Days
14.-16. januar 2010

THANK YOU!

Intel & Microsoft Present:

Maximizing Hyper-V iSCSI Performance

Breakthrough iSCSI Performance and Reliability

Jordan Plawner: Senior Product Planner, Storage Networking, Intel
Suzanne Morgan: Senior Program Manager, Windows Storage, Microsoft
Jim Schwartz: Solutions Marketing Director, Microsoft Virtualization

January 14th, 2010

http://msevents.microsoft.com/CUI/WebCastEventDetails.aspx?EventID=1032432956&EventCategory=4&culture=en-US&CountryCode=US

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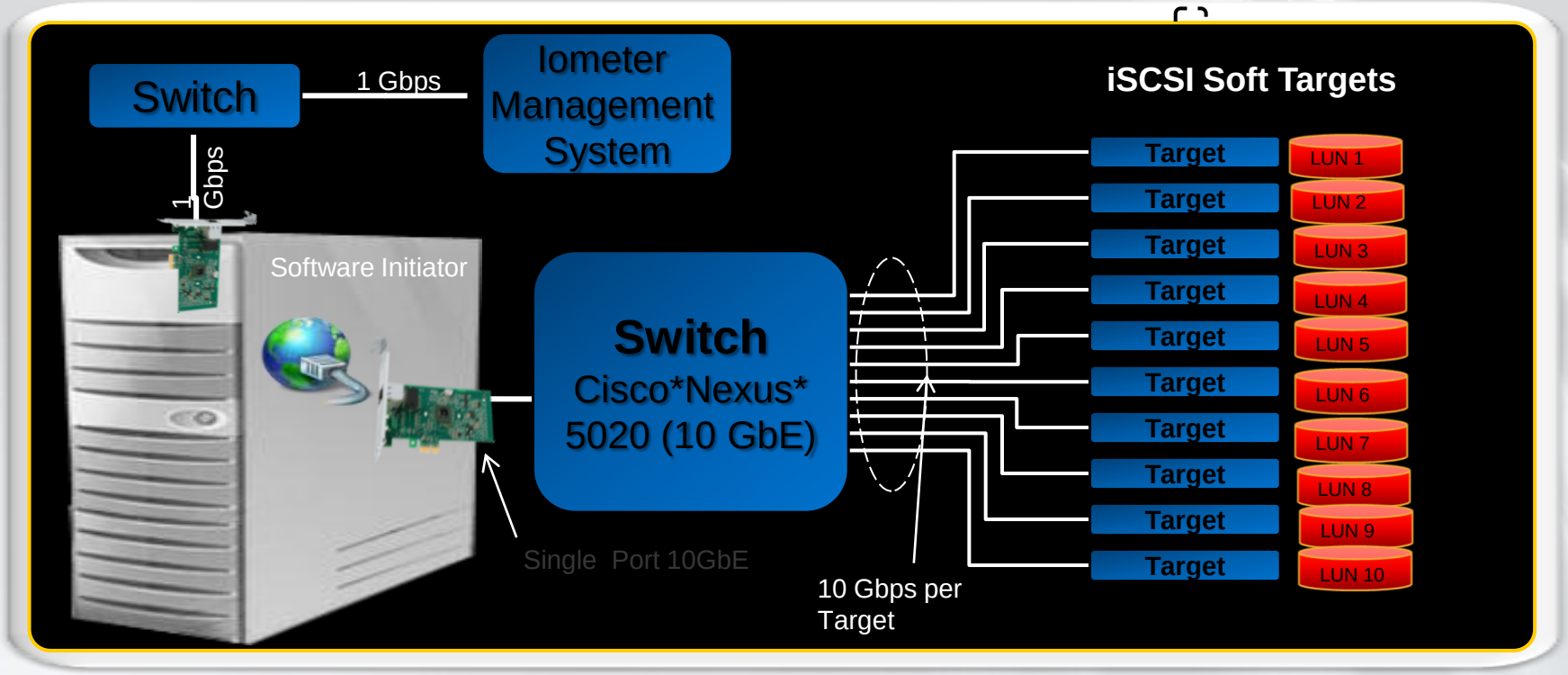
iSCSI Test Configuration



Server

- Windows Server 2008 R2
- Microsoft iSCSI Initiator
- Intel ®Xeon® Processor 5580, quad core, dual socket, 3.2 Ghz, 24GB DDR3, MTU 1500, Outstanding I/Os =20

Adapter

- Intel® Ethernet Server Adapter X520 based on Intel® 82599 10GbE Controller

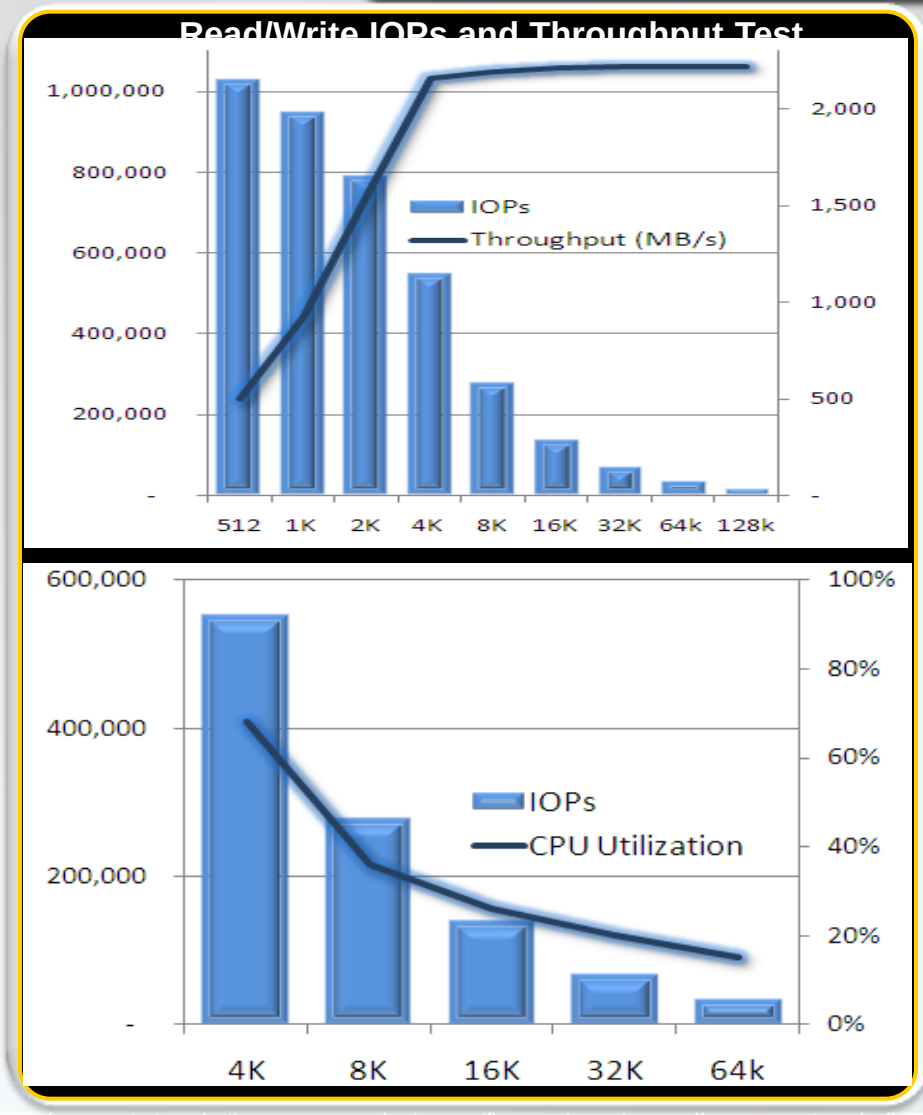
Performance factors

- iSCSI initiator perf optimizations
- Network stack optimizations
- Receive Side Scaling (RSS)
- Intel Xeon 5500 QPI and integrated memory controller
- Intel® 82599: HW Acceleration, multi-core scaling with RSS, MSI-X

Windows Server 2008 R2

Breakthrough Performance at 10GbE

Intel® Xeon® Processor 5580 Platform, Windows Server 2008 R2 and Intel® 82599 10GbE Adapter



1,030,000 IOPs

Single Port

10GbE line rate

10k IOPs per CPU point

Performance for real world apps

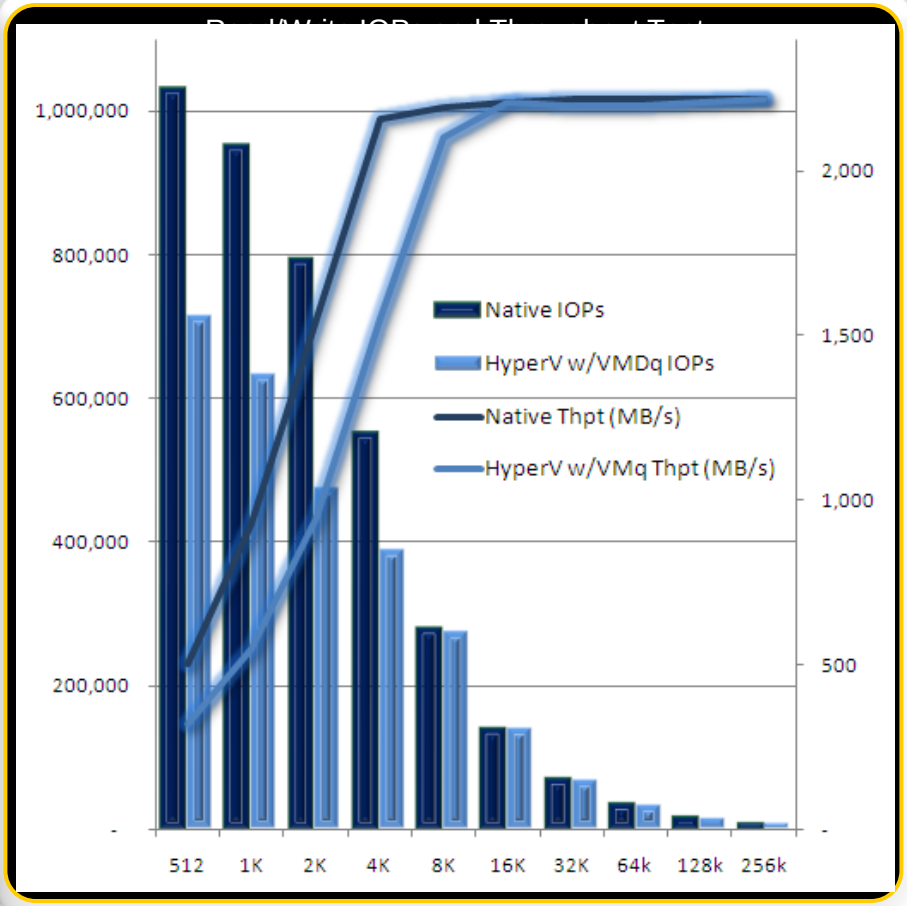
Future ready: Performance Scales

552k IOPs at 4k represents

- 3,100 Hard Disk Drives
- 400x a demanding database workload
- 1.7m Exchange mailboxes
- 9x transactions of large eTailers
- Jumbo frames: >30% CPU decrease is common for larger IO size (jumbo frames not used here)

Breakthrough Performance

iSCSI Performance with Intel® 82599 10G NIC with VMDq, Intel® Xeon 5580 Platform, Windows Server 2008 R2 and R2 Hyper V



- 715k IOPs -- 10GbE line rate
- Intel VMDq and Microsoft VMQ accelerates iSCSI to the guest
- Hyper-V achieves native throughput at 8k and above
- Future ready: Scales with new platforms, OS and Ethernet adapters

Near native iSCSI performance

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