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Configurare Clustered Shared Volume e iSCSI per un ambiente in alta affidabilità

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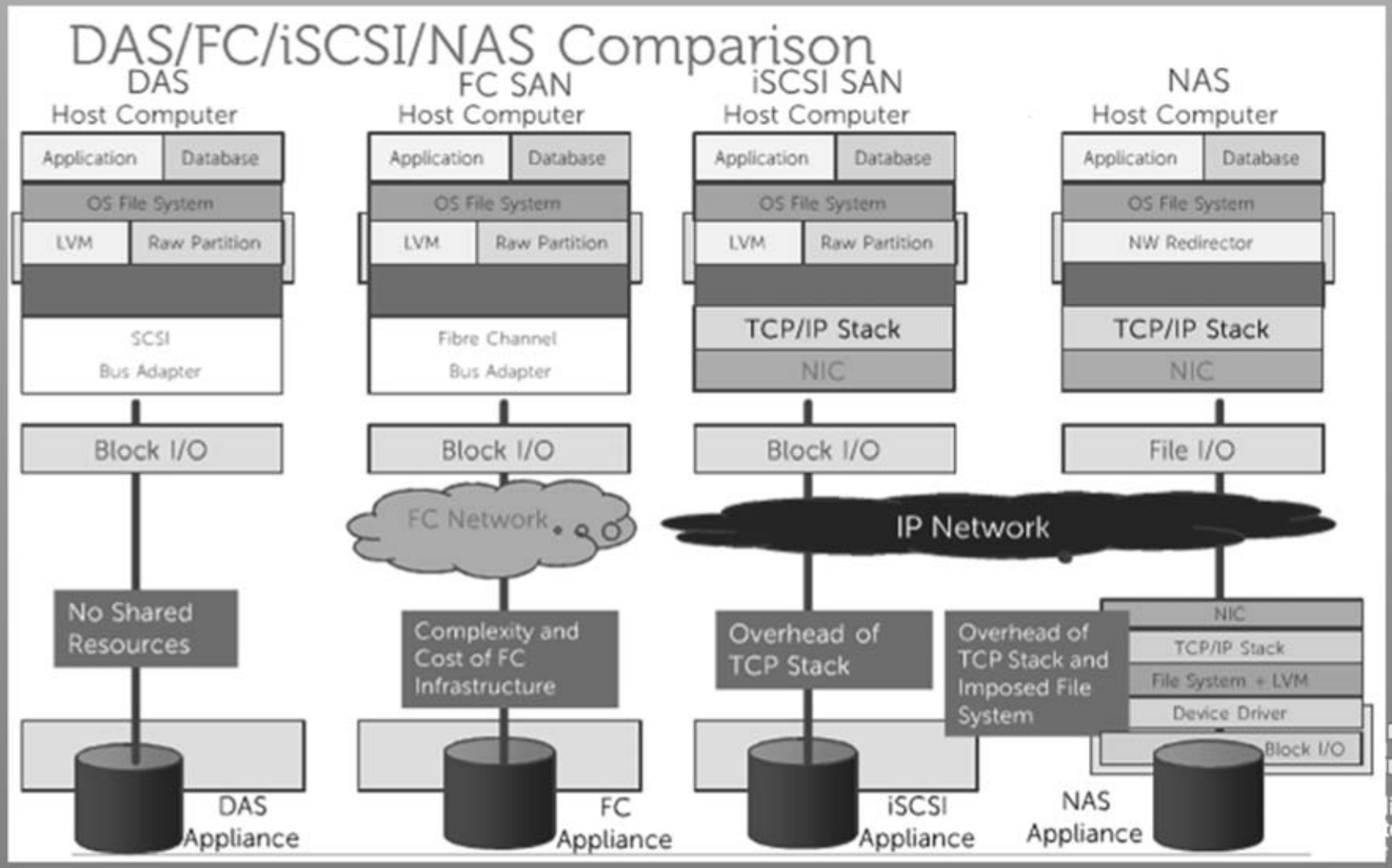
Argomenti trattati

- 1. Progettazione degli storage per il cluster
- 2. Il Protocollo iSCSI
- a. configurazione iSCSI Target
- b. Creazione / Gestione delle LUN
- c. Configurazione iSCSI Iniziator sui server
- d. Ridondanza di iSCSI: Multipath
- 3. Configurazione e analisi delle varie tipologie di MultiPath
- 4. Clustered Shared Volume
- a. Come funziona
- b. Configurazione e gestione
- c. Redirected Mode: problematiche inerenti
- 5. Live Migration
- a. Funzionamento e configurazione della LM
- b. Troubleshooting della LM

Storage in Hyper-V

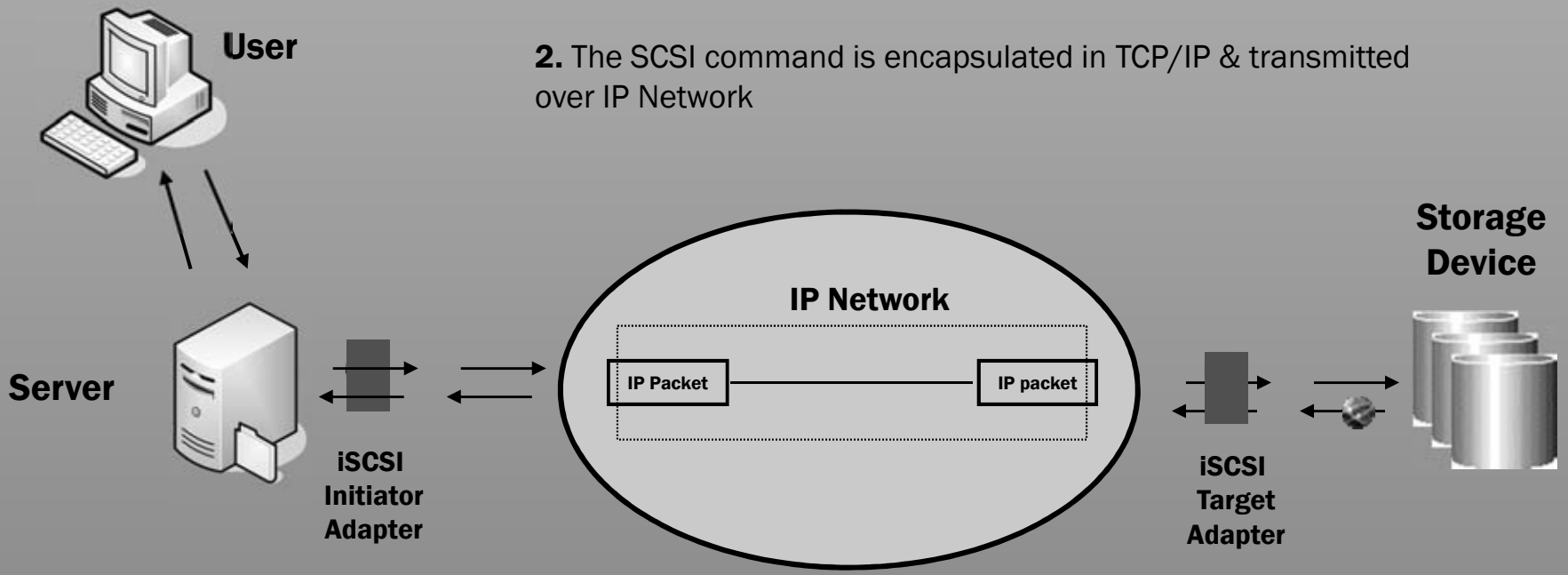
Introduzione

Storage


DAS/FC/iSCSI/NAS Comparison
DAS
Host Computer
Application
Database
OS File System
LVM
Raw Partition
SCSI
Bus Adapter
Block I/O
No Shared Resources
DAS
Appliance
FC SAN
Host Computer
Application
Database
OS File System
LVM
Raw Partition
Fibre Channel
Bus Adapter
Block I/O
FC Network
Complexity and Cost of FC Infrastructure
FC
Appliance
iSCSI SAN
Host Computer
Application
Database
OS File System
LVM
Raw Partition
TCP/IP Stack
NIC
Block I/O
IP Network
Overhead of TCP Stack
iSCSI
Appliance
NAS
Host Computer
Application
Database
OS File System
NW Redirector
TCP/IP Stack
NIC
File I/O
Overhead of TCP Stack and Imposed File System
NIC
TCP/IP Stack
File System + LVM
Device Driver
Block I/O
NAS
Appliance

iSCSI

1. User issues a request for data to a local server



2. The SCSI command is encapsulated in TCP/IP & transmitted over IP Network

3. The packet is decapsulated separating the SCSI commands

4. The SCSI commands are received by the Internal SCSI Controller, and the data is retrieved.

5. The data request is again encapsulated in TCP/IP then returned

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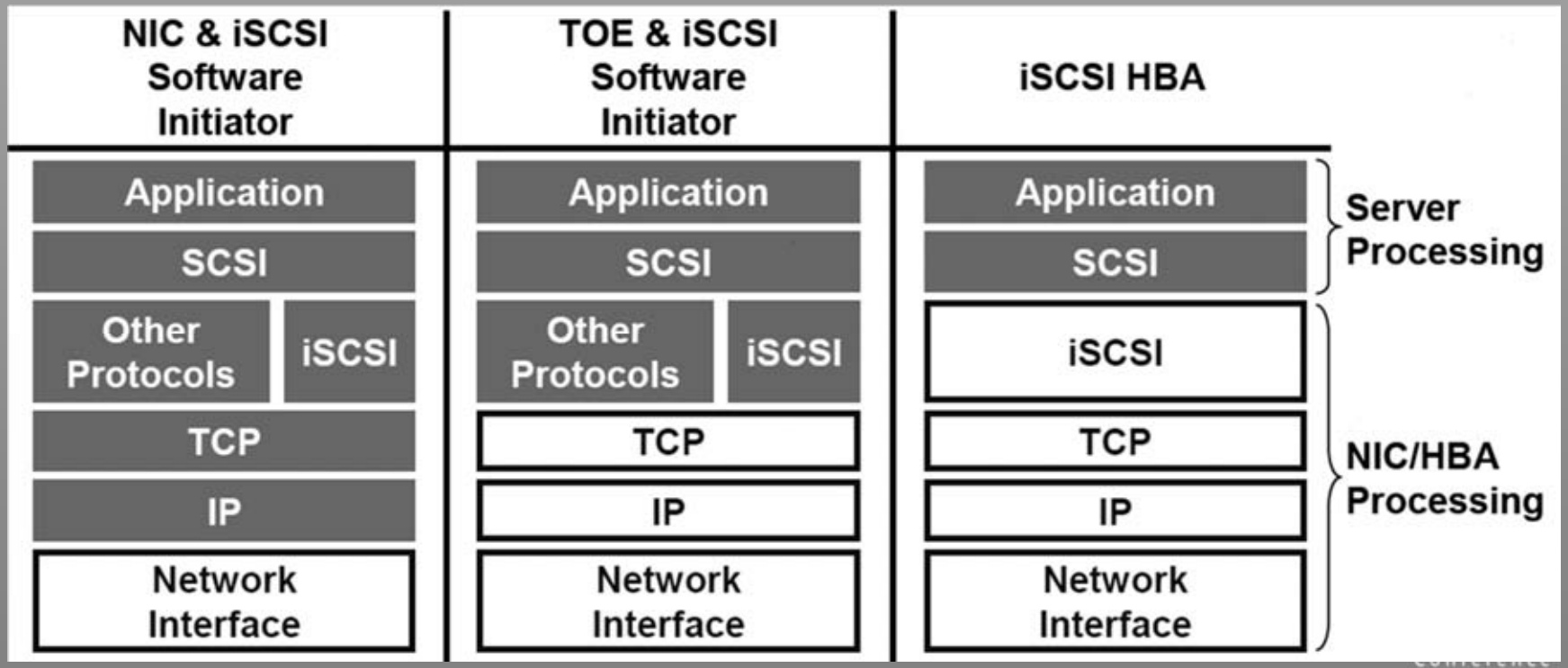
“Indirizzi” iSCSI

- Indirizzi IP
  - Target e initiator hanno indirizzi IP, ma spesso più di uno
- iSCSI Qualified Name (IQN)
  - RFC 3720 e RFC 3721
  - literal iqn
  - date (yyyy-mm) that the naming authority took ownership of the domain
  - reversed domain name of the authority (org.alpinelinux, com.example, to.yp.cr)
  - Optional ":" prefixing a storage target name specified by the naming authority.
- Extended Unique Identifier (EUI)
  - Format: eui.{EUI-64 bit address} (e.g. eui.02004567A425678D)
- T11 Network Address Authority (NASA)
  - Format: naa.{NASA 64 or 128 bit identifier} (e.g. naa.52004567BA64678D)
- iSNS Internet Storage Name Service

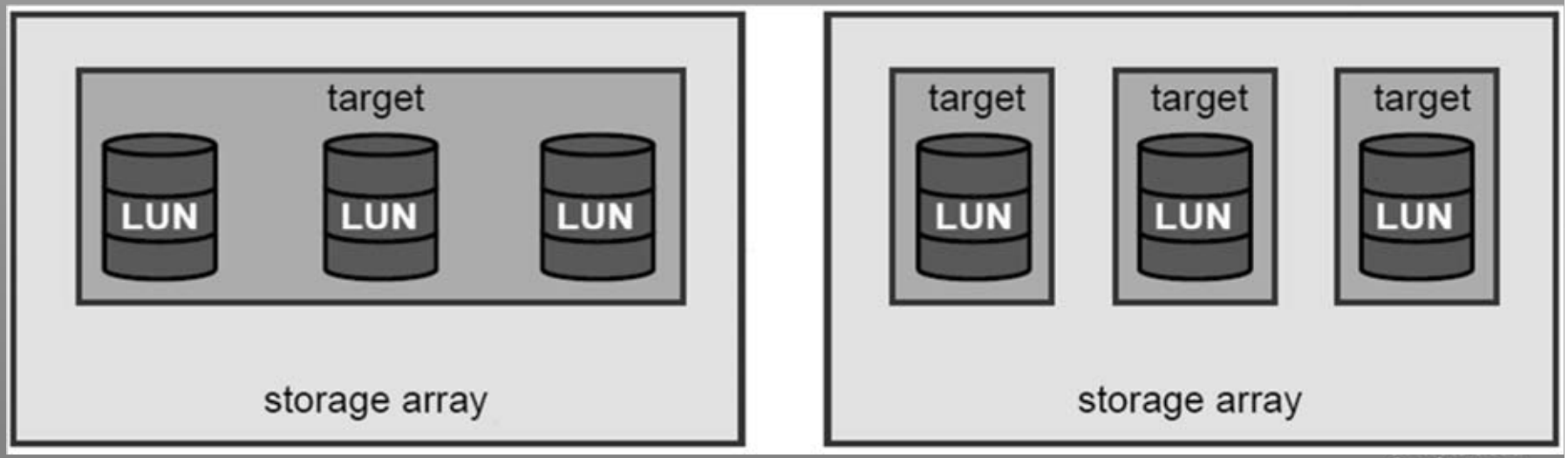
Initiator iSCSI

- La parte “client”
  - Software initiator
  - Hardware initiator
    - HBA iSCSI



Target iSCSI

- La parte “server”
  - Come lo storage mostra le LUN?
  - Come lo storage viene indirizzato?

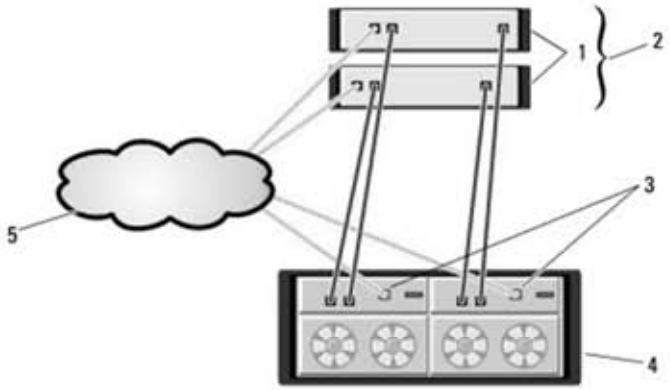


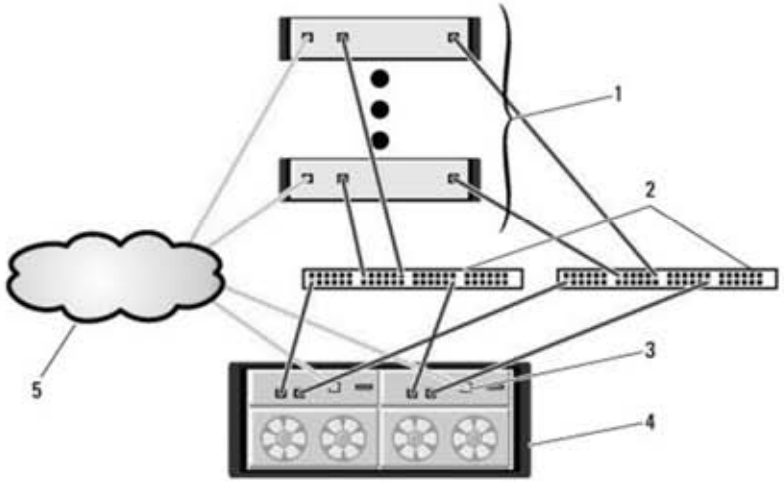
Implementare iSCSI

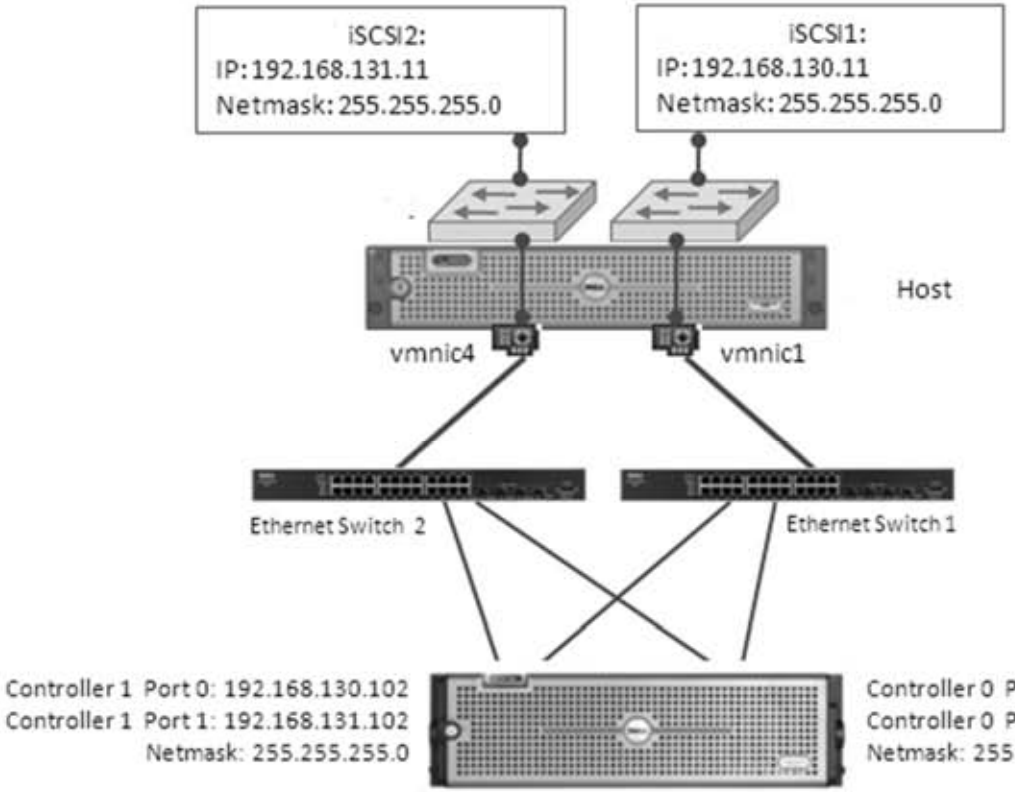
- Parte “client”
  - Microsoft iSCSI initiator
    - Incluso da Vista
    - Disponibile per sistemi precedenti
- Parte “server”
  - Storage iSCSI
  - Microsoft iSCSI target
    - http://www.thomasmaurer.ch/2012/03/create-a-windows-server-8-iscsi-target-server

Multi-path

- Topologia simil-FC
- Reti separate







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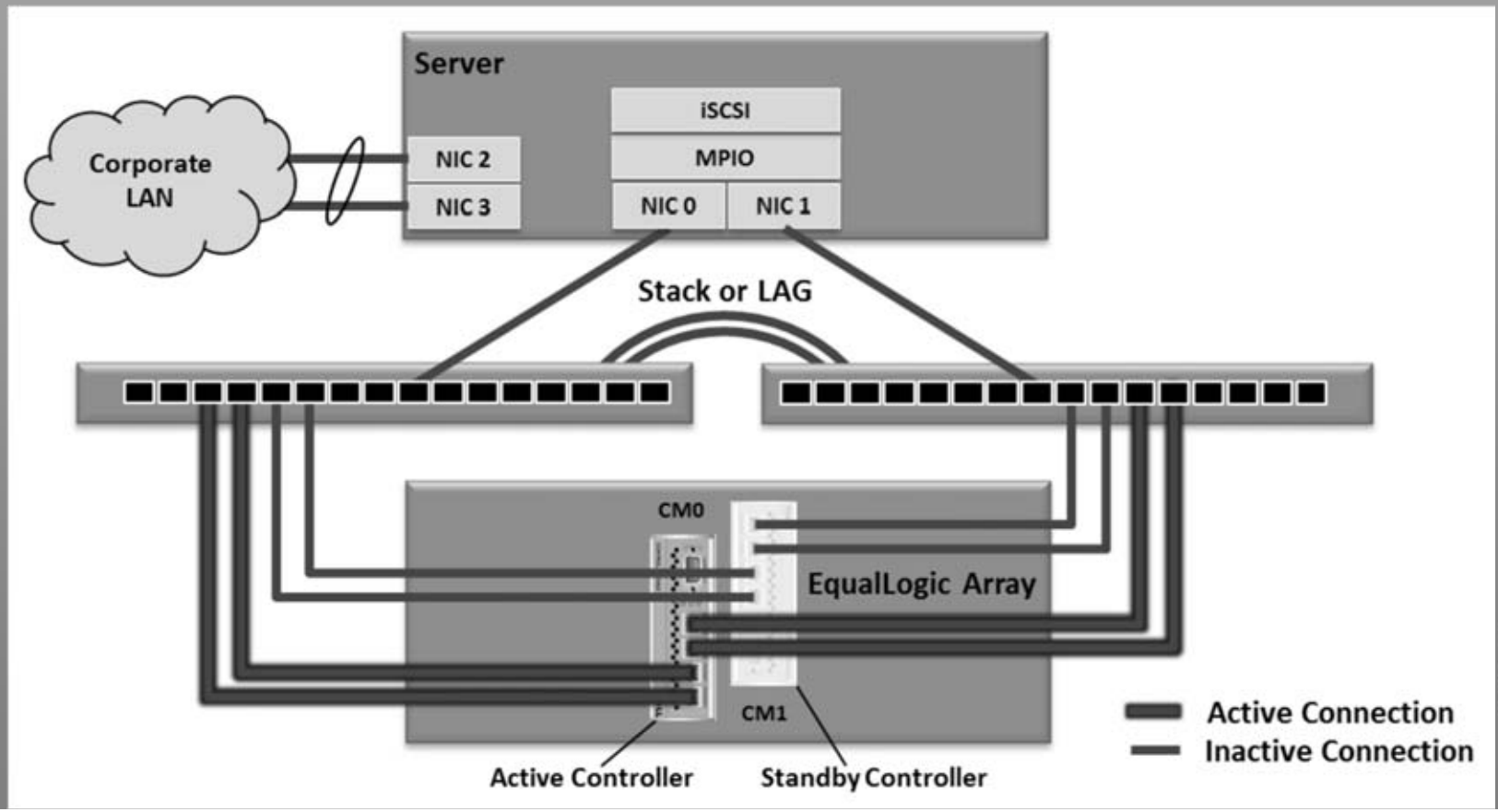
Multi-path

- Soluzione specifica per alcuni storage iSCSI
- Rete flat



Driver Multi-path

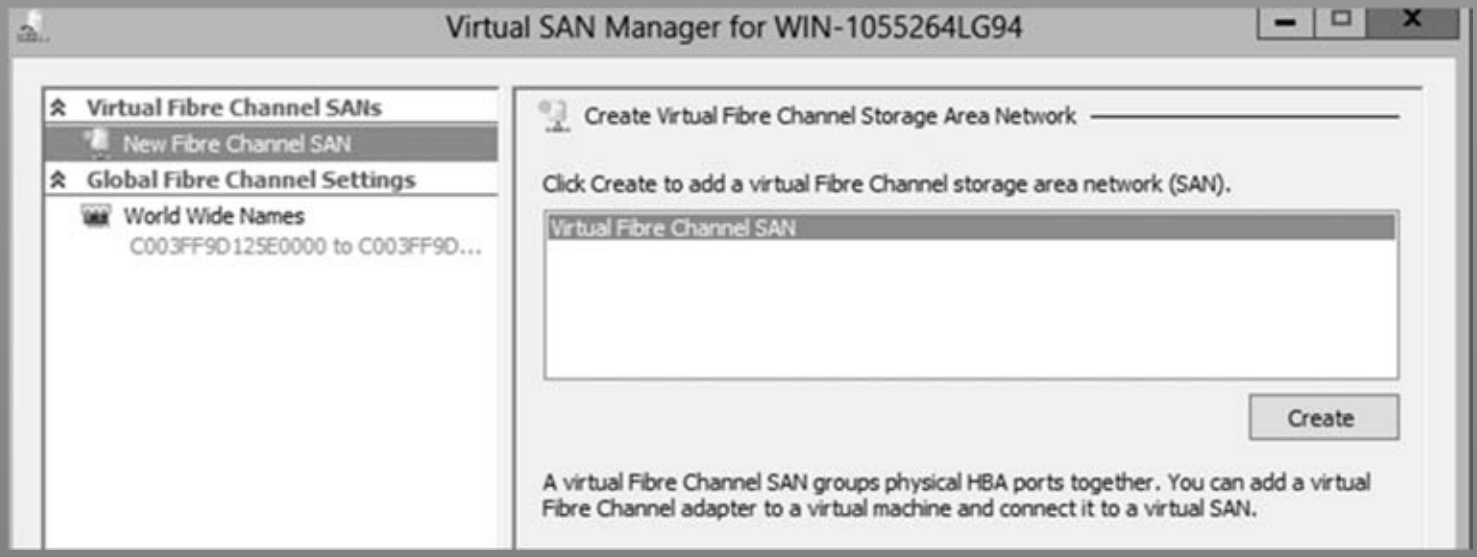
- Driver Microsoft
- Driver dei vendor
- Fare riferimento sempre alla documentazione del vendor

Sicurezza applicata ad iSCSI

- Protezione dei dati
  - IPSec
- Autenticazione
  - IP
  - IQN
  - CHAP password
  - IPSec

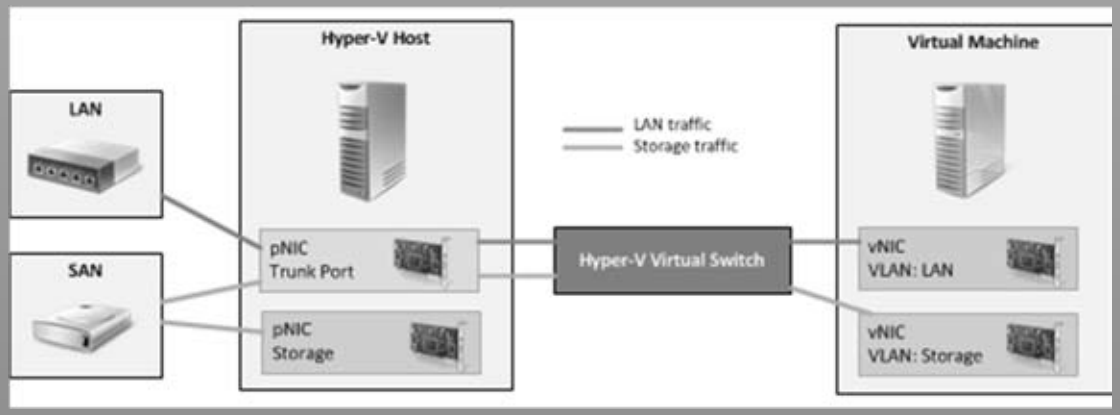
Vantaggi di iSCSI

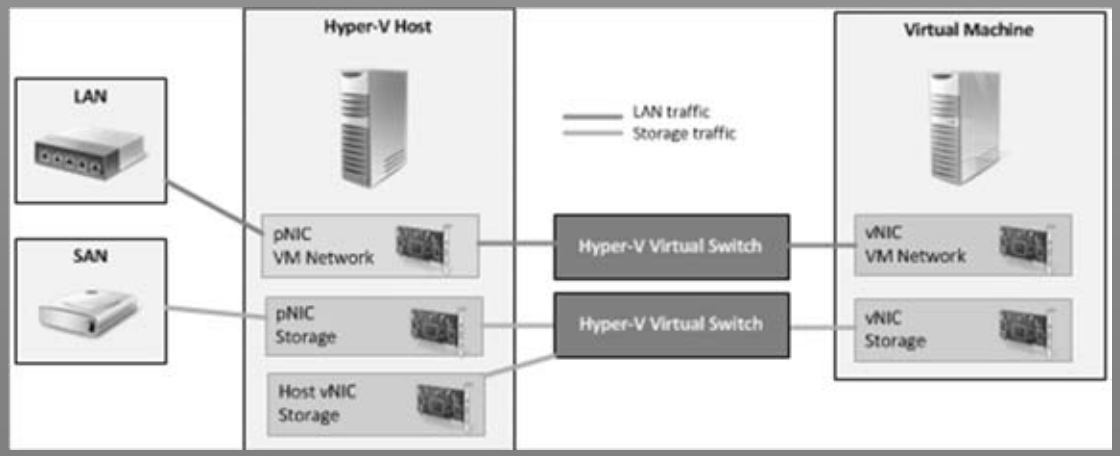
- Costo minore?
- Più semplice?
- Possibilità di usarlo a livello VM
  - In Hyper-V3 è stato introdotto il supporto NPIV



Guest iSCSI

- Utile in alcuni casi
- Diverse configurazioni possibili





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Configurare l'initiator

- Da GUI
  - iscsicpl
- Da CLI
  - sc config msiscsi start= auto
  - sc start msiscsi oppure net start msiscsi
  - sc query msiscsi
  - iscsicli QaddTargetPortal *Target_IP*
  - iscsicli ListTargets
  - iscsicli QloginTarget *Target_IQN*
  - iscsicli PersistentLoginTarget
  - iscsicli listPersistentTargets
  - iscsicli reportTargetMappings

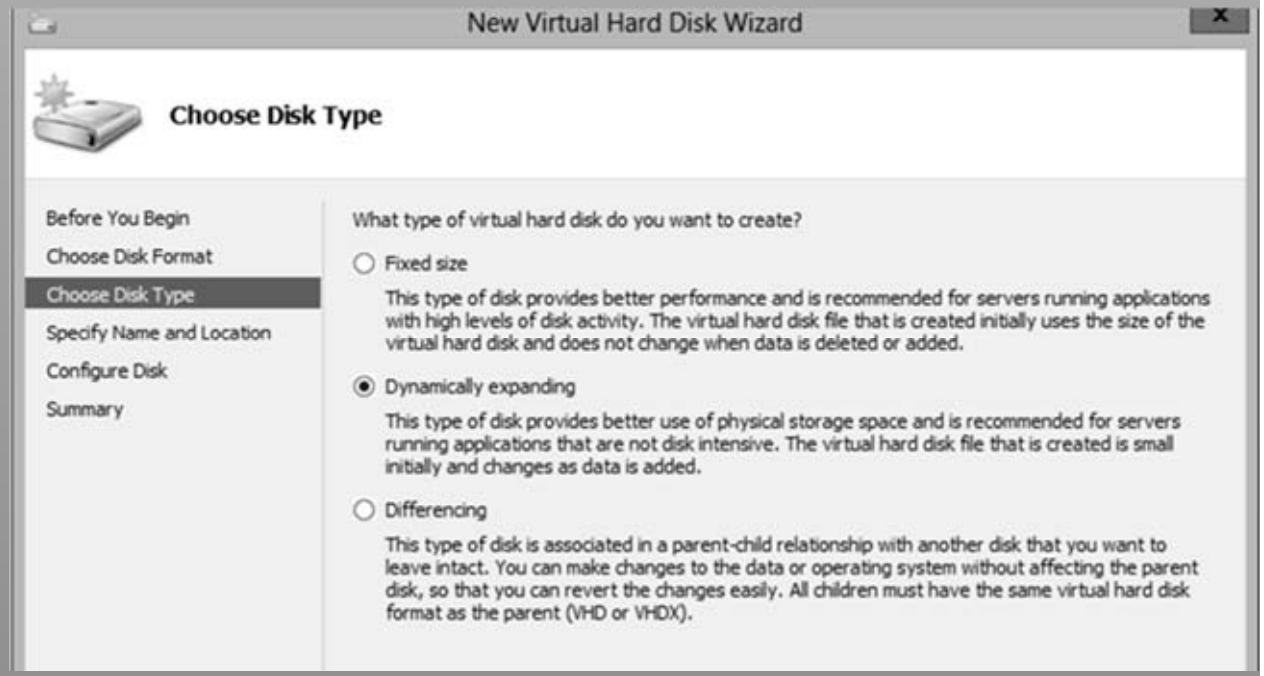
Demo

Storage in Hyper-V

Cluster Hyper-V

Virtual disk

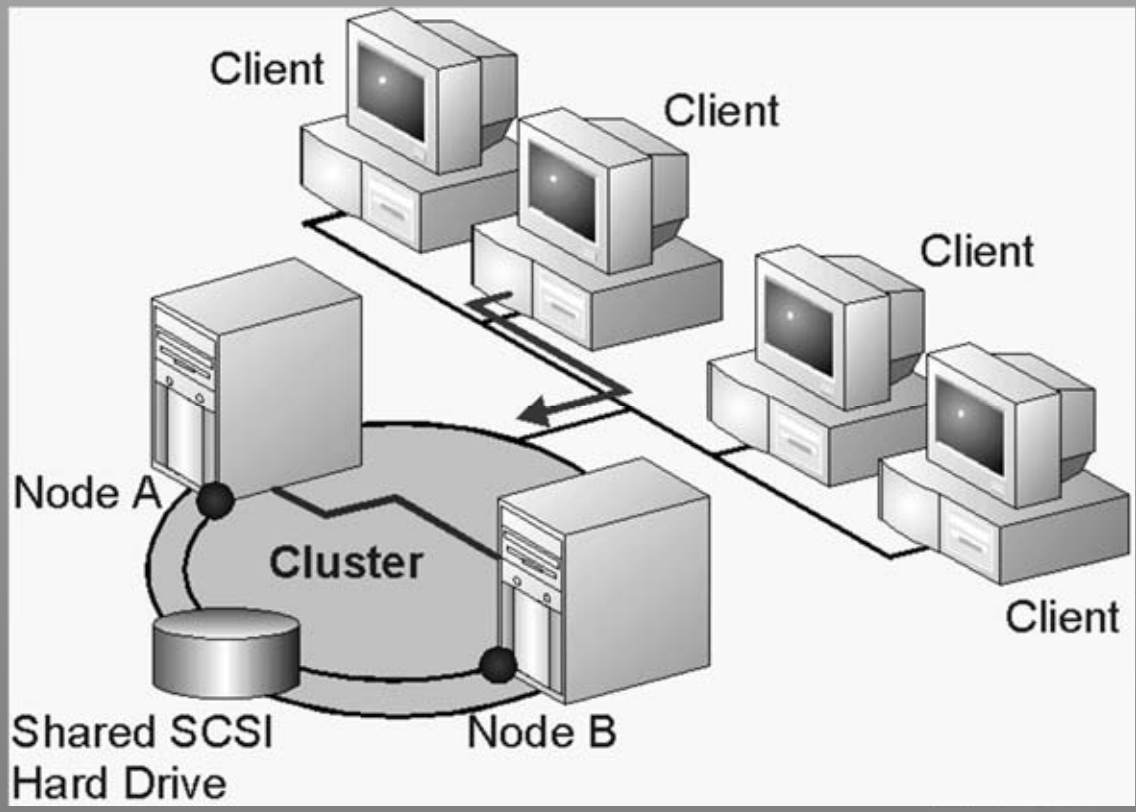
- Dischi VHD
  - Fixed size
  - Dynamically Expanding
  - Differencing
- Controller
  - IDE
  - SCSI



- Dischi Pass-Through con CSV e LM
  - Esplicitare la dipendenza
- Dischi Guest iSCSI

Hyper-V Cluster

- Basato sul Failover Cluster
- Stessi requisiti
- E qualcuno in più
- Funzioni specifiche
  - Live Migration
  - CSV



Hyper-V Cluster

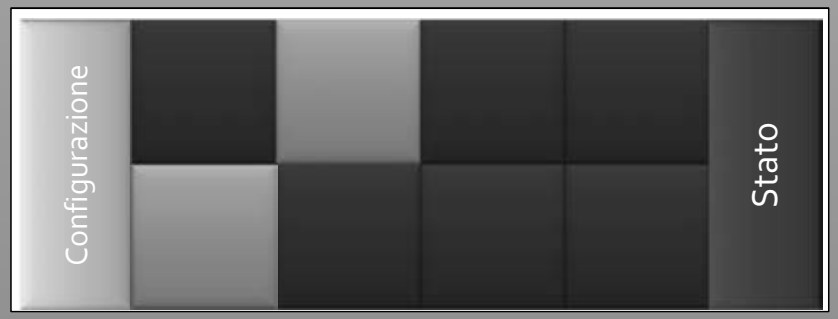
- Requisiti
  - http://technet.microsoft.com/en-us/library/cc732181%28v=ws.10%29.aspx
- Understanding Hyper-V Virtual Machine (VM) Failover Policies
  - http://blogs.msdn.com/b/clustering/archive/2010/12/14/10104402.aspx

Storage in Hyper-V

Live Migration

Live Migration

Memoria



Server 1

Server 2

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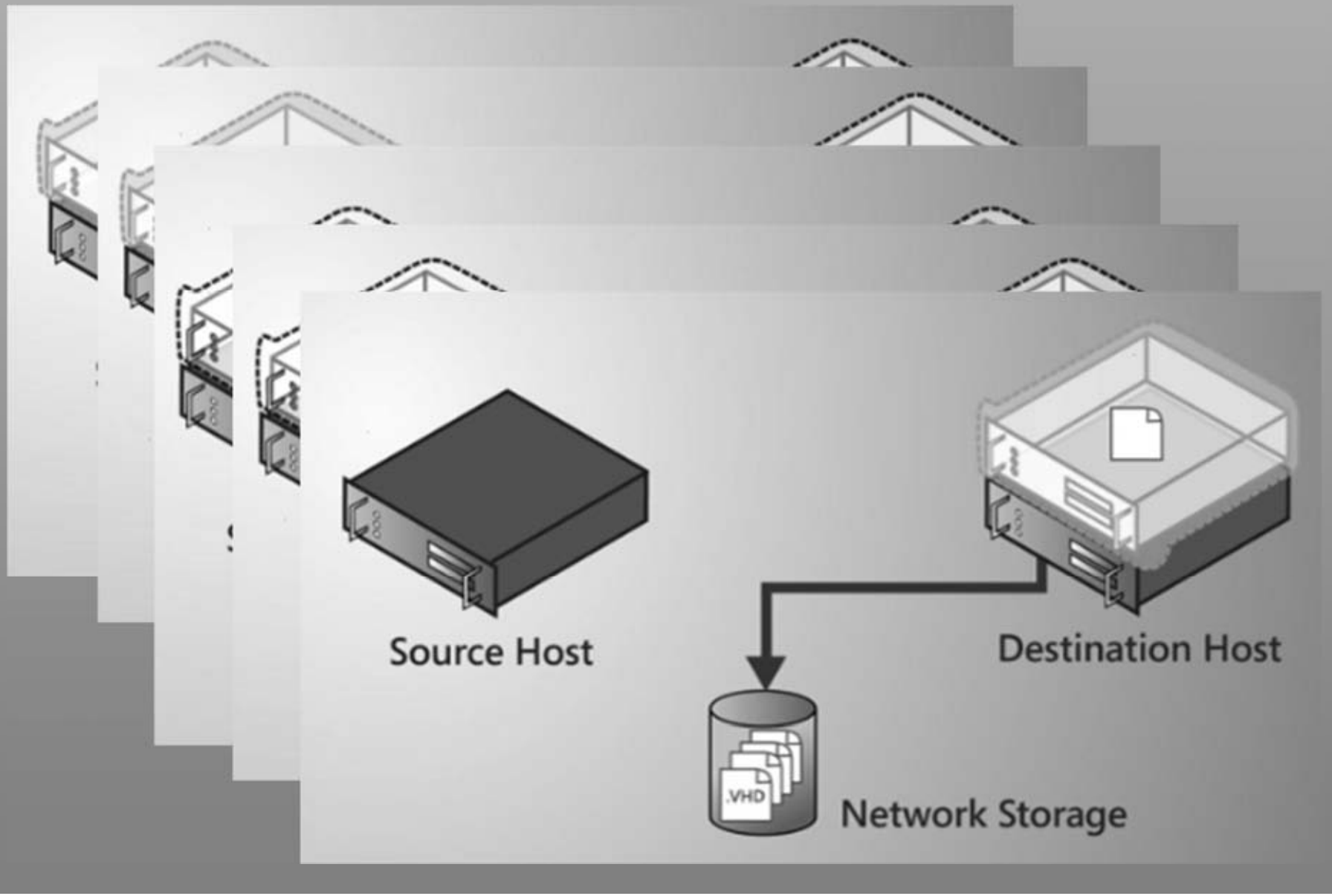
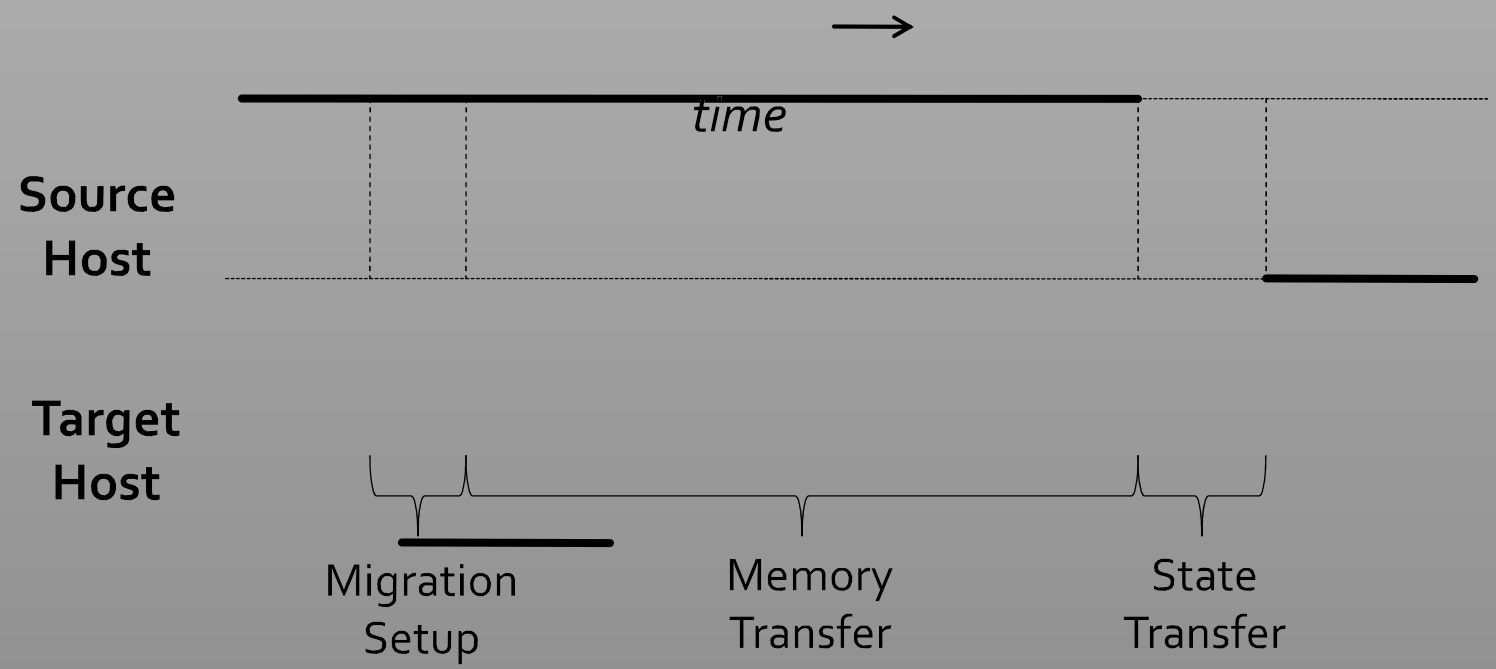
Live Migration



Live Migration Operation

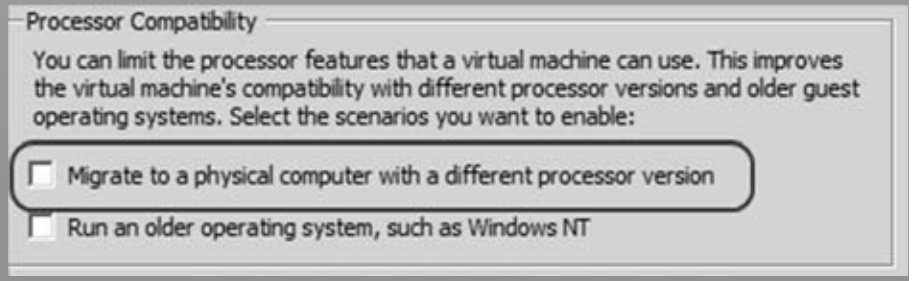


Storage Requirements

- Storage condiviso!
  - Storage a blocchi
- CSV + Live Migration
  - Required? No
  - Recommended? Yes
- Other solutions include:
  - 3rd party Clustered File System
    - SanBolic Melios
    - HP PolyServe

Processor Compatibility Mode

- Overview
  - Permette la LM su differenti versioni di CPU all'interno della stessa famiglia
  - Non permette il passaggio di piattaforma
    - da Intel a AMD o viceversa
  - Compatibilità configurabile per ogni VM
- Benefici
  - Maggior flessibilità all'interno di un cluster
  - Protezione degli investimenti

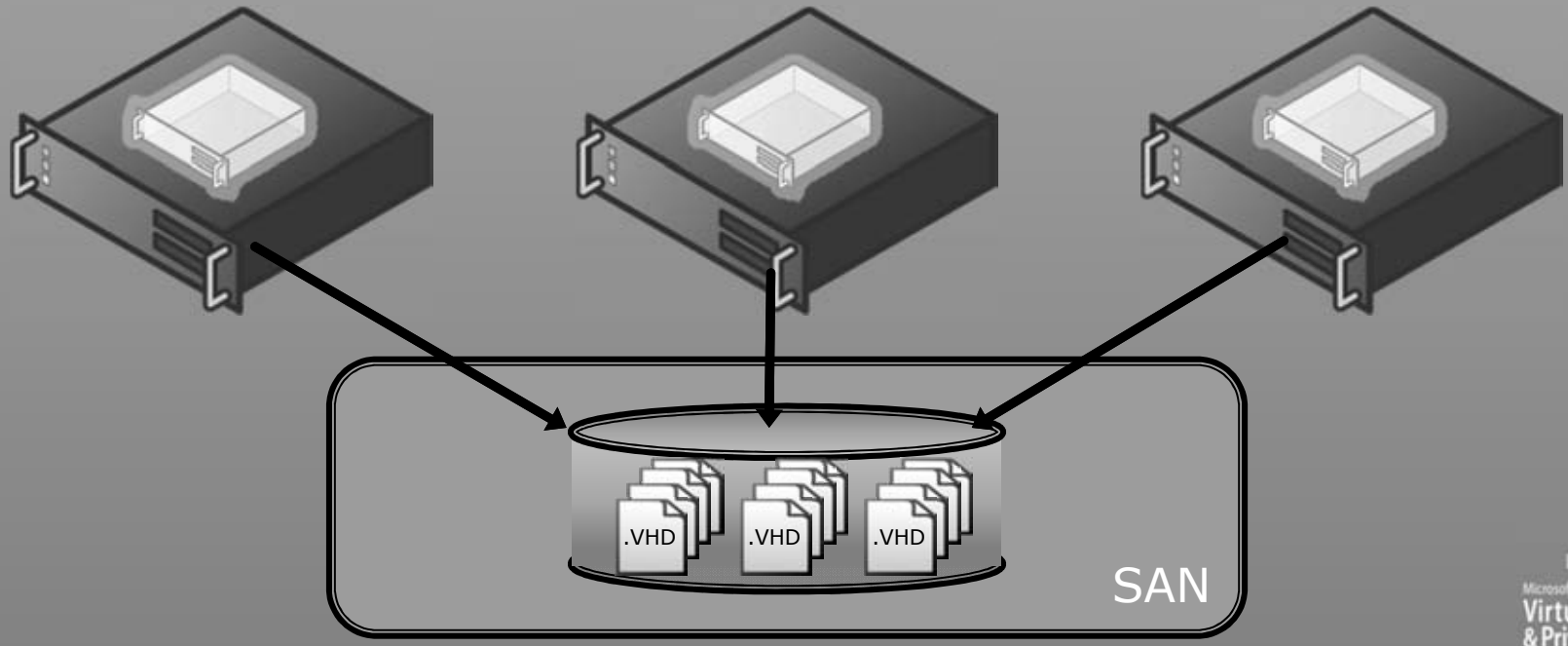


Storage in Hyper-V

CSV

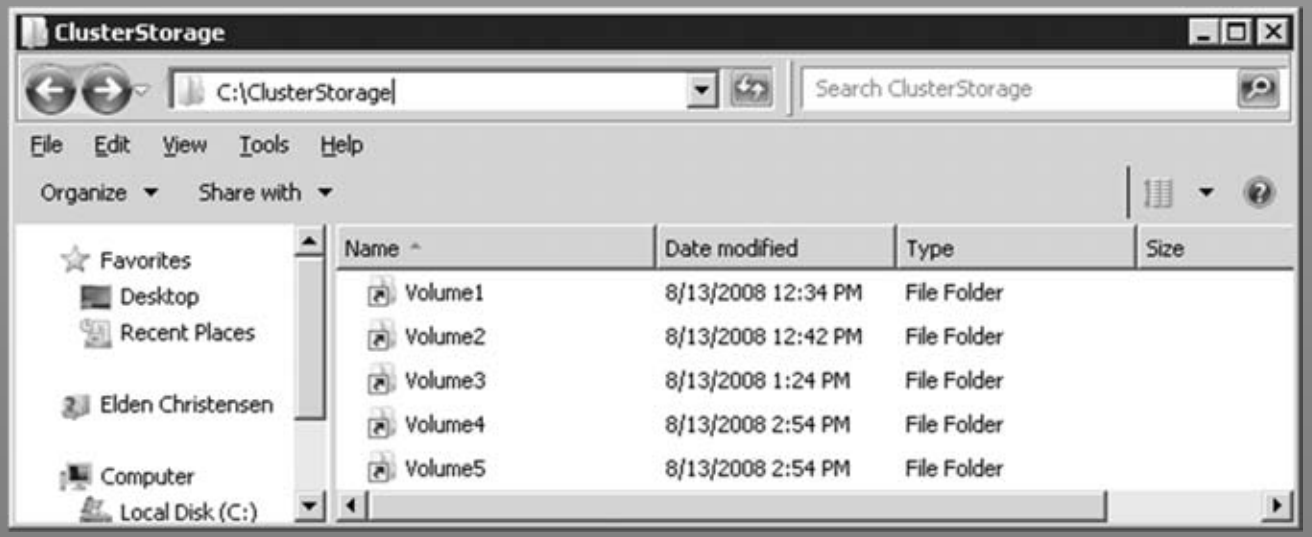
Cluster Shared Volumes (CSV)

- New in Windows Server 2008 R2
- Single namespace for the volumes on all nodes
  - %SystemDrive%\ClusterStorage\VolumeX



Single Name Space

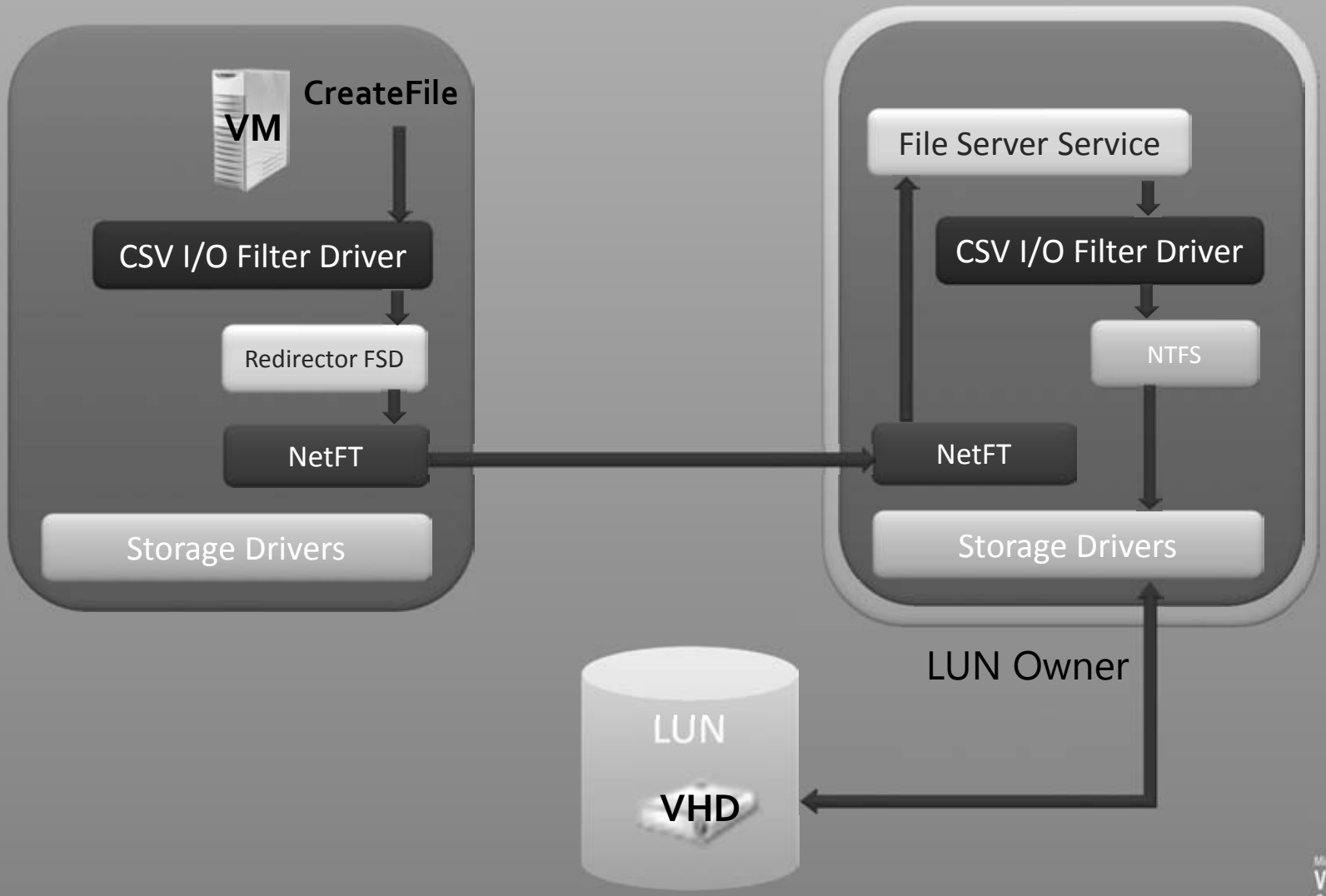
- Files have the same name and path when viewed from any node in the cluster
  - CSV volumes are exposed as directories and subdirectories under the “ClusterStorage” root directory
    - C:\ClusterStorage\Volume1\<root>
    - C:\ClusterStorage\Volume2\<root>
    - C:\ClusterStorage\Volume3\<root>



CSV Implementation

- CSV filter driver forwards all namespace operations (e.g. create file, delete file, resize file) to LUN owner
  - These operations are relatively rare
  - Uses SMB2
- VM hosting node opens VHD for exclusive access
  - VHD read and write is frequent
  - CSV filter obtains raw LUN sector map of file
  - Reads and writes directly to underlying volume

CSV Architecture



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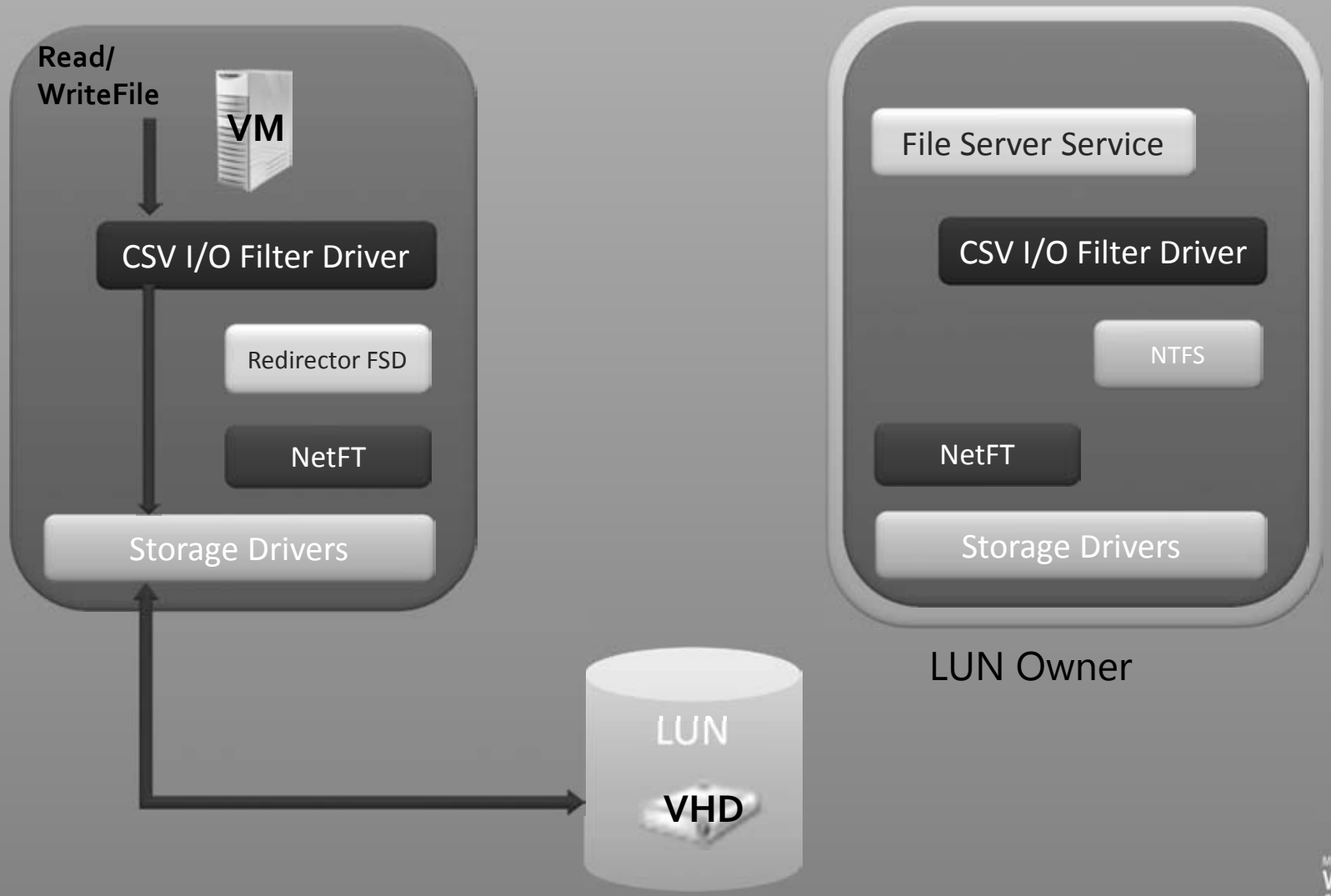
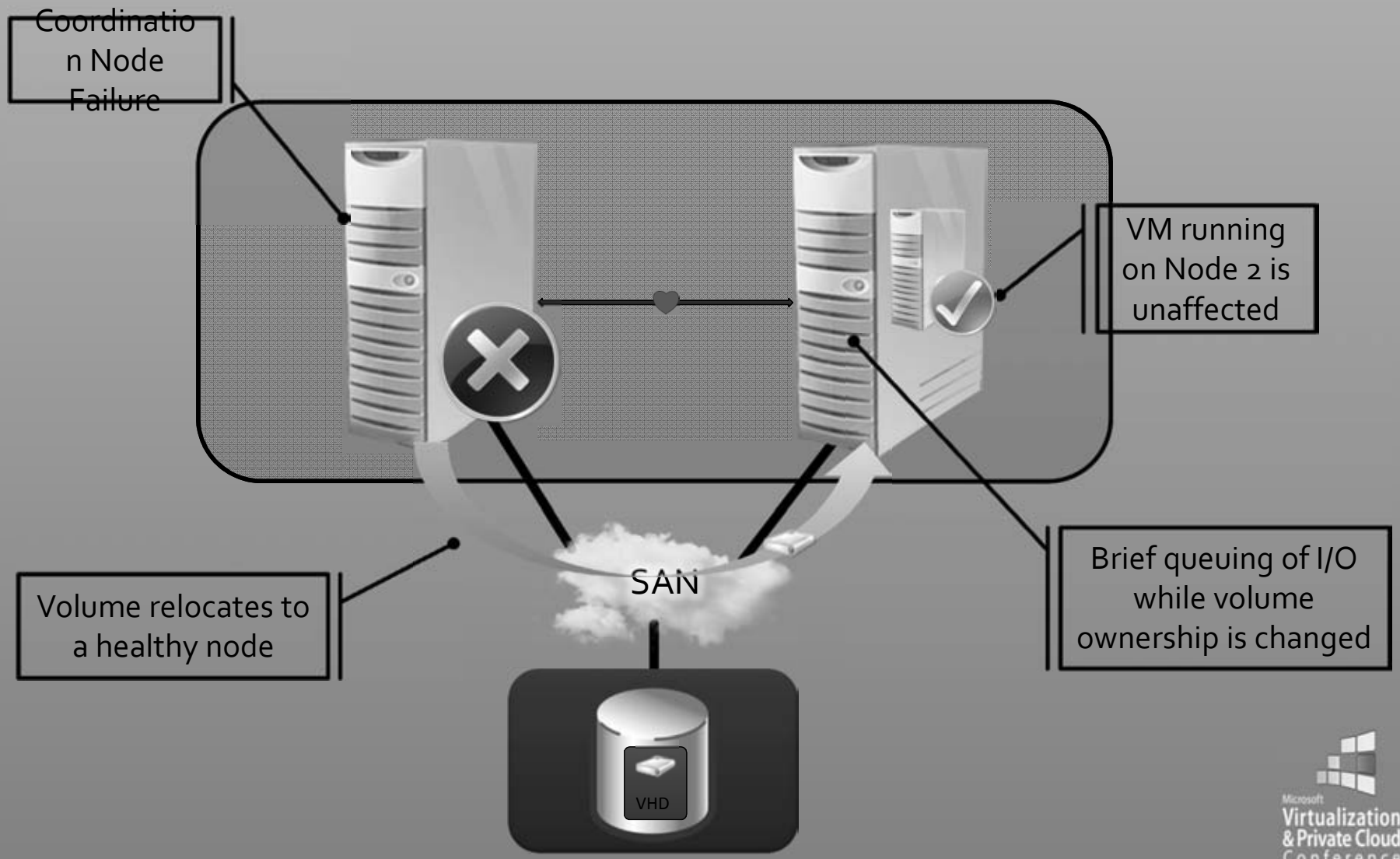
CSV Architecture



Node Fault Tolerance



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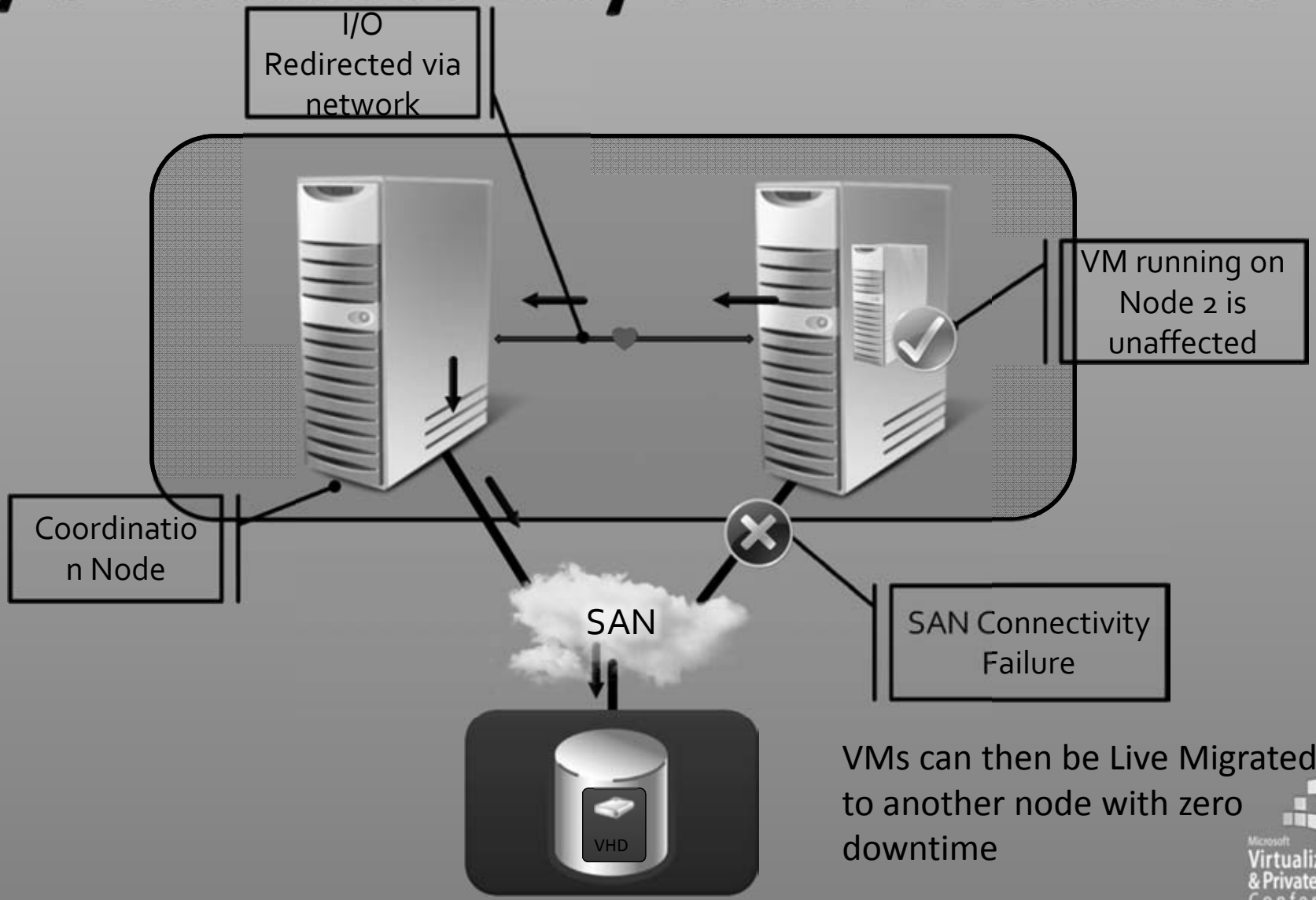
I/O Connectivity Fault Tolerance



VMs can then be Live Migrated to another node with zero downtime

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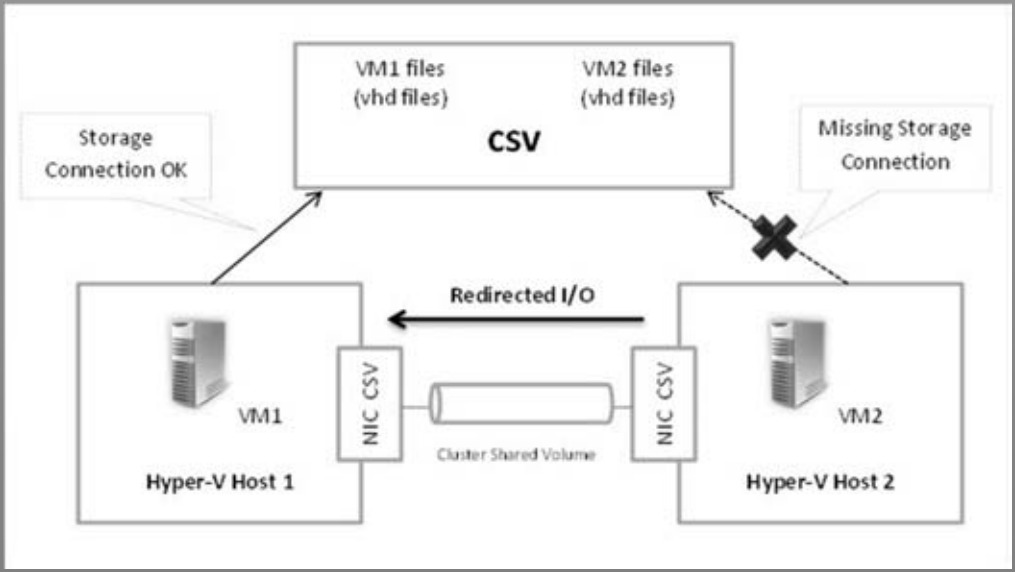
Redirected I/O mode

- Usato per risolvere problemi di connettivà con lo storage
  - To maintain function until the failure is corrected, the node redirects the disk I/O through a cluster network (the preferred network for CSV) to the node where the disk is currently mounted
- Usato anche durante certi tipi di operazioni
  - during management operating-system based backups, also known as parent-partition based backups
- Possibili problemi di prestazioni
  - When a disk in CSV is in redirected I/O mode, the network that is used for CSV communication might need to carry significantly heavier network traffic



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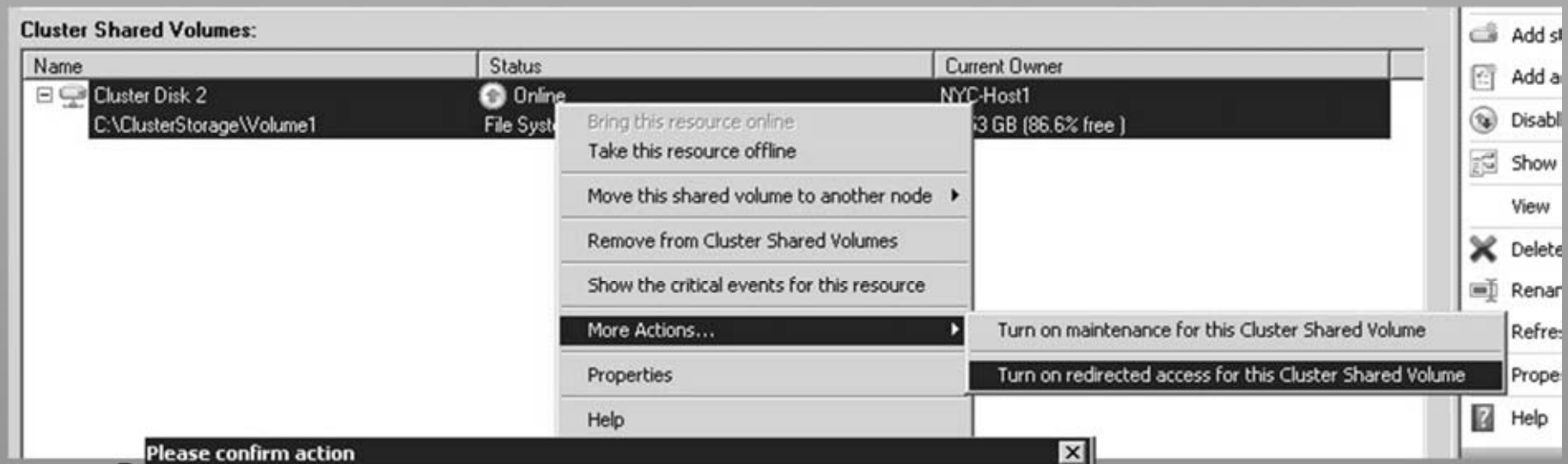
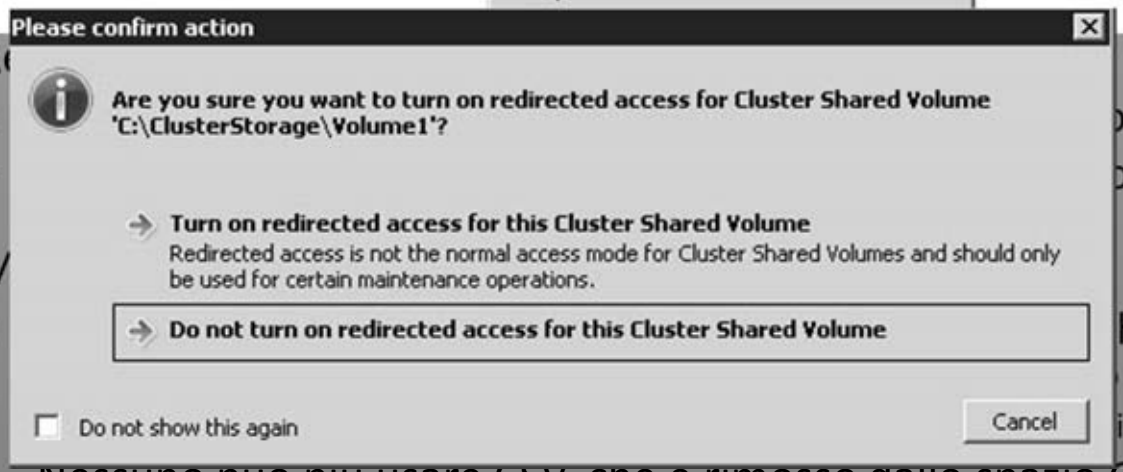
Testare redirected I/O mode





- R
  - orage
  - oprie operazioni di I/O
- M
  - hine virtuali) stanno
    predefinito di spegnimento
    ile in ogni macchina virtuale)
    - Nessuno può più usare CSV, che è rimosso dallo spazio C:\ClusterStorage
    - La LUN sarà però ancora disponibile sul Coordinator Node

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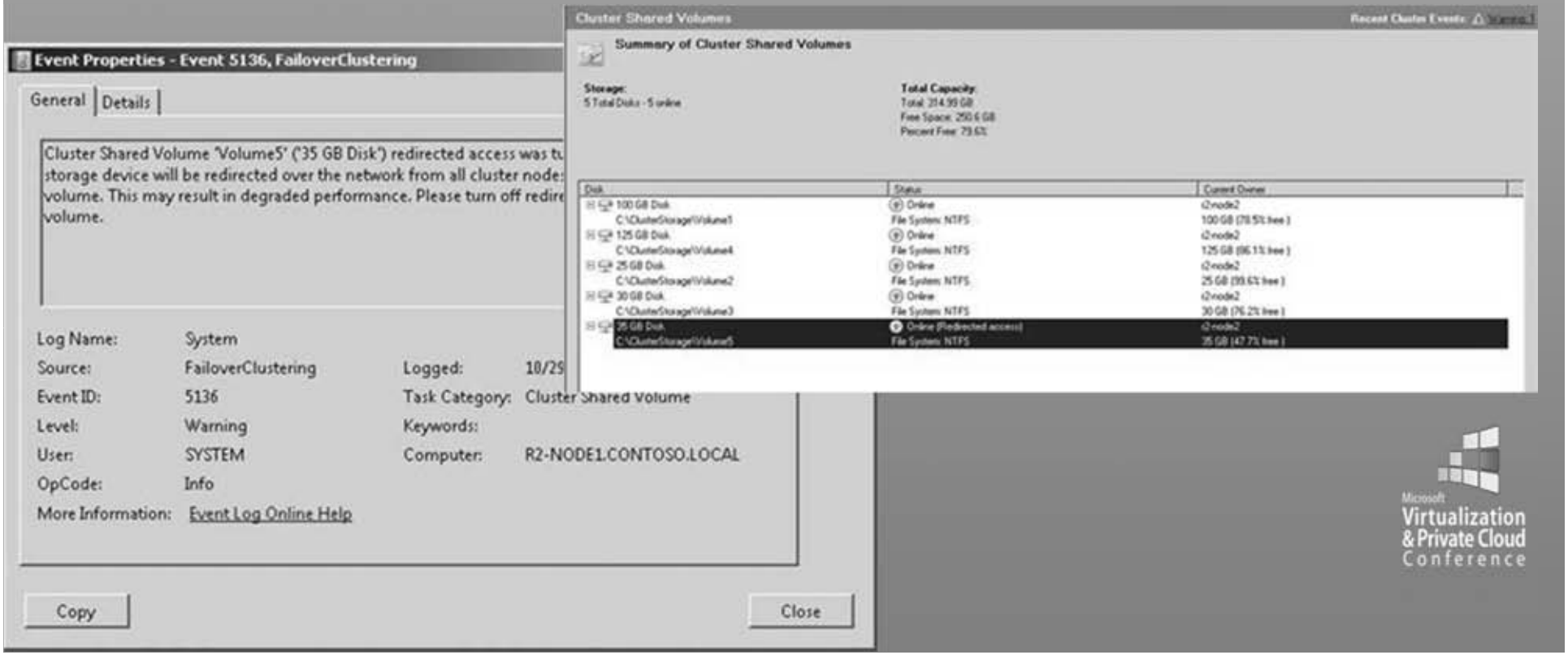
Troubleshooting redirected I/O mode

- Verificare l'event viewer
- Rispettare i requisiti
- Verificare la compatibilità del programma di backup
- Progettare lo storage per usare l'MPIO



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Demo

Storage in Hyper-V

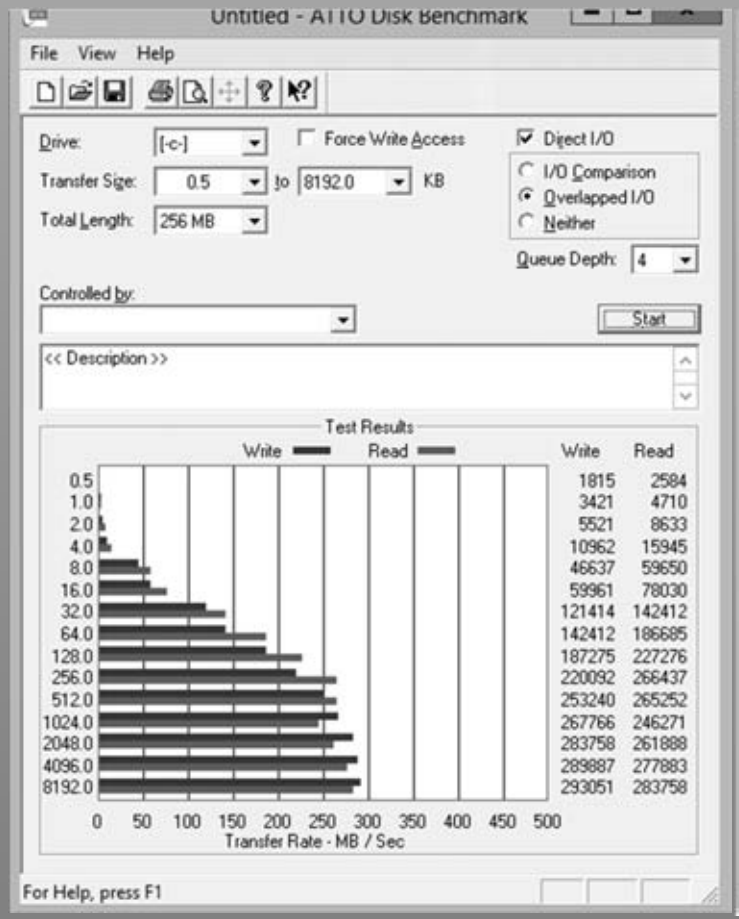
Hyper-V3

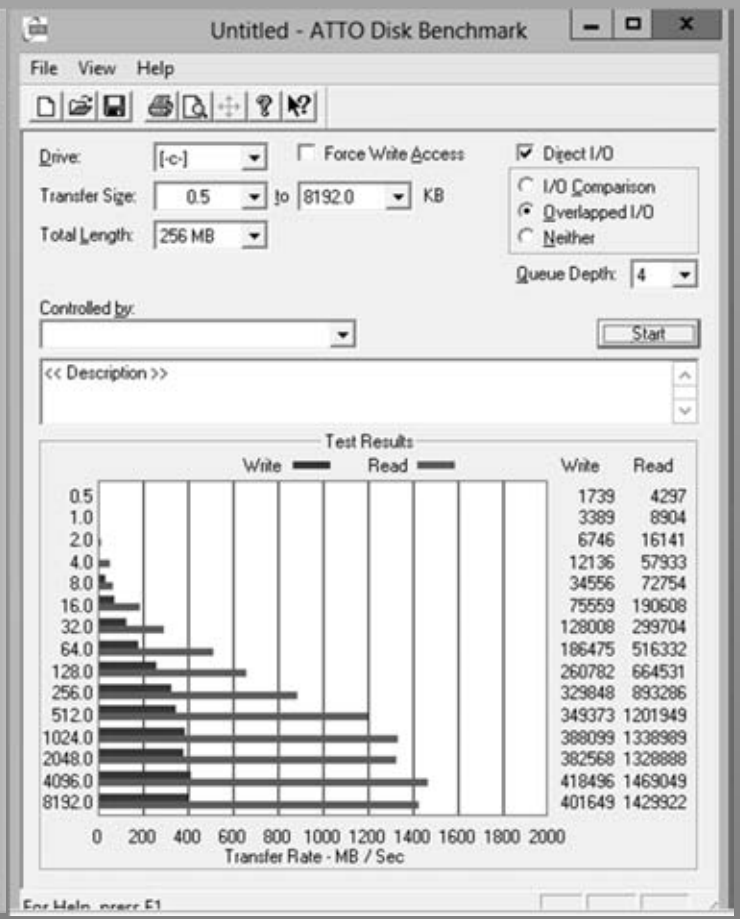
Novità in Hyper-V3

- VHDX (max 16 TB per virtual disk)
- Supporto per SMB come storage condiviso
  - SMB 3.0 – Transparent Failover
- Live Migration concorrente (senza limite?)
  - Rivedere il progetto della rete e della scheda dedicata alla LM
- Live Storage Migration
  - Senza storage condiviso
- Hyper-V VM Replication
- Support for Storage Pooling/Spaces
- Cluster Shared Volume Improvements
  - CVS cache
  - BitLocker support
  - Self-Healing
- ODX (Offloaded Date Transfer)
- Data Deduplication
- Virtual Fiber Channel

CSV Cache

- http://blogs.msdn.com/b/clustering/archive/2012/03/22/10286676.aspx





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Conclusioni

- Abbiamo visto
  - Configurare e gestire gli storage iSCSI per il Failover Cluster
  - Implementare e gestire il Clustered Shared Volume (CSV)
  - Supportare la LiveMigration

Questions & Answers

Grazie

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