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Rockin' and Rollin' with SMB3

Ned Pyle, Microsoft

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Today's Presenters

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SNIA at a glance

160
unique member companies

3,500
active contributing members

50,000
IT end users & storage pros worldwide

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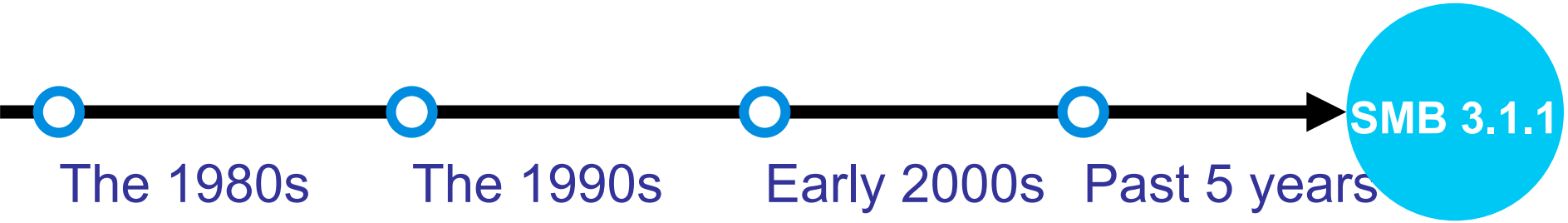
The evolution of SMB



The 1980s	The 1990s	Early 2000s	Past 5 years
The primordial ooze	SMB1/"CIFS"	SMB2	SMB3

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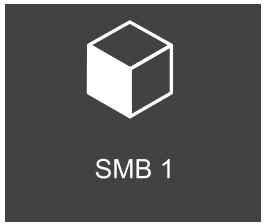
DOS, Windows, LANMan(!)

Ubiquitously abused

Slow unsafe $%^#

Will come back to this



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Windows Vista+ / Windows Server 2008+

User-optimized

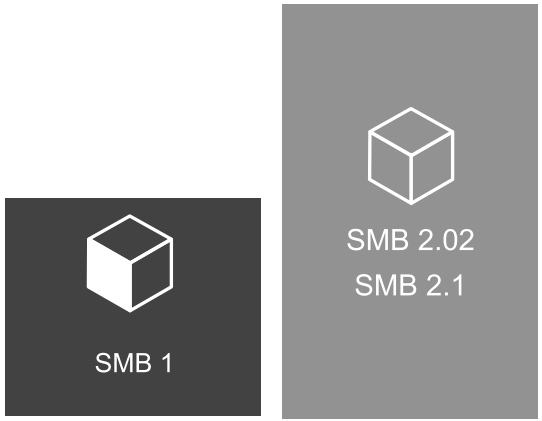
Request compounds, large reads and writes

Folder & file property caching

Durable handles

Improved message signing - HMAC SHA-256

Large MTU support



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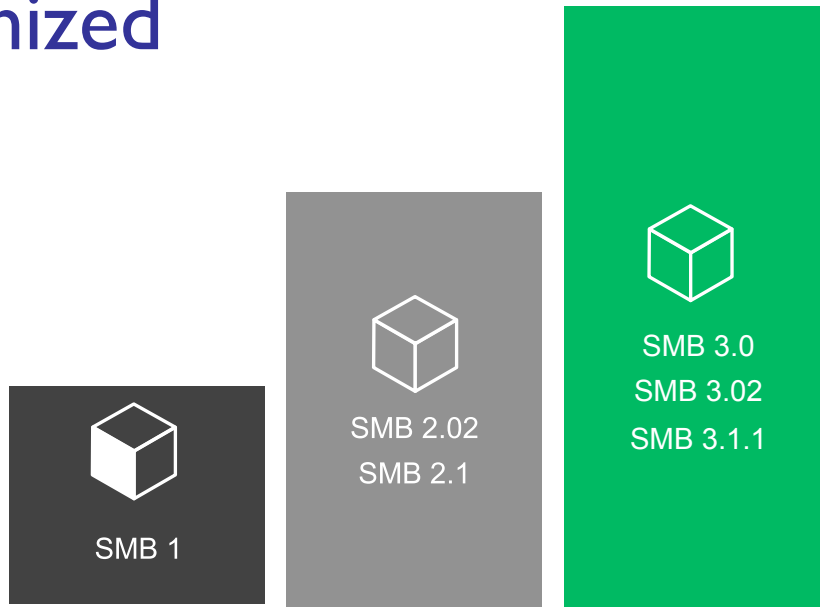
Windows 8+ / Windows Server 2012+

Datacenter application-optimized

Software-defined fabric

Modern user



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Not CIFS. Never, ever CIFS

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Security	Scale	Performance
Encryption Pre-auth integrity Guest block	Transparent failover Scale-out File Server	RDMA Multichannel

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Security

End-to-end SMB encryption

Privacy

AES-128-GCM & AES-128-CCM

SMB Signing updated

Integrity

AES-CMAC

Requires* AES-NI CPUs

Per share or server

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UNC Hardening

Introduced in Win10, KB3000483

MitM prevention

Require Mutual Auth, Signing/Encryption

Client decides

Specify UNC paths to protect

Win10 defaults for AD DS

*\SYSVOL

*\NETLOGON

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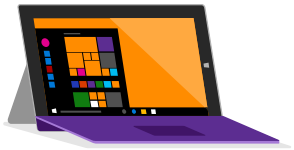
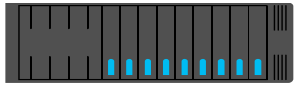
Router

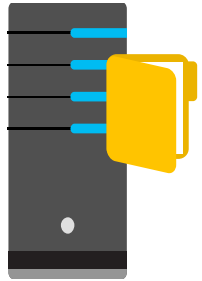
Request \\domain\netlogon\script.ps1



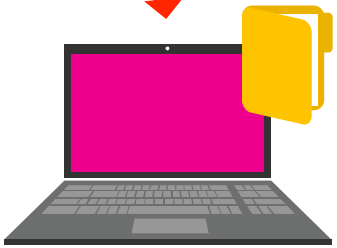


Poisoned ARP

Serves \\domain\netlogon\script.ps1



DC



Serves evil \
\domain\netlogon\script.ps1

Attacker

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MitM protection

Session Setup signed

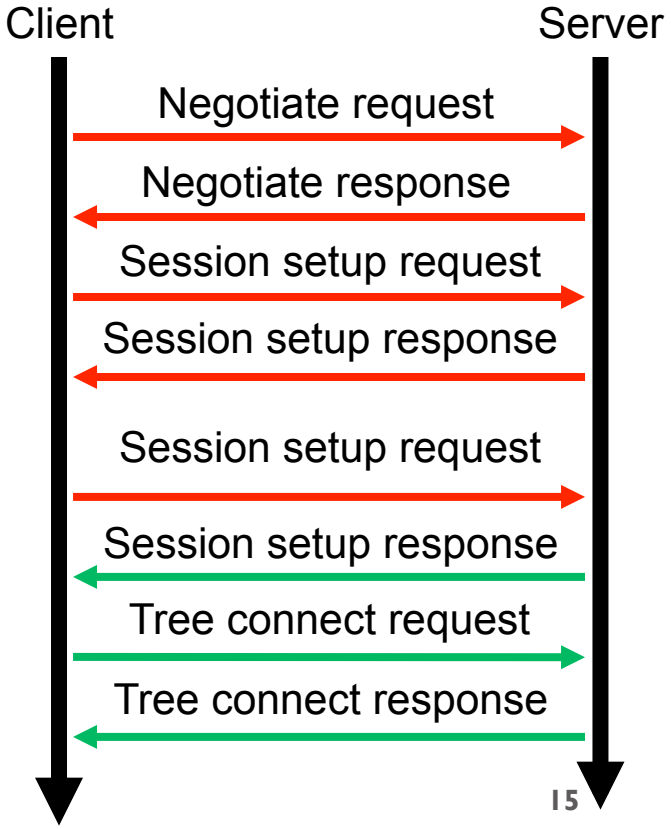
Tree Connect encrypted

No SMB capabilities downgrade possible

Replaces “Secure negotiate”

Cannot be disabled

Update WAN accelerators



Unsigned/Unencrypted Signed/Encrypted

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Insecure Guest Auth

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Stop Guest usage on failed auth

Bad behavior allowed by default

Because SOHO NAS

Group Policy

“Enable Insecure Guest Logons”

key=“HKLM\Software\Policies\Microsoft\Windows\LanmanWorkstation"

DWORD=“AllowInsecureGuestAuth”

If SMB1 enabled, meaningless

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SMB3 security doesn't matter if SMB1 is enabled

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I'm sorry Mr. Johnson, but the test is positive.

Please read this pamphlet…

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Deprecated years ago

Removable since WS2012 R2/Win8.1

Disable-able since Vista/2008

Gone in WS2016 Nano

Uninstalled by default in certain upcoming releases

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Why might SMB1 still be in use?

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XP & WS2003 under custom support agreement

Yeah right

Antique firmware printers

“Scan to share”

Evil NAS devices

Older Linux

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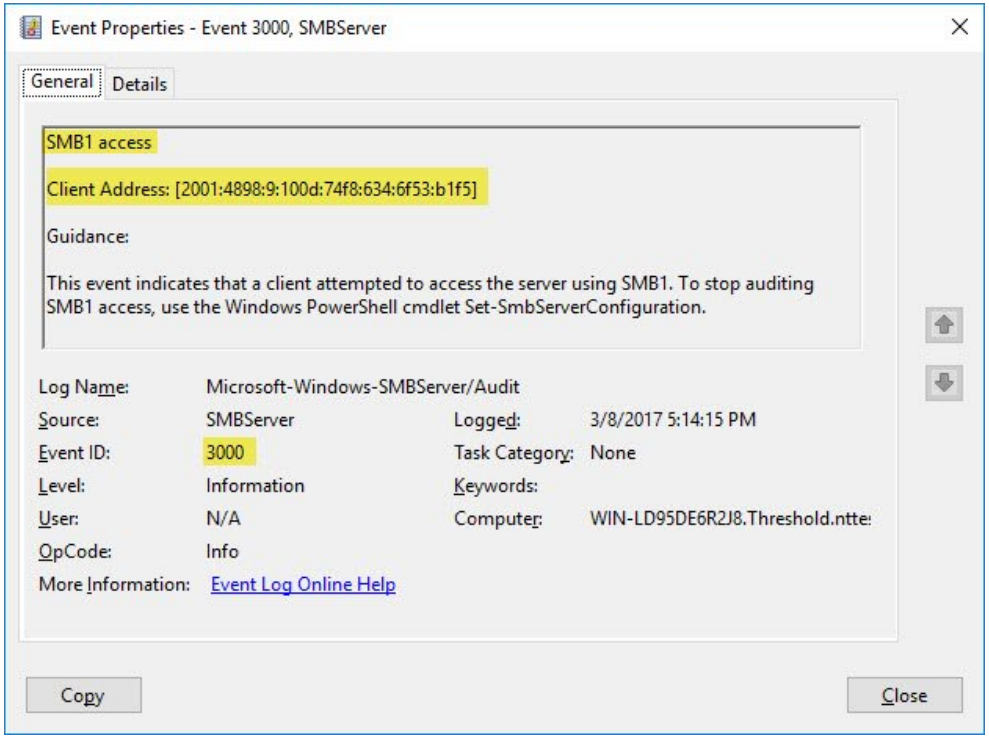
Find it

```
Set-SmbServerConfiguration –AuditSmb1Access $true
```



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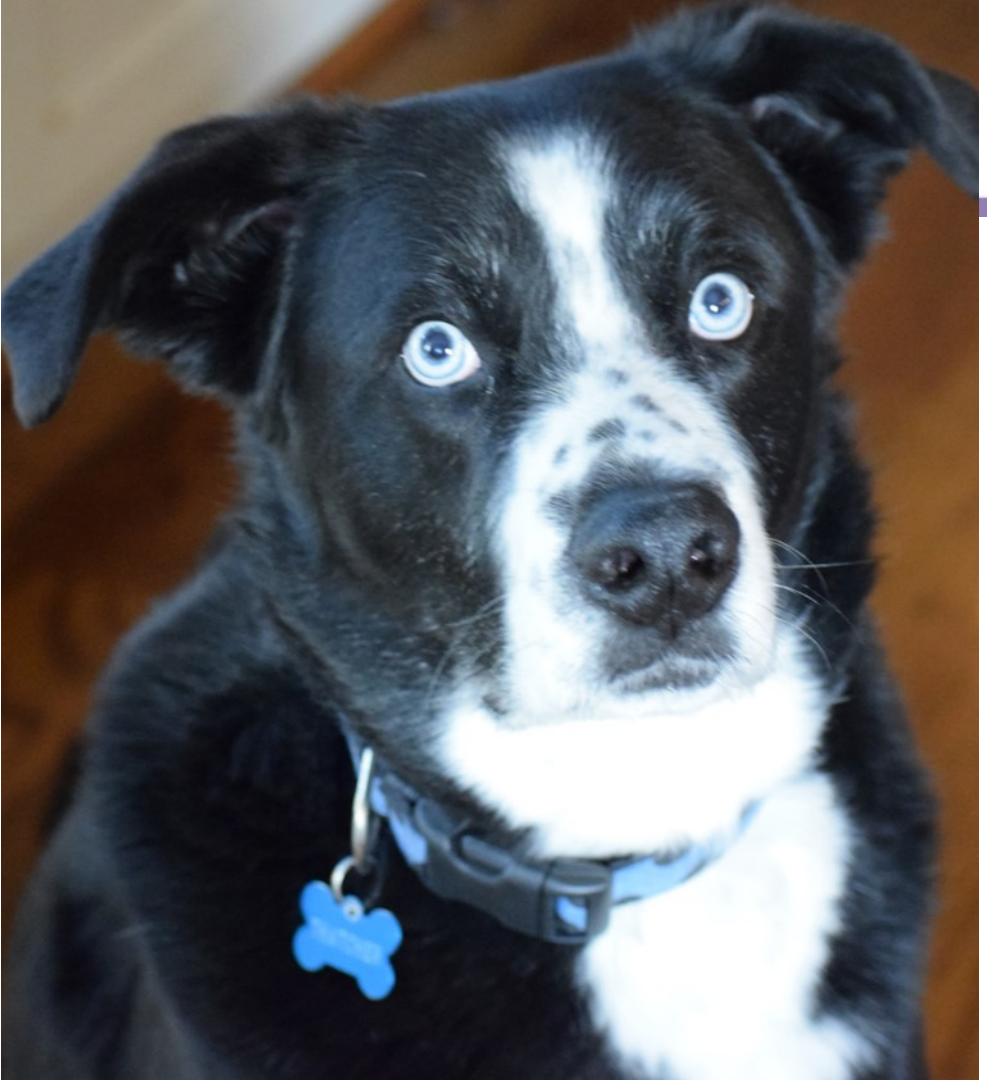


Question break 1

Scale

SMB Transparent Failover

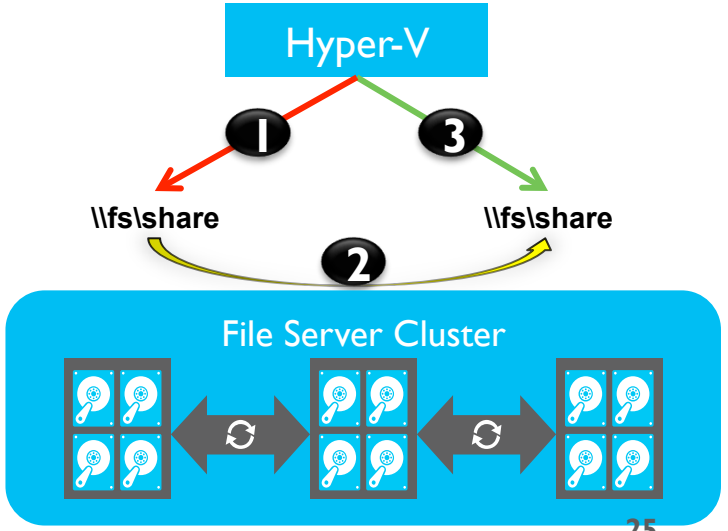
Failover transparent to application

Zero downtime – small IO delay during failover

Planned & unplanned failovers

Clustered

1. Normal operation
2. Failover share - connections & handles lost temporary stall of IO
3. Connections & handles auto-recovered Application IO continues with no errors



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Server app storage

Example: Hyper-V and SQL Server

Increase available bandwidth by adding nodes

CSV

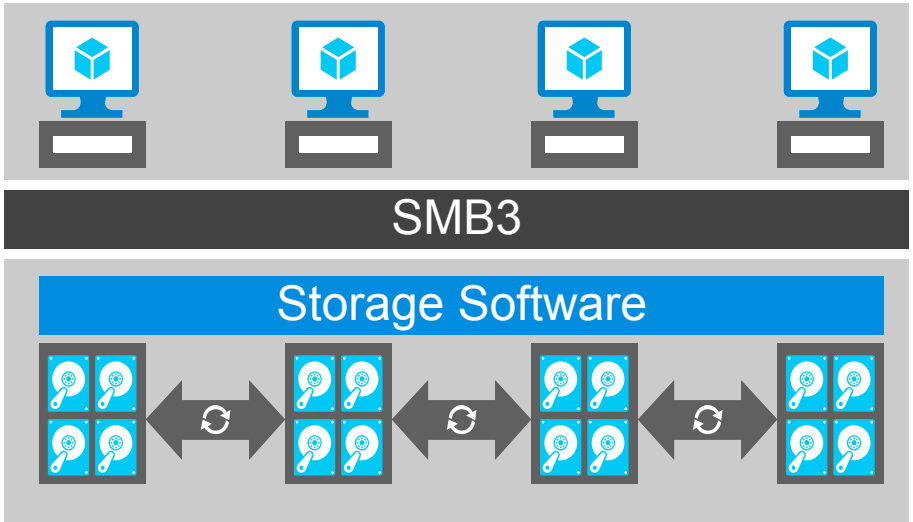
Key capabilities

Active/Active file shares

Fault tolerance with zero downtime

Fast failure recovery

Forced unit access/write through



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Performance

SMB Multichannel

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Full Throughput

Bandwidth aggregation

Automatic Failover

Automatic Configuration

SMB detects & uses multiple paths

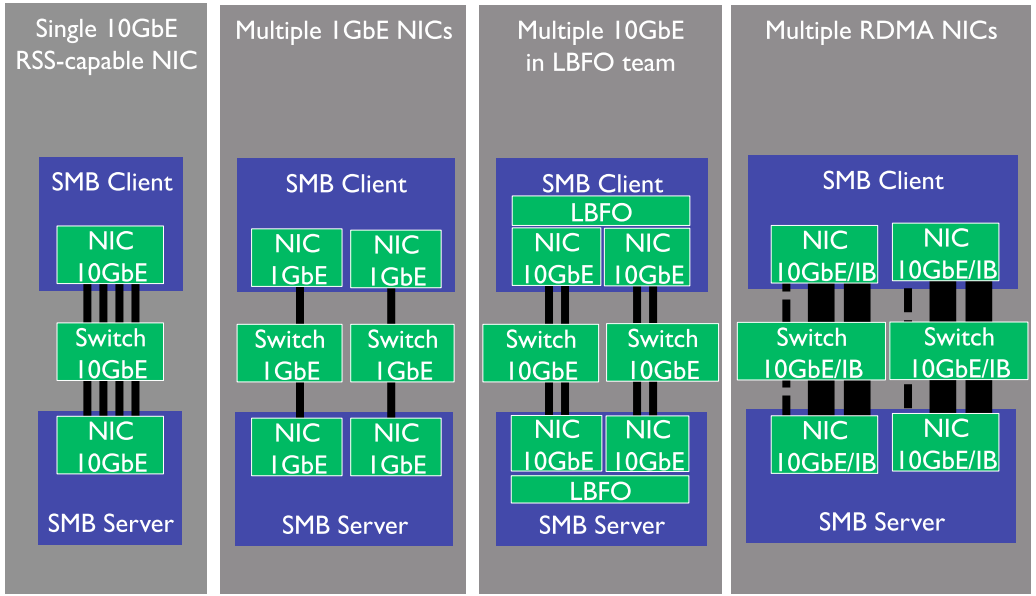
Requires one:

One+ RSS-enabled NIC

Multiple network adapters

Teamed NICs

One+ RDMA NICs



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SMB Direct (SMB over RDMA)

High throughput

Low latency

Minimal CPU

Load balancing

Automatic failover

Bandwidth aggregation

Required hardware

iWARP

RoCE v1 & V2

InfiniBand

NIC	Throughput
1Gb Ethernet	~0.1 GB/sec
10Gb Ethernet	~1.1 GB/sec
40Gb Ethernet	~4.5 GB/sec
32Gb InfiniBand (QDR)	~3.8 GB/sec
56Gb InfiniBand (FDR)	~6.5 GB/sec

HBA	Throughput
3Gb SAS x4	~1.1 GB/sec
6Gb SAS x4	~2.2 GB/sec
4Gb FC	~0.4 GB/sec
8Gb FC	~0.8 GB/sec
16Gb FC	~1.5 GB/sec

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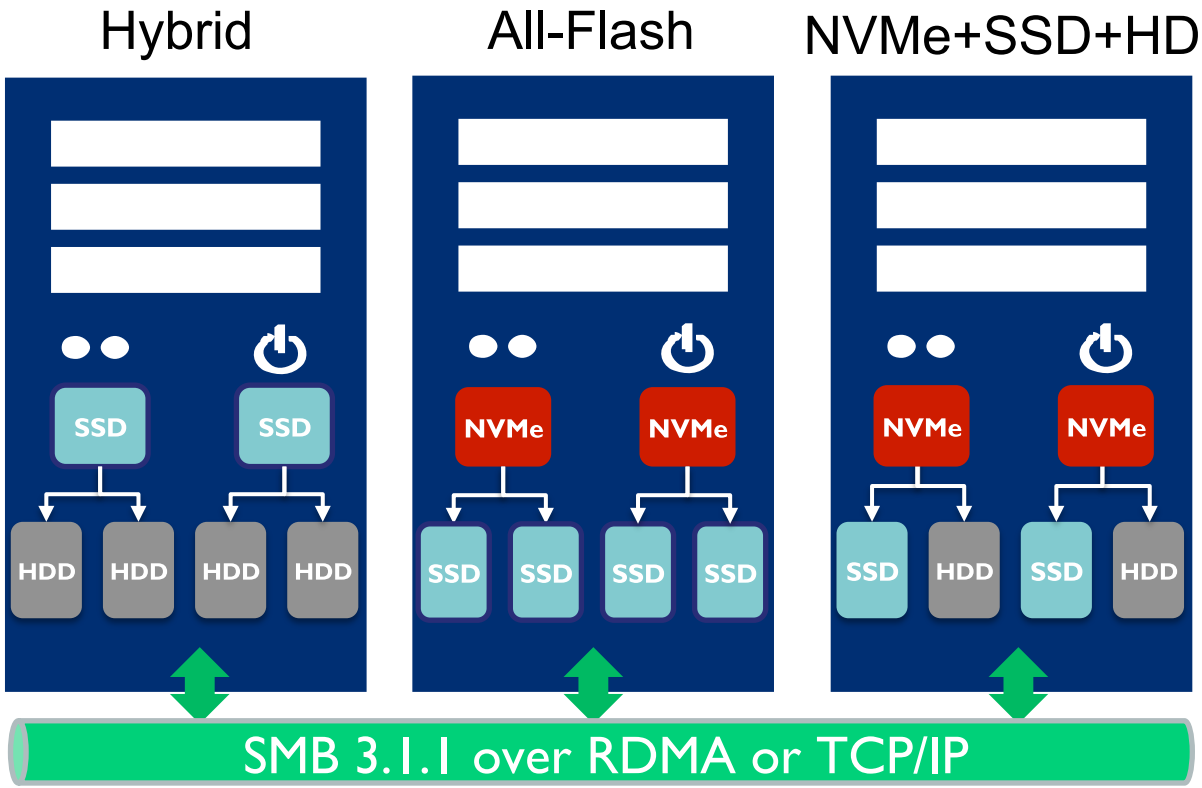
Question break 2

served.

Real world examples

Storage Spaces Direct (hyper-converged storage cluster)



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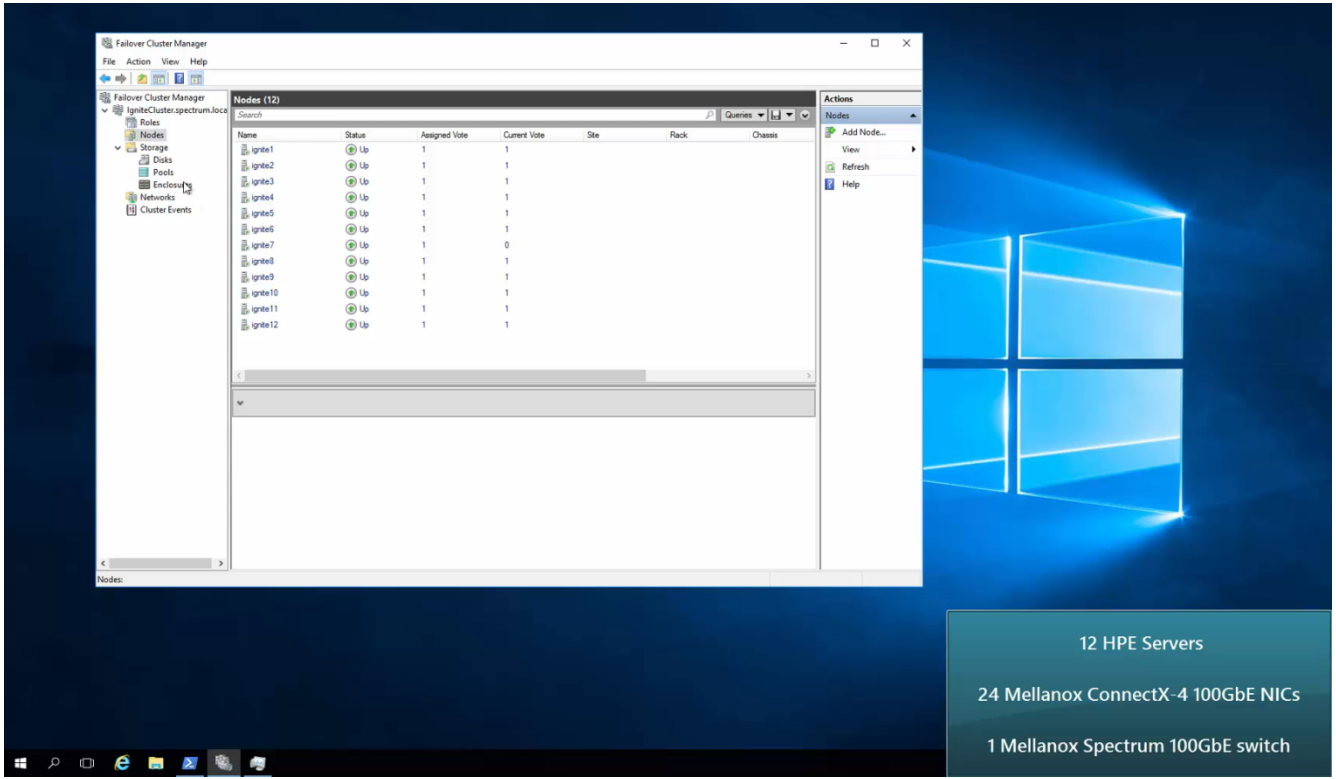
Storage Spaces Direct quasi-demo



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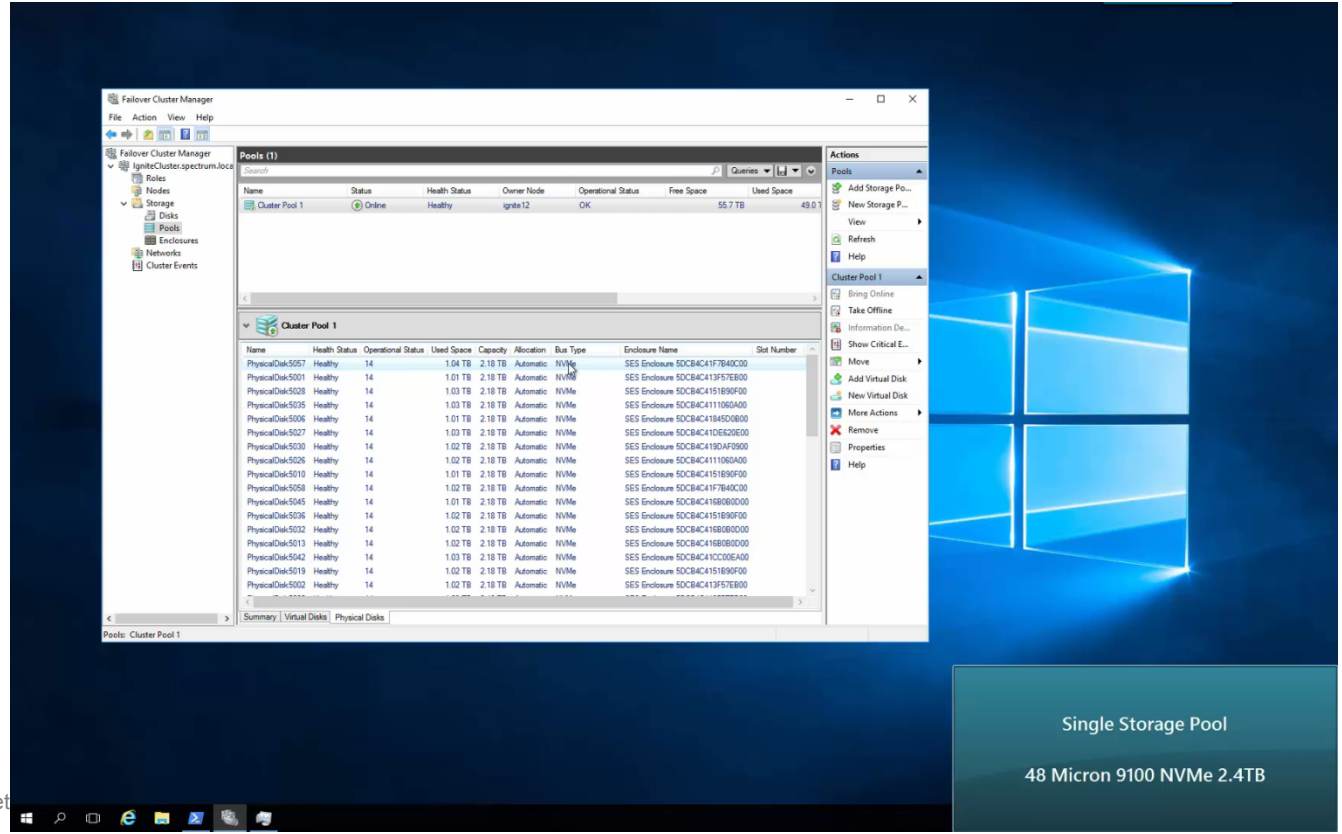
Storage Spaces Direct quasi-demo



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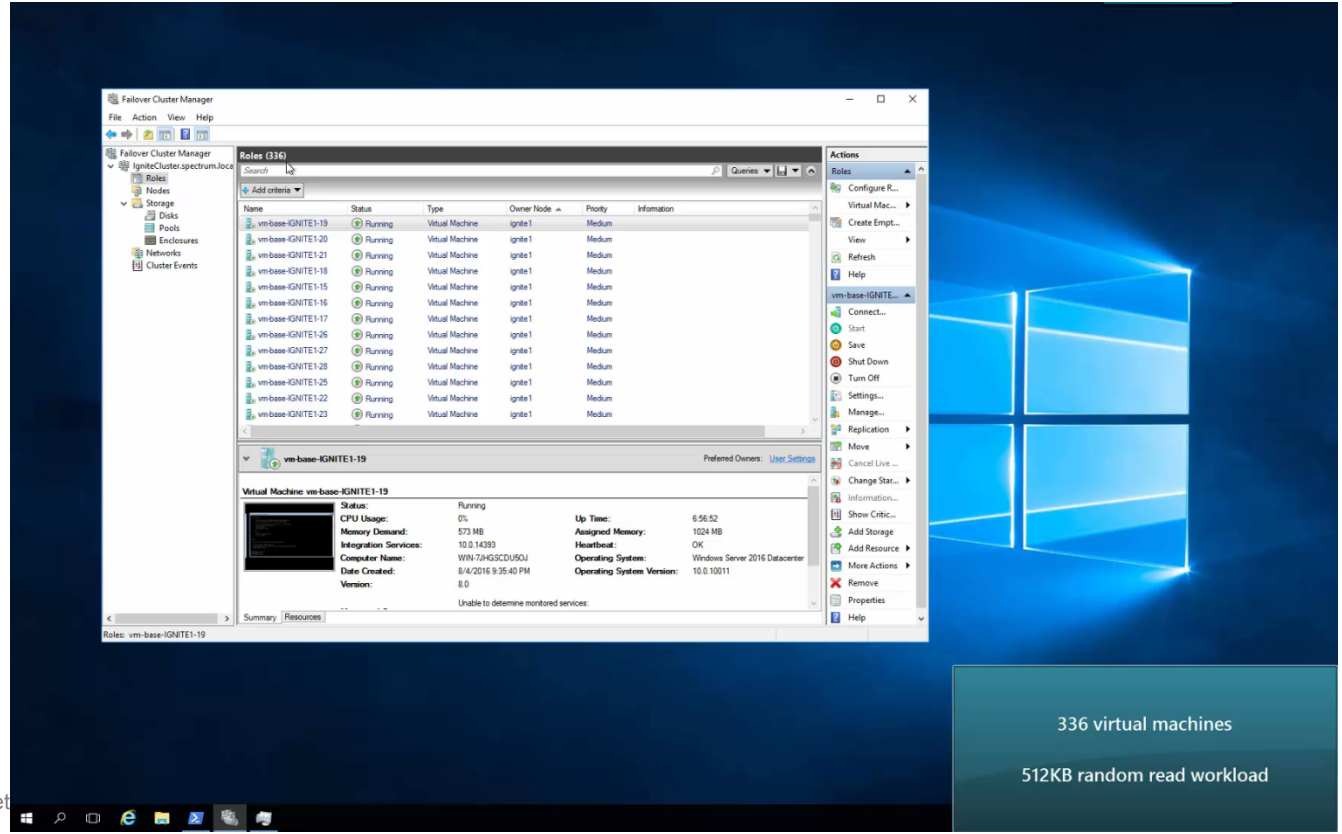
Storage Spaces Direct quasi-demo



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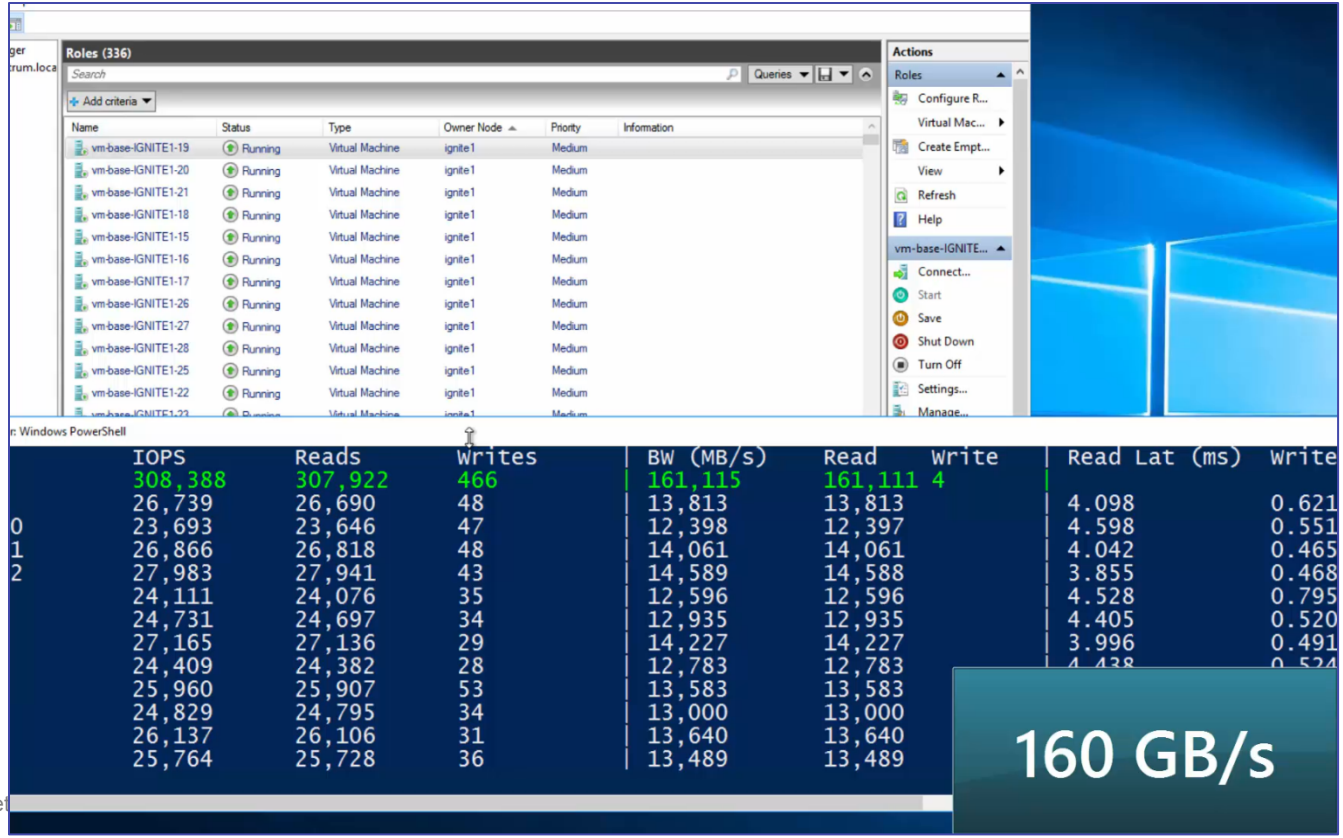
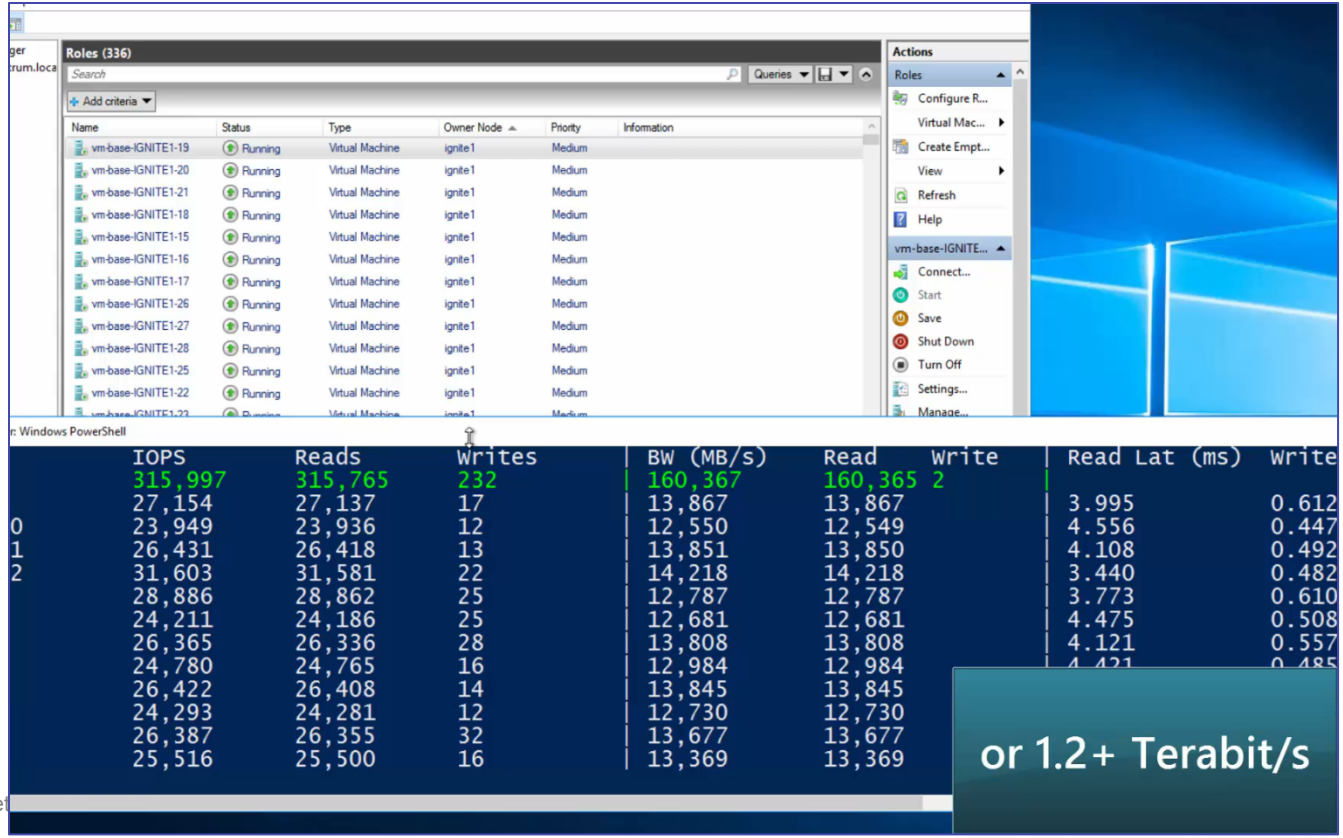
Storage Spaces Direct quasi-demo



Storage Spaces Direct quasi-demo



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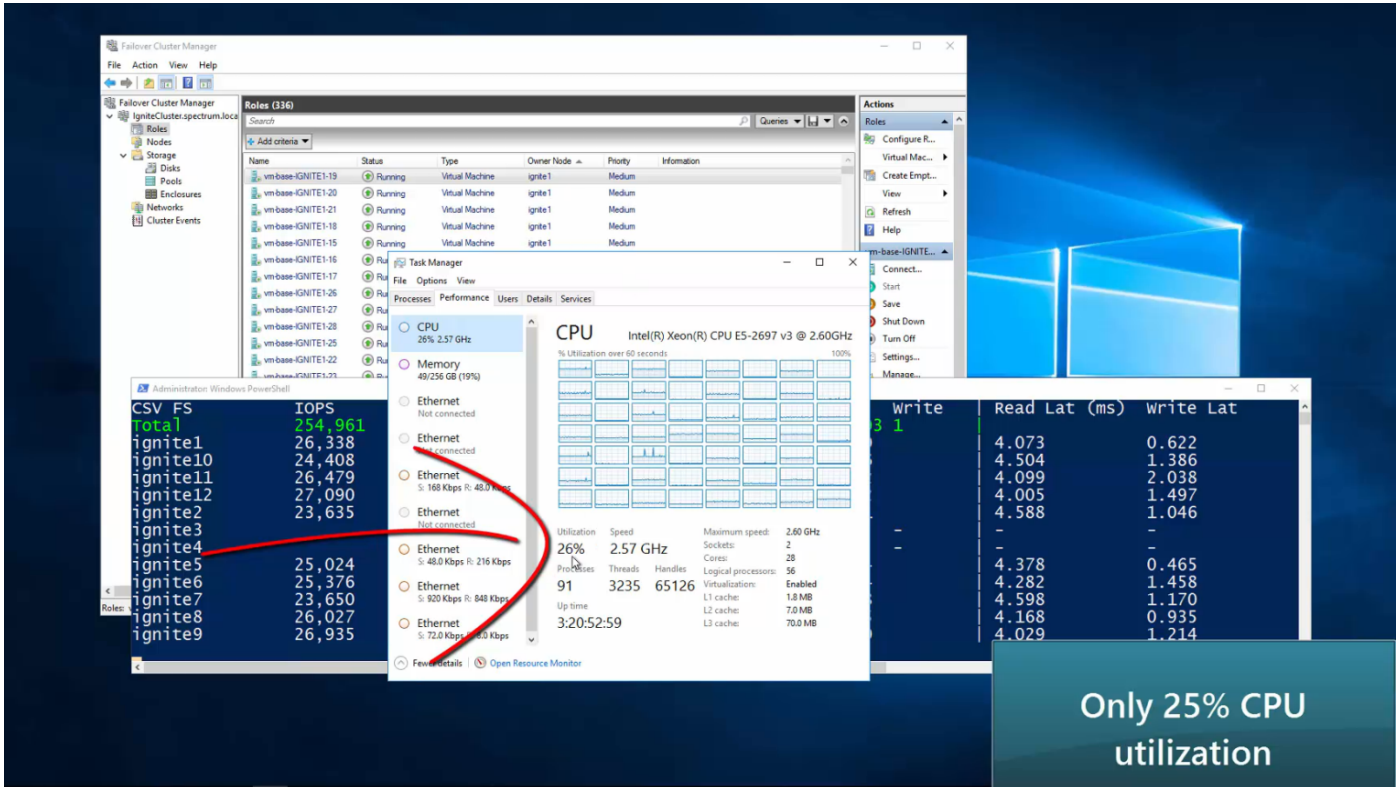
Storage Spaces Direct quasi-demo



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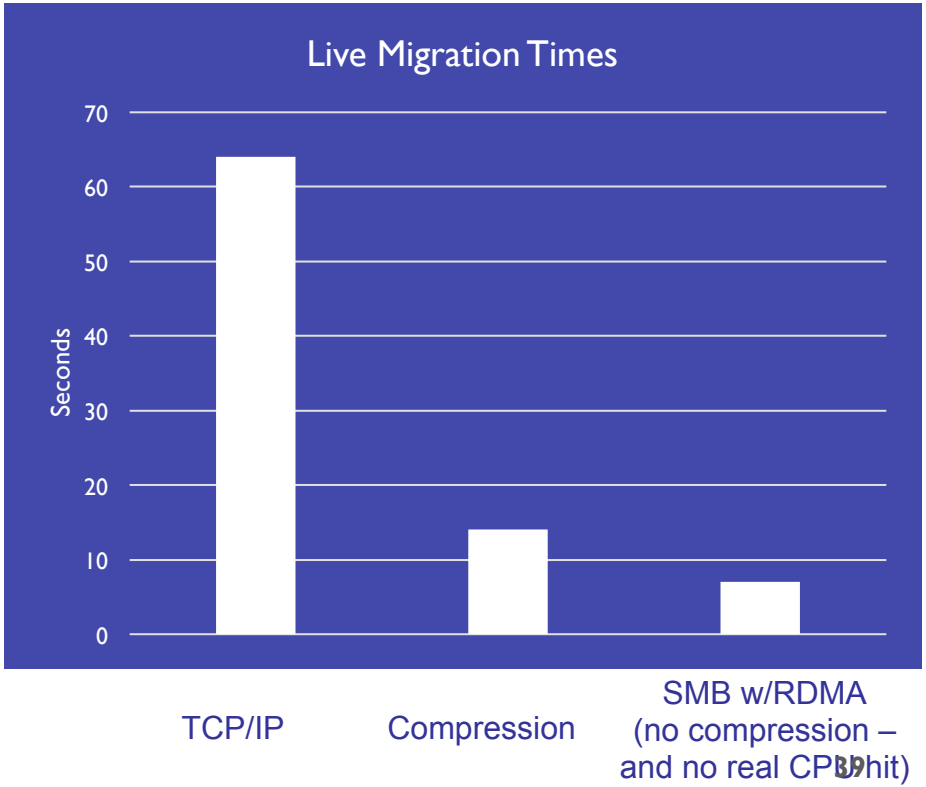
Hyper-V Live Migration over SMB

SMB transport for Live Migration

RDMA

Multichannel over multiple NICs



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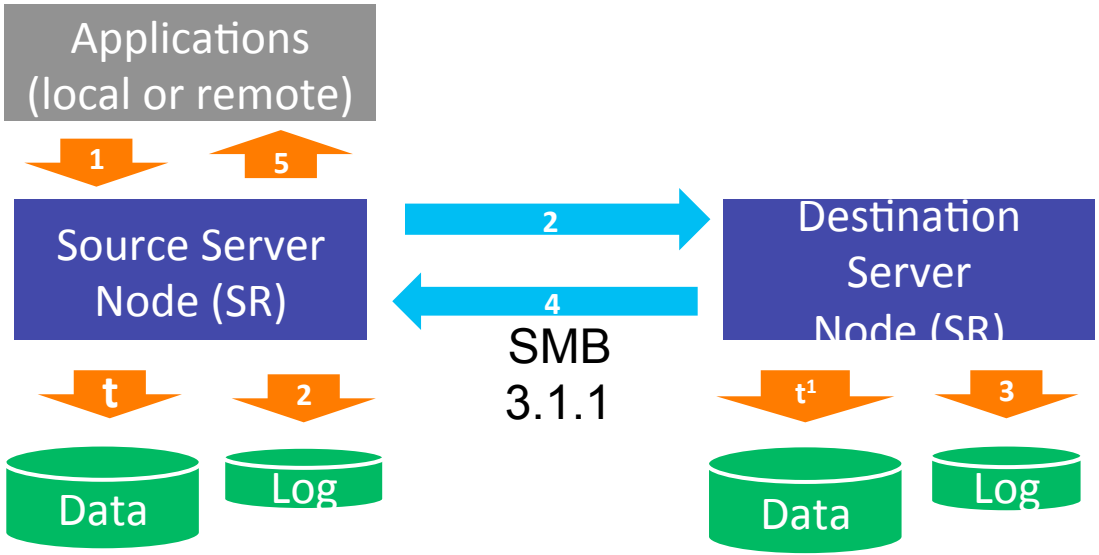
Storage Replica (block replica engine for DR)



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SMB3 Users & Vendors

Apple

EMC

NetApp

Ryussi

Tuxera

Visuality

Etc…

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Get there

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SMB1 removal - aka.ms/stopusingsmb1

SOFS best practices - aka.ms/sofsyaynay

SMB & Windows Server - aka.ms/windowsserver

SMB team blog - aka.ms/serverstorage

Good SMB blog - aka.ms/josesmb3

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2017 SNIA SMB3 Plugfest

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- Co-located at SNIA's Storage Developer Conference, September 11-14, Santa Clara, CA
- Enables vendors to bring their implementations of SMB3 to test, identify, and fix bugs in a collaborative setting with the goal of developing interoperable products
- 20+ companies and 80+ attendees are expected
- Evening Reception and Open House scheduled for September 11th

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2016 SMB3 Plugfest

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Final questions

After This Webcast

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- www.snia.org/forums/esf/knowledge/webcasts
- A full Q&A from this webcast, including answers to questions we couldn't get to today, will be posted to the SNIA-ESF blog: sniaesfblog.org
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Thank you!

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