



# AZ-800

## Administer Windows Server Hybrid Core Infrastructure



# Agenda AZ-800

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- 1 Deploy and manage identity infrastructure – Windows Server
- 2 Deploy and manage identity infrastructure – Hybrid
  
- 3 Administering Windows Server Hybrid Core Infrastructure – Windows Server
- 4 Administering Windows Server Hybrid Core Infrastructure – Hybrid
  
- 5 Manage virtualization and containers – Windows Server
- 6 Manage virtualization and containers – Hybrid
  
- 7 Implement and manage networking infrastructure – Windows Server
- 8 Implement and manage networking Infrastructure – Hybrid
  
- 9 Configure storage and file services – Windows Server
- 10 Configure storage and file services – Hybrid

# Configure storage and file services

*(File servers and storage management in Windows Server)*

- [Manage Windows Server file servers](#)
- [Implement Storage Spaces and Storage Spaces Direct](#)
- [Implement Windows Server Data Deduplication](#)
- [Implement Windows Server iSCSI](#)
- [Implement Windows Server Storage Replica](#)
- [Lab 09 – Implementing Storage Solutions in Windows Server](#)

# Manage Windows Server file servers

# Learning Objectives – Manage Windows Server file servers

- Define the Windows Server file system
- Windows Server file system types - Summary
- Benefits and uses of File Server Resource Manager
- Demonstration - Using FSRM
- Define SMB and its security considerations
- Define Volume Shadow Copy Services (VSS)
- Learning recap

# Define the Windows Server file system

## What is a file system?

- Provides a range of features that implement storage and retrieval of files on storage devices.
- Allows you to organize files in a hierarchical structure and controls their format and naming convention.
- Supports a wide range of storage devices.
- All file systems available on Windows operating system consist of the following storage components:
  - Files
  - Directories
  - Volumes

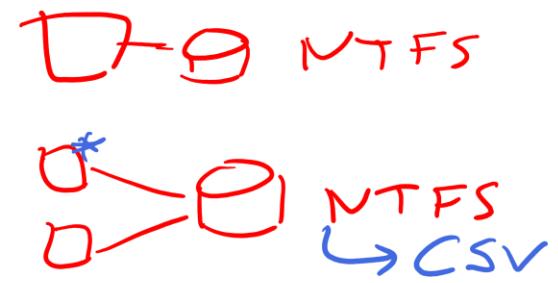
## What are the distinguishing features of Windows Server file system types?

The Windows Server file system types include:

- File allocation table (FAT) FAT32, and extended file allocation table (exFAT)
- The NT File System (NTFS)
- Resilient File System (ReFS)



# Windows Server file system types – Summary



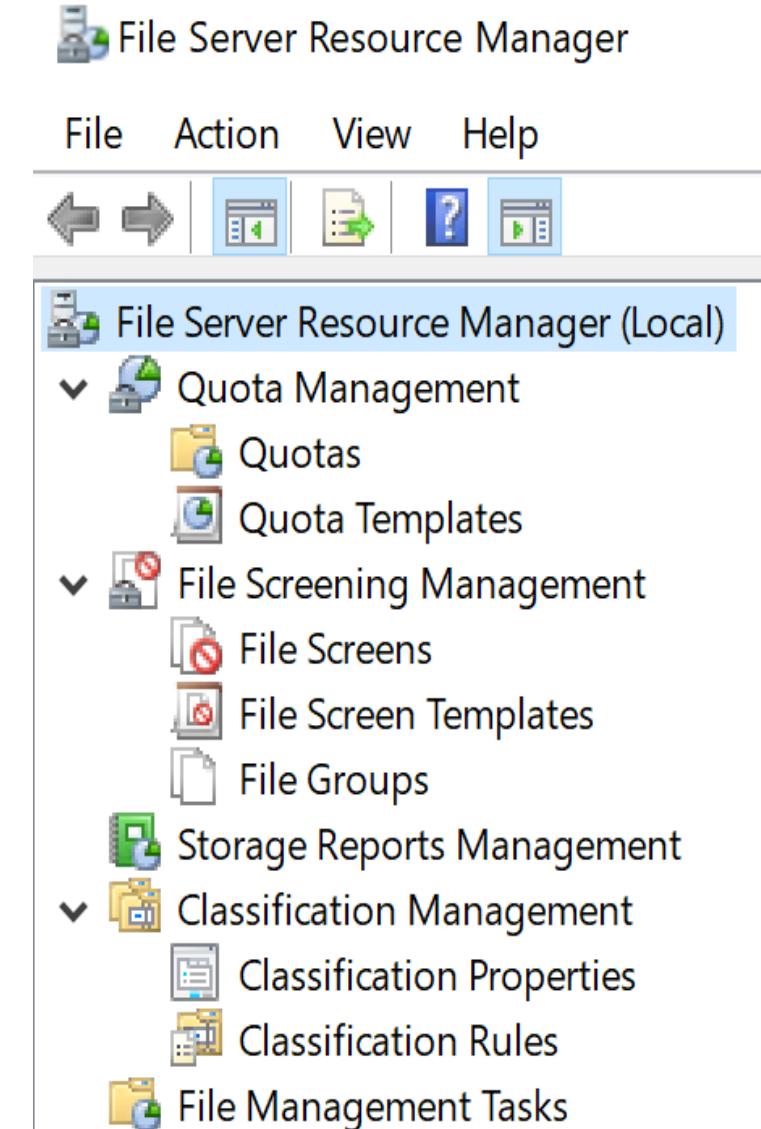
	FAT	NTFS	REFS
Volume Size	<ul style="list-style-type: none"><li>• FAT = &lt;=4GB</li><li>• FAT32 = &lt;=64GB</li><li>• exFAT = &gt;=64GB</li></ul>	Up to 8 Petabytes File Compression	Up to 35 Petabytes No File Compression
Security	No Security	<ul style="list-style-type: none"><li>• File/Folder Permissions using ACLs</li><li>• Encryption</li></ul>	<ul style="list-style-type: none"><li>• File/Folder Permissions using ACLs</li><li>• No File Encryption</li></ul>
Use Case	External Media (USB, Flash Drive)	Server OS Boot Volumes and Data Volumes	Only Data Volumes, not Boot Volumes

SAN  
VEEAM Backup

# List the benefits and uses of File Server Resource Manager

You can use FSRM to manage and classify data that is stored on file servers. FSRM includes the following features:

- Quota management
- File screening management
- Storage reports
- File Classification Infrastructure
- File management tasks
- Access-denied assistance



# Demonstration – Using File Server Resource Manager

Configure quota  
management

Configure file screening

Validate quota  
management

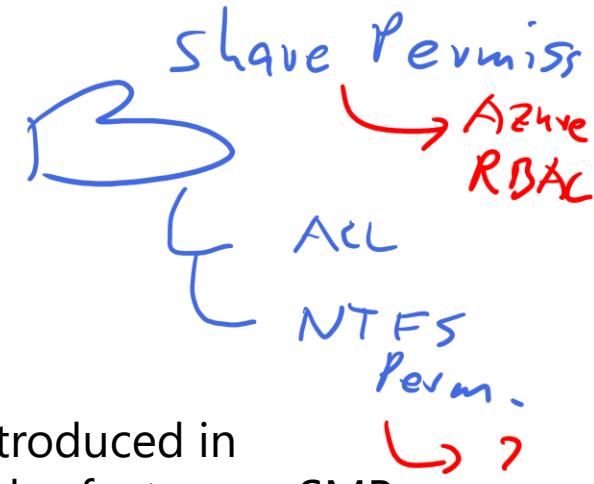
# Define SMB and its security considerations

## What is SMB?

- SMB is a TCP/IP-based network file sharing protocol that allows applications on a computer to read and write to files, and to request services from server programs in a computer network.
- Using the SMB protocol, an application (or the user of an application) can access files or other resources at a remote server.

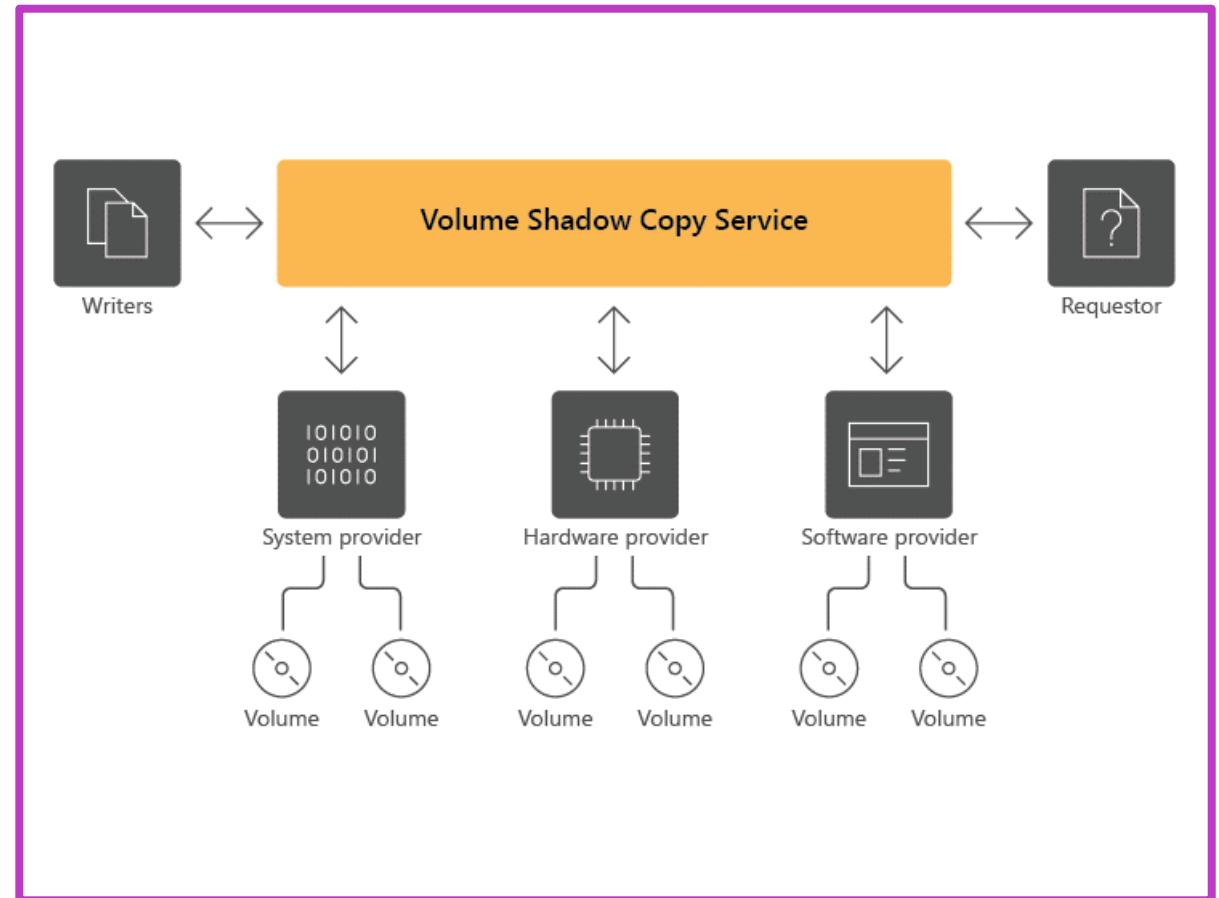
## The benefits of SMB 3.x

- SMB 3.0, which Microsoft introduced in Windows Server 2012, includes features – SMB Transparent Failover/SMB Scale Out/SMB Encryption/Windows PowerShell commands for managing SMB/SMB Multichannel/SMB Direct
- SMB 3.1.1, which Microsoft introduced in Windows Server 2016, offers several additional enhancements, including Preauthentication integrity/SMB Encryption improvements/the removal of the RequireSecureNegotiate setting



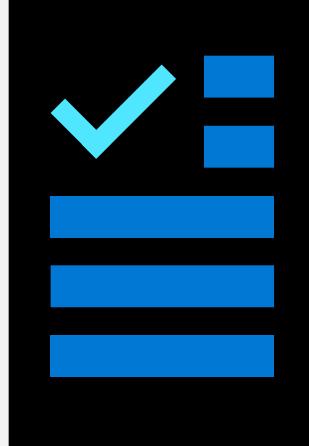
# Define Volume Shadow Copy Service (VSS)

- Windows Server Backup uses VSS to perform backups.
- VSS facilitates communication between these components to optimize their collaboration.
- VSS coordinates the actions that are necessary to create a consistent shadow copy, also known as a snapshot or a point-in-time copy, of the data that's to be backed up.
- VSS solutions have the following basic components:
  - VSS service
  - VSS requester
  - VSS writer
  - VSS provider



# Learning recap – Manage Windows Server file servers

## Module assessment



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Manage Windows Server file servers

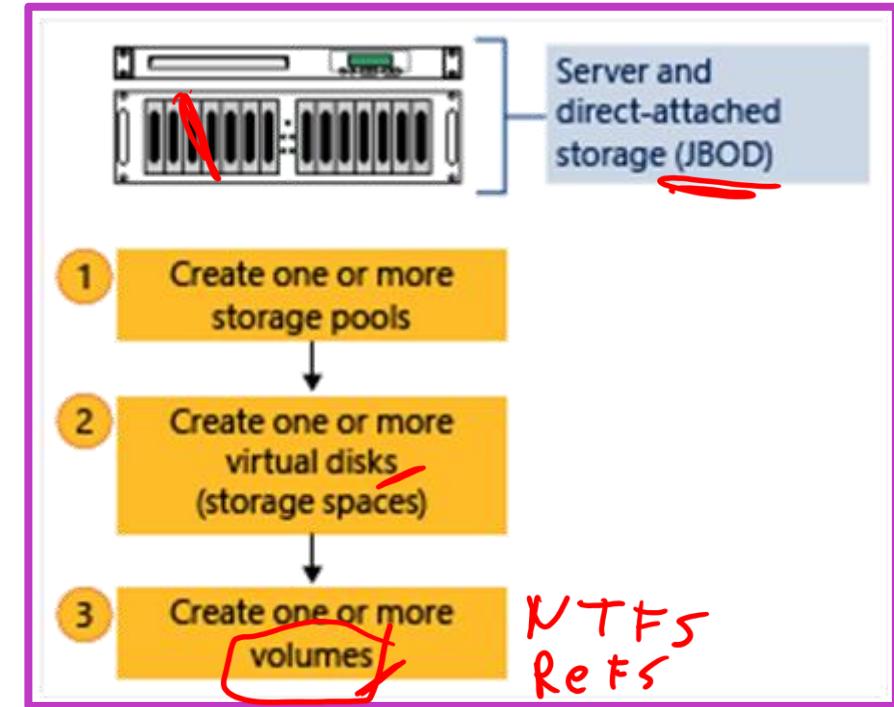
# Implement Storage Spaces and Storage Spaces Direct

# Learning Objectives – Implement Storage Spaces and Storage Spaces Direct

- Define the Storage Spaces architecture and its components
- List the functionalities, benefits, and use cases of Storage Spaces
- Demonstration - Implement Storage Spaces
- List the functionalities, components, benefits, and use cases of Storage Spaces Direct
- Demonstration - Managing objects in AD DS
- Learning recap

# Define the Storage Spaces architecture and its components

- A storage space is a storage-virtualization capability built into Windows Server and Windows 10
- Storage Pools = Collection of (physical) disks
- Storage Spaces = Collection of (virtual) disks
- Volumes = Size, Drive Letter, File System



HCI

# Storage Spaces – functionalities, benefits, and use cases (1/4)

## Storage Spaces offer the following benefits

- Implement and easily manage scalable, reliable, and inexpensive storage.
- Use different types of storage in the same pool (for example, SATA, SAS, USB, and SCSI).
- Designate specific drives as hot spares, and automatically repair failed pools using hot spares.
- Use the existing tools for backup and restore, and use VSS for snapshots.
- Manage either locally or remotely, by using Microsoft Management Console (MMC) or Windows PowerShell.
- Utilize Storage Spaces with Failover Clusters (SAS support only).

# Storage Spaces – functionalities, benefits, and use cases (2/4)

## Storage Spaces have the following limitations:

- Storage Spaces volumes aren't supported as boot or system volumes.
- You should add only unformatted, non-partitioned, disks to a storage pool.
- All drives in a pool must use the same sector size.
- Storage layers that abstract the physical disks aren't compatible with Storage Spaces, including:
  - Pass-through disks in a virtual machine (VM).
  - Storage subsystems deployed in a separate RAID layer.
- Fibre Channel and Internet Small Computer System Interface (iSCSI) aren't supported.

# Storage Spaces – functionalities, benefits, and use cases (3/4)

Relationship between the workload type and Storage Spaces resiliency type.

Resiliency type	Number of data copies maintained	Workload recommendations
Mirror	<ul style="list-style-type: none"><li>• 2 copies (two-way mirror)</li><li>• 3 copies (three-way mirror)</li></ul>	Recommended for all workloads
Parity	<ul style="list-style-type: none"><li>• 2 disks (single parity)</li><li>• 3 disks (dual parity)</li></ul>	Sequential workloads with large units of read/write, such as archival
Simple	<ul style="list-style-type: none"><li>• 1 disk (no redundancy)</li></ul>	Workloads that don't need resiliency, or provide an alternate resiliency mechanism

# Storage Spaces – functionalities, benefits, and use cases (4/4)

## Storage Efficiency and Provisioning Types

Provisioning type	Feature	Workload recommendations
Thin	Drive capacity is reserved as you store data to the drive, rather than all at once.	Initially saving storage capacity, where growth is not known yet (e.g., virtual disks on Hyper-V host)
Fixed (Thick)	Drive capacity is allocated when you create the volume.	When storage capacity is fixed (not dynamic) or you need a guaranteed reserved space capacity

# Demonstration – Implement Storage Spaces

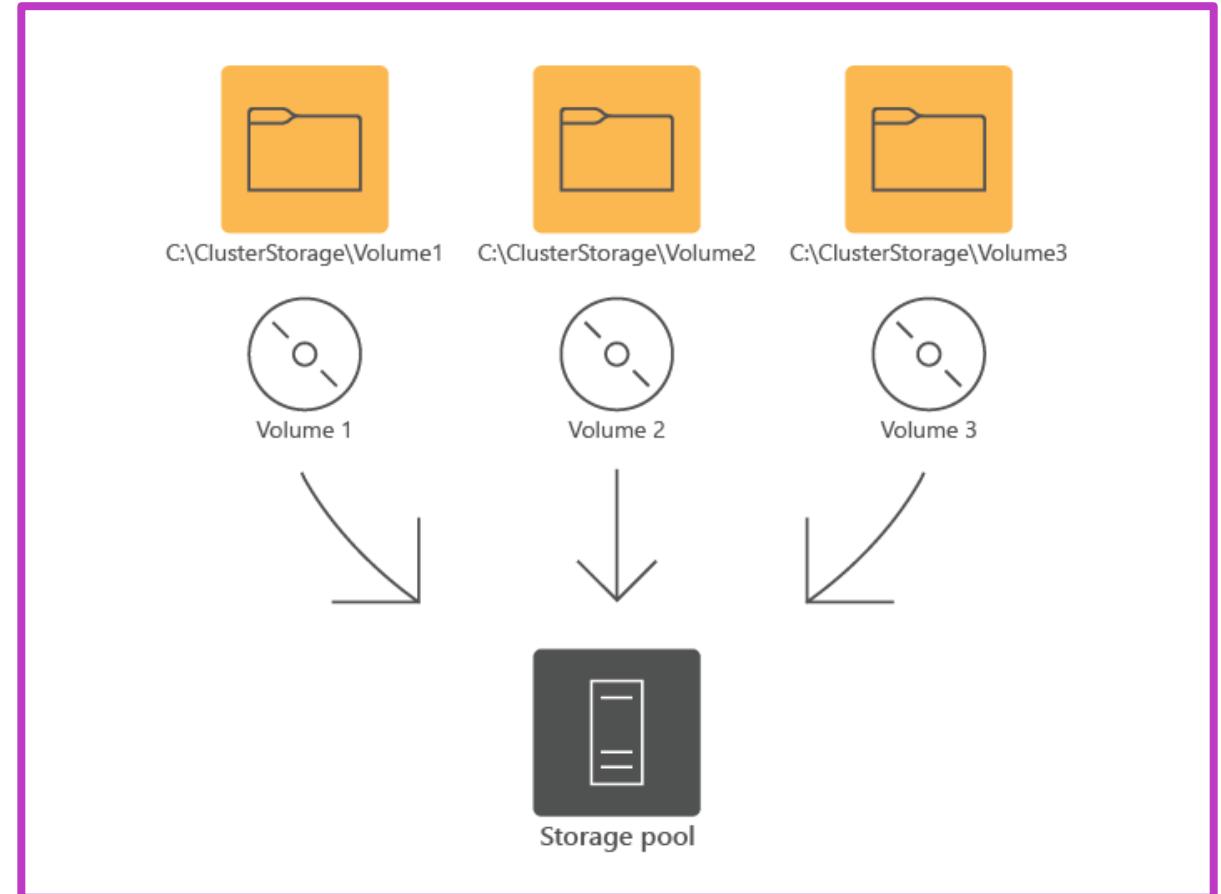
Create a storage pool  
using Server Manager

Create a mirrored virtual  
disk holding a single  
volume

Examine disk properties  
in Windows Admin  
Center

# Storage Spaces Direct – functionalities, components, and benefits (1/3)

- Storage Spaces Direct is the evolution of Storage Spaces, first introduced in Windows Server 2012
- It leverages Storage Spaces, Failover Clustering, Cluster Shared Volumes (CSVs), Software Storage Bus, and SMB 3.x to implement virtualized, highly-available shared storage
- It is suitable for hosting highly-available workloads, including virtual machines and SQL Server databases
- Storage Spaces Direct supports both direct-attached storage (DAS) and JBODs

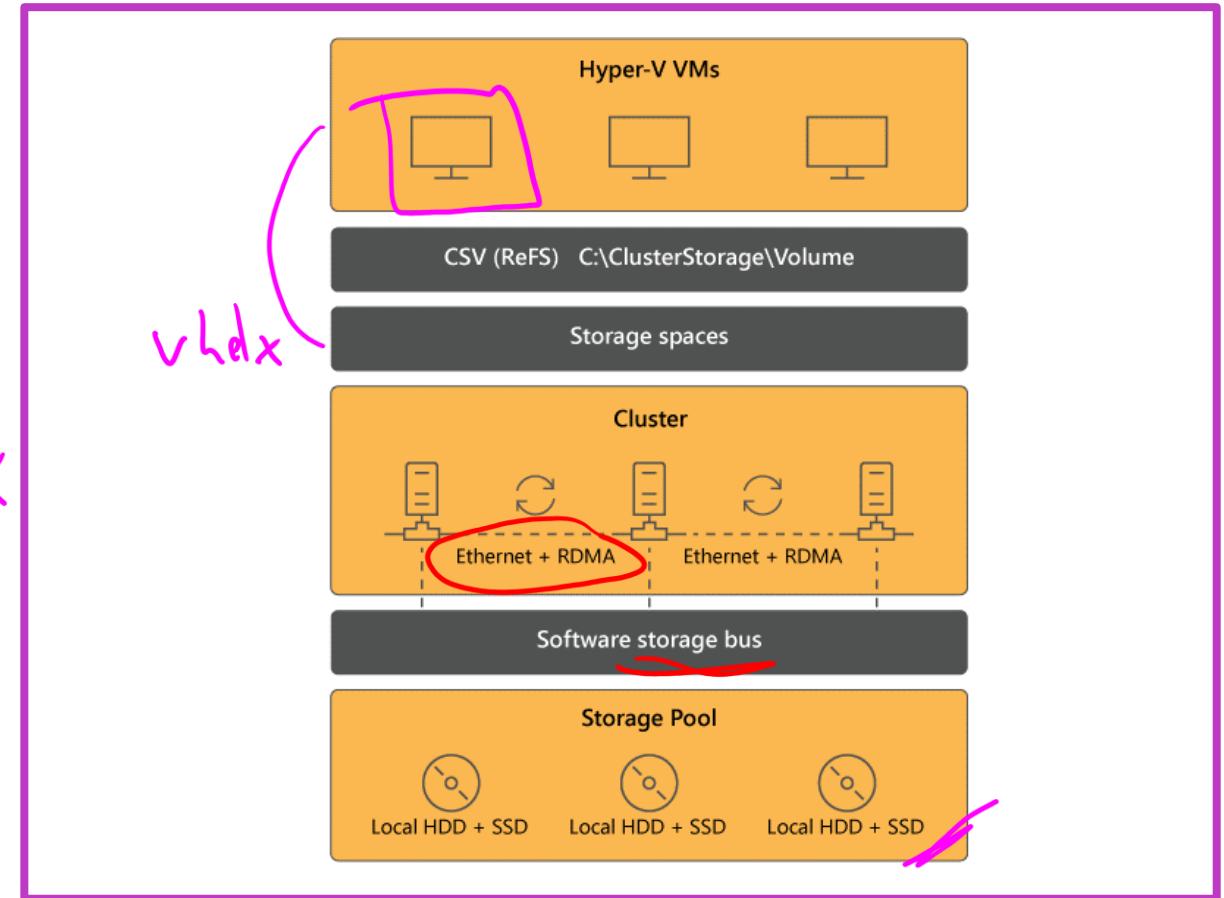


# Storage Spaces Direct – functionalities, components, and benefits (2/3)

The architecture of Storage Spaces Direct consists of the following components:

- Storage Spaces Direct workloads
- CSV
- ReFS or NTFS-formatted volumes
- Software Storage Bus
- SMB Networking

Nutanix  
RDMA



# Storage Spaces Direct – functionalities, components, and benefits (3/3)

Windows Server offers a range of Storage Spaces Direct-related benefits, including:

- Deduplication and compression for ReFS volumes
- Native support for persistent memory modules in Storage Spaces Direct clusters
- Nested resiliency for two-node hyper-converged infrastructure
- USB flash drive as a witness
- Performance history for visibility into resource utilization and performance
- Scaling for up to 4 petabytes (PB) per cluster
- Mirror-accelerated parity
- Drive latency outlier detection
- Storage-class memory support for VMs
- Windows Admin Center extensions

# Demonstration – Provision Storage Spaces Direct – using PowerShell

Install Windows Server roles and features using PowerShell

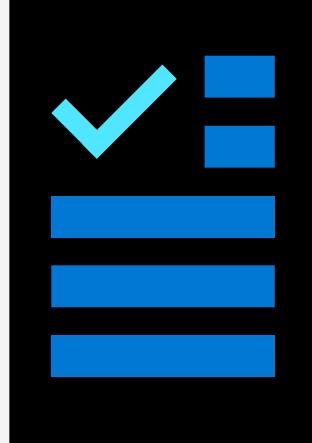
Validate cluster configuration and create a cluster

Enable Storage Spaces Direct, create a storage pool, virtual disk, file server, and file share

Trigger a cluster node failure and test storage high availability

# Learning recap – Implement Storage Spaces and Storage Space Direct

Module  
assessment



**Microsoft Learn Modules ([docs.microsoft.com/Learn](https://docs.microsoft.com/Learn))**

Implement Storage Spaces and Storage Spaces Direct

# Implement Windows Server Data Deduplication

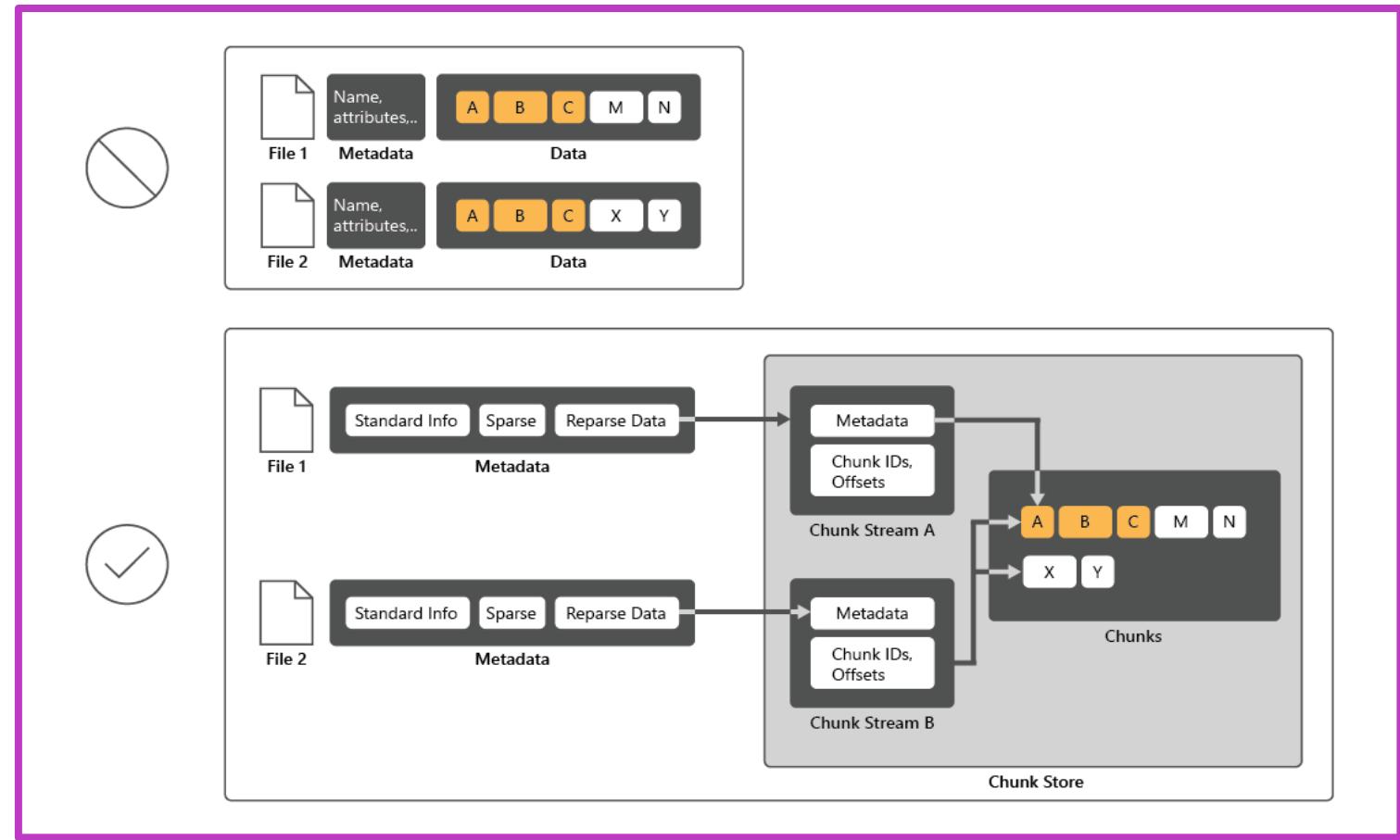
# Learning Objectives – Windows Server Data Deduplication

- Define the architecture, components, and functionality of Data Deduplication
- Define the use cases and interoperability of Data Deduplication
- Implement Data Deduplication
- Manage and maintain Data Deduplication
- Demonstration - Implement Data Deduplication
- Learning recap

# Data Deduplication – architecture, components, and functionality (1/3)

## What is Data Deduplication?

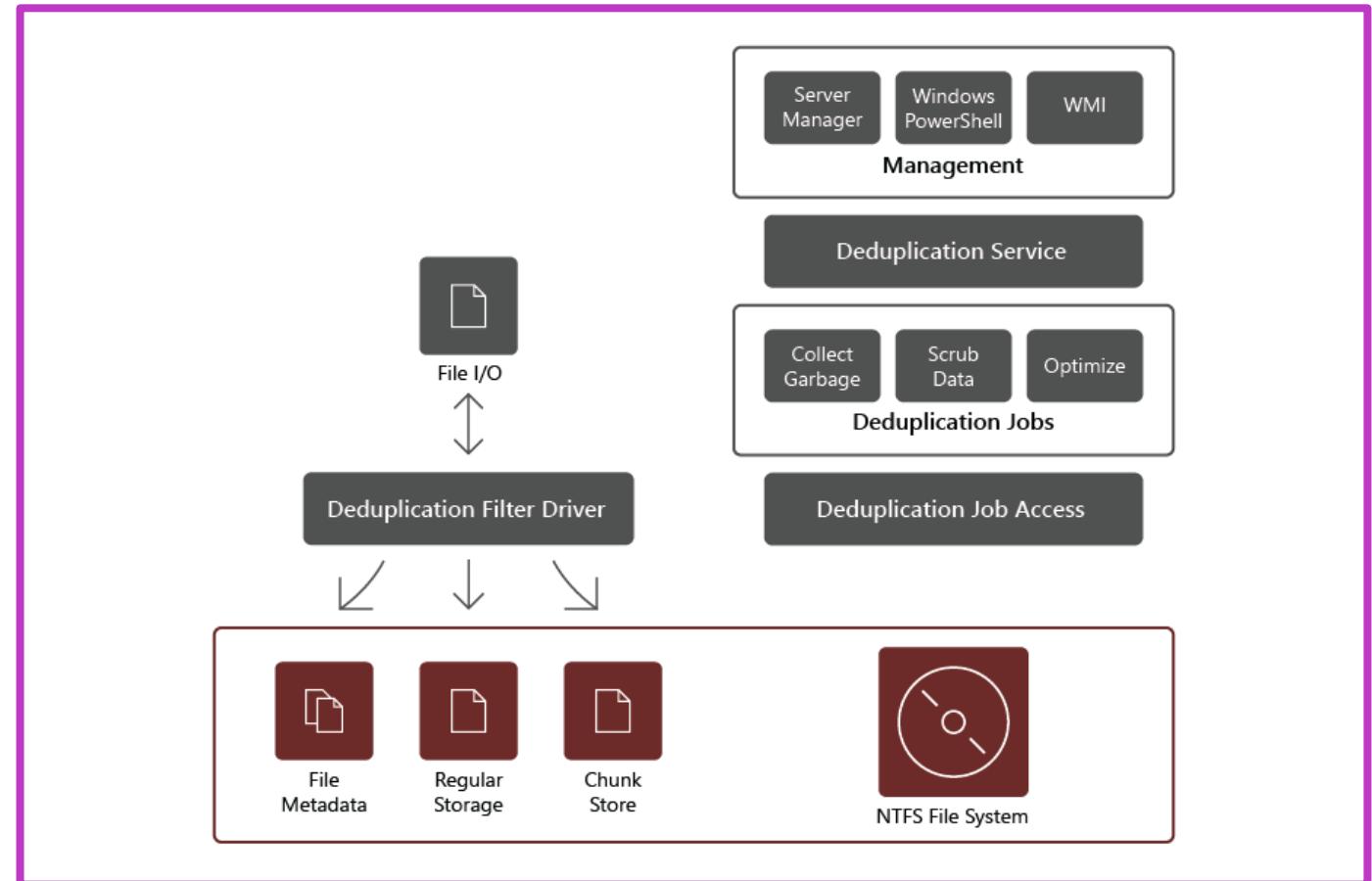
Data Deduplication is a role service of Windows Server that identifies and removes duplications within data without compromising data integrity



# Data Deduplication – architecture, components, and functionality (2/3)

## What are the components of Data Deduplication?

- Filter driver
- Deduplication service.  
(Deduplication and compression,  
Garbage Collection, Scrubbing)
- Unoptimization



# Data Deduplication – architecture, components, and functionality (3/3)

## Scope of Data Deduplication

- Files that don't meet the deduplication policy you configure.
- Files in folders that you explicitly exclude from the scope of deduplication.
- System state files.
- Alternate data streams.
- Encrypted files.
- Files with extended attributes.
- Files smaller than 32 KB.

# Data Deduplication – use cases and interoperability (1/3)

## Data Deduplication use cases

Use case	Content	Space savings
User documents	Group content publication or sharing, user home folders, and profile redirection for accessing offline files	30 to 50 percent
Software deployment shares	Software binaries, cab files, symbols files, images, and updates	70 to 80 percent
Virtualization libraries	Virtual hard disk files (i.e., .vhd and .vhdx files) storage for provisioning to hypervisors	80 to 95 percent
General file share	A mix of all the previously identified data types	50 to 60 percent

# Data Deduplication – use cases and interoperability (2/3)

## Recommended Data Deduplication use cases

- Ideal candidates for deduplication
- Should be evaluated based on content
- Not ideal candidates for deduplication

## Evaluate savings with the Deduplication Evaluation Tool

- You can use the Deduplication Evaluation Tool, DDPEval.exe, to determine the expected savings from deduplication on a particular volume

# Data Deduplication – use cases and interoperability (3/3)

## Data Deduplication interoperability

- **Windows BranchCache** – You can optimize access to data over the wide area network (WAN) by enabling BranchCache on Windows Server and Windows client operating systems.
- **Failover Clusters** – Failover Clusters fully support Data Deduplication.
- **FSRM quotas** – All other FSRM quota functionality, including volume-root soft quotas and quotas on subfolders, will work as expected when using deduplication.
- **DFS Replication** – Data Deduplication is compatible with Distributed File System (DFS) Replication.

# Implement Data Deduplication (1/2)

## Implement Data Deduplication

- Install Data Deduplication Windows Server role service by using Windows Admin Center, Server Manager, or the **Add-WindowsFeature Windows** PowerShell cmdlet with the **-Name FS-Data-Deduplication** parameter.
- Enable Data Deduplication by using Windows Admin Center, Server Manager, or the **Enable-DedupVolume** Windows PowerShell cmdlet with the **-Volume VolumeLetter -UsageType StorageType** parameters. (Hyper-V, Backup; Default)

## Configure Data Deduplication

- Incoming data is static or expected to be read-only, and you want to process files on the volume sooner.
- You have directories that you don't want to deduplicate. Add a directory to the exclusion list.
- You have file types that you don't want to deduplicate. Add a file type to the exclusion list.
- The server has different off-peak hours than the default setting, and you want to change the Garbage Collection and Scrubbing schedules.

# Implement Data Deduplication (2/2)

## Install and enable Data Deduplication

- Windows Admin Center
- Server Manager
- Windows PowerShell
  - Add-WindowsFeature
  - Enable-DedupVolume

## Configure Data Deduplication settings for custom scenarios

- Static or read-only incoming data
- Directories and file types you don't want to deduplicate – Add to exclusion lists
- Change server's default off-peak hours schedules
- Default settings usually sufficient for most environments

# Manage and maintain Data Deduplication (1/2)

## Running Data Deduplication jobs on demand

Job type	To trigger job execution, run (where the <i>VolumeLetter</i> parameter represents the target volume)
Optimization	Start-DedupJob –Volume *VolumeLetter* –Type Optimization
Data Scrubbing	Start-DedupJob –Volume *VolumeLetter* –Type Scrubbing
Garbage Collection	Start-DedupJob –Volume *VolumeLetter* –Type GarbageCollection
Unoptimization	Start-DedupJob –Volume *VolumeLetter* –Type Unoptimization

# Manage and maintain Data Deduplication (2/2)

## Configure Data Deduplication schedules

- When you enable Data Deduplication on a server, three schedules are enabled by default: Optimization is scheduled to run every hour, and Garbage Collection and Scrubbing are scheduled to run once a week.

## Backup and restore considerations with Data Deduplication

- One of the benefits of using Data Deduplication is that backup and restore operations are faster.
- Restore operations can also benefit from Data Deduplication.
- With deduplication in Windows Server, you can back up and restore individual files and full volumes.

# Demonstration – Implement Data Deduplication

Install the Data Deduplication role service using Server Manager

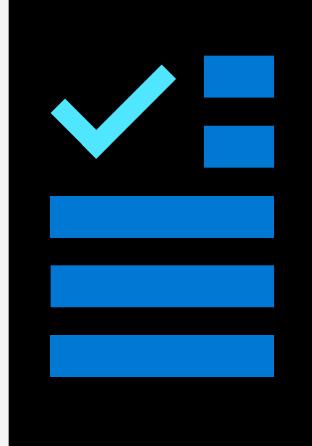
Enable Data Deduplication on the target volume

Copy files to the data volume and extract files to the target volume

Review status of Data Deduplication jobs using Windows PowerShell

# Learning recap – Implement Windows Server Data Deduplication

## Module assessment



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Introduction to AD DS

De los

# Implement Windows Server iSCSI

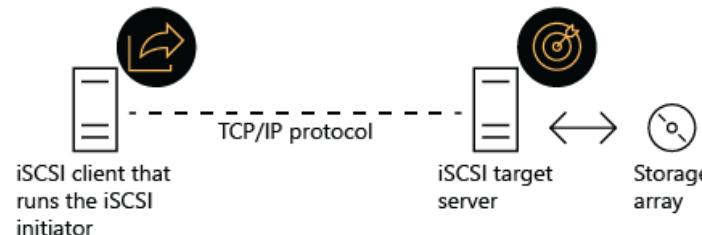
# Learning Objectives – Implement Windows Server iSCSI

- List the functionalities, components, and use cases of iSCSI
- List the considerations for implementing iSCSI
- Demonstration - Implement iSCSI
- Configure high availability for iSCSI
- Learning recap

# iSCSI – functionalities, components, and use cases (1/2)

## What is iSCSI?

- iSCSI is a TCP/IP-based storage networking standard for connecting data storage services.
- iSCSI emulates the popular, high-performance, local storage bus–subsystem technology and creates a logical storage area network (SAN).
- Unlike some SAN protocols, iSCSI requires no specialized cabling or connectivity devices.



## iSCSI components

- **IP network.** Use standard network interface adapters and standard Ethernet protocol network switches to connect to iSCSI.
- **iSCSI targets.** Windows Server provides an iSCSI target server as a file and storage service role. (This item is circled in red.)
- **iSCSI initiators.** The iSCSI initiator is a client-side component that provides connectivity to a remote iSCSI target.
- **iSCSI Qualified Name (IQN).** IQN is a unique identifier that specifies and locates initiators and targets on an iSCSI network.
- **Internet Storage Name Service (iSNS).** iSNS facilitates discovery, management, and configuration of iSCSI targets.

# iSCSI – functionalities, components, and use cases (2/2)

## iSCSI functionality in Windows Server

The iSCSI Target Server role service in Windows Server includes the following functionality:

- It provides authentication, allowing you to implement Challenge Handshake Authentication Protocol (CHAP) to authenticate initiator connections and reverse CHAP to enable the initiator to authenticate the iSCSI target.
- It implements iSCSI virtual disks as VHD or VHDX files.
- It supports management by using Server Manager, Windows PowerShell, and System Center Virtual Machine Manager.
- It scales to 256 iSCSI targets and 512 virtual disks per server.

The iSNS role service in Windows Server includes following functionality:

- It hosts a database of active iSCSI nodes, representing initiators, targets, and management systems.
- It supports automatic registration of initiators and targets.
- It implements State Change Notification Service that triggers notifications to registered clients when changes occur to the database of the iSNS server.
- It offers Discovery Domain Service.

# Considerations for implementing iSCSI

## Common use cases of Windows Server iSCSI

- Network or diskless boot
- Server application storage
- Heterogeneous storage
- Test environments

## Considerations for implementing iSCSI

- Network speed and performance
- High availability
- Security
- Workloads
- Infrastructure staff
- Application support teams

# Demonstration – Implement iSCSI

Install the iSCSI Target role service.

Initialize the data disk, create a new partition, and format it with ReFS.

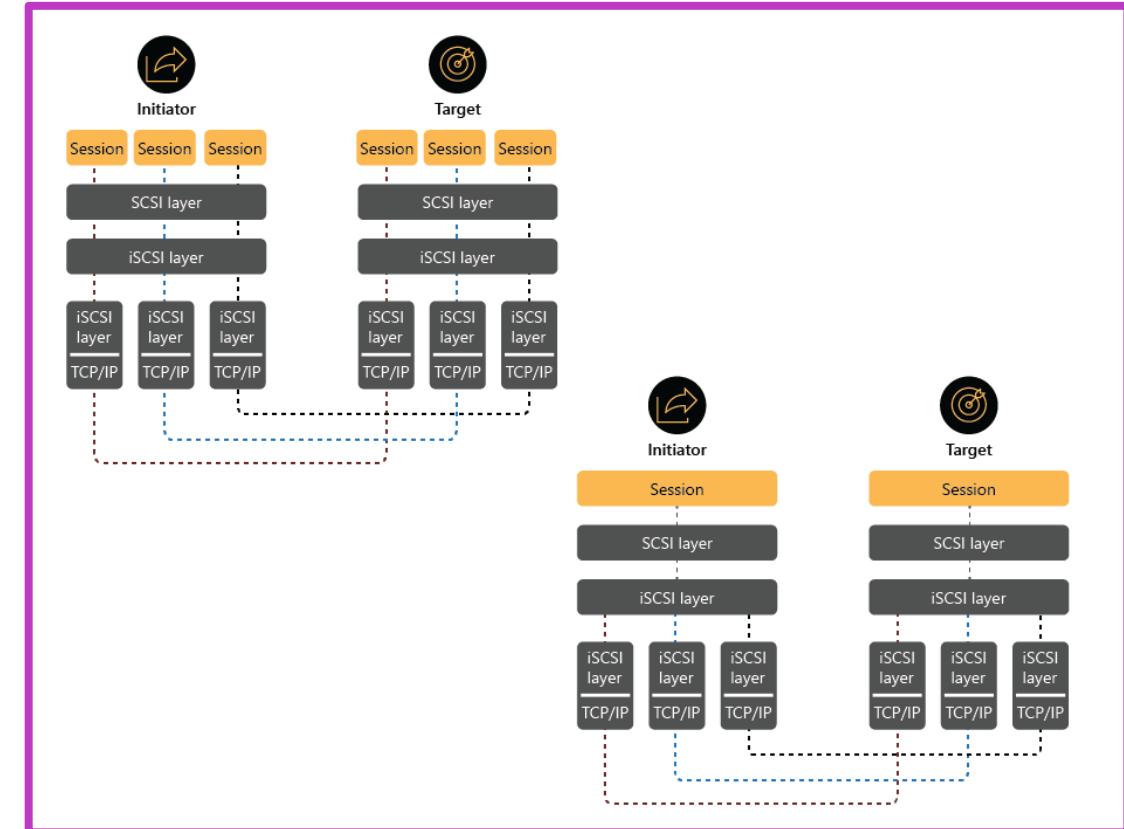
Allow iSCSI-related traffic and create an iSCSI virtual disk and assign it to the iSCSI target.

Connect to the iSCSI Target from the management server and validate the volume mount.

# Configure high availability for iSCSI

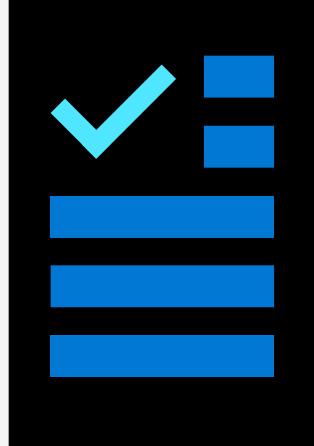
## Network-level redundancy for iSCSI-based storage

- You can implement network-level redundancy for iSCSI storage by using Multiple Connections per Session (MCS) or Multipath Input/Output (MPIO).
- Microsoft MCS enables multiple TCP/IP connections from the initiator to the target for the same iSCSI session.
- Microsoft MPIO allows the initiator to establish multiple sessions to the same target over different network paths and aggregate multiple devices into a single logical device available to the storage stack.
- MPIO uses device-specific module (DSM) to manage interaction with third-party SAN devices.



# Learning recap – Implement Windows Server iSCSI

## Module assessment



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Implement Windows Server iSCSI

# Implement Windows Server Storage Replica

# Learning Objectives – Windows Server Storage Replica

- List the functionalities, and components of Storage Replica
- Examine the prerequisites for implementing Storage Replica
- Implement Storage Replica by using Windows Admin Center
- Demonstration - Implement Storage Replica by using Windows Admin Center
- Implement Storage Replica by using Windows PowerShell
- Demonstration - Implement Storage Replica by using Windows PowerShell
- Learning recap

# Storage Replica – functionalities and components (1/3)

## Storage Replica features

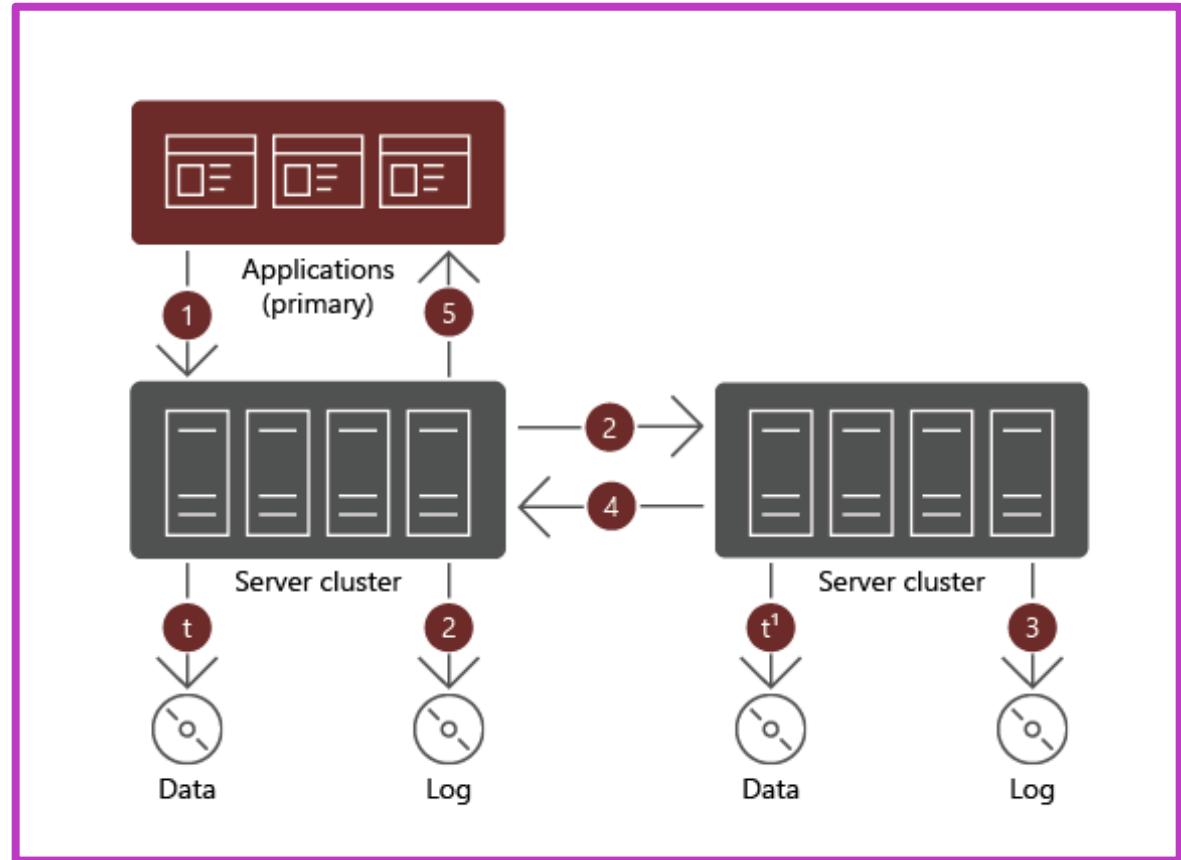
The main features of Storage Replica include:

- 1 Block-level replication
- 2 Simplicity
- 3 Support for physical servers and virtual machines
- 4 Use of Server Message Block (SMB) 3.x
- 5 Security
- 6 High performance initial sync
- 7 Consistency groups
- 8 Delegated administration
- 9 Network constraints
- 10 Thin provisioning

# Storage Replica – functionalities and components (2/3)

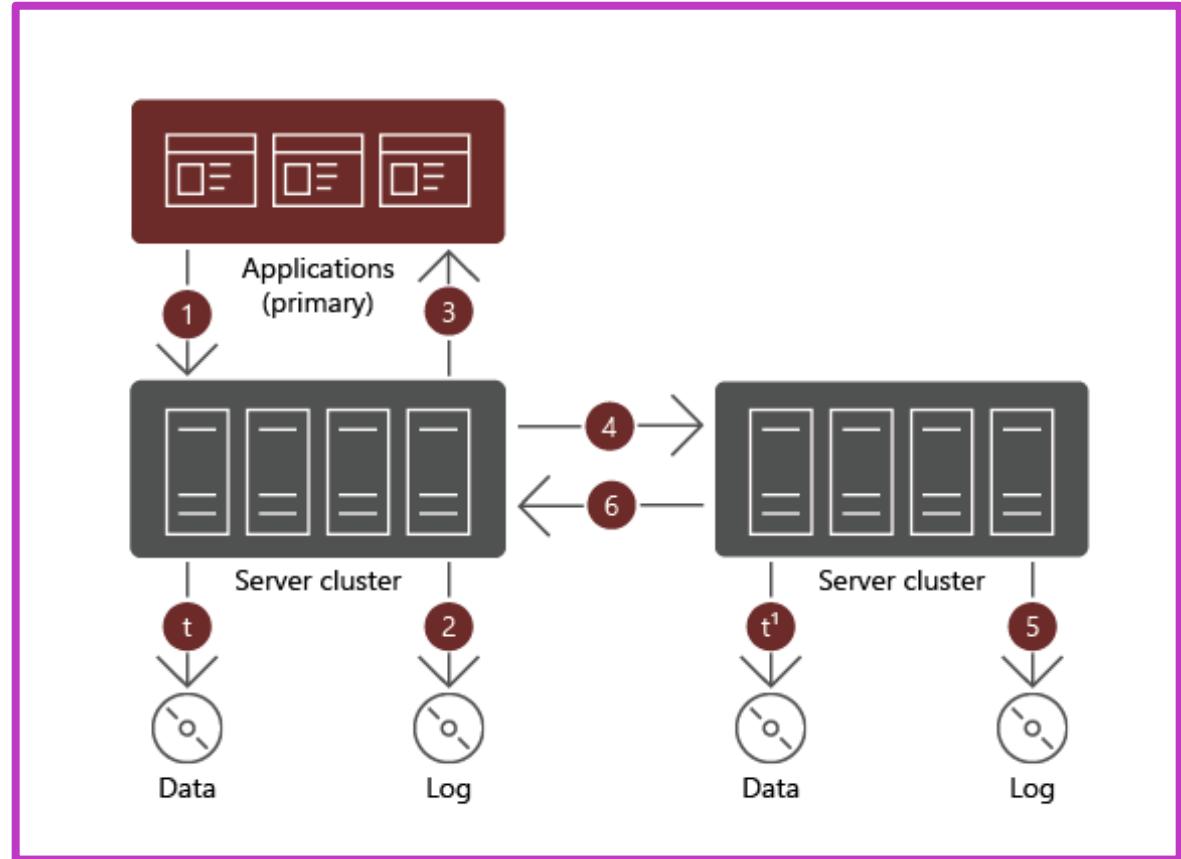
## Synchronous and asynchronous replication

*Synchronous replication* replicates volumes between sites that are relatively close to one another. Replication is crash-consistent, which ensures zero data loss at the file system-level during a failover.



# Storage Replica – functionalities and components (3/3)

*Asynchronous replication* enables replication across longer distances in cases where network round-trip latency exceeds 5 milliseconds (ms), however, it's subject to data loss. The extent of data loss depends on the lag of replication between the source and target volumes.



# Examine the prerequisites for implementing Storage Replica (1/2)

## Prerequisites to use Storage Replica

- Servers hosting replicated volumes must be members of the same or trusted Active Directory Domain Services (AD DS) forest.
- Each server should have at least 2 GB of RAM and two CPU cores.
- Each server should be running Windows Server 2019 Datacenter, Windows Server 2016 Datacenter, or Windows Server 2022 Datacenter edition.
- Each server should have at minimum one Gigabit Ethernet adapter for synchronous replication, although Remote Direct Memory Access (RDMA) is preferable.
- The source and destination server must both have one set of volumes: One volume for data and one volume for logs.
- Bi-directional connectivity via Internet Control Message Protocol (ICMP), SMB (port 445, plus port 5445 for SMB Direct) and Web Services-Management (WS-MAN) (port 5985), between the servers hosting the replicated volumes.
- A network between servers with enough bandwidth to match I/O write workload, and less than 5-ms round-trip latency when implementing synchronous replication.

# Examine the prerequisites for implementing Storage Replica (2/2)

## Data Deduplication

Storage Replica supports Data Deduplication. To implement it, you should:

- 1 Install Data Deduplication on both the source and destination servers.
- 2 Enable Data Deduplication on the data volume on the source server. This automatically replicates the deduplicated content of the primary to the secondary on the destination server.

# Implement Storage Replica by using Windows Admin Center (1/3)

## Validate prerequisites

Before you proceed with the implementation, you should first validate that all Storage Replica prerequisites are in place:

1. Identify the data volume you intend to use for replication and create a corresponding destination volume.  
For each destination volume, create a corresponding log volume on its respective servers.
2. Install the **Storage Replica** feature and the **File Server** role service on the source and destination server.

## Implement Storage Replica by using Windows Admin Center (2/3)

3. Use the `Test-SRTopology` cmdlet to determine whether the source and destination volumes meet Storage Replica's requirements. You can use the cmdlet in requirements-only mode by specifying the `IgnorePerfTests` parameter first. If that's successful, rerun the cmdlet in the performance evaluation mode without the `IgnorePerfTests` parameter, as in the following example:
4. Review the **TestSrTopologyReport.html** report to ensure that your configuration meets Storage Replica's requirements.

```
New-Item -ItemType Directory -Path 'c:\Temp'  
-Force  
  
Test-SRTopology -SourceComputerName S2D001 -  
SourceVolumeName C:\ClusterStorage\Volume1 -  
SourceLogVolumeName  
C:\ClusterStorage\Volume2 -  
DestinationComputerName S2D101 -  
DestinationVolumeName  
C:\ClusterStorage\Volume1 -  
DestinationLogVolumeName  
C:\ClusterStorage\Volume2 -DurationInMinutes  
30 -ResultPath 'c:\Temp'
```

# Implement Storage Replica by using Windows Admin Center (3/3)

## Implement Storage Replica by Using Windows Admin Center

- 1 In the Windows Admin Center, navigate to the source or destination server.
- 2 From the **Storage Replica** panel, use the **Replica with another server** interface to define a new partnership and replication group, and complete or select the following settings:
  - Source server
  - Replication group name
  - Destination server
  - Destination group name
  - Enable synchronous replication
  - Log size
  - Use blocks already seeded on the target to speed up initial synchronization
  - Encrypt replication traffic
  - Enable consistency groups

# Demonstration – Implement Storage Replica by using Windows Admin Center

On each domain member server, initialize the source and destination disks.

Enable CredSSP on the two domain member servers using, Windows PowerShell.

Configure Storage Replica between the two domain member servers, using Windows Admin Center.

Validate the Storage Replica configuration, using Windows Admin Center.

# Implement Storage Replica by using Windows PowerShell (1/5)

Before you proceed with the implementation of Storage Replica, validate that all Storage Replica prerequisites are in place:

1. Use the `Test-SRTopology` cmdlet to determine whether the source and destination volumes meet the Storage Replica requirements.

You can use the cmdlet in requirements-only mode by specifying the `IgnorePerfTests` parameter first, and if that's successful, rerun the cmdlet in the performance evaluation mode without the `IgnorePerfTests` parameter, as in the following example:

```
Test-SRTopology -SourceComputerName 'SEA-SVR1.contoso.com' -SourceVolumeName S: -SourceLogVolumeName L: -DestinationComputerName 'SEA-SVR2.contoso.com' -DestinationVolumeName S: -DestinationLogVolumeName L: -DurationInMinutes 1 -ResultPath C:\Temp } -Authentication Credssp -Credential $cred
```

## Implement Storage Replica by using Windows PowerShell (2/5)

2. Review the results of the test stored in the C:\temp folder on SEA-SVR1 and verify that there are no issues that need to be addressed.
3. Use the New-SRPartnership cmdlet to create a Storage Replica partnership. Specify the source and destination disks, the source and destination logs, the source and destination cluster names, and optionally, the log size, as in the following example:

```
New-SRPartnership -SourceComputerName 'SEA-SVR1' -SourceRGName 'RG01' -  
SourceVolumeName S: -SourceLogVolumeName L:  
-DestinationComputerName 'SEA-SVR2' -  
DestinationRGName 'RG02' -  
DestinationVolumeName S: -  
DestinationLogVolumeName L:
```

## Implement Storage Replica by using Windows PowerShell (3/5)

4. To track the replication progress on the source server, run the following command, and then examine events **5015, 5002, 5004, 1237, 5001**, and **2200**:
5. On the destination server, run the following command to review the Storage Replica events that depict the creation of the partnership. This event states the number of copied bytes and the corresponding time period:

```
Get-WinEvent -ProviderName Microsoft-  
Windows-StorageReplica -max 20
```

```
Get-WinEvent -ProviderName Microsoft-  
Windows-StorageReplica | Where-Object  
{$_.ID -eq "1215"} | Format-List
```

## Implement Storage Replica by using Windows PowerShell (4/5)

6. Alternatively, you can run the following command on the destination server:
7. To track the replication progress on the destination server, run the following command, and then examine events **5009**, **1237**, **5001**, **5015**, **5005**, and **2200**:

There should be no warnings or errors. You should receive a large number of **1237** events, which indicate progress.

```
(Get-SRGroup).Replicas | Select-Object  
    NumOfBytesRemaining
```

```
Get-WinEvent -ProviderName Microsoft-  
Windows-StorageReplica | FL
```

## Implement Storage Replica by using Windows PowerShell (5/5)

- To change direction of replication, run the following command:

```
Set-SRPartnership -NewSourceComputerName -  
SourceRGName 'SEA-SVR2' -  
DestinationComputerName 'SEA-SVR1' -  
DestinationRGName 'RG02'
```

# Demonstration – Implement Storage Replica by using Windows PowerShell

On each domain member server, initialize the source and destination disks.

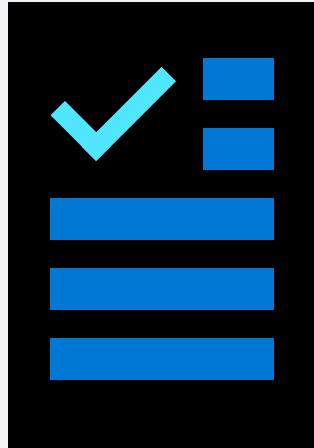
Enable CredSSP on the two domain member servers, using Windows PowerShell.

Configure Storage Replica between the two domain member servers, using Windows PowerShell.

Validate the Storage Replica configuration, using Windows PowerShell.

# Learning recap – Implement Windows Server Storage Replica

## Module assessment



**Microsoft Learn Modules ([docs.microsoft.com/Learn](https://docs.microsoft.com/Learn))**

Implement Windows Server Storage Replica

# Lab 09 – Implementing storage solutions in Windows Server

# Lab 09: Implementing storage solutions in Windows Server



## Lab scenario

At Contoso, Ltd., you need to implement the Storage Spaces feature on the Windows Server 2019 servers to simplify storage access and provide redundancy at the storage level.

Management wants you to test Data Deduplication to save storage. They also want you to implement Internet Small Computer System Interface (iSCSI) storage to provide a simpler solution for deploying storage in the organization. Additionally, the organization is exploring options for making storage highly available and researching the requirements that it must meet for high availability. You want to test the feasibility of using highly available storage, specifically Storage Spaces Direct.

## Objectives

- Implement Data Deduplication
- Configure Internet Small Computer System Interface iSCSI storage
- Configure Storage Spaces
- Implement Storage Spaces Direct

# End of presentation