Implementacija Hyper-V failover klastera

10. PREDAVANJE

Algebra
visoka škola za
primijenjeno računarstvo

Module Overview

- Overview of Integrating Hyper-V with Failover Clustering
- Implementing Hyper-V Virtual Machines on Failover Clusters
- Implementing Hyper-V Virtual Machine Movement

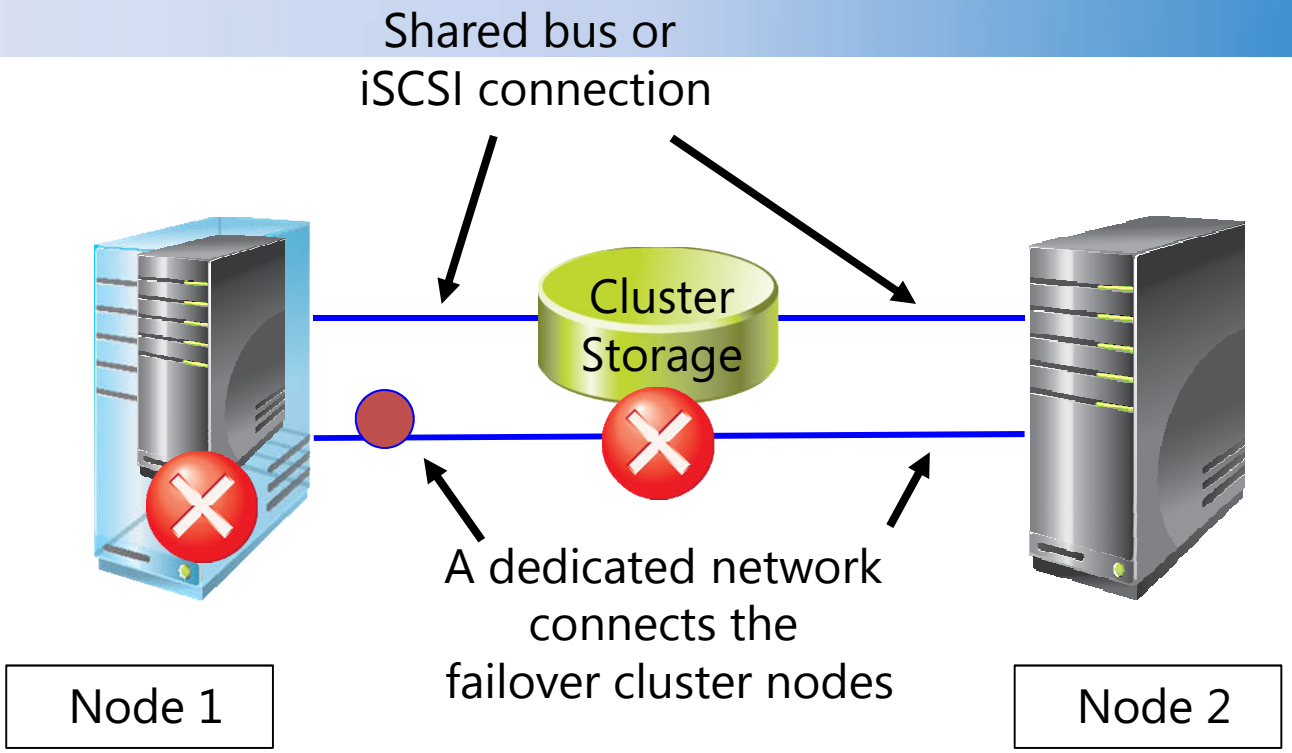
Lesson 1: Overview of Integrating Hyper-V with Failover Clustering

- Options for Making Applications and Services Highly Available
- How Does a Failover Cluster Work with Hyper-V Nodes?
- What's New in Failover Clustering for Hyper-V in Windows Server 2012?
- What's New in Failover Clustering for Hyper-V in Windows Server 2012 R2?
- Best Practices for Implementing High Availability in a Virtual Environment

Options for Making Applications and Services Highly Available

High availability options	Description
Host clustering	• Virtual machines are highly available • Does not require virtual machine operating system or application to be cluster aware
Guest clustering	• Virtual machines are failover cluster nodes • Virtual machine applications must be cluster aware • Requires iSCSI or virtual Fibre Channel interface for shared storage connections
NLB	• Virtual machines are NLB cluster nodes • Use for web-based applications

How Does a Failover Cluster Work with Hyper-V Nodes?



What's New in Failover Clustering for Hyper-V in Windows Server 2012?

The Failover Clustering improvements for Hyper-V in Windows Server 2012 include:

- Support for up to 8,000 virtual machines per cluster
- Multi-select virtual machines for Live Migration
- Virtual machine priority attribute
- CSV improvements
- Virtual machine application monitoring
- Storage of virtual machines on highly available SMB file share

What's New in Failover Clustering for Hyper-V in Windows Server 2012 R2?

- Windows Server 2012 R2 provides new features for virtual machine clustering, which include:
  - Shared virtual hard disk
  - Virtual machine drain on shutdown
  - Network health detection

Best Practices for Implementing High Availability in a Virtual Environment

- Use Windows Server 2012 R2 as the Hyper-V host
- Plan for failover scenarios
- Plan the network design for failover clustering
- Plan the shared storage for failover clustering
- Use the recommended failover cluster quorum mode
- Deploy standardized Hyper-V hosts
- Develop standard management practices

Lesson 2: Implementing Hyper-V Virtual Machines on Failover Clusters

- Components of Hyper-V Clusters
- Implementing Failover Clustering for Hyper-V Virtual Machines
- Configuring CSV
- Configuring a Shared Virtual Hard Disk
- Using Scale-Out File Servers Over SMB 3 for Virtual Machines
- Considerations for Implementing Hyper-V Clusters
- Demonstration: Implementing Virtual Machines on Clusters (optional)
- Maintaining and Monitoring Virtual Machines in

Components of Hyper-V Clusters

Hyper-V cluster components:

- Cluster nodes, must be physical computers
- Cluster networks
- Virtual networks
- Storage for virtual machines
- Virtual machines

Implementing Failover Clustering for Hyper-V Virtual Machines

1. Install and configure Windows Server 2012
2. Configure shared storage
3. Install the Hyper-V and failover clustering features
4. Validate the cluster configuration
5. Create the cluster
6. Create a virtual machine on one of the cluster nodes
7. Make the virtual machine highly available, for existing virtual machine
8. Test virtual machine failover

Configuring CSV

CSV benefits:

- Fewer LUNs required
- Better use of disk space
- Virtual machine files are in a single logical location
- No special hardware required
- Increased resiliency

To implement CSV:

1. Create and format volumes on shared storage
2. Add the disks to failover cluster storage
3. Add the storage to the CSV

Configuring a Shared Virtual Hard Disk

- A failover cluster runs inside virtual machines
- A shared virtual disk is used as shared storage if:
  - Virtual machines do not need access to iSCSI or failover clustering SAN
  - Presented as a virtual serial attached SCSI disk
  - Used only for data
- Requirements for a shared virtual disk:
  - Virtual hard disk must be in VHDX format
  - Connected by using virtual SCSI adapter
  - Stored on a Scale-Out File Server or CSV
- Supported operating system in a virtual machine:
  - Windows Server 2012 or Windows Server 2012 R2

Shared Virtual Disk vs. Other Shared Storage Technologies

Comparing guest clustering options

Capability	Shared VHDX	Virtual Fibre Channel	iSCSI
Supported storage	Storage Spaces, serial attached SCSI, Fibre Channel, iSCSI, SMB	Fibre Channel SAN	iSCSI SAN
How storage is exposed in the virtual machine	Virtual serial attached SCSI	Virtual Fibre Channel LUN	iSCSI LUN
Flows through the Hyper-V virtual switch	No	No	Yes
Storage configured at the Hyper-V host	Yes	Yes	No
Provides low latency and low CPU use	Yes (RDMA or Fibre Channel)	Yes (Fibre Channel)	No
Requires specific hardware	No	Yes	No
Exposes storage architecture	No	Yes	Yes

Using Scale-Out File Servers Over SMB 3 for Virtual Machines

- In Windows Server 2012 or newer, you can store virtual machine files on an SMB 3.0 file share
- File servers should run Windows Server 2012 R2
- File server cluster should run in Scale-Out File Server mode
- Hyper-V Manager can be used to create or move virtual machine files to an SMB file share

Considerations for Implementing Hyper-V Clusters

1. Identify the applications that require high availability
2. Identify the application components that must be highly available
3. Identify the application characteristics
4. Identify the total capacity requirements
5. To create the Windows Server 2012 Hyper-V design:
   - Verify basic requirements
   - Configure a dedicated network adapter for the private virtual network
   - Use similar host hardware
   - Verify network configuration

Maintaining and Monitoring Virtual Machines in Clusters

- In Windows Server 2012 failover clustering, you can implement the following technologies for virtual machine maintenance and monitoring:
  - Service and virtual machine health monitoring
  - Network health detection, for Windows Server 2012 R2 only
  - Virtual machine drain on shutdown, for Windows Server 2012 R2 only

Lesson 3: Implementing Hyper-V Virtual Machine Movement

- Virtual Machine Migration Options
- How Does Virtual Machine and Storage Migration Work?
- Using ODX Capable Storage for Virtual Machines
- How Does Live Migration Work?
- How Does Hyper-V Replica Work?
- New Features of Hyper-V Replica in Windows Server 2012 R2
- Demonstration: Implementing Hyper-V Replica (optional)

Virtual Machine Migration Options

Available options for moving virtual machines are:

- Virtual Machine and Storage Migration
- Quick Migration
- Live Migration
- Hyper-V Replica
- Export or import of a virtual machine

How Does Virtual Machine and Storage Migration Work?

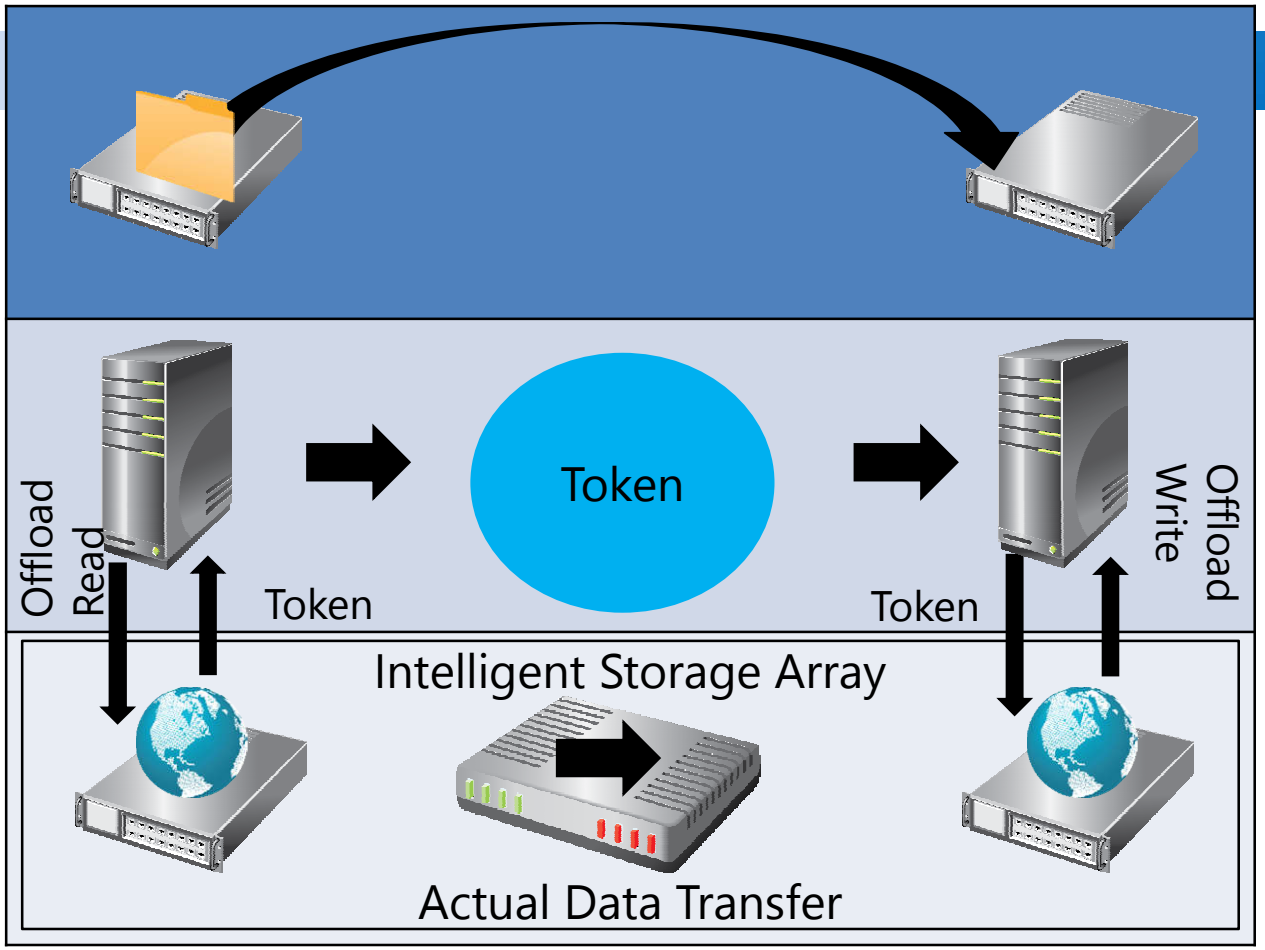
Virtual Machine and Storage Migration technology enables you to move a virtual machine and its storage to another location without downtime

- During migration, the virtual machine hard disk is copied from one location to another
- Changes are written to both the source and destination drive
- You can move virtual machine storage to the same host, another host, or an SMB share
- Storage and virtual machine configuration can be in different locations

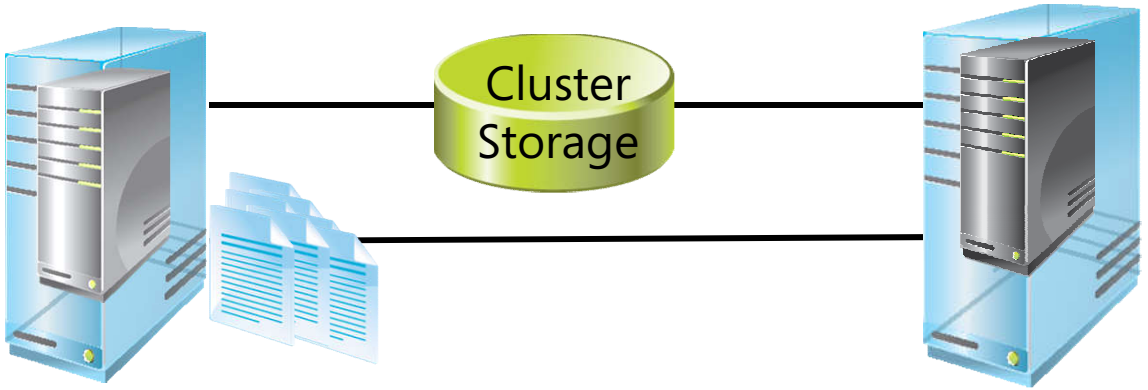
Using ODX Capable Storage for Virtual Machines

When using ODX-capable storage you achieve following benefits:

- Increase data transfer
- Minimize latency
- Minimize host's resource usage while copying and migrating data



How Live Migration Works?



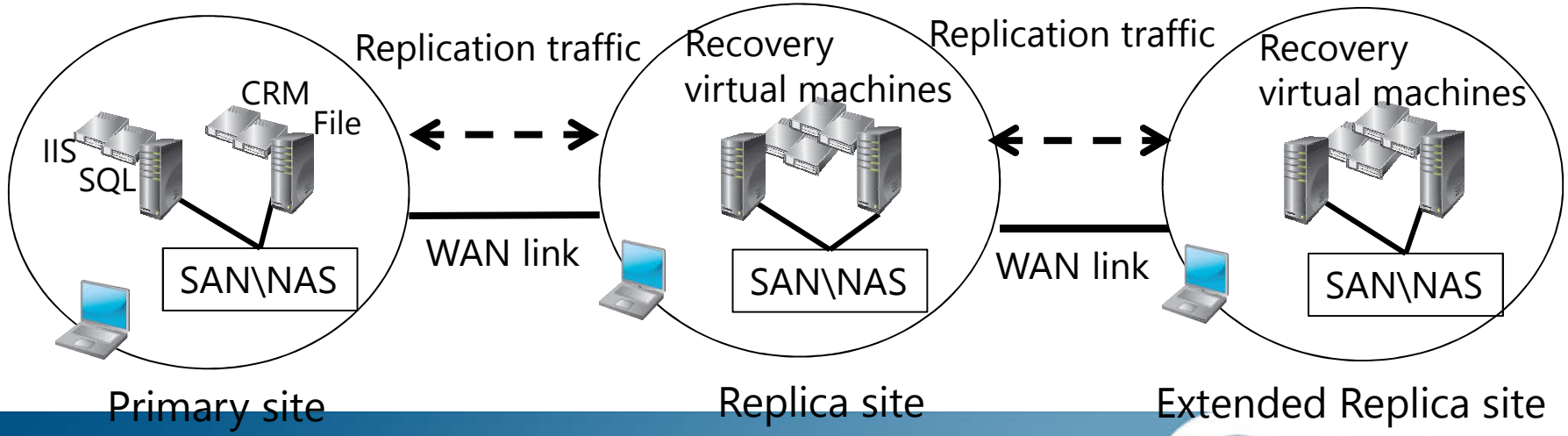
Node 1

Node 2

Hyper-V Replica in Windows Server 2012 enables you to replicate a single virtual machine over a WAN or LAN network to another host

Hyper-V Replica components include:

- Replication engine
- Change tracking
- Network module
- Hyper-V Replica Broker role



How to Configure Hyper-V Replica?

To configure Hyper-V Replica, you should:

1. Configure authentication options
2. Configure ports
3. Select replica servers
4. Select location for replica files
5. Enable replication on virtual machine

New Features of Hyper-V Replica in Windows Server 2012 R2

Hyper-V Replica in Windows Server 2012 R2 is enhanced with the following features:

- The ability to change the replication frequency:
  - The available intervals are 30 seconds, 5 minutes, and 15 minutes
- Extended replication:
  - You can extend Hyper-V Replica to include a third host