Microsoft® Official Course

Module 9

Implementing Network Load Balancing

Microsoft®

Module Overview

- Overview of NLB
- Configuring an NLB Cluster
- Planning an NLB Implementation

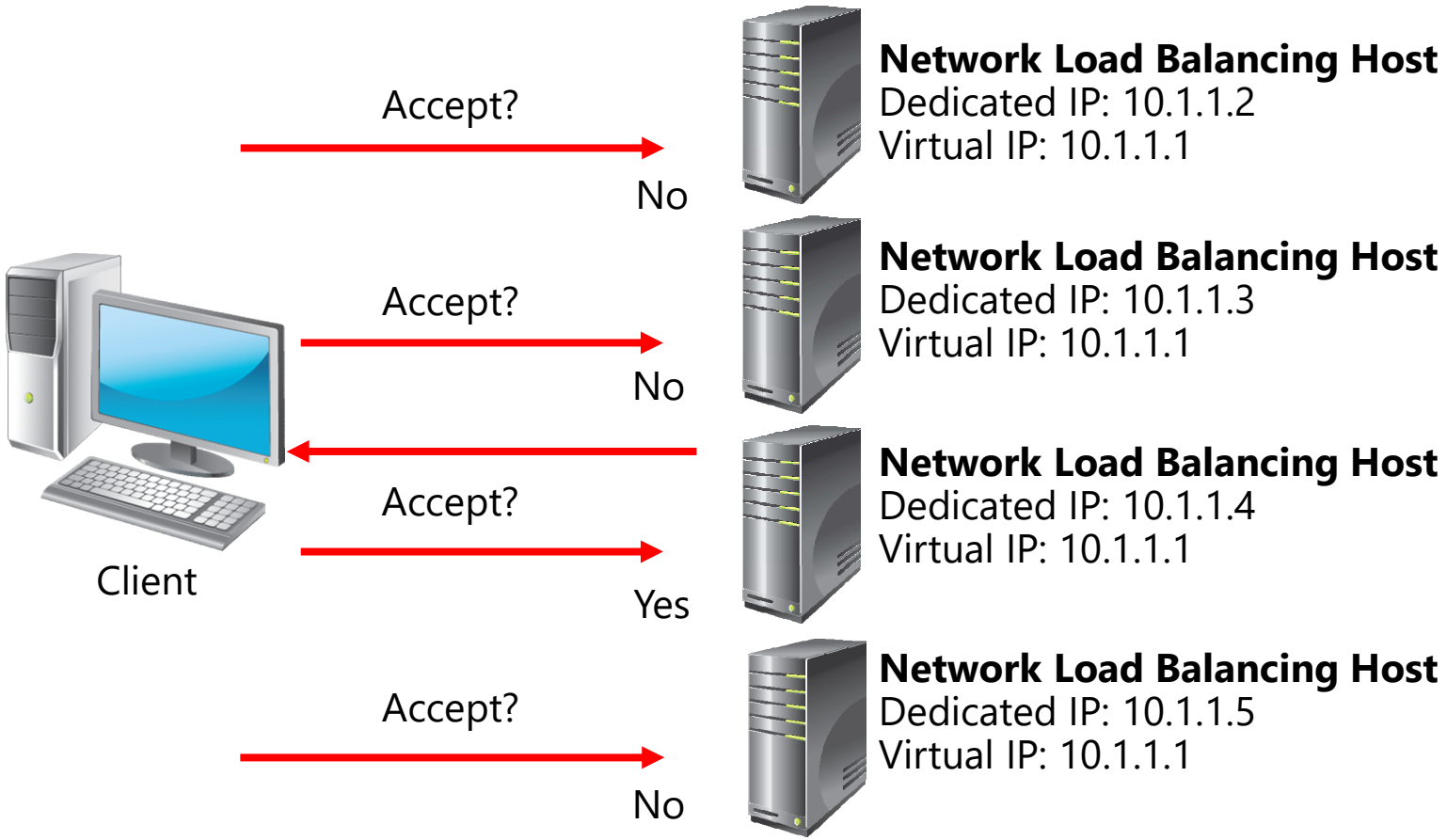
Lesson 1: Overview of NLB

- What Is NLB?
- How NLB Works
- How NLB Works with Server Failures and Recovery
- NLB Features in Windows Server 2012 and Windows Server 2012 R2

What Is NLB?

- Scalable high-availability technology
- Balances traffic based on node utilization
  - New traffic will be directed to the node that is being utilized the least
  - You can configure NLB to preference some nodes over others
- Used with stateless applications such as:
  - Web tiers of multi-tier applications
- Not used with stateful applications such as:
  - Traditional file servers
  - Database servers

How NLB Works



How NLB Works with Server Failures and Recovery

NLB cluster heartbeats are transmitted every second between nodes in a cluster

Convergence occurs when:

- A node misses five consecutive heartbeats, at which time it is automatically removed from an NLB cluster
- A node that was member of a cluster returns to functionality
- An administrator adds or removes a node manually

NLB Features in Windows Server 2012 and Windows Server 2012 R2

Use 35 new NLB Windows PowerShell cmdlets to manage all aspects of NLB configuration

- Use NlbCluster noun to manage the cluster
- Use NlbClusterNode noun to manage individual nodes

Lesson 2: Configuring an NLB Cluster

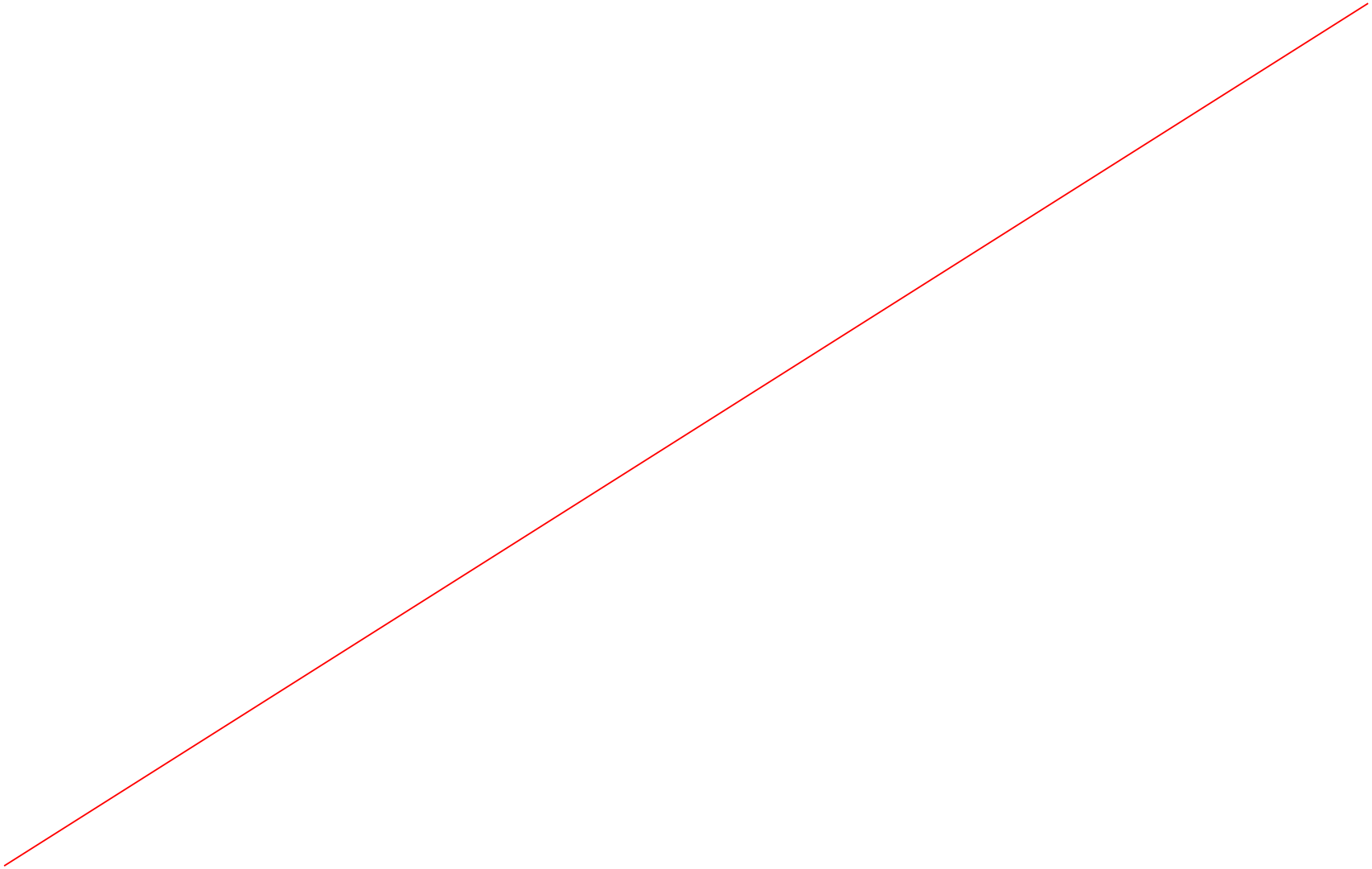
- Deployment Requirements for NLB
- Demonstration: Deploying NLB
- Configuration Options for NLB
- Demonstration: Configuring NLB Affinity and Port Rules
- Network Considerations for NLB

Deployment Requirements for NLB

- All hosts must be on the same subnet
- All adapters must be configured as either unicast or multicast
- Only TCP/IP protocol can be used on adapters
- All adapters used with NLB must be configured with static IP address

Demonstration: Deploying NLB

In this demonstration, you will see how to create a Windows Server 2012 R2 NLB cluster



Configuration Options for NLB

Port rules determine how traffic is directed to cluster nodes depending on TCP or UDP port

- Multiple hosts
- Single host
- Disable port range

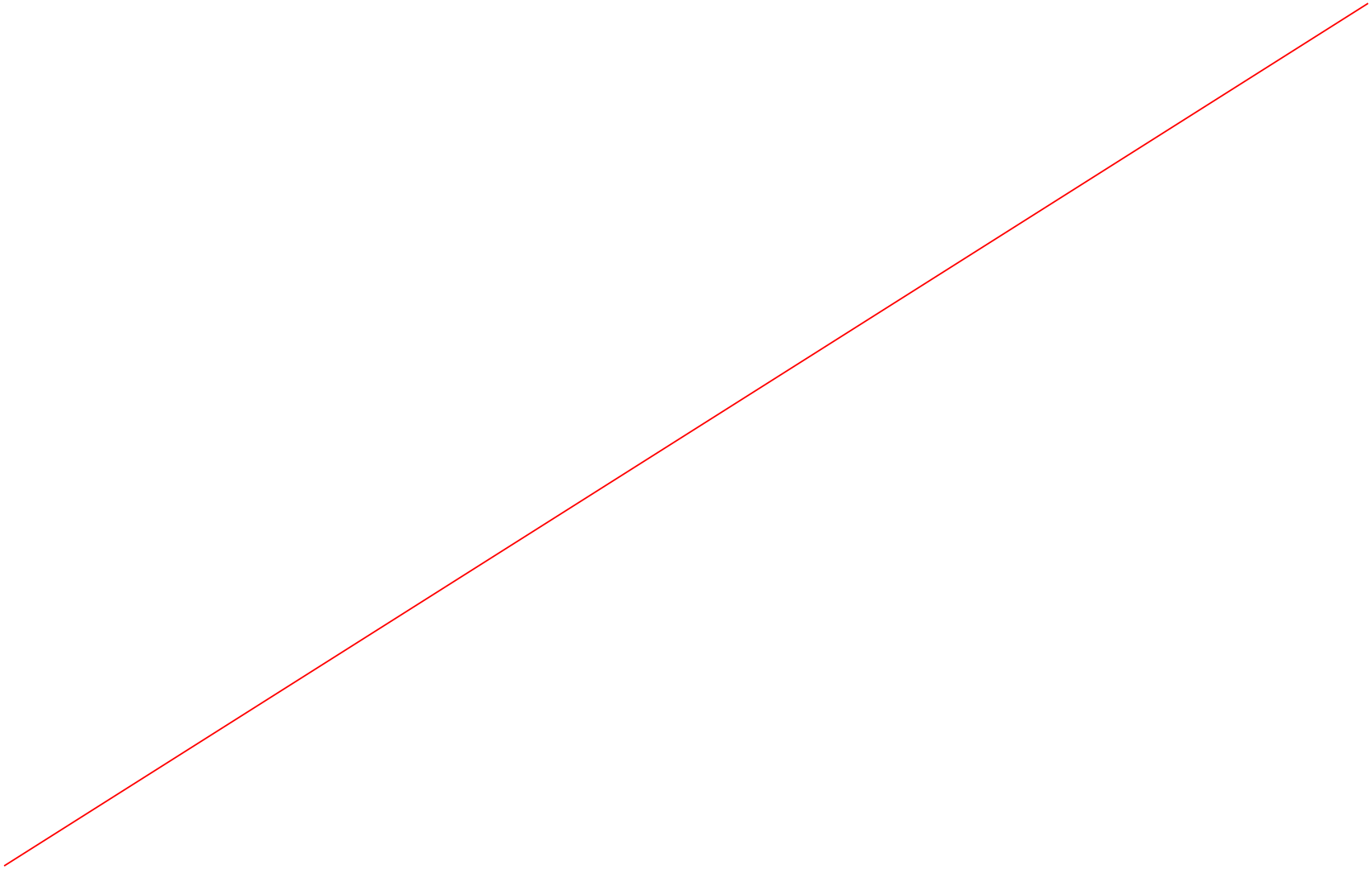
Affinity settings determine how reconnection occurs

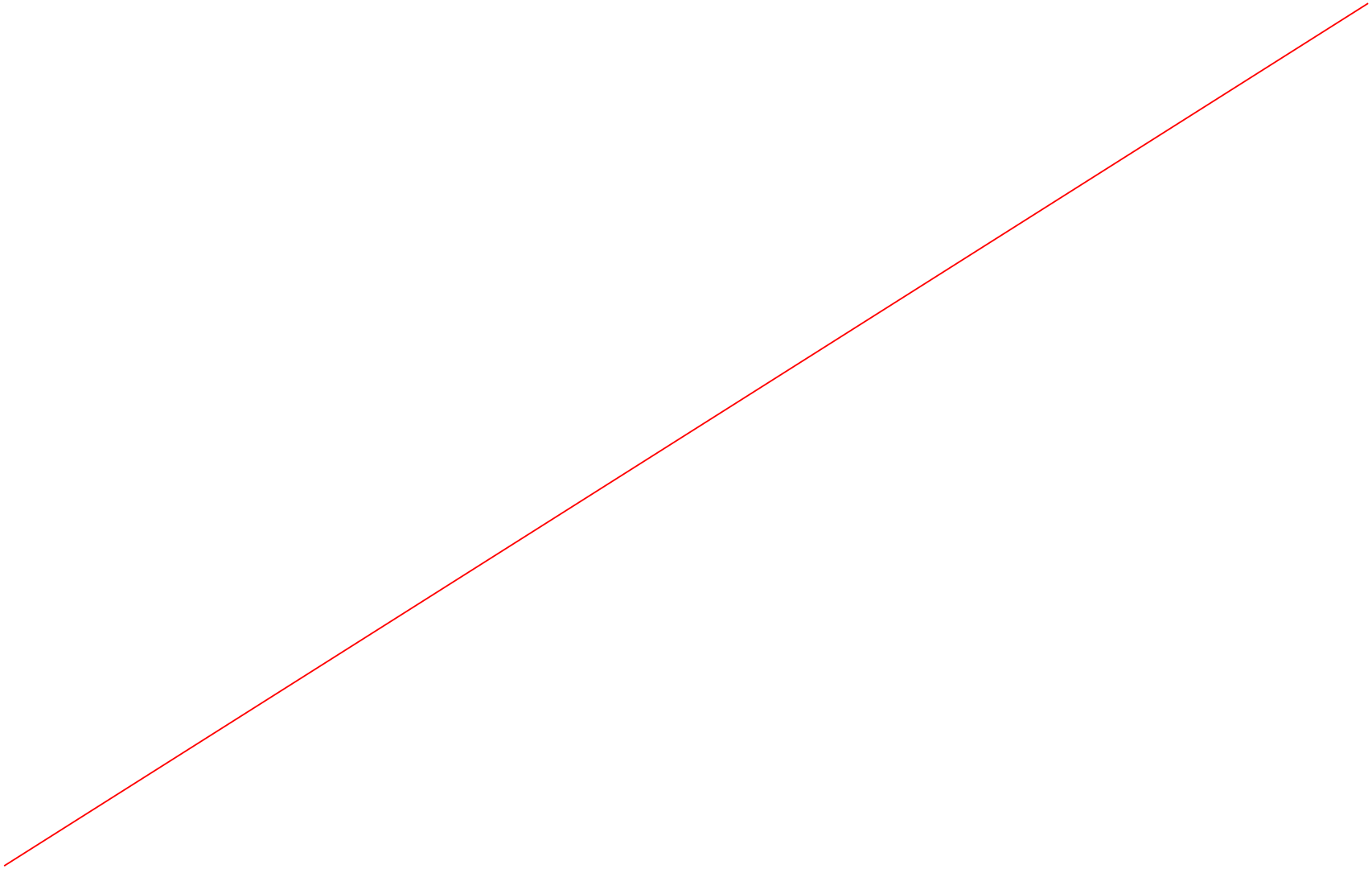
- None
- Single
- Class C

Demonstration: Configuring NLB Affinity and Port Rules

In this demonstration, you will see how to:

- Configure affinity for NLB cluster nodes
- Configure NLB port rules





Network Considerations for NLB

Unicast mode

- Suitable for clusters that have multiple network adapters

Multicast mode

- Suitable for NLB clusters that have single network adapters
- Network devices must support multicast MAC addresses

IGMP multicast

- Improves switch performance
- Requires a network switch that supports this functionality

Lesson 3: Planning an NLB Implementation

- Designing Applications and Storage Support for NLB
- Considerations for Deploying an NLB Cluster on Virtual Machines
- Considerations for Securing NLB
- Considerations for Scaling NLB
- Considerations for Upgrading NLB Clusters

Designing Applications and Storage Support for NLB

- Each node in an NLB cluster needs to have the same configuration
- Each node needs access to the same consistent application data
- Use IIS shared configuration to ensure that web application configuration is consistent across NLB nodes
- Use CSVs to host shared application and configuration data for NLB applications

Considerations for Deploying an NLB Cluster on Virtual Machines

- Configure virtual machines with multiple network adapters
- Configure one network adapter on each node member to use a shared private network switch
- Configure the NLB cluster to use unicast mode and enable MAC address spoofing on Hyper-V host
- Use the shared private network switch for cluster communication
- When NLB nodes span multiple sites, use network virtualization to separate the cluster network

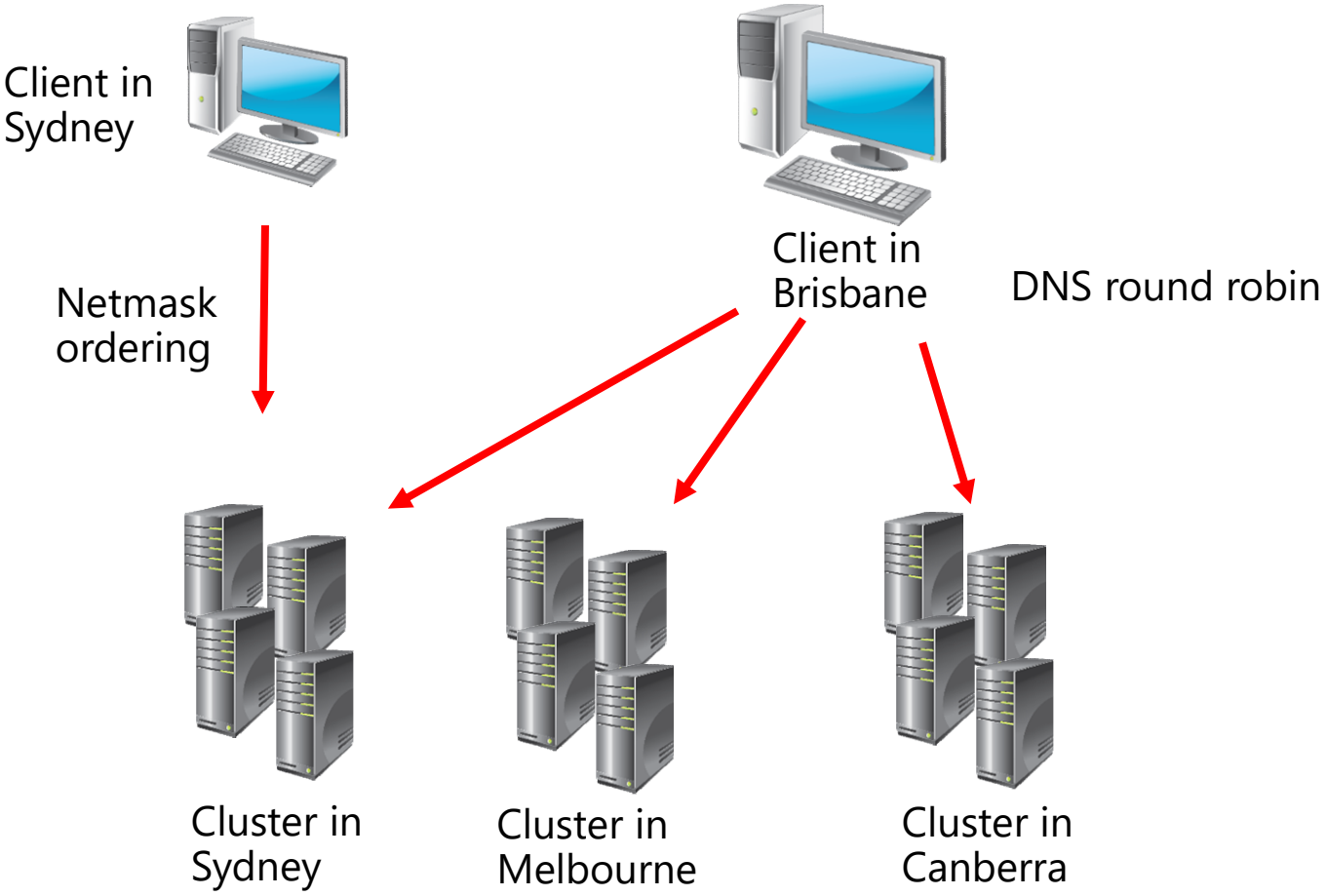
Considerations for Securing NLB

- Use NLB cluster port rules to discard traffic not related to cluster applications
- Use firewall rules on cluster nodes to drop traffic not related to cluster applications or node management
- Configure applications to respond only to traffic that is addressed to the cluster
- Use SANs to create certificates that support the application name and node names
- Implement principle of least privilege to ensure that only authorized users have appropriate permissions on nodes

Considerations for Scaling NLB

NLB clusters can have up to 32 nodes

Use DNS round robin to distribute traffic between NLB clusters



Considerations for Upgrading NLB Clusters

NLB clusters can run with different operating systems

- Windows Server 2012 R2 NLB clusters can interoperate with:
  - Windows Server 2003 & Windows Server 2003 R2
  - Windows Server 2008 & Windows Server 2008 R2
  - Windows Server 2012
- Piecemeal upgrade:
  - Add Windows Server 2012 R2 cluster nodes
  - Remove nodes running earlier operating systems
- Upgrade clusters:
  1. Remove node from NLB cluster
  2. Upgrade to Windows Server 2012 R2
  3. Rejoin node to NLB cluster

Lab: Implementing NLB

- Exercise 1: Implementing an NLB Cluster
- Exercise 2: Configuring and Managing the NLB Cluster
- Exercise 3: Validating High Availability for the NLB Cluster

Logon Information

Virtual machines:	20412D-LON-DC1 20412D-LON-SVR1 20412D-LON-SVR2
User name:	**Adatum\Administrator**
Password:	**Pa$$w0rd**

Estimated Time: 45 minutes

Lab Scenario

A. Datum Corporation is an engineering and manufacturing company. The organization is based in London, England, and is quickly expanding into Australia. As the company expands, the need for scalable web applications has increased. To address this need, you will develop a pilot program to test the deployment of NLB on hosts running the Windows Server 2012 operating system.

Because you intend to automate the process of deploying Windows NLB clusters, you will use Windows PowerShell to perform many of the cluster setup and configuration tasks. You also will configure port rules and affinity, which will allow you to deploy multiple load balanced web applications on the same Windows NLB clusters.

Lab Review

- How many additional nodes can you add to the LON-NLB cluster?
- What steps would you take to ensure that LON-SVR1 always manages requests for web traffic on port 5678, given the port rules established by the end of this exercise?
- What is the difference between a Stop and a Drainstop command?

Module Review and Takeaways

- Review Questions
- Real-world Issues and Scenarios