

Project Title: High Availability with Load Balancing DNS, DHCP, and NLB

Microsoft Certified Solutions Associate

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1. Objective

The objective of this project is to provide:

- *Resilient name resolution*
- *Continuous IP addressing*
- *Load-balanced application access across servers*

using DNS, DHCP Failover, and Network Load Balancing (NLB).

2. Why High Availability Matters ?

- *Ensures business continuity with minimal downtime*
- *Provides fault tolerance for DNS and DHCP services*
- *Balances load for applications to improve performance and scalability*
- *Enables seamless client access during server maintenance or failure*

3. Technologies Used

- *Active Directory–Integrated DNS*
- *DHCP Failover (Load Balance / Hot Standby)*
- *Network Load Balancing (NLB)*
- *Windows Server 2019/2022*
- *Group Policy Management for related configurations*



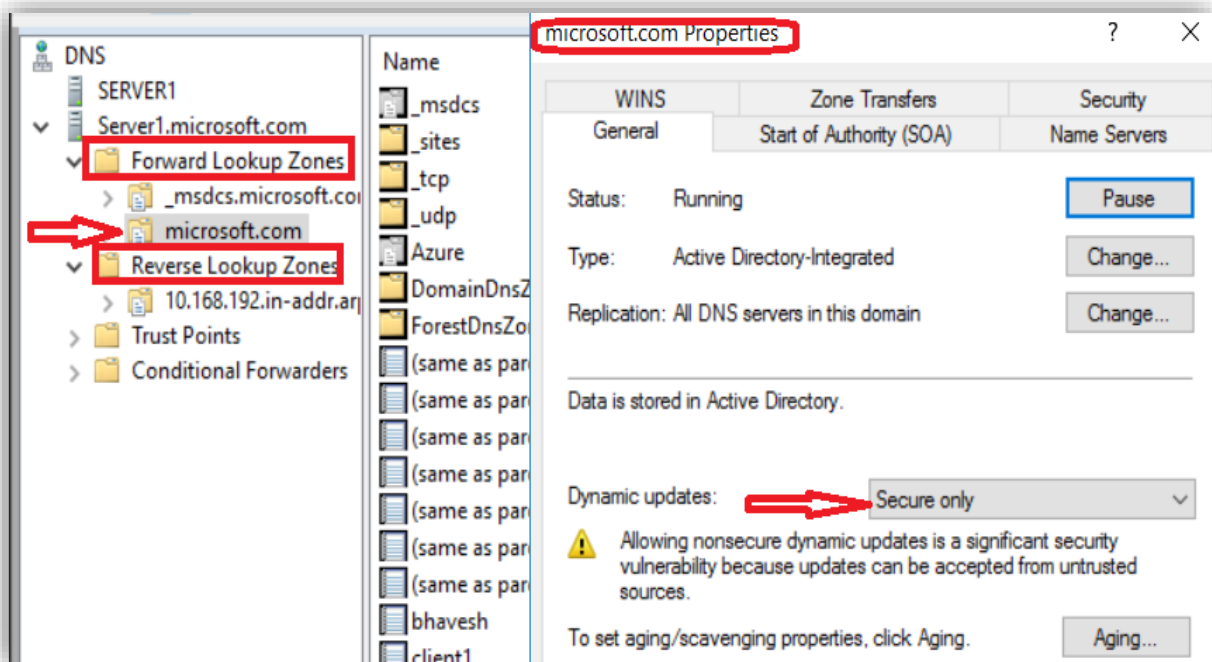
4. Lab Environment Setup

- **Server 1 (DC): Domain Controller with AD DS, DNS, DHCP**
- **Server 2 (Member Server): DHCP Failover partner and NLB host**
- **Client (Workstation): Domain-joined PC to test DNS resolution, DHCP lease continuity, and NLB application access**

Step-by-Step Implementation

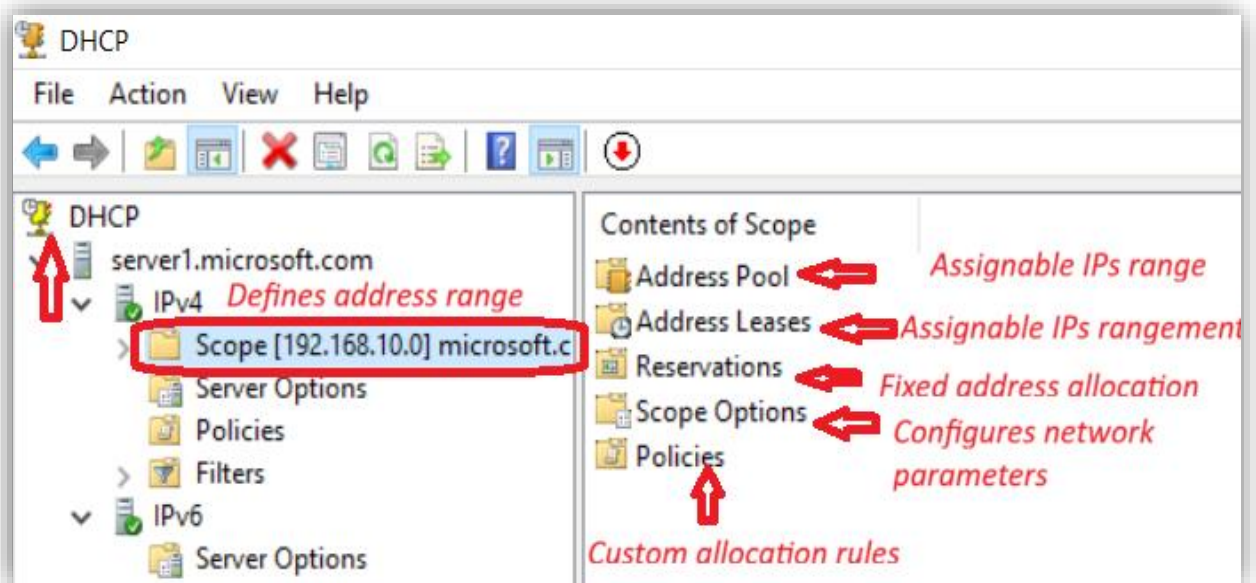
Step 1: Configure AD-Integrated DNS

1. On Server 1, open DNS Manager
2. Right-click Forward Lookup Zones → New Zone (if not already present)
3. Select Primary Zone and choose “Store the zone in Active Directory”
4. Set Replication Scope to *Domain* or *Forest* as required
5. Under Zone Properties, configure Dynamic updates = Secure only



Step 2: Configure DHCP Failover

1. On Server 1, open DHCP Manager
2. Right-click a Scope → Configure Failover
3. Add Server 2 as the Partner Server
4. Choose mode: Load Balance or Hot Standby
5. Set Relationship Parameters and finish the wizard
6. Confirm the Failover Partnership in DHCP Manager



Step 3: Configure Network Load Balancing (NLB)

1. On Server 2, open Server Manager → Add Roles and Features → Install “Network Load Balancing”
2. Open NLB Manager (nlbmgr)
3. Create a New Cluster → Add Host(s)
4. Assign a Virtual IP Address for the cluster
5. Choose Operation Mode: Unicast or Multicast (based on network guidance)
6. Create Port Rules (e.g., TCP 80 for HTTP, TCP 443 for HTTPS)
7. Verify Cluster Status shows hosts converged and running



Network Load Balancing Manager

SERVER1(Ethernet0) Properties

Host Parameters Cluster IP Addresses Cluster Parameters Port Rules

Priority (unique host identifier): 1

Dedicated IP addresses

IP address	Subnet mask
192.168.10.1	255.255.255.0

SERVER 1 IP

Add... Edit... Remove

Host Parameters:
Identify each server uniquely in the cluster.

Network Load Balancing Manager

SERVER1(Ethernet0) Properties

Host Parameters Cluster IP Addresses Cluster Parameters Port Rules

The cluster IP addresses are shared by every member of the cluster for load balancing. The first IP address listed is considered the primary cluster IP address and heartbeats.

Cluster IP addresses:

IP address	Subnet mask
192.168.10.111	255.255.255.0

Cluster IP: Single IP address shared by all servers for client access.

Network Load Balancing Manager

SERVER1(Ethernet0) Properties

Host Parameters Cluster IP Addresses Cluster Parameters Port Rules

Cluster IP configuration

IP address: 192.168.10.111

Subnet mask: 255.255.255.0

Full Internet name: bhavesh

Network address: 03-bf-c0-a8-0a-6f

Cluster operation mode

☐ Unicast

☒ Multicast

☐ IGMP multicast

Cluster Parameters:
Settings that apply to the whole NLB cluster for uniform behavior.

Network Load Balancing Manager

SERVER1(Ethernet0) Properties

Host Parameters Cluster IP Addresses Cluster Parameters Port Rules

Defined port rules:

Cluster IP address	Start	End	Prot...	Mode	Priority	Load	Affinity
All	0	65535	Both	Multiple	--	Equal	Single

Add... Edit... Remove

Port Rules: Define how incoming traffic is divided and managed across servers.



6. Validation Checks

- **DNS:** Resolve records from multiple clients and confirm replication across DCs
 - **DHCP:** Renew client leases and verify continuity when one DHCP server is offline
 - **NLB:** Access the application using the Cluster's Virtual IP/DNS and confirm availability during host maintenance
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7. Troubleshooting Tips

- **DNS:** Confirm Domain Controller health and AD replication status
 - **DHCP:** Remember scope changes may require manual replication across failover partners
 - **NLB:** Verify operation mode (Unicast/Multicast) matches network infrastructure configuration
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Conclusion

This project successfully implemented high availability across DNS, DHCP, and NLB applications.

With AD-integrated DNS, DHCP failover, and Network Load Balancing, the environment achieved:

- Resilience against failures
- Fault tolerance for critical services
- Improved performance and scalability

Clients can now seamlessly access resources even during planned maintenance or server failures, ensuring reliability in a real-time enterprise setup.

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