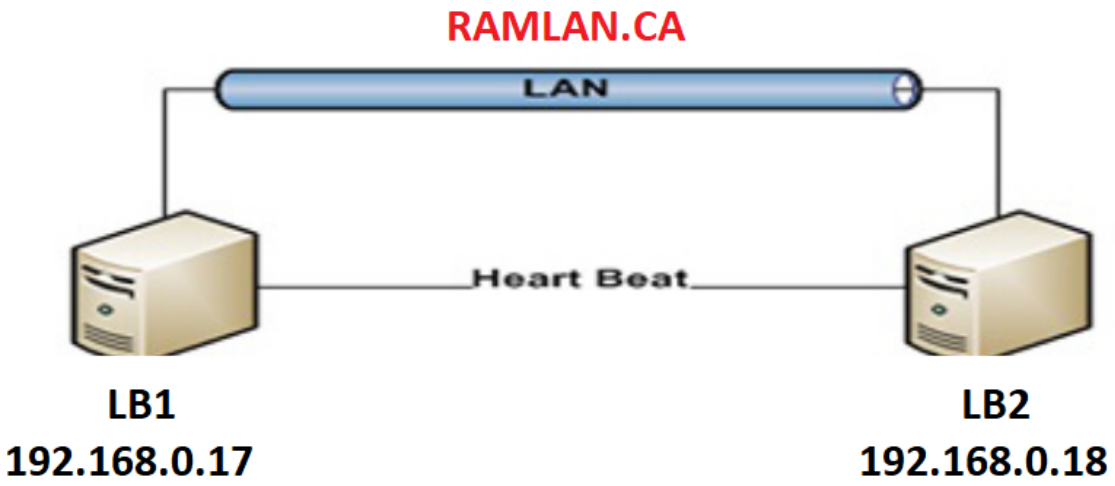
# How to setup Windows Load Balancer on Server 2019

In this post, I will show you the steps for setting up Server 2019 load balancer. My lab setup will be as follows:




Load balancing is defined as the methodical and efficient distribution of network or application traffic across multiple servers in a server farm. Each load balancer sits between client devices and backend servers, receiving and then distributing incoming requests to any available server capable of fulfilling them.

**What are load balancers and how do they work?**

A load balancer may be:

- A physical device, a virtualized instance running on specialized hardware or a software process.
- Incorporated into application delivery controllers (ADCs) designed to more broadly improve the performance and security of three-tier web and microservices-based applications, regardless of where they're hosted.
- Able to leverage many possible load balancing algorithms, including round robin, server response time and the least connection method to distribute traffic in line with current requirements.

Regardless of whether it's hardware or software, or what algorithm(s) it uses, a load balancer disburses traffic to different web servers in the resource pool to ensure that no single server becomes overworked and subsequently unreliable. Load balancers effectively minimize server response time and maximize throughput.

Indeed, the role of a load balancer is sometimes likened to that of a traffic cop, as it is meant to systematically route requests to the right locations at any given moment, thereby preventing costly bottlenecks and unforeseen incidents. Load balancers should ultimately deliver the performance and security necessary for sustaining complex IT environments, as well as the intricate workflows occurring within them.

Load balancing is the most scalable methodology for handling the multitude of requests from modern multi-application, multi-device workflows. In tandem with platforms that enable seamless access to the numerous different applications, files and desktops within today's digital workspaces, load balancing supports a more consistent and dependable end-user experience for employees.

# Hardware-vs software-based load balancers

Hardware-based load balancers work as follows:

- They are typically high-performance appliances, capable of securely processing multiple gigabits of traffic from various types of applications.
- These appliances may also contain built-in virtualization capabilities, which consolidate numerous virtual load balancer instances on the same hardware.
- That allows for more flexible multi-tenant architectures and full isolation of tenants, among other benefits.

In contrast, software-based load balancers:

- Can fully replace load balancing hardware while delivering analogous functionality and superior flexibility.
- May run on common hypervisors, in containers or as Linux processes with minimal overhead on bare-metal servers and are highly configurable depending on the use cases and technical requirements in question.
- Can save space and reduce hardware expenditures.

# What are some of the common load balancing algorithms?

A load balancer, or the ADC that includes it, will follow an algorithm to determine how requests are distributed across the server farm. There are plenty of options in this regard, ranging from the very simple to the very complex.

## Round Robin

Round robin is a simple technique for making sure that a virtual server forwards each client request to a different server based on a rotating list. It is easy for load balancers to implement, but does don't take into account the load already on a server. There is a danger that a server may receive a lot of processor-intensive requests and become overloaded.

## Least Connection Method

Whereas round robin does not account for the current load on a server (only its place in the rotation), the least connection method does make this evaluation and, as a result, it usually delivers superior performance. Virtual servers following the least connection method will seek to send requests to the server with the least number of active connections.

## Least Response Time Method

More sophisticated than the least connection method, the least response time method relies on the time taken by a server to respond to a health monitoring request. The speed of the response is an indicator of how loaded the server is and the overall expected user experience. Some load balancers will take into account the number of active connections on each server as well.

## Least Bandwidth Method

A relatively simple algorithm, the least bandwidth method looks for the server currently serving the least amount of traffic as measured in megabits per second (Mbps).
Least Packets Method

The least packets method selects the service that has received the fewest packets in a given time period.

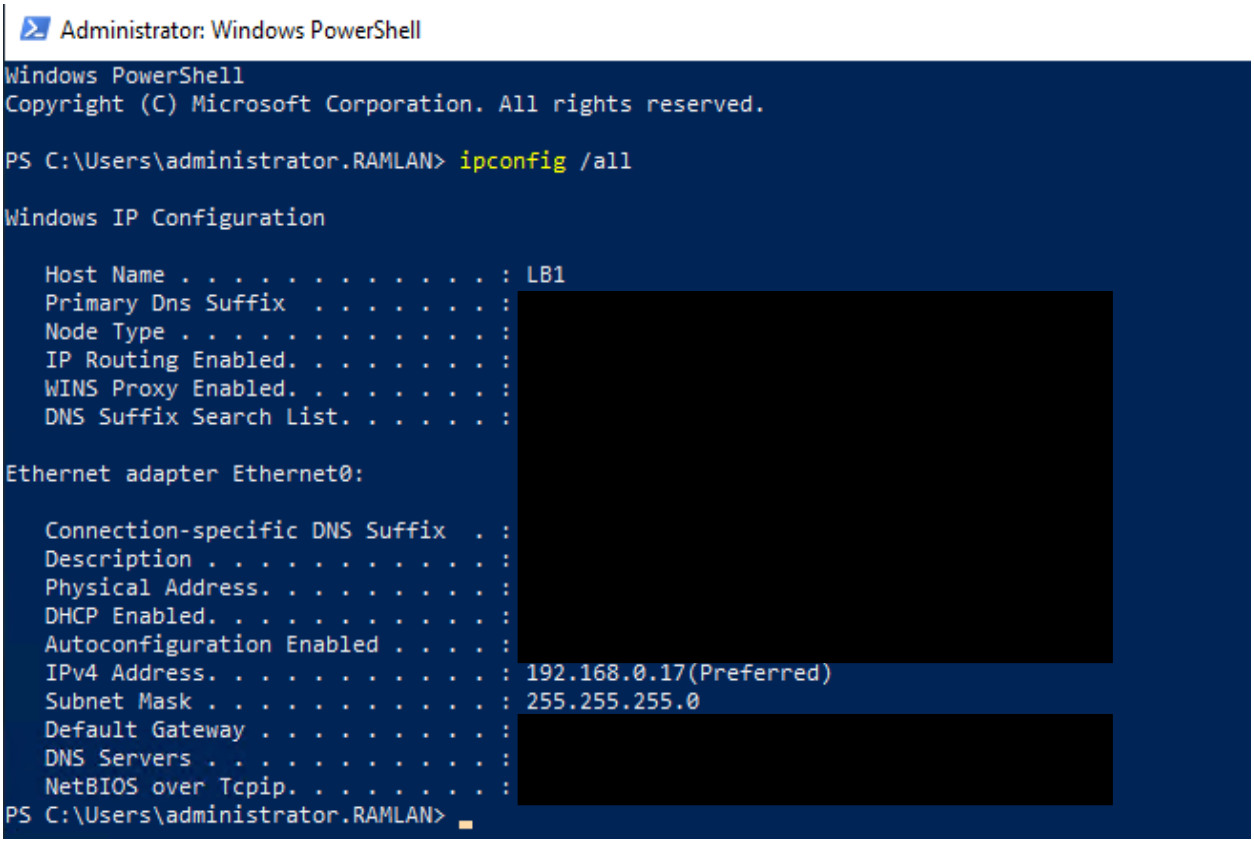
## Hashing Methods

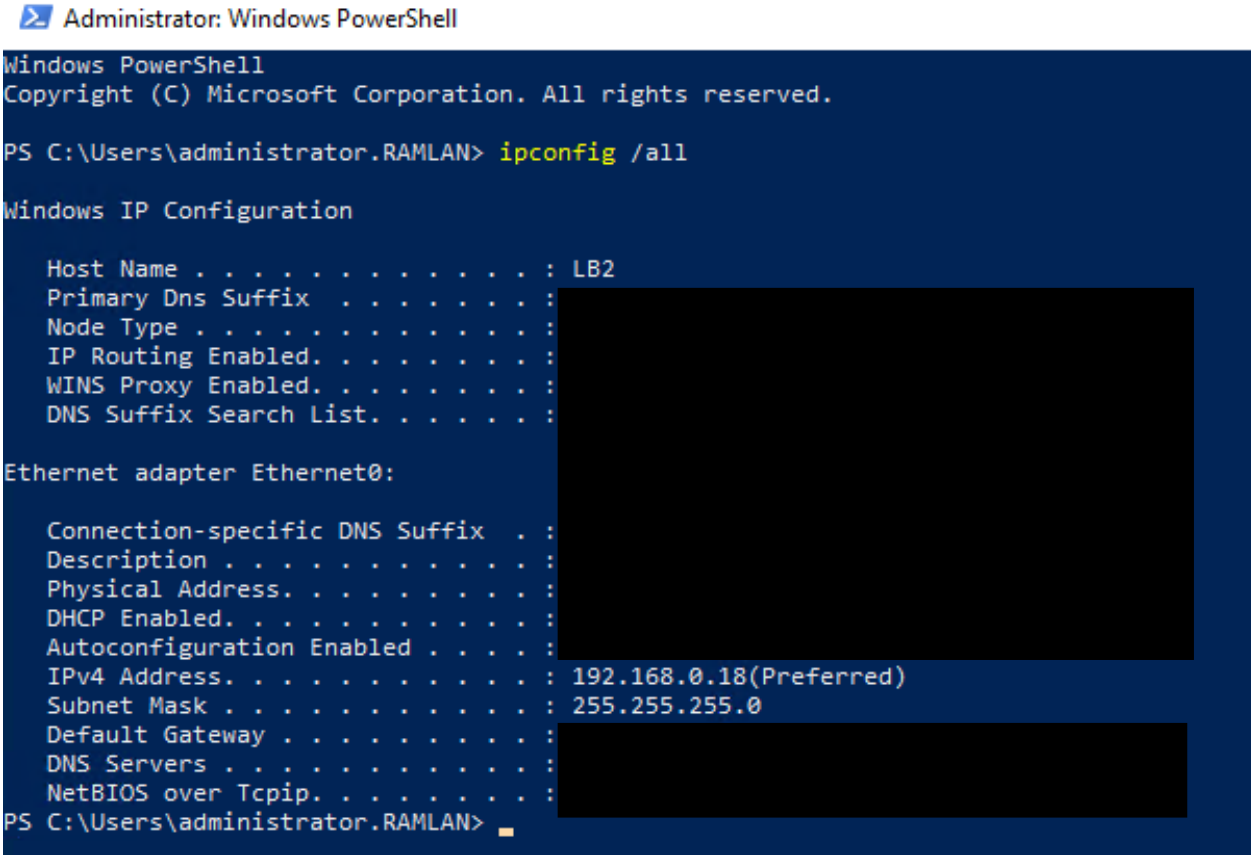
Methods in this category make decisions based on a hash of various data from the incoming packet. This includes connection or header information, such as source/destination IP address, port number, URL or domain name, from the incoming packet.

## Custom Load Method

The custom load method enables the load balancer to query the load on individual servers via SNMP. The administrator can define the server load of interest to query—CPU usage, memory and response time—and then combine them to suit their requests.

For lab setup, I have created 2 virtual servers (**LB1 & LB2**). Installed all the updates and restarted the servers. The servers have 4GB memory and 250GB hard disk. Just bare minimum for testing.

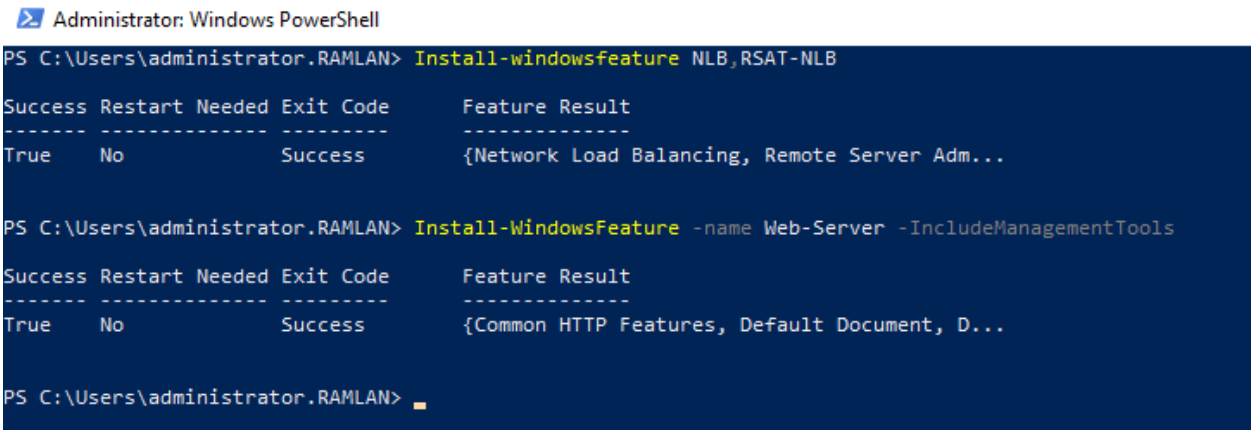


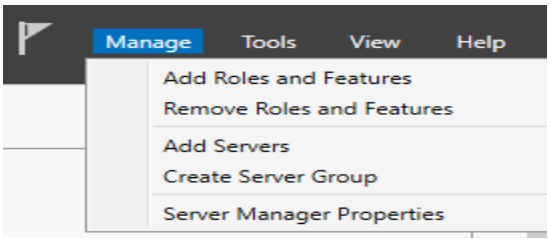
**INSTALLING THE FEATURE:**

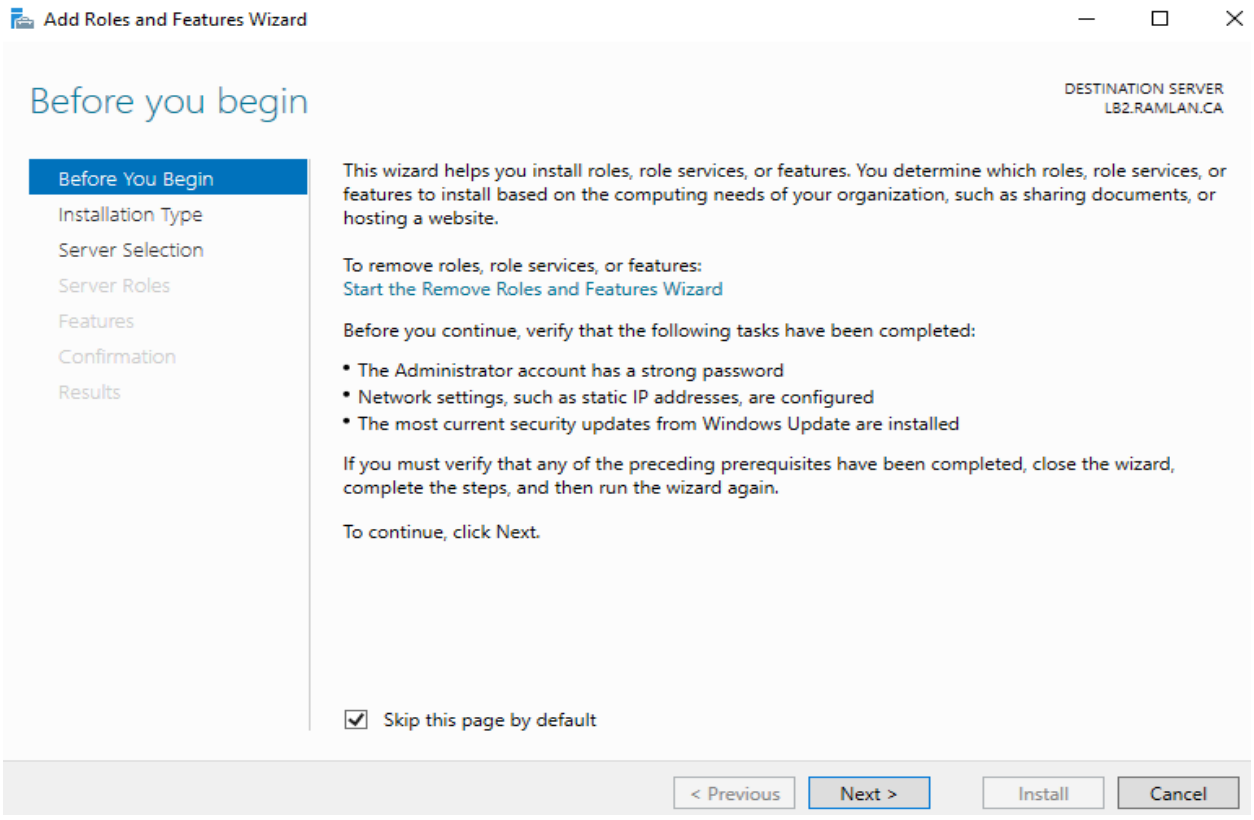
I will install Load Balance feature using PowerShell on **LB1.**

Install-windowsfeature NLB,RSAT-NLB
Install-WindowsFeature -name Web-Server -IncludeManagementTools




I will install Load Balance feature using GUI on **LB2.**



Add Roles and Features Wizard

# Select installation type

DESTINATION SERVER
LB2.RAMLAN.CA

- Before You Begin
- Installation Type
- Server Selection
- Server Roles
- Features
- Confirmation
- Results

Select the installation type. You can install roles and features on a running physical computer or virtual machine, or on an offline virtual hard disk (VHD).

(•) **Role-based or feature-based installation**
Configure a single server by adding roles, role services, and features.

( ) **Remote Desktop Services installation**
Install required role services for Virtual Desktop Infrastructure (VDI) to create a virtual machine-based or session-based desktop deployment.

< Previous | Next > | Install | Cancel

Add Roles and Features Wizard

# Select destination server

DESTINATION SERVER
LB2.RAMLAN.CA

- Before You Begin
- Installation Type
- Server Selection
- Server Roles
- Features
- Confirmation
- Results

Select a server or a virtual hard disk on which to install roles and features.

(•) Select a server from the server pool
( ) Select a virtual hard disk

Server Pool

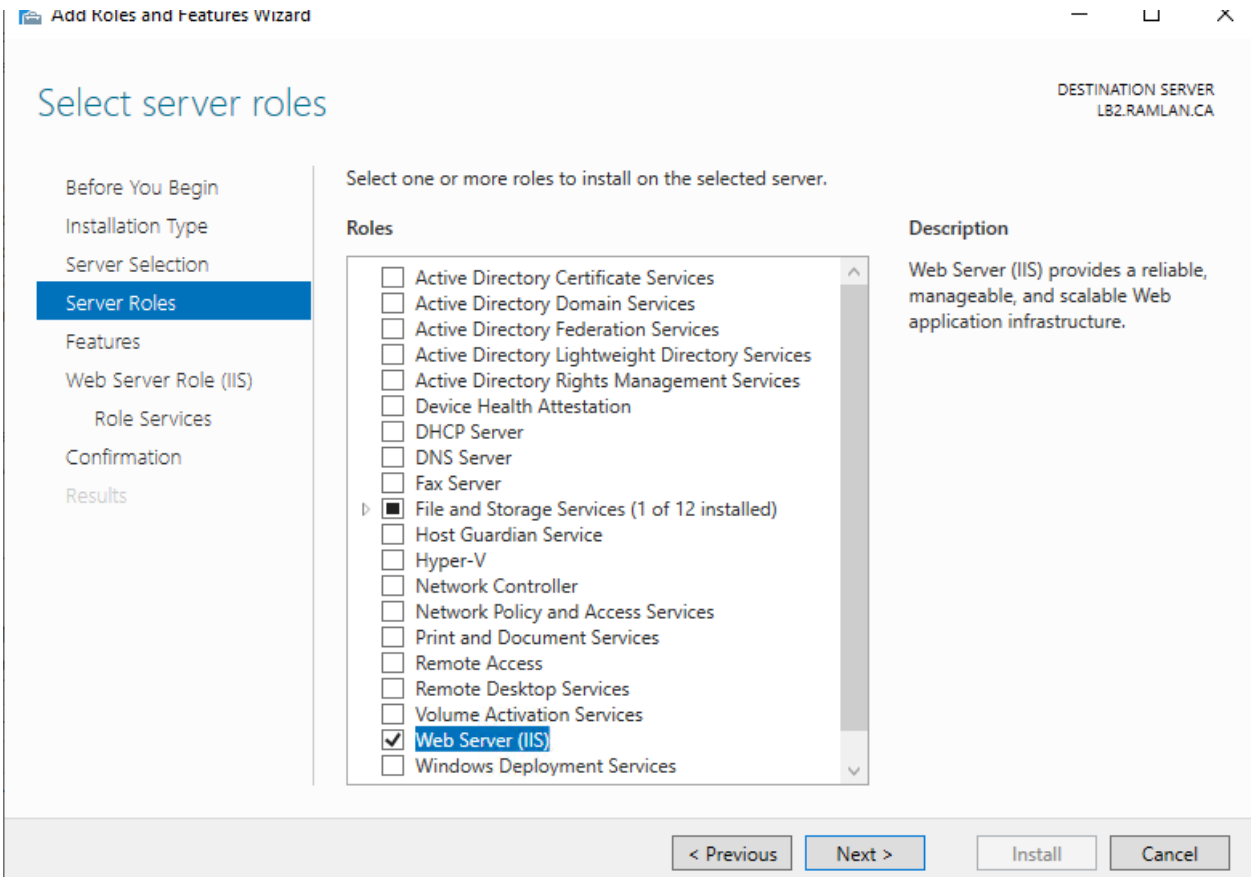
Filter:

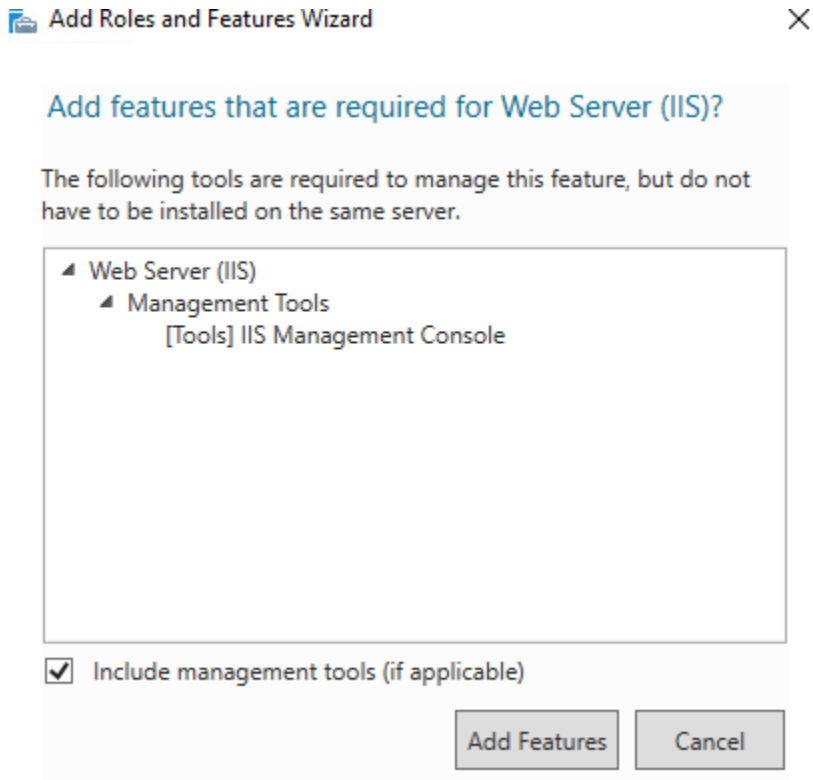
| Name | IP Address | Operating System |
|---|---|---|
| LB2.RAMLAN.CA | 192.168.0.18 | Microsoft Windows Server 2019 Datacenter |

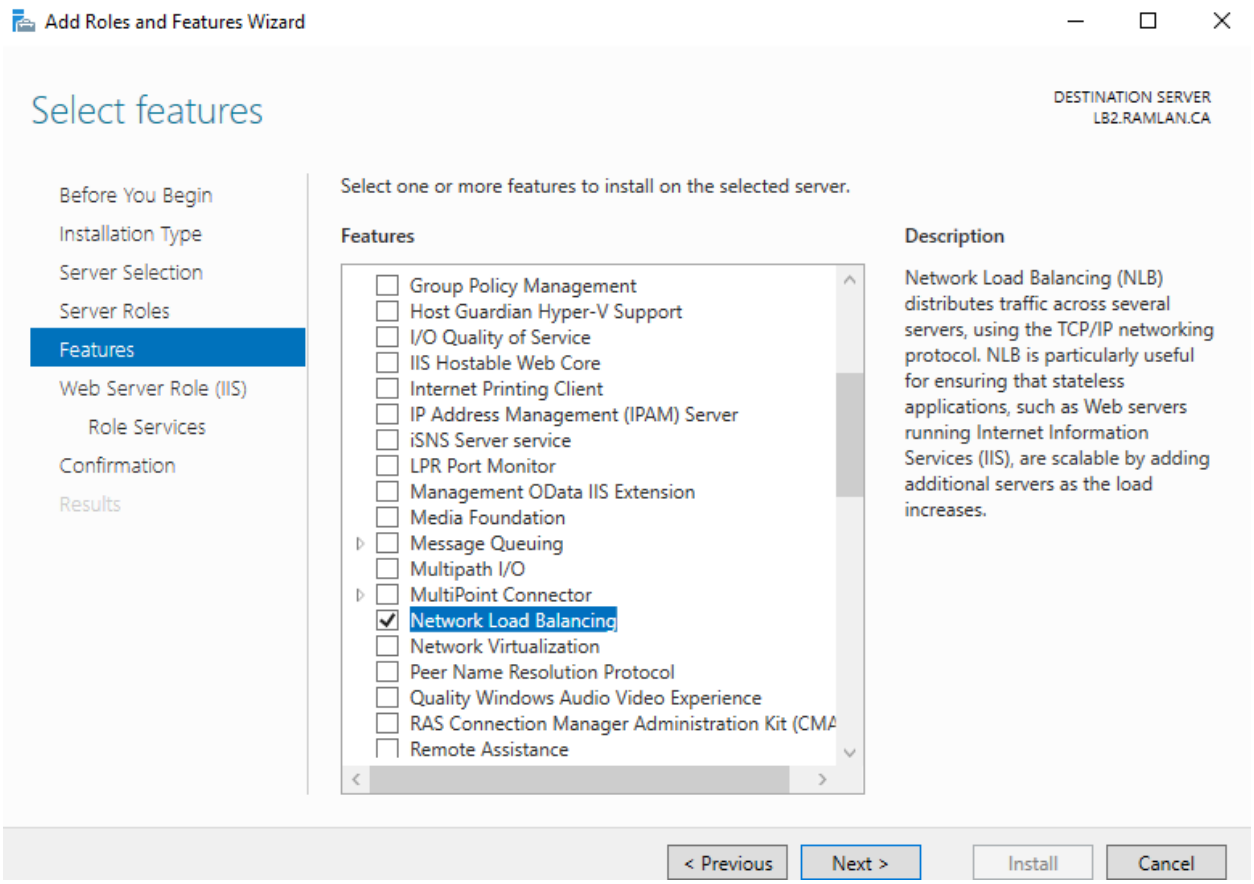
1 Computer(s) found

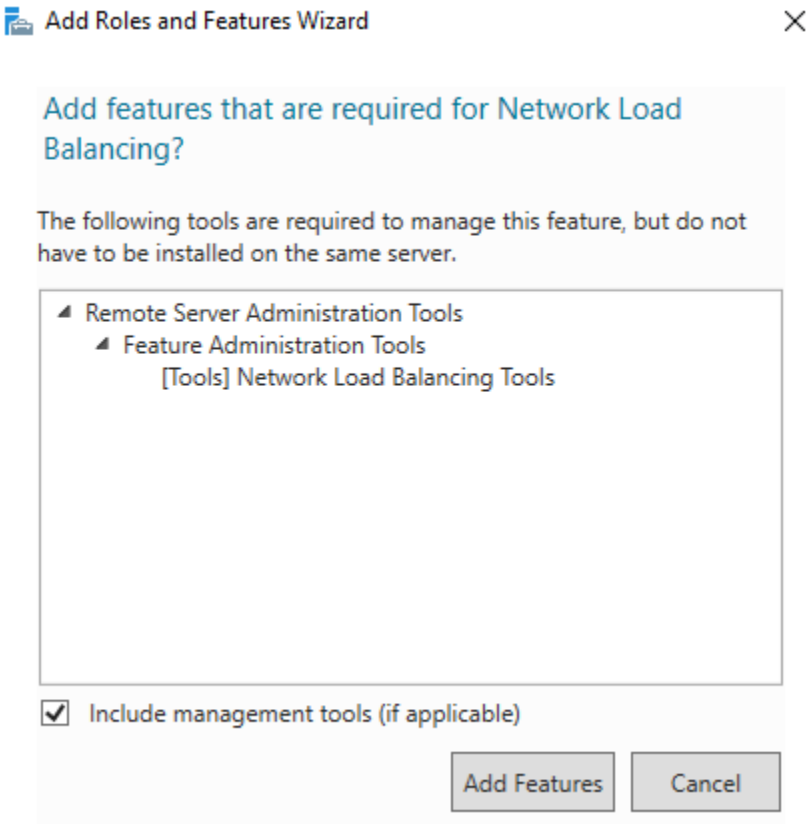
This page shows servers that are running Windows Server 2012 or a newer release of Windows Server, and that have been added by using the Add Servers command in Server Manager. Offline servers and newly-added servers from which data collection is still incomplete are not shown.

< Previous | Next > | Install | Cancel


Add Roles and Features Wizard
Select server roles
DESTINATION SERVER
LB2.RAMLAN.CA
Before You Begin
Installation Type
Server Selection
Server Roles
Features
Web Server Role (IIS)
Role Services
Confirmation
Results
Select one or more roles to install on the selected server.
Roles
Active Directory Certificate Services
Active Directory Domain Services
Active Directory Federation Services
Active Directory Lightweight Directory Services
Active Directory Rights Management Services
Device Health Attestation
DHCP Server
DNS Server
Fax Server
File and Storage Services (1 of 12 installed)
Host Guardian Service
Hyper-V
Network Controller
Network Policy and Access Services
Print and Document Services
Remote Access
Remote Desktop Services
Volume Activation Services
Web Server (IIS)
Windows Deployment Services
Description
Web Server (IIS) provides a reliable, manageable, and scalable Web application infrastructure.
< Previous
Next >
Install
Cancel


Add Roles and Features Wizard
Add features that are required for Web Server (IIS)?
The following tools are required to manage this feature, but do not have to be installed on the same server.
Web Server (IIS)
Management Tools
[Tools] IIS Management Console
Include management tools (if applicable)
Add Features
Cancel


Add Roles and Features Wizard
Select features
DESTINATION SERVER
LB2.RAMLAN.CA
Before You Begin
Installation Type
Server Selection
Server Roles
Features
Web Server Role (IIS)
Role Services
Confirmation
Results
Select one or more features to install on the selected server.
Features
Group Policy Management
Host Guardian Hyper-V Support
I/O Quality of Service
IIS Hostable Web Core
Internet Printing Client
IP Address Management (IPAM) Server
iSNS Server service
LPR Port Monitor
Management OData IIS Extension
Media Foundation
Message Queuing
Multipath I/O
MultiPoint Connector
Network Load Balancing
Network Virtualization
Peer Name Resolution Protocol
Quality Windows Audio Video Experience
RAS Connection Manager Administration Kit (CMA
Remote Assistance
Description
Network Load Balancing (NLB) distributes traffic across several servers, using the TCP/IP networking protocol. NLB is particularly useful for ensuring that stateless applications, such as Web servers running Internet Information Services (IIS), are scalable by adding additional servers as the load increases.
< Previous
Next >
Install
Cancel


Add Roles and Features Wizard
Add features that are required for Network Load Balancing?
The following tools are required to manage this feature, but do not have to be installed on the same server.
Remote Server Administration Tools
Feature Administration Tools
[Tools] Network Load Balancing Tools
Include management tools (if applicable)
Add Features
Cancel

Add Roles and Features Wizard

# Web Server Role (IIS)

DESTINATION SERVER
LB2.RAMLAN.CA

- Before You Begin
- Installation Type
- Server Selection
- Server Roles
- Features
- Web Server Role (IIS)
  - Role Services
- Confirmation
- Results

Web servers are computers that let you share information over the Internet, or through intranets and extranets. The Web Server role includes Internet Information Services (IIS) 10.0 with enhanced security, diagnostic and administration, a unified Web platform that integrates IIS 10.0, ASP.NET, and Windows Communication Foundation.

- The default installation for the Web Server (IIS) role includes the installation of role services that enable you to serve static content, make minor customizations (such as default documents and HTTP errors), monitor and log server activity, and configure static content compression.

More information about Web Server IIS

< Previous | Next > | Install | Cancel

Add Roles and Features Wizard

# Select role services

DESTINATION SERVER
LB2.RAMLAN.CA

- Before You Begin
- Installation Type
- Server Selection
- Server Roles
- Features
- Web Server Role (IIS)
  - Role Services
- Confirmation
- Results

Select the role services to install for Web Server (IIS)

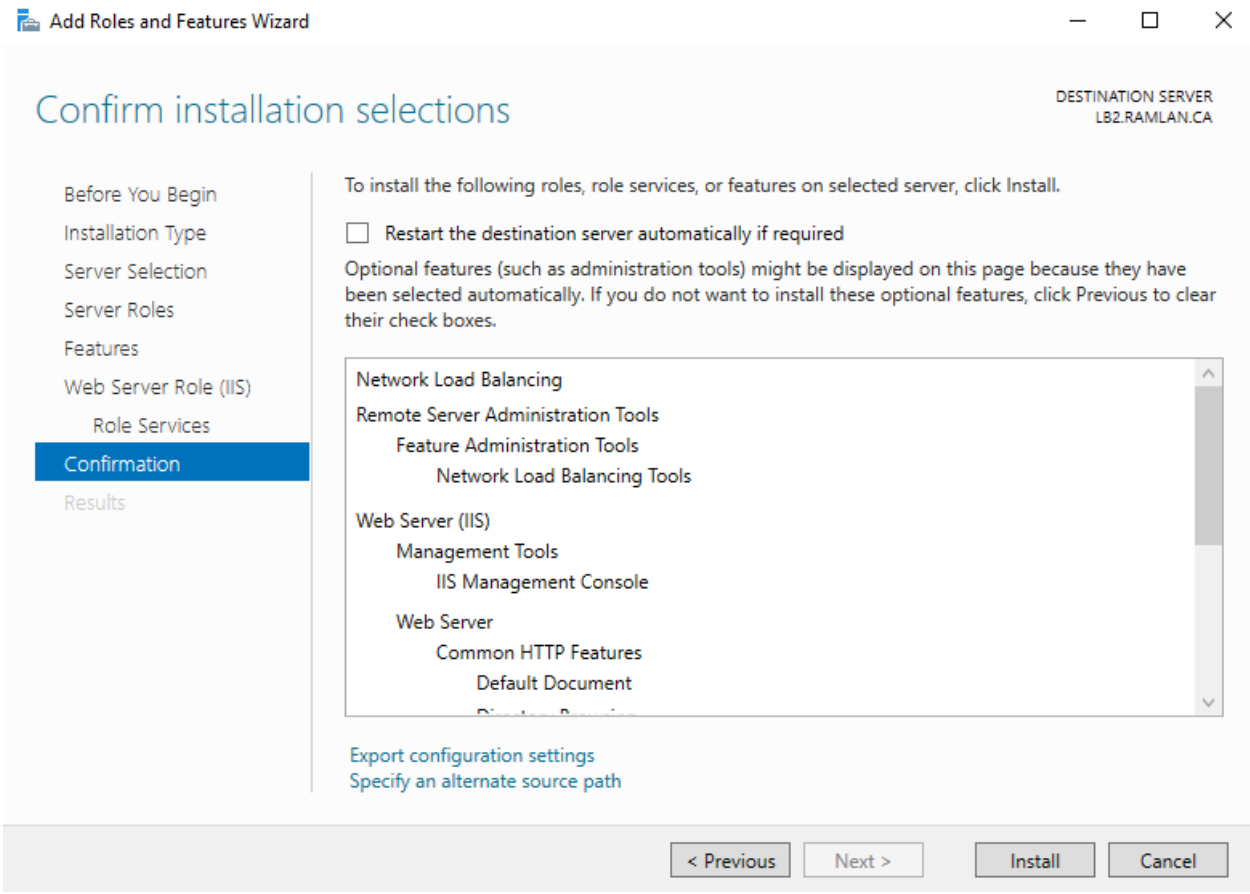
**Role services**

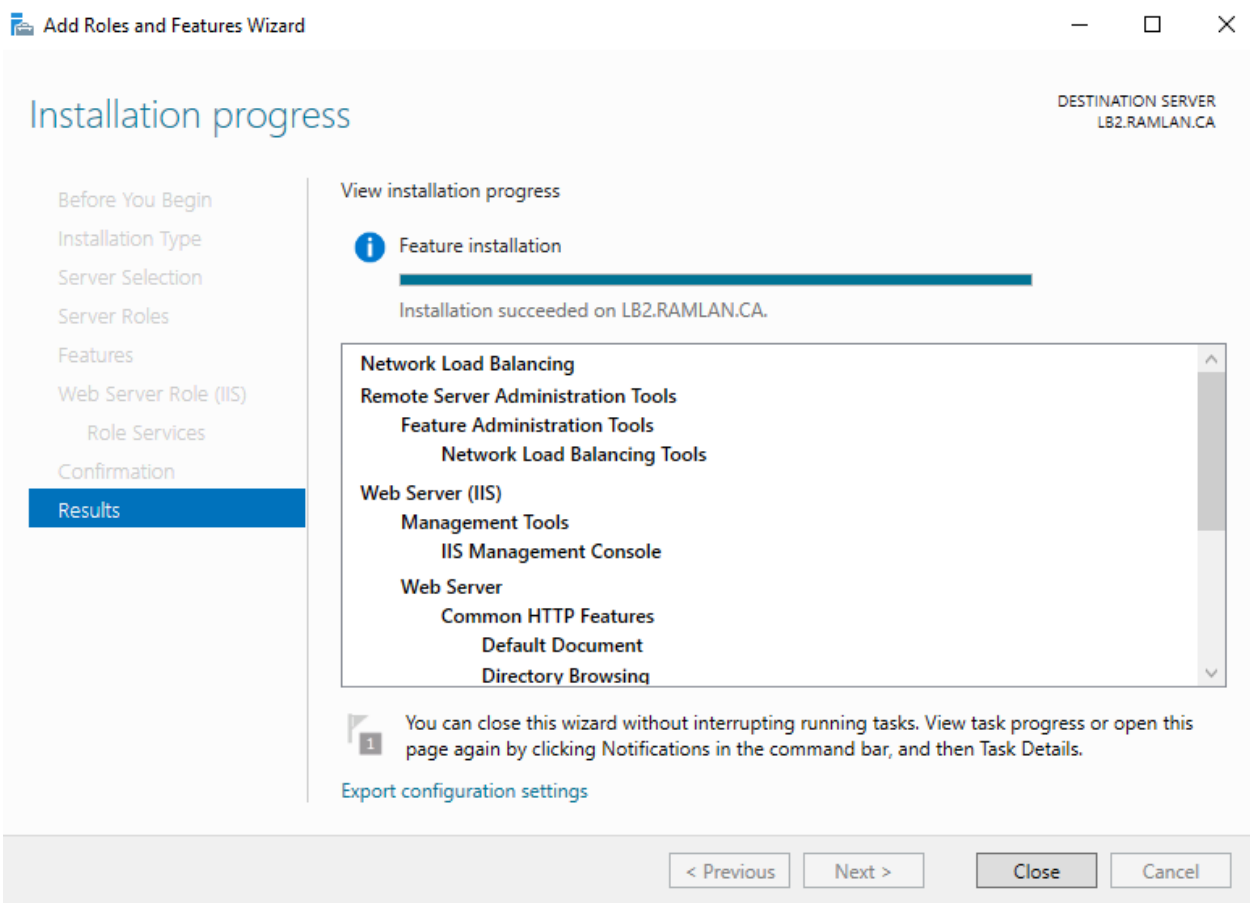
- [x] Web Server
  - [x] Common HTTP Features
    - [x] Default Document
    - [x] Directory Browsing
    - [x] HTTP Errors
    - [x] Static Content
    - [ ] HTTP Redirection
    - [ ] WebDAV Publishing
  - [x] Health and Diagnostics
    - [x] HTTP Logging
    - [ ] Custom Logging
    - [ ] Logging Tools
    - [ ] ODBC Logging
    - [ ] Request Monitor
    - [ ] Tracing
  - [x] Performance
    - [x] Static Content Compression
    - [ ] Dynamic Content Compression
  - [x] Security

**Description**

Web Server provides support for HTML Web sites and optional support for ASP.NET, ASP, and Web server extensions. You can use the Web Server to host an internal or external Web site or to provide an environment for developers to create Web-based applications.

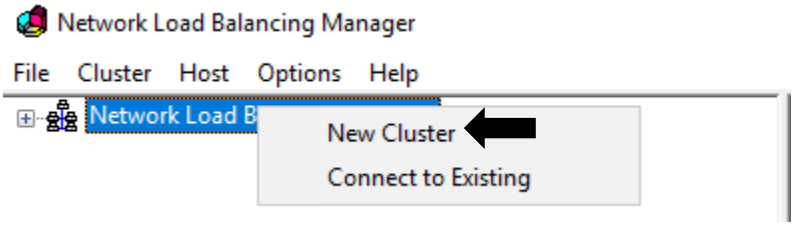
< Previous | Next > | Install | Cancel

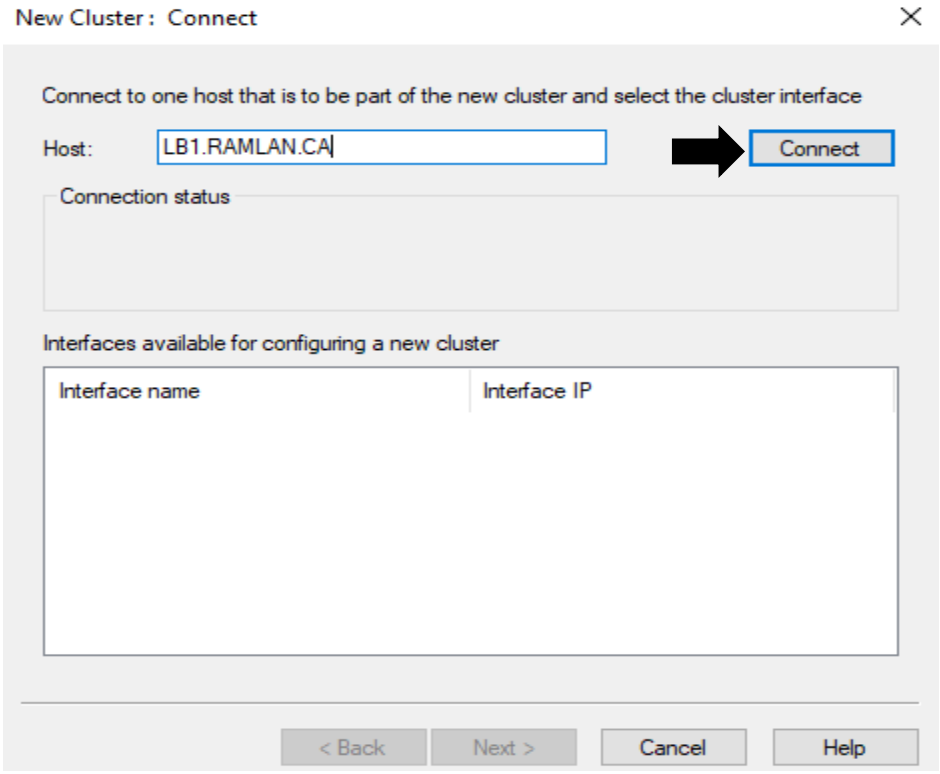

Add Roles and Features Wizard
Confirm installation selections
DESTINATION SERVER
LB2.RAMLAN.CA
Before You Begin
Installation Type
Server Selection
Server Roles
Features
Web Server Role (IIS)
Role Services
Confirmation
Results
To install the following roles, role services, or features on selected server, click Install.
Restart the destination server automatically if required
Optional features (such as administration tools) might be displayed on this page because they have been selected automatically. If you do not want to install these optional features, click Previous to clear their check boxes.
Network Load Balancing
Remote Server Administration Tools
Feature Administration Tools
Network Load Balancing Tools
Web Server (IIS)
Management Tools
IIS Management Console
Web Server
Common HTTP Features
Default Document
Export configuration settings
Specify an alternate source path
< Previous
Next >
Install
Cancel

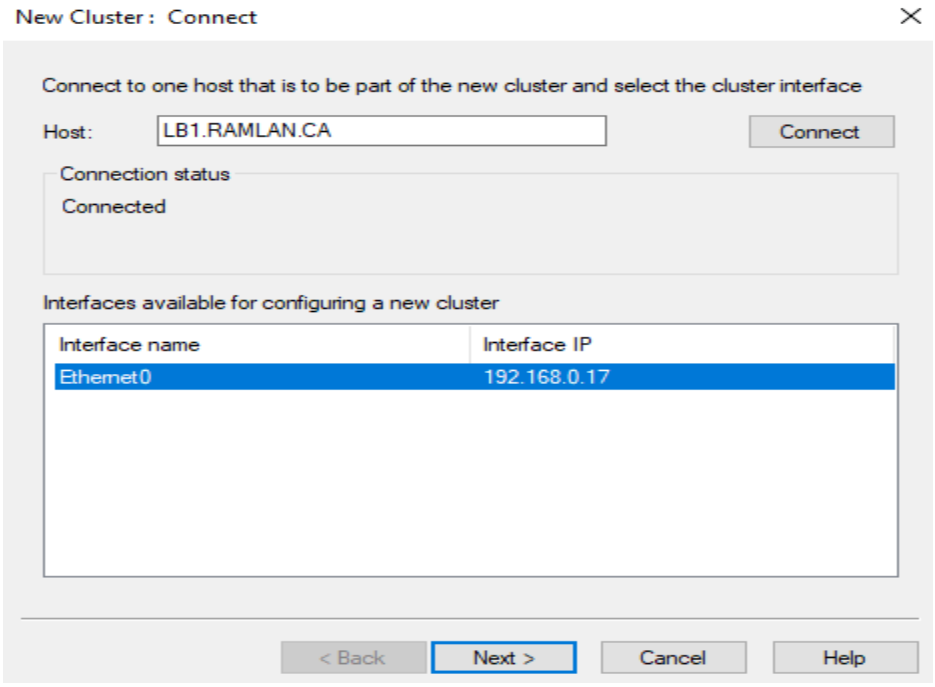

Add Roles and Features Wizard
Installation progress
DESTINATION SERVER
LB2.RAMLAN.CA
Before You Begin
Installation Type
Server Selection
Server Roles
Features
Web Server Role (IIS)
Role Services
Confirmation
Results
View installation progress
Feature installation
Installation succeeded on LB2.RAMLAN.CA.
Network Load Balancing
Remote Server Administration Tools
Feature Administration Tools
Network Load Balancing Tools
Web Server (IIS)
Management Tools
IIS Management Console
Web Server
Common HTTP Features
Default Document
Directory Browsing
You can close this wizard without interrupting running tasks. View task progress or open this page again by clicking Notifications in the command bar, and then Task Details.
Export configuration settings
< Previous
Next >
Close
Cancel

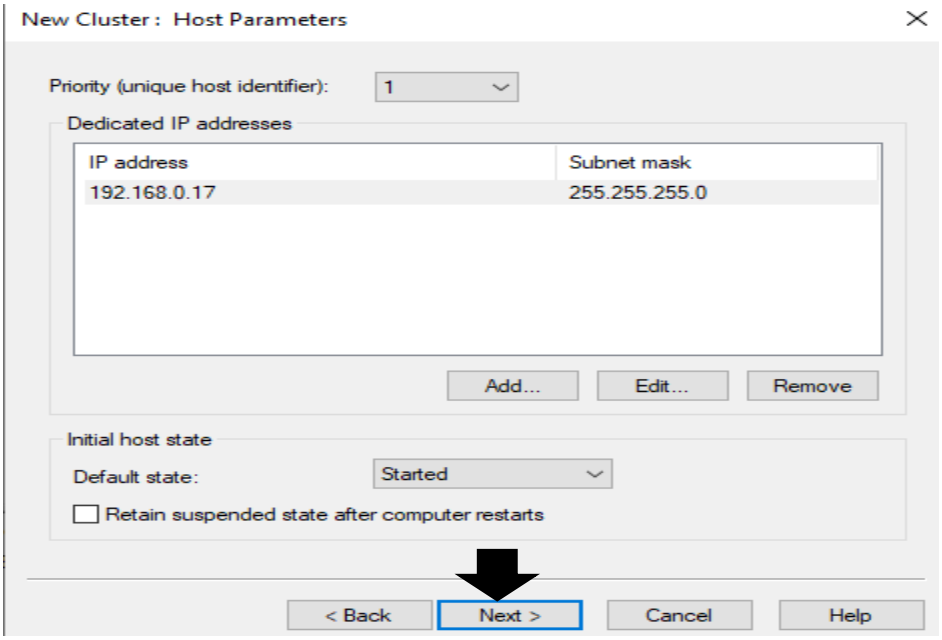
**Configuring Network Load Balancing – Creating a Cluster**

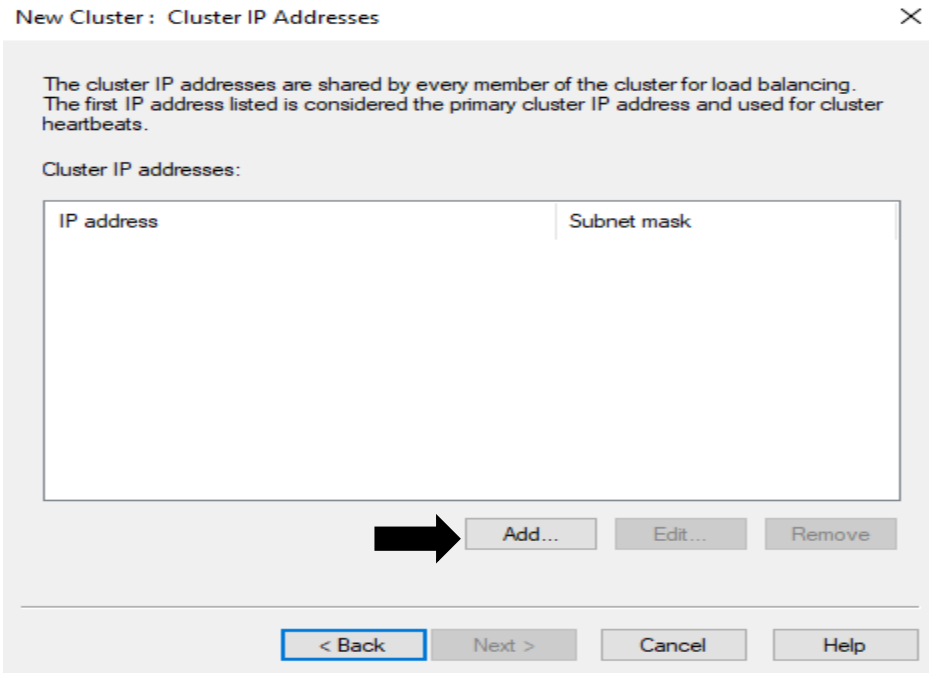
On **LB1** – Open Network Load Balancing Manager from Windows Administrative Tools

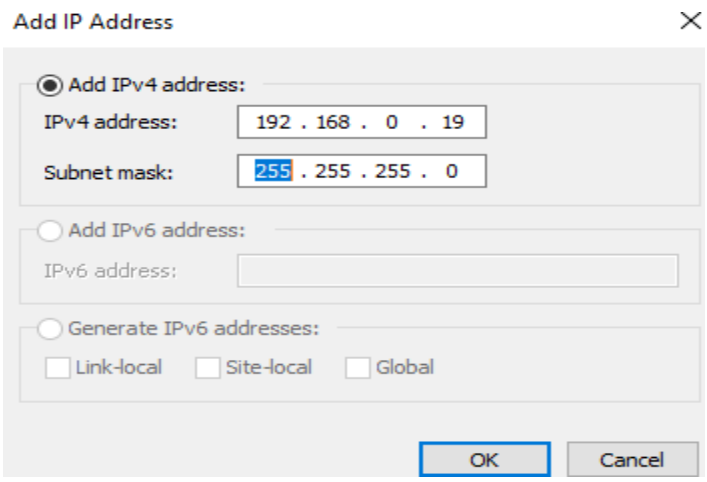



New Cluster : Host Parameters
Priority (unique host identifier):
1
Dedicated IP addresses
IP address
Subnet mask
192.168.0.17
255.255.255.0
Add...
Edit...
Remove
Initial host state
Default state:
Started
Retain suspended state after computer restarts
< Back
Next >
Cancel
Help


New Cluster : Cluster IP Addresses
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 used for cluster heartbeats.
Cluster IP addresses:
IP address
Subnet mask
Add...
Edit...
Remove
< Back
Next >
Cancel
Help


Add IP Address
Add IPv4 address:
IPv4 address:
192 . 168 . 0 . 19
Subnet mask:
255 . 255 . 255 . 0
Add IPv6 address:
IPv6 address:
Generate IPv6 addresses:
Link-local
Site-local
Global
OK
Cancel

New Cluster : Cluster IP Addresses

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 used for cluster heartbeats.

Cluster IP addresses:

| IP address | Subnet mask |
|---|---|
| 192.168.0.19 | 255.255.255.0 |

Add... Edit... Remove

< Back Next > Cancel Help

New Cluster : Cluster Parameters

Cluster IP configuration

IP address: 192.168.0.19

Subnet mask: 255 . 255 . 255 . 0

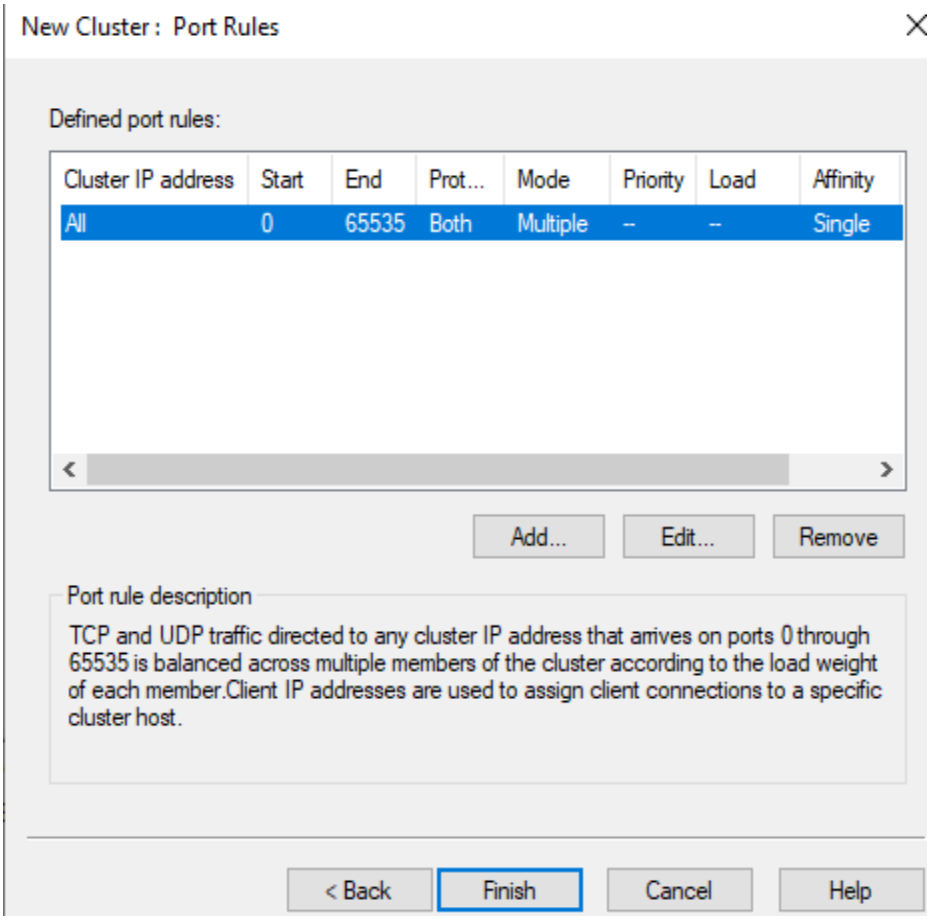
Full Internet name:

Network address: 02-bf-c0-a8-00-13

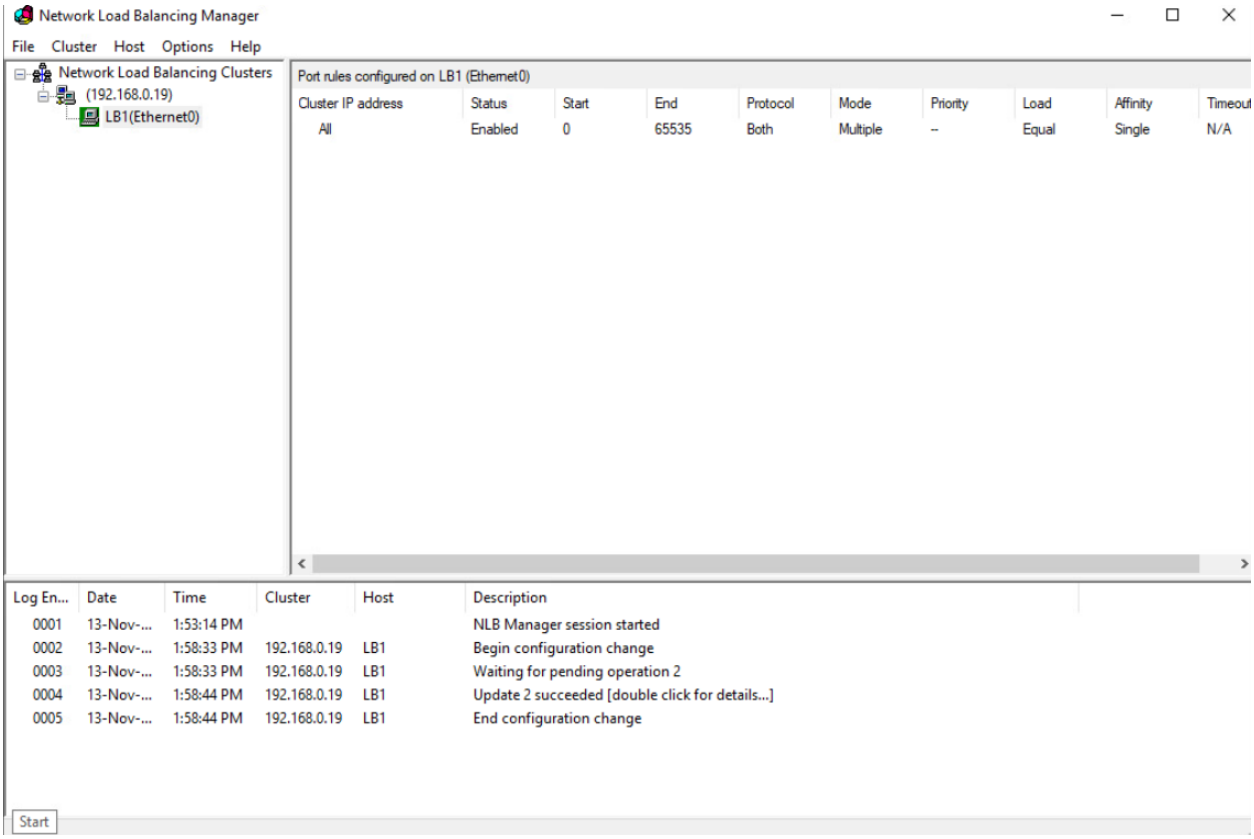
Cluster operation mode

- (•) Unicast
- ( ) Multicast
- ( ) IGMP multicast

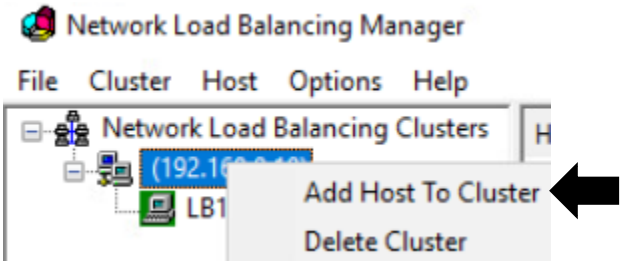
< Back Next > Cancel Help

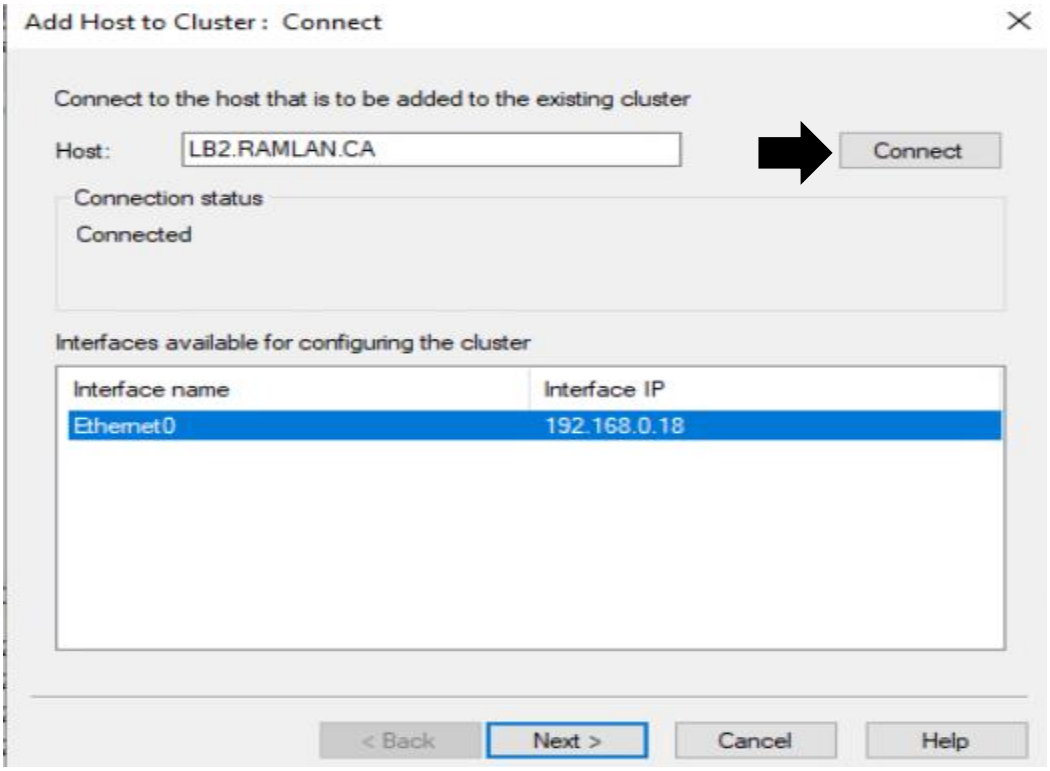


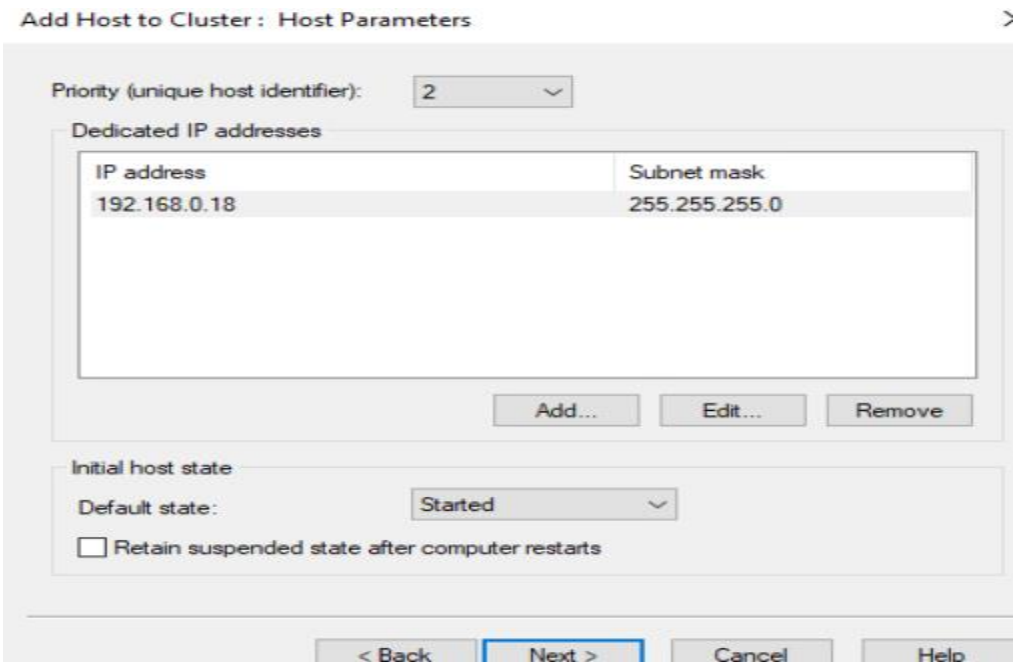

Wait for **LB1** to turn GREEN after the configuration

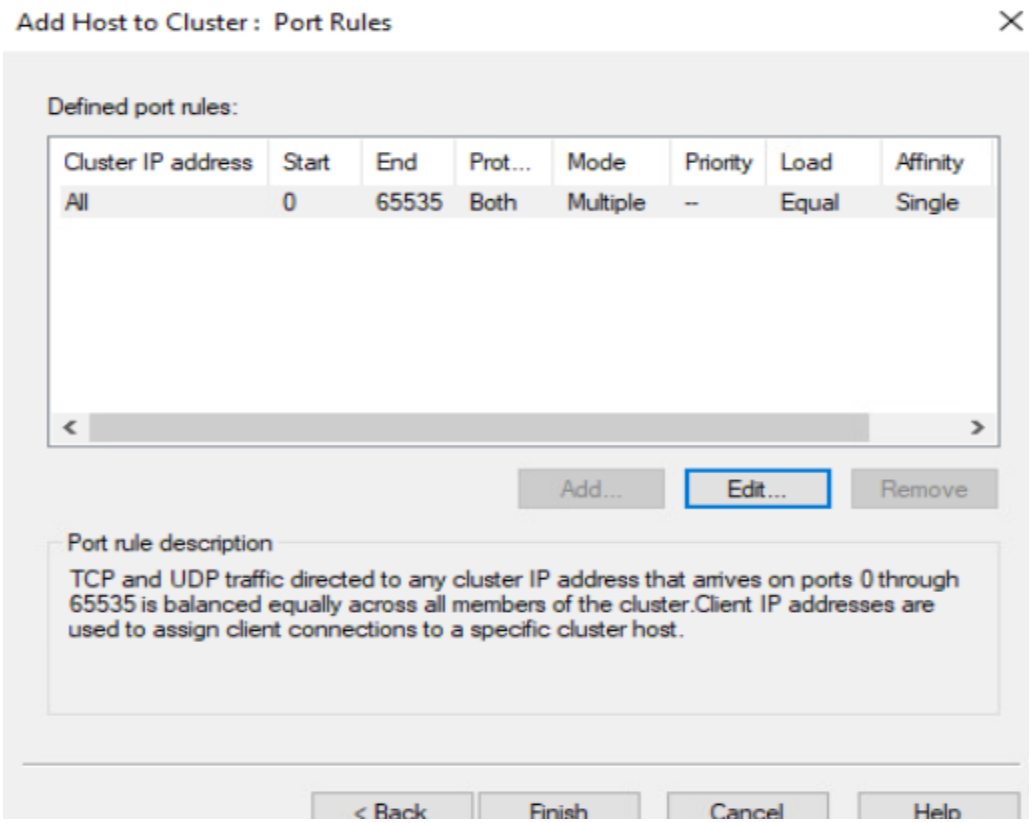


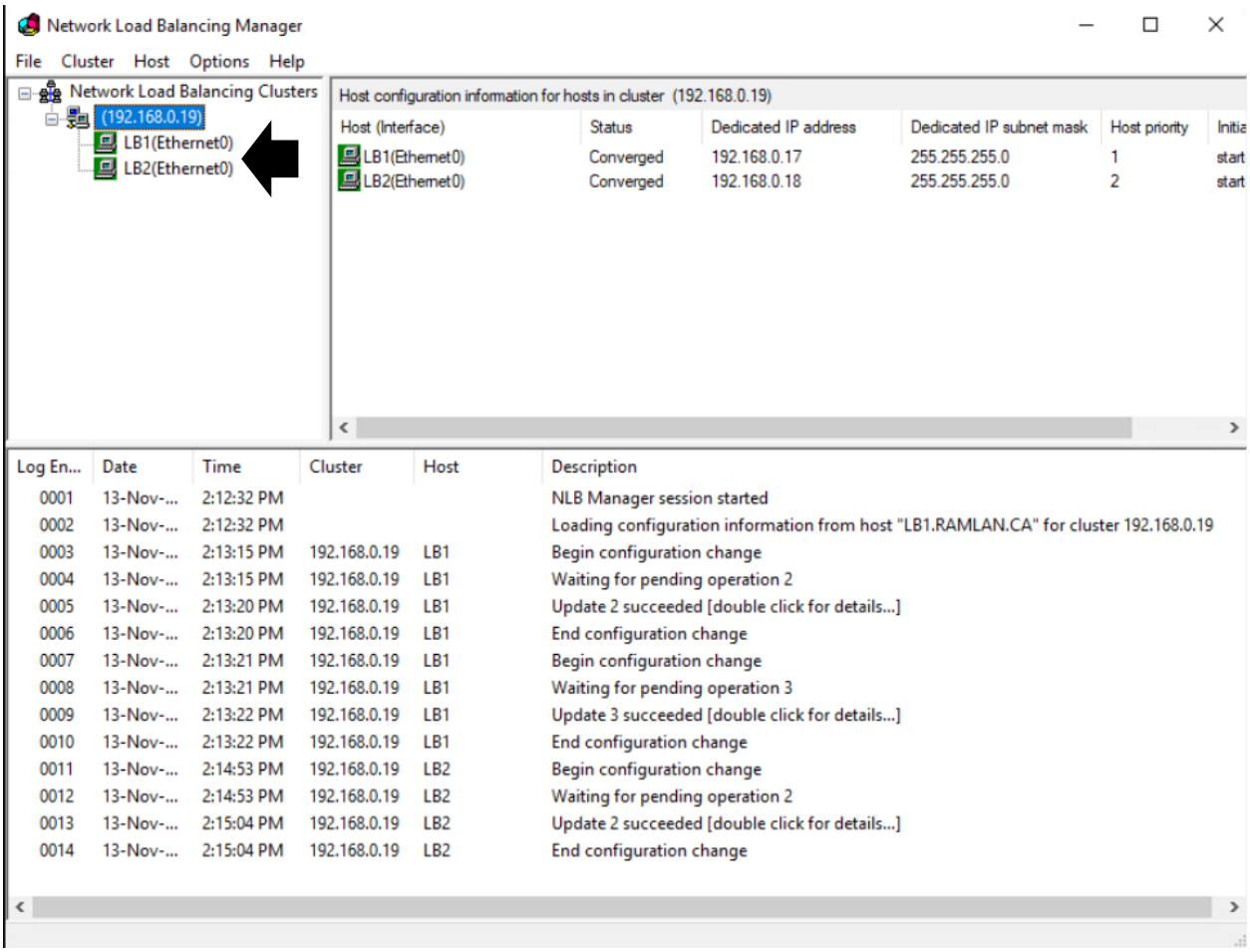
Now it is time to add **LB2.**





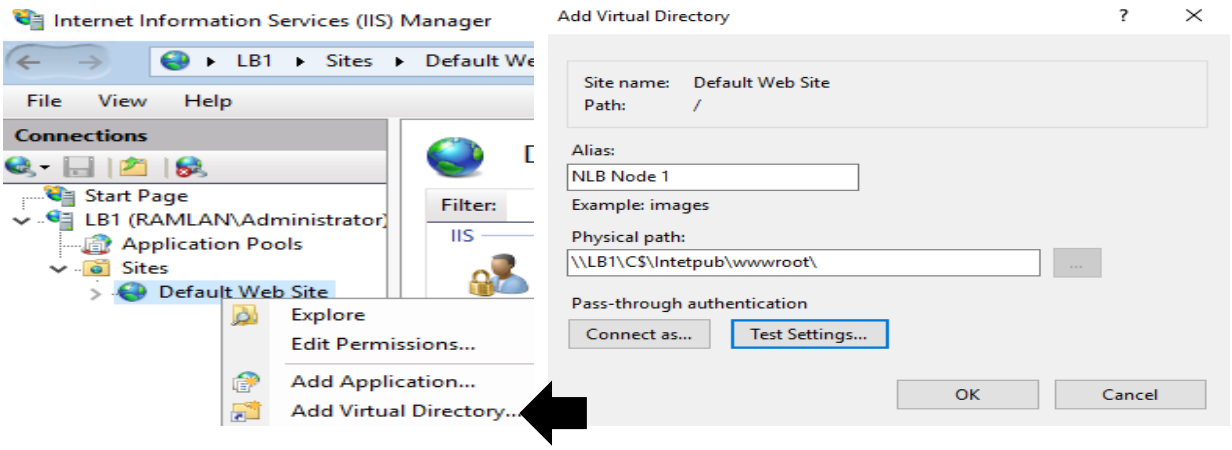



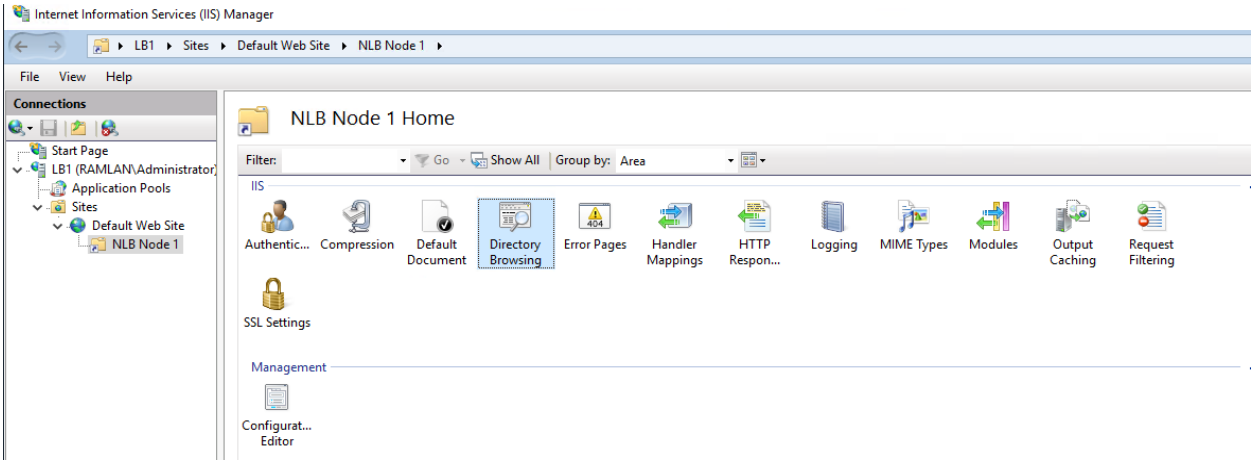

The load balancing configuration is complete.

**Testing Load Balance with IIS site:**

With the load balancer ready, we can handover the configuration to app or developer team to configure IIS site. Since this is home lab, I will create default IIS site and test load balancer is functioning properly.

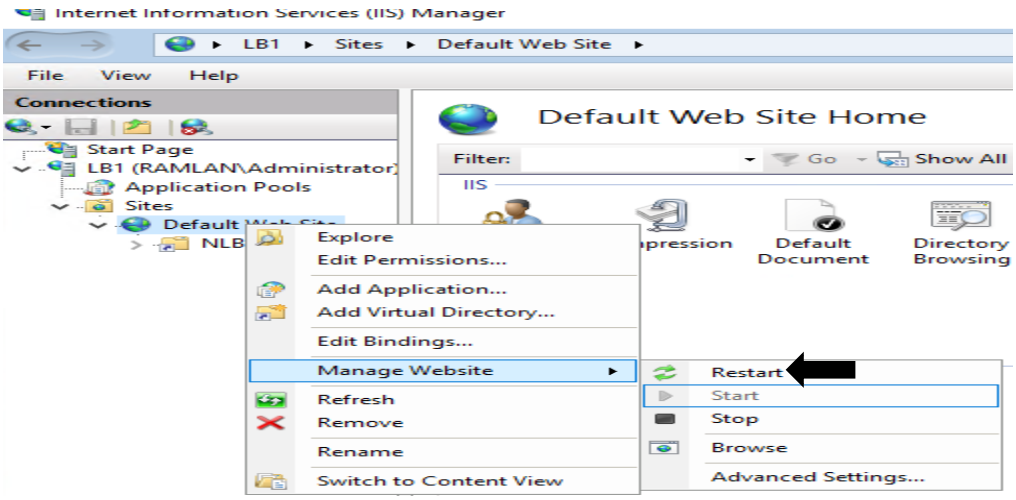
On**LB1** - Open IIS Manager from Windows Administrative Tools



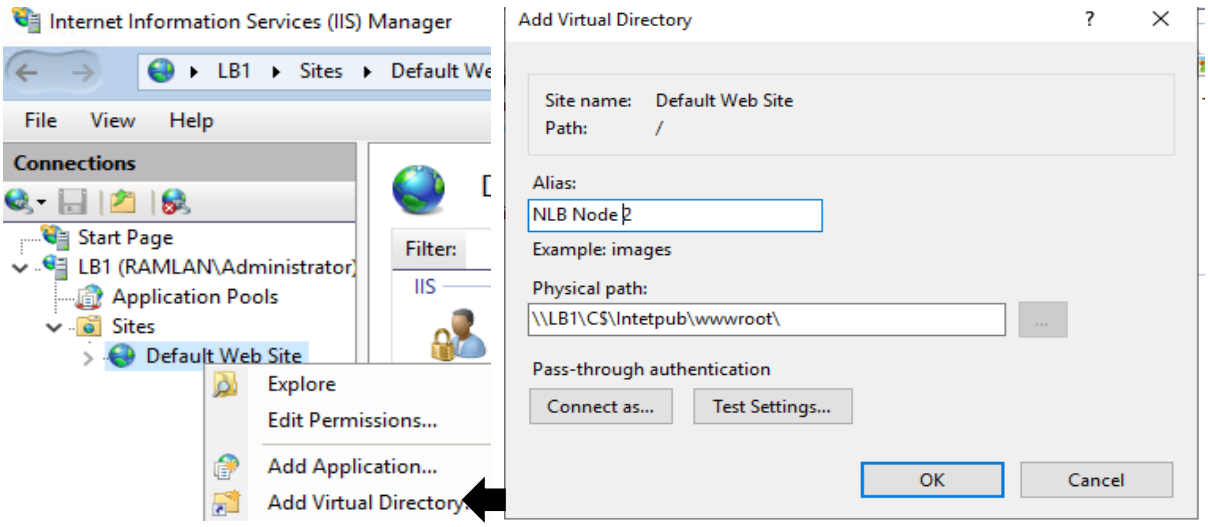



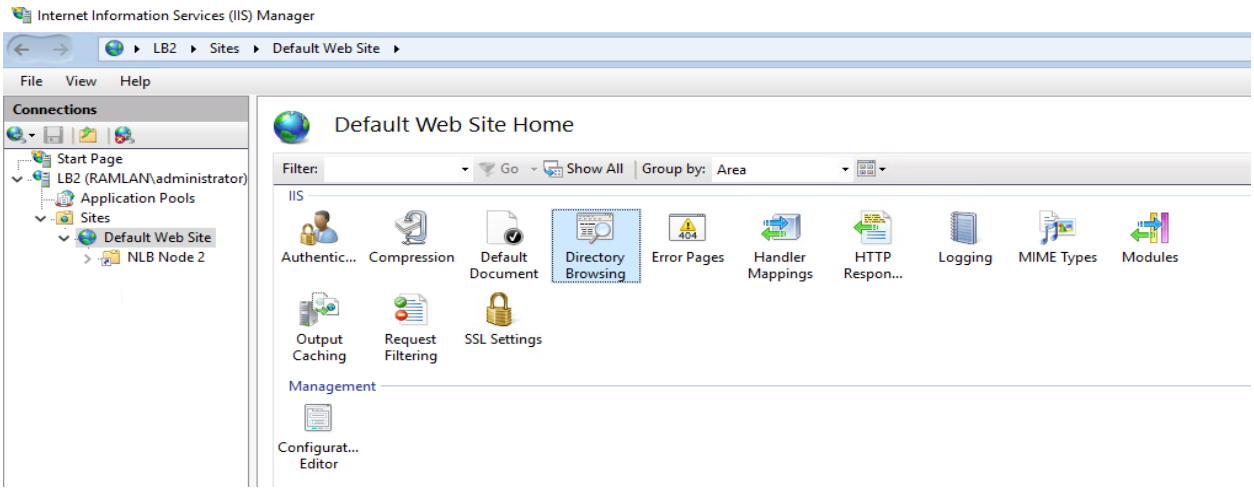

Double click Directory Browsing – Click Enable

Now restart IIS Service



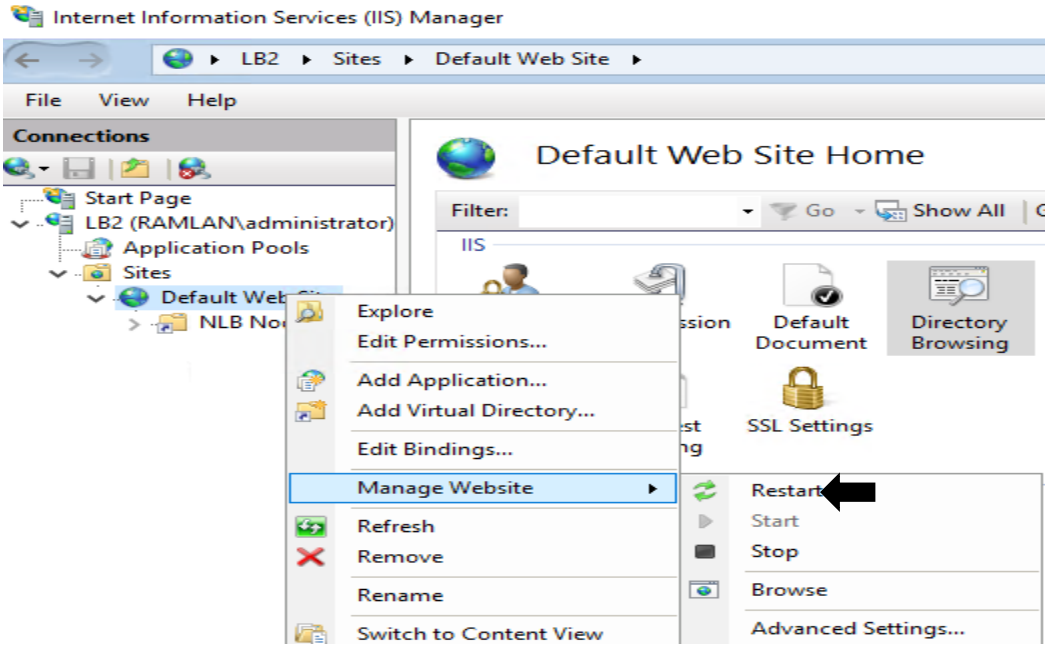
Repeat the same on **LB2**




Double click Directory Browsing – Click Enable

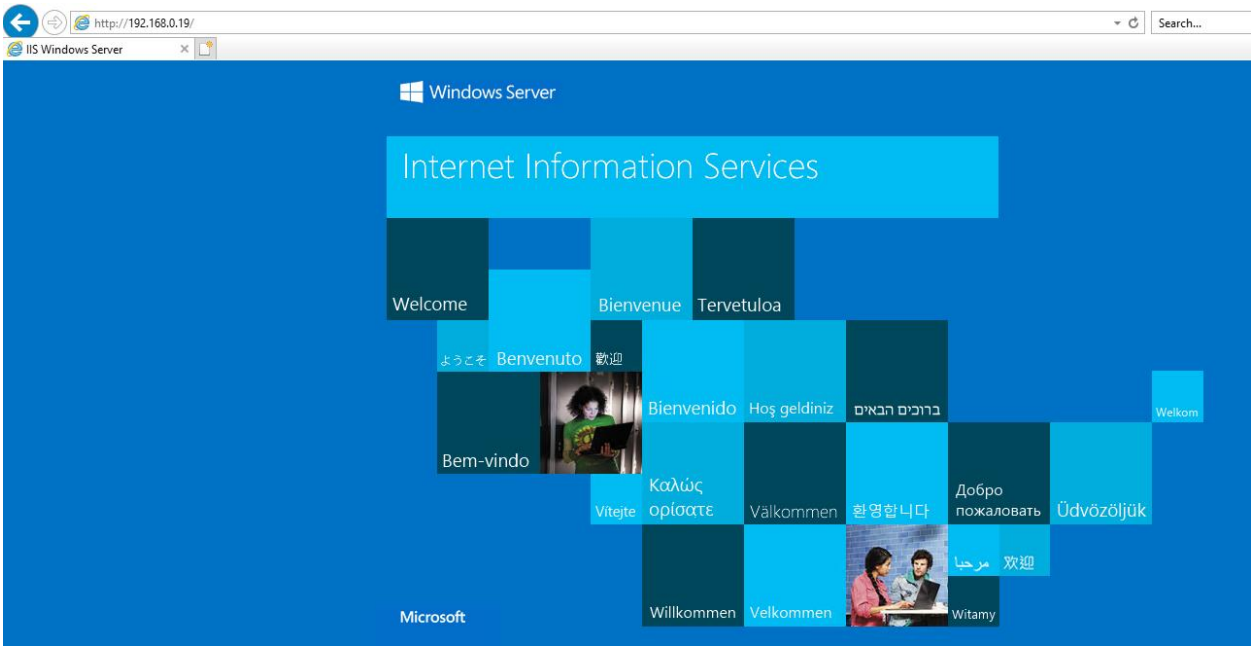
Now restart IIS Service



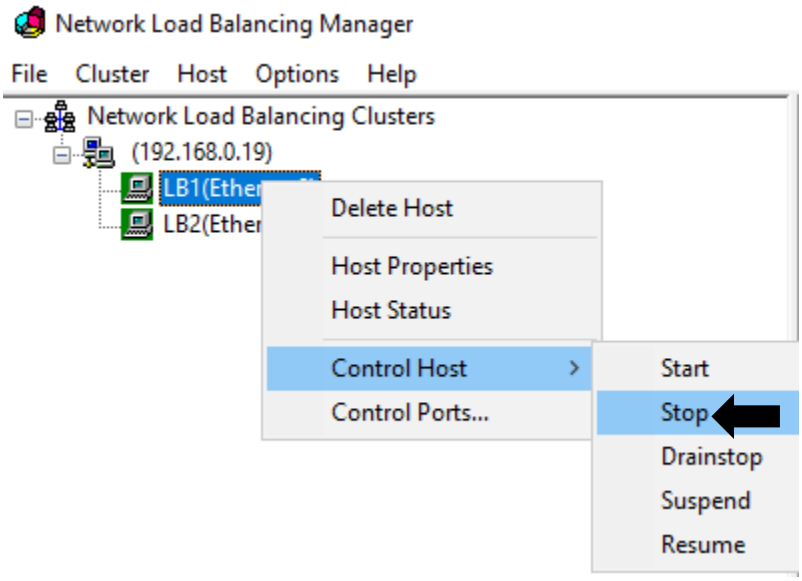
**Verifying Network Load Balancing Configuration**

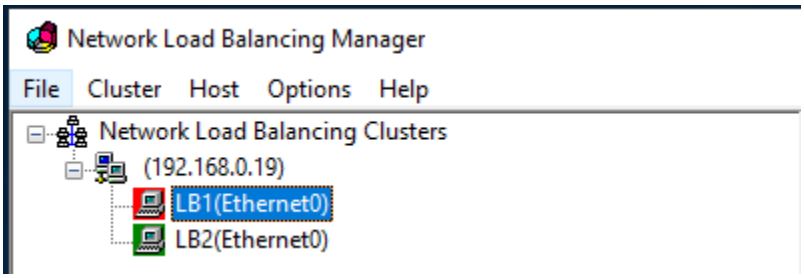
On **LB1** – Open Internet Explorer

Type 192.168.0.19 – This is our **Cluster IP**

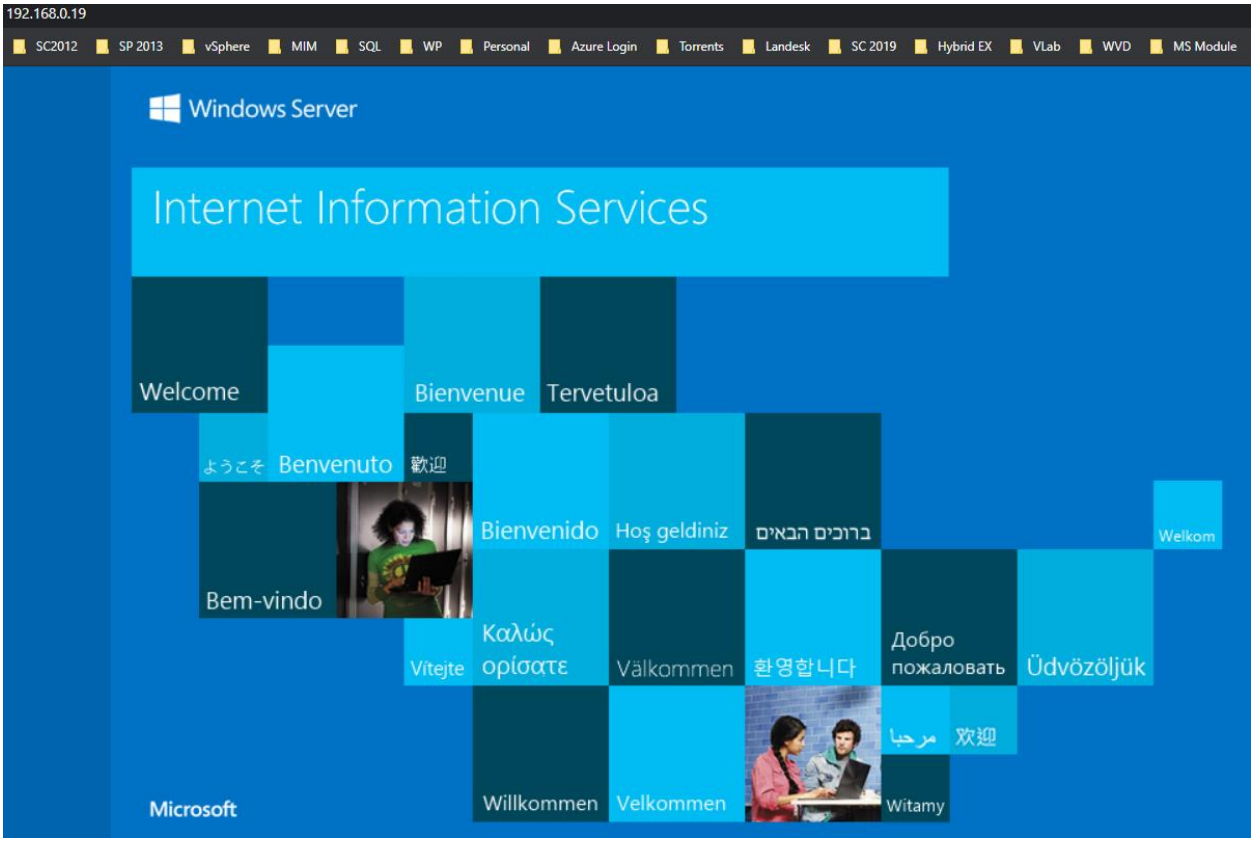



The IIS site is responding. We will stop LB1 and see what happens when we try to access IIS site from another workstation using Internet Explorer.

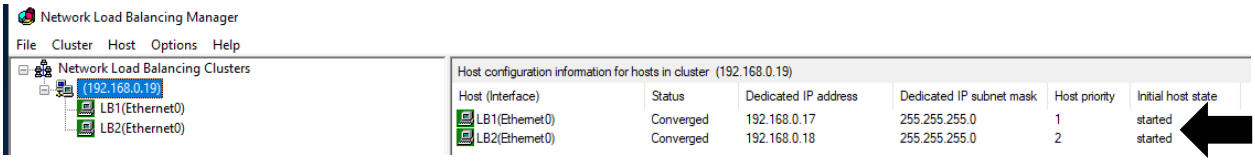


The IIS site is responding and it is being serviced by LB2.  This is how you can configure your application to load balance and available **24/7 365 days**.




Now we can restart **LB1**




We have completed Load Balancer configuration on Server 2019 for default IIS site.

Thanks

**Ram Lan**
**13th Nov 2020**