

EXPRESSCLUSTER® X 4.0

HA Cluster Configuration Guide for Microsoft Azure (Windows)

July 26, 2018
2nd Edition



Revision History

Edition	Revised Date	Description
1st	Apr 17, 2018	New guide
2nd	Jul 26, 2018	Add notes on Heartbeat Timeout following memory preserving maintenance of Azure. 7.1.2 Notes on EXPRESSCLUSTER 7.2.2 Notes on EXPRESSCLUSTER

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Preface

Who Should Use This Guide

The *HA Cluster Configuration Guide for Microsoft Azure (Windows)* is intended for administrators who want to build a cluster system, and for system engineers and maintenance personnel who provide user support.

The software and setup examples introduced in this guide are for reference only, and the software is not guaranteed to run.

Scope of application

This guide covers the following product versions.

- EXPRESSCLUSTER X 4.0 for Windows (Internal version: 12.00)
- Windows Server 2016 Datacenter
- Microsoft Azure portal: Environment as of February 20, 2018
- Azure CLI 2.0

If the product versions that you use differ from the above, some display and configuration contents may differ from those described in this guide.

The display and configuration contents may also change in the future. Therefore, for the latest information, see the website or manual of each product and service.

How This Guide is Organized

Chapter 1	Overview: Describes the functional overview.
Chapter 2	Operating Environments: Describes the tested operating environment of this function.
Chapter 3	Cluster Creation Procedure: Describes the procedure to create an HA cluster using Azure DNS.
Chapter 4	Cluster Creation Procedure: Describes the procedure to create an HA cluster using an Internet facing load balancer.
Chapter 5	Cluster Creation Procedure: Describes the procedure to create an HA cluster using an internal load balancer.
Chapter 6	Error Messages: Describes the error messages and solutions.
Chapter 7	Notes and Restrictions: Describes the notes and restrictions on creating and operating a cluster.

EXPRESSCLUSTER X Documentation Set

The EXPRESSCLUSTER manuals consist of the four guides below. The title and purpose of each guide is described below:

EXPRESSCLUSTER X Getting Started Guide

This guide is intended for all users. The guide covers topics such as product overview, supported operating environments, updates, and known problems.

EXPRESSCLUSTER X Installation and Configuration Guide

This guide is intended for system engineers who install cluster systems using EXPRESSCLUSTER and for system administrators who maintain and operate installed cluster systems, and it describes requirements from for installing a cluster system using EXPRESSCLUSTER to for preparing to start operation. This guide follows the actual procedure for installing a cluster system to describe how to design a cluster system using EXPRESSCLUSTER, how to install and set up EXPRESSCLUSTER, how to check the system after setting it up, and how to evaluate the system before starting operation.

EXPRESSCLUSTER X Reference Guide

This guide is intended for system administrators. The guide covers topics such as how to operate EXPRESSCLUSTER, function of each module, maintenance-related information, and troubleshooting. The guide is supplement to the *EXPRESSCLUSTER X Installation and Configuration Guide*.

EXPRESSCLUSTER X Integrated WebManager Administrator's Guide

This guide is intended for system administrators who manage cluster system using EXPRESSCLUSTER with EXPRESSCLUSTER Integrated WebManager and for system engineers who introduce the Integrated WebManager. In this guide, details on required items for introducing the cluster system using the Integrated WebManager are explained in accordance with the actual procedures.

Conventions

In this guide, **Note**, **Important**, **Related Information** are used as follows:

Note: Used when the information given is important, but not related to the data loss and damage to the system and machine.

Important: Used when the information given is necessary to avoid the data loss and damage to the system and machine.

Related Information: Used to describe the location of the information given at the reference destination.

The following conventions are used in this guide.

Convention	Usage	Example
Bold	Indicates graphical objects, such as text boxes, list boxes, menu selections, buttons, labels, icons, etc.	Click Start . Properties dialog box
Angled bracket within the command line	Indicates that the value specified inside of the angled bracket can be omitted.	<code>clpstat -s[-h <i>host_name</i>]</code>
>	Prompt to indicate that a Windows user has logged on as root user.	<code>> clpstat</code>
Monospace (Courier)	Indicates path names, commands, system output (message, prompt, etc.), directory, file names, functions and parameters.	<code>C:\Program Files</code>
Monospace bold (Courier)	Indicates the value that a user actually enters from a command line.	Enter the following: <code>> clpcl -s -a</code>
<i>Monospace italic</i> (Courier)	Indicates that users should replace italicized part with values that they are actually working with.	<code>> ping <IP address></code>

Contacting NEC

For the latest product information, visit our website below:

<http://www.nec.com/en/global/prod/expresscluster/>

Chapter 1 Overview

1.1 Functional overview

This guide describes how to configure an HA cluster based on EXPRESSCLUSTER X (hereinafter referred to as “EXPRESSCLUSTER”) using Azure Resource Manager on a Microsoft Azure cloud service.

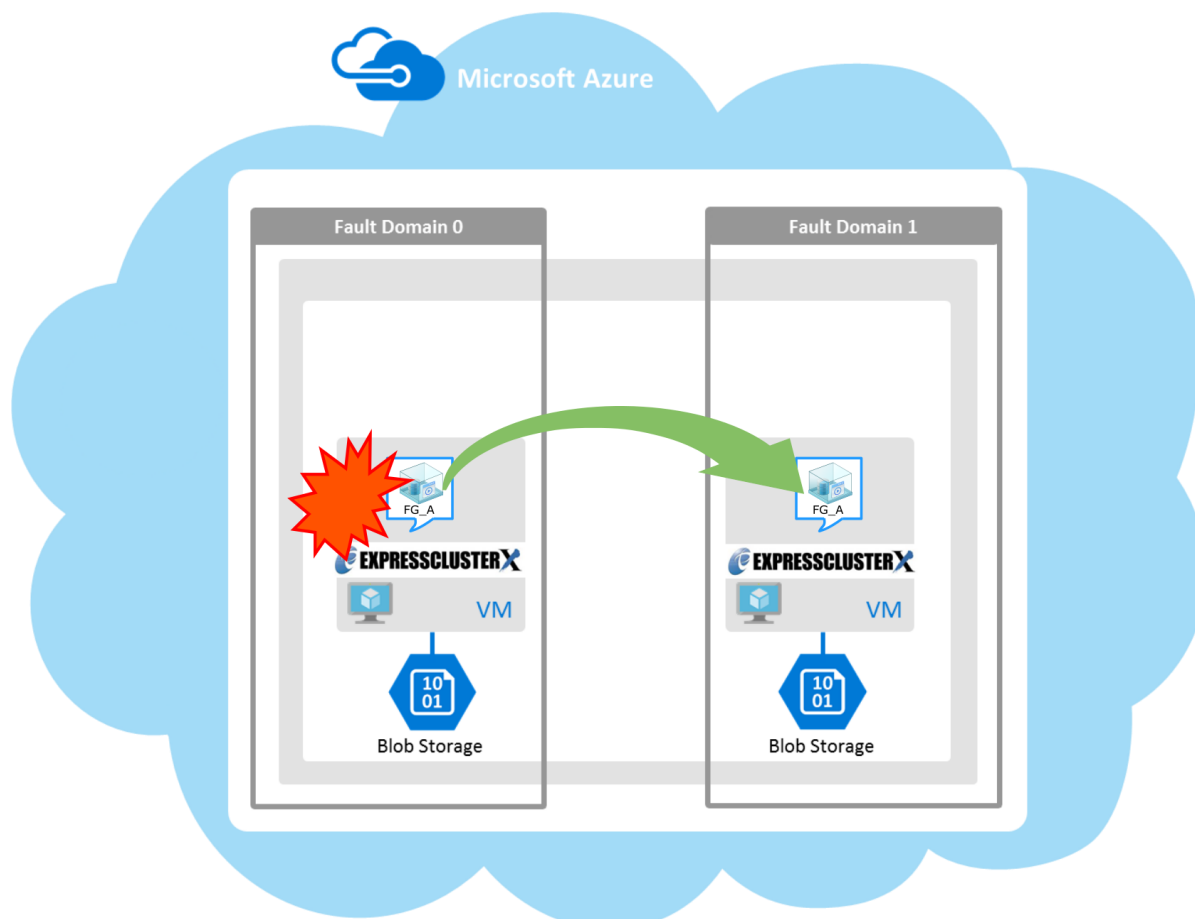


Figure 1-1 HA Cluster on a Cloud Service (Using Azure DNS)

Operational availability can be increased by clustering virtual machines (VMs in Figure 1-1) using a Microsoft Azure region and availability set in a Microsoft Azure environment.

- **Microsoft Azure region**
Physical and logical units called a Microsoft Azure region are provided.
It is possible to build all nodes in a single region (such as Japan East or Japan West). However, if all nodes are built in a single region, there is a possibility for nodes to go down due to a network failure or natural disaster, causing interruption to the flow of business. Distributing nodes into multiple regions can improve the operational availability.
- **Availability set**
Microsoft Azure allows each node to be deployed in a logical group called an *availability set*. Locating each node in an availability set minimizes the impact of planned maintenance or unplanned maintenance due to a physical hardware failure of the Microsoft Azure platform. This guide describes the configuration using an availability set.
For details about an availability set, see the following website:
Manage the availability of Windows virtual machines in Azure:
<https://docs.microsoft.com/en-us/azure/virtual-machines/windows/manage-availability>

1.2 Basic configuration

This guide assumes two types of HA clusters. One is an HA cluster using Azure DNS of the Resource Manager deployment model. The other is an HA cluster using a load balancer of the Resource Manager deployment model. (Both HA clusters are configured as a unidirectional standby cluster.) The following table describes the EXPRESSCLUSTER resources to be selected depending on the Microsoft Azure deployment model in use.

Purpose	EXPRESSCLUSTER resource to use
Accessing the cluster by using a DNS name (Use Azure DNS recordset)	Azure DNS resource
Accessing the cluster by using a virtual IP address (Use frontend IP address of load balancer)	Azure probe port resource

HA cluster using Azure DNS

In this configuration, two virtual machines are deployed the same resource group so that the cluster can be accessed by using the same DNS name. The EXPRESSCLUSTER Azure DNS resource uses Azure DNS to enable access with a DNS name. For details about Azure DNS, see the following website:

Azure DNS: <https://azure.microsoft.com/en-us/services/dns/>

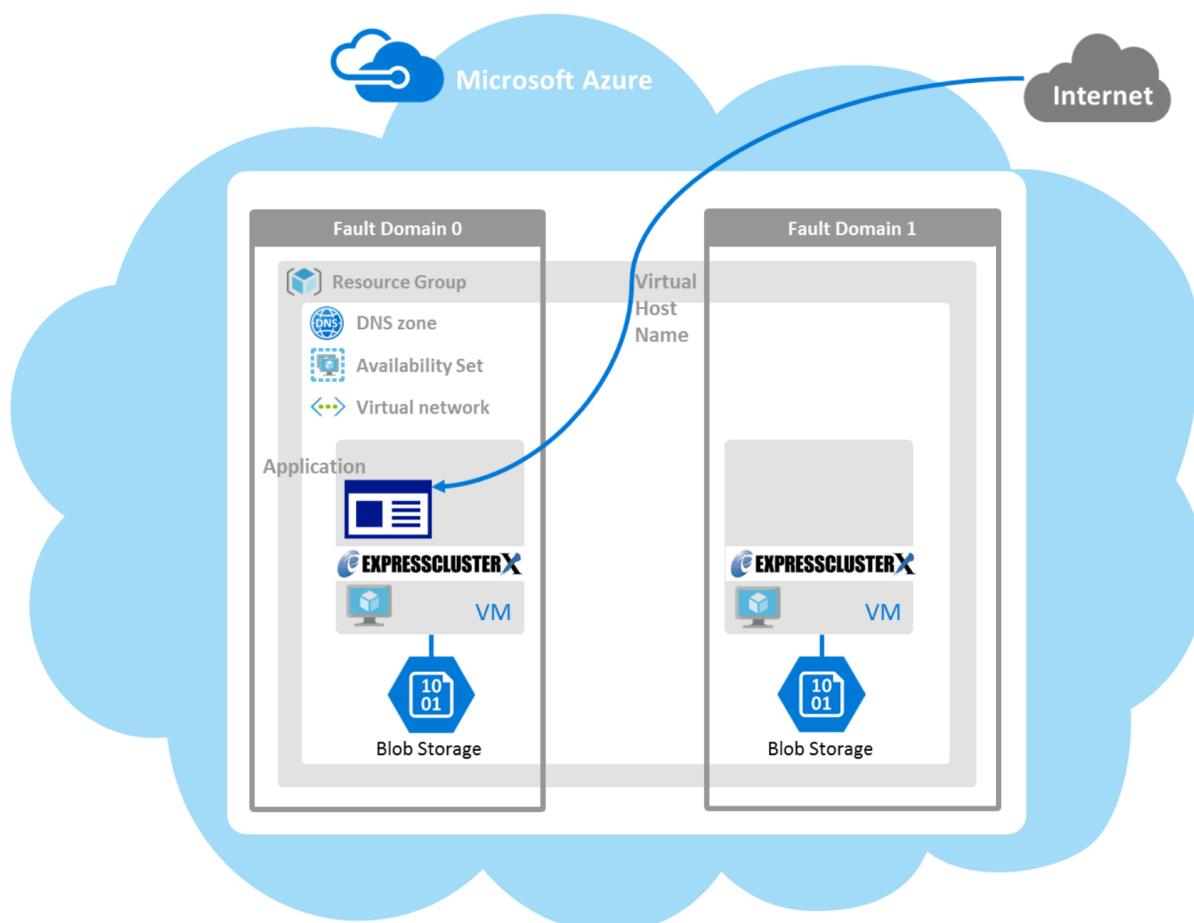


Figure 1-2 HA Cluster Using Azure DNS

These two virtual machines use the same availability set to minimize the impact of planned maintenance or unplanned maintenance due to a physical hardware failure of the Microsoft Azure platform.

The cluster in Figure 1-2 is accessed by using the DNS name of the Azure DNS zone. EXPRESSCLUSTER manages record sets and DNS A records of the Azure DNS zone to find an IP address according to the DNS name. A client need not be conscious about the switching of virtual machines upon failover occurrence or group migration.

The following table describes the EXPRESSCLUSTER resources and monitor resources required for a HA cluster configuration using Azure DNS.

Resource or monitor resource type	Description	Setting
Azure DNS resource	Manages record sets and DNS A records of the Azure DNS zone to find an IP address according to the DNS name.	Required
Azure DNS monitor resource	Checks the existence of a record set and monitors whether the name resolution is available in Azure DNS.	Required
IP monitor resource	Monitors whether communication with the Microsoft Azure Service Management API is possible, and also monitors health of communication with an external network.	When an Internet facing load balancer is used, required to monitor communication between clusters that are configured with virtual machines, and also to monitor health of communication with an internal network.
Custom monitor resource	Monitors communication between clusters that are configured with virtual machines, and also monitors health of communication with an internal network.	When an Internet facing load balancer is used, required to monitor whether communication with the Microsoft Azure Service Management API is possible, and also to monitor health of communication with an external network.
Multi-target monitor resource	Monitors the statuses of both the IP monitor resource and custom monitor resource. If the statuses of both monitor resources are abnormal, a script in which a process for network partition resolution (NP resolution) is described is executed.	When an Internet facing load balancer is used, required to monitor health of communication between an internal network and external network.
Other resources and monitor resources	Depends on the configuration of application, such as a mirror disk, that is used in an HA cluster.	Optional

For details about other resources and monitor resources, see the following:

- Chapter 5, “Group resource details” in the *Reference Guide*.
- Chapter 6, “Monitor resource details” in the *Reference Guide*.

HA cluster using a load balancer

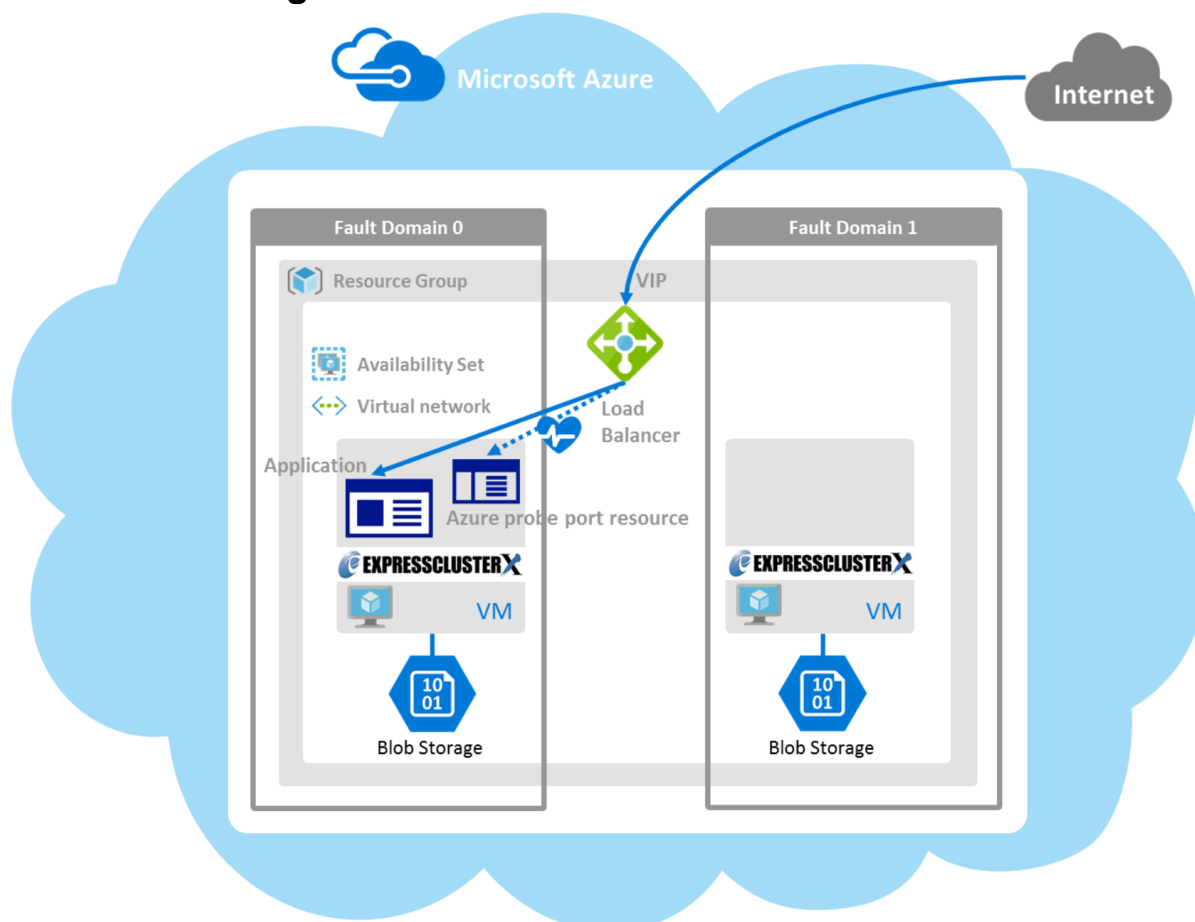


Figure 1-3 HA Cluster Using an Internet Facing Load Balancer

A client application can connect a virtual machine on an availability set in a Microsoft Azure environment to a cluster node by using a public virtual IP address (hereinafter referred to as VIP). By using a VIP, a client need not be conscious about the switching of virtual machines upon failover occurrence or group migration.

A cluster built in a Microsoft Azure environment in Figure 1-3 is accessed by specifying a global IP address of the Microsoft Azure Load Balancer (Load Balancer in Figure 1-3).

Active and standby nodes of a cluster are switched by using probes of Microsoft Azure Load Balancer. To use Microsoft Azure Load Balancer probes, use a probe port provided by the EXPRESSCLUSTER Azure probe port resource.

Activating the Azure probe port resource starts a probe port control process in standby for alive monitoring (access to a probe port) from Microsoft Azure Load Balancer.

Deactivating the Azure probe port resource stops a probe port control process in standby for alive monitoring (access to a probe port) from Microsoft Azure Load Balancer.

The Azure probe port resource also supports the Microsoft Azure internal load balancer (Internal Load Balancing: ILB). For the internal load balancer, a Microsoft Azure private IP address is used as a VIP.

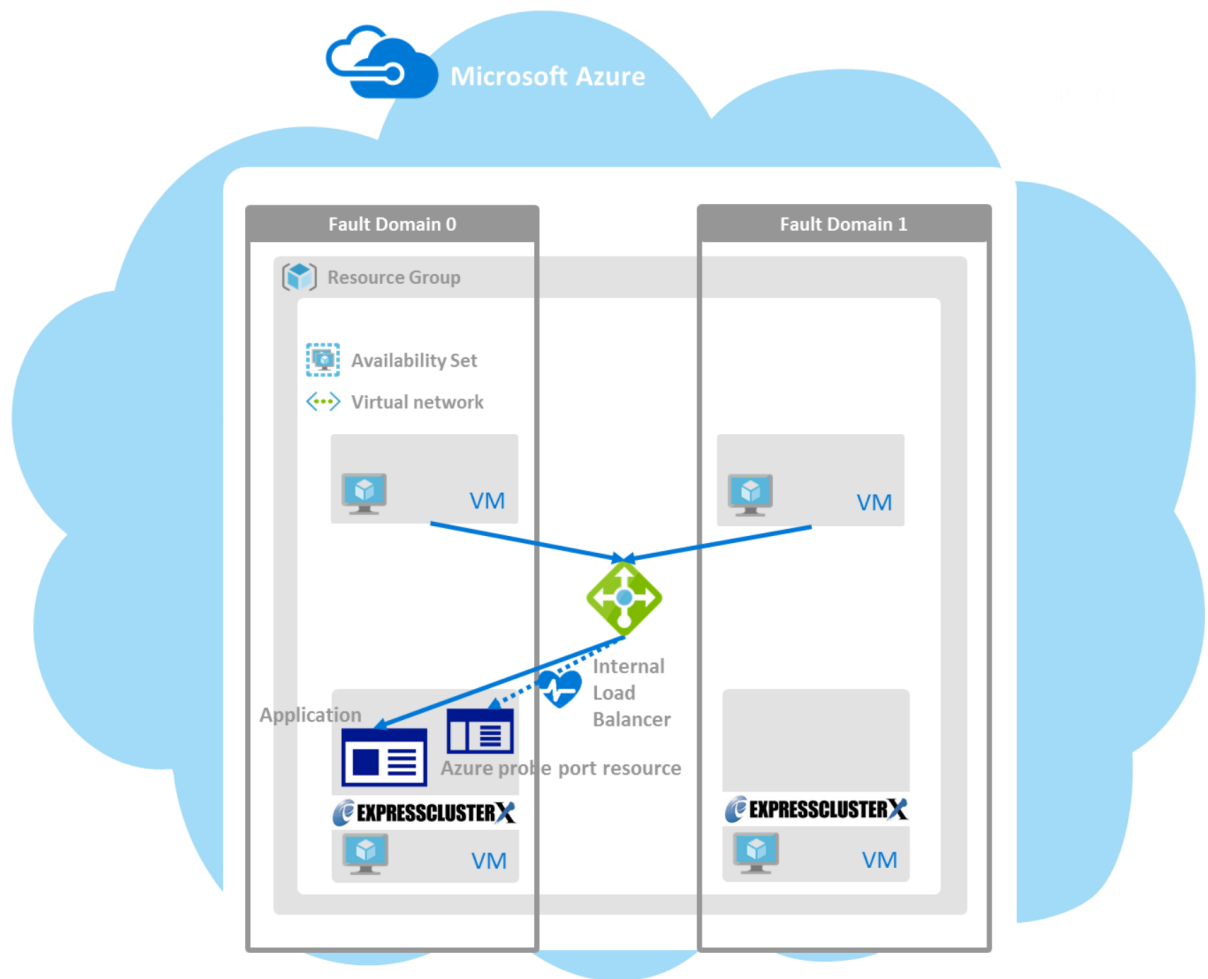


Figure 1-4 HA Cluster Using the Internal Load Balancer

The following are examples of two HA cluster configurations using a load balancer. Select a load balancer to use depending on your purpose.

Purpose	Load balancer to use	Creating procedure
Disclosing operations outside the Microsoft Azure network	Internet facing load balancer	See " Chapter 4 Cluster Creation Procedure (for an HA Cluster Using an Internet Facing Load Balancer)" in this guide.
Publishing operations within the Microsoft Azure network	Internal load balancer (ILB)	See " Chapter 5 Cluster Creation Procedure (for an HA Cluster Using an Internal Load Balancer)" in this guide.

The following table describes the EXPRESSCLUSTER resources and monitor resources required for a HA cluster using a load balancer.

Resource or monitor resource type	Description	Setting
Azure probe port resource	Provides a mechanism to wait for alive monitoring from a load balancer on a specific port of a node in which operations are running.	Required
Azure probe port monitor resource	Performs alive monitoring of a probe port control process, which starts upon activation of the Azure probe port resource, for a node in which the Azure probe port resource is running.	Required
Azure load balance monitor resource	Monitors whether a port with the same number as a probe port is open for a node in which the Azure probe port resource is not running.	Required
IP monitor resource	Monitors whether communication with the Microsoft Azure Service Management API is possible, and also monitors health of communication with an external network.	When an Internet facing load balancer is used, required to monitor communication between clusters that are configured with virtual machines, and also to monitor health of communication with an external network.
Custom monitor resource	Monitors communication between clusters that are configured with virtual machines, and also monitors health of communication with an internal network.	When an Internet facing load balancer is used, required to monitor whether communication with the Microsoft Azure Service Management API is possible, and also to monitor health of communication with an external network.
Multi-target monitor resource	Monitors the statuses of both the IP monitor resource and custom monitor resource. If the statuses of both monitor resources are abnormal, a script in which a process for network partition resolution (NP resolution) is described is executed.	When an Internet facing load balancer is used, required to monitor health of communication between an internal network and external network.
PING network partition resolution resource	When an internal load balancer (ILB) is used, monitors health of communication between subnets by checking whether to communicate with a device that is always on and can return a response to ping (ping device).	When an internal load balancer (ILB) is used, required to monitor health of communication between subnets.
Other resources and monitor resources	Depends on the configuration of application, such as a mirror disk, that is used in an HA cluster.	Optional

For details about other resources and monitor resources, see the following:

- Chapter 5, “Group resource details” in the *Reference Guide*.
- Chapter 6, “Monitor resource details” in the *Reference Guide*.

1.3 Network partition resolution

Virtual machines configuring an HA cluster mutually performs alive monitoring through a heartbeat communication. If the virtual machines exist in different subnets, an undesirable event, such as an application starting more than once, occurs if a heartbeat ceases. To prevent a service from starting more than once, it is necessary to identify whether other virtual machines went down or whether the applicable virtual machine was isolated from a network (network partitioning: NP).

The network partition resolution feature (NP resolution) sends ping to or checks a LISTEN port of a device that is always on and can return a response to ping etc. (access destination). If there is no reply, this feature judges that the device entered the NP status and executes the specified action (such as a warning, recovery action, and server shutdown).

The access destination used on Microsoft Azure described in the following table.

(*) A private IP address of an internal load balancer (ILB) cannot be used because it does not reply to ping.

Scope of disclosure	access destination	Procedure	EXPRESSCLUSTER resources, monitor resources, and commands to be used for NP resolution
Outside the Microsoft Azure Virtual network	Microsoft Azure Service Management API (management.core.windows.net)	Checking a LISTEN port	• Custom monitor resource • clpazure_port_checker command
	each cluster server	Ping	• IP monitor resource
Inside the Microsoft Azure Virtual network	Servers, excluding a cluster server, that exist within the Microsoft Azure network(*)	Ping	• PING network partition resolution resource

For details about NP resolution, see the following:

- Chapter 7, “Network partition resolution resources details” in the *Reference Guide*.

Setting the NP resolution destination

You need to examine the NP resolution destination and method depending on the location of clients accessing a cluster system and the condition for connecting to an on-premise environment (for example, using a dedicated line).

How to judge the network partition status

EXPRESSCLUSTER provides the clpazure_port_checker command to judge the network partition status. Use this command as **Script created with this product** of the custom monitor resource or multi-target monitor resource.

For details about the clpazure_port_checker command, see the following subsections.

Checking the TCP port listening status (clpazure_port_checker command)

`clpazure_port_checker` Checks whether a LISTEN port exists among TCP ports of the specified server.

Command line

`clpazure_port_checker -h hostname -p port`

Description This command checks whether a LISTEN port exists among TCP ports of the server specified for an argument.
If there is no response five seconds (fixed) after the command execution, it is judged that an error (timeout) has occurred.
In case of an error, an error message is output to the standard output.
Executing this command from the custom monitor resource makes it possible to judge the network partition status.
For the configuration example of network partition resolution using this command, see "3.3 Configuring the EXPRESSCLUSTER settings" and "5.3 Configuring the EXPRESSCLUSTER settings"

Options	<code>-h <i>hostname</i></code>	Specify the determining server as <i>hostname</i> (by using an FQDN name or IP address). This option cannot be omitted.
	<code>-p <i>port</i></code>	Specify the determining port number as <i>port</i> (by using a port number or service name). This option cannot be omitted.

Return values	0	Normal
	1	Error (communication error)
	2	Error (timeout)
	3	Error (invalid argument or internal error)

1.4 Differences between on-premises and Microsoft Azure

The following table describes the functional differences of EXPRESSCLUSTER between on-premises and Microsoft Azure. "Y" indicates that the relevant function can be used and "N" indicates that the relevant function cannot be used.

Function	On-premise	Microsoft Azure Resource Manager deployment model
Creating a shared disk type cluster	Y	N
Creating a mirror disk type cluster	Y	Y
Creating a hybrid disk type cluster	Y	N
Using the floating IP resource	Y	N
Using the virtual IP resource	Y	N
Using the Azure probe port resource	N	Y
Using the Azure DNS resource	N	Y

For the procedure to create a 2-node cluster using a mirror disk on an on-premise or Microsoft Azure environment, see the following subsections.

The difference of the procedure to create a cluster between an on-premise environment and Microsoft Azure environment is whether or not configuring the Microsoft Azure settings in advance is required.

HA cluster using Azure DNS

For Microsoft Azure, execute steps 1 to 6 in the following table after logging in to the Microsoft Azure portal (<https://portal.azure.com/>).

For Microsoft Azure, execute steps 7 to 17 after logging in to each virtual machine.

Step No.	Procedure	On-premise	Microsoft Azure
Before installing EXPRESSCLUSTER			
1	Creating a resource group	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
2	Creating a virtual network	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
3	Creating a virtual machine	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
4	Setting a private IP address	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
5	Adding Blob storage	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
6	Creating a DNS zone	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
7	Setting up the DNS server	See the manual provided with the OS or DNS server.	Not required
8	Setting a partition for the mirror disk resource	See the following: <ul style="list-style-type: none">"Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the <i>Installation and Configuration Guide</i>."Understanding mirror disk resources" in Chapter 5, "Group resource details" in the <i>Reference Guide</i>.	See "3.2 Configuring Microsoft Azure" in this guide.

Step No.	Procedure	On-premise	Microsoft Azure
9	Adjusting the OS startup time	See "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the <i>Installation and Configuration Guide</i> .	Same as "On-premise"
10	Checking the network setting		
11	Checking the firewall setting		
12	Synchronizing the server time		
13	Disabling the power saving function		
14	Installing the Azure CLI	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
15	Registering the service principal	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
16	Installing EXPRESSCLUSTER	See Chapter 3, "Installing EXPRESSCLUSTER." in the <i>Installation and Configuration Guide</i> .	Same as "On-premise"
After installing EXPRESSCLUSTER			
17	Registering the EXPRESSCLUSTER license	See Chapter 4, "Registering the license." in the <i>Installation and Configuration Guide</i> .	Same as "On-premise"
18	Creating a cluster: Setting the heartbeat method	See "Creating the configuration data of a node cluster" in Chapter 5, "Creating the cluster configuration data" in the <i>Installation and Configuration Guide</i> .	The COM heartbeat, BMC heartbeat, and disk heartbeat cannot be used.
19	Creating a cluster: Setting the NP resolution processing	<p>The network partition resolution resource is used. See the following:</p> <ul style="list-style-type: none"> "Creating the configuration data of a node cluster" in Chapter 5, "Creating the cluster configuration data".in the <i>Installation and Configuration Guide</i>. Chapter 8, "Network partition resolution resources details" in the <i>Reference Guide</i>. 	See "5.3 Configuring the EXPRESSCLUSTER settings" in this guide.
20	Creating a cluster: Creating a failover group and monitor resource	See "Creating the configuration data of a node cluster" in Chapter 5, "Creating the cluster configuration data".in the <i>Installation and Configuration Guide</i> .	<p>In addition to the references for on-premises, see the following:</p> <ul style="list-style-type: none"> ➤ "Understanding Azure DNS resources" in Chapter 5, "Group resource details" in the Reference Guide. ➤ "Understanding Azure DNS monitor resources" in Chapter 6, "Monitor resource details" in the Reference Guide. ➤ "3.3 Configuring the EXPRESSCLUS settings" in this guide.

HA cluster using a load balancer

For Microsoft Azure, execute steps 1 to 5, and 7 to 8 in the following table after logging in to the Microsoft Azure portal (<https://portal.azure.com/>).

For Microsoft Azure, execute steps 6, and 9 to 15 after logging in to each virtual machine.

Step No.	Procedure	On-premise	Microsoft Azure
Before installing EXPRESSCLUSTER			
1	Creating a resource group	Not required	See either of the following depending on the load balancer to use: <ul style="list-style-type: none"> • "4.2 Configuring Microsoft Azure" in this guide • "5.2 Configuring Microsoft Azure" in this guide
2	Creating a virtual network	Not required	See either of the following depending on the load balancer to use: <ul style="list-style-type: none"> • "4.2 Configuring Microsoft Azure" in this guide • "5.2 Configuring Microsoft Azure" in this guide
3	Creating a virtual machine	Not required	See either of the following depending on the load balancer to use: <ul style="list-style-type: none"> • "4.2 Configuring Microsoft Azure" in this guide • "5.2 Configuring Microsoft Azure" in this guide
4	Setting a private IP address	Not required	See either of the following depending on the load balancer to use: <ul style="list-style-type: none"> • "4.2 Configuring Microsoft Azure" in this guide • "5.2 Configuring Microsoft Azure" in this guide
5	Adding Blob storage	Not required	See either of the following depending on the load balancer to use: <ul style="list-style-type: none"> • "4.2 Configuring Microsoft Azure" in this guide • "5.2 Configuring Microsoft Azure" in this guide
6	Setting a partition for the mirror disk resource	See the following: <ul style="list-style-type: none"> • "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the <i>Installation and Configuration Guide</i> • "Understanding mirror disk resources" in Chapter 5, "Group resource details" in the <i>Reference Guide</i>. 	See either of the following depending on the load balancer to use: <ul style="list-style-type: none"> • "4.2 Configuring Microsoft Azure" in this guide • "5.2 Configuring Microsoft Azure" in this guide
7	Creating and configuring a load balancer	Not required	See either of the following depending on the load balancer to use: <ul style="list-style-type: none"> • "4.2 Configuring Microsoft Azure" in this guide

Step No.	Procedure	On-premise	Microsoft Azure
			<ul style="list-style-type: none"> • "5.2 Configuring Microsoft Azure" in this guide
8	Setting the inbound security rules	Not required	See either of the following depending on the load balancer to use: <ul style="list-style-type: none"> • "4.2 Configuring Microsoft Azure" in this guide • "5.2 Configuring Microsoft Azure" in this guide
9	Adjusting the OS startup time	See "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the <i>Installation and Configuration Guide</i> .	Same as "On-premise"
10	Checking the network setting		
11	Checking the firewall setting		
12	Synchronizing the server time		
13	Disabling the power saving function		
14	Installing EXPRESSCLUSTER	See Chapter 3, "Installing EXPRESSCLUSTER" in the <i>Installation and Configuration Guide</i> .	Same as "On-premise"
After installing EXPRESSCLUSTER			
15	Registering the EXPRESSCLUSTER license	See Chapter 4, "Registering the license" in the <i>Installation and Configuration Guide</i> .	Same as "On-premise"
16	Creating a cluster: Setting the heartbeat method	See "Creating the configuration data of a node cluster". in Chapter 5, "Creating the cluster configuration data" in the <i>Installation and Configuration Guide</i> .	The COM heartbeat, BMC heartbeat, and DISK heartbeat cannot be used.
17	Creating a cluster: Setting the NP resolution processing	The network partition resolution resource is used. See the following: <ul style="list-style-type: none"> • "Creating the configuration data of a node cluster" in Chapter 5, "Creating the cluster configuration data". in the <i>Installation and Configuration Guide</i> • Chapter 8, "Network partition resolution resources details" in the <i>Reference Guide</i>. 	See either of the following depending on the load balancer to use: <ul style="list-style-type: none"> • See "4.3 Configuring the EXPRESSCLUSTER settings" in this guide. • See "5.3 Configuring the EXPRESSCLUSTER settings" in this guide.
18	Creating a cluster: Creating a failover group and monitor resource	See "Creating the configuration data of a node cluster" in Chapter 5, "Creating the cluster configuration data" in the <i>Installation and Configuration Guide</i> .	See the following in addition to the description of "On-premise." <ul style="list-style-type: none"> • "Understanding Azure probe port resources" in Chapter 5, "Group resource details" in the <i>Reference Guide</i>. • "Understanding Azure load balance monitor resources" in Chapter 6, "Monitor resource details" in the <i>Reference Guide</i>.

Step No.	Procedure	On-premise	Microsoft Azure
			<ul style="list-style-type: none"> • "Understanding Azure load balance monitor resources" in Chapter 6, "Monitor resource details" in the <i>Reference Guide</i>. <p>See either of the following depending on the load balancer to use:</p> <ul style="list-style-type: none"> • See "4.3 Configuring the EXPRESSCLUSTER settings" in this guide. • See "5.3 Configuring the EXPRESSCLUSTER settings" in this guide.

Chapter 2 Operating Environments

2.1 HA cluster using Azure DNS

See the following:

- "Getting Started Guide" > "Chapter 3, Installation requirements for EXPRESSCLUSTER" > "Operation environment for Azure DNS resource and Azure DNS monitor resource"

x86_64

OS	Windows Server 2016 DataCenter
EXPRESSCLUSTER	EXPRESSCLUSTER X 4.0 for Windows(Internal version: 12.00)
Microsoft Azure deployment model	Resource Manager
Location	Japan East
Mirror disk size	Disk size: 20 GB (1 GB for a cluster partition and 19 GB for a data partition)
Azure CLI	2.0 (1.0 is not available.)
Python	2.7

The Azure CLI and Python must be installed because Azure DNS resource use them.

Python is installed together with the Azure CLI 2.0.

For details about the Azure CLI, see the following website:

Microsoft Azure Documentation:

<https://docs.microsoft.com/en-us/azure>

Azure DNS must be installed because Azure DNS resource use it. For details about Azure DNS, see the following website:

Azure DNS: <https://azure.microsoft.com/en-us/services/dns/>

2.2 HA cluster using a load balancer

See the following:

- "Operation environment for Azure probe port resource, Azure probe port monitor resource, Azure load balance monitor resource" in Chapter 3, "Installation requirements for EXPRESSCLUSTER" in the *Getting Started Guide*.

Chapter 3 Cluster Creation Procedure (for an HA Cluster Using Azure DNS)

3.1 Creation example

This guide introduces the procedure for creating a 2-node unidirectional standby cluster using EXPRESSCLUSTER. This procedure is intended to create a mirror disk type configuration in which node-1 is used as an active server.

The following tables describe the parameters that do not have a default value and the parameters whose values are to be changed from the default values.

- Microsoft Azure settings (common to node-1 and node-2)

Setting item	Setting value
Resource group setting	
Name	TestGroup1
Resource group location	Japan East
Virtual network setting	
Name	Vnet1
Address space	10.5.0.0/24
Subnet name	Vnet1-1
Subnet address range	10.5.0.0/24
Resource group name	TestGroup1
Location	Japan East
DNS zone setting	
Name	cluster1.zone
Resource group	TestGroup1
Resource group location	Japan East
Record set	test-record1

- Microsoft Azure settings (specific to each of node-1 and node-2)

Setting item	Setting value	
	node-1	node-2
Virtual machine setting		
VM disk type	HDD	
User name	testlogin	
Password	PassWord_123	
Resource group name	TestGroup1	
Location	Japan East	
Storage account setting		
Name	clstorageacc1	
Performance	Standard	
Replication	Locally-redundant storage (LRS)	
Network security group setting		
Name	NetSecGroup-1	
Availability set setting		
Name	AvailabilitySet-1	
Update domains	5	
Fault domains	3	
Diagnostics storage account setting		
Name	clstorageaccdiag1	
Performance	Standard	
Replication	Locally-redundant storage (LRS)	
IP configuration setting		
IP address	10.5.0.120	10.5.0.121

Setting item	Setting value	
	node-1	node-2
Blob storage setting		
Name	Node-1Blob1	Node-2Blob1
Source type	New (empty disk)	
Account type	Standard (HDD)	
Size	20	

- EXPRESSCLUSTER settings (cluster properties)

Setting item	Setting value	
	node-1	node-2
Cluster Name	Cluster1	
Server Name	node-1	node-2
Timeout Tab: Heartbeat Timeout	210	

- EXPRESSCLUSTER settings (failover group)

Resource name	Setting item	Setting value
Mirror disk resource	Name	md
	Details Tab: Data Partition Drive Letter	G:
	Details Tab: Cluster Partition Drive Letter	F:
Azure DNS resource	Name	azuredns1
	Record Set Name	test-record1
	Zone Name	cluster1.zone
	IP Address	(node1) 10.5.0.120 (node2) 10.5.0.121
	Resource Group Name	TestGroup1
	User URI	http://azure-test
	Tenant ID	xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
	File Path of Service Principal	C:\Users\testlogin\examplecert.pem
	Azure CLI File path	C:\Program Files(x86)\Microsoft SDKs\Azure\CLI2\bin\az.cmd

- EXPRESSCLUSTER settings (monitor resource)

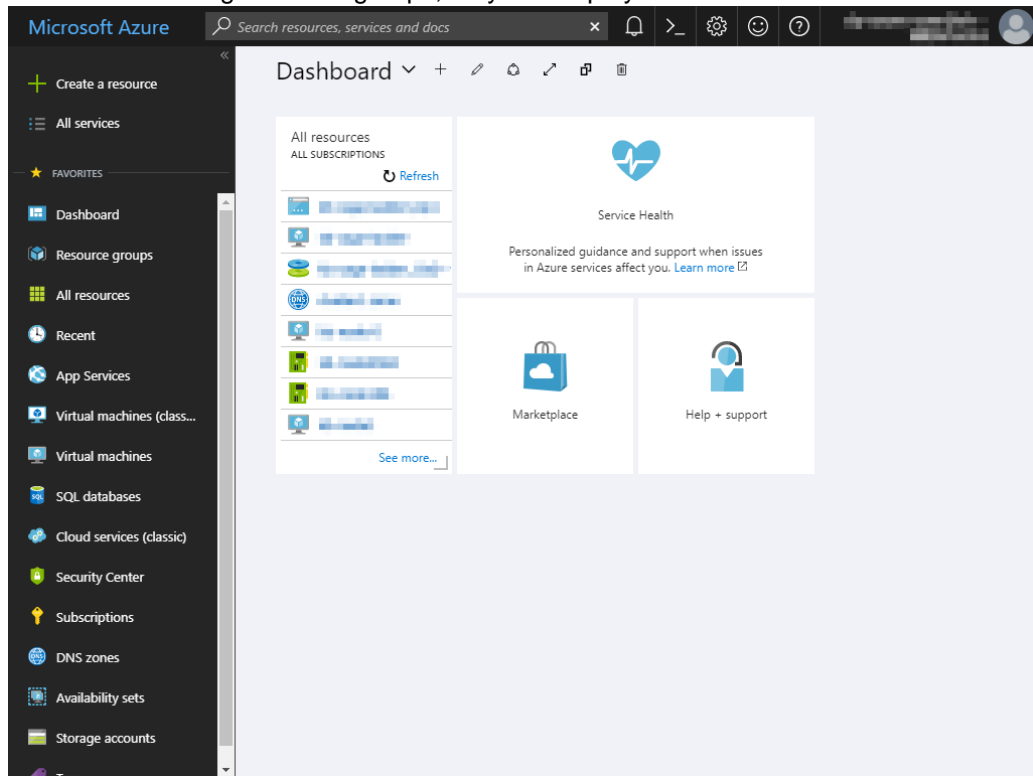
Monitor resource name	Setting item	Setting value
Mirror disk monitor resource	-	-
Azure DNS monitor resource	Name	azurednsw1
Custom monitor resource	Name	genw1
	Script created with this product	On
	Monitor Type	Synchronous
	Normal Return Value	0
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
IP monitor resource	Name	ipw1
	Server to monitor	node-1
	IP address	10.5.0.121
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
IP monitor resource	Name	ipw2
	Server to monitor	node-2
	IP address	10.5.0.120
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
Multi-target monitor resource	Name	mtw1
	Monitor resource list	genw1 ipw1 ipw2
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer

3.2 Configuring Microsoft Azure

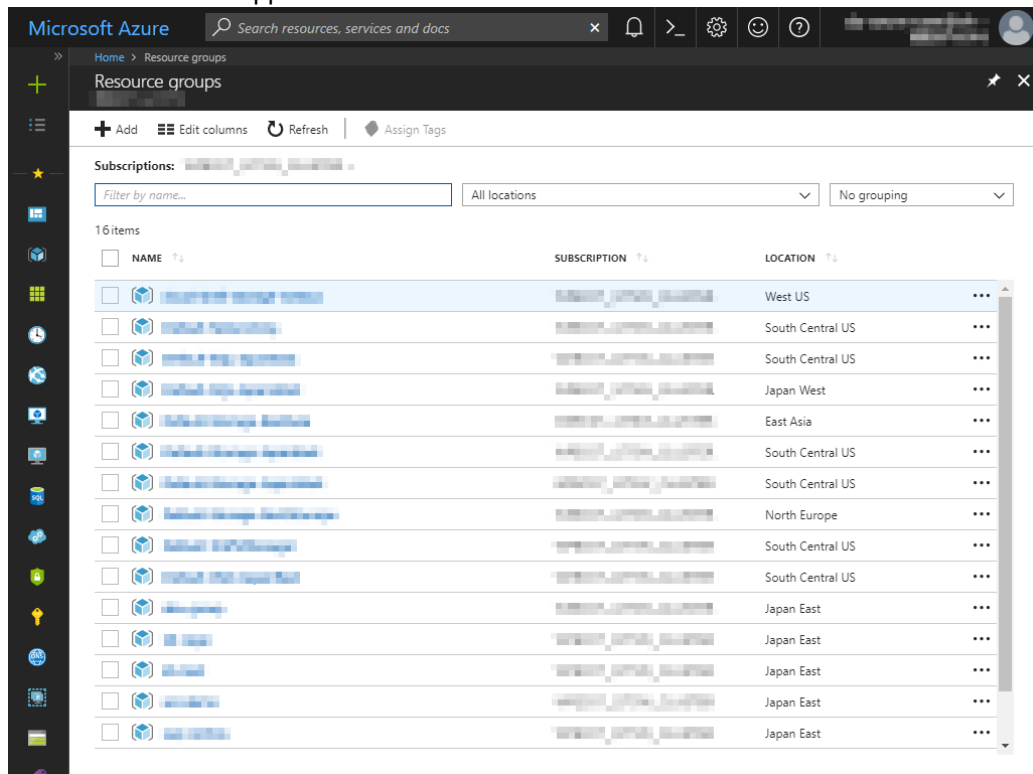
1) Creating a resource group

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and create a resource group following the steps below.

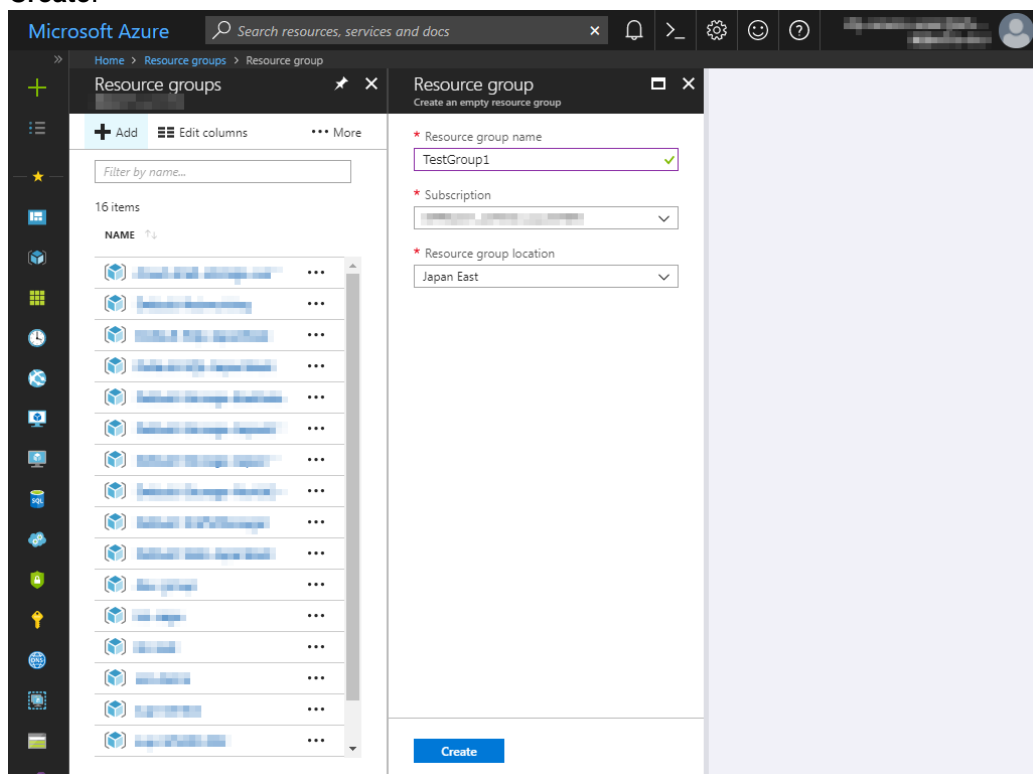
1. Select **Resource groups** or the resource group icon in the menu on the left side of the window. If there are existing resource groups, they are displayed in a list.



2. Select **+Add** at the upper left of the window.



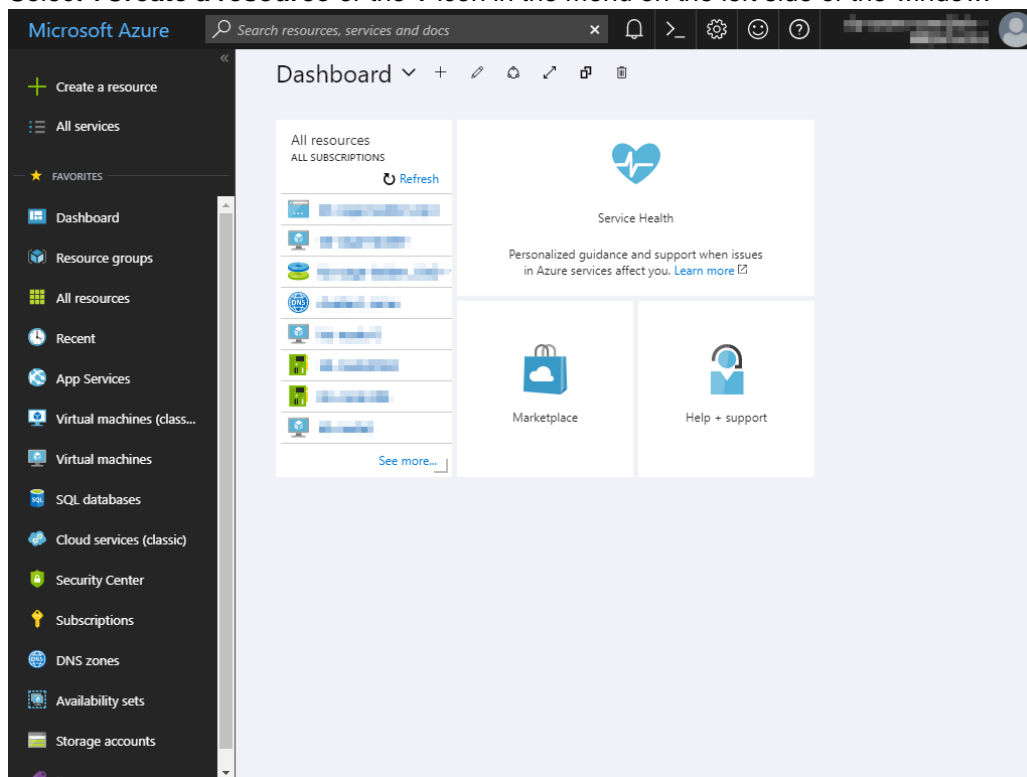
3. Specify **Resource group name**, **Subscription**, and **Resource group location**, and click **Create**.



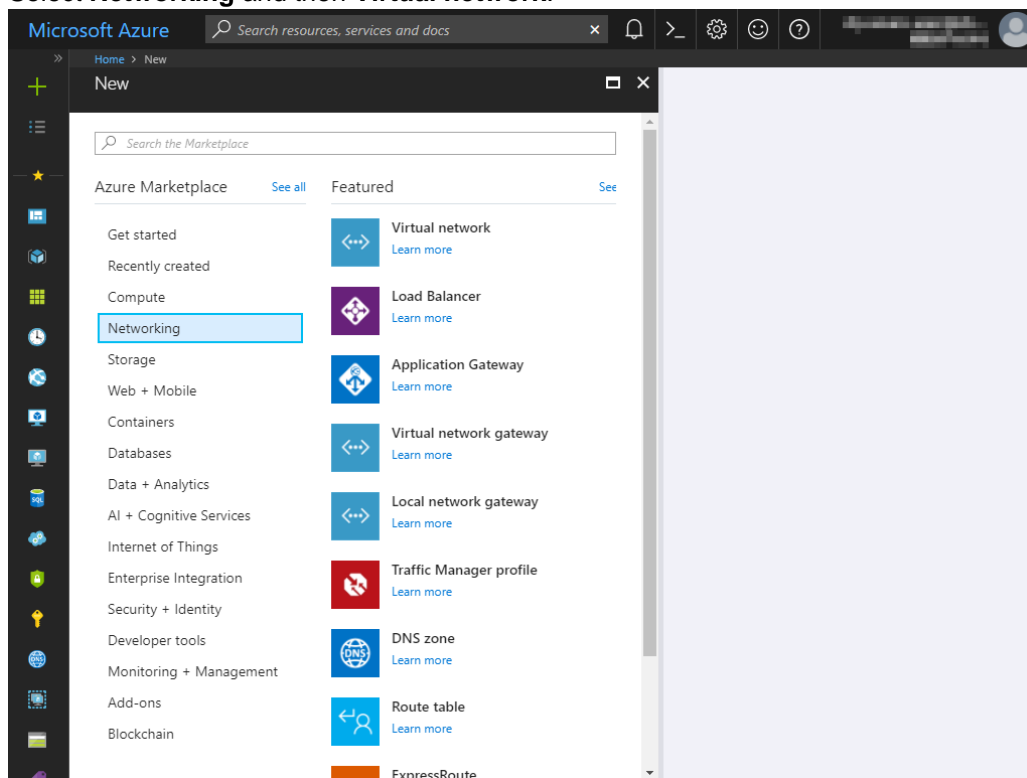
2) Creating a virtual network

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and create a virtual network following the steps below.

1. Select **+Create a resource** or the **+** icon in the menu on the left side of the window.



2. Select **Networking** and then **Virtual network**.



3. Specify **Name**, **Address space**, **Subscription**, **Resource group name**, **Location**, **Name of Subnet**, and **Address range**, and click **Create**.

The screenshot shows the 'Create virtual network' form in the Microsoft Azure portal. The form is titled 'Create virtual network' and is located under the 'Home > New > Create virtual network' breadcrumb. The form fields are as follows:

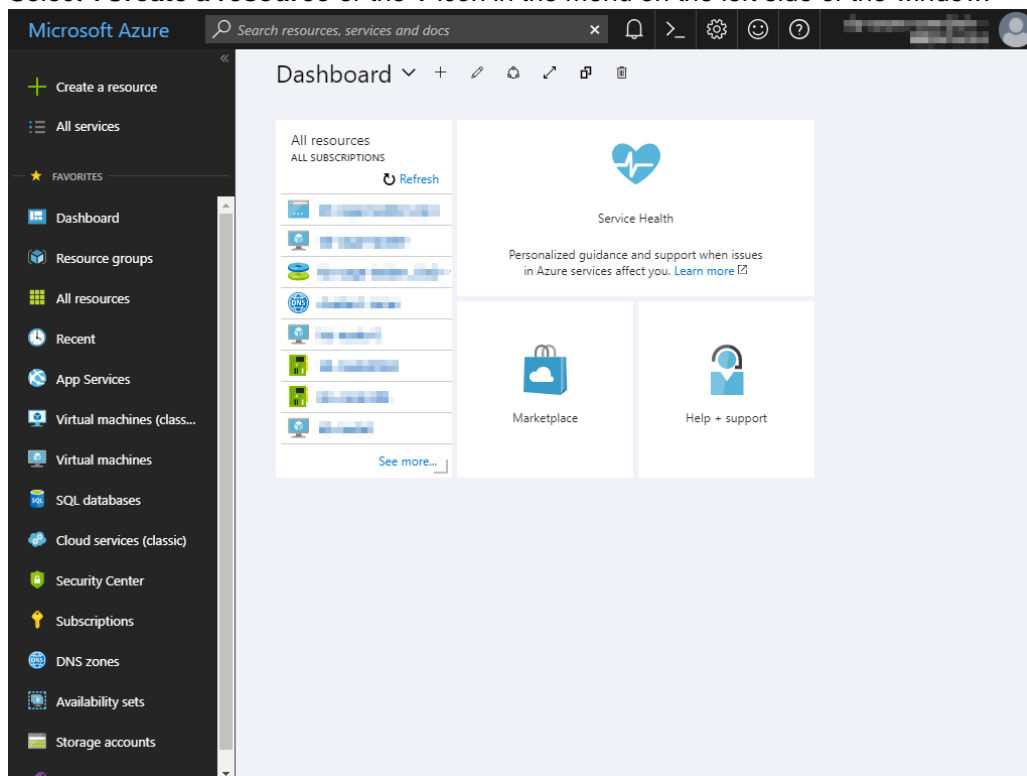
- Name:** Vnet1 (with a green checkmark)
- Address space:** 10.5.0.0/24 (with a green checkmark and a note: 10.5.0.0 - 10.5.0.255 (256 addresses))
- Subscription:** (dropdown menu)
- Resource group:** ☐ Create new ☒ Use existing (selected)
- Resource group name:** TestGroup1 (dropdown menu)
- Location:** Japan East (dropdown menu)
- Subnet:**
 - Name:** Vnet1-1 (with a green checkmark)
 - Address range:** 10.5.0.0/24 (with a green checkmark and a note: 10.5.0.0 - 10.5.0.255 (256 addresses))
- Service endpoints:** ☒ Disabled ☐ Enabled
- Pin to dashboard:** ☐
- Create:** (blue button)
- Automation options:** (link)

3) Creating a virtual machine

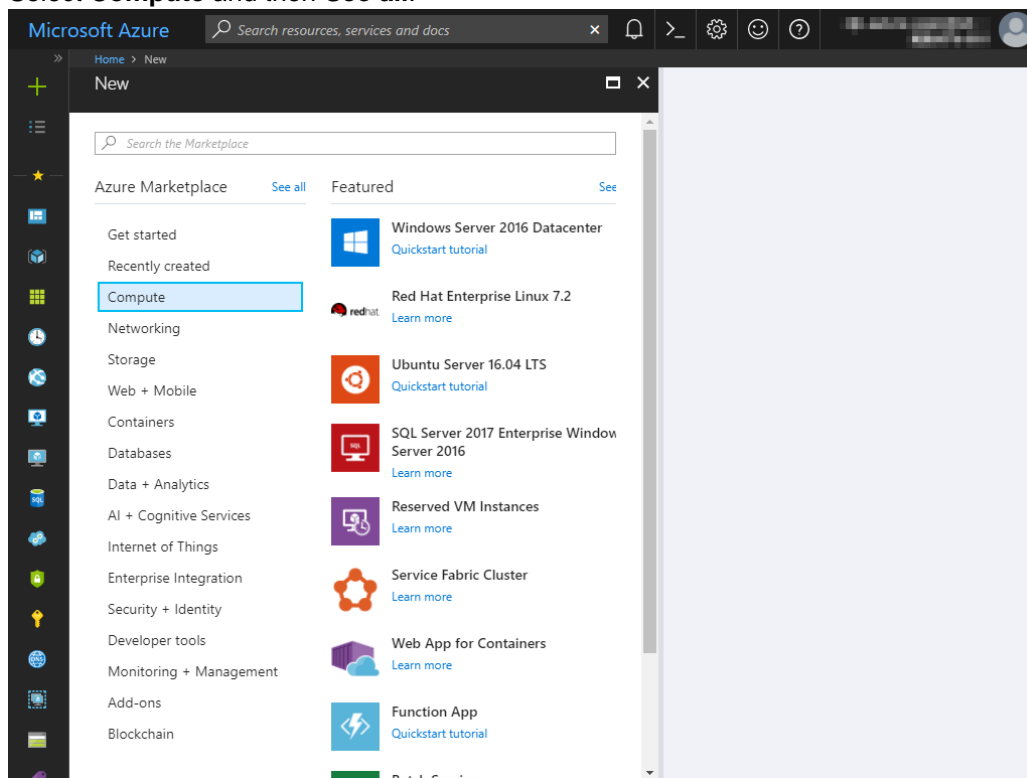
Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and create virtual machines and disks following the steps below.

Create as many virtual machines as required to create a cluster. Create node-1 and then node-2.

1. Select **+Create a resource** or the **+** icon in the menu on the left side of the window.



2. Select **Compute** and then **See all**.



3. Select **Windows Server 2016 Datacenter**.
4. The **Basics** blade is displayed. Specify **Name**, **VM disk type**, **User name**, **Password**, **Confirm password**, **Subscription**, **Resource group name**, and **Location**, and click **OK**. For **Name**, specify node-1 for node-1 and node-2 for node-2.

Microsoft Azure

Home > New > Create virtual machine > Basics

Create virtual machine

1 Basics
Configure basic settings

2 Size
Choose virtual machine size

3 Settings
Configure optional features

4 Summary
Windows Server 2016 Datacenter

* Name
node-1 ✓

VM disk type
HDD

* User name
testlogin ✓

* Password
•••••••• ✓

* Confirm password
•••••••• ✓

Subscription
[Dropdown]

* Resource group
☐ Create new ☒ Use existing
TestGroup1

* Location
Japan East

Save money
Save up to 40% with a license you already have

OK

5. The **Choose a size** blade is displayed. Select the size appropriate for the usage purpose of the virtual machines from the list and click **Select**. In this guide, **A1 Standard** is selected.

Microsoft Azure

Home > New > Create virtual machine > Choose a size

Create virtual machine

1 Basics
Done ✓

2 Size
Choose virtual machine size

3 Settings
Configure optional features

4 Summary
Windows Server 2016 Datacenter

Choose a size
Browse the available sizes and their features

Supported disk type: HDD

Minimum vCPUs: 1

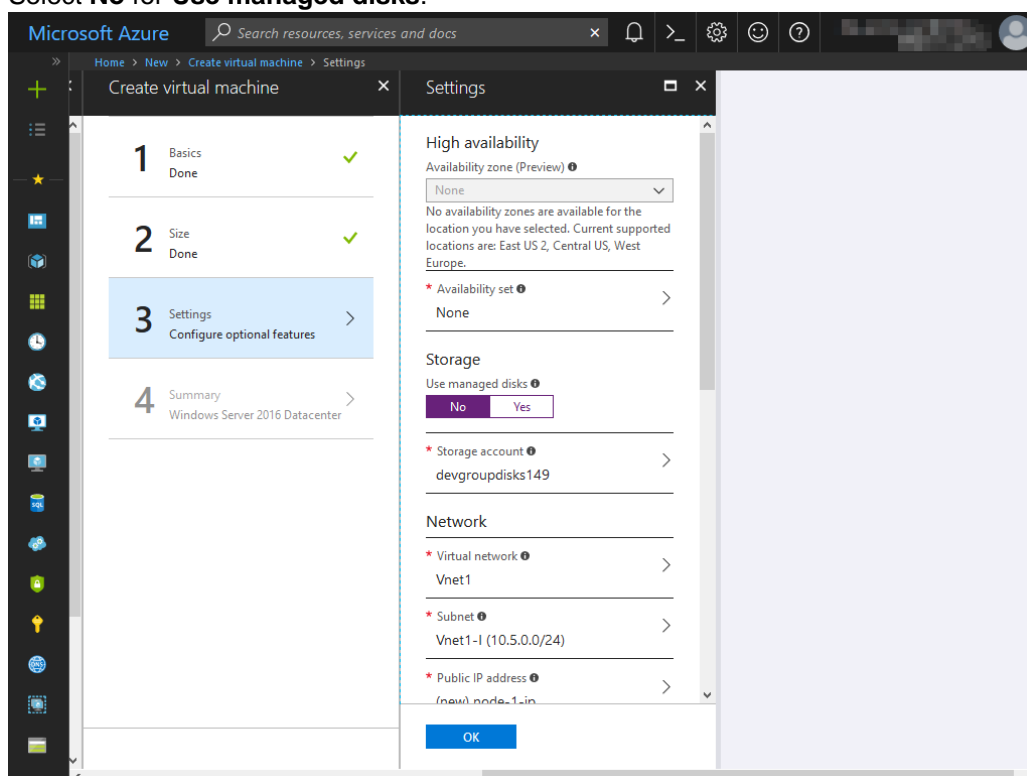
Minimum memory (GiB): 0

☆ Recommended | View all

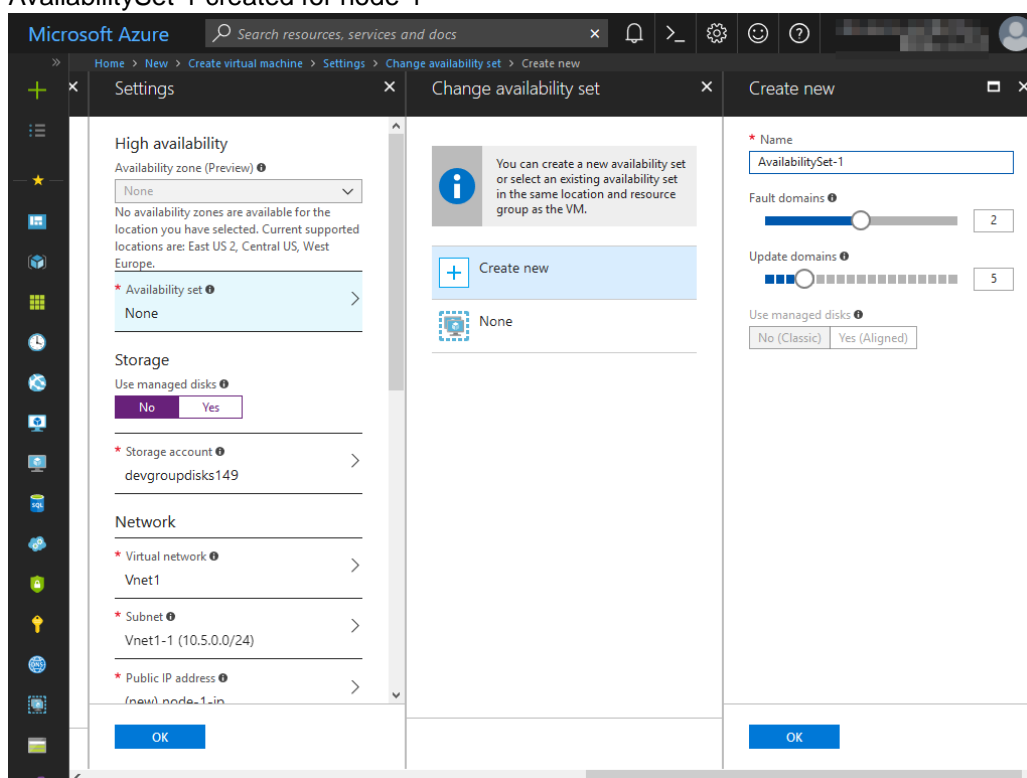
D1_V2 Standard	D1 Standard	A1 Standard
1 vCPU	1 vCPU	1 vCPU
3.5 GB	3.5 GB	1.75 GB
4 Data disks	4 Data disks	2 Data disks
2x500 Max IOPS	2x500 Max IOPS	2x500 Max IOPS
50 GB Local SSD	50 GB Local SSD	Load balancing
Load balancing	Load balancing	
11,226.96 JPY/MONTH (ESTIMATED)	11,226.96 JPY/MONTH (ESTIMATED)	5,148.48 JPY/MONTH (ESTIMATED)

Select

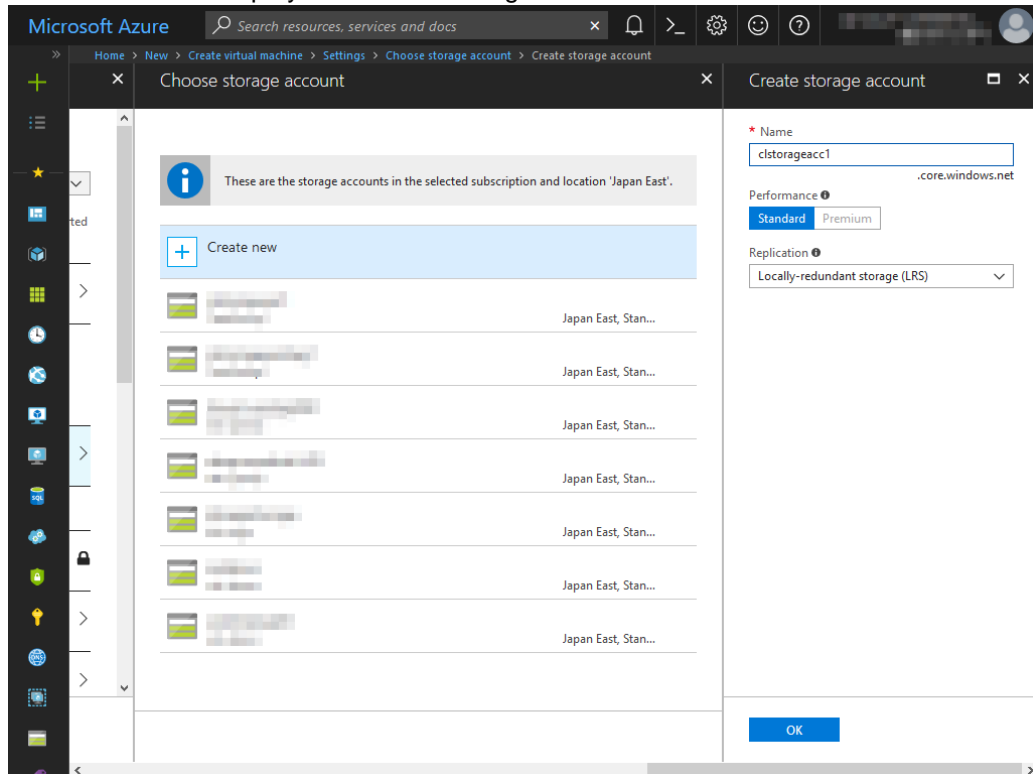
6. The **Settings** blade is displayed. Specify **Availability set**, **Storage account**, **Public IP address**, **Network security group**, and **Diagnostics storage account**.
7. Select **No** for **Use managed disks**.



8. Return to the **Settings** blade and select **Availability set**. For node-1, the **Change availability set** blade is displayed. Select **Create new**. Specify **Name**, **Fault domains**, and **Update domains**, and click **OK**. For node-2, the **Change availability set** blade is displayed. Select AvailabilitySet-1 created for node-1

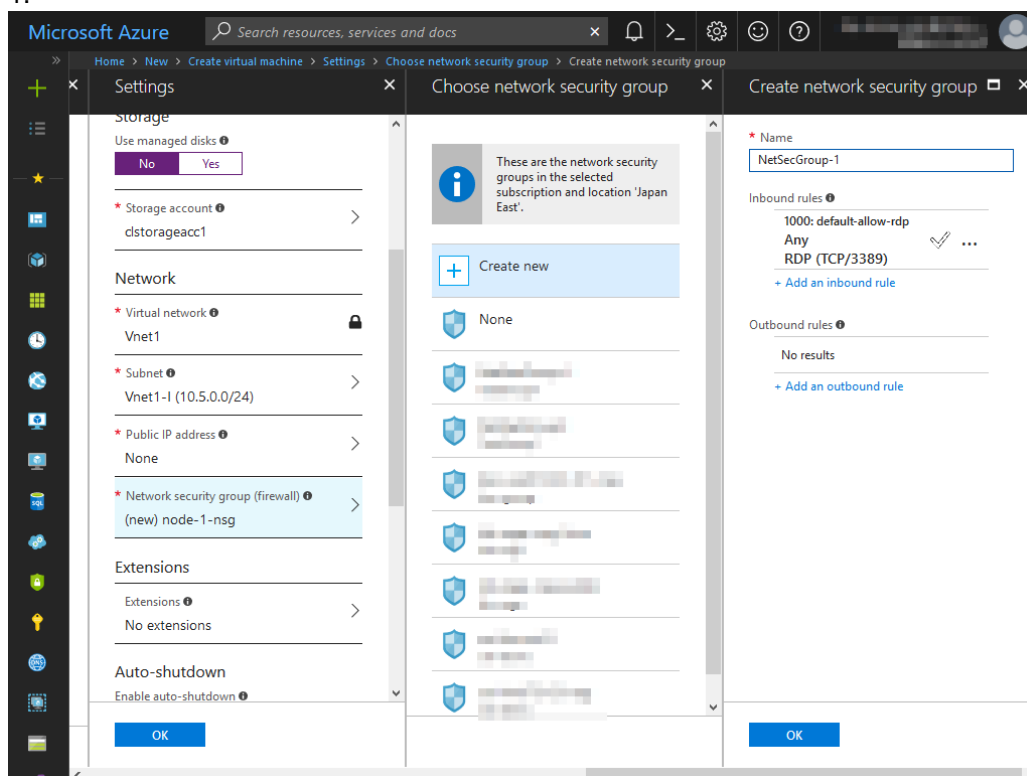


9. Select **Storage account**. For node-1, the **Create storage account** blade is displayed. Specify **Name**, **Performance**, and **Replication**, and click **OK**. For node-2, the **Choose storage account** blade is displayed. Select clstorageacc1 created for node-1.

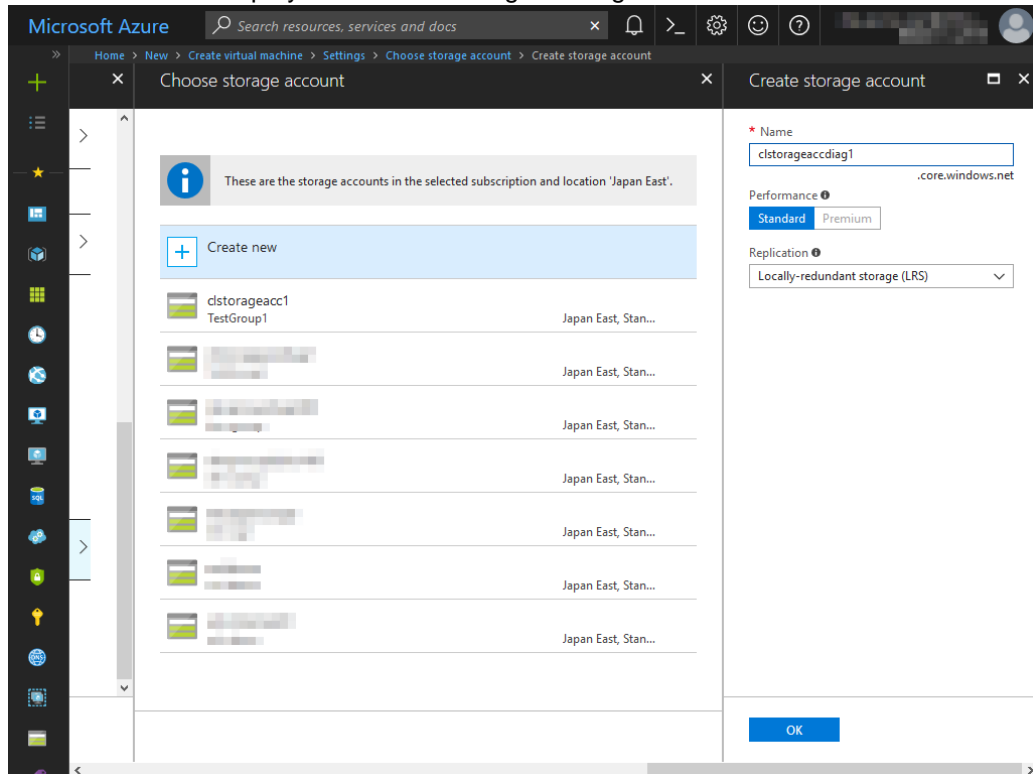


10. Return to the **Settings** blade and select **Public IP address**.
11. The **Choose public IP address** blade is displayed. Select **None**. Ignore the **Create public IP address** blade.

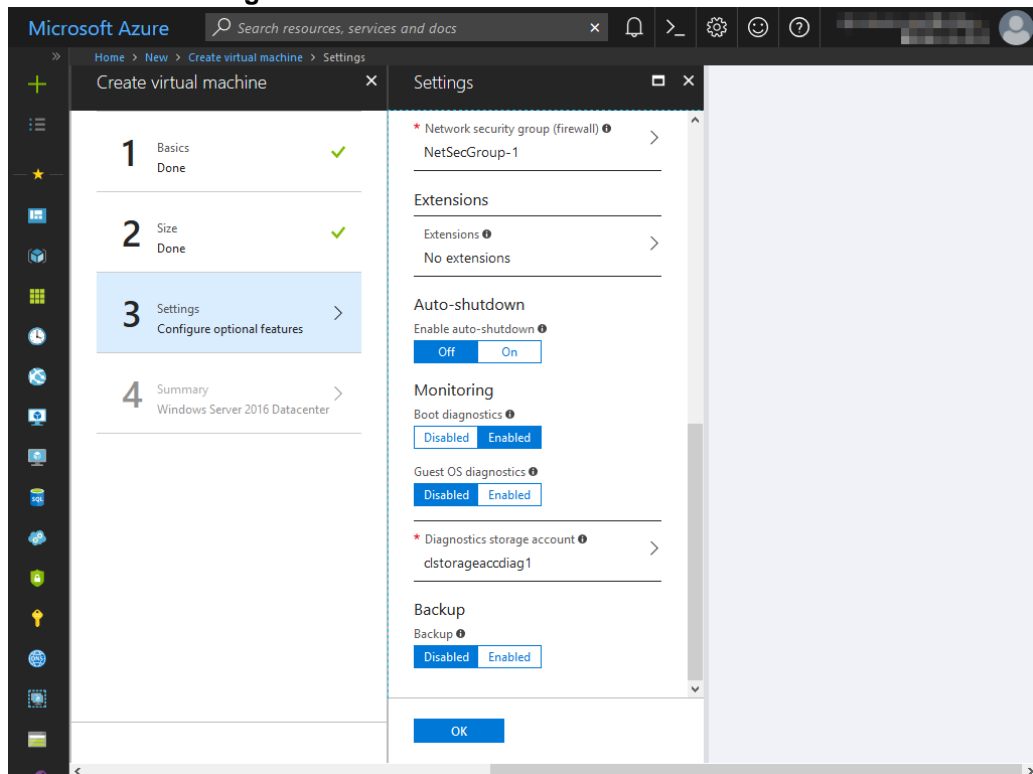
12. Return to the **Settings** blade and select **Network security group**. For node-1, the **Create network security group** blade is displayed. Specify **Name** and click **OK**. For node-2, the **Choose network security group** blade is displayed. Select NetSecGroup-1 created for node-1.



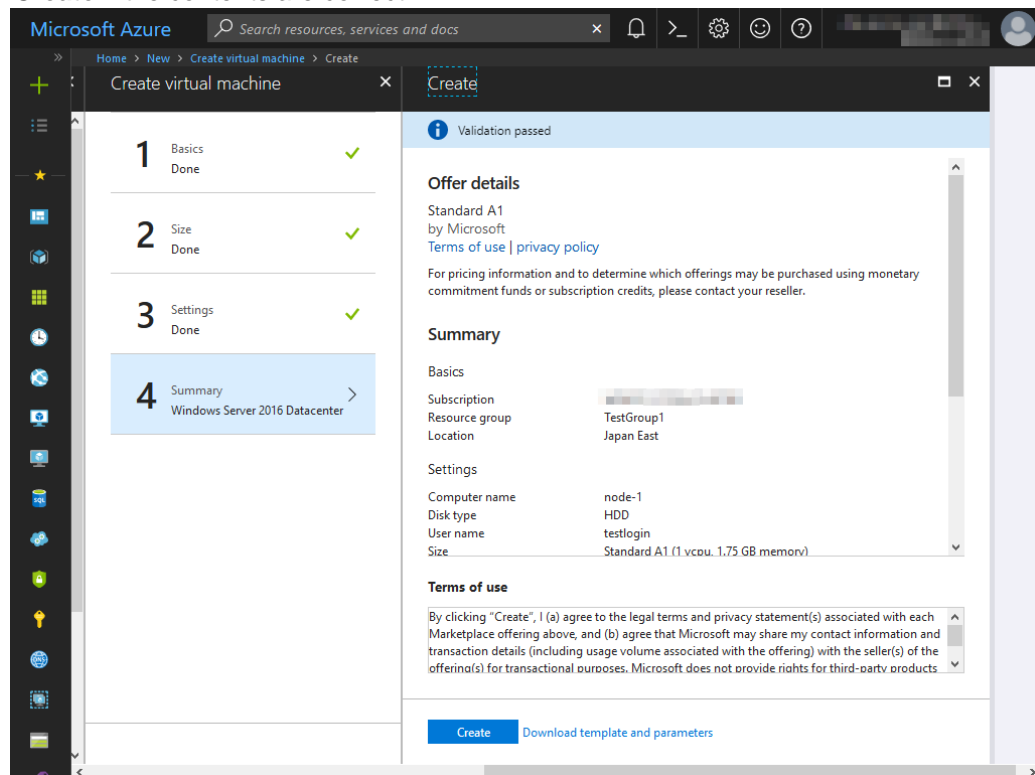
13. Select **Storage account**. For node-1, the **Create storage account** blade is displayed. Specify **Name**, **Performance**, and **Replication**, and click **OK**. For node-2, the **Choose storage account** blade is displayed. Select clstorageaccdiag1 created for node-1.



14. Return to the **Settings** blade and click **OK**.



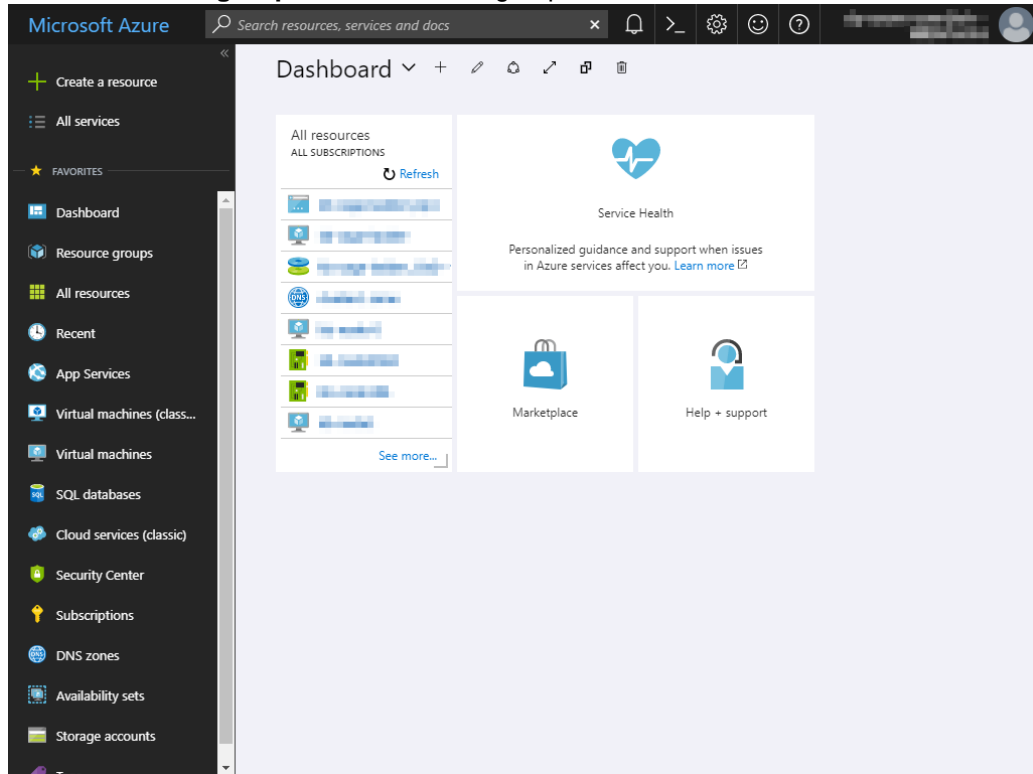
15. The **Create** blade is displayed. Check the contents displayed on the **Create** blade and click **Create** if the contents are correct.



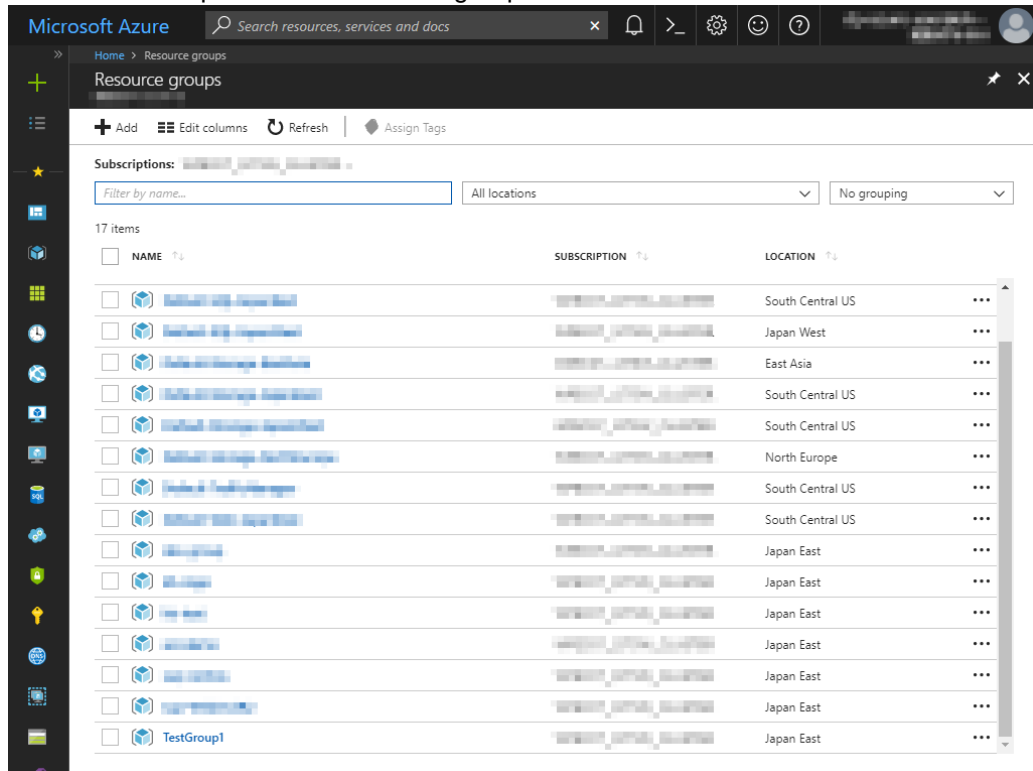
4) Setting a private IP address

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and change the private IP address setting following the steps below. Since an IP address is initially set to be assigned dynamically, change the setting so that an IP address is assigned statically. Change the settings of node-1 and then node-2.

1. Select **Resource groups** or the resource group icon in the menu on the left side of the window.



2. Select **TestGroup1** from the resource group list.



3. The summary of TestGroup1 is displayed. Select virtual machine node-1 or node-2 from the item list.

Microsoft Azure

Home > Resource groups > TestGroup1

TestGroup1
Resource group

Search (Ctrl+F)

+ Add Edit columns Delete resource group Refresh Move Assign Tags

Subscription (change) Deployments
3 Succeeded

Subscription ID

Filter by name... All types All locations No

9 items Show all resources

NAME	TYPE	LOCATION
AvailabilitySet-1	Availability set	Japan East
clstorageacc1	Storage account	Japan East
clstorageacctdiag1	Storage account	Japan East
NetSecGroup-1	Network security group	Japan East
node-1	Virtual machine	Japan East
node-1639	Network interface	Japan East
node-2	Virtual machine	Japan East
node-2542	Network interface	Japan East
Vnet1	Virtual network	Japan East

4. Select **Networking**.

Microsoft Azure

Home > Resource groups > TestGroup1 > node-1 - Networking

node-1 - Networking
Virtual machine

Search (Ctrl+F)

Attach network interface Detach network interface

Network Interface: node-1639 Effective security rules Topology

Virtual network/subnet: Vnet1/Vnet1-1 Public IP: None Private IP: 10.5.0.5

INBOUND PORT RULES

Network security group NetSecGroup-1 (attached to network interface: node-1639)
Impacts 0 subnets, 6 network interfaces

Add inbound port

PRIORITY	NAME	PORT	PROTOCOL	SOURCE	DESTINATION...	ACTION
1000	default-allow-rdp	3389	TCP	Any	Any	Allow
65000	AllowVnetInBound	Any	Any	VirtualNet...	VirtualNet...	Allow
65001	AllowAzureLoadBalan...	Any	Any	AzureLoad...	Any	Allow
65500	DenyAllInBound	Any	Any	Any	Any	Deny

OUTBOUND PORT RULES

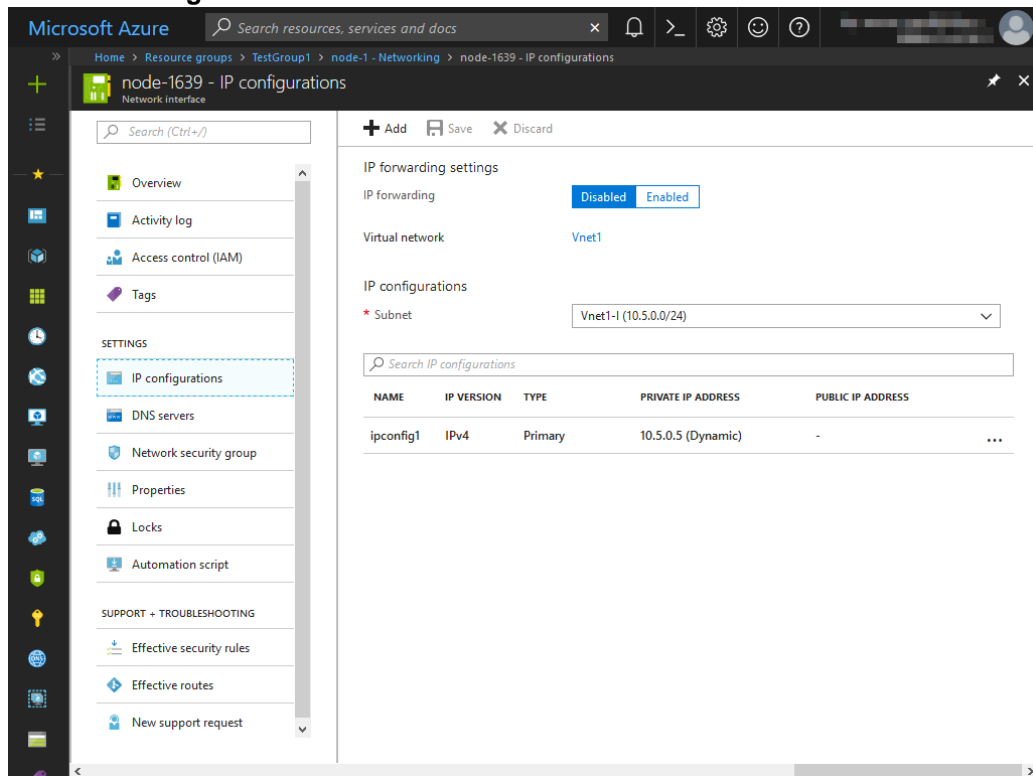
Network security group NetSecGroup-1 (attached to network interface: node-1639)
Impacts 0 subnets, 6 network interfaces

Add outbound port

PRIORITY	NAME	PORT	PROTOCOL	SOURCE	DESTINATION...	ACTION
65000	AllowVnetOutBound	Any	Any	VirtualNet...	VirtualNet...	Allow
65001	AllowInternetOutBou...	Any	Any	Any	Internet	Allow

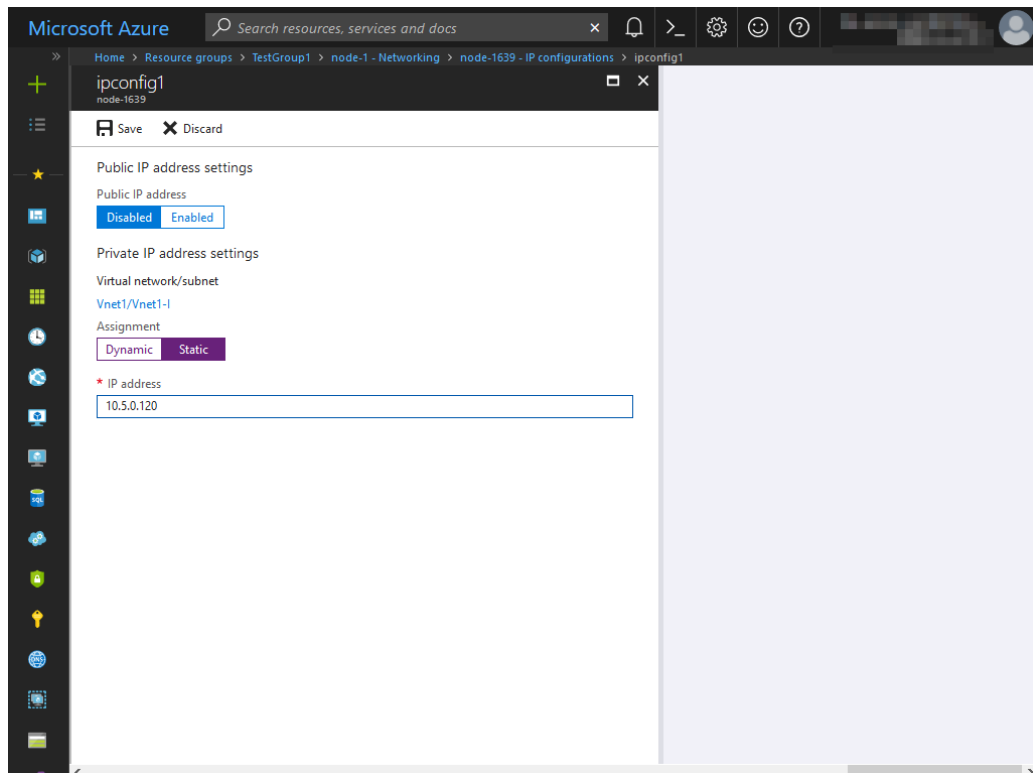
5. Select a network interface displayed in the list. The network interface name is generated automatically.

6. Select **IP configurations**.



7. Only ipconfig1 is displayed in the list. Select it.

8. Select **Static** for **Assignment** under **Private IP address settings**. Enter the IP address to be assigned statically in the **IP address** text box and click **Save** at the top of the window. The IP address of node-1 is 10.5.0.120. The IP address of node-2 is 10.5.0.121.

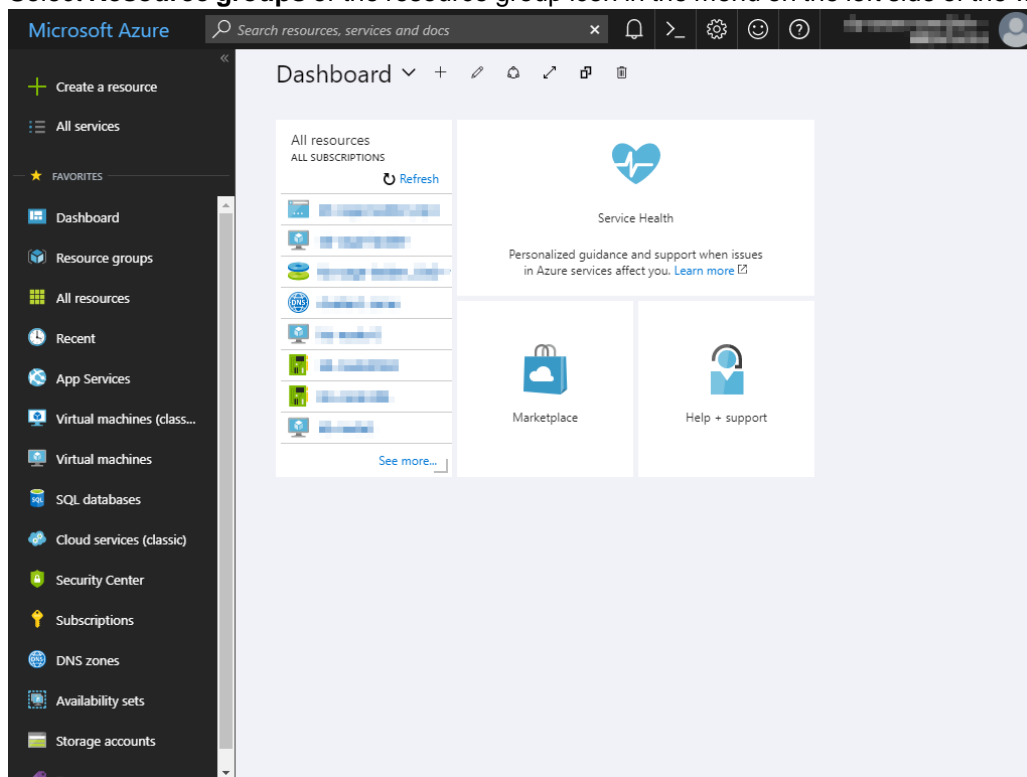


9. The virtual machines restart automatically so that new private IP addresses can be used.

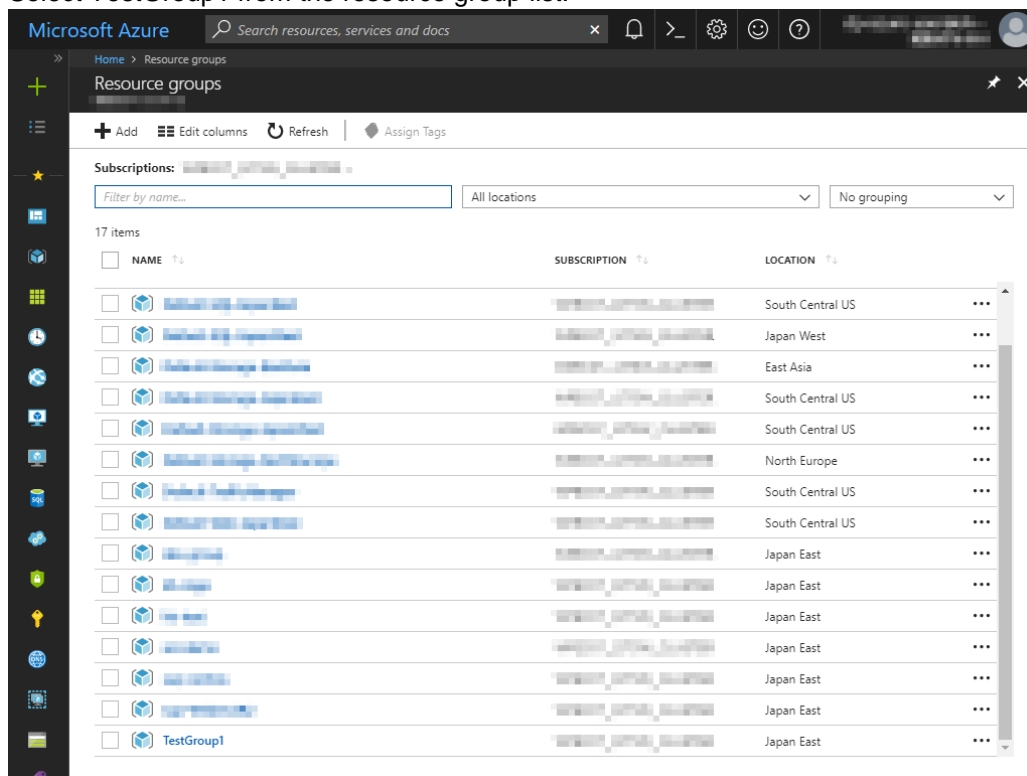
5) Adding Blob storage

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and add Blob storage to be used for a mirror disk (cluster partition or data partition). Change the settings of node-1 and then node-2.

1. Select **Resource groups** or the resource group icon in the menu on the left side of the window.



2. Select TestGroup1 from the resource group list.



3. The summary of TestGroup1 is displayed. Select virtual machine node-1 or node-2 to which to add Blob storage from the item list and select **Disk**.

The screenshot shows the Microsoft Azure portal interface for the 'TestGroup1' resource group. The left sidebar contains navigation links for Overview, Activity log, Access control (IAM), Tags, and various settings and monitoring options. The main content area displays the 'Overview' tab for the resource group. At the top, there are buttons for '+ Add', 'Edit columns', 'Delete resource group', 'Refresh' (highlighted with a dashed blue box), 'Move', and 'Assign Tags'. Below these, there is a section for 'Subscriptions' and a table of resources. The table has columns for 'NAME', 'TYPE', and 'LOCATION'. The resources listed include AvailabilitySet-1, clstorageacc1, clstorageaccdiag1, NetSecGroup-1, node-1, node-1639, node-2, node-2542, and Vnet1. The 'node-1' and 'node-2' entries are highlighted in blue.

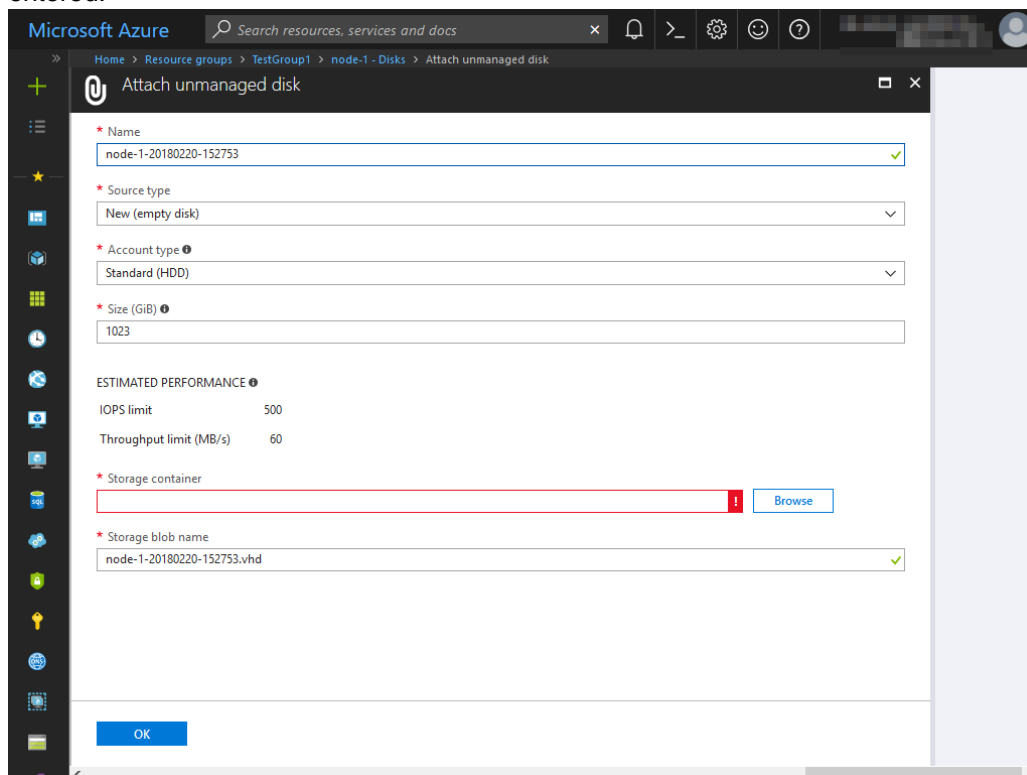
NAME	TYPE	LOCATION
AvailabilitySet-1	Availability set	Japan East
clstorageacc1	Storage account	Japan East
clstorageaccdiag1	Storage account	Japan East
NetSecGroup-1	Network security group	Japan East
node-1	Virtual machine	Japan East
node-1639	Network interface	Japan East
node-2	Virtual machine	Japan East
node-2542	Network interface	Japan East
Vnet1	Virtual network	Japan East

4. Select **+Add data disk**.

The screenshot shows the Microsoft Azure portal interface for the 'node-1 - Disks' page. The left sidebar contains navigation links for Overview, Activity log, Access control (IAM), Tags, and various settings and monitoring options. The main content area displays the 'Disks' tab for the virtual machine 'node-1'. At the top, there is an 'Edit' button. Below it, there is a section for 'OS disk' and a table of disks. The table has columns for 'NAME', 'SIZE', 'STORAGE ACCOU...', 'ENCRYPTION', and 'HOS'. The 'node-1' entry is highlighted in blue. Below the table, there is a section for 'Data disks' and a '+ Add data disk' button (highlighted with a dashed blue box).

NAME	SIZE	STORAGE ACCOU...	ENCRYPTION	HOS
node-1	127 GiB	Standard_LRS	Not enabled	Rea

5. The **Attach unmanaged disk** blade is displayed. Click **Browse** right to the **Storage container** text box. For **Name** and **Storage blob name**, the automatically generated default values are entered.



Microsoft Azure

Home > Resource groups > TestGroup1 > node-1 - Disks > Attach unmanaged disk

Attach unmanaged disk

* Name
node-1-20180220-152753 ✓

* Source type
New (empty disk) ✓

* Account type
Standard (HDD) ✓

* Size (GiB)
1023

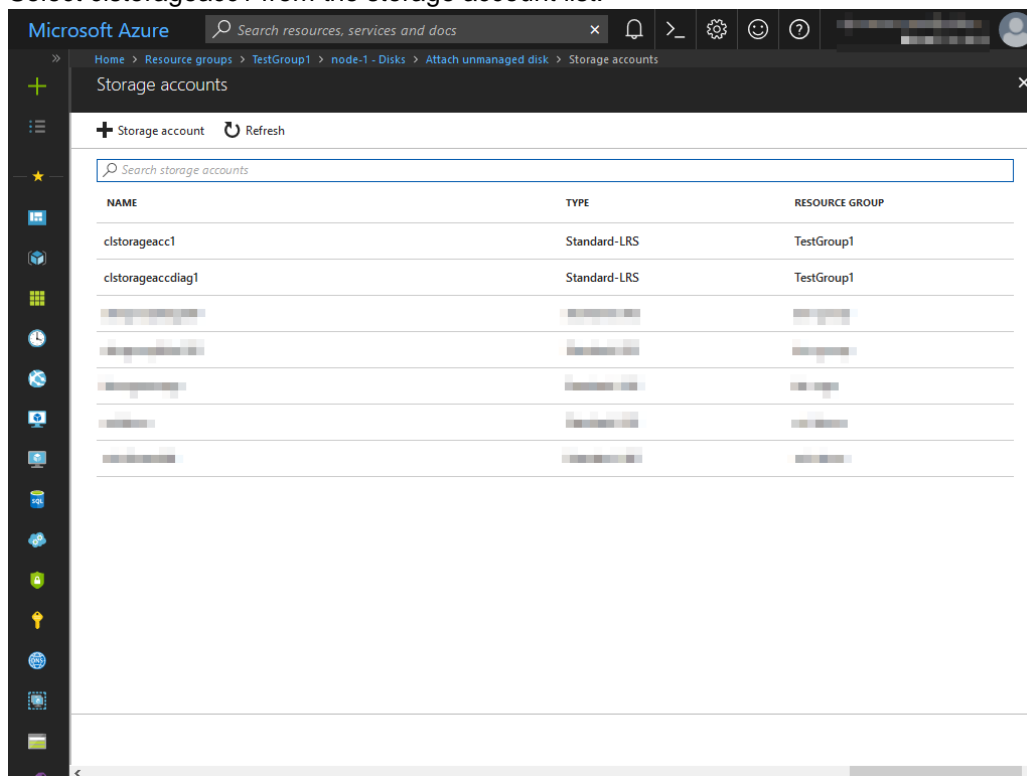
ESTIMATED PERFORMANCE
IOPS limit 500
Throughput limit (MB/s) 60

* Storage container
[Red border] [Browse]

* Storage blob name
node-1-20180220-152753.vhd ✓

OK

6. Select clstorageacc1 from the storage account list.



Microsoft Azure

Home > Resource groups > TestGroup1 > node-1 - Disks > Attach unmanaged disk > Storage accounts

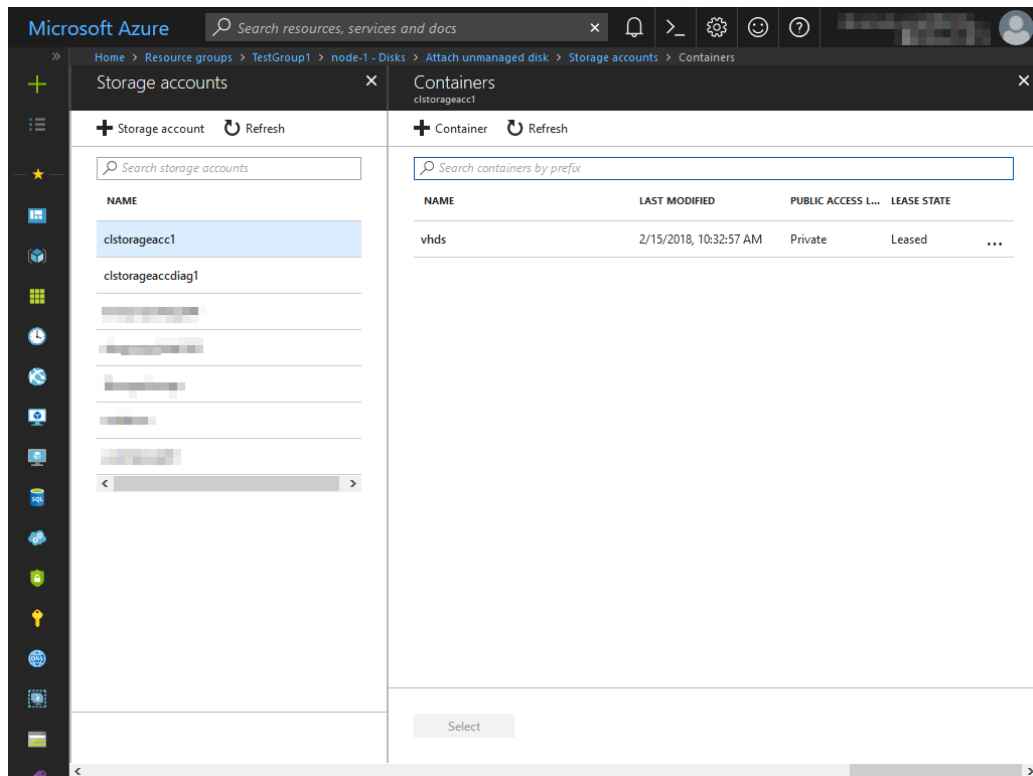
Storage accounts

+ Storage account Refresh

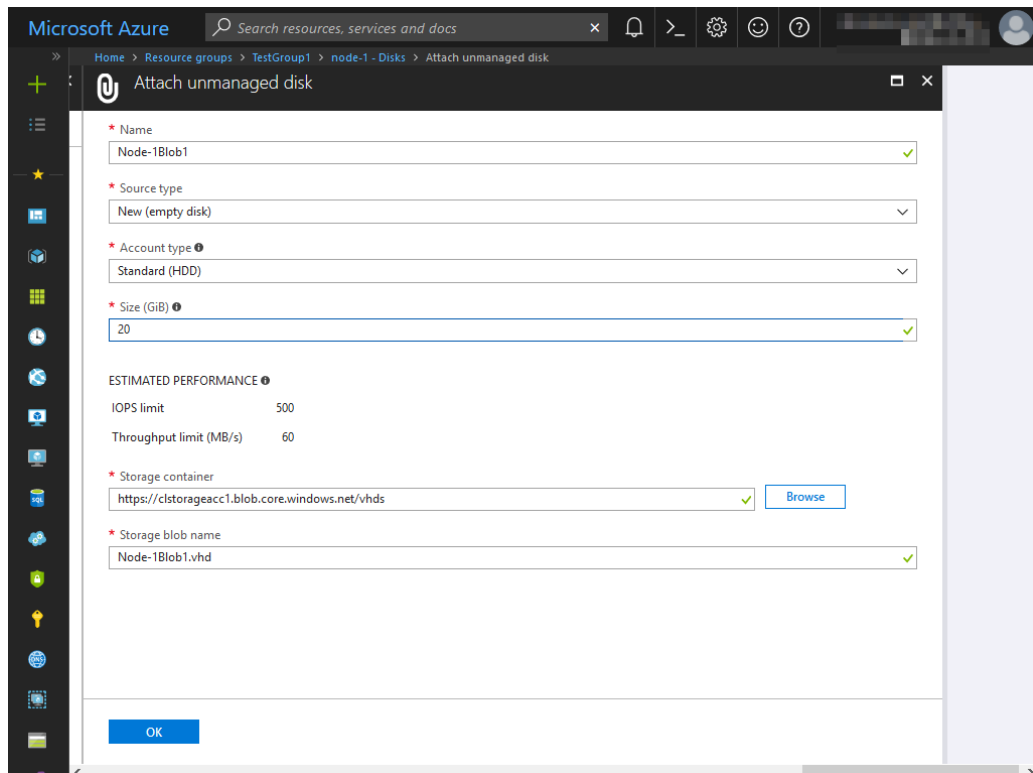
Search storage accounts

NAME	TYPE	RESOURCE GROUP
clstorageacc1	Standard-LRS	TestGroup1
clstorageaccdiag1	Standard-LRS	TestGroup1
[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]
[Redacted]	[Redacted]	[Redacted]

7. Select vhds from the container list and click **Select**.



8. The **Attach unmanaged disk** blade is displayed again. Specify **Name**, **Source type**, **Account type**, **Size**, and **Storage blob name**, and click **OK**. For **Name**, specify Node-1Blob1 for node-1 and Node-2Blob1 for node-2. For **Storage blob name**, specify Node-1Blob1.vhd for node-1 and Node-2Blob1.vhd for node-2.



9. Click **Save**.

Microsoft Azure Search resources, services and docs

Home > Resource groups > TestGroup1 > node-1 - Disks

node-1 - Disks
Virtual machine

Search (Ctrl+F)

Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems

SETTINGS

Networking
Disks
Size
Extensions
Availability set
Configuration
Properties
Locks
Automation script

Save Discard

OS disk

NAME	SIZE	STORAGE ACCOU...	ENCRYPTION	HOS
node-1	127 GiB	Standard_LRS	Not enabled	Rea

Data disks

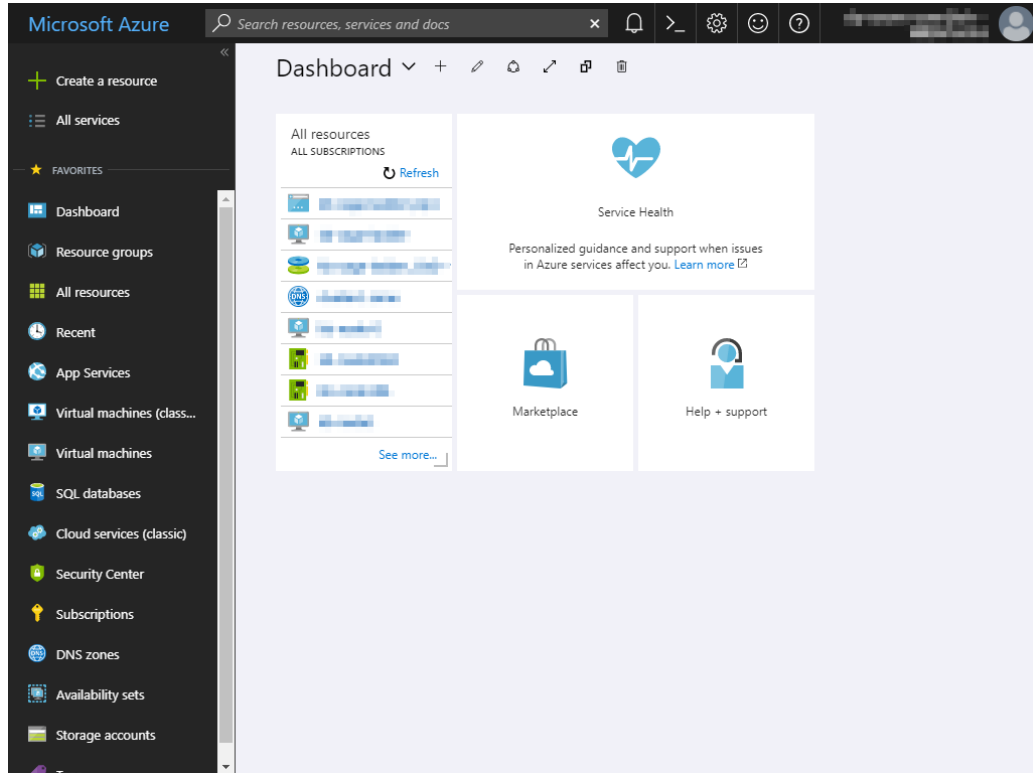
LUN	NAME	SIZE	STORAGE ACCOU...	ENCRYPTION	HOST
0	Node-1Blob1	20 GiB	Standard_LRS	Not enabled	None

+ Add data disk

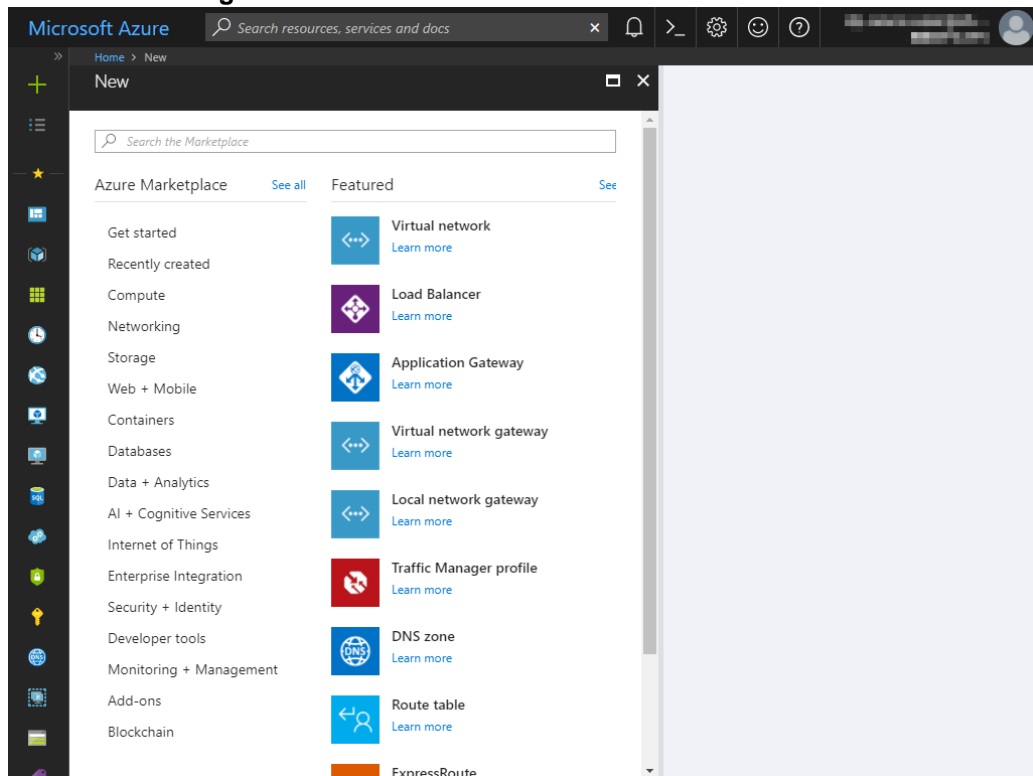
6) Creating a DNS zone

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and configure the DNS zone following the steps below.

1. Select **+Create a resource** or the **+** icon in the menu on the left side of the window.



2. Select **Networking** and then **DNS zone**.



3. The **Create DNS zone** blade is displayed. Specify **Name**, **Subscription**, and **Resource group**, and click **Create**.

The screenshot shows the 'Create DNS zone' blade in the Microsoft Azure portal. The interface includes a top navigation bar with the 'Microsoft Azure' logo and a search bar. A left-hand navigation pane contains various service icons. The main content area is titled 'Create DNS zone' and contains the following fields:

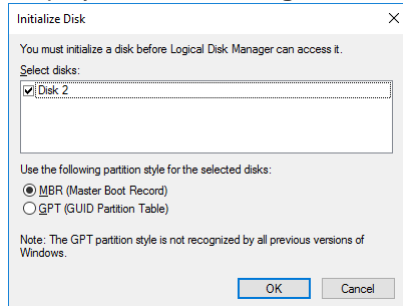
- Name:** A text input field containing 'cluster1.zone' with a green checkmark indicating it is valid.
- Subscription:** A dropdown menu showing a blurred subscription name.
- Resource group:** Radio buttons for 'Create new' and 'Use existing' (selected). Below is a dropdown menu showing 'TestGroup1'.
- Resource group location:** A dropdown menu showing 'Japan East'.

At the bottom of the form, there is a checkbox for 'Pin to dashboard' and a blue 'Create' button. A link for 'Automation options' is also present.

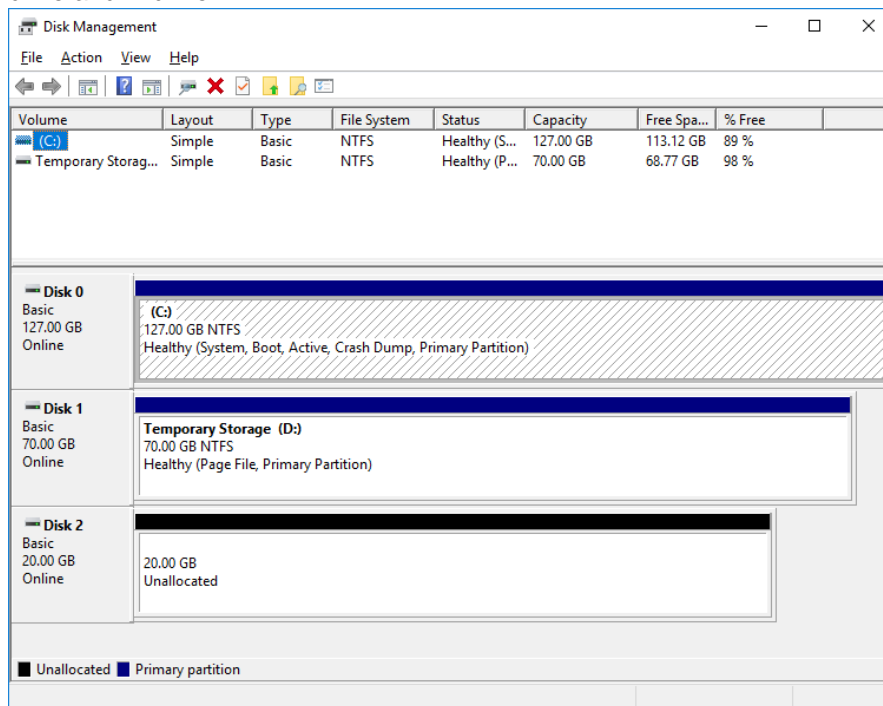
7) Configuring virtual machines

Log in to the created node-1 and node-2 and specify the settings following the procedure below. Set a partition for the mirror disk resource. Create a file system in the added Blob storage. For details about the partition for the mirror disk resource, see "Partition settings for mirror disk resource (when using Replicator)" in "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the *Installation and Configuration Guide*.

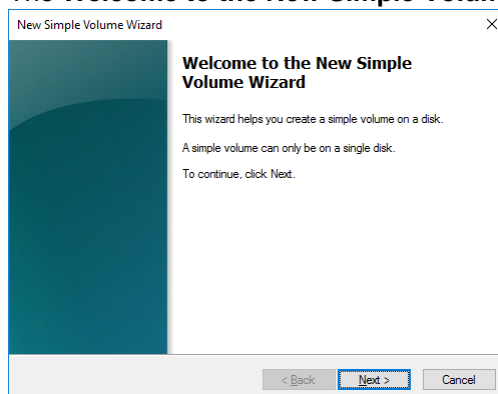
1. Display the **Disk Management** window. The **Initialize Disk** dialog box is displayed.



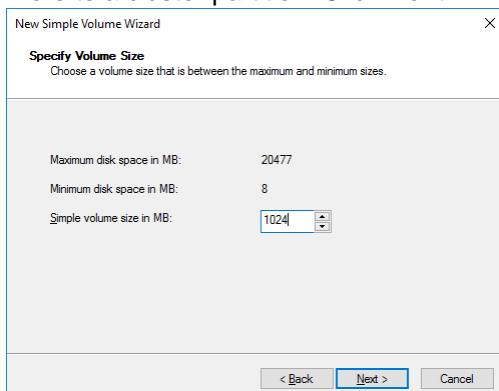
2. Confirm that the added disk is displayed as "Disk 2" in unassigned state under the existing C drive and D drive.



3. Create a cluster partition. Right-click "Disk 2" and select **New Simple Volume**.
4. The **Welcome to the New Simple Volume Wizard** is displayed. Click **Next**.

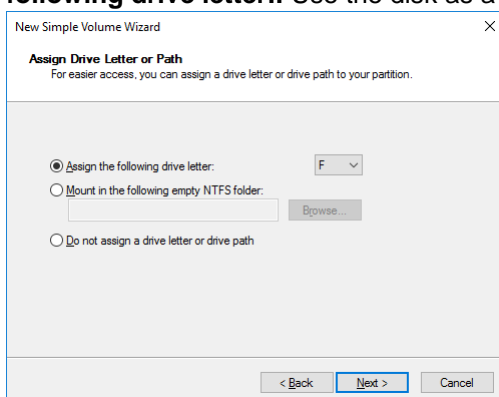


5. The **Specify Volume Size** window is displayed. Allocate 1024 MB (1,073,741,824 bytes) or more to a cluster partition. Click **Next**.



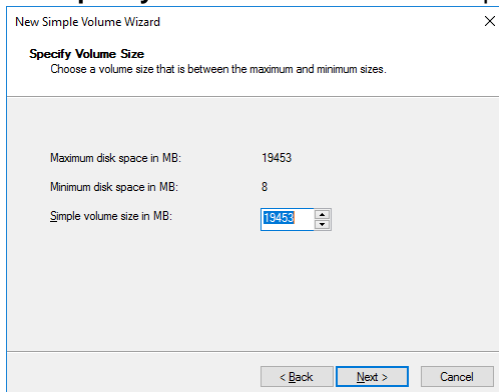
The screenshot shows the 'Specify Volume Size' step of the 'New Simple Volume Wizard'. The window title is 'New Simple Volume Wizard'. Below the title bar, the section is 'Specify Volume Size' with the instruction 'Choose a volume size that is between the maximum and minimum sizes.' The main area contains three labels and values: 'Maximum disk space in MB:' with value '20477', 'Minimum disk space in MB:' with value '8', and 'Simple volume size in MB:' with a text box containing '1024'. At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'.

6. The **Assign Drive Letter or Path** window is displayed. Select the F drive for **Assign the following drive letter:**. Use the disk as a raw partition without formatting.



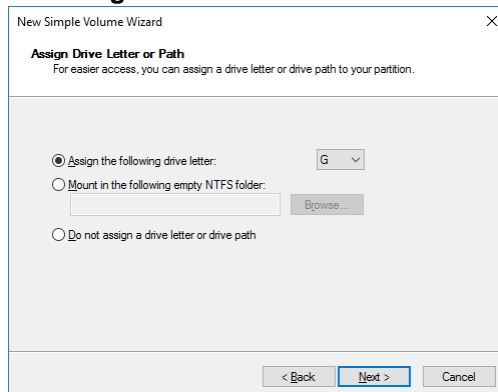
The screenshot shows the 'Assign Drive Letter or Path' step of the 'New Simple Volume Wizard'. The window title is 'New Simple Volume Wizard'. Below the title bar, the section is 'Assign Drive Letter or Path' with the instruction 'For easier access, you can assign a drive letter or drive path to your partition.' There are three radio button options: 'Assign the following drive letter:' (selected), 'Mount in the following empty NTFS folder:', and 'Do not assign a drive letter or drive path'. The 'Assign the following drive letter:' option has a dropdown menu showing 'F'. The 'Mount in the following empty NTFS folder:' option has a text box and a 'Browse...' button. At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'.

7. Next, create a data partition. Right-click "Disk 2" and select **New Simple Volume**.
8. The **Welcome to the New Simple Volume Wizard** is displayed. Click **Next**.
9. The **Specify Volume Size** window is displayed. Click **Next**.



The screenshot shows the 'Specify Volume Size' step of the 'New Simple Volume Wizard'. The window title is 'New Simple Volume Wizard'. Below the title bar, the section is 'Specify Volume Size' with the instruction 'Choose a volume size that is between the maximum and minimum sizes.' The main area contains three labels and values: 'Maximum disk space in MB:' with value '19453', 'Minimum disk space in MB:' with value '8', and 'Simple volume size in MB:' with a text box containing '19453'. At the bottom, there are three buttons: '< Back', 'Next >', and 'Cancel'.

10. The **Assign Drive Letter or Path** window is displayed. Select the G drive for **Assign the following drive letter:** and click **Next**.



New Simple Volume Wizard

Assign Drive Letter or Path
For easier access, you can assign a drive letter or drive path to your partition.

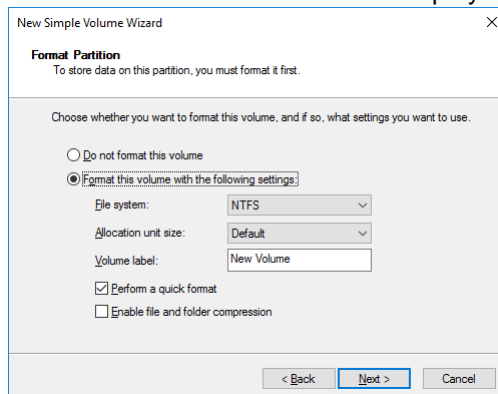
☒ Assign the following drive letter: G

☐ Mount in the following empty NTFS folder:
Browse...

☐ Do not assign a drive letter or drive path

< Back Next > Cancel

11. The **Format Partition** window is displayed. Confirm that **File System** is **NTFS**.



New Simple Volume Wizard

Format Partition
To store data on this partition, you must format it first.

Choose whether you want to format this volume, and if so, what settings you want to use.

☐ Do not format this volume

☒ Format this volume with the following settings:

File system: NTFS

Allocation unit size: Default

Volume label: New Volume

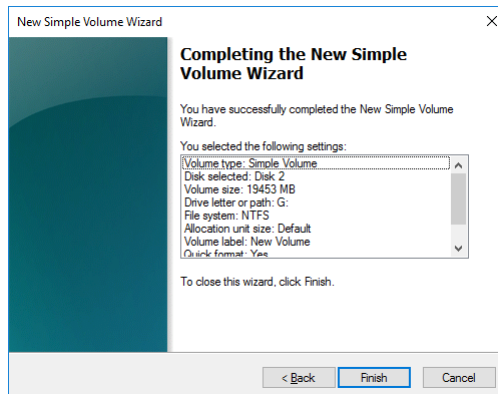
☒ Perform a quick format

☐ Enable file and folder compression

< Back Next > Cancel

12. Click **Next**.

13. The **Completing the New Simple Volume Wizard** window is displayed. Check the displayed contents and click **Finish**.



New Simple Volume Wizard

Completing the New Simple Volume Wizard

You have successfully completed the New Simple Volume Wizard.

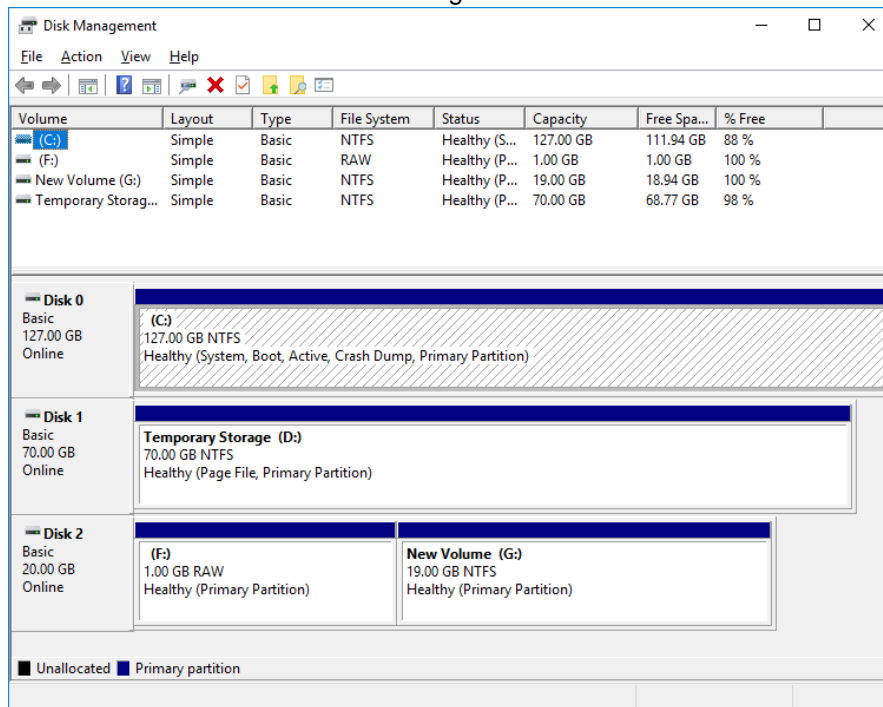
You selected the following settings:

- Volume type: Simple Volume
- Disk selected: Disk 2
- Volume size: 19453 MB
- Drive letter or path: G:
- File system: NTFS
- Allocation unit size: Default
- Volume label: New Volume
- Quick format: Yes

To close this wizard, click Finish.

< Back Finish Cancel

14. Confirm that the added disks are assigned as the F drive and G drive.



8) Adjusting the OS startup time, checking the network setting, checking the firewall setting, synchronizing the server time, and disabling the power saving function.

For each procedure, see "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the *Installation and Configuration Guide*.

9) Installing the Azure CLI

Install the Azure CLI.

The procedure to install the Azure CLI from the installer is described.

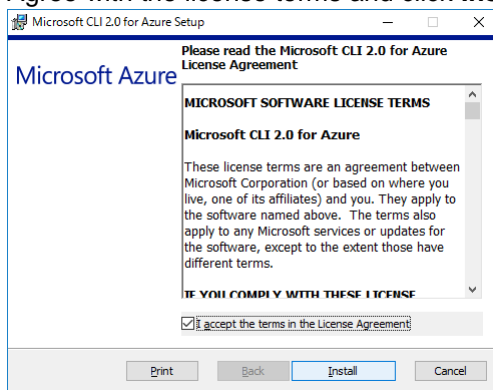
For details about this procedure and other procedures, see the following website:

Install Azure CLI 2.0:

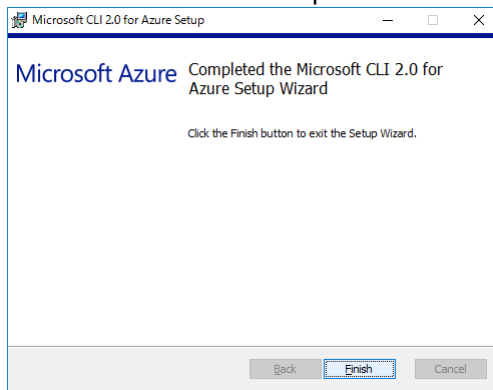
<https://docs.microsoft.com/en-us/cli/azure/install-azure-cli?view=azure-cli-latest>

Log in to the created node-1 and node-2 and install the Azure CLI following the procedure below.

1. Download the CLI installer from the above website.
2. Double-click the CLI installer file and click **Run**.
3. Agree with the license terms and click **Install**.



4. When the installation complete window is displayed, click **Finish**.



10) Creating a service principal

Create a service principal using the Azure CLI.

A script for Azure DNS performs login to Microsoft Azure and DNS zone registration and monitoring. When logging in to Microsoft Azure, Azure login with a service principal is used. For details about a service principal and procedure, see the following websites:

Log in with Azure CLI 2.0:

<https://docs.microsoft.com/en-us/azure/xplat-cli-connect>

Create an Azure service principal with Azure CLI 2.0:

<https://docs.microsoft.com/en-us/cli/azure/create-an-azure-service-principal-azure-cli?view=azure-cli-latest>

1. Log in with an organizational account.

```
az login -u <account-name> -p <password>
```
2. Create and register a service principal. Write down the displayed name and tenant because it is necessary to set them in the Azure environment configuration file. In the following example, a service principal is created in C:\Users\testlogin\examplecert.pem.

```
az ad sp create-for-rbac --create-cert
{
  "appId": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
  "displayName": "azure-test",
  "fileWithCertAndPrivateKey": "C:\\Users\\testlogin\\examplecert.pem",
  "name": "http://azure-test",
  "password": null,
  "tenant": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx"
}
```
3. Log out.

```
az logout --u <account-name>
```
4. Check whether login to Microsoft Azure using the created service principal is possible.

```
az login --service-principal -u <name-value-in-step-2> --tenant <tenant-value-in-step-2> -p <fileWithCertAndPrivateKey-value-in-step-2>
```

The following is displayed upon successful sign-in.

```
[
  {
    "cloudName": "AzureCloud",
    "id": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
    "isDefault": true,
    "state": "Enabled",
    "tenantId": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx",
    "user": {
      "name": "http://azure-test",
      "type": "servicePrincipal"
    }
  }
]
```
5. Log out.

```
az logout --username <name-value-in-step-4>
```

When changing the role of the created service principal from the default "Contributor" to another role, select a role that has access permissions to all of the following operations as the Actions properties. If the role is changed to a role that does not satisfy this condition, monitoring by the Azure DNS monitor resource, which are set up later, fails due to an error.

For the Azure CLI 2.0

Microsoft.Network/dnsZones/A/write

Microsoft.Network/dnsZones/A/delete

Microsoft.Network/dnsZones/NS/read

11) Installing EXPRESSCLUSTER

For the installation procedure, see the *Installation and Configuration Guide*.
After installation is complete, restart the OS.

12) Registering the EXPRESSCLUSTER license

For the license registration procedure, see the *Installation and Configuration Guide*.

3.3 Configuring the EXPRESSCLUSTER settings

Configure the following on the WebManager cluster generation wizard.

For the WebManager setup and connection procedures, see Chapter 5, "Creating the cluster configuration data" in the *Installation and Configuration Guide*.

This section describes the procedure to add the following resources and monitor resources:

- Mirror disk resource
- Azure DNS resource
- Azure DNS monitor resource
- Custom monitor resource (for NP resolution)
- IP monitor resource (for NP resolution)
- Multi target monitor resource (for NP resolution)

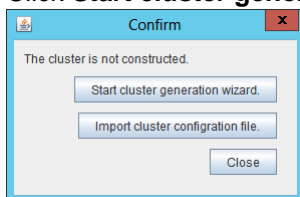
or the settings of other resources and monitor resources, see the *Installation and Configuration Guide* and the *Reference Guide*.

1) Creating a cluster

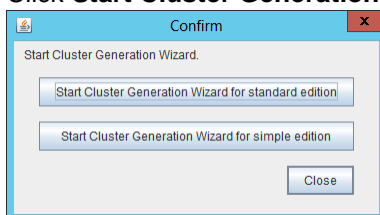
Start the cluster generation wizard to create a cluster.

◆ Creating a cluster

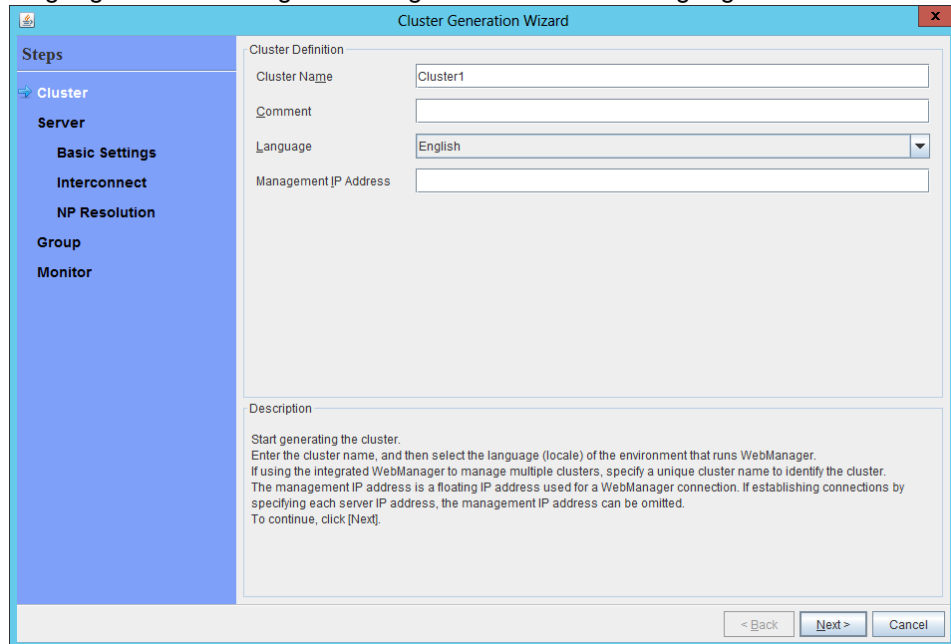
1. Access WebManager. Then, the following dialog box is displayed.
Click **Start cluster generation wizard**.



2. The following dialog box is displayed.
Click **Start Cluster Generation Wizard for standard edition**.



3. The **Cluster Definition** page is displayed.
Enter a desired name in **Cluster Name**.
Select an appropriate language in **Language**. After the setting is applied, the display language of WebManager is changed to the selected language.



The screenshot shows the 'Cluster Generation Wizard' window, specifically the 'Cluster Definition' step. On the left, a 'Steps' sidebar lists 'Cluster', 'Server', 'Basic Settings', 'Interconnect', 'NP Resolution', 'Group', and 'Monitor'. The 'Cluster' step is selected. The main area contains the following fields:

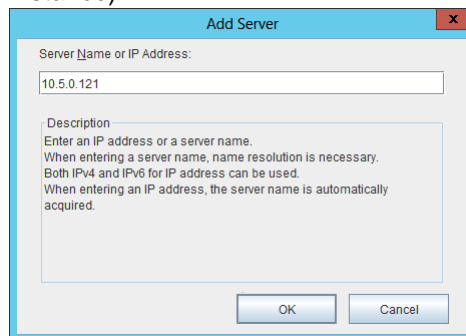
- Cluster Name:** A text box containing 'Cluster1'.
- Comment:** An empty text box.
- Language:** A dropdown menu with 'English' selected.
- Management IP Address:** An empty text box.

Below these fields is a 'Description' section with the following text:

Start generating the cluster.
Enter the cluster name, and then select the language (locale) of the environment that runs WebManager.
If using the integrated WebManager to manage multiple clusters, specify a unique cluster name to identify the cluster.
The management IP address is a floating IP address used for a WebManager connection. If establishing connections by specifying each server IP address, the management IP address can be omitted.
To continue, click [Next].

At the bottom right, there are three buttons: '< Back', 'Next >', and 'Cancel'.

4. The **Server Definition** page is displayed.
The instance connected to WebManager is displayed as a registered master server.
Click **Add** to add the remaining instances (by specifying the private IP address of each instance).



The screenshot shows the 'Add Server' dialog box. It has a title bar with 'Add Server' and a close button. The main area contains:

- Server Name or IP Address:** A text box containing '10.5.0.121'.
- Description:** A text box containing the following text:
Enter an IP address or a server name.
When entering a server name, name resolution is necessary.
Both IPv4 and IPv6 for IP address can be used.
When entering an IP address, the server name is automatically acquired.

At the bottom, there are two buttons: 'OK' and 'Cancel'.

5. Click **Next**.

The screenshot shows the 'Cluster Generation Wizard' window. On the left, the 'Steps' pane is visible with 'Cluster' selected. The main area is titled 'Server Definition'. It contains a 'Server Definition List' table with columns 'Order' and 'Name'. The table has two rows: 'Master Server' and 'node-1', and '1' and 'node-2'. To the right of the table are 'Add' and 'Remove' buttons. Below the table are 'Up' and 'Down' buttons. At the bottom right of the table area is a 'Settings' button. Below the table is a 'Server Group' section with a 'Server Group Definition' field and a 'Settings' button. At the bottom of the window are '< Back', 'Next >', and 'Cancel' buttons.

Order	Name
Master Server	node-1
1	node-2

6. The **Interconnect** page is displayed.

Specify the IP addresses (IP address of each instance) to be used for interconnect. In addition, select mdc1 for **MDC** as a communication path of a mirror disk resource to be created later.

The screenshot shows the 'Cluster Generation Wizard' window. On the left, the 'Steps' pane is visible with 'Cluster' selected. The main area is titled 'Interconnect'. It contains an 'Interconnect List' table with columns 'Priority', 'Type', 'MDC', 'node-1', and 'node-2'. The table has one row: '1', 'Kernel Mode', 'mdc1', '10.5.0.120', and '10.5.0.121'. To the right of the table are 'Add' and 'Remove' buttons. Below the table are 'Up' and 'Down' buttons. At the bottom of the window are '< Back', 'Next >', and 'Cancel' buttons.

Priority	Type	MDC	node-1	node-2
1	Kernel Mode	mdc1	10.5.0.120	10.5.0.121

7. Click **Next**.

8. The **NP Resolution** page is displayed.
Note that NP resolution is not configured on this page. The equivalent feature is achieved by adding the IP monitor resource, custom monitor resource, and multi-target monitor resource. Configure NP resolution in "3)Adding a monitor resource"
Click **Next**.

Cluster Generation Wizard

Steps

- Cluster
- Server
 - Basic Settings
 - Interconnect
 - NP Resolution
- Group
- Monitor

NP Resolution

NP Resolution List

Type	Ping Target	node-1	node-2
------	-------------	--------	--------

Add
Remove
Properties

Tuning

Description

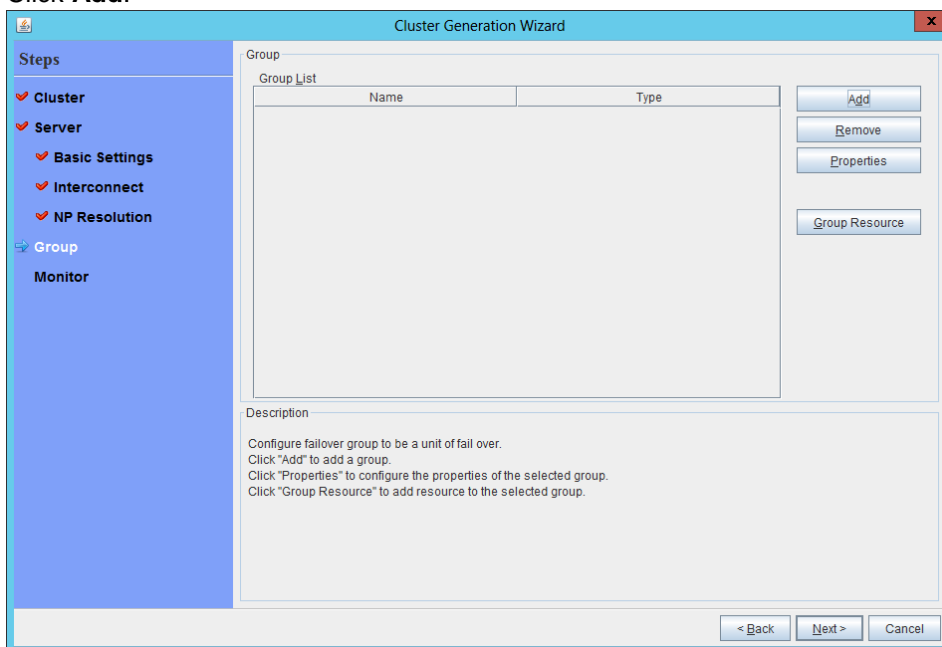
Configure network partition (NP) resolution function.
Click "Add" to add NP resolution resource and select the type.
For "COM" setting, click each server column cell to configure COM port.
For "DISK" setting, click each server column cell to configure driver letter of the partition for disk heartbeat.
For "Ping" setting, click Ping target column cell to configure IP address of Ping destination, and then click each server column cell to configure "Use" or "Do not use".
For "Majority" setting, double-click each server column cell to configure "Use" or "Do not use".
For "DISK" and "Ping" settings, the detailed settings can be verified and changed by clicking "Properties".
Click "Tuning" to configure the actions at NP occurrence.

< Back Next > Cancel

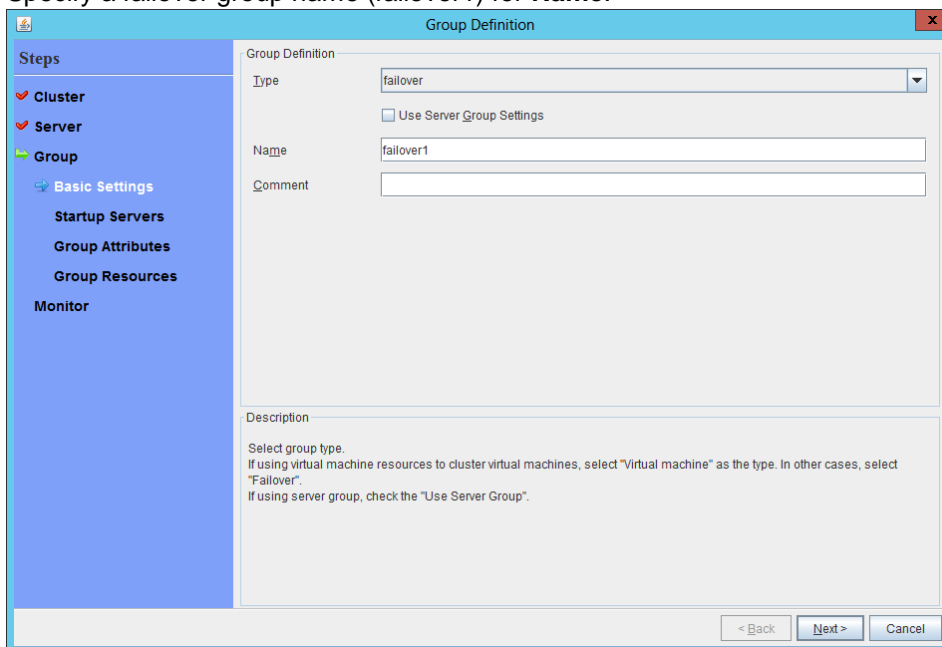
2) Adding a group resource

- ◆ Defining a group
Create a failover group.

1. The **Group List** window is displayed.
Click **Add**.



2. The **Group Definition** window is displayed.
Specify a failover group name (failover1) for **Name**.



3. Click **Next**.

4. The **Servers that can run the Group** page is displayed.
Click **Next** without specifying anything.

The screenshot shows the 'Group Definition(failover1)' window. On the left is a 'Steps' sidebar with options: Cluster, Server, Group (selected), Basic Settings, Startup Servers, Group Attributes, Group Resources, and Monitor. The main area is titled 'Servers that can run the Group'. It has a checkbox 'Failover is possible on all servers' which is checked. Below this are two lists: 'Servers that can run the Group' (empty) and 'Available Servers' (containing 'node-1' and 'node-2'). Between the lists are buttons: '< Add', 'Remove >', 'Up', and 'Down'. At the bottom are '< Back', 'Next >', and 'Cancel' buttons. A 'Description' section at the bottom contains text about server selection and failover settings.

5. The **Group Attribute Settings** page is displayed.
Click **Next** without specifying anything.

The screenshot shows the 'Group Definition(failover1)' window, now on the 'Group Attribute Settings' page. The 'Steps' sidebar remains the same. The main area has settings for 'Startup Attribute' (radio buttons for 'Auto Startup' and 'Manual Startup'), 'Failover Attribute' (radio buttons for 'Auto Failover' and 'Manual Failover'), and 'Failback Attribute' (radio buttons for 'Auto Failback' and 'Manual Failback'). Under 'Auto Failover', there are checkboxes for 'Use the startup server settings', 'Failover dynamically', 'Perform a Forced Failover', 'Prioritize failover policy in the server group', 'Perform a Smart Failover', 'Prioritize failover policy in the server group', and 'Enable only manual failover among the server groups'. There is an 'Edit exclusion monitor' button. At the bottom are '< Back', 'Next >', and 'Cancel' buttons. A 'Description' section at the bottom contains text about configuring failover settings.

6. The **Group Resource** page is displayed.
On this page, add a group resource following the procedure below.

The screenshot shows the 'Group Definition(failover1)' window. On the left is a 'Steps' sidebar with options: Cluster, Server, Group (selected), Basic Settings, Startup Servers, Group Attributes, Group Resources, and Monitor. The main area is titled 'Group Resource' and contains a 'Group Resource List' table with columns 'Name' and 'Type'. To the right of the table are buttons for 'Add', 'Remove', and 'Properties'. Below the table is a 'Description' section with instructions: 'Click "Add" to add resources. Click "Properties" to configure the properties of the selected resource.' At the bottom right are buttons for '< Back', 'Finish', and 'Cancel'.

- ◆ Mirror disk resource
Create a mirror disk resource.
For details, see "Understanding mirror disk resources" in Chapter 5, "Group resource details" in the *Reference Guide*.

1. Click **Add** on the **Group Resource List** page.
2. The **Resource Definition of Group** window is displayed.
Select the group resource type (mirror disk resource) from the **Type** box and enter the group name (md) in the **Name** box.

The screenshot shows the 'Resource Definition of Group(failover1)' window. The 'Steps' sidebar is the same as in the previous screenshot, with 'Group Resources' now selected. The main area is titled 'Group Resource Definitions' and contains a 'Type' dropdown menu set to 'mirror disk resource', a 'Name' text box containing 'md', and an empty 'Comment' text box. To the right of the 'Comment' box is a 'Get Licence Info' button. Below these fields is a 'Description' section with the instruction: 'Select the type of group resource and enter its name.' At the bottom right are buttons for '< Back', 'Next >', and 'Cancel'.

3. Click **Next**.

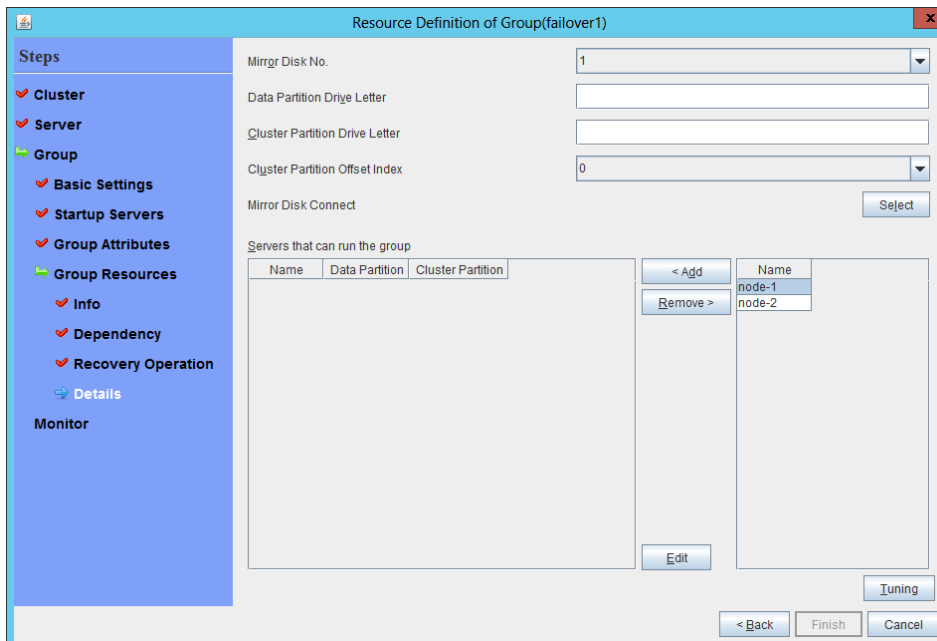
4. The **Dependent Resources** page is displayed.
Click **Next** without specifying anything.

The screenshot shows the 'Resource Definition of Group(failover1)' window. On the left is a 'Steps' sidebar with a tree view containing: Cluster, Server, Group (selected), Basic Settings, Startup Servers, Group Attributes, Group Resources, Info, Dependency, Recovery Operation, Details, and Monitor. The main area has a checkbox 'Follow the default dependency' which is checked. Below it are two empty tables: 'Dependent Resources' with columns 'Name' and 'Resource type', and 'Available Resources' with a 'Name' column. Between the tables are '< Add' and 'Remove >' buttons. At the bottom right are '< Back', 'Next >', and 'Cancel' buttons.

5. The **Recovery Operation at Activity Failure Detection** and **Recovery Operation at Deactivity Failure Detection** page is displayed.
Click **Next**.

The screenshot shows the 'Resource Definition of Group(failover1)' window at the 'Recovery Operation' step. The 'Steps' sidebar is the same as in the previous screenshot. The main area contains settings for two recovery operations. At the top is a checkbox 'Execute Script before or after Activation or Deactivation' with a 'Settings' button. Below are two sections: 'Recovery Operation at Activity Failure Detection' and 'Recovery Operation at Deactivity Failure Detection'. The first section has fields for 'Retry Count' (3), 'Failover Target Server' (radio buttons for 'Stable Server' and 'Maximum Priority Server'), 'Failover Threshold' (1), and 'Final Action' (No operation (not activate next resource)). It also has an unchecked checkbox 'Execute Script before Final Action' and a 'Settings' button. The second section has fields for 'Retry Count at Deactivation Failure' (0) and 'Final Action' (Stop the cluster service and shutdown OS). It also has an unchecked checkbox 'Execute Script before Final Action' and a 'Settings' button. At the bottom right are '< Back', 'Next >', and 'Cancel' buttons.

6. The **Details** page is displayed.
Select a server name in the **Name** column of **Servers that can run the group** and click **Add**.

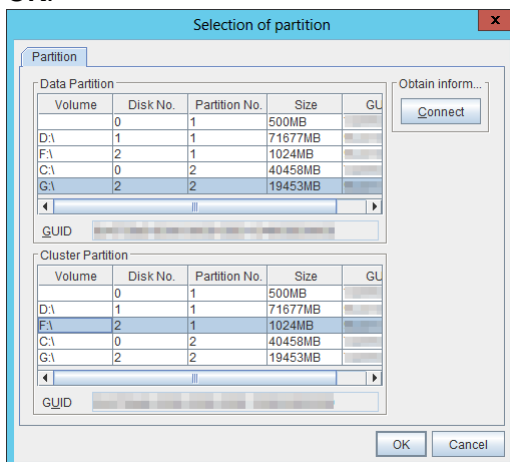


The dialog box titled "Resource Definition of Group(failover1)" shows the configuration for a group. On the left is a "Steps" sidebar with options: Cluster, Server, Group (selected), Basic Settings, Startup Servers, Group Attributes, Group Resources, Info, Dependency, Recovery Operation, and Details. The main area contains fields for "Mirror Disk No." (1), "Data Partition Drive Letter", "Cluster Partition Drive Letter", "Cluster Partition Offset Index" (0), and "Mirror Disk Connect" (with a "Select" button). Below these is a section "Servers that can run the group" with a table and buttons "< Add", "Remove >", and "Edit".

Name	Data Partition	Cluster Partition
node-1		
node-2		

Buttons at the bottom: "< Back", "Finish", "Cancel", "Tuning", and "Edit".

7. The **Selection of partition** dialog box is displayed. Click **Connect**, select the data partition and cluster partition created in "7)Configuring virtual machines", and click **OK**.



The "Selection of partition" dialog box shows two tables for selecting partitions. The "Data Partition" table has columns: Volume, Disk No., Partition No., Size, and GU. The "Cluster Partition" table has the same columns. A "Connect" button is next to the "Data Partition" table. "OK" and "Cancel" buttons are at the bottom.

Volume	Disk No.	Partition No.	Size	GU
	0	1	500MB	
D:\	1	1	71677MB	
F:\	2	1	1024MB	
C:\	0	2	40458MB	
G:\	2	2	19453MB	

Volume	Disk No.	Partition No.	Size	GU
	0	1	500MB	
D:\	1	1	71677MB	
F:\	2	1	1024MB	
C:\	0	2	40458MB	
G:\	2	2	19453MB	

- Perform steps 6 and 7 for node-1 and then node-2 and click **Finish**.

- ◆ Azure DNS resource
Provides a mechanism to register or unregister a record to or from Azure DNS.

For details about the Azure DNS resource, see "Understanding Azure DNS resources" in Chapter 5, "Monitor resource details" in the *Reference Guide*.

- Click **Add** on the **Group Resource List** page.
- The **Resource Definition of Group** window is displayed. Select the group resource type (Azure DNS resource) from the **Type** box and enter the group name (azuredns1) in the **Name** box.

- Click **Next**.

4. The **Dependent Resources** page is displayed. Click **Next** without specifying anything.

The screenshot shows the 'Resource Definition of Group(failover1)' window. On the left, the 'Steps' pane is visible with 'Cluster', 'Server', 'Group', 'Basic Settings', 'Startup Servers', 'Group Attributes', 'Group Resources', 'Info', 'Dependency', 'Recovery Operation', 'Details', and 'Monitor'. The 'Group' step is selected. The main area is titled 'Dependent Resources' and contains a checkbox 'Follow the default dependency' which is checked. Below this is a table with columns 'Name' and 'Resource type'. To the right of the table are buttons '< Add' and 'Remove >'. Further right is an 'Available Resources' section with a 'Name' column. At the bottom right are buttons '< Back', 'Next >', and 'Cancel'.

5. The **Recovery Operation at Activity Failure Detection** and **Recovery Operation at Deactivity Failure Detection** page is displayed. Click **Next**.

The screenshot shows the 'Resource Definition of Group(failover1)' window, now on the 'Recovery Operation' page. The 'Steps' pane on the left is the same, but 'Recovery Operation' is now selected. The main area is titled 'Execute Script before or after Activation or Deactivation' and has a 'Settings' button. It contains two sections: 'Recovery Operation at Activity Failure Detection' and 'Recovery Operation at Deactivity Failure Detection'. The first section has fields for 'Retry Count' (set to 1), 'Failover Target Server' (with radio buttons for 'Stable Server' and 'Maximum Priority Server'), and 'Failover Threshold' (set to 1). It also has a 'Final Action' dropdown menu set to 'No operation (not activate next resource)' and a checkbox 'Execute Script before Final Action'. The second section has fields for 'Retry Count at Deactivation Failure' (set to 0) and a 'Final Action' dropdown menu set to 'Stop the cluster service and shutdown OS'. It also has a checkbox 'Execute Script before Final Action'. At the bottom right are buttons '< Back', 'Next >', and 'Cancel'.

6. Enter the values for each of the following: **Record Set Name**, **Zone Name**, **IP Address**, **Resource Group Name**, **User URI**, **Tenant ID**, **File Path of Service Principal**, **Azure CLI File Path**. When using the IP address of each server, enter the IP address in the tab for each server. When setting up the servers separately, enter any IP address of the servers in the **Common** tab and then make settings for other servers.

Resource Definition of Group(failover1)

Steps

- Cluster
- Server
- Group
 - Basic Settings
 - Startup Servers
 - Group Attributes
 - Group Resources
 - Info
 - Dependency
 - Recovery Operation
 - Details
- Monitor

Common node-1 node-2

Record Set Name test-record1

Zone Name cluster1.zone

IP Address 10.5.0.120

TTL 3600 sec

Resource Group Name TestGroup1

Account

User URI http://azure-test

Tenant ID xxxxxxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx

File Path of Service Principal C:\Users\testlogin\examplecert.pem

Azure CLI File Path C:\Program Files (x86)\Microsoft SDKs\Azure\CLI2\wbin\az.cmd

☒ Delete a record set at deactivation

Tuning

< Back Finish Cancel

7. Click **Finish**.

3) Adding a monitor resource

- ◆ Azure DNS monitor resource

The mechanism to check the record sets registered to the Azure DNS and whether the name resolution is available is provided.

For details about Azure DNS monitor resources, see "*Reference Guide*" > "Chapter 6, Monitor resource details" > "Understanding Azure DNS monitor resources."

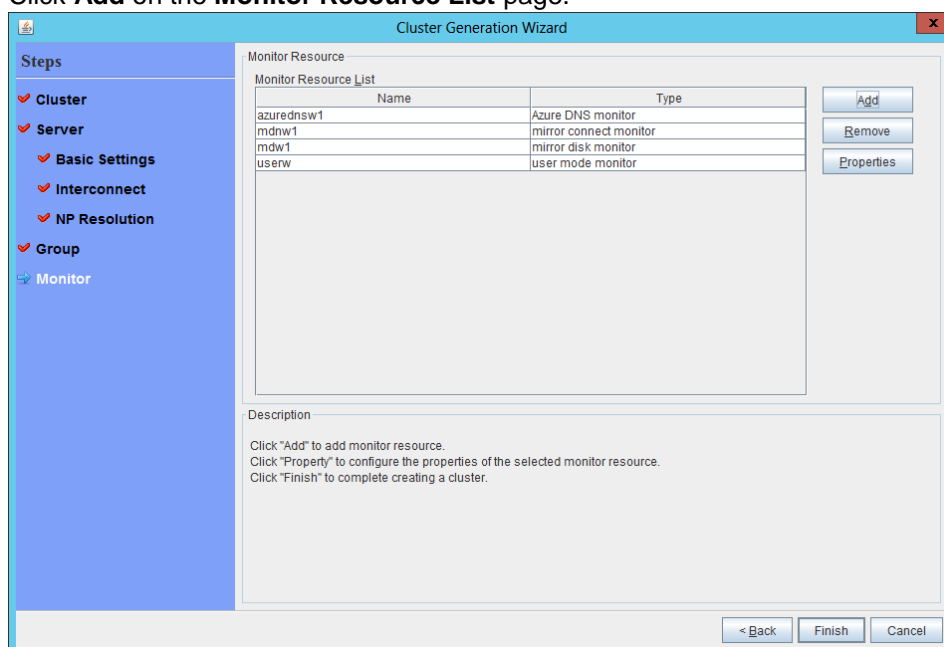
Adding one Azure DNS resource creates one Azure DNS monitor resource automatically.

- ◆ Custom monitor resource

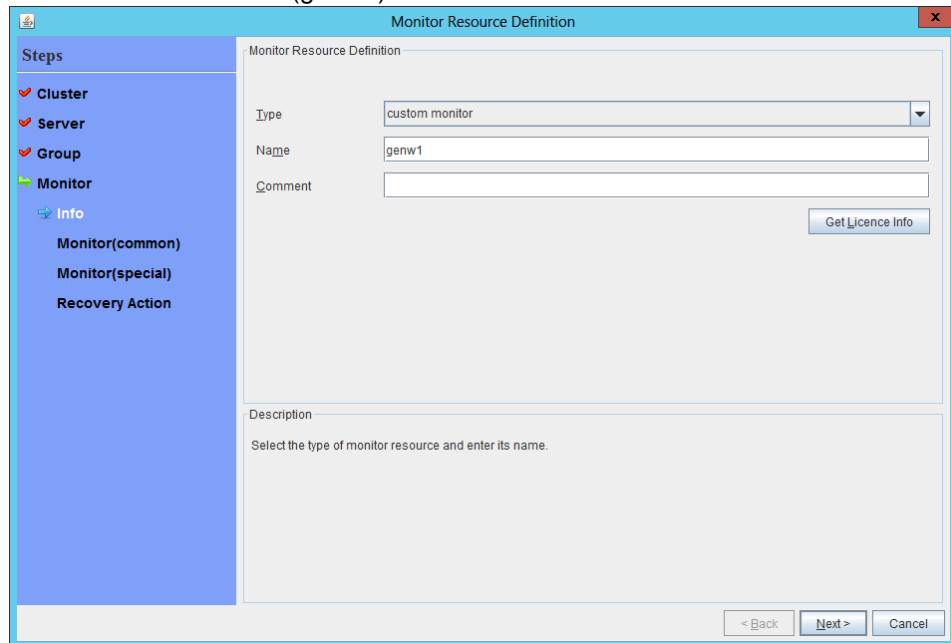
Sets a script to monitor whether communication with Microsoft Azure Service Management API is possible, and also monitors health of communication with an external network.

For details about the custom monitor resource, see "Understanding custom monitor resources" in Chapter 6, "Monitor resource details" in the *Reference Guide*.

1. Click **Add** on the **Monitor Resource List** page.

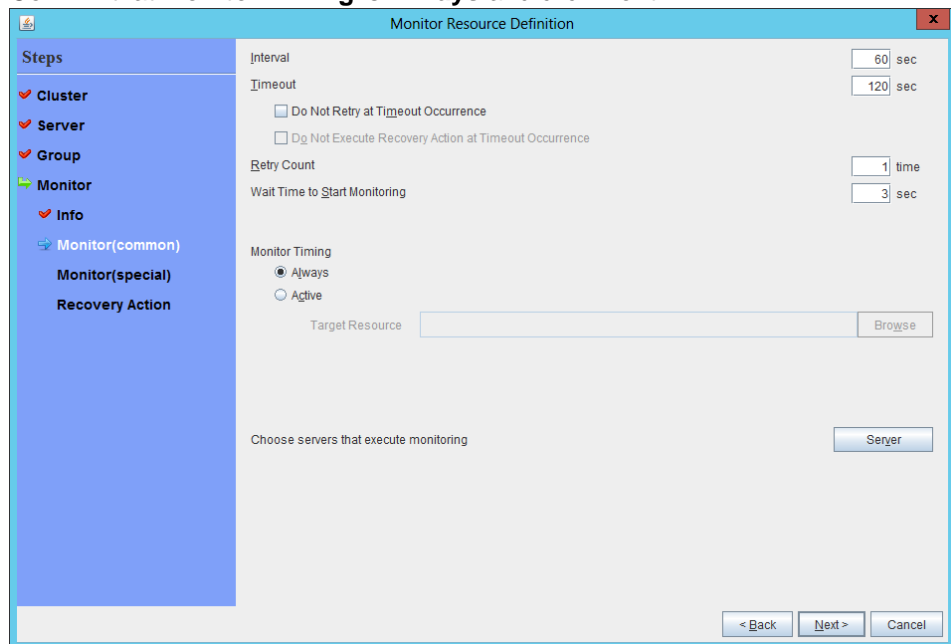


2. Select the monitor resource type (custom monitor) from the **Type** box and enter the monitor resource name (genw1) in the **Name** box.



The dialog box is titled "Monitor Resource Definition". On the left, a "Steps" sidebar shows a tree view with "Cluster", "Server", "Group", "Monitor", "Info", "Monitor(common)", "Monitor(special)", and "Recovery Action". The "Monitor" step is highlighted. The main area is divided into two sections. The top section, "Monitor Resource Definition", contains a "Type" dropdown menu set to "custom monitor", a "Name" text box containing "genw1", and an empty "Comment" text box. A "Get Licence Info" button is to the right. The bottom section, "Description", contains the text "Select the type of monitor resource and enter its name." At the bottom right are "< Back", "Next >", and "Cancel" buttons.

3. Click **Next**.
4. The **Monitor (common)** page is displayed.
Confirm that **Monitor Timing** is **Always** and click **Next**.



The dialog box is titled "Monitor Resource Definition". The "Steps" sidebar on the left now highlights "Monitor(common)". The main area contains configuration options for the monitor. "Interval" is set to 60 sec and "Timeout" to 120 sec. There are two unchecked checkboxes: "Do Not Retry at Timeout Occurrence" and "Do Not Execute Recovery Action at Timeout Occurrence". "Retry Count" is set to 1 time and "Wait Time to Start Monitoring" to 3 sec. Under "Monitor Timing", the "Always" radio button is selected, and the "Active" radio button is unselected. Below is a "Target Resource" text box with a "Browse" button. At the bottom is a "Choose servers that execute monitoring" section with a "Server" button. At the bottom right are "< Back", "Next >", and "Cancel" buttons.

5. The **Monitor (special)** page is displayed.
Select **Script created with this product**.
The following shows the sample of a script to be created.

```
-----
< EXPRESSCLUSTER_installation_path>\bin\clpazure_port_checker -h
management.core.windows.net -p 443
EXIT %ERRORLEVEL%
-----
```

Select **Synchronous** for **Monitor Type**.

6. Click **Next**.
7. The **Recovery Action** page is displayed.
Select **Execute only the final action** for **Recovery Action**, **LocalServer** for **Recovery Target**, and **No operation** for **Final action**.

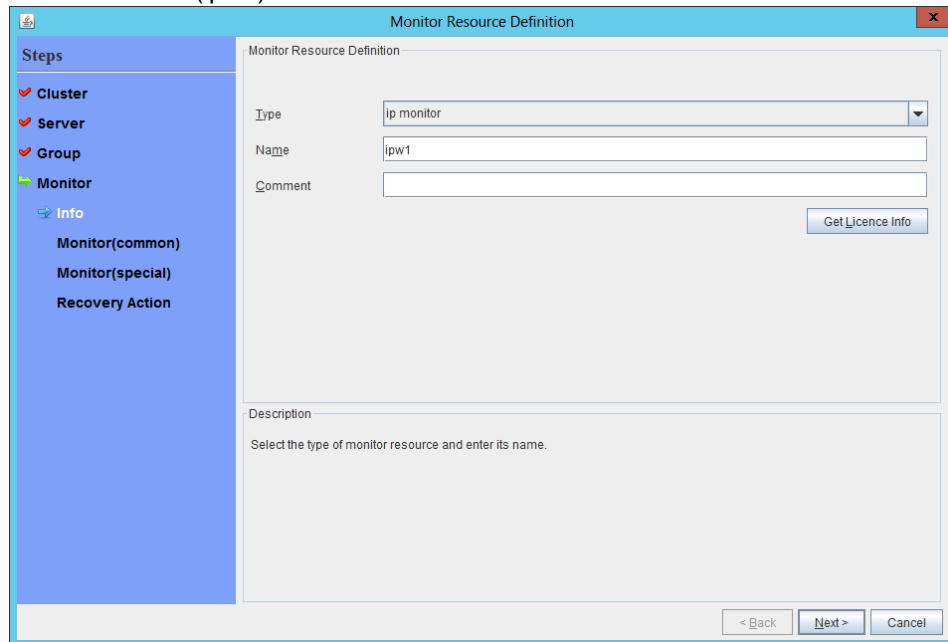
8. Click **Finish** to finish setting.

◆ IP monitor resource

Creates an IP monitor resource to monitor communication between clusters that are configured with virtual machines, and also to monitor whether communication with an internal network is health.

For details about the IP monitor resource, see “Understanding IP monitor resources” in Chapter 6, “Monitor resource details” in the *Reference Guide*.

1. Click **Add** on the **Monitor Resource List** page.
2. Select the monitor resource type (ip monitor) from the **Type** box and enter the monitor resource name (ipw1) in the **Name** box.

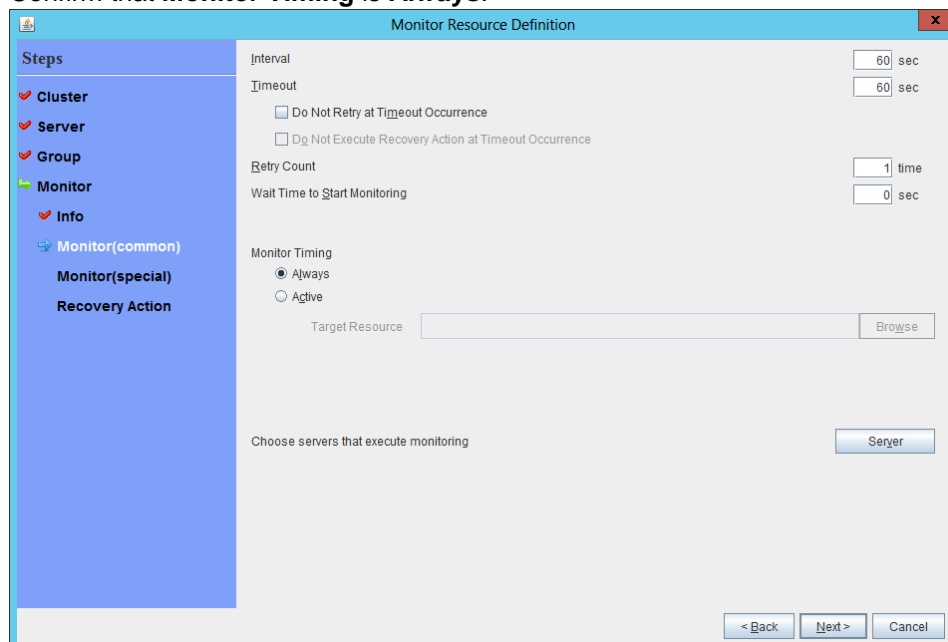


The screenshot shows the 'Monitor Resource Definition' dialog box. On the left, the 'Steps' sidebar has 'Info' selected under the 'Monitor' group. The main area is titled 'Monitor Resource Definition' and contains the following fields:

- Type:** A dropdown menu with 'ip monitor' selected.
- Name:** A text box containing 'ipw1'.
- Comment:** An empty text box.
- Get Licence Info:** A button.
- Description:** A text area with the placeholder text 'Select the type of monitor resource and enter its name.'

At the bottom right, there are three buttons: '< Back', 'Next >', and 'Cancel'.

3. Click **Next**.
4. The **Monitor (common)** page is displayed.
Confirm that **Monitor Timing** is **Always**.

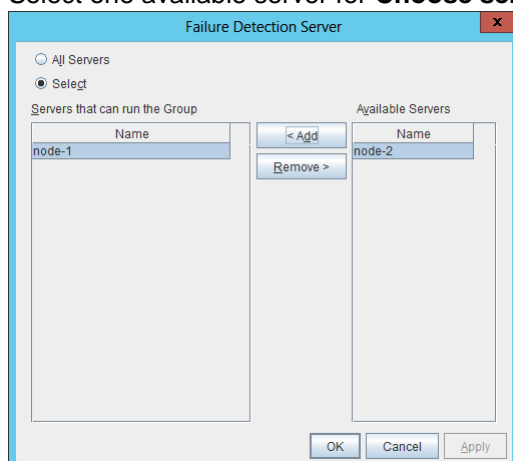


The screenshot shows the 'Monitor Resource Definition' dialog box at the 'Monitor(common)' step. The 'Steps' sidebar on the left has 'Monitor(common)' selected. The main area contains the following configuration options:

- Interval:** 60 sec
- Timeout:** 60 sec
- ☐ Do Not Retry at Timeout Occurrence
- ☐ Do Not Execute Recovery Action at Timeout Occurrence
- Retry Count:** 1 time
- Wait Time to Start Monitoring:** 0 sec
- Monitor Timing:**
 - ☒ Always
 - ☐ Active
- Target Resource:** A text box with a 'Browse' button.
- Choose servers that execute monitoring:** A button labeled 'Server'.

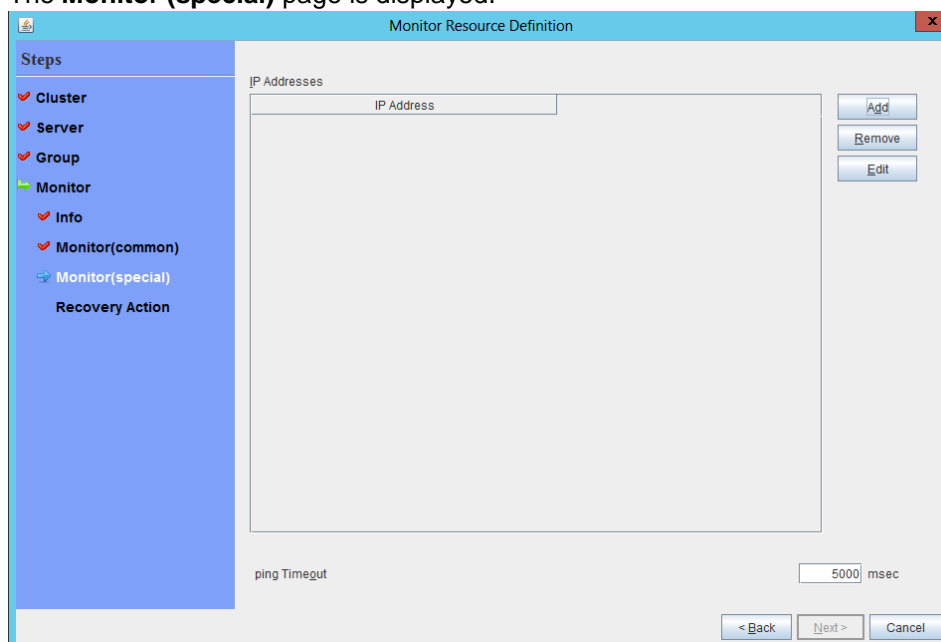
At the bottom right, there are three buttons: '< Back', 'Next >', and 'Cancel'.

Select one available server for **Choose servers that execute monitoring.**

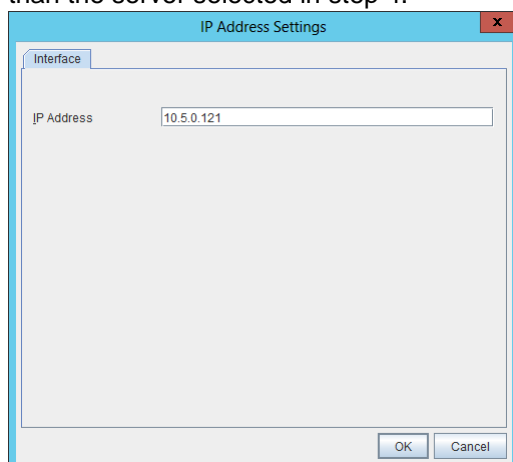


Click **Next**

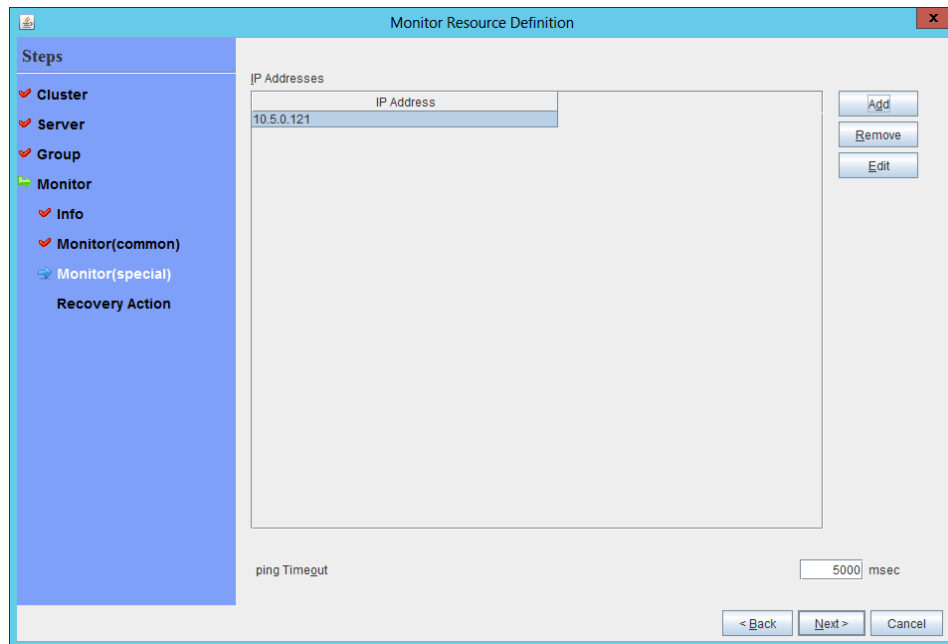
5. The **Monitor (special)** page is displayed.



On the **Common** tab, select **Add** of **IP Address** and set an IP address of a server other than the server selected in step 4.

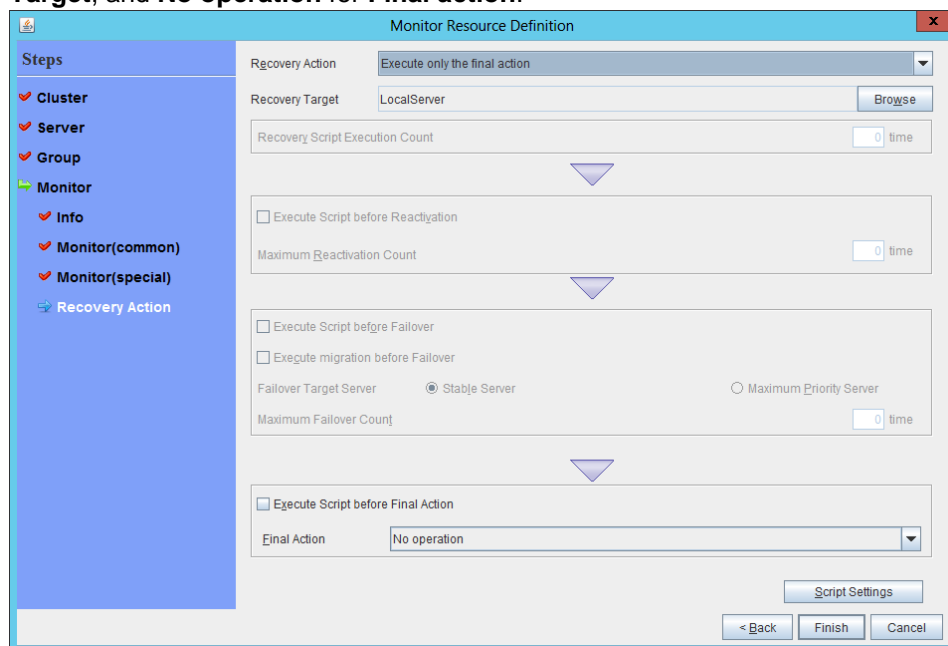


6. Click **Next**.



The 'Monitor Resource Definition' dialog box is shown at the 'Monitor' step. The left sidebar lists steps: Cluster, Server, Group, Monitor (selected), Info, Monitor(common), Monitor(special), and Recovery Action. The main area is titled 'IP Addresses' and contains a table with one row: '10.5.0.121' under the 'IP Address' header. To the right of the table are 'Add', 'Remove', and 'Edit' buttons. At the bottom, there is a 'ping Timeout' field set to '5000 msec' and '< Back', 'Next >', and 'Cancel' buttons.

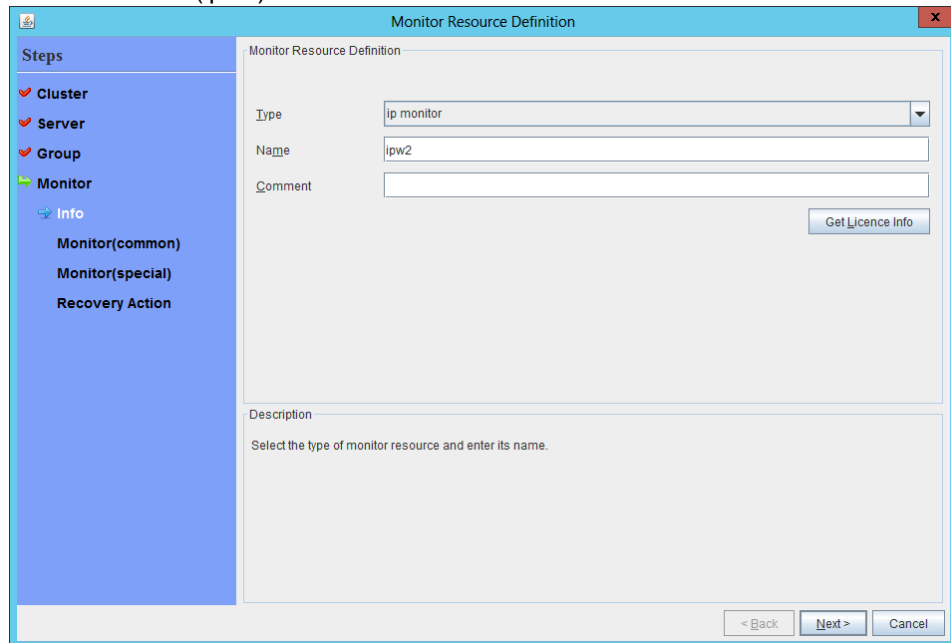
7. The **Recovery Action** page is displayed.
Select **Execute only the final action** for **Recovery Action**, **LocalServer** for **Recovery Target**, and **No operation** for **Final action**.



The 'Monitor Resource Definition' dialog box is shown at the 'Recovery Action' step. The left sidebar is the same as in step 6, with 'Recovery Action' selected. The main area has several sections: 'Recovery Action' is a dropdown menu set to 'Execute only the final action'; 'Recovery Target' is a text field with 'LocalServer' and a 'Browse' button; 'Recovery Script Execution Count' is a text field with '0' and 'time'; a section with 'Execute Script before Reactivation' checkbox and 'Maximum Reactivation Count' text field with '0' and 'time'; a section with 'Execute Script before Failover' and 'Execute migration before Failover' checkboxes, 'Failover Target Server' radio buttons (selected: 'Stable Server', unselected: 'Maximum Priority Server'), and 'Maximum Failover Count' text field with '0' and 'time'; and a section with 'Execute Script before Final Action' checkbox and 'Final Action' dropdown menu set to 'No operation'. At the bottom right are 'Script Settings', '< Back', 'Finish', and 'Cancel' buttons.

8. Click **Finish** to finish setting.
9. Then, create a monitor resource on the other server. Click **Add** on the **Monitor Resource List** page.

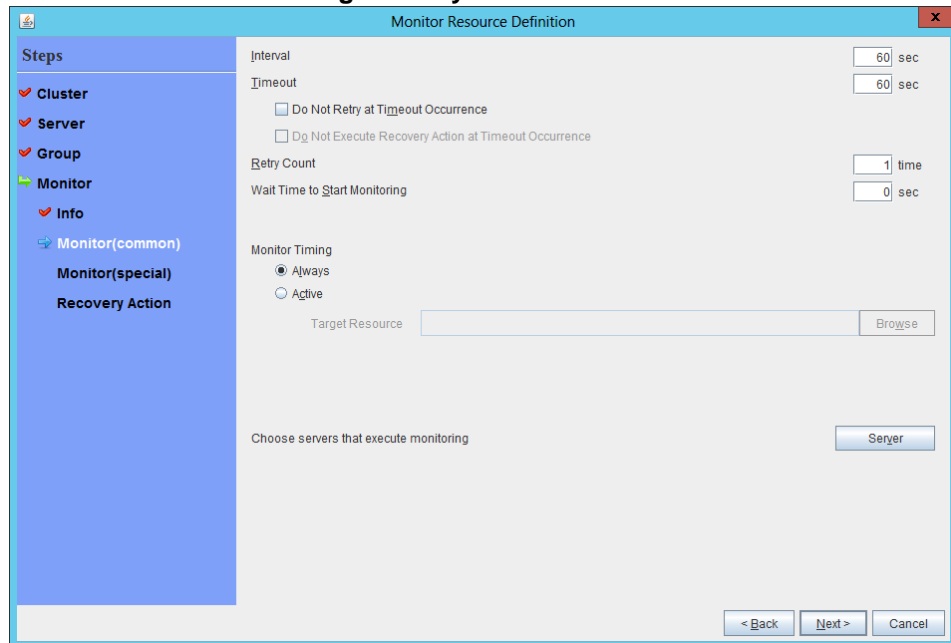
10. Select the monitor resource type (ip monitor) from the **Type** box and enter the monitor resource name (ipw2) in the **Name** box.



The screenshot shows a dialog box titled "Monitor Resource Definition". On the left is a "Steps" sidebar with a tree view containing "Cluster", "Server", "Group", "Monitor" (selected), "Info", "Monitor(common)", "Monitor(special)", and "Recovery Action". The main area is divided into two sections. The top section, "Monitor Resource Definition", contains three input fields: "Type" (a dropdown menu with "ip monitor" selected), "Name" (a text box containing "ipw2"), and "Comment" (an empty text box). A "Get Licence Info" button is located to the right of the "Comment" field. The bottom section, "Description", contains a text box with the instruction "Select the type of monitor resource and enter its name." At the bottom right of the dialog are three buttons: "< Back", "Next >", and "Cancel".

11. Click **Next**.

12. The **Monitor (common)** page is displayed.
Confirm that **Monitor Timing** is **Always**.

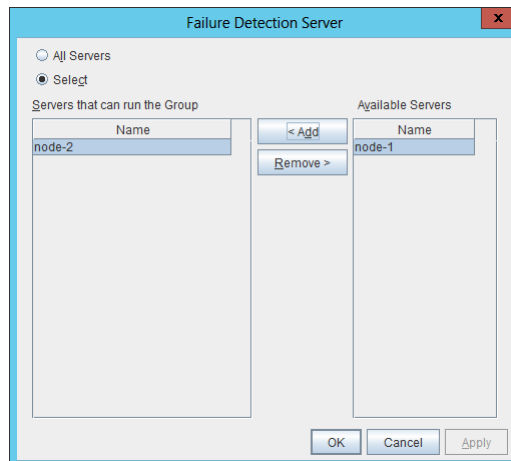


The **Monitor Resource Definition** dialog box is shown. The **Steps** pane on the left has **Monitor** selected. The main area contains the following settings:

- Interval:** 60 sec
- Timeout:** 60 sec
- ☐ Do Not Retry at Timeout Occurrence
- ☐ Do Not Execute Recovery Action at Timeout Occurrence
- Retry Count:** 1 time
- Wait Time to Start Monitoring:** 0 sec
- Monitor Timing:** ☒ Always, ☐ Active
- Target Resource:** (empty text box) with a **Browse** button
- Choose servers that execute monitoring:** (empty text box) with a **Server** button

Navigation buttons at the bottom: **< Back**, **Next >**, and **Cancel**.

Select one available server for **Choose servers that execute monitoring**.



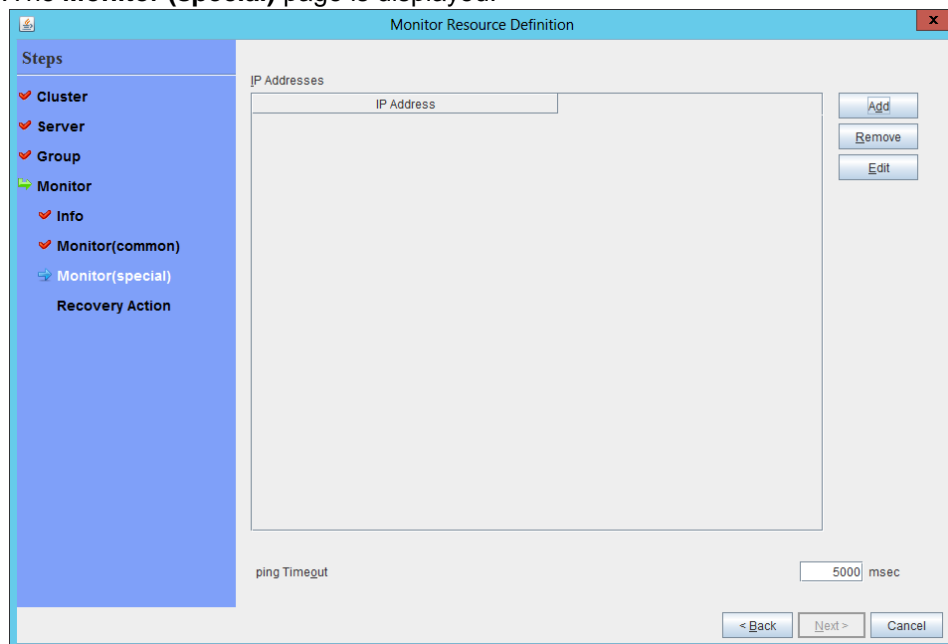
The **Failure Detection Server** dialog box is shown. It has two radio buttons: **All Servers** and **Select**. The **Select** option is chosen. Below are two list boxes:

- Servers that can run the Group:** Contains **node-2**.
- Available Servers:** Contains **node-1**.

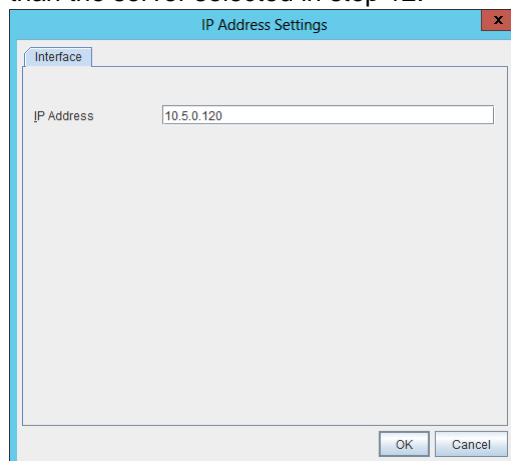
Buttons between the list boxes: **< Add** and **Remove >**. At the bottom are **OK**, **Cancel**, and **Apply** buttons.

Click **Next**.

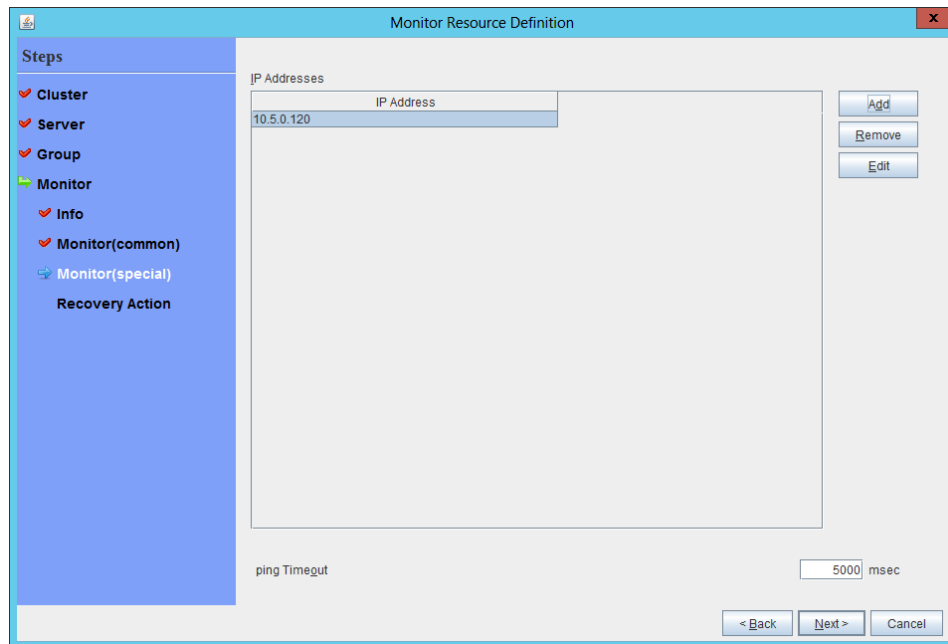
13. The **Monitor (special)** page is displayed.



On the **Common** tab, select **Add of IP Address** and set an IP address of a server other than the server selected in step 12.



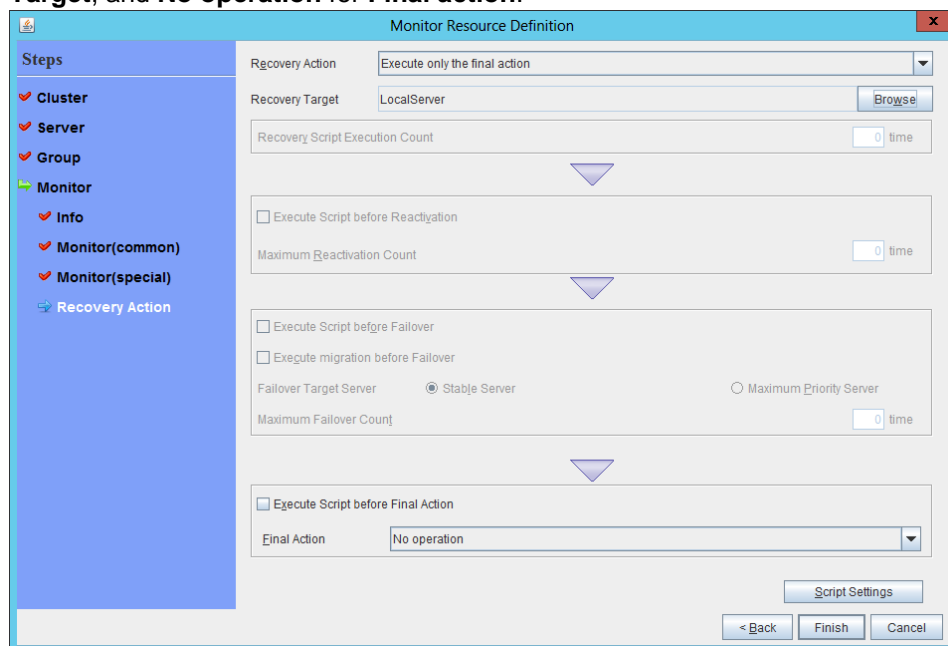
14. Click **Next**.



The 'Monitor Resource Definition' dialog box is shown. The 'Steps' pane on the left has 'Monitor' selected. The main area is titled 'IP Addresses' and contains a table with one row: '10.5.0.120' under the 'IP Address' header. To the right of the table are 'Add', 'Remove', and 'Edit' buttons. At the bottom, there is a 'ping Timeout' field set to '5000 msec' and '< Back', 'Next >', and 'Cancel' buttons.

15. The **Recovery Action** page is displayed.

Select **Execute only the final action** for **Recovery Action**, **LocalServer** for **Recovery Target**, and **No operation** for **Final action**.



The 'Monitor Resource Definition' dialog box is shown at the 'Recovery Action' step. The 'Steps' pane on the left has 'Recovery Action' selected. The main area contains several configuration sections: 'Recovery Action' (dropdown set to 'Execute only the final action'), 'Recovery Target' (text field with 'LocalServer' and a 'Browse' button), 'Recovery Script Execution Count' (spinner set to 0), 'Execute Script before Reactivation' (checkbox), 'Maximum Reactivation Count' (spinner set to 0), 'Execute Script before Failover' (checkbox), 'Execute migration before Failover' (checkbox), 'Failover Target Server' (radio buttons for 'Stable Server' and 'Maximum Priority Server', with 'Stable Server' selected), 'Maximum Failover Count' (spinner set to 0), 'Execute Script before Final Action' (checkbox), and 'Final Action' (dropdown set to 'No operation'). At the bottom right are 'Script Settings', '< Back', 'Finish', and 'Cancel' buttons.

16. Click **Finish** to finish setting.

◆ Multi-target monitor resource

Creates a multi-target monitor resource to check the statuses of the custom monitor resource and IP monitor resource. The custom monitor resource monitors communication to Microsoft Azure Service Management API. The IP monitor resource monitors communication between clusters that are configured with virtual machines.

If their statuses are abnormal, execute the script in which the processing for NP resolution is described.

For details about the multi-target monitor resource, see "Understanding multi-target monitor resources" in Chapter 6, "Monitor resource details" in the *Reference Guide*.

1. Click **Add** on the **Monitor Resource List** page.
2. Select the monitor resource type (multi-target monitor) from the **Type** box and enter the monitor resource name (mtw1) in the **Name** box.

Monitor Resource Definition

Steps

- Cluster
- Server
- Group
- Monitor
- Info
 - Monitor(common)
 - Monitor(special)
 - Recovery Action

Monitor Resource Definition

Type: multi-target monitor

Name: mtw1

Comment:

Get Licence Info

Description

Select the type of monitor resource and enter its name.

< Back Next > Cancel

3. Click **Next**.
4. The **Monitor (common)** page is displayed. Confirm that **Monitor Timing** is **Always** and click **Next**.

Monitor Resource Definition

Steps

- Cluster
- Server
- Group
- Monitor
- Info
 - Monitor(common)
 - Monitor(special)
 - Recovery Action

Interval: 60 sec

Timeout: 60 sec

☐ Do Not Retry at Timeout Occurrence

☐ Do Not Execute Recovery Action at Timeout Occurrence

Retry Count: 1 time

Wait Time to Start Monitoring: 0 sec

Monitor Timing

☒ Always

☐ Active

Target Resource: Browse

Choose servers that execute monitoring: Server

< Back Next > Cancel

5. The **Monitor (special)** page is displayed.
From **Available Monitor Resources**, select the custom monitor resource (genw1) for checking communication with Service Management API and two IP monitor resources (ipw1 and ipw2) that are set to both servers. Then, click **Add** to add them to **Monitor Resource List**.

Monitor Resources		Available Monitor Resources	
Monitor Resource	Type	Monitor Resource	Type
genw1	genw	userw	userw
ipw1	ipw		
ipw2	ipw		

6. Click **Next**.
7. The **Recovery Action** page is displayed.
Specify **Execute only the final action** for **Recovery Action**, **LocalServer** for **Recovery Target**, and **Stop the cluster service and shutdown OS** for **Final action**.

Rcovery Action: Execute only the final action

Recovery Target: LocalServer

Recovery Script Execution Count: 0 time

☐ Execute Script before Reactivation

Maximum Reactivation Count: 0 time

☐ Execute Script before Failover

☐ Execute migration before Failover

Failover Target Server: ☒ Stable Server ☐ Maximum Priority Server

Maximum Failover Count: 0 time

☐ Execute Script before Final Action

Final Action: Stop the cluster service and shutdown OS

8. Click **Finish** to finish setting.

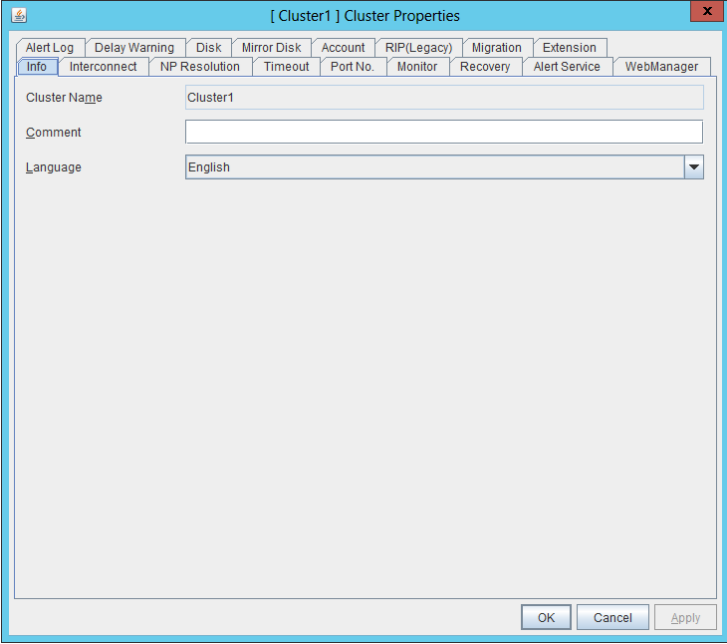
4) Setting the cluster properties

For details about the cluster properties, see "Cluster properties" in Chapter 2, "Functions of the Builder" in the *Reference Guide*.

◆ Cluster properties

Configure the settings in **Cluster Properties** to link Microsoft Azure and EXBERSCLUSTER.

1. Enter **Config Mode** from WebManager, right-click a cluster name, and select **Properties**.



The screenshot shows a dialog box titled "[Cluster1] Cluster Properties". It features a tabbed interface with the following tabs: Alert Log, Delay Warning, Disk, Mirror Disk, Account, RIP(Legacy), Migration, Extension, Info, Interconnect, NP Resolution, Timeout, Port No., Monitor, Recovery, Alert Service, and WebManager. The "Info" tab is currently selected. Within the "Info" tab, there are three input fields: "Cluster Name" with the value "Cluster1", "Comment" which is empty, and "Language" with a dropdown menu showing "English". At the bottom right of the dialog, there are three buttons: "OK", "Cancel", and "Apply".

2. Select the **Timeout** tab. For **Timeout of Heartbeat**, specify a value calculated by "A+B+30" ("Time that the multi-target monitor resource requires to detect an error"+30 seconds).

A: **Interval** of the monitor resource being monitored by the multi-target monitor resource for NP resolution x (**Retry Count**+1)

* Among three monitor resources, select the monitor resource whose calculation result is the largest.

B: **Interval** of the multi-target monitor resource x (**Retry Count**+1)

Note: If **Timeout of Heartbeat** is shorter than the time that the multi-target monitor resource requires to detect an error, a heartbeat timeout will be detected before starting the NP resolution processing. In this case, the same service may start doubly in the cluster because the service also starts on the standby server.

The screenshot shows the 'Cluster Properties' dialog box for 'Cluster1', with the 'Timeout' tab selected. The dialog has a title bar with a close button. Below the title bar is a tabbed interface with the following tabs: Alert Log, Delay Warning, Disk, Mirror Disk, Account, RIP(Legacy), Migration, Extension, Info, Interconnect, NP Resolution, Timeout (selected), Port No., Monitor, Recovery, Alert Service, and WebManager. The main area contains several settings:

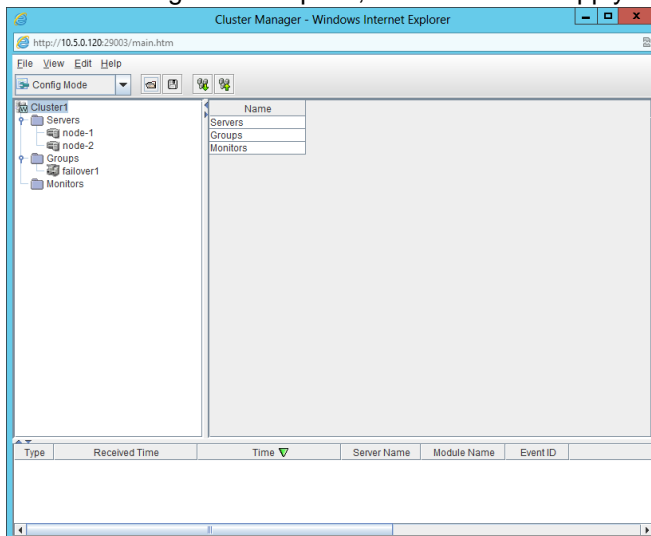
- Network initialization complete wait time: 3 min
- Server Sync Wait Time: 5 min
- Heartbeat section:
 - Interval: 3 sec
 - Timeout: 270 sec
- Server Internal Timeout: 180 sec

At the bottom right, there is an 'Initialize' button. At the very bottom, there are 'OK', 'Cancel', and 'Apply' buttons.

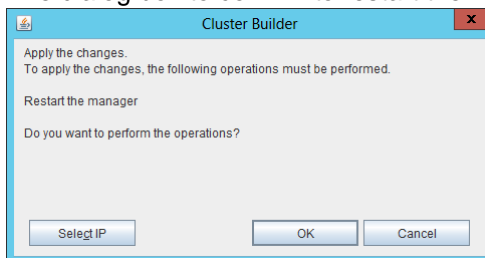
3. Click **OK**.

5) Applying the settings and starting the cluster

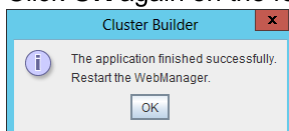
1. After all settings are complete, click the icon to apply the settings under the menu.



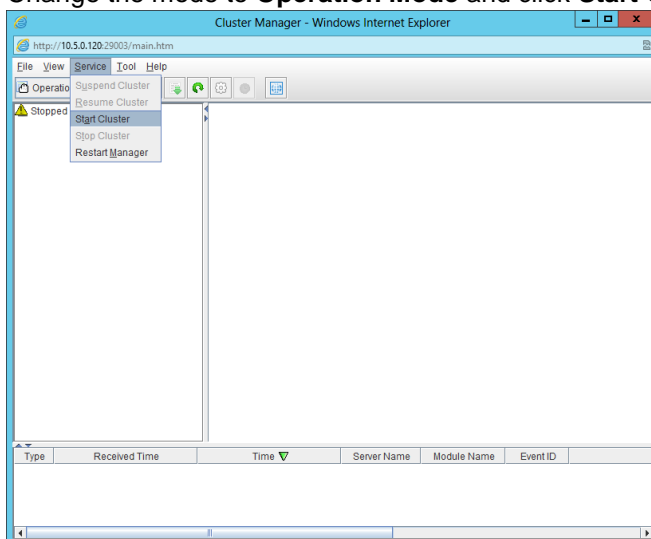
2. The dialog box to confirm to restart the manager is displayed.



3. Click **OK**.
4. Click **OK** again on the following dialog box.



5. Change the mode to **Operation Mode** and click **Start Cluster** from the **Service** menu.



3.4 Verifying the created environment

Verify whether the created environment works properly by generating a monitoring error to fail over a failover group.

If the cluster is running normally, the verification procedure is as follows:

1. Start the failover group (failover1) on the active node (node-1). In the Status tab on the Cluster WebUI, confirm that **Group Status** of failover1 of node-1 is **Normal**.
2. Log in to the Microsoft Azure portal, select cluster1.zone on the **DNS zone** blade, and then select **Summary**. Check the DNS servers displayed on the upper right of the window (name server 1, name server 2, name server 3, and name server 4 in the window example).
3. Confirm that the relevant record set exists in the DNS servers checked in the above step by executing the nslookup command as follows:
nslookup test-record1.cluster1.zone <DNS_servers_checked_in_the_above_step>
4. On the Microsoft Azure portal, delete an A record from the DNS zone. This causes azurednsw1 to detect a monitoring error. On the **DNS zone** blade, select cluster1.zone and then **Summary**.
5. Select the record you want to delete and click **Delete**. When the deletion confirmation dialog box is displayed, select **Yes**.
6. When the time specified for **Interval** of azurednsw1 elapses, the failover group (failover1) enters an error status and fails over to node-2. In the Status tab on the Cluster WebUI, confirm that **Group Status** of failover1 of node2 is **Normal**.
7. Confirm that the relevant record set exists in the DNS servers checked in the above step by executing the nslookup command as follows:
nslookup test-record1.cluster1.zone <DNS_servers_checked_in_the_above_step>

Verifying the failover operation when an A record is deleted from the DNS server is now complete. Verify the operations in case of other failures if necessary.

Chapter 4 Cluster Creation Procedure (for an HA Cluster Using an Internet Facing Load Balancer)

4.1 Creation example

This guide introduces the procedure for creating a 2-node unidirectional standby cluster using EXPRESSCLUSTER on Microsoft Azure. This procedure is intended to create a mirror disk type configuration in which node-1 is used as an active server.

The following tables describe the parameters that do not have a default value and the parameters whose values are to be changed from the default values.

- Microsoft Azure settings (common to node-1 and node-2)

Setting item	Setting value
Resource group setting	
Name	TestGroup1
Resource group location	Japan East
Virtual network setting	
Name	Vnet1
Address space	10.5.0.0/24
Subnet name	Vnet1-1
Subnet address range	10.5.0.0/24
Resource group name	TestGroup1
Location	Japan East
Load balancer setting	
Name	TestLoadBalancer
Type	Public
Public IP address: Name	TestLoadBalancerPublicIP
Public IP address: Assignment	Static
Resource group	TestGroup1
Location	Japan East
Backend pool: Name	TestBackendPool
Associated to	Availability set
Target virtual machine	node-1 node-2
Network IP configuration	10.5.0.120 10.5.0.121
Health probe: Name	TestHealthProbe
Health probe: Port	26001
Load balancing rule: Name	TestLoadBalancingRule
Load balancing rule: Port	80 (Port number offering the operation)
Load balancing rule: Backend port	8080 (Port number offering the operation)
Inbound security rule setting	
Name	TestHTTP
Protocol	TCP
Port range	8080 (Port number offering the operation)

- Microsoft Azure settings (specific to each of node-1 and node-2)

Setting item	Setting value	
	node-1	node-2
Virtual machine setting		
VM disk type	HDD	
User name	testlogin	
Password	PassWord_123	
Resource group name	TestGroup1	
Location	Japan East	
Storage account setting		
Name	clstorageacc1	
Performance	Standard	
Replication	Locally-redundant storage (LRS)	
Network security group setting		
Name	NetSecGroup-1	
Availability set setting		
Name	AvailabilitySet-1	
Update domains	5	
Fault domains	3	
Diagnostics storage account setting		
Name	clstorageaccdiag1	
Performance	Standard	
Replication	Locally-redundant storage (LRS)	
IP configuration setting		
IP address	10.5.0.120	10.5.0.121
Blob storage setting		
Name	Node-1Blob1	Node-2Blob1
Source type	New (empty disk)	
Account type	Standard (HDD)	
Size	20	

- EXPRESSCLUSTER settings (cluster properties)

Setting item	Setting value	
	node-1	node-2
Cluster Name	Cluster1	
Server Name	node-1	node-2
Timeout Tab: Heartbeat timeout	210	

- EXPRESSCLUSTER settings (failover group)

Resource name	Setting item	Setting value
Mirror disk resource	Name	md
	Details Tab: Data Partition Drive Letter	G:
	Details Tab: Cluster Partition Drive Letter	F:
Azure probe port resource	Name	azurepp1
	Probe port	26001 (Value specified for Port of Health probe)

- EXPRESSCLUSTER settings (monitor resource)

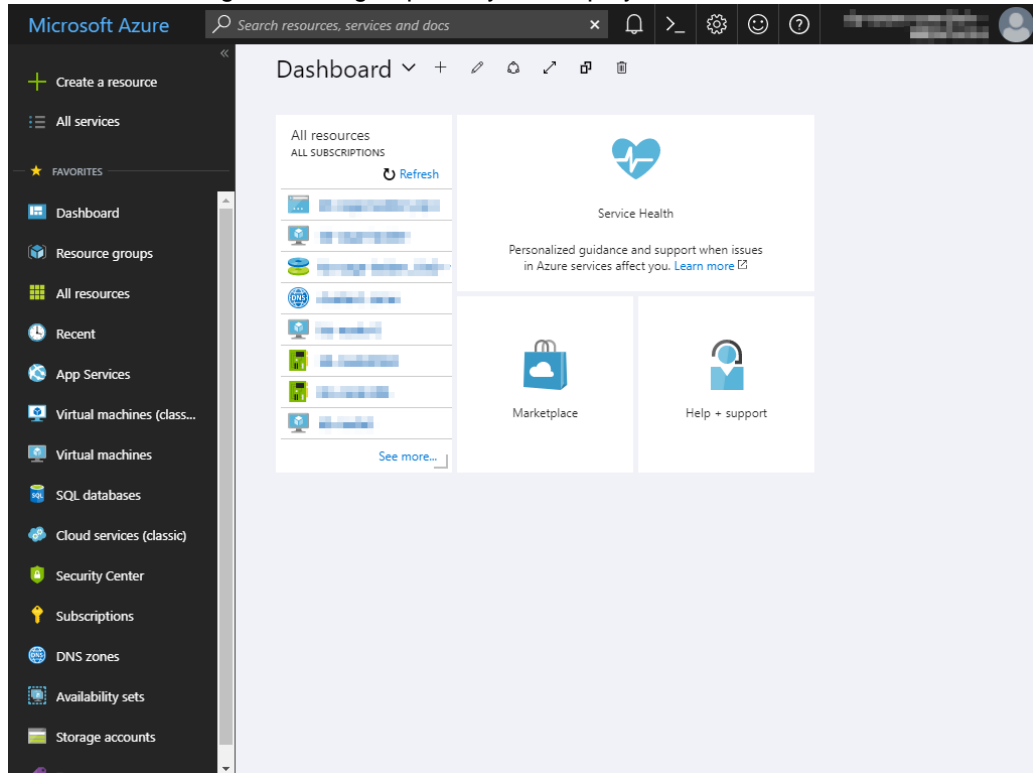
Monitor resource name	Setting item	Setting value
Mirror disk monitor resource	-	-
Azure probe port monitor resource	Name	azureppw1
	Recovery Target	azurepp1
Azure load balance monitor resource	Name	aurelbw1
	Recovery Target	azurepp1
Custom monitor resource	Name	genw1
	Script created with this product	On
	Monitor Type	Synchronous
	Normal Return Value	0
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
IP monitor resource	Name	ipw1
	Server to monitor	node-1
	IP address	10.5.0.121
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
IP monitor resource	Name	ipw2
	Server to monitor	node-2
	IP address	10.5.0.120
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
Multi-target monitor resource	Name	mtw1
	Monitor resource list	genw1 ipw1 ipw2
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
	Execute Script before Final Action	On
	Timeout	30

4.2 Configuring Microsoft Azure

1) Creating a resource group

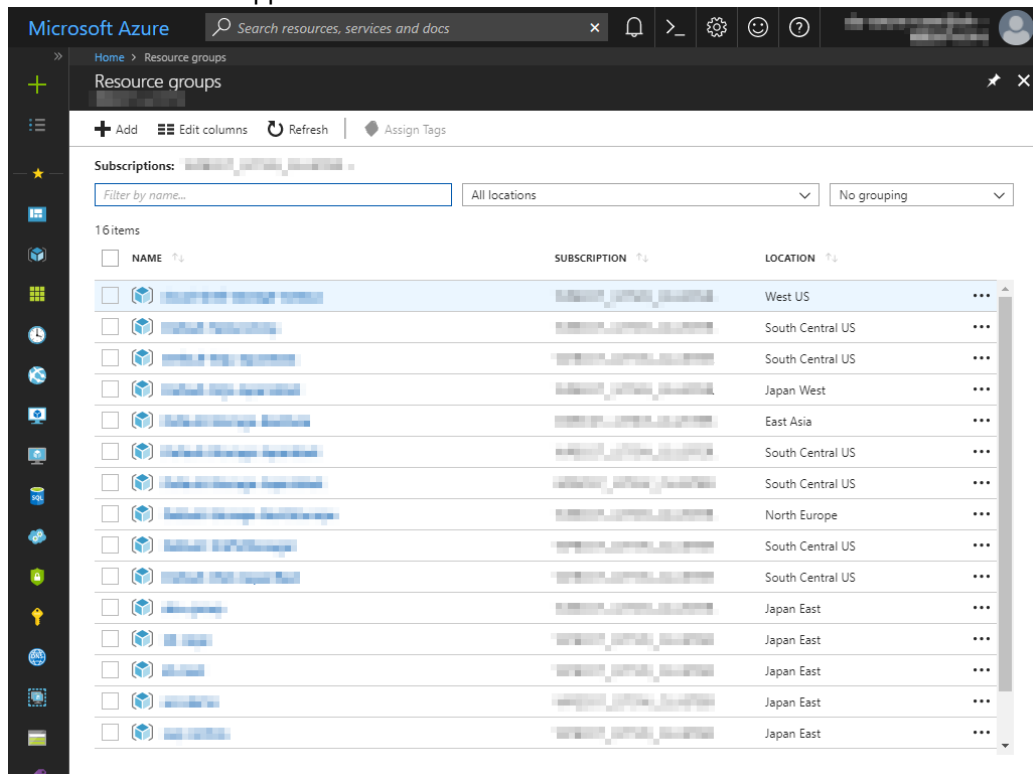
Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and create a resource group following the steps below.

1. Select **Resource groups** or the resource group icon in the menu on the left side of the window. If there are existing resource groups, they are displayed in a list.

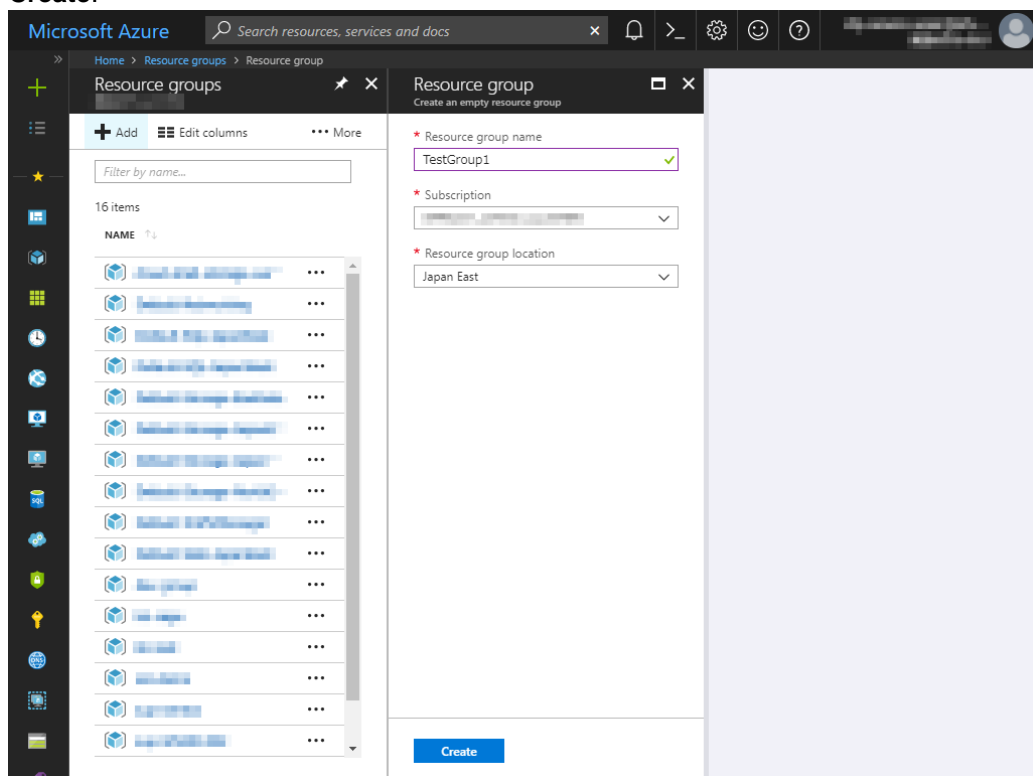


Cluster Creation Procedure (for an HA Cluster Using an Internet Facing Load Balancer)

2. Select **+Add** at the upper left of the window.



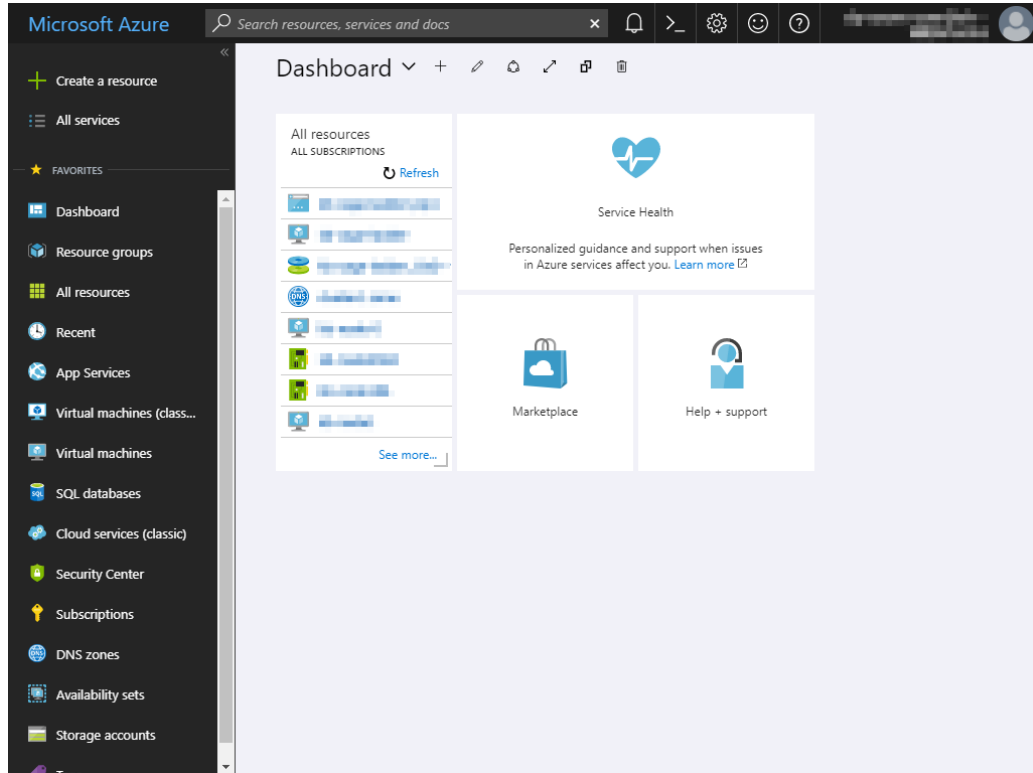
3. Specify **Resource group name**, **Subscription**, and **Resource group location**, and click **Create**.



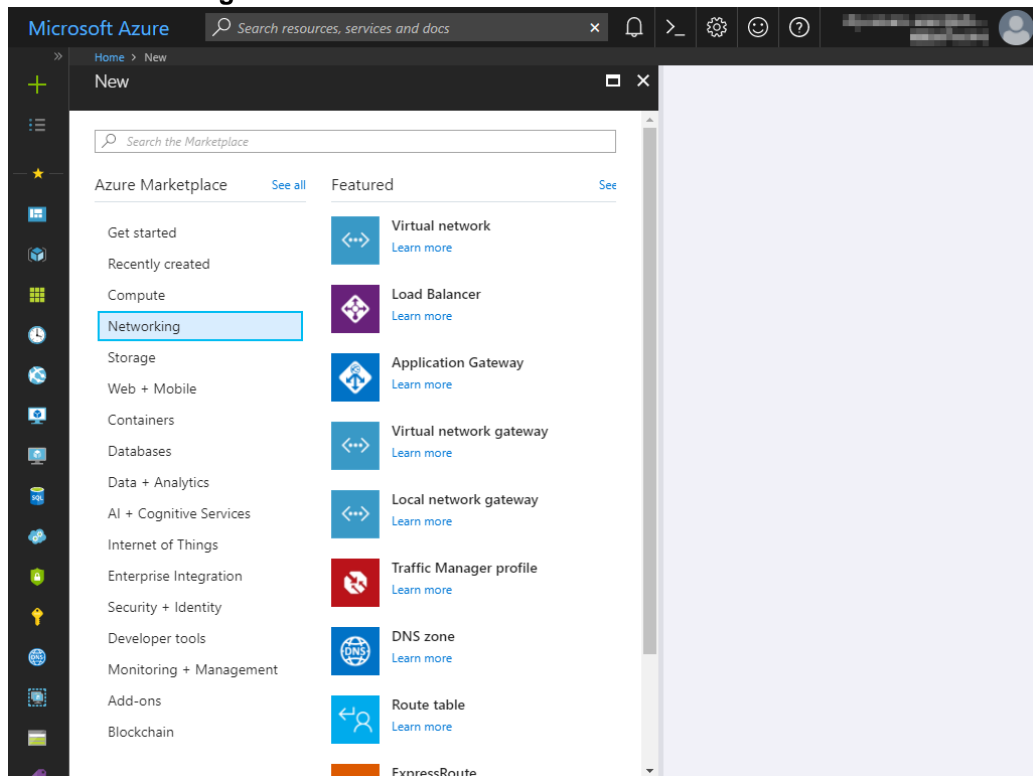
2) Creating a virtual network

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and create a virtual network following the steps below.

1. Select **+Create a resource** or the **+** icon in the menu on the left side of the window.



2. Select **Networking** and then **Virtual network**.



3. Specify **Name**, **Address space**, **Subscription**, **Resource group name**, **Location**, **Name** of Subnet, and **Address range**, and click **Create**.

The screenshot shows the 'Create virtual network' form in the Microsoft Azure portal. The form is titled 'Create virtual network' and is located under the 'Home > New > Create virtual network' breadcrumb. The form contains the following fields and options:

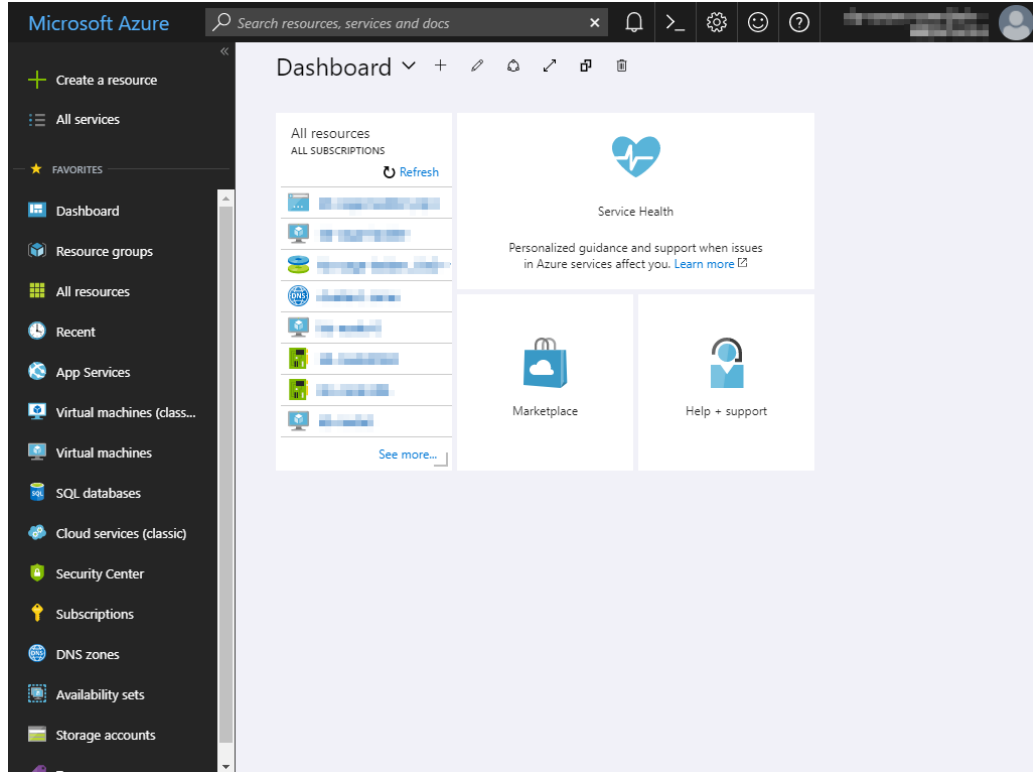
- Name:** Vnet1 (with a green checkmark)
- Address space:** 10.5.0.0/24 (with a green checkmark). Below the input, it says '10.5.0.0 - 10.5.0.255 (256 addresses)'.
- Subscription:** A dropdown menu showing a blurred subscription ID.
- Resource group:** ☐ Create new ☒ Use existing. Below, a dropdown menu shows 'TestGroup1'.
- Location:** A dropdown menu showing 'Japan East'.
- Subnet:**
 - Name:** Vnet1-1 (with a green checkmark)
 - Address range:** 10.5.0.0/24 (with a green checkmark). Below the input, it says '10.5.0.0 - 10.5.0.255 (256 addresses)'.
- Service endpoints:** ☒ Disabled ☐ Enabled
- Pin to dashboard:** ☐
- Create:** A blue button.
- Automation options:** A link.

3) Creating a virtual machine

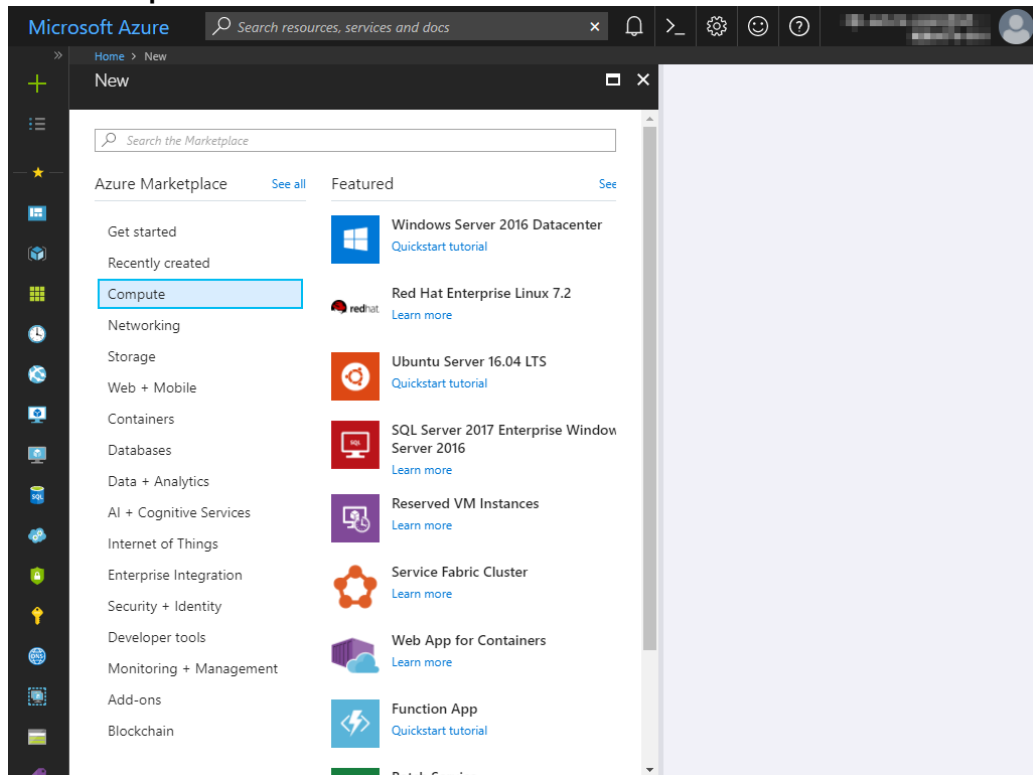
Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and create virtual machines and disks following the steps below.

Create as many virtual machines as required to create a cluster. Create node-1 and then node-2.

1. Select **+Create a resource** or the **+** icon in the menu on the left side of the window.



2. Select **Compute** and then **See all**.



3. Select **Windows Server 2016 Datacenter**.
4. The **Basics** blade is displayed. Specify **Name**, **VM disk type**, **User name**, **Password**, **Confirm password**, **Subscription**, **Resource group name**, and **Location**, and click **OK**. For **Name**, specify node-1 for node-1 and node-2 for node-2.

The screenshot shows the 'Basics' blade of the 'Create virtual machine' wizard in Microsoft Azure. The left sidebar lists four steps: 1. Basics (selected), 2. Size, 3. Settings, and 4. Summary. The main area contains the following fields:

- Name:** node-1
- VM disk type:** HDD
- User name:** testlogin
- Password:** (masked with dots)
- Confirm password:** (masked with dots)
- Subscription:** (selected from a dropdown)
- Resource group:** Use existing (selected), TestGroup1
- Location:** Japan East

At the bottom, there is a 'Save money' section with the text 'Save up to 40% with a license you already have' and an 'OK' button.

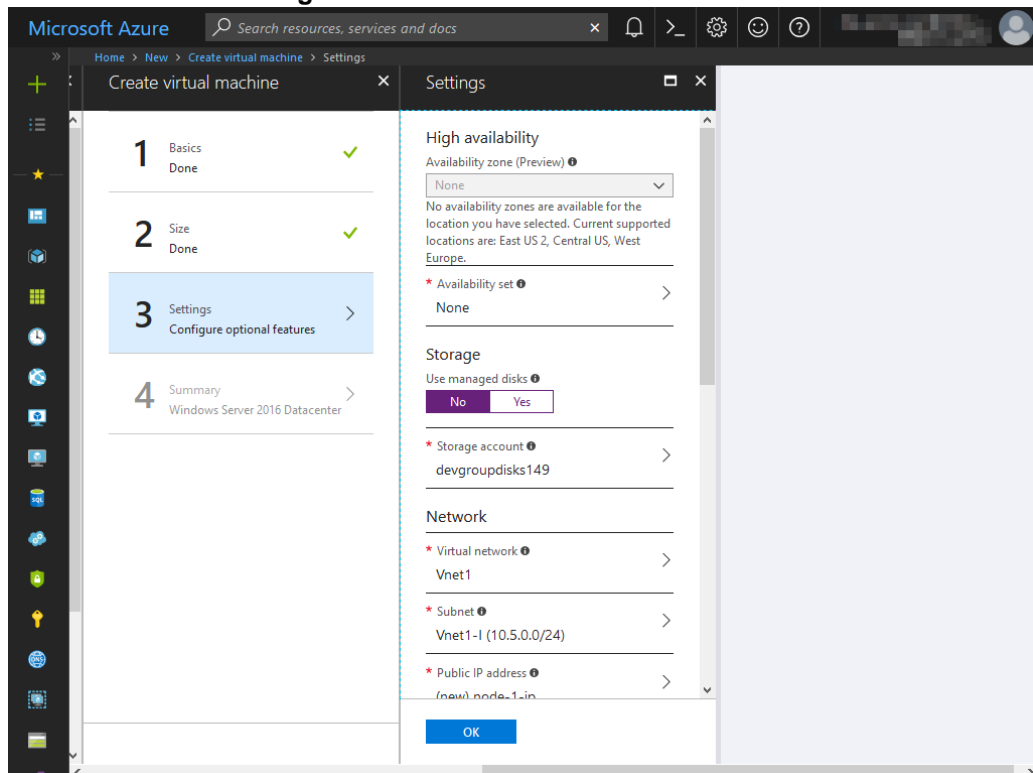
5. The **Choose a size** blade is displayed. Select the size appropriate for the usage purpose of the virtual machines from the list and click **Select**. In this guide, **A1 Standard** is selected.

The screenshot shows the 'Choose a size' blade of the 'Create virtual machine' wizard. The left sidebar shows the first step 'Basics' as 'Done' and the second step 'Size' as the current step. The main area displays a table of available VM sizes with the following columns: D1_V2 Standard, D1 Standard, and A1 Standard. The A1 Standard size is highlighted with a blue dashed border.

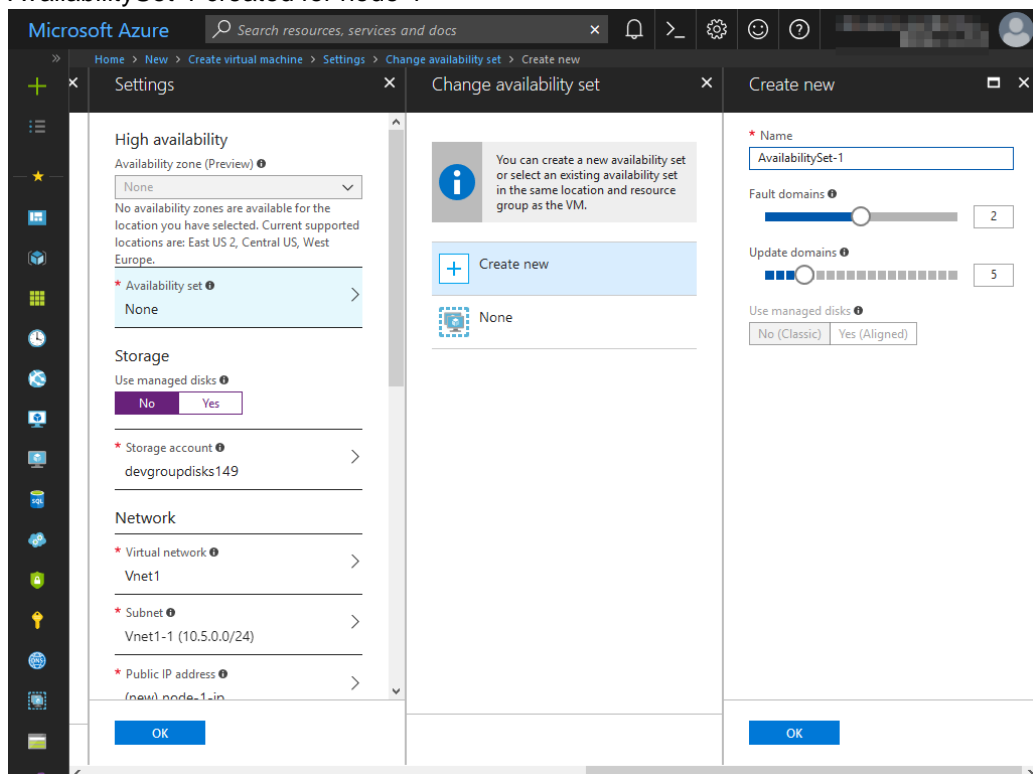
D1_V2 Standard	D1 Standard	A1 Standard
1 vCPU	1 vCPU	1 vCPU
3.5 GB	3.5 GB	1.75 GB
4 Data disks	4 Data disks	2 Data disks
2x500 Max IOPS	2x500 Max IOPS	2x500 Max IOPS
50 GB Local SSD	50 GB Local SSD	Load balancing
Load balancing	Load balancing	
11,226.96 JPY/MONTH (ESTIMATED)	11,226.96 JPY/MONTH (ESTIMATED)	5,148.48 JPY/MONTH (ESTIMATED)

At the bottom, there is a 'Select' button.

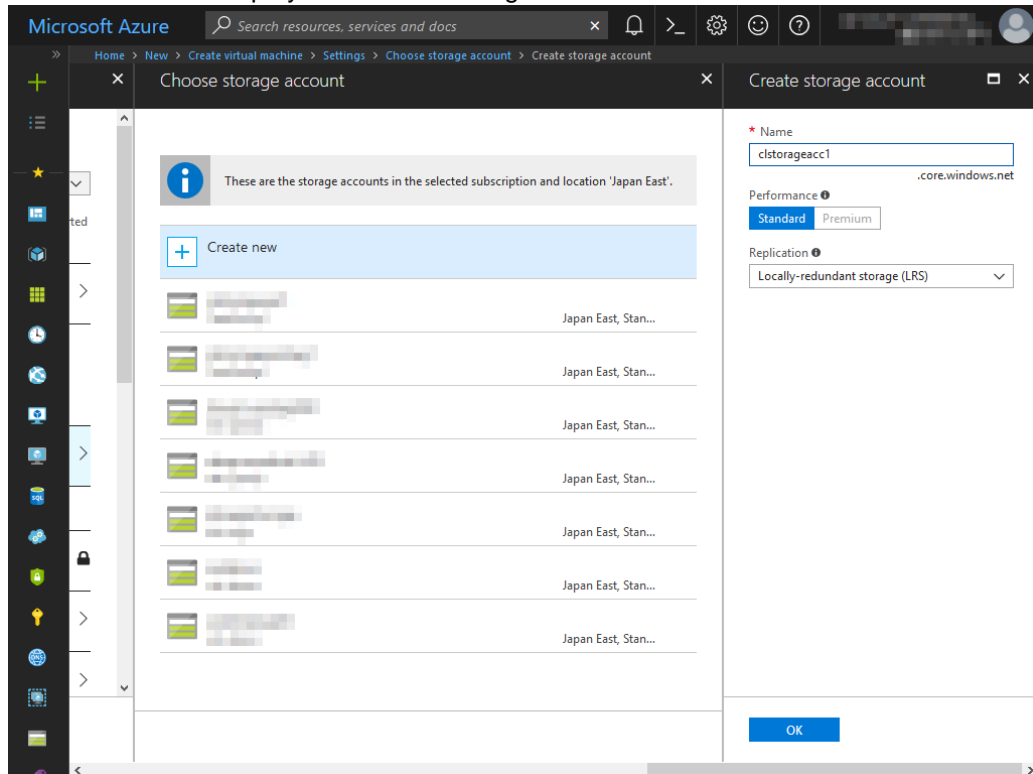
6. The **Settings** blade is displayed. Specify **Availability set**, **Storage account**, **Public IP address**, **Network security group**, and **Diagnostics storage account**.
7. Select **No** for **Use managed disks**.



8. Return to the **Settings** blade and select **Availability set**. For node-1, the **Change availability set** blade is displayed. Select **Create new**. Specify **Name**, **Fault domains**, and **Update domains**, and click **OK**. For node-2, the **Change availability set** blade is displayed. Select **AvailabilitySet-1** created for node-1

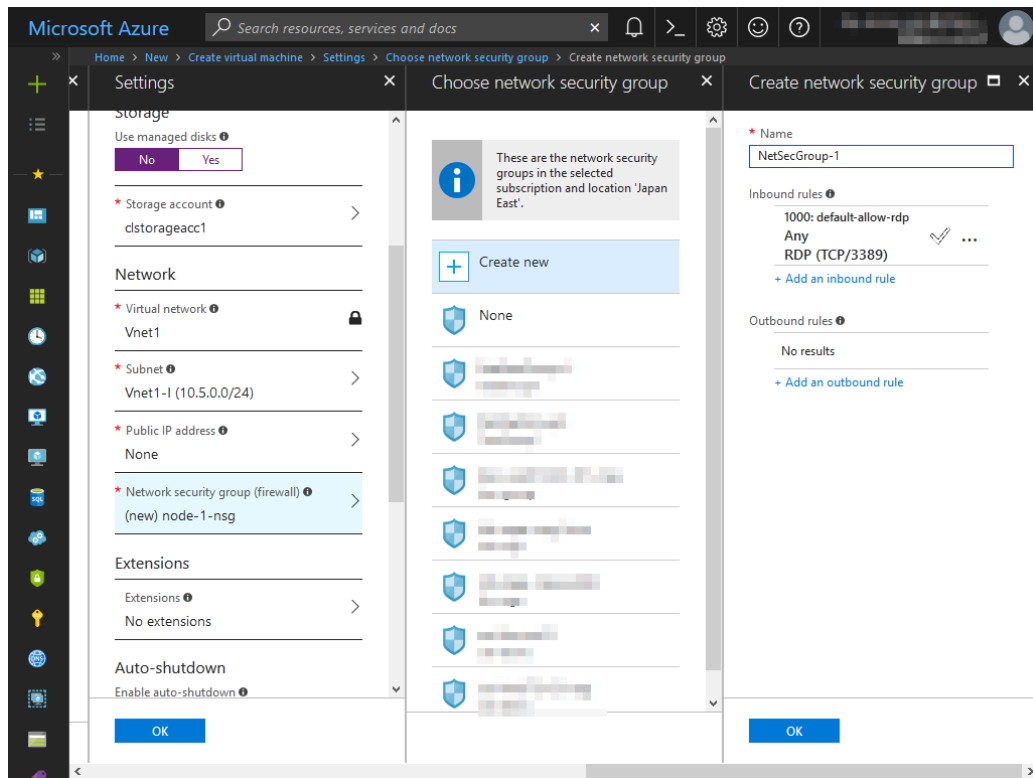


9. Select **Storage account**. For node-1, the **Create storage account** blade is displayed. Specify **Name**, **Performance**, and **Replication**, and click **OK**. For node-2, the **Choose storage account** blade is displayed. Select clstorageacc1 created for node-1.

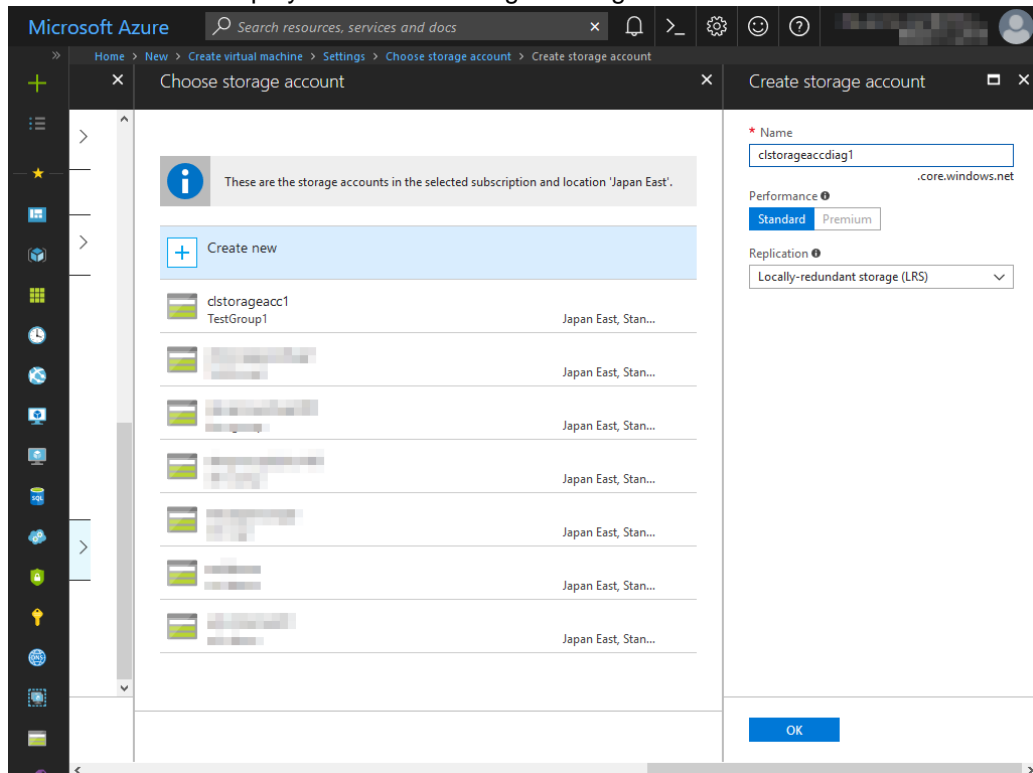


10. Return to the **Settings** blade and select **Public IP address**.
11. The **Choose public IP address** blade is displayed. Select **None**. Ignore the **Create public IP address** blade.

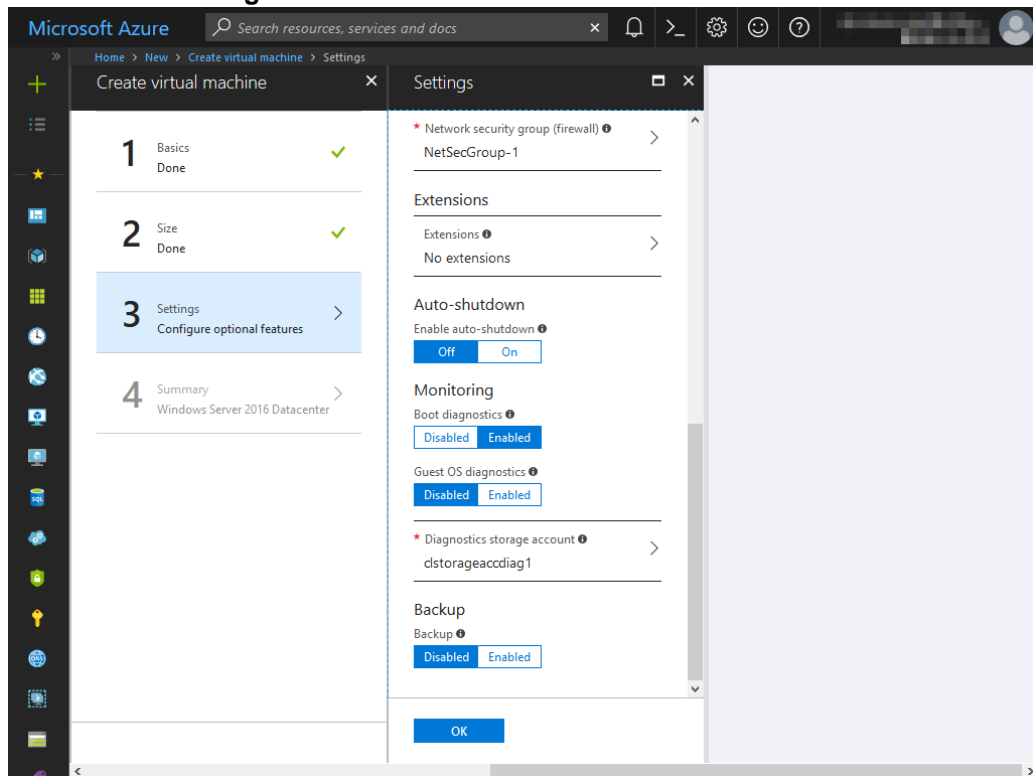
12. Return to the **Settings** blade and select **Network security group**. For node-1, the **Create network security group** blade is displayed. Specify **Name** and click **OK**. For node-2, the **Choose network security group** blade is displayed. Select NetSecGroup-1 created for node-1.



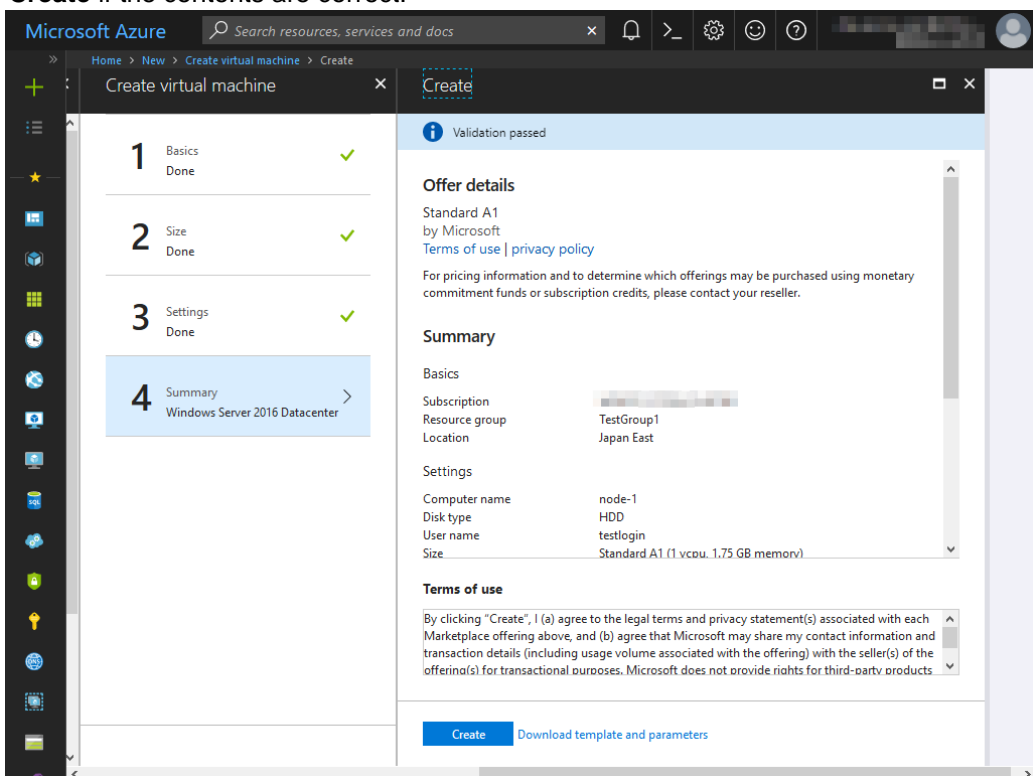
13. Select **Storage account**. For node-1, the **Create storage account** blade is displayed. Specify **Name**, **Performance**, and **Replication**, and click **OK**. For node-2, the **Choose storage account** blade is displayed. Select clstorageaccdiag1 created for node-1.



14. Return to the **Settings** blade and click **OK**.



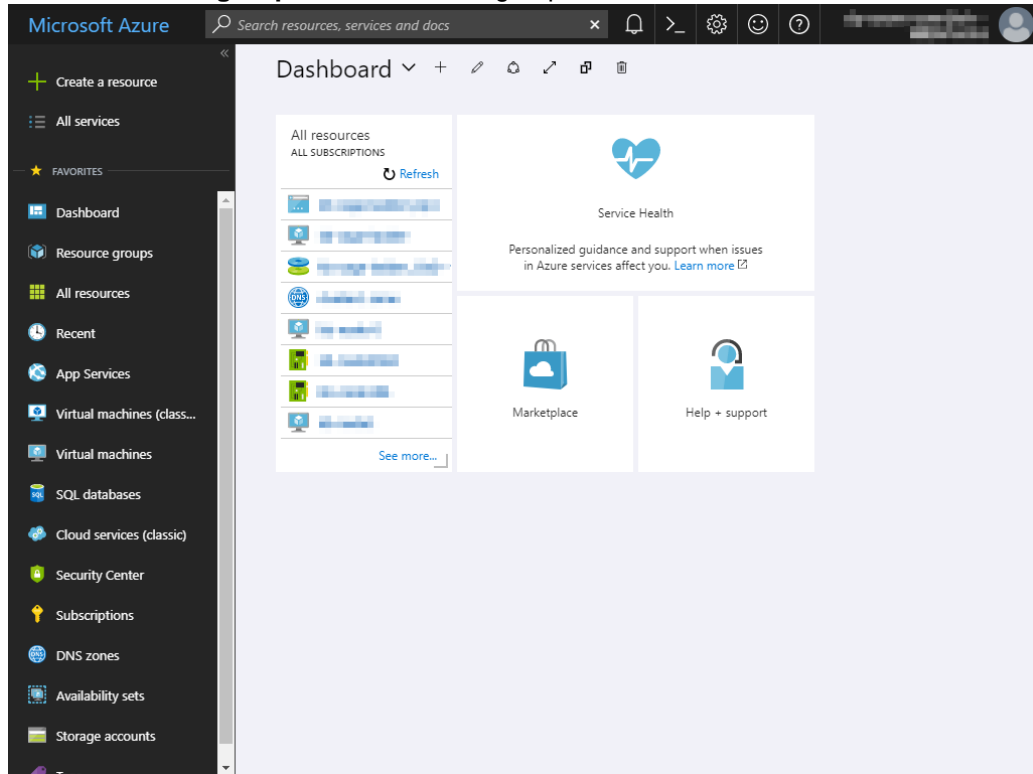
15. The **Create** blade is displayed. Check the contents displayed on the **Create** blade and click **Create** if the contents are correct.



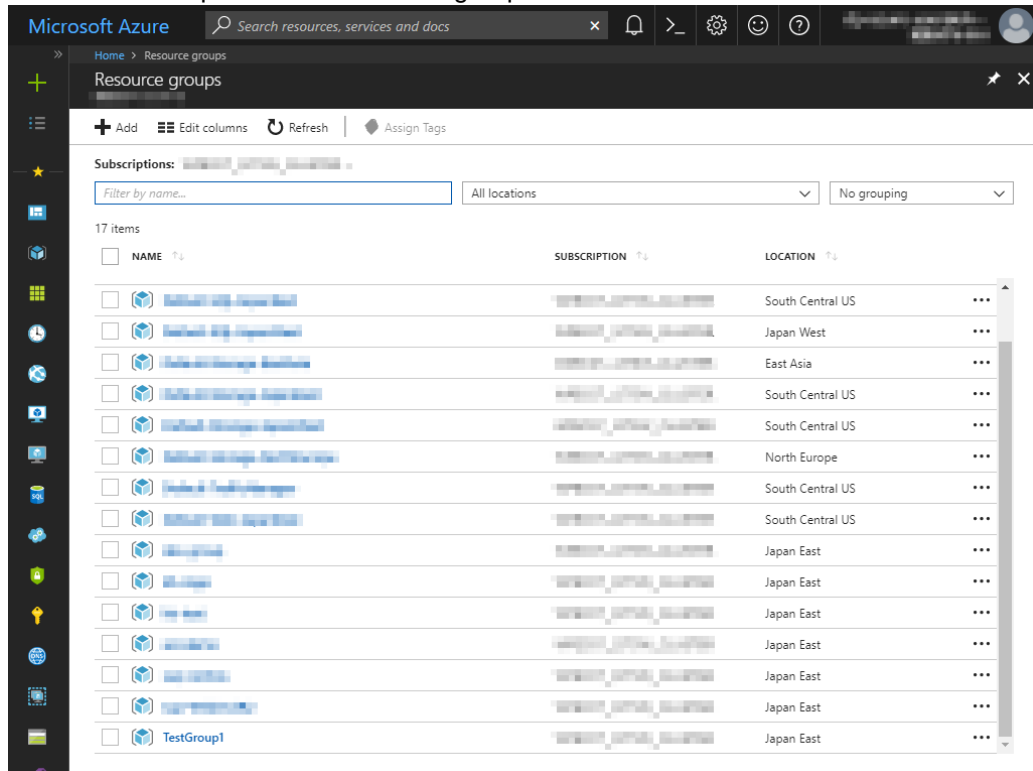
4) Setting a private IP address

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and change the private IP address setting following the steps below. Since an IP address is initially set to be assigned dynamically, change the setting so that an IP address is assigned statically. Change the settings of node-1 and then node-2.

1. Select **Resource groups** or the resource group icon in the menu on the left side of the window.



2. Select **TestGroup1** from the resource group list.



Cluster Creation Procedure (for an HA Cluster Using an Internet Facing Load Balancer)

3. The summary of TestGroup1 is displayed. Select virtual machine node-1 or node-2 from the item list.

Microsoft Azure

Home > Resource groups > TestGroup1

TestGroup1
Resource group

Search (Ctrl+F)

Overview
Activity log
Access control (IAM)
Tags

SETTINGS
Quickstart
Resource costs
Deployments
Policies
Properties
Locks
Automation script

MONITORING
Metrics
Alert rules

+ Add Edit columns Delete resource group Refresh Move Assign Tags

Subscription (change) Deployments
3 Succeeded

Subscription ID

Filter by name... All types All locations No

9 items Show all resources

NAME	TYPE	LOCATION
AvailabilitySet-1	Availability set	Japan East
clstorageacc1	Storage account	Japan East
clstorageaccdiag1	Storage account	Japan East
NetSecGroup-1	Network security group	Japan East
node-1	Virtual machine	Japan East
node-1639	Network interface	Japan East
node-2	Virtual machine	Japan East
node-2542	Network interface	Japan East
Vnet1	Virtual network	Japan East

4. Select **Networking**.

Microsoft Azure

Home > Resource groups > TestGroup1 > node-1 - Networking

node-1 - Networking
Virtual machine

Search (Ctrl+F)

Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems

SETTINGS
Networking
Disks
Size
Extensions
Availability set
Configuration
Properties
Locks
Automation script

Attach network interface Detach network interface

Network Interface: node-1639 Effective security rules Topology

Virtual network/subnet: Vnet1/Vnet1-1 Public IP: None Private IP: 10.5.0.5

INBOUND PORT RULES

Network security group NetSecGroup-1 (attached to network interface: node-1639)
Impacts 0 subnets, 6 network interfaces

PRIORITY	NAME	PORT	PROTOCOL	SOURCE	DESTINATION...	ACTION
1000	default-allow-rdp	3389	TCP	Any	Any	Allow
65000	AllowVnetInBound	Any	Any	VirtualNet...	VirtualNet...	Allow
65001	AllowAzureLoadBalan...	Any	Any	AzureLoad...	Any	Allow
65500	DenyAllInBound	Any	Any	Any	Any	Deny

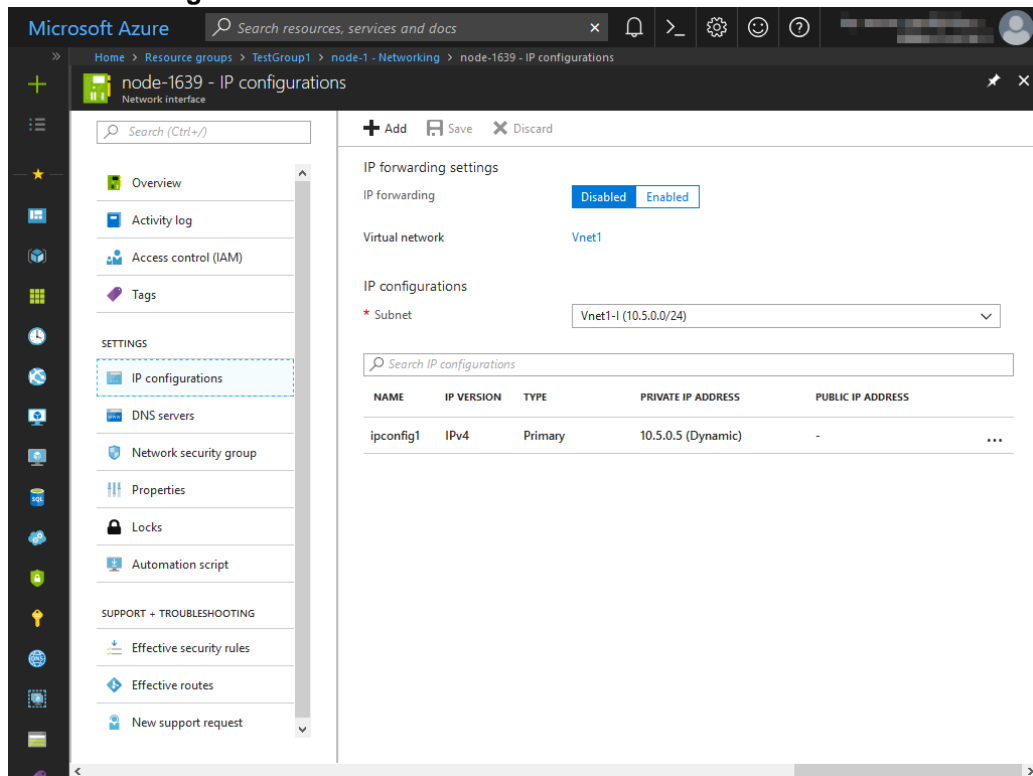
OUTBOUND PORT RULES

Network security group NetSecGroup-1 (attached to network interface: node-1639)
Impacts 0 subnets, 6 network interfaces

PRIORITY	NAME	PORT	PROTOCOL	SOURCE	DESTINATION...	ACTION
65000	AllowVnetOutBound	Any	Any	VirtualNet...	VirtualNet...	Allow
65001	AllowInternetOutBou...	Any	Any	Any	Internet	Allow

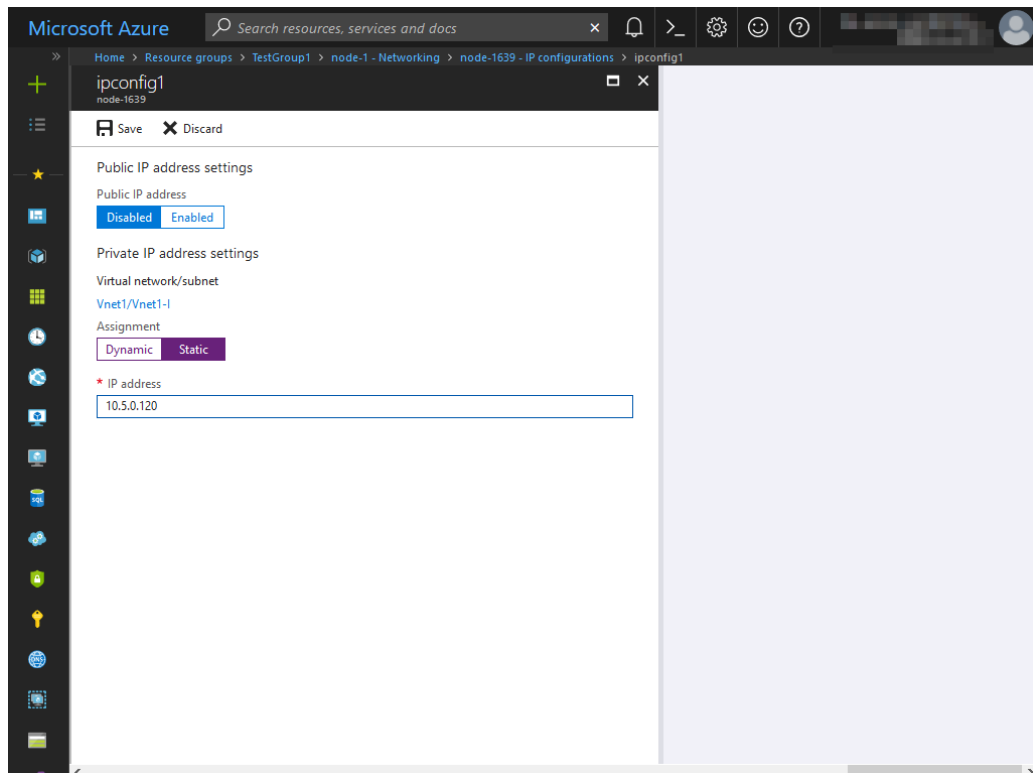
5. Select a network interface displayed in the list. The network interface name is generated automatically.

6. Select **IP configurations**.



7. Only ipconfig1 is displayed in the list. Select it.

8. Select **Static** for **Assignment** under **Private IP address settings**. Enter the IP address to be assigned statically in the **IP address** text box and click **Save** at the top of the window. The IP address of node-1 is 10.5.0.120. The IP address of node-2 is 10.5.0.121.

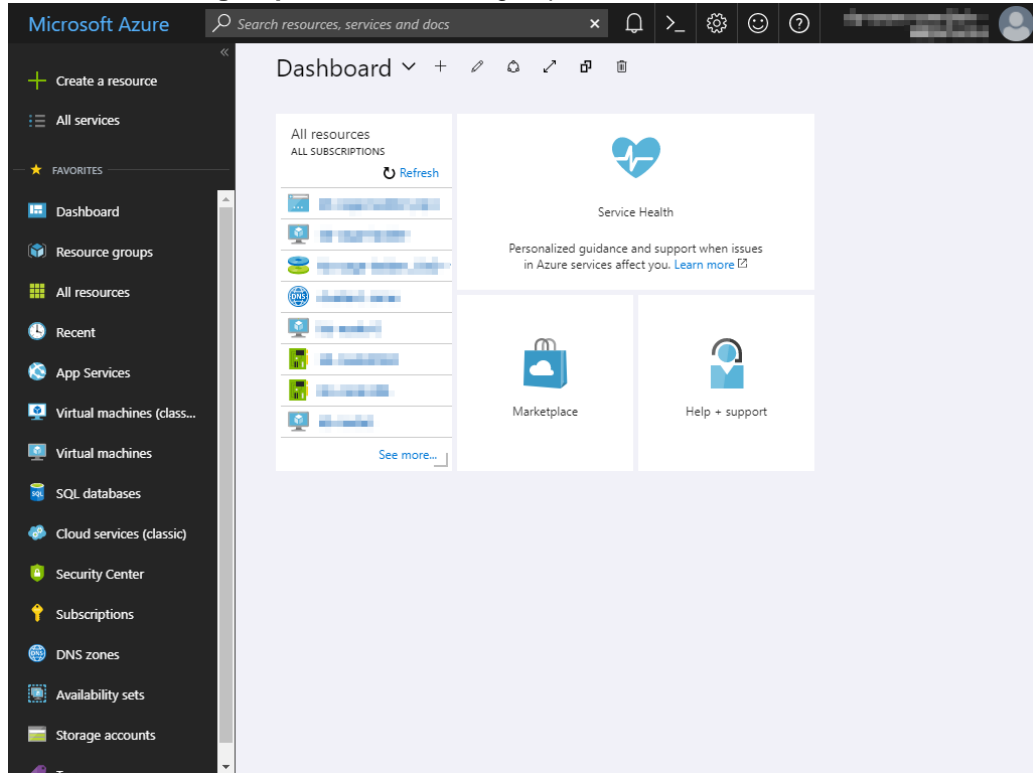


9. The virtual machines restart automatically so that new private IP addresses can be used.

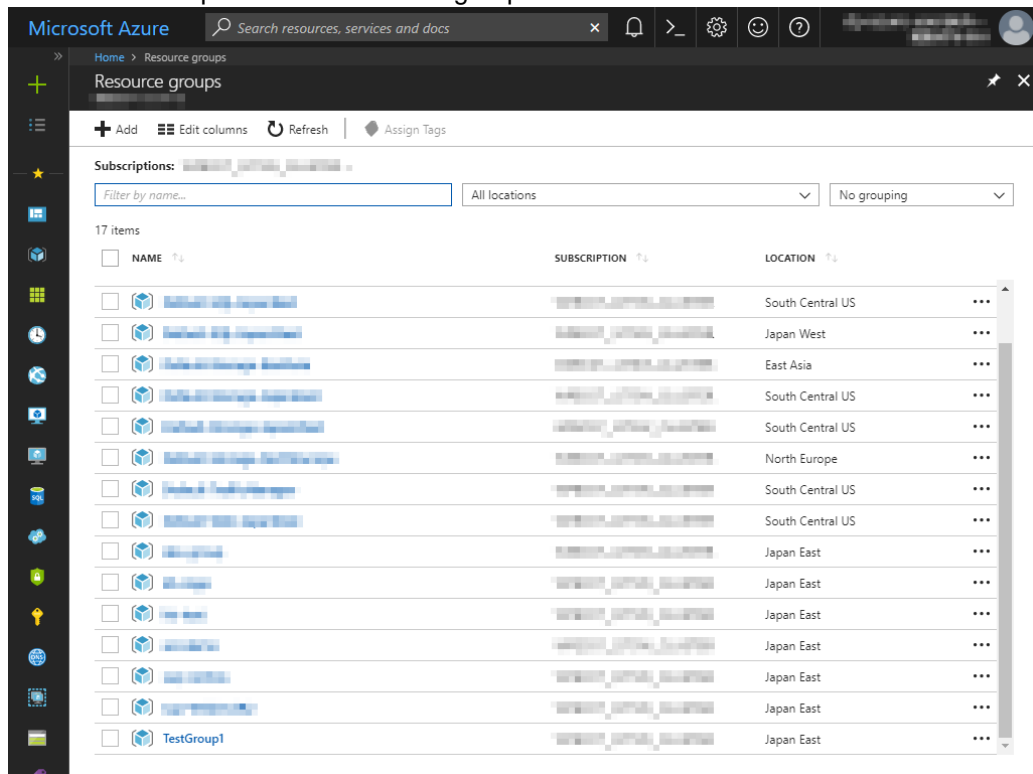
5) Adding Blob storage

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and add Blob storage to be used for a mirror disk (cluster partition or data partition). Change the settings of node-1 and then node-2.

1. Select **Resource groups** or the resource group icon in the menu on the left side of the window.



2. Select TestGroup1 from the resource group list.



3. The summary of TestGroup1 is displayed. Select virtual machine node-1 or node-2 to which to add Blob storage from the item list and select **Disk**.

Microsoft Azure

Home > Resource groups > TestGroup1

TestGroup1
Resource group

Search (Ctrl+F)

+ Add Edit columns Delete resource group Refresh Move Assign Tags

Subscription (change) Deployments
3 Succeeded

Subscription ID

Filter by name... All types All locations No

9 items Show all resources

	NAME	TYPE	LOCATION
<input type="checkbox"/>	AvailabilitySet-1	Availability set	Japan East
<input type="checkbox"/>	clstorageacc1	Storage account	Japan East
<input type="checkbox"/>	clstorageaccdiag1	Storage account	Japan East
<input type="checkbox"/>	NetSecGroup-1	Network security group	Japan East
<input type="checkbox"/>	node-1	Virtual machine	Japan East
<input type="checkbox"/>	node-1639	Network interface	Japan East
<input type="checkbox"/>	node-2	Virtual machine	Japan East
<input type="checkbox"/>	node-2542	Network interface	Japan East
<input type="checkbox"/>	Vnet1	Virtual network	Japan East

4. Select **+Add data disk**.

Microsoft Azure

Home > Resource groups > TestGroup1 > node-1 - Disks

node-1 - Disks
Virtual machine

Search (Ctrl+F)

Overview Activity log Access control (IAM) Tags Diagnose and solve problems

SETTINGS

Networking Disks Size Extensions Availability set Configuration Properties Locks Automation script

Edit

OS disk

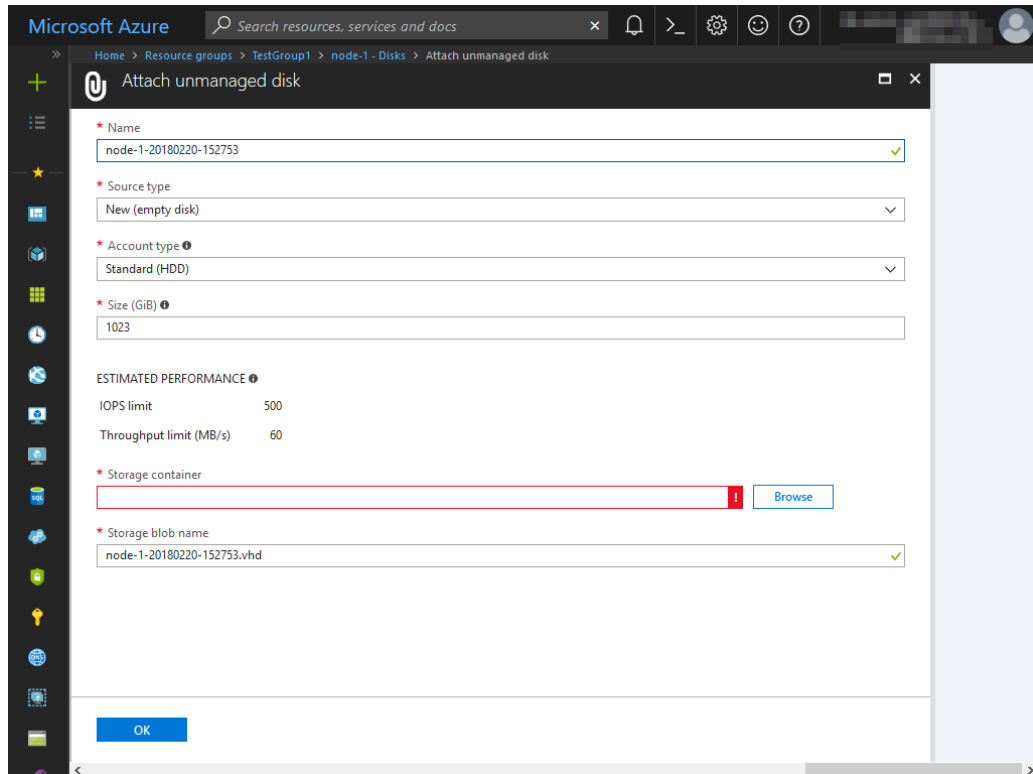
NAME	SIZE	STORAGE ACCOU...	ENCRYPTION	HOS
node-1	127 GiB	Standard_LRS	Not enabled	Rea

Data disks

None

+ Add data disk

- The **Attach unmanaged disk** blade is displayed. Click **Browse** right to the **Storage container** text box. For **Name** and **Storage blob name**, the automatically generated default values are entered.



Microsoft Azure

Home > Resource groups > TestGroup1 > node-1 - Disks > Attach unmanaged disk

Attach unmanaged disk

* Name
node-1-20180220-152753 ✓

* Source type
New (empty disk) ▾

* Account type
Standard (HDD) ▾

* Size (GiB)
1023

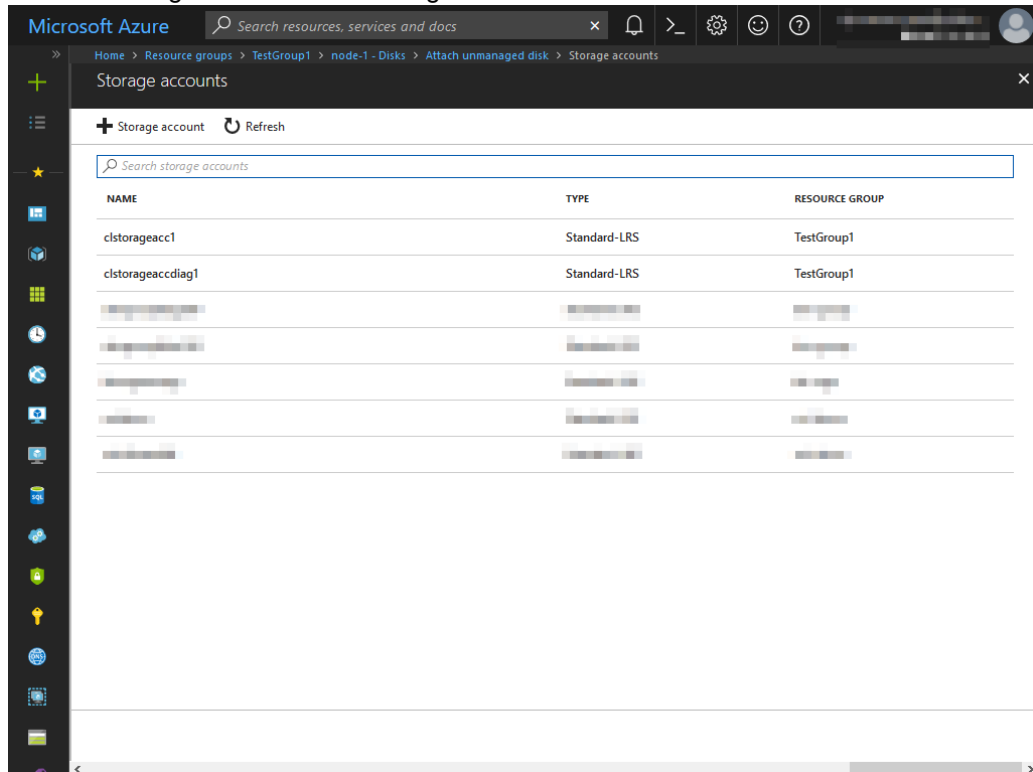
ESTIMATED PERFORMANCE
IOPS limit 500
Throughput limit (MB/s) 60

* Storage container
 ! Browse

* Storage blob name
node-1-20180220-152753.vhd ✓

OK

- Select clstorageacc1 from the storage account list.



Microsoft Azure

Home > Resource groups > TestGroup1 > node-1 - Disks > Attach unmanaged disk > Storage accounts

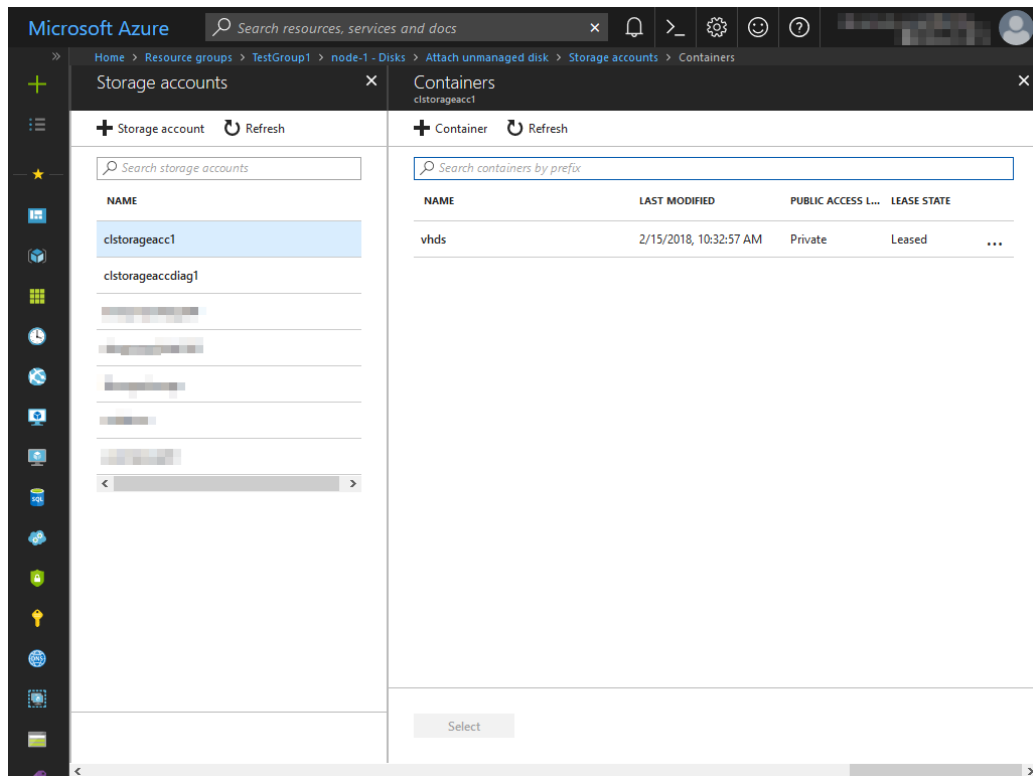
Storage accounts

+ Storage account Refresh

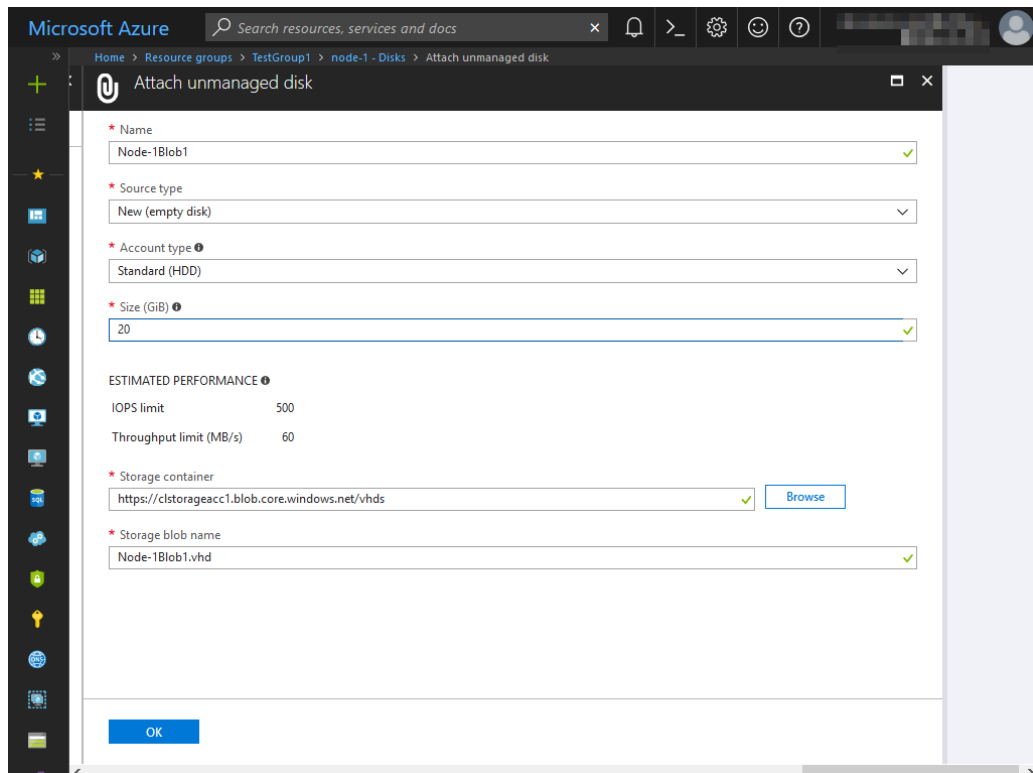
Search storage accounts

NAME	TYPE	RESOURCE GROUP
clstorageacc1	Standard-LRS	TestGroup1
clstorageaccdiag1	Standard-LRS	TestGroup1
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]
[REDACTED]	[REDACTED]	[REDACTED]

7. Select vhds from the container list and click **Select**.



8. The **Attach unmanaged disk** blade is displayed again. Specify **Name**, **Source type**, **Account type**, **Size**, and **Storage blob name**, and click **OK**. For **Name**, specify Node-1Blob1 for node-1 and Node-2Blob1 for node-2. For **Storage blob name**, specify Node-1Blob1.vhd for node-1 and Node-2Blob1.vhd for node-2.



9. Click **Save**.

The screenshot shows the Microsoft Azure portal interface for configuring disks for a virtual machine named 'node-1'. The left sidebar contains navigation options like Overview, Activity log, Access control (IAM), Tags, Diagnose and solve problems, and various settings. The main content area is titled 'node-1 - Disks' and includes a search bar and 'Save'/'Discard' buttons. It displays the OS disk configuration and a table for data disks.

OS disk					
NAME	SIZE	STORAGE ACCOU...	ENCRYPTION	HOS	
node-1	127 GiB	Standard_LRS	Not enabled	Rea	

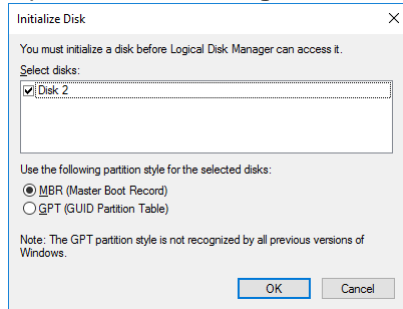
Data disks					
LUN	NAME	SIZE	STORAGE ACCOU...	ENCRYPTION	HOST
0	Node-1Blob1	20 GiB	Standard_LRS	Not enabled	None

+ Add data disk

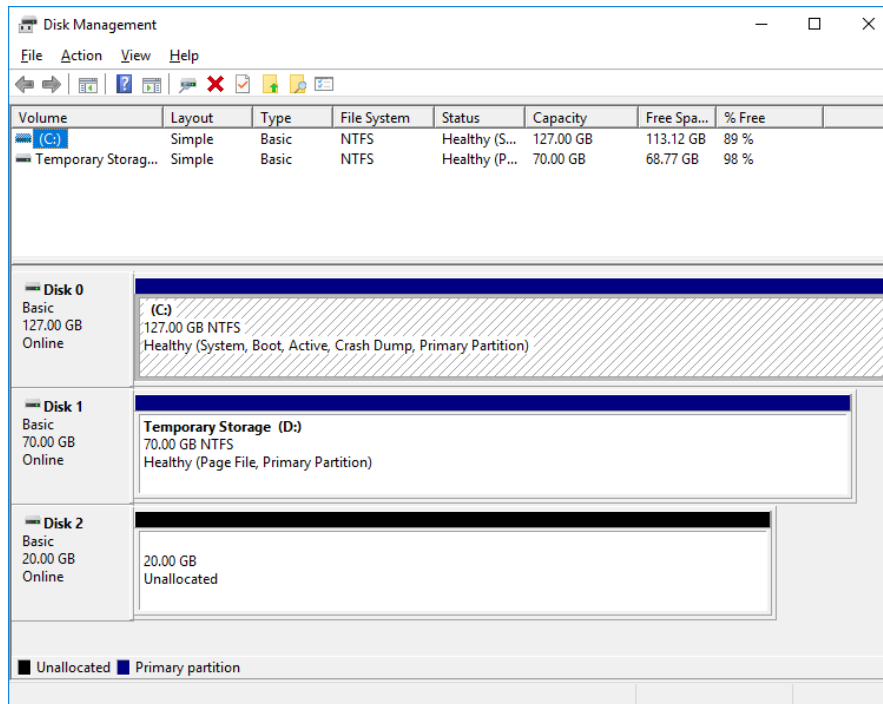
6) Configuring virtual machines

Log in to the created node-1 and node-2 and specify the settings following the procedure below. Set a partition for the mirror disk resource. Create a file system in the added Blob storage. For details about a partition for the mirror disk resource, see "Partition settings for mirror disk resource (when using Replicator)" in "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the *Installation and Configuration Guide*.

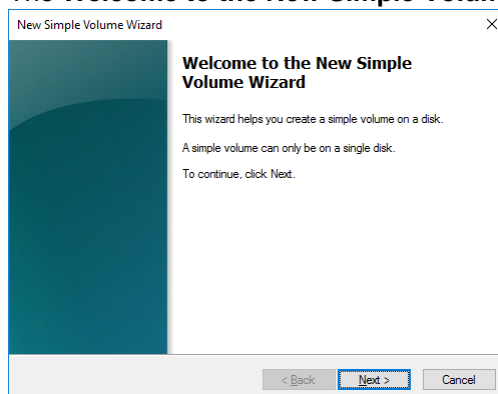
1. Open the **Disk Management** window. The **Initialize Disk** dialog box is displayed.



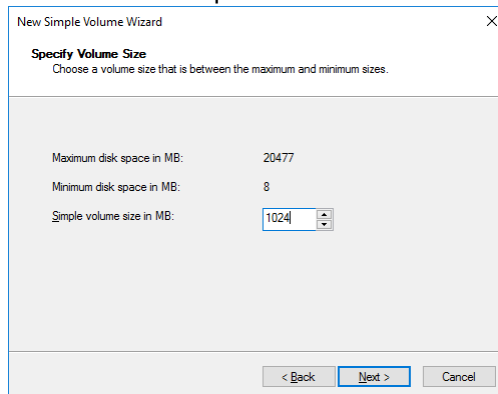
2. Confirm that the added disk is displayed as "Disk 2" in unassigned state under the existing C drive and D drive.



3. Create a cluster partition. Right-click "Disk 2" and select **New Simple Volume**.
4. The **Welcome to the New Simple Volume Wizard** is displayed. Click **Next**.



5. The **Specify Volume Size** window is displayed. Allocate 1024 MB (1,073,741,824 bytes) or more to a cluster partition. Click **Next**.



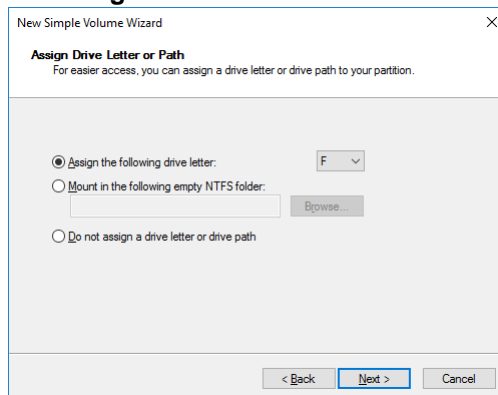
New Simple Volume Wizard

Specify Volume Size
Choose a volume size that is between the maximum and minimum sizes.

Maximum disk space in MB: 20477
Minimum disk space in MB: 8
Simple volume size in MB: 1024

< Back Next > Cancel

6. The **Assign Drive Letter or Path** window is displayed. Select the F drive for **Assign the following drive letter:**. Use the disk as a raw partition without formatting.



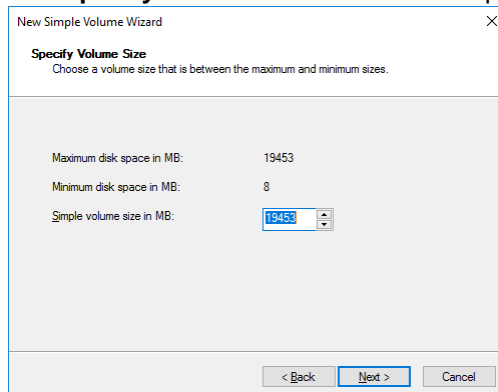
New Simple Volume Wizard

Assign Drive Letter or Path
For easier access, you can assign a drive letter or drive path to your partition.

☒ Assign the following drive letter: F
☐ Mount in the following empty NTFS folder: Browse...
☐ Do not assign a drive letter or drive path

< Back Next > Cancel

7. Next, create a data partition. Right-click "Disk 2" and select **New Simple Volume**.
8. The **Welcome to the New Simple Volume Wizard** is displayed. Click **Next**.
9. The **Specify Volume Size** window is displayed. Click **Next**.



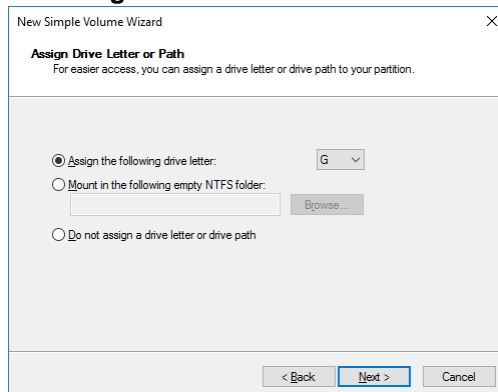
New Simple Volume Wizard

Specify Volume Size
Choose a volume size that is between the maximum and minimum sizes.

Maximum disk space in MB: 19453
Minimum disk space in MB: 8
Simple volume size in MB: 19453

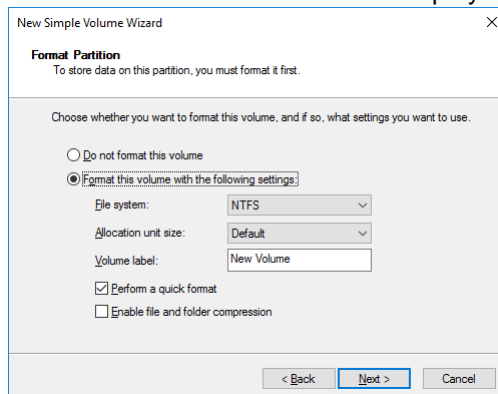
< Back Next > Cancel

10. The **Assign Drive Letter or Path** window is displayed. Select the G drive for **Assign the following drive letter:** and click **Next**.



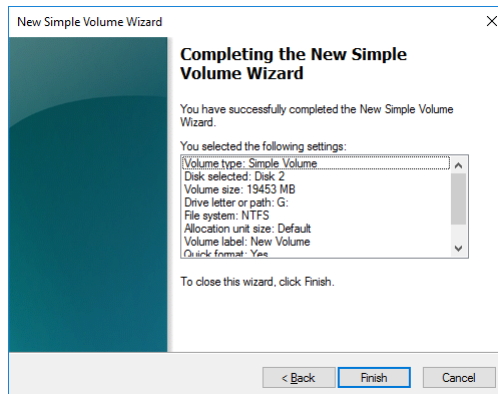
The screenshot shows the 'Assign Drive Letter or Path' step of the New Simple Volume Wizard. The title bar reads 'New Simple Volume Wizard'. The main heading is 'Assign Drive Letter or Path' with a subtitle 'For easier access, you can assign a drive letter or drive path to your partition.' There are three radio button options: 'Assign the following drive letter:' (selected), 'Mount in the following empty NTFS folder:', and 'Do not assign a drive letter or drive path'. The 'Assign the following drive letter:' option has a dropdown menu showing 'G'. Below the 'Mount in the following empty NTFS folder:' option is a text box and a 'Browse...' button. At the bottom are '< Back', 'Next >', and 'Cancel' buttons.

11. The **Format Partition** window is displayed. Confirm that **File system** is **NTFS**.



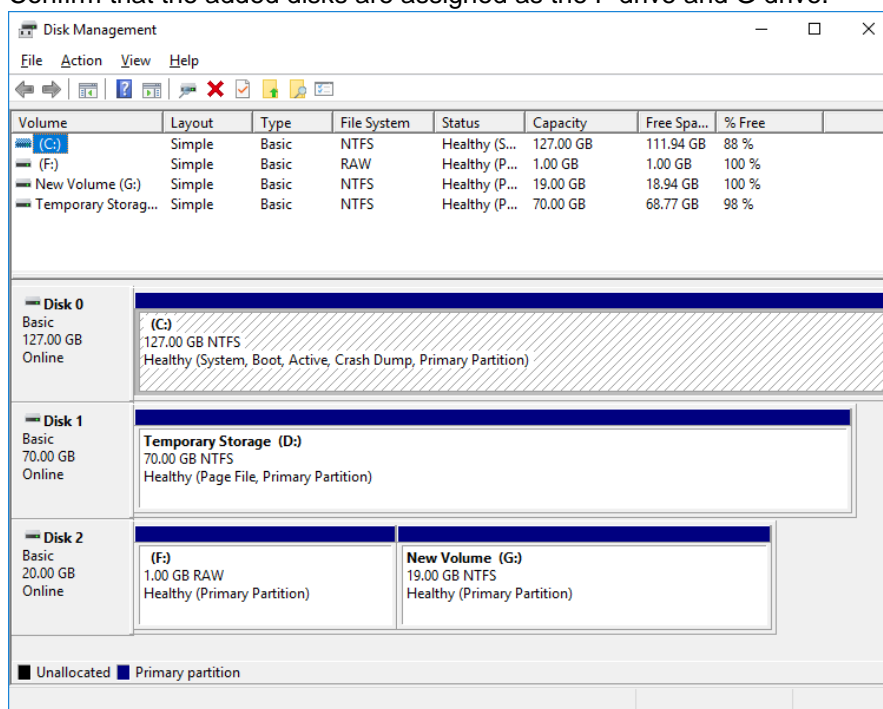
The screenshot shows the 'Format Partition' step of the New Simple Volume Wizard. The title bar reads 'New Simple Volume Wizard'. The main heading is 'Format Partition' with a subtitle 'To store data on this partition, you must format it first.' Below this is the instruction 'Choose whether you want to format this volume, and if so, what settings you want to use.' There are two radio button options: 'Do not format this volume' and 'Format this volume with the following settings:' (selected). Under the selected option, there are settings for 'File system:' (NTFS), 'Allocation unit size:' (Default), and 'Volume label:' (New Volume). There are also checkboxes for 'Perform a quick format' (checked) and 'Enable file and folder compression' (unchecked). At the bottom are '< Back', 'Next >', and 'Cancel' buttons.

12. Click **Next**.
13. The **Completing the New Simple Volume Wizard** window is displayed. Check the displayed contents and click **Finish**.



The screenshot shows the 'Completing the New Simple Volume Wizard' step. The title bar reads 'New Simple Volume Wizard'. The main heading is 'Completing the New Simple Volume Wizard'. Below this is the message 'You have successfully completed the New Simple Volume Wizard.' and a list of settings: 'Volume type: Simple Volume', 'Disk selected: Disk 2', 'Volume size: 19453 MB', 'Drive letter or path: G:', 'File system: NTFS', 'Allocation unit size: Default', 'Volume label: New Volume', and 'Quick format: Yes'. At the bottom is the instruction 'To close this wizard, click Finish.' and buttons for '< Back', 'Finish', and 'Cancel'.

14. Confirm that the added disks are assigned as the F drive and G drive.



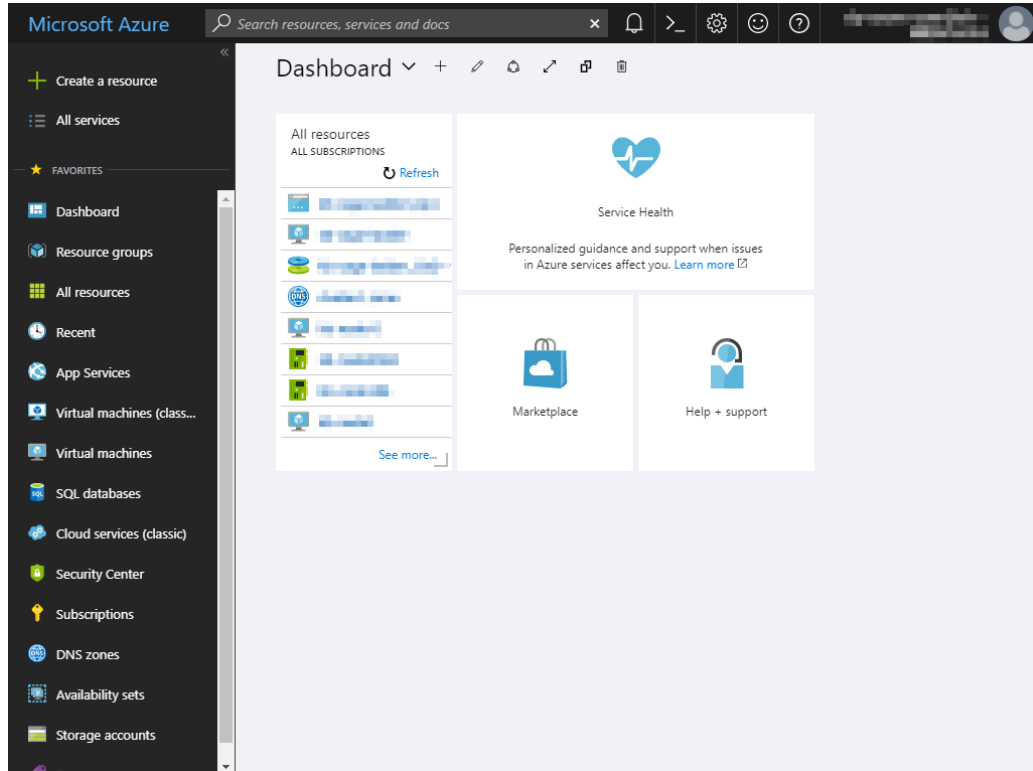
7) Configuring a load balancer

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and add a load balancer following the steps below.

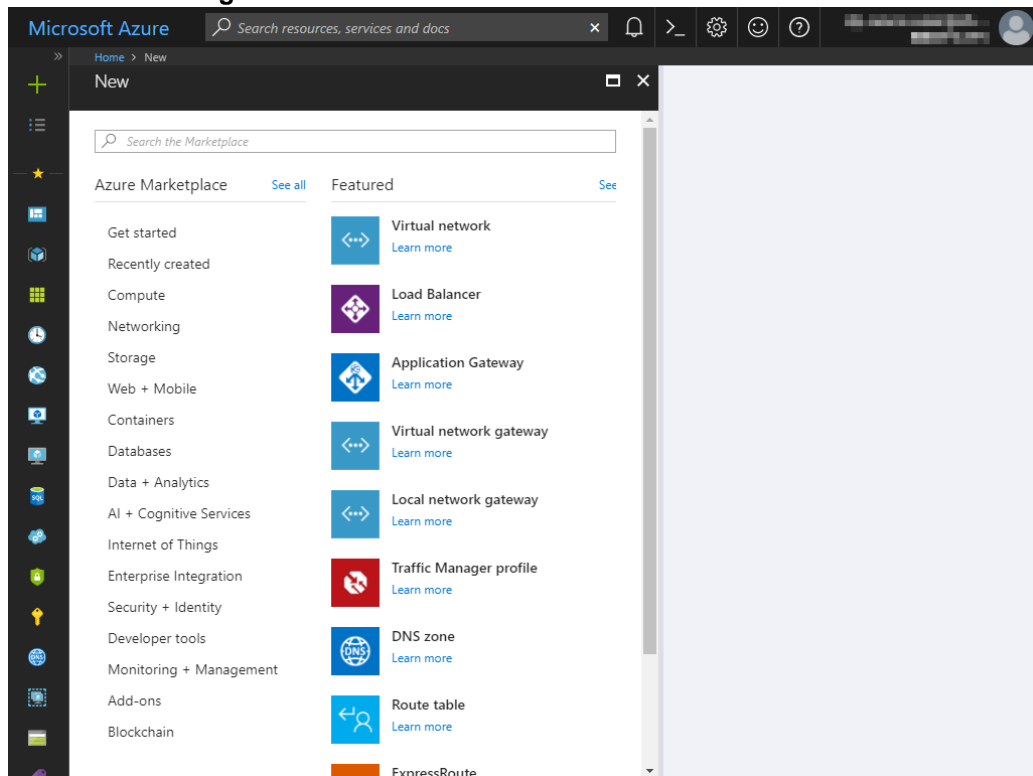
For details, see the following websites:

- Azure Load Balancer overview:
<https://docs.microsoft.com/en-us/azure/load-balancer/load-balancer-overview>
- Creating an Internet-facing load balancer using the Azure portal
<https://docs.microsoft.com/en-us/azure/load-balancer/load-balancer-get-started-internet-portal>

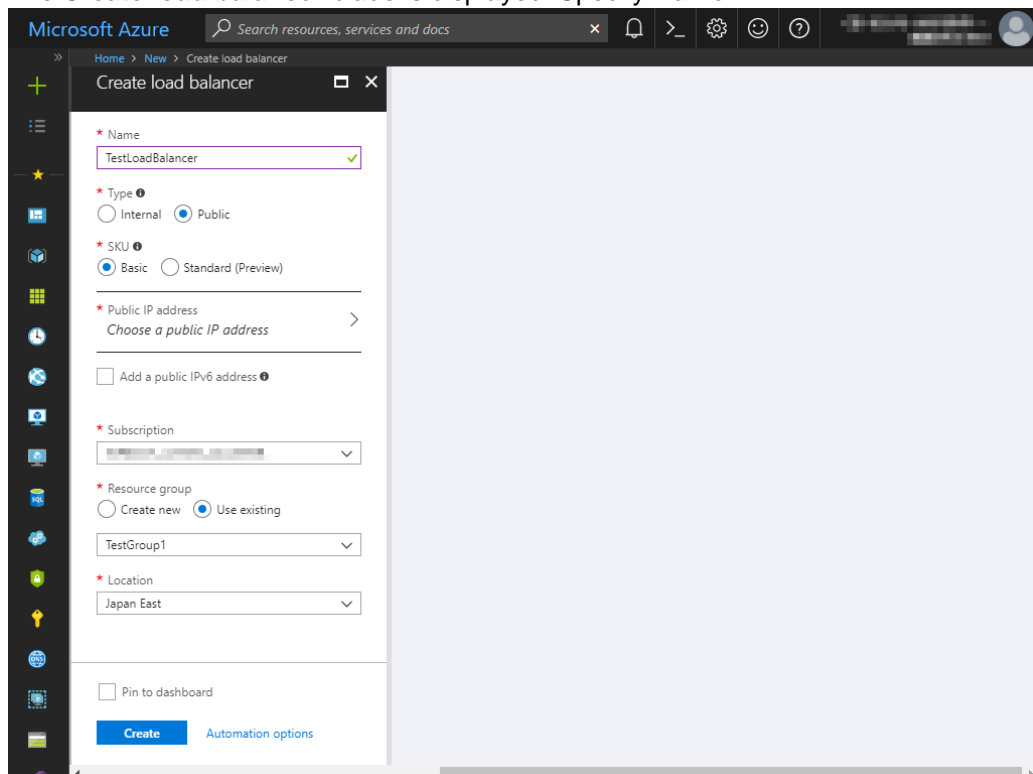
1. Select **+Create a resource** or the **+** icon in the menu on the left side of the window.



2. Select **Networking** and then **Load Balancer**.

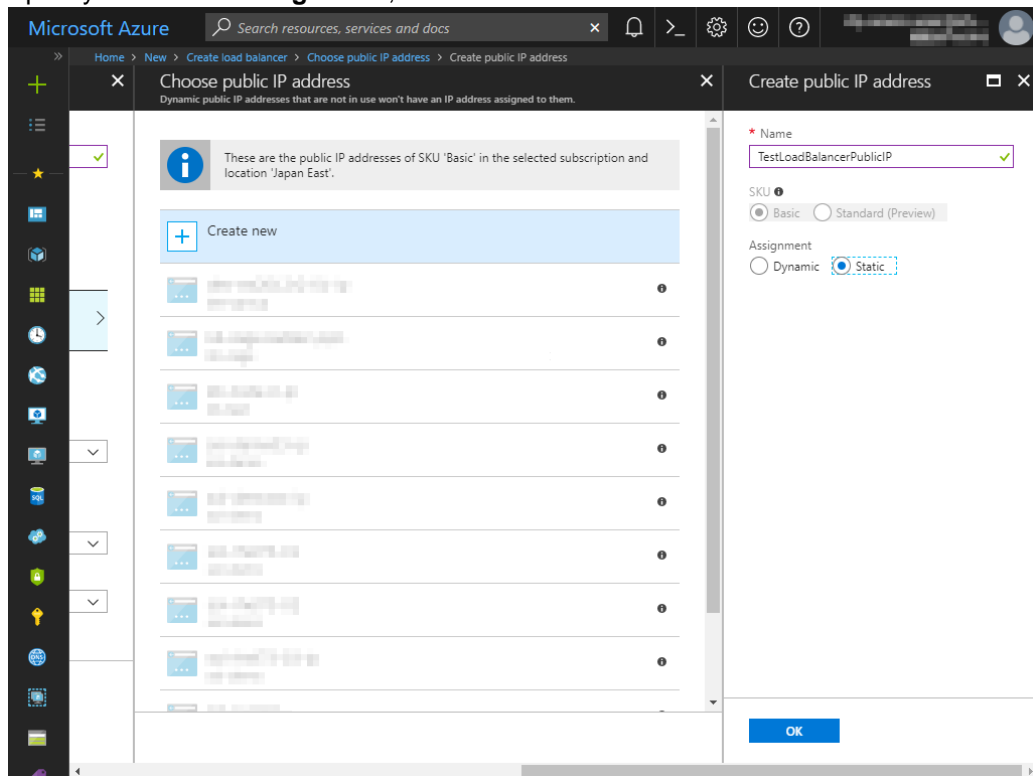


3. The **Create load balancer** blade is displayed. Specify **Name**.

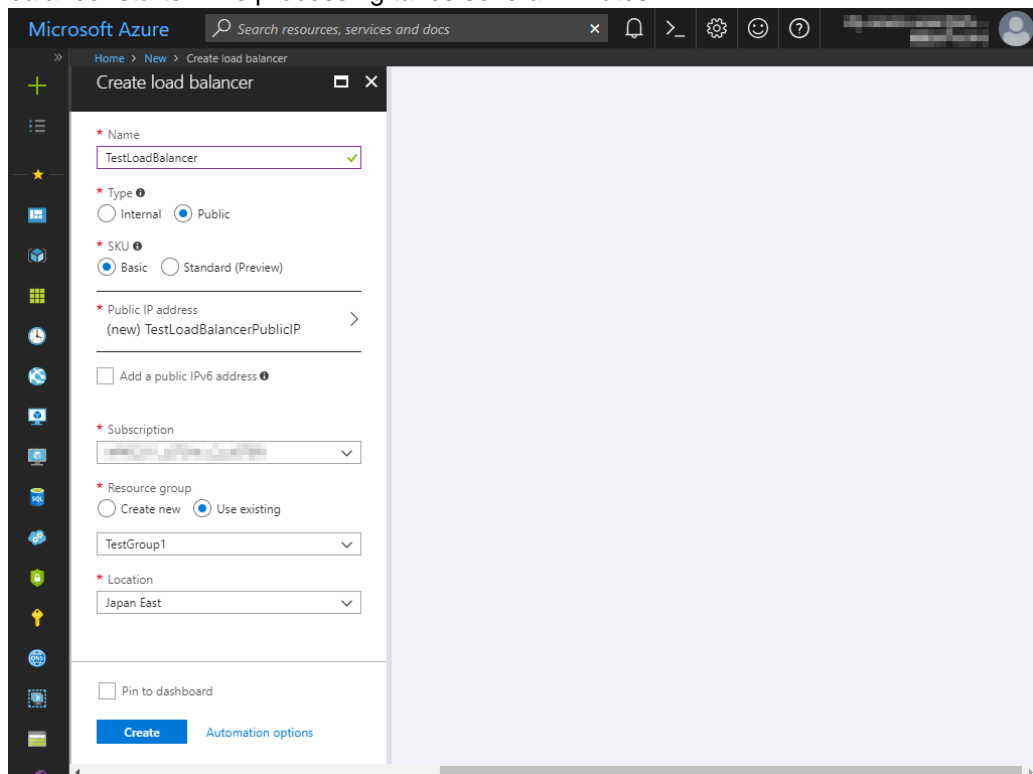


4. Select **Public** for **Type** and select **Create new** for **Public IP address**.

5. Specify **Name** and **Assignment**, and click **OK**.

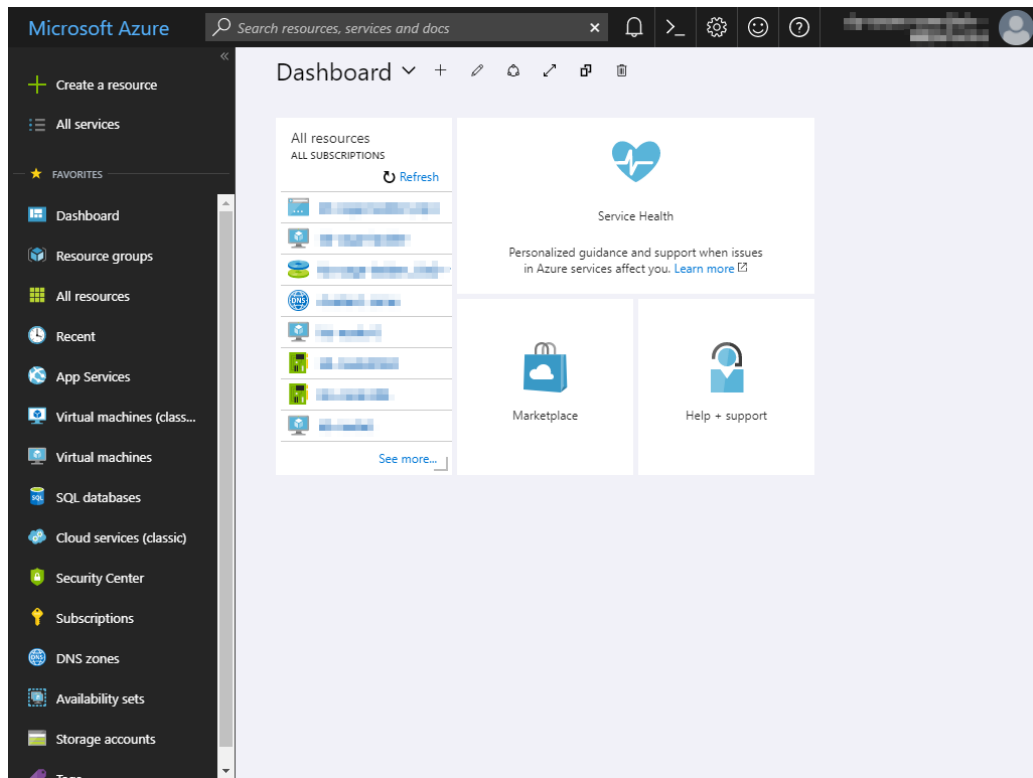


6. Specify **Subscription**, **Resource group**, and **Location**, and click **Create**. Deploying the load balancer starts. This processing takes several minutes.

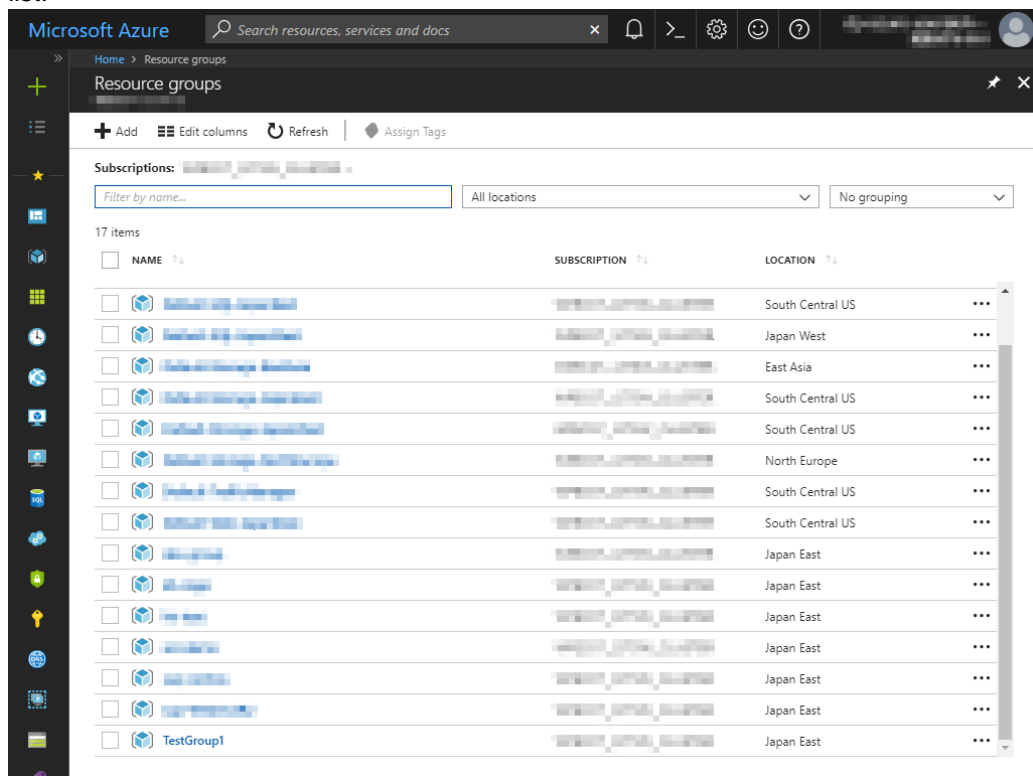


8) Configuring a load balancer (configuring a backend pool)

1. Associate a virtual machine registered to the availability set to the load balancer. After the load balancer has been deployed, select **Resource groups** or the resource group icon in the menu on the left side of the window.



2. Select the resource group to which the created load balancer belongs from the resource group list.



3. The summary of the selected resource group is displayed. Select the created load balancer from the item list.

Microsoft Azure Search resources, services and docs

Home > Resource groups > TestGroup1

TestGroup1 Resource group

Subscription (change) Deployments 4 Succeeded

Subscription ID

Filter by name... All types All locations No

11 items Show all resources

NAME	TYPE	LOCATION
AvailabilitySet-1	Availability set	Japan East
clstorageacct1	Storage account	Japan East
clstorageacctdiag1	Storage account	Japan East
NetSecGroup-1	Network security group	Japan East
node-1	Virtual machine	Japan East
node-1639	Network interface	Japan East
node-2	Virtual machine	Japan East
node-2542	Network interface	Japan East
TestLoadBalancer	Load balancer	Japan East
TestLoadBalancerPublicIP	Public IP address	Japan East
Vnet1	Virtual network	Japan East

4. Select **Backend pools**.

Microsoft Azure Search resources, services and docs

Home > Resource groups > TestGroup1 > TestLoadBalancer - Backend pools

TestLoadBalancer - Backend pools Load balancer

Search backend address pools

VIRTUAL MACHINE	VIRTUAL MACH...	NETWORK INTERFACE	PRIVATE IP ADDRESS
No results.			

5. Click **Add**.
6. The **Add backend pool** blade is displayed. Specify **Name**.
7. For **Associated to**, select **Availability set**.
8. Specify **Availability set**.
9. Click **Add a target network IP configuration**.
10. Specify the target virtual machine for **Target virtual machine** and **Network IP configuration**.

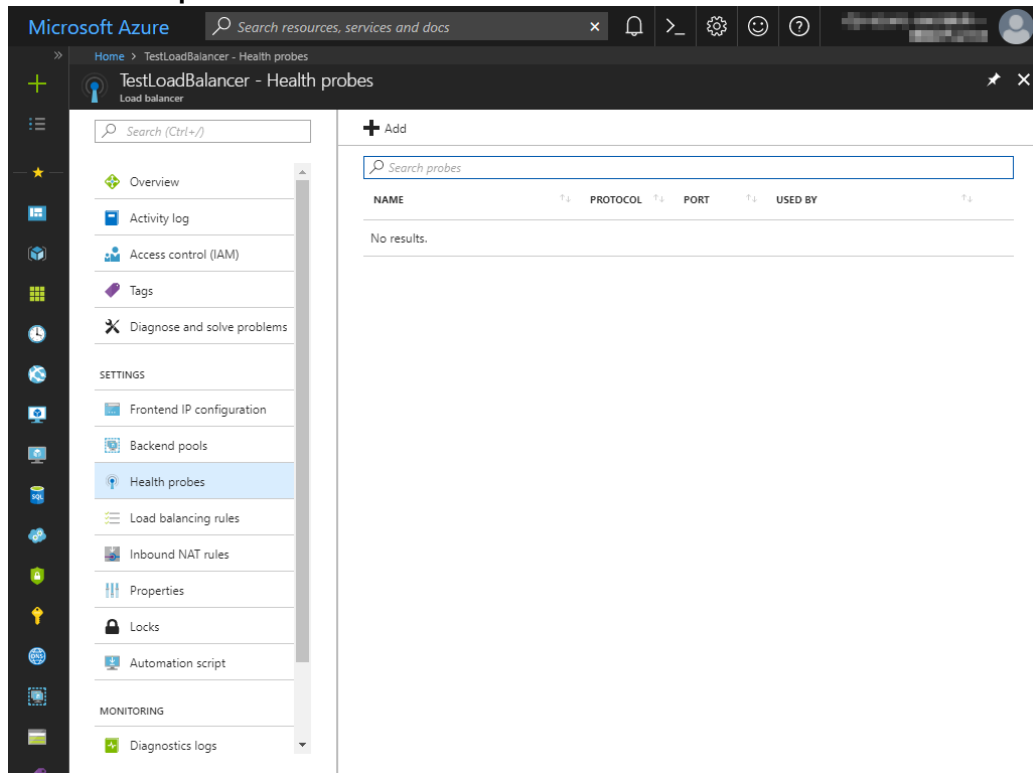
11. Repeat steps 9 and 10 as many times as the number of target virtual machines.
12. Click **OK**.

The screenshot shows the 'Add backend pool' dialog box in the Microsoft Azure portal. The dialog is titled 'Add backend pool' and is part of the 'TestLoadBalancer - Backend pools' section. It contains the following fields and options:

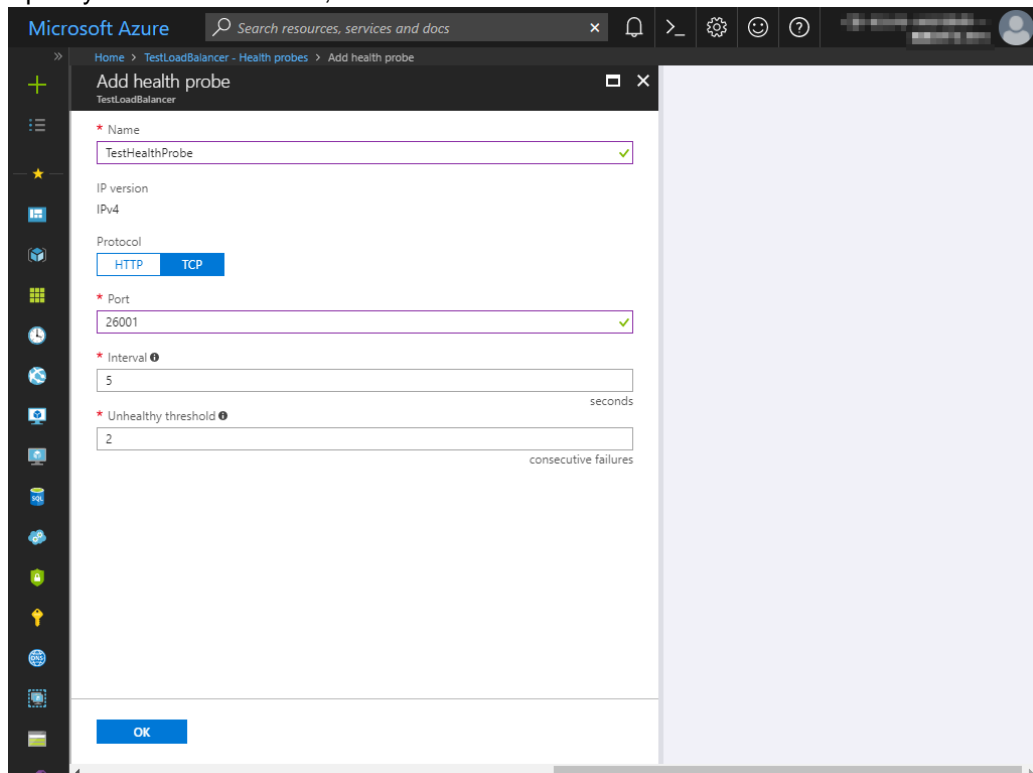
- Name:** 'TestBackendPool' (with a green checkmark).
- IP version:** 'IPv4' (selected) and 'IPv6' (available).
- Associated to:** 'Availability set' (dropdown menu).
- Availability set:** 'AvailabilitySet-1' (dropdown menu) with a note 'number of virtual machines: 2'.
- Target network IP configurations:** A section with the text 'Only VMs within the current availability set can be chosen. Once a VM is chosen, you can select a network IP configuration related to it.' It lists 'Virtual machine: node-1' and 'Network IP configuration: node-1639/ipconfig1 (10.5.0.120)'.
- Target virtual machine:** 'node-2' (dropdown menu) with a note 'size: Standard_A1, network interfaces: 1'.
- Network IP configuration:** 'ipconfig1 (10.5.0.121)' (dropdown menu).
- + Add a target network IP configuration** (button).
- OK** (button).

9) Configuring a load balancer (configuring a health probe)

1. Select **Health probes**.

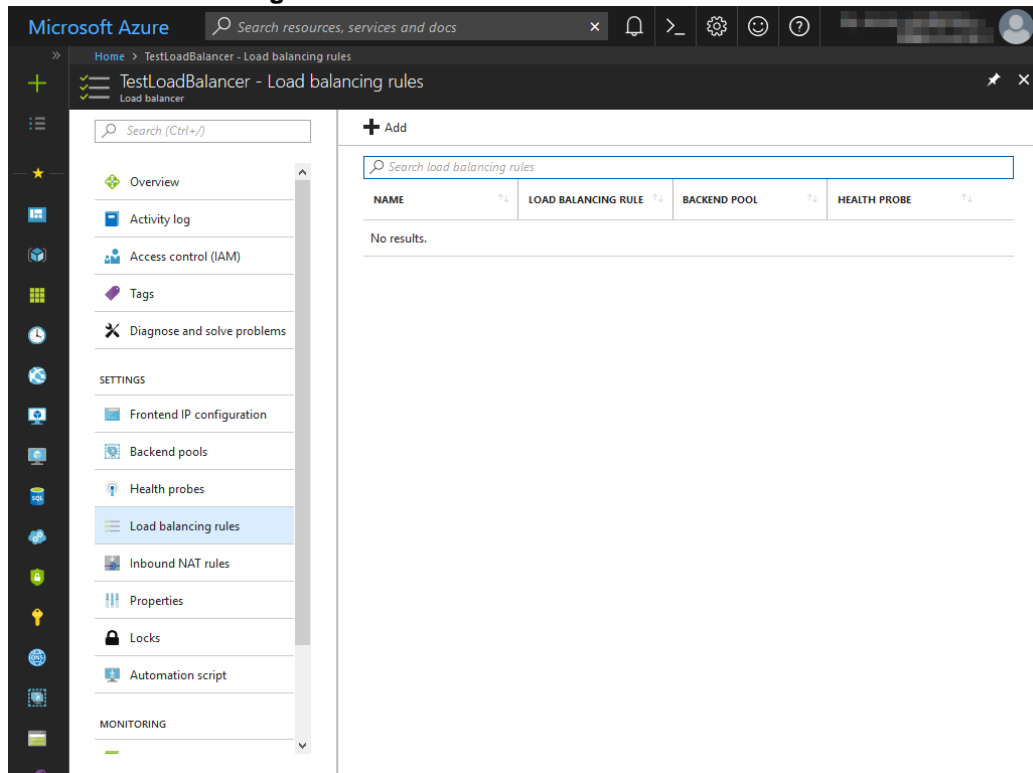


2. Click **Add**.
3. The **Add health probe** blade is displayed. Specify **Name**.
4. Specify **Protocol** and **Port**, and click **OK**.

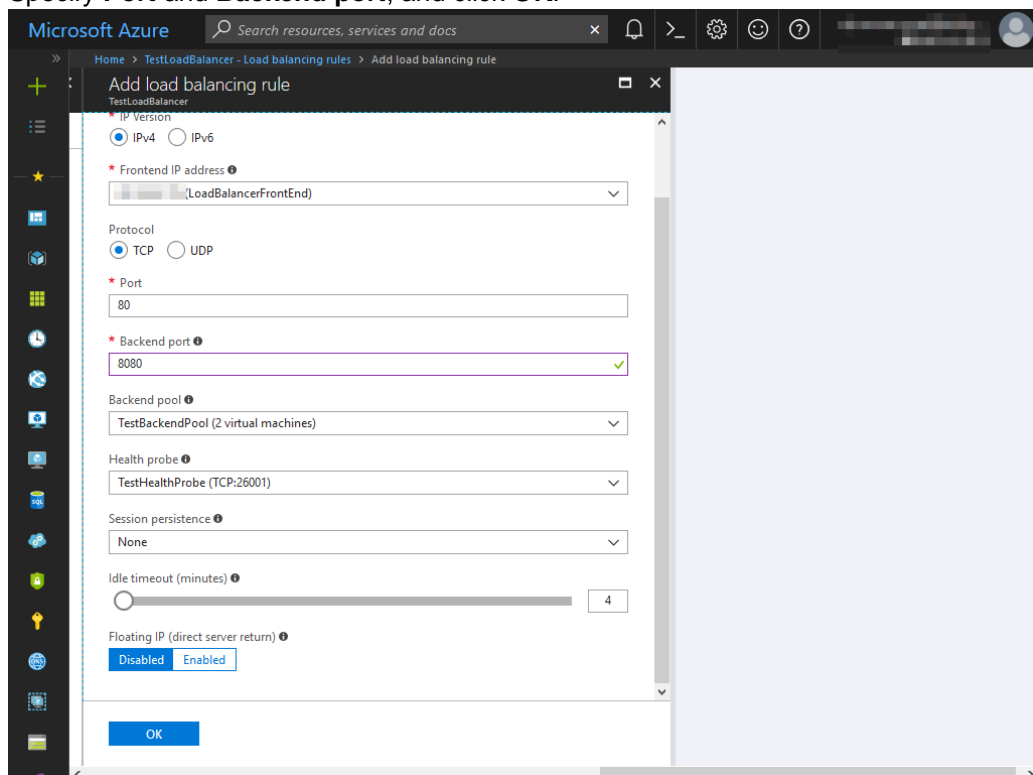


10) Configuring a load balancer (setting the load balancing rules)

1. Select **Load balancing rules**.



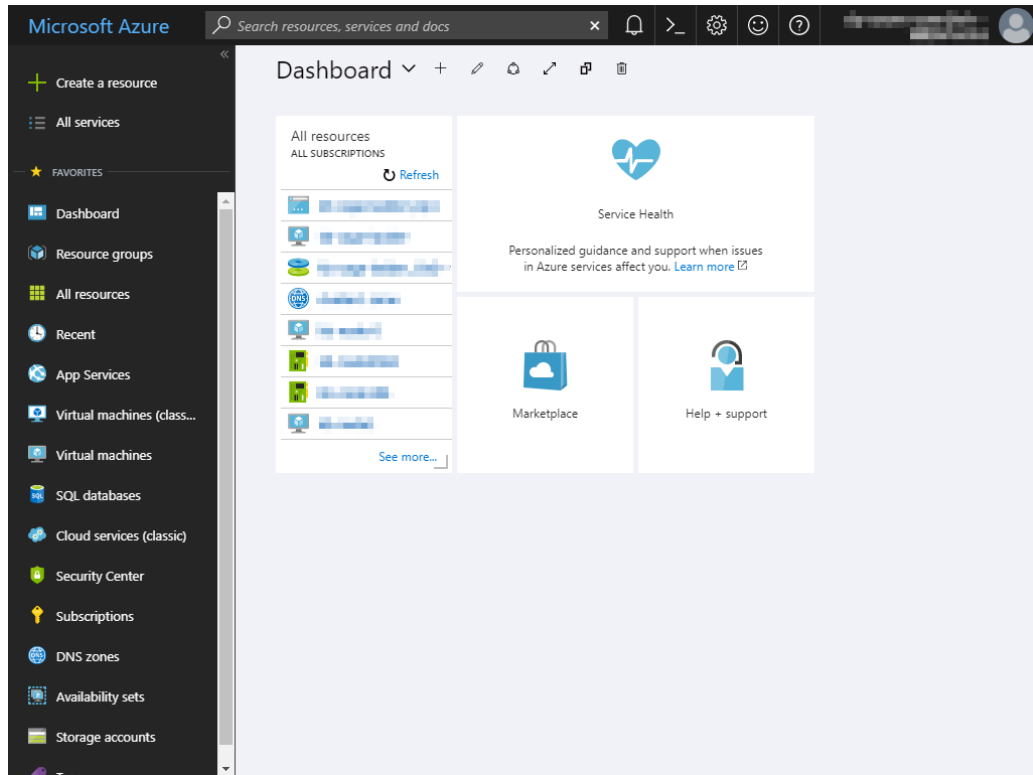
2. Click **Add**.
3. The **Add load balancing rule** blade is displayed. Specify **Name**.
4. Specify **Port** and **Backend port**, and click **OK**.



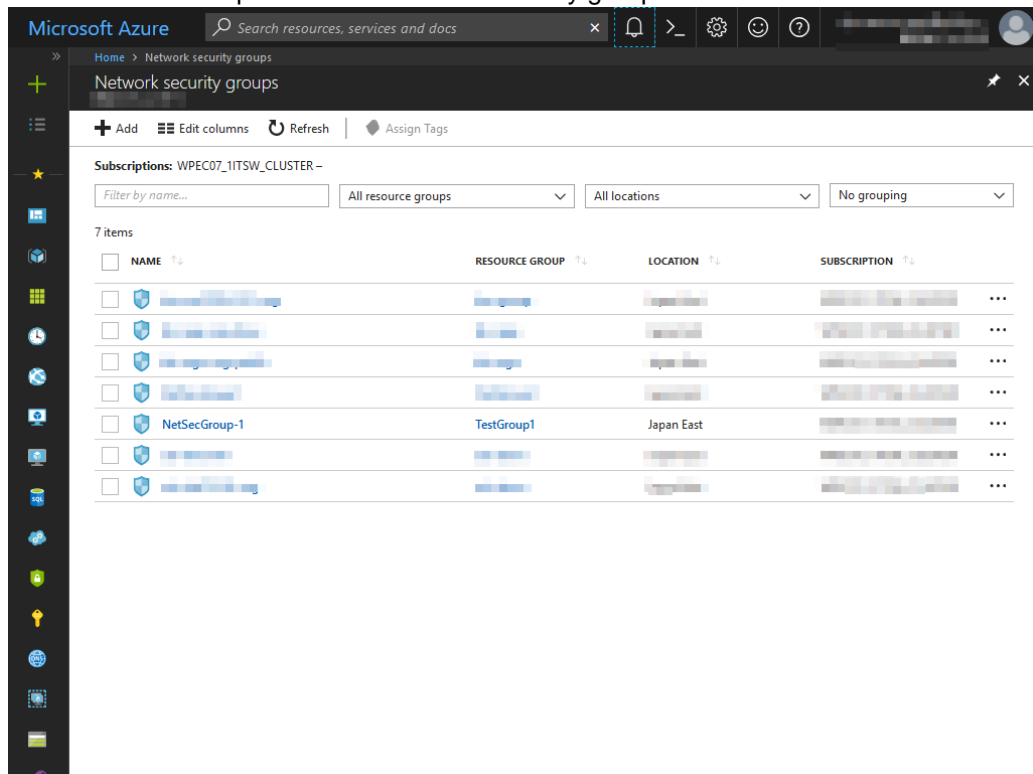
11) Setting the inbound security rules

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and set the inbound security rules following the steps below.

1. Select **Network security groups** or the network security group icon in the menu on the left side of the window.

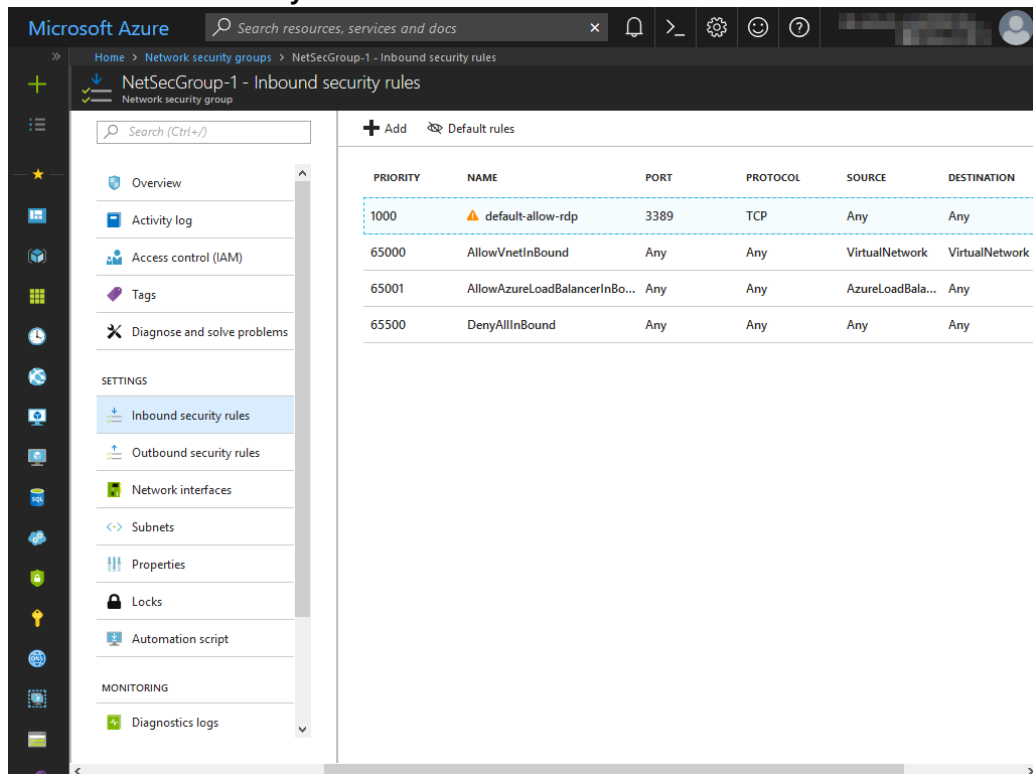


2. Select **NetSecGroup-1** from the network security group list.



3. The summary of NetSecGroup-1 is displayed.

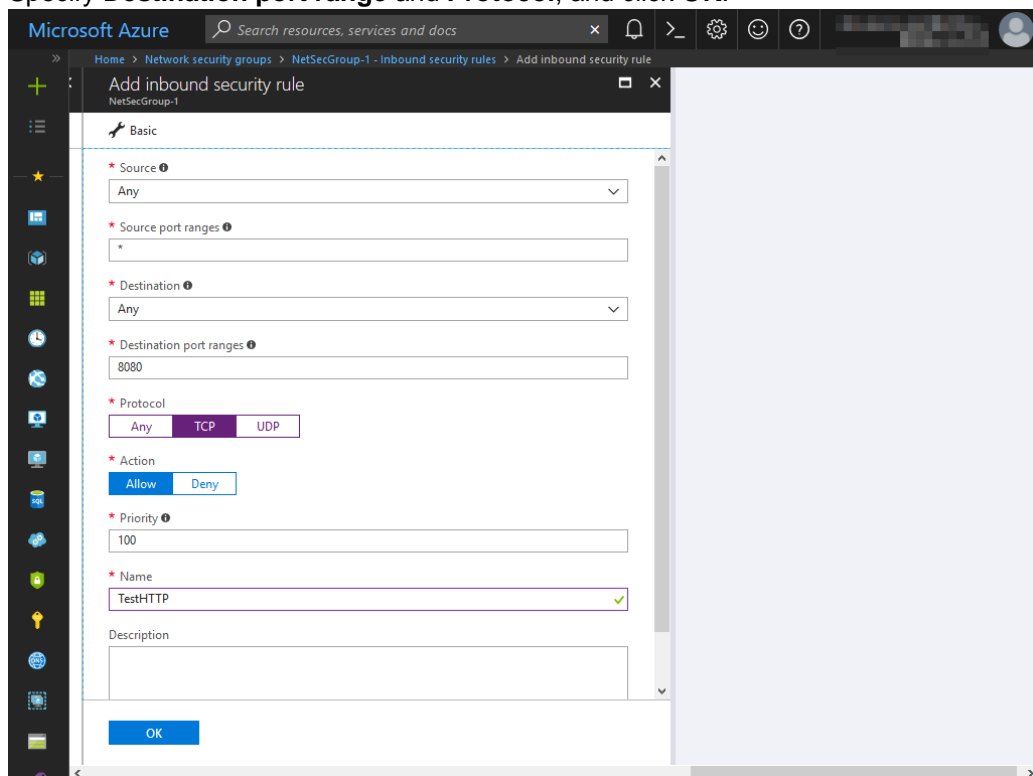
4. Select **Inbound security rules**.



5. Click **Add**.

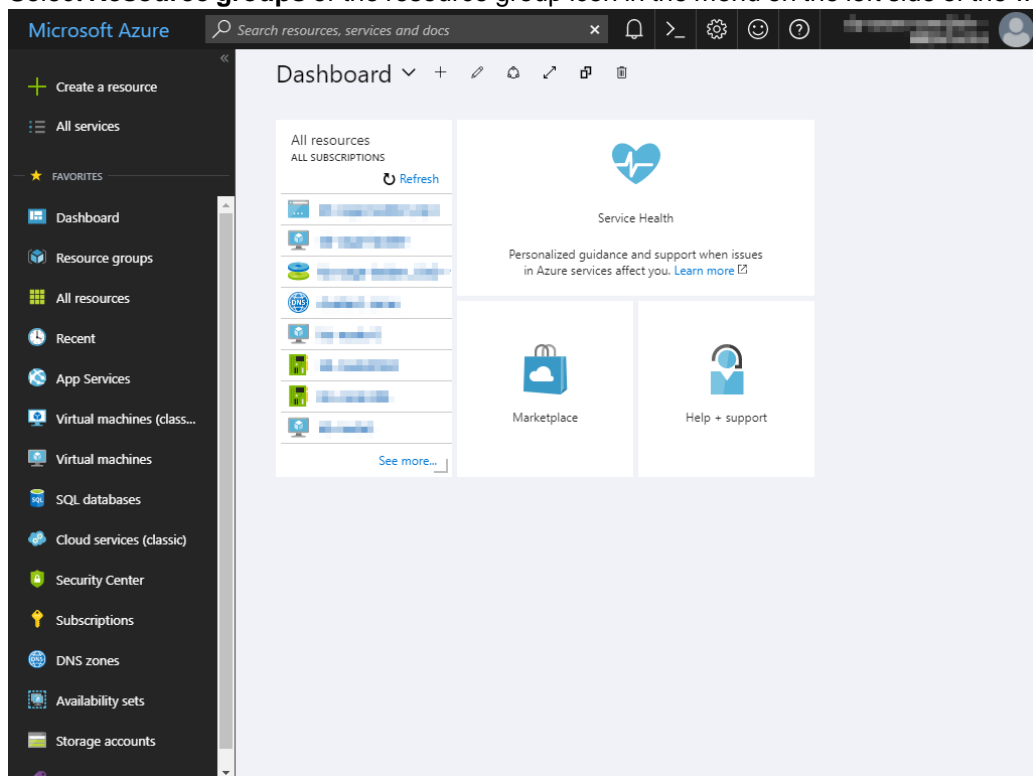
6. The **Add inbound security rule** blade is displayed. Specify **Name**.

7. Specify **Destination port range** and **Protocol**, and click **OK**.

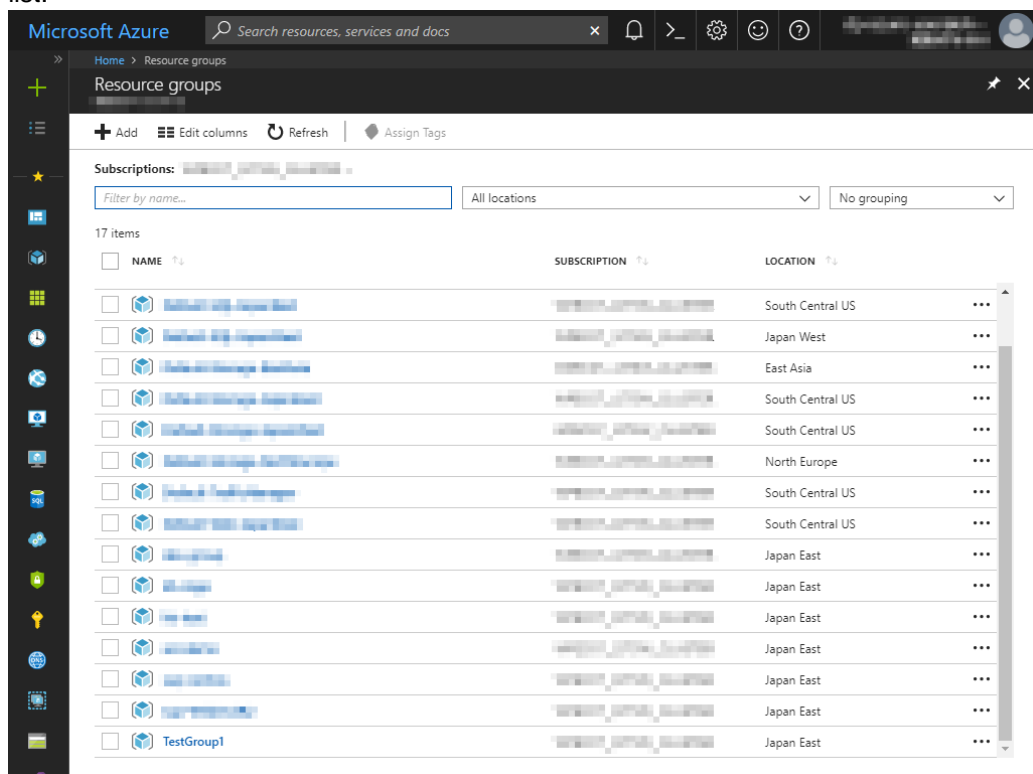


Then, check `<Load_balancer_frontend_IP(public_IP_address)>` specified in the script before recovery action of the multi-target monitor resource that is set in "3)Adding a monitor resource." Write down the confirmatory result.

1. Select **Resource groups** or the resource group icon in the menu on the left side of the window.



2. Select the resource group to which the created load balancer belongs from the resource group list.



Cluster Creation Procedure (for an HA Cluster Using an Internet Facing Load Balancer)

3. The summary of the selected resource group is displayed. Select the created load balancer from the item list.

Microsoft Azure Search resources, services and docs

Home > Resource groups > TestGroup1

TestGroup1 Resource group

Search (Ctrl+/)

+ Add Edit columns Delete resource group Refresh Move Assign Tags

Subscription (change) Deployments
Subscription ID 4 Succeeded

Filter by name... All types All locations No

11 items Show all resources

NAME	TYPE	LOCATION
AvailabilitySet-1	Availability set	Japan East
clstorageacct1	Storage account	Japan East
clstorageacctdiag1	Storage account	Japan East
NetSecGroup-1	Network security group	Japan East
node-1	Virtual machine	Japan East
node-1639	Network interface	Japan East
node-2	Virtual machine	Japan East
node-2542	Network interface	Japan East
TestLoadBalancer	Load balancer	Japan East
TestLoadBalancerPublicIP	Public IP address	Japan East
Vnet1	Virtual network	Japan East

4. The summary of the load balancer is displayed. Select **Public IP address** from the item list.

Microsoft Azure Search resources, services and docs

Home > Load balancers > TestLoadBalancer

TestLoadBalancer Load balancer

Search (Ctrl+/)

Move Delete Refresh

Essentials

Resource group (change) TestGroup1

Location Japan East

Subscription name (change)

Subscription ID

SKU Basic

Backend pool TestBackendPool (2 virtual machines)

Health probe TestHealthProbe (TCP:26001)

Load balancing rule TestLoadBalancingRule (TCP/80 to TCP/8080)

NAT rules

Public IP address (TestLoadBalancerPublicIP)

12) Adjusting the OS startup time, checking the network setting, checking the firewall setting, synchronizing the server time, and disabling the power saving function.

For each procedure, see "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the *Installation and Configuration Guide*.

13) Installing EXPRESSCLUSTER

For the installation procedure, see the *Installation and Configuration Guide*.

After installation is complete, restart the OS.

14) Registering the EXPRESSCLUSTER license

For the license registration procedure, see the *Installation and Configuration Guide*.

4.3 Configuring the EXPRESSCLUSTER settings

Configure the following on the WebManager cluster generation wizard.

For the WebManager setup and connection procedures, see Chapter 5, "Creating the cluster configuration data" in the the *Installation and Configuration Guide*.

This section describes the procedure to add the following resources and monitor resources:

- Mirror disk resource
- Azure probe port resource
- Azure probe port monitor resource
- Azure load balance monitor resource
- Custom monitor resource (for NP resolution)
- IP monitor resource (for NP resolution)
- Multi-target monitor resource (for NP resolution)

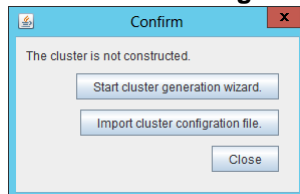
For the settings of other resources and monitor resources, see the *Installation and Configuration Guide* and the *Reference Guide*.

1) Creating a cluster

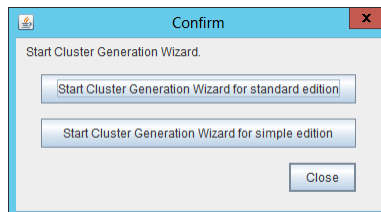
Start the cluster generation wizard to create a cluster.

◆ Creating a cluster

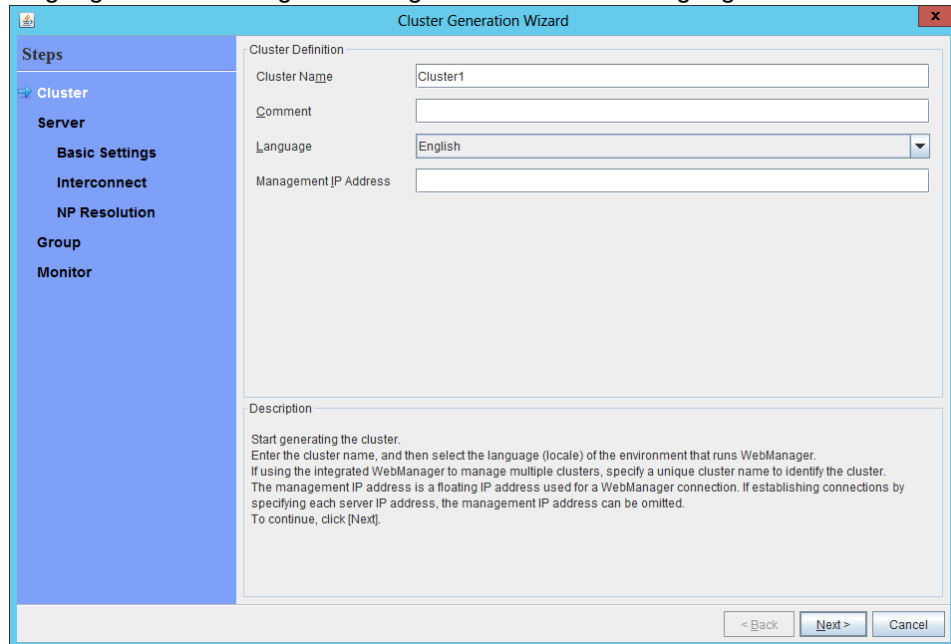
1. Access WebManager. Then, the following dialog box is displayed.
Click **Start cluster generation wizard**.



2. The following dialog box is displayed.
Click **Start Cluster Generation Wizard for standard edition**.



3. The **Cluster Definition** page is displayed.
Enter a desired name in **Cluster Name**.
Select an appropriate language in **Language**. After the setting is applied, the display language of WebManager is changed to the selected language.



The screenshot shows the 'Cluster Generation Wizard' window, specifically the 'Cluster Definition' step. On the left, a 'Steps' sidebar lists 'Cluster', 'Server', 'Basic Settings', 'Interconnect', 'NP Resolution', 'Group', and 'Monitor'. The 'Cluster' step is selected. The main area contains the following fields:

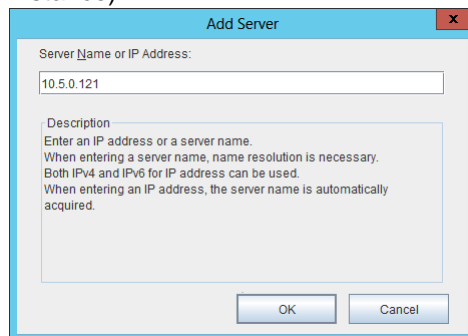
- Cluster Name:** A text box containing 'Cluster1'.
- Comment:** An empty text box.
- Language:** A dropdown menu with 'English' selected.
- Management IP Address:** An empty text box.

Below these fields is a 'Description' section with the following text:

Start generating the cluster.
Enter the cluster name, and then select the language (locale) of the environment that runs WebManager.
If using the integrated WebManager to manage multiple clusters, specify a unique cluster name to identify the cluster.
The management IP address is a floating IP address used for a WebManager connection. If establishing connections by specifying each server IP address, the management IP address can be omitted.
To continue, click [Next].

At the bottom right, there are three buttons: '< Back', 'Next >', and 'Cancel'.

4. The **Server Definition** page is displayed.
The instance connected to WebManager is displayed as a registered master server.
Click **Add** to add the remaining instances (by specifying the private IP address of each instance).



The screenshot shows the 'Add Server' dialog box. It has a title bar with 'Add Server' and a close button. The main area contains:

- Server Name or IP Address:** A text box containing '10.5.0.121'.
- Description:** A text box containing the following text:
Enter an IP address or a server name.
When entering a server name, name resolution is necessary.
Both IPv4 and IPv6 for IP address can be used.
When entering an IP address, the server name is automatically acquired.

At the bottom, there are two buttons: 'OK' and 'Cancel'.

5. Click **Next**.

The screenshot shows the 'Cluster Generation Wizard' window. On the left, the 'Steps' pane has 'Cluster' selected, with 'Server' highlighted under it. The main area is titled 'Server Definition'. It contains a 'Server Definition List' table with columns 'Order' and 'Name'. The table has two rows: 'Master Server' and '1', both with 'node-1' in the 'Name' column. To the right of the table are 'Add' and 'Remove' buttons. Below the table are 'Up' and 'Down' buttons. Further down is a 'Server Group' section with a 'Server Group Definition' field and a 'Settings' button. At the bottom is a 'Description' box with instructions: 'Click "Add" to add servers constructing the cluster. Click "Up" or "Down" to change the server priority. Click "Settings" to configure the server group when using the server group.' At the very bottom are '< Back', 'Next >', and 'Cancel' buttons.

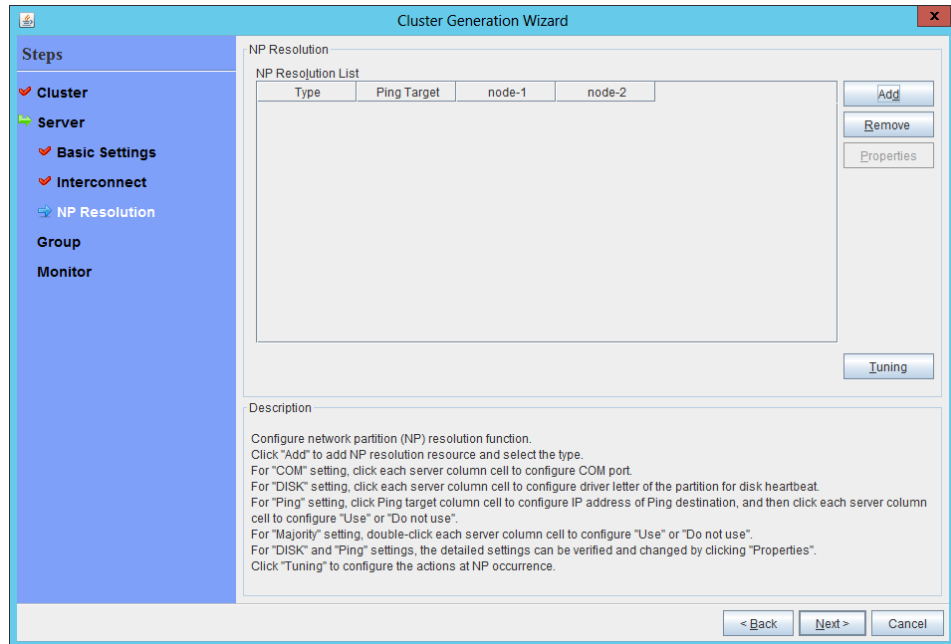
6. The **Interconnect** page is displayed.

Specify the IP addresses (IP address of each instance) to be used for interconnect. In addition, select mdc1 for **MDC** as a communication path of a mirror disk resource to be created later.

The screenshot shows the 'Cluster Generation Wizard' window, now on the 'Interconnect' page. The 'Steps' pane on the left has 'Interconnect' selected. The main area is titled 'Interconnect'. It contains an 'Interconnect List' table with columns 'Priority', 'Type', 'MDC', 'node-1', and 'node-2'. The table has one row with '1' in 'Priority', 'Kernel Mode' in 'Type', 'mdc1' in 'MDC', '10.5.0.120' in 'node-1', and '10.5.0.121' in 'node-2'. To the right of the table are 'Add' and 'Remove' buttons. Below the table are 'Up' and 'Down' buttons. At the bottom is a 'Description' box with instructions: 'Configure the interconnect among the servers constructing the cluster. Click "Add" to add interconnect and select the type. For "Kernel mode" setting, configure the route which is used for heartbeat. For "Mirror Communication Only" setting, configure the route which is used only for data mirroring communication. For "Kernel mode" setting, more than zero routes are necessary to be configured. Configuring more than one routes is recommended. Click each server column cell to configure IP addresses for each communication routes. Click "Up" or "Down" to configure the priority to preferentially use the LAN only for the communication among the cluster servers. For the communication route which is used for data mirroring communication, select the mirror disk connect name to be allocated to the communication route in MDC column.' At the very bottom are '< Back', 'Next >', and 'Cancel' buttons.

7. Click **Next**.

8. The **NP Resolution** page is displayed.
Note that NP resolution is not configured on this page. The equivalent feature is achieved by adding the IP monitor resource, custom monitor resource, and multi-target monitor resource. Configure NP resolution in "3)Adding a monitor resource."
Click **Next**.



The screenshot shows the 'Cluster Generation Wizard' window, specifically the 'NP Resolution' step. On the left, a 'Steps' sidebar lists 'Cluster', 'Server', 'Basic Settings', 'Interconnect', 'NP Resolution' (highlighted), 'Group', and 'Monitor'. The main area is titled 'NP Resolution' and contains an 'NP Resolution List' table with columns 'Type', 'Ping Target', 'node-1', and 'node-2'. The table is currently empty. To the right of the table are buttons for 'Add', 'Remove', and 'Properties'. Below the table is a 'Tuning' button. At the bottom of the main area is a 'Description' section with text explaining the NP resolution function and how to configure various settings like COM, DISK, Ping, and Majority. At the very bottom of the window are '< Back', 'Next >', and 'Cancel' buttons.

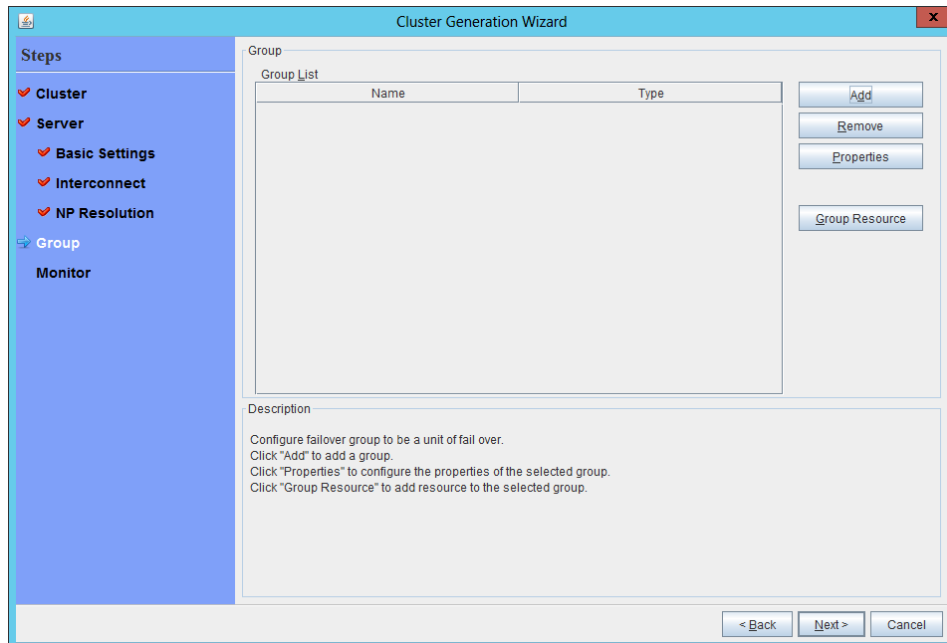
Type	Ping Target	node-1	node-2
------	-------------	--------	--------

Description
Configure network partition (NP) resolution function.
Click "Add" to add NP resolution resource and select the type.
For "COM" setting, click each server column cell to configure COM port.
For "DISK" setting, click each server column cell to configure driver letter of the partition for disk heartbeat.
For "Ping" setting, click Ping target column cell to configure IP address of Ping destination, and then click each server column cell to configure "Use" or "Do not use".
For "Majority" setting, double-click each server column cell to configure "Use" or "Do not use".
For "DISK" and "Ping" settings, the detailed settings can be verified and changed by clicking "Properties".
Click "Tuning" to configure the actions at NP occurrence.

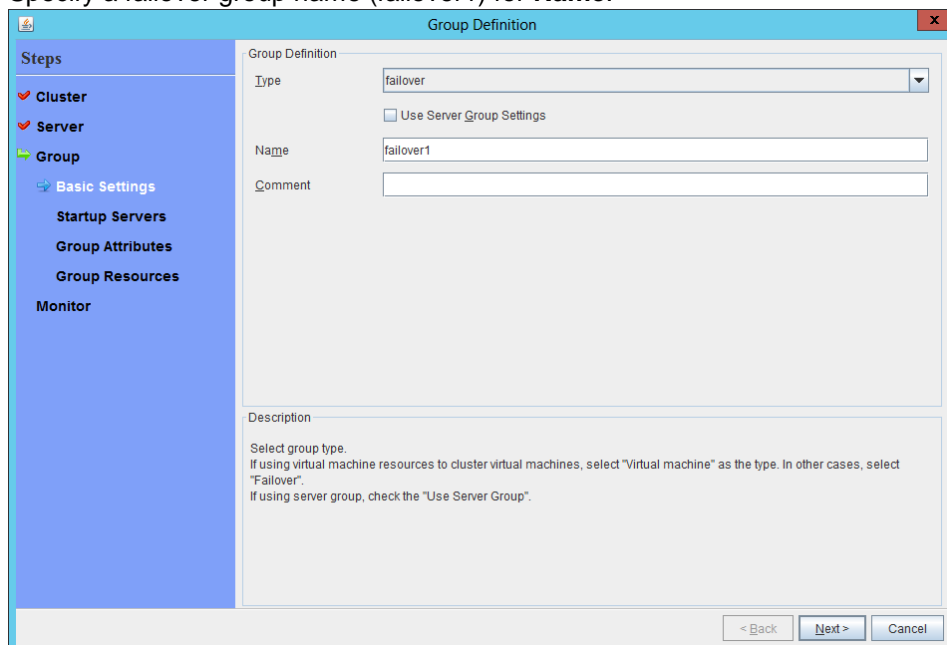
2) Adding a group resource

- ◆ Defining a group
Create a failover group.

1. The **Group List** window is displayed.
Click **Add**.



2. The **Group Definition** window is displayed.
Specify a failover group name (failover1) for **Name**.



3. Click **Next**.

4. The **Servers that can run the Group** page is displayed.
Click **Next** without specifying anything.

The screenshot shows the 'Group Definition(failover1)' window. On the left, a 'Steps' sidebar lists: Cluster, Server, Group (selected), Basic Settings, Startup Servers, Group Attributes, Group Resources, and Monitor. The main area is titled 'Servers that can run the Group'. It features a checkbox 'Failover is possible on all servers' which is checked. Below this are two lists: 'Servers that can run the Group' (empty) and 'Available Servers' (containing 'node-1' and 'node-2'). Between the lists are buttons: '< Add', 'Remove >', 'Up', and 'Down'. A 'Description' section at the bottom provides instructions on server selection and priority. At the bottom right are '< Back', 'Next >', and 'Cancel' buttons.

5. The **Group Attribute Settings** page is displayed.
Click **Next** without specifying anything.

The screenshot shows the 'Group Definition(failover1)' window at the 'Group Attribute Settings' page. The 'Steps' sidebar is the same as in the previous screenshot. The main area contains settings for 'Startup Attribute' (radio buttons for 'Auto Startup' and 'Manual Startup'), 'Failover Attribute' (radio buttons for 'Auto Failover' and 'Manual Failover'), and 'Failback Attribute' (radio buttons for 'Auto Failback' and 'Manual Failback'). Under 'Auto Failover', there are checkboxes for 'Use the startup server settings', 'Failover dynamically', 'Perform a Forced Failover', 'Prioritize failover policy in the server group', and 'Perform a Smart Failover'. There is also an 'Edit exclusion monitor' button. A 'Description' section at the bottom explains the configuration options. At the bottom right are '< Back', 'Next >', and 'Cancel' buttons.

6. The **Group Resource** page is displayed.
On this page, add a group resource following the procedure below.

The screenshot shows the 'Group Definition(failover1)' window. On the left is a 'Steps' sidebar with options: Cluster, Server, Group (selected), Basic Settings, Startup Servers, Group Attributes, Group Resources, and Monitor. The main area is titled 'Group Resource' and 'Group Resource List'. It contains a table with columns 'Name' and 'Type'. To the right of the table are buttons: 'Add', 'Remove', and 'Properties'. Below the table is a 'Description' section with instructions: 'Click "Add" to add resources. Click "Properties" to configure the properties of the selected resource.' At the bottom right are buttons: '< Back', 'Finish', and 'Cancel'.

- ◆ Mirror disk resource
Create a mirror disk resource.
For details, see "Understanding mirror disk resources" in Chapter 5, "Group resource details" in the *Reference Guide*.

1. Click **Add** on the **Group Resource List** page.
2. The **Resource Definition of Group** window is displayed.
Select the group resource type (mirror disk resource) from the **Type** box and enter the group name (md) in the **Name** box.

The screenshot shows the 'Resource Definition of Group(failover1)' window. On the left is a 'Steps' sidebar with options: Cluster, Server, Group (selected), Basic Settings, Startup Servers, Group Attributes, Group Resources, Info, Dependency, Recovery Operation, Details, and Monitor. The main area is titled 'Group Resource Definitions'. It contains a 'Type' dropdown menu with 'mirror disk resource' selected, a 'Name' text box with 'md' entered, and a 'Comment' text box. To the right of the 'Comment' box is a 'Get Licence Info' button. Below these fields is a 'Description' section with the instruction: 'Select the type of group resource and enter its name.' At the bottom right are buttons: '< Back', 'Next >', and 'Cancel'.

3. Click **Next**.

4. The **Dependent Resources** page is displayed.
Click **Next** without specifying anything.

The screenshot shows the 'Resource Definition of Group(failover1)' window. On the left is a 'Steps' sidebar with options: Cluster, Server, Group, Basic Settings, Startup Servers, Group Attributes, Group Resources, Info, Dependency, Recovery Operation, Details, and Monitor. The 'Group' step is selected. The main area has a checkbox 'Follow the default dependency' which is checked. Below it are two empty tables: 'Dependent Resources' and 'Available Resources'. The 'Dependent Resources' table has columns 'Name' and 'Resource type'. The 'Available Resources' table has a column 'Name'. There are '< Add' and 'Remove >' buttons between the tables. At the bottom are '< Back', 'Next >', and 'Cancel' buttons.

5. The **Recovery Operation at Activity Failure Detection** and **Recovery Operation at Deactivity Failure Detection** page is displayed.
Click **Next**.

The screenshot shows the 'Resource Definition of Group(failover1)' window, now on the 'Recovery Operation' page. The 'Steps' sidebar is the same, but 'Recovery Operation' is selected. The main area contains settings for two recovery operations. At the top is a checkbox 'Execute Script before or after Activation or Deactivation' with a 'Settings' button. Below are two sections: 'Recovery Operation at Activity Failure Detection' and 'Recovery Operation at Deactivity Failure Detection'. The first section has fields for 'Retry Count' (3), 'Failover Target Server' (Stable Server selected), 'Failover Threshold' (1), and 'Final Action' (No operation (not activate next resource)). The second section has fields for 'Retry Count at Deactivation Failure' (0) and 'Final Action' (Stop the cluster service and shutdown OS). Both sections have an 'Execute Script before Final Action' checkbox and a 'Settings' button. At the bottom are '< Back', 'Next >', and 'Cancel' buttons.

6. The **Details** page is displayed.
Select a server name in the **Name** column of **Servers that can run the group** and click **Add**.

Resource Definition of Group(failover1)

Steps

- Cluster
- Server
- Group
- Basic Settings
- Startup Servers
- Group Attributes
- Group Resources
- Info
- Dependency
- Recovery Operation
- Details
- Monitor

Mirror Disk No. 1

Data Partition Drive Letter

Cluster Partition Drive Letter

Cluster Partition Offset Index 0

Mirror Disk Connect Select

Servers that can run the group

Name	Data Partition	Cluster Partition
node-1		
node-2		

< Add Remove > Edit

Tuning

< Back Finish Cancel

7. The **Selection of partition** dialog box is displayed. Click **Connect**, select the data partition and cluster partition created in "6)Configuring virtual machines", and click **OK**.

Selection of partition

Partition

Data Partition

Volume	Disk No.	Partition No.	Size	GU
	0	1	500MB	
D:\	1	1	71677MB	
F:\	2	1	1024MB	
C:\	0	2	40458MB	
G:\	2	2	19453MB	

Obtain inform... Connect

GUID

Cluster Partition

Volume	Disk No.	Partition No.	Size	GU
	0	1	500MB	
D:\	1	1	71677MB	
F:\	2	1	1024MB	
C:\	0	2	40458MB	
G:\	2	2	19453MB	

GUID

OK Cancel

8. Perform steps 6 and 7 for node-1 and then node-2 and click **Finish**.

Resource Definition of Group(failover1)

Steps

- Cluster
- Server
- Group
 - Basic Settings
 - Startup Servers
 - Group Attributes
 - Group Resources
 - Info
 - Dependency
 - Recovery Operation
 - Details
 - Monitor

Mirror Disk No. 1

Data Partition Drive Letter G:

Cluster Partition Drive Letter F:

Cluster Partition Offset Index 0

Mirror Disk Connect Select

Servers that can run the group

Name	Data Partition	Cluster Partition
node-1		
node-2		

< Add Remove > Edit

Tuning

< Back Finish Cancel

- ◆ Azure probe port resource
When EXPRESSCLUSTER is used on Microsoft Azure, EXPRESSCLUSTER provides a mechanism to wait for alive monitoring from a load balancer on a port specific to a node in which operations are running.

For details about the Azure probe port resources", see "Understanding Azure probe port resources" in Chapter 5, "Group resource details" in the *Reference Guide*.

1. Click **Add** on the **Group Resource List** page.

2. The **Resource Definition of Group** window is displayed. Select the group resource type (Azure probe port resource) from the **Type** box and enter the group name (azurepp1) in the **Name** box.

Resource Definition of Group(failover1)

Steps

- Cluster
- Server
- Group
- Basic Settings
- Startup Servers
- Group Attributes
- Group Resources
- Info
- Dependency
- Recovery Operation
- Details
- Monitor

Group Resource Definitions

Type: Azure probe port resource

Name: azurepp1

Comment:

Get Licence Info

Description:

Select the type of group resource and enter its name.

< Back Next > Cancel

3. Click **Next**.
4. The **Dependent Resources** page is displayed. Click **Next** without specifying anything.

Resource Definition of Group(failover1)

Steps

- Cluster
- Server
- Group
- Basic Settings
- Startup Servers
- Group Attributes
- Group Resources
- Info
- Dependency
- Recovery Operation
- Details
- Monitor

☒ Follow the default dependency

Dependent Resources

Name	Resource type
------	---------------

< Add Remove >

Available Resources

Name

< Back Next > Cancel

5. The **Recovery Operation at Activity Failure Detection** and **Recovery Operation at Deactivity Failure Detection** page is displayed. Click **Next**.

Resource Definition of Group(failover1)

Steps

- Cluster
- Server
- Group
- Basic Settings
- Startup Servers
- Group Attributes
- Group Resources
- Info
- Dependency
- Recovery Operation
- Details
- Monitor

Execute Script before or after Activation or Deactivation

Settings

Recovery Operation at Activity Failure Detection

Retry Count: 5 time

Failover Target Server

☒ Stable Server ☐ Maximum Priority Server

Failover Threshold: 1 time

Final Action: No operation (not activate next resource)

☐ Execute Script before Final Action

Settings

Recovery Operation at Deactivity Failure Detection

Retry Count at Deactivation Failure: 0 time

Final Action: Stop the cluster service and shutdown OS

☐ Execute Script before Final Action

Settings

< Back Next > Cancel

6. For **Probeport**, enter the value specified for **Port** when configuring a load balancer (configuring health probe).

Resource Definition of Group(failover1)

Steps

- Cluster
- Server
- Group
- Basic Settings
- Startup Servers
- Group Attributes
- Group Resources
- Info
- Dependency
- Recovery Operation
- Details
- Monitor

Probeport: 26001

Tuning

< Back Finish Cancel

7. Click **Finish**.

3) Adding a monitor resource

◆ Azure probe port monitor resource

The port monitoring mechanism for alive monitoring is provided for the node in which the Microsoft Azure probe port resource is running.

For details about the Azure probe port monitor resource, see "Understanding Azure probe port monitor resources" in Chapter 6, "Monitor resource details" in the *Reference Guide*.

Adding one Azure probe port monitor resource creates one Azure probe port monitor resource automatically.

◆ Azure load balance monitor resource

The mechanism to monitor whether the port with the same port number as the probe port is open or not is provided for the node in which the Microsoft Azure probe port resource is not running.

For details about the Azure load balance monitor resource, see "Understanding Azure load balance monitor resources" in Chapter 6, "Monitor resource details" in the *Reference Guide*.

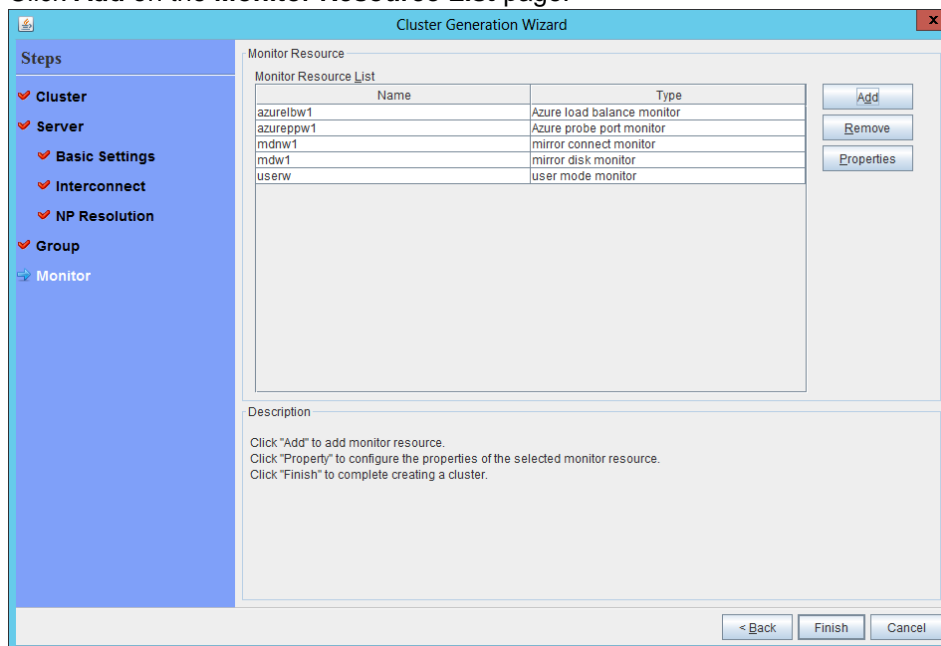
Adding one Azure probe port resource creates one Azure load balance monitor resource automatically.

◆ Custom monitor resource

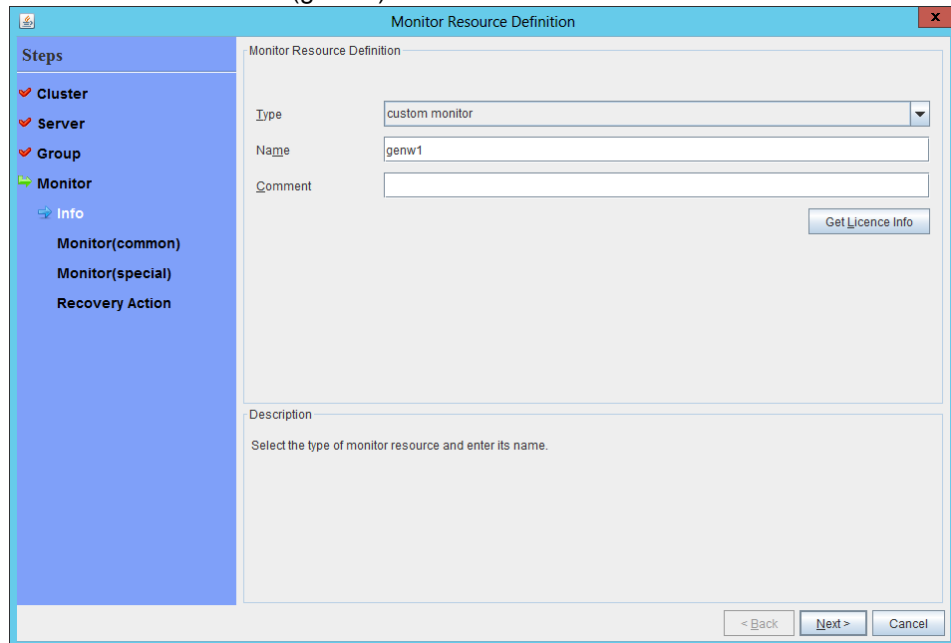
Sets a script to monitor whether communication with Microsoft Azure Service Management API is possible, and also monitors health of communication with an external network.

For details about the custom monitor resource, see "Understanding custom monitor resources" in Chapter 6, "Monitor resource details" in the *Reference Guide*.

1. Click **Add** on the **Monitor Resource List** page.

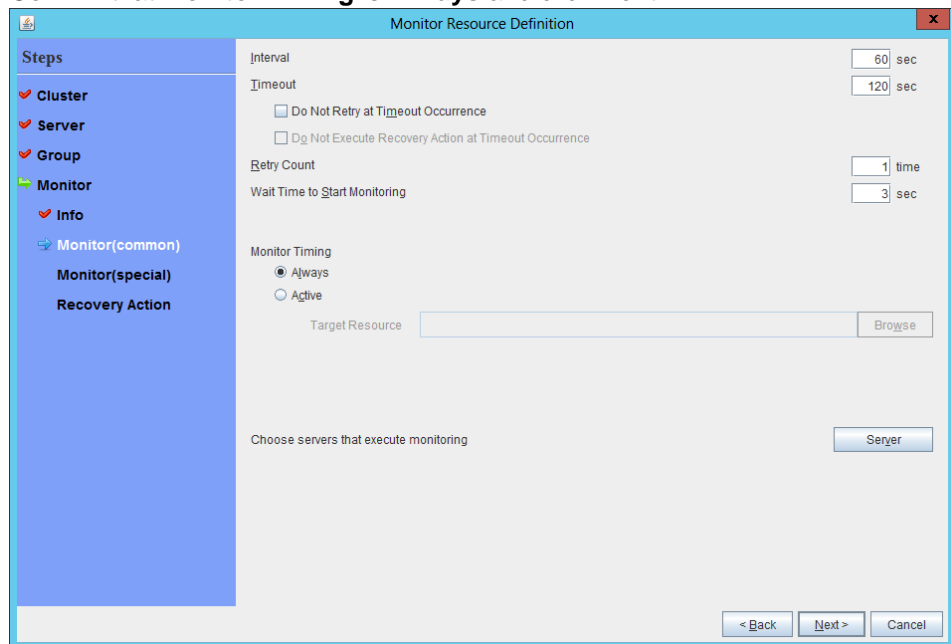


2. Select the monitor resource type (custom monitor) from the **Type** box and enter the monitor resource name (genw1) in the **Name** box.



The dialog box is titled "Monitor Resource Definition". On the left, a "Steps" sidebar shows a tree view with "Cluster", "Server", "Group", "Monitor", and "Info". Under "Monitor", "Monitor(common)" is selected. The main area is divided into two sections. The top section, "Monitor Resource Definition", contains a "Type" dropdown menu set to "custom monitor", a "Name" text box containing "genw1", and an empty "Comment" text box. A "Get Licence Info" button is to the right. The bottom section, "Description", contains the text "Select the type of monitor resource and enter its name." At the bottom right are "< Back", "Next >", and "Cancel" buttons.

3. Click **Next**.
4. The **Monitor (common)** page is displayed.
Confirm that **Monitor Timing** is **Always** and click **Next**.



The dialog box is titled "Monitor Resource Definition". The "Steps" sidebar on the left shows "Monitor(common)" selected. The main area contains several configuration options: "Interval" (60 sec), "Timeout" (120 sec), two unchecked checkboxes "Do Not Retry at Timeout Occurrence" and "Do Not Execute Recovery Action at Timeout Occurrence", "Retry Count" (1 time), and "Wait Time to Start Monitoring" (3 sec). The "Monitor Timing" section has two radio buttons, "Always" (selected) and "Active". Below is a "Target Resource" text box with a "Browse" button. At the bottom is a "Choose servers that execute monitoring" section with a "Server" button. At the bottom right are "< Back", "Next >", and "Cancel" buttons.

5. The **Monitor (special)** page is displayed.
Select **Script created with this product**.
The following shows the sample of a script to be created.

```
-----
< EXPRESSCLUSTER_installation_path>\bin\clpazure_port_checker -h
management.core.windows.net -p 443
EXIT %ERRORLEVEL%
-----
```

Select **Synchronous** for **Monitor Type**.

6. Click **Next**.
7. The **Recovery Action** page is displayed.
Select **Execute only the final action** for **Recovery Action**, **LocalServer** for **Recovery Target**, and **No operation** for **Final action**.

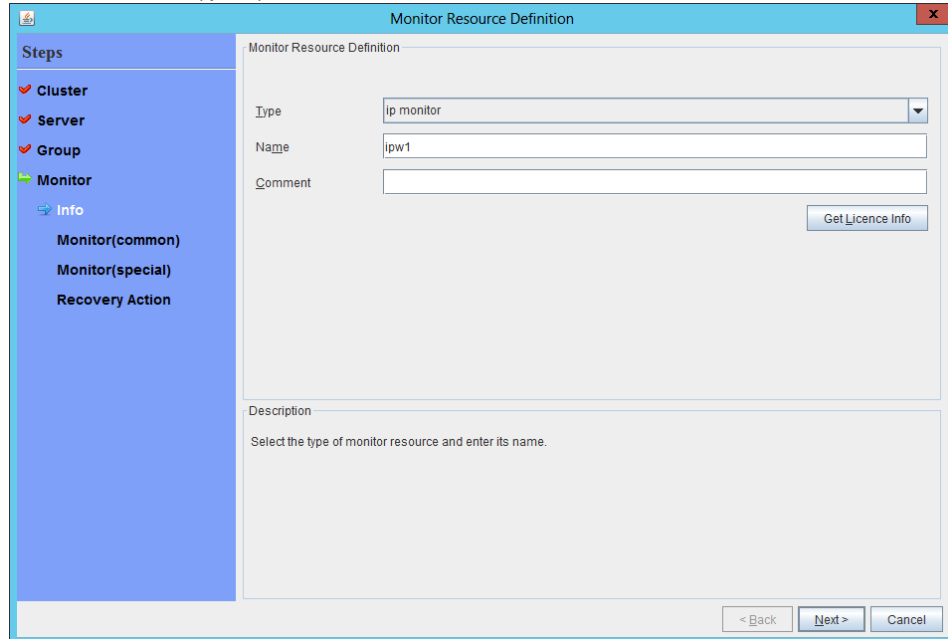
8. Click **Finish** to finish setting.

◆ IP monitor resource

Creates an IP monitor resource to monitor communication between clusters that are configured with virtual machines, and also to monitor whether communication with an internal network is health.

For details about the IP monitor resource, see "Understanding IP monitor resources" in Chapter 6, "Monitor resource details" in the *Reference Guide*.

1. Click **Add** on the **Monitor Resource List** page.
2. Select the monitor resource type (ip monitor) from the **Type** box and enter the monitor resource name (ipw1) in the **Name** box.



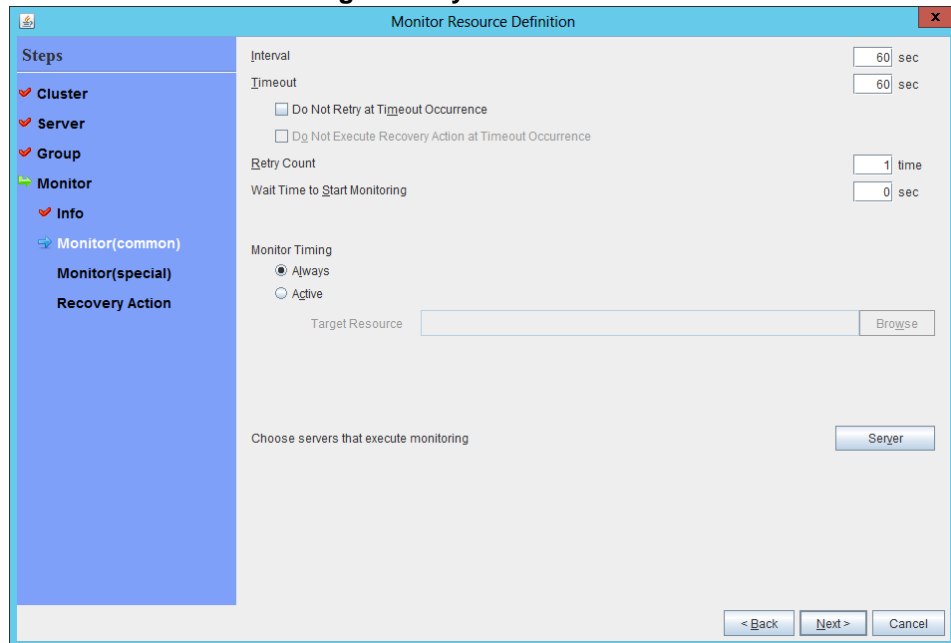
The screenshot shows the "Monitor Resource Definition" dialog box. On the left is a "Steps" sidebar with a tree view containing "Cluster", "Server", "Group", "Monitor", "Info", "Monitor(common)", "Monitor(special)", and "Recovery Action". The "Monitor" step is selected and highlighted in blue. The main area of the dialog is titled "Monitor Resource Definition" and contains the following fields:

- Type**: A dropdown menu with "ip monitor" selected.
- Name**: A text box containing "ipw1".
- Comment**: An empty text box.
- Get Licence Info**: A button.
- Description**: A text area with the placeholder text "Select the type of monitor resource and enter its name."

At the bottom right of the dialog are three buttons: "< Back", "Next >", and "Cancel".

3. Click **Next**.

4. The **Monitor (common)** page is displayed.
Confirm that **Monitor Timing** is **Always**.

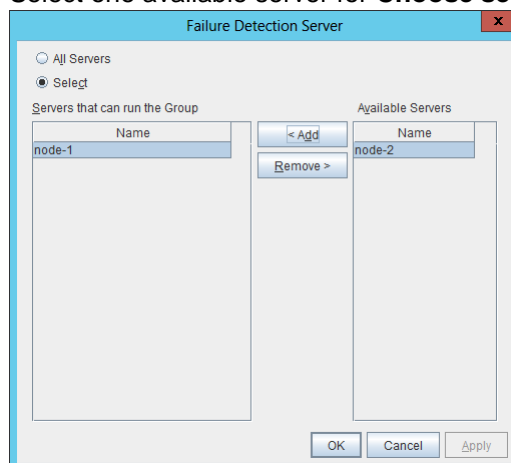


The **Monitor Resource Definition** dialog box is shown. On the left, the **Steps** pane lists: Cluster, Server, Group, Monitor, Info, **Monitor(common)**, Monitor(special), and Recovery Action. The main area contains the following settings:

- Interval:** 60 sec
- Timeout:** 60 sec
- ☐ Do Not Retry at Timeout Occurrence
- ☐ Do Not Execute Recovery Action at Timeout Occurrence
- Retry Count:** 1 time
- Wait Time to Start Monitoring:** 0 sec
- Monitor Timing:** ☒ Always, ☐ Active
- Target Resource:** (empty text box) with a **Browse** button
- Choose servers that execute monitoring:** (empty list) with a **Server** button

At the bottom are **< Back**, **Next >**, and **Cancel** buttons.

Select one available server for **Choose servers that execute monitoring**.



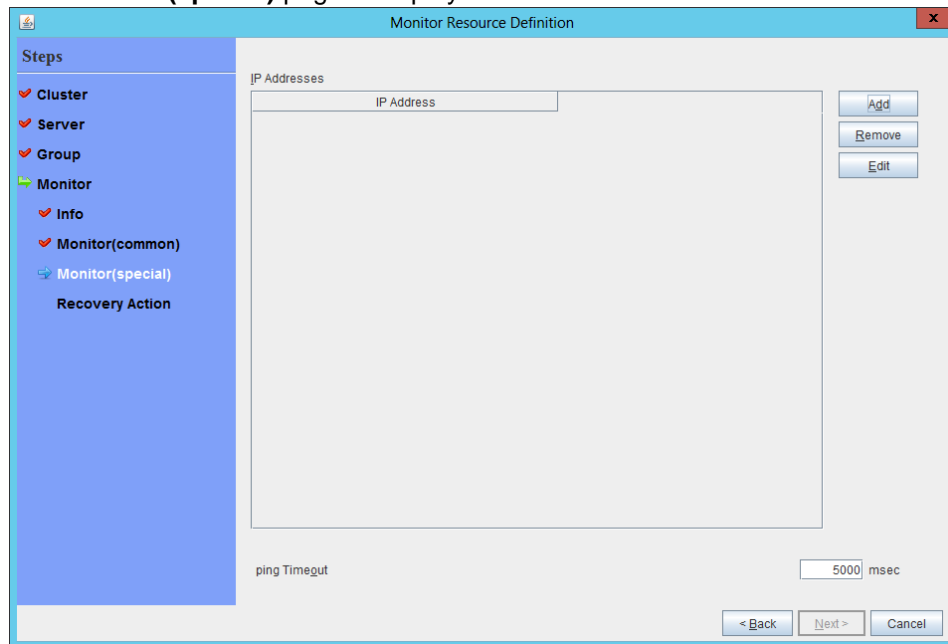
The **Failure Detection Server** dialog box is shown. It has two radio buttons: ☐ All Servers and ☒ Select. Below the **Select** option are two panes:

- Servers that can run the Group:** A list containing **node-1**.
- Available Servers:** A list containing **node-2**.

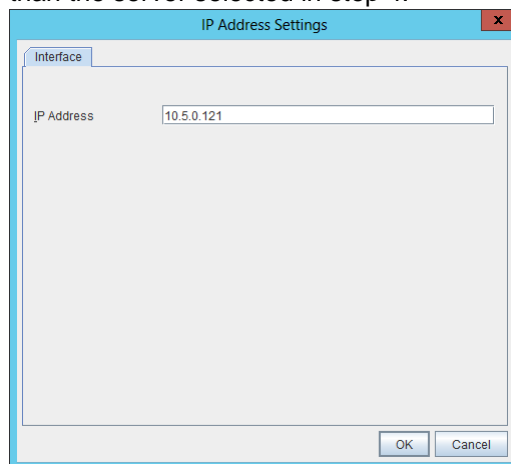
Between the panes are **< Add** and **Remove >** buttons. At the bottom are **OK**, **Cancel**, and **Apply** buttons.

Click **Next**.

5. The **Monitor (special)** page is displayed.



On the **Common** tab, select **Add of IP Address** and set an IP address of a server other than the server selected in step 4.



6. Click **Next**.

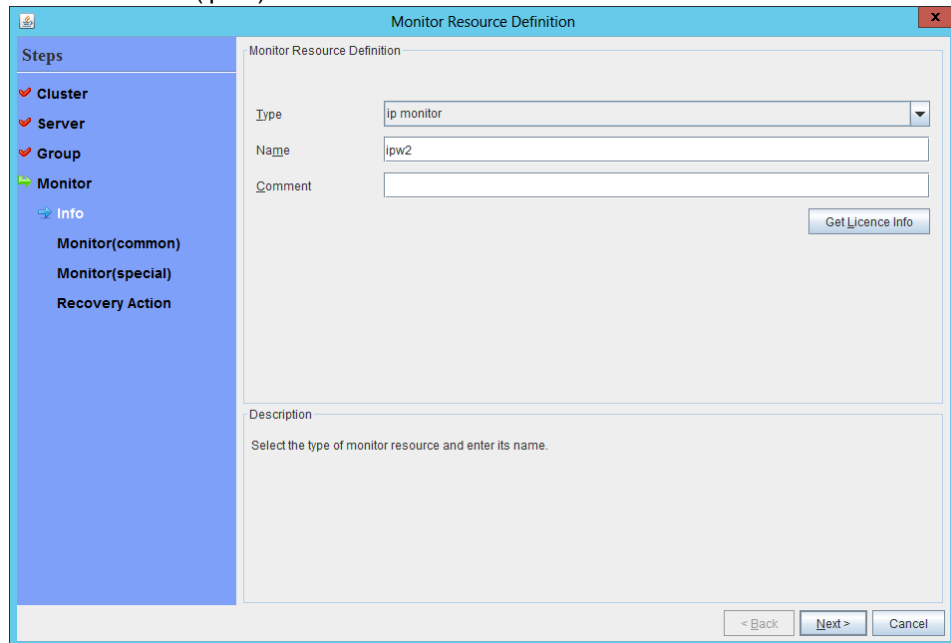
The 'Monitor Resource Definition' dialog box is shown. On the left, a 'Steps' sidebar lists: Cluster, Server, Group, Monitor (selected), Info, Monitor(common), Monitor(special), and Recovery Action. The main area is titled 'IP Addresses' and contains a table with one row: '10.5.0.121' under the 'IP Address' header. To the right of the table are 'Add', 'Remove', and 'Edit' buttons. Below the table, the 'ping Timeout' is set to '5000 msec'. At the bottom right are '< Back', 'Next >', and 'Cancel' buttons.

7. The **Recovery Action** page is displayed.
Select **Execute only the final action** for **Recovery Action**, **LocalServer** for **Recovery Target**, and **No operation** for **Final Action**.

The 'Monitor Resource Definition' dialog box is shown with the 'Recovery Action' step selected in the sidebar. The main area contains several settings: 'Recovery Action' is set to 'Execute only the final action' (dropdown); 'Recovery Target' is 'LocalServer' (text field with a 'Browse' button); 'Recovery Script Execution Count' is '0 time'; 'Execute Script before Reactivation' is unchecked; 'Maximum Reactivation Count' is '0 time'; 'Execute Script before Failover' is unchecked; 'Execute migration before Failover' is unchecked; 'Failover Target Server' has 'Stable Server' selected (radio button); 'Maximum Priority Server' is unselected (radio button); 'Maximum Failover Count' is '0 time'; 'Execute Script before Final Action' is unchecked; and 'Final Action' is 'No operation' (dropdown). A 'Script Settings' button is located above the bottom navigation buttons. The bottom right has '< Back', 'Finish', and 'Cancel' buttons.

8. Click **Finish** to finish setting.
9. Then, create a monitor resource on the other server. Click **Add** on the **Monitor Resource List** page.

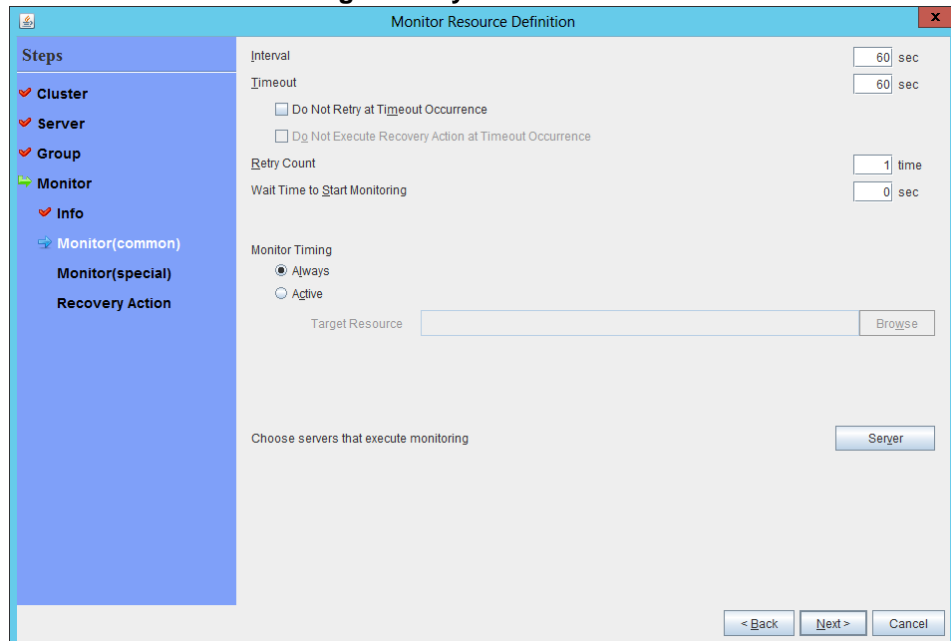
10. Select the monitor resource type (ip monitor) from the **Type** box and enter the monitor resource name (ipw2) in the **Name** box.



The image shows a 'Monitor Resource Definition' dialog box. On the left is a 'Steps' sidebar with a tree view containing 'Cluster', 'Server', 'Group', 'Monitor' (selected), and 'Info'. Under 'Monitor', there are sub-items: 'Monitor(common)', 'Monitor(special)', and 'Recovery Action'. The main area is titled 'Monitor Resource Definition' and contains three input fields: 'Type' (a dropdown menu with 'ip monitor' selected), 'Name' (a text box with 'ipw2' entered), and 'Comment' (an empty text box). A 'Get Licence Info' button is located to the right of the 'Comment' field. Below these fields is a 'Description' section with the text 'Select the type of monitor resource and enter its name.' At the bottom right are three buttons: '< Back', 'Next >', and 'Cancel'.

11. Click **Next**.

12. The **Monitor (common)** page is displayed.
Confirm that **Monitor Timing** is **Always**.

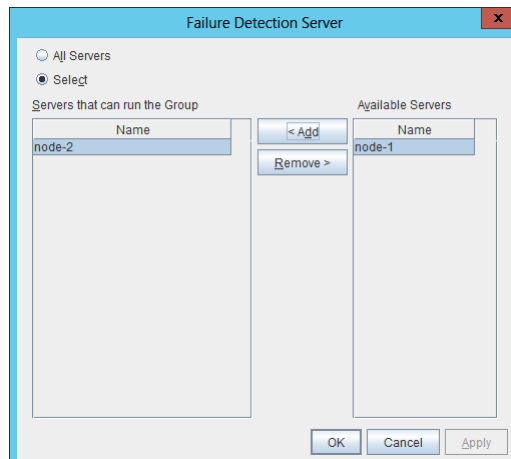


The 'Monitor Resource Definition' dialog box is shown. On the left, the 'Steps' pane lists: Cluster, Server, Group, Monitor, Info, Monitor(common), Monitor(special), and Recovery Action. The 'Monitor(common)' step is selected. The main area contains the following settings:

- Interval: 60 sec
- Timeout: 60 sec
- ☐ Do Not Retry at Timeout Occurrence
- ☐ Do Not Execute Recovery Action at Timeout Occurrence
- Retry Count: 1 time
- Wait Time to Start Monitoring: 0 sec
- Monitor Timing: ☒ Always, ☐ Active
- Target Resource: [Empty text box] with a 'Browse' button
- Choose servers that execute monitoring: [Empty list box] with a 'Server' button

At the bottom right are buttons for '< Back', 'Next >', and 'Cancel'.

Select one available server for **Choose servers that execute monitoring**.



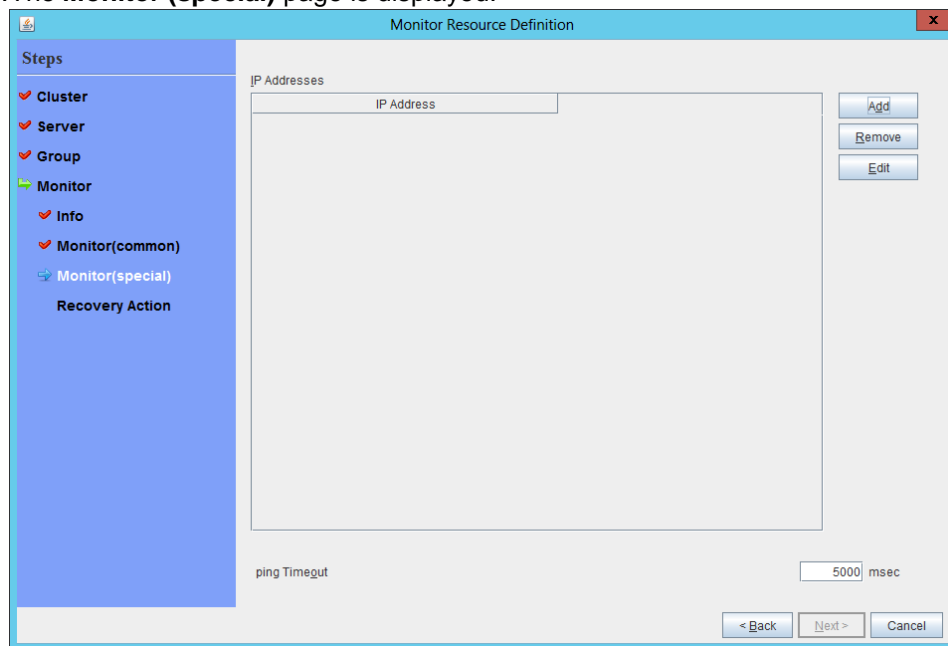
The 'Failure Detection Server' dialog box is shown. It has two radio buttons: 'All Servers' and 'Select'. The 'Select' option is chosen. Below this are two list boxes:

- 'Servers that can run the Group': Contains 'node-2'.
- 'Available Servers': Contains 'node-1'.

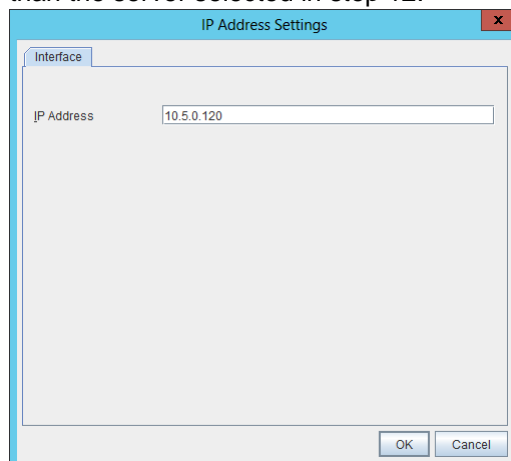
Between the list boxes are buttons for '< Add' and 'Remove >'. At the bottom are buttons for 'OK', 'Cancel', and 'Apply'.

Click **Next**.

13. The **Monitor (special)** page is displayed.



On the **Common** tab, select **Add of IP Address** and set an IP address of a server other than the server selected in step 12.



14. Click **Next**.

The 'Monitor Resource Definition' dialog box is shown. On the left, the 'Steps' pane has 'Monitor' selected. The main area is titled 'IP Addresses' and contains a table with one row: '10.5.0.120' under the 'IP Address' header. To the right of the table are 'Add', 'Remove', and 'Edit' buttons. At the bottom, there is a 'ping Timeout' field set to '5000 msec' and '< Back', 'Next >', and 'Cancel' buttons.

15. The **Recovery Action** page is displayed.

Select **Execute only the final action** for **Recovery Action**, **LocalServer** for **Recovery Target**, and **No operation** for **Final action**.

The 'Monitor Resource Definition' dialog box is shown with the 'Recovery Action' step selected in the left pane. The main area shows configuration for recovery actions. 'Recovery Action' is set to 'Execute only the final action' (dropdown). 'Recovery Target' is 'LocalServer' (with a 'Browse' button). 'Recovery Script Execution Count' is '0 time'. Below this is a section for 'Execute Script before Reactivation' with a checkbox and 'Maximum Reactivation Count' set to '0 time'. Another section for 'Execute Script before Failover' has checkboxes for 'Execute Script before Failover' and 'Execute migration before Failover', 'Failover Target Server' set to 'Stable Server' (radio button), 'Maximum Priority Server' (radio button), and 'Maximum Failover Count' set to '0 time'. At the bottom, 'Execute Script before Final Action' has a checkbox and 'Final Action' is set to 'No operation' (dropdown). 'Script Settings' button is visible. '< Back', 'Finish', and 'Cancel' buttons are at the bottom right.

16. Click **Finish** to finish setting.

◆ Multi-target monitor resource

Creates a multi-target monitor resource to check the statuses of the custom monitor resource and IP monitor resource. The custom monitor resource monitors communication to Microsoft Azure Service Management API. The IP monitor resource monitors communication between clusters that are configured with virtual machines.

If their statuses are abnormal, execute the script in which the processing for NP resolution is described.

For details about the multi-target monitor resource, see "Understanding multi-target monitor resources" in Chapter 6, "Monitor resource details" in the *Reference Guide*.

1. Click **Add** on the **Monitor Resource List** page.
2. Select the monitor resource type (multi-target monitor) from the **Type** box and enter the monitor resource name (mtw1) in the **Name** box.

Monitor Resource Definition

Steps

- Cluster
- Server
- Group
- Monitor
- Info
 - Monitor(common)
 - Monitor(special)
 - Recovery Action

Monitor Resource Definition

Type: multi-target monitor

Name: mtw1

Comment:

Get Licence Info

Description:

Select the type of monitor resource and enter its name.

< Back Next > Cancel

3. Click **Next**.
4. The **Monitor (common)** page is displayed. Confirm that **Monitor Timing** is **Always** and click **Next**.

Monitor Resource Definition

Steps

- Cluster
- Server
- Group
- Monitor
- Info
 - Monitor(common)
 - Monitor(special)
 - Recovery Action

Interval: 60 sec

Timeout: 60 sec

☐ Do Not Retry at Timeout Occurrence

☐ Do Not Execute Recovery Action at Timeout Occurrence

Retry Count: 1 time

Wait Time to Start Monitoring: 0 sec

Monitor Timing

☒ Always

☐ Active

Target Resource: Browse

Choose servers that execute monitoring: Server

< Back Next > Cancel

5. The **Monitor (special)** page is displayed.
From **Available Monitor Resources**, select the custom monitor resource (genw1) for checking communication with Service Management API and two IP monitor resources (ipw1 and ipw2) that are set to both servers. Then, click **Add** to add them to **Monitor Resource List**.

The dialog box is titled "Monitor Resource Definition". On the left, a "Steps" sidebar shows a tree view with "Cluster", "Server", "Group", "Monitor", "Info", "Monitor(common)", "Monitor(special)", and "Recovery Action". "Monitor(special)" is selected. The main area is divided into two tables. The "Monitor Resources" table on the left contains the following data:

Monitor Resource	Type
genw1	genw
ipw1	ipw
ipw2	ipw

Below this table are buttons for "< Add" and "Remove >". The "Available Monitor Resources" table on the right contains the following data:

Monitor Resource	Type
userw	userw

At the bottom right, there are buttons for "Tuning", "< Back", "Next >", and "Cancel".

6. Click **Next**.
7. The **Recovery Action** page is displayed.
Select **Execute only the final action** for **Recovery action**, **LocalServer** for **Recovery Target**, and **No operation** for **Final action**, and select the **Execute Script before Final Action** check box.
Click **Script Settings** and create a script to be executed when the multi-target monitor resource detects an error.

The dialog box is titled "Monitor Resource Definition". On the left, the "Steps" sidebar shows "Recovery Action" selected. The main area contains the following settings:

- Recovery Action:** A dropdown menu set to "Execute only the final action".
- Recovery Target:** A text field containing "LocalServer" and a "Browse" button.
- Recovery Script Execution Count:** A numeric field set to "0" with a "time" unit.
- Execute Script before Reactivation:** An unchecked checkbox.
- Maximum Reactivation Count:** A numeric field set to "0" with a "time" unit.
- Execute Script before Failover:** An unchecked checkbox.
- Execute migration before Failover:** An unchecked checkbox.
- Failover Target Server:** Radio buttons for "Stable Server" (selected) and "Maximum Priority Server".
- Maximum Failover Count:** A numeric field set to "0" with a "time" unit.
- Execute Script before Final Action:** A checked checkbox.
- Final Action:** A dropdown menu set to "No operation".

At the bottom right, there are buttons for "Script Settings", "< Back", "Finish", and "Cancel".

8. The script editing dialog box is displayed.
 Select **Script created with this product** and click **Edit** to edit the script. The following shows the sample of a script to be created.
 Specify the following by referring to "3.1 Creation example." The ports differ depending on operations.
- **Load balancing rule > Backend port** of the load balancer
 - **Load balancing rule > Port** of the load balancer
- Set the public IP address that you wrote down in "11)Setting the inbound security rules" to the following:
- **Frontend IP** (public IP address) of the load balancer

```

-----
rem *****
rem Check Active Node
rem *****
<EXPRESSCLUSTER_installation_path>\bin\clpazure_port_checker -h 127.0.0.1 -p <
Backend_port_of_the_load_balancer_of_Load_balancing_rule>
IF NOT "%ERRORLEVEL%" == "0" (
    GOTO CLUSTER_SHUTDOWN
)

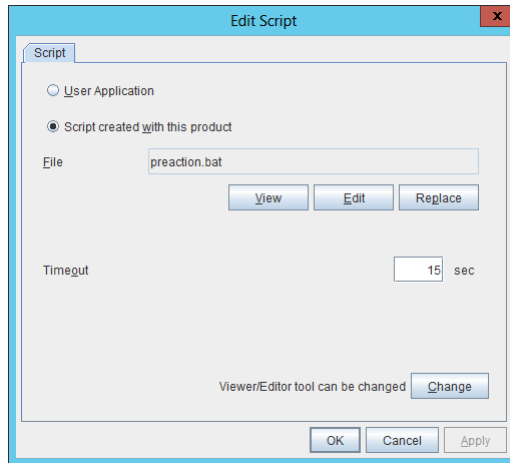
rem *****
rem Check DNS
rem *****
<EXPRESSCLUSTER_installation_path>\bin\clpazure_port_checker      -h      <
Frontend_IP(public_IP_address)_of_the_load_balancer>              -p      <
Port_of_the_load_balancer_of_Load_balancing_rule>
IF "%ERRORLEVEL%" == "0" (
    GOTO EXIT
)

rem *****
rem Cluster Shutdown
rem *****
:CLUSTER_SHUTDOWN
clpdown

rem *****
rem EXIT
rem *****
:EXIT
EXIT 0
-----

```

For **Timeout**, specify a value larger than the timeout value of clpazure_port_checker (fixed to five seconds). In the case of the above sample script, it is recommended to set a value larger than 10 seconds in order to execute clpazure_port_checker twice. Click **OK**.



9. Click **Finish** to finish setting.

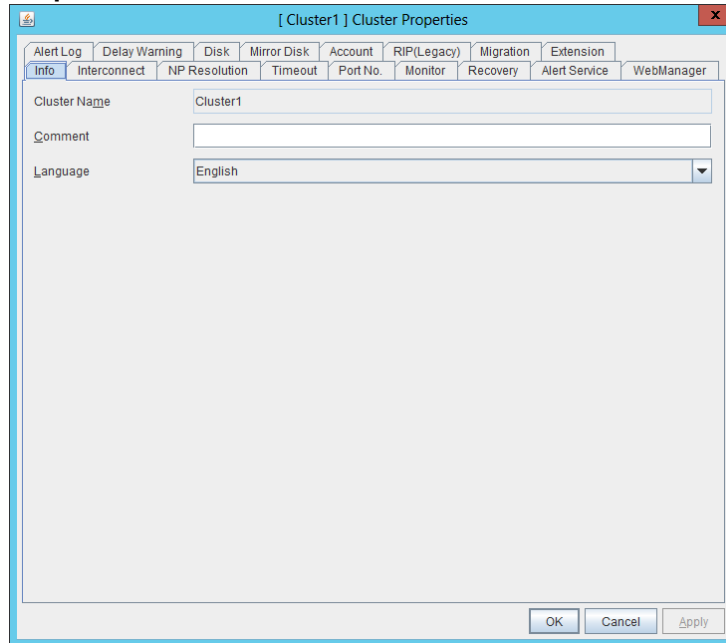
4) Setting the cluster properties

For details about the cluster properties, see "Cluster properties" in Chapter 2, "Functions of the Builder" in the *Reference Guide*.

◆ Cluster properties

Configure the settings in **Cluster Properties** to link Microsoft Azure and EXBERSCLUSTER.

1. Enter **Config Mode** from WebManager, right-click a cluster name, and select **Properties**.



2. Select the **Timeout** tab. For **Timeout of Heartbeat**, specify a value calculated by "A+B+30" ("Time that the multi-target monitor resource requires to detect an error"+30 seconds).

A: **Interval** of the monitor resource being monitored by the multi-target monitor resource for NP resolution x (**Retry Count**+1)

* Among three monitor resources, select the monitor resource whose calculation result is the largest.

B: **Interval** of the multi-target monitor resource x (**Retry Count**+1)

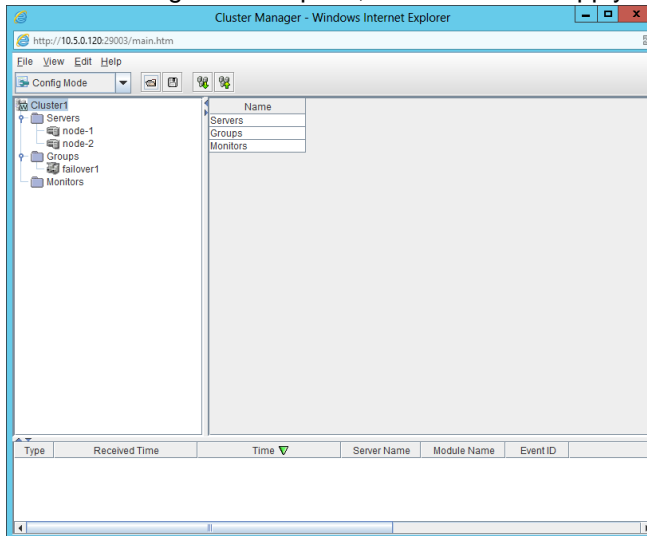
Note: If **Timeout of Heartbeat** is shorter than the time that the multi-target monitor resource requires to detect an error, a heartbeat timeout will be detected before starting the NP resolution processing. In this case, the same service may start doubly in the cluster because the service also starts on the standby server.

The screenshot shows the 'Cluster Properties' dialog box for 'Cluster1', with the 'Timeout' tab selected. The dialog has a title bar with a close button. Below the title bar is a row of tabs: Alert Log, Delay Warning, Disk, Mirror Disk, Account, RIP(Legacy), Migration, Extension, Info, Interconnect, NP Resolution, Timeout (selected), Port No., Monitor, Recovery, Alert Service, and WebManager. The main area contains several settings: 'Network initialization complete wait time' set to 3 min, 'Server Sync Wait Time' set to 5 min, a 'Heartbeat' section with 'Interval' set to 3 sec and 'Timeout' set to 270 sec, and 'Server Internal Timeout' set to 180 sec. At the bottom right is an 'Initialize' button. At the very bottom are 'OK', 'Cancel', and 'Apply' buttons.

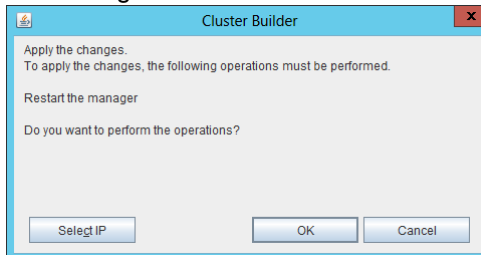
3. Click **OK**.

5) Applying the settings and starting the cluster

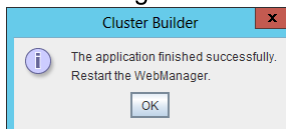
1. After all settings are complete, click the icon to apply the settings under the menu.



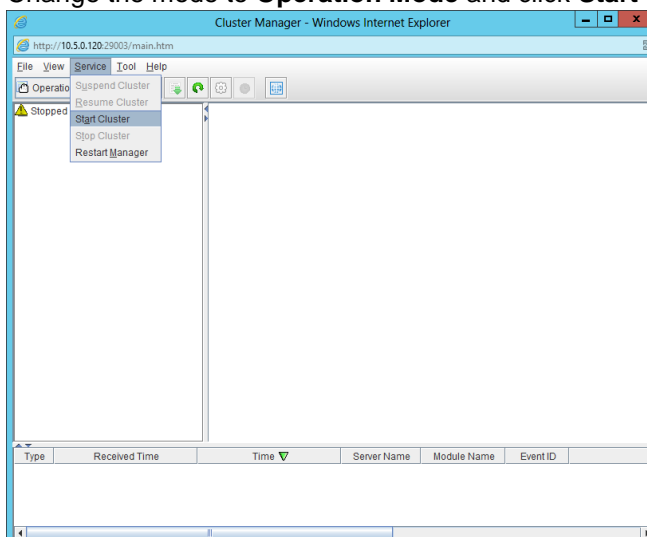
2. The dialog box to confirm to restart the manager is displayed.



3. Click **OK**.
4. Click **OK** again on the following dialog box.



5. Change the mode to **Operation Mode** and click **Start Cluster** from the **Service** menu.



4.4 Verifying the created environment

Verify whether the created environment works properly by generating a (dummy) monitoring error to fail over a failover group.

If the cluster is running normally, the verification procedure is as follows:

1. Start the failover group (failover1) on the active node (node1). In the Status tab on the Cluster WebUI, confirm that **Group Status** of failover1 of node-1 is **Normal**.
2. Change **Operation Mode** to **Verification Mode** from the Cluster WebUI pull-down menu.
3. In the Status tab on the Cluster WebUI, click the **Enable dummy failure** icon of azureppw1 of Monitors.
4. After the Azure probe port resource (azurepp1) activated three times, the failover group (failover1) becomes abnormal and fails over to node-2. In the Status tab on the Cluster WebUI, confirm that **Group Status** of failover1 of node-2 is **Normal**.
Also, confirm that access to the frontend IP and port of the Azure load balancer is normal after the failover.

Verifying the failover operation in case of a dummy failure is now complete. Verify the operations in case of other failures if necessary.

Chapter 5 Cluster Creation Procedure (for an HA Cluster Using an Internal Load Balancer)

5.1 Creation example

This guide introduces the procedure for creating a 2-node unidirectional standby cluster using EXPRESSCLUSTER. This procedure is intended to create a mirror disk type configuration in which node-1 is used as an active server.

The following tables describe the parameters that do not have a default value and the parameters whose values are to be changed from the default values.

- Microsoft Azure settings (common to node-1 and node-2)

Setting item	Setting value
Resource group setting	
Name	TestGroup1
Resource group location	Japan East
Virtual network setting	
Name	Vnet1
Address space	10.5.0.0/24
Subnet name	Vnet1-1
Subnet address range	10.5.0.0/24
Resource group name	TestGroup1
Location	Japan East
Load balancer setting	
Name	TestLoadBalancer
Type	Internal
Virtual network	Vnet1
Subnet	Vnet1-1
IP address assignment	Static
Private IP address	10.5.0.200
Resource group	TestGroup1
Location	Japan East
Backend pool: Name	TestBackendPool
Associated to	Availability set
Target virtual machine	node-1 node-2
Network IP configuration	10.5.0.120 10.5.0.121
Health probe: Name	TestHealthProbe
Health probe: Port	26001
Load balancing rule: Name	TestLoadBalancingRule
Load balancing rule: Port	80 (Port number offering the operation)
Load balancing rule: Backend port	8080 (Port number offering the operation)

- Microsoft Azure settings (specific to each of node-1 and node-2)

Setting item	Setting value	
	node-1	node-2
Virtual machine setting		
VM disk type	HDD	
User name	testlogin	
Password	PassWord_123	
Resource group name	TestGroup1	

Location	Japan East	
Storage account setting		
Name	clstorageacc1	
Performance	Standard	
Replication	Locally-redundant storage (LRS)	
Network security group setting		
Name	NetSecGroup-1	
Availability set setting		
Name	AvailabilitySet-1	
Update domains	5	
Fault domains	3	
Diagnostics storage account setting		
Name	clstorageaccdiag1	
Performance	Standard	
Replication	Locally-redundant storage (LRS)	
IP configuration setting		
IP address	10.5.0.120	10.5.0.121
Blob storage setting		
Name	Node-1Blob	Node-2Blob
Source type	New (empty disk)	
Account type	Standard (HDD)	
Size	20	

- EXPRESSCLUSTER settings (cluster properties)

Setting item	Setting value	
	node-1	node-2
Cluster name	Cluster1	
Server name	node-1	node-2
NP Resolution Tab: Type	Ping	
NP Resolution Tab: Ping Target	10.5.0.5	
NP Resolution Tab: <server> column	Use	Use

- EXPRESSCLUSTER settings (failover group)

Resource name	Setting item	Setting value
Mirror disk resource	Nama	md
	Details Tab: Data Partition Drive Letter	G:
	Details Tab: Cluster Partition Drive Letter	F:
Azure probe port resource	Name	azurepp1
	Probe port	26001 (Value specified for Port of Health probe)

- EXPRESSCLUSTER settings (monitor resource)

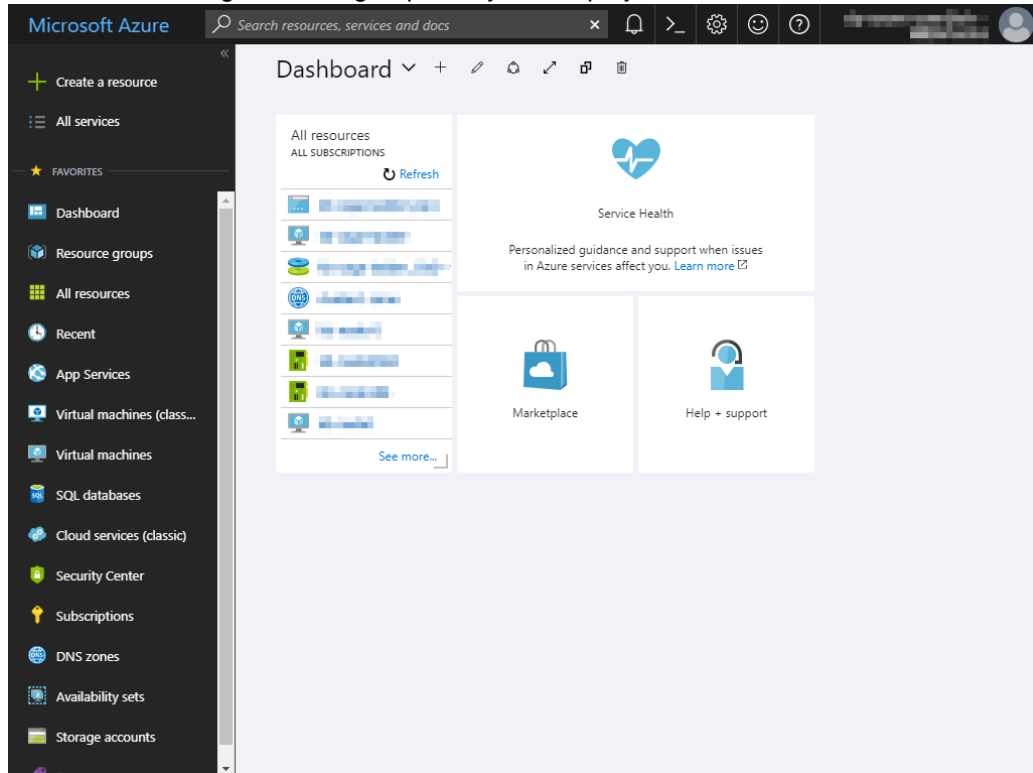
Monitor resource name	Setting item	Setting value
Mirror disk monitor resource	-	-
Azure probe port monitor resource	Name	azureppw1
	Recovery Target	azurepp1
Azure load balance monitor resource	Name	aurelbw1
	Recovery Target	azurepp1

5.2 Configuring Microsoft Azure

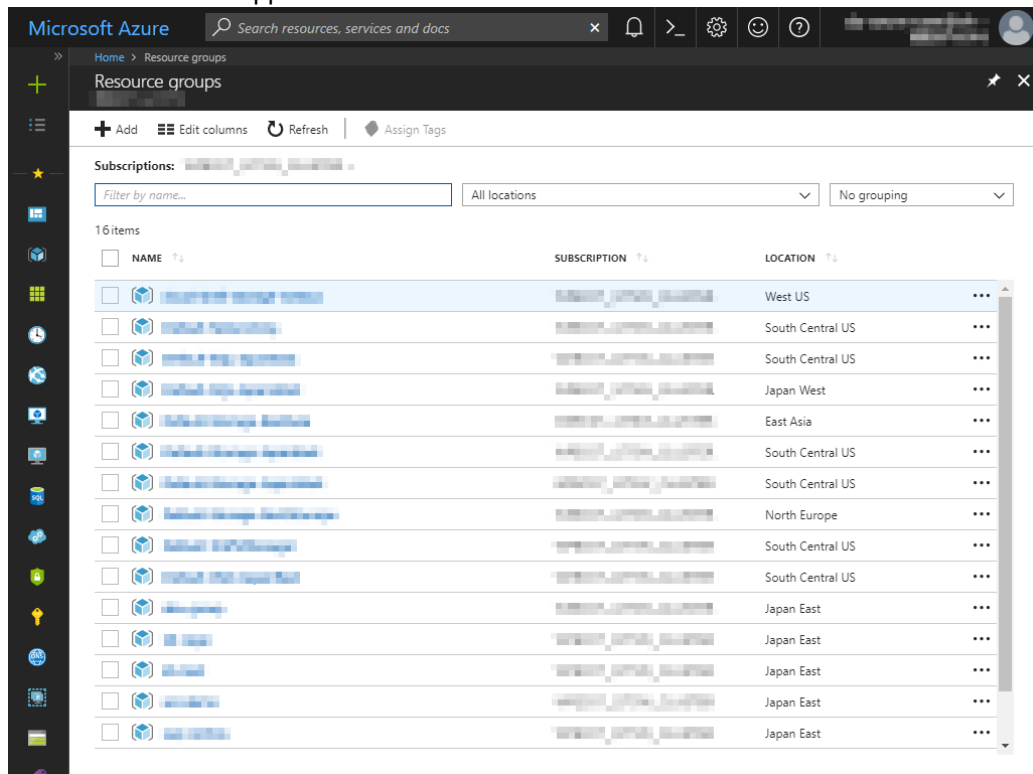
1) Creating a resource group

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and create a resource group following the steps below.

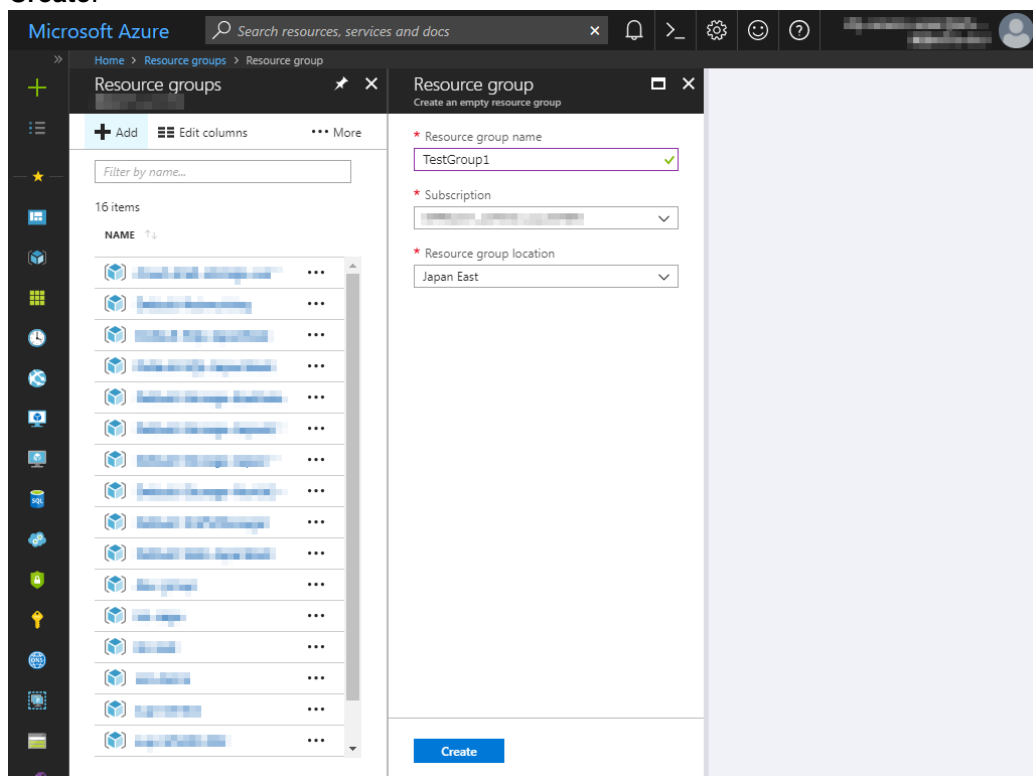
1. Select **Resource groups** or the resource group icon in the menu on the left side of the window. If there are existing resource groups, they are displayed in a list.



2. Select **+Add** at the upper left of the window.



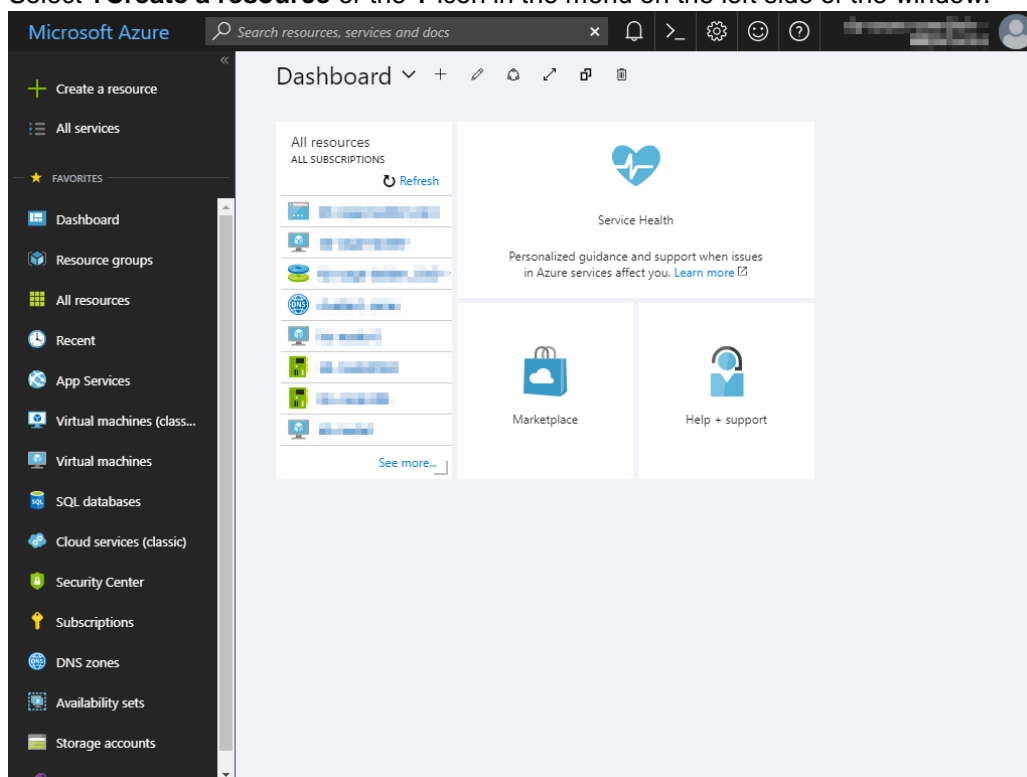
3. Specify **Resource group name**, **Subscription**, and **Resource group location**, and click **Create**.



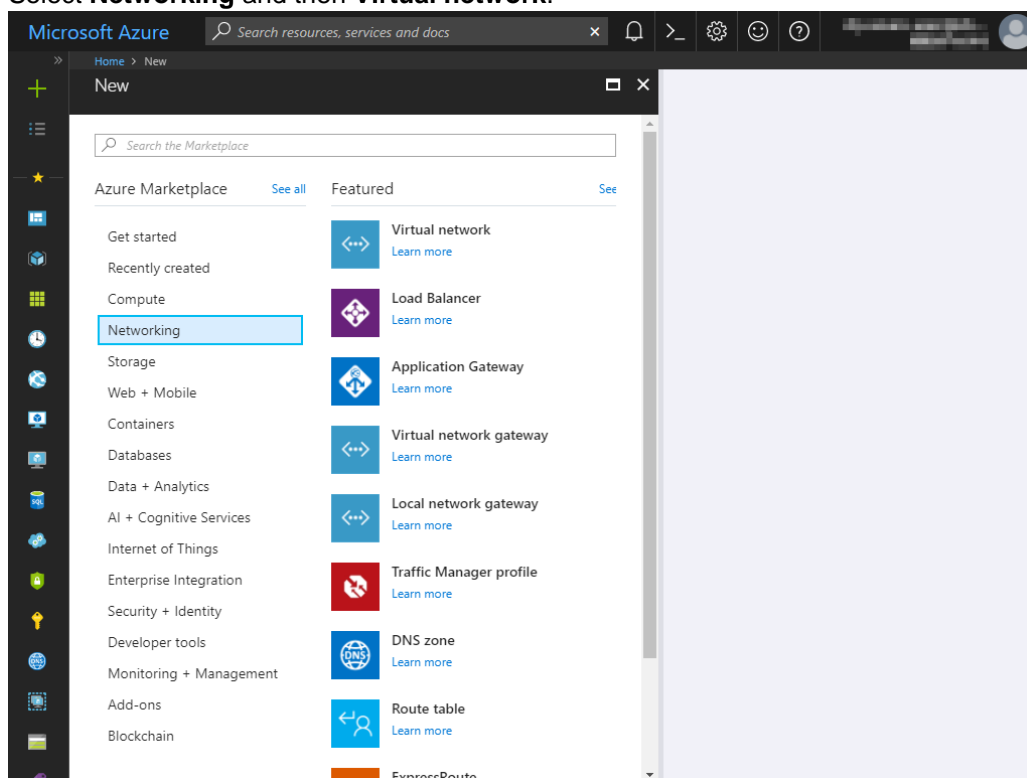
2) Creating a virtual network

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and create a virtual network following the steps below.

1. Select **+Create a resource** or the **+** icon in the menu on the left side of the window.



2. Select **Networking** and then **Virtual network**.



3. Specify **Name**, **Address space**, **Subscription**, **Resource group name**, **Location**, **Name of Subnet**, and **Address range**, and click **Create**.

The screenshot shows the 'Create virtual network' form in the Microsoft Azure portal. The form is titled 'Create virtual network' and is located under the 'Home > New > Create virtual network' breadcrumb. The form contains the following fields and options:

- Name:** Vnet1 (with a green checkmark)
- Address space:** 10.5.0.0/24 (with a green checkmark). Below the input, it says '10.5.0.0 - 10.5.0.255 (256 addresses)'.
- Subscription:** A dropdown menu showing a blurred subscription ID.
- Resource group:** ☐ Create new ☒ Use existing. Below, a dropdown menu shows 'TestGroup1'.
- Location:** A dropdown menu showing 'Japan East'.
- Subnet:**
 - Name:** Vnet1-1 (with a green checkmark)
 - Address range:** 10.5.0.0/24 (with a green checkmark). Below the input, it says '10.5.0.0 - 10.5.0.255 (256 addresses)'.
- Service endpoints:** ☒ Disabled ☐ Enabled
- Pin to dashboard:** ☐
- Create:** A blue button.
- Automation options:** A link.

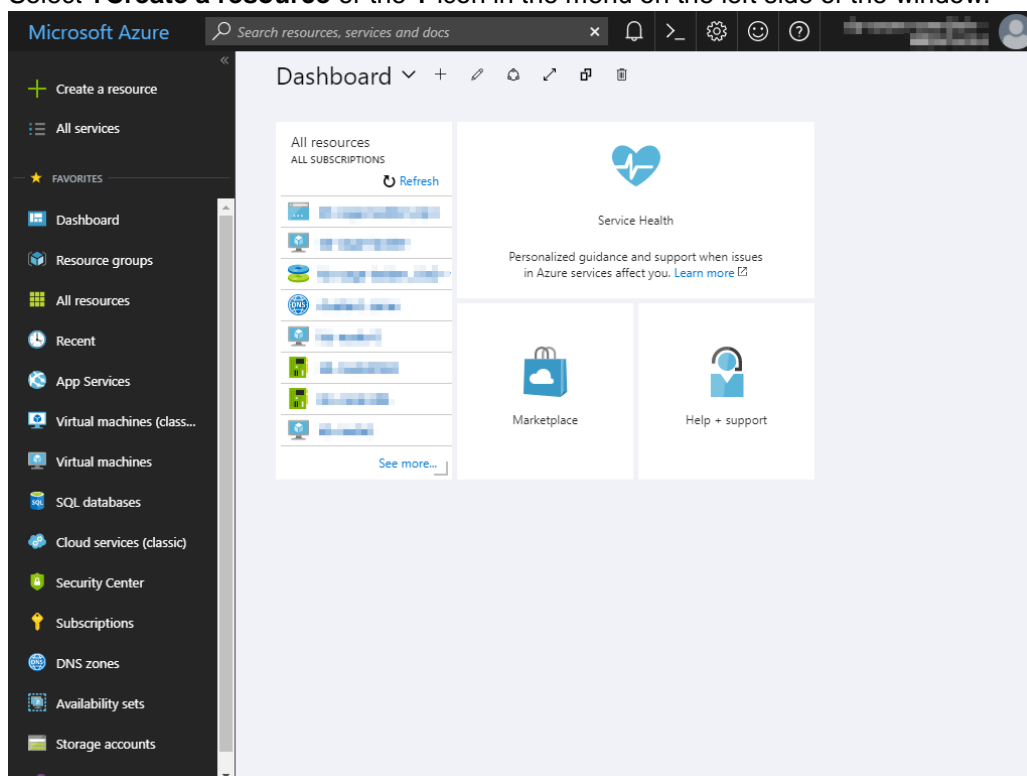
The form is displayed in a sidebar on the left side of the Azure portal interface, which includes a search bar and various navigation icons.

3) Creating a virtual machine

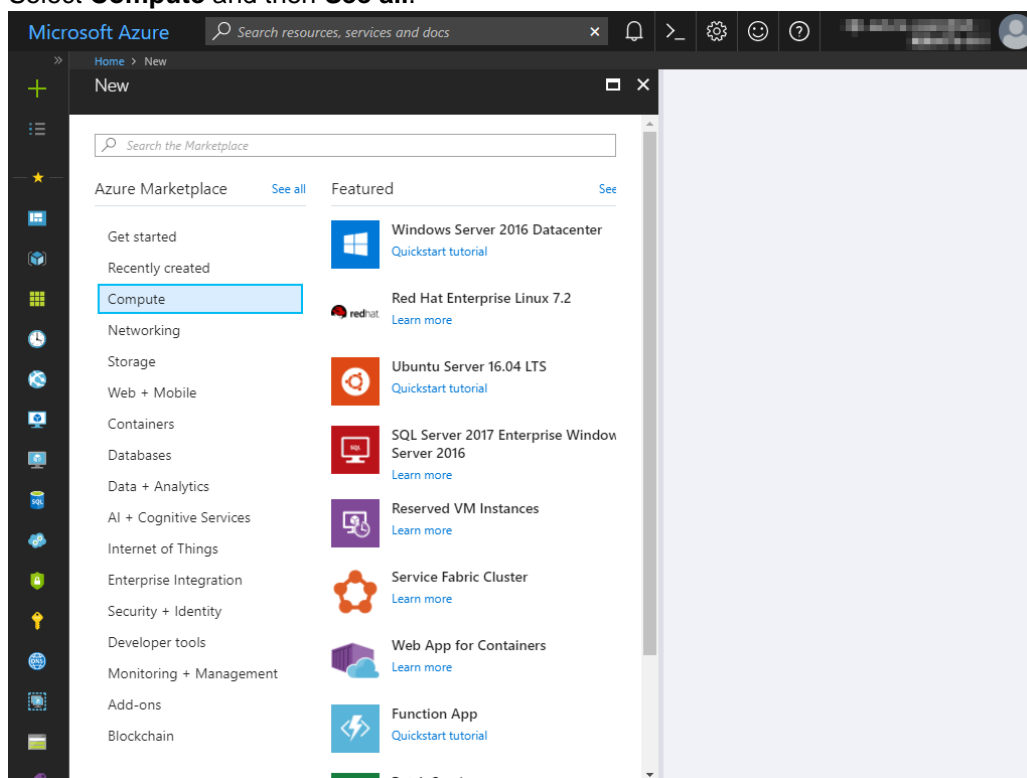
Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and create virtual machines and disks following the steps below.

Create as many virtual machines as required to create a cluster. Create node-1 and then node-2.

1. Select **+Create a resource** or the **+** icon in the menu on the left side of the window.



2. Select **Compute** and then **See all**.



3. Select **Windows Server 2016 Datacenter**.
4. The **Basics** blade is displayed. Specify **Name**, **VM disk type**, **User name**, **Password**, **Confirm password**, **Subscription**, **Resource group name**, and **Location**, and click **OK**. For **Name**, specify node-1 for node-1 and node-2 for node-2.

Microsoft Azure Search resources, services and docs

Home > New > Create virtual machine > Basics

Create virtual machine

1 Basics
Configure basic settings

2 Size
Choose virtual machine size

3 Settings
Configure optional features

4 Summary
Windows Server 2016 Datacenter

* Name
node-1 ✓

VM disk type
HDD

* User name
testlogin ✓

* Password
•••••••• ✓

* Confirm password
•••••••• ✓

Subscription
[Subscription Name]

* Resource group
☐ Create new ☒ Use existing
TestGroup1

* Location
Japan East

Save money
Save up to 40% with a license you already have

OK

5. The **Choose a size** blade is displayed. Select the size appropriate for the usage purpose of the virtual machines from the list and click **Select**. In this guide, **A1 Standard** is selected.

Microsoft Azure Search resources, services and docs

Home > New > Create virtual machine > Choose a size

Create virtual machine

1 Basics
Done ✓

2 Size
Choose virtual machine size

3 Settings
Configure optional features

4 Summary
Windows Server 2016 Datacenter

Choose a size
Browse the available sizes and their features

Supported disk type: HDD

Minimum vCPUs: 1

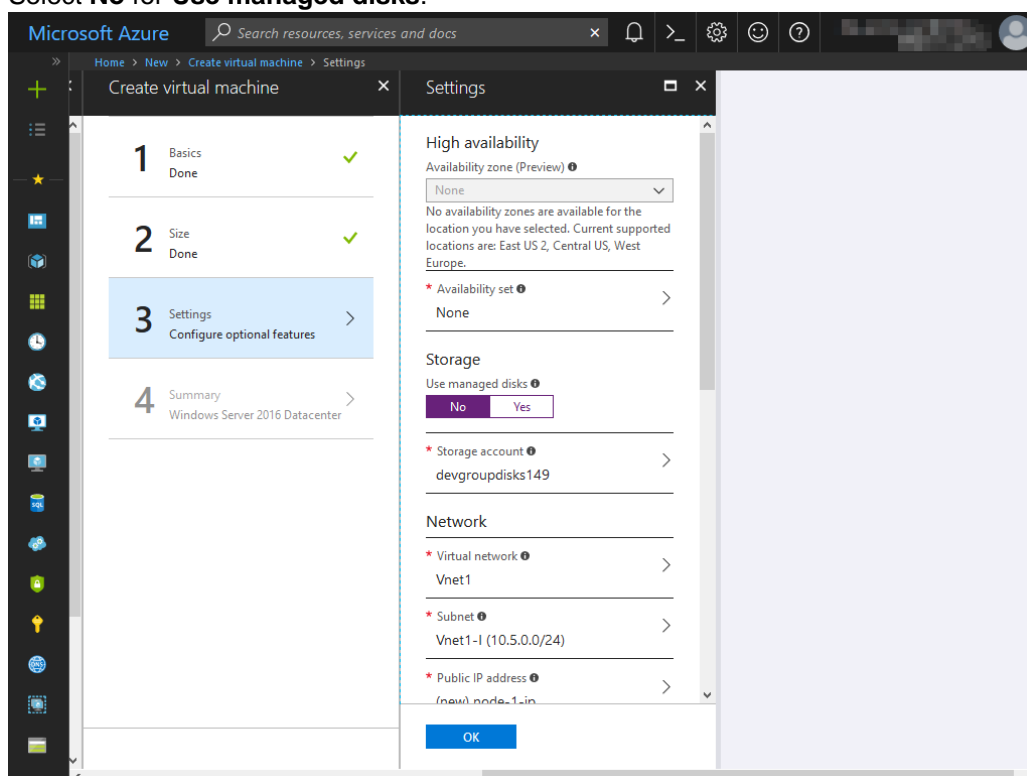
Minimum memory (GiB): 0

☆ Recommended | View all

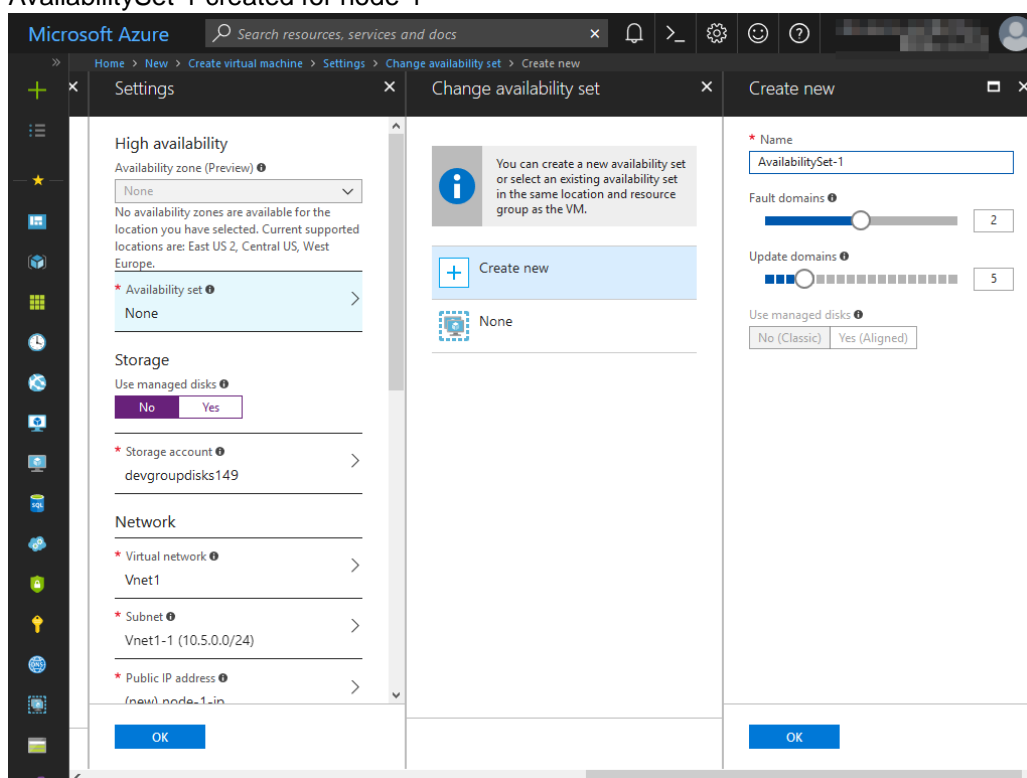
D1_V2 Standard	D1 Standard	A1 Standard
1 vCPU	1 vCPU	1 vCPU
3.5 GB	3.5 GB	1.75 GB
4 Data disks	4 Data disks	2 Data disks
2x500 Max IOPS	2x500 Max IOPS	2x500 Max IOPS
50 GB Local SSD	50 GB Local SSD	Load balancing
Load balancing	Load balancing	
11,226.96 JPY/MONTH (ESTIMATED)	11,226.96 JPY/MONTH (ESTIMATED)	5,148.48 JPY/MONTH (ESTIMATED)

Select

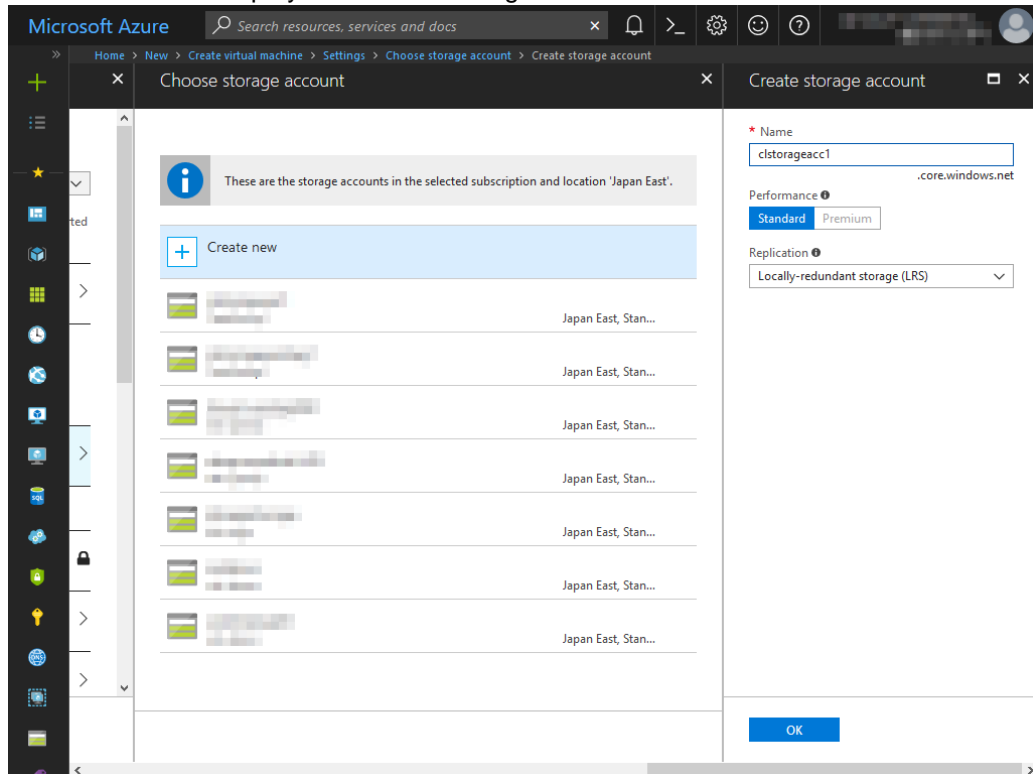
6. The **Settings** blade is displayed. Specify **Availability set**, **Storage account**, **Public IP address**, **Network security group**, and **Diagnostics storage account**.
7. Select **No** for **Use managed disks**.



8. Return to the **Settings** blade and select **Availability set**. For node-1, the **Change availability set** blade is displayed. Select **Create new**. Specify **Name**, **Fault domains**, and **Update domains**, and click **OK**. For node-2, the **Change availability set** blade is displayed. Select **AvailabilitySet-1** created for node-1

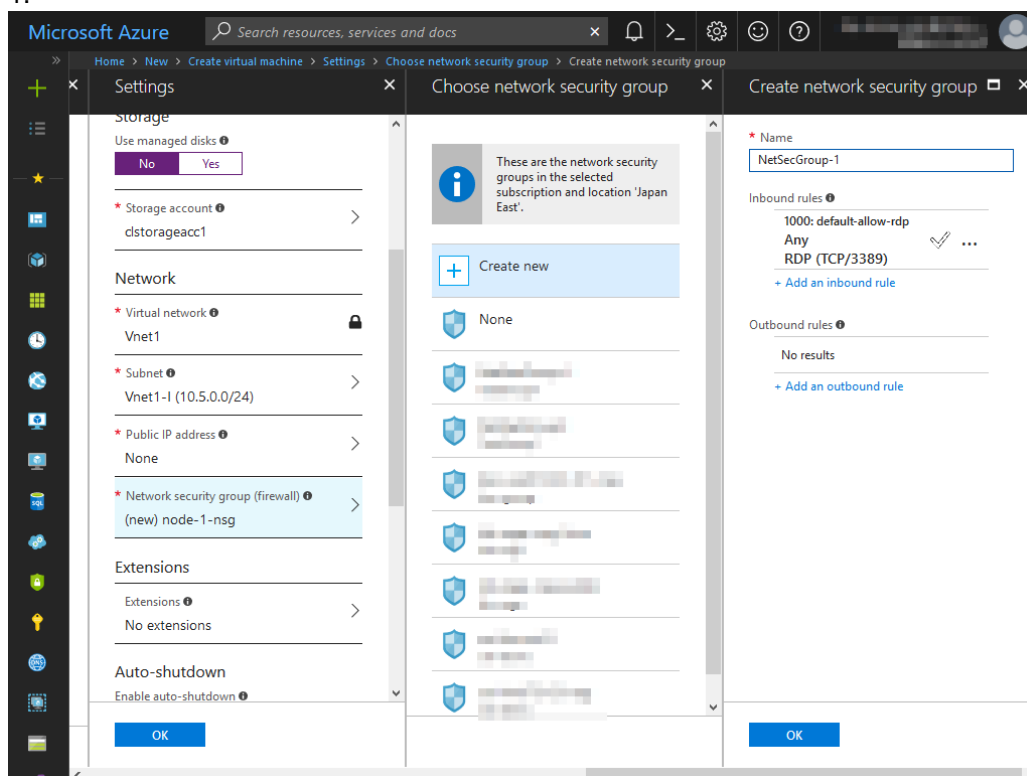


9. Select **Storage account**. For node-1, the **Create storage account** blade is displayed. Specify **Name**, **Performance**, and **Replication**, and click **OK**. For node-2, the **Choose storage account** blade is displayed. Select clstorageacc1 created for node-1.

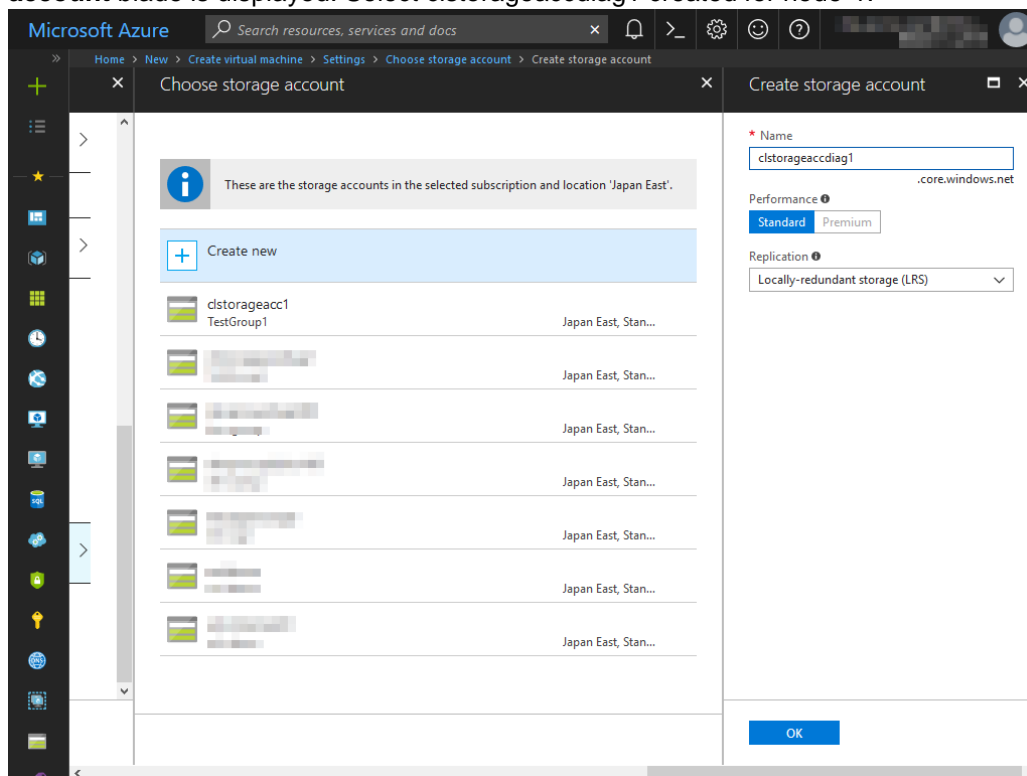


10. Return to the **Settings** blade and select **Public IP address**.
11. The **Choose public IP address** blade is displayed. Select **None**. Ignore the **Create public IP address** blade.

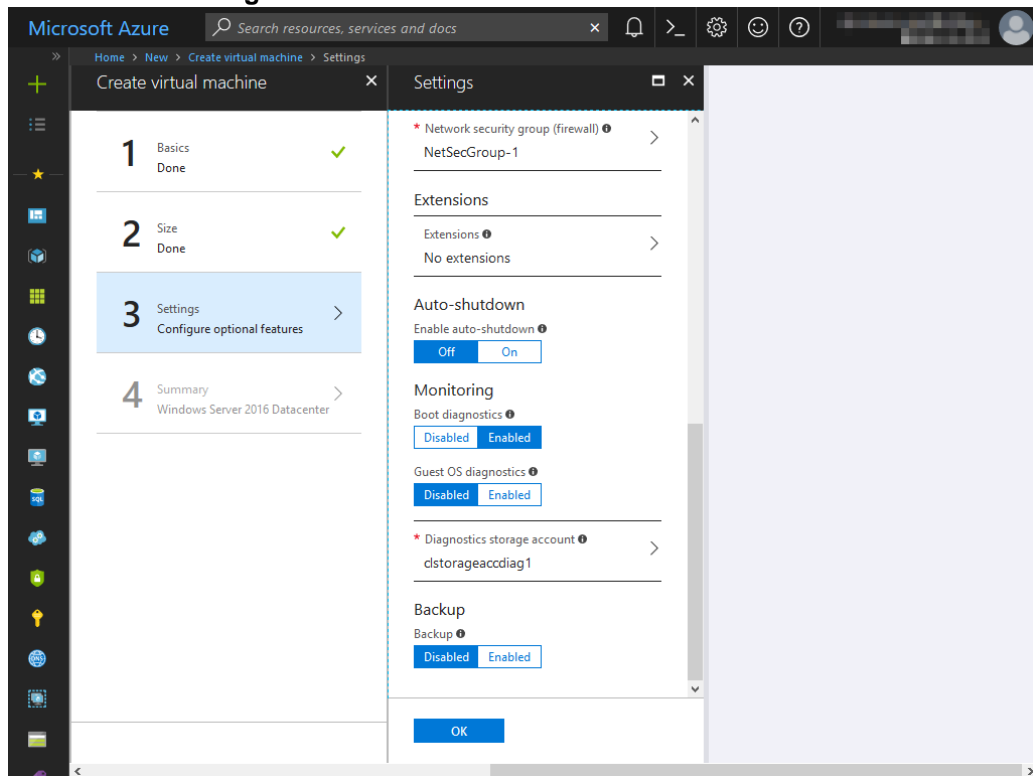
12. Return to the **Settings** blade and select **Network security group**. For node-1, the **Create network security group** blade is displayed. Specify **Name** and click **OK**. For node-2, the **Choose network security group** blade is displayed. Select NetSecGroup-1 created for node-1.



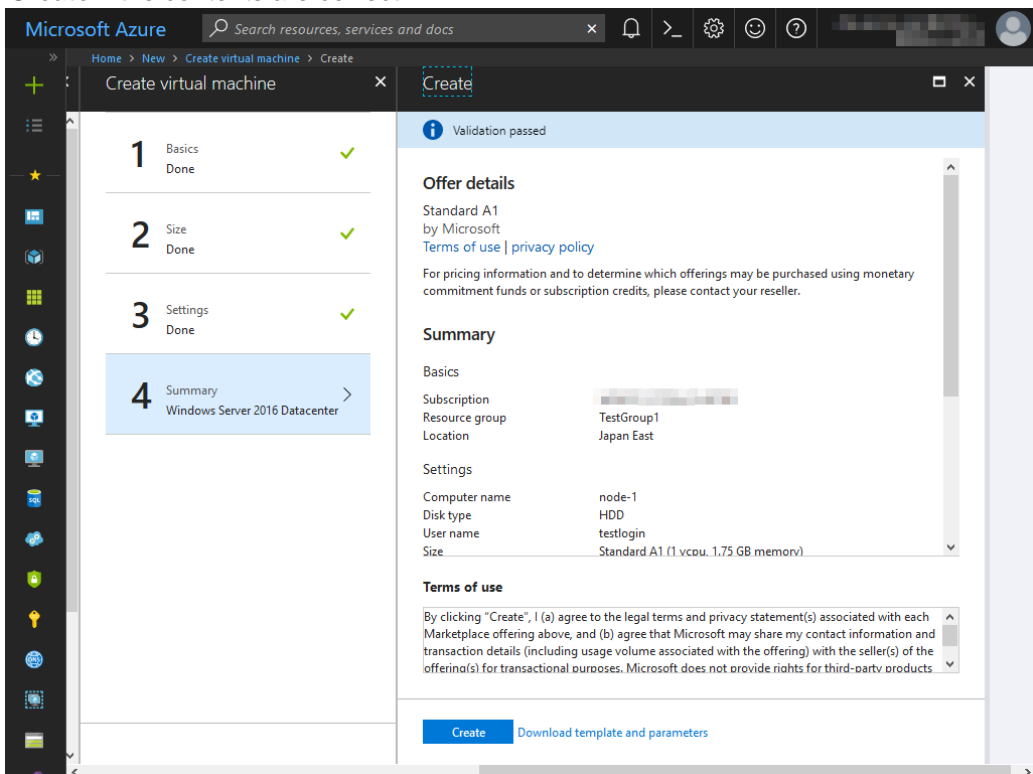
13. Select **Storage account**. For node-1, the **Create storage account** blade is displayed. Specify **Name**, **Performance**, and **Replication**, and click **OK**. For node-2, the **Choose storage account** blade is displayed. Select clstorageaccdiag1 created for node-1.



14. Return to the **Settings** blade and click **OK**.



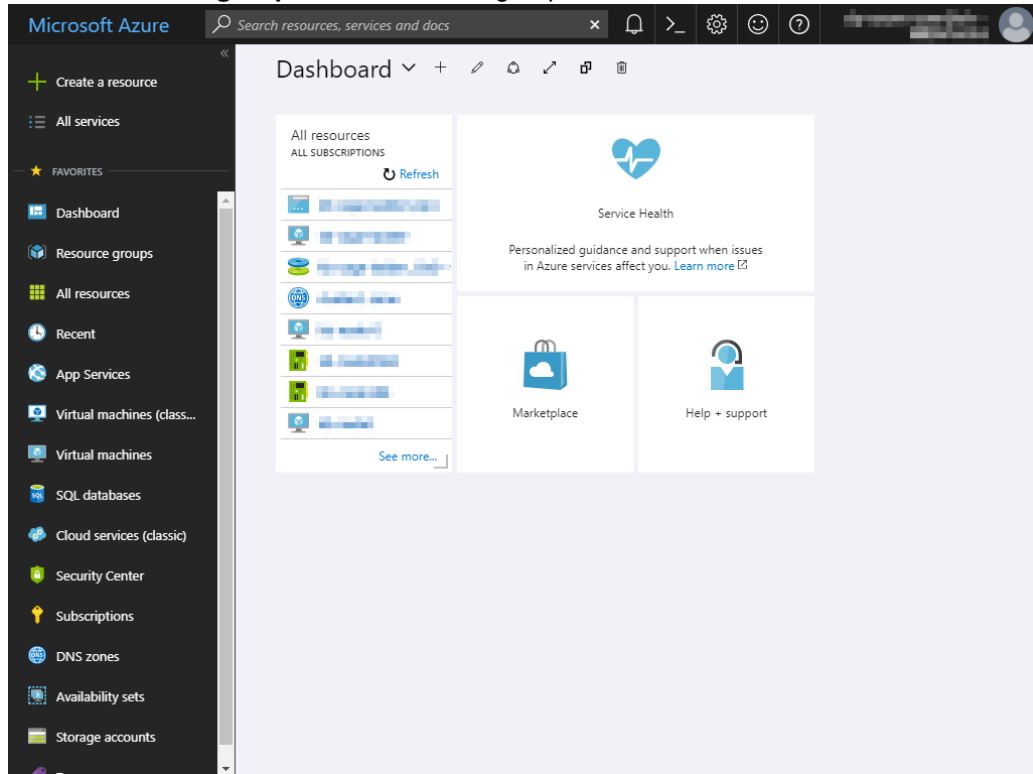
15. The **Create** blade is displayed. Check the contents displayed on the **Create** blade and click **Create** if the contents are correct.



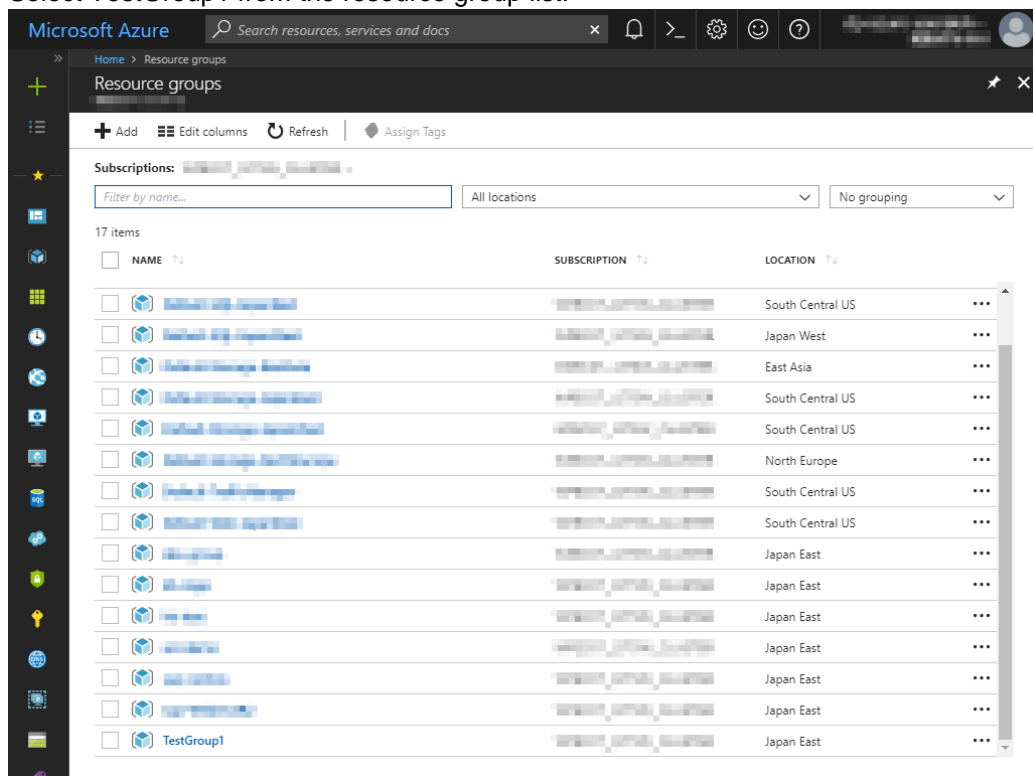
4) Setting a private IP address

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and change the private IP address setting following the steps below. Since an IP address is initially set to be assigned dynamically, change the setting so that an IP address is assigned statically. Change the settings of node-1 and then node-2.

1. Select **Resource groups** or the resource group icon in the menu on the left side of the window.



2. Select **TestGroup1** from the resource group list.



3. The summary of TestGroup1 is displayed. Select virtual machine node-1 or node-2 from the item list.

Microsoft Azure

Home > Resource groups > TestGroup1

TestGroup1
Resource group

Search (Ctrl+F)

+ Add Edit columns Delete resource group Refresh Move Assign Tags

Subscription (change) Deployments
3 Succeeded

Subscription ID

Filter by name... All types All locations No

9 items Show all resources

NAME	TYPE	LOCATION
AvailabilitySet-1	Availability set	Japan East
clstorageacc1	Storage account	Japan East
clstorageaccdiag1	Storage account	Japan East
NetSecGroup-1	Network security group	Japan East
node-1	Virtual machine	Japan East
node-1639	Network interface	Japan East
node-2	Virtual machine	Japan East
node-2542	Network interface	Japan East
Vnet1	Virtual network	Japan East

4. Select **Networking**.

Microsoft Azure

Home > Resource groups > TestGroup1 > node-1 - Networking

node-1 - Networking
Virtual machine

Search (Ctrl+F)

Attach network interface Detach network interface

Network Interface: node-1639 Effective security rules Topology

Virtual network/subnet: Vnet1/Vnet1-I Public IP: None Private IP: 10.5.0.5

INBOUND PORT RULES

Network security group NetSecGroup-1 (attached to network interface: node-1639)
Impacts 0 subnets, 6 network interfaces

PRIORITY	NAME	PORT	PROTOCOL	SOURCE	DESTINATION...	ACTION
1000	default-allow-rdp	3389	TCP	Any	Any	Allow
65000	AllowVnetInBound	Any	Any	VirtualNet...	VirtualNet...	Allow
65001	AllowAzureLoadBalan...	Any	Any	AzureLoad...	Any	Allow
65500	DenyAllInBound	Any	Any	Any	Any	Deny

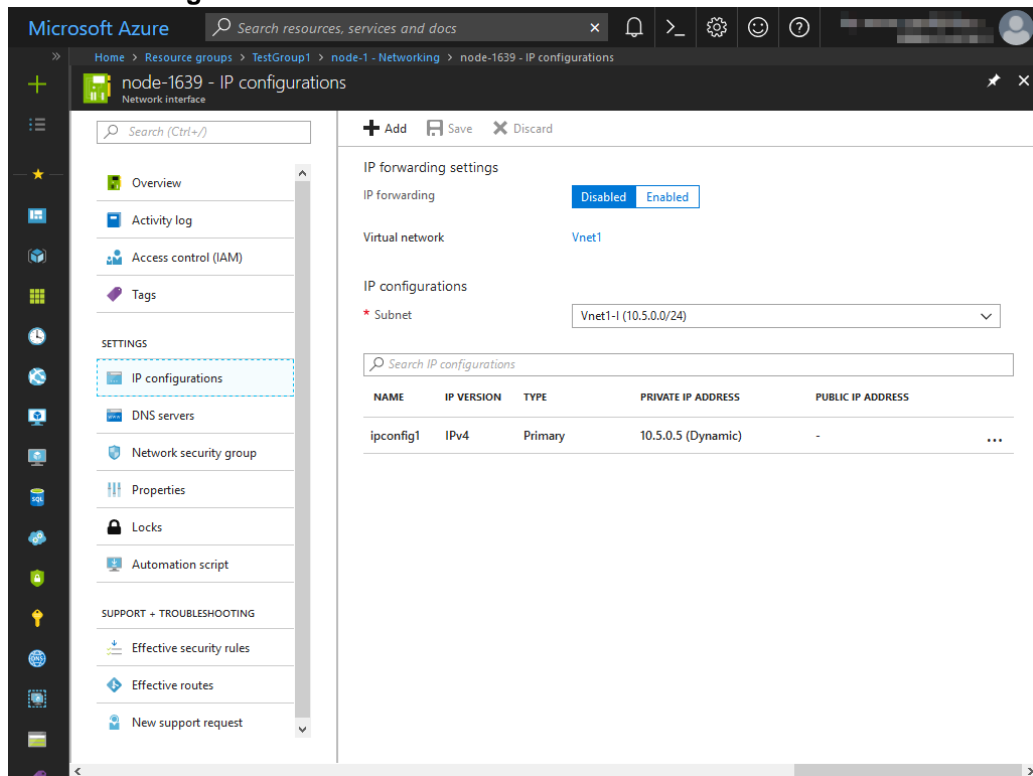
OUTBOUND PORT RULES

Network security group NetSecGroup-1 (attached to network interface: node-1639)
Impacts 0 subnets, 6 network interfaces

PRIORITY	NAME	PORT	PROTOCOL	SOURCE	DESTINATION...	ACTION
65000	AllowVnetOutBound	Any	Any	VirtualNet...	VirtualNet...	Allow
65001	AllowInternetOutBou...	Any	Any	Any	Internet	Allow

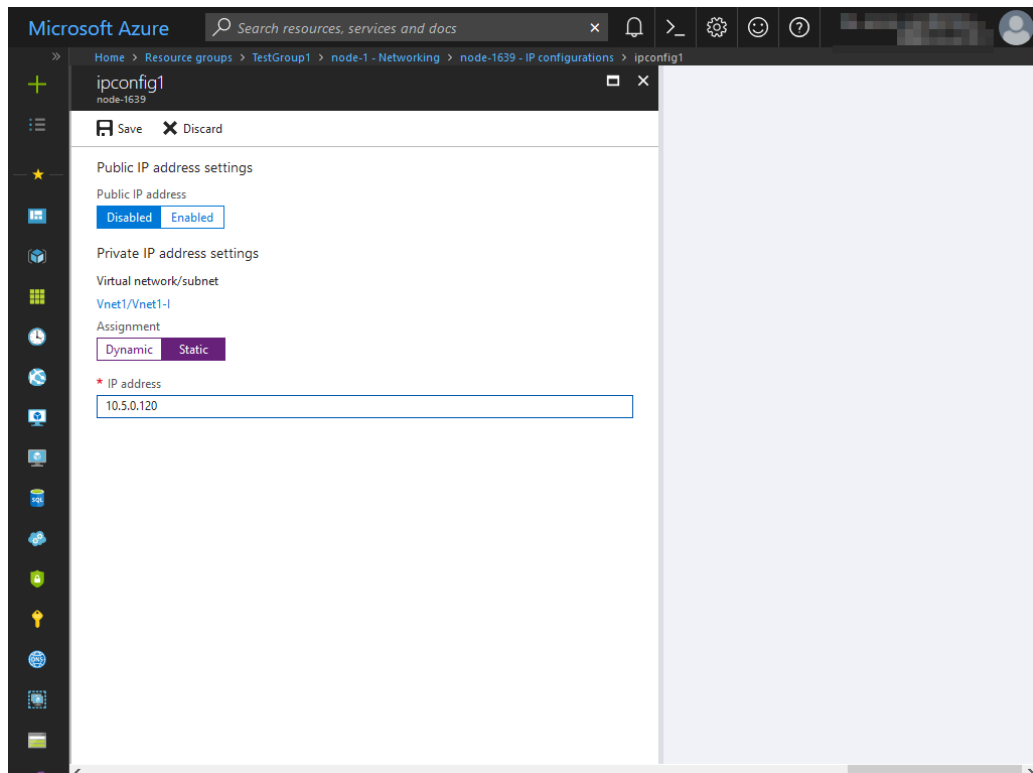
5. Select a network interface displayed in the list. The network interface name is generated automatically.

6. Select **IP configurations**.



7. Only ipconfig1 is displayed in the list. Select it.

8. Select **Static** for **Assignment** under **Private IP address settings**. Enter the IP address to be assigned statically in the **IP address** text box and click **Save** at the top of the window. The IP address of node-1 is 10.5.0.120. The IP address of node-2 is 10.5.0.121.

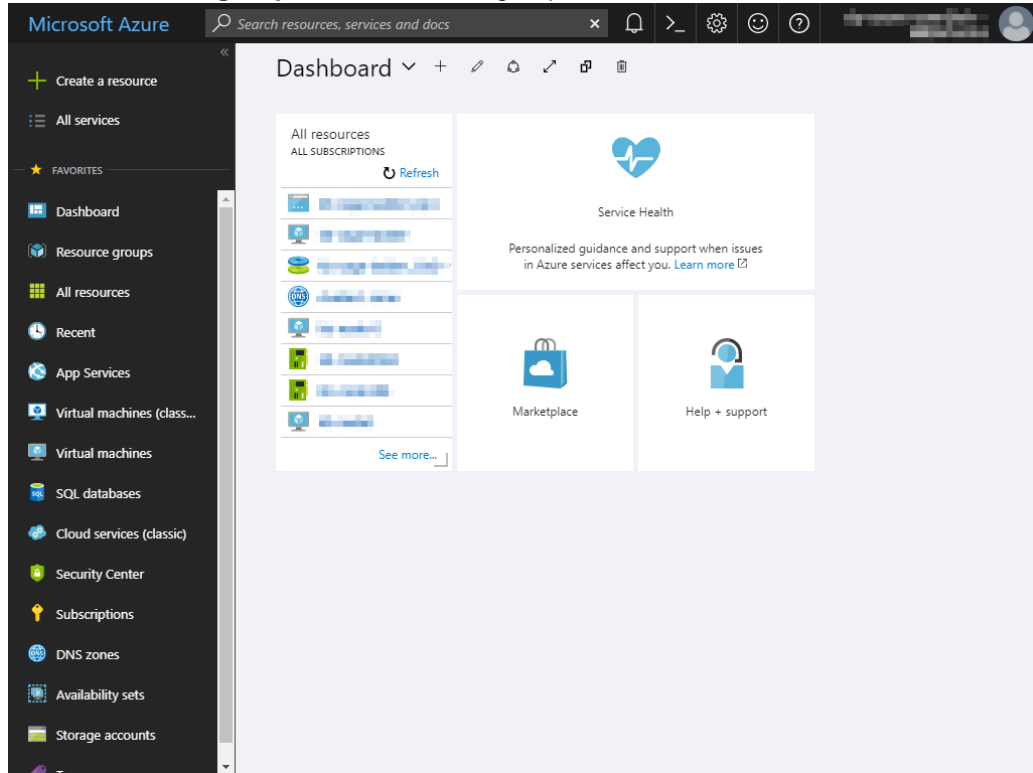


9. The virtual machines restart automatically so that new private IP addresses can be used.

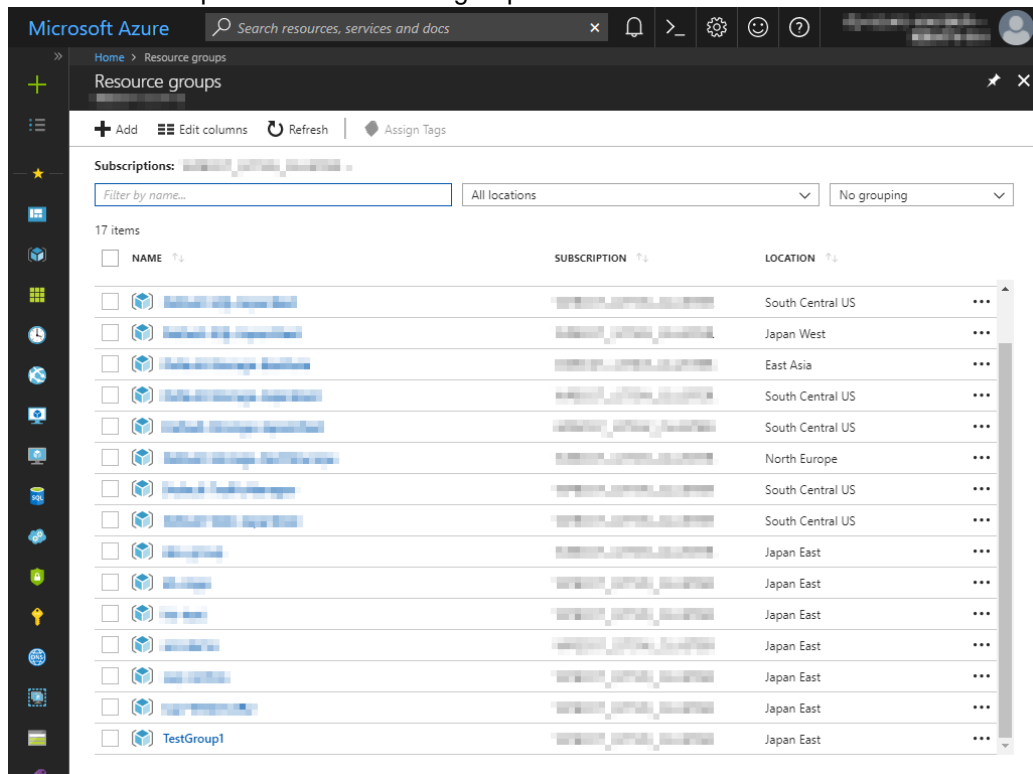
5) Adding Blob storage

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and add Blob storage to be used for a mirror disk (cluster partition or data partition). Change the settings of node-1 and then node-2.

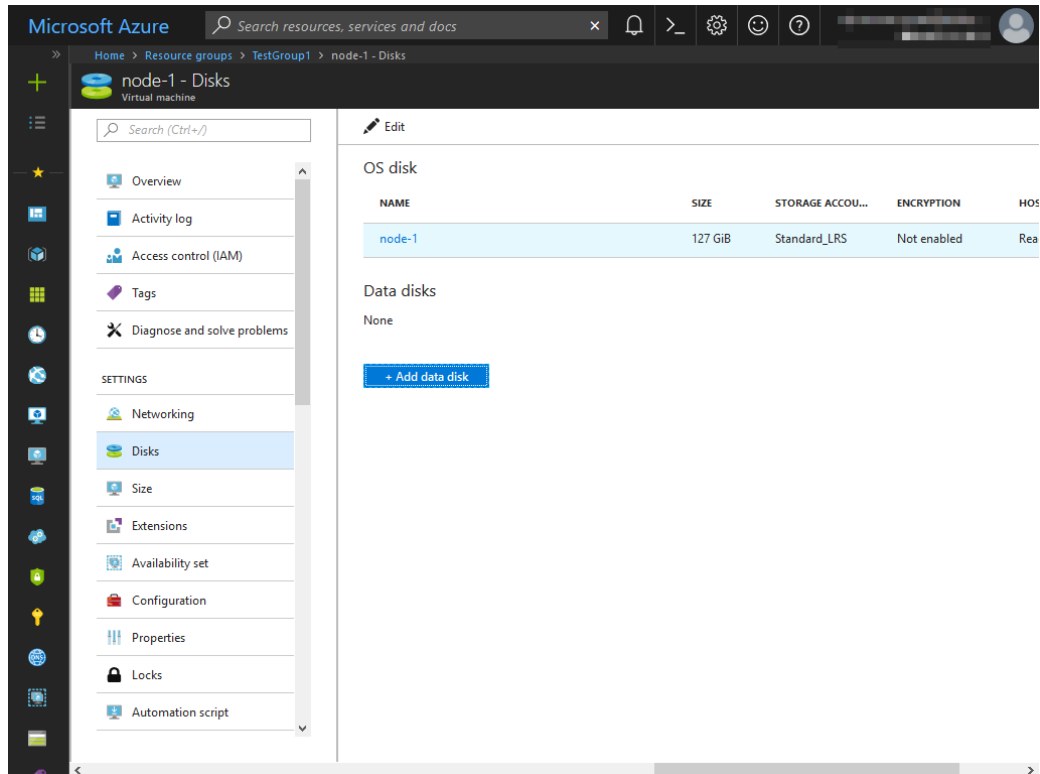
1. Select **Resource groups** or the resource group icon in the menu on the left side of the window.



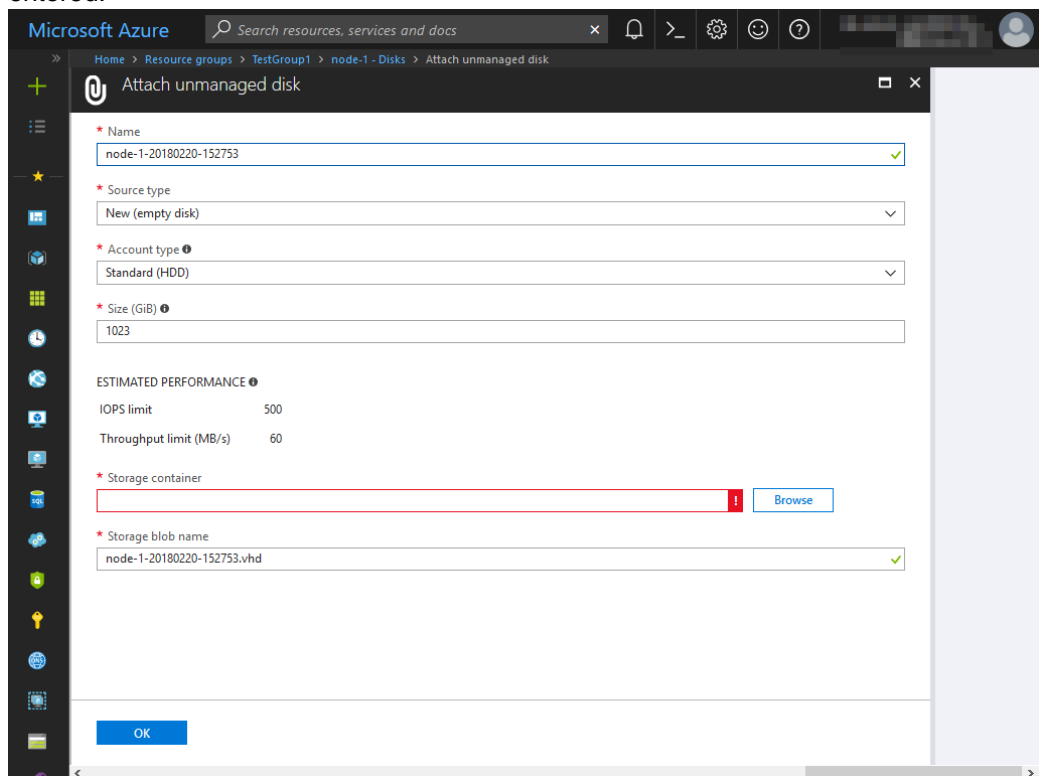
2. Select TestGroup1 from the resource group list.



3. The summary of TestGroup1 is displayed. Select virtual machine node-1 or node-2 to which to add Blob storage from the item list and select **Disk**.
4. Select **+Add data disk**.



5. The **Attach unmanaged disk** blade is displayed. Click **Browse** right to the **Storage container** text box. For **Name** and **Storage blob name**, the automatically generated default values are entered.



6. Select clstorageacc1 from the storage account list.

Microsoft Azure Search resources, services and docs

Home > Resource groups > TestGroup1 > node-1 - Disks > Attach unmanaged disk > Storage accounts

Storage accounts

+ Storage account Refresh

Search storage accounts

NAME	TYPE	RESOURCE GROUP
clstorageacc1	Standard-LRS	TestGroup1
clstorageaccdiag1	Standard-LRS	TestGroup1

7. Select vhds from the container list and click **Select**.

Microsoft Azure Search resources, services and docs

Home > Resource groups > TestGroup1 > node-1 - Disks > Attach unmanaged disk > Storage accounts > Containers

Storage accounts Containers

+ Storage account Refresh

Search storage accounts

clstorageacc1

clstorageaccdiag1

+ Container Refresh

Search containers by prefix

NAME	LAST MODIFIED	PUBLIC ACCESS L...	LEASE STATE
vhds	2/15/2018, 10:32:57 AM	Private	Leased ...

Select

8. The **Attach unmanaged disk** blade is displayed again. Specify **Name**, **Source type**, **Account type**, **Size**, and **Storage blob name**, and click **OK**. For **Name**, specify Node-1Blob1 for node-1 and Node-2Blob1 for node-2. For **Storage blob name**, specify Node-1Blob1.vhd for node-1 and Node-2Blob1.vhd for node-2.

Microsoft Azure

Home > Resource groups > TestGroup1 > node-1 - Disks > Attach unmanaged disk

Attach unmanaged disk

* Name
Node-1Blob1 ✓

* Source type
New (empty disk) ✓

* Account type
Standard (HDD) ✓

* Size (GiB)
20 ✓

ESTIMATED PERFORMANCE
IOPS limit 500
Throughput limit (MB/s) 60

* Storage container
https://clstorageacc1.blob.core.windows.net/vhds ✓ [Browse](#)

* Storage blob name
Node-1Blob1.vhd ✓

OK

9. Click **Save**.

Microsoft Azure

Home > Resource groups > TestGroup1 > node-1 - Disks

node-1 - Disks
Virtual machine

Search (Ctrl+/)

Overview
Activity log
Access control (IAM)
Tags
Diagnose and solve problems

SETTINGS
Networking
Disks
Size
Extensions
Availability set
Configuration
Properties
Locks
Automation script

Save Discard

OS disk

NAME	SIZE	STORAGE ACCOU...	ENCRYPTION	HOS
node-1	127 GiB	Standard_LRS	Not enabled	Rea

Data disks

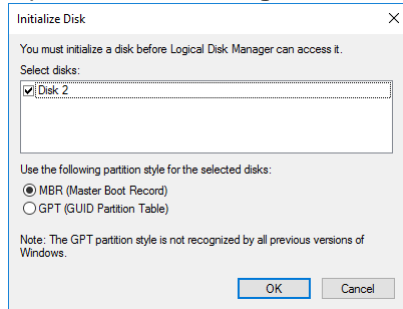
LUN	NAME	SIZE	STORAGE ACCOU...	ENCRYPTION	HOST
0	Node-1Blob1 ✓	20 GiB	Standard_LRS	Not enabled	None

+ Add data disk

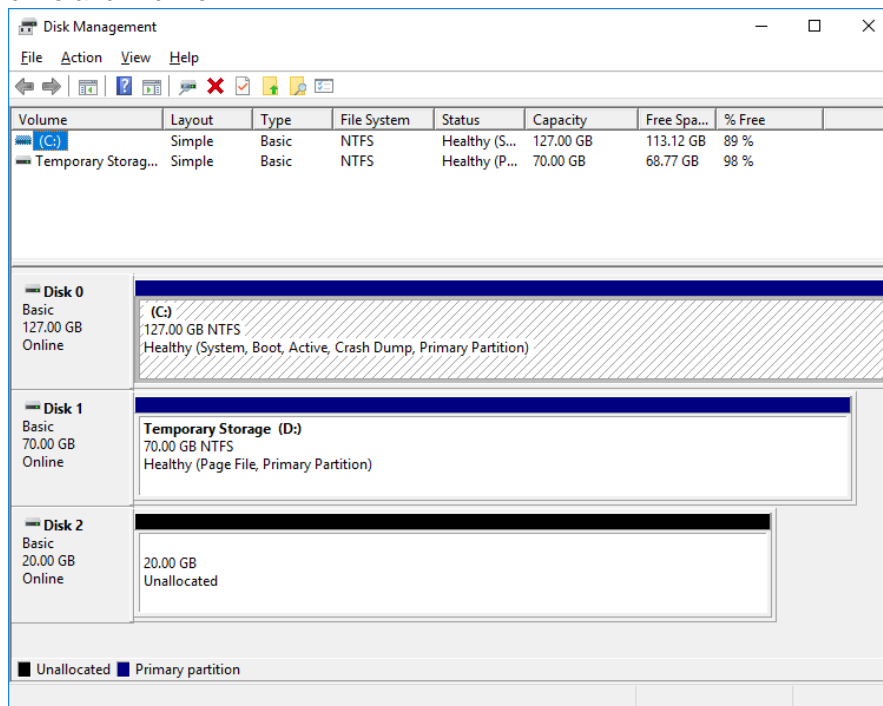
6) Configuring virtual machines

Log in to the created node-1 and node-2 and specify the settings following the procedure below. Set a partition for the mirror disk resource. Create a file system in the added Blob storage. For details about a partition for the mirror disk resource, see "Partition settings for mirror disk resource (when using Replicator)" in "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the *Installation and Configuration Guide*.

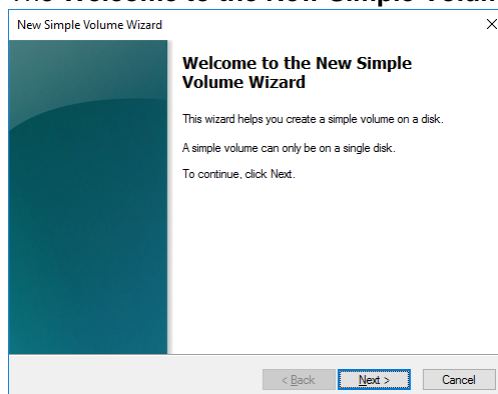
1. Open the **Disk Management** window. The **Initialize Disk** dialog box is displayed.



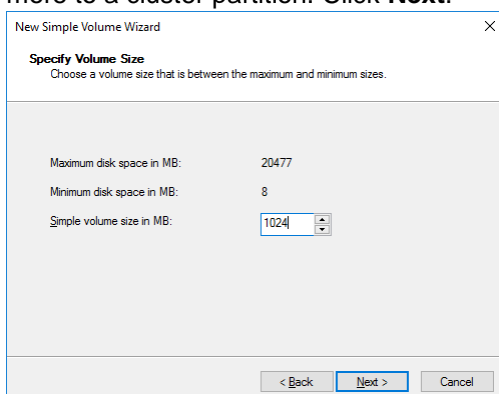
2. Confirm that the added disk is displayed as "Disk 2" in unassigned state under the existing C drive and D drive.



3. Create a cluster partition. Right-click "Disk 2" and select **New Simple Volume**.
4. The **Welcome to the New Simple Volume Wizard** is displayed. Click **Next**.



5. The **Specify Volume Size** window is displayed. Allocate 1024 MB (1,073,741,824 bytes) or more to a cluster partition. Click **Next**.



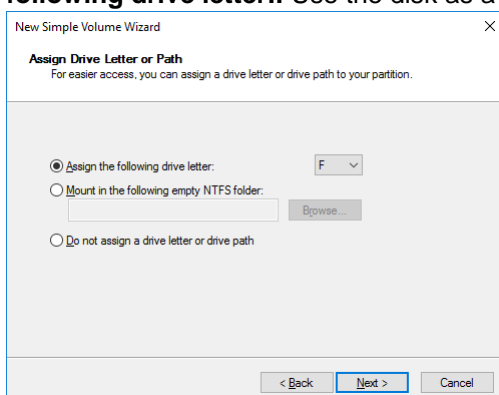
New Simple Volume Wizard

Specify Volume Size
Choose a volume size that is between the maximum and minimum sizes.

Maximum disk space in MB: 20477
Minimum disk space in MB: 8
Simple volume size in MB: 1024

< Back Next > Cancel

6. The **Assign Drive Letter or Path** window is displayed. Select the F drive for **Assign the following drive letter:**. Use the disk as a raw partition without formatting.



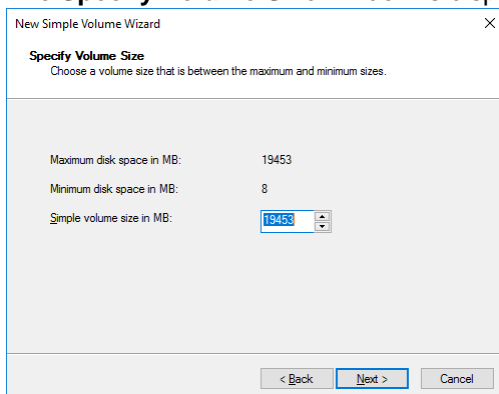
New Simple Volume Wizard

Assign Drive Letter or Path
For easier access, you can assign a drive letter or drive path to your partition.

☒ Assign the following drive letter: F
☐ Mount in the following empty NTFS folder: Browse...
☐ Do not assign a drive letter or drive path

< Back Next > Cancel

7. Next, create a data partition. Right-click "Disk 2" and select **New Simple Volume**.
8. The **Welcome to the New Simple Volume Wizard** is displayed. Click **Next**.
9. The **Specify Volume Size** window is displayed. Click **Next**.



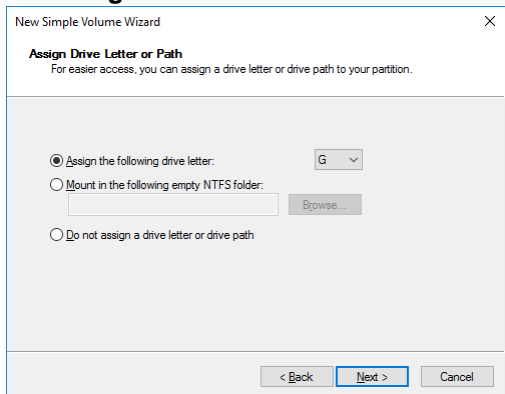
New Simple Volume Wizard

Specify Volume Size
Choose a volume size that is between the maximum and minimum sizes.

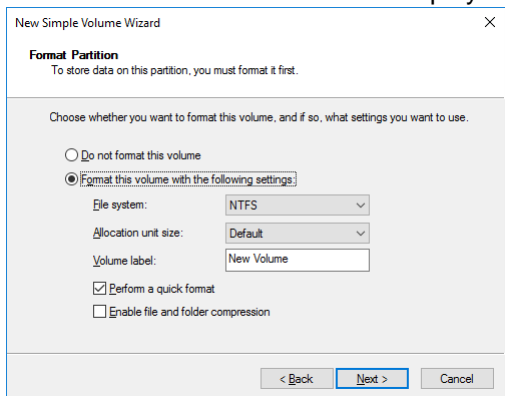
Maximum disk space in MB: 19453
Minimum disk space in MB: 8
Simple volume size in MB: 19453

< Back Next > Cancel

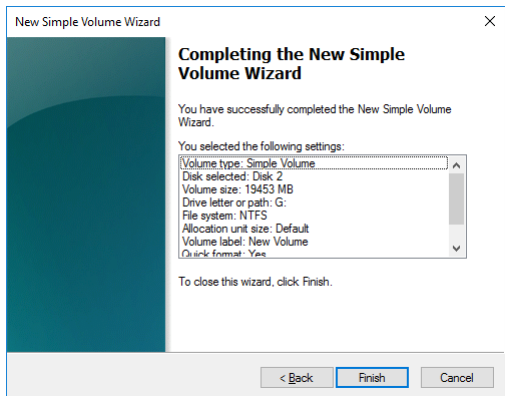
10. The **Assign Drive Letter or Path** window is displayed. Select the G drive for **Assign the following drive letter:** and click **Next**.



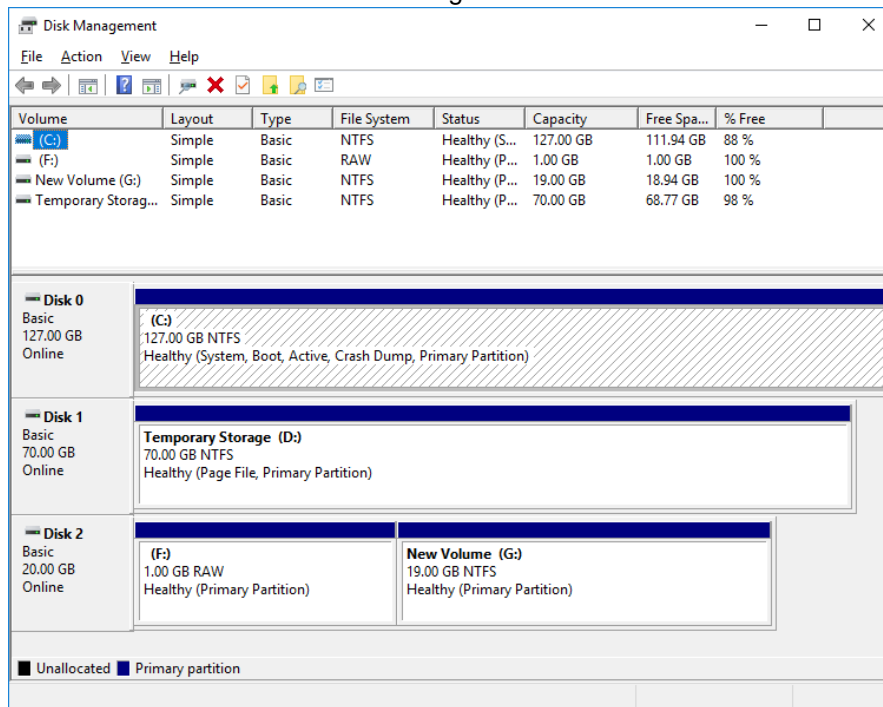
11. The **Format Partition** window is displayed. Confirm that **File System** is **NTFS**.



12. Click **Next**.
13. The **Completing the New Simple Volume Wizard** window is displayed. Check the displayed contents and click **Finish**.



14. Confirm that the added disks are assigned as the F drive and G drive.



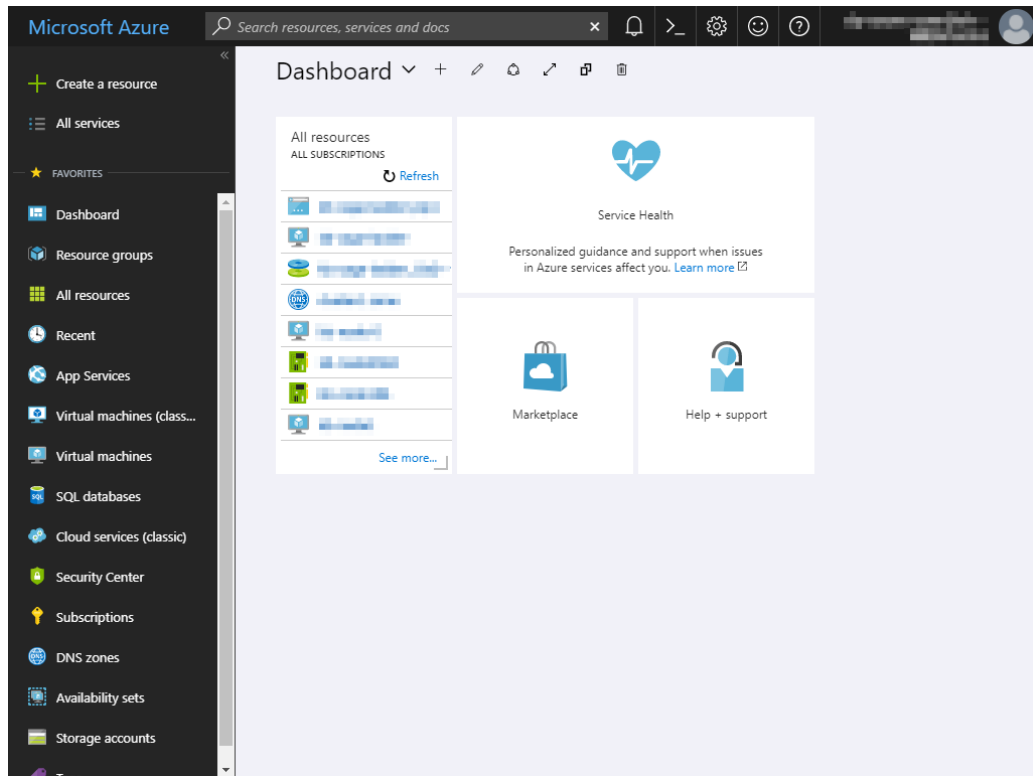
7) Configuring a load balancer

Log in to the Microsoft Azure portal (<https://portal.azure.com/>) and add an internal load balancer following the steps below.

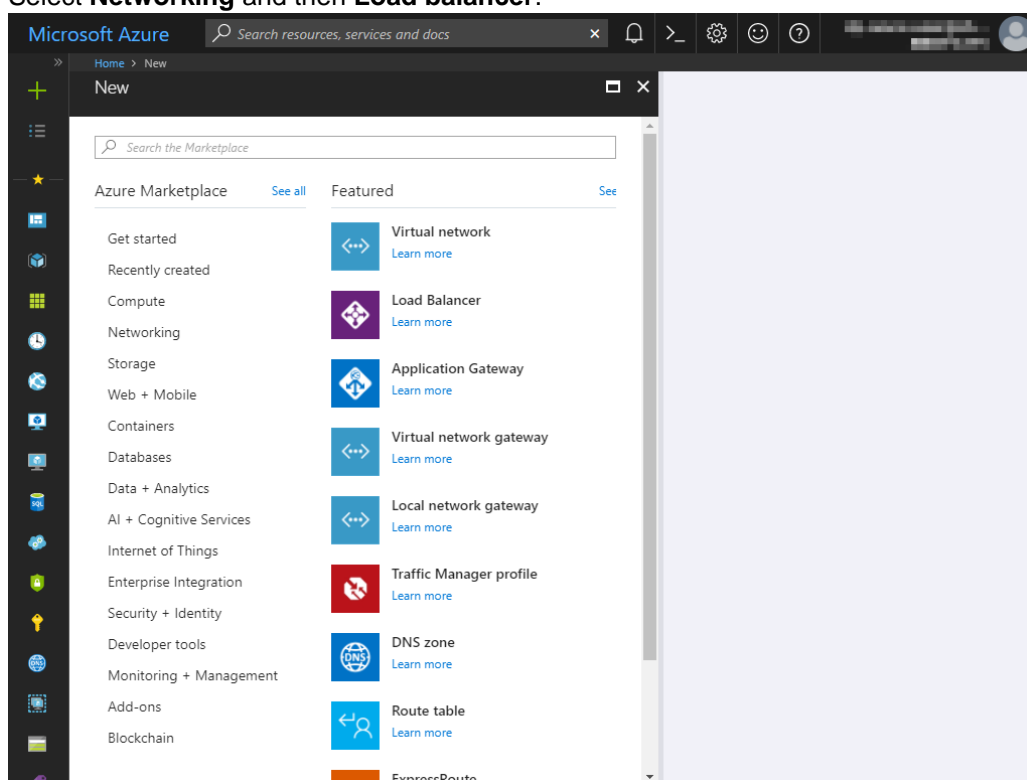
For details, see the following websites:

- Azure Load Balancer overview
<https://docs.microsoft.com/en-us/azure/load-balancer/load-balancer-overview>
- Create an Internal load balancer in the Azure portal
<https://docs.microsoft.com/en-us/azure/load-balancer/load-balancer-get-started-ilb-arm-portal>

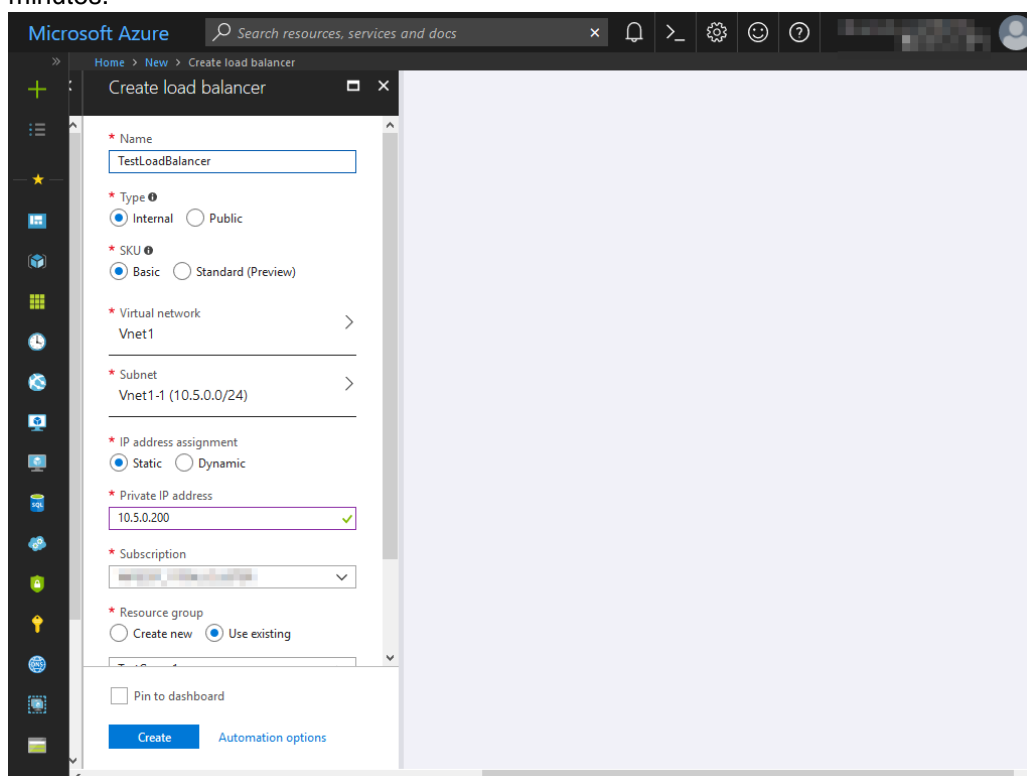
1. Select **+Create a resource** or the **+** icon in the menu on the left side of the window.



2. Select **Networking** and then **Load balancer**.

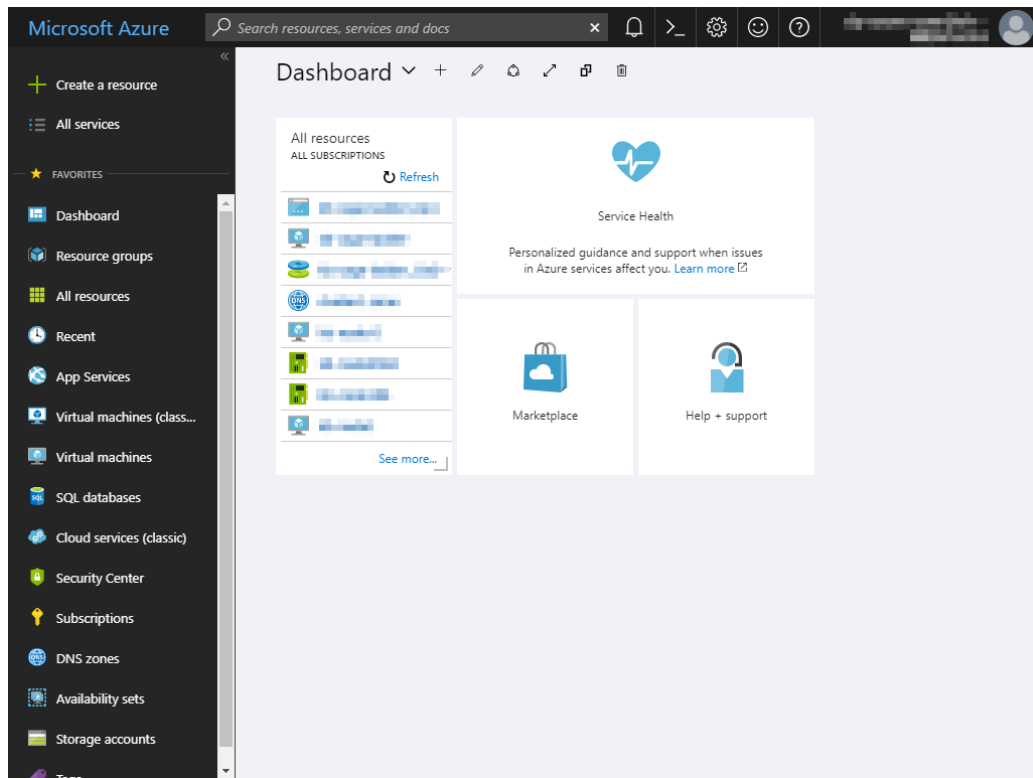


3. The **Create load balancer** blade is displayed. Specify **Name**.
4. Select **Internal** for **Type**.
5. For **Virtual network** and **Subnet**, select the virtual network and subnet created in "2)Creating a virtual network"
6. Specify **IP address assignment**, **Private IP address**, **Subscription**, **Resource group**, and **Location**, and click **Create**. Deploying the load balancer starts. This processing takes several minutes.

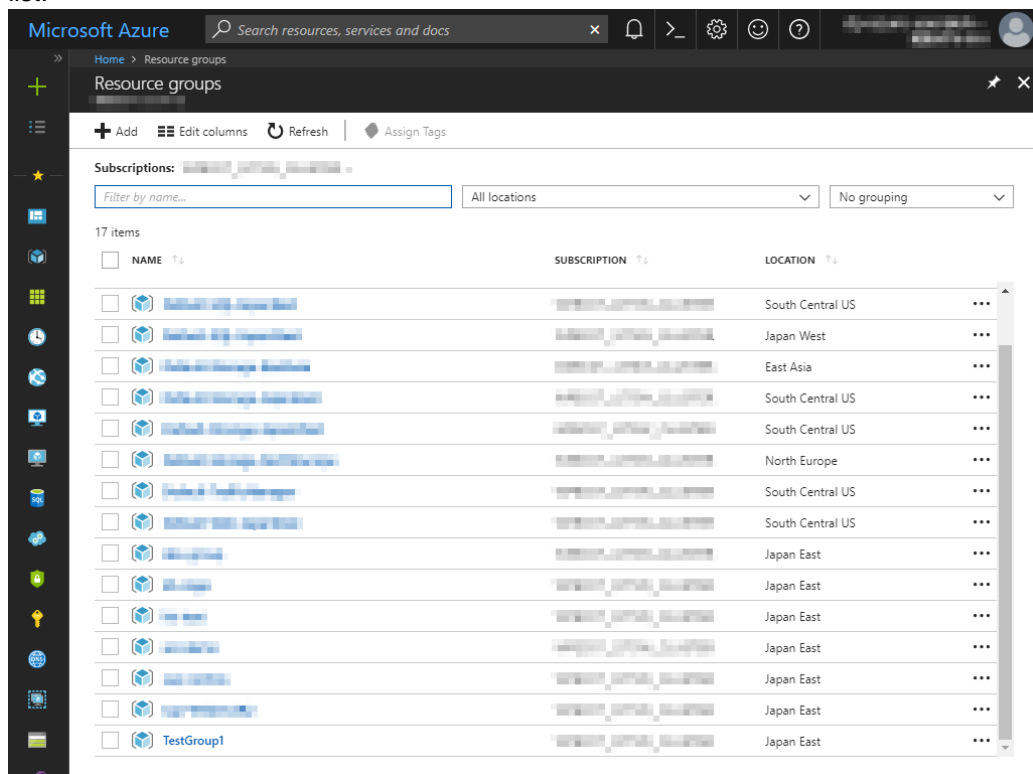


8) Configuring a load balancer (configuring a backend pool)

1. Associate a virtual machine registered to the availability set to the load balancer. After the load balancer has been deployed, select **Resource groups** or the resource group icon in the menu on the left side of the window.

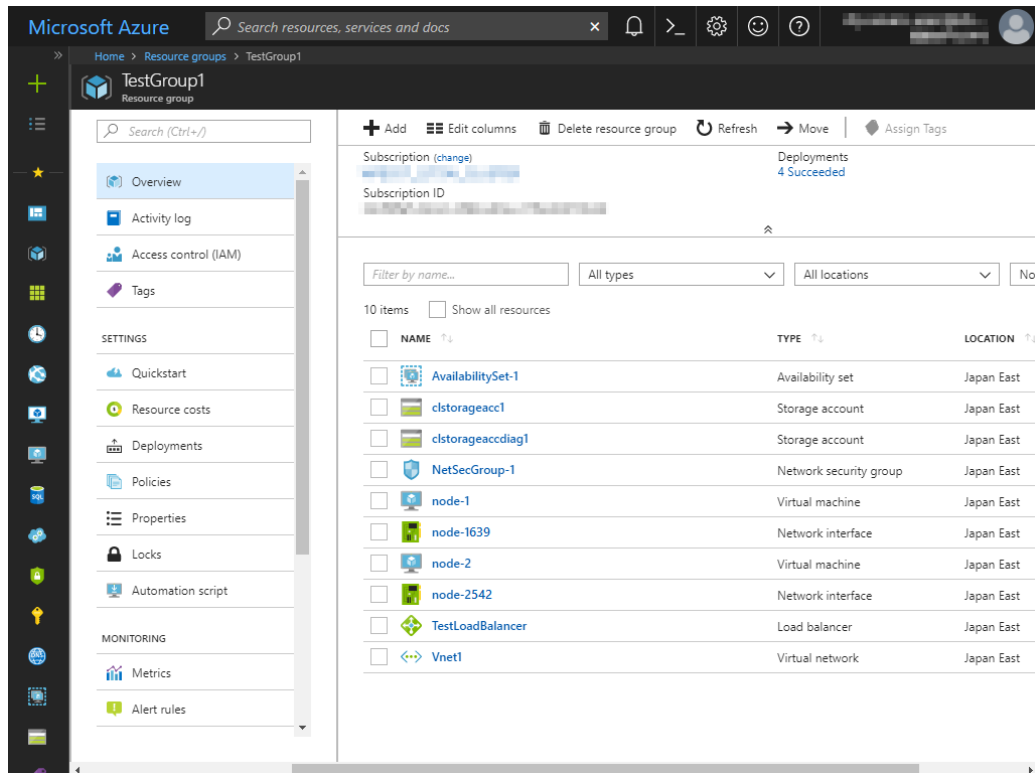


2. Select the resource group to which the created load balancer belongs from the resource group list.

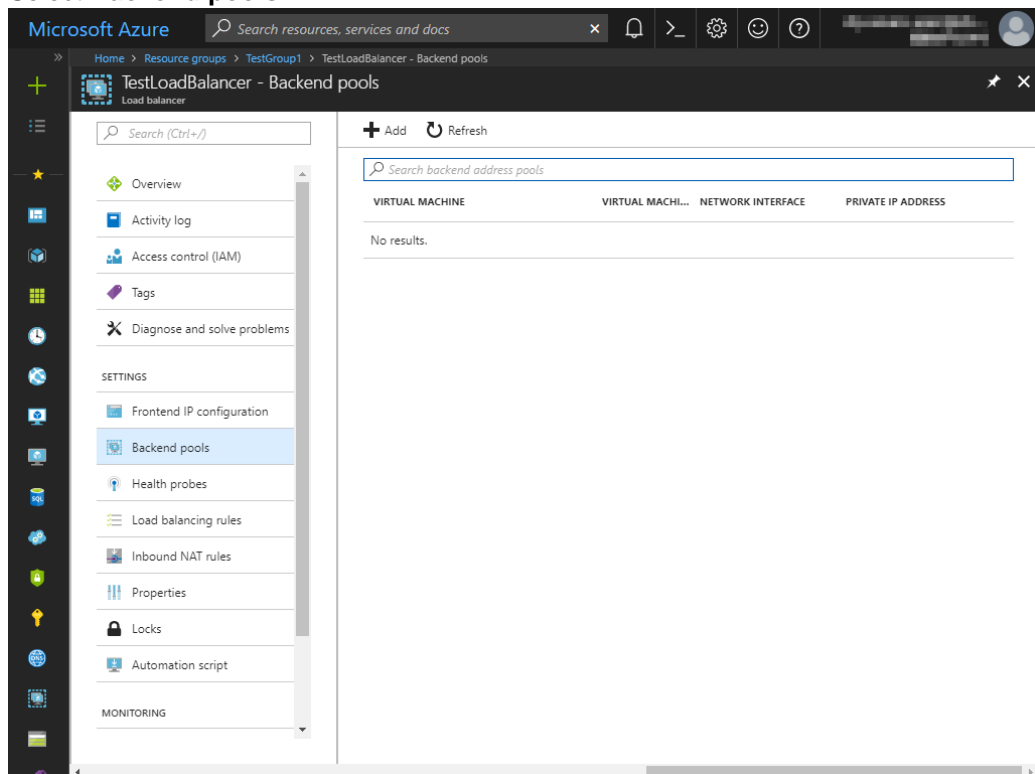


Cluster Creation Procedure (for an HA Cluster Using an Internal Load Balancer)

3. The summary of the selected resource group is displayed. Select the created load balancer from the item list.



4. Select **Backend pools**.



5. Click **Add**.
6. The **Add backend pool** blade is displayed. Specify **Name**.
7. For **Associated to**, select **Availability set**.
8. Specify **Availability set**.
9. Click **Add a target network IP configuration**.
10. Specify the target virtual machine for **Target virtual machine** and **Network IP configuration**.

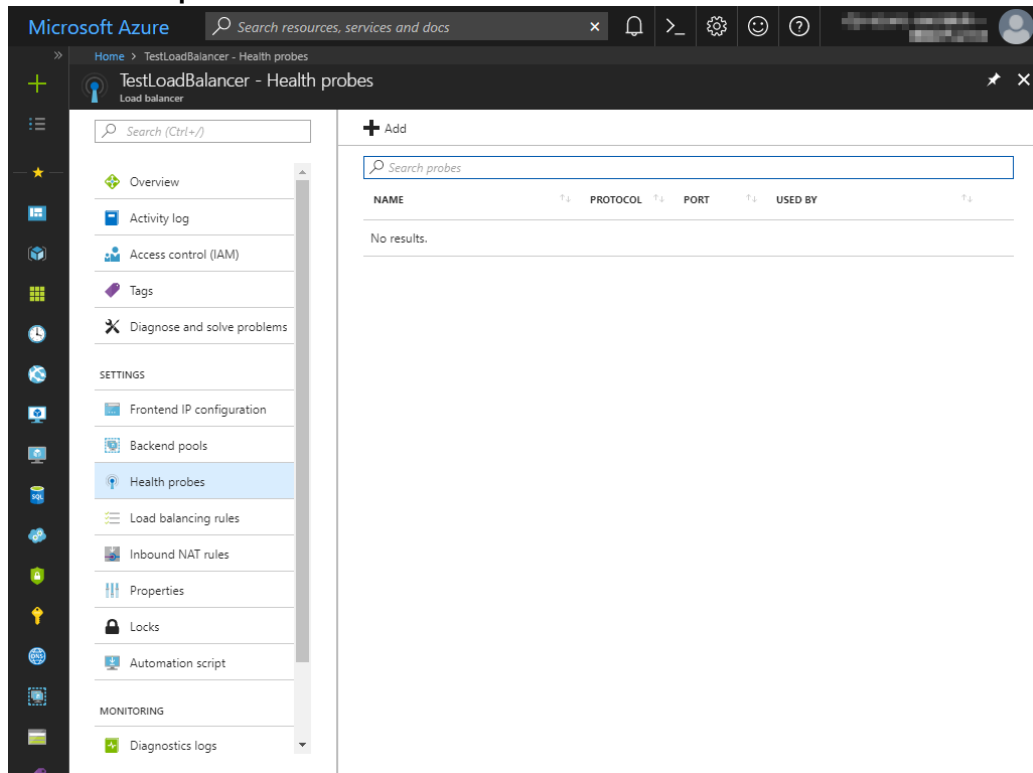
11. Repeat steps 9 and 10 as many times as the number of target virtual machines.
12. Click **OK**.

The screenshot shows the 'Add backend pool' configuration window in the Microsoft Azure portal. The window is titled 'Add backend pool' and is part of the 'TestLoadBalancer' resource. The configuration includes the following fields and options:

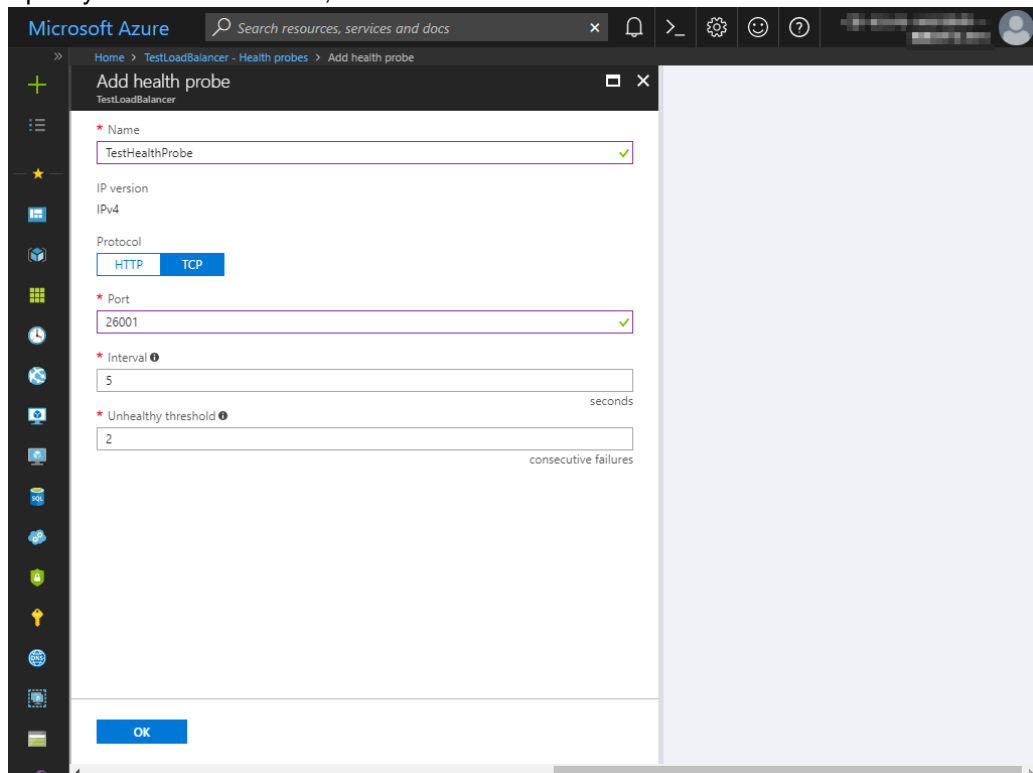
- Name:** TestBackendPool (with a green checkmark indicating it is valid).
- IP version:** IPv4 (selected) and IPv6 (available).
- Associated to:** Availability set (dropdown menu).
- Availability set:** AvailabilitySet-1 (dropdown menu) with a note 'number of virtual machines: 2'.
- Target network IP configurations:** A section with a warning icon stating 'Only VMs within the current availability set can be chosen. Once a VM is chosen, you can select a network IP configuration related to it.'
- Virtual machine:** node-1 (with a trash icon to remove it). Below it, the network IP configuration is listed as 'node-1639/ipconfig1 (10.5.0.120)'.
- Target virtual machine:** node-2 (dropdown menu) with a note 'size: Standard_A1, network interfaces: 1' and a trash icon.
- Network IP configuration:** ipconfig1 (10.5.0.121) (dropdown menu).
- + Add a target network IP configuration:** A button to add more configurations.
- OK:** A blue button at the bottom to confirm the configuration.

9) Configuring a load balancer (configuring a health probe)

1. Select **Health probes**.

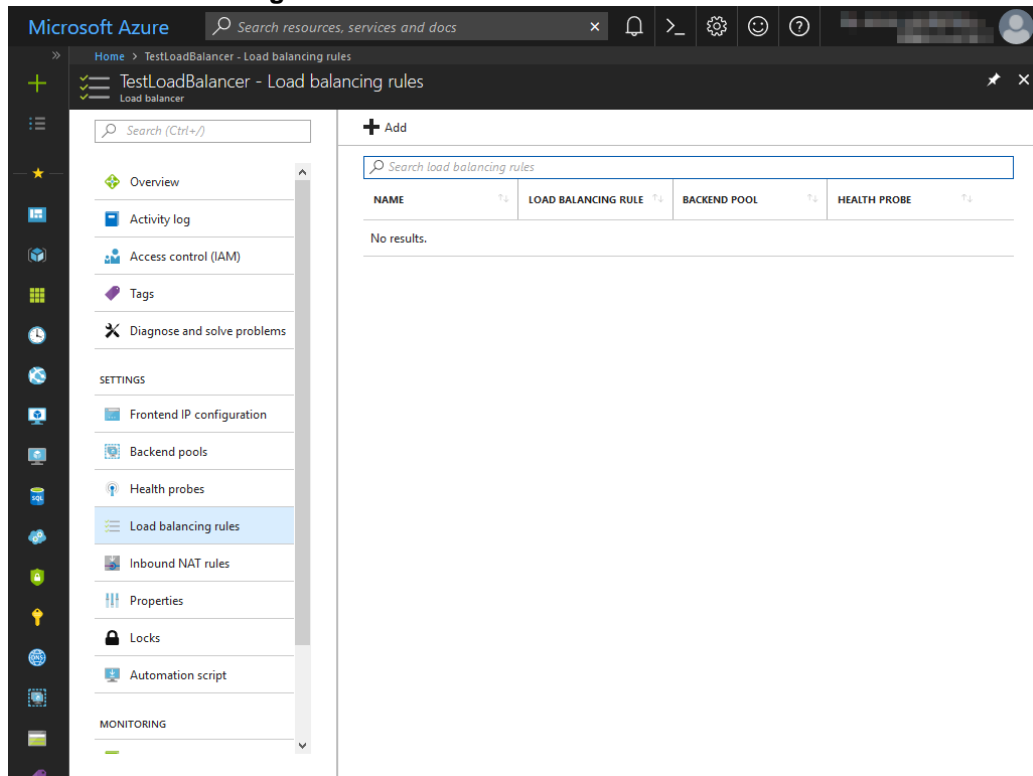


2. Click **Add**.
3. The **Add health probe** blade is displayed. Specify **Name**.
4. Specify **Protocol** and **Port**, and click **OK**.

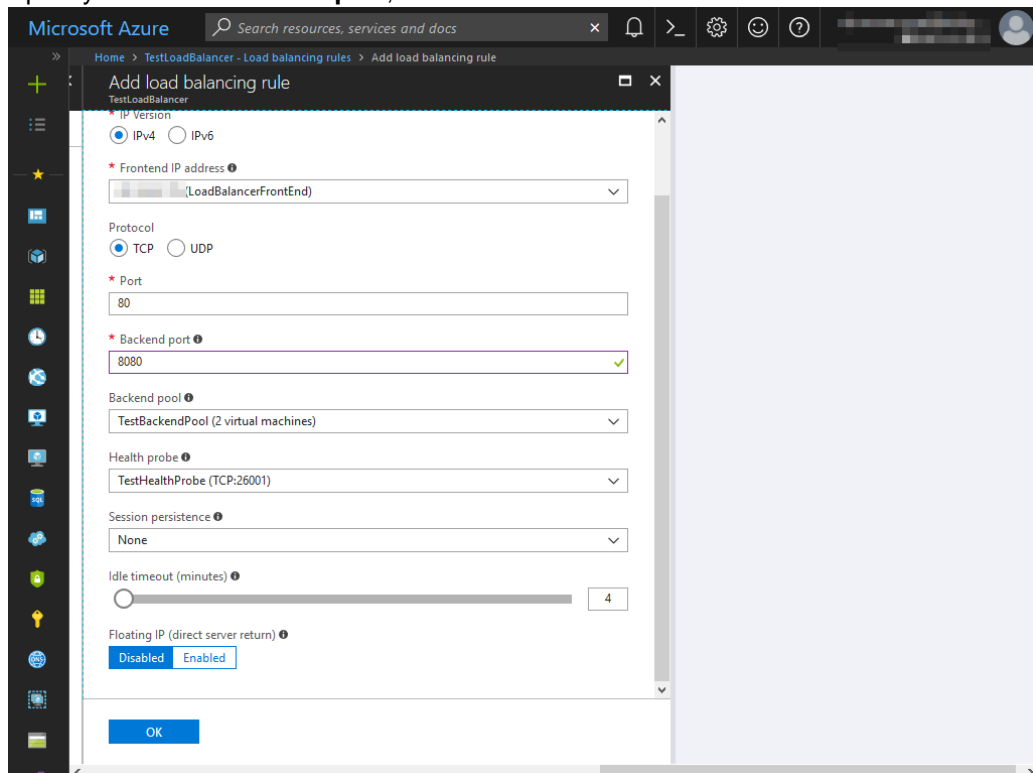


10) Configuring a load balancer (setting the load balancing rules)

1. Select **Load balancing rules**.



2. Click **Add**.
3. The **Add load balancing rule** blade is displayed. Specify **Name**.
4. Specify **Port** and **Backend port**, and click **OK**.



11) Adjusting the OS startup time, checking the network setting, checking the firewall setting, synchronizing the server time, and disabling the power saving function.

For each procedure, see "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the *Installation and Configuration Guide*.

12) Installing EXPRESSCLUSTER

For the installation procedure, see the *Installation and Configuration Guide*.

After installation is complete, restart the OS.

13) Registering the EXPRESSCLUSTER license

For the license registration procedure, see the *Installation and Configuration Guide*.

5.3 Configuring the EXPRESSCLUSTER settings

Configure the following on the WebManager cluster generation wizard.

For the WebManager setup and connection procedures, see Chapter 5, "Creating the cluster configuration data" in the *Installation and Configuration Guide*.

This section describes the procedure to add the following resources and monitor resources:

- Mirror disk resource
- Azure probe port resource
- Azure probe port monitor resource
- Azure load balance monitor resource
- PING network partition resolution resource (for NP resolution)

For the settings of other resources and monitor resources, see the *Installation and Configuration Guide* and the *Reference Guide*.

1) Creating a cluster

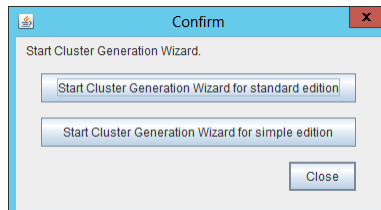
Start the cluster generation wizard to create a cluster.

◆ Creating a cluster

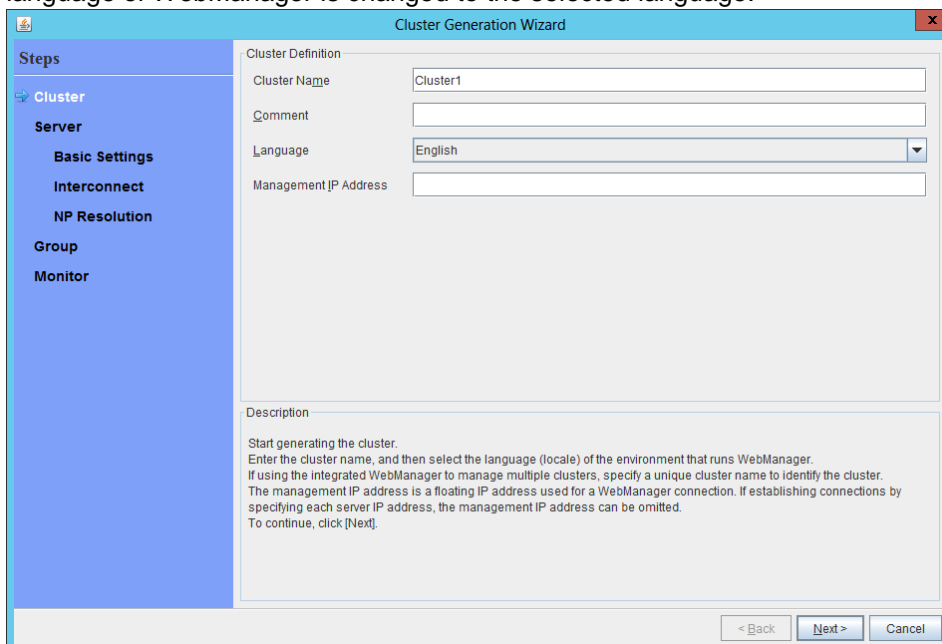
1. Access WebManager. Then, the following dialog box is displayed.
Click **Start cluster generation wizard**.



2. The following dialog box is displayed.
Click **Start Cluster Generation Wizard for standard edition**.

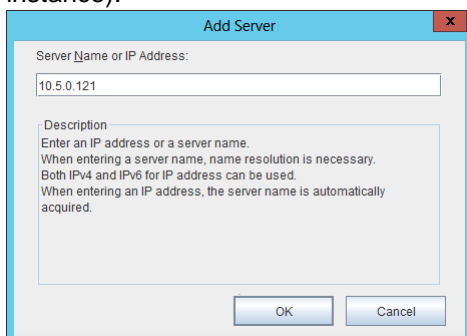


3. The **Cluster Definition** page is displayed.
Enter a desired name in **Cluster Name**.
Select an appropriate language in **Language**. After the setting is applied, the display language of WebManager is changed to the selected language.



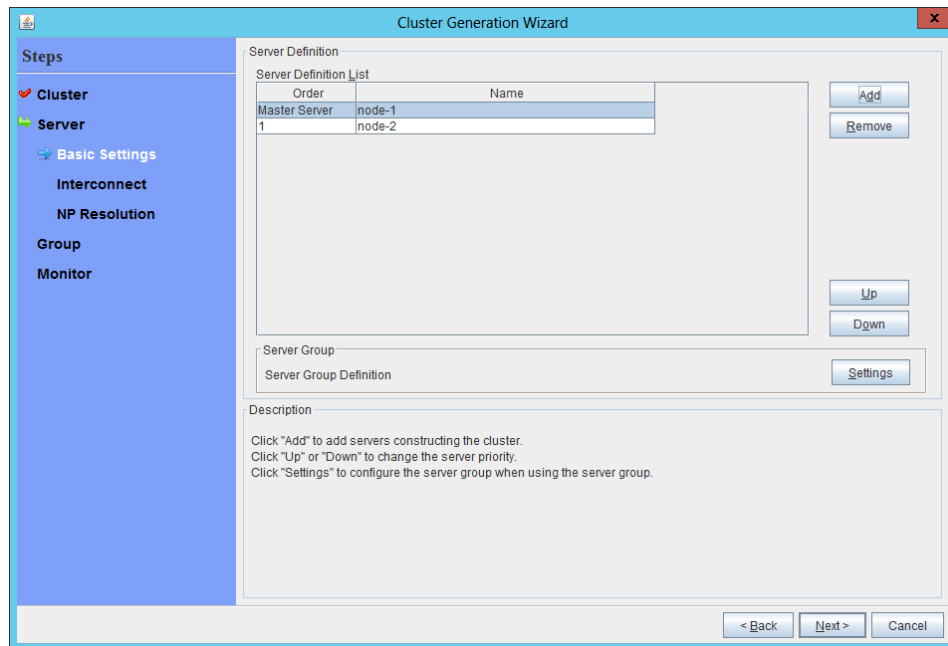
The screenshot shows the 'Cluster Generation Wizard' window, specifically the 'Cluster Definition' step. On the left, a 'Steps' sidebar lists 'Cluster', 'Server', 'Basic Settings', 'Interconnect', 'NP Resolution', 'Group', and 'Monitor'. The 'Cluster' step is selected. The main area contains fields for 'Cluster Name' (set to 'Cluster1'), 'Comment', 'Language' (set to 'English'), and 'Management IP Address'. Below these fields is a 'Description' section with instructions: 'Start generating the cluster. Enter the cluster name, and then select the language (locale) of the environment that runs WebManager. If using the integrated WebManager to manage multiple clusters, specify a unique cluster name to identify the cluster. The management IP address is a floating IP address used for a WebManager connection. If establishing connections by specifying each server IP address, the management IP address can be omitted. To continue, click [Next].' At the bottom right are buttons for '< Back', 'Next >', and 'Cancel'.

4. The **Server Definition** page is displayed.
The instance connected to WebManager is displayed as a registered master server.
Click **Add** to add the remaining instances (by specifying the private IP address of each instance).



The screenshot shows the 'Add Server' dialog box. It has a title bar with 'Add Server' and a close button. Inside, there is a label 'Server Name or IP Address:' followed by a text input field containing '10.5.0.121'. Below this is a 'Description' section with text: 'Enter an IP address or a server name. When entering a server name, name resolution is necessary. Both IPv4 and IPv6 for IP address can be used. When entering an IP address, the server name is automatically acquired.' At the bottom are 'OK' and 'Cancel' buttons.

5. Click **Next**.

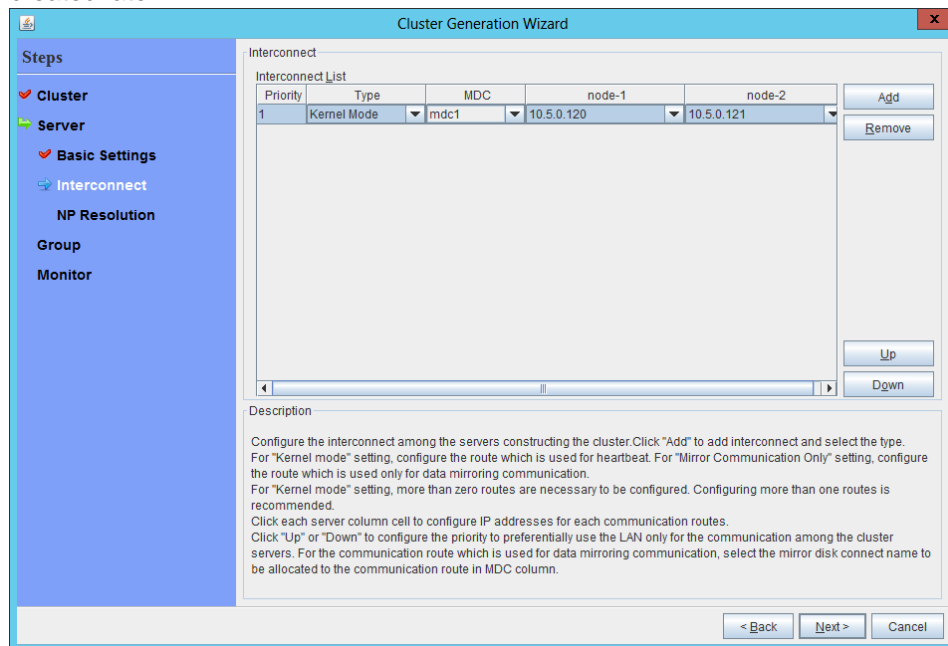


The screenshot shows the 'Cluster Generation Wizard' window, specifically the 'Server Definition' step. The left sidebar shows the 'Steps' list: Cluster, Server, Basic Settings, Interconnect, NP Resolution, Group, and Monitor. The 'Server' step is currently selected. The main area is titled 'Server Definition' and contains a 'Server Definition List' table with columns 'Order' and 'Name'. The table has two rows: 'Master Server' and 'node-1', and '1' and 'node-2'. To the right of the table are 'Add' and 'Remove' buttons. Below the table are 'Up' and 'Down' buttons. At the bottom right of the table area is a 'Settings' button. Below the table is a 'Server Group' section with a 'Server Group Definition' button. At the bottom of the window are '< Back', 'Next >', and 'Cancel' buttons.

Order	Name
Master Server	node-1
1	node-2

6. The **Interconnect** page is displayed.

Specify the IP addresses (IP address of each instance) to be used for interconnect. In addition, select mdc1 for **MDC** as a communication path of a mirror disk resource to be created later.



The screenshot shows the 'Cluster Generation Wizard' window, specifically the 'Interconnect' step. The left sidebar shows the 'Steps' list: Cluster, Server, Basic Settings, Interconnect, NP Resolution, Group, and Monitor. The 'Interconnect' step is currently selected. The main area is titled 'Interconnect' and contains an 'Interconnect List' table with columns 'Priority', 'Type', 'MDC', 'node-1', and 'node-2'. The table has one row: '1', 'Kernel Mode', 'mdc1', '10.5.0.120', and '10.5.0.121'. To the right of the table are 'Add' and 'Remove' buttons. Below the table are 'Up' and 'Down' buttons. At the bottom of the window are '< Back', 'Next >', and 'Cancel' buttons.

Priority	Type	MDC	node-1	node-2
1	Kernel Mode	mdc1	10.5.0.120	10.5.0.121

7. Click **Next**.

8. The **NP Resolution** page is displayed.
- To execute NP resolution by using a ping, click **Add** to add a line to the NP resolution list. Click a cell of the **Type** column and select **Ping**. Click the cell of the **Ping target** column and set the IP address of the device to which to send a ping. Be sure to specify the IP address of a server other than cluster servers within the Microsoft Azure virtual network. Click a cell of each server column and select **Use** or **Not use**.

Cluster Generation Wizard

Steps

- Cluster
- Server
- Basic Settings
- Interconnect
- NP Resolution
- Group
- Monitor

NP Resolution

Type	Ping Target	node-1	node-2
Ping	10.5.0.5	Use	Use

Add
Remove
Properties
Tuning

Description

Configure network partition (NP) resolution function.
Click "Add" to add NP resolution resource and select the type.
For "COM" setting, click each server column cell to configure COM port.
For "DISK" setting, click each server column cell to configure driver letter of the partition for disk heartbeat.
For "Ping" setting, click Ping target column cell to configure IP address of Ping destination, and then click each server column cell to configure "Use" or "Do not use".
For "Majority" setting, double-click each server column cell to configure "Use" or "Do not use".
For "DISK" and "Ping" settings, the detailed settings can be verified and changed by clicking "Properties".
Click "Tuning" to configure the actions at NP occurrence.

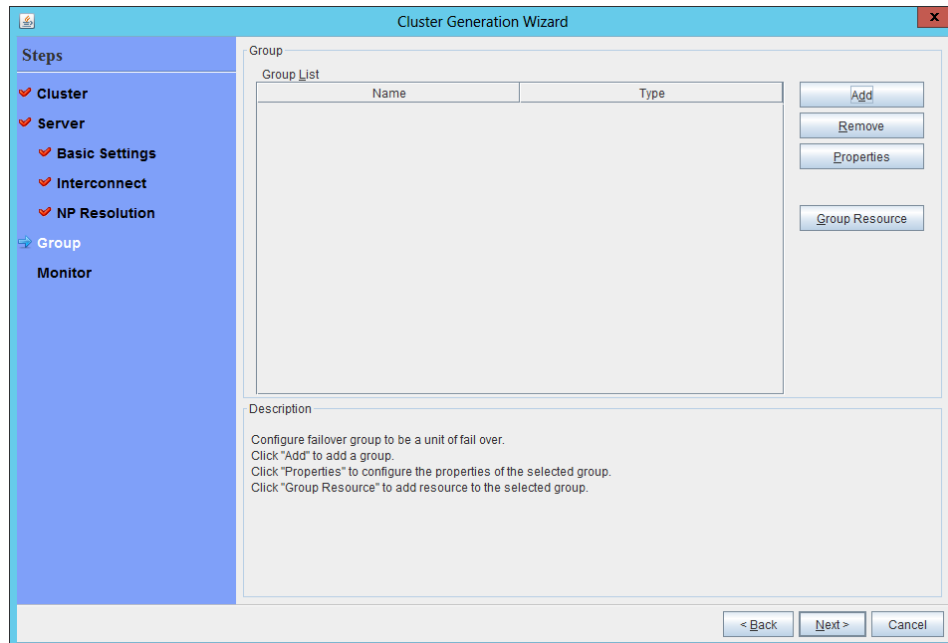
< Back Next > Cancel

9. Click **Next**.

2) Adding a group resource

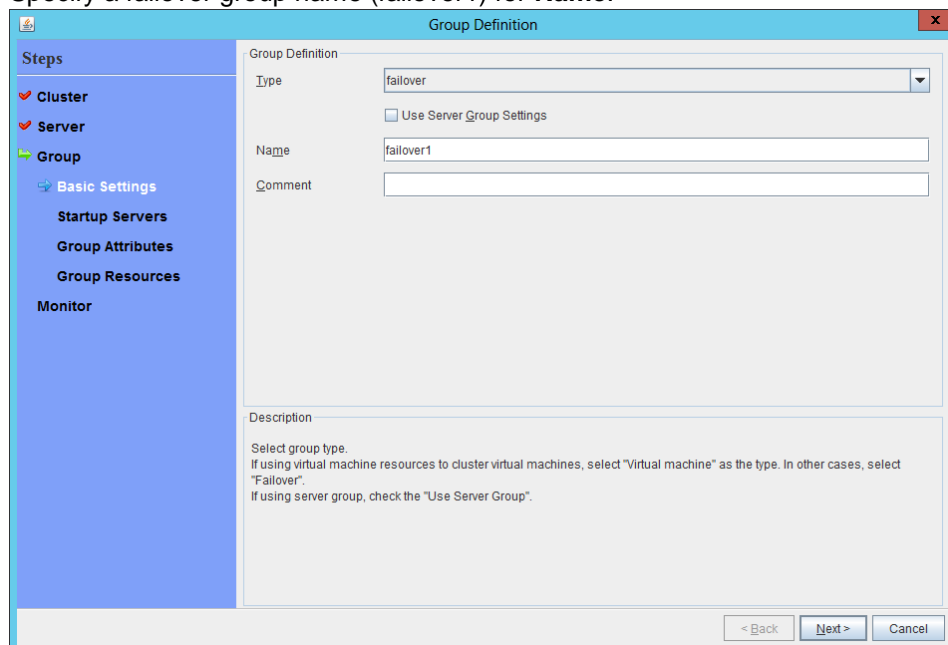
- ◆ Defining a group
Create a failover group.

1. The **Group List** window is displayed.
Click **Add**.



The screenshot shows the 'Cluster Generation Wizard' window, specifically the 'Group List' step. On the left, a 'Steps' sidebar lists 'Cluster', 'Server', 'Basic Settings', 'Interconnect', 'NP Resolution', 'Group' (selected), and 'Monitor'. The main area is titled 'Group' and contains a 'Group List' table with columns 'Name' and 'Type'. To the right of the table are buttons for 'Add', 'Remove', 'Properties', and 'Group Resource'. Below the table is a 'Description' section with instructions: 'Configure failover group to be a unit of fail over. Click "Add" to add a group. Click "Properties" to configure the properties of the selected group. Click "Group Resource" to add resource to the selected group.' At the bottom are '< Back', 'Next >', and 'Cancel' buttons.

2. The **Group Definition** window is displayed.
Specify a failover group name (failover1) for **Name**.



The screenshot shows the 'Group Definition' window. On the left, the 'Steps' sidebar lists 'Cluster', 'Server', 'Group' (selected), 'Basic Settings', 'Startup Servers', 'Group Attributes', 'Group Resources', and 'Monitor'. The main area is titled 'Group Definition' and contains a 'Type' dropdown menu set to 'failover', a checkbox for 'Use Server Group Settings' (unchecked), a 'Name' text box containing 'failover1', and a 'Comment' text box. Below these is a 'Description' section with instructions: 'Select group type. If using virtual machine resources to cluster virtual machines, select "Virtual machine" as the type. In other cases, select "Failover". If using server group, check the "Use Server Group".' At the bottom are '< Back', 'Next >', and 'Cancel' buttons.

3. Click **Next**.

4. The **Servers that can run the Group** page is displayed.
Click **Next** without specifying anything.

The screenshot shows the 'Group Definition(failover1)' window. On the left, a 'Steps' sidebar lists: Cluster, Server, Group (selected), Basic Settings, Startup Servers, Group Attributes, Group Resources, and Monitor. The main area is titled 'Servers that can run the Group'. It contains a checkbox 'Failover is possible on all servers' which is checked. Below this is a table 'Servers that can run the Group' which is currently empty. To the right of this table are buttons '< Add', 'Remove >', 'Up', and 'Down'. Further right is a table 'Available Servers' containing 'node-1' and 'node-2'. At the bottom of the main area is a 'Description' section with text explaining failover settings. At the bottom right of the window are buttons '< Back', 'Next >', and 'Cancel'.

5. The **Group Attribute Settings** page is displayed.
Click **Next** without specifying anything.

The screenshot shows the 'Group Definition(failover1)' window, now on the 'Group Attribute Settings' page. The 'Steps' sidebar remains the same. The main area is titled 'Group Attribute Settings'. It has two sections: 'Startup Attribute' with radio buttons for 'Auto Startup' (selected) and 'Manual Startup'; and 'Failover Attribute' with radio buttons for 'Auto Failover' (selected) and 'Manual Failover'. Under 'Auto Failover', there are checkboxes for 'Use the startup server settings', 'Failover dynamically', 'Perform a Forced Failover', 'Prioritize failover policy in the server group', and 'Perform a Smart Failover'. There is also an 'Edit exclusion monitor' button. Under 'Manual Failover', there are checkboxes for 'Prioritize failover policy in the server group' and 'Enable only manual failover among the server groups'. At the bottom, there is a 'Failback Attribute' section with radio buttons for 'Auto Failback' and 'Manual Failback' (selected). A 'Description' section at the bottom provides instructions on configuring failover. At the bottom right of the window are buttons '< Back', 'Next >', and 'Cancel'.

6. The **Group Resource** page is displayed.
On this page, add a group resource following the procedure below.

The screenshot shows the 'Group Definition(failover1)' window. On the left is a 'Steps' sidebar with options: Cluster, Server, Group (selected), Basic Settings, Startup Servers, Group Attributes, Group Resources, and Monitor. The main area is titled 'Group Resource' and 'Group Resource List'. It contains a table with columns 'Name' and 'Type'. To the right of the table are buttons: 'Add', 'Remove', and 'Properties'. Below the table is a 'Description' section with instructions: 'Click "Add" to add resources. Click "Properties" to configure the properties of the selected resource.' At the bottom right are buttons: '< Back', 'Finish', and 'Cancel'.

- ◆ Mirror disk resource
Create a mirror disk resource.
For details, see "Understanding mirror disk resources" in Chapter 5, "Group resource details" in the *Reference Guide*.

1. Click **Add** on the **Group Resource List** page.
2. The **Resource Definition of Group** window is displayed.
Select the group resource type (mirror disk resource) from the **Type** box and enter the group name (md) in the **Name** box.

The screenshot shows the 'Resource Definition of Group(failover1)' window. On the left is a 'Steps' sidebar with options: Cluster, Server, Group (selected), Basic Settings, Startup Servers, Group Attributes, Group Resources, Info, Dependency, Recovery Operation, Details, and Monitor. The main area is titled 'Group Resource Definitions'. It contains a 'Type' dropdown menu with 'mirror disk resource' selected, a 'Name' text box with 'md' entered, and a 'Comment' text box. To the right of the 'Comment' box is a 'Get Licence Info' button. Below these fields is a 'Description' section with the instruction: 'Select the type of group resource and enter its name.' At the bottom right are buttons: '< Back', 'Next >', and 'Cancel'.

3. Click **Next**.

4. The **Dependent Resources** page is displayed.
Click **Next** without specifying anything.

The screenshot shows the 'Resource Definition of Group(failover1)' window. On the left, a 'Steps' sidebar lists: Cluster, Server, Group, Basic Settings, Startup Servers, Group Attributes, Group Resources, Info, Dependency, Recovery Operation, Details, and Monitor. The 'Group' step is selected. The main area has a checkbox 'Follow the default dependency' which is checked. Below it is a 'Dependent Resources' table with columns 'Name' and 'Resource type'. To the right of this table are '< Add' and 'Remove >' buttons. Further right is an 'Available Resources' section with a 'Name' column. At the bottom right are '< Back', 'Next >', and 'Cancel' buttons.

5. The **Recovery Operation at Activity Failure Detection** and **Recovery Operation at Deactivity Failure Detection** page is displayed.
Click **Next**.

The screenshot shows the 'Resource Definition of Group(failover1)' window, now on the 'Recovery Operation' page. The 'Steps' sidebar is the same, but 'Recovery Operation' is selected. The main area is titled 'Execute Script before or after Activation or Deactivation' with a 'Settings' button. It contains two sections: 'Recovery Operation at Activity Failure Detection' and 'Recovery Operation at Deactivity Failure Detection'. The first section has fields for 'Retry Count' (3), 'Failover Target Server' (Stable Server selected, Maximum Priority Server unselected), and 'Failover Threshold' (1). It also has a 'Final Action' dropdown set to 'No operation (not activate next resource)' and a checkbox 'Execute Script before Final Action' with a 'Settings' button. The second section has a 'Retry Count at Deactivation Failure' field (0) and a 'Final Action' dropdown set to 'Stop the cluster service and shutdown OS', also with a checkbox and 'Settings' button. At the bottom right are '< Back', 'Next >', and 'Cancel' buttons.

6. The **Details** page is displayed.
Select a server name in the **Name** column of **Servers that can run the group** and click **Add**.

Resource Definition of Group(failover1)

Steps

- Cluster
- Server
- Group
 - Basic Settings
 - Startup Servers
 - Group Attributes
 - Group Resources
 - Info
 - Dependency
 - Recovery Operation
 - Details
- Monitor

Mirror Disk No. 1

Data Partition Drive Letter

Cluster Partition Drive Letter

Cluster Partition Offset Index 0

Mirror Disk Connect Select

Servers that can run the group

Name	Data Partition	Cluster Partition
node-1		
node-2		

< Add Remove > Edit

Tuning

< Back Finish Cancel

7. The **Selection of partition** dialog box is displayed. Click **Connect**, select the data partition and cluster partition created in "6)Configuring virtual machines", and click **OK**.

Selection of partition

Partition

Data Partition

Volume	Disk No.	Partition No.	Size	GU
	0	1	500MB	
D:\	1	1	71677MB	
F:\	2	1	1024MB	
C:\	0	2	40458MB	
G:\	2	2	19453MB	

Obtain inform... Connect

GUID

Cluster Partition

Volume	Disk No.	Partition No.	Size	GU
	0	1	500MB	
D:\	1	1	71677MB	
F:\	2	1	1024MB	
C:\	0	2	40458MB	
G:\	2	2	19453MB	

GUID

OK Cancel

8. Perform steps 6 and 7 for node-1 and then node-2 and click **Finish**.

Resource Definition of Group(failover1)

Steps

- Cluster
- Server
- Group
 - Basic Settings
 - Startup Servers
 - Group Attributes
 - Group Resources
 - Info
 - Dependency
 - Recovery Operation
 - Details
- Monitor

Mirror Disk No. 1

Data Partition Drive Letter G:

Cluster Partition Drive Letter F:

Cluster Partition Offset Index 0

Mirror Disk Connect Select

Servers that can run the group

Name	Data Partition	Cluster Partition
node-1		
node-2		

< Add Remove > Edit

Tuning

< Back Finish Cancel

- ◆ Azure probe port resource
When EXPRESSCLUSTER is used on Microsoft Azure, EXPRESSCLUSTER provides a mechanism to wait for alive monitoring from a load balancer on a port specific to a node in which operations are running.

For details about the Azure probe port resources", see "Understanding Azure probe port resources" in Chapter 5, "Group resource details" in the *Reference Guide*.

1. Click **Add** on the **Group Resource List** page.

2. The **Resource Definition of Group** window is displayed. Select the group resource type (Azure probe port resource) from the **Type** box and enter the group name (azurepp1) in the **Name** box.

Resource Definition of Group(failover1)

Steps

- Cluster
- Server
- Group
- Basic Settings
- Startup Servers
- Group Attributes
- Group Resources
- Info
- Dependency
- Recovery Operation
- Details
- Monitor

Group Resource Definitions

Type: Azure probe port resource

Name: azurepp1

Comment:

Get Licence Info

Description

Select the type of group resource and enter its name.

< Back Next > Cancel

3. Click **Next**.
4. The **Dependent Resources** page is displayed. Click **Next** without specifying anything.

Resource Definition of Group(failover1)

Steps

- Cluster
- Server
- Group
- Basic Settings
- Startup Servers
- Group Attributes
- Group Resources
- Info
- Dependency
- Recovery Operation
- Details
- Monitor

☒ Follow the default dependency

Dependent Resources

Name	Resource type
------	---------------

< Add Remove >

Available Resources

Name

< Back Next > Cancel

5. The **Recovery Operation at Activity Failure Detection** and **Recovery Operation at Deactivity Failure Detection** page is displayed. Click **Next**.

6. For **Probeport**, enter the value specified for **Port** when configuring a load balancer (configuring health probe).

7. Click **Finish**.

3) Adding a monitor resource

- ◆ Azure probe port monitor resource

The port monitoring mechanism for alive monitoring is provided for the node in which the Microsoft Azure probe port resource is running.

For details about the Azure probe port monitor resource, see "Understanding Azure probe port monitor resources" in Chapter 6, "Monitor resource details" in the *Reference Guide*.

Adding one Azure probe port monitor resource creates one Azure probe port monitor resource automatically.

- ◆ Azure load balance monitor resource

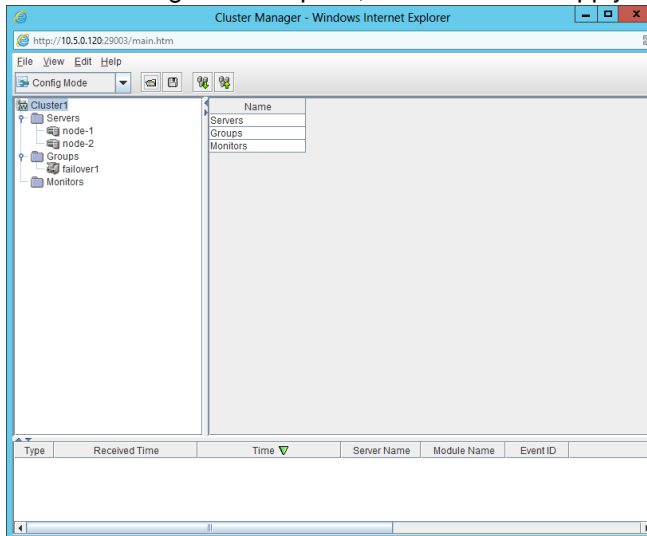
The mechanism to monitor whether the port with the same port number as the probe port is open or not is provided for the node in which the Microsoft Azure probe port resource is not running.

For details about the Azure load balance monitor resource, see "Understanding Azure load balance monitor resources" in Chapter 6, "Monitor resource details" in the *Reference Guide*.

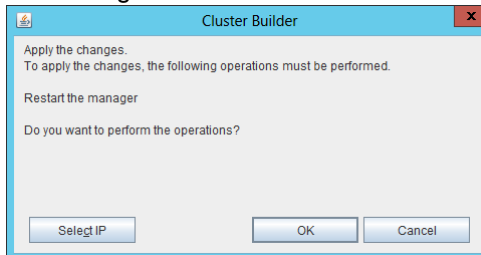
Adding one Azure probe port resource creates one Azure load balance monitor resource automatically.

4) Applying the settings and starting the cluster

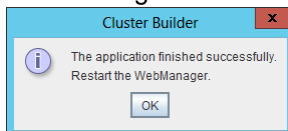
1. After all settings are complete, click the icon to apply the settings under the menu.



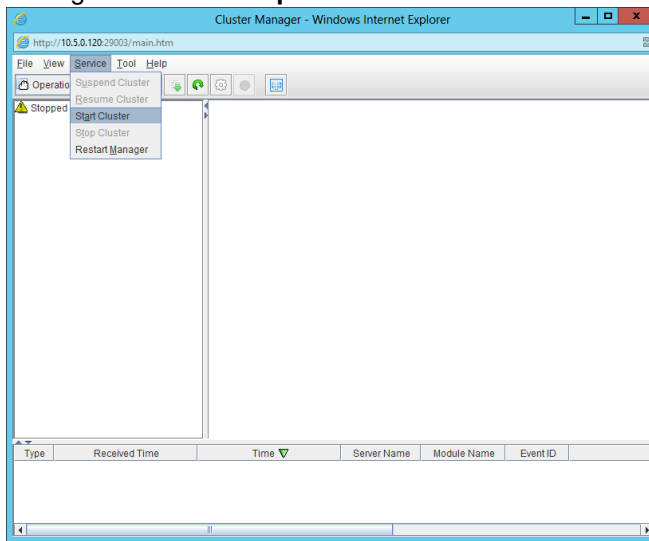
2. The dialog box to confirm to restart the manager is displayed.



3. Click **OK**.
4. Click **OK** again on the following dialog box.



5. Change the mode to **Operation Mode** and click **Start Cluster** from the **Service** menu.



5.4 Verifying the created environment

Verify whether the created environment works properly by generating a (dummy) monitoring error to fail over a failover group.

If the cluster is running normally, the verification procedure is as follows:

1. Start the failover group (failover1) on the active node (node-1). In the Status tab on the Cluster WebUI, confirm that **Group Status** of failover1 of node-1 is **Normal**.
2. Change **Operation Mode** to **Verification Mode** from the Cluster WebUI pull-down menu.
3. In the Status tab on the Cluster WebUI, click the **Enable dummy failure** icon of azureppw1 of Monitors.
4. After the Azure probe port resource (azurepp1) activated three times, the failover group (failover1) becomes abnormal and fails over to node-2. In the Status tab on the Cluster WebUI, confirm that **Group Status** of failover1 of node-2 is **Normal**.
Also, confirm that access to the frontend IP and port of the Azure load balancer is normal after the failover.

Verifying the failover operation in case of a dummy failure is now complete. Verify the operations in case of other failures if necessary.

Chapter 6 Error Messages

For the error messages related to resources and monitor resources, see the following:

- Chapter 12, “Error messages” in the *Reference Guide*.

Chapter 7 Notes and Restrictions

7.1 HA cluster using Azure DNS

7.1.1 Notes on Microsoft Azure

- There is a tendency for the performance difference (performance deterioration rate) to increase in a multi-tenant cloud environment compared to a physical environment or general virtualization environment (non-cloud environment). Therefore, pay careful attention to this point when designing a performance-oriented system.
- Even if a virtual machine is just shut down, its status is **Stopped** and billing continues. Execute **Stop** on the virtual machine setting window of the Microsoft Azure portal to change the virtual machine state to **Stopped (Deallocated)**.
- An availability set can be set only when creating a virtual machine. To move a virtual machine to and from the availability set, it is necessary to create an availability set again.
- To set up EXPRESSCLUSTER to work with Microsoft Azure, a Microsoft Azure organizational account is required. An account other than the organizational account cannot be used because an interactive login is required when executing the Azure CLI.

7.1.2 Notes on EXPRESSCLUSTER

Please refer the following for notes for EXPRESSCLUSTER on Azure:

EXPRESSCLUSTER X Getting Started Guide

- "Communication port number" in Chapter 5, "Notes and Restrictions"
- "Azure DNS resources" in Chapter 5, "Notes and Restrictions"
- "Setting up Azure DNS resources" in Chapter 5, "Notes and Restrictions"

EXPRESSCLUSTER X Reference Guide

- "Notes on Azure DNS resources" in Chapter 5, "Group resource details"
- "Notes on Azure DNS monitor resources" in Chapter 6, "Monitor resource details"

Virtual machines are paused for up to 30 seconds for Azure memory preserving maintenance.

Please refer the following for details about memory preserving maintenance.

<https://docs.microsoft.com/en-us/azure/virtual-machines/windows/maintenance-and-updates>

Therefore, it is recommended to set **Heartbeat Timeout** parameter on **Timeout** tab in **Cluster Properties** more than 30 sec.

In addition to **Heartbeat Timeout**, please also note the following.

- Please set **Heartbeat Timeout** parameter less than OS reboot time.

Please refer the following about the above:

EXPRESSCLUSTER X Getting Started Guide

- "Adjusting OS startup time" in Chapter 5, "Notes and Restrictions"

EXPRESSCLUSTER X Reference Guide

- "Timeout tab" in Chapter 2, "Functions of the Builder"

7.2 HA cluster using a load balancer

7.2.1 Notes on Microsoft Azure

- There is a tendency for the performance difference (performance deterioration rate) to increase in a multi-tenant cloud environment compared to a physical environment or general virtualization environment (non-cloud environment). Therefore, pay careful attention to this point when designing a performance-oriented system.
- Even if a virtual machine is just shut down, its status is **Stopped** and billing continues. Execute **Stop** on the virtual machine setting window of the Microsoft Azure portal to change the virtual machine state to **Stopped (Deallocated)**.
- An availability set can be set only when creating a virtual machine. To move a virtual machine to and from the availability set, it is necessary to create an availability set again.

7.2.2 Notes on EXPRESSCLUSTER

Please refer the following for notes for EXPRESSCLUSTER on Azure:

EXPRESSCLUSTER X Getting Started Guide

- "Communication port number" in Chapter 5, "Notes and Restrictions"
- "Azure probe port resources" in Chapter 5, "Notes and Restrictions"
- "Setting up Azure probe port resources" in Chapter 5, "Notes and Restrictions"
- "Setting up Azure load balance monitor resources" in Chapter 5, "Notes and Restrictions"

EXPRESSCLUSTER X Reference Guide

- "Notes on Azure probe port resources" in Chapter 5, "Group resource details"
- "Notes on Azure probe port monitor resources" in Chapter 6, "Monitor resource details"
- "Note on Azure load balance monitor resources" in Chapter 6, "Monitor resource details"

Virtual machines are paused for up to 30 seconds for Azure memory preserving maintenance.

Please refer the following for details about memory preserving maintenance.

<https://docs.microsoft.com/en-us/azure/virtual-machines/windows/maintenance-and-updates>

Therefore, it is recommended to set **Heartbeat Timeout** parameter on **Timeout** tab in **Cluster Properties** more than 30 sec.

In addition to **Heartbeat Timeout**, please also note the following.

- Please set **Heartbeat Timeout** parameter less than OS reboot time.

Please refer the following about the above:

EXPRESSCLUSTER X Getting Started Guide

- "Adjusting OS startup time" in Chapter 5, "Notes and Restrictions"

EXPRESSCLUSTER X Reference Guide

- "Timeout tab" in Chapter 2, "Functions of the Builder"