

EXPRESSCLUSTER X 5.2

HA Cluster Configuration Guide for Microsoft Azure (Windows)

Release 2

NEC Corporation

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TABLE OF CONTENTS:

1	Preface1.1Who Should Use This Guide	1 1 2 3 4 5 6
2	Overview 2.1 Functional overview 2.2 Basic configuration 2.3 Network partition resolution 2.4 Differences between on-premises and Microsoft Azure	7 7 9 16 18
3	Operating Environments 3.1 HA cluster using Azure DNS 3.2 HA cluster using a load balancer	27 27 29
4	Cluster Creation Procedure (for an HA Cluster Using Azure DNS) 4.1 Creation example	31 35 59 77
5	Cluster Creation Procedure (for an HA Cluster Using a Public Load Balancer) 5.1 Creation example	83 114
6	Cluster Creation Procedure (for an HA Cluster Using an Internal Load Balancer) 6.1 Creation example	139 167
7	Error Messages	177
8	Notes	179
9	Legal Notice	181

10	Revis	on History	183
		Trademark Information	-
	9.1	Disclaimer	181

CHAPTER

ONE

PREFACE

1.1 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.

1.2 Scope of application

For information on the system requirements, see "Getting Started Guide" -> "Installation requirements for EXPRESS-CLUSTER".

This guide contains product- and service-related information (e.g., screenshots) collected at the time of writing this guide. For the latest information, which may be different from the content in this guide, refer to corresponding websites and manuals.

1.3 How This Guide is Organized

- 2. Overview: Describes the functional overview.
- 3. Operating Environments: Describes the tested operating environment of this function.
- 4. *Cluster Creation Procedure (for an HA Cluster Using Azure DNS)*: Describes the procedure to create an HA cluster using Azure DNS.
- 5. *Cluster Creation Procedure (for an HA Cluster Using a Public Load Balancer)*: Describes the procedure to create an HA cluster using a public load balancer.
- 6. *Cluster Creation Procedure (for an HA Cluster Using an Internal Load Balancer)*: Describes the procedure to create an HA cluster using an internal load balancer.
- 7. Error Messages: Describes the error messages and solutions.
- 8. Notes: Describes the notes and restrictions on creating and operating a cluster.

1.4 EXPRESSCLUSTER X Documentation Set

The EXPRESSCLUSTER X manuals consist of the following four guides. 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, system requirements, and known problems.

EXPRESSCLUSTER X Installation and Configuration Guide

This guide is intended for system engineers and administrators who want to build, operate, and maintain a cluster system. Instructions for designing, installing, and configuring a cluster system with EXPRESS-CLUSTER are covered in this guide.

EXPRESSCLUSTER X Reference Guide

This guide is intended for system administrators. The guide covers topics such as how to operate EX-PRESSCLUSTER, function of each module and troubleshooting. The guide is supplement to the Installation and Configuration Guide.

EXPRESSCLUSTER X Maintenance Guide

This guide is intended for administrators and for system administrators who want to build, operate, and maintain EXPRESSCLUSTER-based cluster systems. The guide describes maintenance-related topics for EXPRESSCLUSTER.

1.5 Conventions

In this guide, Note, Important, See also 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.

See also:

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 selec-	Click Start.
	tions, buttons, labels, icons, etc.	Properties dialog box
Angled bracket within the command	Indicates that the value specified in-	clpstat -s [-h
line	side of the angled bracket can be	host_name]
	omitted.	
>	Prompt to indicate that a Windows	> clpstat
	user has logged on as root user.	
Monospace	Indicates path names, commands,	C:\Program Files
	system output (message, prompt,	
	etc.), directory, file names, functions	
	and parameters.	
bold	Indicates the value that a user actu-	
	ally enters from a command line.	Enter the following:
		> clpcl -s -a
italic	Indicates that users should replace	> ping <ip address=""></ip>
	italicized part with values that they	
	are actually working with.	



In the figures of this guide, this icon represents EXPRESSCLUSTER.

1.6 Contacting NEC

For the latest product information, visit our website below:

https://www.nec.com/en/global/prod/expresscluster/

CHAPTER

OVERVIEW

2.1 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.

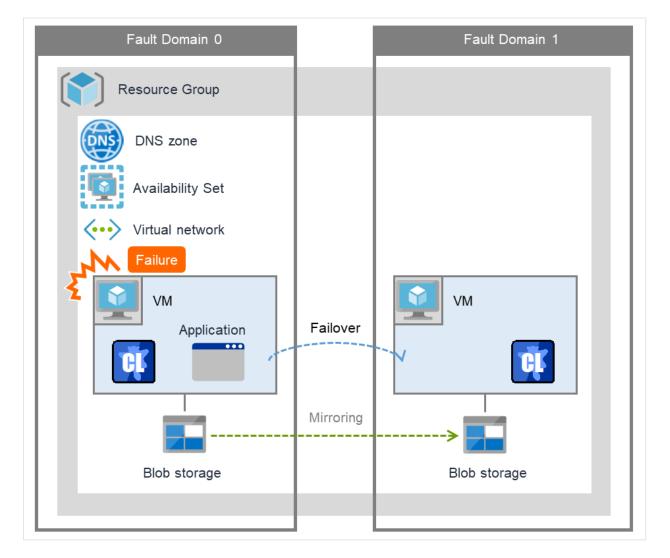


Fig. 2.1: HA Cluster on a Cloud Service (Using Azure DNS)

Operational availability can be increased by clustering virtual machines (VMs in Figure 2.1 HA Cluster on a Cloud Service (Using Azure DNS)) 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

2.2 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(global IP address) (Use public load balancer)	Azure probe port resource
Accessing the cluster by using a virtual (private) IP address (Use internal 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/

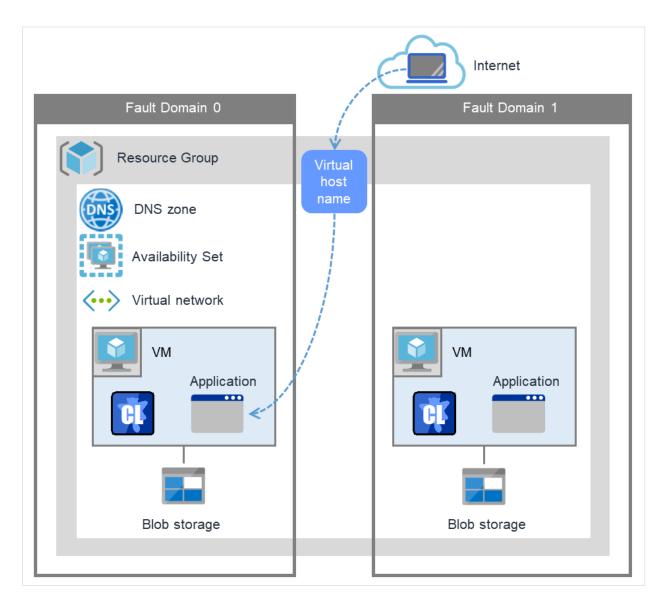


Fig. 2.2: HA Cluster Using Azure DNS

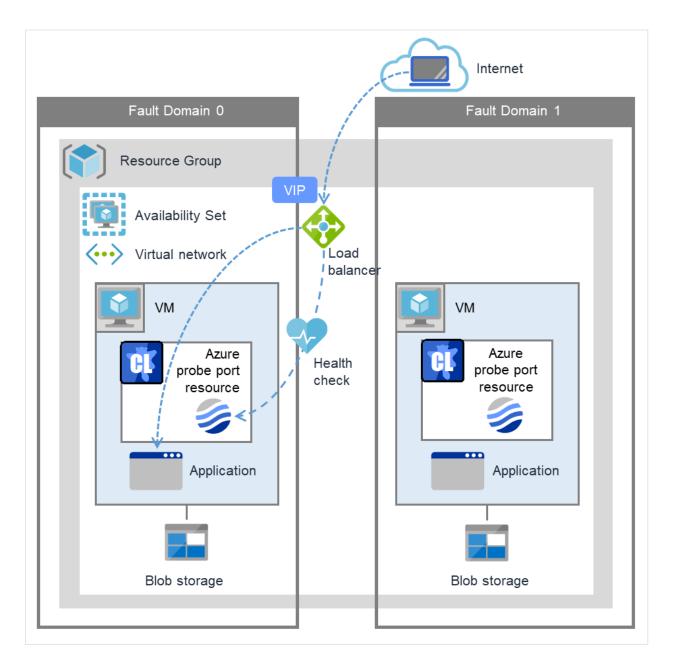
These two virtual machines use the same availability set to minimize the impact of planned maintenance or unplanned maintenance due to a physical hardware failure of the Microsoft Azure platform.

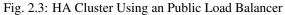
The cluster in Figure 2.2 HA Cluster Using Azure DNS is accessed by using the DNS name of the Azure DNS zone. EXPRESSCLUSTER manages record sets and DNS A records of the Azure DNS zone to find an IP address according to the DNS name. A client need not be conscious about the switching of virtual machines 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 re- source type	Description	Setting
Azure DNS resource	Manages the record sets (A records) of the Azure DNS zone to find an IP address according to the DNS name.	Required
Azure DNS monitor resource	Monitors that the results of name resolution are normal in relation to the Azure DNS record set.	Required
IP monitor resource	Monitors whether communica- tion with the Microsoft Azure Service Management API is possible, and also monitors health of communication with an external network.	When a public load balancer is used, required to monitor communication between clus- ters that are configured with vir- tual machines, and also to mon- itor health of communication with an internal network.
Custom monitor resource	Monitors communication be- tween clusters that are config- ured with virtual machines, and also monitors health of commu- nication with an internal net- work.	When a public 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 re- sources are abnormal, a script in which a process for network partition resolution (NP resolu- tion) is described is executed.	When a public 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 clus- ter.	Optional

HA cluster using a 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 frontend IP address. By using a VIP (Virtual IP), 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 2.3 HA Cluster Using an Public Load Balancer is accessed by specifying a global IP address of the Microsoft Azure Load Balancer (Load Balancer in Figure 2.3 HA Cluster Using an Public Load Balancer).

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.

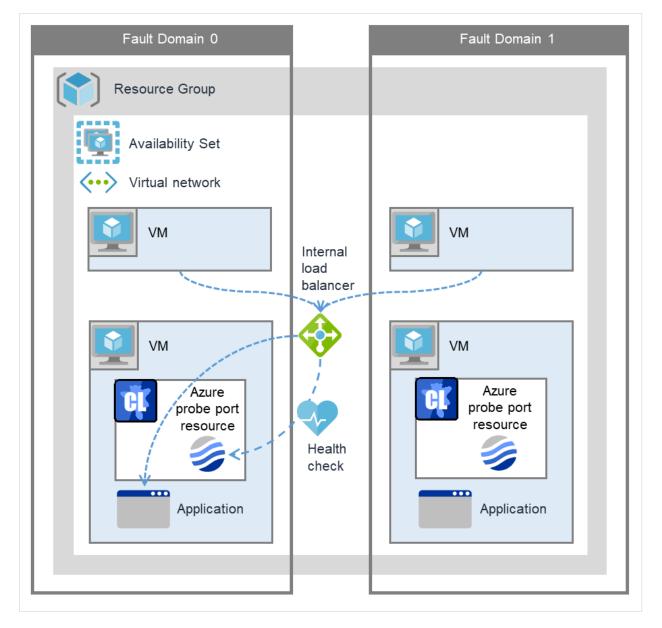


Fig. 2.4: HA Cluster Using the Internal Load Balancer

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 out- side the Microsoft Azure net-	Public load balancer	See "5. Cluster Creation Proce- dure (for an HA Cluster Using a
work		<i>Public Load Balancer</i>)" in this guide.
Publishing operations within the Microsoft Azure network	Internal load balancer (ILB)	See "6. Cluster Creation Proce- dure (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 re- source 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 re- source	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 communica- tion with the Microsoft Azure Service Management API is possible, and also monitors health of communication with an external network.	When a public load balancer is used, required to monitor communication between clus- ters that are configured with vir- tual machines, and also to mon- itor health of communication with an external network.
Custom monitor resource	Monitors communication be- tween clusters that are config- ured with virtual machines, and also monitors health of commu- nication with an internal net- work.	When a public 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.

Resource or monitor re-	Description	Setting		
source type				
Multi target monitor resource	Monitors the statuses of both	When a public load balancer is		
_	the IP monitor resource and	used, required to monitor health		
	custom monitor resource. If	of communication between an		
	the statuses of both monitor re-	internal network and external		
	sources are abnormal, a script	network.		
	in which a process for network			
	partition resolution (NP resolu-			
	tion) is described is executed.			
PING network partition reso-	When an internal load balancer	When an internal load balancer		
lution resource	(ILB) is used, monitors health	(ILB) is used, required to moni-		
	of communication between sub-	tor health of communication be-		
	nets by checking whether to	tween subnets.		
	communicate with a device that			
	is always on and can return a re-			
	sponse to ping (ping device).			
Other resources and monitor	Depends on the configuration	Optional		
resources	of application, such as a mirror			
	disk, that is used in an HA clus-			
	ter.			

Table 2.4 – continued from previous page

2.3 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 Outside the Mi- crosoft Azure Virtual network	access destination Microsoft Azure Service Manage- ment API (manage- ment.core.windows.net)	Procedure Checking a LISTEN port	EXPRESSCLUSTER resources, monitor resources, and com- mands to be used for NP resolution - Custom monitor resource - clpazure_port_checker command
	each cluster server	Ping	IP monitor resource
Inside the Microsoft	Servers, excluding a	Ping	PING network par-
Azure Virtual net-	cluster server, that ex-		tition resolution
work	ist within the Microsoft		resource
	Azure network(*)		
	Web servers that ex-	HTTP	HTTP network par-
	ist within the Microsoft		tition resolution
	Azure network		resource

For details about NP resolution, see the following:

• "Details on network partition resolution resources" 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). There is no NP resolution destination nor method to recommend.

How to judge the network partition status

EXPRESSCLUSTER provides the clpazure_port_checker command to check the TCP port listening 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 "4.3. *Configuring the EXPRESSCLUSTER settings*" and "6.3. *Configuring the EXPRESSCLUSTER settings*"

Options

- -h *hostname* Specify the determining server as *hostname* (by using an FQDN name or IP address). This option cannot be omitted.
- **-p** *port* Specify the determining port number as port (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)

2.4 Differences between on-premises and Microsoft Azure

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

Function	On-premise	Microsoft Azure Resource Manager deployment model
Creating a shared disk type cluster	\checkmark	\checkmark
Creating a mirror disk type cluster	\checkmark	\checkmark
Creating a hybrid disk type cluster	\checkmark	\checkmark
Using the management group	\checkmark	n/a
Using the floating IP resource	\checkmark	n/a
Using the virtual IP resource	\checkmark	n/a
Using the virtual computer name resource	\checkmark	n/a
Using the Azure probe port resource	n/a	\checkmark
Using the Azure DNS resource	n/a	\checkmark

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.

• Before installing EXPRESSCLUSTER

Step No.	Procedure	On-premise	Microsoft Azure
1	Creating a resource	Not required	See "4.2. Configuring
	group		Microsoft Azure" in this
			guide.
2	Creating a virtual net-	Not required	See "4.2. Configuring
	work		Microsoft Azure" in this
			guide.
3	Creating a virtual ma-	Not required	See "4.2. Configuring
	chine		Microsoft Azure" in this
			guide.
4	Setting a private IP ad-	Not required	See "4.2. Configuring
	dress		Microsoft Azure" in this
			guide.
5	Adding a disk	Not required	See "4.2. Configuring
			Microsoft Azure" in this
			guide.
6	Creating a DNS zone	Not required	See "4.2. Configuring
			Microsoft Azure" in this
			guide.
			Continued on next page

Stop No.		ntinued from previous pag	
Step No.	Procedure	On-premise	Microsoft Azure
/	Setting up the DNS	See the manual provided with the OS or DNS	Not required
	server		
8	Setting a partition for the	server.	See "4.2. Configuring
0	mirror disk resource	See the following:	Microsoft Azure" in this
	mintor disk resource	- "Settings after	guide.
		configuring hardware" in	guide.
		"Determining a system	
		configuration" in the	
		Installation and	
		Configuration Guide.	
		- "Understanding Mirror	
		disk resources" in the	
		Reference Guide.	
9	Adjusting the OS startup	See "Settings after con-	Same as "On-premise"
	time	figuring hardware" in	
		"Determining a sys-	
		tem configuration" in	
		the Installation and	
		Configuration Guide.	
10	Checking the network	See "Settings after con-	Same as "On-premise"
	setting	figuring hardware" in	
		"Determining a sys-	
		tem configuration" in the Installation and	
		the Installation and Configuration Guide.	
11	Checking the firewall set-	See "Settings after con-	Same as "On-premise"
	ting	figuring hardware" in	Same as on-premise
		"Determining a sys-	
		tem configuration" in	
		the Installation and	
		Configuration Guide.	
12	Synchronizing the server	See "Settings after con-	Same as "On-premise"
	time	figuring hardware" in	
		"Determining a sys-	
		tem configuration" in	
		the Installation and	
		Configuration Guide.	
13	Disabling the power sav-	See "Settings after con-	Same as "On-premise"
	ing function	figuring hardware" in	
		"Determining a sys-	
		tem configuration" in	
		the Installation and	
1/	Installing the Arms CLI	Configuration Guide.	Saa "42 Confouring
14	Installing the Azure CLI	Not required	See "4.2. Configuring Microsoft Azure" in this
			guide.
			Continued on next page

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Step No.	Procedure	On-premise	Microsoft Azure
15	Registering the service principal	Not required	See "4.2. Configuring Microsoft Azure" in this guide.
16	Installing EXPRESS- CLUSTER	See"InstallingEX-PRESSCLUSTER"intheInstallationandConfiguration Guide.	Same as "On-premise"

Table 2.7 – continued from previous page

• After installing EXPRESSCLUSTER

Step No.	Procedure	On-premise	Microsoft Azure
17	Registering the EX- PRESSCLUSTER license	See "Registering the li- cense." in the Installation and Configuration Guide.	Same as "On-premise"
18	Creating a cluster: Set- ting the heartbeat method	See "Procedure for cre- ating the cluster configu- ration data" in "Creating the cluster configuration data" in the Installation and Configuration Guide.	The COM heartbeat, BMC heartbeat, and disk heartbeat cannot be used.
19	Creating a cluster: Set- ting the NP resolution processing	The network partition resolution resource is used. See the following: - "Procedure for creating the cluster configuration data" in "Creating the cluster configuration data".in the Installation and Configuration Guide. - "Details on network partition resolution resources" in the Reference Guide.	See "6.3. Configuring the EXPRESSCLUSTER set- tings" in this guide.

		nunued nom previous pag	JC
Step No.	Procedure	On-premise	Microsoft Azure
20	Creating a cluster: Creat-	See "Procedure for cre-	
	ing a failover group and	ating the cluster config-	In addition to the
	monitor resource	uration data" in "Creat-	references for
		ing the cluster configu-	on-premises, see the
		ration data".in the Instal-	following:
		lation and Configuration	- "Understanding Azure
		Guide.	DNS resources" in the
			Reference Guide.
			- "Understanding Azure
			DNS monitor resources"
			in the Reference Guide.
			- "4.3. Configuring the
			EXPRESSCLUSTER
			settings" in this guide.

Table 2.8 – continued from previous page

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.

• Before installing EXPRESSCLUSTER

Step No.	Procedure	On-premise	Microsoft Azure
1	Creating a resource group	Not required	See either of the following depending on the load balancer to use: - "5.2. Configuring Microsoft Azure" in this guide - "6.2. 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: - "5.2. Configuring Microsoft Azure" in this guide - "6.2. Configuring Microsoft Azure" in this guide Continued on next page

Step No.	Procedure	ntinued from previous pag	Microsoft Azure
3	Creating a virtual machine	Not required	See either of the following depending on the load balancer to use: - "5.2. Configuring Microsoft Azure" in this guide - "6.2. 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: - "5.2. Configuring Microsoft Azure" in this guide - "6.2. Configuring Microsoft Azure" in this guide
5	Adding a disk	Not required	See either of the following depending on the load balancer to use: - "5.2. <i>Configuring</i> <i>Microsoft Azure</i> " in this guide - "6.2. <i>Configuring</i> <i>Microsoft Azure</i> " in this guide
6	Setting a partition for the mirror disk resource	See the following: - "Settings after configuring hardware" in "Determining a system configuration" in the Installation and Configuration Guide - "Understanding mirror disk resources" in the Reference Guide.	See either of the following depending on the load balancer to use: - "5.2. Configuring Microsoft Azure" in this guide - "6.2. Configuring Microsoft Azure" in this guide

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Step No.	Procedure	On-premise	Microsoft Azure
7	Creating and configuring a load balancer	Not required	See either of the following depending on the load balancer to use: - "5.2. Configuring Microsoft Azure" in this guide - "6.2. Configuring Microsoft Azure" in this guide
8	Setting the inbound secu- rity rules	Not required	- "5.2. Configuring Microsoft Azure" in this guide
9	Adjusting the OS startup time	See "Settings after con- figuring hardware" in "Determining a sys- tem configuration" in the Installation and Configuration Guide.	Same as "On-premise"
10	Checking the network setting	See "Settings after con- figuring hardware" in "Determining a sys- tem configuration" in the Installation and Configuration Guide.	Same as "On-premise"
11	Checking the firewall set- ting	See "Settings after con- figuring hardware" in "Determining a sys- tem configuration" in the Installation and Configuration Guide.	Same as "On-premise"
12	Synchronizing the server time	See "Settings after con- figuring hardware" in "Determining a sys- tem configuration" in the Installation and Configuration Guide.	Same as "On-premise"
13	Disabling the power sav- ing function	See "Settings after con- figuring hardware" in "Determining a sys- tem configuration" in the Installation and Configuration Guide.	Same as "On-premise"
14	Installing EXPRESS- CLUSTER	See "Installing EX- PRESSCLUSTER" in the Installation and Configuration Guide.	Same as "On-premise"

Table 2.9 – continued from previous page
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• After installing EXPRESSCLUSTER

Step No.	Procedure	On-premise	Microsoft Azure
15	Registering the EX- PRESSCLUSTER license	See "Registering the li- cense" in the Installation and Configuration Guide.	Same as "On-premise"
16	Creating a cluster: Set- ting the heartbeat method	See "Procedure for cre- ating the cluster configu- ration data" in "Creating the cluster configuration data" in the Installation and Configuration Guide.	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: - "Procedure for creating the cluster configuration data" in "Creating the cluster configuration data". in the Installation and Configuration Guide - "Details on network partition resolution resources" in the Reference Guide.	See either of the following depending on the load balancer to use: - See "5.3. Configuring the EXPRESSCLUSTER settings" in this guide. - See "6.3. Configuring the EXPRESSCLUSTER settings" in this guide.

Step No.	Procedure	On-premise	Microsoft Azure
18	Creating a cluster: Creating a failover group and monitor resource	See "Procedure for creating the cluster configuration data" in "Creating the cluster configuration data" in the Installation and Configuration Guide.	See the following in addition to the description of "On-premise." - "Understanding Azure probe port resources" in the Reference Guide. - "Understanding Azure load balance monitor resources" in the Reference Guide. - "Understanding Azure load balance monitor resources" in the Reference Guide. See either of the following depending on the load balancer to use: - See "5.3. Configuring the EXPRESSCLUSTER settings" in this guide. - See "6.3. Configuring the EXPRESSCLUSTER settings" in this guide.

Table 2.10 – continued from previous page

CHAPTER

THREE

OPERATING ENVIRONMENTS

3.1 HA cluster using Azure DNS

Supports the OS versions listed in the following manuals:

• "Getting Started Guide" > " Installation requirements for EXPRESSCLUSTER" > "Operation environment for Azure DNS resource and Azure DNS monitor resource"

Its operation has been verified in the following environments.

If the OS version is supported by Azure in EXPRESSCLUSTER X 4.2, you can use it by the same procedure. If the procedure differs depending on the OS version, replace it.

x86_64

OS	Windows Server 2016 DataCenter
EXPRESSCLUSTER	EXPRESSCLUSTER X 4.2 for Windows(Internal version: 12.20)
Microsoft Azure deployment	Resource Manager
model	
Region (otherwise region or loca-	(Asia Pacific) Japan East
tion according to parameter)	
Mirror disk size	Disk size: 20 GB (1 GB for a cluster partition and 19 GB for a data partition)
Azure CLI	2

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: Get started with Azure CLI: https://docs.microsoft.com/en-us/cli/azure/get-started-with-azure-cli?view=azure-cli-latest

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/

3.2 HA cluster using a load balancer

Supports the OS versions listed in the following manuals:

• "Operation environment for Azure probe port resource, Azure probe port monitor resource and Azure load balance monitor resource" in "Installation requirements for EXPRESSCLUSTER" in the Getting Started Guide.

Its operation has been verified in the following environments. If the OS version is supported by Azure in EXPRESSCLUSTER X 4.2, you can use it by the same procedure. If the procedure differs depending on the OS version, replace it.

x86_64

OS	Windows Server 2016 DataCenter
EXPRESSCLUSTER	EXPRESSCLUSTER X 4.2 for Windows(Internal version: 12.20)
Microsoft Azure deployment	Resource Manager
model	
Region (otherwise region or loca-	(Asia Pacific) Japan East
tion according to parameter)	
Mirror disk size	Disk size: 20 GB (1 GB for a cluster partition and 19 GB for a data partition)

CHAPTER

FOUR

CLUSTER CREATION PROCEDURE (FOR AN HA CLUSTER USING AZURE DNS)

4.1 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			
– Resource group	TestGroup1		
– Region	(Asia Pacific) 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	TestGroup1		
– Location	(Asia Pacific) Japan East		
DNS zone setting			

Setting item	Setting value	
– Name	cluster1.zone	
- Resource group	TestGroup1	
- Resource group location	(Asia Pacific) Japan East	
- Record set	test-record1	

Table 4.1 – continued from previous page

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

Setting item	Setting value	
	node1	node2
Virtual machine setting		
– Disk type	Standard HDD	Standard HDD
– User name	testlogin	testlogin
– Password	PassWord_123	PassWord_123
- Resource group	TestGroup1	TestGroup1
– Region	(Asia Pacific) Japan East	(Asia Pacific) Japan East
Network security group setting		
– Name	node1-nsg	node2-nsg
Availability set setting		
– Name	AvailabilitySet-1	AvailabilitySet-1
– Update domains	5	5
– Fault domains	2	2
Diagnostics storage account set- ting		Continued on pout page

Setting item	Setting value	
	node1	node2
– Name	Automatically generated	Automatically generated
- Performance	Standard	Standard
- Replication	Locally-redundant storage (LRS)	Locally-redundant storage (LRS)
IP configuration setting		
– IP address	10.5.0.120	10.5.0.121
Disk setting		
– Name	node1_DataDisk_0	node2_DataDisk_0
– Source type	None (empty disk)	None (empty disk)
– Account type	Standard HDD	Standard HDD
– Size	20	20

Table 4.2 – continued from previous page

• EXPRESSCLUSTER settings (cluster properties)

Setting item	Setting value	
	node1	node2
– Cluster Name	Cluster1	Cluster1
– Server Name	node1	node2
- Timeout Tab: Heartbeat timeout	210	210

• EXPRESSCLUSTER settings (failover group)

Resource name	Setting item	Setting value
Mirror disk resource	Name	md
	Details Tab: Data Partition Drive	G:
	Letter	
		• • • • • • • • • • • • • • • • • • •

Continued on next page

Tabi	e 4.4 – continued from previous p	Jage				
Resource name	Setting item	Setting value				
	Details Tab: Cluster Partition	F:				
	Drive Letter					
Azure DNS resource	Name	azuredns1				
	Record Set Name	test-record1				
	Zone Name	cluster1.zone				
	IP Address	(node-1) 10.5.0.120				
		(node-2) 10.5.0.121				
	Resource Group Name	TestGroup1				
	User URI	XXXXXXXX-XXXX-XXXX-XXXX-				
		XXXXXXXXXXX				
	Tenant ID	XXXXXXXX-XXXX-XXXX-				
		XXXXXXXXXXX				
	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				

Table 4.4 – continued from previous page

• EXPRESSCLUSTER settings (monitor resource)

Monitor resource name	Setting item	Setting value
Mirror disk monitor resource	Name	mdw1
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

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** on the upper part of the window. If there are existing resource groups, they are displayed in a list.

+	()	ę		+		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent resc	ources								
	NAME			TYPE				LAST VIEWED	
~~>								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
•••								28 min ago	
9								28 min ago	
688								28 min ago	
9								29 min ago	
9								30 min ago	
8								32 min ago	
Navigate	criptions	() Resource	e groups	All r	esources	🔚 Dashi	ooard		

2. Select +Add on the upper part of the window.

Home > Resource groups			
Resource groups			\$
REAL CONTRACTOR OF THE OWNER			
+ Add ≡≡ Edit columns 🕐 Refresh 🞍 Export to CSV	🖗 Assign tags 🛛 🛇 Feedback		
Subscription == all Locatio	n == all		
howing 1 to 30 of 30 records.		No grouping	~
Name 1	Subscription ↑↓	Location ↑↓	
		Japan East	
		Southeast Asia	
		West US	
		South Central US	•••
		South Central US	•••
		Japan West	
		East Asia	
		South Central US	•••
		South Central US	
		North Europe	
		South Central US	•••
		South Central US	
		Central US	
		Japan East	•••
		West India	•••
		Japan East	
		Japan East	
		Japan East	

3. Specify Subscription, Resource group, and Region, and click Review+Create.

\equiv Microsoft Azure			and docs (G+/)	>_ 67	0 Ø	and show the second	
Home > Resource groups > C	reate a resource group						
Create a resource grou	ıp						×
Basics Tags Review + c	reate						
resources for the solution, or on	nat holds related resources for an Az ly those resources that you want to roups based on what makes the mo	manage as a group. You decide	how you want to				
Project details							
Subscription *			\sim				
Resource group *①	TestGroup1		~				
Resource details							
Region *	(Asia Pacific) Japan East		\sim				
Review + create < P	Vrevious Next : Tags >						
<							>

2) Creating a virtual network

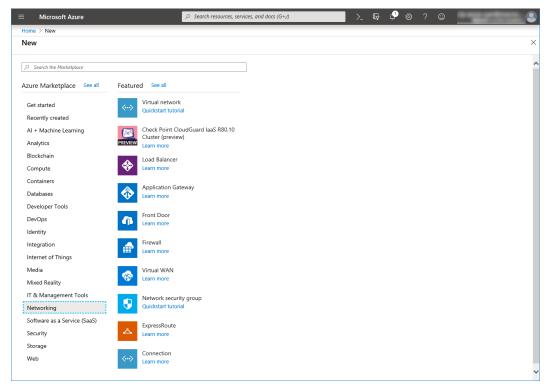
Log in to the Microsoft Azure portal (https://portal.azure.com/) and create a virtual network following the steps below.

Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent re	sources								
	NAME			ТҮРЕ				LAST VIEWED	
\Leftrightarrow								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
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•••								28 min ago	
-								28 min ago	
								28 min ago	
9								29 min ago	
.								30 min ago	
8								32 min ago	
Navigate	bscriptions	() Resourc	e groups	All r	esources	Dashb	oard		

1. Select Create a resource on the upper part of the window.

≡

2. Select Networking and then Virtual network.



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

Microsoft Azure
Iome > New > Create virtual network
Create virtual network $\square \times$
lame *
Vnet1
ddress space *①
10.5.0.0/24 🗸
10.5.0.0 - 10.5.0.255 (256 addresses)
Add an IPv6 address space 🛈
ubscription *
~
esource group *
TestGroup1 🗸
ireate new
ocation * (Asia Pacific) Japan East
ubnet Jame *
Vnet1-1 🗸
uddress range ★①
10.5.0.0/24 🗸
10.5.0.0 - 10.5.0.255 (256 addresses) DDoS protection ①
Basic Standard
ervice endpoints ①
Disabled Enabled
irewall ①
Disabled Enabled
Create Automation options

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 on the upper part of the window.

Azure servi	ces								
+	()			+		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent rese	ources								
	NAME			TYPE				LAST VIEWED	
{··>								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
•••								28 min ago	
5								28 min ago	
								28 min ago	
<u>•</u>								29 min ago	
<u>•</u>								30 min ago	
8								32 min ago	
Navigate	criptions	() Resourc	e groups	All r	esources	Dashi	poard		

2. Select Compute and then See all.

≡ Microsoft Azure		>_	Ŗ	Ļ	ŵ	?	٢	1.4.5	
Home > New									
New									×
									^
Azure Marketplace See all	Featured See all								
Get started Recently created	Virtual machine Learn more								
Al + Machine Learning Analytics	SQL Server 2017 Enterprise Windows Server 2016								
Blockchain Compute	Reserved VM Instances Quickstart tutorial								
Containers Databases	Kubernetes Service Quickstart tutorial								
Developer Tools DevOps Identity	Service Fabric Cluster Quickstart tutorial								
Integration Internet of Things	Web App for Containers Quickstart tutorial								
Media Mixed Reality	Function App Quickstart tutorial								
IT & Management Tools Networking	Batch Service Quickstart tutorial								
Software as a Service (SaaS) Security	Debian 9 "Stretch" with backports kernel Learn more								
Storage Web	Ubuntu Server 16.04 LTS Quickstart tutorial								~

- 3. Select Windows Server 2016 Datacenter.
- 4. When the Basics tab appears, specify the settings of Subscription, Resource group, Virtual machine name, Region, Image, Size, Username, Password, and Confirm password. Select Availability set from Availability options, and click Create new under the Availability set field. When the Create new blade appears, specify the settings of Name, Fault domains, and Update domains. Then click OK.

🗏 Microsoft Azure 🔎 s	Search resources, services, and docs (G+/)		Σ	Ŗ	0 Ø		
Home > New > Create a virtual ma	chine						
Create a virtual machine							;
Basics Disks Networking	Management Advanced Tags Review + create						
	nux or Windows. Select an image from Azure marketplace or us	e your own customized					
image. Complete the Basics tab then Review	+ create to provision a virtual machine with default paramete	rs or review each tab for full					
customization. Looking for classic VMs? Create VM	from Azure Marketolace						
-	non searc markepace						
Project details							
Select the subscription to manage de your resources.	eployed resources and costs. Use resource groups like folders t	o organize and manage all					
,							
Subscription *		\sim					
Resource group *	TestGroup1	\sim					
	Create new						
Instance details							
Virtual machine name *							
virtual machine name	node-1	~					
Region *	(Asia Pacific) Japan East	\sim					
Availability options ①	Availability set	\sim					
	Availability set	· · ·					
Availability set * ①		\checkmark					
	Create new						
Image 📩 🕕	Windows Server 2016 Datacenter	\sim					
	Browse all public and private images						
Review + create	< Previous Next : Disks >						
							>

≡ Microsoft Azure 🔎 Sea	rch resources, services, and docs (G+/)] 🛱 🗘 🐵 ? 🙂 🔽 🔍
Home > New > Create a virtual machin	ne	Create new ×
Create a virtual machine		Group two or more VMs in an availability set to ensure that at least one is available during planned or unplanned maintenance events.
Create a virtual machine that runs Linux image. Complete the Basics tab then Review + of customization. Looking for classic VMs? Create VM fro Project details		Learn more Name * AvailabilitySet-1 Fault domains 2 Update domains 5
Select the subscription to manage deplo your resources. Subscription * Resource group *	yed resources and costs. Use resource groups like folders to organize and manage all V TestGroup1 V Create new V	Use managed disks () No (Classic) Yes (Aligned)
Instance details		
Virtual machine name *	node-1 🗸	
Region * 🛈	(Asia Pacific) Japan East	
Availability options 🕕	Availability set	
Availability set 🗡 🕕	✓	
Image * () Review + create <	Create new The value must not be empty. Windows Server 2016 Datacenter Rrowse all public and private impace Previous Next : Disks >	
		ок

Click Change size to display the Select a VM size blade.

From the list, choose a size (A1 - Standard in this guide) suitable for your virtual machine and click Select.

Regarding the **Virtual machine name**, node-1 is for node-1, and node-2 is for node-2. Click **Next: Disks >**

5. When the **Disks** tab appears, go through the following steps to add a disk to be used for a mirror disk (cluster partition or data partition).

From the DATA DISKS list, click Create and attach a new disk.

\equiv Microsoft Azure ρ s	search resources, services, and docs (G+/)	Þ	Ŗ	Q		0	Conceptual designation of the	
Home > New > Create a virtual mad	chine							
Create a virtual machine								×
Basics Disks Networking	Management Advanced Tags Review + create							
Azure VMs have one operating system The size of the VM determines the typ	n disk and a temporary disk for short-term storage. You can attach additional data disks. pe of storage you can use and the number of data disks allowed. Learn more							
Disk options								
OS disk type *	Standard HDD V							
Enable Ultra Disk compatibility 🛈	Ves 🖲 No							
	Ultra Disk compatibility is not available for this VM size and location.							
Data disks								
You can add and configure additional temporary disk.	l data disks for your virtual machine or attach existing disks. This VM also comes with a							
LUN Name	Size (GiB) Disk type Host caching							
Create and attach a new disk Atta	ach an existing disk							
✓ Advanced								
Review + create	< Previous Next : Networking >							
<								>

6. The Create a new disk blade appears.

Specify Name, Source type, and Size. Then click OK. Click Next: Networking >.

≡ Microsoft A	ر المعند الم	
Home > New > Cre	te a virtual machine > Create a new disk	
Create a new d	sk	×
Create a new disk to storage type, and nur	ore applications and data on your VM. Disk pricing varies based on factors including disk size, ber of transactions. Learn more about Azure Managed Disks	
Name ★	node-1_DataDisk_0	
Source type *	None (empty disk)	
Size 📩 🛈	20 GiB	
	Standard HDD	
	Change size	
ок		
<		>

7. The **Networking** tab appears.

Specify the settings of Virtual network, Subnet, Network security group, and Configure network security group.

Click **Create new** under the **Configure network security group** field to display the **Create network security group** blade. Specify the setting of **Name** and then click **OK**. Click **Next: Management** >.

\equiv Microsoft Azure $ ho$ Sea	rch resources, services, and docs (G+/)	Þ	Ģ	Ð		
Home > New > Create a virtual machin	ne					
Create a virtual machine						×
Basics Disks Networking Ma	nagement Advanced Tags Review + create					· · · · · · · · · · · · · · · · · · ·
Define network connectivity for your virt ports, inbound and outbound connectivi Learn more	ual machine by configuring network interface card (NIC) settings. You can control ty with security group rules, or place behind an existing load balancing solution.					
Network interface						
When creating a virtual machine, a netw	ork interface will be created for you.					
Virtual network *	Vnet1 V					
	Create new					
Subnet * 🛈	Vnet1-1 (10.5.0.0/24)					
	Manage subnet configuration					
Public IP 🛈	None					
	Create new					
NIC network security group $\ensuremath{\bigcirc}$	○ None ○ Basic ● Advanced					
Configure network security group 🕇	(new) node-1-nsg V					
	Create new					
Accelerated networking ①	On 🖲 Off					
	The selected VM size does not support accelerated networking.					
Load balancing						
You can place this virtual machine in the	backend pool of an existing Azure load balancing solution. Learn more					
Review + create <	Previous Next : Management >					
<						>

8. The Management tab appears.

Click **Create new** under the **Diagnostics storage account** field to display the **Create storage account** blade.

Specify the settings of Name, Account kind, and Replication. Then click OK.

In the **Diagnostics storage account** field, the default value is automatically generated and entered. Click **Next: Advanced >**.

≡ Microsoft Azure 🔑 Searc	h resources, services, and docs (G+/)	2	Ģ	Q 🔅		-	
Home > New > Create a virtual machine	2						
Create a virtual machine							×
Basics Disks Networking Mar	agement Advanced Tags Review + create						^
Configure monitoring and management of	ptions for your VM.						
Azure Security Center							
Azure Security Center provides unified sec Learn more	urity management and advanced threat protection across hybrid cloud workloads.						
 Your subscription is protected by Az 	ure Security Center basic plan.						
Monitoring							
Boot diagnostics ①	• On () Off						
OS guest diagnostics $$	○ on ● off						
Diagnostics storage account \star ()	testgroup1diag600 ✓ Create new						
Identity							-
System assigned managed identity ①	On on off						
Azure Active Directory							
Login with AAD credentials (Preview) ①	◯ On						
Review + create < Pr	evious Next : Advanced >						
							-
<							>

9. Click Next: Tags >.

■ Microsoft Azure P Search resources, services, and docs (G+/)	\geq	Ģ	Q		-	
Home > New > Create a virtual machine						
Create a virtual machine						×
Basics Disks Networking Management Advanced Tags Review + create						^
Add additional configuration, agents, scripts or applications via virtual machine extensions or cloud-init.						
Extensions						
Extensions provide post-deployment configuration and automation.						
Extensions O Select an extension to install						
Cloud init						
Cloud init is a widely used approach to customize a Linux VM as it boots for the first time. You can use cloud-init to install packages and write files or to configure users and security. Learn more						
The selected image does not support cloud init.						
Host						
Azure Dedicated Hosts allow you to provision and manage a physical server within our data centers that are dedicated to your Azure subscription. A dedicated host gives you assurance that only VMs from your subscription are on the host, flexibility to choose VMs from your subscription that will be provisioned on the host, and the control of platform maintenance at the level of the host. Learn more						
Host group ① No host group found ~						
1 Dedicated hosts cannot be used with availability sets.						
						~
Review + create < Previous Next : Tags >						
<						>

10. Click Next: Review + create >.

≡ Microsoft Azure		locs (G+/)		D. 🗗	Q 🐵	? 🙄	1000	
Home > New > Create a	virtual machine							
Create a virtual ma	chine							×
Basics Disks Netwo	orking Management Advanced	Tags Review + create						
Tags are name/value pairs t multiple resources and reso	that enable you to categorize resources an ource groups. Learn more about tags of	nd view consolidated billing by applying th	e same tag to					
Note that if you create tags	s and then change resource settings on ot	her tabs, your tags will be automatically up	odated.					
Name 🕕	Value ①	Resource						
	:	11 selected	\checkmark					
Review + create	< Previous Next : Revi	ew + create >						
Review + create	< Previous Next : Revi	ew - create >						
<								>

11. The **Review + create** tab appears. Check the contents. If there is no problem, click **Create**. The deployment starts and takes several minutes.

\equiv Microsoft Azure $ ho$ Searc	h resources, services, and docs (G+/)	Ģ	Q	٢	?	٢	and strength	
Home > New > Create a virtual machine								
Create a virtual machine								\times
Validation passed								
Basics Disks Networking Man	agement Advanced Tags Review + create							^
PRODUCT DETAILS								
Standard A1 v2 by Microsoft Terms of use Privacy policy	Subscription credits apply ① 9.0700 JPY/hr Pricing for other VM sizes							
TERMS								
above; (b) authorize Microsoft to bill my c billing frequency as my Azure subscriptior information with the provider(s) of the off	I terms and privacy statement(s) associated with the Marketplace offering(s) listed urrent payment method for the fees associated with the offering(s), with the same van (c) agree that Microsoft may share my contact, usage and transactional ering(s) for support, billing and other transactional activities. Microsoft does not et he Azure Marketplace Terms for additional details.							
Basics								
Subscription								
Resource group	TestGroup1							
Virtual machine name	node-1							
Region	(Asia Pacific) Japan East							
Availability options	Availability set							
Availability set	(new) AvailabilitySet-1							
Username	testlogin							
Already have a Windows Server license?	No							~
Create < Pr	evious Next > Download a template for automation							>

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** on the upper part of the window.

+	()		.	†		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent reso	urces								
	NAME			TYPE				LAST VIEWED	
\Leftrightarrow								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
								27 min ago	
								28 min ago	
5								28 min ago	
								28 min ago	
•								29 min ago	
•								30 min ago	
8								32 min ago	
Navigate	iptions	() Resourc	e groups	All r	esources	Dasht	poard		

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.

	Search resources, services, and docs (G+/)	∑ Ę ¢² :	© ? ©	
Home > Resource groups > Test TestGroup1	Group1			\$
Resource group				~
	≪ + Add ≡≡ Edit columns 🛍 Delete resource group 💍 F	Refresh \rightarrow Move \downarrow Export to CSV $ $ \otimes Ass	ign tags 🏾 🗎 Delete 🕁 Export terr	nplate ···
 Overview 	Essentials	*		
 Activity log 		== all 🔹 († Add filter		
Access control (IAM)	Showing 1 to 28 of 28 records. Show hidden types ①		No grouping	~
Tags	□ Name ↑↓	Туре ↑↓	Location $\uparrow \downarrow$	
Events	AvailabilitySet-1	Availability set	Japan East	
Settings	AvailabilitySet1	Availability set	Japan East	
Quickstart	🔲 🏧 ipconfig1	Public IP address	Japan East	
Deployments	🔲 🖬 ipconfig2	Public IP address	Japan East	
Policies	🔲 📮 node-1	Virtual machine	Japan East	
Properties	🔲 💎 node-1-nsg	Network security group	Japan East	
Locks	🔲 🐻 node-1284	Network interface	Japan East	
Export template	Source 1_DataDisk_0	Disk	Japan East	
ost Management	S node-1_OsDisk_1_dfa99e02b54a4452ac9964de51616aa3	Disk	Japan East	
Cost analysis	node-2	Virtual machine	Japan East	
Cost alerts	🔲 🌎 node-2-nsg	Network security group	Japan East	
Budgets	C 🕼 node-2419	Network interface	Japan East	
Advisor recommendations	node-2_DataDisk_0	Disk	Japan East	
Monitoring	node-2_OsDisk_1_5bdf3b9c14a6472888aa54dc732cd720	Disk	Japan East	
Insights (preview)	< Previous Page 1 V of 1 Next >			
Alerts	•			

4. Select Networking.

Iome > Resource groups > TestGro	upi > node	- I - Networkin	ig						
node-1 - Networking Virtual machine									
	« Ø /	Attach network	interface ್ರ ^೮ Detach network inter	face					
Overview	~ ® N	etwork inter	face: node-1284 Effective secu	irity rules Topol	ogy				
Activity log	Virtu	al network/sub	onet: Vnet1/Vnet1-1 NIC Public IP	- NIC Private IP:	10.5.0.4 Acceler	ated networking: Disa	bled		
Access control (IAM)	Inb	ound port rul	les Outbound port rules Appli	cation security grou	ps Load balancing	1			
Tags			ty group node-1-nsg (attached to r			,			
Diagnose and solve problems			ty group node-1-nsg (attached to r its, 1 network interfaces	network interface: no	ode-1284)			Add inbound port	rule
ettings	Prie	ority	Name	Port	Protocol	Source	Destination	Action	
Networking	100	0	🔺 default-allow-rdp	3389	ТСР	Any	Any	Allow	
Disks	650	00	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow	
Size	650	01	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	Allow	
Security	655	00	DenyAllInBound	Any	Any	Any	Any	Ø Deny	
Extensions									
Continuous delivery (Preview)									
Availability + scaling									
Configuration									
ldentity									
Properties									
Locks									
Export template									

- 5. Select a network interface displayed in the list. The network interface name is generated automatically.
- 6. Select **IP configurations**.

\equiv Microsoft Azure \checkmark Search	n resources, services,	and docs (G+/)			D Q	₽ @ ?	©	
Home > Resource groups > TestGroup1	> node-1 - Network	king > node-1284	1 - IP configuratio	ns				
node-1284 - IP configurat	tions							×
	🕂 Add 🔛 Si	ave 🗙 Discard						
Overview	IP forwarding se	ettings						
Activity log	IP forwarding			Disabled Enabled				
Access control (IAM)	Virtual network			Vnet1				
Tags	IP configuration	s						
Settings	Subnet *			Vnet1-1 (10.5.0.0/24)				\sim
IP configurations								
DNS servers	✓ Search IP cor							
💎 Network security group	Name	IP Version	Туре	Private IP address		Public IP ad	dress	
Properties	ipconfig1	IPv4	Primary	10.5.0.4 (Dynamic)		-		
🔒 Locks								
🖳 Export template								
Support + troubleshooting								
📩 Effective security rules								
Effective routes								
📯 New support request								
/								

- 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.

■ Microsoft Azure			۶.	Ŗ	P	٢	?	٢	and shows	
Home > Resource groups > TestGroup1 > node-1 - Networking > node-1284 - IP of	onfigur	tions > ipconfig1							_	
ipconfig1 node-1284										
🔚 Save 🗙 Discard										
The virtual machine associated with this network interface will be restarted to utilize th new private IP address. The network interface will be reprovisioned and network configuration settings, including secondary IP addresses, built marks, and default gateway, will need to be manually reconfigured within the virtual machine. Learn more										
Public IP address settings Public IP address (Disabled) Enabled										
Private IP address settings Virtual network/subnet										
Vnet1/Vnet1-1 Assignment (Dynamic Static)										
IP address * 10.5.0.120	~									
<										>

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

5) Creating a DNS zone

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

Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent res	sources								
	NAME			TYPE				LAST VIEWED	
~~>								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
								27 min ago	
								28 min ago	
-								28 min ago	
								28 min ago	
9								29 min ago	
9								30 min ago	
8								32 min ago	
Navigate	bscriptions	Resource	e groups	All r	esources	Dashb	oard		

1. Select Create a resource on the upper part of the window.

2. Select **Networking > See all**, and search for DNS zone.

Microsoft Azure	, Search resources, services, and docs (G+/)	 Ģ Q @ ?	
ome > New			
New			
	×		
DNS zone			
Private DNS zone			
Get started	Virtual network		
Recently created	Quickstart tutorial		
AI + Machine Learning	Check Point CloudGuard IaaS R80.10		
Analytics	Cluster (preview) PREVIEW Learn more		
Blockchain	Load Balancer		
Compute	Learn more		
Containers			
Databases	Application Gateway Learn more		
Developer Tools			
DevOps	Front Door		
Identity	Learn more		
Integration	Firewall		
Internet of Things	Eearn more		
Media	Virtual WAN		
Mixed Reality	Cearn more		
IT & Management Tools	Network security group		
Networking	Quickstart tutorial		
Software as a Service (SaaS)			
Security	A ExpressRoute		
Storage	—		
Web	Connection Learn more		
	Lean more		

3. Create DNS zone is displayed. Specify Subscription, Resource group, and Name, and click Review+create. Then click Create.

\equiv Microsoft Azure			docs (G+/)	>_ 1	₽ Q		-	
Home > New > DNS zone >	Create DNS zone							
Create DNS zone								×
Basics Tags Review +	DNS records for a particular domain	. For example, the domain 'contoso.	com' may contain a					
allows you to host your DNS zo	s 'mail.contoso.com' (for a mail serve one and manage your DNS records, a ecords that you create. Learn more.							
Project details								
Subscription *			\sim					
Resource group *	TestGroup1 Create new		\checkmark					
Instance details								
Name *	cluster1.zone		~					
Resource group location ①	(Asia Pacific) Japan East		\sim					
Review + create	< Previous Next : Tags > D	ownload a template for automation						
<								>

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 disk. 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 "Determining a system configuration" in the Installation and Configuration Guide.

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

Initialize Disk	\times
You must initialize a disk before Logical Disk Manager can access it. <u>S</u> elect disks:	
☑ Disk 2	
Use the following partition style for the selected disks:	
<u>MBR</u> (Master Boot Record)	
○ <u>G</u> PT (GUID Partition Table)	
Note: The GPT partition style is not recognized by all previous versions of Windows.	
OK Cancel	

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

File Action	ement <u>V</u> iew <u>H</u> elp						_	×
] 🔒 🔎 🛙	8					
Volume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free	
(C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	113.12 GB	89 %	
 Temporary St 	orag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %	
Disk 0 Basic 127.00 GB Dnline	(C:) 127.00 GB NTFS Healthy (System,		e, Crash Dump, I	Primary Partition				
Disk 1 Basic 70.00 GB Online	Temporary Stor 70.00 GB NTFS Healthy (Page Fi	-	Partition)					
Disk 2 Basic 20.00 GB Online	20.00 GB Unallocated							

- 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.

New Simple Volume Wizard		×
	Welcome to the New Simple Volume Wizard	
	This wizard helps you create a simple volume on a disk.	
	A simple volume can only be on a single disk.	
	To continue, click Next.	
	< <u>B</u> ack <u>N</u> ext > Cancel	

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
<u>S</u> imple 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: Mount in the following empty NTFS folder:	F ✓ Browse
O <u>D</u> o not assign a drive letter or drive path	
<	Back <u>N</u> ext > 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 betwee	en the maximum and minimum sizes.
Maximum disk space in MB:	19453
Minimum disk space in MB:	8
<u>Simple volume size in MB:</u>	19453
	< <u>B</u> ack <u>N</u> ext > 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: ☐ Mount in the following empty NTFS folder: ☐ Mount in the following empty NTFS folder: ☐ Mount in the following empty number of the following empty number	
< <u>B</u> ack <u>N</u> ext >	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 th	nis volume, and if so, what settings you want to use.				
O Do not format this volume					
Format this volume with the following the following of	owing settings:				
<u>File system:</u>	NTFS ~				
Allocation unit size:	Default ~				
<u>V</u> olume label:	New Volume				
Perform a quick format					
Enable file and folder cor	npression				
	< <u>B</u> ack <u>N</u> ext > Cancel				

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

New Simple Volume Wizard		Х
	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 Ouirck format: Yes To close this wizard, click Finish.	
	< <u>B</u> ack Finish Cancel	

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

 Disk Manage 	ement						_	\times
Eile <u>A</u> ction	<u>V</u> iew <u>H</u> elp							
Þ 🔿 📷	? 🗊 🗩 🗙 🛛	3 🔒 🛃	3 21					
/olume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free	
🗰 (C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	111.94 GB	88 %	
= (F:)	Simple	Basic	RAW	Healthy (P	1.00 GB	1.00 GB	100 %	
New Volume	(G:) Simple	Basic	NTFS	Healthy (P	19.00 GB	18.94 GB	100 %	
Temporary St	torag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %	
Basic 127.00 GB	(C:)	///////////////////////////////////////	11111111111					
Online	127.00 GB NTFS Healthy (System		/e, Crash Dump,	Primary Partition	8			
		, Boot, Activ		Primary Partition	<u> </u>			
Doline Disk 1 Basic 70.00 GB	Healthy (System Temporary Stor 70.00 GB NTFS	, Boot, Activ		Primary Partition				
Online Disk 1 Basic 70.00 GB Online	Healthy (System Temporary Stor 70.00 GB NTFS	, Boot, Activ rage (D:) Ile, Primary F	Partition)	Primary Partition ew Volume (G:) 0.00 GB NTFS ealthy (Primary P				

7) 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 "Determining a system configuration" in the Installation and Configuration Guide.

8) 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 the Azure CLI:

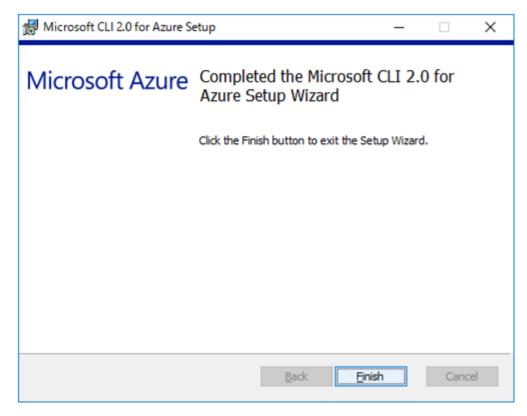
https://docs.microsoft.com/en-us/cli/azure/install-azure-cli?view=azure-cli-latest

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

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

Microsoft CLI 2.0 for Azure Setup -				×			
Microsoft Azure	Please read the Microsoft CLI License Agreement	2.0 for	Azure				
	MICROSOFT SOFTWARE LICE	NSE TEF	RMS	^			
	Microsoft CLI 2.0 for Azure						
	These license terms are an agr Microsoft Corporation (or based live, one of its affiliates) and yo the software named above. Th apply to any Microsoft services the software, except to the exter different terms.	d on wh u. They le terms or upda	ere you apply to also ites for				
	TE YOU COMPLY WITH THESE	LICENS	3F	*			
☑ I accept the terms in the License Agreement							
Print	<u>B</u> ack <u>I</u> nstall		Cance	el			

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



9) 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. Please note that certificates have an expiration date. For more details, see the --years option of az ad sp create-for-rbac.

https://docs.microsoft.com/en-us/cli/azure/ad/sp?view=azure-cli-latest# az-ad-sp-create-for-rbac

For details about a service principal and procedure, see the following websites:

Sign in with Azure CLI: https://docs.microsoft.com/en-us/cli/azure/authenticate-azure-cli?view=azure-cli-latest

Create an Azure service principal with Azure CLI: 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 they need to be entered for configuring Azure DNS resource by Cluster WebUI. In the following example, a service principal is created in C:\Users\testlogin\examplecert.pem.

```
3. Log out.
```

Γ

```
az logout --u <account-name>
```

4. Check whether login to Microsoft Azure using the created service principal is possible.

The following is displayed upon successful sign-in.

```
{
   "cloudName": "AzureCloud",
   "id": "xxxxxxx-xxxx-xxxx-xxxx-xxxxxxx,
   "isDefault": true,
   "name": "xxxxxxxxx,
   "state": "Enabled",
   "tenantId": "xxxxxxx-xxxx-xxxx-xxxx-xxxxxxxx,
   "user": {
        "name": "xxxxxxx-xxxx-xxxx-xxxx-xxxxxxxx,
        "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.

```
Microsoft.Network/dnsZones/A/write
Microsoft.Network/dnsZones/A/delete
Microsoft.Network/dnsZones/NS/read
```

10) Installing EXPRESSCLUSTER

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

After installation is complete, restart the OS.

11) Registering the EXPRESSCLUSTER license

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

4.3 Configuring the EXPRESSCLUSTER settings

For the Cluster WebUI setup and connection procedures, see "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 Cluster WebUI, and click Cluster generation wizard.

Cluster WebUI <cluster></cluster>				🗲 Config	j mode 🗸	Ł	3	ß	۶	i ?	
Cluster generation wizard	Export Get the Configuration File	Apply the Configuration File	Update Serv	er Data	Check the Config	juration File					

 The Cluster window on the Cluster generation wizard is displayed. Enter a desired name in Cluster Name. Select an appropriate language in Language. Click Next.

Cluster generation wizard	×				
Server Server Cluster → Basic Settings → Interconnect →	Server ▶ NP Resolution → Group → Monitor				
Cluster Name*	Cluster1				
Comment					
Language*	English 🗸				
Management IP Address					
• 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].					
	Back Next Cancel				

3. The **Basic Settings** window is displayed.

The instance connected to Cluster WebUI is displayed as a registered master server. Click **Add** to add the remaining instances (by specifying the private IP address of each instance). Click **Next**.

Add server	
Server Name or IP Address*	10.5.0.121
• Enter an IP address or a server name. When entering a server name, name res Both IPv4 and IPv6 for IP address can be When entering an IP address, the server	olution is necessary. e used.
	OK Cancel
Cluster generation wizard	\$
Server Server Server Cluster ♥ → Basic Settings → Interconnect → NP Resolution → Add Remove Server Definitions Order Name	Group 🔸 Monitor
Master server node-1	
1 node-2 ↑ ↓ Server Group Definition	Settings
O Click "Add" to add servers constructing the cluster. Click ↑↑ J or ↓↓ to change the server priority. Click "Settings" to configure the server group when using the server group.	
	Back Next Cancel

4. The Interconnect window 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. Click **Next**.

🌮 Cluster ge	neration wizard				
Cluster 🔗 🔸	Server Basic Settings Add Remove	Server ⊘ → Interconi	Server	ution ᢣ Group ᢣ Monitor	
Interconnect L Priority Ty		MDC	node-1	node-2	
1 К	ernel Mode	✓ mdc1 ✓	10.5.0.120	✔ 10.5.0.121	\checkmark
$\uparrow \downarrow$					
For "Kernel r which is used For "Kernel r	node" and "Witness I only for data mirro node" setting, more	HB" settings, configu ring communication. than zero routes are	re the route which is necessary to be con	figured. Configuring more than one ro	munication Only" setting, configure the route
For "Witness Click "↑" or For "Mirror C	HB" setting, click ea "↓" to configure the ommunication Only" nunication route whi	ach server column ce priority to preferent setting, click on the	ially use the LAN only cell for each server o	not use", and then click "Properties" t v for the communication among the cl column and set an IP address.	
					Back Next Cance

5. The NP Resolution window is displayed.

Note that NP resolution is not configured on this window. 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**"

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). There is no NP resolution destination nor method to recommend. Additionally, you can use network partition resolution resources for NP resolution.



2) Adding a group resource

• Defining a group

Create a failover group.

1. The Group List window s displayed.

Click Add.

Cluster generation wizard	×
Server Server Server Cluster O + Basic Settings O + Interconnect O +	Monitor
Properties Add Remove	Group Resource
Group List	
Name Type	
No groups	
 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. 	

2. The Group Definition window is displayed.

Specify a failover group name (failover1) for Name. Click Next.

Group Definition		failover 🗙
Basic Settings → Startup Servers	→ Group Attributes → Group Resource	
Туре*	failover 🗸	
Use Server Group Settings		
Name*	failover1	
Comment		
 Select group type. If using virtual machine resources to clust "Failover". If using server group, check the "Use Server 	ter virtual machines, select "Virtual machine" as the type. In other case ver Group".	s, select
	4 Back Next ►	Cancel

- 3. The **Startup Servers** window is displayed. Click **Next** without specifying anything.
- 4. The **Group Attributes** window is displayed. Click **Next** without specifying anything.
- 5. The **Group Resource** window is displayed.

On this page, add a group resource following the procedure below.

Group Definit	tion					failover	
Basic Setting	s 📀 🔶 Startup	Servers 🛇 🔸	Group Attributes) >	Group Resource		
Properties	Add Remove						
Group Resourc	e List						
Name			Туре				
No resources							
-	d" to add resources ties" to configure th		e selected resource.				
					 ■ Back 	Finish Cance	əl

• Mirror disk resource

Create a mirror disk resource.

For details, see "Understanding Mirror disk resources" in the Reference Guide.

- 1. Click Add on the Group Resource List page.
- 2. The Resource Definition of Group | failover1 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. Click **Next**.

Resource Definition of Group failover1 md						
Info \rightarrow Dependency \rightarrow Recovery	Operation 🔶 Details					
Туре*	Mirror disk resource					
Name*	md					
Comment						
Get License Info						
• Select the type of group resource and enter its name.						
		Hack Next ► Cancel				

- 3. The **Dependency** window is displayed. Click **Next** without specifying anything.
- 4. The **Recovery Operation** window is displayed. Click **Next**.
- The Details window 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		md 🗙
Info \bigcirc \rightarrow Dependency \oslash \rightarrow Recovery Operation \oslash	→ Details	
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		Name
	← Add	node-1
	→ Remove	node-2
Edit		
Add Servers that can run the group		
Tuning		
		Back Finish Cancel

6. 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**.

Connect				
ata Partiti	ion			
Volume	Disk No.	Partition No.	Size	GUID
	0	1	500MB	
D:¥	1	1	10238MB	
F:¥	2	1	1024MB	
C:¥	0	2	129546MB	
G:¥	2	2	19453MB	
luster Par Volume	tition Disk No.	Partition No.	Size	GUID
	0	1	500MB	and the based states are as a super-
D:¥	1	1	10238MB	
F:¥	2	1	1024MB	
C:¥	0	2	129546MB	
G:¥	2	2	19453MB	

7. Perform steps 5 and 6 for node-1 and then node-2 and click Finish.

Resource Definition of Group failover1	md 🗙
Info \bigcirc \rightarrow Dependency \oslash \rightarrow Recovery Operation \oslash	→ Details
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	Name
node-1	← Add
node-2	→ Remove
Edit	
Tuning	
	Back Finish Cancel

• 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 the Reference Guide.

- 1. Click Add on the Group Resource List page.
- 2. The **Resource Definition of Group | failover1** 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**.

Resource Definition of Group failover1			
Info \rightarrow Dependency \rightarrow Recovery	Operation 🔶 Details		
Туре*	Azure DNS resource		
Name*	azuredns1		
Comment			
Get License Info			
Select the type of group resource and enter its name.			

- 3. The **Dependency** window is displayed. Click **Next** without specifying anything.
- 4. The Recovery Operation window is displayed. Click Next.
- 5. 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.

For User URI and Tenant ID, specify respectively the appID and tenant you wrote down in "9)Creating a service principal".

Resource Definition of Group failover1 azuredns ×			
Info ⊘ → Dependency ⊘ → Recovery Operation ⊘ → Details			
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*	XXXXXXXX-XXXX-XXXX-XXXX-XXX		
Tenant ID*	XXXXXXXX-XXXX-XXXX-XXXX-XX		
File Path of Service Principal*	C:¥Users¥testlogin¥example		
Azure CLI File Path*	C:¥Program Files(x86)¥Micro]	
Delete a record set at deactivation			
Tuning			
		Back Fir	ish Cancel

6. 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 "Understanding Azure DNS monitor resources" in the "Reference Guide".

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 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. Click **Next**.

Monitor Resource Definition		genw 🗙	
Info → Monitor(common) → Mor	itor(special) → Recovery Action		
Туре*	Custom monitor		
Name*	genw1		
Comment			
Get Licence Info			
• Select the type of monitor resource and enter its name.			

3. The **Monitor** (common) window is displayed.

Confirm that Monitor Timing is Always and click Next.

Monitor Resource Definition		genw 🗙
Info 📀 🔶 Monitor(common) 🔶 Monitor(special)	→ Recovery	Action
Interval*	60	sec
Timeout*	120	sec
Do Not Retry at Timeout Occurrence		
Do Not Execute Recovery Action at Timeout Occurrence		
Retry Count*	1	time
Wait Time to Start Monitoring*	3	sec
Monitor Timing		
Always Active		
Target Resource		Browse
Choose servers that execute monitoring	Server	
		▲ Back Next ▶ Cancel

4. The **Monitor** (**special**) window is displayed. Select **Script created with this product**.

The following shows the sample of a script to be created.

```
< EXPRESSCLUSTER_installation_path>\binclpazure_port_checker -h_

management.core.windows.net -p 443

EXIT %ERRORLEVEL%
```

Select Synchronous for Monitor Type. Click Next.

Monitor Resource Definition				genw 🗙
Info 🔮 🔶 Monitor(common) 🔗	→ Monitor(special) → Recovery Action			
○ User Application ◉ Script created with this product				
File	genw.bat			
		Edit	View	Replace
Monitor Type	 Synchronous Asynchronous 			
Normal Return Value*	0			
Kill the application when exit				
Wait for activation monitoring to stop before stopping the cluster				
Execution user	\checkmark			
	4	Back	Next 🕨	Cancel

5. The **Recovery Action** window is displayed.

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

Monitor Resource Definition		genw 🗙
Info 🛇 🔸 Monitor(common) 🛇 ·	→ Monitor(special) → Recovery	y Action
Recovery Action	Execute only the final action	~
Recovery Target *	LocalServer	Browse
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	No operation	~
		Script Settings
		Back Finish Cancel

- 6. 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 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. Click **Next**.

Monitor Resource Definition		ipw 🗙
Info → Monitor(common) → Mor	itor(special) 🔶 Recovery Action	
Туре*	IP monitor	
Name*	ipw1	
Comment		
Get Licence Info		
3 Select the type of monitor resource an	nd enter its name.	
		Gancel Accel Accel Cancel

3. The Monitor (common) window is displayed.

Confirm that Monitor Timing is Always.

Monitor Resource Definition		ipw 🗙
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

Select one available server for Choose servers that execute monitoring.

Click OK and click Next.

Failure Detection Server					
○ All servers ● Select					
Servers that can run the Group		Available Servers			
Name	←	Name			
node-1	Add	node-2			
	→ Remove				
			OK	Cancel	Apply

4. The Monitor (special) window is displayed.

Monitor Resource Definition		іру	w ×
Info 📀 🔶 Monitor(common) 📀 🚽	→ Monitor(special) → Re	covery Action	
Edit Add Remove			
IP Address List			
IP Address			
No Ip Address			
ping Timeout*	5000	msec	
		Garket Next ► Car Car	ncel

On the **Common** tab, select **Add** of **IP Address** and set an IP address of a server other than the server selected in step 3. Click **Next**.

IP Address Settings			
IP Address*	10.5.0.121		
		ОК	Cancel

Monitor Resource Definition				ipw 🗙
Info 🔮 🔶 Monitor(common) 🔮 -	→ Monitor(special) → Re	covery Action		
Edit Add Remove				
IP Address List				
IP Address				
10.5.0.121				
ping Timeout*	5000	msec		
			Hack Next Next	Cancel

5. The **Recovery Action** window is displayed.

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

Monitor Resource Definition		ipw 🗙
Info 🛛 🔸 Monitor(common) 🛇 -	Monitor(special) 📀 🔶 Recovery Actio	'n
Recovery Action	Execute only the final action	~
Recovery Target *	LocalServer	Browse
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	
	O Maximum priority server	
Maximum Failover Count	0 time	
Execute Script before Final Action		
Final Action	No operation 🗸	
		Script Settings
		Back Finish Cancel

- 6. Click **Finish** to finish setting.
- 7. Then, create a monitor resource on the other server. Click Add on the Monitor Resource List page.
- 8. Select the monitor resource type (IP monitor) from the **Type** box and enter the monitor resource name (ipw2) in the **Name** box. Click **Next**.
- 9. The **Monitor** (common) window is displayed. Confirm that **Monitor Timing** is **Always**.

Select one available server for Choose servers that execute monitoring. Click OK and Click Next.

10. The Monitor (special) window 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 9. Click **Next**.

11. The **Recovery Action** window is displayed.

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

- 12. 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 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. Click **Next**.

Monitor Resource Definition		mtw 🗙
Info → Monitor(common) → Mor	itor(special) 🔶 Recovery Action	
Туре*	Multi target monitor	
Name*	mtw1	
Comment		
Get Licence Info		
Select the type of monitor resource an	nd enter its name.	
		Gancel And the second se

The Monitor (common) window is displayed.
 Confirm that Monitor Timing is Always and click Next.

Monitor Resource Definition		mtw	×
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		
		Gancel And the second se	

4. The **Monitor** (special) window 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**. Click **Next**.

Monitor Resource Definition	on			mtw 🗙
Info 🔮 🔶 Monitor(com	mon) 📀 🔶 Moni	itor(special) 🔶 R	ecovery Action	
Monitor Resources			Available Monitor Resources	5
Monitor Resource	Туре	←	Monitor Resource	Туре
genw1	genw	Add	userw	userw
ipw1	ipw	→		
ipw2	ipw	Remove		
Tuning				
			▲ Back	Next > Cancel

5. The Recovery Action window 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.

Monitor Resource Definition			mtw 🗙
Info 🛛 🔸 Monitor(common) 🖉 🔸	→ Monitor(special) → Recov	very Action	
Recovery Action	Execute only the final action		~
Recovery Target *	LocalServer	Browse	
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 shutd	own OS 🗸	
		Scr	ipt Settings
		Back Finish	Cancel

6. Click Finish to finish setting.

4) Setting the cluster properties

For details about the cluster properties, see "Cluster properties" in the Reference Guide.

• Cluster properties

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

1. Enter Config Mode from Cluster WebUI, click the property icon of the cluster name.

Cluster Name	Cluster1	
Comment		
Language	English 🗸	
		OK Cancel Apply

- 2. Select the **Timeout** tab. For **Timeout** of **Heartbeat**, specify a value calculated by "A+B+C" as described below.
 - 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)

 C: 30 seconds (Waiting time for heartbeat not to time out before the multi target monitor resource detects an error. The time can be changed accordingly.

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.

Network initialization complete wait time*	3	min	
Server Sync Wait Time*	5	min	
Heartbeat			
Interval*	3	sec	
Timeout*	270	sec	
Server Internal Timeout*	180	sec	
Initialize			
		OK Cancel A	oply

3. Click OK.

5) Applying the settings and starting the cluster

1. Click Apply the Configuration File in the config mode of Cluster WebUI.

A popup message asking "Do you want to perform the operations?" is displayed. Click **OK**. When the upload ends successfully, a popup message saying "The application finished successfully." is displayed. Click **OK**.

If the upload fails, perform the operations by following the displayed message.

- 2. Select the **Operation Mode** on the drop down menu of the toolbar in Cluster WebUI to switch to the operation mode.Select **Start Cluster** in the **Status** tab of Cluster WebUI and click.
- 3. Confirm that a cluster system starts and the status of the cluster is displayed to the Cluster WebUI. If the cluster system does not start normally, take action according to an error message.

For details, refer to the following:

Installation and Configuration Guide

-> How to create a cluster

4.4 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:

- 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 node-2 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:

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.

CLUSTER CREATION PROCEDURE (FOR AN HA CLUSTER USING A PUBLIC LOAD BALANCER)

5.1 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.

Setting item	Setting value
Resource group setting	
Resource group	TestGroup1
Region	(Asia Pacific) 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	TestGroup1
Location	(Asia Pacific) Japan East
Load balancer setting	
Name	TestLoadBalancer
Туре	Public
Public IP address name	TestLoadBalancerPublicIP
Public IP address: Assignment	Static
Resource group	TestGroup1
Region	(Asia Pacific) Japan East
Backend pool: Name	TestBackendPool
Associated to	Availability set
Target virtual machine	
	node-1
	node-2
	Continued on poyt page

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

Continued on next page

Setting item	Setting value
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	ТСР
Destination Port range	8080 (Port number offering the operation)

Table 5.1 – continued from previous page

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

Setting item	Setting value	
	node1	node2
Virtual machine setting		
– Disk type	Standard HDD	Standard HDD
– User name	testlogin	testlogin
– Password	PassWord_123	PassWord_123
- Resource group	TestGroup1	TestGroup1
– Region	(Asia Pacific) Japan East	(Asia Pacific) Japan East
Network security group setting		
– Name	node1-nsg	node2-nsg
Availability set setting		
– Name	AvailabilitySet-1	AvailabilitySet-1
– Update domains	5	5
– Fault domains	2	2
Diagnostics storage account set- ting		
		Continued on next page

Continued on next page

Setting item	Setting value	
	node1	node2
– Name	Automatically generated	Automatically generated
– Performance	Standard	Standard
– Replication	Locally-redundant storage (LRS)	Locally-redundant storage (LRS)
IP configuration setting		
– IP address	10.5.0.120	10.5.0.121
Disk setting		
– Name	node1_DataDisk_0	node2_DataDisk_0
– Source type	None (empty disk)	None (empty disk)
– Account type	Standard HDD	Standard HDD
– Size	20	20

Table 5.2 – continued from previous page

• EXPRESSCLUSTER settings (cluster properties)

Setting item	Setting value	
	node1	node2
– Cluster Name	Cluster1	Cluster1
– Server Name	node1	node2
- Timeout Tab: Heartbeat timeout	210	210

• EXPRESSCLUSTER settings (failover group)

Resource name	Setting item	Setting value
Mirror disk resource	Name	md
	Details Tab: Data Partition Drive	G:
	Letter	
		• • • • • • • • • • • • • • • • • • •

Continued on next page

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

Table 5.4 – continued from previous page

• EXPRESSCLUSTER settings (monitor resource)

Monitor resource name	Setting item	Setting value
Mirror disk monitor resource	Name	mdw1
Azure probe port monitor re-	Name	azureppw1
source		
	Recovery Target	azurepp1
Azure load balance monitor re-	Name	azurelbw1
source		
	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
		·r···
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
	Execute Script before Final Ac-	On
	tion	
	Timeout	30

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** on the upper part of the window. If there are existing resource groups, they are displayed in a list.

+	()	ę		+		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent resc	ources								
	NAME			TYPE				LAST VIEWED	
~~>								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
•••								28 min ago	
9								28 min ago	
688								28 min ago	
9								29 min ago	
9								30 min ago	
8								32 min ago	
Navigate	criptions	() Resource	e groups	All r	esources	🔚 Dashi	ooard		

2. Select +Add on the upper part of the window.

Microsoft Azure		>_ 16, ₽ @ ? ©	
Home > Resource groups			
Resource groups			s?
+ Add	port to CSV 🛛 🖉 Assign tags 🛛 🛇 Feedback		
Subscription == a	II Location == all () ([†] y Add filter		
Showing 1 to 30 of 30 records.		No grouping	\sim
Name ↑↓	Subscription \uparrow_{\downarrow}	Location $\uparrow \downarrow$	
		Japan East	
		Southeast Asia	
		West US	
		South Central US	
		South Central US	
		Japan West	
		East Asia	
		South Central US	
		South Central US	
		North Europe	
		South Central US	
		South Central US	
		Central US	
		Japan East	
. 📦		West India	
. 📦		Japan East	
		Japan East	
		Japan East	
		· ·	

3. Specify Subscription, Resource group, and Region, and click Review+Create.

≡ Microsoft Azure		<i>P</i> Search resources, service	es, and docs (G+/)	>_ 🖓	0 ©	? 😊	1000	
Home > Resource groups > C	Create a resource group							
Create a resource grou	qu							×
Basics Tags Review + o	create							
resources for the solution, or or	hat holds related resources for an Az nly those resources that you want to proups based on what makes the mo	manage as a group. You deci	de how you want to					
Project details								
Subscription *			\sim					
Resource group *	TestGroup1		~					
Resource details Region *①								
Region **····	(Asia Pacific) Japan East		~					
Review + create < F	Previous Next : Tags >							
()

2. Creating a virtual network

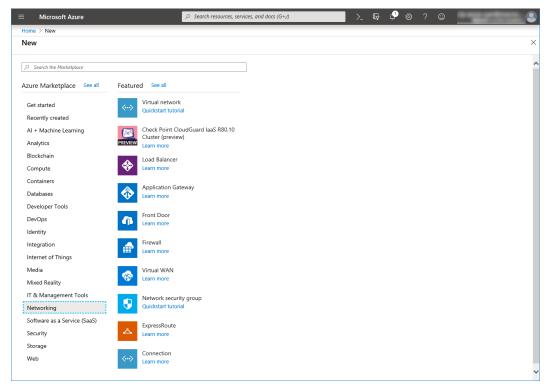
Log in to the Microsoft Azure portal (https://portal.azure.com/) and create a virtual network following the steps below.

Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent re	sources								
	NAME			TYPE				LAST VIEWED	
\Leftrightarrow								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
•••								28 min ago	
5								28 min ago	
								28 min ago	
.								29 min ago	
.								30 min ago	
8								32 min ago	
Navigate	bscriptions	() Resourc	e groups	All r	esources	Dashb	oard		

1. Select Create a resource on the upper part of the window.

≡

2. Select Networking and then Virtual network.



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

Microsoft Azure	_
ome > New > Create virtual network	
reate virtual network \Box >	<
ame *	~
vnet1 v	
ddress space *①	
10.5.0.0/24 V	
10.5.0.0 - 10.5.0.255 (256 addresses)	
Add an IPv6 address space ①	
ubscription *	
esource group *	
TestGroup1 V	
eate new	
ocation *	
(Asia Pacific) Japan East 🗸 🗸	
ubnet	
ame★ √net1-1 ✓	
ddress range ★① 10.5.0.0/24	
10.5.0.0 - 10.5.0.255 (256 addresses)	
DoS protection () Basic () Standard	
-	
Prvice endpoints () Disabled Enabled	
rewall ①	
Disabled Enabled	~
Create Automation options	

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 on the upper part of the window.

+	()			•				SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent res	ources								
	NAME			TYPE				LAST VIEWED	
{··>								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
***								28 min ago	
8								28 min ago	
085								28 min ago	
<u>e</u>								29 min ago	
<u>•</u>								30 min ago	
8								32 min ago	
Navigate	scriptions	() Resourc	e groups	All r	esources	Dashi	board		

2. Select Compute and then See all.

\equiv Microsoft Azure		> ਯ ↓ ◎ ? ☺
Home > New		
New		×
		^
Azure Marketplace See all	Featured See all	
Get started Recently created	Virtual machine Learn more	
AI + Machine Learning	SQL Server 2017 Enterprise Windows Server 2016	
Analytics	Learn more	
Blockchain	Reserved VM Instances	
Compute	Quickstart tutorial	
Containers	Kubernetes Service	
Databases	Quickstart tutorial	
Developer Tools		
DevOps	Service Fabric Cluster Ouickstart tutorial	
Identity	•••	
Integration	Web App for Containers	
Internet of Things	Quickstart tutorial	
Media	5 Function App	
Mixed Reality	Quickstart tutorial	
IT & Management Tools	Batch Service	
Networking	Quickstart tutorial	
Software as a Service (SaaS)	Dahian 0 "Chartah" with basissants	
Security	Debian 9 "Stretch" with backports kernel	
Storage	Learn more	
Web	Ubuntu Server 16.04 LTS	
	Quickstart tutorial	~

- 3. Select Windows Server 2016 Datacenter.
- 4. When the Basics tab appears, specify the settings of Subscription, Resource group, Virtual machine name, Region, Image, Size, Username, Password, and Confirm password. Select Availability set from Availability options, and click Create new under the Availability set field. When the Create new blade appears, specify the settings of Name, Fault domains, and Update domains. Then click OK.

🗏 Microsoft Azure 🔎 s	Search resources, services, and docs (G+/)		Σ	Ŗ	0 Ø		
Home > New > Create a virtual ma	chine						
Create a virtual machine							;
Basics Disks Networking	Management Advanced Tags Review + create						
	nux or Windows. Select an image from Azure marketplace or us	e your own customized					
image. Complete the Basics tab then Review	+ create to provision a virtual machine with default paramete	rs or review each tab for full					
customization. Looking for classic VMs? Create VM	from Azure Marketolace						
-	non searc markepace						
Project details							
Select the subscription to manage de your resources.	eployed resources and costs. Use resource groups like folders t	o organize and manage all					
,							
Subscription *		\sim					
Resource group *	TestGroup1	\sim					
	Create new						
Instance details							
Virtual machine name *							
virtual machine name	node-1	~					
Region *	(Asia Pacific) Japan East	\sim					
Availability options ①	Availability set	\sim					
	Availability set	· · · · · · · · · · · · · · · · · · ·					
Availability set * ①		\checkmark					
	Create new						
Image 📩 🕕	Windows Server 2016 Datacenter	\sim					
	Browse all public and private images						
Review + create	< Previous Next : Disks >						
							>

≡ Microsoft Azure 🔎 Searc	ch resources, services, and docs (G+/)	₽ 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Home > New > Create a virtual machin	e	Create new X
Create a virtual machine		Group two or more VMs in an availability set to ensure that at least
Create a virtual machine that runs Linux c image. Complete the Basics tab then Review + cr customization. Looking for classic VMs? Create VM from Project details	hagement Advanced Tags Review + create If Windows. Select an image from Azure marketplace or use your own customized eate to provision a virtual machine with default parameters or review each tab for full to Azure Marketplace red resources and costs. Use resource groups like folders to organize and manage all TestGroup1 Create new	one is available during planned or unplanned maintenance events. Learn more Name * AvailabilitySet-1 Fault domains ① Update domains ① Update domains ① Use managed disks ② No (Classic) ● Yes (Aligned)
Instance details		
Virtual machine name *	node-1 🗸	
Region *	(Asia Pacific) Japan East	
Availability options ①	Availability set	
Availability set *	✓	
Image *	Create new The value must not be empty. Windows Server 2016 Datacenter Rrowee all public and private images	
Review + create < P	revious Next : Disks >	ок

Click Change size to display the Select a VM size blade.

From the list, choose a size (A1 - Standard in this guide) suitable for your virtual machine and click Select.

Regarding the **Virtual machine name**, node-1 is for node-1, and node-2 is for node-2. Click **Next: Disks >**

5. When the **Disks** tab appears, go through the following steps to add a disk to be used for a mirror disk (cluster partition or data partition).

From the DATA DISKS list, click Create and attach a new disk.

\equiv Microsoft Azure	P Search resources, services, and docs (G+/)	Ŗ	Q		0	
Home > New > Create a virtua	machine					
Create a virtual machin	e					×
Basics Disks Networking	g Management Advanced Tags Review + create					
	ystem disk and a temporary disk for short-term storage. You can attach additional data disks. e type of storage you can use and the number of data disks allowed. Learn more					
Disk options						
OS disk type * i	Standard HDD V					
Enable Ultra Disk compatibility	0 Ves () No					
	Ultra Disk compatibility is not available for this VM size and location.					
Data disks						
	ional data disks for your virtual machine or attach existing disks. This VM also comes with a					
LUN Name	Size (GiB) Disk type Host caching					
Create and attach a new disk	Attach an existing disk					
✓ Advanced						
Review + create	< Previous Next : Networking >					
,						
(>

6. The Create a new disk blade appears.

Specify Name, Source type, and Size. Then click OK. Click Next: Networking >.

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Home > New > Create a vi	rtual machine 🗧 Create a new disk						
Create a new disk							×
Create a new disk to store ap storage type, and number of	plications and data on your VM. Disk pricing varies based on factors including disk size, transactions. Learn more about Azure Managed Disks						
Name *	node-1_DataDisk_0						
Source type *	None (empty disk)						
Size *	20 GiB						
	Standard HDD						
	Change size						
ОК							
<							>

7. The **Networking** tab appears.

Specify the settings of Virtual network, Subnet, Network security group, and Configure network security group.

Click **Create new** under the **Configure network security group** field to display the **Create network security group** blade. Specify the setting of **Name** and then click **OK**. Click **Next: Management** >

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Home > New > Create a virtual machin	e							-		
Create a virtual machine									\times	
Basics Disks Networking Management Advanced Tags Review + create										
	al machine by configuring network interface card (NIC) settings. You can control y with security group rules, or place behind an existing load balancing solution.									
Network interface										
When creating a virtual machine, a netwo	rk interface will be created for you.									
Virtual network *	Vnet1 V									
	Create new									
Subnet *	Vnet1-1 (10.5.0.0/24)									
	Manage subnet configuration									
Public IP ①	None									
	Create new									
NIC network security group $\ensuremath{\mathbb{O}}$	○ None ○ Basic ④ Advanced									
Configure network security group ★	(new) node-1-nsq									
	Create new									
Accelerated networking $\ensuremath{\bigcirc}$	On 🖲 Off									
	The selected VM size does not support accelerated networking.									
Load balancing										
-	backend pool of an existing Azure load balancing solution. Learn more								~	
									~	
Baulau I anata										
Review + create < P	revious Next : Management >									
<									>	

8. The Management tab appears.

Click **Create new** under the **Diagnostics storage account** field to display the **Create storage account** blade.

Specify the settings of Name, Account kind, and Replication. Then click OK.

In the **Diagnostics storage account** field, the default value is automatically generated and entered. Click **Next: Advanced >**.

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Home > New > Create a virtual machin	e							
Create a virtual machine								×
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Configure monitoring and management	pptions for your VM.							
Azure Security Center								
Azure Security Center provides unified se Learn more	curity management and advanced threat protection across hybrid cloud workloads.							
 Your subscription is protected by Az 	ure Security Center basic plan.							
Monitoring								
Boot diagnostics ①	• On () Off							
OS guest diagnostics ①	On () Off							- 1
Diagnostics storage account $\star \odot$	testgroup1diag600 V Create new							
Identity								
System assigned managed identity ①	○ on ● off							
Azure Active Directory								
Login with AAD credentials (Preview) ①	○ on ④ Off							~
Review + create < P	revious Next : Advanced >							
<								>

9. Click Next: Tags >.

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Home > New > Create a virtual machine					
Create a virtual machine					×
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Basics Disks Networking Management Advanced Tags Review + create					
Add additional configuration, agents, scripts or applications via virtual machine extensions or cloud-init.					
Extensions					
Extensions provide post-deployment configuration and automation.					
Extensions Select an extension to install					
Cloud init					
Cloud init is a widely used approach to customize a Linux VM as it boots for the first time. You can use cloud-init to install packages and write files or to configure users and security. Learn more					
The selected image does not support cloud init.					
Host					
Azure Dedicated Hosts allow you to provision and manage a physical server within our data centers that are dedicated to your Azure subscription. A dedicated host gives you assurance that only VMs from your subscription are on the host, flexibility to chose VMs from your subscription that will be provisioned on the host, and the control of platform maintenance at the level of the host. Learn more					
Host group 🕥 No host group found 🗸 🗸					
Dedicated hosts cannot be used with availability sets.					
					~
Review + create < Previous Next : Tags >					
Review + create < Previous Next : Tags >					
<					>

10. Click Next: Review + create >.

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Home > New > Create a vir	tual machine						
Create a virtual mach	nine						×
Basics Disks Networl	king Management Advanced Ta	gs Review + create					
Tags are name/value pairs that multiple resources and resour	at enable you to categorize resources and v rce groups. Learn more about tags of	iew consolidated billing by applying	the same tag to				
Note that if you create tags a	nd then change resource settings on other	tabs, your tags will be automatically	updated.				
Name ①	Value ①	Resource					
	:	11 selected	\sim				
Review + create	< Previous Next : Review	+ create >					
<							>

11. The **Review + create** tab appears. Check the contents. If there is no problem, click **Create**. The deployment starts and takes several minutes.

≡ Microsoft Azure 🔎 Sear	ch resources, services, and docs (G+/)	Þ	Ŗ	Q	٢	?	٢	and stores	
Home > New > Create a virtual machin	ie								
Create a virtual machine									×
Validation passed									
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PRODUCT DETAILS									
Standard A1 v2 by Microsoft Terms of use Privacy policy	Subscription credits apply ① 9.0700 JPY/hr Pricing for other VM sizes								
TERMS									
above; (b) authorize Microsoft to bill my billing frequency as my Azure subscriptio information with the provider(s) of the ol	al terms and privacy statement(s) associated with the Marketplace offering(s) listed current payment method for the fees associated with the offering(s), with the same rr, and (c) agree that Microsoft may share my contact, usage and transactional ffering(s) for support, billing and other transactional activities. Microsoft does not ee the Azure Marketplace Terms for additional details.								
Basics									
Subscription									
Resource group	TestGroup1								
Virtual machine name	node-1								
Region	(Asia Pacific) Japan East								
Availability options	Availability set								
Availability set	(new) AvailabilitySet-1								
Username	testlogin								
Already have a Windows Server license?	? No								*
Create < P	revious Next > Download a template for automation								>

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** on the upper part of the window.

+	()			+		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent reso	urces								
	NAME			TYPE				LAST VIEWED	
\leftrightarrow								22 min ago	
								24 min ago	
()								24 min ago	
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<u>•</u>								30 min ago	
8								32 min ago	
Navigate	riptions	(i) Resource	e groups	All r	esources	Dashi	poard		

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	Search resources, services, and docs (G+/)		æ? ©	
Home > Resource groups > T	estGroup1			
Resource group				Â
, ○ Search (Ctrl+/)		→ Move 🛓 Export to CSV 🖉 Ass	ign tags 📋 Delete 🞍 Export tem	plate ···
 Overview 	Essentials	*		
 Activity log 	Filter by name Type == all () Location == all	Add filter		
Access control (IAM)	Showing 1 to 28 of 28 records.		No grouping	~
🔷 Tags	□ Name ↑↓	Туре ↑↓	Location ↑↓	
🗲 Events	AvailabilitySet-1	Availability set	Japan East	
Settings	AvailabilitySet1	Availability set	Japan East	
Quickstart	🔲 🔤 ipconfig1	Public IP address	Japan East	
Deployments	🔲 🚾 ipconfig2	Public IP address	Japan East	
Policies	node-1	Virtual machine	Japan East	
Properties	🗌 💎 node-1-nsg	Network security group	Japan East	
🔒 Locks	🗌 🕼 node-1284	Network interface	Japan East	
Export template	Benode-1_DataDisk_0	Disk	Japan East	
Cost Management	S node-1_OsDisk_1_dfa99e02b54a4452ac9964de51616aa3	Disk	Japan East	
Q Cost analysis	node-2	Virtual machine	Japan East	
Cost alerts	🔲 🎈 node-2-nsg	Network security group	Japan East	
3 Budgets	🔲 🜇 node-2419	Network interface	Japan East	
Advisor recommendations	node-2_DataDisk_0	Disk	Japan East	
Monitoring	node-2_OsDisk_1_5bdf3b9c14a6472888aa54dc732cd720	Disk	Japan East	•••
Insights (preview)	< Previous Page 1 V of 1 Next >			
Alarte				_

4. Select Networking.

Iome > Resource groups > TestGro	upi > node	- I - Networkin	ig						
node-1 - Networking Virtual machine									
	« Ø /	Attach network	interface ್ರ ^೮ Detach network inter	face					
Overview	~ ® N	etwork inter	face: node-1284 Effective secu	irity rules Topol	ogy				
Activity log	Virtu	al network/sub	onet: Vnet1/Vnet1-1 NIC Public IP	- NIC Private IP:	10.5.0.4 Acceler	ated networking: Disa	bled		
Access control (IAM)	Inb	ound port rul	les Outbound port rules Appli	cation security grou	ps Load balancing	1			
Tags			ty group node-1-nsg (attached to r			,			
Diagnose and solve problems			ty group node-1-nsg (attached to r its, 1 network interfaces	network interface: no	ode-1284)			Add inbound port	rule
ettings	Prie	ority	Name	Port	Protocol	Source	Destination	Action	
Networking	100	0	🔺 default-allow-rdp	3389	ТСР	Any	Any	Allow	
Disks	650	00	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow	
Size	650	01	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	Allow	
Security	655	00	DenyAllInBound	Any	Any	Any	Any	Ø Deny	
Extensions									
Continuous delivery (Preview)									
Availability + scaling									
Configuration									
ldentity									
Properties									
Locks									
Export template									

- 5. Select a network interface displayed in the list. The network interface name is generated automatically.
- 6. Select **IP configurations**.

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Home > Resource groups > TestGrou	p1 > node-1 - Netwo	king > node-128	4 - IP configuratio	ns				
node-1284 - IP configur	rations							×
	- + Add 🗔 🗄	ave 🗙 Discard						
Overview	IP forwarding s	ettings						
Activity log	IP forwarding			Disabled Enabled				
Access control (IAM)	Virtual network			Vnet1				
Tags	IP configuratio	าร						
Settings	Subnet *			Vnet1-1 (10.5.0.0/24)				\sim
IP configurations								
DNS servers	✓ Search IP co							
💎 Network security group	Name	IP Version	Туре	Private IP address		Public IP	address	
Properties	ipconfig1	IPv4	Primary	10.5.0.4 (Dynamic)		-		
🔒 Locks								
🖳 Export template								
Support + troubleshooting								
📩 Effective security rules								
Effective routes								
📯 New support request								
1								

- 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.

\equiv Microsoft Azure				۶.	Ģ	Ļ	©	?	٢	14.00	
Home > Resource groups >	TestGroup1 > node-1 - Networking > node-1284 - IP o	onfigurat	ions > ipconfig1								
ipconfig1		$\Box \times$									
🔚 Save 🗙 Discard											
new private IP address. T configuration settings. in	sciated with this network interface will be restarted to utilize the The network interface will be reprovisioned and network cluding secondry. IP addresses, build reaks, and default manually reconfigured within the virtual machine. Learn more										
Public IP address settings Public IP address Disabled Enabled											
Private IP address settings Virtual network/subnet											
Vnet1/Vnet1-1 Assignment											
Dynamic Static											
10.5.0.120		~									
<											>

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

5. 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 disk. 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 "Determining a system configuration" in the Installation and Configuration Guide.

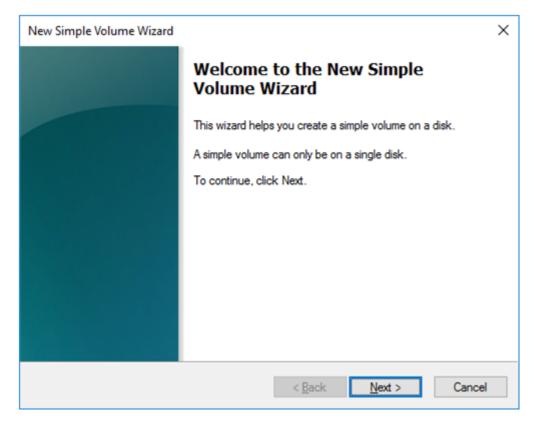
1. Open the **Disk Management** window. The **Initialize Disk** dialog box is displayed.

Initialize Disk	\times
You must initialize a disk before Logical Disk Manager can access it. <u>S</u> elect disks:	
☑ Disk 2	
Use the following partition style for the selected disks:	
MBR (Master Boot Record)	
○ <u>G</u> PT (GUID Partition Table)	
Note: The GPT partition style is not recognized by all previous versions of Windows.	
OK Cancel	

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

	jement						-		×
Eile <u>A</u> ction	<u>V</u> iew <u>H</u> elp								
-	🛛 🖬 🖉 🖛 🗙 🖸	2 🔒 🗾	2						
/olume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free		
🕷 (C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	113.12 GB	89 %		
Temporary S	torag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %		
Disk 0									
Basic 127.00 GB	(C:)								
Dnline	127.00 GB NTFS		re, Crash Dump, I					/////	
						////////////			
Disk 1									
Basic	Temporary Sto								-
Basic 70.00 GB	Temporary Sto 70.00 GB NTFS	rage (D:)			9//////////////////////////////////////				
Basic 70.00 GB	Temporary Sto	rage (D:)							
Basic 70.00 GB Online	Temporary Sto 70.00 GB NTFS	rage (D:)							
Basic 70.00 GB Online Disk 2	Temporary Sto 70.00 GB NTFS	rage (D:)							
Basic 70.00 GB Online Disk 2 Basic	Temporary Sto 70.00 GB NTFS	rage (D:)							
Basic 70.00 GB Online	Temporary Sto 70.00 GB NTFS Healthy (Page F	rage (D:)							
Basic 70.00 GB Online Disk 2 Basic 20.00 GB	Temporary Sto 70.00 GB NTFS Healthy (Page F	rage (D:)							
Basic 70.00 GB Online Disk 2 Basic 20.00 GB	Temporary Sto 70.00 GB NTFS Healthy (Page F	rage (D:)							
Basic 70.00 GB Dnline Disk 2 Jasic 20.00 GB Dnline	Temporary Sto 70.00 GB NTFS Healthy (Page F	rage (D:) iile, Primary F							

- 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								
<u>S</u> imple 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: ► ✓ ○ Mount in the following empty NTFS folder: ■ Browse 									
O <u>D</u> o not assign a drive letter or drive path									
< <u>B</u> ack <u>N</u> ext > Can	cel								

- 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 betwee	en the maximum and minimum sizes.
Maximum disk space in MB:	19453
Minimum disk space in MB:	8
Simple volume size in MB:	19453
	< <u>B</u> ack <u>N</u> ext > 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	\times
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 	
< <u>B</u> ack <u>N</u> ext > 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	s volume, and if so, what settings you want to use.								
O Do not format this volume									
Format this volume with the follow	wing settings:								
File system:	NTFS ~								
Allocation unit size:	Default ~								
Volume label:	New Volume								
Perform a quick format									
Enable file and folder com	pression								
	< <u>B</u> ack <u>N</u> ext > Cancel								

- 12. Click Next.
- 13. The **Completing the New Simple Volume Wizard** window s 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 Outick format: Yes To close this wizard, click Finish.	
	< <u>B</u> ack Finish Cancel	

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

📅 Disk Managemer	nt						_		\times
<u>File Action V</u> iew	/ <u>H</u> elp								
⊨ 🔿 🖬 📝 🛛	TT 🗩 🗙 [2 🔒 🛃	3 =						
/olume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free		
(C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	111.94 GB	88 %		
= (F:)	Simple	Basic	RAW	Healthy (P	1.00 GB	1.00 GB	100 %		
New Volume (G:)	Simple	Basic	NTFS	Healthy (P	19.00 GB	18.94 GB	100 %		
Temporary Storage	Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %		
	(C:)			(//////////////////////////////////////		///////////////////////////////////////		/////	////
Online	127.00 GB NTFS Healthy (System		ve, Crash Dump,	Primary Partition					
Online H Disk 1 Basic 70.00 GB		n, Boot, Activ prage (D:)		Primary Partition	<u> </u>				
Online 1 Basic 70.00 GB 7 Online H	Healthy (System Femporary Sto 70.00 GB NTFS	n, Boot, Activ prage (D:)		Primary Partition					
Online 1 Basic 70.00 GB 7 Online F Disk 2 Basic 20.00 GB 1	Healthy (System Femporary Sto 70.00 GB NTFS	n, Boot, Activ prage (D:) file, Primary F	Partition)	Primary Partition Primary Partition ew Volume (G:) 0.00 GB NTFS ealthy (Primary P					

6. 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:

Load Balancer:

https://docs.microsoft.com/en-us/azure/load-balancer/

1. Select Create a resource on the upper part of the window.

Create a	() Resource	Network	Virtual	? Subscriptions	All resources	App Services	Storage	SQL databases	
resource	groups	security groups	machines				accounts		
Recent reso	ources								
	NAME			TYPE				LAST VIEWED	
{·· >								22 min ago	
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•								29 min ago	
9								30 min ago	
8								32 min ago	
Navigate									
<u> </u>	criptions	Resourc		All	esources	Dashi			

- 2. Select Networking and then Load Balancer.
- 3. The **Create load balancer** blade is displayed. Specify **Name**. Select **Public** for **Type** and **Basic** for **SKU**, respectively.
- 4. Specify Create new, Public IP address name and Assignment for Public IP address.
- 5. Specify Subscription, Resource group, and Region, and click Review+create. Then click Create.

Deploying the load balancer starts. This processing takes several minutes.

≡ Microsoft Azure 🔎 Searc	th resources, services, and docs (G+/)	⊵	Ģ			and shows	
Home > New > Create load balancer							
Create load balancer							×
balancers uses a hash-based distribution destination port, protocol type) hash to m accessible via public IP addresses, or inter	nor that distributes incoming traffic among healthy virtual machine instances. Load algorithm, By default, it uses a 5-tuple (source P, source port, destination IP, uap traffic to available servers. Load balancers can either be internet-facing where it is nal where it is only accessible from a virtual network. Azure load balancers also 1) to route traffic between public and private IP address. Learn more.						-
Project details							
Subscription *	۱. V						
Resource group *	TestGroup1 V						
	Create new						
Instance details							
Name *	TestLoadBalancer 🗸						
Region *	(Asia Pacific) Japan East 🗸						
Туре * 🛈	O Internal Public						
ѕки ★⊙	● Basic ◯ Standard						
Public IP address							
Public IP address *	Create new Use existing						
Public IP address name *	TestLoadBalancerPublicIP 🗸						
Public IP address SKU	Basic						
Assignment *	🔿 Dynamic 💿 Static						
Review + create < Previous	Next : Tags > Download a template for automation						>

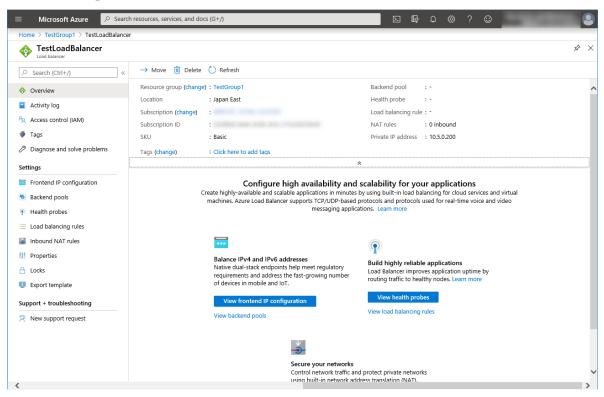
- 7. Configuring a load balancer (configuring a backend pool)
- 1. Associate a virtual machine registered to the availability set to the load balancer. After the load balancer has been deployed, select **Resource groups** on the upper part of the window.

+	[]			+		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent reso	ources								
	NAME			TYPE				LAST VIEWED	
{·· >								22 min ago	
								24 min ago	
()								24 min ago	
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<u>•</u>								30 min ago	
8								32 min ago	
Navigate	criptions	Resource	e groups	All r	esources	🗔 Dashi	board		

- 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.

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Home > TestGroup1		
FestGroup1		× ×
	« 🕂 Add == Edit columns 📋 Delete resource group 🖒 Refresh → Move 🞍 Export to CSV 🛛 🖄 Assign tags 🗊 Delete 🞍 Export template	
Overview	Essentials	
Activity log	Filter by name Filter by name Type == all ♥) Location == all ♥) ^t ∀ Add filter	
Access control (IAM)	Showing 1 to 31 of 31 records. Show hidden types O	\sim
 Tags 		
Events	Name ↑↓ Type ↑↓ Location ↑↓	
y Events	🗌 🕵 AvailabilitySet-1 Availability set Japan East	/
Settings	AvailabilitySet1 Availability set Japan East	
n Quickstart	O cluster1.zone DNS zone global	
Deployments	🗌 🧰 ipconfig1 Public IP address Japan East	
Policies	🗌 🧮 ipconfig11 Public IP address Japan East	
🐲 Properties	🗌 🖬 ipconfig12 Public IP address Japan East	
🔒 Locks	🗌 🖬 ipconfig2 Public IP address Japan East	
🖳 Export template	🗌 📮 node-1 Virtual machine Japan East	
Cost Management	Network security group Japan East	
🗞 Cost analysis	🗌 🧟 node-1284 Network interface Japan East	
Cost alerts	Sande-1_DataDisk_0 Disk Japan East	
(§) Budgets	Senode-1_OsDisk_1_dfa99e02b54a4452ac9964de51616aa3 Disk Japan East	
Advisor recommendations	🗌 📮 node-2 Virtual machine Japan East	
	Network security group Japan East	
Monitoring	Network interfare Ianan Fact	`
 Insights (preview) Alerts 	<pre></pre>	

4. Select Backend pools.



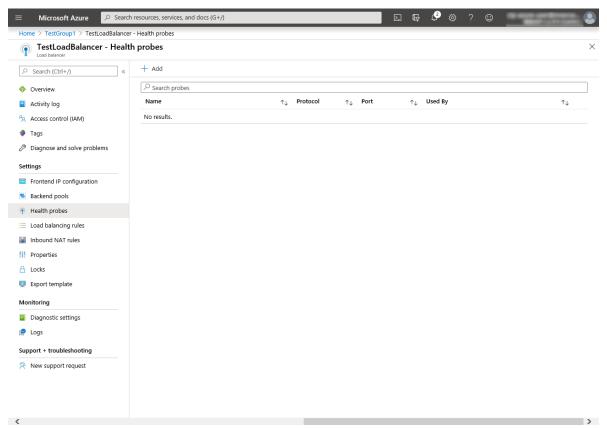
5. Click Add.

	n resources, services, and docs (G+	/)		@?©	
Iome > TestGroup1 > TestLoadBalance					
TestLoadBalancer - Backe	end pools				>
	🕂 Add 💍 Refresh				
> Overview					
Activity log	Virtual machine	Virtual machine status	Network interface	Private IP address	
Access control (IAM)	No results				
Tags					
Diagnose and solve problems					
ettings					
Frontend IP configuration					
Backend pools					
Health probes					
E Load balancing rules					
Inbound NAT rules					
Properties					
Locks					
Export template					
upport + troubleshooting					
Rew support request					

- 6. The Add backend pool blade is displayed. Specify Name.
- 7. Select Virtual machine for Associated to.
- 8. Specify **Virtual machine** and **IP address** for the virtual machine you want to associate. Repeat this procedure for the rest of such virtual machines.
- 9. Then click Add.

\equiv Microsoft Azure \checkmark Search	n resources, services, and docs (G+/)	ы бр. ф. ф. ф. 🤤 🕒 🚨
Home > TestGroup1 > TestLoadBalancer	- Backend pools	Add backend pool $ imes$
TestLoadBalancer - Backe	nd pools	TestloadBalancer
	+ Add 💍 Refresh	Name * TestBackendPool
 Overview Activity log 	Virtual machine Virtual machine status	Virtual network 〇 Vnet1
Access control (IAM)	No results	IP version IPv4 IPv6
Diagnose and solve problems		Associated to ① Virtual machine
Settings		
Frontend IP configuration		Virtual machines
🥵 Backend pools		Virtual Machines must be in same location as Load Balancer. Only IP configurations that have
Health probes		the same SKU (Basic/Standard) as the Load Balancer can be selected. All of the IP configurations have to be in the same Virtual Network.
📒 Load balancing rules		Virtual machine IP address
Inbound NAT rules		
Properties		node-1 ipconfig1 (10.5.0.120)
🔒 Locks		node-2 V ipconfig1 (10.5.0.121) V i
🖳 Export template		~
Support + troubleshooting		
New support request		
		Add
<		

- 8. 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.

Microsoft Azure	D 47	ې 🗘	? 🙂	
Home > TestLoadBalancer - Health probes > Add health probe				
Add health probe TextcadBlancer				>
Name *				
TestHealthProbe				
Protocol ①				
TCP				
Port * ①				
26001				
Interval * ①				
5				
seconds				
Unhealthy threshold * O				
2 consecutive failures				
ок				
OK .				
<				>

- 9. Configuring a load balancer (setting the load balancing rules)
- 1. Select Load balancing rules.

\equiv Microsoft Azure \checkmark Search	resources, services, and docs (G	+/)		ç 🖓 🎯 ?	° ©	
Home > TestGroup1 > TestLoadBalancer						
TestLoadBalancer - Load	balancing rules					×
	+ Add					
💠 Overview	P					
Activity log	Name	\uparrow_{\downarrow} Load balancing rule	\uparrow_{\downarrow} Backend pool	↑↓ ŀ	lealth probe	\uparrow_{\downarrow}
Access control (IAM)	No results.					
🔶 Tags						
Diagnose and solve problems						
Settings						
Frontend IP configuration						
Backend pools						
Health probes						
📒 Load balancing rules						
Inbound NAT rules						
Properties						
🔒 Locks						
🖳 Export template						
Monitoring						
Diagnostic settings						
🏩 Logs						
Support + troubleshooting						
R New support request						
<						>

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

■ Microsoft Azure P Search resources, services, and docs (G+/)	Ģ	P	0	?	٢	
Home > TestGroup1 > TestLoadBalancer - Load balancing rules > Add load balancing rule						
Add load balancing rule TestLoadBalancer						×
Name *						~
TestLoadBalancingRule 🗸						
IP Version *						
IPv4 IPv6						
Frontend IP address * ①						
10.5.0.200 (LoadBalancerFrontEnd)						
Protocol						
● TCP ◯ UDP						
Port *						
80						
Backend port *①						
8080 🗸						
Backend pool \odot						
TestBackendPool (2 virtual machines)						
Health probe ①						
TestHealthProbe (TCP:26001)						
Session persistence ①						
None V						
Idle timeout (minutes) ①						
0 4						
Floating IP (direct server return) ①						
Disabled Enabled						~
ок						
<						>

10. 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. Search for Network security groups.
- 2. Select Network security groups.

≡	Microsoft Azure			X	} 🕹 🐵	? 😊	-	
	Azure servic	Services See a	Marketplace					^
	Azure servic	💎 Network security groups		No results were found.				
	+	🏮 Network security groups (classic)	Documentation			SQL	\rightarrow	
	Create a	Virtual networks	Deploy Azure Mul	ti-Factor Authentication - Azu	ire Active	atabases	More services	
	resource	Application security groups	Resource Groups					
		🎎 Groups		No results were found.				
	Recent reso	📪 Host groups						
	News	(A) Management groups				Viewed		
	Name	Metwork interfaces						
	🚸 TestLoadBala	🔎 Network Watcher				in ago		
	TestGroup1	() Resource groups				go		
	🖳 node-1	Resources				go		
	node-2	No results were found.				go		
	node-2419	Searching all subscriptions. Change				ago		
	node-1284		Network interface		24 h	n ago		
	🖳 win10-ogata		Virtual machine		2 d a	ago		
	💶 node1		Virtual machine		2 d a	ago		
	node2		Virtual machine		2 d a	ago		
	ipconfig1		Public IP address		2 d a	ago		
	node1186		Network interface		2 d a	ago		
	💎 node1-nsg		Network security group		2 d a	ago		
	Navigate							
	•							
	📍 Subscript	ions 🛛 🔯 Resource groups	All resou	irces	Dashboard	d		~

- 3. From the network security group list, select node-1-nsg for node-1 or node-2-nsg for node-2.
- 4. The summary is displayed.
- 5. Select Inbound security rules.

Home > Network security groups >	node-	1-nsg - Inbound	security rules						
node-1-nsg - Inbound Network security group	d secu	urity rules							
	~	+ Add 🔌	Default rules						
👂 Overview	^	Priority	Name	Port	Protocol	Source	Destination	Action	
Activity log		1000	A default-allow-rdp	3389	TCP	Any	Any	Allow	
Access control (IAM)		1010							
Tags		65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow	
Diagnose and solve problems		65001	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	Allow	
Settings		65500	DenyAllInBound	Any	Any	Any	Any	Ø Deny	
Inbound security rules									
Outbound security rules									
Network interfaces									
-> Subnets									
Properties									
🖞 Locks									
Export template									
Aonitoring									
Diagnostic settings									
🗜 Logs									
NSG flow logs									
upport + troubleshooting									
Effective security rules	0								
New current request	~								

- 6. Click Add.
- 7. The Add inbound security rule blade is displayed. Specify Name.

Home > Network security groups : node-1-nsg - Inboun		-	security rules		Add inbound security rule
Network security group	a sec	unity rules			🤌 Basic
	~	🕂 Add 🔌	Default rules		
💎 Overview	~	Priority	Name	Port	Source * 🛇 Any
 Activity log 		1000	▲ default-allow-rdp	3389	Source port ranges * ①
Access control (IAM)		1010			*
Tags		65000	AllowVnetInBound	Any	Destination * ①
Diagnose and solve problems		65001	AllowAzureLoadBalancerInBound	Any	Any
Settings		65500	DenyAllInBound	Any	Destination port ranges * ①
Inbound security rules					8080
Outbound security rules					Protocol *
Network interfaces					Any TCP UDP ICMP
 Subnets 					Action *
Properties					
🔒 Locks					Priority * ① 1020
Export template					Name *
Monitoring					TestHTTP
Diagnostic settings					Description
👷 Logs					·
NSG flow logs					
Support + troubleshooting					
Effective security rules					

8. Specify **Destination port range** and **Protocol**, and click **Add**.

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** on the upper part of the window.

Create a	() Resource	Network	Virtual	Subscriptions	All resources	App Services	Storage	SQL databases	More services
resource	groups	security groups	machines				accounts		
Recent res	ources								
	NAME			TYPE				LAST VIEWED	
«· »								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
•••								28 min ago	
-								28 min ago	
DNS								28 min ago	
<u>•</u>								29 min ago	
<u>•</u>								30 min ago	
8								32 min ago	
Neutral									
Navigate									
<u> </u>	scriptions	Resource	e groups	All r	esources	Dasht	aaard		

- 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		
Home > TestGroup1		
(is) TestGroup1 Resource group		\$
. ○ Search (Ctrl+/)	« + Add ≡ Edit columns ⁽¹⁾ Delete resource group ⁽²⁾ Refresh → Move ⁽²⁾ Export to CSV ⁽³⁾ Assign tags ⁽¹⁾ Delete ⁽²⁾ Export template ⁽²⁾	-
i Overview	Essentials ×	
 Activity log 	Filter by name Type == all () Location == all () Type Add filter	
Access control (IAM)	Showing 1 to 31 of 31 records.	\sim
Tags	Name ↑↓ Type ↑↓ Location ↑↓	
🗲 Events	AvailabilitySet-1 Availability set Japan East	
Settings	🗌 🔯 AvailabilitySet1 Availability set Japan East	
🗳 Quickstart	DNS zone global	
Deployments	🗌 🖬 ipconfig1 Public IP address Japan East	•••
Policies	🗌 🖬 ipconfig11 Public IP address Japan East	•••
Properties	🗌 🖬 ipconfig12 Public IP address Japan East	
🔒 Locks	🗌 🖬 ipconfig2 Public IP address Japan East	
Export template	🗌 📮 node-1 Virtual machine Japan East	
Cost Management	Network security group Japan East	
🗞 Cost analysis	Retwork interface Japan East	
Cost alerts	Disk Japan East	
③ Budgets	Senode-1_OsDisk_1_dfa99e02b54a4452ac9964de51616aa3 Disk Japan East	
Advisor recommendations	🗌 📮 node-2 Virtual machine Japan East	
Monitoring	Retwork security group Japan East	
Insights (preview)	- Nøtwork interface lanan Fast	
 Alerts 	Previous Page 1 v of 1 Next >	

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

112

≡ Microsoft Azure 🔎 Searc	h resources, services, and docs (G+/)	0		
Home > TestGroup1 > TestLoadBalance	r			
TestLoadBalancer Load balancer			s?	\times
. ○ Search (Ctrl+/) «	\rightarrow Move \square Delete \bigcirc R	Refresh		
💠 Overview	Resource group (change) : Test	stGroup1	Backend pool : TestBackendPool (2 virtual machines)	^
 Activity log 		oan East	Health probe : TestHealthProbe (Tcp:26001)	
Access control (IAM)	Subscription (change) :		Load balancing rule : TestLoadBalancingRule (Tcp/80 to Tcp/8080)	
Tags	Subscription ID : SKU : Basi	rie .	NAT rules : 0 inbound Private IP address : 10.5.0.200	
Diagnose and solve problems			Private in address . 10.3.0.200	
	Tags (change) : Clic	ck here to add tags		
Settings	L			l
Frontend IP configuration	Courte la	Configure high availability and so	alability for your applications using built-in load balancing for cloud services and virtual	
Backend pools		ines. Azure Load Balancer supports TCP/UDP-based pro	tocols and protocols used for real-time voice and video	
Health probes		messaging application	ins. Learn more	
📒 Load balancing rules				
Inbound NAT rules	••	••		
Properties	Bal	alance IPv4 and IPv6 addresses		
🔒 Locks	Nat	ative dual-stack endpoints help meet regulatory quirements and address the fast-growing number	Build highly reliable applications Load Balancer improves application uptime by	
😟 Export template		devices in mobile and IoT.	routing traffic to healthy nodes. Learn more	
Support + troubleshooting		View frontend IP configuration	View health probes	
R New support request	View	ew backend pools	View load balancing rules	
		Secure your networks		
		Control network traffic and p using built-in network addre		~
<		the second		>

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 "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

For the Cluster WebUI setup and connection procedures, see "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
- 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 Cluster WebUI, and click Cluster generation wizard.

Cluster WebUI <clus< th=""><th>ster></th><th></th><th></th><th></th><th>🖋 Con</th><th>fig mode 🗸</th><th>₹ 0</th><th>ß</th><th>₽</th><th>i</th><th>? 🔳</th></clus<>	ster>				🖋 Con	fig mode 🗸	₹ 0	ß	₽	i	? 🔳
Cluster generation wizard	Import	Export	Get the Configuration File	↑ Apply the Configuration File	Update Server Data	Check the Config	uration File				

2. The Cluster window on the Cluster generation wizard is displayed.

Enter a desired name in **Cluster Name**. Select an appropriate language in **Language**. Click **Next**.

Cluster generation wizard		<
Server Server Cluster > Basic Settings > Interconnect	Server → NP Resolution → Group → Monitor	
Cluster Name*	Cluster1	
Comment		
Language*	English 🗸	
Management IP Address		
If using the integrated WebManager to manage mult	e (locale) of the environment that runs WebManager. iple clusters, specify a unique cluster name to identify the cluster. used for a WebManager connection. If establishing connections by specifying each server IP address, the	

3. The **Basic Settings** window is displayed.

The instance connected to Cluster WebUI is displayed as a registered master server. Click **Add** to add the remaining instances (by specifying the private IP address of each instance). Click **Next**.

Add server	
Server Name or IP Address*	10.5.0.121
• Enter an IP address or a server name. When entering a server name, name results both IPv4 and IPv6 for IP address can be When entering an IP address, the server	plution is necessary. e used.
	OK Cancel
Cluster generation wizard	×
Server Server Server Server → MP Resolution → Add Remove	Group ᢣ Monitor
Server Definitions Order Name	
Master server node-1	
1 node-2 ↑ ↓	
Server Group Definition O Click "Add" to add servers constructing the cluster. Click 「介」 or 「↓」 to change the server priority. Click "Settings" to configure the server group when using the server group.	Settings
	Back Next Cancel

4. The Interconnect window is displayed.

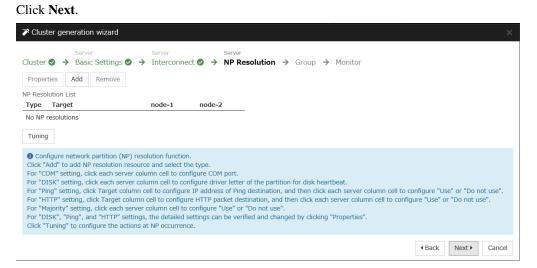
Specify the IP addresses (IP address of each instance) to be used for interconnect. In addition, select mdc1 for **MDC** as a communication path of a mirror disk resource to be created later. Click **Next**.

Cluster generation wizard				>
Cluster I to Server Basic Settings I to Properties Add Remove	Server	Server → NP Resolution → 0	Group 🔶 Monitor	
Interconnect List Priority Type	MDC	node-1	node-2	
1 Kernel Mode V	mdc1 🗸	10.5.0.120 🗸	10.5.0.121	~
\uparrow \downarrow				
which is used only for data mirroring c For "Kernel mode" setting, more than For "Kernel mode" setting, click each se For "Witness HB" setting, click each se Click " 1" or " J" to configure the prior For "Mirror Communication Only" setti	ettings, configur ommunication. zero routes are r erver column ce rver column cell ity to preferentia ng, click on the c	e the route which is used for hea necessary to be configured. Confi II and set an IP address. to set "Use" or "Do not use", and II y use the LAN only for the com III for each server column and so	rtbeat. For "Mirror Communic guring more than one routes i I then click "Properties" to set nunication among the cluster et an IP address.	ation Only" setting, configure the route is recommended. t detailed settings.
				Back Next Cancel

5. The NP Resolution window is displayed.

Note that NP resolution is not configured on this window. 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."

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). There is no NP resolution destination nor method to recommend. Additionally, you can use network partition resolution resources for NP resolution.



2) Adding a group resource

• Defining a group

Create a failover group.

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

Cluster generation wizard			×
Server Cluster 📀 🔶 Basic Settings	Server Server S Server → Interconnect S → NP Resolution	ution 🥑 🔶 Group 🔶 Monitor	
Properties Add Remove			Group Resource
Group List			
Name		Туре	
No groups			
Configure failover group to b Click "Add" to add a group. Click "Properties" to configure t Click "Group Resource" to add r	he properties of the selected group.		
			◆Back Next → Cancel

2. The Group Definition window is displayed.

Specify a failover group name (failover1) for Name. Click Next.

Group Definition	failover 🗙
Basic Settings → Startup Servers	→ Group Attributes → Group Resource
Туре*	failover 🗸
Use Server Group Settings	
Name*	failover1
Comment	
 Select group type. If using virtual machine resources to clust "Failover". If using server group, check the "Use Server gr	ter virtual machines, select "Virtual machine" as the type. In other cases, select ver Group".

- 3. The **Startup Servers** window is displayed. Click **Next** without specifying anything.
- 4. The **Group Attributes** window is displayed. Click **Next** without specifying anything.
- 5. The **Group Resource** window is displayed. On this page, add a group resource following the procedure below.

Group Defini	tion	failover 🗙
Basic Setting	gs 📀 → Startup Servers 🤡 → Group Attributes 🤡 → Group Resource	
Properties	Add Remove	
Group Resour	te List Type	
No resources		
-	ld" to add resources. ties" to configure the properties of the selected resource.	
		ish Cancel
	Back Fin	ish Cancel

• Mirror disk resource

Create a mirror disk resource.

For details, see "Understanding mirror disk resources" in "Group resource details" in the Reference Guide.

- 1. Click Add on the Group Resource List page.
- 2. The Resource Definition of Group | failover1 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. Click **Next**.

Resource Definition of Group failover1		
Info → Dependency → Recovery	Operation 🔶 Details	
Туре*	Mirror disk resource \checkmark	
Name*	md	
Comment		
Get License Info		
• Select the type of group resource and	enter its name.	

- 3. The **Dependency** window is displayed. Click **Next** without specifying anything.
- 4. The **Recovery Operation** window is displayed. Click **Next**.
- The Details window 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	md 🗙
Info \bigcirc \rightarrow Dependency \bigcirc \rightarrow Recovery Operation \oslash	→ Details
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	Name
	← node-1 Add
	node-2
	Remove
Edit	
Add Servers that can run the group	
Tuning	
	Back Finish Cancel

6. The **Selection of partition** dialog box is displayed. Click **Connect**, select the data partition and cluster partition created in "5)**Configuring virtual machines**", and click **OK**.

ata Partiti	ion			
Volume	Disk No.	Partition No.	Size	GUID
	0	1	500MB	
D:¥	1	1	10238MB	
F:¥	2	1	1024MB	
C:¥	0	2	129546MB	
G:¥	2	2	19453MB	
luster Par Volume	tition Disk No.	Partition No.	Size	GUID
	0	1	500MB	and "a "mast stress stress stress concentrations
	1	1	10238MB	
D:¥			1024MB	
D:¥ F:¥	2	1		
	2 0	1	129546MB	

7. Perform steps 5 and 6 for node-1 and then node-2 and click Finish.

Resource Definition of Group failover1	md 🗙
Info \bigcirc \rightarrow Dependency \bigcirc \rightarrow Recovery Operation \bigcirc	→ Details
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	Name
node-1	← Add
node-2	→ 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 the Reference Guide.

- 1. Click Add on the Group Resource List page.
- 2. The **Resource Definition of Group | failover1** 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. Click **Next**.

Resource Definition of Group failover1		
Info → Dependency → Recovery	Operation > Details	
Туре*	Azure probe port resource	
Name*	azurepp1	
Comment		
Get license information		
• Select the type of group resource and	enter its name.	

3. The Dependency window is displayed. Click Next without specifying anything.

- 4. The Recovery Operation window is displayed. Click Next.
- 5. For **Probeport**, enter the value specified for **Port** when configuring a load balancer (configuring health probe).

Resource Definition of Group failover1		
Info \bigcirc \rightarrow Dependency \oslash \rightarrow R	ecovery Operation 🛛 🔿 Details	
Probeport*	26001	
Tuning		
		Back Finish Cancel

6. 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 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 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 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. Click **Next**.

Monitor Resource Definition			genw 🗙
Info → Monitor(common) → Mor	itor(special) 🔶 Recovery Action		
Туре*	Custom monitor		
Name*	genw1		
Comment			
Get Licence Info			
• Select the type of monitor resource an	nd enter its name.		
		Next 🕨	Cancel

3. The **Monitor** (common) window is displayed.

Confirm that Monitor Timing is Always and click Next.

Monitor Resource Definition		genw 🗙
Info 📀 🔶 Monitor(common) 🔶 Monitor(special)	→ Recovery	Action
Interval*	60	sec
Timeout*	120	sec
Do Not Retry at Timeout Occurrence		
Do Not Execute Recovery Action at Timeout Occurrence		
Retry Count*	1	time
Wait Time to Start Monitoring*	3	sec
Monitor Timing		
 Always Active 		
Target Resource		Browse
Choose servers that execute monitoring	Server	

4. The **Monitor** (**special**) window is displayed. Select **Script created with this product**.

The following shows the sample of a script to be created.

```
< EXPRESSCLUSTER_installation_path>\binclpazure_port_checker -h_

management.core.windows.net -p 443

EXIT %ERRORLEVEL%
```

Select Synchronous for Monitor Type. Click Next.

Monitor Resource Definition				genw 🗙
Info 🔮 🔶 Monitor(common) 🔗	→ Monitor(special) → Recovery Action			
○ User Application ◉ Script created with this product				
File	genw.bat			
		Edit	View	Replace
Monitor Type	 Synchronous Asynchronous 			
Normal Return Value*	0			
Kill the application when exit				
Wait for activation monitoring to stop before stopping the cluster				
Execution user	\checkmark			
	4	Back	Next 🕨	Cancel

5. The **Recovery Action** window is displayed.

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

Monitor Resource Definition		genw 🗙
Info 🔮 🔶 Monitor(common) 🤡 -	→ Monitor(special) → Recovery Act	tion
Recovery Action	Execute only the final action	~
Recovery Target *	LocalServer	Browse
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	No operation	\sim
		Script Settings
		Back Finish Cancel

- 6. 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 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. Click **Next**.

Monitor Resource Definition		ipw 🗙
Info → Monitor(common) → Mor	itor(special) 🔶 Recovery Action	
Туре*	IP monitor	
Name*	ipw1	
Comment		
Get Licence Info		
3 Select the type of monitor resource an	nd enter its name.	
		Gancel Accel Accel Cancel

3. The Monitor (common) window is displayed.

Confirm that Monitor Timing is Always.

Monitor Resource Definition		ipw 🗙
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

Select one available server for Choose servers that execute monitoring.

Click OK and click Next.

Failure Detection Server					
○ All servers ● Select					
Servers that can run the Group		Available Servers			
Name	←	Name			
node-1	Add	node-2			
	→ Remove				
			OK	Cancel	Apply

4. The Monitor (special) window is displayed.

Monitor Resource Definition		іру	w ×
Info 📀 🔶 Monitor(common) 📀 🚽	→ Monitor(special) → Re	covery Action	
Edit Add Remove			
IP Address List			
IP Address			
No Ip Address			
ping Timeout*	5000	msec	
		Garket Next ► Car Car	ncel

On the **Common** tab, select **Add** of **IP Address** and set an IP address of a server other than the server selected in step 3. Click **Next**.

IP Address Settings			
IP Address*	10.5.0.121		
		OK	Cancel

Monitor Resource Definition				ipw 🗙
Info 🔮 🔶 Monitor(common) 🔮 🕂	→ Monitor(special) → Re	covery Action		
Edit Add Remove				
IP Address List				
IP Address				
10.5.0.121				
ping Timeout*	5000	msec		
			Hack Next Next	Cancel

5. The **Recovery Action** window is displayed.

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

Monitor Resource Definition		ipw 🗙
Info 🛛 🔸 Monitor(common) 🖉 -	Monitor(special) 🛛 🔸 Recovery Action	
Recovery Action	Execute only the final action	~
Recovery Target *	LocalServer Brow	se
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	No operation	
		Script Settings
	4 [Back Finish Cancel

- 6. Click **Finish** to finish setting.
- 7. Then, create a monitor resource on the other server. Click Add on the Monitor Resource List page.
- 8. Select the monitor resource type (IP monitor) from the **Type** box and enter the monitor resource name (ipw2) in the **Name** box. Click **Next**.
- 9. The **Monitor** (common) window is displayed. Confirm that **Monitor Timing** is **Always**.

Select one available server for Choose servers that execute monitoring. Click OK and Click Next.

10. The Monitor (special) window 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 9. Click **Next**.

11. The **Recovery Action** window is displayed.

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

- 12. 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 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. Click **Next**.

Monitor Resource Definition		mtw 🗙
Info → Monitor(common) → Mor	itor(special) 🔶 Recovery Action	
Туре*	Multi target monitor	
Name*	mtw1	
Comment		
Get Licence Info		
1 Select the type of monitor resource an	nd enter its name.	

The Monitor (common) window is displayed.
 Confirm that Monitor Timing is Always and click Next.

Monitor Resource Definition		mtw	×
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		
		Gancel And the second se	

4. The **Monitor** (special) window 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**. Click **Next**.

Monitor Resource Definition	on			mtw 🗙
Info 🔮 🔶 Monitor(com	mon) 🥑 🔶 Moni	tor(special) 🔶 R	Recovery Action	
Monitor Resources			Available Monitor Resources	5
Monitor Resource	Туре	←	Monitor Resource	Туре
genw1	genw	Add	userw	userw
ipw1	ipw	→		
ipw2	ipw	Remove		
Tuning				
			▲ Back	Next Cancel

5. The Recovery Action window 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.

Monitor Resource Definition		mtw 🗙		
Info 🥑 → Monitor(common) 🔗	→ Monitor(special) → Recover	ry Action		
Recovery Action	Execute only the final action	Execute only the final action		
Recovery Target *	LocalServer	Browse		
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	\checkmark			
Final Action	No operation	~		
		Script Settings		
		Back Finish Cancel		

6. 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 "4.1 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 "10)**Setting the inbound security rules**" to the following:

- Frontend IP (public IP address) of the load balancer

```
<EXPRESSCLUSTER_installation_path>binclpazure_port_checker -h <_</pre>
→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
:CLUSTER_SHUTDOWN
clpdown
rem EXIT
: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**.

Edit Script O User Application Script created with this product File preaction.bat Edit View Replace Timeout* 15 sec Exec User \sim OK Cancel Apply

7. Click Finish to finish setting.

4) Setting the cluster properties

For details about the cluster properties, see "Cluster properties" in the Reference Guide.

· Cluster properties

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

1. Enter Config Mode from Cluster WebUI, click the property icon of the cluster name.

Cluster Name	Cluster1
Comment	
Language	English 🗸

- 2. Select the **Timeout** tab. For **Timeout** of **Heartbeat**, specify a value calculated by "A+B+C" as described below.
 - 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)
- C: 30 seconds (Waiting time for heartbeat not to time out before the multi target monitor resource detects an error. The time can be changed accordingly.

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.

Network initialization complete wait time*	3	min	
Server Sync Wait Time*	5	min	
Heartbeat			
Interval*	3	sec	
Timeout*	270	sec	
Server Internal Timeout*	180	sec	
Initialize			
			OK Cancel Apply

3. Click OK.

5) Applying the settings and starting the cluster

1. Click Apply the Configuration File in the config mode of Cluster WebUI.

A popup message asking "Do you want to perform the operations?" is displayed. Click **OK**. When the upload ends successfully, a popup message saying "The application finished successfully." is displayed. Click **OK**.

If the upload fails, perform the operations by following the displayed message.

- 2. Select the **Operation Mode** on the drop down menu of the toolbar in Cluster WebUI to switch to the operation mode.Select **Start Cluster** in the **Status** tab of Cluster WebUI and click.
- 3. Confirm that a cluster system starts and the status of the cluster is displayed to the Cluster WebUI. If the cluster system does not start normally, take action according to an error message.

For details, refer to the following:

Installation and Configuration Guide

-> How to create a cluster

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.

CLUSTER CREATION PROCEDURE (FOR AN HA CLUSTER USING AN INTERNAL LOAD BALANCER)

6.1 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		
Resource group	TestGroup1	
Region	(Asia Pacific) 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	TestGroup1	
Location	(Asia Pacific) Japan East	
Load balancer setting		
Name	TestLoadBalancer	
Туре	Internal	
Virtual network	Vnet1	
Subnet	Vnet1-1	
IP address assignment	Static	
Private IP address	10.5.0.200	
Resource group	TestGroup1	
Region	(Asia Pacific) Japan East	
Backend pool: Name	TestBackendPool	
Associated to	Availability set	
Target virtual machine		
	node-1	
	node-2	

Continued on next page

Setting item	Setting value	
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)	

Table 6.1 – continued from previous page

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

Setting value	
node1	node2
Standard HDD	Standard HDD
testlogin	testlogin
PassWord_123	PassWord_123
TestGroup1	TestGroup1
(Asia Pacific) Japan East	(Asia Pacific) Japan East
node1-nsg	node2-nsg
AvailabilitySet-1	AvailabilitySet-1
5	5
2	2
Automatically generated	Automatically generated
	node1 Standard HDD testlogin PassWord_123 TestGroup1 (Asia Pacific) Japan East node1-nsg AvailabilitySet-1 5 2

Setting item	Setting value	
	node1	node2
- Performance	Standard	Standard
– Replication	Locally-redundant storage (LRS)	Locally-redundant storage (LRS)
IP configuration setting		
– IP address	10.5.0.120	10.5.0.121
Disk setting		
– Name	node-1Blob1	node-2Blob1
– Source type	None (empty disk)	None (empty disk)
– Account type	Standard HDD	Standard HDD
– Size	20	20

Table 6.2 – continued from previous page

• EXPRESSCLUSTER settings (cluster properties)

Setting item	Setting value	
	node1	node2
– Cluster Name	Cluster1	Cluster1
– Server Name	node1	node2
- NP Resolution Tab: Type	Ping	Ping
- NP Resolution Tab: Target	10.5.0.5	10.5.0.5
– NP Resolution Tab: <server> column</server>	Use	Use

• EXPRESSCLUSTER settings (failover group)

Resource name	Setting item	Setting value
Mirror disk resource	Name	md

Continued on next page

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

Table 6.4 – continued from previous page

• EXPRESSCLUSTER settings (monitor resource)

Monitor resource name	Setting item	Setting value
Mirror disk monitor resource	Name	mdw1
Azure probe port monitor resource	Name	azureppw1
	Recovery Target	azurepp1
Azure load balance monitor resource	Name	azurelbw1
	Recovery Target	azurepp1

6.2 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** on the upper part of the window. If there are existing resource groups, they are displayed in a list.

Create a	[]			~				_	
Create a			•	†		۲		SQL	\rightarrow
resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent resour	ces								
NA	ME			TYPE				LAST VIEWED	
\leftrightarrow								22 min ago	
								24 min ago	
()								24 min ago	
=								26 min ago	
								26 min ago	
								27 min ago	
								28 min ago	
-								28 min ago	
(DNS)								28 min ago	
.								29 min ago	
.								30 min ago	
8								32 min ago	

2. Select +Add on the upper part of the window.

Home > Resource groups			
Resource groups			Ŕ
+ Add ≡≡ Edit columns 🖒 Refresh 🞍 Export to	o CSV ⊘ Assign tags ♡ Feedback		
Subscription == all	Location == all Add filter		
howing 1 to 30 of 30 records.		No grouping	\sim
Name ↑↓	Subscription \uparrow_{\downarrow}	Location \uparrow_{\downarrow}	
		Japan East	
		Southeast Asia	
		West US	•••
		South Central US	
		South Central US	
		Japan West	
		East Asia	
		South Central US	
		South Central US	
		North Europe	
		South Central US	
		South Central US	
		Central US	
		Japan East	
		West India	
		Japan East	
		Japan East	
		Japan East	
		· - ·	

3. Specify Subscription, Resource group, and Region, and click Review+Create.

Microsoft Azure		℅ Search resources, services,	and docs (G+/)	>_	Ģ Ω		٢	and strength of	
Home > Resource groups > C	Create a resource group								
Create a resource grou	ир								×
Basics Tags Review + o	create								
resources for the solution, or or	that holds related resources for an Az nly those resources that you want to groups based on what makes the mos	manage as a group. You decide	how you want to						
Project details									
Subscription *			\checkmark						
Resource group *	TestGroup1		~						
Resource details									
Region *	(Asia Pacific) Japan East		\sim						
Review + create <	Previous Next : Tags >								
)

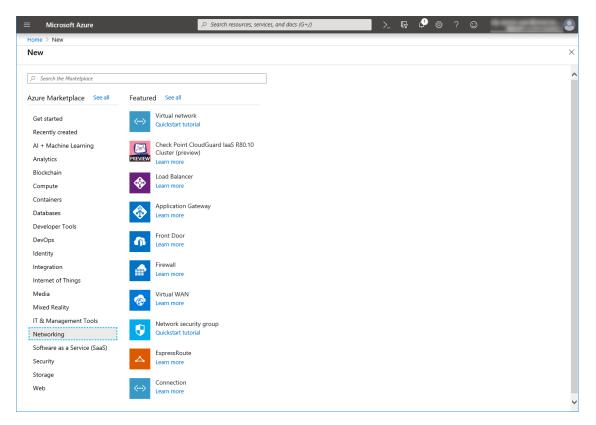
2) Creating a virtual network

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

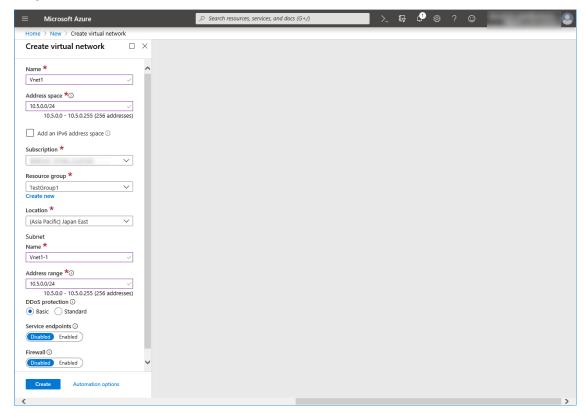
1. Select **Create a resource** on the upper part of the window.

Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent res	ources								
	NAME			TYPE				LAST VIEWED	
«· »								22 min ago	
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()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
•••								28 min ago	
9								28 min ago	
DNS								28 min ago	
•								29 min ago	
<u>•</u>								30 min ago	
8								32 min ago	
Navigate									

2. Select Networking and then Virtual network.



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



3) Creating a virtual machine

:

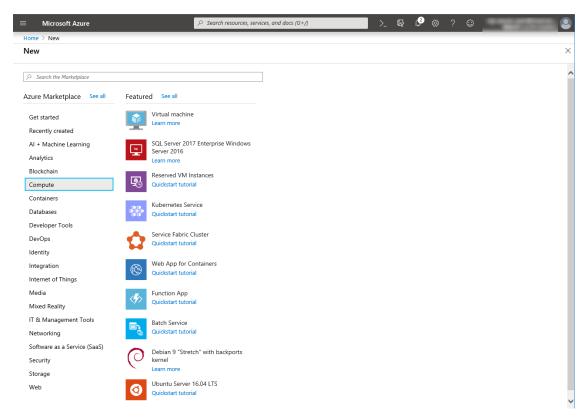
Log in to the Microsoft Azure portal (https://portal.azure.com/) and create virtual machines and disks following the steps below.

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

1. Select **Create a resource** on the upper part of the window.

Create a	() Resource	Network	Virtual	Subscriptions	All resources	App Services	Storage	SQL databases	More services
resource	groups	security groups	machines				accounts		
Recent res	sources								
	NAME			TYPE				LAST VIEWED	
~~>								22 min ago	
								24 min ago	
[;]								24 min ago	
								26 min ago	
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<u>ę</u>								30 min ago	
8								32 min ago	
Navigate									
•	oscriptions		e groups	All r	esources	Dasht			

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



3. Select Windows Server 2016 Datacenter.

domains. Then click OK.

4. When the Basics tab appears, specify the settings of Subscription, Resource group, Virtual machine name, Region, Image, Size, Username, Password, and Confirm password.
Select Availability set from Availability options, and click Create new under the Availability set field. When the Create new blade appears, specify the settings of Name, Fault domains, and Update

144 Chapter 6. Cluster Creation Procedure (for an HA Cluster Using an Internal Load Balancer)

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Home > New > Create a virtual machin	ie				
Create a virtual machine					×
Basics Disks Networking Ma	nagement Advanced Tags Review + create				^
Create a virtual machine that runs Linux image.	or Windows. Select an image from Azure marketplace or use your own customized				
	reate to provision a virtual machine with default parameters or review each tab for f	ull			
Looking for classic VMs? Create VM from	n Azure Marketplace				
Project details					
Select the subscription to manage deplo your resources.	yed resources and costs. Use resource groups like folders to organize and manage a	11			
Subscription * ①	·	\checkmark			
Resource group *	(establish)	~			
	Create new				
Instance details					
Virtual machine name * ①		_			
Region * 🛈	(Asia Pacific) Japan East	~			
Availability options ①	Availability set	~			
Availability set 🗙 🛈		~			
Image *					
	Browse all public and private images	×			~
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Microsoft Azure Sear Microsoft Azure Sear Home > New > Create a virtual machine Create a virtual machine Basics Disks Networking Ma Create a virtual machine that runs Linux image. Complete the Basics tab then Review + 0 customization.	ch resources, services, and docs (G+/) ne nagement Advanced Tags Review + create or Windows. Select an image from Azure marketplace or use your own customized reate to provision a virtual machine with default parameters or review each tab for f		Create new Group two or more V one is available durin Learn more Name * AvailabilitySet-1	'Ms in an availability se	
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Microsoft Azure M	ch resources, services, and docs (G+/) ne nagement Advanced Tags Review + create or Windows. Select an image from Azure marketplace or use your own customized reate to provision a virtual machine with default parameters or review each tab for f n Azure Marketplace	ull	Create new Group two or more V one is available durin Learn more Name * AvailabilitySet-1 Fault domains ①	Ms in an availability se g planned or unplanne	
Microsoft Azure P Sea Home > New > Create a virtual machine Basics Disks Networking Me Create a virtual machine that runs Linux image. Complete the Basics tab then Review + o customization. Looking for dassis UMs? Create VM foo Project details Select the subscription to manage deplo	ch resources, services, and docs (G+/) ne nagement Advanced Tags Review + create or Windows. Select an image from Azure marketplace or use your own customized reate to provision a virtual machine with default parameters or review each tab for f in Azure Marketplace yed resources and costs. Use resource groups like folders to organize and manage a	ull	Create new Group two or more V one is available durin Learn more Name * AvailabilitySet-1 Fault domains ①	Ms in an availability se g planned or unplanne	ed maintenance events.
Microsoft Azure P Sea Tome > New > Create a virtual machine Create a virtual machine Basics Disks Networking Ma Create a virtual machine that runs Linux image. Complete the Basics tab then Review + o customizatio. Looking for classic VMs? Create VM for Project details Select the subscription to manage deploy your resources.	ch resources, services, and docs (G+/) ne nagement Advanced Tags Review + create or Windows. Select an image from Azure marketplace or use your own customized reate to provision a virtual machine with default parameters or review each tab for f n Azure Marketplace yed resources and costs. Use resource groups like folders to organize and manage a		Create new Group two or more V one is available durin Learn more Name * AvailabilitySet-1 Fault domains ① Update domains ③	Ms in an availability se g planned or unplanne	ed maintenance events.
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Click Change size to display the Select a VM size blade.

From the list, choose a size (A1 - Standard in this guide) suitable for your virtual machine and click Select.

Regarding the **Virtual machine name**, node-1 is for node-1, and node-2 is for node-2. Click **Next: Disks >** 5. When the **Disks** tab appears, go through the following steps to add a disk to be used for a mirror disk (cluster partition or data partition).

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Home > New > Create a virtual machi			νγ τ _ο μι «	w !	0	
Create a virtual machine						
Basics Disks Networking Ma	anagement Advanced Tags Revie	ew + create				
	disk and a temporary disk for short-term stor of storage you can use and the number of d					
Disk options						
OS disk type * ①	Standard HDD	~				
Enable Ultra Disk compatibility 🛈	Ves 🔍 No					
	Ultra Disk compatibility is not available	of or this VM size and location.				
temporary disk. LUN Name Create and attach a new disk Attach	Size (GiB) Disk type	Host caching				
✓ Advanced						
Review + create <	Previous Next : Networking >					

From the DATA DISKS list, click Create and attach a new disk.

6. The Create a new disk blade appears.
 Specify Name, Source type, and Size. Then click OK.
 Click Next: Networking >

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Home > New > Create a vir	tual machine > Create a new disk					
Create a new disk						×
Create a new disk to store ap storage type, and number of	plications and data on your VM. Disk pricing varies based on factors including disk size, transactions. Learn more about Azure Managed Disks					
Name *	node-1_DataDisk_0					
Source type *	None (empty disk)					
size ★⊙	20 GiB Standard HDD Change size					
ок						

7. The **Networking** tab appears.

Specify the settings of Virtual network, Subnet, Network security group, and Configure network security group.

Click **Create new** under the **Configure network security group** field to display the **Create network security group** blade. Specify the setting of **Name** and then click **OK**.

Click Next: Management >.

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Create a virtual machine									×
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	ual machine by configuring network interface card (NIC) settings. You can control ity with security group rules, or place behind an existing load balancing solution.								
Network interface									
When creating a virtual machine, a netw	ork interface will be created for you.								
Virtual network *	Vnet1 V								
	Create new								
Subnet *	Vnet1-1 (10.5.0.0/24)								
	Manage subnet configuration								
Public IP 🕕	None								
	Create new								
NIC network security group $$	None Basic Advanced								
Configure network security group 🕇	(new) node-1-nsg								
	Create new								
Accelerated networking ①	On 💿 Off								
	The selected VM size does not support accelerated networking.								
Load balancing									
-	backend pool of an existing Azure load balancing solution. Learn more								
	-								
Review + create <	Previous Next : Management >								
Neview + create	Next, Management >								
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8. The **Management** tab appears.

Click **Create new** under the **Diagnostics storage account** field to display the **Create storage account** blade.

Specify the settings of Name, Account kind, and Replication. Then click OK.

In the **Diagnostics storage account** field, the default value is automatically generated and entered. Click **Next: Advanced >**.

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Home \geq New \geq Create a virtual	machine						
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Basics Disks Networking	Management Advanced Tags Review + create						
Configure monitoring and manag	ement options for your VM.						
Azure Security Center							
Azure Security Center provides ur Learn more	ified security management and advanced threat protection across hybrid cloud workloads.						
 Your subscription is protected 	d by Azure Security Center basic plan.						
Monitoring							
Boot diagnostics ①	● On ◯ Off						
OS guest diagnostics 🕕	On () Off						
Diagnostics storage account *	testgroup1diag600 V						
	Create new						
Identity							
System assigned managed identi	ty 0 On ● Off						
Azure Active Directory							
Login with AAD credentials (Prev	iew) 🛈 🔿 on 🖲 off						
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9. Click Next: Tags >.

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Home > New > Create a virtual machine								
Create a virtual machine								\times
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Add additional configuration, agents, scripts or applications via virtual n	achine extensions or cloud-init.							
Extensions								
Extensions provide post-deployment configuration and automation.								
Extensions Select an extension to instal								
Cloud init								
Cloud init is a widely used approach to customize a Linux VM as it boot: packages and write files or to configure users and security. Learn more	for the first time. You can use cloud-init	to install						
1 The selected image does not support cloud init.								
Host								
Azure Dedicated Hosts allow you to provision and manage a physical se Azure subscription. A dedicated host gives you assurance that only VMs choose VMs from your subscription that will be provisioned on the host of the host. Learn more	from your subscription are on the host, f	flexibility to						
Host group ① No host group found		\sim						
 Dedicated hosts cannot be used with availability sets. 								
- ·								~
Review + create < Previous Next : Tags >								
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10. Click **Next: Review + create >**.

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Home > New > Create a virtual machine					
Create a virtual machine					×
Basics Disks Networking Management	Advanced Tags Review + create				
Tags are name/value pairs that enable you to catego multiple resources and resource groups. Learn more	nize resources and view consolidated billing by applying the same tag to about tags of				
Note that if you create tags and then change resource	ce settings on other tabs, your tags will be automatically updated.				
Name 🕕 Value 🛈	Resource				
	11 selected V				
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11. The **Review + create** tab appears. Check the contents. If there is no problem, click **Create**. The deployment starts and takes several minutes.

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Home > New > Create a virtual machine	2								
Create a virtual machine									×
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Standard A1 v2	Subscription credits apply ①								
by Microsoft	9.0700 JPY/hr								
Terms of use Privacy policy	Pricing for other VM sizes								
TERMS									
above; (b) authorize Microsoft to bill my c billing frequency as my Azure subscriptior information with the provider(s) of the off	I terms and privacy statement(s) associated with the Marketplace offering(s) listed surrent payment method for the fees associated with the offering(s), with the same y and (c) agree that Microsoft may share my contact, usage and transactional lering(s) for support, billing and other transactional activities. Microsoft does not e the Azure Marketplace Terms for additional details.								
Basics									
Subscription									
Resource group	TestGroup1								
Virtual machine name	node-1								
Region	(Asia Pacific) Japan East								
Availability options	Availability set								
Availability set	(new) AvailabilitySet-1								
Username	testlogin								
Already have a Windows Server license?	No								¥
Create < Pr	evious Next > Download a template for automation								
<									>

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** on the upper part of the window.

1

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Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent res	ources								
	NAME			TYPE				LAST VIEWED	
~~>								22 min ago	
•								24 min ago	
[;]								24 min ago	
								26 min ago	
								26 min ago	
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ONS								28 min ago	
.								29 min ago	
X								30 min ago	
8								32 min ago	
Navigate									
📍 Sub	scriptions	Resource	groups	All r	esources	Dasht	ooard		

- 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.

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Home > Resource groups >		
FestGroup1		× x
	$_{\ll}$ + Add $\equiv\equiv$ Edit columns in Delete resource group \bigcirc Refresh \rightarrow Move \downarrow Export to CSV \otimes Assign tags in Delete \downarrow Export template	
Overview	Essentials 🛛 🕹	
Activity log	Filter by name Type == all () Location == all () +> Add filter	
Access control (IAM)	Showing 1 to 28 of 28 records. Show hidden types 🛈	\sim
Tags	\square Name \uparrow_{\downarrow} Type \uparrow_{\downarrow} Location \uparrow_{\downarrow}	
Events	🗌 💽 AvailabilitySet-1 Availability set Japan East	,
Settings	AvailabilitySet1 Availability set Japan East	
📣 Quickstart	Disconfig1 Public IP address Japan East	
Deployments	🗌 🖬 ipconfig2 Public IP address Japan East	
Policies	🗌 🖳 node-1 Virtual machine Japan East	
Se Properties	Network security group Japan East	
🔒 Locks	Retwork interface Japan East	
Export template	Disk Japan East	
Cost Management	Senode-1_OsDisk_1_dfa99e02b54a4452ac9964de51616aa3 Disk Japan East	
🗞 Cost analysis	Virtual machine Japan East	
Cost alerts	Network security group Japan East	
③ Budgets	Network interface Japan East	
Advisor recommendations	Sanode-2_DataDisk_0 Disk Japan East	
Monitoring	Disk Japan East	\
Insights (preview)	<pre> Previous Page 1 v of 1 Next > </pre>	
▲ Alarte		>

4. Select Networking.

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Home > Resource groups > T	TestGroup1	> node-1 - Netwo	rking						_
Nirtual machine	ang								>
, P Search (Ctrl+/)	«	💉 Attach netw	ork interface 🖉 Detach network	k interface					
Overview	^				opology ate IP: 10.5.0.4 Acc	elerated networking: Disa l	bled		
Activity log						-			
Tags			rules Outbound port rules			cing			
Diagnose and solve problem	ms		curity group node-1-nsg (attache bnets, 1 network interfaces	ed to network interfa	ce: node-1284)			Add inbound po	ort rule
Settings		Priority	Name	Port	Protocol	Source	Destination	Action	
🙇 Networking		1000	A default-allow-rdp	3389	TCP	Any	Any	Allow	
Bisks		65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow	
📮 Size		65001	AllowAzureLoadBalancerinBo	und Any	Any	AzureLoadBalancer	Any	Allow	
Security		65500	DenyAllInBound	Any	Any	Any	Any	Oeny	
Extensions									
🐔 Continuous delivery (Previe	:w)								
Availability + scaling									
Gonfiguration									
💲 Identity									
Properties									
🔒 Locks									
Export template									
Operations									
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- 5. Select a network interface displayed in the list. The network interface name is generated automatically.
- 6. Select IP configurations.

\equiv Microsoft Azure $ ho$ Search	n resources, services,	and docs (G+/)			D 🗗	₽ ©	? 🙂	
Home > Resource groups > TestGroup1	> node-1 - Network	ang ≥ node-1284	- IP configuratio	ons				
node-1284 - IP configurat	tions							×
	🕂 Add 🔛 Sa	ave 🗙 Discard						
Overview	IP forwarding se	ettings						
 Activity log 	IP forwarding			Disabled Enabled				
Access control (IAM)	Virtual network			Vnet1				
Tags	IP configuration	s						
Settings	Subnet *			Vnet1-1 (10.5.0.0/24)				\sim
IP configurations								
DNS servers	√ Search IP cor							
💎 Network security group	Name	IP Version	Type	Private IP address		Publ	ic IP address	
H Properties	ipconfig1	IPv4	Primary	10.5.0.4 (Dynamic)		-		
🔒 Locks								
Export template								
Support + troubleshooting								
📩 Effective security rules								
Effective routes								
📯 New support request								
<								>

- 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.

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Home > Resource groups > TestGroup1 > node-1 - Networking > node-1284 - IP config	igurations > ipconfig1								
ipconfig1	×								
🔚 Save 🗙 Discard									
The virtual machine associated with this network interface will be restarted to utilize the new private IP address. The network interface will be reprovisioned and network configuration settings, including secondary IP addresses, subnet masks, and default gateway, will need to be manually reconfigured within the virtual machine. Learn more									
Public IP address settings									
Public IP address Disabled Enabled									
Private IP address settings									
Virtual network/subnet									
Vnet1/Vnet1-1 Assignment									
Dynamic Static									
IP address *	_								
10.5.0.120									
e									

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

5) 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 disk.

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 "Determining a system configuration" in the Installation and Configuration Guide.

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

Initialize Disk	\times
You must initialize a disk before Logical Disk Manager can access it. Select disks:	
☑ Disk 2	
Use the following partition style for the selected disks:	
MBR (Master Boot Record)	
○ <u>G</u> PT (GUID Partition Table)	
Note: The GPT partition style is not recognized by all previous versions of Windows.	
OK Cancel	

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

📅 Disk Manager	ment						_		×
<u>F</u> ile <u>A</u> ction <u>V</u>	<u>/</u> iew <u>H</u> elp								
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Volume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free		
····· (C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	113.12 GB	89 %		
- Temporary Sto	rag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %		
	1								
Disk 0 Basic								77777	77777
127.00 GB	(C:) 127.00 GB NTFS								
Online	Healthy (System,	Boot, Activ	e, Crash Dump, P	rimary Partition	\$//////				
Disk 1									
Basic	Temporary Stora	ige (D:)							-
70.00 GB Online	70.00 GB NTFS	Defenses							
Omme	Healthy (Page File	e, Primary P	artition)						
	1								
Disk 2									
Basic 20.00 GB	20.00 GB								
Online	Unallocated								
Unallocated	Primary partition								

- 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.

New Simple Volume Wizard		×
	Welcome to the New Simple Volume Wizard	
	This wizard helps you create a simple volume on a disk.	
	A simple volume can only be on a single disk.	
	To continue, click Next.	
	< <u>B</u> ack <u>N</u> ext > Cancel	

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	ne maximum and minimum sizes.
Maximum diala annos in MD:	20477
Maximum disk space in MB:	
Minimum disk space in MB:	8
Simple volume size in MB:	1024
	< <u>B</u> ack <u>N</u> ext > 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: Mount in the following empty NTFS folder: Browse Do not assign a drive letter or drive path	
< <u>B</u> ack <u>N</u> ext > 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.

EXPRESSCLUSTER X 5.2 HA Cluster Configuration Guide for Microsoft Azure (Windows), Release 2

New Simple Volume Wizard	×
Specify Volume Size Choose a volume size that is betwee	en the maximum and minimum sizes.
Maximum disk space in MB:	19453
Minimum disk space in MB:	8
<u>S</u> imple 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.

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: Mount in the following empty NTFS folder: Browse Do not assign a drive letter or drive path	
< <u>B</u> ack <u>N</u> ext > Canc	el

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 th	his volume, and if so, what settings you want to use.				
○ <u>D</u> o not format this volume					
Format this volume with the following the following of	owing settings:				
<u>File system:</u>	NTFS ~				
Allocation unit size:	Default ~				
<u>V</u> olume label:	New Volume				
Perform a quick format					
Enable file and folder cor	npression				
	< <u>B</u> ack <u>N</u> ext > Cancel				

- 12. Click Next.
- 13. The **Completing the New Simple Volume Wizard** window s 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 Outick format: Yes To close this wizard, click Finish.	
	< <u>B</u> ack Finish Cancel	

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

a Disk Wallay	ement						-	\times
Eile <u>A</u> ction	<u>V</u> iew <u>H</u> elp							
⊨ 🔿 📰	? 🖬 🗩 🗙 🛛	2 🔒 🍃 🛛	3 2)					
/olume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free	
(C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	111.94 GB	88 %	
= (F:)	Simple	Basic	RAW	Healthy (P	1.00 GB	1.00 GB	100 %	
New Volume	(G:) Simple	Basic	NTFS	Healthy (P	19.00 GB	18.94 GB	100 %	
Temporary St	torag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %	
Basic 127.00 GB Online	(C:) 127.00 GB NTFS							
onnie	Healthy (System	, Boot, Activ	re, Crash Dump, I	Primary Partition	S///////			
Disk 1 Basic 70.00 GB Online	Healthy (System) Temporary Sto 70.00 GB NTFS Healthy (Page F	rage (D:)		Primary Partition				
Disk 1 Basic 70.00 GB	Temporary Sto 70.00 GB NTFS	rage (D:)		Primary Partition	S////////			
Disk 1 Basic 70.00 GB Online Disk 2 Basic	Temporary Sto 70.00 GB NTFS Healthy (Page F	rage (D:)	Partition)	ew Volume (G:)	S/////////////////////////////////////			
Disk 1 Basic 70.00 GB Online Disk 2	Temporary Sto 70.00 GB NTFS Healthy (Page F	rage (D:) ile, Primary F	Partition)					
Disk 1 Basic 70.00 GB Online Disk 2 Basic 20.00 GB Online	(F:) 1.00 GB RAW	rage (D:) ile, Primary F	Partition)	ew Volume (G:) .00 GB NTFS				

6) 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:

- Load Balancer: https://docs.microsoft.com/en-us/azure/load-balancer/
- 1. Select Create a resource on the upper part of the window.

+	[]	V	•	1		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent resou	ırces								
,	NAME			TYPE				LAST VIEWED	
{··>								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
•••								28 min ago	
								28 min ago	
ONS								28 min ago	
								29 min ago	
•								30 min ago	
8								32 min ago	
Navigate									
Nuvigute									
🔶 Subscr	iptions	Resource	e groups	All r	esources	Dashi	oard		

- 2. Select Networking and then Load balancer.
- 3. The Create load balancer blade is displayed. Specify Name. Select Internal for Type and Basic for SKU, respectively.
- 4. For Virtual network and Subnet, select the virtual network and subnet created in "2)Creating a virtual network"
- 5. Specify **Subscription**, **Resource group**, and **Region**, and click **Review+create**. Then click **Create**. Deploying the load balancer starts. This processing takes several minutes.

😑 Microsoft Azure 🔎 Sea	ch resources, services, and docs (G+/)	Þ	Ŗ	¢1	٢	?	٢	and shows the	
Home > New > Create load balancer									
Create load balancer									×
Basics Tags Review + create									_
balancers uses a hash-based distribution destination port, protocol type) hash to accessible via public IP addresses, or inte	Incer that distributes incoming traffic among healthy virtual machine instances. Load algorithm. By default, it uses a 5-tuple (source IP, source port, destination IP, map traffic to available servers. Load balancers can either be internet-facing where it is smal where it is only accessible from a virtual network. Azure load balancers also AT) to route traffic between public and private IP addresses. Learn more.								
Project details									
Subscription *	×								
Resource group *	TestGroup1 V								
	Create new								
Instance details									
Name *	TestLoadBalancer 🗸								
Region *	(Asia Pacific) Japan East								
Туре * 🕕	Internal Public								
ѕк∪ *⊙	Basic Standard								
Configure virtual network.									
Virtual network *	Vnet1 ~								
Subnet *	Vnet1-1 (10.5.0.0/24) V								
Review + create < Previou									
Review + Greate	s reactings - bornious a template for automation								
<									>

7) 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** on the upper part of the window.

+				+		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent res	ources								
	NAME			TYPE				LAST VIEWED	
~~>								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
***								28 min ago	
-								28 min ago	
ONS								28 min ago	
<u>.</u>								29 min ago	
<u>•</u>								30 min ago	
8								32 min ago	

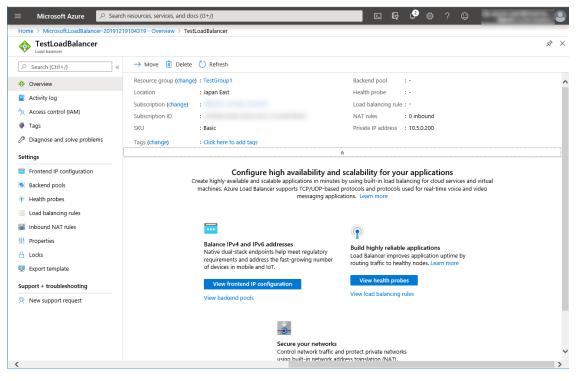
2. Select the resource group to which the created load balancer belongs from the resource group list.

Ξ

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

Microsoft Azure		
Home > TestGroup1		
FestGroup1		\$
	🐇 🕂 Add 📰 Edit columns 📋 Delete resource group 🖒 Refresh 🔶 Move 🛓 Export to CSV 🛛 🖗 Assign tags 📋 Delete 🛓 Export template	e
 Overview 	Essentials ×	
 Activity log 	Filter by name Type == all () Location == all () Type Add filter	
Access control (IAM)	Showing 1 to 31 of 31 records. 🗌 Show hidden types 🛈	\sim
🔷 Tags	Name ↑↓ Type ↑↓ Location ↑↓	
🗲 Events	🗌 💽 AvailabilitySet-1 Availability set Japan East	
Settings	AvailabilitySet1 Availability Set Japan East	
🗳 Quickstart	ONS zone global	
Deployments	🗌 🖬 ipconfig1 Public IP address Japan East	
Policies	🗌 🖬 ipconfig11 Public IP address Japan East	
🔁 Properties	🗌 🖬 ipconfig12 Public IP address Japan East	
🔒 Locks	🗌 📅 ipconfig2 Public IP address Japan East	
Export template	🗌 🖳 node-1 Virtual machine Japan East	
Cost Management	Network security group Japan East	
🙊 Cost analysis	Network interface Japan East	••
Cost alerts	Disk Japan East	
③ Budgets	Sende-1_OSDisk_1_dfa99e02b54a4452ac9964de51616aa3 Disk Japan East	
Advisor recommendations	Virtual machine Japan East	
Monitoring	🗌 🔮 node-2-nsg Network security group Japan East	•••
Insights (preview)	Incide-2/410 Network interface Ianan Fact	•••
Alerts	< Previous Page 1 v of 1 Next >	

4. Select Backend pools.



5. Click Add.

≡ Microsoft Azure 🔑 Sea	rch resources, services, and docs (G+	Ŋ	5 t 7 û		
Home > TestGroup1 > TestLoadBalan					
TestLoadBalancer - Bac	kend pools				×
	+ Add 💍 Refresh				
Overview	Virtual machine	Virtual machine status	Network interface	Private IP address	
Activity log	No results				
Access control (IAM)					
Tags					
Diagnose and solve problems					
Settings					
Frontend IP configuration					
Backend pools					
Health probes					
E Load balancing rules					
📓 Inbound NAT rules					
Properties					
🔒 Locks					
Export template					
Support + troubleshooting					
Rew support request					
<					>

- 6. The Add backend pool blade is displayed. Specify Name.
- 7. Select Virtual machine for Associated to.
- 8. Specify **Virtual machine** and **IP address** for the virtual machine you want to associate. Repeat this procedure for the rest of such virtual machines.
- 9. Then click Add.

\equiv Microsoft Azure \checkmark Search	resources, services, and docs (G+,	Ŋ	D ty	L ² ©	? ☺	
Home > Microsoft.LoadBalancer-20191219		alancer - Backend pools	Add backend pool			×
TestLoadBalancer - Backer	nd pools					
	🕂 Add 💍 Refresh		Name * TestBackendPool			~
 Overview Activity log 	Virtual machine	Virtual machine status	Virtual network ① Vnet1			
Access control (IAM)			IP version IPv4 IPv6			
Diagnose and solve problems			Associated to Virtual machine			~
Settings						
Frontend IP configuration			Virtual machines			
Backend pools			Virtual Machines must be in sa			
P Health probes			the same SKU (Basic/Standard configurations have to be in th			l of the IP.
E Load balancing rules			Virtual machine		IP address	
Inbound NAT rules			node-1		ipconfig1 (10.5.0.120)	Î
H Properties			node-2	~	ipconfig1 (10.5.0.121)	
🔒 Locks				~	(, peering) (restored) /	
🕎 Export template						
Support + troubleshooting						
📯 New support request						
			Add			
<						

- 8) Configuring a load balancer (configuring a health probe)
 - 1. Select Health probes.

\equiv Microsoft Azure $ ho$ Sea	earch resources, services, and docs (G+/)	☑ ₽ ₽ @ ? ☺	•
Home > TestGroup1 > TestLoadBalar	ncer - Health probes		
TestLoadBalancer - Hea	alth probes		×
	« + Add		
Overview	${\cal P}$ Search probes		
Activity log	Name ↑↓ Protocol ↑↓ Port	↑↓ Used By ↑↓	
Access control (IAM)	No results.		
Tags			
Diagnose and solve problems			
Settings			
Frontend IP configuration			
Backend pools			
Health probes			
E Load balancing rules			
Inbound NAT rules			
Properties			
🔒 Locks			
🖳 Export template			
Monitoring			
Diagnostic settings			
🔛 Logs			
Support + troubleshooting			
<			>

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

■ Microsoft Azure P Search resources, services, and docs (G+/)	E 🕼 🗘 🎯 ? 😊 🥥
Home > TestLoadBalancer - Health probes > Add health probe	
Add health probe	Х
Name * TestHealthProbe	
Protocol ①	
тср 🗸	
Port *①	
26001	
Interval * 🛈	
5 seconds	
Unhealthy threshold *①	
2	
consecutive failures	
ок	
<	>

- 9) Configuring a load balancer (setting the load balancing rules)
 - 1. Select Load balancing rules.

≡ Microsoft Azure 🔎 Search	resources, services, and docs (S+/)		D G	۵ في	? 🙂	the supervised in the local division of the	0
Home > TestGroup1 > TestLoadBalancer								
TestLoadBalancer - Load	balancing rules							×
	+ Add							
Overview	P]
Activity log	Name	$\uparrow_{\downarrow} \text{Load balancing rule}$	\uparrow_{\downarrow} Backend p	ool	↑,	, Health prob	e ↑↓	
Access control (IAM)	No results.							
Tags								
Diagnose and solve problems								
Settings								
Frontend IP configuration								
Backend pools								
P Health probes								
📒 Load balancing rules								
Inbound NAT rules								
H Properties								
🔒 Locks								
Export template								
Monitoring								
Diagnostic settings								
🏩 Logs								
Support + troubleshooting								
Rew support request								
<								>

- 2. Click Add.
- 3. The Add load balancing rule blade is displayed. Specify Name.

4. Specify Port and Backend port, and click OK.

■ Microsoft Azure P Search resources, services, and docs (G+/)	Þ	Ŗ	Û	Ö	?	٢	1.00	
Home > TestGroup1 > TestLoadBalancer - Load balancing rules > Add load balancing rule								
Add load balancing rule								×
Name *								
TestLoadBalancingRule								· · · ·
IP Version *								
IPv4 IPv6								
Frontend IP address * ①								
10.5.0.200 (LoadBalancerFrontEnd)								
Protocol								
● TCP ◯ UDP								
Port *								
80								
Backend port $\star_{\mathbb{O}}$								
8080 🗸								
Backend pool ①								
TestBackendPool (2 virtual machines)								
Health probe \odot								
TestHealthProbe (TCP:26001)								
Session persistence ①								
None V								
Idle timeout (minutes) ①								
O 4								
Floating IP (direct server return) 🛇								
(Disabled) Enabled								
οκ								
								>

10) 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 "Determining a system configuration" in the Installation and Configuration Guide.

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.

6.3 Configuring the EXPRESSCLUSTER settings

For the Cluster WebUI setup and connection procedures, see "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 Cluster WebUI, and click Cluster generation wizard.

Cluster WebUI <cluster></cluster>					🗲 Con	fig mode 🗸	Ł	()	₹D	۶	i	?	:
Cluster generation wizard	Export	Get the Configuration File	↑ Apply the Configuration File	Update Ser	o ver Data	Check the Config	uration File						

 The Cluster window on the Cluster generation wizard is displayed. Enter a desired name in Cluster Name. Select an appropriate language in Language. Click Next.

Cluster generation wizard	×			
Cluster → Basic Settings → Interconnect →	Server ▶ NP Resolution → Group → Monitor			
Cluster Name*	Cluster1			
Comment				
Language*	English 🗸			
Management IP Address				
• 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 duster. 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].				

3. The **Basic Settings** window is displayed.

The instance connected to Cluster WebUI is displayed as a registered master server. Click **Add** to add the remaining instances (by specifying the private IP address of each instance). Click **Next**.

Add server				
Server Name or IP Address*	10.5.0.121			
 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. 				
	OK Cancel			
Cluster generation wizard	×			
Server Server Server Server Cluster ♥ → Basic Settings → Interconnect → NP Resolution → Add Remove Server Definitions Order Name	Group 🗲 Monitor			
Master server node-1				
1 node-2 ↑ ↓ Server Group Definition	Settings			
● Click "Add" to add servers constructing the cluster. Click 「↑」 or 「↓」 to change the server priority. Click "Settings" to configure the server group when using the server group.				
	Back Next Cancel			

4. The Interconnect window 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. Click **Next**.

Cluster generation wizard				×
Server Cluster ♥ → Basic Settings ♥ Properties Add Remove Interconnect List	Server	Server ect → NP Resolution → C	Group 🔶 Monitor	
Priority Type	MDC	node-1	node-2	
1 Kernel Mode 🗸	mdc1 🗸	10.5.0.120 🗸	10.5.0.121	\mathbf{v}
↑ ↓				
 O Configure the interconnect among the servers constructing the cluster.Click "Add" to add interconnect and select the type. For "Kernel mode" and "Witness HB" settings, 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, click each server column cell and set an IP address. For "Witness HB" setting, click each server column cell to set "Use" or "Do not use", and then click "Properties" to set detailed settings. Click "↑" or "↓" to configure the priority to preferentially use the LAN only for the communication and get decess. For "Mirror Communication Only" setting, click on the cell for each server column and set an IP address. For "I_" to configure the priority to preferentially use the LAN only for the communication among the cluster servers. For "Mirror Communication Only" setting, click not cell for each server column and set an IP address. For the communication conly" setting, click not cell for each server column and set an IP address. 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. 				

5. The NP Resolution window 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 **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**.

Click Next.



2) Adding a group resource

• Defining a group

Create a failover group.

1. The Group List window s displayed.

Click Add.

Cluster generation wizard			×
Server Server Server Cluster ♥ → Basic Settings ♥ → Interconnect ♥ → NP Resolution ♥ → Group → Monitor			
Properties Add Remove		Group	Resource
Group List			
Name Type			
No groups			
 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. 			
	 Back 	Next ►	Cancel

2. The Group Definition window is displayed.

Specify a failover group name (failover1) for Name. Click Next.

Group Definition		failover 🗙		
Basic Settings → Startup Servers	➔ Group Attributes ➔ Group Resource			
Туре*	failover 🗸			
Use Server Group Settings				
Name*	failover1			
Comment				
 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". 				
	4 Back Next ►	Cancel		

- 3. The **Startup Servers** window is displayed. Click **Next** without specifying anything.
- 4. The **Group Attributes** window page is displayed. Click **Next** without specifying anything.
- 5. The Group Resource window is displayed.

On this page, add a group resource following the procedure below.

Group Defini	ition							f	ailover 🗙
Basic Setting	js 📀 🗧	Startup	Servers 🛇	→ Group A	ttributes 📀	→	Group Resource		
Properties	Add	Remove							
Group Resourc	ce List								
Name					Туре				
No resources	;								
-		d resources configure th	le properties of	f the selected r	esource.				
							 ▲ Back 	Finish	Cancel

• Mirror disk resource

Create a mirror disk resource.

For details, see "Understanding mirror disk resources" in "Group resource details" in the Reference Guide.

- 1. Click Add on the Group Resource List page.
- 2. The Resource Definition of Group | failover1 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. Click **Next**.

Resource Definition of Group failover1 md					
Info → Dependency → Recovery Operation → Details					
Туре*	Mirror disk resource \checkmark				
Name*	md				
Comment					
Get License Info					
• Select the type of group resource and	enter its name.				

- 3. The **Dependency** window is displayed. Click **Next** without specifying anything.
- 4. The **Recovery Operation** window is displayed. Click **Next**.
- The Details window 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		md 🗙
Info ⊘ → Dependency ⊘ → Recovery Operation ⊘	→ Details	
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		Name
	← Add	node-1
	→ Remove	node-2
Edit		
Add Servers that can run the group		
Tuning		
		Back Finish Cancel

6. The **Selection of partition** dialog box is displayed. Click **Connect**, select the data partition and cluster partition created in "5)**Configuring virtual machines**", and click **OK**.

Connect					
ata Partiti	ion				
Volume	Disk No.	Partition No.	Size	GUID	
	0	1	500MB		
D:¥	1	1	10238MB		
F:¥	2	1	1024MB		
C:¥	0	2	129546MB		
G:¥	2	2	19453MB		
luster Par Volume	tition Disk No.	Partition No.	Size	GUID	
	0	1	500MB	March and some state states and and	
D:¥	1	1	10238MB		
F:¥	2	1	1024MB		
C:¥	0	2	129546MB		
G:¥	2	2	19453MB		

7. Perform steps 5 and 6 for node-1 and then node-2 and click Finish.

Resource Definition of Group failover1	md 🗙
Info \bigcirc \rightarrow Dependency \bigcirc \rightarrow Recovery Operation \bigcirc	→ Details
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	Name
node-1	← Add
node-2	→ 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 the Reference Guide.

- 1. Click Add on the Group Resource List page.
- 2. The **Resource Definition of Group | failover1** 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. Click **Next**.

Resource Definition of Group failover1 azurepp					
Info → Dependency → Recovery	Operation 🗲 Details				
Туре*	Azure probe port resource				
Name*	azurepp1				
Comment					
Get license information					
• Select the type of group resource and enter its name.					

3. The Dependency window is displayed. Click Next without specifying anything.

- 4. The Recovery Operation window is displayed. Click Next.
- 5. For **Probeport**, enter the value specified for **Port** when configuring a load balancer (configuring health probe).

Resource Definition of Group failover1		
Info ⊘ → Dependency ⊘ → Rec	covery Operation 🤣 🔶 Details	
Probeport*	26001	
Tuning		
		Back Finish Cancel

6. 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 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 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. Click Apply the Configuration File in the config mode of Cluster WebUI.

A popup message asking "Do you want to perform the operations?" is displayed. Click **OK**. When the upload ends successfully, a popup message saying "The application finished successfully." is displayed. Click **OK**.

If the upload fails, perform the operations by following the displayed message.

- 2. Select the **Operation Mode** on the drop down menu of the toolbar in Cluster WebUI to switch to the operation mode.Select **Start Cluster** in the **Status** tab of Cluster WebUI and click.
- 3. Confirm that a cluster system starts and the status of the cluster is displayed to the Cluster WebUI. If the cluster system does not start normally, take action according to an error message.

For details, refer to the following:

- Installation and Configuration Guide
 - -> How to create a cluster

6.4 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

SEVEN

ERROR MESSAGES

For the error messages related to resources and monitor resources, see the following:

• "Error messages" in the Reference Guide.

CHAPTER

EIGHT

NOTES

Please refer the following for notes for EXPRESSCLUSTER on Azure:

EXPRESSCLUSTER X Getting Started Guide

- "Communication port number" in "Notes and Restrictions"

For an HA cluster using Azure DNS:

EXPRESSCLUSTER X Getting Started Guide

- "Azure DNS resources" in "Notes and Restrictions"

- "Setting up Azure DNS resources" in "Notes and Restrictions"

EXPRESSCLUSTER X Reference Guide

- "Notes on Azure DNS resources"

- "Notes on Azure DNS monitor resources"

For an HA cluster using a load balancer:

EXPRESSCLUSTER X Getting Started Guide

- "Setting up Azure probe port resources" in "Notes and Restrictions"

- "Setting up Azure load balance monitor resources" in "Notes and Restrictions"

EXPRESSCLUSTER X Reference Guide

- "Notes on Azure probe port resources"
- "Notes on Azure probe port monitor resources"
- "Note on Azure load balance monitor resources"

Maintenance for preserving Azure memory

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 "Notes and Restrictions"

EXPRESSCLUSTER X Reference Guide

- "Timeout tab"

Note on using Azure DNS

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.

CHAPTER

LEGAL NOTICE

9.1 Disclaimer

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CHAPTER

REVISION HISTORY

Edition	Revised Date	Description
1st	Apr 15, 2024	New Guide
2nd	Jul 12, 2024	Corrected typographical errors.

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