

EXPRESSCLUSTER X 4.2

HA Cluster Configuration Guide for Microsoft Azure (Windows)

Release 2

NEC Corporation

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CHAPTER

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

This guide covers the following product versions.

- EXPRESSCLUSTER X 4.2 for Windows (Internal version: 12.20)
- Windows Server 2016 Datacenter
- Microsoft Azure portal: Environment as of December 19, 2019
- Azure CLI 2.0

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

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

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 an Public Load Balancer)*: Describes the procedure to create an HA cluster using an 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 and Restrictions: 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 six 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.

EXPRESSCLUSTER X Hardware Feature Guide

This guide is intended for administrators and for system engineers who want to build EXPRESSCLUSTER-based cluster systems. The guide describes features to work with specific hardware, serving as a supplement to the Installation and Configuration Guide.

EXPRESSCLUSTER X Legacy Feature Guide

This guide is intended for administrators and for system engineers who want to build EXPRESSCLUSTER-based cluster systems. The guide describes *EXPRESSCLUSTER* X 4.0 WebManager, Builder, and *EXPRESSCLUSTER* Ver 8.0 compatible commands.

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 com-	Indicates that the value specified in-	clpstat -s [-h
mand 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 (Courier)	Indicates path names, commands,	C:\Program Files
	system output (message, prompt,	
	etc.), directory, file names, functions	
	and parameters.	
Monospace bold (Courier)	Indicates the value that a user actu-	
	ally enters from a command line.	Enter the following:
		> clpcl -s -a
Monospace <i>italic</i> (Courier)	Indicates that users should replace	> ping <ip address=""></ip>
	italicized part with values that they	
	are actually working with.	

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.

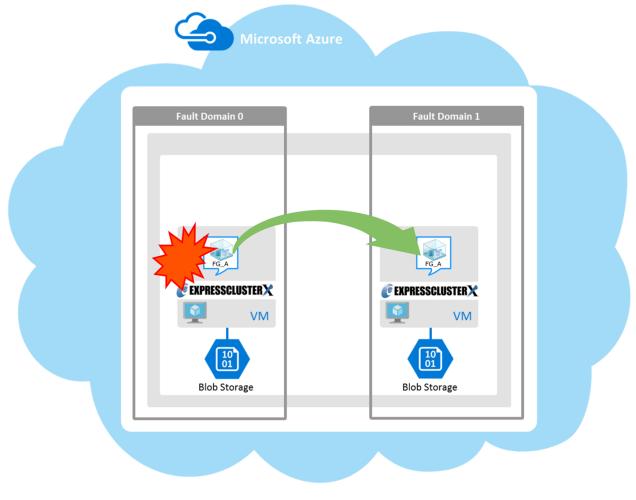


Fig. 2.1: HA Cluster on a Cloud Service (Using Azure DNS)

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 EXPRESSCLUSER 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/

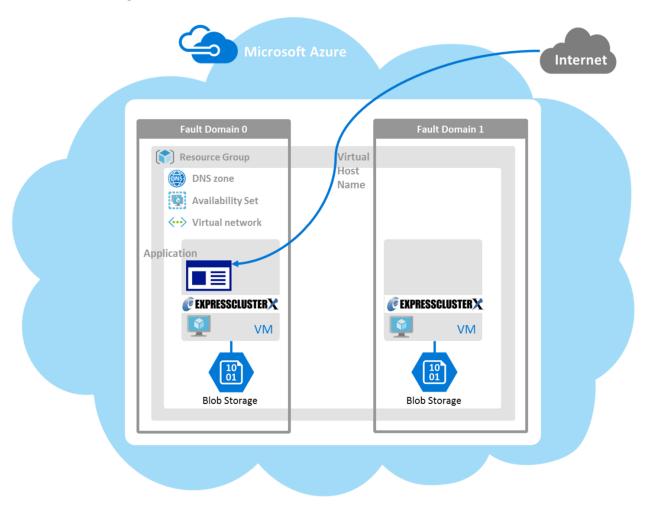


Fig. 2.2: HA Cluster Using Azure DNS

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 an 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 anpublic 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 an 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.

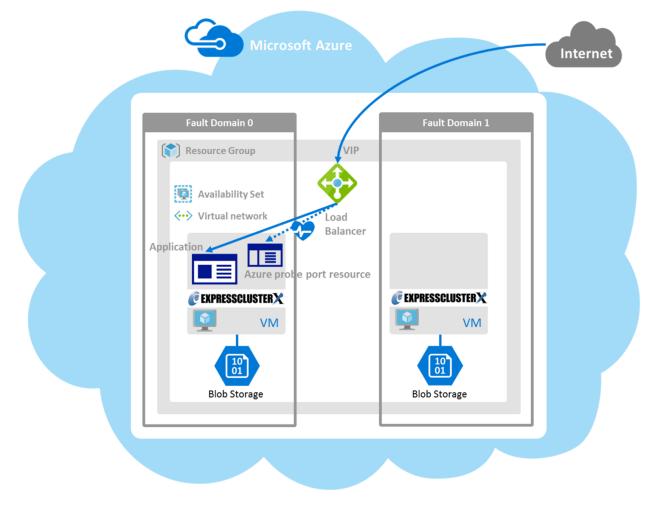


Fig. 2.3: HA Cluster Using an Public Load Balancer

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.

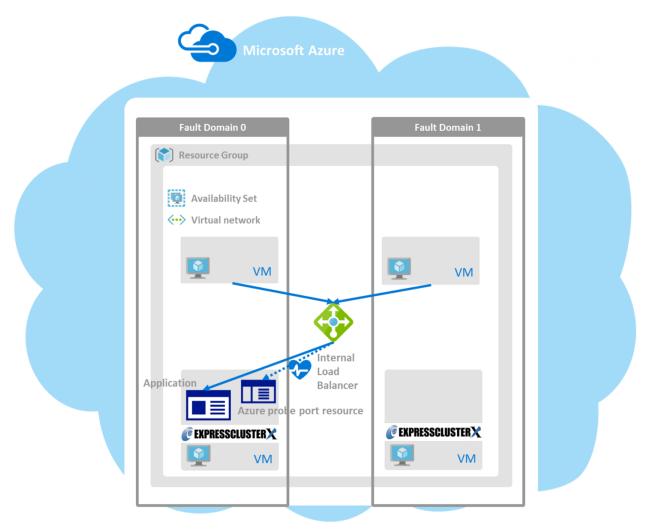


Fig. 2.4: HA Cluster Using the Internal Load Balancer

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-	Public load balancer	See "5. Cluster Creation Proce-
side the Microsoft Azure net-		dure (for an HA Cluster Using
work		an Public Load Balancer)" in
		this guide.

Purpose	Load balancer to use	Creating procedure
Publishing operations within	Internal load balancer (ILB)	See "6. Cluster Creation Proce-
the Microsoft Azure network		dure (for an HA Cluster Using
		an Internal Load Balancer)" in
		this guide.

Table 2.3 – continued from previous page

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 an 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 an 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 an public load balancer is used, required to monitor health of communication between an internal network and external network.

		1
Resource or monitor re-	Description	Setting
source type		
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	access destination	Procedure	EXPRESSCLUSTER resources, monitor resources, and com- mands to be used for NP resolution
Outside the Mi- crosoft Azure Virtual network	Microsoft Azure Service Manage- ment API (manage- ment.core.windows.net)	Checking a LISTEN port	- Custom monitor resource - clpazure_port_checker command
	each cluster server	Ping	IP monitor resource

		a nom providuo pugo	
Scope of disclosure	access destination	Procedure	EXPRESSCLUSTER resources, monitor resources, and com- mands to be used for NP resolution
Inside the Microsoft Azure Virtual net- work	Servers, excluding a cluster server, that ex- ist within the Microsoft Azure network(*)	Ping	PING network par- tition resolution resource
	Web servers that ex- ist within the Microsoft Azure network	НТТР	HTTP network par- tition resolution resource

Table 2.5 – continued from previous page

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. "Y" indicates that the relevant function can be used and "N" indicates that the relevant function cannot be used.

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

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

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

HA cluster using Azure DNS

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

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

• 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	Not required	See "4.2. Configuring
	address		Microsoft Azure" in
			this guide.
5	Adding a disk	Not required	See "4.2. Configuring
			Microsoft Azure" in
			this guide.
		Co	ntinued on next page

	Table 2.7 – continue		
Step No.	Procedure	On-premise	Microsoft Azure
6	Creating a DNS zone	Not required	See "4.2. Configuring
			Microsoft Azure" in
		~	this guide.
7	Setting up the DNS	See the manual pro-	Not required
	server	vided with the OS or	
		DNS server.	
8	Setting a partition for		See "4.2. Configuring
	the mirror disk re-	See the following:	Microsoft Azure" in
	source	- "Settings after	this guide.
		configuring	
		hardware" in	
		"Determining a	
		system	
		configuration" in the	
		Installation and	
		Configuration Guide.	
		- "Understanding	
		mirror disk	
		resources" in the	
		Reference Guide.	
9	Adjusting the OS	See "Settings af-	Same as "On-
	startup time	ter configuring	premise"
	I I	hardware" in "De-	1
		termining a system	
		configuration" in	
		the Installation and	
		Configuration Guide.	
10	Checking the net-	See "Settings af-	Same as "On-
	work setting	ter configuring	premise"
		hardware" in "De-	r
		termining a system	
		configuration" in	
		the Installation and	
		Configuration Guide.	
11	Checking the firewall	See "Settings af-	Same as "On-
	setting	ter configuring	premise"
		hardware" in "De-	L
		termining a system	
		configuration" in	
		the Installation and	
		Configuration Guide.	
12	Synchronizing the	See "Settings af-	Same as "On-
	server time	ter configuring	premise"
		hardware" in "De-	L
		termining a system	
		configuration" in	
		the Installation and	
		Configuration Guide.	
L		-	ntinued on nevt nage

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Step No.	Procedure	On-premise	Microsoft Azure
13	Disabling the power	See "Settings af-	
	saving function	ter configuring	premise"
		hardware" in "De-	
		termining a system	
		configuration" in	
		the Installation and	
		Configuration Guide.	
14	Installing the Azure	Not required	See "4.2. Configuring
	CLI		Microsoft Azure" in
			this guide.
15	Registering the ser-	Not required	See "4.2. Configuring
	vice principal		Microsoft Azure" in
			this guide.
16	Installing EXPRESS-	See "Installing EX-	Same as "On-
	CLUSTER	PRESSCLUSTER"	premise"
		in the Installation and	
		Configuration Guide.	

Table 2.7 – continued from previous page

• After installing EXPRESSCLUSTER

Step No.	Procedure	On-premise	Microsoft Azure
17	Registering the EX- PRESSCLUSER license	See "Registering the license." in the Instal- lation and Configura- tion Guide.	Same as "On- premise"
18	Creating a cluster: Setting the heartbeat method	See "Creating the configuration data of a node cluster" 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 clus- ter: Setting the NP resolution processing	The network partition resolution resource is used. See the following: - "Creating the configuration data of a node cluster" in "Creating the cluster configuration data".in the Installation and Configuration Guide. - "Network partition resolution resources details" in the Reference Guide.	See "6.3. Configuring the EXPRESSCLUS- TER settings" in this guide.

Table 2.8 – continued from previous page			
Step No.	Procedure	On-premise	Microsoft Azure
20	Creating a cluster: Creating a failover group and monitor resource	See "Creating the configuration data of a node cluster" in "Creating the cluster configuration data".in the Installation and Configuration Guide.	In addition to the references for on-premises, see the following: - "Understanding Azure 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

Step No.	Procedure	ed from previous page On-premise	Microsoft Azure
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
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. Configuring Microsoft Azure" in this guide - "6.2. Configuring Microsoft Azure" in this guide

Table 2.9 – continued from previous page

Table 2.9 – continued from previous page				
Step No.	Procedure	On-premise	Microsoft Azure	
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	
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 security rules	Not required	- "5.2. Configur- ing Microsoft Azure" in this guide	
9	Adjusting the OS startup time	See "Settings af- ter configuring hardware" in "De- termining a system configuration" in the Installation and Configuration Guide.	Same as "On- premise"	
10	Checking the net- work setting	See "Settings af- ter configuring hardware" in "De- termining a system configuration" in the Installation and Configuration Guide.	Same as "On- premise"	

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Step No. Procedure On-premise Microsoft Azure				
Step No.	Procedure			
11	Checking the firewall	See "Settings af-	Same as "On-	
	setting	ter configuring	premise"	
		hardware" in "De-		
		termining a system		
		configuration" in		
		the Installation and		
		Configuration Guide.		
12	Synchronizing the	See "Settings af-	Same as "On-	
	server time	ter configuring	premise"	
		hardware" in "De-		
		termining a system		
		configuration" in		
		the Installation and		
		Configuration Guide.		
13	Disabling the power	See "Settings af-	Same as "On-	
	saving function	ter configuring	premise"	
		hardware" in "De-		
		termining a system		
		configuration" in		
		the Installation and		
		Configuration Guide.		
14	Installing EXPRESS-	See "Installing EX-	Same as "On-	
	CLUSTER	PRESSCLUSTER"	premise"	
		in the Installation and	-	
		Configuration Guide.		

Table 2.9 – continued from previous page

• After installing EXPRESSCLUSTER

Step No.	Procedure	On-premise Microsoft Azure	
15	Registering the EX-	See "Registering the	Same as "On-
	PRESSCLUSER	license" in the Instal-	premise"
	license	lation and Configura-	
		tion Guide.	
16	Creating a cluster:	See "Creating the	The COM heartbeat,
	Setting the heartbeat	configuration data of	BMC heartbeat, and
	method	a node cluster". in	DISK heartbeat can-
		"Creating the cluster	not be used.
		configuration data" in	
		the Installation and	
		Configuration Guide.	

Table 2.10 – continued from previous page

Step No.	Procedure	On-premise	Microsoft Azure
18	Creating a cluster: Creating a failover group and monitor resource	See "Creating the configuration data of a node cluster" 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.

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)

x86_64

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

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

Setting item	Setting value	
	node-1	node-2
Virtual machine setting		
– Disk type	Standard HDD	
– User name	testlogin	
– Password	PassWord_123	
– Resource group	TestGroup1	
– Region	(Asia Pacific) Japan East	
Network security group setting	·	
Name	node-1-nsg	node-2-nsg
Availability set setting		
– Name	AvailabilitySet-1	
- Update domains	5	
– Fault domains	2	
Diagnostics storage account setti	ng	
– Name	Automatically generated	
– Performance	Standard	
– Replication	Locally-redundant storage (LRS)	
IP configuration setting		
– IP address	10.5.0.120	10.5.0.121
Disk setting	1	1
– Name	node-1_DataDisk_0	node-2_DataDisk_0
– Source type	None (empty disk)	
– Account type	Standard HDD	
– Size	20	

• EXPRESSCLUSTER settings (cluster properties)

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

• EXPRESSCLUSTER settings (failover group)

Resource name	Setting item	Setting value
Mirror disk resource	Name	md
	Details Tab: Data Partition Drive	G:
	Letter	
	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	http://azure-test
	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

• 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

Monitor resource name	Setting item	Setting value
	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

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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.

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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
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8								32 min ago	
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2. Select +Add on the upper part of the window.

Home > Resource groups		<u>≻</u> ਯ	
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+ Add ≡≡ Edit columns 🕐 Refresh 🞍 Export to CS	V 🖉 Assign tags 🛛 🛇 Feedback		
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howing 1 to 30 of 30 records.		No grouping	~
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		Central US	
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(m) .			

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

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Home > Resource groups > C	Create a resource group								
Create a resource grou	up								>
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resources for the solution, or or	that holds related resources for an A nly those resources that you want to groups based on what makes the mo	manage as a group. You d	ecide how you want to						
Project details									
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Resource group *	TestGroup1			7					
				_					
Resource details				_					
Region *	(Asia Pacific) Japan East		~						
Review + create < I	Previous Next : Tags >								
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2) Creating a virtual network

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

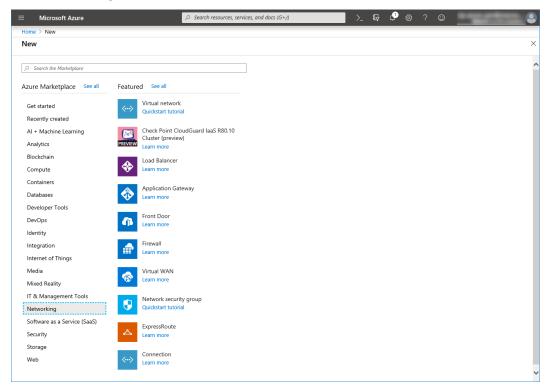
steps below.

≡

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	CO App Services	Storage accounts	SQL databases	
Recent res	ources								
	NAME			TYPE				LAST VIEWED	
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8								32 min ago	
Navigate									
e cub	scriptions	Resource	aroups	All	resources	Dasht	oard		

2. Select Networking and then Virtual network.



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

Microsoft Azure	
New > Create virtual netwo	
virtual network	
ne *	
Vnet1	~
ddress space *①	
10.5.0.0/24 10.5.0.0 - 10.5.0.255 (256 addre	(29226)
Add an IPv6 address space 🛈	
ubscription *	\sim
esource group *	~
TestGroup1	\sim
Create new	
Location *	_
(Asia Pacific) Japan East	~
Subnet Name *	
Vnet1-1	~
Address range *	
10.5.0.0/24	~
10.5.0.0 - 10.5.0.255 (256 addre DDoS protection (i)	esses)
Basic Standard	
Service endpoints ①	
Disabled Enabled	
Firewall () Disabled Enabled	
Disabled Enabled	
Create Automation options	

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.

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

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Blockchain Compute	Reserved VM Quickstart tuto								
Containers Databases Developer Tools	Kubernetes S Quickstart tuto								
DevOps Identity	Service Fabric Quickstart tuto								
Integration Internet of Things	Web App for Quickstart tuto								
Media Mixed Reality	Cuickstart tuto	rial							
IT & Management Tools Networking	Batch Service Quickstart tuto	rial							
Software as a Service (SaaS) Security Storage	Debian 9 "Str kernel Learn more	etch" with backports							
Web	Ouickstart tuto								,

- 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**.

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Home > New > Create a virtual machine Create a virtual machine Basics Disks Networking Mair Create a virtual machine that runs Linux o image. Complete the Basics tab then Review + cr customizato. Looking for classic VMs? Create VM from Project details Select the subscription to manage deploy your resources. Subscription *① Resource group *① Instance details Virtual machine name *① Region *①	e hagement Advanced Tags Review + create r 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 h Azure Marketplace ed resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resource groups like folders to organize and manage all h Azure Marketplace resources and costs. Use resources and costs. Use resources and costs. I azure marketplace resour	Create new × Group two or more VMs in an availability set to ensure that at least one is available during planned or unplanned maintenance events. Learn more Name * Availabilityset-1 Fault domains ③ 2 Update domains ③ 5 Use managed disks ④
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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 mach	ine					
Create a virtual machine						
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	disk and a temporary disk for short-term storage. You can attach additional data disks. of storage you can use and the number of data disks allowed. Learn more					
Disk options						
OS disk type ★①	Standard HDD V					
Enable Ultra Disk compatibility 🛈	Ves () No					
	Ultra Disk compatibility is not available for this VM size and location.					
temporary disk.	lata disks for your virtual machine or attach existing disks. This VM also comes with a Size (GiB) Disk type Host caching					
Create and attach a new disk Attac	h an existing disk					
arsigma Advanced						
Review + create <	Previous Next : Networking >					
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From the DATA DISKS list, click Create and attach a new disk.

 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	virtual machine > Create a new disk				
Create a new disk					×
Create a new disk to store a storage type, and number of	applications and data on your VM. Disk pricing varies based on factors including disk size, f transactions. Learn more about Azure Managed Disks				
Name *	node-1_DataDisk_0				
Source type *	None (empty disk)				
Size * ①	20 GiB Standard HDD Change size				
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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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Define network connectivity for your virt ports, inbound and outbound connectivi Learn more	ual machine by configuring network interface card (NIC) settings. You ca ty with security group rules, or place behind an existing load balancing s	n control solution.					
Network interface							
When creating a virtual machine, a netwo	ork interface will be created for you.						
Virtual network * ①	Vnet1	\sim					
	Create new						
Subnet * 🛈	Vnet1-1 (10.5.0.0/24)	\sim					
	Manage subnet configuration						
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	Create new						
NIC network security group ①	🔿 None 🔵 Basic 💿 Advanced						
Configure network security group *	(new) node-1-nsq	\sim					
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Accelerated networking ①	On Off						
	The selected VM size does not support accelerat	ed networking.					
Load balancing							
-	backend pool of an existing Azure load balancing solution. Learn more						
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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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Azure Security Center							
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 Your subscription is protected by Az 	ure Security Center basic plan.						
Monitoring							
Boot diagnostics ①	● On ◯ Off						
OS guest diagnostics ①	On () Off						
Diagnostics storage account \star ()	testgroup1diag600 V Create new						
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9. Click Next: Tags >.

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Extensions								
Extensions provide post-deployment cor	nfiguration and automation.							
Extensions	Select an extension to install							
Cloud init								
Cloud init is a widely used approach to o packages and write files or to configure	ustomize a Linux VM as it boots for the first time. You can use cloud-init to install users and security. Learn more							
The selected image does not support	rt cloud init.							
Host								
Azure subscription. A dedicated host giv	vision and manage a physical server within our data centers that are dedicated to your es you assurance that only VMs from your subscription are on the host, flexibility to will be provisioned on the host, and the control of platform maintenance at the level							
Host group ①	No host group found \checkmark							
Dedicated hosts cannot be used wit	h availability sets.							
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Basics Disks Networking	Management Advanced Tags Revie	ew + create						
Tags are name/value pairs that enable multiple resources and resource grou	le you to categorize resources and view consoli ups. <u>Learn more about tags</u> d'	idated billing by applying the same tag to						
Note that if you create tags and then	n change resource settings on other tabs, your t	tags will be automatically updated.						
Name 🕕	Value ①	Resource						
	:	11 selected V						
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.

\equiv Microsoft Azure	∠ Search resources, services, and docs (G+/)	Ģ	Q	٢	?	٢		
Home > New > Create a v	irtual machine							1
Create a virtual mac	hine						>	<
Validation passed								
Basics Disks Netwo	rking Management Advanced Tags Review + create							^
PRODUCT DETAILS								
Standard A1 v2	Subscription credits apply ①							
by Microsoft	9.0700 JPY/hr							
Terms of use Privacy polic	y Pricing for other VM sizes							
TERMS								
above; (b) authorize Microso billing frequency as my Azur information with the provide	ee to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed fit to bill my current payment method for the fees associated with the offering(s), with the same e subscription; and (c) agree that Microsoft may share my contact, usage and transactional r(s) of the offering(s) for support, billing and other transactional activities. Microsoft does not r offerings. See 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 Se	rver license? No							ř
Create	< Previous 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.

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	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
								28 min ago	
10								28 min ago	
000								28 min ago	
.								29 min ago	
								30 min ago	
8								32 min ago	
Navigate									
langute									
🔶 Subs	criptions	Resourc	e groups	All r	esources	Dasht	oard		

- 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+/)		⇔?©	
Home > Resource groups > Teste TestGroup1	Group1			\$? >
Resource group	≪ 🕂 Add 📰 Edit columns 📋 Delete resource group 🕐 Refresh		sign tags 🍈 Delete 🚽 Export tem	plate ···
(•) Overview	Essentials	×		
Activity log	Filter by name Type == all O Location == all	Add filter		
Access control (IAM)	Showing 1 to 28 of 28 records. Show hidden types 🛈		No grouping	\sim
Tags	□ Name ↑↓	Туре ↑↓	Location ↑↓	
Events	AvailabilitySet-1	Availability set	Japan East	
Settings	AvailabilitySet1	Availability set	Japan East	
4 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 State	Disk	Japan East	
Cost Management	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	node-2419	Network interface	Japan East	
Advisor recommendations	Solution and Solut	Disk	Japan East	
Monitoring	node-2_OsDisk_1_5bdf3b9c14a6472888aa54dc732cd720	Disk	Japan East	
Insights (preview)	< Previous Page 1 V of 1 Next >			
Alarts	·			

4. Select Networking.

node-1 - Networking									
© Search (Ctrl+/)	«	🔊 Attach netw	work interface $\delta^{\mathcal{G}}$ Detach network inter	rface					
Overview Activity log Access control (IAM) Tags	^	Virtual network/	terface: node_1284 Effective sec /subnet: Vnet1/Vnet1-1 NIC Public If t rules Outbound port rules Appl	P: - NIC Priv		elerated networking: Disa cing	bled		
Diagnose and solve problems			curity group node-1-nsg (attached to bnets, 1 network interfaces	network interfa	ice: node-1284)			Add inbound po	ort rule
ettings		Priority	Name	Port	Protocol	Source	Destination	Action	
Networking		1000	🔺 default-allow-rdp	3389	TCP	Any	Any	Allow	
Disks		65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow	
Size		65001	AllowAzureLoadBalancerinBound	Any	Any	AzureLoadBalancer	Any	Allow	
Security		65500	DenyAllInBound	Any	Any	Any	Any	O Deny	
Extensions									
Continuous delivery (Preview)									
Availability + scaling									
Configuration									
Identity									
,									
Properties									

- 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	resources, services, a	and docs (G+/)			D Q	₽ © ?	٢	and general	•
Home > Resource groups > TestGroup1	> node-1 - Network	ing > node-1284 -	IP configuratio	ins					
node-1284 - IP configurat	ions								×
,	🕂 Add 🖫 Sa	we 🗙 Discard							
Overview	IP forwarding se	ttings							
 Activity log 	IP forwarding			Disabled Enabled					
Access control (IAM)	Virtual network			Vnet1					
Tags	IP configurations	5							
Settings	Subnet *			Vnet1-1 (10.5.0.0/24)				~	-
IP configurations									_
DNS servers									
💎 Network security group	Name	IP Version	Туре	Private IP address		Public I	o 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.

■ Microsoft Azure			<u>ک</u>	Ģ	P		
Home > Resource groups > TestGroup1 > node-1 - Networking > node-1284 - IP co	nfigurati	ions > ipconfig1					
ipconfig1 node-1284	$\square \times$						
🔚 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, submit 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 Vnetl/Vnetl-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.

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

1	()		•				-	SQL	\rightarrow
Create a	Resource	Network	Virtual	Subscriptions	All resources	App Services	Storage	SQL databases	More services
resource	groups	security groups	machines				accounts		
Recent resource	ces								
NA	ME			ТҮРЕ				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	
<u></u>								28 min ago	
x								29 min ago	
.								30 min ago	
8								32 min ago	

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

	Microsoft Azure			>_	Ŗ	Q		and party	
Hom	ne > New								
Ne	w								×
P	DNS zone		×						^
	DNS zone								
	Private DNS zone								
G	et started		uirtuar network Quickstart tutorial						
Re	ecently created								
AI	+ Machine Learning		Check Point CloudGuard IaaS R80.10 Cluster (preview)						
Ar	nalytics		earn more						
BI	ockchain		oad Balancer						
Co	ompute	😵 🛛	earn more						
Co	ontainers		opplication Gateway						
D	atabases		earn more						
D	eveloper Tools								
D	evOps		ront Door earn more						
ld	entity								
In	tegration		irewall						
In	ternet of Things		earn more						
М	edia		/irtual WAN						
М	ixed Reality	1 🛞	earn more						
IT	& Management Tools		letwork security group						
N	etworking		Quickstart tutorial						
So	oftware as a Service (SaaS)	F	xpressRoute						
Se	ecurity		earn more						
St	orage								
W	eb	/	Connection earn more						
									~

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

	Microsoft Azure			nd docs (G+/)	>_ 🖓	Ф @	?	٢	100	
Home	> New > DNS zone >	Create DNS zone								
Crea	ate DNS zone									×
numb allow:	S zone is used to host the per of DNS records such a s you to host your DNS zo	create DNS records for a particular domain s 'mail.contoso.com' (for a mail serve one and manage your DNS records, it ecords that you create. Learn more.	r) and 'www.contoso.com' (for a v	veb site). Azure DNS						
Proje	ect details									
Subso	cription *			\sim						
	– Resource group 🗙	TestGroup1		\sim						
Insta	nce details									
Name	*	cluster1.zone		~						
Resou	urce group location ①	(Asia Pacific) Japan East		\sim						
Re	eview + create	< Previous Next : Tags >	Download a template for automat	ion						
(>

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	×
You must initialize a disk before Logical Disk Manager can access it Select disks:	t.
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 version Windows.	ons of
ОК	Cancel

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

📅 Disk Manag	gement						-		×
File <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	(C:)	7777777	///////////////////////////////////////	7777777777	777777777	777777777	///////	77777	7777
127.00 GB	127.00 GB NTFS								
Online	Healthy (System	, Boot, Activ	e, Crash Dump, I	Primary Partition)//////////////////////////////////////				
									////
Disk 1									
Basic	Temporary Sto	rage (D:)							-
70.00 GB	70.00 GB NTFS	-							
Online	Healthy (Page F	ile, Primary F	Partition)						
- Disk 2									
Basic									
20.00 GB	20.00 GB								
	Unallocated								
Online									
Online									
Online									
	Primary partition]		
	Primary partition					1			

- 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.	
	< Back Next > Cance	el

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

lew Simple Volume Wizard	>
Specify Volume Size Choose a volume size that is betwee	en the maximum and minimum sizes.
Maximum disk space in MB:	20477
Minimum disk space in MB:	8
Simple volume size in MB:	1024
	< Back Next > Cancel

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

Assign Drive Letter or Path For easier access, you can assign a drive letter	or drive path to your partition.
<u>Assign the following drive letter:</u> <u>Mount in the following empty NTFS folder:</u> <u>Do not assign a drive letter or drive path</u>	F v Browse
	< Back Next > Cance

- 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.

ew 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	
	< Back Next > Cance	ł

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

Simple Volume Wizard	
ssign Drive Letter or Path For easier access, you can assign a drive lett	er or drive path to your partition.
Assign the following drive letter:	G ~
O Mount in the following empty NTFS folder:	Browse
O Do not assign a drive letter or drive path	มโกแลกาน
	< Back Next > Cance

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

Format Partition To store data on this partition, y	ou must format it first
to store data on this partition, y	ou muse romae it mse.
Choose whether you want to for	mat this volume, and if so, what settings you want to use.
O Do not format this volume	
Format this volume with the second seco	
Ele system:	NTFS V
rie system:	NIF5 V
Allocation unit size:	Default 🗸
<u>V</u> olume label:	New Volume
Perform a quick for	mat
Enable file and fold	er compression

- 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: Smole Volume Disk selected: Disk 2 Volume size: 19453 MB Dirwe letter or path: G: File system: NTFS Allocation unit size: Default Volume label: New Volume Orack-Kommar Vea 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	antene							×
<u>File Action </u>	<u>V</u> iew <u>H</u> elp							
Þ 🔿 🗖 🚺	? 🖬 🗩 🗙 [2 🔒 🗾	8					
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 Sto	orag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %	
	Vies							
127.00 GB	(C:) 127.00 GB NTFS Healthy (Syster		e, Crash Dump, I	Primary Partition				
Disk 0 Basic 127.00 GB Online Disk 1 Basic 70.00 GB Online	127.00 GB NTFS	n, Boot, Activ prage (D:)		Primary Partition				

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 S	etup	-		×
Microsoft Azure	Please read the Microsoft CLI License Agreement	2.0 for	Azure	
	MICROSOFT SOFTWARE LICE	NSE TER	MS	^
	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 whe u. They e terms or updat	ere you apply to also ces for	
	TE YOU COMPLY WITH THESE	LICENS	F	*
	☑ <u>I</u> <u>a</u> ccept the terms in the License A	greement		
Print	Back Instal		Cance	el

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

🖟 Microsoft CLI 2.0 for Azure S	etup	-		×
Microsoft Azure	Completed the Microsoft CL Azure Setup Wizard	1 2.0	for	
	Click the Finish button to exit the Setup	Wizard.		
	<u>B</u> adk <u>F</u> inish		Cano	el

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.

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

→<tenant-value-in-step-2> -p <fileWithCertAndPrivateKey-value-in-step-2>

→
```

The following is displayed upon successful sign-in.

```
{
   "cloudName": "AzureCloud",
   "id": "xxxxxxx-xxxx-xxxx-xxxx-xxxxxxx,
   "isDefault": true,
   "name": "xxxxxxxxx,
   "state": "Enabled",
   "tenantId": "xxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxx,
   "user": {
        "name": "http://azure-test",
        "type": "servicePrincipal"
   }
}
```

5. Log out.

1

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 EXPRESSCLUSER 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>	F	Config mode 🖌 🕹 🕚	ଟ 👂 i ? 🗮
		ta Check the Configuration 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.

Server Server Server Cluster > Basic Settings > Interconnect > NP Resolution > Group > Monitor Cluster Name* Cluster 1 Comment Language* English English Management IP Address	Cluster generation wizard		×
Language* English V Management IP Address O Start generating the cluster.	ister → Basic Settings → Interconnect	→ NP Resolution → Group → Monitor	
Management IP Address O Start generating the duster.			
		English	
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].	hter the cluster name, and then select the languag- using the integrated WebManager to manage mult e management IP address is a floating IP address anagement IP address can be omitted.	iple clusters, specify a unique cluster name to identify the cluster.	

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 resc Both IPv4 and IPv6 for IP address can be When entering an IP address, the server	used.	
	OK Canc	ncel
Cluster generation wizard		
Cluster ♥ → Basic Settings → Interco Add Remove Server Definitions Order Master server node-1	nnect → NP Resolution → Group	ib 🗲 dr
1 node-2		
	у.	tings

4. The Interconnect window is displayed.

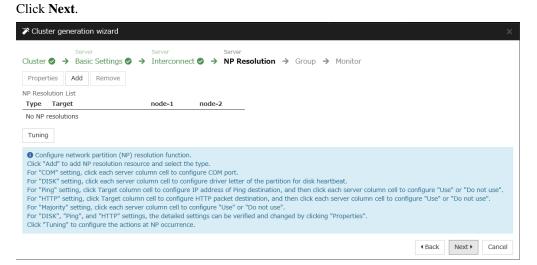
Specify the IP addresses (IP address of each instance) to be used for interconnect. In addition, select mdc1 for **MDC** as a communication path of a mirror disk resource to be created later. Click **Next**.

Cluster generation wizard				×
Server Cluster ♥ → Basic Settings ♥ Properties Add Remove	Server → Interconne	server ect → NP Resolution → 0	Group 🔶 Monitor	
Interconnect List	MDC			
Priority Type 1 Kernel Mode	MDC mdc1 V	node-1	node-2	~
\uparrow \downarrow				
which is used only for data mirroring For "Kernel mode" setting, more than For "Kernel mode" setting, click each For "Witness HB" setting, click each s Click "^ or or "J." to configure the pric For "Mirror Communication Only" set	settings, configur communication. a zero routes are i server column ce server column cell ority to preferentia ting, 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", an illy use the LAN only for the com cell for each server column and so	rtbeat. For "Mirror Communical guring more than one routes is I then click "Properties" to set o munication among the cluster s et an IP address.	ion Only" setting, configure the route recommended. detailed settings.

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 Server Cluster I A A Basic Settings I A Interconnect I A NP Resolution I	→ Group → Monitor	
Properties Add Remove	Group Reso	urce
Group List		
Name	Туре	
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 ► Ca	ancel

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			
Type*	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". 				

- 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 Definition	failover 🗙
Basic Settings ⊘ → Startup Servers ⊘ → Group Attributes ⊘ → Group I	Resource
Properties Add Remove	
Group Resource List	
Name Type	
No resources	
• Click "Add" to add resources. Click "Properties" to configure the properties of the selected resource.	
	Back Finish Cancel

• 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 failover	1	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**.
- 5. 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 \bigcirc	→ 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		
		Image: 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**.

Obtain info	rmation			
Connect				
Data Partit	ion			
Volume	Disk No.	Partition No.	Size	GUID
	0	1	500MB	and the second second second second
D:¥	1	1	10238MB	
F:¥	2	1	1024MB	
C:¥	0	2	129546MB	
G:¥	2	2	19453MB	
Cluster Par Volume	tition Disk No.	Partition No.	Size	GUID
	0	1	500MB	MC*CARA DOM: NOT THE CONTRACTOR
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	
i di ilig	
	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 failove	r1	azuredns 🗙
Info → Dependency → Recovery	Operation 🗲 Details	
Туре*	Azure DNS resource	
Name*	azuredns1	
Comment		
Get License Info		
Select the type of group resource and	enter its name.	
		Gancel Accel Cancel

- 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 name and tenant you wrote down in "9)**Creating a service principal**".

Resource Definition of Group failove	r1		azuredns 🗙
Info ⊘ → Dependency ⊘ → Reco Common node-1 node-2	overy Operation 🔗 🔶 Deta	ails	
Record Set Name*	test-record1		
Zone Name*	cluster1.zone		
IP Address*	10.5.0.120		
TTL*	3600	sec	
Resource Group Name*	TestGroup1		
Account			
User URI*	http://azure-test		
Tenant ID*	XXXXXXXX-XXXX-XXXX-XXXX-XXX		
File Path of Service Principal*	C:¥¥Users¥¥testlogin¥¥tmp_		
Azure CLI File Path*	C:¥Program Files (x86)¥Mici		
Delete a record set at deactivation			
Tuning			
		▲ Back F	inish 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 "Reference Guide" > "Understanding Azure DNS monitor resources."

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

• Custom monitor resource

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

For details about the custom monitor resource, see "Understanding custom monitor resources" in 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) → Mon	itor(special) → Recovery Action	
Type*	Custom monitor	
Name*	genw1	
Comment		
Get Licence Info		
• Select the type of monitor resource an	d enter its name.	
		Gancel Accel Accel 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		E	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) 🔶 Re	lecovery 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	~	

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 Acti	ion
Recovery Action	Execute only the final action	~
Recovery Target *	LocalServer	Browse
Recovery Script Execution Count		
Execute Script before Reactivation		
Maximum Reactivation Count		
Execute Script before Failover		
Execute migration before Failover		
Failover Target Server	Stable server	
	 Maximum priority server 	
Maximum Failover Count		
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	nitor(special) 🔶 Recovery Action	
Туре*	IP monitor 🗸	
Name*	ipw1	
Comment		
Get Licence Info		
• Select the type of monitor resource a	nd enter its name.	
		▲ Back Next ► 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	

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				ipw 🗙
Info ⊘ → Monitor(common) ⊘ →	Monitor(special) 🔶 Re	covery Action		
Edit Add Remove				
IP Address List				
IP Address				
No Ip Address				
ping Timeout*	5000	msec		
			A Back Next N	Cancel

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 Definiti	on		ipw 🗙
Info ⊘ → Monitor(com Edit Add Remove IP Address List IP Address	mon) 🛛 🗲 Monitor	(special) → Recovery Action	
10.5.0.121			
ping Timeout*	5000	msec	

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 Act	tion	
Recovery Action	Execute only the final action	~	
Recovery Target *	LocalServer	Browse	
Recovery Script Execution Count			
Execute Script before Reactivation			
Maximum Reactivation Count			
Execute Script before Failover			
Execute migration before Failover			
Failover Target Server	 Stable server Maximum priority server 		
Maximum Failover Count			
Execute Script before Final Action			
Final Action	No operation	\checkmark	
		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.
- 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.
- 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	nitor(special) 🔶 Recovery Action	
Туре*	Multi target monitor	
Name*	mtw1	
Comment		
Get Licence Info		
• Select the type of monitor resource a	nd enter its name.	
		Back Next Cancel

3. 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	

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 Definiti	on			mtw 🗙
Info ⊘ → Monitor(com Monitor Resources	mon) 🛇 🔶 Monit	tor(special) \rightarrow R	lecovery Action Available Monitor Resources	
Monitor Resource	Туре	<i></i>	Monitor Resource	Туре
genw1	genw	Add	userw	userw
ipw1	ipw	→		
ipw2	ipw	Remove		
Tuning			4 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		m	itw 🗙
Info 🛛 🔸 Monitor(common) 🖉 ·	→ Monitor(special) → Recovery	Action	
Recovery Action	Execute only the final action		~
Recovery Target *	LocalServer	Browse	
Recovery Script Execution Count			
Execute Script before Reactivation			
Maximum Reactivation Count			
Execute Script before Failover			
Execute migration before Failover			
Failover Target Server	 Stable server Maximum priority server 		
Maximum Failover Count			
Execute Script before Final Action			
Final Action	Stop the cluster service and shutdown	os 🗸	
		Script Se	ttings
		Back Finish C	ancel

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 Properties Cluster1		×
	meout Port No. Monitor Rec Irning Disk Mirror Disk Acco	overy Alert Service WebManager unt RIP(Legacy) Migration Extension
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.

Cluster Properties Cluster1			×
Info Interconnect NP Resolution T API Encryption Alert Log Delay Wa	imeout Port arning Disk	No. Monitor Recovery Alert S Mirror Disk Account RIP(Legac	5
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

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 AN 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.

TestGroup1 (Asia Pacific) Japan East Vnet1 10.5.0.0/24 Vnet1-1 10.5.0.0/24 TestGroup1 (Asia Pacific) Japan East
(Asia Pacific) Japan East Vnet1 10.5.0.0/24 Vnet1-1 10.5.0.0/24 TestGroup1 (Asia Pacific) Japan East
Vnet1 10.5.0.0/24 Vnet1-1 10.5.0.0/24 TestGroup1 (Asia Pacific) Japan East
10.5.0.0/24 Vnet1-1 10.5.0.0/24 TestGroup1 (Asia Pacific) Japan East
10.5.0.0/24 Vnet1-1 10.5.0.0/24 TestGroup1 (Asia Pacific) Japan East
Vnet1-1 10.5.0.0/24 TestGroup1 (Asia Pacific) Japan East
10.5.0.0/24 TestGroup1 (Asia Pacific) Japan East
TestGroup1 (Asia Pacific) Japan East
(Asia Pacific) Japan East
TestLoadBalancer
Public
TestLoadBalancerPublicIP
Static
TestGroup1
(Asia Pacific) Japan East
TestBackendPool
Availability set
node-1
node-2
noue-2
-

• 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		
	node-1	node-2	
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 setti	ng		
– Name	node-1-nsg	node-2-nsg	
Availability set setting			
– Name	AvailabilitySet-1	AvailabilitySet-1	
- Update domains	5	5	
– Fault domains	2	2	
Diagnostics storage account	setting		
– Name	Automatically generated		
– Performance	Standard	Standard	
– Replication	Locally-redundant storage ()	Locally-redundant storage (LRS)	
IP configuration setting			
– IP address	10.5.0.120	10.5.0.121	
Disk setting		I	
– Name	node-1_DataDisk_0	node-2_DataDisk_0	
– Source type	None (empty disk)	None (empty disk)	
– Account type	Standard HDD	Standard HDD	
– Size	20		
L		1	

• EXPRESSCLUSTER settings (cluster properties)

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

• EXPRESSCLUSTER settings (failover group)

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

• EXPRESSCLUSTER settings (monitor resource)

Monitor resource name	Setting item	Setting value
Mirror disk monitor resource	Name	mdw1
Azure probe port monitor re-	Name	azureppw1
source		
	Recovery Target	azurepp1
Azure load balance monitor re- source	Name	aurelbw1
	Recovery Target	azurepp1
Custom monitor resource	Name	genw1
	Script created with this product	On
	Monitor Type	Synchronous
	Normal Return Value	0
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
IP monitor resource	Name	ipw1
	Server to monitor	node-1
	IP address	10.5.0.121
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
IP monitor resource	Name	ipw2
	Server to monitor	node-2
	IP address	10.5.0.120
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
Multi target monitor resource	Name	mtw1

Continued on next page

Monitor resource name	Setting item	Setting value
	Monitor resource list	
		genw1
		ipw1
		ipw2
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
	Execute Script before Final Ac-	On
	tion	
	Timeout	30

Table 5.3 – continued from previous page

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.

+	()	•	.	†		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	
1								28 min ago	
								28 min ago	
9								29 min ago	
•								30 min ago	
8								32 min ago	
Navigate	scriptions	Resource	e groups	All	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 🔕 († Add filter		
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		resources, services, and docs (G+/)	>_ 😡	Q 🕸	? 😊	1000	
Home > Resource groups > C	reate a resource group						
Create a resource grou	ıp						\times
resources for the solution, or or	reate hat holds related resources for an Azure solution. ly those resources that you want to manage as a roups based on what makes the most sense for y	group. You decide how you want to					
Project details							
Subscription *		\sim					
Resource group *	TestGroup1	\checkmark					
Resource details Region *①	(Asia Pacific) Japan East	~					
	(Asia Pacific) Japan cast	· · ·					
Review + create <	Next : Tags >						
<							>

2. Creating a virtual network

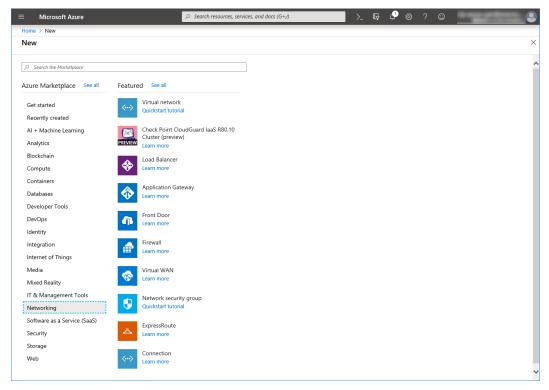
Log in to the Microsoft Azure portal (https://portal.azure.com/) and create a virtual network following the steps below.

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	
~ >								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	
<u>@</u>								28 min ago	
<u>,</u>								29 min ago	
9								30 min ago	
8								32 min ago	
Navigate	bscriptions	() Resource	e groups	All r	resources	Dasht	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.

+	()		•	e			-	SQL	\rightarrow
Create a	Resource	Network	Virtual	Subscriptions	All resources	App Services	Storage	SQL databases	More services
resource	groups	security groups	machines				accounts		
Recent reso	ources								
	NAME			ТҮРЕ				LAST VIEWED	
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Navigate									
Navigate									
🔶 Subs	criptions	Resource	e groups	All r	esources	Dashi	oard		
• 5455	anpaono -		c groups		counces		Jourd		

2. Select Compute and then See all.

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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 >						
							>

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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 r Windows. Select an image from Azure marketplace or use your own customized exate to provision a virtual machine with default parameters or review each tab for full n Azure Marketplace eved resources and costs. Use resource groups like folders to organize and manage all restGroup1 Create new	one is available during planned or unplanned maintenance events. Learn more Name * AvailabilitySet-1 Fault domains O Q Update domains O S Use managed disks O 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 Recovers all public and private images	
Review + create < P	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.

74

≡ Microsoft Azure 🔎 Sea	arch resources, services, and docs (G+/)	Þ	Ç	Q		\odot	and statements	
Home > New > Create a virtual mach	ine							
Create a virtual machine								\times
Basics Disks Networking M	lanagement Advanced Tags Review + create							
	disk and a temporary disk for short-term storage. You can attach additional data disks. e 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								
	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 Attack	h an existing disk							
✓ Advanced								
Review + create <	Previous Next : Networking >							
e								>

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 virtu	al machine > Create a new disk						
Create a new disk							×
Create a new disk to store appli storage type, and number of tra	cations and data on your VM. Disk pricing varies based on factors including disk size, nsactions. 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** >

≡ Microsoft Azure 🔎 Searc	ch resources, services, and docs (G+/)	Ģ	Q		Conception of the local division of the loca	
Home > New > Create a virtual machin	e				-	
Create a virtual machine						\times
Basics Disks Networking Mar	nagement 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 >**.

\equiv Microsoft Azure 2 Searce	ch resources, services, and docs (G+/)	\geq	Ģ	Q	ŝ	0	
Home > New > Create a virtual machin	e						
Create a virtual machine							×
Basics Disks Networking Mar	nagement Advanced Tags Review + create						^
Configure monitoring and management of	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						
Diagnostics storage account \star ()	testgroup1diag600 V Create new						
Identity							
System assigned managed identity ①	On () Off						
Azure Active Directory							
Login with AAD credentials (Preview) ①	On () Off						
Review + create < P	revious Next : Advanced >						
							/

9. Click Next: Tags >.

■ Microsoft Azure P Search resources, services, and docs (G+/)	\geq	Ŗ			
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 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.

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Home > New > Create a virtual r	machine							
Create a virtual machine								\times
✓ Validation passed								
Basics Disks Networking	Management 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 b billing frequency as my Azure subs information with the provider(s) of	the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed pill my current payment method for the fees associated with the offering(s), with the same scription; and (c) agree that Microsoft may share my contact, usage and transactional the offering(s) for support, billing and other transactional activities. Microsoft does not ings. See 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 li	icense? No							~
Create	< Previous 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	
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.								30 min ago	
8								32 min ago	
Navigate	riptions	() 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.

	Search resources, services, and docs (G+/)		₿?©	
Home > Resource groups > Te	stGroup1			
FestGroup1				s?
	≪ + Add ≣≣ Edit columns 📋 Delete resource group 💍 Refre	sh \rightarrow Move \downarrow Export to CSV \mid \otimes 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. Show hidden types ①		No grouping	\sim
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	Source State	Disk	Japan East	
Cost Management	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	🗌 🐻 node-2419	Network interface	Japan East	
Advisor recommendations	S 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 >			
Alarts				

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	resources, services, a	and docs (G+/)			D 🗣	🗳 🕸 ? 😊	9
Home > Resource groups > TestGroup1	> node-1 - Network	ting > node-1284	4 - IP configuratio	ns			
node-1284 - IP configurat	tions						×
	🕂 Add 🗄 Sa	ave 🗙 Discard					
Overview	IP forwarding se	ttings					
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)			~
IP configurations							
DNS servers	✓ Search IP cor						
💎 Network security group	Name	IP Version	Туре	Private IP address		Public IP addre	ss
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.	Ŗ	Ç2		100	-	
Home > Resource groups >	TestGroup1 > node-1 - Networking > node-1284 - IP c	onfigurat	ions > ipconfig1							
ipconfig1 node-1284										
🔚 Save 🗙 Discard										
new private IP address. T configuration settings, in	viated with this network interface will be restarted to utilize the he network interface will be reprovisioned and network cluding secondary II addresses, subter masks, 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										
IP address * 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	×
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;	
<u>MBR</u> (Master Boot Record)	
○ <u>G</u> PT (GUID Partition Table)	
Note: The CRT - office of the in-office of the office of t	
Note: The GPT partition style is not recognized by all previ Windows.	ous versions of
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 Manag	jement						-		\times
Eile <u>A</u> ction	<u>V</u> iew <u>H</u> elp								
Þ 🔿 📷	🛛 🖬 🗩 🗙	🖸 🔒 🗾 (3						
/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		70.00 GB	68.77 GB	98 %		
Disk 0									
Basic 127.00 GB	(C:)								
Online			ve, Crash Dump,	Primary Partition	s///////				
- Disk 1									
Basic 70.00 GB	70.00 GB NTFS								
Online	Healthy (Page		Partition)						
Disk 2							1		
Basic									
20.00 GB	20.00 GB								
Online	Unallocated								
Upplicated	Drimany partition								
Unallocated	Primary partition	n						1	

- 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.	
	< Back Next > Cance	el

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

ew Simple Volume Wizard		>
Specify Volume Size Choose a volume size that is betwee	en the maximum and minimum sizes.	
Maximum disk space in MB:	20477	
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.

Assign Drive Letter or Path For easier access, you can assign a drive letter	or drive path to your partition.
<u>Assign the following drive letter:</u> <u>Mount in the following empty NTFS folder:</u> <u>Do not assign a drive letter or drive path</u>	F v Browse
	< Back Next > Cance

- 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.

ew 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	
	< Back Next > Cance	ł

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

/ Simple Volume Wizard	
sign Drive Letter or Path For easier access, you can assign a drive letter	or drive path to your partition.
<u>Assign</u> the following drive letter:	G ~
O Mount in the following empty NTFS folder:	Browse
O Do not assign a drive letter or drive path	alonao
	< Back Next > Cano

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

Format Partition To store data on this partition, yo	ou must format it first.
Choose whether you want to for	nat this volume, and if so, what settings you want to use.
O Do not format this volume	
Format this volume with the	e following settings:
<u>File system:</u>	NTFS ~
Allocation unit size:	Default ~
Volume label:	New Volume
Perform a quick form	nat
Enable file and folde	er compression

- 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: Smple Volume A Disk selected: Disk 2 Volume size: 19453 MB Drive letter or path: G: File system: NTFS Allocation unit size: Default Volume label: New Volume	
	Chick format: Yes To close this wizard, click Finish.	
	< <u>B</u> ack Finish Cance	sl.

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

	ment						_	×
<u>File</u> <u>A</u> ction	<u>V</u> iew <u>H</u> elp							
⊨ 🔿 🖬 [? 🖬 🗩 🗙 🛛	2 🔒 🛃	Ē					
Volume	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 Sto	orag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %	
Basic 127.00 GB Online	(C:) 127.00 GB NTFS Healthy (System		e, Crash Dump, F	Primary Partition				
	-							
	Temporary Sto 70.00 GB NTFS Healthy (Page F	-	artition)					
	70.00 GB NTFS	-	artition)					

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.

Azure servi	ces								
+	[]		P	†		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	
								26 min ago	
								26 min ago	
••••								27 min ago	
								28 min ago	
8								28 min ago	
000								28 min ago	
.								29 min ago	
.								30 min ago	
8								32 min ago	
Navigate	criptions	Resource	e groups	All n	esources	Dashi	board		

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.

\equiv Microsoft Azure		\sum	Ð			
Home > New > Create load ba	lancer					
Create load balancer						;
Basics Tags Review + cr	reate					
balancers uses a hash-based dist destination port, protocol type) h accessible via public IP addresses	sad balancer that distributes incoming traffic among healthy virtual machine instances. Load incluion algorithm by default, it uses a 5-tupie (source) Port destination IP, isah to map traffic to available servers. Load balancers can either be internet-facing where it is 5, or internal where it is only accessible from a virtual network. Azure load balancers also ation (NAT) to route traffic between public and private IP addresses. Learn more.					
Project details						
Subscription *	· · · · · · · · · · · · · · · · · · ·					
Resource group *	TestGroup1					
	Create new					
Instance details						
Name *	TestLoadBalancer 🗸					
Region *	(Asia Pacific) Japan East					
Туре * 🕕	O Internal Public					
sku * 🛈	Basic Standard					
Public IP address						
Public IP address *	Create new Use existing					
Public IP address name *	TestLoadBalancerPublicIP 🗸					
Public IP address SKU	Basic					
Assignment *	O Dynamic 💿 Static					
Review + create <	Previous Next : Tags > Download a template for automation					
<						>

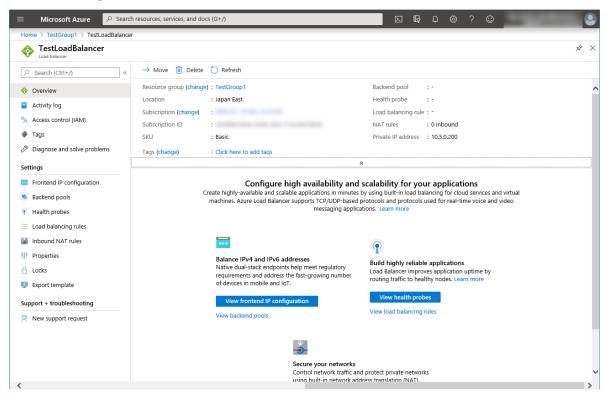
- 7. Configuring a load balancer (configuring a backend pool)
- 1. Associate a virtual machine registered to the availability set to the load balancer. After the load balancer has been deployed, select **Resource groups** on the upper part of the window.

Azure services		-							
+	[考]		.	†		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 resource	es								
NA	ME			ТҮРЕ				LAST VIEWED	
\leftrightarrow								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	
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•								29 min ago	
Q								30 min ago	
8								32 min ago	
Navigate									
gute									
📍 Subscript	ons	Resourc	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.

■ Microsoft Azure	P Search resources, services, and docs (G+/) □ 🛱 Ω 🚳 ? 🤅	9
Home > TestGroup1		
(intersection of the second se		Ŕ
	« + Add ≡ Edit columns Delete resource group Nove Export to CSV Ø Assign tags	Delete 🞍 Export template …
(iv) Overview	Essentials ×	
Activity log	Filter by name Type == all () Location == all () + Y Add filter	
Access control (IAM)	Showing 1 to 31 of 31 records. $\hfill \square$ Show hidden types \odot	No grouping \checkmark
Tags	□ Name ↑↓ Type ↑↓ Locati	tion ↑↓
Events	AvailabilitySet-1 Availability set Japan	East ····
Settings	AvailabilitySet1 Availability set Japan	East
📣 Quickstart	Cluster1.zone DNS zone global	al
Deployments	🗌 🖬 ipconfig1 Public IP address Japan	n East •••
Policies	Depending 11 Public IP address Japan	n East ····
🐲 Properties	Definition Public IP address Japan	n East ····
🔒 Locks	Description Descripti Description Description Description Description Descript	n East •••
Export template	Virtual machine Japan	East ····
Cost Management	🗌 🔮 node-1-nsg Network security group Japan	East ····
🗙 Cost analysis	Network interface Japan	East ····
Cost alerts	Since-1_DataDisk_0 Disk Japan	i East ····
③ Budgets	Image: Second system Disk Japan	East ····
Advisor recommendations	s Virtual machine Japan	East ····
Monitoring	□ 💡 node-2-nsg Network security group Japan	East ····
Insights (preview)	Retwork interface lanan	Fact ···
Alerts	<pre> v < Previous Page 1 v of 1 Next > </pre>	

4. Select Backend pools.



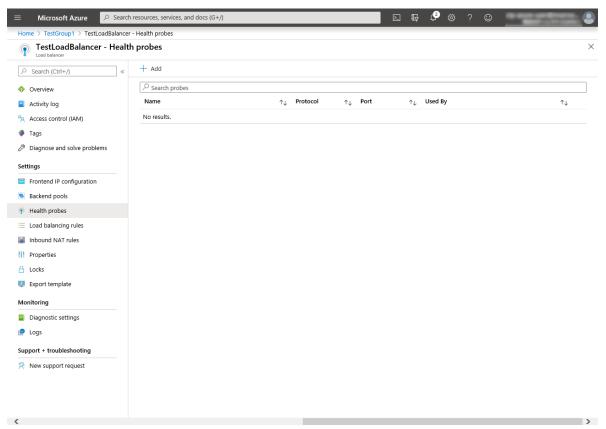
5. Click Add.

	th resources, services, and docs (G+/)	5 6 0	© ?	
Home > TestGroup1 > TestLoadBalance TestLoadBalancer - Back Load balancer					
Coad balancer Search (Ctrl+/) «	🕂 Add 💍 Refresh				
♦ Overview	Virtual machine	Virtual machine status	Network interface	Private IP address	
Activity log	No results				
Tags					
Diagnose and solve problems					
Settings					
Frontend IP configuration					
Backend pools					
P Health probes					
Load balancing rules					
Inbound NAT rules					
Properties					
Locks					
Export template					
Support + troubleshooting					
R New 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+/)	D ty	Q 🕸	? 😳	-	
Home > TestGroup1 > TestLoadBalancer	- Backend pools	Add backend pool				×
TestLoadBalancer - Backer	nd pools	l estLoadBalancer				
	+ Add 🕐 Refresh	Name * TestBackendPool				~
 Overview Activity log 	Virtual machine Virtual machine status	Virtual network Vnet1				
Access control (IAM)	No results	IP version				
 Tags Diagnose and solve problems 		Associated to ①				\sim
Settings		<u></u>				
Frontend IP configuration		Virtual machines				
Sackend pools		Virtual Machines must be in sa	me location	as Load Balancer. Only IP conf	igurations tha	at have
Health probes		the same SKU (Basic/Standard configurations have to be in th			of the IP	
📒 Load balancing rules		-				
Inbound NAT rules		Virtual machine		IP address		
Properties		node-1		ipconfig1 (10.5.0.120)		Î.
🔒 Locks		node-2	~	ipconfig1 (10.5.0.121)		Î
😟 Export template			\checkmark		\sim	
Support + troubleshooting						
Rew 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.

\equiv Microsoft Azure	℅ Search resources, services, and docs (G+/)	Þ] 🖓	₽ ⊚	9	
Home > TestLoadBalancer -	Health probes > Add health probe					
Add health probe						\times
Name *						
TestHealthProbe	✓					
Protocol 🕕						
TCP	~					
Port *						
26001						
Interval *						
5						
Unhealthy threshold * ③	seconds					
2						
	consecutive failures					
ОК						
<						>

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

\equiv Microsoft Azure		h resources, services, and d	ocs (G+/)			Þ	G (<u>چ</u>	? 😊		the second	
Home > TestGroup1 > Test												
TestLoadBalance	er - Load	balancing rules										×
	«	+ Add										
💠 Overview		P										
Activity log		Name	\uparrow_{\downarrow}	Load balancing rule	↑↓ B	ackend pool		↑J	, Health pro	be	\uparrow_{\downarrow}	
Access control (IAM)		No results.										
🔷 Tags												
Diagnose and solve prob	olems											
Settings												
Frontend IP configuration	n											
Backend pools												
Health probes												
📒 Load balancing rules												
Inbound NAT rules												
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.

E Microsoft Azure P Search resources, services, and docs (G+/)	E 🗣 🗳 🍥 ? 😊
Home > TestGroup1 > TestLoadBalancer - Load balancing rules > Add load balancing rule	
Add load balancing rule	
Name *	
Name " TestLoadBalancingRule	
IP Version *	
Frontend IP address * ①	
10.5.0.200 (LoadBalancerFrontEnd)	
Protocol	
Port *	
80	
Backend port * ①	
8080	
Backend pool ①	
TestBackendPool (2 virtual machines)	
Health probe ①	
TestHealthProbe (TCP:26001)	
Session persistence ①	
None V	
Idle timeout (minutes) ①	
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	➢ Network secuity groups	×	< D 🖓 🖗 🎯	? 🙂	
	Azure servic	Services See al	Marketplace			^
	Azure servic	Network security groups	No results w	ere found.		
	+ [🌍 Network security groups (classic)	Documentation			
	Create a	Virtual networks	Deploy Azure Multi-Factor Author	entication - Azure Active	atabases More services	
	resource	Application security groups	Resource Groups			
		A Groups	No results w	vere found.		
	Recent reso	🐺 Host groups				
	Name	(杰) Management groups			Viewed	
		Network interfaces				
	🚸 TestLoadBala	🔎 Network Watcher			in ago	
	[iii] 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	ago	
	📮 win10-ogata		Virtual machine	2 d	ago	
	👤 node1		Virtual machine	2 d	ago	
	node2		Virtual machine	2 d	ago	
	ipconfig1		Public IP address	2 d	ago	
	🐻 node1186		Network interface	2 d	ago	
	💎 node1-nsg		Network security group	2 d	ago	
	Navigate					
	inavigate					
	📍 Subscription	ons (i) Resource groups	All resources	Dashboan	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.

E Microsoft Azure 🔎	Search r	esources, services	s, and docs (G+/)			D 🖓 🗳 🕸	? 🙂	and some	
Home > Network security groups >	node-	1-nsg - Inbound	security rules						
Network security group	d secu	urity rules							
		+ Add 🛛 🔯	Default rules						
🗧 Overview	~	Priority	Name	Port	Protocol	Source	Destination	Action	
Activity log		1000	🔺 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	O Deny	
Inbound security rules Outbound security rules									
Network interfaces									
Subnets Properties									
Locks									
Export template									
Monitoring									
Diagnostic settings									
单 Logs									
NSG flow logs									
Support + troubleshooting									
Effective security rules									
New support request	~								

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

- D 🕼 🖓 🕸 ? 😳 Home > Network security groups > node-1-nsg - Inbound security rules Add inbound security rule node-1-nsg - Inbound security rules 🤌 Basic . P Search (Ctrl+/) ≪ 🕂 Add 🔌 Default rules Source * Overview Priority Name Port Any \sim Activity log 🔺 default-allow-rdp 1000 3389 Source port ranges * Access control (IAM) 1010 < Tags 65000 AllowVnetInBound Any Destination * \sim Diagnose and solve problems Any 65001 AllowAzureLoadBalancerInBound Any 65500 DenyAllInBound Any Destination port ranges * Settings 8080 📩 Inbound security rules Protocol * Outbound security rules Any TCP UDP ICMP Retwork interfaces Action * Subnets Allow Deny Properties Priority 🗡 🛈 🔒 Locks 1020 😟 Export template Name ★ Monitoring TestHTTP Diagnostic settings Description 💭 Logs NSG flow logs Support + troubleshooting 📩 Effective security rules Add New connort request <
- 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.

+	[]	Ţ		+		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	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	
ONS								28 min ago	
.								29 min ago	
9								30 min ago	
8								32 min ago	
Navigate	oscriptions	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.

Microsoft Azure		ç @ ? © °	
Home > TestGroup1			_
FestGroup1			Ŷ
	\ll + Add $\equiv\equiv$ Edit columns in Delete resource group \bigcirc Refresh \rightarrow Move \checkmark Export to CSV \parallel	🖗 Assign tags 📋 Delete 🚽 Export tem	plate
Overview	Essentials ×		
 Activity log 	Filter by name Type == all () Location == all () Type Add filter		
Access control (IAM)	Showing 1 to 31 of 31 records. \square Show hidden types \bigcirc	No grouping	~
Tags	□ Name ↑↓ Type ↑↓	Location $\uparrow \downarrow$	
Events	AvailabilitySet-1 Availability set	Japan East	
Settings	AvailabilitySet1 Availability set	Japan East	
Quickstart	Ouster1.zone DNS zone	global	
Deployments	Disconfig1 Public IP address	Japan East	
Policies	Disconfig11 Public IP address	Japan East	
Properties	Disconfig12 Public IP address	Japan East	
🖞 Locks	Disconfig2 Public IP address	Japan East	
Export template	Virtual machine	Japan East	
Cost Management	Network security group	Japan East	
Q Cost analysis	Network interface	Japan East	
Cost alerts	Disk	Japan East	
Budgets	Sector State	Japan East	
Advisor recommendations	s 🗌 📮 node-2 Virtual machine	Japan East	
Monitoring	Network security group	Japan East	•
 Insights (preview) 	Network interface	lanan Fast	
 Insights (preview) 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.

≡ Microsoft Azure 🔎 Search	n resources, services, and docs (G+/)	🗖 🕞 🖓 🔅 ? 😳 🔤 🔍
Home > TestGroup1 > TestLoadBalance	r	
TestLoadBalancer		\$ ×
	\rightarrow Move iii Delete 🖒 Refresh	
💠 Overview	Resource group (change) : TestGroup1	Backend pool : TestBackendPool (2 virtual machines)
Activity log Access control (IAM)	Location : Japan East Subscription (change) :	Health probe : TestHealthProbe (Tcp:26001) Load balancing rule : TestLoadBalancingRule (Tcp/80 to Tcp/8080)
 Tags 	Subscription ID : SKU : Basic	NAT rules : 0 inbound Private IP address : 10.5.0.200
Diagnose and solve problems	Tags (change) : Click here to add tags	
Settings		*
Frontend IP configuration		bility and scalability for your applications
Backend pools		ns in minutes by using built-in load balancing for cloud services and virtual P/UDP-based protocols and protocols used for real-time voice and video
Health probes		saging applications. Learn more
😑 Load balancing rules		
Inbound NAT rules	•••	
Properties	Balance IPv4 and IPv6 addresses	Build highly reliable applications
🔒 Locks	Native dual-stack endpoints help meet re requirements and address the fast-growin	gulatory Load Balancer improves application uptime by
😟 Export template	of 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 backend pools	View load balancing rules
	8 -	
		r networks ordk traffic and protect private networks network address translation (NAT).

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 EXPRESSCLUSER 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 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 <cluster></cluster>			🔎 Cor	nfig mode 🗸	Ł	()	ß	۶	i	? ≣	
Cluster generation wizard	ort Get the Configuration File	Apply the Configuration File	Update Server Data	Check the Config	uration File	L					

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	×						
Cluster → Basic Settings → Server 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 resol Both IPv4 and IPv6 for IP address can be When entering an IP address, the server n	used.		
	OK	3	
Cluster generation wizard			×
Server Server Cluster	Server anect → NP Resolution → Group	➔ Monitor	
Order Name Master server node-1			
1 node-2			
↑ ↓			
Server Group Definition	Settin	gs	
● Click "Add" to add servers constructing the clu Click 「↑」 or 「↓」 to change the server priority Click "Settings" to configure the server group who	<i>.</i>		
			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 Server Cluster Server Basic Settings Cluster Cluster Add Remove Interconnect List	Server	Server ◆ NP Resolution → 0	Group → Monitor	
Priority Type	MDC	node-1	node-2	
1 Kernel Mode 🗸	mdc1 🗸	10.5.0.120 🗸	10.5.0.121	~
↑ ↓				
which is used only for data mirroring o For "Kernel mode" setting, more than 1 For "Kernel mode" setting, click each s For "Witness HB" setting, click each s Click "1" or " J" to configure the prior For "Mirror Communication Only" setti	ettings, configur ommunication. zero routes are i erver column ce rver column cell ity to preferentiang, 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", an illy use the LAN only for the com cell for each server column and so	rtbeat. For "Mirror Communica guring more than one routes is I then click "Properties" to set munication among the cluster et an IP address.	ation Only" setting, configure the route is recommended. 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.

Click Next .		
Cluster generation wizard		×
Cluster Server Cluster Server Cluster Server Cluster	Server Server → Interconnect ② → NP Resolution → Group → Monitor node-1 node-2	
For "Ping" setting, click Target colur For "HTTP" setting, click Target colu For "Majority" setting, click each ser	purce and select the type. column cell to configure COM port. column cell to configure driver letter of the partition for disk heartbeat. nn cell to configure IP address of Ping destination, and then click each server column cell to configure "Use" or "Do not use". mn cell to configure HTTP packet destination, and then click each server column cell to configure "Use" or "Do not use". ver column cell to configure "Use" or "Do not use". ngs, the detailed settings can be verified and changed by clicking "Properties".	
		el

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 S	ver Server terconnect ⊘ → NP Resolution ⊘ → Group → Monitor	Group Resource
Group List Name No groups	Туре	
Configure failover group to be a unit of fail Click "Add" to add a group. Click "Properties" to configure the properties Click "Group Resource" to add resource to the	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
Type*	failover 🗸
Use Server Group Settings	
Name*	failover1
Comment	
 Select group type. If using virtual machine resources to clust "railover". If using server group, check the "Use Server 	er virtual machines, select "Virtual machine" as the type. In other cases, select ver Group".
	Gack 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 Definition	failover 🗙
Basic Settings ⊘ → Startup Servers ⊘ → Group Attributes ⊘ →	Group Resource
Properties Add Remove	
Group Resource List	
Name Type	
No resources	
• Click "Add" to add resources. Click "Properties" to configure the properties of the selected resource.	
	Back Finish Cancel

• Mirror disk resource

100

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	l 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 \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
	````	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**.

Selection o	of partition			
Obtain info	rmation			
Connect				
Data Partit	ion			
Volume	Disk No.	Partition No.	Size	GUID
	0	1	500MB	and the second second second second
D:¥	1	1	10238MB	
F:¥	2	1	1024MB	
C:¥	0	2	129546MB	
G:¥	2	2	19453MB	
Cluster Par	tition			
Volume	Disk No.	Partition No.	Size	GUID
	0	1	500MB	MAX and shall shall shall a summarized
D:¥	1	1	10238MB	
F:¥	2	1	1024MB	
C:¥	0	2	129546MB	
G:¥	2	2	19453MB	
				OK Cancel

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	<b>←</b> 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		
<b>Info</b> → 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.	
		Back Next      Cancel

- 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	Recovery 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) → Monitor(special) → Recovery Action						
Туре*	Custom monitor	~				
Name*	genw1					
Comment						
Get Licence Info						
• Select the type of monitor resource and enter its name.						
				Next 🕨	Cancel	

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     Alw					
○ Active					
Target Resource		Browse			
Choose servers that execute monitoring	Server				

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)	
<ul> <li>User Application</li> <li>Script created with this product</li> </ul>		
File	genw.bat	
		Edit View Replace
Monitor Type	<ul> <li>Synchronous</li> <li>Asynchronous</li> </ul>	
Normal Return Value*	0	
Kill the application when exit		
Wait for activation monitoring to stop before stopping the cluster		
Execution user	~	
	4	Back Next  Cancel

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 Acti	ion
Recovery Action	Execute only the final action	~
Recovery Target *	LocalServer	Browse
Recovery Script Execution Count		
Execute Script before Reactivation		
Maximum Reactivation Count		
Execute Script before Failover		
Execute migration before Failover		
Failover Target Server	Stable server	
	<ul> <li>Maximum priority server</li> </ul>	
Maximum Failover Count		
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	nitor(special) 🔶 Recovery Action	
Туре*	IP monitor	
Name*	ipw1	
Comment		
Get Licence Info		
• Select the type of monitor resource a	nd enter its name.	
		Back Next ► 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		
<ul> <li>Always</li> <li>Active</li> <li>Target Resource</li> </ul>		Browse
Choose servers that execute monitoring	Server	
		<ul><li>✓ Back Next ► Cancel</li></ul>

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

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

4. The Monitor (special) window is displayed.

Monitor Resource Definition				ipw 🗙
Info ⊘ → Monitor(common) ⊘ →	Monitor(special) 🔶 Re	covery Action		
Edit Add Remove				
IP Address List				
IP Address				
No Ip Address				
ping Timeout*	5000	msec		
			A Back     Next     N	Cancel

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 Definiti	on		ipw 🗙
Info ⊘ → Monitor(com Edit Add Remove IP Address List IP Address	mon) 🛛 🔿 Monitor	(special) → Recovery Action	
10.5.0.121			
ping Timeout*	5000	msec	

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 Ac	tion
Recovery Action	Execute only the final action	~
Recovery Target *	LocalServer	Browse
Recovery Script Execution Count		
Execute Script before Reactivation		
Maximum Reactivation Count		
Execute Script before Failover		
Execute migration before Failover		
Failover Target Server	<ul> <li>Stable server</li> <li>Maximum priority server</li> </ul>	
Maximum Failover Count		
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**.
- 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.
- 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.
- 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

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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) 🌛 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		
<ul> <li>Always</li> <li>Active</li> <li>Target Resource</li> </ul>		Browse
Choose servers that execute monitoring	Server	

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

Monitor Resource Definition	on			mtw 🗧
info 🥑 🔶 Monitor(com	mon) 🥑 🔶 Monit	or(special) → F		
Ionitor Resources Monitor Resource	Туре	←	Available Monitor Resources Monitor Resource	Туре
genw1	genw	Add	userw	userw
ipw1	ipw	<b>→</b>		
ipw2	ipw	Remove		
Tuning			▲ Back	Next   Cancel

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			mtw 🗙
Info 🛛 🔸 Monitor(common) 🛇 -	→ Monitor(special)  → Recovery Acti	on	
Recovery Action	Execute only the final action		~
Recovery Target *	LocalServer	Browse	
Recovery Script Execution Count			
Execute Script before Reactivation			
Maximum Reactivation Count			
Execute Script before Failover			
Execute migration before Failover			
Failover Target Server	<ul> <li>Stable server</li> <li>Maximum priority server</li> </ul>		
Maximum Failover Count			
Execute Script before Final Action			
Final Action	Stop the cluster service and shutdown OS <b>v</b>	•	
			Script Settings
		<ul> <li>▲ Back</li> </ul>	Finish 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.

Info ⊘ → Monitor(common) ⊘	→ Monitor(special)   → Recov	very Action	
Recovery Action	Execute only the final action		~
Recovery Target *	LocalServer	Browse	
Recovery Script Execution Count			
Execute Script before Reactivation			
Maximum Reactivation Count			
Execute Script before Failover			
Execute migration before Failover			
Failover Target Server	<ul> <li>Stable server</li> <li>Maximum priority server</li> </ul>		
Maximum Failover Count			
Execute Script before Final Action	V		
Final Action	No operation	~	
		Script Sett	ngs
		▲ Back Finish 0	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

```
rem \****************
rem Check Active Node
rem \*****************
<*EXPRESSCLUSTER_installation_path*>\bin\clpazure_port_checker -h *127.0.0.1*_
→-p < *Backend_port_of_the_load_balancer_of_Load_balancing_rule*>
IF NOT "%ERRORLEVEL%" == "0" (
GOTO CLUSTER_SHUTDOWN
)
rem \***************
rem Check DNS
rem \***************
<*EXPRESSCLUSTER_installation_path*>\bin\clpazure_port_checker -h < *Frontend_
→IP(public_IP_address) of the load balancer*> -p < *Port_of_the load_
→balancer of Load balancing rule*>
IF "\&ERRORLEVEL%" == "0" (
GOTO EXIT
)
rem \****************
rem Cluster Shutdown
rem \****************
:CLUSTER_SHUTDOWN
clpdown
rem \***************
rem EXIT
rem \*****************
:EXIT
EXIT 0
```

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

Edit Script		×
○ User Application	product	
File	preaction.bat	
		Edit View Replace
Timeout*	15 sec	
Exec User	~	
		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 Properties   Cluster1		×
	Timeout Port No. Monitor Varning Disk Mirror Disk	Recovery Alert Service WebManager Account RIP(Legacy) Migration Extension
Cluster Name Comment	Cluster1	
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.

Cluster Properties   Cluster1				×
	imeout Port	, , , , , , , , , , , , , , , , , , , ,		oManager
API Encryption Alert Log Delay Wa Network initialization complete wait time*	arning Disk	Mirror Disk Account	RIP(Legacy) Migrati	on Extension
Server Sync Wait Time*	5	min		
Heartbeat				
Interval*	3	sec		
Timeout*	270	sec		
Server Internal Timeout*	180	sec		
Initialize				
			ОК Са	ancel 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.
- 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 item	Setting value							
	node-1	node-2						
Virtual machine setting								
– Disk type	Standard HDD							
– User name	testlogin	testlogin						
– Password	PassWord_123	PassWord_123						
- Resource group	TestGroup1	TestGroup1						
– Region	(Asia Pacific) Japan East							
Network security group settin	lg							
– Name	node-1-nsg	node-2-nsg						
Availability set setting								
– Name	AvailabilitySet-1							
– Update domains	5	5						
– Fault domains	2							
Diagnostics storage account s	etting							
– Name	Automatically generated							
– Performance	Standard							
– Replication	Locally-redundant storage (I	LRS)						
IP configuration setting	1							
– IP address	10.5.0.120	10.5.0.121						
Disk setting	I	1						
– Name	node-1Blob1	node-2Blob1						
– Source type	None (empty disk)	1						
– Account type	Standard HDD							
– Size	20							
L	1	1						

• EXPRESSCLUSTER settings (cluster properties)

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

• EXPRESSCLUSTER settings (failover group)

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

• EXPRESSCLUSTER settings (monitor resource)

Monitor resource name	Setting item	Setting value
Mirror disk monitor resource	Name	mdw1
Azure probe port monitor resource	Name	azureppw1
	Recovery Target	azurepp1
Azure load balance monitor resource	Name	aurelbw1
	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.

+ 💿 🎈			<b>P</b>	<b>†</b>				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				
<b>{··&gt;</b>								22 min ago				
								24 min ago				
()								24 min ago				
								26 min ago				
							26 min ago					
								27 min ago				
•••								28 min ago				
<b>B</b>								28 min ago				
ONS								28 min ago				
<b>.</b>								29 min ago				
<b>X</b>								30 min ago				
8								32 min ago				
Navigate												
5												
🔶 Subso	riptions	Resourc	e groups	All r	esources	Dashb	oard					

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

Microsoft Azure		>_ 167 ♀ ⑳ ? ☺	
Home > Resource groups			
Resource groups			Ŷ
+ Add ≡≡ Edit columns 🕐 Refresh 🞍 E	xport to CSV 🛛 🖉 Assign tags 🛛 💙 Feedback		
Subscription == a	all Location == all ( $\sqrt[+]{}$ Add filter	No grouping	~
howing 1 to 30 of 30 records. Name ↑↓	Subscription $\uparrow \downarrow$	Location 1	
		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		$\wp$ Search resources, services, and do	rs (G+/)	>_	Ŗ	Q		٢	and strength	
Hon	me > Resource groups > 0	Create a resource group									
Cre	eate a resource gro	up									×
	asics Tags Review +										
resc	ources for the solution, or o	nly those resources that you want to	zure solution. The resource group can ir manage as a group. You decide how yo ist sense for your organization. Learn m	u want to							
Pro	ject details										
Sub	oscription *			$\sim$							
	— Resource group *	TestGroup1		~							
Por	source details										
	jion *	(Asia Pacific) Japan East		$\sim$							
	Review + create <	Previous Next : Tags >									
	Review - create	Next: Tags >									
<											>

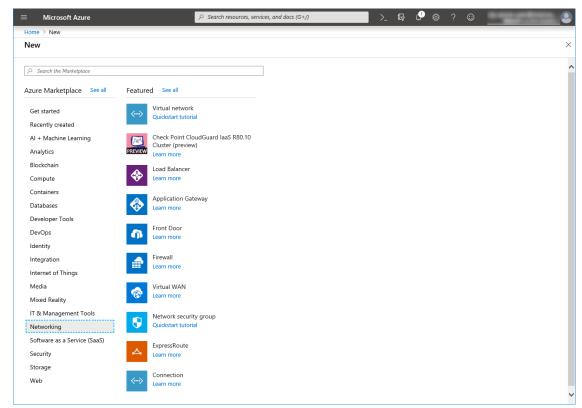
#### 2) Creating a virtual network

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	Network	Virtual	Subscriptions	All resources	App Services	Storage	SQL databases	More services
Recent res	groups	security groups	machines				accounts		
Recent res	NAME			ТҮРЕ				LAST VIEWED	
<b>~~&gt;</b>								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	
<b>.</b>								30 min ago	
8								32 min ago	
Navigate	scriptions	Resourc	e groups	All r	esources	Dasht	ooard		

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	
Home > New > Create virtual netw	
Create virtual network	
Name *	^
Vnet1	~
Address space *	
10.5.0.0/24	~
10.5.0.0 - 10.5.0.255 (256 add	esses)
Add an IPv6 address space 🛈	
Subscription *	
	$\sim$
Resource group *	
TestGroup1	$\sim$
Create new	_
Location *	
(Asia Pacific) Japan East	~
Subnet	
Name *	_
Vnet1-1	<u> </u>
Address range *	_
10.5.0.0/24 10.5.0.0 - 10.5.0.255 (256 adds	
DDoS protection ①	essesj
<ul> <li>Basic O Standard</li> </ul>	
Service endpoints ()	
Disabled Enabled	
Firewall 🛈	- 1
Disabled Enabled	~
Create Automation option	
Create Automation option	5

## 3) Creating a virtual machine

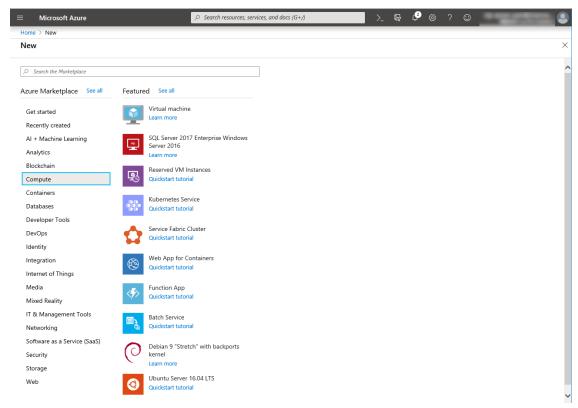
Log in to the Microsoft Azure portal (https://portal.azure.com/) and create virtual machines and disks following the steps below.

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.

+	()	V		<b>†</b>		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	
<b>~~&gt;</b>								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	
ONS								28 min ago	
<b>.</b>								29 min ago	
<b>9</b>								30 min ago	
8								32 min ago	
Navigate	scriptions	Resource	e groups	All r	esources	Dash	poard		

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



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.

$\equiv$ Microsoft Azure $\checkmark$ Set	earch resources, services, and docs (G+/)	
Home > New > Create a virtual mac	hine	
Create a virtual machine		;
Basics Disks Networking N	Aanagement Advanced Tags Review + create	
	x or Windows. Select an image from Azure marketplace or use your own customized	
image.		
customization.	create to provision a virtual machine with default parameters or review each tab for full	
Looking for classic VMs? Create VM f	om Azure Marketplace	
Project details		
Select the subscription to manage dep your resources.	loyed resources and costs. Use resource groups like folders to organize and manage all	
Subscription *		
Resource group *		
Kesource group **·····	TestGroup1 V Create new	
Instance details Virtual machine name *①		
	node-1	
Region * ①	(Asia Pacific) Japan East 🗸 🗸	
Availability options ①	Availability set	
Availability set *	V	
	Create new	
Image 🗙 🕕	Windows Server 2016 Datacenter	
	Browse all public and private images	
Microsoft Azure Pome > New > Create a virtual mac	arch resources, services, and docs (G+/) hine	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. Learn more
Basics Disks Networking M	Aanagement Advanced Tags Review + create	Name *
Create a virtual machine that runs Linu image.	x or Windows. Select an image from Azure marketplace or use your own customized	AvailabilitySet-1
	+ create to provision a virtual machine with default parameters or review each tab for full	Fault domains ①
Looking for classic VMs? Create VM f	rom Azure Marketplace	O2
Project details		Update domains ①
Select the subscription to manage dep your resources.	loyed resources and costs. Use resource groups like folders to organize and manage all	O 5_
		Use managed disks ① O No (Classic) ④ Ves (Aligned)
Subscription * ①	×	
Resource group <b>*</b> ①	TestGroup1 V	
	Create new	
Instance details		
Virtual machine name *		
	node-1 🗸	
Region * 🛈	node-1 V (Asia Pacific) Japan East V	
Region * 🛈 Availability options 🛈		
Availability options ①	(Asia Pacific) Japan East     V       Availability set     V	
	(Asia Pacific) Japan East	
Availability options ① Availability set <b>*</b> ①	(Asia Pacific) Japan East       Availability set       Create new       The value must not be empty.	
Availability options ①	(Asia Pacific) Japan East       ✓         Availability set       ✓         Create new       ✓         The value must not be empty.       ✓         Windows Server 2016 Datacenter       ✓	
Availability options ○ Availability set ★○ Image ★○	(Asia Pacific) Japan East       Availability set       Create new       The value must not be empty.       Windows Server 2016 Datacenter       Browse all nublic and private images	
Availability options ○ Availability set ★○ Image ★○	(Asia Pacific) Japan East       ✓         Availability set       ✓         Create new       ✓         The value must not be empty.       ✓         Windows Server 2016 Datacenter       ✓	OK

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 $ ho$ Sea	arch resources, services, and docs (G+/)		Σ.	Ŗ	Q		٢	
Home > New > Create a virtual mach	ine							
Create a virtual machine								×
Basics Disks Networking M	lanagement Advanced Tags Review + create							
	disk and a temporary disk for short-term storage. You can att e of storage you can use and the number of data disks allowed							
Disk options								
OS disk type <b>*</b> ①	Standard HDD	$\sim$						
Enable Ultra Disk compatibility ①	Ves () No							
	Ultra Disk compatibility is not available for this VM size	and location.						
Data disks								
	lata disks for your virtual machine or attach existing disks. Thi	VM also comes with a						
LUN Name	Size (GiB) Disk type Host ca	ching						
Create and attach a new disk Attac	h an existing disk							
$\checkmark$ 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 >

$\equiv$ Microsoft Azure		Ŗ	Q		$\odot$	
Home > New > Create a vir	tual machine 🗧 Create a new disk					
Create a new disk						$\times$
Create a new disk to store app storage type, and number of t	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 >.

≡ Microsoft Azure 🔎 Sea	rch resources, services, and docs (G+/)	Ŗ	© ۵	٢	Conception and the second
Home > New > Create a virtual machi	ne				
Create a virtual machine					
Basics Disks Networking Ma	anagement Advanced Tags Review + create				
	tual 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				
Subnet * 🛈	Vnet1-1 (10.5.0.0/24)				
Public IP 🛈	Manage subnet configuration           None         V				
NIC network security group ①	Create new           O None         Basic <ul></ul>				
Configure network security group *	(new) node-1-nsg V				
Accelerated networking ①	Create new				
	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 >				
ξ					

#### 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 >**.

$\equiv$ Microsoft Azure $2$ Searc	h resources, services, and docs (G+/)	⊵	Ģ	Q	ŵ	?	$\odot$	
Home > New > Create a virtual machine	2							
Create a virtual machine								×
								^
Basics Disks Networking Man	agement Advanced Tags Review + create							
Configure monitoring and management o	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 Azu	ire Security Center basic plan.							
Monitoring								
Boot diagnostics ①	● On () Off							
OS guest diagnostics ①	O on () off							
Diagnostics storage account $\star$ ()	[testgroup1diag600 ∨ Create new							
Identity								_
System assigned managed identity ①	○ on ● off							
Azure Active Directory								
Login with AAD credentials (Preview) $\bigcirc$	On () Off							
								~
Review + create < Pr	evious Next : Advanced >							
<								>

9. Click Next: Tags >.

■ Microsoft Azure $P$ Search resources, services, and docs (G+/)	$\geq$	Ŗ	Q		$\odot$	
Home > New > Create a virtual machine						
Create a virtual machine						$\times$
						^
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 🔿 No host group found 🗸						
1 Dedicated hosts cannot be used with availability sets.						
						~
Review + create < Previous Next : Tags >						
rener recitus rent ingo -						
<						>

#### 10. Click Next: Review + create >.

					 _	_
me > New > Create a vir eate a virtual macl						
eate a virtual maci	nine					
asics Disks Networ	king Management Advanced	Tags Review + create				
		and view consolidated billing by applying the same	e tao to			
Itiple resources and resou	rce groups. Learn more about tags d	and vew consolidated binning by applying the same				
ite that if you create tags a	and then change resource settings on c	other tabs, your tags will be automatically updated				
lame 🕕	Value 🕕	Resource				
	:	11 selected V	·			
Review + create	<previous :="" next="" pre="" rev<=""></previous>	/iew + create >				

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

building of the set of	ent Advanced Tags Review + create scription credits apply O <b>0700 JPY/hr</b> icing for other VM sizes s and privacy statement(s) associated with the Marketplace offering(s) list payment method for the fees associated with the offering(s), with the sa (c) agree that Microsoft may share my contact, usage and transactional (c) or support, billing and other transactional activities. Microsoft does no				×
Validation passed Basics Disks Networking Manager PRODUCT DETAILS Standard A1 v2 St by Microsoft Comparison of the second	scription credits apply ① <b>0700 JPY/hr</b> icing for other VM sizes s and privacy statement(s) associated with the Marketplace offering(s) list payment method for the fees associated with the offering(s), with the sa () agree that Microsoft may share my contact, usage and transactional				
Basics     Disks     Networking     Manager       PRODUCT DETAILS       Standard A1 v2     Status       by Microsoft     1       Terms of use   Privacy policy     1       By clicking "Create", 1 (a) agree to the legal terr above; (b) authorize Microsoft to bill my currer billing frequency as my Azure subscription; can information with the provider(s) of the offering provide rights for third-party offerings. See the Basics       Bubscription       Resource group     Terms	scription credits apply ① <b>0700 JPY/hr</b> icing for other VM sizes s and privacy statement(s) associated with the Marketplace offering(s) list payment method for the fees associated with the offering(s), with the sa () agree that Microsoft may share my contact, usage and transactional				
PRODUCT DETAILS Standard A1 v2 Su by Microsoft Terms of use   Privacy policy TERMS By clicking "Create", 1 (a) agree to the legal terr above: (b) authorize Microsoft to bill my currer billing frequency as my Azure subscription; and information with the provider(s) of the offening provide rights for third-party offenings. See the Basics Subscription Resource group Termson See See See See See See See See See Se	scription credits apply ① <b>0700 JPY/hr</b> icing for other VM sizes s and privacy statement(s) associated with the Marketplace offering(s) list payment method for the fees associated with the offering(s), with the sa () agree that Microsoft may share my contact, usage and transactional				
Standard A1 v2 SU by Microsoft Terms of use   Privacy policy TERMS By clicking "Create", I (a) agree to the legal terr above: (b) authorize Microsoft to bill my currer billing frequency as my Azure subscription; ran information with the provider(s) of the offering provide rights for third-party offerings. See the Basics Subscription Resource group Ter	0700 JPY/hr icing for other VM sizes s and privacy statement(s) associated with the Marketplace offering(s) list payment method for the fees associated with the offering(s), with the sa () agree that Microsoft may share my contact, usage and transactional				
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above: (b) authorize Microsoft to bill my currer billing frequency as my Azure subscription; and information with the provider(s) of the offering provide rights for third-party offerings. See the Basics Subscription Resource group Te	payment method for the fees associated with the offering(s), with the sa (c) agree that Microsoft may share my contact, usage and transactional				
Subscription Te		it			
Resource group Te					
	tGroup1				
	le-1				
	a Pacific) Japan East				
	ilability set				
	w) AvailabilitySet-1				
Username te	login				
Already have a Windows Server license? No					
Create < Previou	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.

+	[]	•	<b>.</b>	<b>†</b>		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	
<b>«·</b> »								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	
<b>.</b>								29 min ago	
<b>.</b>								30 min ago	
8								32 min ago	
Nevineta									
Navigate									
🔒 Cula	scriptions	Resource	aroups	All r	esources	Dashi	board		

- 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.

Home > Resource groups > Tes	tfGroup1	≥ t _t ¢		_
TestGroup1     Resource group	i de la de la della d			Ŕ
Search (Ctrl+/)	≪ + Add ≡≡ Edit columns 📋 Delete resource group 💍 Refre	esh $\rightarrow$ Move $\downarrow$ Export to CSV $ $ $\otimes$ Ass	sign tags 🗊 Delete 🞍 Export tem	iplate   ···
Overview	Essentials	×		
<ul> <li>Activity log</li> </ul>	Filter by name Type == all O Location ==	all 🔹 (+ Add filter		
Access control (IAM)	Showing 1 to 28 of 28 records. Show hidden types ①		No grouping	$\sim$
Tags	□ Name ↑↓	Type ↑↓	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	node-1_DataDisk_0	Disk	Japan East	•
Cost Management	node-1_OsDisk_1_dfa99e02b54a4452ac9964de51616aa3	Disk	Japan East	•
o, Cost analysis	node-2	Virtual machine	Japan East	•
Cost alerts	🔲 💙 node-2-nsg	Network security group	Japan East	•
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 >			

4. Select Networking.

Microsoft Azure 🔎	Search	resources, service:	s, and docs (G+/)			D 🖟 🗳 🔅	? 🙂	A	
Home > Resource groups > Test	iroup1 🔾	node-1 - Netwo	orking						
Node-1 - Networking	I								
	~	🔗 Attach net	work interface 🖉 Detach network inter	face					
Overview	~	Network In	nterface: node-1284 Effective seco	urity rules T	opology				
Activity log		Virtual network	/subnet: Vnet1/Vnet1-1 NIC Public IF	e: - NIC Priva	te IP: 10.5.0.4 Acc	elerated networking: Disa	bled		
Access control (IAM)		Inhound nor	t rules Outbound port rules Appli	ication security	groups Load balan	cina			
Tags						cing			
Diagnose and solve problems			curity group node-1-nsg (attached to ubnets, 1 network interfaces	network interfac	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	
Disks		65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow	
📮 Size		65001	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	Allow	
Security		65500	DenyAllInBound	Any	Any	Any	Any	Oeny	
Extensions									
Continuous delivery (Preview)									
Availability + scaling									
Configuration									
Identity									
Properties									
Locks									
Export template									
perations									

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

≡ Microsoft Azure 🔎 Searc	h resources, services,	and docs (G+/)			2 <b>G</b> (	<b>2</b> ₿ ?	0	
Home > Resource groups > TestGroup1	> node-1 - Networ	king > node-1284	- IP configuration	าร				
node-1284 - IP configura	tions							
. ✓ Search (Ctrl+/) «	+ Add 🗔 S	iave 🗙 Discard						
Overview	IP forwarding s	ettings						
Activity log	IP forwarding			Disabled Enabled				
Access control (IAM)	Virtual network			Vnet1				
Tags	IP configuration							
Settings	Subnet *	ns		Vnet1-1 (10.5.0.0/24)				~
IP configurations				There is a solution of the sol				
DNS servers								
💎 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								
<								

- 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			$\geq$	Ŗ	Ļ2	÷	?	٢	100	19.00	
Home > Resource groups > TestGroup1 > node-1 - Networking > node-1284 - IP o	onfigura	tions > ipconfig1									
ipconfig1 node-1284											
🔚 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, bunch 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	~										

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	×
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)	
○ GPT (GUID Partition Table)	
Note: The GPT partition style is not recognized by all previous versions o Windows.	f
OK Can	cel

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

	·						-		×
<u>Eile Action</u>	<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	itorag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %		
Disk 0 Basic	(C;)							/////	////
127.00 GB	127.00 GB NTFS								
Online	Healthy (System	, Boot, Activ	e, Crash Dump, F	Primary Partition	\$///////				
									////
- Disk 1									
Basic	Temporary Stor	rage (D:)							-
Basic 70.00 GB	70.00 GB NTFS	-	Partition						-
Basic 70.00 GB		-	Partition)						
Basic 70.00 GB Online	70.00 GB NTFS	-	Partition)						
Basic 70.00 GB Online Disk 2	70.00 GB NTFS	-	Partition)						
Basic 70.00 GB Online	70.00 GB NTFS	-	Partition)						
Basic 70.00 GB Online <b>Disk 2</b> Basic	70.00 GB NTFS Healthy (Page Fi	-	Partition)						
Basic 70.00 GB Online <b>Disk 2</b> Basic 20.00 GB	20.00 GB NTFS	-	Partition)						
Basic 70.00 GB Online <b>Disk 2</b> Basic 20.00 GB	20.00 GB NTFS	-	Partition)						
Basic 70.00 GB Online <b>Disk 2</b> Basic 20.00 GB Online	20.00 GB NTFS	-	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.	
	< Back Next > Cance	4

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

Specify Volume Size Choose a volume size that is betwe	en 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

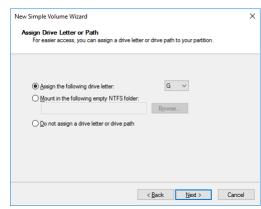
6. The Assign Drive Letter or Path window is displayed. Select the F drive for Assign the following drive letter:. Use the disk as a raw partition without formatting.

New Simple Volume Wizard	×
Assign Drive Letter or Path For easier access, you can assig	n a drive letter or drive path to your partition.
Assign the following drive lett     Mount in the following empty     Do not assign a drive letter or	NTFS folder: Browse
	< Back Next > Cancel

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

New Simple Volume Wizard	
Specify Volume Size Choose a volume size that is betwe	en the maximum and minimum sizes.
Maximum disk space in MB:	19453
Minimum disk space in MB:	8
Simple volume size in MB:	19453
	< Back Next > Cancel

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



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

New Simple Volume Wizard Format Partition To store data on this partition, yo	u must format it first.	×
Choose whether you want to form	nat this volume, and if so, what settings you want to use.	
O Do not format this volume		
Format this volume with the	e following settings	
<u>File</u> system:	NTFS ~	
Allocation unit size:	Default ~	
Volume label:	New Volume	
Perform a quick form	at	
Enable file and folde	r compression	
	< Back Next > 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 Waard. You selected the following settings: Volume type: Simple Volume Disk selected: Disk 20 Volume size: 19453 MB Drive letter or path: G: File system: NTFS Allocation unit size: Default Volume label: New Volume Or close this wizard, click Finish.	
	< Back Finish Cancel	

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

Ele       Action       Yiew       Help         Image: Simple       Basic       NTFS       Healthy (S       127.00 GB       111.94 GB       88 %         Image: Gripping Basic       NTFS       Healthy (P       100 GB       100 %       111.94 GB       88 %         Image: Gripping Basic       NTFS       Healthy (P       100 GB       100 %       111.94 GB       88 %         Image: Gripping Basic       NTFS       Healthy (P       19.00 GB       10.00 %       18.94 GB       100 %         Image: Gripping Basic       NTFS       Healthy (P       19.00 GB       18.94 GB       100 %         Image: Gripping Basic       NTFS       Healthy (P       10.00 GB       18.94 GB       100 %         Image: Gripping Basic       NTFS       Healthy (P       10.00 GB       18.94 GB       100 %         Basic       Image: Gripping Basic       NTFS       Healthy (P       10.00 GB       10.00 %         Image: Gripping Basic       Image: Gripping Basic       NTFS       Healthy (P       10.00 GB       10.00 %         Image: Gripping Basic       Image: Gripping Basic       Image: Gripping Basic       10.00 GB       10.00 GB       10.00 GB       10.00 GB       10.00 GB       10.00 GB       10.00	📅 Disk Managen	nent						-		Х
Volume       Layout       Type       File System       Status       Capacity       Free Spa       % Free <ul> <li>Simple</li> <li>Basic</li> <li>RAW</li> <li>Healthy (S</li> <li>127.00 GB</li> <li>111.94 GB</li> <li>88 %</li> <li>(F)</li> <li>Simple</li> <li>Basic</li> <li>NFS</li> <li>Healthy (P</li> <li>100 GB</li> <li>127.00 GB</li> <li>1127.00 GB</li> <li>127.00 G</li></ul>	<u>File Action V</u>	iew <u>H</u> elp								
Image: Column	🔶 🄿   📰   💈	🗖 🖉 🖛 🗙 🖸	2 🔒 🔓	2						
Image: F(r)         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 Storag         Simple         Basic         NTFS         Healthy (P         70.00 GB         68.77 GB         98 %           Disk 0         Basic         I27.00 GB         I27.00 GB NTFS         Healthy (System, Boot, Active, Crash Dump, Primary Partition)         127.00 GB         127.00 GB NTFS           Disk 1         Basic         Temporary Storage (D:)         70.00 GB NTFS         100 GB NTFS           Disk 2         Basic         (f-)         1.00 GB RAW         Healthy (Primary Partition)           Disk 2         Basic         (f-)         1.00 GB RAW         Healthy (Primary Partition)           Disk 2         Basic         (f-)         1.00 GB RAW         Healthy (Primary Partition)           Disk 2         Basic         Cold GB RAW         Healthy (Primary Partition)         Healthy (Primary Partition)	Volume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free		
Image: New Volume (G:)         Simple         Basic         NTFS         Healthy (P         19.00 GB         18.94 GB         100 %           Image: Temporary Storag         Simple         Basic         NTFS         Healthy (P         70.00 GB         18.94 GB         100 %           Image: Temporary Storag         Simple         Basic         NTFS         Healthy (P         70.00 GB         68.77 GB         98 %           Image: Temporary Storag         Image: Color Storage         Image: Color Sto	••••• (C:)	Simple		NTFS	Healthy (S	127.00 GB	111.94 GB	88 %		
Temporary Storag Simple       Basic       NTFS       Healthy (P 70.00 GB       68.77 GB       98 %         Disk 0 Basic Online       IC(3)       IC(3)       IC(3)       Intervention         Disk 1 Basic       Temporary Storage (D-) 70.00 GB       Temporary Partition)         Disk 2 Basic Online       (F-) 1.00 GB RAW Healthy (Primary Partition)       New Volume (G-) 19.00 GB NTFS Healthy (Primary Partition)	💳 (F:)	Simple	Basic	RAW			1.00 GB	100 %		
Disk 0     Basic       127.00 GB     127.00 GB       Online     Healthy (System, Boot, Active, Crash Dump, Primary Partition)       Disk 1     Temporary Storage (D:) 70.00 GB       Basic     Temporary Storage (D:) 70.00 GB NTFS       Online     Healthy (Page File, Primary Partition)       Disk 2     Basic       20.00 GB     (f:) 1.00 GB RAW       Healthy (Primary Partition)       Healthy (Primary Partition)										
Basic     CO       127.00 GB     127.00 GB NTFS       Healthy (System, Boot, Active, Crash Dump, Primary Partition)       Disk 1 Basic     Temporary Storage (D:) 70.00 GB NTFS       Online     Temporary Storage (D:) 70.00 GB NTFS       Disk 2 Basic     (F:) 1.00 GB RAW       Healthy (Page File, Primary Partition)	- Temporary Stor	rag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %		
Basic 70.00 GB     Temporary Storage (D2) 70.00 GB NTFS       Online     Healthy (Page File, Primary Partition)       Mew Volume (G3) 19.00 GB NTFS 19.00 GB NTFS Healthy (Primary Partition)	Basic 127.00 GB	127.00 GB NTFS		e, Crash Dump, F	Primary Partition					-
Basic     (F:)     New Volume (G:)       20.00 GB     1.00 GB RAW     19.00 GB NTFS       Healthy (Primary Partition)     Healthy (Primary Partition)	Basic 70.00 GB	70.00 GB NTFS								
Basic         (F:)         New Volume (G:)           20.00 GB         1.00 GB RAW         19.00 GB NTFS           Mealthy (Primary Partition)         Healthy (Primary Partition)	- Di-I- 2							1		
Unallocated Primary partition	Basic 20.00 GB	1.00 GB RAW	y Partition)	19.	00 GB NTFS					
	Unallocated	Primary partition								

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.

+	[]	P	<b>P</b>	+		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	
<b>~~&gt;</b>								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	
Navigate	scriptions	Resource	e groups	All r	esources	🔚 Dasht	ooard		

- 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 🔎	Search resources, services, and docs (G+/)		D G	₽ ©	? 😳	9
Home > New > Create load balan	cer					
Create load balancer						×
balancers uses a hash-based distribut destination port, protocol type) has	balancer that distributes incoming traffic among healthy virtual ution algorithm. By default, it uses a 5-tuple (source IP, source pr to map traffic to available servers. Load balancers can either br	ort, destination IP, e internet-facing where it is				,
	r internal where it is only accessible from a virtual network. Azur n (NAT) to route traffic between public and private IP addresses					
Project details						
Subscription *		$\checkmark$				
Resource group *	TestGroup1	~				
	Create new	¥				
Instance details						
Name *						
	TestLoadBalancer					
Region *	(Asia Pacific) Japan East	$\checkmark$				
Туре * 🛈	Internal      Public					
sku *0	• Basic O Standard					
Configure virtual network.						I
Virtual network 🗡 🛈	Vnet1	$\sim$				
Subnet *	Vnet1-1 (10.5.0.0/24)	$\checkmark$				*
	Manage subnet configuration					
Review + create < Pre	vious Next : Tags > Download a template for auton	nation				
<						>

## 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.

+	[]		<b>.</b>	+		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	
<b>~~&gt;</b>								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	

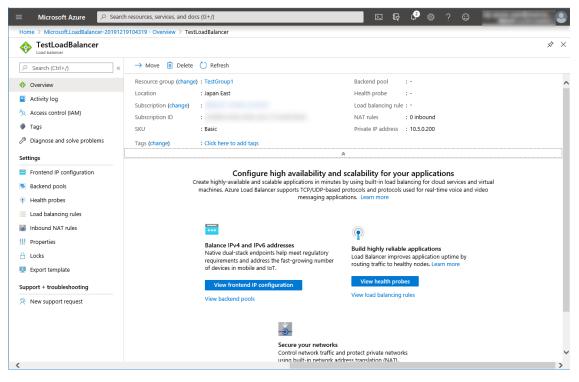
2. Select the resource group to which the created load balancer belongs from the resource group list.

Ξ

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

Microsoft Azure	Search resources, services, and docs (G+/)		? 😊	
Home > TestGroup1				
FestGroup1				Ŷ
	$_{\ll} \ \ + \ {\rm Add} \ \ \equiv \ {\rm Edit} \ {\rm columns} \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	≟ Export to CSV   ⊘ Assign tag	gs 🗊 Delete 🞍 Export template	
<ul><li>Overview</li></ul>	Essentials ×			
<ul> <li>Activity log</li> </ul>		dd filter		
Access control (IAM)	Showing 1 to 31 of 31 records. Show hidden types ①		No grouping	$\sim$
Tags	□ Name ↑↓ T	'ype ↑↓	Location $\uparrow \downarrow$	
Events	AvailabilitySet-1	vailability set	Japan East	
lettings	AvailabilitySet1	vailability set	Japan East	
Quickstart	Cluster1.zone	NS zone	global	
Deployments	🗌 🖬 ipconfig1 🛛 P	ublic IP address	Japan East	
Policies	🗌 🖬 ipconfig11 🛛 P	ublic IP address	Japan East	
Properties	🗌 🖬 ipconfig12 P	ublic IP address	Japan East	
Locks	🗌 🖬 ipconfig2 P	ublic IP address	Japan East	
Export template	🗌 📮 node-1 🛛 V	rirtual machine	Japan East	
ost Management	🗌 👽 node-1-nsg 💦 N	letwork security group	Japan East	
b. Cost analysis	🗌 🐻 node-1284 🛛 💦	letwork interface	Japan East	
Cost alerts	s node-1_DataDisk_0	lisk	Japan East	
Budgets	node-1_OsDisk_1_dfa99e02b54a4452ac9964de51616aa3	lisk	Japan East	
Advisor recommendations	🗌 📮 node-2 🛛 V	firtual machine	Japan East	
Aonitoring		letwork security group	Japan East	
Insights (preview)		letwork interface	lanan Fast	
Alerts	< Previous Page 1 V of 1 Next >			

4. Select Backend pools.



5. Click Add.

$\equiv$ Microsoft Azure $\checkmark$ Sear	ch resources, services, and docs (G+,	0	5 <b>t</b> 7 a	\$\$ ? ©	
Home > TestGroup1 > TestLoadBaland					
TestLoadBalancer - Bacl	kend pools				×
	+ Add 💍 Refresh				
Overview	Virtual machine	Virtual machine status	Network interface	Private IP address	
Activity log		virtual machine status	Network interface	Filvate if address	
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					
Support + troubleshooting					
📯 New 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			~	
<ul> <li>Overview</li> <li>Activity log</li> </ul>	Virtual machine	Virtual machine status	Virtual network ① Vnet1				
Access control (IAM)	140 165015		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	×
Name *	
TestHealthProbe	
Protocol 🛈	
ТСР 🗸	
Port *	
26001 🗸	
Interval * ①	
5	
seconds	
Unhealthy threshold * ① 2	
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 (G	i+/)		D G	∲ ⊚	? 😳	
Home > TestGroup1 > TestLoadBalancer	- Load balancing rules						
Coad balancer - Load b	palancing rules						
	+ Add						
Overview	<u></u> ٩						
Activity log	Name	$\uparrow_{\downarrow}$ Load balancing rule	↑↓ Backend	pool	↑↓	Health prob	• ↑↓
Access control (IAM)	No results.						
Tags							
Diagnose and solve problems							
Settings							
Frontend IP configuration							
Backend pools							
📒 Load balancing rules							
Inbound NAT rules							
Properties							
🖰 Locks							
Export template							
Monitoring							
Diagnostic settings							
🧐 Logs							
Support + troubleshooting							
New support request							
<							2

- 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	$\sum$	Ŗ	¢	ŵ	?	$\odot$	100	
Home > TestGroup1 > TestLoadBalancer - Load balancing rules > Add load balancing rule								
Add load balancing rule								×
Name *								~
TestLoadBalancingRule 🗸								
IP Version ★ (● IPv4 ) Pv6								
Frontend IP address * 0								
10.5.0.200 (LoadBalancerFrontEnd)								
Protocol								
• TCP UDP								
Port *								
80								
Backend port $\star \odot$								
8080								
Backend pool ①								
TestBackendPool (2 virtual machines)								
Health probe ①								
TestHealthProbe (TCP:26001)								
Session persistence 🛈								
None								
Idle timeout (minutes) ①								
O 4								
Floating IP (direct server return) $\odot$								
(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 EXPRESSCLUSER 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 🗸	<b>F</b> ()	£ 👂	i ?	
Cluster generation wizard	↓ Get the Configuration File	<b>Apply the Configuration File</b>	Update Server Data	Check the Configur	ration 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						
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].						
	4Back 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 resc Both IPv4 and IPv6 for IP address can be When entering an IP address, the server	used.	d.
	ОК	Cancel
Cluster generation wizard		
Server Server Server Cluster ♥ → Basic Settings → Interco Add Remove Server Definitions Order Name	server nnect → NP Resolution →	Group →
Master server node-1		
↑ <b>↓</b>		
Server Group Definition		Settings
● Click "Add" to add servers constructing the clt Click 「↑」 or 「↓」 to change the server priorit Click "Settings" to configure the server group wh	у.	

#### 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**.

					<u> </u>
Properties Add Remove	Server → Interconne	Server → NP Resolution -	→ Group → Monitor		
Interconnect List Priority Type	MDC	node-1	node-2		
1 Kernel Mode	✓ mdc1 ✓	10.5.0.120	✔ 10.5.0.121	$\checkmark$	
◆      ◆     Configure the interconnect amo For "Kernel mode" and "Witness H which is used only for data mirrori for "kernel mode" setting, dick es For "Kernel mode" setting, dick es For "Witness HB" setting, dick es For "\" to configure the j	HB [®] settings, configur ing communication. than zero routes are ach server column ce ch server column cell	re the route which is used for necessary to be configured. C ell and set an IP address. I to set "Use" or "Do not use"	heartbeat. For "Mirror Comm Configuring more than one rou , and then click "Properties" to	nunication Only" setting, configure the rout utes is recommended. o set detailed settings.	e
For "Mirror Communication Only" For the communication route whic MDC column.				ne to be allocated to the communication ro	ute in

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 **Ping Target** column and set the IP address of the device to which to send a ping. Be sure to specify the IP address of a server other than cluster servers within the Microsoft Azure virtual network. Click a cell of each server column and select **Use** or **Not use**. Click **Next**.

Cluster generation wizard		×
	Server Server Interconnect ⊘ → NP Resolution → Group → Monitor	
Type Target	node-1 node-2	
Ping 🗸 10.5.0.5	Use V Use V	
Tuning		
For "Ping" setting, click Target column cell t For "HTTP" setting, click Target column cell For "Majority" setting, click each server colu	and select the type. nn cell to configure COM port. nn cell to configure driver letter of the partition for disk heartbeat. Il to configure IP address of Ping destination, and then click each server column cell to configure "Use" or "Do all to configure HTTP packet destination, and then click each server column cell to configure "Use" or "Do nol plumn cell to configure "Use" or "Do not use". the detailed settings can be verified and changed by clicking "Properties".	
	Back Next	Cancel

#### 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	) 🔿 Group 🔿 Monitor	
Properties Add Remove			Group Resource
Group List			
Name		Туре	
No groups			
Configure failover group to be a Click "Add" to add a group. Click "Properties" to configure the p Click "Group Resource" to add reso	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 Sen	er 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 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 Definition	failover 🗙
Basic Settings ♥ → Startup Servers ♥ → Group Attributes ♥ → Group Resource	
Properties Add Remove	
Group Resource List	
Name Type	
No resources	
• Click "Add" to add resources. Click "Properties" to configure the properties of the selected resource.	
4 Back Finis	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   failover	r1	md 🗙
<b>Info</b> → Dependency → Recovery	Operation 🔶 Details	
Туре*	Mirror disk resource 🗸 🗸	
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**.
- 5. 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 $\bigcirc$	→ 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
		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**.

Selection o	of partition			
Obtain info	Obtain information			
Connect				
Data Partit	ion			
Volume	Disk No.	Partition No.	Size	GUID
	0	1	500MB	and the second second second second
D:¥	1	1	10238MB	
F:¥	2	1	1024MB	
C:¥	0	2	129546MB	
G:¥	2	2	19453MB	
Cluster Par	tition			
Volume	Disk No.	Partition No.	Size	GUID
	0	1	500MB	MAX and shall shall shall a summarized
D:¥	1	1	10238MB	
F:¥	2	1	1024MB	
C:¥	0	2	129546MB	
G:¥	2	2	19453MB	
				OK Cancel

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

Resource Definition of Group   failover1	md 🗙
Info 🛛 🔸 Dependency 🛇 🔸 Recovery Operation 🛇	→ 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 azurepp		
Info $\bigcirc$ $\rightarrow$ Dependency $\oslash$ $\rightarrow$ R	Recovery 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.

# SEVEN

# **ERROR MESSAGES**

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

• "Error messages" in the Reference Guide.

## NOTES AND RESTRICTIONS

## 8.1 HA cluster using Azure DNS

### 8.1.1 Notes on Microsoft Azure

- There is a tendency for the performance difference (performance deterioration rate) to increase in a multitenant cloud environment compared to a physical environment or general virtualization environment (non-cloud environment). Therefore, pay careful attention to this point when designing a performance-oriented system.
- Even if a virtual machine is just shut down, its status is **Stopped** and billing continues. Execute **Stop** on the virtual machine setting window of the Microsoft Azure portal to change the virtual machine state to **Stopped** (**Deallocated**).
- An availability set can be set only when creating a virtual machine. To move a virtual machine to and from the availability set, it is necessary to create an availability set again.
- To set up EXPRESSCLUSTER to work with Microsoft Azure, a Microsoft Azure organizational account is required. An account other than the organizational account cannot be used because an interactive login is required when executing the Azure CLI.

## 8.1.2 Notes on EXPRESSCLUSTER

Please refer the following for notes for EXPRESSCLUSTER on Azure:

EXPRESSCLUSTER X Getting Started Guide

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

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"

## 8.2 HA cluster using a load balancer

### 8.2.1 Notes on Microsoft Azure

- There is a tendency for the performance difference (performance deterioration rate) to increase in a multitenant cloud environment compared to a physical environment or general virtualization environment (non-cloud environment). Therefore, pay careful attention to this point when designing a performance-oriented system.
- Even if a virtual machine is just shut down, its status is **Stopped** and billing continues. Execute **Stop** on the virtual machine setting window of the Microsoft Azure portal to change the virtual machine state to **Stopped** (**Deallocated**).
- An availability set can be set only when creating a virtual machine. To move a virtual machine to and from the availability set, it is necessary to create an availability set again.

### 8.2.2 Notes on EXPRESSCLUSTER

Please refer the following for notes for EXPRESSCLUSTER on Azure:

EXPRESSCLUSTER X Getting Started Guide

- "Communication port number" in "Notes and Restrictions"
- "Azure probe port resources" in "Notes and Restrictions"
- "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"

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"

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# **REVISION HISTORY**

Edition	Revised Date	Description
1st	Apr 10, 2020	New Guide
2nd	Dec 25, 2020	Added explanation about supported OS version.
		Shared disk type cluster is now supported.

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