

EXPRESSCLUSTER X 5.0

HA Cluster Configuration Guide for Microsoft Azure (Windows)

Release 3

NEC Corporation

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CHAPTER

ONE

PREFACE

1.1 Who Should Use This Guide

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

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

1.2 Scope of application

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 a 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 four guides. The title and purpose of each guide is described below:

EXPRESSCLUSTER X Getting Started Guide

This guide is intended for all users. The guide covers topics such as product overview, system requirements, and known problems.

EXPRESSCLUSTER X Installation and Configuration Guide

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

EXPRESSCLUSTER X Reference Guide

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

EXPRESSCLUSTER X Maintenance Guide

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

1.5 Conventions

In this guide, Note, Important, See also are used as follows:

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

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

See also:

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

The following conventions are used in this guide.

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



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

1.6 Contacting NEC

For the latest product information, visit our website below:

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

CHAPTER

OVERVIEW

2.1 Functional overview

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

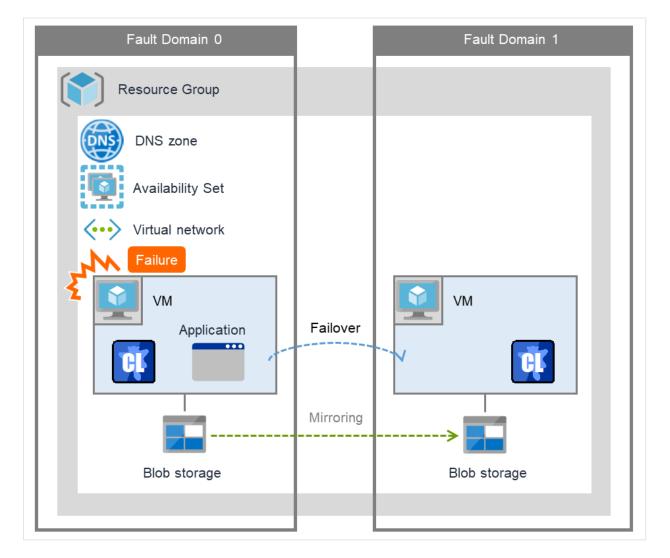


Fig. 2.1: HA Cluster on a Cloud Service (Using Azure DNS)

Operational availability can be increased by clustering virtual machines (VMs in Figure 2.1 HA Cluster on a Cloud Service (Using Azure DNS)) using a Microsoft Azure region and availability set in a Microsoft Azure environment.

• Microsoft Azure region

Physical and logical units called a Microsoft Azure region are provided.

It is possible to build all nodes in a single region (such as Japan East or Japan West). However, if all nodes are built in a single region, there is a possibility for nodes to go down due to a network failure or natural disaster, causing interruption to the flow of business. Distributing nodes into multiple regions can improve the operational availability.

• Availability set

Microsoft Azure allows each node to be deployed in a logical group called an *availability set*. Locating each node in an availability set minimizes the impact of planned maintenance or unplanned maintenance due to a physical hardware failure of the Microsoft Azure platform. This guide describes the configuration using an availability set.

For details about an availability set, see the following website:

Manage the availability of Windows virtual machines in Azure: https://docs.microsoft.com/en-us/azure/virtual-machines/windows/manage-availability

2.2 Basic configuration

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

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

HA cluster using Azure DNS

In this configuration, two virtual machines are deployed the same resource group so that the cluster can be accessed by using the same DNS name. The 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/

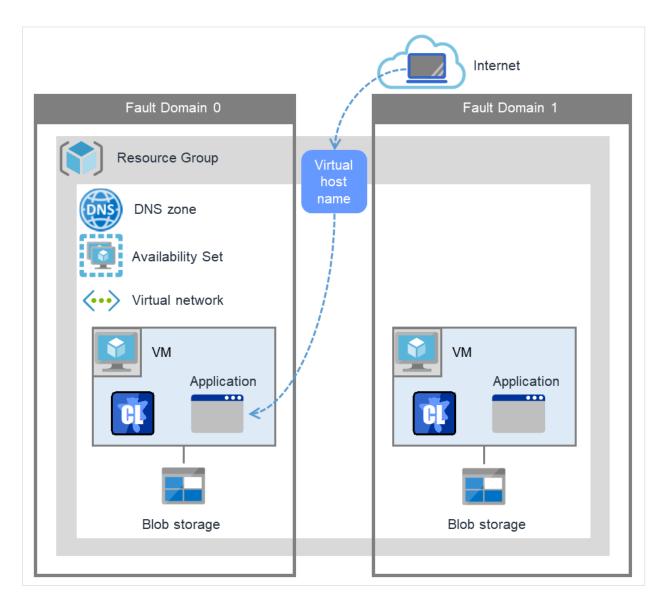


Fig. 2.2: HA Cluster Using Azure DNS

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-	Description	Setting
source type 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

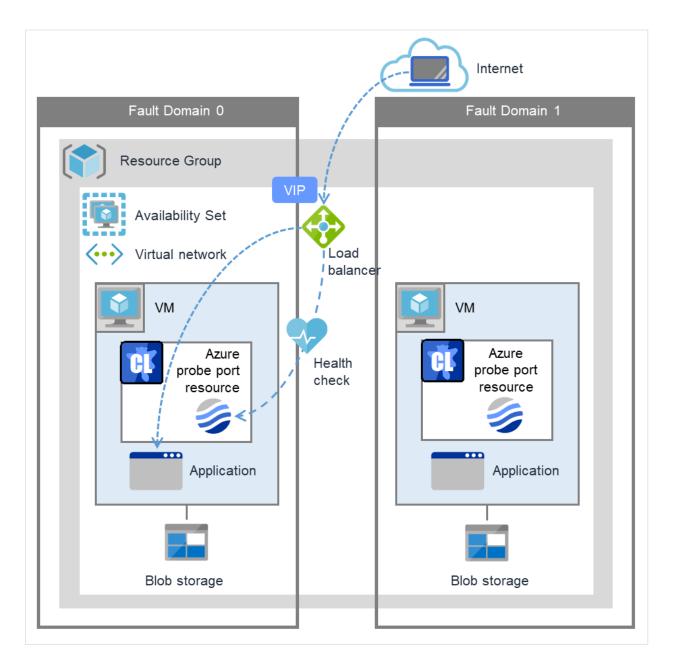


Fig. 2.3: HA Cluster Using an Public Load Balancer

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

A cluster built in a Microsoft Azure environment in Figure 2.3 HA Cluster Using an Public Load Balancer is accessed by specifying a global IP address of the Microsoft Azure Load Balancer (Load Balancer in Figure 2.3 HA Cluster Using an Public Load Balancer).

Active and standby nodes of a cluster are switched by using probes of Microsoft Azure Load Balancer. To use Microsoft Azure Load Balancer probes, use a probe port provided by the EXPRESSCLUSTER Azure probe port resource. Activating the Azure probe port resource starts a probe port control process in standby for alive monitoring (access to a probe port) from Microsoft Azure Load Balancer. Deactivating the Azure probe port resource stops a probe port control process in standby for alive monitoring (access to a probe port) from Microsoft Azure Load Balancer.

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

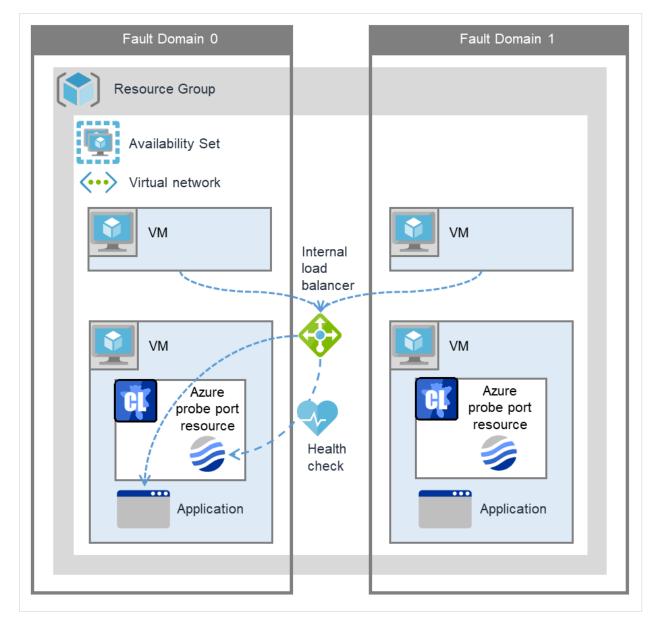


Fig. 2.4: HA Cluster Using the Internal Load Balancer

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

Purpose	Load balancer to use	Creating procedure
Disclosing operations out- side the Microsoft Azure net-	Public load balancer	See "5. Cluster Creation Proce- dure (for an HA Cluster Using a
work		<i>Public Load Balancer</i>)" in this guide.
Publishing operations within the Microsoft Azure network	Internal load balancer (ILB)	See "6. Cluster Creation Proce- dure (for an HA Cluster Using an Internal Load Balancer)" in this guide.

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

Resource or monitor re- source type	Description	Setting
Azure probe port resource	Provides a mechanism to wait for alive monitoring from a load balancer on a specific port of a node in which operations are running.	Required
Azure probe port monitor re- source	Performs alive monitoring of a probe port control process, which starts upon activation of the Azure probe port resource, for a node in which the Azure probe port resource is running.	Required
Azure load balance monitor resource	Monitors whether a port with the same number as a probe port is open for a node in which the Azure probe port resource is not running.	Required
IP monitor resource	Monitors whether communica- tion with the Microsoft Azure Service Management API is possible, and also monitors health of communication with an external network.	When 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.

Table 2.4 – continued from previous page				
Resource or monitor re-	Description	Setting		
source type				
Multi target monitor resource	Monitors the statuses of both	When an public load balancer is		
_	the IP monitor resource and	used, required to monitor health		
	custom monitor resource. If	of communication between an		
	the statuses of both monitor re-	internal network and external		
	sources are abnormal, a script	network.		
	in which a process for network			
	partition resolution (NP resolu-			
	tion) is described is executed.			
PING network partition reso-	When an internal load balancer	When an internal load balancer		
lution resource	(ILB) is used, monitors health	(ILB) is used, required to moni-		
	of communication between sub-	tor health of communication be-		
	nets by checking whether to	tween subnets.		
	communicate with a device that			
	is always on and can return a re-			
	sponse to ping (ping device).			
Other resources and monitor	Depends on the configuration	Optional		
resources	of application, such as a mirror			
	disk, that is used in an HA clus-			
	ter.			

Table 2.4 – continued from previous page

2.3 Network partition resolution

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

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

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

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

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

For details about NP resolution, see the following:

• "Details on network partition resolution resources" in the Reference Guide.

Setting the NP resolution destination

You need to examine the NP resolution destination and method depending on the location of clients accessing a cluster system and the condition for connecting to an on-premise environment (for example, using a dedicated line). There is no NP resolution destination nor method to recommend.

How to judge the network partition status

EXPRESSCLUSTER provides the clpazure_port_checker command to check the TCP port listening status. Use this command as **Script created with this product** of the custom monitor resource or multi target monitor resource.

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

Checking the TCP port listening status (clpazure_port_checker command)

clpazure_port_checker

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

Command line clpazure_port_checker -h hostname -p port

Description

This command checks whether a LISTEN port exists among TCP ports of the server specified for an argument.

If there is no response five seconds (fixed) after the command execution, it is judged that an error (timeout) has occurred.

In case of an error, an error message is output to the standard output.

Executing this command from the custom monitor resource makes it possible to judge the network partition status.

For the configuration example of network partition resolution using this command, see "4.3. *Configuring the EXPRESSCLUSTER settings*" and "6.3. *Configuring the EXPRESSCLUSTER settings*"

Options

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

Return values

- 0 Normal
- 1 Error (communication error)
- 2 Error (timeout)
- **3** Error (invalid argument or internal error)

2.4 Differences between on-premises and Microsoft Azure

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

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

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

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

HA cluster using Azure DNS

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

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

• Before installing EXPRESSCLUSTER

Step No.	Procedure	On-premise	Microsoft Azure
1	Creating a resource	Not required	See "4.2. Configuring
	group		Microsoft Azure" in this
			guide.
2	Creating a virtual net-	Not required	See "4.2. <i>Configuring</i>
	work		Microsoft Azure" in this
			guide.
3	Creating a virtual ma-	Not required	See "4.2. Configuring
	chine		Microsoft Azure" in this
			guide.
4	Setting a private IP ad-	Not required	See "4.2. Configuring
	dress		Microsoft Azure" in this
			guide.
5	Adding a disk	Not required	See "4.2. Configuring
			Microsoft Azure" in this
			guide.
6	Creating a DNS zone	Not required	See "4.2. Configuring
			Microsoft Azure" in this
			guide.
7	Setting up the DNS	See the manual provided	Not required
	server	with the OS or DNS	
		server.	
·			Continued on next page

Stop No.	Procedure	ontinued from previous page	Microsoft Azure
Step No. 8		On-premise	
8	Setting a partition for the mirror disk resource	See the following:	See "4.2. Configuring Microsoft Azure" in this guide.
		- "Settings after	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 startup	See "Settings after con-	Same as "On-premise"
Ū	time	figuring hardware" in	
		"Determining a sys-	
		tem configuration" in	
		the Installation and	
		Configuration Guide.	
10	Checking the network	See "Settings after con-	Same as "On-premise"
	setting	figuring hardware" in	1
	e e	"Determining a sys-	
		tem configuration" in	
		the Installation and	
		Configuration Guide.	
11	Checking the firewall set-	See "Settings after con-	Same as "On-premise"
	ting	figuring hardware" in	-
		"Determining a sys-	
		tem configuration" in	
		the Installation and	
		Configuration Guide.	
12	Synchronizing the server	See "Settings after con-	Same as "On-premise"
	time	figuring hardware" in	
		"Determining a sys-	
		tem configuration" in	
		the Installation and	
		Configuration Guide.	
13	Disabling the power sav-	See "Settings after con-	Same as "On-premise"
	ing function	figuring hardware" in	
		"Determining a sys-	
		tem configuration" in	
		the Installation and	
		Configuration Guide.	
14	Installing the Azure CLI	Not required	See "4.2. Configuring
			Microsoft Azure" in this
			guide.
15	Registering the service	Not required	See "4.2. Configuring
	principal		Microsoft Azure" in this
			guide.
			Continued on next page

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	-			a e p. ee]=
Step No.	Procedure		On-p	oremise		Microsoft Azure
16	Installing	EXPRESS-		e		Same as "On-premise"
	CLUSTER		PRES	SSCLUSTER"	in	
			the	Installation	and	
			Conf	iguration Guide	e.	

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 li- cense." in the Installation and Configuration Guide.	Same as "On-premise"
18	Creating a cluster: Set- ting the heartbeat method	See "Creating the con- figuration 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 cluster: Set- ting 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 EXPRESSCLUSTER set- tings" in this guide.
20	Creating a cluster: Creat- ing a failover group and monitor resource	See "Creating the con- figuration 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.

HA cluster using a load balancer

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

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

• Before installing EXPRESSCLUSTER

Step No.	Procedure	On-premise	Microsoft Azure
1	Creating a resource group	Not required	See either of the following depending on the load balancer to use: - "5.2. Configuring Microsoft Azure" in this guide - "6.2. Configuring Microsoft Azure" in this guide
2	Creating a virtual network	Not required	See either of the following depending on the load balancer to use: - "5.2. Configuring Microsoft Azure" in this guide - "6.2. Configuring Microsoft Azure" in this guide
3	Creating a virtual machine	Not required	See either of the following depending on the load balancer to use: - "5.2. <i>Configuring</i> <i>Microsoft Azure</i> " in this guide - "6.2. <i>Configuring</i> <i>Microsoft Azure</i> " in this guide

Stop No	Procedure	ntinued from previous pag	Microsoft Azure
Step No.	Procedure	On-premise	
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
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 secu- rity rules	Not required	- "5.2. Configuring Microsoft Azure" in this guide

Table 2.9 – continued from previous page

		ntinued from previous pag	•
Step No.	Procedure	On-premise	Microsoft Azure
9	Adjusting the OS startup time	See "Settings after con- figuring hardware" in	Same as "On-premise"
		"Determining a sys-	
		tem configuration" in	
		the Installation and	
		Configuration Guide.	
10	Checking the network	See "Settings after con-	Same as "On-premise"
	setting	figuring hardware" in	
		"Determining a sys-	
		tem configuration" in	
		the Installation and	
		Configuration Guide.	
11	Checking the firewall set-	See "Settings after con-	Same as "On-premise"
	ting	figuring hardware" in	
		"Determining a sys-	
		tem configuration" in	
		the Installation and	
		Configuration Guide.	
12	Synchronizing the server	See "Settings after con-	Same as "On-premise"
	time	figuring hardware" in	
		"Determining a sys-	
		tem configuration" in	
		the Installation and	
13	Dischling the second	Configuration Guide.	Somo og "Og granier"
13	Disabling the power sav- ing function	See "Settings after con- figuring hardware" in	Same as "On-premise"
		"Determining a sys- tem configuration" in	
		the Installation and	
		Configuration Guide.	
14	Installing EXPRESS-	See "Installing EX-	Same as "On-premise"
	CLUSTER	PRESSCLUSTER" in	
		the Installation and	
	1	and another and	1

Table 2.9 - continued from previous page

• After installing EXPRESSCLUSTER

Step No.	Procedure	On-premise	Microsoft Azure
15	Registering the EX- PRESSCLUSER license	See "Registering the li- cense" in the Installation and Configuration Guide.	Same as "On-premise"
16	Creating a cluster: Set- ting the heartbeat method	See "Creating the config- uration 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.

Step No.	Procedure	ontinued from previous pa	Microsoft Azure
Step NO.		On-premise	
17	Creating a cluster: 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 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.
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.

x86_64

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

CHAPTER

FOUR

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

4.1 Creation example

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

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

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

Setting item	Setting value
Resource group setting	
– Resource group	TestGroup1
– Region	(Asia Pacific) Japan East
Virtual network setting	
– Name	Vnet1
- Address space	10.5.0.0/24
– Subnet Name	Vnet1-1
– Subnet Address range	10.5.0.0/24
– Resource group	TestGroup1
– Location	(Asia Pacific) Japan East
DNS zone setting	
– 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

100		page
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

Table	4.2 – continued from	previous	page

4.2 Configuring Microsoft Azure

1) Creating a resource group

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

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

+	()	ę	.	1		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent resou	urces								
r	NAME			TYPE				LAST VIEWED	
\Leftrightarrow								22 min ago	
ę								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
								27 min ago	
								28 min ago	
8								28 min ago	
								28 min ago	
X								29 min ago	
X								30 min ago	
8								32 min ago	
Navigate									
Navigate									
🔶 Subscr	iptions	Resource	e aroups	All r	esources	Dasht	oard		

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

Microsoft Azure		≻_ਯੋ₽@?©	
Home > Resource groups			
Resource groups			\$
+ Add ≡≡ Edit columns 🖒 Refresh 🞍 Export to	o CSV 🛛 🖉 Assign tags 🛛 🛇 Feedback		
Subscription == all	Location == all (3) (ty Add filter)		
howing 1 to 30 of 30 records.		No grouping	~
Name ↑↓	Subscription \uparrow_{\downarrow}	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			d docs (G+/)	\searrow \mathbb{Q}	¢ ©	? 😊	
Home > Resource groups >	Create a resource group						
Create a resource gr	oup						:
Basics Tags Review	+ create						
resources for the solution, or	er that holds related resources for an only those resources that you want t e groups based on what makes the m	o manage as a group. You decide h	ow you want to				
Project details Subscription *			~				
Resource group *	TestGroup1		\checkmark				
Resource details	(Asia Pacific) Japan East		~				
	(And Facility Supar Last						
Review + create	< Previous Next : Tags >						
<							>

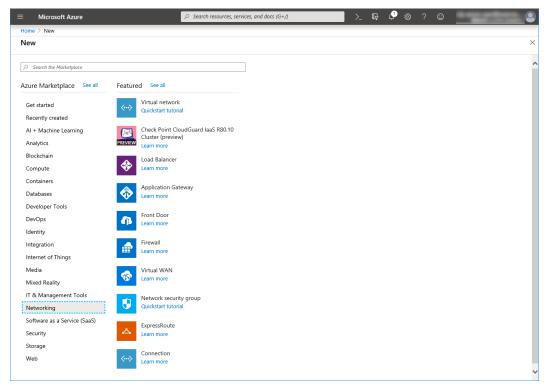
2) Creating a virtual network

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

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

+	[>]		.	+		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	
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								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
								27 min ago	
								28 min ago	
5								28 min ago	
<u>688</u>								28 min ago	
.								29 min ago	
9								30 min ago	
8								32 min ago	
Navigate									
<u> </u>	riptions	Resource		All r	esources	Dashi			

2. Select Networking and then Virtual network.



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

Microsoft Azure
Iome > New > Create virtual network
Create virtual network \square $ imes$
Name *
Vnet1 ✓
Address space *
10.5.0.0/24
10.5.0.0 - 10.5.0.255 (256 addresses)
Add an IPv6 address space ①
ubscription *
~
Resource group *
TestGroup1 V
Treate new
ocation *
(Asia Pacific) Japan East 🗸 🗸
ubnet
Name * Vnet1-1
Address range *0
10.5.0.0 - 10.5.0.255 (256 addresses)
DoS protection O Basic Standard
Disabled Enabled
irewall ①
Disabled Enabled
Create Automation options

3) Creating a virtual machine

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

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

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

+	()		.	+		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent resc	ources								
	NAME			TYPE				LAST VIEWED	
{··>								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
•••								28 min ago	
5								28 min ago	
								28 min ago	
•								29 min ago	
•								30 min ago	
8								32 min ago	
Navigate									
Havigute									
🔶 Subs	criptions	Resource	e groups	All	resources	Dashl	board		

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

\equiv Microsoft Azure		>_ 5	L ² ©	? 😊	1000	
Home > New						
New						×
						^
Azure Marketplace See all Fea	tured See all					
Get started Recently created	Virtual machine Learn more					
Al + Machine Learning Analytics	SQL Server 2017 Enterprise Windows Server 2016 Learn more					
Blockchain Compute	Reserved VM Instances Quickstart tutorial					
Containers Databases	Kubernetes Service Quickstart tutorial					
Developer Tools DevOps Identity	Service Fabric Cluster Quickstart tutorial					
Integration	Web App for Containers Quickstart tutorial					
Media Mixed Reality	Function App Quickstart tutorial					
IT & Management Tools	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					~

- 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 ρ s	earch resources, services, and docs (G+/)		N 🖓	0 @	1000	
Home > New > Create a virtual ma	chine					
Create a virtual machine						×
Basics Disks Networking	Management Advanced Tags Review + create					í
image.	ux or Windows. Select an image from Azure marketplace or u + create to provision a virtual machine with default parametr from Azure Marketplace					
Project details						
	ployed resources and costs. Use resource groups like folders	to organize and manage all				
Subscription *	1	\sim				
Resource group * ①	TestGroup1	\sim				
	Create new					
Instance details						
Virtual machine name *	node-1	\checkmark				
Region *	(Asia Pacific) Japan East	\checkmark				
Availability options	Availability set	\checkmark				
Availability set 🗡 🕕		\sim				
	Create new					
Image 🕇 🕕	Windows Server 2016 Datacenter	\sim				
	Browse all public and private images					~
Review + create	< Previous Next : Disks >					
<						>

≡ Microsoft Azure <mark>🔎 Sea</mark>	ch resources, services, and docs (G+/)] tīg _ @ ? ©
Home > New > Create a virtual machi	ne	Create new ×
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 image. Complete the Basics tab then Review + of customization. Looking for classic VMs? Create VM fro Project details	magement Advanced Tags Review + create or Windows. Select an image from Azure marketplace or use your own customized seate to provision a virtual machine with default parameters or review each tab for full m Azure Marketplace with the second	one is available during planned or unplanned maintenance events. Learn more Name * AvailabilitySet-1 Fault domains () Question Update domains () Vuldate domains () Vul
Instance details		
Virtual machine name *	node-1 🗸	
Region *	(Asia Pacific) Japan East	
Availability options ①	Availability set	
Availability set 🗡 🗊	✓	
Image *	Create new Create new Vindows Server 2016 Datacenter Rrowsa all public and privata imanee	
Review + create <	Previous Next : Disks >	ок

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

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

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

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

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

\equiv Microsoft Azure	 Search resources, services, and docs (G+/) 	Þ	Ģ	Q		\odot	
Home > New > Create a virtual	machine						
Create a virtual machine	e						>
Basics Disks Networking	Management Advanced Tags Review + create						
Azure VMs have one operating sy The size of the VM determines th	rstem disk and a temporary disk for short-term storage. You can attach additional data disks. e type of storage you can use and the number of data disks allowed. Learn more						
Disk options							
OS disk type *	Standard HDD 🗸						
Enable Ultra Disk compatibility (D Ves () No						
	Ultra Disk compatibility is not available for this VM size and location.						
Data disks							
You can add and configure additi temporary disk.	onal data disks for your virtual machine or attach existing disks. This VM also comes with a						
LUN Name	Size (GiB) Disk type Host caching						
Create and attach a new disk	Attach an existing disk						
✓ Advanced							
Review + create	< Previous Next : Networking >						
<							>

6. The Create a new disk blade appears.

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

\equiv Microsoft Azure	, P Search resources, services, and docs (G+/)	Ģ	Q	ŵ	?	٢	
Home > New > Create a virtu	ual machine > Create a new disk						
Create a new disk							×
Create a new disk to store appl storage type, and number of tr	ications and data on your VM. Disk pricing varies based on factors including disk size, ansactions. Learn more about Azure Managed Disks						
Name *	node-1_DataDisk_0						
Source type *	None (empty disk)						
Size *	20 GiB						
	Standard HDD						
	Change size						
ок							
<u> </u>							
<							>

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+/)	Þ.	Ģ	Ð		
Home > New > Create a virtual machi	ne					
Create a virtual machine						×
Basics Disks Networking Ma	anagement Advanced Tags Review + create					í
Define network connectivity for your viri ports, inbound and outbound connectiv Learn more	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					
	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 💿 Advanced					
Configure network security group 🗙	(new) node-1-nsg V					
	Create new					
Accelerated networking ①	On 💿 Off					
	The selected VM size does not support accelerated networking.					
Load balancing						
You can place this virtual machine in the	backend pool of an existing Azure load balancing solution. Learn more					
Review + create <	Previous Next : Management >					
<						>

8. The Management tab appears.

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

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

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

Configure monitoring and management opt	ity management and advanced threat protection across hybrid cloud workloads.			×
Basics Disks Networking Manag Configure monitoring and management opt Azure Security Center Azure Security Center provides unified secur	ity management and advanced threat protection across hybrid cloud workloads.			
Configure monitoring and management opt Azure Security Center Azure Security Center provides unified secur	ity management and advanced threat protection across hybrid cloud workloads.			
Configure monitoring and management opt Azure Security Center Azure Security Center provides unified secur	ity management and advanced threat protection across hybrid cloud workloads.			
Azure Security Center Azure Security Center provides unified secur	ity management and advanced threat protection across hybrid cloud workloads.			
Azure Security Center provides unified secur				
	Security Center basic plan.			
 Your subscription is protected by Azure 				
Monitoring				
Boot diagnostics ①	• On 🔿 Off			
OS guest diagnostics ①	○ on ④ off			
Diagnostics storage account * 🛈	testgroup1diag600 V			
	Create new			
Identity				
System assigned managed identity ①	On () Off			
Azure Active Directory				
Login with AAD credentials (Preview)	On () Off			
Review + create < Prev	ious Next : Advanced >			
Keview + cleate - < Prev	Index : Auvanced >			
<				

9. Click Next: Tags >.

\equiv Microsoft Azure	, P Search resources, services, and docs (G+/)	Þ	Ŗ	Q	ŝ	? 😳	
Home > New > Create a virt	ual machine						
Create a virtual mach	ine						×
							^
Basics Disks Network	ng Management Advanced Tags Review + create						
Add additional configuration, a	agents, scripts or applications via virtual machine extensions or cloud-init.						
Extensions							
Extensions provide post-deplo	yment configuration and automation.						
Extensions	Select an extension to install						
Cloud init							
Cloud init is a widely used app packages and write files or to a	roach to customize a Linux VM as it boots for the first time. You can use cloud-init to install onfigure users and security. Learn more						
The selected image does	not support cloud init.						
Host							
Azure subscription. A dedicate	ou to provision and manage a physical server within our data centers that are dedicated to your d host gives you assurance that only VMs from your subscription are on the host, flexibility to bition that 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 b	e used with availability sets.						
							~
Review + create	< Previous Next : Tags >						
Review + create	< Previous Next : Tags >						
<							>

10. Click Next: Review + create >.

Steme > New > Create a virtual machine	Microsoft Azure	Search resources, services, and do	cs (G+/)		Ф 🕸	? 🙂	1000	
Basic Disks Networking Management Advanced Tags Review + create age are name/halle pairs that enable you to categorize resources and view consolidated billing by applying the same tag to subje resources and resource groups. Learn more about tags of resource groups and then change resource settings on other tabs, your tags will be automatically updated. Name O Value O Resource resource resour								
ags are name/value pairs that enable you to categorize resources and view consolidated billing by applying the same tag to ultiple resource groups. Learn more about tags of that if you create tags and then change resource settings on other tabs, your tags will be automatically updated. Name Value Resource : : ::::::::::::::::::::::::::::::::::::								
ultiple resource and resource groups. Learn more about tags of a construction of the tabs, your tags will be automatically updated. Name O Value O Resource : : :11 selected	Basics Disks Networkir	g Management Advanced	Tags Review + create					
Value · Resource : : <td:< td=""> :</td:<>	gs are name/value pairs that ultiple resources and resource	enable you to categorize resources and groups, Learn more about tags of	d view consolidated billing by applyin	g the same tag to				
: 11 selected			er tabs, your tags will be automaticall	y updated.				
	Name 🕕	Value 🕕	Resource					
Review + create < Previous		:	11 selected	\sim				
Review + create < Previous								
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Review + create < Previous								
Review + create >								
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Review + create > Next : Review + create >								
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Review + create < Previous Next : Review + create >								
Review + create > Next : Review + create >								
Review + create < Previous Next : Review + create >								
	Review + create	< Previous Next : Review	w + 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 machine	2							
Create a virtual machine								>
✓ Validation passed								
Basics Disks Networking Mar	nagement Advanced Tags Review + create							
PRODUCT DETAILS								
Standard A1 v2	Subscription credits apply ①							
by Microsoft	9.0700 JPY/hr							
Terms of use Privacy policy	Pricing for other VM sizes							
TERMS								
billing frequency as my Azure subscription information with the provider(s) of the off	urrent payment method for the fees associated with the offering(s), with the same v and (c) agree that Microsoft may share my contact usage and transactional ering(s) for support, billing and other transactional activities. Microsoft does not e the Azure Marketplace Terms for additional details.							
Basics								
Subscription								
Resource group	TestGroup1							
Virtual machine name	node-1							
Region	(Asia Pacific) Japan East							
Availability options	Availability set							
Availability set	(new) AvailabilitySet-1							
Username	testlogin							
Already have a Windows Server license?	No							
Create < Pi	evious Next > Download a template for automation							
<								>

4) Setting a private IP address

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

1. Select **Resource groups** on the upper part of the window.

Azure servic									
+	[]	•		+		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								
I	NAME			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	
5								28 min ago	
088								28 min ago	
•								29 min ago	
•								30 min ago	
8								32 min ago	
Navigate Subscr Tools	riptions	(i) Resource	e groups	All r	esources	🔚 Dasht	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.

E Microsoft Azure	, P Search resources, services, and docs (G+/)		© ? ©	
Home > Resource groups > T	festGroup1			\$
Resource group				Ż
	« + Add ≡≡ Edit columns 📋 Delete resource group 🖒 Refresh	→ Move 🛓 Export to CSV 🖗 Ass	ign tags 📋 Delete 🞍 Export temp	olate 🛛 …
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	~
🖗 Tags	Name ↑↓	Type ↑↓	Location 1	
Events	AvailabilitySet-1	Availability set	Japan East	
ettings	AvailabilitySet1	Availability set	Japan East	
Quickstart	ipconfig1	Public IP address	Japan East	
Deployments	ipconfig2	Public IP address	Japan East	
Policies	Den node-1	Virtual machine	Japan East	
Properties	🗌 💎 node-1-nsg	Network security group	Japan East	
Locks	🗌 🐻 node-1284	Network interface	Japan East	
Export template	Solution and Solut	Disk	Japan East	
ost Management	node-1_OsDisk_1_dfa99e02b54a4452ac9964de51616aa3	Disk	Japan East	
b. Cost analysis	node-2	Virtual machine	Japan East	
Cost alerts	rode-2-nsg	Network security group	Japan East	
Budgets	🗌 🐻 node-2419	Network interface	Japan East	
Advisor recommendations	second contraction of the second contra	Disk	Japan East	
Monitoring	node-2_OsDisk_1_5bdf3b9c14a6472888aa54dc732cd720	Disk	Japan East	
Insights (preview)	<pre>< Previous Page 1 v of 1 Next ></pre>			
Alarte	·			

4. Select Networking.

ome > Resource groups > TestGro	up1 > node-1 - Ne	tworking						
onde-1 - Networking								
© Search (Ctrl+/)	« 🖉 Attach r	network interface ್ರ ^ರ Detach network inter	face					
Overview Activity log Access control (IAM)	Virtual netw	k Interface: node-1284 Effective sect ork/subnet: Vnet1/Vnet1-1 NIC Public IF	R - NIC Priv		elerated networking: Disa cing	bled		
 Tags Diagnose and solve problems 	Network	c security group node-1-nsg (attached to 0 subnets, 1 network interfaces				I	Add inbound p	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	🕴 Deny	
Extensions								
Continuous delivery (Preview)								
Availability + scaling								
Configuration								
Identity								
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 2 Search	resources, services,	and docs (G+/)			D 🖓	₽ © ?	•	and strength	
Home > Resource groups > TestGroup1	> node-1 - Networ	king > node-1284	1 - IP configuratio	ns					
node-1284 - IP configurat	tions								×
	🕂 Add 🗒 S	ave 🗙 Discard							
Overview	IP forwarding s	ettings							
Activity log	IP forwarding			Disabled Enabled					
Access control (IAM)	Virtual network			Vnet1					
Tags	IP configuration								
Settings	Subnet *	15		Vnet1-1 (10.5.0.0/24)				~	7
IP configurations									_
DNS servers									
Network security group	Name	IP Version	Туре	Private IP address		Public I	P 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			۶.	Ŗ	P	٢	?	٢	-	
Home > Resource groups > TestGroup1 > node-1 - Networking > node-1284 - IP	configurat	ions > ipconfig1								
ipconfig1 node-1284	$\Box \times$									
🔚 Save 🗙 Discard										
The virtual machine associated with this network interface will be restarted to utilize th new private IP address. The network interface will be resprovisioned and network configuration settings, including accondary IP addresses, submet 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) 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.

Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent res		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,							
	NAME			TYPE				LAST VIEWED	
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9								29 min ago	
•								30 min ago	
8								32 min ago	
Navigate									
				All r	esources	Dasht			

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

teme > New New D MS cone private DNS zone Private DNS zone Get started Are started Recently conside Are started Are started Are started Are started Discome Biodichain Constainers Developer Tools Developer Tools <	Microsoft Azure		>_ 17; ♀ 戀 ? ☺	a second second
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DNS zone Private DNS zone Get started Image: Conditional data futurial	New			
DNS one Private DNS zone Get started Get started Guidkaft tutorial Recently created A1 + Machine Learning Aistine Learning Guidkaft tutorial Rocently created Blockchain Got data Balancer Learn more Blockchain Containers Databases Got data more Databases Developer Tools Integration Front Door Learn more Integration Integration Integration If & Management Tools Networking Software as a Service (SaaS) Security Storage	DNS zonel	×		
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A + Machine Learning	Recently created	Quickstart tutorial		
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Compute Icod Balancer Compute Icod Balancer Compute Icod Balancer Containers Icod Balancer Datbases Icod Balancer Developer Tools Icod Balancer Devolper Tools Icod Balancer Identity Icod Balancer Integration Icod B	-	Learn nore		
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Identity Integration Image: Firewall Integration Image: Firewall Internet of Things Image: Firewall Media Image: Firewall Mixed Reality Image: Firewall If & Management Tools Image: Firewall Networking Image: Firewall Software as a Service (Saas) Image: Firewall Security Image: Firewall Software as a Service (Saas) Image: Firewall				
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Security ExpressRoute Learn more Storage		Quickstart tutorial		
Security Learn more Storage With the security Connection	Software as a Service (SaaS)			
Connection	Security			
	Storage	Connection		
	Web			

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

\equiv Microsoft Azure		\wp Search resources, services, and do	rs (G+/)) >_ ∶	Ę Ω		
Home > New > DNS zone >	Create DNS zone						
Create DNS zone							×
Basics Tags Review +							
number of DNS records such as allows you to host your DNS zo	s 'mail.contoso.com' (for a mail serve	. For example, the domain 'contoso.cor r) and 'www.contoso.com' (for a web sit nd provides name servers that will resp	e). Azure DNS				
Project details							
Subscription *			\sim				
Resource group *	TestGroup1		\sim				
	Create new						
Instance details							
Name *	cluster1.zone		~				
Resource group location ①	(Asia Pacific) Japan East		\sim				
Review + create	< Previous Next : Tags > C	ownload a template for automation					
<							>

6) Configuring virtual machines

Log in to the created node-1 and node-2 and specify the settings following the procedure below.

Set a partition for the mirror disk resource. Create a file system in the added disk. For details about the partition for the mirror disk resource, see "Partition settings for mirror disk resource (when using Replicator)" in "Settings after configuring hardware" in "Determining a system configuration" in the Installation and Configuration Guide.

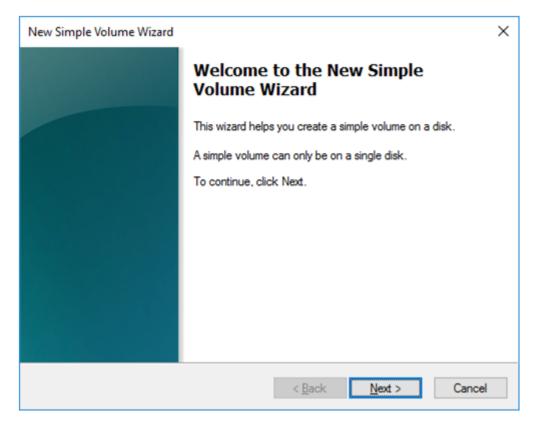
1. Open the **Disk Management** window. The **Initialize Disk** dialog box is displayed.

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

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

📅 Disk Manage	ement						_		×
<u>F</u> ile <u>A</u> ction	<u>V</u> iew <u>H</u> elp								
🗢 🄿 📰	🛛 🖬 🖛 🗙 🗹	🔒 🔎 🛙	8						
Volume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free		
(C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	113.12 GB	89 %		
- Temporary St	orag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %		
- Disk 0									
Basic	(C:)	///////	///////////////////////////////////////	///////////////////////////////////////	///////////////////////////////////////	///////////////////////////////////////	///////	77777	/////
127.00 GB Online	127.00 GB NTFS	//////	///////////////////////////////////////	///////////////////////////////////////					
Onine	Healthy (System,	BOOT, ACTIV	e, Crash Dump, P	rimary Partition					
- Disk 1									
Basic 70.00 GB	Temporary Stor	ige (D:)							
Online	70.00 GB NTFS Healthy (Page Fil	e, Primary P	artition)						
		· · · ·							
- Disk 2									
Basic									
20.00 GB Online	20.00 GB								
Unline	Unallocated								
Unallocated	Primary partition								

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



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

New Simple Volume Wizard	×
Specify Volume Size Choose a volume size that is between the	ne maximum and minimum sizes.
Maximum disk space in MB:	20477
Minimum disk space in MB:	8
<u>S</u> imple volume size in MB:	1024
	< <u>B</u> ack <u>N</u> ext > Cancel

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

New Simple Volume Wizard	×
Assign Drive Letter or Path For easier access, you can assign a drive letter or drive path to your partition.	
Assign the following drive letter: Mount in the following empty NTFS folder: Browse Do not assign a drive letter or drive path	
< <u>B</u> ack <u>N</u> ext > Canc	el

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

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

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

New Simple Volume Wizard	\times
Assign Drive Letter or Path For easier access, you can assign a drive letter or drive path to your partition.	
 ● Assign the following drive letter: ○ Mount in the following empty NTFS folder: ○ Mount in the following empty NTFS folder: ○ Do not assign a drive letter or drive path 	
< <u>B</u> ack <u>N</u> ext > Cancel	

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

New Simple Volume Wizard		×					
Format Partition To store data on this partition, you must format it first.							
Choose whether you want to format t	his volume, and if so, what settings you want to use.						
O Do not format this volume							
Format this volume with the following the second	lowing settings:						
<u>F</u> ile system:	NTFS ~						
Allocation unit size:	Default ~						
Volume label:	New Volume						
Perform a quick format							
Enable file and folder co	mpression						
	< <u>B</u> ack <u>N</u> ext > Cancel						

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

New Simple Volume Wizard		×
	Completing the New Simple Volume Wizard	
	You have successfully completed the New Simple Volume Wizard. You selected the following settings: Volume type: Simple Volume Disk selected: Disk 2 Volume size: 19453 MB Drive letter or path: G: File system: NTFS Allocation unit size: Default Volume label: New Volume Outick format: Yes To close this wizard, click Finish.	
	< <u>B</u> ack Finish Cancel	

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

📅 Disk Managemer	nt						_	\times
<u>File Action View</u>	v <u>H</u> elp							
Þ 🔿 📰 <table-cell></table-cell>	T 🗩 🗙 [2 🔒 🛃	2					
/olume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free	
(C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	111.94 GB	88 %	
= (F:)	Simple	Basic	RAW	Healthy (P	1.00 GB	1.00 GB	100 %	
New Volume (G:)	Simple	Basic	NTFS	Healthy (P	19.00 GB	18.94 GB	100 %	
Temporary Storag	Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %	
	(C:)							
127.00 GB Online	127.00 GB NTFS		re, Crash Dump,	Primary Partition				
127.00 GB Online Disk 1 Basic 70.00 GB	127.00 GB NTFS	n, Boot, Activ rage (D:)		Primary Partition	<u> </u>			
127.00 GB Online Disk 1 Basic 70.00 GB	127.00 GB NTFS Healthy (System Temporary Sto 70.00 GB NTFS	n, Boot, Activ rage (D:)		Primary Partition				
127.00 GB Online Disk 1 Basic 70.00 GB Online Disk 2 Basic 20.00 GB	127.00 GB NTFS Healthy (System Temporary Sto 70.00 GB NTFS	rage (D:) ile, Primary F	Partition)	Primary Partition ew Volume (G:) 0.00 GB NTFS ealthy (Primary P				

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

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

8) Installing the Azure CLI

Install the Azure CLI.

The procedure to install the Azure CLI from the installer is described. For details about this procedure and other procedures, see the following website:

Install the Azure CLI:

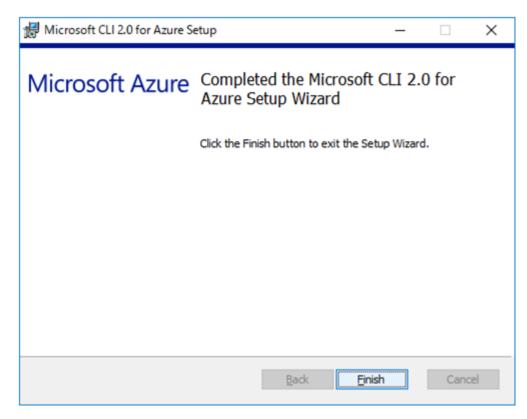
https://docs.microsoft.com/en-us/cli/azure/install-azure-cli?view=azure-cli-latest

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

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

🖟 Microsoft CLI 2.0 for Azure S	etup	-		\times			
Please read the Microsoft CLI 2.0 for Azure License Agreement							
	MICROSOFT SOFTWARE LICENSE TERMS						
	Microsoft CLI 2.0 for Azure						
	These license terms are an age Microsoft Corporation (or base live, one of its affiliates) and yo the software named above. The apply to any Microsoft services the software, except to the ext different terms.	d on wh ou. They he terms or upda	ere you apply to also ites for				
	TE YOU COMPLY WITH THESE	LICENS	۶F	~			
☑ I accept the terms in the License Agreement							
Print	<u>B</u> ack <u>I</u> nstal		Cance	el			

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



9) Creating a service principal

Create a service principal using the Azure CLI.

A script for Azure DNS performs login to Microsoft Azure and DNS zone registration and monitoring. When logging in to Microsoft Azure, Azure login with a service principal is used. Please note that certificates have an expiration date. For more details, see the --years option of az ad sp create-for-rbac.

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

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

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

Create an Azure service principal with Azure CLI: https://docs.microsoft.com/en-us/cli/azure/create-an-azure-service-principal-azure-cli?view= azure-cli-latest

1. Log in with an organizational account.

az login -u <account-name> -p <password>

2. Create and register a service principal. Write down the displayed name and tenant because they need to be entered for configuring Azure DNS resource by Cluster WebUI. In the following example, a service principal is created in C:\Users\testlogin\examplecert.pem.

3. Log out.

az logout --u <account-name>

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

The following is displayed upon successful sign-in.

```
{
   "cloudName": "AzureCloud",
   "id": "xxxxxxx-xxxx-xxxx-xxxxx-xxxxxxx,
   "isDefault": true,
   "name": "xxxxxxxxx,
   "state": "Enabled",
   "tenantId": "xxxxxxx-xxxx-xxxx-xxxx-xxxxxxxx,
   "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>			🖋 Cor	ifig mode 🗸	Ł ()	ß	₽ i	? 🗉
Cluster generation wizard	port Get the Configuration File	Apply the Configuration File	Update Server Data	¢ Check the Config				

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

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

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

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

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

4. The Interconnect window is displayed.

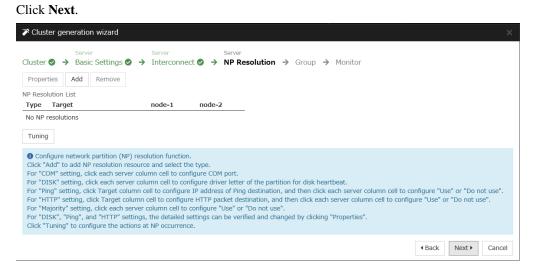
Specify the IP addresses (IP address of each instance) to be used for interconnect. In addition, select mdc1 for **MDC** as a communication path of a mirror disk resource to be created later. Click **Next**.

Cluster generation wizard				>
Server Cluster Server Cluster Add Remove Interconnect List	Server • Interconne	Server → NP Resolution → G	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 c For "Kernel mode" setting, more than For "Kernel mode" setting, click each se For "Witness HB" setting, click each se Click " \uparrow " or " \downarrow " to configure the prior For "Mirror Communication Only" settii	ettings, configur ommunication. zero routes are r erver column cel rver column cell ity to preferentia ng, click on the c	e the route which is used for hear necessary to be configured. Config II and set an IP address. to set "Use" or "Do not use", and II/y use the LAN only for the comr III for each server column and se	tbeat. For "Mirror Communic puring more than one routes i then click "Properties" to set nunication among the cluster t an IP address.	ation Only" setting, configure the route is recommended. t detailed settings.
				Back Next Cancel

5. The NP Resolution window is displayed.

Note that NP resolution is not configured on this window. The equivalent feature is achieved by adding the IP monitor resource, custom monitor resource, and multi target monitor resource. Configure NP resolution in "3) Adding a monitor resource"

You need to examine the NP resolution destination and method depending on the location of clients accessing a cluster system and the condition for connecting to an on-premise environment (for example, using a dedicated line). There is no NP resolution destination nor method to recommend. Additionally, you can use network partition resolution resources for NP resolution.



2) Adding a group resource

• Defining a group

Create a failover group.

1. The Group List window s displayed.

Click Add.

Cluster generation wizard			×
Cluster 🗞 🔸 Basic Settings 🛇	Server Server → Interconnect ♥ → NP Resolution ♥	→ Group → Monitor	
Properties Add Remove			Group Resource
Group List			
Name		Туре	
No groups			
Configure failover group to be a ur Click "Add" to add a group. Click "Properties" to configure the pro Click "Group Resource" to add resource	perties of the selected group.		
			Back Next Cancel

2. The Group Definition window is displayed.

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

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

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

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

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

- 3. The **Dependency** window is displayed. Click **Next** without specifying anything.
- 4. The **Recovery Operation** window is displayed. Click **Next**.
- The Details window is displayed.
 Select a server name in the Name column of Servers that can run the group and click Add.

Resource Definition of Group failover1		md 🗙
Info \bigcirc \rightarrow Dependency \bigcirc \rightarrow Recovery Operation \oslash	→ Details	
Mirror Disk No.*	1 ¥	
Data Partition Drive Letter*		
Cluster Partition Drive Letter*		
Cluster Partition Offset Index*	0 🗸	
Mirror Disk Connect	Select	
Servers that can run the group		
Name Data Partition Cluster Partition		Name
	← 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 "6)**Configuring virtual machines**", and click **OK**.

Connect				
ata Partit	ion			
Volume	Disk No.	Partition No.	Size	GUID
	0	1	500MB	
D:¥	1	1	10238MB	
F:¥	2	1	1024MB	
C:¥	0	2	129546MB	
G:¥	2	2	19453MB	
luster Par Volume	tition Disk No.	Partition No.	Size	GUID
	0	1	500MB	and "without states states as an a concentration
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	
	Back Finish Cancel

• Azure DNS resource

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

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

- 1. Click Add on the Group Resource List page.
- 2. The **Resource Definition of Group | failover1** window is displayed. Select the group resource type (Azure DNS resource) from the **Type** box and enter the group name (azuredns1) in the **Name** box. Click **Next**.

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

- 3. The **Dependency** window is displayed. Click **Next** without specifying anything.
- 4. The Recovery Operation window is displayed. Click Next.
- 5. Enter the values for each of the following: Record Set Name, Zone Name, IP Address, Resource Group Name, User URI, Tenant ID, File Path of Service Principal, Azure CLI File Path. When using the IP address of each server, enter the IP address in the tab for each server. When setting up the servers separately, enter any IP address of the servers in the Common tab and then make settings for other servers. For User URI and Tenant ID, specify respectively the name and tenant you wrote down in "9)Creating a service principal".

Resource Definition of Group failove	er1		azuredns 🗙
Info ⊘ → Dependency ⊘ → Rec	covery Operation 📀 🔶 Deta	ails	
Common node-1 node-2			
Record Set Name*	test-record1		
Zone Name*	cluster1.zone		
IP Address*	10.5.0.120		
TTL*	3600	sec	
Resource Group Name*	TestGroup1		
Account			
User URI*	http://azure-test		
Tenant ID*	XXXXXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX-XXXX		
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			
		A 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) → Mor	itor(special) 🔶 Recovery Action	
Туре*	Custom monitor	
Name*	genw1	
Comment		
Get Licence Info		
Select the type of monitor resource an	nd enter its name.	
		Gancel And And And And And And And And And

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

Confirm that Monitor Timing is Always and click Next.

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

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

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

```
< EXPRESSCLUSTER_installation_path>\binclpazure_port_checker -h_

management.core.windows.net -p 443

EXIT %ERRORLEVEL%
```

Select Synchronous for Monitor Type. Click Next.

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

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

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

Monitor Resource Definition		genw 🗙	
Info 🛛 → Monitor(common) 🛇 →	Monitor(special) 🤣 🔿 Recovery Action		
Recovery Action	Execute only the final action		
Recovery Target *	LocalServer	Browse	
Recovery Script Execution Count	0 time		
Execute Script before Reactivation			
Maximum Reactivation Count	0 time		
Execute Script before Failover			
Execute migration before Failover			
Failover Target Server	Stable server		
	O Maximum priority server		
Maximum Failover Count	0 time		
Execute Script before Final Action			
Final Action	No operation		
		Script Settings	
		Back Finish Cancel	

- 6. Click **Finish** to finish setting.
- IP monitor resource

Creates an IP monitor resource to monitor communication between clusters that are configured with virtual machines, and also to monitor whether communication with an internal network is health. For details about the IP monitor resource, see "Understanding IP monitor resources" in the Reference Guide.

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

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

3. The Monitor (common) window is displayed.

Confirm that Monitor Timing is Always.

Monitor Resource Definition		ipw 🗙
Info 📀 🔶 Monitor(common) 🌛 Monitor(special)	→ Recovery	Action
Interval*	60	sec
Timeout*	60	sec
Do Not Retry at Timeout Occurrence		
Do Not Execute Recovery Action at Timeout Occurrence		
Retry Count*	1	time
Wait Time to Start Monitoring*	0	sec
Monitor Timing		
Always Alw		
○ Active		
Target Resource		Browse
Choose servers that execute monitoring	Server	
		 ✓ Back Next ► Cancel

Select one available server for Choose servers that execute monitoring.

Click **OK** and click **Next**.

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

4. The **Monitor** (special) window is displayed.

Monitor Resource Definition			ipw 🗙
Info 🔮 → Monitor(common) 🔮 →	Monitor(special) → Re	covery Action	
Edit Add Remove			
IP Address List			
IP Address			
No Ip Address			
ping Timeout*	5000	msec	
		 ■ Bac 	k Next 🕨 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 Definition			ipw 🗙
Info 🛛 🔶 Monitor(common) 🖉	→ Monitor(special) → Re	covery Action	
Edit Add Remove			
IP Address List			
IP Address			
10.5.0.121			
ping Timeout*	5000	msec	
			Back Next Cancel

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

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

Monitor Resource Definition		ipw 🗙
Info 🛛 → Monitor(common) 🖉 →	Monitor(special) 🛇 🔶 Recovery Actio	n
Recovery Action	Execute only the final action	~
Recovery Target *	LocalServer	Browse
Recovery Script Execution Count	0 time	
Execute Script before Reactivation Maximum Reactivation Count	0 time	
Execute Script before Failover Execute migration before Failover		
Failover Target Server	 Stable server Maximum priority server 	
Maximum Failover Count	0 time	
Execute Script before Final Action Final Action	□ No operation	
		Script Settings
		Back Finish Cancel

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

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

10. The Monitor (special) window is displayed.

On the **Common** tab, select **Add** of **IP Address** and set an IP address of a server other than the server selected in step 9. Click **Next**.

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

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

- 12. Click Finish to finish setting.
- Multi target monitor resource

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

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

For details about the multi target monitor resource, see "Understanding multi target monitor resources" in the Reference Guide.

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

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

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

5. The Recovery Action window is displayed.

Specify **Execute only the final action** for **Recovery Action**, **LocalServer** for **Recovery Target**, and **Stop the cluster service and shutdown OS** for **Final action**.

EXPRESSCLUSTER X 5.0 HA Cluster Configuration Guide for Microsoft Azure (Windows), Release 3

Info 🛇 🔶 Monitor(common) 🛇	→ Monitor(special) 📀 → Rec	overy Action	
Recovery Action	Execute only the final action		~
Recovery Target *	LocalServer	Browse	
Recovery Script Execution Count	0 time		
Execute Script before Reactivation			
Maximum Reactivation Count	0 time		
Execute Script before Failover			
Execute migration before Failover			
Failover Target Server	Stable server		
	O Maximum priority server		
Maximum Failover Count	0 time		
Execute Script before Final Action			
Final Action	Stop the cluster service and shu	utdown OS 🗸	
			Script Settings
		I Back Fin	ish Cancel

6. Click Finish to finish setting.

4) Setting the cluster properties

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

• Cluster properties

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

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

Cluster Name	Cluster1		
Comment			
Language	English 🗸		
		OK Cancel Apply	

- 2. Select the **Timeout** tab. For **Timeout** of **Heartbeat**, specify a value calculated by "A+B+C" as described below.
 - A: **Interval** of the monitor resource being monitored by the multi target monitor resource for NP resolution x (**Retry Count**+1)

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

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

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

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

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

5.1 Creation example

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

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

Setting item	Setting value
Resource group setting	
Resource group	TestGroup1
Region	(Asia Pacific) Japan East
Virtual network setting	
Name	Vnet1
Address space	10.5.0.0/24
Subnet Name	Vnet1-1
Subnet Address range	10.5.0.0/24
Resource group	TestGroup1
Location	(Asia Pacific) Japan East
Load balancer setting	
Name	TestLoadBalancer
Туре	Public
Public IP address name	TestLoadBalancerPublicIP
Public IP address: Assignment	Static
Resource group	TestGroup1
Region	(Asia Pacific) Japan East
Backend pool: Name	TestBackendPool
Associated to	Availability set
Target virtual machine	
	node-1
	node-2
	Continued on poyt page

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

Continued on next page

Setting item	Setting value
Network IP configuration	
	10.5.0.120
	10.5.0.121
Health probe: Name	TestHealthProbe
Health probe: Port	26001
Load balancing rule: Name	TestLoadBalancingRule
Load balancing rule: Port	80 (Port number offering the operation)
Load balancing rule: Backend port	8080 (Port number offering the operation)
Inbound security rule setting	
Name	TestHTTP
Protocol	ТСР
Destination Port range	8080 (Port number offering the operation)

Table 5.1 – continued from previous page

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

Setting item	Setting value						
	node-1	node-2					
Virtual machine setting							
– Disk type	Standard HDD						
– User name	testlogin	testlogin					
– Password	PassWord_123						
- Resource group	TestGroup1						
– Region	(Asia Pacific) Japan East						
Network security group setti	ng						
– Name	node-1-nsg	node-2-nsg					
Availability set setting							
– Name	AvailabilitySet-1						
- Update domains	5						
– Fault domains	2						
Diagnostics storage account	setting						
– 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		I					
– Name	node-1_DataDisk_0	node-2_DataDisk_0					
– Source type	None (empty disk)	1					
– Account type	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.

+	()	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 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	
5								28 min ago	
<u></u>								28 min ago	
Q								29 min ago	
Q								30 min ago	
8								32 min ago	
Navigate	criptions	(i) Resource	e groups	All r	esources	🗔 Dashi	poard		

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

Microsoft Azure	rces, services, and docs (G+/)	≻_ਯੋ, ಧ @ ? ☺	
Home > Resource groups			
Resource groups			Ŕ
+ Add ≡≡ Edit columns 🕐 Refresh 🞍 Export to CSV 🔗 Assign tags	♡ Feedback		
Subscription == all (Location == all () (***	Add filter		
nowing 1 to 30 of 30 records.		No grouping	\sim
Name \uparrow_{\downarrow}	Subscription \uparrow_{\downarrow}	Location \uparrow_{\downarrow}	
		Japan East	
		Southeast Asia	
		West US	
		South Central US	
		South Central US	
		Japan West	
		East Asia	
		South Central US	
		South Central US	
		North Europe	
		South Central US	
		South Central US	
		Central US	
		Japan East	
		West India	
		Japan East	
		Japan East	
		Japan East	

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

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Home > Resource groups >	Create a resource group						
Create a resource gro	up						:
Basics Tags Review +	create						
resources for the solution, or o	that holds related resources for an A mly those resources that you want to groups based on what makes the m	manage as a group. You decide	how you want to				
Project details							
Subscription *			\sim				
Resource group *	TestGroup1		~				
Resource details Region *①							
Region **()	(Asia Pacific) Japan East		\checkmark				
Review + create <	Previous Next : Tags >						
<)

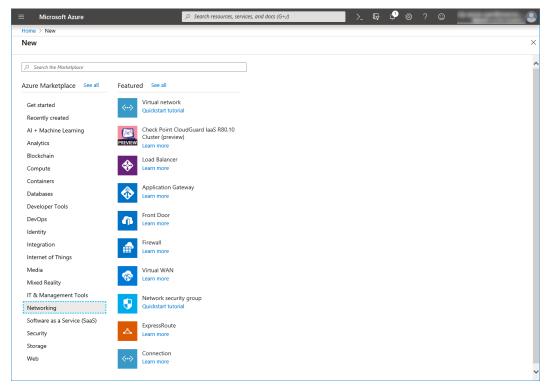
2. Creating a virtual network

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

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

+	[[]		.	+		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent reso	urces								
	NAME			TYPE				LAST VIEWED	
\leftrightarrow								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
								27 min ago	
								28 min ago	
5								28 min ago	
<u>688</u>								28 min ago	
.								29 min ago	
9								30 min ago	
8								32 min ago	
Navigate									
<u> </u>	riptions	Resource		All r	esources	Dashi			

2. Select Networking and then Virtual network.



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

Microsoft Azure
Iome > New > Create virtual network
Create virtual network \square $ imes$
Name *
Vnet1 ✓
Address space *
10.5.0.0/24
10.5.0.0 - 10.5.0.255 (256 addresses)
Add an IPv6 address space ①
ubscription *
~
Resource group *
TestGroup1 V
Treate new
ocation *
(Asia Pacific) Japan East 🗸 🗸
ubnet
Name * Vnet1-1
Address range *0
10.5.0.0 - 10.5.0.255 (256 addresses)
DoS protection O Basic Standard
Disabled Enabled
irewall ①
Disabled Enabled
Create Automation options

3. Creating a virtual machine

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

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

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

+	()		.	+		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent rese	ources								
	NAME			TYPE				LAST VIEWED	
~~>								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
•••								28 min ago	
5								28 min ago	
000								28 min ago	
•								29 min ago	
•								30 min ago	
8								32 min ago	
Navigate	scriptions	() Resource	e groups	ı ILA	esources	Dashi	board		

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

\equiv Microsoft Azure		>_ 5	L ² ©	? 😊	1000	
Home > New						
New						×
						^
Azure Marketplace See all Fea	tured See all					
Get started Recently created	Virtual machine Learn more					
Al + Machine Learning Analytics	SQL Server 2017 Enterprise Windows Server 2016 Learn more					
Blockchain Compute	Reserved VM Instances Quickstart tutorial					
Containers Databases	Kubernetes Service Quickstart tutorial					
Developer Tools DevOps Identity	Service Fabric Cluster Quickstart tutorial					
Integration	Web App for Containers Quickstart tutorial					
Media Mixed Reality	Function App Quickstart tutorial					
IT & Management Tools	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					~

- 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 ma	chine					
Create a virtual machine						×
Basics Disks Networking	Management Advanced Tags Review + create					í
image.	ux or Windows. Select an image from Azure marketplace or u + create to provision a virtual machine with default parametr from Azure Marketplace					
Project details						
	ployed resources and costs. Use resource groups like folders	to organize and manage all				
Subscription *	1	\sim				
Resource group * ①	TestGroup1	\sim				
	Create new					
Instance details						
Virtual machine name *	node-1	\checkmark				
Region *	(Asia Pacific) Japan East	\checkmark				
Availability options	Availability set	\checkmark				
Availability set 🗡 🕕		\sim				
	Create new					
Image 🕇 🕕	Windows Server 2016 Datacenter	\sim				
	Browse all public and private images					~
Review + create	< Previous Next : Disks >					
<						>

≡ Microsoft Azure 🔎 Search	n resources, services, and docs (G+/)]	φ ρ ⊗ ? ©
Home > New > Create a virtual machine			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
Create a virtual machine that runs Linux or image.	agement Advanced Tags Review + create Windows. Select an image from Azure marketplace or use your own customized		Name * AvailabilitySet-1
Complete the Basics tab then Review + cre customization. Looking for classic VMs? Create VM from	ate to provision a virtual machine with default parameters or review each tab for full Azure Marketplace		Fault domains ① 2
Project details			Update domains ①
Select the subscription to manage deploye your resources.	d resources and costs. Use resource groups like folders to organize and manage all		Use managed disks ①
Subscription *	V		No (Classic) Yes (Aligned)
Resource group *	TestGroup1		
Instance details			
Virtual machine name 🗡 🛈	node-1 🗸		
Region * ①	(Asia Pacific) Japan East		
Availability options ①	Availability set		
Availability set *	✓		
	Create new The value must not be empty.		
Image 🗙 🛈	Windows Server 2016 Datacenter		
Review + create < Pro	Rowse all public and private images evious Next : Disks >	-	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$ Search resources, services, and docs (G+		Þ.	Ģ	Q		\odot	-	
Home > New > Create a virtual machine								
Create a virtual machine								×
Basics Disks Networking Management Advanced Tags	eview + create							
Azure VMs have one operating system disk and a temporary disk for short-to The size of the VM determines the type of storage you can use and the num								
Disk options								
OS disk type * ① Standard HDD	\checkmark							
Enable Ultra Disk compatibility ① Ves No								
	ble for this VM size and location.							
Data disks								
You can add and configure additional data disks for your virtual machine or temporary disk.	ch existing disks. This VM also comes with a							
LUN Name Size (GiB) Disk type	Host caching							
Create and attach a new disk Attach an existing disk								
✓ Advanced								
Review + create < Previous Next : Networking]							
								>

6. The Create a new disk blade appears.

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

≡ Microsoft Azure	${\cal P}$ Search resources, services, and docs (G+/)	Ģ	Q		
Home > New > Create a vir	tual machine > Create a new disk				
Create a new disk					×
Create a new disk to store ap storage type, and number of	plications and data on your VM. Disk pricing varies based on factors including disk size, transactions. Learn more about Azure Managed Disks				
Name *	node-1_DataDisk_0				
Source type *	None (empty disk)				
Size * 🛈	20 GiB				
	Standard HDD Change size				
ок					
<					>

7. The **Networking** tab appears.

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

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

≡ Microsoft Azure 🔎 Sea	rch resources, services, and docs (G+/)	Þ.	Ģ	Ð		
Home > New > Create a virtual machi	ne					
Create a virtual machine						×
Basics Disks Networking Ma	anagement Advanced Tags Review + create					í
Define network connectivity for your viri ports, inbound and outbound connectiv Learn more	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					
	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 💿 Advanced					
Configure network security group 🗙	(new) node-1-nsg V					
	Create new					
Accelerated networking ①	On 💿 Off					
	The selected VM size does not support accelerated networking.					
Load balancing						
You can place this virtual machine in the	backend pool of an existing Azure load balancing solution. Learn more					
Review + create <	Previous Next : Management >					
<						>

8. The Management tab appears.

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

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

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

Configure monitoring and management opt	ity management and advanced threat protection across hybrid cloud workloads.			×
Basics Disks Networking Manag Configure monitoring and management opt Azure Security Center Azure Security Center provides unified secur	ity management and advanced threat protection across hybrid cloud workloads.			
Configure monitoring and management opt Azure Security Center Azure Security Center provides unified secur	ity management and advanced threat protection across hybrid cloud workloads.			
Configure monitoring and management opt Azure Security Center Azure Security Center provides unified secur	ity management and advanced threat protection across hybrid cloud workloads.			
Azure Security Center Azure Security Center provides unified secur	ity management and advanced threat protection across hybrid cloud workloads.			
Azure Security Center provides unified secur				
	Security Center basic plan.			
 Your subscription is protected by Azure 				
Monitoring				
Boot diagnostics ①	• On 🔿 Off			
OS guest diagnostics ①	○ on ④ off			
Diagnostics storage account * 🛈	testgroup1diag600 V			
	Create new			
Identity				
System assigned managed identity ①	On () Off			
Azure Active Directory				
Login with AAD credentials (Preview)	On () Off			
Review + create < Prev	ious Next : Advanced >			
Keview + cleate - < Prev	Index : Auvanced >			
<				

9. Click Next: Tags >.

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Home > New > Create a v	irtual machine								
Create a virtual mac	hine								×
									~
Basics Disks Netwo	rking Management Advanced Tags Review + create								_
Add additional configuration	n, agents, scripts or applications via virtual machine extensions or cloud-init.								
Extensions									
Extensions provide post-dep	loyment configuration and automation.								
Extensions ①	Select an extension to install								
Cloud init									
	pproach to customize a Linux VM as it boots for the first time. You can use cloud-init to install o configure users and security. Learn more								
1 The selected image do	es not support cloud init.								
Host									
Azure subscription. A dedica	you to provision and manage a physical server within our data centers that are dedicated to your ted host gives you assurance that only VMs from your subscription are on the host, flexibility to cription that 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 canno	t be used with availability sets.								
									~
Review + create	< Previous Next : Tags >								
<									>

10. Click Next: Review + create >.

\equiv Microsoft Azure \checkmark	Search resources, services, and docs (G+/)		© ب	? 🙂	9
Home > New > Create a virtual n	nachine				
Create a virtual machine					×
Basics Disks Networking	Management Advanced Tags Re-	view + create			
Tags are name/value pairs that ena multiple resources and resource gr	ble you to categorize resources and view consources and view consources. Learn more about tags 🗟	olidated billing by applying the same tag to			
Note that if you create tags and the	en change resource settings on other tabs, you	r tags will be automatically updated.			
Name 🕕	Value 🕕	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.

≡ Microsoft Azure 🔎 Searc	h resources, services, and docs (G+/)	2	₽	¢	٢	?	٢	
Home > New > Create a virtual machine	2							
Create a virtual machine								>
✓ Validation passed								
Basics Disks Networking Mar	nagement Advanced Tags Review + create							
PRODUCT DETAILS								
Standard A1 v2	Subscription credits apply ①							
by Microsoft	9.0700 JPY/hr							
Terms of use Privacy policy	Pricing for other VM sizes							
TERMS								
billing frequency as my Azure subscription information with the provider(s) of the off	urrent payment method for the fees associated with the offering(s), with the same v and (c) agree that Microsoft may share my contact usage and transactional ering(s) for support, billing and other transactional activities. Microsoft does not e the Azure Marketplace Terms for additional details.							
Basics								
Subscription								
Resource group	TestGroup1							
Virtual machine name	node-1							
Region	(Asia Pacific) Japan East							
Availability options	Availability set							
Availability set	(new) AvailabilitySet-1							
Username	testlogin							
Already have a Windows Server license?	No							
Create < Pi	evious Next > Download a template for automation							
<								>

4. Setting a private IP address

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

1. Select **Resource groups** on the upper part of the window.

	4.5	~	_	•		•		_	
+	()	-		†		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			ТҮРЕ				LAST VIEWED	
~ >								22 min ago	
ę								24 min ago	
()								24 min ago	
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								26 min ago	
•••								27 min ago	
•••								28 min ago	
1								28 min ago	
								28 min ago	
•								29 min ago	
•								30 min ago	
8								32 min ago	
Navigate	criptions	() Resourc	e groups	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.

Microsoft Azure	Search resources, services, and docs (G+/)	🛛 🕼 🗳 🍪 ?	•	
Home > Resource groups > 1	estGroup1			
Resource group				Ś
	≪ + Add ≡≡ Edit columns i Delete resource group \bigcirc Refresh → Move \downarrow	Export to CSV 🖉 Assign tags 🧵	🗓 Delete 🕁 Export template	
😥 Overview	Essentials ×			
Activity log	Filter by name Type == all ♥ Location == all ♥ ⁺ Y Add	filter		
Access control (IAM)	Showing 1 to 28 of 28 records. Show hidden types ①		No grouping	\sim
Tags	□ Name ↑↓ Type	e ↑↓ Loc	ation ↑↓	
Events	AvailabilitySet-1 Avai	ilability set Jap	an East	
ettings	AvailabilitySet1 Avai	ilability set Jap	an East	
Quickstart	Disconfig1 Public	lic IP address Jap	an East	••
Deployments	Disconfig2 Publ	lic IP address Jap	an East	••
Policies	virtu	ual machine Jap	an East	
Properties	Netv	work security group Jap	an East	••
Locks		work interface Jap	an East	•
Export template	Disk		an East	••
ost Management	Disk S node-1_OsDisk_1_dfa99e02b54a4452ac9964de51616aa3 Disk		an East	••
b. Cost analysis			an East	••
Cost alerts			an East	
Budgets			an East	••
Advisor recommendations	second state s		an East	
Aonitoring	Sector 2_0sDisk_1_5bdf3b9c14a6472888aa54dc732cd720	. Jap	an East	
Insights (preview)	Previous Page 1 v of 1 Next >			
1 Alarte				

4. Select Networking.

ome > Resource groups > TestGi	oup1 >	node-1 - Netwo	rking						
node-1 - Networking Virtual machine									
○ Search (Ctrl+/)		🖉 Attach netv	work interface $\mathcal{S}^{\mathcal{T}}$ Detach network inter	face					
Overview .	~	Network In	iterface: node-1284 Effective secu	urity rules T	opology				
Activity log		Virtual network	/subnet: Vnet1/Vnet1-1 NIC Public IP	- NIC Priva	te IP: 10.5.0.4 Acce	elerated networking: Disa	bled		
Access control (IAM)		Inbound port	t rules Outbound port rules Appli	cation security	groups Load baland	ting			
Tags			curity group node-1-nsg (attached to)						
Diagnose and solve problems			bnets, 1 network interfaces	network internat	e: node-1264)			Add inbound po	rt rule
ettings		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	8 Deny	•••
Extensions									
Continuous delivery (Preview)									
Availability + scaling									
Configuration									
Identity									
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 $ ho$ Search	resources, services, a	and docs (G+/)			D 🖓	P 😳		1000	
Home > Resource groups > TestGroup1	> node-1 - Network	ing > node-1284	- IP configuration	ns					
node-1284 - IP configurati	ions								×
. ○ Search (Ctrl+/) «	🕂 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	✓ Search IP con								
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.

\equiv Microsoft Azure				۶.	Ģ	Ļ	ŵ	?	٢	Laborar .	
Home > Resource groups >	TestGroup1 > node-1 - Networking > node-1284 - IP o	onfigurat	ions > ipconfig1								
ipconfig1 node-1284		$\Box \times$									
🔚 Save 🗙 Discard											
new private IP address. Th configuration settings, inc	iated with this network interface will be restarted to utilize the network interface will be reprovisioned and network fuding secondary 19 didresses, subtract masks, and default nanually 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	\times
You must initialize a disk before Logical Disk Manager can access it. <u>S</u> elect disks:	
Disk 2	
Use the following partition style for the selected disks:	
<u>MBR</u> (Master Boot Record)	
○ <u>G</u> PT (GUID Partition Table)	
Note: The GPT partition style is not recognized by all previous versions of Windows.	
OK Cancel	

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

	jement						_	×
	View Help							
•	🛛 🖬 🖛 🗙 🖳	2 🔒 🛃	8					
olume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free	
(C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	113.12 GB		
Temporary S	torag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %	
Disk 0								////
asic 27.00 GB	(C:) 127.00 GB NTFS							
Online	Healthy (System		e. Crash Dump.	Primary Partition				
Disk 1								1
- DISK 1								
Basic	Temporary Stor	rage (D:)						
Basic 70.00 GB	70.00 GB NTFS	-						
Basic		-	Partition)					
Basic 70.00 GB	70.00 GB NTFS	-	Partition)					
Basic 70.00 GB Online	70.00 GB NTFS	-	Partition)					
Basic 70.00 GB Donline Disk 2 Basic 20.00 GB	70.00 GB NTFS Healthy (Page Fi 20.00 GB	-	Partition)					
Basic 70.00 GB Online Disk 2	70.00 GB NTFS Healthy (Page Fi	-	Partition)					
Basic 70.00 GB Donline Disk 2 Basic 20.00 GB	70.00 GB NTFS Healthy (Page Fi 20.00 GB	-	Partition)					
Basic 70.00 GB Dnline Disk 2 Basic 20.00 GB	70.00 GB NTFS Healthy (Page Fi 20.00 GB	-	Partition)					
Basic 70.00 GB Dnline Disk 2 Basic 20.00 GB Dnline	70.00 GB NTFS Healthy (Page Fi 20.00 GB	-	Partition)					

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

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

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

New Simple Volume Wizard	×
Specify Volume Size Choose a volume size that is between the	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.

New Simple Volume Wizard	×
Assign Drive Letter or Path For easier access, you can assign a drive letter	or drive path to your partition.
 Assign the following drive letter: Mount in the following empty NTFS folder: Do not assign a drive letter or drive path 	F ✓ 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.

EXPRESSCLUSTER X 5.0 HA Cluster Configuration Guide for Microsoft Azure (Windows), Release 3

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

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

New Simple Volume Wizard	×
Assign Drive Letter or Path For easier access, you can assign a drive letter or drive path to your partition.	
 ● Assign the following drive letter: ○ Mount in the following empty NTFS folder: ○ Mount in the following empty of the second seco	
< <u>B</u> ack <u>N</u> ext >	Cancel

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

New Simple Volume Wizard									
Format Partition To store data on this partition, you must format it first.									
Choose whether you want to format the	his volume, and if so, what settings you want to use.								
O Do not format this volume									
Format this volume with the following the	owing settings:								
<u>F</u> ile system:	NTFS ~								
Allocation unit size:	Default ~								
Volume label: New Volume									
Perform a quick format									
Enable file and folder cor	Enable file and folder compression								
	< <u>B</u> ack <u>N</u> ext > Cancel								

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

New Simple Volume Wizard		×
	Completing the New Simple Volume Wizard	
	You have successfully completed the New Simple Volume Wizard. You selected the following settings: Volume type: Simple Volume Disk selected: Disk 2 Volume size: 19453 MB Drive letter or path: G: File system: NTFS Allocation unit size: Default Volume label: New Volume Outick format: Yes To close this wizard, click Finish.	
	< <u>B</u> ack Finish Cancel	

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

📅 Disk Manage	ement						_	×
<u>File</u> <u>A</u> ction	<u>V</u> iew <u>H</u> elp							
Þ 🔿 🖬	? 🖬 🗩 🗙 🖣	3 🔒 🛃	5 <u>2</u>					
/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 Ste	orag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %	
Basic	(C:)							
Basic 127.00 GB Online	127.00 GB NTFS		re, Crash Dump,	Primary Partition	\$			
127.00 GB	127.00 GB NTFS	, Boot, Activ		Primary Partition				
127.00 GB Online Disk 1 Basic 70.00 GB	127.00 GB NTFS Healthy (System) Temporary Stor 70.00 GB NTFS	, Boot, Activ		Primary Partition				
127.00 GB Online Disk 1 Basic 70.00 GB Online	127.00 GB NTFS Healthy (System) Temporary Stor 70.00 GB NTFS	, Boot, Activ rage (D:) Ile, Primary P	Partition)	Primary Partition Pew Volume (G:) 9.00 GB NTFS lealthy (Primary P				

6. Configuring a load balancer

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

For details, see the following websites:

Load Balancer:

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

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

+	[📦]		.	+		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	
~>								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	
Q								29 min ago	
Q								30 min ago	
8								32 min ago	
Navigate									
-									
📍 Subsc	riptions	Resource	e groups	All r	esources	🔚 Dashi	oard		

- 2. Select Networking and then Load Balancer.
- 3. The **Create load balancer** blade is displayed. Specify **Name**. Select **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 \mathbb{P}	> Search resources, services, and docs (G+/)	⊾	Ŗ			
Home > New > Create load bala	ancer					
Create load balancer						
Basics Tags Review + cre	ate					
balancers uses a hash-based distri destination port, protocol type) ha accessible via public IP addresses,	ad balancer that distributes incoming traffic among healthy virtual machine instances. Load bution algorithms by default, it uses a 5-tuple (source PP. destination IP, sht to map traffic to available servers. Load balancers can either be internet-tacing where it is or internal where it is only accessible from a virtual network. Azure load balancers also for (NAT) to route traffic between public and private IP addresses. Leam more.					
Project details						
Subscription *	1 V					
Resource group *	TestGroup1 V					
	Create new					
Instance details						
Name ★	TestLoadBalancer 🗸					
Region *	(Asia Pacific) Japan East					
Туре * 🕕	O Internal 💿 Public					
ѕки ★⊙	Basic Standard					
Public IP address						
Public IP address *	Create new Use existing					
Public IP address name *	TestLoadBalancerPublicIP ✓					
Public IP address SKU	Basic					
Assignment *	O Dynamic 💿 Static					
Review + create < P	revious Next : Tags > Download a template for automation					
<						>

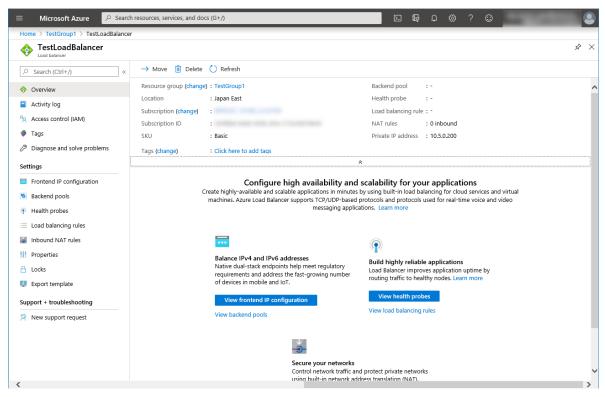
- 7. Configuring a load balancer (configuring a backend pool)
- 1. Associate a virtual machine registered to the availability set to the load balancer. After the load balancer has been deployed, select **Resource groups** on the upper part of the window.

+	[]		P	†				SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent resou	rces								
N	AME			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	
ONS								28 min ago	
•								29 min ago	
9								30 min ago	
8								32 min ago	
Navigate									
inanguto									
🔶 Subscrip	otions	Resource	e groups	All r	esources	🔚 Dashi	oard		

- 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	A Search resources, services, and docs (G+/)	
Home > TestGroup1		
(initial sector of the sector		\$
. > Search (Ctrl+/)	🔹 🕂 Add 📰 Edit columns 🗻 Delete resource group 💍 Refresh 🔿 Move 🛓 Export to CSV 🖗 Assign tags 🗊 Delete 🞍 Export template	e
(i) Overview	Essentials ×	
 Activity log 	Filter by name Type == all ♥ Location == all ♥ ⁺ ∀ Add filter	
Access control (IAM)	Showing 1 to 31 of 31 records. Show hidden types 🛈	\sim
Tags	$\begin{tabular}{ccc} $Name \uparrow_{\downarrow}$ & $Type \uparrow_{\downarrow}$ & $Location \uparrow_{\downarrow}$ \\ \end{tabular}$	
🗲 Events	AvailabilitySet-1 Availability set Japan East	
Settings	AvailabilitySet1 Availability Set Japan East	
Quickstart	Cluster1.zone DNS zone global	
Deployments	🗌 🖬 ipconfig1 Public IP address Japan East	
Policies	🗌 🖬 ipconfig11 Public IP address Japan East	
😂 Properties	Delic IP address Japan East	
🔒 Locks	🗌 🖬 ipconfig2 Public IP address Japan East	
Export template	🗌 📮 node-1 Virtual machine Japan East	
Cost Management	🗌 🌎 node-1-nsg Network security group Japan East	
🗞 Cost analysis	🗌 😨 node-1284 Network interface Japan East	
Cost alerts	Disk Japan East	
③ Budgets	Image: Source of the second	
Advisor recommendations	Virtual machine Japan East	
Monitoring	Network security group Japan East	
Insights (preview)	- Network interface Ianan East	
Alerts	<pre></pre>	

4. Select Backend pools.



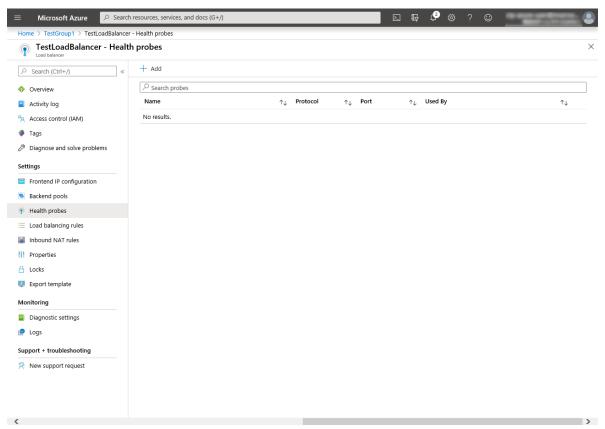
5. Click Add.

	n resources, services, and docs (G+/)		5 G Q	@?©	
Home > TestGroup1 > TestLoadBalance					
TestLoadBalancer - Back	end pools				×
	🕂 Add 💍 Refresh				
Overview	Virtual machine	Virtual machine status	Network interface	Private IP address	
Activity log	No results				
Access control (IAM)					
Tags					
Diagnose and solve problems					
Settings					
Frontend IP configuration					
Backend pools					
👔 Health probes					
😑 Load balancing rules					
Inbound NAT rules					
Properties					
🔒 Locks					
🖳 Export template					
Support + troubleshooting					
Rew support request					
V item subharriedness					
<					>

- 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+/)		9 G Q @	? ©	
Home > TestGroup1 > TestLoadBalancer	- Backend pools	Add backend p	loool		×
TestLoadBalancer - Backe	nd pools	i est.LoadBalancer			
Search (Ctrl+/) «	+ Add 💍 Refresh	Name * TestBackendPool			~
 Overview Activity log 	Virtual machine Virtual machi	Virtual network ① ne status Vnet1			
Access control (IAM)	No results	IP version	$\overline{)}$		
 Tags Diagnose and solve problems 		Associated to ①			~
Settings					
Frontend IP configuration		Virtual machines			
Sackend pools				as Load Balancer. Only IP con	
Health probes			(Standard) as the Load to be in the same Virtu	Balancer can be selected. All al Network.	of the IP
📒 Load balancing rules		Virtual machine		IP address	
Inbound NAT rules					~
Properties		node-1]	ipconfig1 (10.5.0.120)	1
🔒 Locks		node-2		ipconfig1 (10.5.0.121)	
🕎 Export template			\checkmark		\checkmark
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		resources, services, a	and docs (G+/)					\geq	Ģ	₽	÷	?	٢	L.		
Home > TestGroup1 > TestL															_	
Coad balance	er - Load I	balancing rules														×
	«	+ Add														
Overview		P														
Activity log		Name		\uparrow_{\downarrow}	Load balancing rule	¢ι	Backend	pool			\uparrow_{\downarrow}	Hea	lth probe		\uparrow_{\downarrow}	
🙊 Access control (IAM)		No results.														
Tags																
Diagnose and solve proble	ems															
Settings																
Frontend IP configuration																
Backend pools																
Health probes																
📒 Load balancing rules																
Inbound NAT rules																
Properties																
🔒 Locks																
😫 Export template																
Monitoring																
Diagnostic settings																
📫 Logs																
Support + troubleshooting																
🙊 New support request																
<																>

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

■ Microsoft Azure	Ŗ	P 🔅	?	٢	
Home > TestGroup1 > TestLoadBalancer - Load balancing rules > Add load balancing rule					
Add load balancing rule					×
Name *					~
TestLoadBalancingRule 🗸					I
IP Version *					
● IPv4 ○ IPv6					
Frontend IP address *					
10.5.0.200 (LoadBalancerFrontEnd)					
Protocol					
● TCP UDP					
Port *					
80					
Backend port * ①					
8080 🗸					
Backend pool ①					
TestBackendPool (2 virtual machines)					
Health probe ①					
TestHealthProbe (TCP:26001)					
Session persistence ①					
None					
Idle timeout (minutes) \odot					
0 4					
Floating IP (direct server return) \odot					
(Disabled) Enabled					1
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	X	R 🗳 🔅	? 🙂	
	Azure servic	Services See all	Marketplace			^
	Azure servic	Network security groups	No results were found.			
	+ [Network security groups (classic)	Documentation		$\overline{\mathbf{sol}} \rightarrow$	
	Create a	Virtual networks	Deploy Azure Multi-Factor Authentication - A	Azure Active	atabases More services	
	resource	Application security groups	Resource Groups			
		A Groups	No results were found.			
	Recent reso	🐺 Host groups				
	Name	(A) Management groups			Viewed	
		Network interfaces				
	🚸 TestLoadBala	🔎 Network Watcher			in ago	
	TestGroup1	Resource groups			go	
	🖳 node-1	Resources			go	
	📮 node-2	No results were found.			go	
	node-2419	Searching all subscriptions. Change			ago	
	node-1284		Network interface	24 h	ago	
	📮 win10-ogata		Virtual machine	2 d a	ago	
	👰 node1		Virtual machine	2 d a	ago	
	node2		Virtual machine	2 d a	ago	
	ipconfig1		Public IP address	2 d a	ago	
	node1186		Network interface	2 d a	ago	
	💎 node1-nsg		Network security group	2 d a	ago	
	Navigate					
	📍 Subscription	ons (i) Resource groups	All resources	Dashboard	d	~

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

🗧 Microsoft Azure 📝	Search I	resources, service	s, and docs (G+/)			d 🗣 🗘 🎯	? 🙂	and some	
Home > Network security group	> node-	1-nsg - Inbound	security rules						
Network security group	nd secu	urity rules							
,○ Search (Ctrl+/)	«	🕂 Add 🔌	Default rules						
🗧 Overview	~	Priority	Name	Port	Protocol	Source	Destination	Action	
Activity log		1000	A default-allow-rdp	3389	TCP	Any	Any	Allow	
Access control (IAM)		1010							
Tags		65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow	
Diagnose and solve problems		65001	AllowAzureLoadBalancerInBound	Any	Any	AzureLoadBalancer	Any	Allow	
Settings		65500	DenyAllInBound	Any	Any	Any	Any	Oeny	
Inbound security rules									
Outbound security rules									
Network interfaces									
Subnets									
Properties									
Locks									
Export template									
Monitoring									
Diagnostic settings									
📮 Logs									
NSG flow logs									
Support + troubleshooting									
Effective security rules	0								
New connort request									

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

- 区 🕼 🖓 ⑳ ? 😳 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.

Create a resource	Resource groups s	Network security groups	Virtual machines	? Subscriptions	All resources	App Services	Storage accounts	SQL databases	
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	
5								28 min ago	
DNS								28 min ago	
.								29 min ago	
.								30 min ago	
8								32 min ago	
Navigate	oscriptions	Resource	e groups	All n	esources	Dasht	ooard		

- 2. Select the resource group to which the created load balancer belongs from the resource group list.
- 3. The summary of the selected resource group is displayed. Select the created load balancer from the item list.

■ Microsoft Azure	Search resources, services, and docs (G+/)	
Home > TestGroup1		
TestGroup1		\$
. Search (Ctrl+/)	🔹 🕂 Add 📰 Edit columns 📋 Delete resource group 🕐 Refresh 🔿 Move 🞍 Export to CSV 🕅 Assign tags 📋 Delete 🞍 Export template	
(i) Overview	Essentials ¥	
 Activity log 	Filter by name Type == all () Location == all () \phi \gamma Add filter	
Access control (IAM)	Showing 1 to 31 of 31 records. Show hidden types O	\sim
Tags	□ Name ↑↓ Type ↑↓ Location ↑↓	
🗲 Events	AvailabilitySet-1 Availability set Japan East	
Settings	AvailabilitySet1 Availability Set Japan East	
Quickstart	DNS zone global	
Deployments	Dig ipconfig1 Public IP address Japan East	
Policies	Disconfig11 Public IP address Japan East	
Properties	Digital Public IP address Japan East	
🔒 Locks	Disconfig2 Public IP address Japan East	•
Export template	🗌 📮 node-1 Virtual machine Japan East	
Cost Management	🗌 🌍 node-1-nsg Network security group Japan East	
Q Cost analysis	🗌 🤹 node-1284 Network interface Japan East	••
Cost alerts	Disk Japan East	
3 Budgets	S node-1_OSDisk_1_dfa99e02b54a4452ac9964de51616aa3 Disk Japan East	
Advisor recommendations	Virtual machine Japan East	
Monitoring	Network security group Japan East	
Insights (preview)	Nøtwork interface lanan Fact	
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.

\equiv Microsoft Azure \checkmark Search	n resources, services, and docs (G+/)	E G 🖓 🐵 ? 😊 🗌	
Home > TestGroup1 > TestLoadBalancer			
TestLoadBalancer Load balancer		Å	×
	\rightarrow Move 📋 Delete 💍 Refresh		
💠 Overview	Resource group (change) : TestGroup1	Backend pool : TestBackendPool (2 virtual machines)	^
Activity log	Location : Japan East	Health probe : TestHealthProbe (Tcp:26001)	
Access control (IAM)	Subscription (change) : Subscription ID :	Load balancing rule : TestLoadBalancingRule (Tcp/80 to Tcp/8080) NAT rules : 0 inbound	
🔶 Tags	SKU : Basic	Private IP address : 10.5.0.200	
Diagnose and solve problems	Tags (change) Click here to add tags		
Settings		Â]
Frontend IP configuration	Configur	e high availability and scalability for your applications	
Backend pools	Create highly-available and s	scalable applications in minutes by using built-in load balancing for cloud services and virtual ancer supports TCP/UDP-based protocols and protocols used for real-time voice and video	
Health probes		messaging applications. Learn more	
😑 Load balancing rules			
Inbound NAT rules	•••		
Properties	Balance IPv4 and IPv6	F addresses	
🖰 Locks		Build highly reliable applications Load Balancer improves application uptime by	
🖳 Export template	of devices in mobile and		
Support + troubleshooting	View frontend IP co		
Rew support request	View backend pools	View load balancing rules	
,		Secure your networks Control network traffic and protect private networks ursing huilt-in 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

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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 <clus< th=""><th>ster></th><th></th><th></th><th></th><th></th><th>🔑 Cor</th><th>fig mode 🗸</th><th>7 (C</th><th>ß</th><th>۶</th><th>i</th><th>? 📑</th></clus<>	ster>					🔑 Cor	fig mode 🗸	7 (C	ß	۶	i	? 📑
Cluster generation wizard	Import	Export	Get the Configuration File	↑ Apply the Configuration File	Update Ser	ver Data	Check the Configu	ation 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].								
	Back Next Cancel							

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

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

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

4. The Interconnect window is displayed.

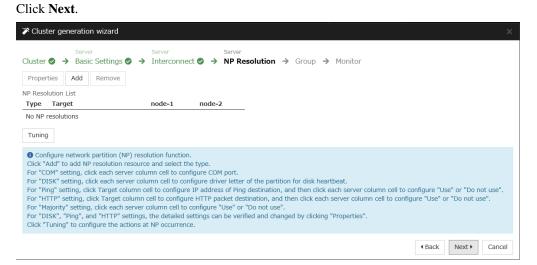
Specify the IP addresses (IP address of each instance) to be used for interconnect. In addition, select mdc1 for **MDC** as a communication path of a mirror disk resource to be created later. Click **Next**.

Cluster generation wizard				>
Properties Add Remove	Server → Interconne	server ◆ NP Resolution → 0	Sroup 🔶 Monitor	
Interconnect List 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 For "Kernel mode" setting, more than For "Kernel mode" setting, click each For "Witness HB" setting, click each s Click " \uparrow " or " \downarrow " to configure the prio For "Mirror Communication Only" sett	settings, configur communication. a zero routes are i server column ce erver column cell rrity to preferentia ting, click on the c	e the route which is used for hea necessary to be configured. Confi ill and set an IP address. to set "Use" or "Do not use", an ally 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 s et an IP address.	ition Only" setting, configure the route s 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 Cluster ♥ → Basic Settings ♥ → Interconnect ♥ → NP Resolution ♥ → Group → Monitor			
Properties Add Remove		Group	Resource
Group List			
Name Type			
No groups			
 Configure failover group to be a unit of fail over. Click "Add" to add a group. Click "Properties" to configure the properties of the selected group. Click "Group Resource" to add resource to the selected group. 			
	 Back 	Next 🕨	Cancel

2. The Group Definition window is displayed.

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

Group Definition		failover 🗙
Basic Settings → Startup Servers	➔ Group Attributes ➔ Group Resource	
Туре*	failover 🗸	
Use Server Group Settings		
Name*	failover1	
Comment		
 Select group type. If using virtual machine resources to clust "Failover". If using server group, check the "Use Server gr	ter virtual machines, select "Virtual machine" as the type. In other cas ver Group".	es, select
		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. 44 follow n this .1 1 O

2-	thia		add a	~		fallowing	the a	manaaduuma	halow
л	uns	Dage.	auu a	group	resource	IOHOWINE	une	procedure	below.
		1.9.		0 1		0		L	

Group Defini	ition							f	ailover 🗙
Basic Setting	js 🛇 🗧	> Startup	Servers 🛇	→ G	Group Attributes 🤗	→	Group Resource		
Properties	Add	Remove							
Group Resource	ce List								
Name					Туре				
No resources	;								
-		d resources. configure the		of the se	elected resource.				
							I Back	Finish	Cancel

• Mirror disk resource

Create a mirror disk resource.

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

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

Select the group resource type (Mirror disk resource) from the **Type** box and enter the group name (md) in the **Name** box. Click **Next**.

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

- 3. The **Dependency** window is displayed. Click **Next** without specifying anything.
- 4. The **Recovery Operation** window is displayed. Click **Next**.
- The Details window is displayed.
 Select a server name in the Name column of Servers that can run the group and click Add.

Resource Definition of Group failover1		md 🗙
Info \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**.

Connect				
ata Partit	ion			
/olume	Disk No.	Partition No.	Size	GUID
	0	1	500MB	
D:¥	1	1	10238MB	
=:¥	2	1	1024MB	
::¥	0	2	129546MB	
G:¥	2	2	19453MB	
luster Par Volume	tition Disk No.	Partition No.	Size	GUID
	0	1	500MB	MCN264 REELEMENT (1995) CONSTRUCTION
D:¥	1	1	10238MB	
=:¥	2	1	1024MB	
C:¥	0	2	129546MB	
G:¥	2	2	19453MB	

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

Resource Definition of Group failover1	md 🗙
Info \bigcirc \rightarrow Dependency \bigcirc \rightarrow Recovery Operation \bigcirc	→ Details
Mirror Disk No.*	1 🗸
Data Partition Drive Letter*	G:
Cluster Partition Drive Letter*	F:
Cluster Partition Offset Index*	0 🗸
Mirror Disk Connect	Select
Servers that can run the group	
Name Data Partition Cluster Partition	Name
node-1	← Add
node-2	→ Remove
Edit	
Tuning	
	Back Finish Cancel

• Azure probe port resource

When EXPRESSCLUSTER is used on Microsoft Azure, EXPRESSCLUSTER provides a mechanism to wait for alive monitoring from a load balancer on a port specific to a node in which operations are running. For details about the Azure probe port resources", see "Understanding Azure probe port resources" in the Reference Guide.

- 1. Click Add on the Group Resource List page.
- 2. The **Resource Definition of Group | failover1** window is displayed. Select the group resource type (Azure probe port resource) from the **Type** box and enter the group name (azurepp1) in the **Name** box. Click **Next**.

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

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

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

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

6. Click Finish.

3) Adding a monitor resource

• Azure probe port monitor resource

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

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

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

• Azure load balance monitor resource

The mechanism to monitor whether the port with the same port number as the probe port is open or not is provided for the node in which the Microsoft Azure probe port resource is not running. For details about the Azure load balance monitor resource, see "Understanding Azure load balance monitor resources" in the Reference Guide.

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

• Custom monitor resource

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

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

- 1. Click Add on the Monitor Resource List page.
- 2. Select the monitor resource type (Custom monitor) from the **Type** box and enter the monitor resource name (genw1) in the **Name** box. Click **Next**.

Monitor Resource Definition		genw 🗙
Info → Monitor(common) → Mor	itor(special) → Recovery Action	
Туре*	Custom monitor	
Name*	genw1	
Comment		
Get Licence Info		
• Select the type of monitor resource an	nd enter its name.	
		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		Browse
Choose servers that execute monitoring	Server	
		Image: Heat Algorithm Next Image: Cancel

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

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

```
< EXPRESSCLUSTER_installation_path>\binclpazure_port_checker -h_

management.core.windows.net -p 443

EXIT %ERRORLEVEL%
```

Select Synchronous for Monitor Type. Click Next.

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

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

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

Monitor Resource Definition		genw 🗙
Info 🛛 🔶 Monitor(common) 🖉 🗧	Monitor(special) 📀 🔶 Recovery Acti	on
Recovery Action	Execute only the final action	~
Recovery Target *	LocalServer	Browse
Recovery Script Execution Count	0 time	
Execute Script before Reactivation		
Maximum Reactivation Count	0 time	
Execute Script before Failover		
Execute migration before Failover		
Failover Target Server	Stable server	
	Maximum priority server	
Maximum Failover Count	0 time	
Execute Script before Final Action		
Final Action	No operation	
		Script Settings
		Back Finish Cancel

- 6. Click **Finish** to finish setting.
- IP monitor resource

Creates an IP monitor resource to monitor communication between clusters that are configured with virtual machines, and also to monitor whether communication with an internal network is health. For details about the IP monitor resource, see "Understanding IP monitor resources" in the Reference Guide.

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

Monitor Resource Definition		ipw 🗙
Info → Monitor(common) → Mor	itor(special) 🔶 Recovery Action	
Туре*	IP monitor 🗸	
Name*	ipw1	
Comment		
Get Licence Info		
3 Select the type of monitor resource an	nd enter its name.	
		Gack 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 Alw					
○ Active					
Target Resource		Bro	wse		
Choose servers that execute monitoring	Server				
		▲ Back Next ▶	Cancel		

Select one available server for Choose servers that execute monitoring.

Click **OK** and click **Next**.

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

4. The **Monitor** (special) window is displayed.

Monitor Resource Definition			ipw 🗙
Info 🔮 → Monitor(common) 🔮 →	Monitor(special) → Re	covery Action	
Edit Add Remove			
IP Address List			
IP Address			
No Ip Address			
ping Timeout*	5000	msec	
		 ■ Bac 	k Next 🕨 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 Definition			ipw 🗙
Info 🛛 🔶 Monitor(common) 🖉	→ Monitor(special) → Re	covery Action	
Edit Add Remove			
IP Address List			
IP Address			
10.5.0.121			
ping Timeout*	5000	msec	
			Back Next Cancel

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

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

Monitor Resource Definition		ipw 🗙	
Info 🛛 🔸 Monitor(common) 🖉 🗧	Monitor(special) 📀 🔶 Recovery Acti	on	
Recovery Action	Execute only the final action		
Recovery Target *	LocalServer	Browse	
Recovery Script Execution Count	0 time		
Execute Script before Reactivation			
Maximum Reactivation Count	0 time		
Execute Script before Failover			
Execute migration before Failover			
Failover Target Server	Stable server		
	O Maximum priority server		
Maximum Failover Count	0 time		
Execute Script before Final Action			
Final Action	No operation		
		Script Settings	
		Back Finish Cancel	

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

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

10. The Monitor (special) window is displayed.

On the **Common** tab, select **Add** of **IP Address** and set an IP address of a server other than the server selected in step 9. Click **Next**.

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

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

- 12. Click Finish to finish setting.
- Multi target monitor resource

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

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

For details about the multi target monitor resource, see "Understanding multi target monitor resources" in the Reference Guide.

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

Monitor Resource Definition		mtw 🗙
Info 📀 🔶 Monitor(common) 🌛 Monitor(special)	→ Recovery	y 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 Always Always		
○ Active		
Target Resource		Browse
Choose servers that execute monitoring	Server	

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

Monitor Resource Definition	on			mtw 🗙
Info 🥑 🔶 Monitor(comr	mon) 🥑 🔶 Moni	tor(special) 🔶 R	Recovery Action	
Monitor Resources			Available Monitor Resources	
Monitor Resource	Туре	←	Monitor Resource	Туре
genw1	genw	Add	userw	userw
ipw1	ipw	>		
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	Action	
Recovery Action	Execute only the final action		~
Recovery Target *	LocalServer	Browse	
Recovery Script Execution Count	0 time		
Execute Script before Reactivation			
Maximum Reactivation Count	0 time		
Execute Script before Failover			
Execute migration before Failover			
Failover Target Server	Stable server		
	Maximum priority server		
Maximum Failover Count	0 time		
Execute Script before Final Action			
Final Action	Stop the cluster service and shutdown	os 🗸	
		Script	Settings
		Back 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.

Monitor Resource Definition		mtw 🗙
Info 🛛 → Monitor(common) 🖉 →	Monitor(special) 🛇 🔶 Recovery A	Action
Recovery Action	Execute only the final action	~
Recovery Target *	LocalServer	Browse
Recovery Script Execution Count	0 time	
Execute Script before Reactivation Maximum Reactivation Count	0 time	
Execute Script before Failover		
Execute migration before Failover		
Failover Target Server	 Stable server Maximum priority server 	
Maximum Failover Count	0 time	
Execute Script before Final Action	Z	
Final Action	No operation	~
		Script Settings
		Back Finish Cancel

6. The script editing dialog box is displayed.

Select **Script created with this product** and click **Edit** to edit the script. The following shows the sample of a script to be created.

Specify the following by referring to "4.1 Creation example" The ports differ depending on operations.

- Load balancing rule > Backend port of the load balancer
- Load balancing rule > Port of the load balancer

Set the public IP address that you wrote down in "10)**Setting the inbound security rules**" to the following:

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

```
<EXPRESSCLUSTER_installation_path>binclpazure_port_checker -h <_</pre>
→Frontend_IP(public_IP_address)_of_the_load_balancer> -p < Port_of_
→the_load_balancer_of_Load_balancing_rule>
IF "%ERRORLEVEL%" == "0" (
GOTO EXIT
)
rem *******************
rem Cluster Shutdown
rem **********************
:CLUSTER_SHUTDOWN
clpdown
rem EXIT
:EXIT
EXIT 0
```

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

Edit Script O User Application Image: Script created with this 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 Name	Cluster1	
Comment		
Language	English 🗸	

- 2. Select the **Timeout** tab. For **Timeout** of **Heartbeat**, specify a value calculated by "A+B+C" as described below.
 - A: Interval of the monitor resource being monitored by the multi target monitor resource for NP resolution x (Retry Count+1)

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

- B: Interval of the multi target monitor resource x (Retry Count+1)
- C: 30 seconds (Waiting time for heartbeat not to time out before the multi target monitor resource detects an error. The time can be changed accordingly.

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

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

3. Click **OK**.

5) Applying the settings and starting the cluster

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

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

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

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

For details, refer to the following:

Installation and Configuration Guide

-> How to create a cluster

5.4 Verifying the created environment

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

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

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

Also, confirm that access to the frontend IP and port of the Azure load balancer is normal after the failover.

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

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

6.1 Creation example

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

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

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

Setting item	Setting value
Resource group setting	
Resource group	TestGroup1
Region	(Asia Pacific) Japan East
Virtual network setting	
Name	Vnet1
Address space	10.5.0.0/24
Subnet Name	Vnet1-1
Subnet Address range	10.5.0.0/24
Resource group	TestGroup1
Location	(Asia Pacific) Japan East
Load balancer setting	
Name	TestLoadBalancer
Туре	Internal
Virtual network	Vnet1
Subnet	Vnet1-1
IP address assignment	Static
Private IP address	10.5.0.200
Resource group	TestGroup1
Region	(Asia Pacific) Japan East
Backend pool: Name	TestBackendPool
Associated to	Availability set
Target virtual machine	
	node-1
	node-2

Continued on next page

Setting item	Setting value
Network IP configuration	
	10.5.0.120
	10.5.0.121
Health probe: Name	TestHealthProbe
Health probe: Port	26001
Load balancing rule: Name	TestLoadBalancingRule
Load balancing rule: Port	80 (Port number offering the operation)
Load balancing rule: Backend port	8080 (Port number offering the operation)

Table 6.1 – continued from previous page

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

Inode-1 Inode-2 Virtual machine setting Standard HDD - Disk type Standard HDD - User name Lestlogin - Password PassWord_123 - Resource group TestGroup1 - Region (Axia Pacific) Japan East Network security group setting node-1-nsg - Name node-1-nsg Availability set setting node-2-nsg - Name AvailabilitySet-1 - Update domains 5 - Fault domains 2 Diagnostics storage account setting - Name - Name Automatically generated - Performance Standard - Replication Locally-redundant storage (LRS) IP configuration setting - - IP address 10.5.0.120 Disk setting - - Name node-1Blob1 - Source type None (empty disk) - Account type Standard HDD - Size 20	Setting item	Setting value				
- Disk type Standard HDD - User name testlogin - Password PassWord_123 - Resource group TestGroup1 - Region (Asia Pacific) Japan East Network security group setting node-1-nsg - Name node-1-nsg - Name AvailabilitySet-1 - Name AvailabilitySet-1 - Update domains 5 - Fault domains 2 Diagnostics storage account setting - - Performance Standard - Replication Locally-redundant storage (LRS) IP configuration setting - - IP address 10.5.0.120 Disk setting - - Name node-1Blob1 - Source type None (empty disk) - Account type Standard HDD		-	node-2			
Disk type User name User name User name Vestrore group Resource group Region (Asia Pacific) Japan East Network security group setting Name Name Name Availability set setting Name Vidate domains S Fault domains S Fault domains S Performance Replication ID configuration setting IO.5.0.120 ID Source type None (empty disk) Account type Standard HDD Account type Standard HD Account type Standard HD Account type Account	Virtual machine setting					
- User name PassWord_123 - Password PassWord_123 - Region TestGroup1 - Region (Asia Pacific) Japan East Network security group setting node-1-nsg - Name node-1-nsg - Name AvailabilitySet-1 - Name AvailabilitySet-1 - Update domains 5 - Fault domains 2 Diagnostics storage account setting - - Name Automatically generated - Name Standard - Replication Locally-redundant storage (LRS) IP configuration setting - - IP address 10.5.0.120 Disk setting - - Name node-1Blob1 - Source type None (empty disk) - Account type Standard HDD	– Disk type	Standard HDD				
- Password TestGroup1 - Region (Asia Pacific) Japan East Network security group setting node-1-nsg - Name node-1-nsg - Name Availability Set-1 - Name Availability Set-1 - Update domains 5 - Fault domains 2 Diagnostics storage account setting - Name - Name Automatically generated - Performance Standard - Replication Locally-redundant storage (LRS) IP configuration setting - - IP address 10.5.0.120 Disk setting - - Name Node-1Blob1 - Name None (empty disk) - Source type None (empty disk) - Account type Standard HDD	– User name	testlogin				
- Region (Asia Pacific) Japan East Network security group setting node-1-nsg - Name node-1-nsg Availability set setting	– Password	PassWord_123				
- Region node-1-nsg node-2-nsg - Name node-1-nsg node-2-nsg - Name AvailabilitySet-1 - - Name AvailabilitySet-1 - - Update domains 5 - - Fault domains 2 - Diagnostics storage account setting - - - Name Automatically generated - - Name Standard - - Performance Standard - - Replication Locally-redundant storage (LRS) - IP configuration setting - - - IP address 10.5.0.120 10.5.0.121 Disk setting - - - Name node-1Blob1 node-2Blob1 - Source type Standard HDD - - Account type 20 -	- Resource group	TestGroup1				
- Name node-1-nsg node-2-nsg Availability set setting - - - Name AvailabilitySet-1 - - Update domains 5 - - Fault domains 2 - Diagnostics storage account setting - - - Name Automatically generated - - Name Standard - - Replication Locally-redundant storage (LRS) - IP configuration setting - - - IP address 10.5.0.120 10.5.0.121 Disk setting - - - Name node-1Blob1 node-2Blob1 - Source type None (empty disk) - - Account type Standard HDD -	– Region	(Asia Pacific) Japan East				
- Name node-1-nsg node-2-nsg Availability set setting - - - Name AvailabilitySet-1 - - Update domains 5 - - Fault domains 2 - Diagnostics storage account setting - - - Name Automatically generated - - Name Standard - - Replication Locally-redundant storage (LRS) - IP configuration setting - - - IP address 10.5.0.120 10.5.0.121 Disk setting - - - Name node-1Blob1 node-2Blob1 - Source type None (empty disk) - - Account type Standard HDD -	Network security group setting	1				
- Name AvailabilitySet-1 - Update domains 5 - Fault domains 2 Diagnostics storage account setting - - Name Automatically generated - Name Standard - Performance Standard - Replication Locally-redundant storage (LRS) IP configuration setting - - IP address 10.5.0.120 Disk setting - - Name Node-1Blob1 - Source type None (empty disk) - Account type Standard HDD		node-1-nsg	node-2-nsg			
- Name AvailabilitySet-1 - Update domains 5 - Fault domains 2 Diagnostics storage account setting - - Name Automatically generated - Name Standard - Performance Standard - Replication Locally-redundant storage (LRS) IP configuration setting - - IP address 10.5.0.120 Disk setting - - Name Node-1Blob1 - Source type None (empty disk) - Account type Standard HDD	Availability set setting					
- Update domains 2 - Fault domains 2 Diagnostics storage account setting - - Name Automatically generated - Performance Standard - Replication Locally-redundant storage (LRS) IP configuration setting - - IP address 10.5.0.120 Disk setting - - Name node-1Blob1 - Source type None (empty disk) - Account type 20		AvailabilitySet-1				
- Fault domains Diagnostics storage account setting - Name Automatically generated - Performance Standard - Replication Locally-redundant storage (LRS) IP configuration setting - - IP address 10.5.0.120 Disk setting - - Name node-1Blob1 - Source type None (empty disk) - Account type 20	– Update domains	5				
- Name Automatically generated - Name Standard - Performance Standard - Replication Locally-redundant storage (LRS) IP configuration setting 10.5.0.120 - IP address 10.5.0.120 Disk setting node-1Blob1 - Name None (empty disk) - Source type Standard HDD - Account type 20	– Fault domains	2				
- Name Automatically generated - Name Standard - Performance Standard - Replication Locally-redundant storage (LRS) IP configuration setting 10.5.0.120 - IP address 10.5.0.120 Disk setting node-1Blob1 - Name None (empty disk) - Source type Standard HDD - Account type 20	Diagnostics storage account setti	ng				
- Performance Locally-redundant storage (LRS) - Replication Locally-redundant storage (LRS) IP configuration setting 10.5.0.120 - IP address 10.5.0.120 Disk setting node-1Blob1 - Name node-1Blob1 - Source type None (empty disk) - Account type Standard HDD						
- Replication 10.5.0.120 IP address 10.5.0.120 Disk setting 10.5.0.121 - Name node-1Blob1 - Source type None (empty disk) - Account type Standard HDD	– Performance	Standard				
- IP address 10.5.0.120 10.5.0.121 Disk setting - node-1Blob1 node-2Blob1 - Name None (empty disk) - Standard HDD - Account type 20 20 -	– Replication	Locally-redundant storage (LRS)	1			
- IP address 10.5.0.120 10.5.0.121 Disk setting - Name node-1Blob1 node-2Blob1 - Source type None (empty disk) - - Account type Standard HDD 20	IP configuration setting	1				
- Name node-1Blob1 node-2Blob1 - Source type None (empty disk) - Account type Standard HDD	– IP address	10.5.0.120	10.5.0.121			
- Name node-1Blob1 node-2Blob1 - Source type None (empty disk) - Account type Standard HDD	Disk setting	1	1			
 Source type Account type 20 		node-1Blob1	node-2Blob1			
- Account type	– Source type	None (empty disk)	1			
- Size 20	- Account type	Standard HDD				
	– Size	20				

• EXPRESSCLUSTER settings (cluster properties)

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

		•	_	•				_	
+	[🖻]		<u> </u>	†		۲		SQL	\rightarrow
Create a resource	Resource groups	Network security groups	Virtual machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent resc	ources								
	NAME			TYPE				LAST VIEWED	
{··>								22 min ago	
								24 min ago	
[]								24 min ago	
								26 min ago	
								26 min ago	
••••								27 min ago	
••••								28 min ago	
-								28 min ago	
DNS								28 min ago	
.								29 min ago	
.								30 min ago	
8								32 min ago	
Navigate	criptions	(is) Resource	groups	All r	esources	🗔 Dashi	poard		

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

Home > Resource groups			
Resource groups			Ŕ
+ Add ≡≡ Edit columns 🖒 Refresh 🞍 Export	to CSV 🖉 Assign tags 🛛 🗢 Feedback		
Subscription == all	Location == all		
howing 1 to 30 of 30 records.		No grouping	\sim
Name ↑J	Subscription \uparrow_{\downarrow}	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.

Microsoft Azure			nd docs (G+/)	×	Ģ û		٢	the second s
Home > Resource groups > 0	Create a resource group							
Create a resource gro	up							
Basics Tags Review +	create							
resources for the solution, or o	that holds related resources for an Az nly those resources that you want to groups based on what makes the mo	manage as a group. You decide h	iow you want to					
Project details								
Subscription *			\sim					
Resource group *	TestGroup1		~					
Resource details								
Region *	(Asia Pacific) Japan East		\checkmark					
Review + create <	Previous Next : Tags >							
(

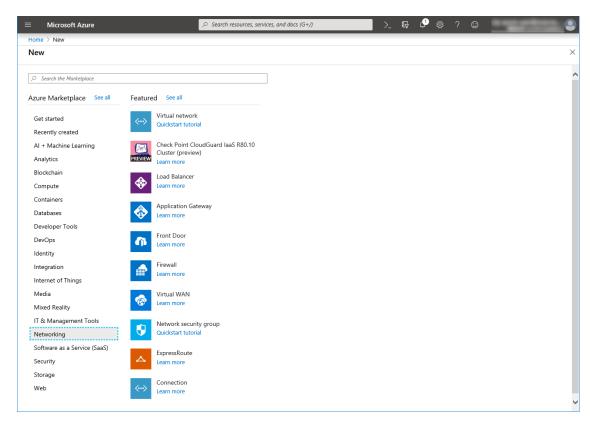
2) Creating a virtual network

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

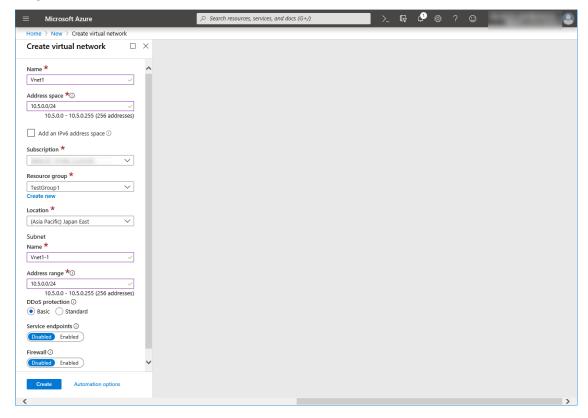
1. Select **Create a resource** on the upper part of the window.

Create a	(intersection) Resource	Network	Virtual	Subscriptions	All resources	App Services	Storage	SQL databases	More services
resource	groups	security groups	machines				accounts		
Recent res	sources								
	NAME			TYPE				LAST VIEWED	
{··>								22 min ago	
								24 min ago	
()								24 min ago	
								26 min ago	
								26 min ago	
•••								27 min ago	
•••								28 min ago	
5								28 min ago	
088								28 min ago	
								29 min ago	
.								30 min ago	
2								32 min ago	

2. Select Networking and then Virtual network.



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



3) Creating a virtual machine

:

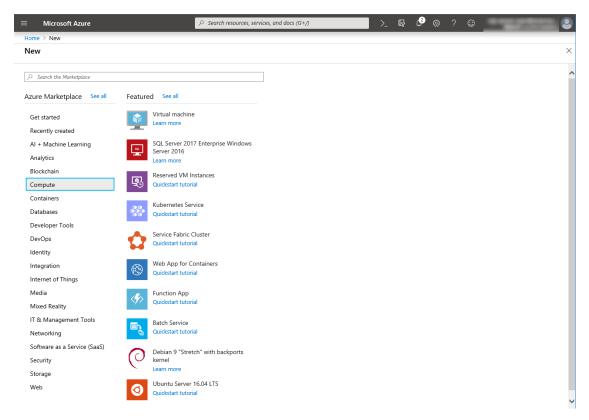
Log in to the Microsoft Azure portal (https://portal.azure.com/) and create virtual machines and disks following the steps below.

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

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

Create a	() Resource	Network	Virtual	Subscriptions	All resources	App Services	Storage	SQL databases	More services
resource	groups	security groups	machines				accounts		
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2. Select **Compute** and then **See all**.



3. Select Windows Server 2016 Datacenter.

domains. Then click OK.

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

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

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	or Windows. Select an image from Azure marketplace or use your own customized	
image. Complete the Basics tab then Review + (customization.	reate to provision a virtual machine with default parameters or review each tab for full	
Looking for classic VMs? Create VM fro	m Azure Marketplace	
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your resources.	yed resources and costs. Use resource groups like folders to organize and manage all	
Subscription *	· · · · · · · · · · · · · · · · · · ·	
Resource group *	TestGroup1 V	
	Create new	
Instance details		
Virtual machine name *	node-1	
Region * 🛈	(Asia Pacific) Japan East 🗸 🗸	
Availability options ①	Availability set V	
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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	ne					
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Azure VMs have one operating system The size of the VM determines the type	disk and a temporary disk for short-term storage. You can attach additional c of storage you can use and the number of data disks allowed. Learn more	lata disks.				
Disk options						
OS disk type * ①	Standard HDD	\sim				
Enable Ultra Disk compatibility 🛈	Ves No					
	Ultra Disk compatibility is not available for this VM size and location.					
temporary disk.	ata disks for your virtual machine or attach existing disks. This VM also come Size (GiB) Disk type Host caching n an existing disk	s with a				
Review + create <	Previous Next : Networking >					
< c						>

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

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

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

7. The **Networking** tab appears.

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

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

Click Next: Management >.

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Create a virtual machine								\times
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	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 ~	1						
	Create new							
Subnet *	Vnet1-1 (10.5.0.0/24)	7						
	Manage subnet configuration							
Public IP 🕕	None	1						
	Create new							
NIC network security group $\ensuremath{\mathbb{O}}$	○ None ○ Basic ● Advanced							
Configure network security group *	(new) node-1-nsq V	1						
	Create new							
Accelerated networking ①	On 💿 Off							
	The selected VM size does not support accelerated networking	J.						
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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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 \bigcirc	○ on ● off							
Diagnostics storage account $\star \odot$	Etestgroup1diag600							
Identity System assigned managed identity ①								
system assigned managed identity ()	On (Off							
Azure Active Directory								
Login with AAD credentials (Preview) 🛈	On () Off							
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>

9. Click Next: Tags >.

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Home > New > Create a virtua	I machine				
Create a virtual machir	e				>
Basics Disks Networkin	g Management Advanced Tags Review + create				
Add additional configuration, ag	ents, scripts or applications via virtual machine extensions or cloud-init.				
Extensions					
Extensions provide post-deployr	nent configuration and automation.				
Extensions ①	Select an extension to install				
Cloud init					
	ach to customize a Linux VM as it boots for the first time. You can use cloud-init to inst nfigure users and security. Learn more	I			
The selected image does not	ot support cloud init.				
Host					
Azure subscription. A dedicated	u to provision and manage a physical server within our data centers that are dedicated t host gives you assurance that only VMs from your subscription are on the host, flexibilit ion that will be provisioned on the host, and the control of platform maintenance at the	to			
Host group ①	No host group found	\sim			
 Dedicated hosts cannot be 	used with availability sets.				
Review + create	< Previous Next : Tags >				
Review + cleate	< FIEVIOUS IVEAL I BUS >				
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10. Click **Next: Review + create >**.

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Create a virtual machir	ne								×
Basics Disks Networkin	ng Management Advanced Tags	Review + create							
Tags are name/value pairs that e multiple resources and resource	enable you to categorize resources and view co e groups. <u>Learn more about tags</u> a	onsolidated billing by applying the same tag to							
Note that if you create tags and	then change resource settings on other tabs,	your tags will be automatically updated.							
Name ①	Value 🕕	Resource							
	:	11 selected V							
Review + create	< Previous Next : Review + crea	te >							
<									>

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

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

4) Setting a private IP address

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

:

Create a resource	Resource groups	Network	Virtual						
	groups	security groups	machines	Subscriptions	All resources	App Services	Storage accounts	SQL databases	More services
Recent reso	urces								
	NAME			TYPE				LAST VIEWED	
{··>								22 min ago	
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()								24 min ago	
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ONS								28 min ago	
9								29 min ago	
9								30 min ago	
8								32 min ago	

- 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 > Test@	Group1			
FestGroup1				Ŕ
, ○ Search (Ctrl+/)	≪ + Add ≡≡ Edit columns 💼 Delete resource group 🏷 Refr	esh \rightarrow Move \downarrow Export to CSV $ $ \otimes As:	sign tags 📋 Delete 🕁 Export terr	nplate ···
Overview	Essentials	*		
 Activity log 	Filter by name Type == all Location ==	all 🔹 ⁺ Y 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	Bode-1_DataDisk_0	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	
③ Budgets	C 🕼 node-2419	Network interface	Japan East	
Advisor recommendations	Source 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.

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Home > Resource groups > Te	estGroup1	> node-1 - Netwo	rking				_		
Virtual machine	ng								
	«	🚿 Attach netv	vork interface 🖉 Detach network in	nterface					
📮 Overview	~	Network In	iterface: node-1284 Effective s	security rules	Topology				
Activity log		Virtual network,	/subnet: Vnet1/Vnet1-1 NIC Publ	ic IP: - NIC Priv	rate IP: 10.5.0.4 Acc	elerated networking: Disa	bled		
Access control (IAM)		Inbound port	t rules Outbound port rules A	pplication security	groups Load balan	cing			
🔶 Tags		💎 Network se	curity group node-1-nsg (attached	to network interfa	ace: node-1284)			Add inbound po	at a de
Diagnose and solve problem	is		ibnets, 1 network interfaces					Add Inbound po	ort rule
Settings		Priority	Name	Port	Protocol	Source	Destination	Action	
🙇 Networking		1000	🔺 default-allow-rdp	3389	TCP	Any	Any	Allow	
B Disks		65000	AllowVnetInBound	Any	Any	VirtualNetwork	VirtualNetwork	Allow	
💶 Size		65001	AllowAzureLoadBalancerInBoun	id Any	Any	AzureLoadBalancer	Any	Allow	
Security		65500	DenyAllInBound	Any	Any	Any	Any	Oeny	
Extensions									
🐔 Continuous delivery (Previev	v)								
Availability + scaling									
Configuration									
🐍 Identity									
Properties									
🔒 Locks									
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Operations									
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- 5. Select a network interface displayed in the list. The network interface name is generated automatically.
- 6. Select IP configurations.

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

- 7. Only ipconfig1 is displayed in the list. Select it.
- 8. Select Static for Assignment under Private IP address settings. Enter the IP address to be assigned

statically in the **IP address** text box and click **Save** at the top of the window. The IP address of node-1 is 10.5.0.120. The IP address of node-2 is 10.5.0.121.

Microsoft Azure P Search resources, services, and docs (G+/)		Þ	Ŗ	Ç2	Ö	?	٢	and store	
Home > Resource groups > TestGroup1 > node-1 - Networking > node-1284 - IP config	igurations > ipconfig1								
ipconfig1	×								
🔚 Save 🗙 Discard									
The virtual machine associated with this network interface will be restarted to utilize the new private IP address. The network interface will be reprovisioned and network configuration settings, including secondary IP addresses, subnet masks, and default gateway, will need to be manually reconfigured within the virtual machine. Learn more									
Public IP address settings									
Public IP address Disabled Enabled									
Private IP address settings									
Virtual network/subnet									
Vnet1/Vnet1-1 Assignment									
Dynamic Static									
IP address *	_								
10.5.0.120									
e									

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

5) Configuring virtual machines

Log in to the created node-1 and node-2 and specify the settings following the procedure below.

Set a partition for the mirror disk resource. Create a file system in the added disk.

For details about a partition for the mirror disk resource, see "Partition settings for mirror disk resource (when using Replicator)" in "Settings after configuring hardware" in "Determining a system configuration" in the Installation and Configuration Guide.

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

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

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

🖅 Disk Manage	ement						_		×
<u>File</u> <u>Action</u>	<u>V</u> iew <u>H</u> elp								
🗢 🄿 📰	? 🖬 🗩 🗙 🕗	🔒 🔎 🛙	8						
Volume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free		
····· (C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	113.12 GB	89 %		
- Temporary St	orag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %		
- Disk 0									
Basic	(C:)	///////					///////	//////	7777
127.00 GB Online	Healthy (System,	Paat Activ	Crack Duran P	line and Dartition					
Onine	Healthy (System,		e, Crash Dump, P						
- Disk 1									
Basic 70.00 GB	Temporary Stora	ige (D:)							-
Online	70.00 GB NTFS Healthy (Page File	e, Primary P	artition)						
- Disk 2									
Basic									
20.00 GB Online	20.00 GB Unallocated								
onnic	Unanocated								
	, 								
Unallocated	Primary partition					1		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.	
	< <u>B</u> ack <u>N</u> ext > Cancel	

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

New Simple Volume Wizard	×
Specify Volume Size Choose a volume size that is between the	ne maximum and minimum sizes.
Maximum diala annos in MD:	20477
Maximum disk space in MB:	
Minimum disk space in MB:	8
Simple volume size in MB:	1024
	< <u>B</u> ack <u>N</u> ext > Cancel

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

New Simple Volume Wizard
Assign Drive Letter or Path For easier access, you can assign a drive letter or drive path to your partition.
 ● Assign the following drive letter: ► ✓ ● Mount in the following empty NTFS folder: ■ Browse ● Do not assign a drive letter or drive path
< <u>B</u> ack <u>N</u> ext > Cancel

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

EXPRESSCLUSTER X 5.0 HA Cluster Configuration Guide for Microsoft Azure (Windows), Release 3

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

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

New Simple Volume Wizard	×
Assign Drive Letter or Path For easier access, you can assign a drive letter or drive path to your partition.	
Assign the following drive letter: Mount in the following empty NTFS folder: Browse Do not assign a drive letter or drive path	
< <u>B</u> ack <u>N</u> ext > Canc	el

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

New Simple Volume Wizard		х
Format Partition To store data on this partition, you mu	ist format it first.	
Choose whether you want to format th	nis volume, and if so, what settings you want to use.	
○ <u>D</u> o not format this volume		
Format this volume with the following the following of	owing settings:	
<u>Fi</u> le system:	NTFS ~	
Allocation unit size:	Default ~	
Volume label:	New Volume	
Perform a quick format		
<u>Enable file and folder con</u>	npression	
	< <u>B</u> ack <u>N</u> ext > Cancel	

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

New Simple Volume Wizard		×
	Completing the New Simple Volume Wizard	
	You have successfully completed the New Simple Volume Wizard. You selected the following settings: Volume type: Simple Volume Disk selected: Disk 2 Volume size: 19453 MB Drive letter or path: G: File system: NTFS Allocation unit size: Default Volume label: New Volume Ouick format: Yes To close this wizard, click Finish.	
	< <u>B</u> ack Finish Cancel	

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

a bisk manag	Jement						-	\times
<u>File</u> <u>A</u> ction	<u>V</u> iew <u>H</u> elp							
⊨ 🔿 🖬	🛛 🖬 🖛 🗙 🤅	- 🔒 🧏	2					
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 St	torag 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, I	Primary Partition				
Disk 1 Basic 70.00 GB Online	Temporary Sto 70.00 GB NTFS Healthy (Page F	-	Partition)					
Basic 70.00 GB Online	70.00 GB NTFS	-	Partition)					
Basic 70.00 GB	70.00 GB NTFS	File, Primary P	Ne 19	e w Volume (G:) .00 GB NTFS ealthy (Primary P	artition)			
Basic 70.00 GB Online Disk 2 Basic 20.00 GB Online	70.00 GB NTFS Healthy (Page F (F:) 1.00 GB RAW	ry Partition)	Ne 19	.00 GB NTFS	artition)			

6) Configuring a load balancer

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

For details, see the following websites:

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

+	[]	V	•	+		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	
~ •>								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	
•								29 min ago	
•								30 min ago	
8								32 min ago	
Navigate									
Navigate									
🔶 Subsc	riptions	Resource	aroups	All r	esources	Dashi	oard		

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

≡ Microsoft Azure 🔑 Searc	h resources, services, and docs (G+/)		Þ	Ģ	Ļ1	٢	?	٢	1.00	
Home > New > Create load balancer										
Create load balancer										×
Basics Tags Review + create										
balancers uses a hash-based distribution destination port, protocol type) hash to m accessible via public IP addresses, or inter	icer that distributes incoming traffic among healthy virtual machine instances. Loa algorithm. By default, it uses a 5-tuple (source IP, source port, destination IP, ap traffic to available servers: Load balancers can either be internet-facing where i nal where it is only accessible from a virtual network. Azure load balancers also T) to route traffic between public and private IP addresses. Learn more.									
Project details										
Subscription *		\sim								
Resource group *	TestGroup1	\sim								
	Create new	·								
Instance details										
Name *	TestLoadBalancer	~								
Region *	(Asia Pacific) Japan East	\checkmark								
Туре * 🛈	Internal O Public									
ѕки ★⊙	• Basic O Standard									
Configure virtual network.										
Virtual network 🗡 🕕	Vnet1	\sim								
Subnet *	Vnet1-1 (10.5.0.0/24) Manage subnet configuration	\sim								
Review + create < Previous										
<										>

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.

+	[]	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	
-								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	Dashi	poard		

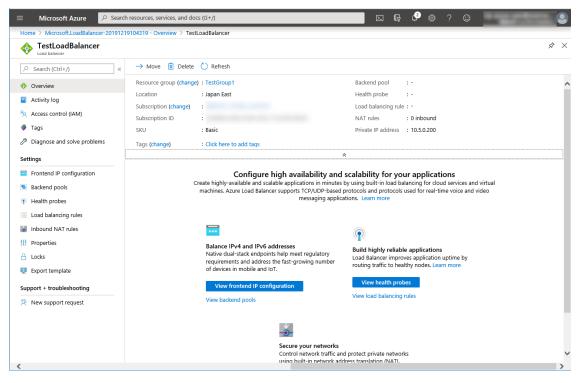
2. Select the resource group to which the created load balancer belongs from the resource group list.

Ξ

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

Microsoft Azure	Search resources, see	rvices, and docs (G+/)		₽ ₽ © ? ©	and the second	
Home > TestGroup1						Ń
. Search (Ctrl+/)	« + Add	≡≡ Edit columns 📋 Delete resourc	e group \bigcirc Refresh \rightarrow Move \downarrow Export to C	SV 🛛 🕅 Assign tags 📋 D	elete 🛓 Export templat	te ···
 Overview 	Essentials		*			
Activity log	Filter by na	ame Type == all	■ Location == all ● ⁺ _Y Add filter			
🙊 Access control (IAM)	Showing 1 to	to 31 of 31 records. 🗌 Show hidden	types ①		No grouping	\sim
Tags	Name	↑↓	Туре ↑↓	Location	ר ↑↓	
Events	🗌 👰 AV	vailabilitySet-1	Availability set	Japan Ea	ast	
lettings	🗌 💽 AV	vailabilitySet1	Availability set	Japan Ea	ast	
Quickstart	🗌 🍥 cli	uster1.zone	DNS zone	global		
Deployments	🗌 🖬 ip	config1	Public IP address	Japan Ea	ast	
Policies	🗌 🖬 ip	config11	Public IP address	Japan Ea	ast	
Properties	🗌 🖬 ip	config12	Public IP address	Japan Ea	ast	
Locks	🗌 🖬 ip	config2	Public IP address	Japan Ea	ast	
Export template	🗌 🖳 no	ode-1	Virtual machine	Japan Ea	ast	
ost Management	🗌 🎈 nc	ode-1-nsg	Network security	group Japan Ea	ast	
Cost analysis	🗌 🕼 no	ode-1284	Network interface	Japan Ea	ast	
Cost alerts		ode-1_DataDisk_0	Disk	Japan Ea	ast	
Budgets	🗌 🛢 nc	ode-1_OsDisk_1_dfa99e02b54a4452ac9	964de51616aa3 Disk	Japan Ea	ast	
Advisor recommendations	🗌 🖳 no	ode-2	Virtual machine	Japan Ea	ast	
Aonitoring	🗌 🎈 no	ode-2-nsg	Network security	group Japan Ea	ast	
Insights (preview)	—	nde-2/10	Network interface	lanan Es	act	
Alerts	< Previo	pus Page 1 V of 1 Nex	t>			

4. Select Backend pools.



5. Click Add.

Microsoft Azure P Sear	er - Backend nools			· · · · · · · · · · · · · · · · · · ·	
TestLoadBalancer - Back					
O Search (Ctrl+/) «	+ Add 💍 Refresh				
Overview Activity log	Virtual machine	Virtual machine status	Network interface	Private IP address	
Access control (IAM)	No results				
Tags					
Diagnose and solve problems					
ettings					
Frontend IP configuration					
Backend pools					
Health probes					
Inbound NAT rules					
Properties					
Locks					
Export template					
upport + 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+,	0	D G	L ² ©	* ? ©		
Home > Microsoft.LoadBalancer-20191219	0104319 - Overview > TestLoadB	alancer - Backend pools	Add backend pool				×
TestLoadBalancer - Backer	nd pools						
	🕂 Add 💍 Refresh		Name * TestBackendPool				~
Overview	Virtual machine	Virtual machine status	Virtual network ① Vnet1				
Activity log	No results		IP version				
Tags			IPv4 IPv6				
Diagnose and solve problems			Associated to ①				
Settings			Virtual machine				\sim
Frontend IP configuration			Virtual machines				
Backend pools			Virtual Machines must be in sa	me location	as Load Balancer. Only IP con	figurations tl	hat have
Health probes			the same SKU (Basic/Standard) configurations have to be in th) as the Load	Balancer can be selected. All	of the IP	
📒 Load balancing rules			-		IP address		
Inbound NAT rules			Virtual machine				
111 Properties			node-1		ipconfig1 (10.5.0.120)		1
🔒 Locks			node-2	~	ipconfig1 (10.5.0.121)	~	Î
Export template				~		\sim	
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 (S+/)		D G	۵ في	? 🙂	the supervised in the local division of the	0
Home > TestGroup1 > TestLoadBalancer								
TestLoadBalancer - Load	balancing rules							×
	+ Add							
Overview	P]
Activity log	Name	$\uparrow_{\downarrow} \text{Load balancing rule}$	\uparrow_{\downarrow} Backend p	ool	↑,	, Health prob	e ↑↓	
Access control (IAM)	No results.							
Tags								
Diagnose and solve problems								
Settings								
Frontend IP configuration								
Backend pools								
P Health probes								
📒 Load balancing rules								
Inbound NAT rules								
H Properties								
🔒 Locks								
Export template								
Monitoring								
Diagnostic settings								
🏩 Logs								
Support + troubleshooting								
Rew support request								
<								>

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

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

■ Microsoft Azure P Search resources, services, and docs (G+/)	\sum	Ŗ	Q	ŝ	?	\odot	100	
Home > TestGroup1 > TestLoadBalancer - Load balancing rules > Add load balancing rule								
Add load balancing rule								×
Name *								~
TestLoadBalancingRule 🗸								- 1
IP Version ★ ● IPv4								
Frontend IP address * ①								
10.5.0.200 (LoadBalancerFrontEnd)								
Protocol								
• TCP UDP								
Port *								
80								
Backend port \star \odot								
8080 🗸								
Backend pool \odot								
TestBackendPool (2 virtual machines)								
Health probe ①								
TestHealthProbe (TCP:26001)								
Session persistence ①								
None V								
Idle timeout (minutes) \odot								
O 4								
Floating IP (direct server return) ①								
(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 <clus< th=""><th>ter></th><th></th><th></th><th></th><th></th><th>🗲 Con</th><th>fig mode 🗸</th><th>¥</th><th>(1)</th><th>ß</th><th>۶</th><th>i</th><th>?</th><th></th></clus<>	ter>					🗲 Con	fig mode 🗸	¥	(1)	ß	۶	i	?	
Cluster generation wizard	Import	Export	Get the Configuration File	Apply the Configuration File	Update Ser	ver Data	¢ Check the Config	guration File						

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

Cluster generation wizard	×
Server Server Cluster → Basic Settings → Interconnect +	Server → NP Resolution → Group → Monitor
Cluster Name*	Cluster1
Comment	
Language*	English 🗸
Management IP Address	
	(locale) of the environment that runs WebManager. le clusters, specify a unique cluster name to identify the cluster. sed for a WebManager connection. If establishing connections by specifying each server IP address, the
	Back Next Cancel

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

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

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

4. The Interconnect window is displayed.

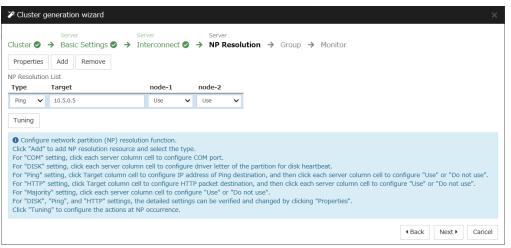
Specify the IP addresses (IP address of each instance) to be used for interconnect. In addition, select mdc1 for **MDC** as a communication path of a mirror disk resource to be created later. Click **Next**.

Cluster generation wizard				×
Cluster Server Properties Add Remove	Server	Server ◆ NP Resolution → (Group ᢣ Monitor	
Interconnect List 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 of For "Kernel mode" setting, more than For "Kernel mode" setting, click each setting for "Mirror Communication Only" setting For "Mirror Communication Only" setting	settings, configur communication. zero routes are server column cell rity to preferentia ng, click on the	e the route which is used for hea necessary to be configured. Confi II and set an IP address. to set "Use" or "Do not use", and illy use the LAN only for the com lell for each server column and se	rtbeat. For "Mirror Communica guring more than one routes is I then click "Properties" to set of nunication among the cluster s et an IP address.	tion Only" setting, configure the route s recommended. detailed settings.

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.



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 O A Basic Settings O Interconnect O NP Resolution O	→ Group → Monitor	
Properties Add Remove		Group Resource
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. 		
		ext • Cancel

2. The Group Definition window is displayed.

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

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

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

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

Group Defini	tion								f	ailover 🗙
Basic Setting	js 🕗 🚽	> Startup	Servers 🛇	→	Group Attribut	tes 📀	→	Group Resource		
Properties	Add	Remove								
Group Resourc	ce List									
Name					-	Гуре				
No resources										
•		d resources		of the	selected resource	ē				
Cher Proper	105 10	configure en	e properties (or the	Sciecce resourc					
								 ▲ Back 	Finish	Cancel

• Mirror disk resource

Create a mirror disk resource.

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

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

Select the group resource type (Mirror disk resource) from the **Type** box and enter the group name (md) in the **Name** box. Click **Next**.

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

- 3. The **Dependency** window is displayed. Click **Next** without specifying anything.
- 4. The **Recovery Operation** window is displayed. Click **Next**.
- The Details window is displayed.
 Select a server name in the Name column of Servers that can run the group and click Add.

Resource Definition of Group failover1		md 🗙
Info \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		4 Pools Finish Control
		Back Finish Cancel

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

Connect					
ata Partiti	ion				
Volume	Disk No.	Partition No.	Size	GUID	
	0	1	500MB		
D:¥	1	1	10238MB		
F:¥	2	1	1024MB		
C:¥	0	2	129546MB		
G:¥	2	2	19453MB		
luster Par Volume	tition Disk No.	Partition No.	Size	GUID	
Volume	0	1	500MB	5015	
D:¥	1	1	10238MB		
F:¥	2	1	1024MB		
C:¥	0	2	129546MB		
G:¥	2	2	19453MB		

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

Resource Definition of Group failover1	md 🗙
Info \bigcirc \rightarrow Dependency \bigcirc \rightarrow Recovery Operation \bigcirc	→ Details
Mirror Disk No.*	1 🗸
Data Partition Drive Letter*	G:
Cluster Partition Drive Letter*	F:
Cluster Partition Offset Index*	0 🗸
Mirror Disk Connect	Select
Servers that can run the group	
Name Data Partition Cluster Partition	Name
node-1	← Add
node-2	→ Remove
Edit	
Tuning	
	Back Finish Cancel

• Azure probe port resource

When EXPRESSCLUSTER is used on Microsoft Azure, EXPRESSCLUSTER provides a mechanism to wait for alive monitoring from a load balancer on a port specific to a node in which operations are running. For details about the Azure probe port resources", see "Understanding Azure probe port resources" in the Reference Guide.

- 1. Click Add on the Group Resource List page.
- 2. The **Resource Definition of Group | failover1** window is displayed. Select the group resource type (Azure probe port resource) from the **Type** box and enter the group name (azurepp1) in the **Name** box. Click **Next**.

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

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

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

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

6. Click Finish.

3) Adding a monitor resource

• Azure probe port monitor resource

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

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

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

· Azure load balance monitor resource

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

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

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

4) Applying the settings and starting the cluster

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

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

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

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

For details, refer to the following:

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

6.4 Verifying the created environment

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

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

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

Also, confirm that access to the frontend IP and port of the Azure load balancer is normal after the failover.

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

CHAPTER

SEVEN

ERROR MESSAGES

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

• "Error messages" in the Reference Guide.

CHAPTER

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"

CHAPTER

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CHAPTER

REVISION HISTORY

Edition	Revised Date	Description
1st	Apr 08, 2022	New Guide
2nd	Jul 29, 2022	Corrected typographical errors.
3rd	Feb 17, 2023	Corrected typographical errors.

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