EXPRESSCLUSTER® X 4.1

HA Cluster Configuration Guide for Microsoft Azure (Windows)



Revision History

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1st	Apr 10, 2019	New guide

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Preface

Who Should Use This Guide

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

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

Scope of application

This guide covers the following product versions.

- EXPRESSCLUSTER X 4.1 for Windows (Internal version: 12.10)
- Windows Server 2016 Datacenter
- Microsoft Azure portal: Environment as of January 16, 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.

How This Guide is Organized

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

EXPRESSCLUSTER X Documentation Set

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

Getting Started Guide

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

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 EXPRESSCLUSTER are covered in this guide.

Reference Guide

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

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.

Hardware Feature Guide

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

Legacy Feature Guide

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

Conventions

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

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

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

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

The following conventions are used in this guide.

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

Contacting NEC

For the latest product information, visit our website below:

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

Chapter 1 Overview 1.1 Functional overview

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

Microsoft A	zure	
Fault Domain 0	Fault Domain 1	
EXPRESSCLUSTER X	FC_A C EXPRESSCLUSTER	
VM		
Blob Storage	Blob Storage	

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

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

Microsoft Azure region

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

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

Availability set

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

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

Manage the availability of Windows virtual machines in Azure:

https://docs.microsoft.com/en-us/azure/virtual-machines/windows/manage-availability

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

Purpose	EXPRESSCLUSTER resource to use
Accessing the cluster by using a DNS name (Use Azure DNS recordset)	Azure DNS resource
Accessing the cluster by using a virtual IP address(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
Accessing the cluster by using a virtual (private) IP address, with the clustered application configured as Always On (Use internal load balancer and configure Direct Server Return, hereinafter called "DSR")	Azure probe port resource

Refer to the following when creating a DSR configuration. https://jpn.nec.com/clusterpro/blog/20181031.html (Japanese only)

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/

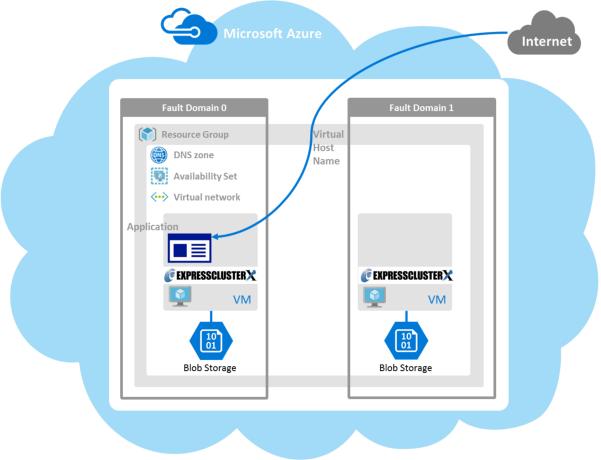


Figure 1-2 HA Cluster Using Azure DNS

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

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

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

Resource or monitor resource type	Description	Setting
Azure DNS resource	Manages 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 communication 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 clusters that are configured with virtual machines, and also to monitor health of communication with an internal network.
Custom monitor resource	Monitors communication between clusters that are configured with virtual machines, and also monitors health of communication with an internal network.	When 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 resources are abnormal, a script in which a process for network partition resolution (NP resolution) 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 cluster.	Optional

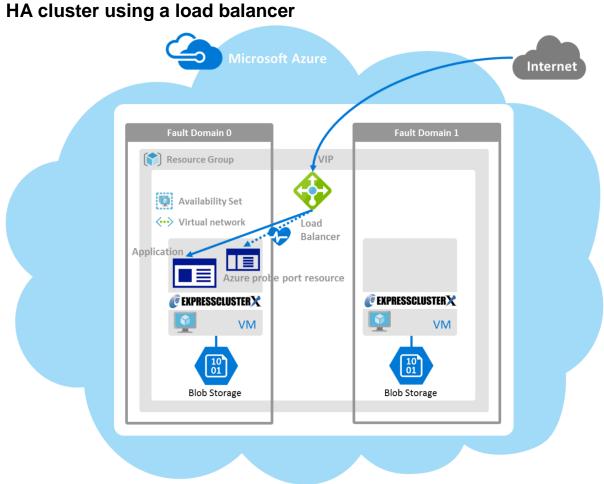


Figure 1-3 HA Cluster Using an Public Load Balancer

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

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

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

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

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

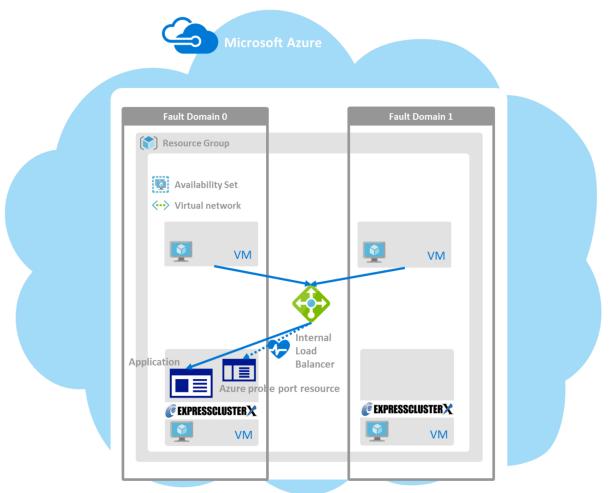


Figure 1-4 HA Cluster Using the Internal Load Balancer

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

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

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

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

1.3 Network partition resolution

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

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

The access destination used on Microsoft Azure described in the following table. (*) A private IP address of an internal load balancer (ILB) cannot be used because it does not reply to ping

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

For details about NP resolution, see the following:

Chapter 5, "Network partition resolution resources details" in the Reference Guide.

Setting the NP resolution destination

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

How to judge the network partition status

EXPRESSCLUSTER provides the clpazure_port_checker command to 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 "3.3 Configuring the EXPRESSCLUSTER settings" and "5.3 Configuring the EXPRESSCLUSTER settings"

Options	-h <i>hostname</i> -p <i>port</i>	Specify the determining server as <i>hostname</i> (by using an FQDN name or IP address). This option cannot be omitted. Specify the determining port number as <i>port</i> (by using a port number or service name). This option cannot be omitted.
Return values	0	Normal
	1	Error (communication error)
	2	Error (timeout)
	3	Error (invalid argument or internal error)

1.4 Differences between on-premises and Microsoft Azure

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

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

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

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

HA cluster using Azure DNS

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

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

Step No.	Procedure	On-premise	Microsoft Azure
		Before installing EXPRESSCLUS	TER
1	Creating a resource group	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
2	Creating a virtual network	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
3	Creating a virtual machine	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
4	Setting a private IP address	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
5	Adding Blob storage	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
6	Creating a DNS zone	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
7	Setting up the DNS server	See the manual provided with the OS or DNS server.	Not required
8	Setting a partition for the mirror disk resource	 See the following: "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the <i>Installation and</i> <i>Configuration Guide</i>. "Understanding mirror disk resources" in the <i>Reference</i> <i>Guide</i>. 	See "3.2 Configuring Microsoft Azure" in this guide.

Step No.	Procedure	On-premise	Microsoft Azure
9	Adjusting the OS startup time	See "Settings after configuring hardware" in Chapter 1,	Same as "On-premise"
10	Checking the network setting		
11	Checking the firewall setting	"Determining a system configuration" in the <i>Installation</i>	
12	Synchronizing the server time	and Configuration Guide.	
13	Disabling the power saving function		
14	Installing the Azure	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
15	Registering the service principal	Not required	See "3.2 Configuring Microsoft Azure" in this guide.
16	Installing EXPRESSCLUSTE R	See Chapter 3, "Installing EXPRESSCLUSTER." in the Installation and Configuration Guide.	Same as "On-premise"
		After installing EXPRESSCLUS	TER
17	Registering the EXPRESSCLUSER license	See Chapter 4, "Registering the license." in the <i>Installation</i> and Configuration Guide.	Same as "On-premise"
18	Creating a cluster: Setting the heartbeat method	See "Creating the configuration data of a node cluster" in Chapter 5, "Creating the cluster configuration data" in the <i>Installation and</i> <i>Configuration Guide</i> .	The COM heartbeat, BMC heartbeat, and disk heartbeat cannot be used.
19	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 Chapter 5, "Creating the cluster configuration data".in the <i>Installation and</i> <i>Configuration Guide</i>. Chapter 5, "Network partition resolution resources details" in the <i>Reference Guide</i>. 	See "5.3 Configuring the EXPRESSCLUSTER settings" in this guide.
20	Creating a cluster: Creating a failover group and monitor resource	See "Creating the configuration data of a node cluster" in Chapter 5, "Creating the cluster configuration data".in the <i>Installation and</i> <i>Configuration Guide</i> .	 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. "3.3 Configuring the EXPRESSCLUS settings" in this guide.

HA cluster using a load balancer For Microsoft Azure, execute steps 1 to 5, and 7 to 8 in the following table after logging in to the Microsoft Azure portal (https://portal.azure.com/). For Microsoft Azure, execute steps 6, and 9 to 15 after logging in to each virtual machine.

Step No.	Procedure	On-premise	Microsoft Azure	
Before installing EXPRESSCLUSTER				
1	Creating a resource group	Not required	 See either of the following depending on the load balancer to use: "4.2 Configuring Microsoft Azure" in this guide "5.2 Configuring Microsoft Azure" in this guide 	
2	Creating a virtual network	Not required	 See either of the following depending on the load balancer to use: "4.2 Configuring Microsoft Azure" in this guide "5.2 Configuring Microsoft Azure" in this guide 	
3	Creating a virtual machine	Not required	 See either of the following depending on the load balancer to use: "4.2 Configuring Microsoft Azure" in this guide "5.2 Configuring Microsoft Azure" in this guide 	
4	Setting a private IP address	Not required	 See either of the following depending on the load balancer to use: "4.2 Configuring Microsoft Azure" in this guide "5.2 Configuring Microsoft Azure" in this guide 	
5	Adding Blob storage	Not required	 See either of the following depending on the load balancer to use: "4.2 Configuring Microsoft Azure" in this guide "5.2 Configuring Microsoft Azure" in this guide 	
6	Setting a partition for the mirror disk resource	 See the following: "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the <i>Installation and</i> <i>Configuration Guide</i> "Understanding mirror disk resources" in the <i>Reference</i> <i>Guid</i>e. 	 See either of the following depending on the load balancer to use: "4.2 Configuring Microsoft Azure" in this guide "5.2 Configuring Microsoft Azure" in this guide 	
7	Creating and configuring a load balancer	Not required	 See either of the following depending on the load balancer to use: "4.2 Configuring Microsoft Azure" in this guide 	

Step No.	Procedure	On-premise	Microsoft Azure
			 "5.2 Configuring Microsoft Azure" in this guide
8	Setting the inbound security rules	Not required	 "4.2 Configuring Microsoft Azure" in this guide
9	Adjusting the OS startup time		
10	Checking the network setting	See "Settings after configuring hardware" in Chapter 1,	
11	Checking the firewall setting	"Determining a system configuration" in the <i>Installation</i>	Same as "On-premise"
12	Synchronizing the server time	and Configuration Guide.	
13	Disabling the power saving function		
14	Installing EXPRESSCLUSTE R	See Chapter 3, "Installing EXPRESSCLUSTER" in the Installation and Configuration Guide.	Same as "On-premise"
		After installing EXPRESSCLUST	ER
15	Registering the EXPRESSCLUSER license	See Chapter 4, "Registering the license" in the <i>Installation</i> and Configuration Guide.	Same as "On-premise"
16	Creating a cluster: Setting the heartbeat method	See "Creating the configuration data of a node cluster". in Chapter 5, "Creating the cluster configuration data" in the <i>Installation and</i> <i>Configuration Guide</i> .	The COM heartbeat, BMC heartbeat, and DISK heartbeat cannot be used.
17	Creating a cluster: Setting the NP resolution processing	 The network partition resolution resource is used. See the following: "Creating the configuration data of a node cluster" in Chapter 5, "Creating the cluster configuration data". in the <i>Installation and</i> <i>Configuration Guide</i> Chapter 5, "Network partition resolution resources details" in the <i>Reference Guide</i>. 	 See either of the following depending on the load balancer to use: See "4.3 Configuring the EXPRESSCLUSTER settings" in this guide. See "5.3 Configuring the EXPRESSCLUSTER settings" in this guide.
18	Creating a cluster: Creating a failover group and monitor resource	See "Creating the configuration data of a node cluster" in Chapter 5, "Creating the cluster configuration data" in the Installation and Configuration Guide.	 See the following in addition to the description of "On-premise." "Understanding Azure probe port resources" in the <i>Reference Guide</i>. "Understanding Azure load balance monitor resources" in the <i>Reference Guide</i>. "Understanding Azure load balance monitor resources" in the <i>Reference Guide</i>. "Understanding Azure load balance monitor resources" in the <i>Reference Guide</i>. See either of the following depending on the load balancer to use:

Step No.	Procedure	On-premise	Microsoft Azure
			 See "4.3 Configuring the EXPRESSCLUSTER settings" in this guide. See "5.3 Configuring the EXPRESSCLUSTER settings" in this guide.

Chapter 2 Operating Environments 2.1 HA cluster using Azure DNS

See the following:

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

<u></u>	
OS	Windows Server 2016 DataCenter
EXPRESSCLUSTER	EXPRESSCLUSTER X 4.1 for Windows(Internal version: 12.10)
Microsoft Azure	Resource Manager
deployment model	
Location	Japan East
Mirror disk size	Disk size: 20 GB
	(1 GB for a cluster partition and 19 GB for a data partition)
Azure CLI	2.0
Python	2.7

The Azure CLI and Python must be installed because Azure DNS resource use them. Python is installed together with the Azure CLI 2.0.

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

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/

2.2 HA cluster using a load balancer

See the following:

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

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

3.1 Creation example

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

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

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

Setting item	Setting value		
Resource group setting	Resource group setting		
Resource group	TestGroup1		
Region	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	Japan East		
DNS zone setting			
Name	cluster1.zone		
Resource group	TestGroup1		
Resource group location	Japan East		
Record set	test-record1		

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

Setting item	Setting value		
	node-1	node-2	
Virtual machine setting			
Disk type	Standard HDD		
User name	testlogin		
Password	PassWord_123		
Resource group	TestGroup1		
Region	Japan East		
Network security group set	ting		
Name	NetSecGroup-1		
Availability set setting			
Name	AvailabilitySet-1		
Update domains	5		
Fault domains	2		
Diagnostics storage account setting			
Name	Automatically generated (testgroup1diag679)		
Replication	Locally-redundant storage (LRS)		
	IP configuration setting		
IP address	10.5.0.120	10.5.0.121	
Blob storage setting			
Name	node-1Blob1	node-2Blob1	
Source type	None (empty disk)		
Account type	Standard HDD		

• EXPRESSCLUSTER settings (cluster properties)

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

• EXPRESSCLUSTER settings (failover group)

Resource name	Setting item	Setting value
Mirror disk resource	Name	md
	Details Tab: Data Partition	G:
	Drive Letter	
	Details Tab: Cluster	F:
	Partition 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-XXXX-
		XXXXXXXXXXXX
	File Path of Service	C:\Users\ testlogin\examplecert.pem
	Principal	
	Azure CLI File path	C:\Program Files(x86)\Microsoft
		SDKs\Azure\CLI2\wbin\az.cmd

•	EXPRESSCLUSTER settings	(monitor resource)
---	-------------------------	--------------------

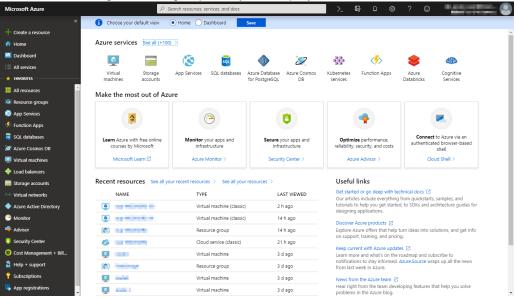
Monitor resource name	Setting item	Setting value
Mirror disk monitor	-	-
resource		
Azure DNS monitor	Name	azurednsw1
resource		
Custom monitor resource	Name	genw1
	Script created with this product	On
	Monitor Type	Synchronous
	Normal Return Value	0
	Recovery Action	Execute only the final action
	Recovery 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	Name	mtw1
resource	Monitor resource list	genw1
		ipw1
		ipw2
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer

3.2 Configuring Microsoft Azure

1) Creating a resource group

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

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



Microsoft Azure		ices, and docs	\rightarrow B	ф 🥸	≩ ? ☺	-
«	Home > Resource groups					
+ Create a resource	Resource groups					\$ ×
🛧 Home	Add ■ Edit columns ひ Refresh ◆ Assign	tags				
🛄 Dashboard		tags 👱 Export to CSV				
i≡ All services	Subscriptions:					
- 🛨 FAVORITES	Filter by name	All locations	```	✓ All tags	~	No grouping 🗸 🗸
🗰 All resources 📄	23 items					
📦 Resource groups	NAME 13	5	UBSCRIPTION 1		LOCATION 10	
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SQL databases					10.00	
S Azure Cosmos DB					teres interest	
Virtual machines			and the second second second		Sec. 199	
Load balancers					and the second	
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Virtual networks					and the second	
Azure Active Directory			100 C		and the second	
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 Security Center Cost Management + Bill 					inter inter	
			100 C		and her	
Help + support			No. of Concession, Name		Sector Sector	
Subscriptions					iner lesi	
App registrations						

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

 Microsoft Azure
 > Search resources, services, and docs
 > Search resources

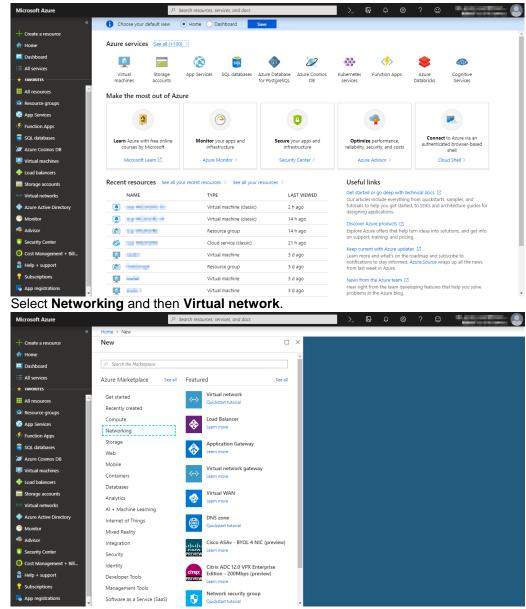
	Home > Resource groups > Create a resource gro	oup	
- Create a resource	Resource groups 《 ダ × 取定のディレクトリ(WPEC)	Create a resource group	\times
🟫 Home	+ Add E Edit columns ···· More		
🔟 Dashboard	-	Basics Tags Review + Create	
∃ All services	Filter by name	Resource group - A container that holds related resources for an Azure solution. The resource group can include all the	
🛨 FAVORITES	NAME 🗇	resources for the solution, or only those resources that you want to manage as a group. You decide how you want to allocate resources to resource groups based on what makes the most sense for your organization. Learn more 🖄	
All resources	(*) 1.0.0 (0.0.0)	PROJECT DETAILS	
🗊 Resource groups		* Subscription 🕐	
S App Services		* Resource group	
Function Apps			
👼 SQL databases		RESOURCE DETAILS * Region Jacoan East	
🬌 Azure Cosmos DB		Japan cast	
Virtual machines			
🚸 Load balancers			
Storage accounts			
Virtual networks			
Azure Active Directory			
🕒 Monitor			
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Security Center			
Ost Management + Bill			
Help + support			
💡 Subscriptions			
😽 App registrations	· · · · · · · · · · · · · · · · · · ·	Review + Create Next : Tags	

2) Creating a virtual network

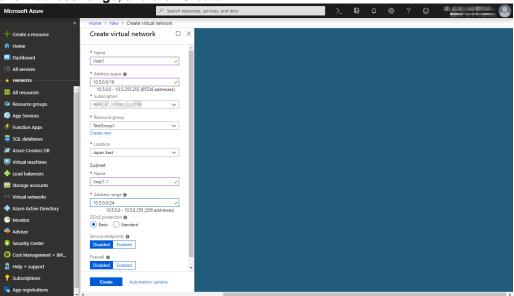
2.

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

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



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



3) Creating a virtual machine

2.

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

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

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

Microsoft Azure	Q	Search resources, services, and docs		>_ 67 ♀ ⊗	? 🙂
«	() Choose your default view	Home Dashboard	ave		
+ Create a resource					
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🛅 Dashboard		🙈 🚔	A 107	38 < / >	هه 😒
E All services	_	App Services SOL databases	Azure Database Azure Cosmos		•
+ FAVORITES	Virtual Storage machines accounts		Azure Database Azure Cosmos for PostgreSQL DB	Kubernetes Function Apps services	Azure Cognitive Databricks Services
👭 All resources	Make the most out of Az	1170			
😵 Resource groups	Make the most out of Az				
🔇 App Services	4				
Inction Apps		G	•		
🐱 SQL databases	Learn Azure with free online	Monitor your apps and	Secure your apps and	Optimize performance.	Connect to Azure via an
😹 Azure Cosmos DB	courses by Microsoft	infrastructure	infrastructure	reliability, security, and costs	authenticated browser-based shell
Virtual machines	Microsoft Learn 🗹	Azure Monitor >	Security Center >	Azure Advisor >	Cloud Shell >
🚸 Load balancers					
Storage accounts	Recent resources See all y	our recent resources $>$. See all your r	esources >	Useful links	
••• Virtual networks	NAME	TYPE	LAST VIEWED	Get started or go deep with teo	
Azure Active Directory		Virtual machine (classic)	2 h ago	Our articles include everything tutorials to help you get started	d, to SDKs and architecture guides for
Monitor		Virtual machine (classic)	14 h ago	designing applications.	
Advisor		Resource group	- 14 h ago	Discover Azure products [2] Explore Azure offers that help t	turn ideas into solutions, and get info
Security Center		Cloud service (classic)	21 h ago	on support, training, and pricin	g.
O Cost Management + Bill		Virtual machine	3 d ago	Keep current with Azure update Learn more and what's on the r	
Help + support		Resource group	3 d ago	notifications to stay informed.	Azure.Source wraps up all the news
? Subscriptions		Virtual machine	3 d ago	from last week in Azure.	
App registrations		Virtual machine	3 d ago	News from the Azure team 🗹 Hear right from the team devel	loping features that help you solve
Coloct Comm	ute and then S	aa all		problems in the Azure blog.	
Microsoft Azure		Search resources, services, and docs			? 🙄 🔔
*	Home > New				
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A Home	Search the Marketplace		<u>^</u>		
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i≡ All services	Azure Marketplace See all	Featured	See all		
★ FAVORITES	Get started	Windows Server 2016 D	atacenter		
All resources	Recently created	Quickstart tutorial			
Resource groups	Compute	Red Hat Enterprise Linu	x 7.2		
S App Services	Networking	redhat Quickstart tutorial			
Function Apps	Storage	Ubuntu Server 18.04 LT	, III		
👼 SQL databases	Web	(d) Learn more			
Azure Cosmos DB	Mobile				
Virtual machines	Containers	SQL Server 2017 Enterp Windows Server 2016	rise		
💠 Load balancers	Databases	Learn more			
Storage accounts	Analytics	SUSE Linux Enterprise S SUSE software purchase	erver		
Virtual networks	AI + Machine Learning	Learn more			
Azure Active Directory	Internet of Things	Service Fabric Cluster			
Monitor	Mixed Reality	Quickstart tutorial			
🔷 Advisor	Integration	Web App for Container			
Security Center	Security	Quickstart tutorial			
Ost Management + Bill	Identity	-			
Provide the Help + Support	Developer Tools	Function App Quickstart tutorial			
<u>^</u>					
Subscriptions	Management Tools	Batch Service			

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

Microsoft Azure	₽ Searc	th resources, services, and docs	>_	Ģ	Q	٢	?	٢	And a state of the second
«	Home > New > Create a virtual machine								
+ Create a resource	Create a virtual machine								×
🛧 Home									A
🛄 Dashboard	Basics Disks Networking Mana	agement Guest config Tags Review + create							
E All services	Create a virtual machine that runs Linux or Wir	ndows. Select an image from Azure marketplace or use your own customized in	nage.						
+ FAVORITES	Complete the Basics tab then Review + create customization.	to provision a virtual machine with default parameters or review each tab for fu	1						
III resources	Looking for classic VMs? Create VM from Azu	ire Marketplace							
📦 Resource groups	PROJECT DETAILS								
🔇 App Services	Select the subscription to manage deployed re resources.	esources and costs. Use resource groups like folders to organize and manage al	l your						
Function Apps	* Subscription	and a standard and		~					
🐱 SQL databases	* Resource group @			_					
🬌 Azure Cosmos DB	- Kesource group 😈	TestGroup1 Create new	```	~					
🧕 Virtual machines	INSTANCE DETAILS								
🚸 Load balancers	* Virtual machine name ()	node-1		~					
Storage accounts	* Region ()			_					
🐡 Virtual networks	· Region 0	Japan East	```	~					
Azure Active Directory	Availability options ()	Availability set	``	~					
🕒 Monitor	* Availability set 🚯	(new) AvailabilitySet-1	,	~					
🔷 Advisor		Create new							
🟮 Security Center	* Image 0	Windows Server 2016 Datacenter Browse all images and disks	`	~					
0 Cost Management + Bill	* Size O	Standard A1							
Help + support	-								·
📍 Subscriptions	Review + create Previo	ous Next : Disks >							
Ann registrations									

Microsoft Azure	,P Sea	rch resources, services, and docs	Ģ	Q	☺ ?	٢	*****	
«	Home > New > Create a virtual machine	2		Create r	iew			×
+ Create a resource	Create a virtual machine			Group two c	r mor e VMs in	an availabili	y set to ensure that	t at least one
🛧 Home							d maintenance eve	
🛄 Dashboard	Basics Disks Networking Mar	agement Guest config Tags Review + create						
E All services	Create a virtual machine that runs Linux or W	indows. Select an image from Azure marketplace or use your own customized image.		* Name Availability	C.a+.1			
- 🛨 FAVORITES		e to provision a virtual machine with default parameters or review each tab for full						•
III resources	Looking for classic VMs? Create VM from Az	ure Marketplace		Fault domain	15 🚺	0		2
📦 Resource groups	PROJECT DETAILS			Update dom	ainr O	0		
S App Services	Select the subscription to manage deployed resources.	resources and costs. Use resource groups like folders to organize and manage all your						5
Function Apps	* Subscription ()	1000 - 100 - 100	~	Use manage				
🐱 SQL databases	* Resource group 🛛			O No (Cla	ssic) 🔘 Yes	(Aligned)		
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📻 Storage accounts								
Virtual networks	* Region 🛛	Japan East	~					
Azure Active Directory	Availability options 0	Availability set	\sim					
Monitor	* Availability set 🚯	No existing availability sets in current resource group and location.	\sim					
🔷 Advisor		Create new						
Security Center	* Image 🛛	Windows Server 2016 Datacenter Browse all images and disks	\sim					
Ost Management + Bill	* Size O	Standard A1						
Help + support	U	Standard A1	-					
? Subscriptions	Review + create Prev	ious Next : Disks >						
App registrations	1		_	OK				

5. 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 >**

Microsoft Azure	ی حر	earch resources, services,	and docs			\geq 5	¢ ⊗	? 😊	
« Home >	Select a VM size								×
+ Create a resource Create									
A Home customiz		× Restore defaul	t filters						
Dashboard	tren to the term term term term term term term ter								
E All services	Showing 191 VM sizes.	Subscription:	14.100	Region:	Japan East	Current size: Standard_A1			
KAVORITES Select the resources		FAMILY 1	VCPUS	RAM (GB)	DATA DISKS	MAX IOPS	ARY STOR	PREMIUM DISK SUP	COST/MONTH (ESTI
All resources	A0 Standard	General purpose	1	0.75	1	1x500		No	¥2.001
📦 Resource groups			1	0.75	1	1x300		No	¥1.838
🔇 App Services		General purpose							
Function Apps INSTANCE	A1 Standard	General purpose	1	1.75	2	2×500		No	¥8,839
👼 SQL databases * Virtual	A1 Basic	General purpose	1	1.75	2	2x300		No	¥3,415
Azure Cosmos DB * Region	A1_v2 Standard	General purpose	1	2	2	2×500		No	¥6,748
Virtual machines	A2 Standard	General purpose	2	3.5	4	4x500		No	¥17,677
🚸 Load balancers	A2 Basic	General purpose	2	3.5	4	4x300		No	¥12,083
* Image	A2_v2 Standard	General purpose	2	4	4	4x500		No	¥14,173
Virtual networks Size	A2m_v2 Standard	General purpose	2	16	4	4x500		No	¥19,426
Azure Active Directory	A3 Standard	General purpose	4	7	8	8×500		No	¥35,347
Monitor	A3 Basic	General purpose	4	7	8	8x300		No	¥31,680
Advisor ADMINIS ADMINIS Security Center Vserna	A4 Standard	General purpose	8	14	16	16x500		No	¥70.687
Security Center	A4 Basic	General purpose	8	14	16	16x300		No	¥63,359
	busic	ecteres purpose	~						••••••••
Help + support									
Subscriptions R						tructure costs and any discount n your local currency in cost an			prices don't include any
App registrations					,	,,	,	-	

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

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

Microsoft Azure	₽ Searce	h resources, services, and docs		Ģ			ALC: NOT THE OWNER.	- •
	Home > New > Create a virtual machine							
+ Create a resource	Create a virtual machine							\times
🛧 Home								
🧾 Dashboard	Basics Disks Networking Mana	agement Guest config Tags Review + create						
E All services		d a temporary disk for short-term storage. You can attach additional data disk	cs. The size o	f.				
* FAVORITES	the VM determines the type of storage you ca	n use and the number of data disks allowed. Learn more						
III resources	DISK OPTIONS							
Resource groups	* OS disk type 🛛	Standard SSD	~					
🔇 App Services	Enable Ultra SSD compatibility (Preview) \tag	Yes No Ultra SSD compatibility is not available for this VM size and location.						
Function Apps		onra 550 compatibility is not available for this VM size and location.						
🗟 SQL databases	DATA DISKS	ks for your virtual machine or attach existing disks. This VM also comes with a						
🬌 Azure Cosmos DB	disk.	cs for your virtual machine or attach existing disks. This VM also comes with a	temporary					
Virtual machines	LUN NAME	SIZE (GIB) DISK TYPE HOST CACHING						
🚸 Load balancers	Create and attach a new disk Attach an ex	isting disk						
🥁 Storage accounts								
Virtual networks	✓ ADVANCED							
Azure Active Directory	ADVANCED							
Monitor								
🔷 Advisor								
Security Center								
Oost Management + Bill								
🔒 Help + support								
Subscriptions	Review + create Previo	Next : Networking >						
😽 App registrations								

 The Create a new disk blade appears.
 Specify the settings of Disk type, Name, Size (GiB), and Source type. Then click OK. Click Next: Networking >.

Microsoft Azure		${\cal P}$ $$ Search resources, services, and docs $$	>_ 167 Q @ ? ©
	Home > New > Create a vir	ual machine > Create a new disk	
+ Create a resource	Create a new disk		
🛧 Home			
🔟 Dashboard	Create a new disk to store applic	ations and data on your VM. Disk pricing varies based on factors incl s. Learn more about Azure Managed Disks	luding disk size, storage
E All services		-	
+ FAVORITES	* Disk type 📵	Standard HDD	~
III resources	* Name	node-1Blob1	✓
🜍 Resource groups	* Size (GiB) 🚯		
S App Services	* Source type 😗	None (empty disk)	~
Function Apps		constants and	
👼 SQL databases	ESTIMATED PERFORMANCE 📀		
🬌 Azure Cosmos DB		00	
Virtual machines	Throughput limit (MB/s)	60	
🚸 Load balancers			
Storage accounts			
Virtual networks			
Azure Active Directory			
Monitor			
🔷 Advisor			
Security Center			
O Cost Management + Bill			
Help + support			
Subscriptions	ОК		
Registrations			

8. 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	, \wp Search resources, services, and docs \searrow \bigtriangledown \bigtriangledown	? 🙂 💶 🕒
	Home > New > Create a virtual machine > Create network security group	
+ Create a resource	×	Create network security g \Box \times
🟫 Home		* Name
🛄 Dashboard	t Guest config Tags Review + create	Name NetSecGroup-1
i≡ All services	v configuring network interface card (NIC) settings. You can control ports, inbound	Inbound rules
🛨 FAVORITES ————————————————————————————————————	r place behind an existing load balancing solution. Learn more	1000: default-allow-rdp
III resources		Any 🗸 RDP (TCP/3389)
📦 Resource groups	ill be created for you.	+ Add an inbound rule
🔇 App Services		Outbound rules 📵
Function Apps	new	No results
🧧 SQL databases	-1 (105.0.0/24)	+ Add an outbound rule
🬌 Azure Cosmos DB	e subnet configuration	
🧕 Virtual machines	v	
🚸 Load balancers	new	
Storage accounts	ine 🚫 Basic 💿 Advanced	
••• Virtual networks	node-1-nsg V new	
Azure Active Directory	new ● Off	
🕒 Monitor	The selected VM size does not support accelerated networking.	
今 Advisor		
Security Center	of an existing Azure load balancing solution. Learn more	
Oost Management + Bill	; • No	-
🎴 Help + support	-	
💡 Subscriptions	Next : Management >	ок
👪 App registrations		

9. 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.

Microsoft Azure	, P Search resources, services, and docs		? ©
	Home > New > Create a virtual machine		Create storage account ×
+ Create a resource	Create a virtual machine		
🛧 Home			* Name
🛄 Dashboard	Basics Disks Networking Management Guest config Tags Review + create		testgroup1diag210 .core.windows.net
E All services	Configure monitoring and management options for your VM.		Account kind
+ FAVORITES			Storage (general purpose v1) V
🛄 All resources	Boot diagnostics On Off		Performance ()
🗊 Resource groups			Standard Premium
🔇 App Services			Replication () Locally-redundant storage (LRS)
Function Apps	* Diagnostics storage account (new) testgroup Idiag210 Create new	~	Locally-redundant storage (LNS)
🐱 SQL databases			
🧟 Azure Cosmos DB			
Virtual machines	System assigned managed identity On On Off		
🚸 Load balancers	AUTO-SHUTDOWN		
Storage accounts	Enable auto-shutdown 🕢 🔘 On 💿 Off		
··· Virtual networks	BACKUP		
Azure Active Directory	Enable backup 🕘 💫 On 💿 Off		
Monitor			
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Click Next: Ta	ags >.		
Microsoft Azure	,P Search resources, services, and docs	>_ 🕼 Q 🚳	? 🙄 💶 🔍
	Home > New > Create a virtual machine		
Create a resource	Create a virtual machine		×
🛧 Home			
🔟 Dashboard	Basics Disks Networking Management Guest config Tags Review + create		
∃ All services	Add additional configuration, agents, scripts or applications via virtual machine extensions or cloud-init.		
+ FAVORITES	EXTENSIONS		
🛄 All resources	Extensions provide post-deployment configuration and automation.		
📦 Resource groups	Extensions Select an extension to install		
🔇 App Services			
Function Apps	CLOUD INIT		
🗟 SQL databases	Cloud init is a widely used approach to customize a Linux VM as it boots for the first time. You can use cloud-init to install write files or to configure users and security. Learn more	packages and	
🐹 Azure Cosmos DB			
Virtual machines	The selected image does not support cloud init.		
Load balancers			
Storage accounts			
Virtual networks			
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O Cost Management + Bill	Breine a croste Directory Net 1 Juny 2		
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Click Next: Guest config >.

10.

11. Click **Next: Review + create >**.

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«	Home > New > Create a virtual machine								
+ Create a resource	Create a virtual machine							×	
🛧 Home									
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∃ All services	Tags are name/value pairs that enable you to categorize resources and view consolidated billing by applying the same ta	g to multiple							
+ FAVORITES	resource and resource groups. Learn more								
🛗 All resources	Note that if you create tags and then change resource settings on other tabs, your tags will be automatically updated.								
📦 Resource groups	NAME VALUE RESOURCE								
🔇 App Services	✓ : ✓ 7 selected ✓								
Function Apps									
👼 SQL databases									
🧟 Azure Cosmos DB									
Virtual machines									
🚸 Load balancers									
Storage accounts									
Virtual networks									
Azure Active Directory									
🕒 Monitor									
🔷 Advisor									
Security Center									
O Cost Management + Bill									
😫 Help + support									
Subscriptions	Review + create Previous Next : Review + create >								
😽 App registrations									

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

Microsoft Azure	${\cal P}$ Search resources, services, and docs				Ģ					-	
«	Home > New > Create a virtua	l machine									
+ Create a resource	Create a virtual machine ×										
🛧 Home	•										
🛄 Dashboard	Validation passed										
E All services	Basics Disks Networking	Management Guest con	ifig Tags Review + create								
+ FAVORITES			<u> </u>								
III resources	PRODUCT DETAILS										
Resource groups	Standard A1	Pricing not available	e for this offering								
S App Services	by Microsoft Terms of use Privacy policy										
Function Apps	TERMS										
🐱 SQL databases	By clicking "Create", I (a) agree to the legal terms and privacy statement(s) associated with the Marketplace offering(s) listed above; and (b) agree that Microsoft may share my contact, usage and transactional information with the provider(s) of the offering(s) for										
Azure Cosmos DB	August of the second seco										
Virtual machines											
🚸 Load balancers	BASICS										
Storage accounts	Subscription Resource group	TestGroup1									
Virtual networks	Virtual machine name	node-1									
Azure Active Directory	Region	Japan East									
Monitor	Availability options Availability set										
- -	Availability set (new) AvailabilitySet-1										
🔷 Advisor	Username	testlogin									
Security Center	Already have a Windows license?	No									
Oost Management + Bill	DISKS										
🔒 Help + support	OS disk type	Standard HDD									
Subscriptions	Create	Previous Next	Download a template for automation								
😽 App registrations 👻 🗸										•	

4) Setting a private IP address

2.

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

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

	و مر	Search resources, services, and docs			? 🙂
×	Choose your default view	Home ODashboard Sa	ave		
Create a resource					
Home	Azure services See all (+100	<u>)</u>			
Dashboard		🔕 🗖	(1)	🌼 🎸	۹۵ 😓
All services	Virtual Storage		zure Database Azure Cosmos	Kubernetes Function Apps	Azure Cognitive
FAVORITES	machines accounts		or PostgreSQL DB	services	Databricks Services
All resources	Make the most out of Azi	ure			
Resource groups					
App Services	4		A		
> Function Apps	-				
SQL databases	Learn Azure with free online	Monitor your apps and	Secure your apps and	Optimize performance,	Connect to Azure via an authenticated browser-based
💐 Azure Cosmos DB	courses by Microsoft	infrastructure	infrastructure	reliability, security, and costs	shell
Virtual machines	Microsoft Learn 🗹	Azure Monitor >	Security Center >	Azure Advisor >	Cloud Shell >
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3. The summary of TestGroup1 is displayed. Select virtual machine node-1 or node-2 from the item list.

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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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- 7. Only ipconfig1 is displayed in the list. Select it.
- 8. Select **Static** for **Assignment** under **Private IP address settings**. Enter the IP address to be assigned statically in the **IP address** text box and click **Save** at the top of the window. The IP address of node-1 is 10.5.0.120. The IP address of node-2 is 10.5.0.121.

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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.

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

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

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i≡ All services	A DNS zone is used to host the DNS records	for a particular domain.	For example, the domain 'cont	oso.com' may contain a nun	nber of					
+ FAVORITES	DNS records such as 'mail.contoso.com' (for DNS zone and manage your DNS records, ar									
Ill resources	records that you create. Learn more.									
📦 Resource groups	PROJECT DETAILS									
🔇 App Services	* Subscription	-			~					
Function Apps	* Resource group	TestGroup1			~					
👼 SQL databases		Create new								
🬌 Azure Cosmos DB	INSTANCE DETAILS					_				
Virtual machines	* Name	cluster1.zone				 				
🚸 Load balancers	Resource group location ()	Japan East			~					
Storage accounts										
Virtual networks										
Azure Active Directory										
Monitor										
🔷 Advisor										
Security Center										
Ost Management + Bill										
🔒 Help + support										
Subscriptions	Review + create Previous	Next : Tags >	Download a template for auto	mation						
😽 App registrations										

6) Configuring virtual machines

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

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

Initialize Disk	<
You must initialize a disk before Logical Disk Manager can access it. Select disks: Select disks:	
Use the following partition style for the selected disks:	
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 Managem	ient						-		×
<u>F</u> ile <u>A</u> ction <u>V</u> i	ew <u>H</u> elp								
🔶 🧼 🛛 📰 🛛 😰	🗊 🗩 🗙 🗹	1 🔎 🗵]						
Volume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free		
••••• (C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	113.12 GB	89 %		
Temporary Store	ag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %		
Disk 0									
Basic	(C:)							/////	
127.00 GB Online	127.00 GB NTFS								
Onine	Healthy (System,	BOOT, ACTIVE	Crash Dump, P	rimary Partition					
Disk 1 Basic	TCh	(D.)							-
70.00 GB	Temporary Stora 70.00 GB NTFS	ige (D:)							
Online	Healthy (Page File	e, Primary Pa	rtition)						
= Disk 2									
Basic									
20.00 GB Online	20.00 GB Unallocated								
Online	Unallocated								
	1								
Unallocated	Primary partition								

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

New Simple Volume Wizard		Х
	Welcome to the New Simple Volume Wizard	
	This wizard helps you create a simple volume on a disk.	
	A simple volume can only be on a single disk.	
	To continue, click Next.	
	< Back Next > Cance	1

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 betwee	en the maximum and minimum sizes.
Maximum disk space in MB:	20477
Minimum disk space in MB:	8
<u>S</u> imple volume size in MB:	1024
	< Back Next > Cancel

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

New Simple Volume Wizard			×
Assign Drive Letter or Path For easier access, you can assign a drive lett	er or drive patł	n to your partition.	
Assign the following drive letter: Mount in the following empty NTFS folder: De not assign a drive letter or drive path	Brows	¢	
	< <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.

en the maximum and minimum sizes.	
19453	
8	
<u>19453</u> ►	
< Back Next > Cance	el
	19453 8 10255 :

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

0		
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: Assign the following empty NTFS folder: Do not assign a drive letter or drive path		
Can The Format Partition window is displa		n is NTF
Can Can The Format Partition window is displation. New Simple Volume Wizard		n is NTF
The Format Partition window is displa	yed. Confirm that File Syster	n is NTF
The Format Partition window is displa New Simple Volume Wizard Format Partition	yed. Confirm that File Syster	n is NTF
The Format Partition window is displa New Simple Volume Wizard Format Partition To store data on this partition, you must format it first.	yed. Confirm that File Syster	n is NTF
The Format Partition window is displa New Simple Volume Wizard Format Partition To store data on this partition, you must format it first. Choose whether you want to format this volume, and if so, what settings you want to us	yed. Confirm that File Syster	n is NTF
The Format Partition window is displa New Simple Volume Wizard Format Partition To store data on this partition, you must format it first. Choose whether you want to format this volume, and if so, what settings you want to us O to ont format this volume	yed. Confirm that File Syster	n is NTF
The Format Partition window is displa New Simple Volume Wizard Format Partition To store data on this partition, you must format it first. Choose whether you want to format this volume, and if so, what settings you want to us O to not format this volume (*) Figmat this volume with the following settings.	yed. Confirm that File Syster	n is NTF
The Format Partition window is displa New Simple Volume Wizard Format Partition To store data on this partition, you must format it first. Choose whether you want to format this volume, and if so, what settings you want to us O to not format this volume O to not format this volume O to not format the following settings Ele system: NTFS	yed. Confirm that File Syster	n is NTF
The Format Partition window is displa New Simple Volume Wizard Format Partition To store data on this partition, you must format it first. Choose whether you want to format this volume, and if so, what settings you want to us Op on ot format this volume @)Format this volume @)Fo	yed. Confirm that File Syster	n is NTF
The Format Partition window is displa New Simple Volume Wizard Format Partition To store data on this partition, you must format it first. Choose whether you want to format this volume, and if so, what settings you want to us O to not format this volume O to not format t	yed. Confirm that File Syster	n is NTF
The Format Partition window is displa New Simple Volume Wizard Format Partition To store data on this partition, you must format it first. Choose whether you want to format this volume, and if so, what settings you want to us O to not format this volume () for not format this volume with the following settings Ele system: Allocation unit size: Yokume label: New Volume Defout Defout a quick format	yed. Confirm that File Syster	n is NTI

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 Ward. You selected the following settings: <u>Volume type: Simple Volume</u> Disk selected: Disk 2 Volume size: 19453 MB Drive letter or path: G: File system: NTFS Allocation unit size: Default Volume label: New Volume Out-ick format: Yes To close this wizard, click Finish.	
	< Back Finish Cance	el

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

	ement						-	×
Eile <u>A</u> ction	<u>V</u> iew <u>H</u> elp							
Þ 🔿 🖬 🛙	? 🖬 🗩 🗙 [-	8					
/olume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free	
🗰 (C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	111.94 GB	88 %	
- (F:)	Simple	Basic	RAW	Healthy (P	1.00 GB	1.00 GB	100 %	
- New Volume ((G:) Simple	Basic	NTFS	Healthy (P	19.00 GB	18.94 GB	100 %	
Temporary Sto	orag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %	
Disk 0 Basic 127.00 GB Online	(C:) 127.00 GB NTFS Healthy (System		e, Crash Dump, F	Primary Partition				
70.00 GB	Temporary Sto 70.00 GB NTFS Healthy (Page F	-	artition)					
Basic 70.00 GB Online	70.00 GB NTFS	-	'artition)					
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)			

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 Chapter 1, "Determining a system configuration" in the *Installation and Configuration Guide*.

8) Installing the Azure CLI

Install the Azure CLI.

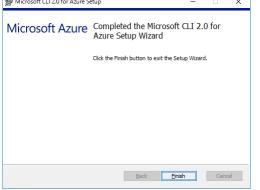
The procedure to install the Azure CLI from the installer is described. For details about this procedure and other procedures, see the following website: Install the Azure CLI: https://docs.microsoft.com/en-us/cli/azure/install-azure-cli?view=azure-cli-latest

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.

	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 agreement between Microsoft Corporation (or based on where you live, one of its affiliates) and you. They apply to the software named above. The terms also apply to any Microsoft services or updates for the software, except to the extent those have different terms.	
	TE YOU COMPLY WITH THESE LICENSE	~
	☑ accept the terms in the License Agreement	
Print	Back Install Cance	ł

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
    it is necessary to set them in the Azure environment configuration file. In the following
    example, a service principal is created in C:\Users\testlogin\examplecert.pem.
    az ad sp create-for-rbac --create-cert
    {
      "appId": "xxxxxxxx-xxxx-xxxx-xxxx-xxxx,
      "displayName": "azure-test",
      "fileWithCertAndPrivateKey": "C:\\Users\\testlogin\\examplecert.
      pem",
      "name": "http://azure-test",
      "password": null,
      }
3. Log out.
   az logout --u <account-name>
4. Check whether login to Microsoft Azure using the created service principal is possible.
    az login --service-principal -u <name-value-in-step-2> --tenant
    <tenant-value-in-step-2> -p <fileWithCertAndPrivateKey-value-in-
    step-2>
    The following is displayed upon successful sign-in.
    [
      {
        "cloudName": "AzureCloud",
        "id": "xxxxxxxx-xxxx-xxxx-xxxx-xxxxx,",
        "isDefault": true,
        "name": "xxxxxxxxx",
        "state": "Enabled",
        "tenantId": "xxxxxxxx-xxxx-xxxx-xxxx-xxxx,",
        "user": {
         "name": "http://azure-test",
         "type": "servicePrincipal"
        }
      }
5.
   Log out.
    az logout --username <name-value-in-step-4>
```

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

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.

3.3 Configuring the EXPRESSCLUSTER settings

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

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

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

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

1) Creating a cluster

Start the cluster generation wizard to create a cluster.

- Creating a cluster
 - 1. Access Cluster WebUI, and click Cluster generation wizard.

Cluster webu1 <cluster></cluster>	🗡 Config mode 🗸 🕹 😺 😂 🏓 1 ? 🖼
Cluster generation wizard Import Export Get the Configuration File Apply the Configuration File	Update Server Data

2. The Cluster window on the Cluster Generation Wizard is displayed. Enter a desired name in Cluster Name.

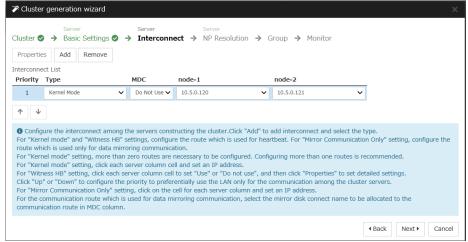
Server Server	server Inect → NP Resolution → Group → Monitor
iluster Name*	Cluster1
comment	
anguage*	English 🗸
lanagement IP Address	
If using the integrated WebManager to mana	inguage (locale) of the environment that runs WebManager. Je multiple clusters, specify a unique cluster name to identify the cluster. ddress used for a WebManager connection. If establishing connections by specifying each server IP omitted.

 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 re Both IPv4 and IPv6 for IP address can When entering an IP address, the server	esolution is necessary. be used.
	OK Cancel
Cluster generation wizard Server Server Server Cluster ♥ → Basic Settings → Interconnect → NP Resolu Add Remove Server Definitions	× ition → Group → Monitor
Order Name Master server node-1	
1 node-2	
Server Group Definition	Settings
● Click "Add" to add servers constructing the duster. Click 「↑」 or 「↓」 to change the server priority. Click "Settings" to configure the server group when using the server group	up.
	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**.



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 onpremise environment (for example, using a dedicated line). Additionally, you can use network partition resolution resources for NP resolution.

lick Next .	
P Cluster generation wizard	×
Server Server Server Cluster ♥ → Basic Settings ♥ → Interconnect ♥ → NP Resolution → Group → Monitor Properties Add Remove VP Resolution List Type Ping Target node-1 No NP resolutions	
© Configure network partition (NP) resolution function. Click "Add" to add NP resolution resource and select the type. For "COM" setting, click each server column cell to configure COM port. For "DISK" setting, click Ping target column cell to configure IP address of Ping destination, and then click each server colum "Do not use". For "HITP" setting, click Ping target column cell to configure HTP packet destination, and then click each server column to use". For "HiTTP" setting, dick Ping target column cell to configure HTTP packet destination, and then click each server column not use". For "HITTP" setting, double-click each server column cell to configure "Use" or "Do not use". For "DISK", "Ping", and "HTTP" settings, the detailed settings can be verified and changed by clicking "Properties". Click "Tuning" to configure the actions at NP occurrence.	
	Back Next Cancel

2) Adding a group resource

• Defining a group

Create a failover group.

1. The Group List window s displayed.

Click Add.			×
Server Server Server Cluster O + Basic Settings O + Interconnect O + NP Resolution O + Group + Monitor Properties Add		Group	Resource
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. 			
	A Back Back Back Compared Compar	Next 🕨	Cancel

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

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

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

Group Definition	failover 🗙
Basic Settings ⊘ → Startup Servers ⊘ → Group Attributes ⊘ → Group Resource	
Properties Add Remove	
Group Resource List	
Name Type	
No resources	
 Click "Add" to add resources. Click "Properties" to configure the properties of the selected resource. 	
4 Back Finis	h 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.
- 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			
Name*	md			
Comment				
Get license information				
• Select the type of group resource and	enter its name.			
		Gack Next ► Cancel		
The Dependency window i	in displayed			

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

5. The **Details** window is displayed.

Select a server name in the Name column of Servers that can run the group and click Add.

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

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

Selection of	of partition			
Obtain info	rmation			
Connect				
Data Partit	ion			
Volume	Disk No.	Partition No.	Size	GUID
	0	1	500MB	ATTACK AND AND AND ADDRESS OF
D:¥	1	1	71678MB	And when they are stored and an end of the
F:¥	2	1	1024MB	-Carlo Can and and -Committee
C:¥	0	2	129546MB	chairs and construction in the second
G:¥	2	2	19453MB	THE REPORT OF A DESCRIPTION OF A DESCRIP
Cluster Par	tition			
Volume	Disk No.	Partition No.	Size	GUID
	0	1	500MB	and the state last and the state of the
D:¥	1	1	71678MB	induction and some one concerning
F:¥	2	1	1024MB	CONTRACTORS AND ADDRESS OF THE OWNER.
C:¥	0	2	129546MB	and of the same same same the income
G:¥	2	2	19453MB	which any new case or comments
				OK Cancel
				ok Cancer

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

Resource Definition of Group failover1			md \times
Info \bigcirc \rightarrow Dependency \oslash \rightarrow Recovery Operation \oslash	→ Details		
Mirror Disk No.*	1 ¥		
Data Partition Drive Letter*	G:		
Cluster Partition Drive Letter*	F:		
Cluster Partition Offset Index*	0 🗸		
Mirror Disk Connect	Select		
Servers that can run the group			
Name Data Partition Cluster Partition	←	Name	
node-1	Add		
node-2	→ Remove		
Edit			
Tuning			
			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.
- 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				ıredns 🗙	
Info → Dependency → Recovery	Operation 🔶 Details				
Туре*	Azure DNS resource				
Name*	azuredns1				
Comment					
Get license information					
Select the type of group resource and	enter its name.				
				Next 🕨	Cancel

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

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

Resource Definition of Group failover	-1		azuredns 🗙
Info ♥ → Dependency ♥ → Reco Common node-1 node-2	overy Operation 🤡 🔶 Deta	nils	
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*	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX		
File Path of Service Principal*			
Azure CLI File Path*			
Delete a record set at deactivation	V		
Tuning			
		✓ Back Fin	ish Cancel
Click Finish .			

6.

3) Adding a monitor resource

Azure DNS monitor resource

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

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

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

Custom monitor resource

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

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

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

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

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

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

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

Select Script created with this product.

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

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

Select Synchronous for Monitor Type. Click Next.

Monitor Resource Definition		genw >
Info ⊘ → Monitor(common) ⊘	Monitor(special) → Re	ecovery Action
○ User Application ● Script created with this product		
File		
		Edit View Replace
Monitor Type	Synchronous	
	O Asynchronous	
Normal Return Value*	0	
Kill the application when exit		
Wait for activation monitoring to stop before stopping the cluster		
		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 Actio	on
Recovery Action	Execute only the final action	~
Recovery Target *	LocalServer	Browse
Recovery Script Execution Count		
Execute Script before Reactivation Maximum Reactivation Count		
Execute Script before Failover Execute migration before Failover		
Failover Target Server	 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

3.

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	
 Select the type of monitor resource and 	d enter its name.
The Monitor (common) wi	
Confirm that Monitor Timir	g is Always .
Monitor Resource Definition	ipw 🗙
Info 🤡 🔶 Monitor(common) 🔶	1onitor(special) 🔶 Recovery Action
Interval*	60 sec
Timeout*	60 sec
Do Not Retry at Timeout Occurrence	
Do Not Execute Recovery Action at Time	out Occurrence
Retry Count*	1 time
Wait Time to Start Monitoring*	0 sec
Monitor Timing	
 Always 	
○ Active	
Target Resource	Browse
Choose servers that execute monitoring	Server
	Gancel Accel Accel Cancel

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

Failure Detection Server			
All serversSelect			
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 \bigcirc \rightarrow Monitor(common) \oslash \rightarrow	Monitor(special) → Rec	overy Action		
Edit Add Remove				
IP Address List IP Address				
No Ip Address				
Please add a IP Address.				
ping Timeout*	5000	msec		
			4 Back	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 Settings			
IP Address*	10.5.0.121		
			OK Cancel
Monitor Resource Definition			ipw 🗙
Info ♥ → Monitor(common) ♥ →	Monitor(special) → Red	covery Action	
Edit Add Remove			
IP Address List IP Address			
10.5.0.121			
ping Timeout*	5000	msec	

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

Recovery Action	Execute only the final action	Execute only the final action		
Recovery Target *	LocalServer	Browse		
Recovery Script Execution Count				
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	\sim		

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

3.

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) → Moni	itor(special) 🔸 Recovery Action
Туре*	Multi target monitor
Name*	mtw1
Comment	
Get Licence Info	
Select the type of monitor resource and	d enter its name.
	Back Next ► Cancel
The Monitor (common) wir	ndow is displayed.
	g 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 Times	out Occurrence
Retry Count*	1 time
Wait Time to Start Monitoring*	0 sec
Monitor Timing	
Always	
○ Active	
Target Resource	
Choose servers that execute monitoring	Server

Back Next
 Next

Cance

- 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(commo	on) 🥑 🔶 Monito	or(special) 🔶 R	lecovery Action	
Monitor Resource List			Available Monitor Resources	
Monitor Resource	Туре	←	Monitor Resource	Туре
genw1	genw	Add	userw	userw
ipw1	ipw	→		
ipw2	ipw	Remove		
Tuning				
			 Back 	Next Cancel

- 5. The **Recovery Action** window is displayed.
 - Specify Execute only the final action for Recovery Action, LocalServer for Recovery Target, and Stop the cluster service and shutdown OS for Final action.

	→ Monitor(special) → Recovery Act				
Recovery Action	Execute only the final action	Execute only the final action \checkmark			
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	~			
		Scrip	t Settings		
		Gack Finish	Cancel		

6. Click **Finish** to finish setting.

4) Setting the cluster properties

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

Cluster properties

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

Enter Config Mode from Cluster WebUI, click the property icon of the cluster name.
 Cluster Properties | Cluster1

	meout Port No. or Disk Account	Monitor R RIP(Legacy)	· · ·	Alert Service n Extension	WebManager
Cluster Name	Cluster1				
Comment					
Language	English 🗸				
				ОК	Cancel Apply

 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.

Tefe Teterenet ND Develotion	in and Deat	No. Marihan D		. Consider	M-6M
	imeout Port or Disk Acco			: Service Extension	WebManager
Network initialization complete wait time*	3	min	hightion	Extension	
Server Sync Wait Time*	5	min			
Heartbeat					
Interval*	3	sec			
Timeout*	270	sec			
Server Internal Timeout*	180	sec			
Initialize					
				ОК	Cancel Apply

3. Click OK.

5) Applying the settings and starting the cluster

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

- Select the Operation Mode on the drop down menu of the toolbar in Cluster WebUI to 2. switch to the operation mode. Select Start Cluster in the Status tab of Cluster WebUI and click.
- Confirm that a cluster system starts and the status of the cluster is displayed to the Cluster 3. 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 \rightarrow How to create a cluster

3.4 Verifying the created environment

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

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

- 1. Start the failover group (failover1) on the active node (node-1). In the Status tab on the Cluster WebUI, confirm that **Group Status** of failover1 of node-1 is **Normal**.
- 2. Log in to the Microsoft Azure portal, select cluster1.zone on the **DNS zone** blade, and then select **Summary**. Check the DNS servers displayed on the upper right of the window (name server 1, name server 2, name server 3, and name server 4 in the window example).
- Confirm that the relevant record set exists in the DNS servers checked in the above step by executing the nslookup command as follows: nslookup test-record1.cluster1.zone < DNS servers checked in the above step>
- 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**.
- Confirm that the relevant record set exists in the DNS servers checked in the above step by executing the nslookup command as follows: nslookup test-record1.cluster1.zone < DNS_servers_checked_in_the_above_step>

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

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

4.1 Creation example

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

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

Resource group setting TestGroup1 Region Japan East Virtual network setting Name 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 Japan East Load balancer setting Name Name TestLoadBalancer Type Public Public IP address: Name TestLoadBalancerPublicIP Public IP address: Static Assignment Resource group Resource group TestBackendPool Associated to Availability set Target virtual machine node-1 node-2 Network IP configuration 10.5.0.120 Health probe: Name TestLoadBalancingRule Name TestLoadBalancingRule Load balancing rule: TestLoadBalancingRule Name 10.5.0.121 Health probe: Name TestLoadBalancingRule Name 800 (Port number offering the operation) Load balancing rule: 800 (Port n	Microsoft Azure settings (co	,	
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Name TestHTTP Protocol TCP			
Protocol TCP	,		
Destination Port range 8080 (Port number offering the operation)			
	Destination Port range	8080 (Port number offering the operation)	

• Microsoft Azure settings (common to 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	Japan East			
Network security group	setting			
Name	NetSecGroup-1			
Availability set setting	Availability set setting			
Name	AvailabilitySet-1	AvailabilitySet-1		
Update domains	5	5		
Fault domains	2	-		
Diagnostics storage acc				
Name		Automatically generated (testgroup1diag679)		
Replication	Locally-redundant sto	rage (LRS)		
IP configuration setting				
IP address	10.5.0.120	10.5.0.121		
Blob storage setting				
Name	node-1Blob1	node-2Blob1		
Source type	None (empty disk)			
Account type	Standard HDD	Standard HDD		

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

• EXPRESSCLUSTER settings (cluster properties)

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

• EXPRESSCLUSTER settings (failover group)

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

Monitor resource name	Setting item	Setting value
Mirror disk monitor	-	-
resource		
Azure probe port monitor	Name	azureppw1
resource	Recovery Target	azurepp1
Azure load balance	Name	aurelbw1
monitor resource	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	Name	mtw1
resource	Monitor resource list	genw1
		ipw1
		ipw2
	Recovery Action	Execute only the final action
	Recovery Target	LocalServer
	Execute Script before Final Action	On
	Timeout	30

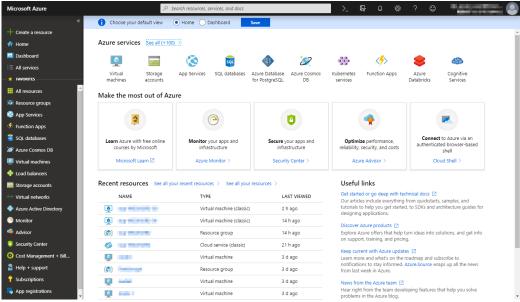
• EXPRESSCLUSTER settings (monitor resource)

4.2 Configuring Microsoft Azure

1) Creating a resource group

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

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



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

Microsoft Azure	\wp Search resources, services, and docs	\geq G	û	
	Home > Resource groups			
Create a resource	Resource groups 環境のディレクトUMMEC			Ń
🛧 Home	Add Edit columns Refresh Assign tags ✓ Export to CSV			
🗖 Dashboard	Subscriptions:			
∃ All services				
+ FAVORITES	Filter by name All locations	~	All tags V No groupin	g v
All resources	23 items			
🕅 Resource groups	NAME 13	SUBSCRIPTION 1	LOCATION 1	
S App Services		1993 (1997), 1993 (1997), 1993 (1997)	1000 (K)	^
Function Apps		1998 (P. 1998, S. 1998)	10.00.0000000	
SQL databases		Contraction, and the second second	The Advancement of the Advancement	
Azure Cosmos DB		and the second second	April 1000	
Virtual machines		1000 (0. 1000 (0. 1000))	Territory.	
Load balancers		and the second second	The Residence of Concerning State	
Storage accounts		1000 (0.000 (0.000 (0.000))	(automatic)	
··· Virtual networks		and the second second	man Arraya	
Azure Active Directory		and the second second	the state of the state of the	
Monitor		and the second second	(and (second)))	
Advisor		1000 (0.000 (0.000))	- and 5at	
		CONTRACTOR AND AND	Test with	
Security Center		CONTRACTOR OF A DESCRIPTION	Jacob Land	
Oost Management + Bill		CONTRACTOR OF A DESCRIPTION	-000 Not	
Help + support		CONTRACTOR OF A DESCRIPTION		
🕆 Subscriptions		and a second sec	Jacob Section 1	
App registrations				+

3.

м

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

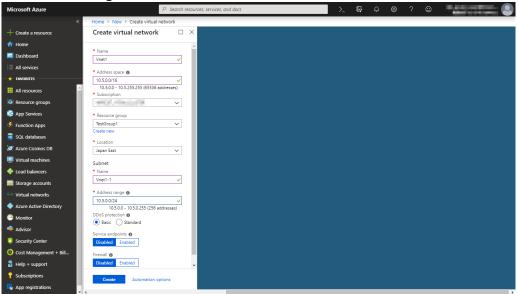
Microsoft Azure	,○ Search resource	rces, services, and docs		
«	Home > Resource groups > Create a resource group			
+ Create a resource	Resource groups « ポ × 聞かのディレクトリ(WPEC)	Create a resource group ×		
🛧 Home	+ Add II Edit columns ···· More			
🔲 Dashboard	Filter by name	Basics Tags Review + Create		
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2) Creating a virtual network

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

- Microsoft Azure >_ ------🖲 Home 🔵 Dashboard () Choose your default view + Create a resource Azure services See all (+100) > 📴 Dashboard ٢ **(P**) 2 $\langle \!\!\!/ \rangle$ 8 SQL 430 E All services SQL databases Azure Database Azure Cosmos for PostgreSQL DB Function Apps Azure Databricks Virtual machines Storage accounts App Services Kubernetes services Cognitive Services 🛨 FAVORITES -All resources Make the most out of Azure 😵 Resource groups Services M <u>(</u> 0 -. Function Apps Connect to Azure via an authenticated browser-based shell SQL databases Learn Azure with free online courses by Microsoft Monitor your apps and infrastructure Secure your apps and infrastructure Optimize performance, eliability, security, and costs 🬌 Azure Cosmos DB Azure Advisor > Cloud Shell > Microsoft Learn 🖄 Azure Monitor > Security Center > Virtual machines 🚸 Load balancers Recent resources See all your recent resources See all your resources Useful links Storage accounts Get started or go deep with technical docs. [2] Our articles include everything from quickstarts, samples, and tutorials to help you get started, to SDKs and architecture guides for designing applications. NAME TYPE LAST VIEWED Virtual networks Azure Active Directory • Virtual machine (classic) 2 h ago . Monitor Virtual machine (classic) 14 h ago Discover Azure products 12 🔷 Advisor (*) Resource group 14 h ago Explore Azure offers that help turn ideas into solutions, and get info on support, training, and pricing. 🙆 Security Center ø Cloud service (classic) 21 h ago Keep current with Azure updates [2] Learn more and what's on the roadmap and subscribe to notifications to stay informed. Azure-Source wraps up all the news from last week in Azure. Ost Management + Bill.. Q Virtual machine 3 d ago 🔒 Help + support (*) Resource group 3 d ago **Ŷ** Subscriptions Virtual machine News from the Azure team IZ Hear right from the team developing features that help you solve problems in the Azure blog. 3 d ago 😽 App registrations Virtual machine 3 d ago 2. Select Networking and then Virtual network. <u>></u>Б-Ф @? © Microsoft Azure Create a resource New $\Box \times$ 🛖 Home , Search the Marketplace 📴 Dashboard Azure Marketplace See all Featured See all 🛨 FAVORITES -Get started $\langle \cdots \rangle$ Virtual network Quickstart tutorial All resources Recently created 😭 Resource groups Compute Networking Load Balancer 🔇 App Services Storage Application Gateway 👼 SQL databases \langle Web 🧟 Azure Cosmos DB Mobile /irtual network gateway Virtual machines Containers 🚸 Load balancers Databases 🧮 Storage accounts Virtual WAN Analytics 1 ··· Virtual networks AI + Machine Learning 🚸 Azure Active Dire Internet of Things DNS zone Quickstart tutorial 6 Monitor Mixed Reality 🏟 Advisor Integration Cisco ASAv - BYOL 4 NIC (preview) Security Center Security Ost Management + Bill. Identity Citrix ADC 12.0 VPX Enterprise Edition - 200Mbps (preview) Help + support Developer Tools Learn more **9** Subscriptions Management Tools Network security group 😽 App registratio Software as a Service (SaaS) Quickstart tutoria
- 1. Select **+Create a resource** or the **+** icon in the menu on the left side of the window.

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

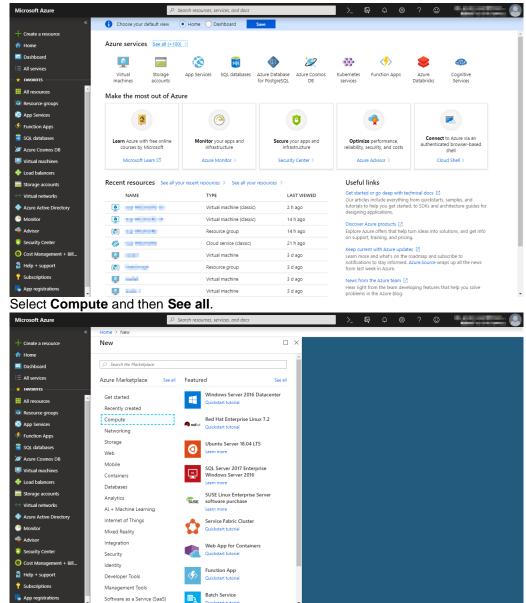


3) Creating a virtual machine

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 or the + icon in the menu on the left side of the window.



2.

- 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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🔇 App Services	Select the subscription to manage deployed re resources.	sources and costs. Use resource groups like folders to organize and manage all you	r		5						
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🬌 Azure Cosmos DB	Resource group 0	Create new	~								
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5. 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 >**

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E All services	Showing 191 VM sizes. Subscription: Region: Japan East Current size: Standard_A1	
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🗟 SQL databases 🔹 Virtual	A1 Basic General purpose 1 1.75 2 2x300 No ¥3,415	
X Azure Cosmos DB * Region	A1_v2 Standard General purpose 1 2 2 2x500 No ¥6,748	
Virtual machines	A2 Standard General purpose 2 3.5 4 4x500 No ¥17,677	
Load balancers Image	A2 Basic General purpose 2 3.5 4 4x300 No ¥12,083	
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6. When the **Disks** tab appears, go through the following steps to add a blob to be used for a mirror disk (cluster partition or data partition).

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

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* FAVORITES	the VM determines the type of storage you can	n use and the number of data disks allowed. Learn more					
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 The Create a new disk blade appears. Specify the settings of Disk type, Name, Size (GiB), and Source type. Then click OK. Click Next: Networking >.

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🛄 Dashboard	Create a new disk to store appli-	ations and data on your VM. Disk pricing varies based on factors includi s. Learn more about Azure Managed Disks	ding disk size, storage
E All services			
+ FAVORITES	* Disk type	Standard HDD	v
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🚱 Resource groups	* Size (GiB) 🚯		
🔇 App Services	* Source type 🚯	None (empty disk)	~
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8. 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 >

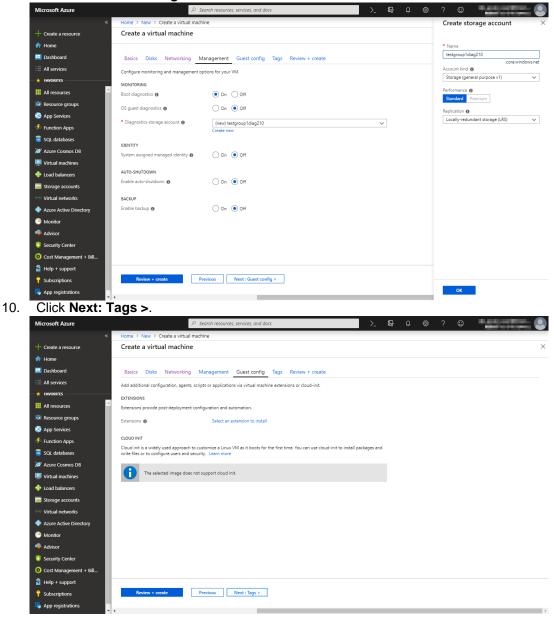
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9. The Management tab appears.

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: Guest config >.

11. Click Next: Review + create >.

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12. 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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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.

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

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Monitor	•	Virtual machine (classic)	14 h ago	Discover Azure products [2] Explore Azure offers that help turn ideas into solutions, and get info on support, training, and pricing.								
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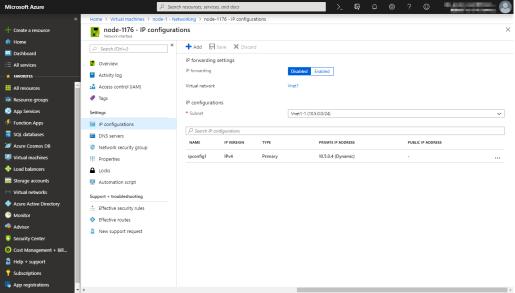
3. The summary of TestGroup1 is displayed. Select virtual machine node-1 or node-2 from the item list.

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4.

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

6. Select IP configurations.



- 7. Only ipconfig1 is displayed in the list. Select it.
- Select Static for Assignment under Private IP address settings. Enter the IP address to be assigned statically in the IP address text box and click Save at the top of the window. The IP address of node-1 is 10.5.0.120. The IP address of node-2 is 10.5.0.121.

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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 Blob storage. For details about a partition for the mirror disk resource, see "Partition settings for mirror disk resource (when using Replicator)" in "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the *Installation and Configuration Guide*.

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

Initialize Disk	×
You must initialize a disk before Logical Disk Manager can access it. Select disks: ØDisk 2	
Use the following partition style for the selected disks: (MBR (Master Boot Record) (GPT (GUID Partition Table)	
Note: The GPT partition style is not recognized by all previous versions 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 Managem	ient						-		×
<u>File Action Vi</u>									
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Volume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free		
••••• (C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	113.12 GB	89 %		
- Temporary Stor	ag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %		
Disk 0									
Basic	(C:)	////////				///////////////////////////////////////	///////////////////////////////////////	////	
127.00 GB Online	127.00 GB NTFS								
Online	Healthy (System,	Boot, Active,	Crash Dump, Pr	imary Partition					
	<u> </u>						///////////////////////////////////////		
Disk 1									_
Basic 70.00 GB	Temporary Stora 70.00 GB NTFS	ge (D:)							
Online	Healthy (Page File	, Primary Pa	rtition)						
- Disk 2									
Basic									
20.00 GB Online	20.00 GB Unallocated								
onne	onanocated								
Unallocated	Primary partition								

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

New Simple Volume Wizard		×
	Welcome to the New Simple Volume Wizard	
	This wizard helps you create a simple volume on a disk.	
	A simple volume can only be on a single disk.	
	To continue, click Next.	
	< Back Next > 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 betwee	en the maximum and minimum sizes.	
Maximum disk space in MB:	20477	
Minimum disk space in MB:	8	
<u>S</u> imple volume size in MB:	1024	
	< <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 lette	er or drive path to your partition.
Assign the following drive letter: Mount in the following empty NTFS folder:	F v Browse
O <u>D</u> o not assign a drive letter or drive path	< Back Next > Cancel

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

	×
en the maximum and minimum sizes.	
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< <u>B</u> ack <u>N</u> ext > Cancel	
	19453 8 IEEEE

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

New Simple Volume Wizard	×
Assign Drive Letter or Path For easier access, you can assign a drive letter or drive path to your partition.	
Assign the following drive letter: G Mount in the following empty NTFS folder: Browse Do not assign a drive letter or drive path	
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The Format Partition window is displa	ayed. Confirm that File system is N1
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The Format Partition window is displa	ayed. Confirm that File system is NT
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The Format Partition window is displative view Simple Volume Wizard Format Partition To store data on this partition, you must format it first. Choose whether you want to format this volume, and if so, what settings you want to us	ayed. Confirm that File system is NT
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The Format Partition window is displatively be an analysis of the set of the	ayed. Confirm that File system is NT
The Format Partition window is displatively be an advertee of the setting of the	ayed. Confirm that File system is NT

 Click Next.
 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 Witzard. You selected the following settings: Volume type: <u>Simple Volume</u> Disk selected: Disk 2 Volume size: 19453 MB Drive letter or path: G: File system: NTFS Allocation unit size: Idefault Volume label: New Volume Cauck format: Yes To close this wizard, click Finish.	
	< Back Finish Cance	el

📅 Disk Management _ \times <u>File</u> <u>Action</u> <u>View</u> <u>H</u>elp 🗢 🔿 | 📰 | 📔 🗊 | 🗩 🗙 🕑 🔒 🦕 🖾
 Volume
 Layout

 (C)
 Simple

 (F:)
 Simple

 New Volume (G:)
 Simple

 Temporary Storag...
 Simple
 Layout Type File System Status Free Spa... % Free Capacity Healthy (S... 127.00 GB Healthy (P... 1.00 GB Healthy (P... 19.00 GB Healthy (P... 70.00 GB NTFS 111.94 GB 88 % Basic 1.00 GB 100 % 18.94 GB 100 % Basic RAW NTFS Basic Basic NTFS 68.77 GB 98 % - Disk 0 Basic 127.00 GB Online (C:) 127.00 GB NTFS Healthy (System, Boot, Active, Crash Dump, Primary Partition)

> New Volume (G:) 19.00 GB NTFS Healthy (Primary Partition)

Disk 1 Basic 70.00 GB Online

Disk 2 Basic 20.00 GB Online

Unallocated Primary partition

Temporary Storage (D:) 70.00 GB NTFS Healthy (Page File, Primary Partition)

(F:) 1.00 GB RAW Healthy (Primary Partition)

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

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.

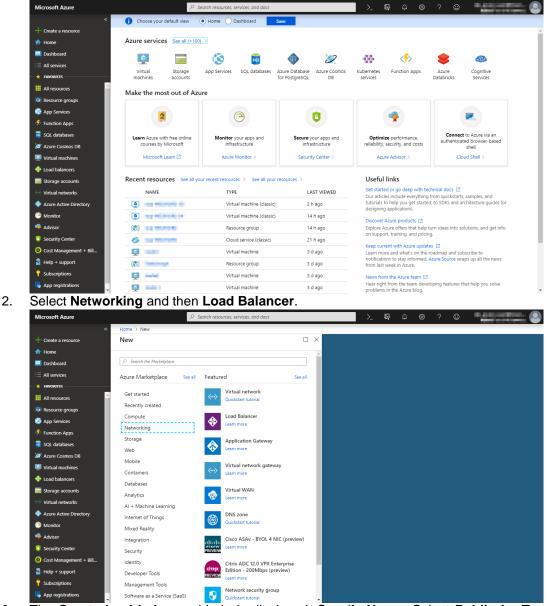
For details, see the following websites:

Load Balancer:

•

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

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



- 3. The Create load balancer blade is displayed. Specify Name. Select Public for Type and Basic for SKU, respectively.
- 4. Specify Create new, Name and Assignment for Public IP address.

5. Specify **Subscription**, **Resource group**, and **Region**, and click **Review+create**. Deploying the load balancer starts. This processing takes several minutes.

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«	Home > New > Create load balancer						
+ Create a resource	Create load balancer						×
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E All services		that distributes incoming traffic among healthy virtual machine instances. Load					
+ FAVORITES	uses a hash-based distribution algorithm. By type) hash to map traffic to available servers.	default, it uses a 5-tuple (source IP, source port, destination IP, destination port, load balancers can either be internet-facing where it is accessible via public IP a	protocol addresses.or				
III resources		al network. Azure load balancers also support Network Address Translation (NA					
📦 Resource groups	PROJECT DETAILS						
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Function Apps	* Resource group	TestGroup1	×				
🐱 SQL databases	Career of Produ	Create new	Ŷ				
🬌 Azure Cosmos DB	INSTANCE DETAILS						
Virtual machines	* Name	TestLoadBalancer	~				
🚸 Load balancers	* Region	Japan East	~				
Storage accounts	* Type 0	Internal Public					
Virtual networks		0 0					
Azure Active Directory	* SKU 🚯	Basic Standard					
😁 Monitor	PUBLIC IP ADDRESS						
🗣 Advisor	* Public IP address 🚯	Create new Use existing					
Security Center	* Public IP address name	TestLoadBalancerPublicIP					
Oost Management + Bill	Public IP address SKU	Basic					
🔒 Help + support		er war te					¥
° Subscriptions	Review + create Previous	Next : Tags > Download a template for automation					
App registrations							

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 or the resource group icon in the menu on the left side of the window.

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«	1 Choose your default view	Home O Dashboard Sar	ve		
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Function Apps					
👼 SQL databases	Learn Azure with free online	Monitor your apps and	Secure your apps and	Optimize performance,	Connect to Azure via an
🧟 Azure Cosmos DB	courses by Microsoft	infrastructure	infrastructure	reliability, security, and costs	authenticated browser-based shell
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🚸 Load balancers					
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\varTheta Monitor	Q	Virtual machine (classic)	14 h ago	Discover Azure products	
🔷 Advisor		Resource group	14 h ago	Explore Azure offers that help t	turn ideas into solutions, and get info
Security Center	(a) 10 10 10 10 10 10 10 10 10 10 10 10 10	Cloud service (classic)	21 h ago	on support, training, and pricin	·
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Help + support	(*)	Resource group	3 d ago	notifications to stay informed. from last week in Azure.	Azure.Source wraps up all the news
Subscriptions		Virtual machine	3 d ago	News from the Azure team [2]	
Registrations		Virtual machine	3 d ago		loping features that help you solve
	*		احدا احجا احجا		·

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

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+ Create a resource	Resource groups 既定のディレクトリ(WPEC)			$x \times x$
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🧷 Azure Cosmos DB		CONTRACTOR OF A DESCRIPTION	. 10.00 March	
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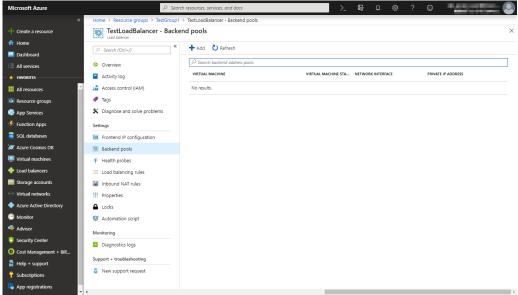
3. The summary of the selected resource group is displayed. Select the created load balancer from the item list.

Microsoft Azure		P Search resources, services, and docs >_ ₽₽ ♀ ♥	
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Create a resource	TestGroup1		\$
🟫 Home	Resource group		
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🕅 Resource groups	🛷 Tags	Click here to add tags	
🔇 App Services	Events	Â	
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Virtual machines	Policies		
Load balancers	Properties	Ode-1 Virtual machine Japan East	
Storage accounts	Locks	S node-1_OsDisk_1_71486cd179fe4c7783627bb925385b6b Disk Japan East	
Virtual networks	Automation script	node-1176 Network interface Japan East	
Azure Active Directory	-	Disk Japan East	
Monitor	Cost management	Node-2 Virtual machine Japan East	
- Advisor	🙇 Cost analysis	Source 2_OsDisk_1_bf9c31e2cfb44f0398bfd67ced7f9a1f Disk Japan East	
Security Center	③ Budgets	- Network interface Japan East	
Oost Management + Bill	Advisor recommendations	🗌 🍔 node-2Blob1 Disk Japan East	
Help + support	Monitoring	Storage account Japan East	
Subscriptions	💎 Insights (preview)	Coad Balancer Load Balancer Japan East	
App registrations	Alerts	Virtual network Japan East	

4. Select Backend pools.

Microsoft Azure	, <i>P</i> Searc	h resources, services, and docs	>_⊑	
«	Home > Resource groups > TestGroup1	> TestLoadBalancer		
+ Create a resource	TestLoadBalancer Load balancer			$x \times x$
🛧 Home		→ Move 🛍 Delete 💍 Refresh		
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E All services	Overview	Resource group (change) TestGroup1	Backend pool -	
+ FAVORITES	Activity log	Location Japan East	Health probe	
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🚱 Resource groups	🥔 Tags	weight an early and		
🔇 App Services	X Diagnose and solve problems	Subscription ID	NAT rules 0 inbound	
Function Apps	Settings	SKU Basic	Public IP address (TestLoadBalancerPublicIP)	
👼 SQL databases	Frontend IP configuration	Tags (change)	(
😹 Azure Cosmos DB	Backend pools	Click here to add tags	*	
💆 Virtual machines	🕴 Health probes		*	
🚸 Load balancers	😑 Load balancing rules			
Storage accounts	Inbound NAT rules			
Virtual networks	Properties			
Azure Active Directory	Locks			
Onitor	Automation script			
🔷 Advisor	Monitoring			
Security Center	Diagnostics logs			
Ost Management + Bill	Connect of the Market Street			
Help + support	Support + troubleshooting			
📍 Subscriptions	New support request			
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5. Click Add.



- 6. The Add backend pool blade is displayed. Specify Name.
- 7. For Associated to, select Availability set.
- 8. Specify Availability set.
- 9. Click Add a target network IP configuration.
- 10. Specify the target virtual machine for Target virtual machine and Network IP configuration.
- 11. Repeat steps 9 and 10 as many times as the number of target virtual machines.
- 12. Click **OK**.

Microsoft Azure	$ \mathcal{P} $ Search resources, services, and docs		\geq 5	Q	© () ©	*********************************
«	Home > Resource groups > TestGroup1 > TestLoadBalancer - Backend po	ols > Add backend pool					
+ Create a resource	Add backend pool						
🛧 Home	* Name						
🔟 Dashboard	TestBackendPool	✓					
E All services	IP version						
+ FAVORITES	IPv4 IPv6						
🛗 All resources 🔒	Associated to 🚯						
📦 Resource groups	Availability set	~					
🔇 App Services	Availability set 👔						
Function Apps	AvailabilitySet-1 number of virtual machines: 2	~					
🗟 SQL databases	Target network IP configurations						
🬌 Azure Cosmos DB	Only VMs within the current availability set can be chosen. Once a VM is chosen, yo network IP configuration related to it.	ou can select a					
Virtual machines							
🚸 Load balancers	Virtual machine: node-1 Network IP configuration: node-1176/ipconfig1 (10.5.0.120)	亩					
Storage accounts	* Target virtual machine 🚯	亩					
Virtual networks	node-2	~					
Azure Active Directory	size: Standard_A1, network interfaces: 1, resource group: TESTGROUP1 * Network IP configuration						
🕒 Monitor	ipconfig1 (10.5.0.121)	~					
🔷 Advisor	+ Add a target network IP configuration						
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8) Configuring a load balancer (configuring a health probe) 1. Select Health probes.

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«	Home > Resource groups > TestGroup1 >	TestLoadBalancer - Health probes						
+ Create a resource	TestLoadBalancer - Health	probes						\times
🛧 Home		+ Add						
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E All services	Overview							
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📦 Resource groups	🛷 Tags							
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🖳 Virtual machines	Health probes							
🚸 Load balancers	😑 Load balancing rules							
📻 Storage accounts	Inbound NAT rules							
Virtual networks	Properties							
Azure Active Directory	Locks							
🕒 Monitor	Automation script							
🔷 Advisor	Monitoring							
Security Center	Diagnostics logs							
Ocst Management + Bill								
🔒 Help + support	Support + troubleshooting							
💡 Subscriptions	New support request							
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- 2. Click Add.
- The Add health probe blade is displayed. Specify Name.
 Specify Protocol and Port, and click OK.

Microsoft Azure	▷ Search resources, services, e	and docs	\geq G		
«	Home > Resource groups > TestGroup1 > TestLoadBalancer -	- Health probes > Add health probe			
+ Create a resource	Add health probe				
🛧 Home	* Name				
🛅 Dashboard	TestHealthProbe	✓			
i≡ All services	IP version				
- 🛧 FAVORITES	IPv4				
III resources	Protocol O				
📦 Resource groups	TCP	~			
🔇 App Services	* Port 🕖				
Function Apps	26001	_			
👼 SQL databases	* Interval 🕐				
🬌 Azure Cosmos DB		seconds			
Virtual machines	* Unhealthy threshold ()				
🚸 Load balancers	2	consecutive failures			
Ze Storage accounts					
··· Virtual networks					
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9) Configuring a load balancer (setting the load balancing rules) 1. Select Load balancing rules.

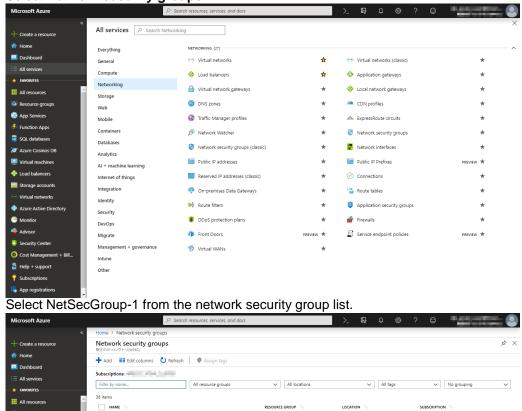
- Microsoft Azure 9<u>.000</u> • TestLoadBalancer - Load balan TestLoadBalancer - Load balancing rules × Create a resource « 🕂 Add 🛄 Dashboard 🚸 Overview NAME LOAD BALANCING RULE BACKEND POOL HEALTH PROBE Activity log 🛨 FAVO ITES — Access control (IAM) No results. All resources 🧳 Tags urce group: X Diagnose and solve problems 🔇 App Services Function Apps Settings SQL databases Frontend IP configuration 🥙 Azure Cosmos DB Backend pools Health probes Virtual machines 🚸 Load balancers 😑 Load balancing rules 📻 Storage a Inbound NAT rules Virtual networks Properties 🚸 Azure Act Locks ⊖ ма itor Automation script 🔷 Advisor Monitoring Security Center Diagnostics logs Ost Management + Bill Support + troubleshooting 🔒 Help + support New support request 💡 Subscriptions
- 2. Click Add.
- 3. The Add load balancing rule blade is displayed. Specify Name.
- 4. Specify Port and Backend port, and click OK.

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«	Home > Resource groups > TestGroup1 > TestLoadBalancer - Load balancing rule	es > Add	l load balancing rule							
+ Create a resource	Add load balancing rule		×							
🛧 Home	* Name		*							
🛄 Dashboard	TestLoadBalancingRule	~								
E All services	* IP Version									
- * FAVORITES	IPv4 IPv6									
🛗 All resources	* Frontend IP address 🚯									
📦 Resource groups	(LoadBalancerFrontEnd)	~								
🔇 App Services	Protocol TCP UDP									
Function Apps	* Port									
👼 SQL databases	80									
🬌 Azure Cosmos DB	* Backend port 🚯									
Virtual machines	8080	~								
🚸 Load balancers	Backend pool									
Storage accounts	TestBackendPool (2 virtual machine)	~								
Virtual networks	Health probe TestHealthProbe (TCP:26001)	~								
Azure Active Directory		~								
Onitor	Session persistence () None	\sim								
🔷 Advisor	Idle timeout (minutes) Ø									
Security Center	0	4								
Oost Management + Bill	Floating IP (direct server return) 🚯		1.00							
Help + support	Disabled Enabled		•							
Subscriptions	ок									
😽 App registrations										

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.

- Select All services in the menu on the left side of the window. 1.
- Select Network security groups. 2.



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🔇 App Services

👼 SQL databases

🥭 Azure Cosmos DB

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🚸 Load balancers

Storage accounts

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Security Center

💡 Subscriptions

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Monitor

Advisor

Azure Active Directory

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Help + support

5. Select Inbound security rules.

Microsoft Azure	∠ Search resource	res, services, and docs		\geq G	Q ₹	₿ ?	٢	1400		
*	Home > Network security groups > NetSecGroup	-1 - Inbound security rules								
+ Create a resource	Network security grou « A × 取定のディレクトリ(WPEC)	NetSecGroup-1 - Inbound	security	/ rules						\times
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∃ All services	Filter by name	🔇 Overview	PRIORI	TY NAME	PORT	PROTOCOL	SOURCE	DESTINAT	ACTION	
- 🛨 FAVORITES	NAME 10	Activity log	1000	A default-allow-rdp	3389	TCP	Any	Any	Allow	
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🜳 Advisor		Diagnostic settings								
Security Center		NSG flow logs								
Ost Management + Bill										
🔒 Help + support		Support + troubleshooting								
Subscriptions		Effective security rules								
Registrations		New support request								

- 6. Click Add.
- 7. The Add inbound security rule blade is displayed. Specify Name.
- 8. Specify Destination port range and Protocol, and click Add.

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«	Home > Network security groups > NetSecGroup	-1 - Inbound security rules	👔 Add inbound security rule 🛛 🕹
- Create a resource	Network security grou « ダ × 思述のディレクトリ(WPEC)	NetSecGroup-1 - Inbound see	VetSecGroup-1 Basic
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🗰 All resources 🚔	· · ·	Access control (IAM)	*
📦 Resource groups		🕐 Tags —	* Destination 😰
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Function Apps		Settings	* Destination port ranges 🗿
👼 SQL databases		inbound security rules	
🧟 Azure Cosmos DB		Outbound security rules	* Protocol Any TCP UDP
👰 Virtual machines	C and the state of	Network interfaces	* Action
Load balancers		Subnets	Allow Deny
Storage accounts	Contraction and the second	Properties	* Priority @
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App registrations			

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.

- >_ ਯ ♀ ◎ ? ◎ Microsoft Azure $\mathcal P$ Search resources, services, and docs 1 Choose your default view Home Oashboard Smin Create a resource Azure services See all (+100) 🗔 Dashboard 🖬 🔇 🗟 🌚 🖉 Ŷ 432 8 App Services SQL databases Azure Database Azure Cosmos Kubernetes Function Apps for PostgreSQL DB services Azure Databricks Virtual Storage machines accounts Cognitive Services 🛨 FAVORITES — All resources Make the most out of Azure 🔇 App Services M <u>(</u> D -👼 SQL databases Connect to Azure via an uthenticated browser-based shell Learn Azure with free online courses by Microsoft Secure your apps and infrastructure Monitor your apps and infrastructure Optimize performance, eliability, security, and costs 🬌 Azure Cosmos DB Microsoft Learn 🖄 Azure Monitor > Security Center > Azure Advisor > Cloud Shell > Virtual machines 🚸 Load balancers Recent resources See all your recent resources See all your resources Useful links Get started or go deep with technical docs: Our articles include everything from quickstarts, samples, and tutonis to help you get started, to SDKs and architecture guides for designing applications. Storage accounts Virtual networks NAME TYPE LAST VIEWED • 🚸 Azure Active Dire Virtual machine (classic) 2 h ago Virtual machine (classic) 陓 Monitor • 14 h ago Explore Azure products 2 Explore Azure offers that help turn ideas into solutions, and get info on support, training, and pricing. Resource group (*) 14 h ago Security Center 8 Cloud service (classic) 21 h ago Keep current with Azure updates [2] Learn more and what's on the roadmap and subscribe to notifications to stay informed. Azure.Source wraps up all the news from last week in Azure. Oost Management + Bill... 0 Virtual machine 3 d ago Help + support Resource group Virtual machine (*) 3 d ago 💡 Subscriptions News from the Azure team [2] Hear right from the team developing features that help you solve problems in the Azure blog. 3 d ago Virtual machine 3 d ago
- 1. Select **Resource groups** or the resource group icon in the menu on the left side of the window.

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

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🗔 Dashboard		n to csv		
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- 🛨 Favorites	Filter by name All locati	ons 🗸	All tags 🗸 No grouping	\sim
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Help + support		and the second second second	agent fact	
		CONTRACT, CONTRACTOR OF	again had	
Subscriptions		1000 C	Jacob Landard	
App registrations				

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

Microsoft Azure	,₽ Se	arch resources, services, and docs \searrow $\Bbb G$ \bigcirc ? \odot	
	Home > Resource groups > TestGroup	p1	
+ Create a resource	TestGroup1		\$
🛧 Home		× 🕂 Add ☷ Edit columns 🍵 Delete resource group 💍 Refresh → Move 🌩 Assign tags 🍵 Delete 💆 Export to CSV	
💷 Dashboard			
E All services	(*) Overview	Subscription (change) Deployments 4 Succeeded	
+ FAVORITES	Activity log	Subscription ID	
III resources	Access control (IAM)	Taqs (change)	
📦 Resource groups	🖉 Tags	Click here to add tags	
🔇 App Services	🗲 Events	*	
Function Apps	Settings	Filter by name All types All locations No grouping	
🐱 SQL databases	📣 Quickstart	9 items Show hidden types O	
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Virtual machines	Policies		
🚸 Load balancers	E Properties	Virtual machine Japan East	
Storage accounts	Locks	S node-1_OsDisk_1_71486cd179fe4c7783627bb925385b6b Disk Japan East	
Virtual networks	Automation script	Network interface Japan East	
Azure Active Directory	Cost management	Senode-1 Blob1 Disk Japan East	
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Advisor	🔯 Cost analysis	search and	
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4. The summary of the load balancer is displayed. Select Public IP address from the item list.

Microsoft Azure	,⊅ Sear	th resources, services, and docs		Ģ					10000	
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🔇 App Services	✗ Diagnose and solve problems	subscription ID		0 inbou						
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🧟 Azure Cosmos DB	Backend pools	Click here to add tags								
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🚸 Load balancers	듣 Load balancing rules									
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🕒 Monitor	Automation script									
🔷 Advisor	Monitorina									
Security Center	2 Diagnostics logs									
0 Cost Management + Bill										
🔒 Help + support	Support + troubleshooting									
Subscriptions	New support request									
😽 App registrations										
· · · · · · · · · · · · · · · · · · ·	4									÷

11) Adjusting the OS startup time, checking the network setting, checking the firewall setting, synchronizing the server time, and disabling the power saving function. For each procedure, see "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the *Installation and Configuration Guide*.

12) Installing EXPRESSCLUSTER

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

13) Registering the 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 Chapter 5, "Creating the cluster configuration data" in the the *Installation and Configuration Guide*.

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

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

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

1) Creating a cluster

Start the cluster generation wizard to create a cluster.

- Creating a cluster
 - 1. Access Cluster WebUI, and click Cluster generation wizard.

Cluster WebUI <cluster></cluster>	🗜 Config mode - 🔹 🕚 😂 🏓 i ? 📑
Cluster generation wizard Import Export Get the Configuration File Apply the Configuration File I	Update Server Data

 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.

ter → Basic Settings → Interconn	server → NP Resolution → Group → Monitor
er Name*	Cluster1
ment	
uage*	English 🗸
gement IP Address	
sing the integrated WebManager to manage	nguage (locale) of the environment that runs WebManager. e multiple clusters, specify a unique cluster name to identify the cluster. Idress used for a WebManager connection. If establishing connections by specifying each server IP mitted.

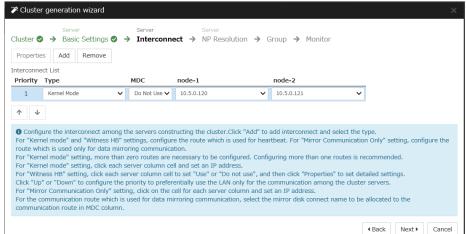
3. The **Basic Settings** window is displayed.

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 reso Both IPv4 and IPv6 for IP address can be When entering an IP address, the server	used.							
OK Cancel								
Cluster generation wizard		×						
Cluster Server Server Server Cluster Server Server	→ Group → Monitor							
Order Name Master server node-1								
1 node-2								
↑ ↓								
Server Group Definition	Settings							
● Click "Add" to add servers constructing the cluster. Click 「个」 or 「↓」 to change the server priority. Click "Settings" to configure the server group when using the server group.								
	4 Back Next ►	Cancel						

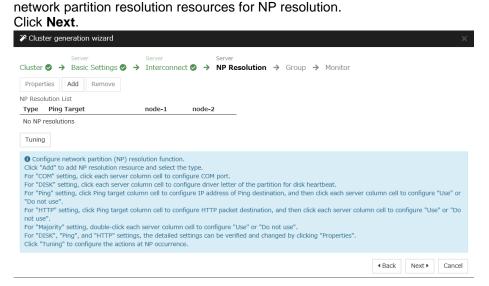
4. The **Interconnect** window is displayed.

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**.



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 onpremise environment (for example, using a dedicated line). Additionally, you can use



2) Adding a group resource

Defining a group

3.

4.

Create a failover group.

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

Click Add.			
Cluster generation wizard			×
Server Cluster ♥ → Basic Settings ♥	Server Server	olution 🤡 🔶 Group 🔶 Monitor	
Properties Add Remove			Group Resource
Group List			
Name		Туре	
No groups			
© Configure failover group to be a Click "Add" to add a group. Click "Properties" to configure the p Click "Group Resource" to add reso	properties of the selected group.		
			Gancel And And And And And And And And And

2.

The Group Definition win Specify a failover group na	dow is displayed. ame (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 clus "Failover". If using server group, check the "Use Se 	ster virtual machines, select "Virtual machine" as the type. In other cases, select
The Startup Servers wind Click Next without specify The Group Attributes win Click Next without specify	ng anything. idow is displayed. ng 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 Resour	rce
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.	
< B	Back Finish Cancel

Mirror disk resource

Create a mirror disk resource.

For details, see "Understanding mirror disk resources" in Chapter 5, "Group resource details" in the *Reference Guide*.

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

Resource Definition of Group failover	1	md 🗙
Info → Dependency → Recovery	Operation 🔶 Details	
Type*	Mirror disk resource \checkmark	
Name*	md	
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**.
- The Details window is displayed. Select a server name in the Name column of Servers that can run the group and click Add.

Info \bigcirc \rightarrow Dependency \oslash \rightarrow Recovery Operation	n 📀 🔶 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
	Add	node-1 node-2
Edit	Add >	
Edit Add Servers that can run the group	Add >	

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							
Data Partit	ion						
Volume	Disk No.	Partition No.	Size	GUID			
	0	1	500MB				
D:¥	1	1	71678MB	1000			
F:¥	2	1	1024MB				
C:¥	0	2	129546MB	1000			
G:¥	2	2	19453MB				
Cluster Par	tition						
Volume	Disk No.	Partition No.	Size	GUID			
	0	1	500MB				
D:¥	1	1	71678MB				
F:¥	2	1	1024MB	1000			
C:¥	0	2	129546MB				
		2 and 6 for not Group failover1	^{19453MB} de-1 and th	nen node-2		OK	
Perform Resource	steps 5 Definition of		de-1 and tl	nen node-2		OK	
Perform Resource	steps 5 Definition of Dependen	and 6 for not Group failover1	de-1 and tl	nen node-2		OK	
Perform Resource Info © → Mirror Disk	steps 5 Definition of Dependen	and 6 for not Group failover1 cy ⊘ → Recove	de-1 and tl	nen node-2 → Details		OK	
Perform Resource Info ♥ → Mirror Disk Data Partit	Steps 5 Definition of Dependen	and 6 for not Group failover1 cy ⊘ → Recove ter*	de-1 and tl	→ Details		OK	
Perform Resource Info @ = Mirror Disk Data Partit Cluster Par	Steps 5 Definition of Dependen No.*	and 6 for not Group failover1 cy ⊘ → Recove ter* etter*	de-1 and tl	→ Details		OK	
Perform Resource Info @ = Mirror Disk Data Partit Cluster Par	Steps 5 Definition of Dependen No.* tion Drive Lett rtition Offset :	and 6 for not Group failover1 cy ⊘ → Recove ter* etter*	de-1 and tl	→ Details		OK	
Perform Resource Info ⊘ → Mirror Disk Data Partit Cluster Par Cluster Par Mirror Disk	Steps 5 Definition of Dependen No.* tion Drive Lett rtition Drive L rtition Offset :	and 6 for not Group failover1 cy ⊘ → Recove ter* .etter* Index*	de-1 and tl	→ Details → Details 1 → G: F: 0 →		OK	
Perform Resource Info ⊘ → Mirror Disk Data Partit Cluster Par Cluster Par Cluster Par Servers tha	Steps 5 Definition of Dependen No.* tion Drive Lett rtition Offset :	and 6 for not Group failover1 cy ⊘ → Recove ter* .etter* Index*	de-1 and th	→ Details → Details 1 → G: F: 0 →		OK	
Perform Resource Info ⊘ → Mirror Disk Data Partit Cluster Par Cluster Par Cluster Par Servers tha Servers tha	steps 5 Definition of Dependen No.* tion Drive Lett rtition Drive L rtition Offset : c Connect t can run the g	and 6 for not Group failover1 cy ⊘ → Recove ter* .etter* Index* group Cluster Pa	de-1 and the ry Operation I artition	Details → Details 1 → G: F: 0 → Select	and click	OK	
Perform Resource Info ⊘ → Mirror Disk Data Partit Cluster Par Cluster Par Cluster Par Cluster Par Mirror Disk Servers tha Name I node-1	steps 5 Definition of Dependen No.* tion Drive Lett rtition Drive L tritition Offset : Connect t can run the g Data Partition	and 6 for not Group failover1 cy ⊘ → Recove ter* .etter* Index* group <u>Cluster P</u> a	de-1 and the ry Operation I artition	Details → Details 1 → G: F: 0 → Select	and click	OK	
Perform Resource Info ⊘ → Mirror Disk Data Partit Cluster Par Cluster Par Cluster Par Cluster Par Mirror Disk Servers tha Name I node-1	Steps 5 Definition of Dependen No.* tion Drive Lett rtition Drive L trition Offset : Connect t can run the g Data Partition	and 6 for not Group failover1 cy ⊘ → Recove ter* tetter* Index* group <u>Cluster Pa</u>	de-1 and the ry Operation I artition	Details → Details 1 → G: F: 0 → Select	and click	OK	
Perform Resource Info ⊘ → Mirror Disk Data Partit Cluster Par Cluster Par Cluster Par Mirror Disk Servers tha Name I node-1	steps 5 Definition of Dependen No.* tion Drive Lett rtition Drive L tritition Offset : Connect t can run the g Data Partition	and 6 for not Group failover1 cy	de-1 and the ry Operation I artition	Details → Details 1 G: F: 0 Select ← Add →	and click	OK	Ca m

• 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**.

	failover1	azurepp 🗙
Info → Dependency → F	Recovery Operation \rightarrow Details	
Type*	Azure probe port resource	
Name*	azurepp1	
Comment		
Get license information		
Select the type of group res	source and enter its name.	
	ndow is displayed. Click Next witho	ut specifying anything.
The Recovery Opera	ation window is displayed. Click Ne	ut specifying anything. xt .
The Recovery Opera For Probeport , enter	ation window is displayed. Click Ne r the value specified for Port whe	ut specifying anything. xt .
The Recovery Opera or Probeport , enter configuring health pr	ation window is displayed. Click Ne r the value specified for Port whe obe).	ut specifying anything. xt . n configuring a load bala
The Recovery Opera For Probeport , enter	ation window is displayed. Click Ne r the value specified for Port whe obe).	ut specifying anything. xt .
The Recovery Opera or Probeport , enter configuring health pro- Resource Definition of Group	ation window is displayed. Click Ne r the value specified for Port whe obe).	ut specifying anything. xt . n configuring a load bala
The Recovery Opera or Probeport , enter configuring health pro- Resource Definition of Group	ation window is displayed. Click Ne r the value specified for Port whe obe). failover1	ut specifying anything. xt . n configuring a load bala

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.	

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 					
O Active					
Target Resource					wse
Choose servers that execute monitoring	Server				
			 Back 	Next ►	Cancel

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

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

< *EXPRESSCLUSTER_installation_path*>\bin\clpazure_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		
		Edit View Replace
Monitor Type	Synchronous	
Monitor Type	 Synchronous Asynchronous 	
Monitor Type Normal Return Value*		
	O Asynchronous	
Normal Return Value*	O Asynchronous	

 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.

Info 📀 🔶 Monitor(common) 📀	→ Monitor(special) → Recove	ry Action
Recovery Action	Execute only the final action	
Recovery Target *	LocalServer	Browse
Recovery Script Execution Count		
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		
Execute Script before Final Action		
Final Action	No operation	~
		Script Settings
		Gancel Ga

- 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) → Mon	itor(special) → Recovery Action	
Туре*	IP monitor	
Name*	ipw1	
Comment		
Get Licence Info		
• Select the type of monitor resource an	id enter its name.	

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

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 				
O 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**.



4. The Monitor (special) window is displayed.

Monitor Resource Definition		ipw	×
Info ⊘ → Monitor(common) ⊘ →	Monitor(special) -> Recovery Action		
Edit Add Remove			
IP Address List IP Address			
No Ip Address			
Please add a IP Address.			
ping Timeout*	5000 msec		
	 ✓ Back Next ▶ 	Cance	ł

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 \bigcirc \rightarrow Monitor(common) \oslash \rightarrow	Monitor(special) → Red	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.

Recovery Action	Execute only the final action		~
Recovery Target *	LocalServer	Browse	
Recovery Script Execution Count			
Execute Script before Reactivation			
Maximum Reactivation Count			
Execute Script before Failover			
Execute migration before Failover			
Failover Target Server	Stable server		
	Maximum priority server		
Maximum Failover Count	0 time		
Execute Script before Final Action			
Final Action	No operation	~	

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

3.

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

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

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

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

Monitor Resource Definition			mtw 🗙
Info → Monitor(common) → Mor	itor(special) → Recovery Action		
Туре*	Multi target monitor		
Name*	mtw1		
Comment			
Get Licence Info			
Select the type of monitor resource an	nd enter its name.		
		Gack Next Next	Cancel
The Monitor (common) wi	ndow is displayed.		
Confirm that Monitor Timir	ng is Always and click Next.		
Monitor Resource Definition			mtw 🗙

→ Recovery	Action			
60	sec			
60	sec			
1	time			
0	sec			
Server				
		A Back	Next 🕨	Cano
	60 60 1 0	60 sec 1 time 0 sec	60 sec 60 sec 1 time 0 sec Server	60 sec 60 sec 1 time 0 sec 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	า			mtw 🗙
Info 🥑 🔶 Monitor(comm	non) 🥑 🔶 Moni	itor(special) 🔶 R	ecovery Action	
Monitor Resource List			Available Monitor Resources	
Monitor Resource	Туре	<i></i>	Monitor Resource	Туре
genw1	genw	Add	userw	userw
ipw1	ipw	→		
ipw2	ipw	Remove		
Tuning				
			4 Back	Next • Cancel

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

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) 📀 🔶 Reco	very Action	
Recovery Action	Execute only the final action		~
Recovery Target *	LocalServer	Browse	
Recovery Script Execution Count	0 time		
Execute Script before Reactivation			
Maximum Reactivation Count	0 time		
Execute Script before Failover			
Execute migration before Failover			
Failover Target Server	 Stable server Maximum priority server 		
Maximum Failover Count	0 time		
Execute Script before Final Action	V		
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
  -----
  rem Check Active Node
  <EXPRESSCLUSTER_installation_path>\bin\clpazure_port_checker -h 127.0.0.1 -p <
  Backend_port_of_the_load_balancer_of_Load_balancing_rule>
  IF NOT "%ERRORLEVEL%" == "0" (
     GOTO CLUSTER_SHUTDOWN
  )
  rem Check DNS
  <EXPRESSCLUSTER_installation_path>\bin\clpazure_port_checker
                                                                -h
                                                                       <
  Frontend_IP(public_IP_address)_of_the_load_balancer>
                                                           -p
                                                                       <
  Port_of_the_load_balancer_of_Load_balancing_rule>
  IF "%ERRORLEVEL%" == "0" (
     GOTO EXIT
  )
  rem Cluster Shutdown
  :CLUSTER_SHUTDOWN
  clpdown
  rem EXIT
  :EXIT
  EXIT 0
  -----
```

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

Edit Script		×
○ User Application	oduct	
File	preaction.bat	
		Edit View Replace
Timeout*	15 sec	
		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 EXPERSSCLUSTER.

1. Enter **Config Mode** from Cluster WebUI, click the property icon of the cluster name. Cluster Properties | Cluster1

	meout Port No. or Disk Account	Monitor R RIP(Legacy)	,	Alert Service	WebManager
Cluster Name	Cluster1				
Comment					
Language	English 🗸				
				ОК	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.

	imeout Port or Disk Acco		· ·	Service W xtension	/ebManager
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					
				ОК	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.

- Select the Operation Mode on the drop down menu of the toolbar in Cluster WebUI to 2. switch to the operation mode.Select Start Cluster in the Status tab of Cluster WebUI and click.
- Confirm that a cluster system starts and the status of the cluster is displayed to the Cluster 3. 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 ٠ \rightarrow How to create a cluster

4.4 Verifying the created environment

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

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

- 1. Start the failover group (failover1) on the active node (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 5 Cluster Creation Procedure (for an HA Cluster Using an Internal Load Balancer)

5.1 Creation example

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

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

9 (mmon to node-1 and node-2)
Setting item	Setting value
Resource group setting	
Resource group	TestGroup1
Region	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	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	Japan East
Backend pool: Name	TestBackendPool
Associated to	Availability set
Target virtual machine	node-1
	node-2
Network IP configuration	10.5.0.120
	10.5.0.121
Health probe: Name	TestHealthProbe
Health probe: Port	26001
Load balancing rule:	TestLoadBalancingRule
Name	
Load balancing rule: Port	80 (Port number offering the operation)
Load balancing rule: Backend port	8080 (Port number offering the operation)
· ·	1

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

• 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	Japan East							
Network security group set								
Name	NetSecGroup-1							
Availability set setting								
Name	AvailabilitySet-1							
Update domains	5							
Fault domains	2							
Diagnostics storage account setting								
Name	Automatically generated (testgroup1diag679)							
Performance	Standard	Standard						
Replication	Locally-redundant storage (LRS	5)						
IP configuration setting								
IP address	10.5.0.120	10.5.0.121						
Blob storage setting								
Name	node-1Blob1	node-1Blob1 node-2Blob1						
Source type	None (empty disk)							
Account type	Standard HDD							

• 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	10.5.0.5					
Target						
NP Resolution Tab:	Use	Use				
<server> column</server>						

• EXPRESSCLUSTER settings (failover group)

Resource name	Setting item	Setting value
Mirror disk resource	Nama	md
	Details Tab: Data Partition	G:
	Drive Letter	
	Details Tab: Cluster Partition	F:
	Drive Letter	
Azure probe port resource	Name	azurepp1
	Probe port	26001 (Value specified for
		Port of Health probe)
Script resource (when	Name	script1
DSR is used)		

• EXPRESSCLUSTER settings (monitor resource)

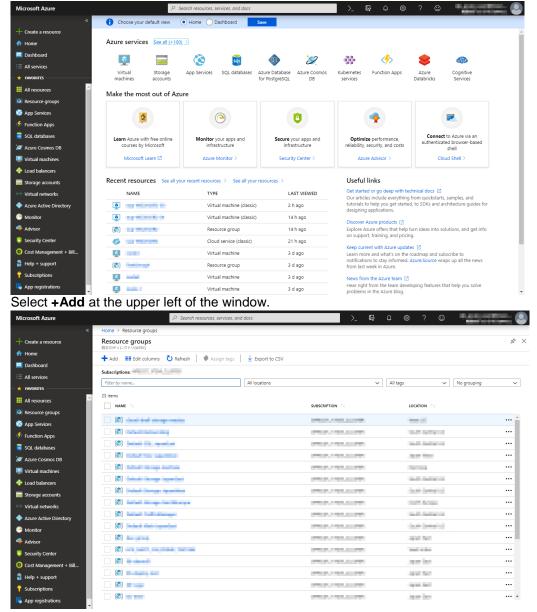
Monitor resource name	Setting item	Setting value
Mirror disk monitor	-	-
resource		
Azure probe port monitor	Name	azureppw1
resource	Recovery Target	azurepp1
Azure load balance	Name	aurelbw1
monitor resource	Recovery Target	azurepp1

5.2 Configuring Microsoft Azure

1) Creating a resource group

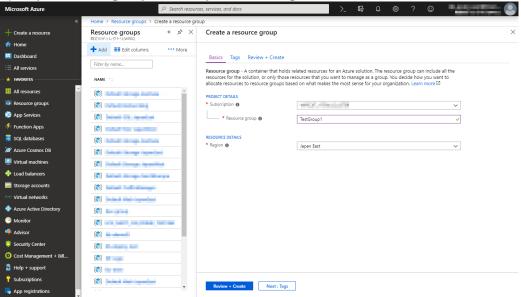
Log in to the Microsoft Azure portal (https://portal.azure.com/) and create a resource group following the steps below.

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



2.

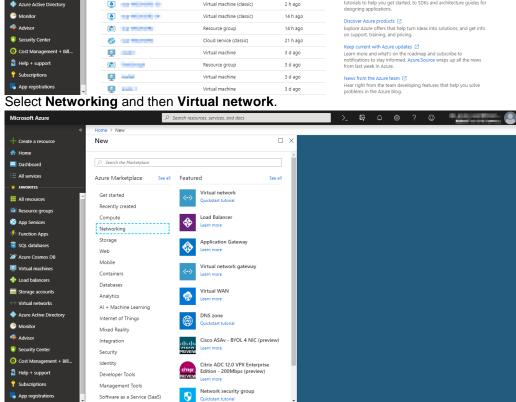
3. Specify Resource group, Subscription, and Region, and click Review+Create.



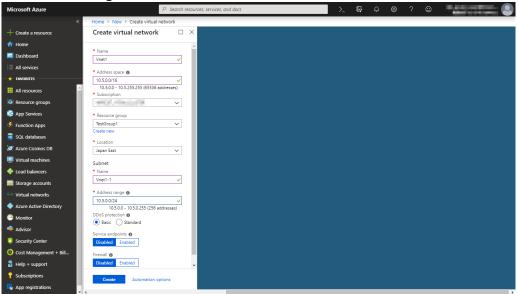
2) Creating a virtual network

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

Select +Create a resource or the + icon in the menu on the left side of the window. 1. Microsoft Azure 10,000,000,000 Home Dashboard () Choose your default view Create a resource Azure services See all (+100) > Dashboard ٢ (\mathbf{S}) SQL (I) $\langle\!\!\!\!/ \rangle$ 2 333 8 430 ∃ All services App Services SQL databases Azure Database Azure Cosmos for PostgreSQL DB Cognitive Services Kubernetes services Function Apps Virtual machines Storage Azure Databricks 🛨 FAVORITES -All resources Make the most out of Azure 📦 Resource groups 🔇 App Services 100 () 0 -. Connect to Azure via an authenticated browser-based shell Learn Azure with free online courses by Microsoft Monitor your apps and Secure your apps and infrastructure Optimize performance, liability, security, and costs 🦉 Azure Cosmos DB Microsoft Learn 🗹 Azure Monitor > Azure Advisor > Cloud Shell > Security Center > Virtual machines Load balancers Useful links Recent resources See all your recent resources > See all your resources > Storage accounts Get started or go deep with technical docs [2] Our articles include everything from quickstarts, samples, and tutorials to help you get started, to SDKs and architecture guides for designing applications. TYPE NAME LAST VIEWED ··· Virtual networks 🚸 Azure Active Di • Virtual machine (classic) 2 h ago Onitor . Virtual machine (classic) 14 h ago Discover Azure products [2] 🏟 Advisor Resource aroup 14 h ago Explore Azure offers that help turn ideas into solutions, and get info on support, training, and pricing. 🟮 Security Center ø -----Cloud service (classic) 21 h ago Keep current with Azure updates [2] Learn more and what's on the roadmap and subscribe to notifications to stay informed. Azure.Source wraps up all the news from last week in Azure. Virtual machine Ost Management + Bill... 3 d ago 🔮 Help + support Resource group 3 d ago 💡 Subscriptions News from the Azure team 2 Hear right from the team developing features that help you solve problems in the Azure blog. Virtual machine 3 d ago 😽 App registrations Virtual machine 3 d ago 2. Select Networking and then Virtual network. >_⊑, ♀ @ ? © Microsoft Azure 𝒫 Search resources, services, and docs



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

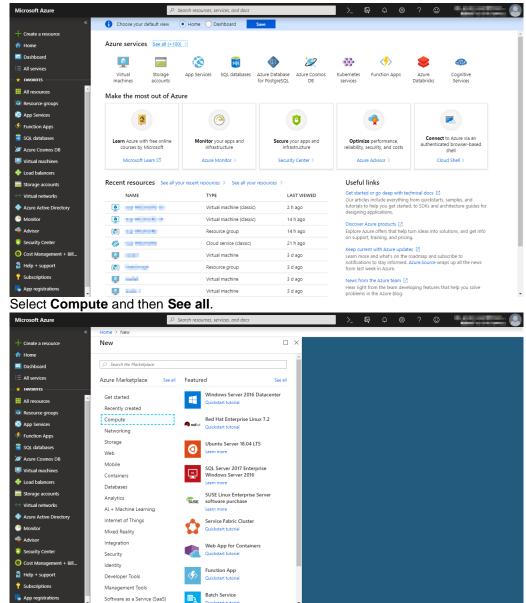


3) Creating a virtual machine

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 or the + icon in the menu on the left side of the window.



2.

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

Microsoft Azure	,₽ Searc	h resources, services, and docs	\rightarrow_{-}	Ģ			The state of the s
«	Home > New > Create a virtual machine						
+ Create a resource	Create a virtual machine						×
🛧 Home							
🔤 Dashboard	Basics Disks Networking Mana	igement Guest config Tags Review + create					
E All services	Create a virtual machine that runs Linux or Win	ndows. Select an image from Azure marketplace or use your own customized	image.				
* FAVORITES		to provision a virtual machine with default parameters or review each tab for					
III resources	Looking for classic VMs? Create VM from Azu	re Marketplace					
📦 Resource groups	PROJECT DETAILS						
🔇 App Services	Select the subscription to manage deployed re resources.	sources and costs. Use resource groups like folders to organize and manage	all your				
Function Apps	* Subscription ()	and a straight the					
👼 SQL databases				~			
🥖 Azure Cosmos DB	* Resource group 🛛	TestGroup1 Create new	`	~			
Virtual machines	INSTANCE DETAILS						
🚸 Load balancers	Virtual machine name	node-1		~			
Storage accounts	-			<u>×</u>			
••• Virtual networks	* Region 🚯	Japan East	`	~			
Azure Active Directory	Availability options 0	Availability set	`	~			
Monitor	* Availability set 🚯	(new) AvailabilitySet-1	```	~			
Advisor		Create new					
Security Center	* Image 0	Windows Server 2016 Datacenter Browse all images and disks	`	~			
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Help + support	and A	Standard A1					*
Subscriptions	Review + create Previo	ous Next : Disks >					
Ann registrations							

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«	Home > New > Create a virtual machine			Create new X
+ Create a resource	Create a virtual machine			Group two or more VMs in an availability set to ensure that at least one
🟫 Home				is available during planned or unplanned maintenance events. Learn more
🛄 Dashboard	Basics Disks Networking Mana	agement Guest config Tags Review + create		
E All services	Create a virtual machine that runs Linux or Wir	ndows. Select an image from Azure marketplace or use your own customized image.		* Name AvailabilitySet-1
+ FAVORITES	Complete the Basics tab then Review + create customization.	to provision a virtual machine with default parameters or review each tab for full		Fault domains 0
🛄 All resources	Looking for classic VMs? Create VM from Azu	re Marketplace		
📦 Resource groups	PROJECT DETAILS			Update domains ()
🔇 App Services	Select the subscription to manage deployed re resources.	sources and costs. Use resource groups like folders to organize and manage all your		5
Function Apps	* Subscription ()	and disclose	~	Use managed disks 🕜
📓 SQL databases	* Resource group ()			No (Classic) (Yes (Aligned)
🬌 Azure Cosmos DB	Resource group 0	TestGroup1 Create new	~	
Virtual machines	INSTANCE DETAILS			
🚸 Load balancers	* Virtual machine name 🗿	node-1	~	
🧱 Storage accounts	* Region ()		_	
• Virtual networks	3	Japan East	~	
Azure Active Directory	Availability options	Availability set	~	
🕒 Monitor	* Availability set 🚯	No existing availability sets in current resource group and location.	\sim	
🔷 Advisor		Create new		
🔋 Security Center	* Image 0	Windows Server 2016 Datacenter Browse all images and disks	~	
Ost Management + Bill	* Size O	Standard A1		
😫 Help + support			_	
📍 Subscriptions	Review + create Previo	Next : Disks >		
😽 App registrations			_	ОК

5. 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 >**

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« Home 3	Select a VM size Brows available virtual machine sizes and their features	×
+ Create a resource Creat		
1 Home customiz	Search by VM size Restore default filters	
Dashboard	(⁺ _▼ Add filter	
E All services	Showing 191 VM sizes. Subscription: Region: Japan East Current size: Standard_A1	
FAVORITES FAVORITES	VM SIZE 🖖 OFFERING 🦈 FAMILY 👘 VCPUS 🎋 RAM (GB) 🦈 DATA DISKS խ MAX IOPS 🤼 TEMPORARY STOR 🎋 PREMIUM DISK SUP 🥍 COST/MON	TH (ESTI
III All resources		A
📦 Resource groups		
🔇 App Services		
Function Apps INSTANCE	A1 Standard General purpose 1 1.75 2 2x500 No ¥8,839	
🗟 SQL databases 🔹 Virtual	A1 Basic General purpose 1 1.75 2 2x300 No ¥3,415	
X Azure Cosmos DB * Region	A1_v2 Standard General purpose 1 2 2 2x500 No ¥6,748	
Virtual machines	A2 Standard General purpose 2 3.5 4 4x500 No ¥17,677	
Load balancers Image	A2 Basic General purpose 2 3.5 4 4x300 No ¥12,083	
Storage accounts	A2_v2 Standard General purpose 2 4 4 4x500 No ¥14,173	
Virtual networks * Size @	A2m_v2 Standard General purpose 2 16 4 4x500 No ¥19,426	
Azure Active Directory	A3 Standard General purpose 4 7 8 8x500 No ¥35,347	
C Monitor	A3 Basic General purpose 4 7 8 8xi300 No ¥31,680	
Advisor ADMINIS Security Center * Userni		
Cost Management + Bill * Passwi		
Help + support		•
Subscriptions	Prices presented are estimates in your local currency that include only Azure infrastructure costs and any discounts for the subscription and location. The prices don't in	
App registrations	Select vince presented are estimates in your local currency that include only Aquie immatrixcure costs and any discounts for the subscription and location. The prices on t in applicable software costs. View Aque pricing calculator. Final charges will appear in your local currency in cost analysis and billing views.	ciude any

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

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

Microsoft Azure	♀ Searce	th resources, services, and docs	>_	Ģ			
	Home > New > Create a virtual machine						
+ Create a resource	Create a virtual machine						×
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🛄 Dashboard	Basics Disks Networking Man	agement Guest config Tags Review + create					
∃ All services		d a temporary disk for short-term storage. You can attach additional data disk	ks. The size o	f			
* FAVORITES	the VM determines the type of storage you ca	n use and the number of data disks allowed. Learn more					
III All resources	DISK OPTIONS						
📦 Resource groups	* OS disk type 🜒	Standard SSD	~	·			
🔇 App Services	Enable Ultra SSD compatibility (Preview) 0	Ves No Ultra SSD compatibility is not available for this VM size and location.					
Function Apps		one out compatibility is not evaluable for this viri size and inclution.					
👼 SQL databases	DATA DISKS	ks for your virtual machine or attach existing disks. This VM also comes with a					
🜌 Azure Cosmos DB	disk.	ks for your virtual machine or attach existing disks. This vivi also comes with a	temporary				
Virtual machines	LUN NAME	SIZE (GIB) DISK TYPE HOST CACHING					
🚸 Load balancers	Create and attach a new disk Attach an ex	visting disk					
Storage accounts							
••• Virtual networks	✓ ADVANCED						
Azure Active Directory							
👄 Monitor							
🔷 Advisor							
Security Center							
Ocst Management + Bill							
Help + support							
† Subscriptions	Review + create Previo	ous Next : Networking >					
Rep registrations							

 The Create a new disk blade appears. Specify the settings of Disk type, Name, Size (GiB), and Source type. Then click OK. Click Next: Networking >

Microsoft Azure		₽ Search resources, services, and docs	>_	Ŗ	Q	٢	?	٢	A DECOMPOSITION OF	
«	Home > New > Create a virtual	machine > Create a new disk								
+ Create a resource	Create a new disk									\times
🛧 Home										
🔤 Dashboard	Create a new disk to store application	ns and data on your VM. Disk pricing varies based on factors including disk size, storag earn more about Azure Managed Disks	e							
E All services										
+ FAVORITES	* Disk type	Standard HDD	\sim							
🗰 All resources 📄	* Name	node-18lob1	~							
😵 Resource groups	* Size (GiB) 🚯									
🔇 App Services	* Source type 🛛	None (empty disk)	\checkmark							
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🬌 Azure Cosmos DB	IOPS limit 500									
🖳 Virtual machines	Throughput limit (MB/s) 60									
🚸 Load balancers										
📻 Storage accounts										
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Azure Active Directory										
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🔷 Advisor										
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🞴 Help + support										
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8. The **Networking** tab appears.

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

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

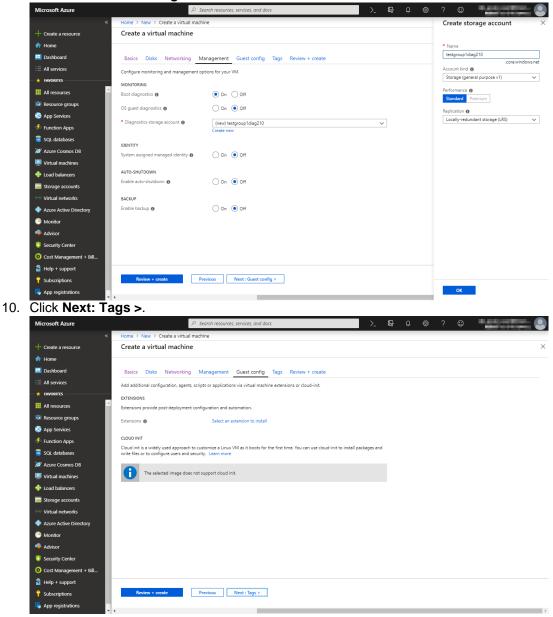
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	Home > New > Create a virtual machine > Create network security group	
+ Create a resource	×	Create network security g $\ \square \ \times$
🛧 Home		
📴 Dashboard	t Guest config Tags Review + create	* Name NetSecGroup-1
i∃ All services	v configuring network interface card (NIC) settings. You can control ports, inbound	Inbound rules
- 🛧 FAVORITES	r place behind an existing load balancing solution. Learn more	1000: default-allow-rdp
All resources	A	Any 🗸 RDP (TCP/3389)
😵 Resource groups	fill be created for you.	+ Add an inbound rule
🔇 App Services		Outbound rules 👩
Function Apps	new	No results
🧧 SQL databases	-1 (10,50,0/24)	+ Add an outbound rule
🬌 Azure Cosmos DB	e subnet configuration	
🧕 Virtual machines	v	
🚸 Load balancers	new	
Storage accounts	ne 🚫 Basic 💿 Advanced	
Virtual networks	nade-1-nsg V	
Azure Active Directory	new Off	
🕒 Monitor	The selected VM size does not support accelerated networking.	
🤹 Advisor		
Security Center	of an existing Azure load balancing solution. Learn more	
Ost Management + Bill	; • No	
Help + support		
💡 Subscriptions	Next : Management >	ок
矏 App registrations	× 4	

9. 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: Guest config >.

11. Click Next: Review + create >.

Microsoft Azure	${\cal P}$ Search resources, services, and docs	>_	Ę			*
«	Home > New > Create a virtual machine					
+ Create a resource	Create a virtual machine					×
🛧 Home						
🖪 Dashboard	Basics Disks Networking Management Guest config Tags Review + create					
Ξ All services	Tags are name/value pairs that enable you to categorize resources and view consolidated billing by applying the same ta	g to multiple				
- * FAVORITES	resources and resource groups. Learn more					
🗰 All resources	Note that if you create tags and then change resource settings on other tabs, your tags will be automatically updated.					
📦 Resource groups	NAME VALUE RESOURCE					
🔇 App Services	✓ : ✓ 7 selected ✓					
Function Apps						
👼 SQL databases						
🥖 Azure Cosmos DB						
Virtual machines						
🚸 Load balancers						
Storage accounts						
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Ocst Management + Bill						
Help + support						
Ŷ Subscriptions	Review + create Previous Next : Review + create >					
Registrations						

12. 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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Load balancers Subscription	
Storage accounts Resource group TestGroup1	
◇ Virtual networks Virtual machine name node-1	
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Availability options Availability set	
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Advisor Username testlogin	
Security Center Already have a Windows license? No	
O Cost Management + Bil DISKS	
Refp + support OS disk type Standard HDD	*
Subscriptions Create Previous Next Download a template for automation	
Rep registrations	•

4) Setting a private IP address

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

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

		earch resources, services, and docs		>_ E; Q @	? 😳
«	Choose your default view	Home Dashboard	Save		
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Resource groups					
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SQL databases	Learn Azure with free online	Monitor your apps and	Secure your apps and	Optimize performance,	Connect to Azure via an authenticated browser-based
Azure Cosmos DB	courses by Microsoft	infrastructure	infrastructure	reliability, security, and costs	shell
Virtual machines	Microsoft Learn 🗹	Azure Monitor >	Security Center >	Azure Advisor >	Cloud Shell >
Load balancers					
Storage accounts	Recent resources See all yo	ur recent resources > See all your	resources >	Useful links	
Virtual networks	NAME	TYPE	LAST VIEWED	Get started or go deep with te Our articles include everything	
Azure Active Directory	Q	Virtual machine (classic)	2 h ago	tutorials to help you get starte designing applications.	d, to SDKs and architecture guides for
Monitor	Q	Virtual machine (classic)	14 h ago	Discover Azure products	
Advisor		Resource group	14 h ago	Explore Azure offers that help	turn ideas into solutions, and get info
Security Center	(*)	Cloud service (classic)	21 h ago	on support, training, and pricir	
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Help + support		Resource group	3 d ago	notifications to stay informed. from last week in Azure.	Azure.Source wraps up all the news
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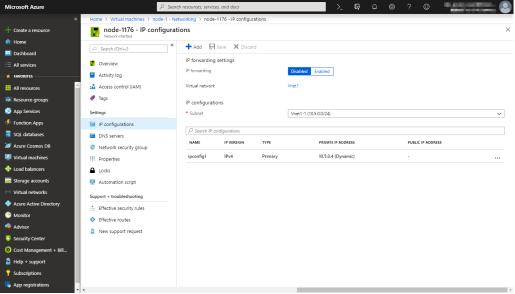
3. The summary of TestGroup1 is displayed. Select virtual machine node-1 or node-2 from the item list.

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4.

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

6. Select IP configurations.



- 7. Only ipconfig1 is displayed in the list. Select it.
- Select Static for Assignment under Private IP address settings. Enter the IP address to be assigned statically in the IP address text box and click Save at the top of the window. The IP address of node-1 is 10.5.0.120. The IP address of node-2 is 10.5.0.121.

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	Home > Virtual machines >	node-1 - Networking > node-1	1176 - IP configurations > ip	config1					
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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 Blob storage. For details about a partition for the mirror disk resource, see "Partition settings for mirror disk resource (when using Replicator)" in "Settings after configuring hardware" in Chapter 1, "Determining a system configuration" in the *Installation and Configuration Guide*.

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

Initialize Disk	х
You must initialize a disk before Logical Disk Manager can access it. Select disks:	
Use the following partition style for the selected disks: MBR (Master Boot Record) GPT (GUID Partition Table) Note: The GPT partition style is not recognized by all previous versions 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 Managem	ient						-		×
<u>File Action V</u> i	ew <u>H</u> elp								
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Volume	Layout	Туре	File System	Status	Capacity	Free Spa	% Free		
🛲 (C:)	Simple	Basic	NTFS	Healthy (S	127.00 GB	113.12 GB	89 %		
Temporary Store	ag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %		
Disk 0									
Basic	(C:)	///////////////////////////////////////		///////////////////////////////////////		///////////////////////////////////////	7//////////////////////////////////////	/////	77772
127.00 GB	127.00 GB NTFS								
Online	Healthy (System, I	Boot, Active,	Crash Dump, Pr	imary Partition					
= Disk 1									
Basic 70.00 GB	Temporary Stora	ge (D:)							
Online	70.00 GB NTFS Healthy (Page File	Primany Par	tition)						
	ricularly (rugerine	, i i i i i i i i i i i i i i i i i i i	adony						
Disk 2 Basic									
20.00 GB	20.00 GB								
Online	Unallocated								
Unallocated	Primary partition								

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

New Simple Volume Wizard		×
	Welcome to the New Simple Volume Wizard	
	This wizard helps you create a simple volume on a disk.	
	A simple volume can only be on a single disk.	
	To continue, click Next.	
	< Back Next > 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**.

Vew Simple Volume Wizard								
Specify Volume Size Choose a volume size that is between the maximum and minimum sizes.								
Maximum disk space in MB:	20477							
Minimum disk space in MB:	8							
<u>S</u> imple volume size in MB:	1024							
	< Back Next > Cancel							

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

New Simple Volume Wizard			×
Assign Drive Letter or Path For easier access, you can assign a drive lett	er or drive path	to your partition.	
Assign the following drive letter: Mount in the following empty NTFS folder	F	♥	
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.

New Simple Volume Wizard		×						
Specify Volume Size Choose a volume size that is between the maximum and minimum sizes.								
Maximum disk space in MB:	19453							
Minimum disk space in MB:	8							
<u>S</u> imple volume size in MB:	19453 •							
	< Back Next > Cance	4						

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

	X
New Simple Volume Wizard	×
Assign Drive Letter or Path	
For easier access, you can assign a drive letter or drive path to your partition.	
○ Mount in the following empty NTFS folder:	
Browse	
O Do not assign a drive letter or drive path	
< <u>B</u> ack <u>N</u> ext > 0	Cancel
The Format Partition window is disp	layed. Confirm that File System is NTF
New Simple Volume Wizard	×
Format Partition To store data on this partition, you must format it first.	
Choose whether you want to format this volume, and if so, what settings you want to	use.
O Do not format this volume	
Format this volume with the following settings:	
Format this volume with the following settings: Ele system: VTFS	
Egmat this volume with the following settings: Ele system: NTFS Allocation unit size: Default	
Format this volume with the following settings: Ele system: VTFS	
Egmat this volume with the following settings Ele system: NTFS Allocation unit size: Default	
Fgmat this volume with the following settings: File system: NTFS Allocation unit size: Default Volume label: New Volume	
Fgmat this volume with the following settings: File system: NTFS Allocation unit size: Default Volume label: New Volume Perform a quick format	
Format this volume with the following settings Ele system: NTFS Allocation unit size: Default Volume label: New Volume Perform a quick format Enable file and folder compression	arcel

 Click Next.
 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: Simole Volume Disk selected: Disk 2 Volume size: 13453 MB Drive letter or path: G: File system: NTFS Allocation unit size: Default Volume label: New Volume Cask: formar: Ves To close this wizard, click Finish.	
	< Back Finish Cance	el I

14	Confirm	that the	added	disks	are a	ssigned	as the	F drive	and G	drive
	00111111	unat uno	auucu	alono	arca	SSIGNED		i unvo		unve.

- Disk Wahag	gement						-	\times
<u>File</u> <u>A</u> ction	<u>V</u> iew <u>H</u> elp							
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/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	e (G:) Simple	Basic	NTFS	Healthy (P	19.00 GB	18.94 GB	100 %	
🖷 Temporary S	Storag Simple	Basic	NTFS	Healthy (P	70.00 GB	68.77 GB	98 %	
Basic 127.00 GB	(C:) 127.00 GB NTFS							
Online	Healthy (Syster	n, Boot, Activ	re, Crash Dump,	Primary Partition				
Online Disk 1 Basic 70.00 GB Online	Healthy (Syster Temporary Sto 70.00 GB NTFS Healthy (Page I	n, Boot, Activ orage (D:)		Primary Partition				
Disk 1 Basic 70.00 GB Online	Healthy (Syster Temporary Sto 70.00 GB NTFS	n, Boot, Activ orage (D:)		Primary Partition				
Disk 1 Basic 70.00 GB Online Disk 2 Basic 20.00 GB	Healthy (Syster Temporary Sto 70.00 GB NTFS	n, Boot, Activ orage (D:) File, Primary F	Partition)	Primary Partition Primary Partition Iew Volume (G:) 9.00 GB NTFS lealthy (Primary Pri				
Disk 1 Basic 70.00 GB Online Disk 2 Basic 20.00 GB Online	Healthy (Syster Temporary Sto 70.00 GB NTFS Healthy (Page I (F:) 1.00 GB RAW	n, Boot, Activ orage (D:) File, Primary P	Partition)	lew Volume (G:) 9.00 GB NTFS				

Next, for using DSR, add a loopback adapter in each node configuring a cluster. Refer to the following when creating a DSR configuration. https://jpn.nec.com/clusterpro/blog/20181031.html (Japanese only)

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.

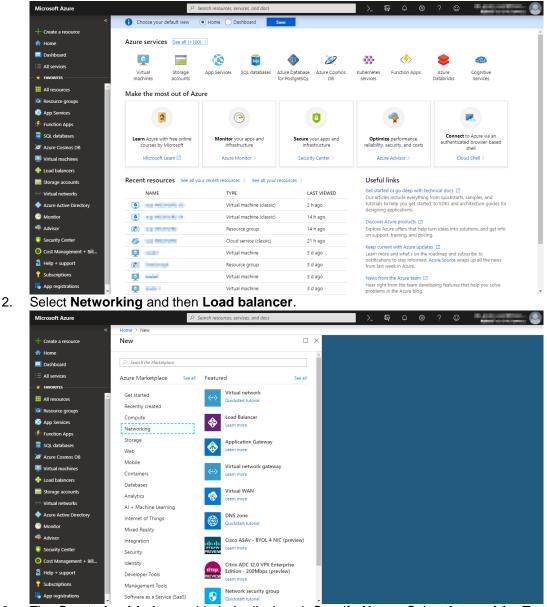
For details, see the following websites:

Load Balancer:

•

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

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



- 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 IP address assignment, Private IP address, Subscription, Resource group, and Region, and click Review+create. Deploying the load balancer starts. This processing takes several minutes.

Microsoft Azure	₽ Sear	ch resources, services, and docs		Ģ			
«	Home > New > Create load balancer						
+ Create a resource	Create load balancer						×
🛧 Home	uses a hash-based distribution algorithm. By	default, it uses a 5-tuple (source IP, source port, destination IP, destination port,	protocol				*
📃 Dashboard	internal where it is only accessible from a virti	Load balancers can either be internet-facing where it is accessible via public IP a ual network. Azure load balancers also support Network Address Translation (NA					
i≡ All services	traffic between public and private IP addresse	is. Learn more.					
🕂 🛧 FAVORITES ————————————————————————————————————	PROJECT DETAILS						
All resources	* Subscription	and the second sec	~				
📦 Resource groups	* Resource group	TestGroup1	~	·			
S App Services		Create new					
Function Apps	INSTANCE DETAILS						
SQL databases	* Name	TestLoadBalancer		/			
X Azure Cosmos DB	* Region	Japan East	~				
	* Type ()	Internal Public					
Virtual machines		0 0					
Load balancers	* SKU 👩	Basic Standard					
Storage accounts	CONFIGURE VIRTUAL NETWORK.						
Virtual networks	* Virtual network 🚯	Vnet1	~				
Azure Active Directory	* Subnet	Vnet1-1 (10.5.0.0/24)					
😬 Monitor	Same	Manage subnet configuration	~	· _			
🔷 Advisor	* IP address assignment	Static Dynamic					
Security Center	* Private IP address	10.50.200					
0 Cost Management + Bill	Filvate in address	10.5.0.200		<u>~</u>			
Help + support							*
? Subscriptions	Review + create Previous	Next : Tags > Download a template for automation					
😽 App registrations		·					F

 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 or the resource group icon in the menu on the left side of the window.

Microsoft Azure	. جر	Search resources, services, and docs		>_ 16 Q 🚳	? 😊 💶 🕘			
«	1 Choose your default view	Home Dashboard	Save					
+ Create a resource								
🛧 Home	Azure services See all (+10)) >						
🛄 Dashboard	I	(Ã) 👼	an teo					
E All services	Virtual Storage		Azure Database Azure Cosmos	Kubernetes Function Apps	Azure Cognitive			
- * FAVORITES	machines accounts	App services SQL databases	for PostgreSQL DB	services	Databricks Services			
All resources	Make the most out of Az	ure						
📦 Resource groups								
🔇 App Services	1		(
Function Apps		6						
🐱 SQL databases	Learn Azure with free online	Monitor your apps and	Secure your apps and	Optimize performance.	Connect to Azure via an			
🬌 Azure Cosmos DB	courses by Microsoft	infrastructure	infrastructure	reliability, security, and costs	authenticated browser-based shell			
Virtual machines	Microsoft Learn 🖄	Azure Monitor >	Security Center >	Azure Advisor >	Cloud Shell >			
🚸 Load balancers								
Storage accounts	Recent resources See all y	our recent resources \geq See all your	resources >	Useful links				
••• Virtual networks	NAME	TYPE	LAST VIEWED	Get started or go deep with teo Our articles include everything				
Azure Active Directory		Virtual machine (classic)	2 h ago		I, to SDKs and architecture guides for			
Monitor	•	Virtual machine (classic)	14 h ago	Discover Azure products 12				
🔷 Advisor		Resource group	14 h ago	Explore Azure offers that help t	urn ideas into solutions, and get info			
Security Center	Ø 11 -	Cloud service (classic)	21 h ago	on support, training, and pricin				
Ost Management + Bill		Virtual machine	3 d ago	Keep current with Azure updates [2] Learn more and what's on the roadmap and subscribe to notifications to stay informed, Azure.Source wraps up all the news from last week in Azure.				
🔒 Help + support		Resource group	3 d ago					
📍 Subscriptions		Virtual machine	3 d ago	News from the Azure team				
😽 App registrations		Virtual machine	3 d ago	Hear right from the team devel	oping features that help you solve			
	*		امطلم مالم	problems in the Azure blog.				

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

st.				
Microsoft Azure	esources, services, and docs	>_ 67	û @ ? © 	
Home > Resource groups				
+ Create a resource Resource groups 度ポのティレクトリハッPEC)				$x \times x$
A Home Add III Edit columns ♥ Refresh	Assign tags			
🛄 Dashboard				
All services				
★ FAVORITES	All locations	~	All tags V No grouping	~
All resources				
Resource groups		SUBSCRIPTION 1	LOCATION 14	
S App Services		1991 (1997), 1992 (1997) (1997)	1000 (X	••• ^
Function Apps		1990 (P. 1990) (P. 1997)	10.000000	
SQL databases			the distance of the second sec	
Azure Cosmos DB		STREET, STREET	And the second second	
Virtual machines		1000 (0.000 (0.000))	Test tests	
Load balancers		1990 (1990) (1990) (1990)	the state of the s	
Storage accounts		and the second second	(a.4) (artistic)	
Storage accounts		and a second second	CONTRACTOR AND	
Azure Active Directory		1000 C 1000 C 1000	the Residence of Concerning State	
		1990 (1990) (1990) (1990)	(and (advants))	
Monitor		1793 (C. 1993) (C. 1997)	100.00	
Advisor		STREET, STREET, STREET,	100 C 100	
Security Center		1998-1997, 1998, 2011 (1998)	Jacob Section 1	
Cost Management + Bill		1998-1997 (1998) (1998)	- 100 M	
Help + support		and a second second second	agent fact	
Subscriptions				
App registrations		THE R. LEWIS CO., LANSING	Anna (an)	•••• •

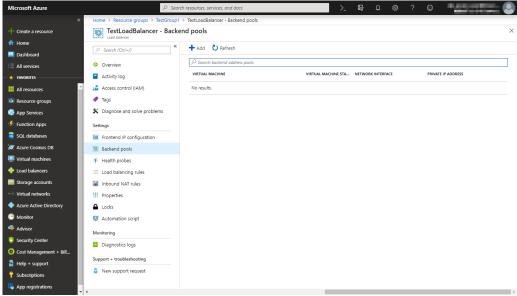
3. The summary of the selected resource group is displayed. Select the created load balancer from the item list.

Microsoft Azure	و م	earch resources, services, and docs	
	Home > Resource groups > TestGrou	p1	
+ Create a resource	TestGroup1		\$
🛧 Home			
💷 Dashboard	,		
All services	(Overview	Subscription (change) Deployments 4 Succeeded	
★ FAVORITES	Activity log	Subscription ID	
All resources	 Access control (IAM) 	Taos (change)	
🕄 Resource groups	🖉 Tags	Click here to add tags	
🔇 App Services	🗲 Events	*	
Function Apps	Settings	Filter by name All types All locations No grouping	
👼 SQL databases	4 Quickstart	9 items Show hidden types O	
Azure Cosmos DB	Deployments	NAME ↑↓ TYPE ↑↓ LOCATION ↑↓	
Virtual machines	Policies		
😵 Load balancers	E Properties	Virtual machine Japan East	
Storage accounts	Locks	S node-1_OsDisk_1_71486cd179fe4c7783627bb925385b6b Disk Japan East	
Virtual networks	Automation script	node-1176 Network interface Japan East	
Azure Active Directory		Disk Japan East	
Monitor	Cost management	Node-2 Virtual machine Japan East	
Advisor	Scost analysis	Sector State	
Security Center	Sudgets	node-231 Network interface Japan East	
Oost Management + Bill	Advisor recommendations	🗌 📚 node-2Blob1 Disk Japan East	
Help + support	Monitoring	Storage account Japan East	
Subscriptions	Insights (preview)	🗌 💠 TestLoadBalancer 🛛 Load balancer Japan East	
App registrations	Alerts	Virtual network Japan East	

4. Select Backend pools.

Microsoft Azure	₽ Searce	h resources, services, and docs		Ģ				
«	Home > Resource groups > TestGroup1	> TestLoadBalancer						
+ Create a resource	TestLoadBalancer							× \$\$
🛧 Home		→ Move 💼 Delete 💍 Refresh						
🛄 Dashboard								
i≡ All services	Overview	Resource group (change) TestGroup1		Backen -	d pool			
* FAVORITES	Activity log	Location Japan East		Health	probe			
🗰 All resources 📫	Access control (IAM)	Subscription (change)		Load b	alancing	rule		
📦 Resource groups	🛷 Tags	weight and a start		-				
🔇 App Services	🗙 Diagnose and solve problems	Subscription ID		NAT rui 0 inbou				
Function Apps	Settings	SKU Basic		Private 10.5.0.2	IP addre	SS		
👼 SQL databases	Frontend IP configuration	Tags (change)						
🥖 Azure Cosmos DB	Backend pools	Click here to add tags	*					
Virtual machines	🕴 Health probes							
🚸 Load balancers	\Xi Load balancing rules							
Storage accounts	Inbound NAT rules							
··· Virtual networks	Properties							
Azure Active Directory	Locks							
🕒 Monitor	Automation script							
🔷 Advisor	Monitoring							
Security Center	Diagnostics logs							
0 Cost Management + Bill								
🔒 Help + support	Support + troubleshooting							
? Subscriptions	New support request							
ttps://portal.azure.com/?l=en.en-us#create	A.4							
rups://portaliazure.com/rt=enien-us#create	ynub							÷

5. Click Add.



- 6. The Add backend pool blade is displayed. Specify Name.
- 7. For Associated to, select Availability set.
- 8. Specify Availability set.
- 9. Click Add a target network IP configuration.
- 10. Specify the target virtual machine for Target virtual machine and Network IP configuration.
- 11. Repeat steps 9 and 10 as many times as the number of target virtual machines.
- 12. Click **OK**.

Microsoft Azure	$\mathcal P$ Search resources, services, and docs		\rightarrow	B	Q	٢	?	٢	*
«	Home > Resource groups > TestGroup1 > TestLoadBalancer - Backend pool	s > Add backend pool							
+ Create a resource	Add backend pool								
🛧 Home	* Name								
🔤 Dashboard	TestBackendPool	✓							
∃ All services	IP version								
- 🛧 FAVORITES	IPv4 IPv6								
👭 All resources	Associated to 🚯								
🚱 Resource groups	Availability set	~							
🔇 App Services	Availability set 🜒								
Function Apps	AvailabilitySet-1 number of virtual machines: 2	~							
👼 SQL databases	Target network IP configurations								
🬌 Azure Cosmos DB	Only VMs within the current availability set can be chosen. Once a VM is chosen, you network IP configuration related to it.	can select a							
Virtual machines	Virtual machine: node-1	 商							
🚸 Load balancers	Network IP configuration: node-1176/ipconfig1 (10.5.0.120)								
Storage accounts	* Target virtual machine 🗿	面							
Virtual networks	node=2 size: Standard_A1, network interfaces: 1, resource group: TESTGROUP1	~							
Azure Active Directory	size: Standard_A1, network interfaces: 1, resource group: 1ES (GNOUP1 * Network IP configuration								
Monitor	ipconfig1 (10.5.0.121)	~							
🔶 Advisor	+ Add a target network IP configuration								
Security Center									
Ost Management + Bill									
Help + support									
💡 Subscriptions	ок								
😽 App registrations									

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

Microsoft Azure		resources, services, and docs	>_ 167 Q @ ? ©	
«	Home > Resource groups > TestGroup1 >	TestLoadBalancer - Health probes		
+ Create a resource	TestLoadBalancer - Health	probes		×
🛧 Home		+ Add		
🔲 Dashboard				
E All services	💠 Overview	,		
- 🛨 FAVORITES	Activity log	NAME To PROTOCOL	°↓ PORT °↓ USED BY	
III resources	Access control (IAM)	No results.		
📦 Resource groups	🛷 Tags			
🔇 App Services	X Diagnose and solve problems			
Function Apps	Settings			
🐱 SQL databases	Frontend IP configuration			
🬌 Azure Cosmos DB	Backend pools			
🖳 Virtual machines	Health probes			
🚸 Load balancers	😑 Load balancing rules			
Storage accounts	Inbound NAT rules			
Virtual networks	Properties			
Azure Active Directory	Locks			
Monitor	Automation script			
🔷 Advisor	Monitoring			
Security Center	Diagnostics logs			
Ocst Management + Bill				
P Help + support	Support + troubleshooting			
💡 Subscriptions	New support request			
Subscription App registrations	4			>

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

Microsoft Azure	$\mathcal P$ Search resources, services, o	and docs	\geq G		
«	Home > Resource groups > TestGroup1 > TestLoadBalancer -	Health probes > Add health probe			
+ Create a resource	Add health probe				
🛧 Home	* Name				
🛅 Dashboard	TestHealthProbe	✓			
i≡ All services	IP version				
- 🛧 FAVORITES	IPv4				
III resources	Protocol 💿				
📦 Resource groups	TCP	~			
🔇 App Services	* Port 🕖				
Function Apps	26001	<u> </u>			
👼 SQL databases	* Interval 🕐				
🬌 Azure Cosmos DB		seconds			
Virtual machines	* Unhealthy threshold ()				
🚸 Load balancers	2	consecutive failures			
Ze Storage accounts					
··· Virtual networks					
Azure Active Directory					
Monitor					
🔷 Advisor					
Security Center					
Oost Management + Bill					
😫 Help + support					
Subscriptions	ОК				
😽 App registrations					

- 9) Configuring a load balancer (setting the load balancing rules)
 1. Select Load balancing rules.
 - Microsoft Azure 940 . TestLoadBalancer - Load balar TestLoadBalancer - Load balancing rules × Create a resource 🛖 Home « 🕂 Add 🛄 Dashboard Overview NAME LOAD BALANCING RULE BACKEND POOL HEALTH PROBE Activity log ITES -Access control (IAM) No results II resources 🥒 Tags urce gro × Diagnose and solve problems App Services Settings Function Apps 👿 SQL databases Frontend IP configuration Backend pools 🧭 Azure Cosmos DB Health probes Virtual m: 🚸 Load balar 😑 Load balancing rules Inbound NAT rules Virtual netw Properties Locks \varTheta м Automation script 🔷 Advisor Monitoring Security Center Diagnostics logs Ost Management + Bill Support + troubleshooting 🔒 Help + support New support request 💡 Subscriptions 😽 App registratio
 - 2. Click Add.
 - 3. The Add load balancing rule blade is displayed. Specify Name.
 - 4. Specify **Port** and **Backend port**, and click **OK**.

For using DSR, set the same port number to **Port** and **Backend port** and set **Floating IP** (Direct Server Return) to Enabled, and then select OK. In that case, specify the port number for connecting to the application to provide operations (e.g. 80).

Microsoft Azure	$ \mathcal{P} $ Search resources, services, and docs		>_	Ş			
«	Home > Resource groups > TestGroup1 > TestLoadBalancer - Load balance	ing rules > Add load balancing ru	le				
+ Create a resource	Add load balancing rule						
🛧 Home	* Name	A					
🛄 Dashboard	TestLoadBalancingRule	✓					
i≡ All services	* IP Version						
- 🛨 FAVORITES	● IPv4 ○ IPv6						
🛗 All resources	* Frontend IP address ()						
📦 Resource groups	40.115.190.6 (LoadBalancerFrontEnd)	~					
🔇 App Services	Protocol TCP UDP						
Function Apps	* Port						
👼 SQL databases	80						
🧟 Azure Cosmos DB	* Backend port 🚯						
🖳 Virtual machines	8080	✓					
🚸 Load balancers	Backend pool 0						
Storage accounts	TestBackendPool (2 virtual machine)	~					
••• Virtual networks	Health probe TestHealthProbe (TCP:26001)						
Azure Active Directory							
🕒 Monitor	Session persistence ()	~					
🔷 Advisor	Idle timeout (minutes) Ø						
Security Center		4					
Oost Management + Bill	Floating IP (direct server return)						
😫 Help + support	Disabled Enabled	~					
Subscriptions	ок						
😽 App registrations	4						•

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 Chapter 1, "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.

5.3 Configuring the EXPRESSCLUSTER settings

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

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

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

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

1) Creating a cluster

Start the cluster generation wizard to create a cluster.

- Creating a cluster
 - 1. Access Cluster WebUI, and click Cluster generation wizard.

Cluster WebUI <cluster></cluster>			🗲 Config mode 🗸	Ł	٩	ß	۶	i ?	. 🖻
Cluster generation wizard	Get the Configuration File	Apply the Configuration File	Update Server Data						

2. The **Cluster** window on the **Cluster Generation Wizard** is displayed. Enter a desired name in **Cluster Name**.

Cluster Server Server Server Intercon	server nnect → NP Resolution → Group → Monitor
luster Name*	Cluster1
omment	
anguage*	English 🗸
anagement IP Address	
If using the integrated WebManager to mana	anguage (locale) of the environment that runs WebManager. ge multiple dusters, specify a unique duster name to identify the cluster. Iddress used for a WebManager connection. If establishing connections by specifying each server IP omitted.

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

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

Add server			
Server Name or IP Address*	10.5.0.121		
Enter an IP address or a server name When entering a server name, name res Both IPv4 and IPv6 for IP address can be When entering an IP address, the server	olution is necessary. e used.	y acquired.	
		ОК Са	ncel
Cluster generation wizard			×
Cluster 🔮 🔶 Basic Settings 🔶 Interconnect 🍝 NP Resolution	n → Group → Monitor		
Server Definitions			
Order Name Master server node-1			
1 node-2			
↑ ↓			
Server Group Definition	Settings		
$\label{eq:click} \begin{tabular}{lllllllllllllllllllllllllllllllllll$			
		Hack Next Next	Cancel

4. The Interconnect window is displayed.

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

Cluster generation wizard			×
Server Cluster ⊘ → Basic Settings ⊘ →	Server Server	esolution 🔶 Group 🔶 Monitor	
Properties Add Remove			
Interconnect List			
Priority Type	MDC node-1	node-2	
1 Kernel Mode 🗸	Do Not Use 🗸 10.5.0.120	✓ 10.5.0.121	~
		er.Click "Add" to add interconnect and so h is used for heartbeat. For "Mirror Comi	
route which is used only for data mirror	ring communication. tero routes are necessary to be o	configured. Configuring more than one ro	
For "Witness HB" setting, click each ser Click "Up" or "Down" to configure the p For "Mirror Communication Only" settin For the communication route which is u	ver column cell to set "Use" or " priority to preferentially use the L ng, click on the cell for each serve	'Do not use", and then click "Properties" AN only for the communication among t	the cluster servers.
communication route in MDC column.			

5. The **NP Resolution** window is displayed.

To execute NP resolution by using a ping, click **Add** to add a line to the NP resolution list. Click a cell of the **Type** column and select **Ping**. Click the cell of the **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**.

Server Server Server Server Server Server Server Server Cluster ♥ → Basic Settings ♥ → Interconnect ♥ → NP Resolution → Group → Monitor Properties Add Remove PR Resolution List Type Ping Target node-1 node-2 Ping ↓ 10.5.0.5 Use ↓ Use ↓ Tuning C Configure network partition (NP) resolution function. Cickk *Add* to add NP resolution resource and select the type. For *COM* setting, click each server column cell to configure driver letter of the partition for disk heartbeat. For *DiSK* setting, click Ping target column cell to configure HTTP packet destination, and then click each server column cell to configure HTTP packet destination, and then click each server column cell to configure HTTP packet destination, and then click each server column cell to configure HTTP packet destination, and then click each server column cell to configure "Use" or "Do not use". For *DiSK*, "Ping", and *HTTP" settings, the detailed settings can be verified and changed by clicking "Properties". Click *Tuning* to configure the actions at NP occurrence.	🌮 Cluster gener	ration wizard					
Type Ping Target node-1 node-2 Ping 10.5.0.5 Use Use Tuning Configure network partition (NP) resolution function. Use Image: Configure network partition (NP) resolution function. Click 'Add' to add NP resolution resource and select the type. For "COM" setting, click each server column cell to configure COM port. For "DSK" setting, click each server column cell to configure driver letter of the partition for disk heartbeat. For "Ping" setting, click Ping target column cell to configure IP address of Ping destination, and then click each server column cell to configure in the configure "Use" or "Do not use". For "Majority" setting, duble-click each server column cell to configure ITP packet destination, and then click each server column cell to configure "Use" or "Do not use". For "Majority" setting, duble-click each server column cell to configure "Use" or "Do not use". For "Majority" setting, duble-click each server column cell to configure Use" or "Do not use". For "Majority" setting, duble-click each server column cell to configure "Use" or "Do not use".	lluster ⊘ → Properties A	Server Ser Basic Settings In Add Remove			ution → Gr	roup 🗲 Monitor	
Tuning • Configure network partition (NP) resolution function. Click "Add" to add NP resolution resource and select the type. For "COM" setting, click each server column cell to configure OM port. For "DSK" setting, click each server column cell to configure driver letter of the partition for disk heartbeat. For "Ping" setting, click Ping target column cell to configure IP address of Ping destination, and then click each server column cell to configure "Use" or "Do not use". For "HTTP" setting, dick Ping target column cell to configure HTTP packet destination, and then click each server column cell to configure "Use" or "Do not use". For "Majority" setting, double-click each server column cell to configure "Use" or "Do not use". For "Strip", and "HTTP" settings, the detailed settings can be verified and changed by clicking "Properties".			node-1	node-2			
Configure network partition (NP) resolution function. Cick "Add" to add NP resolution resource and select the type. For "COM" setting, click each server column cell to configure COM port. For "DiSK" setting, click each server column cell to configure IP address of Ping destination, and then click each server column cell to configure "Use" or "Do not use". For "HTTP" setting, dick Ping target column cell to configure HTTP packet destination, and then click each server column cell to configure "Use" or "Do not use". For "HTTP" setting, dick Ping target column cell to configure HTTP packet destination, and then click each server column cell to configure "Use" or "Do not use". For "Majority" setting, double-click each server column cell to configure "Use" or "Do not use". For "Disprit," setting, add "HTTP" settings, the detailed settings can be verified and changed by clicking "Properties".	Ping ¥ 10).5.0.5	Use 🗸	Use 🗸			
Click "Add" to add NP resolution resource and select the type. For "COM" setting, click each server column cell to configure COM port. For "DISK" setting, click ach server column cell to configure driver letter of the partition for disk heartbeat. For "Ping" setting, click Ping target column cell to configure IP address of Ping destination, and then click each server column cell to configure "Use" or "Do not use". For "HTIP" setting, click Ping target column cell to configure HTTP packet destination, and then click each server column cell to configure "Use" or "Do not use". For "Majority" setting, double-click each server column cell to configure "Use" or "Do not use". For "Majority" setting, and "HTTP" settings, the detailed settings can be verified and changed by clicking "Properties".	Tuning						
	Click "Add" to ac For "COM" settin For "DISK" settin For "Ping" settin "Do not use". For "HTTP" setti for use". For "Majority" se For "DISK", "Ping	dd NP resolution resource an ng, click each server column ng, click each server column ng, click Ping target column o ing, click Ping target column etting, double-click each serv ng ^o , and "HTTP" settings, the	d select the type. cell to configure C cell to configure a ell to configure IP cell to configure H rer column cell to detailed settings	driver letter of t address of Pine ITTP packet de: configure "Use	destination, and the for "Do not use	nd then click each serv nen click each server o ".	-

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 → Monito	Dr	
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. 		
	Gack Next Next	Cance

2. The Group Definition window is displayed.

Specify a failover group na	ne (failover1) for Name . Click Next .
Group Definition	failover 🗙
Basic Settings → Startup Servers	➔ Group Attributes ➔ Group Resource
Туре*	failover 🗸
Use Server Group Settings	
Name*	failover1
Comment	
 Select group type. If using virtual machine resources to clust "Failover". If using server group, check the "Use Sen 	ter virtual machines, select "Virtual machine" as the type. In other cases, select ver Group".
	Back Next ► Cancel
The Startup Servers wind	ow is displayed

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

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

Mirror disk resource

Create a mirror disk resource.

For details, see "Understanding mirror disk resources" in Chapter 5, "Group resource details" in the *Reference Guide*.

1. Click Add on the Group Resource List page.

2.	The Resource Definition of Group failover1 window is displayed.
	Select the group resource type (Mirror disk resource) from the Type box and enter the
	group name (md) in the Name box. Click Next.

Resource Definition of Group failover	1	ma 🗙
Info → Dependency → Recovery	Operation 🗲 Details	
Type*	Mirror disk resource	
Name*	md	
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. 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
	Add	
		node-2
	→ Remove	node-2
Edit	<i>></i>	node-2
Edit Add Servers that can run the group	<i>></i>	node-2
	<i>></i>	node-2

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**.

obtain info	rmation						
Connect							
Data Partit	ion						
Volume	Disk No.	Partition No.	Size	GUID			
	0	1	500MB				
D:¥	1	1	71678MB				
F:¥	2	1	1024MB				
C:¥	0	2	129546MB				
G:¥	2	2	19453MB				
Cluster Par	tition						
Volume	Disk No.	Partition No.	Size	GUID			
	0	1	500MB				
D:¥	1	1	71678MB	1.00			
F:¥	2	1	1024MB			-	
C:¥	0	2	129546MB	1000			
0.+							
G:¥		2 and 6 for not Group failover1	^{19453MB} de-1 and t		and click F	ок са inish.	
G:¥ erform Resource I	steps 5	and 6 for not Group failover1	de-1 and tl	nen node-2		ок са inish.	
G:¥ Perform Resource I Info ⊘ →	steps 5 and the steps 5 and the steps 5 and the steps th	and 6 for no	de-1 and tl	nen node-2 → Details		ок са inish.	
G:¥ Perform Resource I Info ⊘ → Mirror Disk	steps 5 and the steps 5 and the steps 5 and the steps th	and 6 for no Group failover1 cy ⊘ → Recove	de-1 and tl	nen node-2		ок са inish.	
G:¥ Cerform Resource I Info ⊘ → Mirror Disk Data Partit	Steps 5 Definition of Dependen	and 6 for no Group failover1 cy ⊘ → Recove ter*	de-1 and tl	→ Details		ок са inish.	
G:¥ erform Resource Info ⊘ → Mirror Disk Data Partit Cluster Par	Steps 5 and the steps 5 and the steps 5 and the steps of	and 6 for no Group failover1 cy ⊘ → Recove ter* etter*	de-1 and tl	→ Details		ок са inish.	
G:¥ erform Resource Info ⊘ → Mirror Disk Data Partit Cluster Par	Steps 5 a Definition of Dependen No.* tion Drive Lett rtition Drive L	and 6 for no Group failover1 cy ⊘ → Recove ter* etter*	de-1 and tl	→ Details		ок са inish.	
G:¥ erform Resource I Info © → Mirror Disk Data Partit Cluster Par Cluster Par Mirror Disk	Steps 5 a Definition of Dependen No.* tion Drive Lett rtition Drive L	and 6 for nor Group failover1 cy ⊘ → Recove ter* .etter* Index*	de-1 and tl	→ Details → Details 1 → G: F: 0 →		ок са inish.	
G:¥ Perform Resource I Info © - Mirror Disk Data Partit Cluster Par Cluster Par Cluster Par Servers tha	Steps 5 = Definition of Dependen No.* Cho.* Chorise Lett Chorise Lett Chorise Lett Chorise Lett Chorise Lett Chorise Lett	and 6 for nor Group failover1 cy ⊘ → Recove ter* .etter* Index*	de-1 and th	→ Details → Details 1 → G: F: 0 →		ок са inish.	
G:¥ Perform Resource I Info © - Mirror Disk Data Partit Cluster Par Cluster Par Cluster Par Servers tha	Steps 5 Definition of Dependen No.* tion Drive Lett rtition Drive L trition Offset 1 c Connect t can run the g Data Partition	and 6 for nor Group failover1 cy ⊘ → Recove ter* .etter* Index*	de-1 and th	→ Details → Details 1 → G: F: 0 →	and click F	ок са inish.	
G:¥ erform Resource Info Info Info Data Partit Cluster Partit Cluster Partit Cluster Partit Servers tha Name I	Steps 5 Definition of Dependen No.* tion Drive Lett rtition Drive L trition Offset 1 c Connect t can run the g Data Partition	and 6 for nor Group failover1 cy ⊘ → Recove ter* etter* Index* group <u>Cluster P</u>	de-1 and the second sec	→ Details → Details 1 → G: F: 0 → Select	and click F	ок са inish.	
G:¥ Resource Info O → Mirror Disk Data Partit Cluster Par Cluster	Steps 5 Definition of Dependen No.* tition Drive Lett rtition Drive Lett rtition Offset 1 c Connect t can run the g Data Partition	and 6 for nor Group failover1 cy ⊘ → Recove ter* etter* Index* group <u>Cluster P</u>	de-1 and the second sec	Details → Details 1 ✓ G: F: 0 ✓ Select ✓ Add →	and click F	ок са inish.	
G;¥ erform Resource I Info ♥ → Mirror Disk Data Partit Cluster Par Mirror Disk Servers tha Name D node-1 node-2	Steps 5 Definition of Dependen No.* tition Drive Lett rtition Drive Lett rtition Offset 1 c Connect t can run the g Data Partition	and 6 for nor Group failover1 cy ⊘ → Recove ter* etter* Index* group <u>Cluster P</u>	de-1 and the second sec	Details → Details 1 ✓ G: F: 0 ✓ Select ✓ Add →	and click F	ок са inish.	ance

• Azure probe port resource

7.

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.

 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 → Recove	ry Operation 🔶 Details	
Type*	Azure probe port resource	
Name*	azurepp1	
Comment		
Get license information		
• Select the type of group resource a	nd enter its name.	
		Back Next ► Cancel
The Dependency windov	is displayed. Click Next with	out specifying anything.
	window is displayed. Click N	
For Probeport , enter the configuring health probe)	value specified for Port wh	nen configuring a load
Resource Definition of Group failow	er1	azurepp 🗙

Resource Definition of Group failover	azurepp 🗙	
Info \bigcirc \rightarrow Dependency \oslash \rightarrow Reco	very Operation 🥑 🔶 Details	
Probeport*	26001	
Tuning		
		Image: Back Finish Cancel

6. Click Finish.

3. 4. 5.

Script resource (when DSR is used)

The addition of a script resource provides a mechanism to add/delete the frontend IP address to the loopback adapter along with the switching of the load balancer.

For details on script resources, refer to "Understanding script resources" in the *Reference Guide*.

- 1. Click Add on the Group Resource List page.
- The Resource Definition of Group | failover1 window is displayed. Select the type of the group resource (script resource) in the Type box and enter the group name (script1) in the Name box.
- 3. Click Next.
- 4. The **Dependency** window is displayed. Click **Next** without specifying anything.
- 5. The Recovery Operation window is displayed. Click Next.
- Select start.bat and stop.bat, and then click Edit. For details on configuring scripts, refer to the following EXPRESSCLUSTER official blog (https://jpn.nec.com/clusterpro/blog/20181031.html) (Japanese only). The scripts described on the blog are just samples. Customize the scripts according to your environment.
- 7. Click Finish.

3) Adding a monitor resource

◆ Azure probe port monitor resource

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

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

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

- Select the Operation Mode on the drop down menu of the toolbar in Cluster WebUI to 2. switch to the operation mode. Select Start Cluster in the Status tab of Cluster WebUI and click.
- Confirm that a cluster system starts and the status of the cluster is displayed to the Cluster 3. 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 \rightarrow 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:

- 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. Additionally, for using DSR, perform a packet capture to confirm that communications are made between the IP address of the client and the frontend IP address of the load balancer.
- 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. Additionally, for using DSP, perform a packet capture to confirm that communications are

Additionally, for using DSR, perform a packet capture to confirm that communications are made between the IP address of the client and the frontend IP address of the load balancer.

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

Chapter 6 Error Messages

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

Chapter 9, "Error messages" in the *Reference Guide*.

Chapter 7 Notes and Restrictions

7.1 HA cluster using Azure DNS

7.1.1 Notes on Microsoft Azure

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

7.1.2 Notes on EXPRESSCLUSTER

Please refer the following for notes for EXPRESSCLUSTER on Azure: *EXRESSCLUSTER X Getting Started Guide*

- "Communication port number" in Chapter 5, "Notes and Restrictions"
- "Azure DNS resources" in Chapter 5, "Notes and Restrictions"
- "Setting up Azure DNS resources" in Chapter 5, "Notes and Restrictions"
- EXRESSCLUSTER 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:

EXRESSCLUSTER X Getting Started Guide

- "Adjusting OS startup time" in Chapter 5, "Notes and Restrictions"
- EXRESSCLUSTER X Reference Guide
- "Timeout tab"

7.2 HA cluster using a load balancer

7.2.1 Notes on Microsoft Azure

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

7.2.2 Notes on EXPRESSCLUSTER

Please refer the following for notes for EXPRESSCLUSTER on Azure: EXRESSCLUSTER X Getting Started Guide

- "Communication port number" in Chapter 5, "Notes and Restrictions"
- "Azure probe port resources" in Chapter 5, "Notes and Restrictions"
- "Setting up Azure probe port resources" in Chapter 5, "Notes and Restrictions"
- "Setting up Azure load balance monitor resources" in Chapter 5, "Notes and Restrictions" EXRESSCLUSTER 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:

EXRESSCLUSTER X Getting Started Guide

- "Adjusting OS startup time" in Chapter 5, "Notes and Restrictions"
- EXRESSCLUSTER X Reference Guide
- "Timeout tab"