

EXPRESSCLUSTER® X 3.3

HA Cluster Configuration Guide
for Amazon Web Services
(Windows)

10/03/2016
2nd Edition



Revision History

| Edition | Revised Date | Description |
|---------|--------------|--------------------------------------------|
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Preface

Who Should Use This Guide

The "EXPRESSCLUSTER® X3.3 HA Cluster Configuration Guide (Windows) for Amazon Web Services" is intended for administrators who set up cluster systems, system engineers who provide user support for such systems, and cluster-system maintenance personnel. They must also have knowledge of Amazon EC2, Amazon VPC, and IAM provided by Amazon Web Services.

Scope of Application

This guide covers the following EXPRESSCLUSTER version.

- EXPRESSCLUSTER X 3.3 for Windows

How This Guide is Organized

Chapter 1, Overview: Describes the functional overview.

Chapter 2, Operating environment:

Describes the operating environment on which the operation of EXPRESSCLUSTER has been verified.

Chapter 3, Notes: Describes the notes on constructing a cluster.

Chapter 4, Constructing an HA cluster based on VIP control:

Describes how to create an HA cluster based on VIP control.

Chapter 5, Constructing an HA cluster based on EIP control:

Describes how to create an HA cluster based on EIP control.

Chapter 6, Configuring the IAM:

Describes how to configure the IAM.

Chapter 7, Troubleshooting:

Describes the problems and their solutions.

ExpressCluster Documentation Set

The ExpressCluster X manuals consist of the following five 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. This guide follows the actual sequence of actions performed when introducing a cluster system using ExpressCluster to describe how to design the system, install and set up ExpressCluster X, check the operation after the setup, and perform evaluation before starting operation.

Reference Guide

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

Integrated WebManager Administrator's Guide

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

WebManager Mobile Administrator's Guide

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

Conventions

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

Note:

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

Important:

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

Related Information:

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

The following conventions are used in this guide.

| Convention | Usage | Example |
|----------------------------------------|------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| Bold | Indicates graphical objects, such as fields, list boxes, menu selections, buttons, labels, icons, etc. | In User Name , type your name. On the File menu, click Open Database . |
| Angled bracket within the command line | Indicates that the value specified inside of the angled bracket can be omitted. | <code>clpstat -s[-h <i>host_name</i>]</code> |
| Monospace (courier) | Indicates path names, commands, system output (message, prompt, etc), directory, file names, functions and parameters. | <code>c:\Program files\EXPRESSCLUSTER</code> |
| Monospace bold (courier) | Indicates the value that a user actually enters from a command line. | Enter the following: <code>clpcl -s -a</code> |
| <i>Monospace italic</i> (courier) | Indicates that users should replace italicized part with values that they are actually working with. | <code>clpstat -s [-h <i>host_name</i>]</code> |

Contacting NEC

For the latest product information, visit our website below:

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

Chapter 1 Overview

1-1. Functional overview

The settings described in this guide allow you to construct an HA cluster with EXPRESSCLUSTER in the Amazon Virtual Private Cloud (VPC) environment provided by Amazon Web Services (AWS). Because more important applications can be performed by constructing an HA cluster, a wider range of system configuration options are available in the AWS environment. The AWS has a robust configuration made up of multiple availability zones (hereafter referred to as AZ) in each region. The user can select and use an AZ as needed. EXPRESSCLUSTER realizes highly available applications by allowing the HA cluster to operate between multiple AZs in a region (hereafter referred to as Multi-AZ).

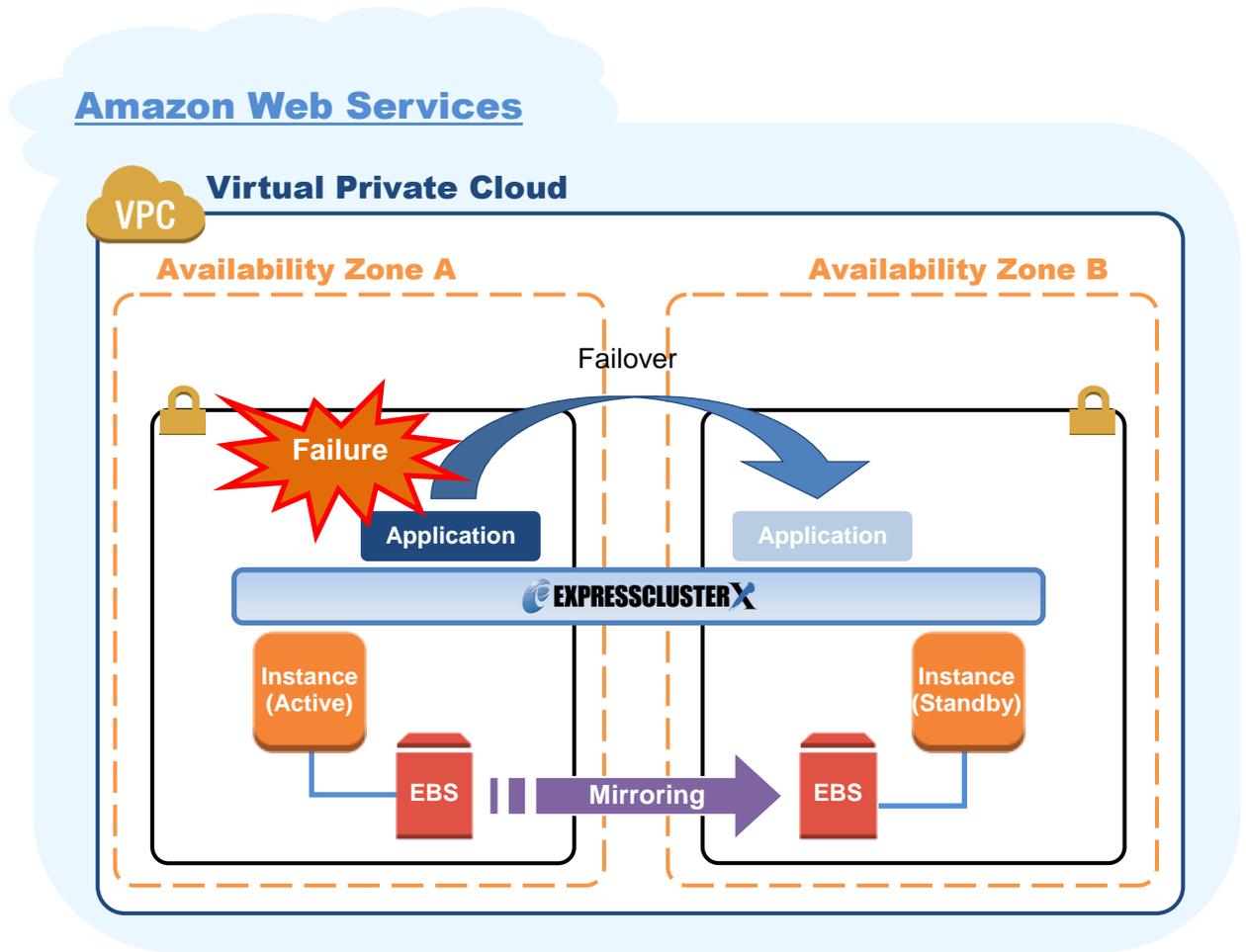


Figure 1-1 Mirror Type HA Cluster in Multi-AZ Configuration

In the AWS environment, a virtual IP can be used to connect to the cluster server. The AWS virtual ip resource and AWS elastic ip resource enable the client not to be aware of switching the destination server even if a “failover” or “group transition” occurred.

1-2. HA cluster configuration

This guide describes two HA cluster configurations: HA cluster based on virtual IP (VIP) control and HA cluster based on elastic IP (EIP) control. This section describes a single AZ configuration. For a multi-AZ configuration, refer to "1-3 Multi-AZ."

| Location of a client accessing an HA cluster | Resource to be selected | Reference in this chapter |
|----------------------------------------------|-------------------------|---------------------------------|
| In the same VPC | AWS virtual ip resource | HA cluster based on VIP control |
| Internet | AWS elastic ip resource | HA cluster based on EIP control |

HA cluster based on VIP control

This guide assumes the configuration in which a client in the same VPC accesses an HA cluster via a VIP address. For example, a DB server is clustered and accessed from a web server via a VIP address.

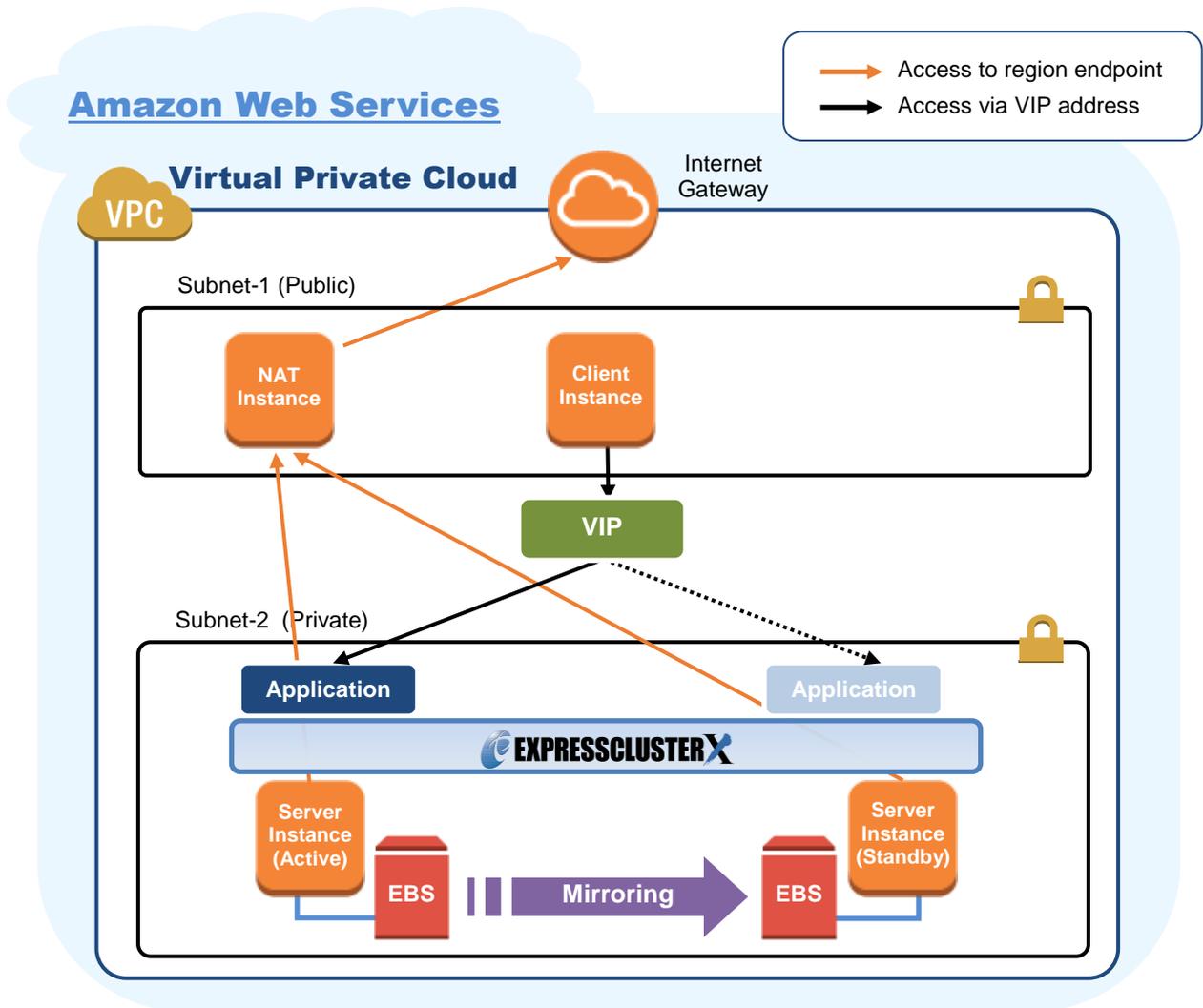


Figure 1-2 HA Cluster Based on VIP Control

In the above figure, the server instances are clustered and placed on the private subnet. The AWS virtual ip resource of EXPRESSCLUSTER sets a VIP address to the active server instance and rewrites the VPC route table. This enables the client instance placed on any subnet in the VPC to access the active server instance via the VIP address. The VIP address must be out of the VPC CIDR range.

NEC has verified that the AWS specifications do not allow clients outside the VPC to access the server instance via the VIP address assigned by the AWS virtual ip resource. Therefore, to enable clients outside the VPC to access, specify the EIP address assigned by the AWS elastic ip resource.

When executing the AWS CLI or referencing the DNS, each server instance accesses the regional endpoint or the Internet via a NAT instance placed on the public subnet as needed.

* When executing the AWS CLI, each instance must be able to communicate with the regional endpoint by -. In this guide, NAT is used for the HA cluster based on VIP control.

Overview

The following resources and monitor resources are required for an HA cluster based on VIP control configuration.

| Resource type | Description | Setup |
|---------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|
| AWS virtual ip resource | Assigns a VIP address to an active sever instance, changes the route table of the assigned VIP address, and publishes operations within the VPC. | Required |
| AWS virtual ip monitor resource | Periodically monitors whether the VIP address assigned by the AWS virtual ip resource exists in the local server and whether the VPC route table is changed illegally. (This monitor resource is automatically added when the AWS virtual ip resource is added.) | Required |
| AWS AZ monitor resource | Periodically monitors the health of the AZ in which the local server exists by using Multi-AZ. If Multi-AZ is not used, this monitor resource can be used to monitor whether the AWS CLI is available. | Recommended |
| IP monitor resource | Monitors the health of communication between subnets by checking whether communication with a NAT is available. | Required to check the health of communication between subnets. |
| Other resources and monitor resources | Depends on the configuration of the application, such as a mirror disk, used in an HA cluster. | Optional |

For details of the above resources and monitor resources, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
→ Chapter 5 Group resource details
- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
→ Chapter 6 Monitor resource details

HA cluster based on EIP control

This guide assumes the configuration in which a client accesses an HA cluster via a global IP address assigned to the EIP through the Internet. Clustered instances are placed on a public subnet. Each instance can access the Internet via the Internet gateway.

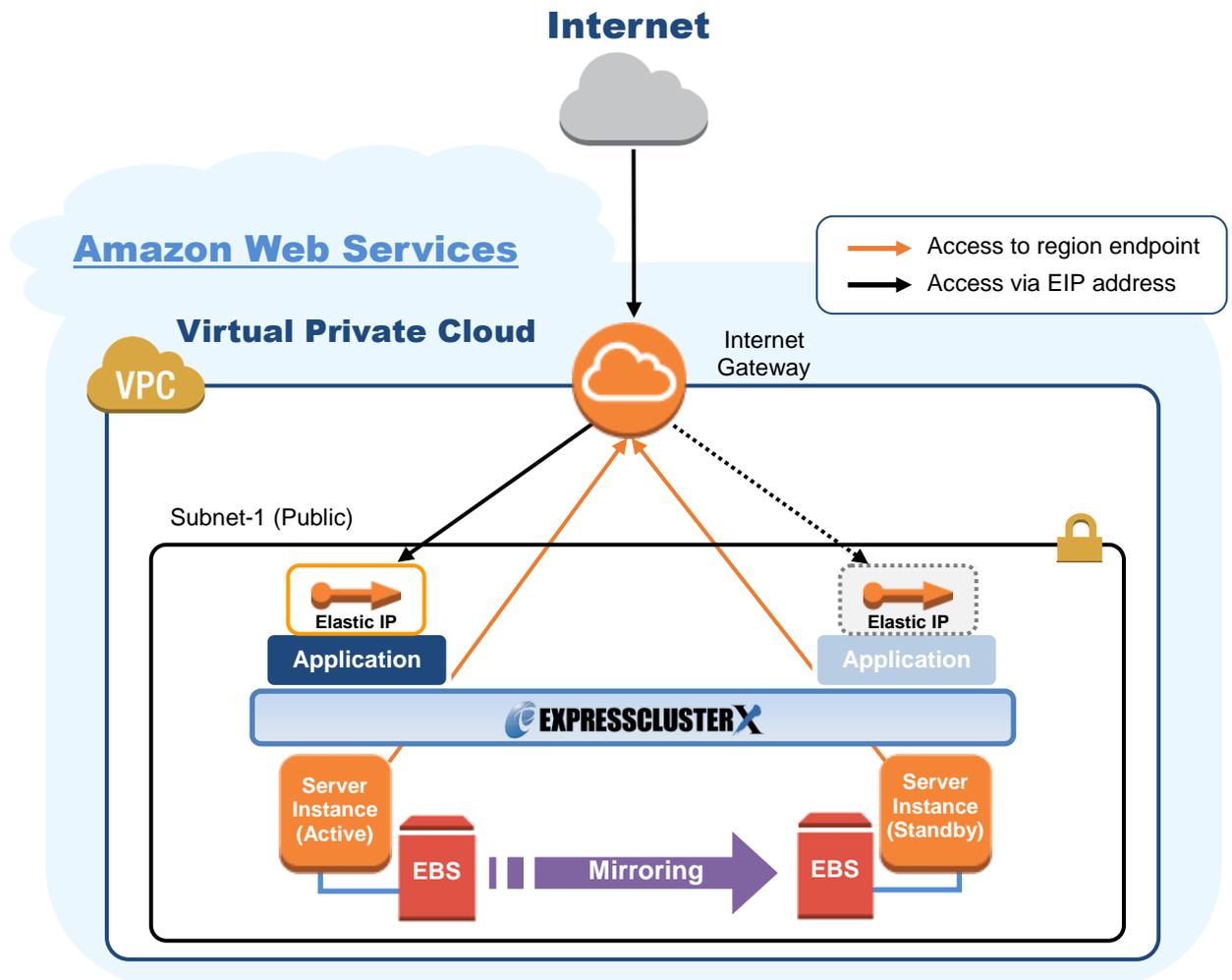


Figure 1-3 HA Cluster Based on EIP Control

In the above figure, the server instances are clustered and placed on the public subnet. The AWS virtual ip resource of EXPRESSCLUSTER attaches the EIP to the active server instance. This enables a client on the Internet to access the active server instance via the EIP address.

* When executing the AWS CLI, each instance must be able to communicate with the regional endpoint by using a method such as a proxy server, NAT, public IP, and EIP. In this guide, a public IP assigned to the instance is used for the HA cluster based on EIP control.

The following resources and monitor resources are required for an HA cluster based on EIP control configuration.

Overview

| Resource type | Description | Setup |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| AWS elastic ip resource | Assigns an EIP address to an active sever instance and publishes operations to the Internet. | Required |
| AWS elastic IP monitor resource | Periodically monitors whether the EIP address assigned by the AWS elastic ip resource exists in the local server. (This monitor resource is automatically added when the AWS elastic ip resource is added.) | Required |
| AWS AZ monitor resource | Periodically monitors the health of the AZ in which the local server exists by using Multi-AZ. If Multi-AZ is not used, this monitor resource can be used to monitor whether the AWS CLI is available. | Recommended |
| Custom monitor resource | Monitors a network partition (NP) so that the same resource does not start in multiple instances at the same time. | Required to perform NP resolution |
| Other resources and monitor resources | Depends on the configuration of the application, such as a mirror disk, used in an HA cluster. | Optional |

For details of the above resources and monitor resources, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
→ Chapter 5 Group resource details
- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
→ Chapter 6 Monitor resource details

1-3. Multi-AZ

In the AWS environment, the instances configuring an HA cluster can be distributed to AZs. This provides the instance redundancy for a failure occurrence in an AZ, and increases the system availability.

The AWS AZ monitor resource monitors the health of each AZ. If the monitor resource detects a failure, it makes EXPRESSCLUSTER to issue a warning or perform a recovery operation.

For details, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
 - Chapter 6 Monitor resource details
 - Understanding AWS AZ monitor resources

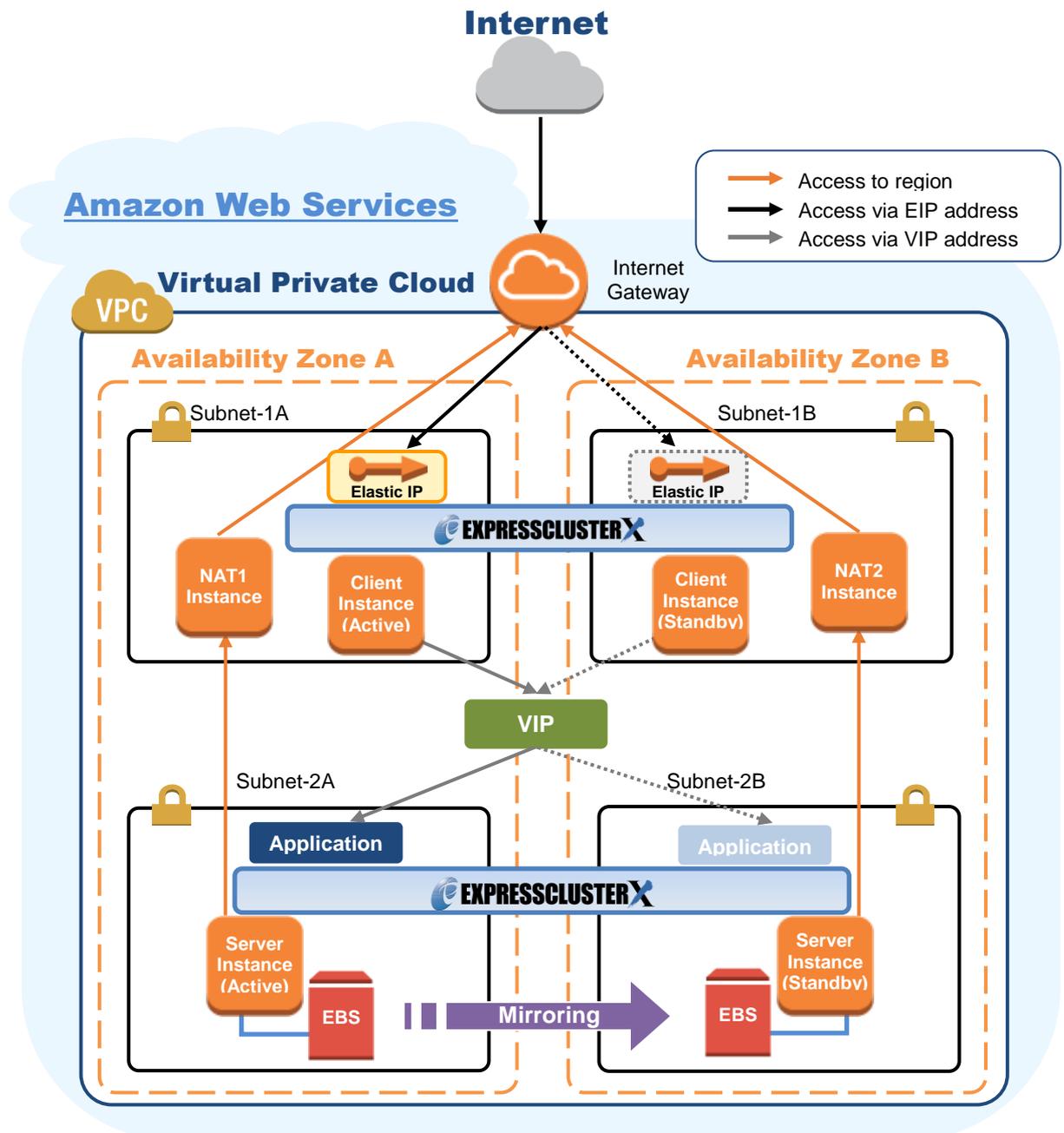


Figure 1-4 HA Cluster Using Multi-AZ

1-4. Network partition resolution

The instances configuring an HA cluster perform alive monitoring on each other by using heartbeat. In the configuration in which instances are distributed to multiple subnets, an undesirable condition such as redundant startup of a service occurs if the heartbeat is lost. To prevent redundant startup of a service, it is required to determine whether the instance itself was isolated in a network (network partition: NP) or the other instance was down.

The NP resolution conducts a ping or LISTEN port test for an always running device that can return a response (hereafter referred to as an *acknowledgement device*). If the acknowledgement device does not return a response, it is determined that an NP has occurred and the predefined process is performed (for example, issuing a warning, performing a recovery operation, or shutting down the server).

The Amazon VPC uses the following as the ping device usually.

| HA cluster type | ping device | Method | Remarks |
|---------------------------------|-------------------------------------------|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| HA cluster based on VIP control | Instance always running on another subnet | Ping | In this guide, NAT is used. |
| HA cluster based on EIP control | Regional endpoint | LISTEN port acknowledgement | For the regional endpoints, refer to the following URL: http://docs.aws.amazon.com/general/latest/gr/raande.html Example: When the region name is Asia Pacific (Tokyo), the regional endpoint is <code>ec2.ap-northeast-1.amazonaws.com</code> . |

For details, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
 → Chapter 8 Details on network partition resolution resources

1-5. On-premises and AWS

The following table describes the EXPRESSCLUSTER functional differences between the on-premises and AWS environments.

A: Available, N: Not available

| Function | On-premises | AWS |
|----------------------------------------|-------------|-----|
| Creation of a shared disk type cluster | A | NA |
| Creation of a mirror disk type cluster | A | A |
| Floating IP resource | A | NA |
| Virtual IP resource | A | NA |
| AWS elastic ip resource | NA | A |
| AWS virtual ip resource | NA | A |

The following table describes the creation flow of a 2-node cluster that uses a mirror disk and IP alias (on-premises: floating IP resource, AWS: AWS virtual ip resource) in the on-premises and AWS environments.

| | Step | On-premises | AWS |
|----------------------------------|---------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Before installing EXPRESSCLUSTER | | | |
| 1 | Configure the VPC environment. | Not required | <ul style="list-style-type: none"> ◇ When using the AWS virtual ip resource, refer to “4-1 Configuring the VPC Environment” in this guide. ◇ When using the AWS elastic ip resource, refer to “5-1 Configuring the VPC Environment” in this guide. |
| 2 | Configure the instance. | Not required | <ul style="list-style-type: none"> ◇ When using the AWS virtual ip resource, refer to “4-2 Configuring the instance” in this guide. ◇ When using the AWS elastic ip resource, refer to “5-2 Configuring the instance” in this guide. |
| 3 | Configure a partition for a mirror disk resource. | Refer to the following: <ul style="list-style-type: none"> • EXPRESSCLUSTER X 3.3 for Windows Installation and Configuration Guide <ul style="list-style-type: none"> → Chapter 1 Determining a system configuration → Settings after configuring hardware • EXPRESSCLUSTER X 3.3 for Windows Reference Guide <ul style="list-style-type: none"> → Chapter 5 Group resource details → Understanding mirror disk resources | Same as the on-premises environment |

Overview

| | | | |
|---------------------------------|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | Adjust the OS startup time. | Refer to the following: EXPRESSCLUSTER X 3.3 for Windows Installation and Configuration Guide → Chapter 1 Determining a system configuration → Settings after configuring hardware | Same as the on-premises environment |
| 5 | Check the network. | | |
| 6 | Check the firewall. | | |
| 7 | Synchronize the server time. | | |
| 8 | Install EXPRESSCLUSTER. | Refer to the following: • EXPRESSCLUSTER X 3.3 for Windows Installation and Configuration Guide → Chapter 3 Installing EXPRESSCLUSTER | Same as the on-premises environment |
| After installing EXPRESSCLUSTER | | | |
| 9 | Register the EXPRESSCLUSTER license. | Refer to the following: • EXPRESSCLUSTER X 3.3 for Windows Installation and Configuration Guide → Chapter 4 Registering the license | Same as the on-premises environment |
| 10 | Construct a cluster - Set up the heartbeat method. | Refer to the following: • EXPRESSCLUSTER X 3.3 for Windows Installation and Configuration Guide → Chapter 5 Creating the cluster configuration data → Creating the two-node cluster configuration data | BMC heartbeat and DISK heartbeat cannot be used. |
| 11 | Construct a cluster: Set up the NP resolution. | Use an NP resolution resource. Refer to the following: • EXPRESSCLUSTER X 3.3 for Windows Installation and Configuration Guide → Chapter 5 Creating the cluster configuration data → Creating the cluster configuration data • EXPRESSCLUSTER X 3.3 for Windows Reference Guide → Chapter 8 Details on network partition resolution resources | <ul style="list-style-type: none"> ◇ When using the AWS virtual ip resource, refer to “4-3 Setting up EXPRESSCLUSTER” → “3) Add a monitor resource.” → “IP monitor resource” in this guide. ◇ When using the AWS elastic ip resource, refer to “5-3 Setting up EXPRESSCLUSTER” → “1) Construct a cluster” in this guide. |

| | | | |
|-----------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>12</p> | <p>Construct a cluster: Create a failover group Create a monitor resource.</p> | <p>Refer to the following:</p> <ul style="list-style-type: none"> • EXPRESSCLUSTER X 3.3 for Windows Installation and Configuration Guide → Chapter 5 Creating the cluster configuration data → Creating the cluster configuration data | <p>In addition to the reference for the on-premises environment, refer to the following:</p> <ul style="list-style-type: none"> ◇ When using the AWS virtual ip resource <ul style="list-style-type: none"> • “4-3 Setting up EXPRESSCLUSTER” in this guide • EXPRESSCLUSTER X 3.3 for Windows Reference Guide → Chapter 5 Group resource details → Understanding AWS virtual ip resources ◇ When using the AWS elastic ip resource, refer to the following: <ul style="list-style-type: none"> • “5-3 Setting up EXPRESSCLUSTER” in this guide • EXPRESSCLUSTER X 3.3 for Windows Reference Guide → Chapter 5 Group resource details → Understanding AWS elastic ip resources |
|-----------|----------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Chapter 2 Operating Environment

For details, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Getting Started Guide
 - Chapter 3 Installation requirements for EXPRESSCLUSTER
 - Operation environment for AWS elastic ip resource, AWS virtual ip resource, AWS Elastic IP monitor resource, AWS virtual IP monitor resource, AWS AZ monitor resource

Chapter 3 Notes

Notes on Using EXPRESSCLUSTER in the VPC

Note the following points when using EXPRESSCLUSTER in the VPC environment.

Access from the Internet

NEC has verified that the AWS specifications do not allow clients outside the VPC to access the server instance via the VIP address assigned by the AWS virtual ip resource. Therefore, to enable clients outside the VPC to access, specify the EIP address assigned by the AWS elastic ip resource.

Restrictions on the group resource functions

Refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Getting Started Guide
 - Chapter 5 Notes and Restrictions
 - Setting up AWS elastic ip resources
 - Setting up AWS virtual ip resources

Mirror disk performance

For a mirror type HA cluster, a write request to a mirror disk takes the following routes:

Write request I/O:

Guest OS on the active server → Host OS on the active server → Host OS on the standby server → Guest OS on the standby server

Writing completion notice:

Guest OS on the standby server → Host OS on the standby server → Host OS on the active server → Guest OS on the active server

If an HA cluster is constructed in a Multi-AZ configuration, the instances are located at long distances from each other, causing a TCP/IP response delay. This might affect a mirroring operation.

Also, the usage of other systems affects the mirroring performance due to multi-tenancy. Therefore, the difference in the mirror disk performance in a cloud environment tends to be larger than that in a physical or general virtualized environment (non-cloud environment) (that is, the degradation rate of the mirror disk performance tends to be larger).

Take this point into consideration at the design phase if priority is put on writing performance in your system.

Chapter 4 Constructing an HA cluster based on VIP control

This chapter describes how to construct an HA cluster based on VIP control. The numbers in the figure correspond to the descriptions and setting values in the following sections.

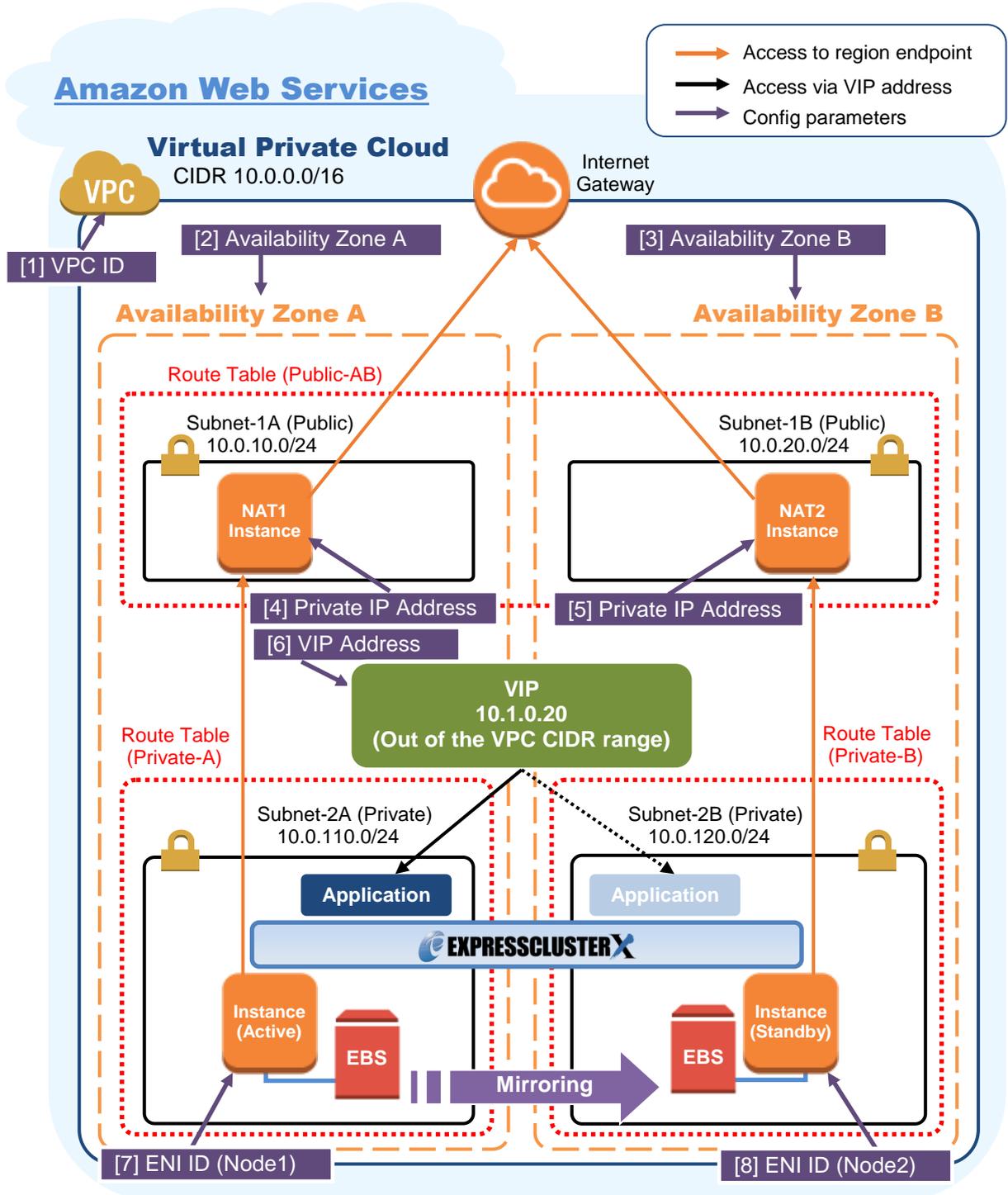


Figure 4-1 System Configuration of the HA Cluster Based on VIP Control

4-1. Configuring the VPC Environment

Configure the VPC on the VPC Management console and EC2 Management console.

The IP addresses used in the figures and description are an example. In the actual configuration, use the actual IP addresses assigned to the VPC. When installing EXPRESSCLUSTER in the existing VPC, specify the appropriate settings such as adding a subnet if the number of subnets is insufficient. This guide does not describe the case to perform operations by adding an ENI to an instance of an HA cluster node.

1) Configure the VPC and subnet.

Create a VPC and subnet first.

→ Add a VPC and subnet in **VPC** and **Subnets** on the VPC Management console.

[1] VPC ID

Write down the VPC ID (vpc-xxxxxxx) because it is necessary to set up the AWS virtual ip resource later.

2) Configure the Internet gateway.

Add an Internet gateway to access the Internet from the VPC.

→ To create an Internet gateway, select **Internet Gateways > Create Internet Gateway** on the VPC Management console. Attach the created Internet gateway to the VPC.

3) Configure the network ACL and security group.

Specify the appropriate network ACL and security group settings to prevent unauthorized network access from in and out of the VPC.

Change the network ACL and security group path settings so that the instances of the HA cluster node can communicate with the Internet gateway via HTTPS, communicate with WebManager, and communicate with each other. The instances are to be placed on the private networks (Subnet-2A and Subnet-2B).

→ Change the settings in **Network ACLs** and **Security Groups** on the VPC Management console.

For the port numbers that are used by the EXPRESSCLUSTER components, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Getting Started Guide
 - Chapter 5 Notes and Restrictions
 - Before installing EXPRESSCLUSTER

4) Add an HA cluster instance.

Create an HA cluster node instance on the private networks (Subnet-2A and Subnet-2B).

To use an IAM role by assigning it to an instance, be sure to specify the IAM role to the instance when creating it. (After the instance has been created, it is not possible to change the assigned IAM role or assign a new IAM role.)

→ To create an instance, select **Instances > Launch Instance** on the EC2 Management console.
→ For details about the IAM settings, refer to "Chapter 6 Configuring the IAM."

Disable **Source/Dest. Check** of the elastic network interface (ENI) assigned to each created instance.

To perform the VIP control by using the AWS virtual ip resource, communication with the VIP address (10.1.0.20 in the above figure) must be routed to the ENI of the instance. It is necessary to disable **Source/Dest. Check** of the ENI of each instance to communicate with the private IP address and VIP address.

→ To change the settings, right-click the added instance in **Instances** on the EC2 Management console, and select **Networking > Change Source/Dest. Check**.

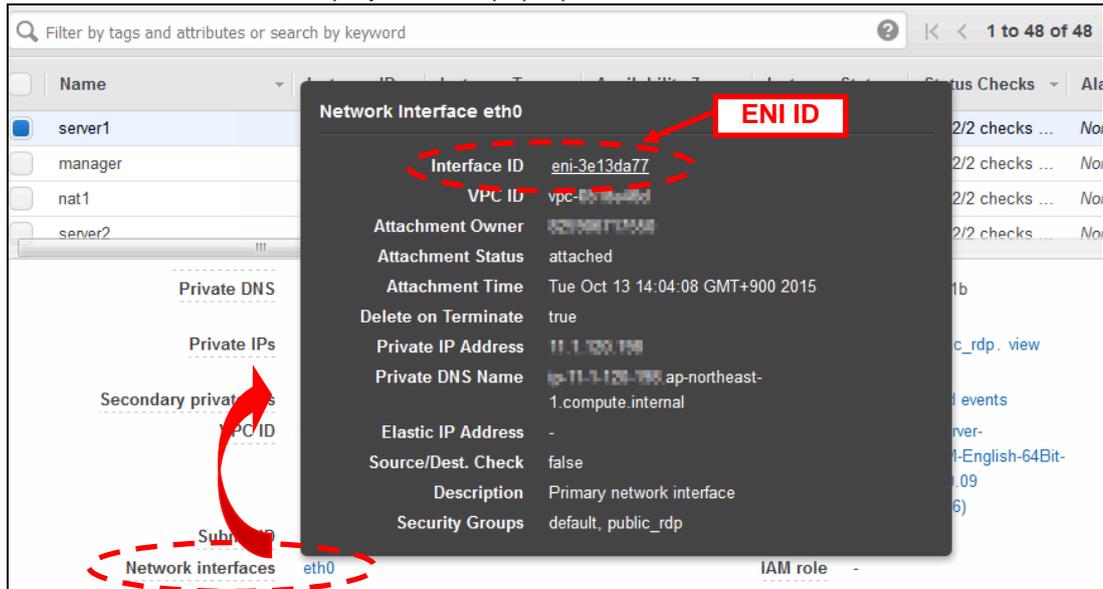
[7] ENI ID (Node1)

[8] ENI ID (Node2)

[Write down the ENI ID \(eni-xxxxxxx\) of each instance because it is necessary to set up the AWS virtual ip resource later.](#)

Use the following procedure to check the ENI ID assigned to the instance.

1. Select the instance to display its detailed information.
2. Click the target device in **Network Interfaces**.
3. Check **Interface ID** displayed in the pop-up window.



5) Add a NAT instance.

To perform the VIP control by using the AWS CLI, communication from the instance of the HA cluster node to the regional endpoint via HTTPS must be enabled.

To do so, create a NAT instance on the public networks (Subnet-1A and Subnet-1B). In the AWS environment, amzn-ami-vpc-nat-pv-2014.09.1.x86_64-ebs is prepared as the AMI for NAT.

When creating a NAT instance, enable the public IP. In addition, disable **Source/Dest. Check** of the added NAT instance to enable the NAT function.

→ To change the settings, right-click the NAT instance in **Instances** on the EC2 Management console, and select **Networking > Change Source/Dest. Check**.

6) Disable DHCP for the network adapter of the instance. (Set a static IP.)

[\(This step is required for EXPRESSCLUSTER internal version 11.31 or earlier, but not required for internal version 11.32 or later.\)](#)

Change the method to obtain an IP address for the ENI assigned to the instance from DHCP to manual setting.

Use the command such as `ipconfig /all` to check the IP address, subnet mask, default gateway, and primary DNS server that are obtained by DHCP.

In the properties of the network adapter, set the checked IP address, subnet mask, default gateway, and primary DNS server statically.

[Do not set the IP address that is set as the AWS virtual IP.](#)

→ Change the settings from Windows **Control Panel**.

Constructing an HA cluster based on VIP control

7) Configure the route table.

Add the routing to the Internet gateway so that the AWS CLI can communicate with the regional endpoint via NAT and the routing so that a client in the VPC can access the VIP address. The number of CIDR blocks of the VIP address must always be 32.

(For EXPRESSCLUSTER internal version 11.31 or earlier, the same routing must be added in all route tables of the VPC as the routing to the VIP address. For internal version 11.32 or later, it is not required to add it to all route tables.)

The following routings must be set in the route table (Public-AB) of the public networks (Subnet-1A and Subnet-1B in the above figure).

◇ Route table (Public-AB)

| Destination | Target | Remarks |
|------------------------------------------------------|---------------------------------------------------------------------------------|---------------------|
| VPC network <i>(Example: 10.0.0.0/16)</i> | local | Existing by default |
| 0.0.0.0/0 | Internet gateway | Add (required) |
| VIP address <i>(Example: 10.1.0.20/32)</i> | eni-xxxxxxx (ENI ID of the active server instance) [7] ENI ID (Node1) | Add (required) |

The following routings must be set in the route tables (Private-A and Private-B) of the private networks (Subnet-2A and Subnet-2B in the above figure).

◇ Route table (Private-A)

| Destination | Target | Remarks |
|------------------------------------------------------|---------------------------------------------------------------------------------|---------------------|
| VPC network <i>(Example: 10.0.0.0/16)</i> | local | Existing by default |
| 0.0.0.0/0 | NAT1 | Add (required) |
| VIP address <i>(Example: 10.1.0.20/32)</i> | eni-xxxxxxx (ENI ID of the active server instance) [7] ENI ID (Node1) | Add (required) |

◇ Route table (Private-B)

| Destination | Target | Remarks |
|------------------------------------------------------|---------------------------------------------------------------------------------|---------------------|
| VPC network <i>(Example: 10.0.0.0/16)</i> | local | Existing by default |
| 0.0.0.0/0 | NAT2 | Add (required) |
| VIP address <i>(Example: 10.1.0.20/32)</i> | eni-xxxxxxx (ENI ID of the active server instance) [7] ENI ID (Node1) | Add (required) |

When a failover occurred, the AWS virtual ip resource switches all routings to the VIP address set in these route tables to the ENI of the standby server instance by using the AWS CLI.

[6] VIP Address

The VIP address must be out of the VPC CIDR range of the VPC. Write down the VIP address set to the route table because it is necessary to set up the AWS virtual ip resource later.

Configure other routings according to the environment.

8) Add a mirror disk (EBS).

Add an EBS to be used as the mirror disk (cluster partition or data partition) as needed.

→ To add an EBS, select **Volumes > Create Volume** on the EC2 Management console, and then attach the created volume to an instance.

4-2. Configuring the instance

Log in to each instance of the HA cluster and specify the following settings.

For the Python and AWS CLI versions supported by EXPRESSCLUSTER, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Getting Started Guide
 - Chapter 3 Installation requirements for EXPRESSCLUSTER
 - Operation environment for AWS elastic ip resource, AWS virtual ip resource

1) Configure a firewall.

Change the firewall setting as needed.

For the port numbers that are used by the EXPRESSCLUSTER components, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Getting Started Guide
 - Chapter 5 Notes and Restrictions
 - Before installing EXPRESSCLUSTER

2) Install Python.

Install Python required by EXPRESSCLUSTER.

First, confirm that Python is installed.

If not installed, download Python from the following URL and install it. After the installation, add the path to `python.exe` to the environment variable `PATH` from **Control Panel**. (Usually, Python is installed under `C:\`.)

<https://www.python.org/downloads/>

3) Install the AWS CLI.

Download the AWS CLI MSI installer from the following URL and install it.

The installer automatically adds the path to `aws.exe` to the environment variable `PATH`.

<http://docs.aws.amazon.com/cli/latest/userguide/installing.html#install-msi-on-windows>

* Installation by using `pip` is not supported.

For details about how to set up the AWS CLI, refer to the following:

<http://docs.aws.amazon.com/cli/latest/userguide/installing.html>

(If EXPRESSCLUSTER has been installed before installing Python or the AWS CLI, be sure to restart the OS before using EXPRESSCLUSTER.)

4) Register the AWS access key.

Start the command prompt as the Administrator user and run the following command:

```
> aws configure
```

Enter information such as the AWS access key to the inquiries.

The settings to be specified vary depending on whether an IAM role is assigned to the instance or not.

◇ Instance to which an IAM role is assigned.

```
AWS Access Key ID [None]: (Press Enter without entering anything.)
AWS Secret Access Key [None]: (Press Enter without entering anything.)
Default region name [None]: <default region name>
Default output format [None]: text
```

◇ Instance to which an IAM role is not assigned.

```
AWS Access Key ID [None]: <AWS access key>
AWS Secret Access Key [None]: <AWS secrete access key>
```

```
Default region name [None]: <default region name>
Default output format [None]: text
```

If you specified incorrect settings, delete the folder %SystemDrive%\Users\Administrator\.aws entirely, and specify the above settings again.

5) Prepare the mirror disk.

If an EBS has been added to be used as the mirror disk, divide the EBS into partitions and use each partition as the cluster partition and data partition.

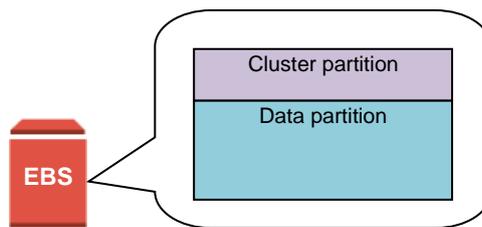


Figure 4-2 EBS Partitioning Example

For details about the mirror disk partition, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Installation & Configuration Guide
 - Chapter 1 Determining a system configuration
 - Mirror partition settings

6) Install EXPRESSCLUSTER.

For the installation procedure, refer to “EXPRESSCLUSTER X 3.3 for Windows Installation & Configuration Guide”.

Store the EXPRESSCLUSTER installation media in the environment to which to install EXPRESSCLUSTER.

(To transfer data, use any method such as Remote Desktop and Amazon S3.)

After the installation, restart the OS.

4-3. Setting up EXPRESSCLUSTER

This section describes how to set up EXPRESSCLUSTER by using the WebManeger cluster generation wizard.

For details about how to set up and connect to WebManager, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Installation and Configuration Guide
→ Chapter 5 Creating the cluster configuration data

This section describes how to add the following resources:

- Mirror disk resource
- AWS virtual ip resource
- AWS AZ monitor resource
- AWS virtual ip monitor resource
- NP resolution (IP monitor resource)

For the settings other than the above, refer to “EXPRESSCLUSTER X 3.3 for Windows Installation and Configuration Guide”.

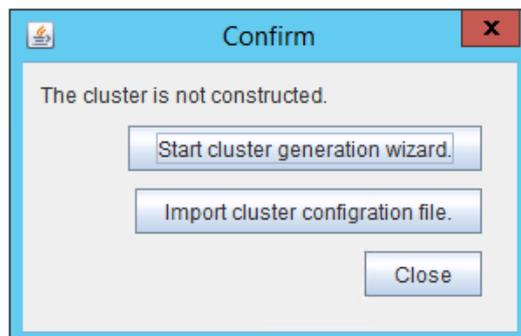
1) Construct a cluster.

Start the cluster generation wizard to construct a cluster.

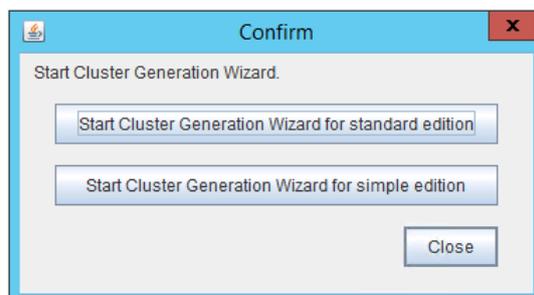
- ◇ Construct a cluster.

Steps

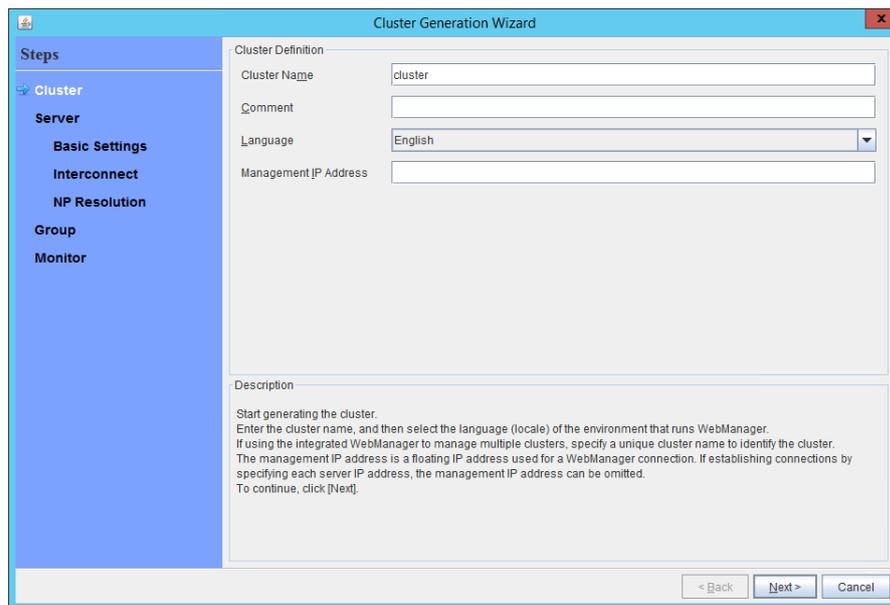
1. Access WebManager. The dialog box below is displayed.
Click **Start Cluster Generation Wizard**.



2. The dialog box below is displayed.
Click **Start Standard Cluster Generation Wizard**.



3. The **Cluster Definition** page is displayed.
Enter a cluster name in **Cluster Name**.
Select an appropriate language from **Language**. The display language of WebManager will be changed to the language selected here by applying the settings.



The screenshot shows the 'Cluster Generation Wizard' window. On the left, a 'Steps' sidebar lists: Cluster, Server, Basic Settings, Interconnect, NP Resolution, Group, and Monitor. The 'Cluster Definition' section is active, containing fields for Cluster Name (filled with 'cluster'), Comment, Language (set to 'English'), and Management IP Address. A 'Description' box at the bottom provides instructions on how to use the wizard.

Cluster Definition

Cluster Name: cluster

Comment:

Language: English

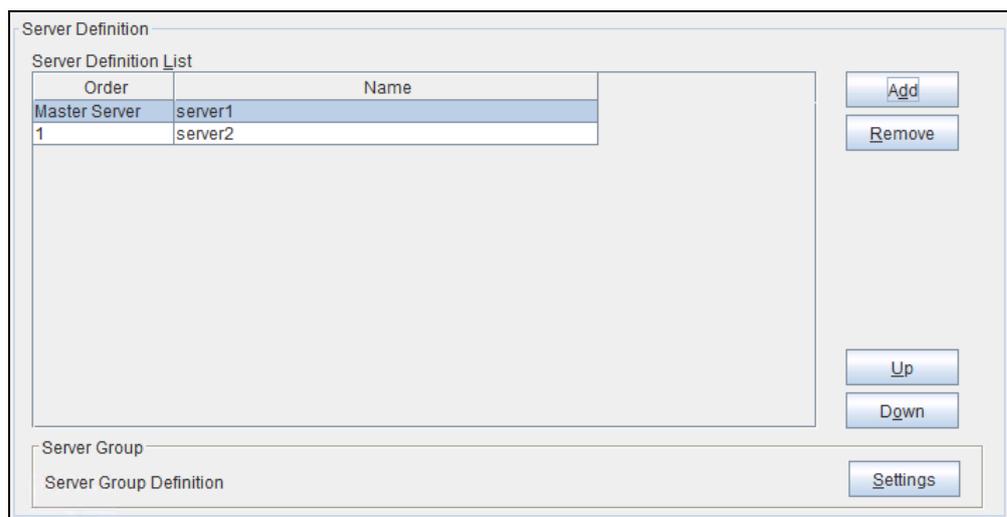
Management IP Address:

Description

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

< Back Next > Cancel

- The **Server Definition** page is displayed.
The instance connecting to WebManager is displayed as the registered master server.
Click **Add** to add other instances (by specifying their private IP addresses).



The screenshot shows the 'Server Definition' page. It features a table with columns 'Order' and 'Name'. The first row is labeled 'Master Server' and contains 'server1'. The second row contains '1' and 'server2'. To the right of the table are buttons for 'Add', 'Remove', 'Up', and 'Down'. At the bottom, there is a 'Server Group' section with a 'Server Group Definition' field and a 'Settings' button.

Server Definition

Server Definition List

| Order | Name |
|---------------|---------|
| Master Server | server1 |
| 1 | server2 |

Add

Remove

Up

Down

Server Group

Server Group Definition

Settings

- Click **Next**.
- The **Interconnect** page is displayed.
Specify the IP address (private IP address of each instance) to be used for interconnect.
Select mdc1 from **MDC** for the communication path of the mirror disk resource to be created later.

Constructing an HA cluster based on VIP control

| Priority | Type | MDC | server1 | server2 |
|----------|-------------|------|-------------|-------------|
| 1 | Kernel Mode | mdc1 | 11.1.120.40 | 11.1.120.41 |

7. Click **Next**.

8. The **NP Resolution** page is displayed.

However, the NP resolution is not set on this page. The same operation as the NP resolution can be achieved by adding the IP monitor resource and monitoring a NAT instance set in each AZ. (The NP resolution will be set in "3) Add a monitor resource." described later.)

Click **Next**.

2) Add a group resource.

- ◇ Group definition
Create a failover group.

Steps

1. The **Group Definition** dialog box is displayed.
Enter the failover group name (failover1) in the **Name** box.

Group Definition

Type: failover

Use Server Group Settings

Name: failover

Comment:

2. Click **Next**.

3. The **Available Servers** page is displayed.
Click **Next** without specifying anything.

4. The **Group Attribute Settings** page is displayed.
Click **Next** without specifying anything.
5. The **Group Resource** page is displayed.
Add a group resource on this page following the procedure below.

◇ Mirror disk resource

Create the mirror disk resource according the mirror disk (EBS) as needed.

For details, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
→ Chapter 5, Group resource details
→ Understanding mirror disk resources

Steps

1. Click **Add** in **Group Resource List**.
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 resource name (md) in the **Name** box.
3. Click **Next**.
4. The **Dependency** page is displayed.
Click **Next** without specifying anything.
5. The **Recovery Operation at Activation Failure Detection** and **Recovery Operation at Deactivation Failure Detection** pages are displayed.
Click **Next**.
6. Enter the drive letter for the partition set up in “4-2 Configuring the instance” → “5) Prepare the mirror disk.” in **Data Partition Drive Letter** and **Cluster Partition Drive Letter**.
7. Click **Add** for **Available Servers**.
8. The **Selection of Partition** window is displayed.
Click **Connect** to obtain partition information.
Select the data and cluster partitions and click **OK**.
9. Perform steps 7 and 8 on the other node.
10. Return to the **Advanced Settings** page and click **Finish** to complete setting.

◇ AWS virtual ip resource

Add the AWS virtual ip resource that controls the VIP by using the AWS CLI.

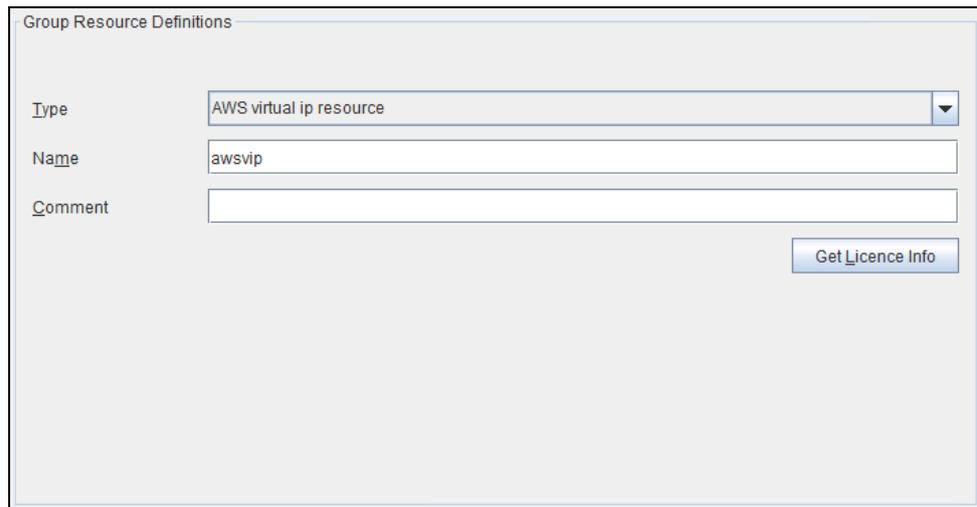
For details, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
→ Chapter 5, Group resource details
→ Understanding AWS virtual ip resources

Steps

1. Click **Add** in **Group Resource List**.
2. The **Resource Definition of Group(failover1)** window is displayed.
Select the group resource type (AWS virtual ip resource) from the **Type** box and enter the group resource name (awsvip1) in the **Name** box.

Constructing an HA cluster based on VIP control



Group Resource Definitions

Type: AWS virtual ip resource

Name: awsvip

Comment:

Get Licence Info

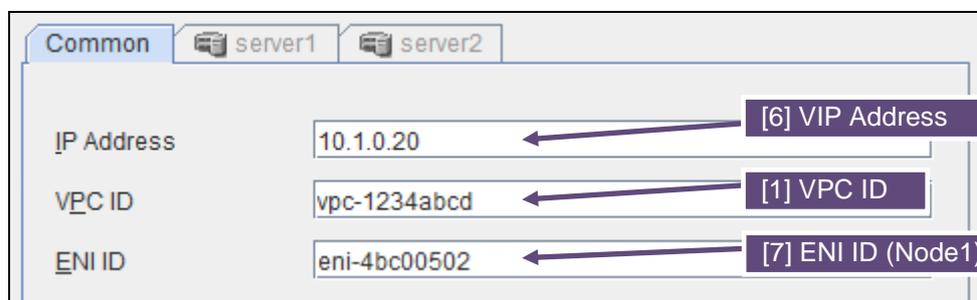
3. Click **Next**.
4. The **Dependency** page is displayed. Click **Next** without specifying anything.
5. The **Recovery Operation at Activation Failure Detection** and **Recovery Operation at Deactivation Failure Detection** pages are displayed. Click **Next**.
6. The **Advanced Settings** page is displayed.
Set a VIP address to be assigned in the **IP Address** box on the **Common** tab.
[\(For EXPRESSCLUSTER internal version 11.31 or earlier, all route tables in the VPC ID must include the routing to the VIP address specified in the IP Address box. For internal version 11.32 or later, it is not required that all route tables include the routing.\)](#)

Set the ID of the VPC including instances in the **VPC ID** box.

To set up the servers individually, enter the VPC ID of one server on the **Common** tab and specify the VPC ID of the other server separately.

Enter the ENI ID of the active server instance to which the VIP address is to be routed in the **ENI ID** box.

The ENI IDs of the servers must be set up individually. Enter the ENI ID of one server on the **Common** tab and specify the ENI ID of the other server separately.



Common server1 server2

IP Address: 10.1.0.20 [6] VIP Address

VPC ID: vpc-1234abcd [1] VPC ID

ENI ID: eni-4bc00502 [7] ENI ID (Node1)

7. Specify the node settings on each node tab
Select the **Individually Set Up Servers** check box.
Confirm that the VPC ID specified on the **Common** tab is entered in the **VPC ID** box.
Enter the ENI ID of the instance corresponding to the node in the **ENI ID** box.

The image shows two screenshots of a configuration window for 'server1' and 'server2'. Both screenshots have 'Set Up Individually' checked. The 'VPC ID' field contains 'vpc-1234abcd' and the 'ENI ID' field contains 'eni-4bc00502' for server1 and 'eni-5a3a7902' for server2. Callouts point to the VPC ID and ENI ID fields.

8. Click **Finish** to complete setting.

3) Add a monitor resource.

◇ AWS AZ monitor resource

Create an AWZ AZ monitor resource to check whether the specified AZ is usable by using the monitor command.

For details, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
 - Chapter 6, Monitor resource details
 - Understanding AWS AZ monitor resources

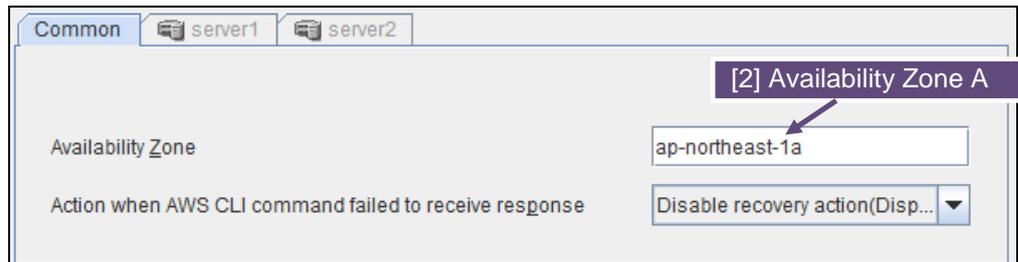
Steps

1. Click **Add** in **Monitor Resource List**.
2. Select the monitor resource type (AWS AZ monitor) from the **Type** box and enter the monitor resource name (awsazw1) in the **Name** box.

The image shows the 'Monitor Resource Definition' dialog box. The 'Type' dropdown is set to 'AWS AZ monitor', the 'Name' field contains 'awsazw', and the 'Comment' field is empty. A 'Get Licence Info' button is visible at the bottom right.

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3. Click **Next**.
4. The **Monitor (common)** page is displayed.
Click **Next** without specifying anything.
5. The **Monitor (special)** page is displayed.
Enter the AZ to be monitored in the **Availability Zone** box on the **Common** tab.
(Specify the AZ of the active server instance.)

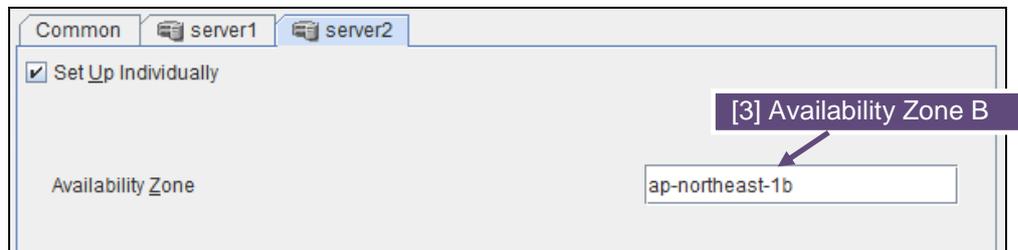


The screenshot shows the 'Common' tab of the 'Monitor (special)' page. The 'Availability Zone' field contains the text 'ap-northeast-1a'. A callout box with the text '[2] Availability Zone A' and an arrow points to this field. Below the 'Availability Zone' field is a dropdown menu for 'Action when AWS CLI command failed to receive response', which is currently set to 'Disable recovery action(Disp...'. The 'server1' and 'server2' tabs are visible at the top.

6. Specify the node settings on each node tab.
Select the **Individually Set Up Servers** check box.
Enter the AZ of the instance corresponding to the node in the **Availability Zone** box.



The screenshot shows the 'server1' tab of the 'Monitor (special)' page. The 'Set Up Individually' checkbox is checked. The 'Availability Zone' field contains the text 'ap-northeast-1a'. A callout box with the text '[2] Availability Zone A' and an arrow points to this field. The 'Common' and 'server2' tabs are visible at the top.



The screenshot shows the 'server2' tab of the 'Monitor (special)' page. The 'Set Up Individually' checkbox is checked. The 'Availability Zone' field contains the text 'ap-northeast-1b'. A callout box with the text '[3] Availability Zone B' and an arrow points to this field. The 'Common' and 'server1' tabs are visible at the top.

7. Click **Next**.
8. The **Recovery Action** page is displayed.
Set LocalServer in the **Recovery Target** box.

The screenshot shows a configuration window with several sections separated by downward-pointing triangles. The 'Recovery Action' dropdown is set to 'Custom settings'. The 'Recovery Target' text box contains 'LocalServer' and is circled in red. Below it, 'Recovery Script Execution Count' is set to '0 time'. The next section has an unchecked checkbox for 'Execute Script before Reactivation' and 'Maximum Reactivation Count' set to '0 time'. The following section has two unchecked checkboxes: 'Execute Script before Failover' and 'Execute migration before Failover'. 'Failover Target Server' has 'Stable Server' selected with a radio button, and 'Maximum Priority Server' is unselected. 'Maximum Failover Count' has 'Set as much as the number of the servers' unselected and 'Set Number' selected with a value of '0 time'. The final section has an unchecked checkbox for 'Execute Script before Final Action' and 'Final Action' set to 'No operation'.

9. Click **Finish** to complete setting.

◇ AWS virtual ip monitor resource

This resource is automatically added when the AWS virtual ip resource is added.

The existence of the VIP address and the health of the route table can be checked by using the OS API and the AWS CLI commands.

For details, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
 - Chapter 6, Monitor resource details
 - Understanding AWS virtual ip monitor resources

◇ IP monitor resource

Create the IP monitor resource to monitor the health of the subnet by sending a ping to a NAT instance placed in each AZ. Specify the following:

Steps

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

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Monitor Resource Definition

Type: ip monitor

Name: ipw

Comment:

Get Licence Info

3. Click **Next**.
4. The **Monitor (common)** page is displayed.
Confirm that **Monitoring Timing** is **Always** and click **Next**.
5. The **Monitor (special)** page is displayed.
Enter the private IP address of the NAT instance used by each node in the **IP Address** box of the **Common** tab.



IP Addresses

| IP Address |
|-------------|
| 10.0.10.100 |
| 10.0.20.100 |

[4] Private IP Address

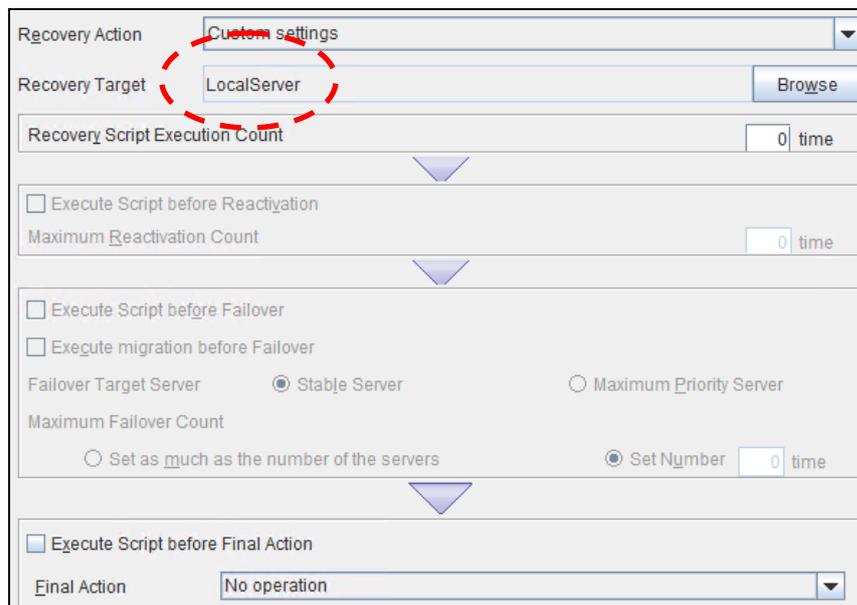
[5] Private IP Address

Add

Remove

Edit

6. Click **Next**.
7. The **Recovery Action** page is displayed.
Set **LocalServer** in the **Recovery Target** box.
Select **Stop cluster service and shutdown OS** in **Final Action**.



Recovery Action: Custom settings

Recovery Target: LocalServer

Recovery Script Execution Count: 0 time

Execute Script before Reactivation

Maximum Reactivation Count: 0 time

Execute Script before Failover

Execute migration before Failover

Failover Target Server: Stable Server Maximum Priority Server

Maximum Failover Count: Set as much as the number of the servers Set Number: 0 time

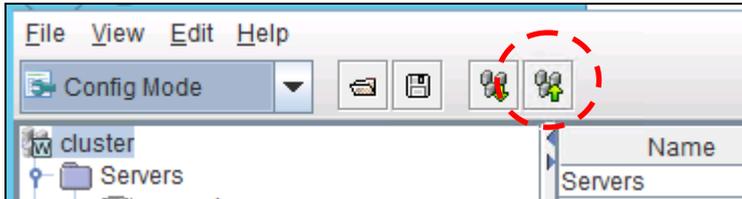
Execute Script before Final Action

Final Action: No operation

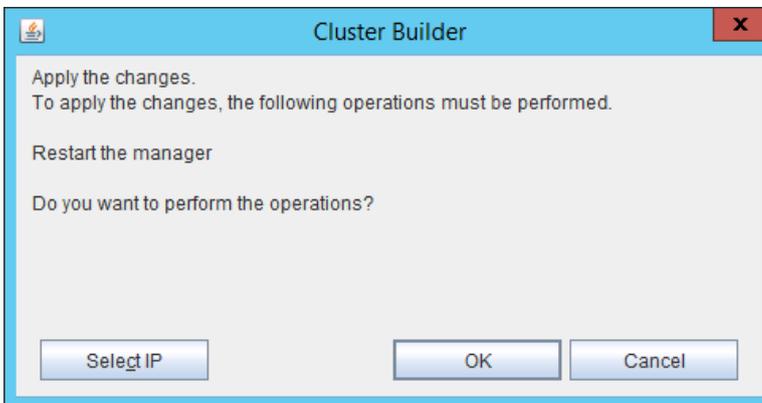
8. Click **Finish** to complete setting.

4) Apply the settings and start the cluster.

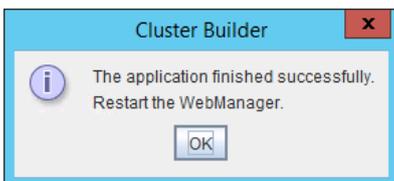
After the settings are complete, click the **Apply Settings** icon under the menu.



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

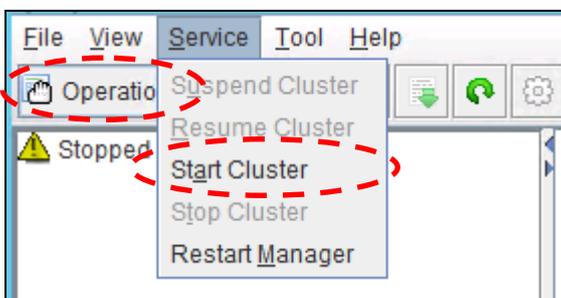


Click **OK**.



Click **OK**.

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



Chapter 5 Constructing an HA cluster based on EIP control

This chapter describes how to construct an HA cluster based on EIP control. The numbers in the figure correspond to the descriptions and setting values in the following sections.

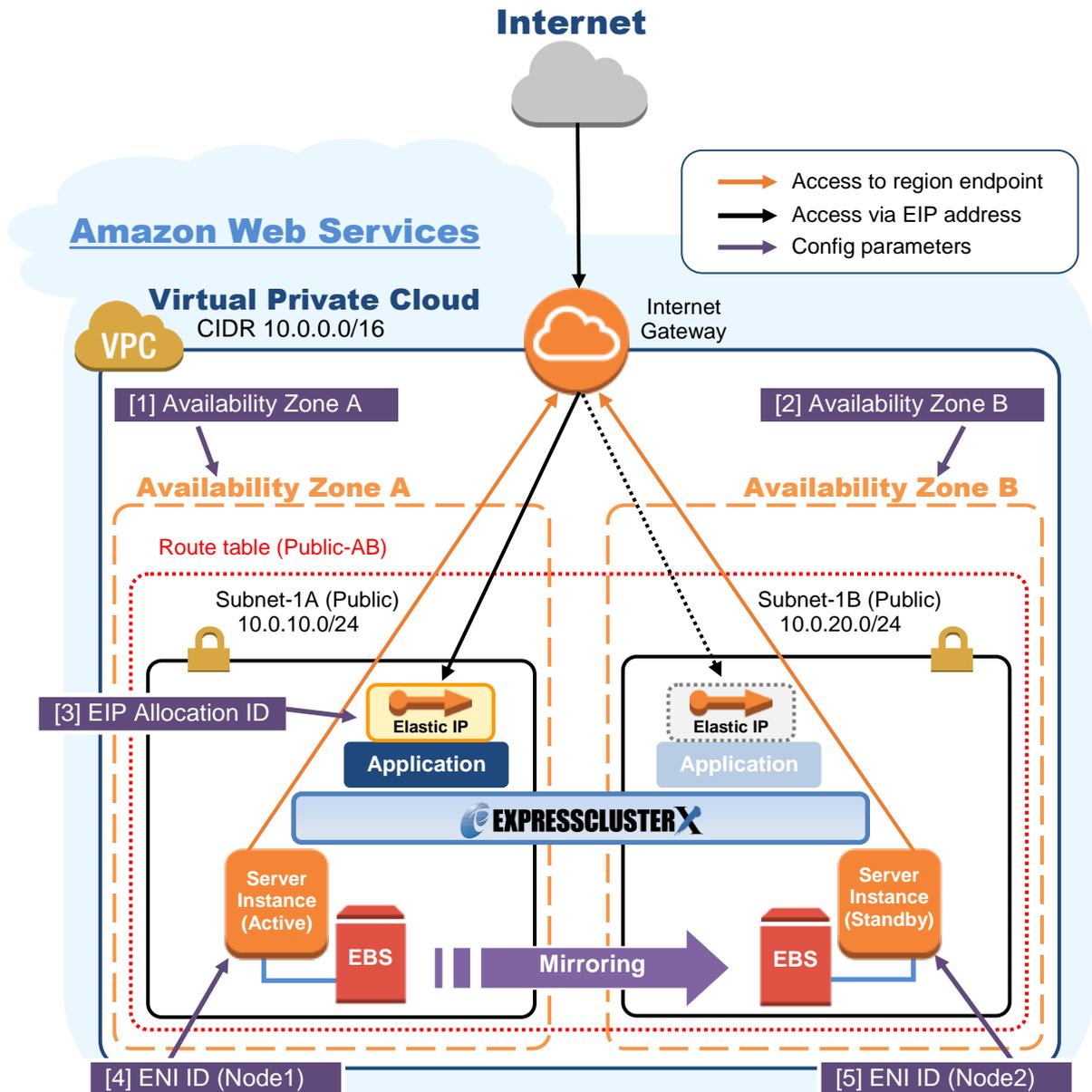


Figure 5-1 System Configuration of the HA cluster based on EIP control

5-1. Configuring the VPC Environment

Configure the VPC on the VPC Management console and EC2 Management console. The IP address used in the figures and description is an example. In the actual configuration, use the actual IP address assigned to the VPC. When installing EXPRESSCLUSTER in the existing VPC, specify the appropriate settings such as adding a subnet if the number of subnets is insufficient. This guide does not describe the case to perform operations by adding an ENI to an instance of an HA cluster node.

1) Configure the VPC and subnet.

Create a VPC and subnet first.

→ Add a VPC and subnet in **VPC** and **Subnets** on the VPC Management console.

2) Configure the Internet gateway.

Add an Internet gateway to access the Internet from the VPC.

→ To create an Internet gateway, select **Internet Gateways > Create Internet Gateway** on the VPC Management console. Attach the created Internet gateway to the VPC.

3) Configure the network ACL and security group.

Specify the appropriate network ACL and security group settings to prevent unauthorized network access from in and out of the VPC.

Change the network ACL and security group path settings so that the instances of the HA cluster node can communicate with the Internet gateway via HTTPS, communicate with WebManager, and communicate with each other. The instances are to be placed on the public networks (Subnet-1A and Subnet-1B).

→ Change the settings in **Network ACLs** and **Security Groups** on the VPC Management console.

For the port numbers that are used by the EXPRESSCLUSTER components, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Getting Started Guide
 - Chapter 5 Notes and Restrictions
 - Before installing EXPRESSCLUSTER

4) Add an HA cluster instance.

Create an HA cluster node instance on the public networks (Subnet-1A and Subnet-1B).

When creating an HA cluster node instance, be sure to specify the setting to enable a public IP. If an instance is created without using a public IP, it is necessary to add an EIP or a NAT instance later. (This guide does not describe this case.)

To use an IAM role by assigning it to an instance, be sure to specify the IAM role to the instance when creating it. (After the instance has been created, it is not possible to change the assigned IAM role or assign a new IAM role.)

→ To create an instance, select **Instances > Launch Instance** on the EC2 Management console.
→ For details about the IAM settings, refer to "Chapter 6 Configuring the IAM."

Check the ID of the elastic network interface (ENI) assigned to each created instance.

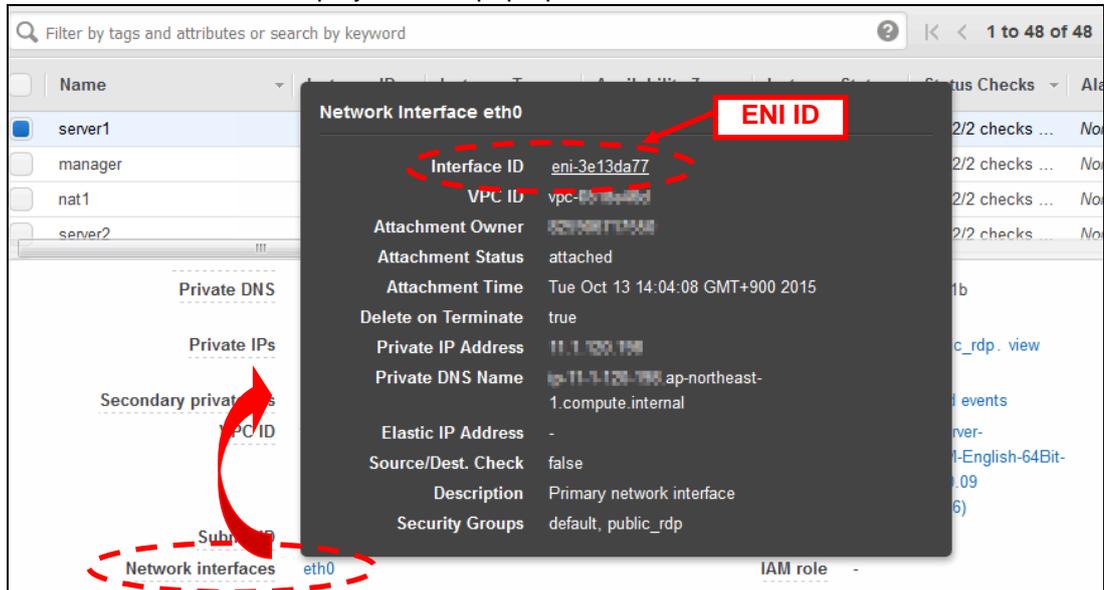
[4] ENI ID (Node1)

[5] ENI ID (Node2)

[Write down the ENI ID \(eni-xxxxxxx\) of each instance because it is necessary to set up the AWS elastic ip resource later.](#)

Use the following procedure to check the ENI ID assigned to the instance.

1. Select the instance to display its detailed information.
2. Click the target device in **Network Interfaces**.
3. Check **Interface ID** displayed in the pop-up window.



5) Add an EIP.

Add an EIP to access an instance in the VPC from the Internet.

→ To add an EIP, select **Elastic IPs > Allocate New Address** on the EC2 Management console.

[3] EIP Allocation ID

Write down the Allocation ID (eipalloc-xxxxxxx) of the added EIP because it is necessary to set up the AWS elastic ip resource later.

6) Configure the route table.

Add the routing to the Internet gateway so that the AWS CLI can communicate with the regional endpoint via NAT.

The following routings must be set in the route table (Public-AB) of the public networks (Subnet-1A and Subnet-1B in the above figure).

◇ Route table (Public-AB)

| Destination | Target | Remarks |
|-----------------------------------------------------|-------------------------|---------------------|
| VPC network <i>(Example: 10.0.0.0/16)</i> | local | Existing by default |
| 0.0.0.0/0 | Internet Gateway | Add (required) |

When a failover occurred, the AWS elastic ip resource deassigns the EIP assigned to the active server instance by using the AWS CLI, and assign it to the standby server instance.

Configure other routings according to the environment.

7) Add a mirror disk (EBS).

Add an EBS to be used as the mirror disk (cluster partition or data partition) as needed.

→ To add an EBS, select **Volumes > Create volume** on the EC2 Management console, and then attach the created volume to an instance.

5-2. Configuring the instance

Log in to each instance of the HA cluster and specify the following settings.

For the Python and AWS CLI versions supported by EXPRESSCLUSTER, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Getting Started Guide
 - Chapter 3 Installation requirements for EXPRESSCLUSTER
 - Operation environment for AWS elastic ip resource, AWS virtual ip resource

1) Configure a firewall.

Change the firewall setting as needed.

For the port numbers that are used by the EXPRESSCLUSTER components, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Getting Started Guide
 - Chapter 5 Notes and Restrictions
 - Before installing EXPRESSCLUSTER

2) Install Python.

Install Python required by EXPRESSCLUSTER.

First, confirm that Python is installed.

If not installed, download Python from the following URL and install it. After the installation, add the path to `python.exe` to the environment variable `PATH` from **Control Panel**. (Usually, Python is installed under `C:\.`)

<https://www.python.org/downloads/>

3) Install the AWS CLI.

Download the AWS CLI MSI installer from the following URL and install it.

The installer automatically adds the path to `aws.exe` to the environment variable `PATH`.

<http://docs.aws.amazon.com/cli/latest/userguide/installing.html#install-msi-on-windows>

* Installation by using `pip` is not supported.

For details about how to set up the AWS CLI, refer to the following:

<http://docs.aws.amazon.com/cli/latest/userguide/installing.html>

(If EXPRESSCLUSTER has been installed before installing Python or the AWS CLI, be sure to restart the OS before using EXPRESSCLUSTER.)

4) Register the AWS access key.

Start the command prompt as the Administrator user and run the following command:

```
> aws configure
```

Enter information such as the AWS access key to the inquiries.

The settings to be specified vary depending on whether an IAM role is assigned to the instance or not.

◇ Instance to which an IAM role is assigned.

```
AWS Access Key ID [None]: (Press Enter without entering anything.)
AWS Secret Access Key [None]: (Press Enter without entering anything.)
Default region name [None]: <default region name>
Default output format [None]: text
```

◇ Instance to which an IAM role is not assigned.

```
AWS Access Key ID [None]: <AWS access key>
AWS Secret Access Key [None]: <AWS secrete access key>
```

```
Default region name [None]: <default region name>
Default output format [None]: text
```

If you specified incorrect settings, delete the folder %SystemDrive%\Users\Administrator\.aws entirely, and specify the above settings again.

5) Prepare the mirror disk.

If an EBS has been added to be used as the mirror disk, divide the EBS into partitions and use each partition as the cluster partition and data partition.

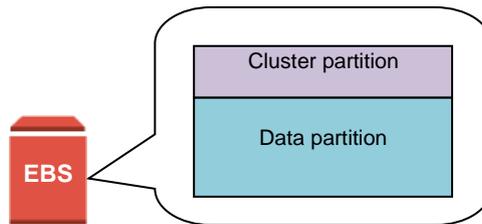


Figure 5-2 EBS Partitioning Example

For details about the mirror disk partition, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Installation & Configuration Guide
 - Chapter 1 Determining a system configuration
 - Mirror partition settings

6) Install EXPRESSCLUSTER.

For the installation procedure, refer to “EXPRESSCLUSTER X 3.3 for Windows Installation & Configuration Guide.”

Store the EXPRESSCLUSTER installation media in the environment to which to install EXPRESSCLUSTER.

(To transfer data, use any method such as Remote Desktop and Amazon S3.)

After the installation, restart the OS.

5-3. Setting up EXPRESSCLUSTER

This section describes how to set up EXPRESSCLUSTER by using the WebManeger cluster generation wizard.

For details about how to set up and connect to WebManager, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Installation and Configuration Guide
→ Chapter 5 Creating the cluster configuration data

This section describes how to add the following resources:

- Mirror disk resource
- AWS EIP resource
- AWS AZ monitor resource
- AWS EIP monitor resource
- NP resolution (Custom monitor resource)

For the settings other than the above, refer to “EXPRESSCLUSTER X 3.3 for Windows Installation and Configuration Guide”.

1) Construct a cluster.

Start the cluster generation wizard to construct a cluster.

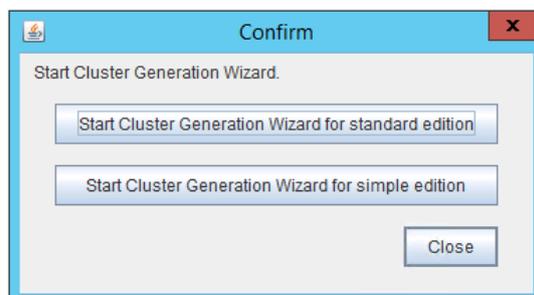
- ◇ Construct a cluster.

Steps

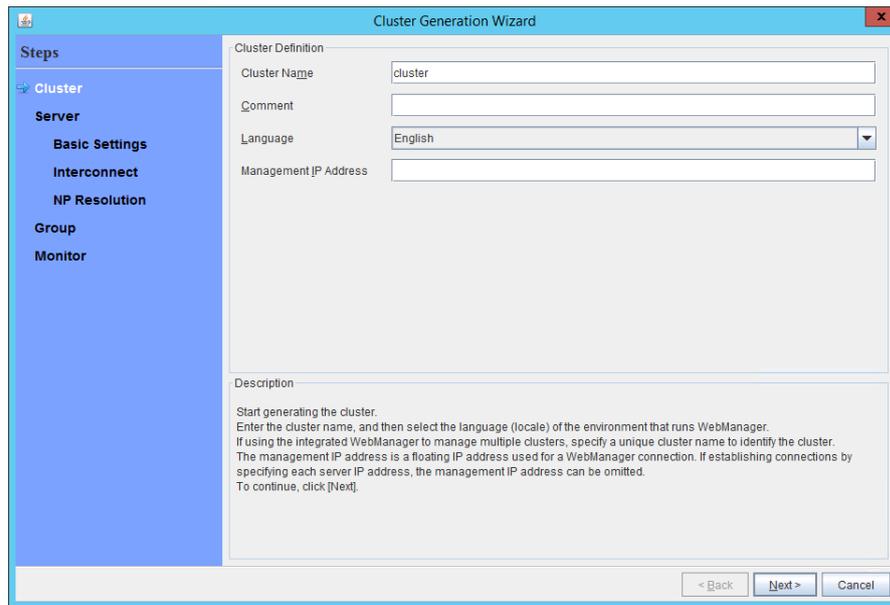
1. Access WebManager. The dialog box below is displayed.
Click **Start Cluster Generation Wizard**.



2. The dialog box below is displayed.
Click **Start Standard Cluster Generation Wizard**.



3. The **Cluster Definition** page is displayed.
Enter a cluster name in **Cluster Name**.
Select an appropriate language from **Language**. The display language of WebManager will be changed to the language selected here by applying the settings.



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

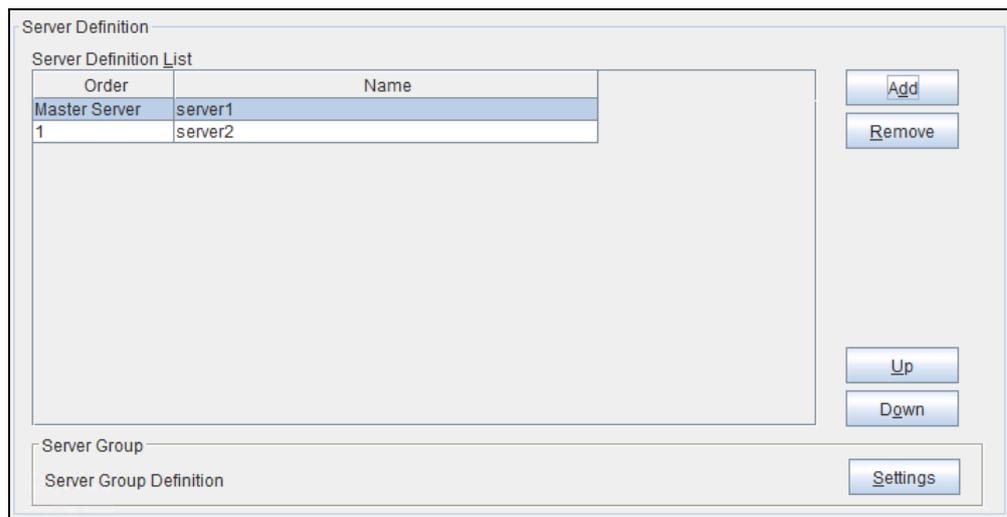
- Cluster Name: cluster
- Comment: (empty)
- Language: English
- Management IP Address: (empty)

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

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

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

- The **Server Definition** page is displayed.
The instance connecting to WebManager is displayed as the registered master server.
Click **Add** to add other instances (by specifying their private IP addresses).



The screenshot shows the 'Server Definition' page. It features a table with the following data:

| Order | Name |
|---------------|---------|
| Master Server | server1 |
| 1 | server2 |

Below the table is a 'Server Group' section with a 'Server Group Definition' field and a 'Settings' button. To the right of the table are buttons for 'Add', 'Remove', 'Up', and 'Down'.

- Click **Next**.
- The **Interconnect** page is displayed.
Specify the IP address (private IP address of each instance) to be used for interconnect.
Select mdc1 from **MDC** for the communication path of the mirror disk resource to be created later.

Constructing an HA cluster based on EIP control

| Priority | Type | MDC | server1 | server2 |
|----------|-------------|------|-------------|-------------|
| 1 | Kernel Mode | mdc1 | 11.1.120.40 | 11.1.120.41 |

7. Click **Next**.

8. The **NP Resolution** page is displayed.

However, the NP resolution is not set on this page. The same operation as the NP resolution can be achieved by adding the custom monitor resource to confirm whether listening on port 443 of the regional endpoint is normally performed. (The NP resolution will be set in “3) Add a monitor resource.” described later.)

Click **Next**.

2) Add a group resource.

- ◇ Group definition
Create a failover group.

Steps

1. The **Group Definition** dialog box is displayed.
Enter the failover group name (failover1) in the **Name** box.

Group Definition

Type: failover

Use Server Group Settings

Name: failover

Comment:

2. Click **Next**.

3. The **Available Servers** page is displayed.
Click **Next** without specifying anything.

4. The **Group Attribute Settings** page is displayed.
Click **Next** without specifying anything.
5. The **Group Resource** page is displayed.
Add a group resource on this page following the procedure below.

◇ Mirror disk resource

Create the mirror disk resource according the mirror disk (EBS) as needed.

For details, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
→ Chapter 5, Group resource details
→ Understanding mirror disk resources

Steps

1. Click **Add** in **Group Resource List**.
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 resource name (md) in the **Name** box.
3. Click **Next**.
4. The **Dependency** page is displayed.
Click **Next** without specifying anything.
5. The **Recovery Operation at Activation Failure Detection** and **Recovery Operation at Deactivation Failure Detection** pages are displayed.
Click **Next**.
6. Enter the drive letter for the partition set up in “5-2 Configuring the instance” → “5) Prepare the mirror disk.” in **Data Partition Drive Letter** and **Cluster Partition Drive Letter**.
7. Click **Add** for **Available Servers**.
8. The **Selection of Partition** window is displayed.
Click **Connect** to obtain partition information.
Select the data and cluster partitions and click **OK**.
9. Perform steps 7 and 8 on the other node.
10. Return to the **Advanced Settings** page and click **Finish** to complete setting.

◇ AWS elastic ip resource

Add an AWS elastic ip resource that controls the VIP by using the AWS CLI.

For details, refer to the following:

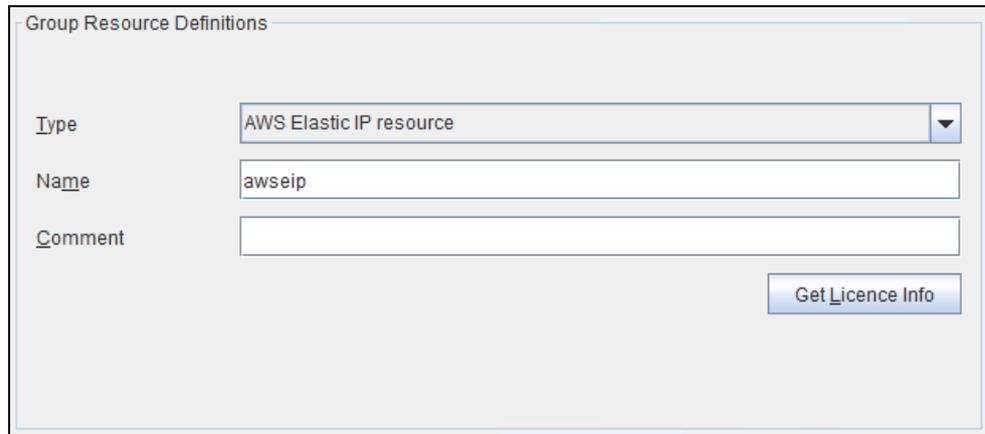
- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
→ Chapter 5, Group resource details
→ Understanding AWS elastic ip resources

Steps

1. Click **Add** in **Group Resource List**.
2. The **Resource Definition of Group(failover1)** window is displayed.
Select the group resource type (AWS elastic ip resources) from the **Type** box and enter

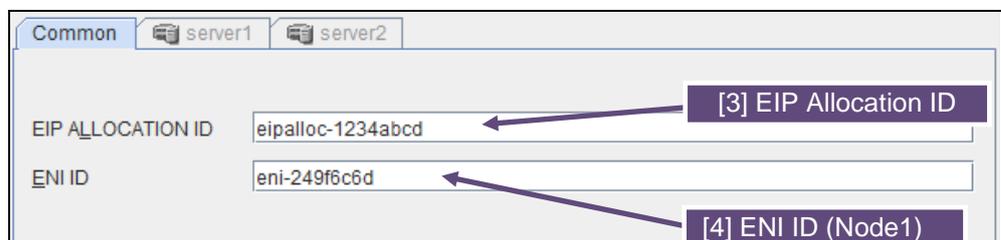
Constructing an HA cluster based on EIP control

the group resource name (awseip1) in the **Name** box.



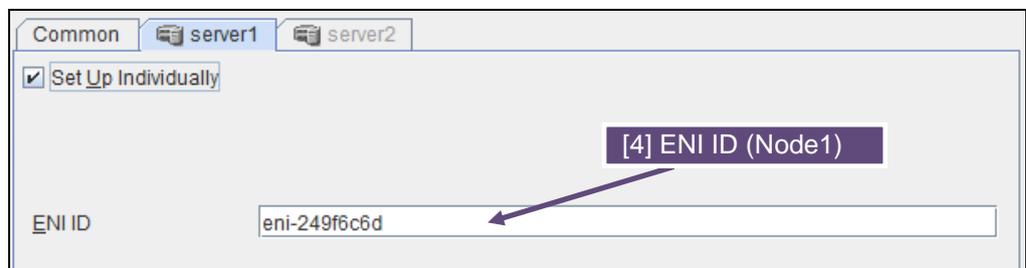
The screenshot shows the 'Group Resource Definitions' dialog box. It has three input fields: 'Type' is a dropdown menu set to 'AWS Elastic IP resource'; 'Name' is a text box containing 'awseip'; and 'Comment' is an empty text box. A 'Get Licence Info' button is located at the bottom right.

3. Click **Next**.
4. The **Dependency** page is displayed. Click **Next** without specifying anything.
5. The **Recovery Operation at Activation Failure Detection** and **Recovery Operation at Deactivation Failure Detection** pages are displayed. Click **Next**.
6. The **Advanced Settings** page is displayed.
Enter the allocation ID of the EIP to be assigned in the **EIP ALLOCATION ID** box on the **Common** tab.
Enter the ENI ID of the active server instance to which the EIP is assigned in the **ENI ID** box.

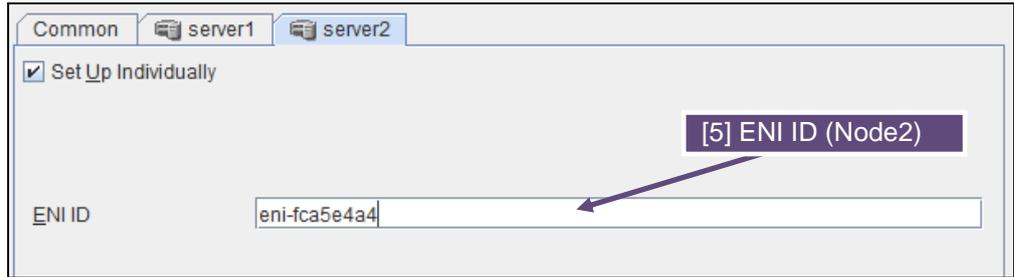


The screenshot shows the 'Advanced Settings' dialog box with the 'Common' tab selected. There are two tabs: 'Common', 'server1', and 'server2'. The 'EIP ALLOCATION ID' field contains 'eipalloc-1234abcd' and is pointed to by a callout box labeled '[3] EIP Allocation ID'. The 'ENI ID' field contains 'eni-249f6c6d' and is pointed to by a callout box labeled '[4] ENI ID (Node1)'.

7. Specify the node settings on each node tab
Select the **Individually Set Up Servers** check box.
Enter the ENI ID of the instance corresponding to the node in the **ENI ID** box.



The screenshot shows the 'Advanced Settings' dialog box with the 'server1' tab selected. The 'Set Up Individually' checkbox is checked. The 'ENI ID' field contains 'eni-249f6c6d' and is pointed to by a callout box labeled '[4] ENI ID (Node1)'.



8. Click **Finish** to complete setting.

3) Add a monitor resource.

◇ AWS AZ monitor resource

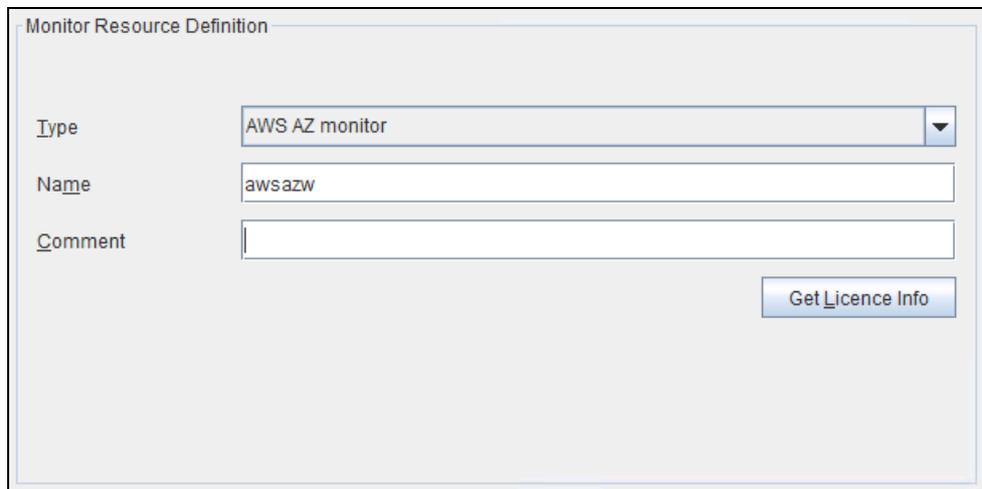
Create the AWS AZ monitor resource to check whether the specified AZ is usable by using the monitor command.

For details, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
 - Chapter 6, Monitor resource details
 - Understanding AWS AZ monitor resources

Steps

1. Click **Add** in **Monitor Resource List**.
2. Select the monitor resource type (AWS AZ monitor) from the **Type** box and enter the monitor resource name (awsazw1) in the **Name** box.



3. Click **Next**.
4. The **Monitor (common)** page is displayed. Click **Next** without specifying anything.
5. The **Monitor (special)** page is displayed. Enter the AZ to be monitored in the **Availability Zone** box on the **Common** tab. (Specify the AZ of the active server instance.)

Constructing an HA cluster based on EIP control

The screenshot shows the 'Common' tab for 'server1'. The 'Availability Zone' field is set to 'ap-northeast-1a'. A callout box labeled '[1] Availability Zone A' points to this field. The 'Action when AWS CLI command failed to receive response' dropdown is set to 'Disable recovery action(Disp...)'.

- Specify the node settings on each node tab
Select the **Individually Set Up Servers** check box.
Enter the AZ of the instance corresponding to the node in the **Availability Zone** box.

The screenshot shows the 'Common' tab for 'server1'. The 'Set Up Individually' checkbox is checked. The 'Availability Zone' field is set to 'ap-northeast-1a'. A callout box labeled '[1] Availability Zone A' points to this field.

The screenshot shows the 'Common' tab for 'server2'. The 'Set Up Individually' checkbox is checked. The 'Availability Zone' field is set to 'ap-northeast-1b'. A callout box labeled '[2] Availability Zone B' points to this field.

- Click **Next**.
- The **Recovery Action** page is displayed.
Set LocalServer in the **Recovery Target** box.

The screenshot shows the 'Recovery Action' page. The 'Recovery Action' dropdown is set to 'Custom settings'. The 'Recovery Target' field is set to 'LocalServer', which is circled in red. The 'Browse' button is visible next to it. Below this, there are several sections with checkboxes and dropdowns for configuring recovery actions, including 'Execute Script before Reactivation', 'Execute Script before Failover', and 'Execute Script before Final Action'. The 'Final Action' dropdown is set to 'No operation'.

9. Click **Finish** to complete setting.

◇ AWS elastic ip monitor resource

This resource is automatically added when the AWS virtual ip resource is added. The health of the EIP address can be checked by monitoring the communication with the EIP address that is assigned to the active server instance.

For details, refer to the following:

- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
→ Chapter 6, Monitor resource details
→ Understanding AWS elastic ip monitor resources

◇ Custom monitor resource

This resource checks the status of the communication with the EIP address by monitoring the communication with port 443 of the endpoint of the region in which the environment has been constructed.

For the regional endpoints, refer to the following URL:

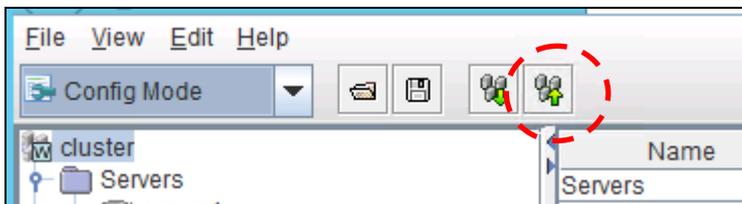
<http://docs.aws.amazon.com/general/latest/gr/rande.html>

For details, refer to the following:

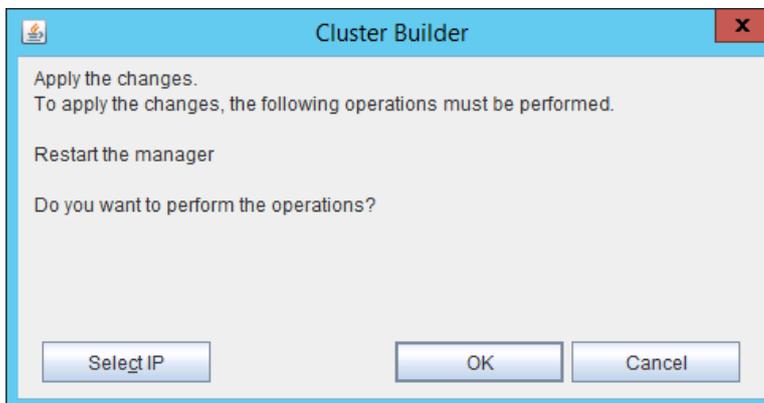
- EXPRESSCLUSTER X 3.3 for Windows Reference Guide
→ Chapter 6, Monitor resource details
→ Understanding custom monitor resources

4) Apply the settings and start the cluster.

After the settings are complete, click the **Apply Settings** icon under the menu.

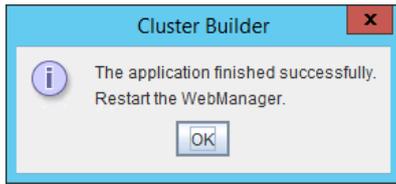


The dialog box to confirm to restart the manager is displayed.



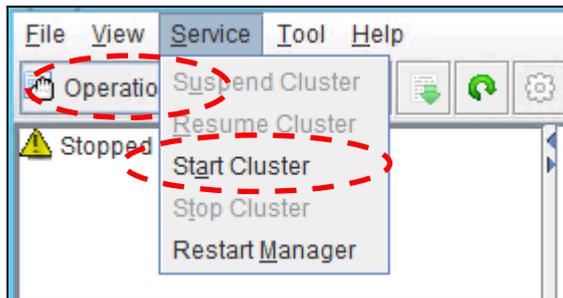
Click **OK**.

Constructing an HA cluster based on EIP control



Click **OK**.

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



Chapter 6 Configuring the IAM

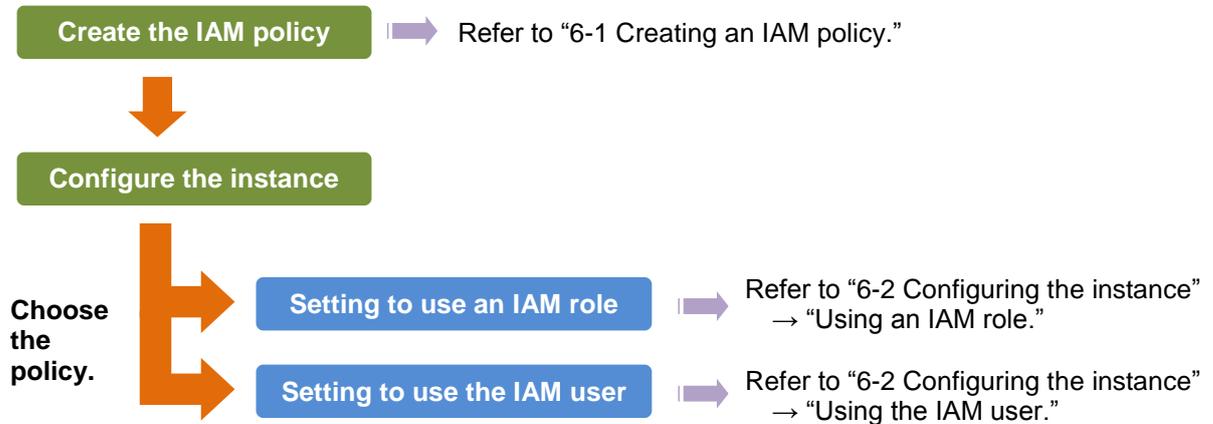
This chapter describes the Identity & Access Management (IAM) settings in the AWS environment. For the resource and monitor resources such as the AWS virtual ip resource, the AWS CLI is run in a resource to process the resource itself. To run the AWS CLI correctly, it is required to configure the IAM in advance.

There are two methods to grant access permissions to the AWS CLI: the policy to use an IAM role and the policy to use an IAM user. NEC recommends the policy to use an IAM role because it is unnecessary to store the AWS access key ID and AWS secret access key in each instance in principle, enhancing the security.

The following table describes the advantages and disadvantages of both policies.

| | Advantages | Disadvantages |
|---------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| Policy to use an IAM role | High security Easy to manage key information. | Not available to set access permissions to an individual instance later because the defined IAM role cannot be changed. |
| Policy to use an IAM user | Available to set access permissions to an individual instance later | High risk of key information disclosure Complicated to manage key information |

The procedure to configure the IAM is as follows:



6-1. Creating an IAM policy

Create a policy in which access permissions granted to the actions for the services such as EC2 and S3 of AWS are described. Access permissions need to be granted to the following actions so that the AWS related resources and monitor resources of EXPRESSCLUSTER run the AWS CLI.

[The required policies may be changed in future.](#)

- ◇ AWS virtual ip resource and AWS virtual ip monitor resource

| Action | Description |
|------------------|------------------------------------------------------------------------------|
| ec2:Describe* | Required to obtain information of a VPC, route table, and network interface. |
| ec2:ReplaceRoute | Required to update a route table. |

Configuring the IAM

- ◇ AWS elastic ip resource and AWS elastic ip monitor resource

| Action | Description |
|-------------------------|-----------------------------------------------------------------|
| ec2:Describe* | Required to obtain information of an EIP and network interface. |
| ec2:AssociateAddress | Required to assign an EIP to an ENI. |
| ec2:DisassociateAddress | Required to deassign an EIP from an ENI. |

- ◇ AWS AZ monitor resource

| Action | Description |
|---------------|------------------------------------------|
| ec2:Describe* | Required to obtain information of an AZ. |

In the following custom policy example, access permissions are granted to all actions to be used by the AWS-related resources and monitore resources.

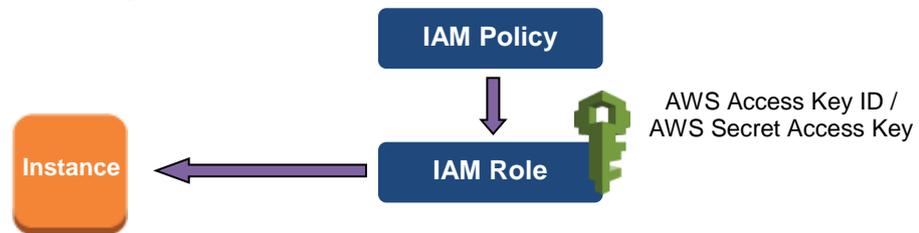
```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Action": [
        "ec2:Describe*",
        "ec2:ReplaceRoute",
        "ec2:AssociateAddress",
        "ec2:DisassociateAddress"
      ],
      "Effect": "Allow",
      "Resource": "*"
    }
  ]
}
```

→ To create a custom policy, select **Policies > Create Policy** on the IAM Management console.

6-2. Configuring the instance

Using an IAM role

Create an IAM role and assign the created IAM role to an instance to run the AWS CLI.



- 1) Create an IAM role. Attach the IAM policy to the created role.
 → To create an IAM role, select **Roles > Create New Role** on the IAM Management console.
- 2) When creating an instance, specify the created IAM role for **IAM Role**.
 (The IAM role cannot be assigned to the created instance later.)
- 3) Log on to the instance.
- 4) Install Python.
 Install Python required by EXPRESSCLUSTER.
 First, confirm that Python is installed.
 If not installed, download Python from the following URL and install it. After the installation, add the path to `python.exe` to the environment variable `PATH` from **Control Panel**. (Usually, Python is installed under `C:\.`)
<https://www.python.org/downloads/>
- 5) Install the AWS CLI.
 Download the AWS CLI MSI installer from the following URL and install it.
 The installer automatically adds the path to `aws.exe` to the environment variable `PATH`.
<http://docs.aws.amazon.com/cli/latest/userguide/installing.html#install-msi-on-windows>
 * Installation by using `pip` is not supported.

For details about how to set up the AWS CLI, refer to the following:
<http://docs.aws.amazon.com/cli/latest/userguide/installing.html>

(If EXPRESSCLUSTER has been installed before installing Python or the AWS CLI, be sure to restart the OS before using EXPRESSCLUSTER.)

- 6) Start the command prompt as the Administrator user and run the following command:

```
> aws configure
```

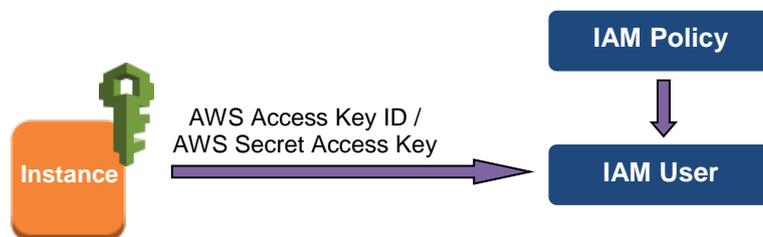
Enter the information required to run the AWS CLI to the inquiries. Be careful not to enter the AWS access key ID and AWS secret access key.

```
AWS Access Key ID [None]: (Press Enter without entering anything.)
AWS Secret Access Key [None]: (Press Enter without entering anything.)
Default region name [None]: <default region name>
Default output format [None]: text
```

If you specified incorrect settings, delete the folder `%SystemDrive%\Users\Administrator\.aws` entirely, and specify the above settings again.

Using an IAM user

Create an IAM user and store the access key ID and secret access key of the created user in an instance to run the AWS CLI. It is not required to assign the created IAM role to an instance to be created.



- 1) Create an IAM user. Attach the IAM policy to the created user.

→ To create an IAM user, select **Users > Create New Users** on the IAM Management console.

- 2) Log on to the instance.
- 3) Install Python.
Install Python required by EXPRESSCLUSTER.
First, confirm that Python is installed.
If not installed, download Python from the following URL and install it. After the installation, add the path to `python.exe` to the environment variable `PATH` from **Control Panel**. (Usually, Python is installed under `C:\.`)
<https://www.python.org/downloads/>
- 4) Install the AWS CLI.
Download the AWS CLI MSI installer from the following URL and install it.
The installer automatically adds the path to `aws.exe` to the environment variable `PATH`.
<http://docs.aws.amazon.com/cli/latest/userguide/installing.html#install-msi-on-windows>
* Installation by using `pip` is not supported.

For details about how to set up the AWS CLI, refer to the following:
<http://docs.aws.amazon.com/cli/latest/userguide/installing.html>

(If EXPRESSCLUSTER has been installed before installing Python or the AWS CLI, be sure to restart the OS before using EXPRESSCLUSTER.)

- 5) Start the command prompt as the Administrator user and run the following command:

```
> aws configure
```

Enter the information required to run the AWS CLI to the inquiries. For the AWS access key ID and AWS secret access key, enter those obtained from the IAM user detailed information window.

```
AWS Access Key ID [None]: <AWS access key>
AWS Secret Access Key [None]: <AWS secret access key>
Default region name [None]: <default region name>
Default output format [None]: text
```

If you specified incorrect settings, delete the folder `%SystemDrive%\Users\Administrator\.aws` entirely, and specify the above settings again.

Chapter 7 Troubleshooting

This chapter describes the points to be checked and solutions if EXPRESSCLUSTER cannot be set up in the AWS environment.

- ◆ Failed to start the installer of the EXPRESSCLUSTER trial version.
An AMI for Windows Server provided by AWS is an English OS. Therefore, the trial version in Japanese cannot be installed. Do either of the following:
 - Obtain the trial version in English.
 - Run archdisp.exe in Windows\3.3\common\server.
- ◆ Failed to start a resource or monitor resource related to AWS.
Confirm that the OS has restarted, Python and the AWS CLI are installed, and the AWS CLI has been set up correctly.
If the OS has been restarted when installing EXPRESSCLUSTER, the environment variable settings might be changed by installing Python and the AWS CLI. In this case, restart the OS again.
- ◆ For EXPRESSCLUSTER internal version 11.32 or earlier, if all the following conditions are met, starting the AWS virtual ip resource, AWS elastic ip resource, or AWS AZ monitor resource fails.
 - The AWS EC2 instance is started by using an IAM role. (There is no problem for an IAM user.)
 - A language other than English is specified as the OS language and system locale.
 If these conditions are met, apply the latest update.
- ◆ Failed to start the AWS virtual ip resource.

| | |
|--------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WebManager message | Failed to start the resource <i>awsvip1</i> . (99 : Internal error occurred.) |
| Possible cause | Any of the following might be the cause. <ul style="list-style-type: none"> ◆ Python has not been installed, or the path does not reach python.exe. ◆ The AWS CLI has not been installed, or the path does not reach aws.exe. |
| Solution | Confirm that Python and the AWS CLI are installed. Confirm that the paths to <code>python.exe</code> and <code>aws.exe</code> are set to the environment variable <code>PATH</code> . |

| | |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WebManager message | Failed to start the resource <i>awsvip1</i> . (5 : the AWS CLI command failed.) |
| Possible cause | Any of the following might be the cause. <ul style="list-style-type: none"> ◆ The AWS CLI has not been set up. (<code>aws configure</code> has not been run.) ◆ The AWS CLI configuration file (file under <code>%SystemDrive%\Users\Administrator\.aws</code>) could not be found. (A user other than Administrator ran <code>aws configure</code>.) ◆ The specified AWS CLI settings (such as a region, access key, and secret key) are not correct. ◆ (For an operation using an IAM role) An IAM role has not been set to the instance. ◆ The specified VPC ID or ENI ID is invalid. ◆ The routing for the VIP address has not been set in all route tables on the specified VPC ID. (This occurs in EXPRESSCLUSTER internal versions 11.30 and 11.31, but does not occur in 11.32 or later.) |
| Solution | Confirm that the AWS CLI works normally. Correct the above mentioned settings. |

Troubleshooting

| | |
|--------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| WebManager message | (For EXPRESSCLUSTER internal version 11.33 or later) Failed to start the resource <i>awsvip1</i> . (5 : The vpc ID 'vpc-xxxxxxx' does not exist) |
| Possible cause | The specified VPC ID might not be correct or might not exist. |
| Solution | Specify a correct VPC ID. |

| | |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WebManager message | (For EXPRESSCLUSTER internal version 11.33 or later) Failed to start the resource <i>awsvip1</i> . (5 : The networkInterface ID 'eni-xxxxxxx' does not exist) |
| Possible cause | The specified ENI ID might not be correct or might not exist. |
| Solution | Specify a correct ENI ID. |

| | |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WebManager message | Failed to start the resource <i>awsvip1</i> . (6 : Timeout occurred.) |
| Possible cause | The AWS CLI command might not be able to communicate with the regional endpoint. |
| Solution | Check the following: <ul style="list-style-type: none"> ◆ The instance for NAT is running. ◆ The routing for the NAT instance has been set up. ◆ The packet is not excluded by filtering. |

| | |
|--------------------|----------------------------------------------------------------------------------------------|
| WebManager message | Failed to start the resource <i>awsvip1</i> . (7 : The VIP address belongs to a VPC subnet.) |
| Possible cause | The specified VIP address is not appropriate because it is within of the VPC CIDR range. |
| Solution | Specify an IP address out of the VPC CIDR range as the VIP address. |

| | |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WebManager message | Failed to start the resource <i>awsvip1</i> . (12 : The IP address on ENI is not static.) |
| Possible cause | DHCP is enabled for the network adapter corresponding to the ENI. (This occurs in EXPRESSCLUSTER internal versions 11.30 and 11.31, but does not occur in 11.32 or later) |
| Solution | Disable DHCP for the network adapter and set a static IP. |

- ◆ The AWS virtual ip resource is running normally, but `ping` cannot reach the VIP address.

| | |
|--------------------|-------------------------------------------------------------------------------------|
| WebManager message | - |
| Possible cause | Source/Dest. Check of the ENI set to the AWS virtual ip resource is enabled. |
| Solution | Disable Source/Dest. Check of the ENI set to the AWS virtual ip resource. |

- ◆ The AWS virtual ip monitor resource enters the error state.

| | |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WebManager message | Monitor <i>awsvipw1</i> detected an error. (8 : The routing for VIP was changed.) |
| Possible cause | In the route table, the target of the VIP address corresponding to the AWS virtual ip resource has been changed to another ENI ID for some reason. |
| Solution | When an error is detected, the AWS virtual ip resource is restarted automatically and the target is updated to a correct ENI ID. Check whether another HA cluster uses the same VIP address mistakenly and so on. |

◆ Failed to start the AWS elastic ip resource.

| | |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WebManager message | Failed to start the resource <i>awseip1</i> . (99 : Internal error occurred.) |
| Possible cause | Any of the following might be the cause. <ul style="list-style-type: none"> ◆ Python has not been installed, or the path does not reach <code>python.exe</code>. ◆ The AWS CLI has not been installed, or the path does not reach <code>aws.exe</code>. |
| Solution | Confirm that Python and the AWS CLI are installed. Confirm that the paths to <code>python.exe</code> and <code>aws.exe</code> are set to the environment variable <code>PATH</code> . |

| | |
|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WebManager message | Failed to start the resource <i>awseip1</i> . (5 : the AWS CLI command failed.) |
| Possible cause | Any of the following might be the cause. <ul style="list-style-type: none"> ◆ The AWS CLI has not been set up. (<code>aws configure</code> has not been run.) ◆ The AWS CLI configuration file (file under <code>%SystemDrive%\Users\Administrator\.aws</code>) could not be found. (A user other than Administrator ran <code>aws configure</code>.) ◆ The specified AWS CLI settings (such as a region, access key, and secret key) are not correct. ◆ (For an operation using an IAM role) An IAM role has not been set to the instance. ◆ The specified VPC ID or ENI ID is invalid. ◆ The routing for the VIP address has not been set in all route tables on the specified VPC ID. (This occurs in EXPRESSCLUSTER internal versions 11.30 and 11.31, but does not occur in 11.32 or later.) |
| Solution | Confirm that the AWS CLI works normally. Correct the above mentioned settings. |

| | |
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| WebManager message | (For EXPRESSCLUSTER internal version 11.33 or later) Failed to start the resource <i>awseip1</i> . (5 : The allocation ID ' <i>eipalloc-xxxxxxx</i> ' does not exist) |
| Possible cause | The specified EIP allocation ID might not be correct or might not exist. |
| Solution | Specify a correct EIP allocation ID. |

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| WebManager message | (For EXPRESSCLUSTER internal version 11.33 or later) Failed to start the resource <i>awseip1</i> . (5 : The networkInterface ID ' <i>eni-xxxxxxx</i> ' does not exist) |
| Possible cause | The specified ENI ID might not be correct or might not exist. |
| Solution | Specify a correct ENI ID. |

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| WebManager message | Failed to start the resource <i>awseip1</i> . (6 : Timeout occurred.) |
| Possible cause | The AWS CLI command might not be able to communicate with the regional endpoint. |
| Solution | Confirm that a public IP is assigned to each instance. Confirm that the AWS CLI works normally in each instance. |

◆ The AWS elastic ip monitor resource enters the error state.

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| WebManager message | Monitor <i>awseipw1</i> detected an error. (7 : The EIP address does not exist.) |
| Possible cause | The specified ENI ID and elastic IP have been deassociated for some reason. |
| Solution | When an error is detected, the AWS elastic ip resource is |

Troubleshooting

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| | <p>restarted automatically and the specified ENI ID and elastic IP are associated.</p> <p>Check whether another HA cluster uses the same EIP allocation ID mistakenly and so on.</p> |
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- ◆ The AWS AZ monitor resource enters the warning or error state.

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| WebManager message | <p>[Warning] Monitor <i>awsazw1</i> is in the warning status. (105 : the AWS CLI command failed.)</p> <p>[Error] Monitor <i>awsazw1</i> detected an error. (5 : the AWS CLI command failed.)</p> |
| Possible cause | <p>Any of the following might be the cause.</p> <ul style="list-style-type: none"> ◆ The AWS CLI has not been set up. (<i>aws configure</i> has not been run.) ◆ The AWS CLI configuration file (file under %SystemDrive%\Users\Administrator\.aws) could not be found. (A user other than Administrator ran <i>aws configure</i>.) ◆ The specified AWS CLI settings (such as a region, access key, and secret key) are not correct. ◆ (For an operation using an IAM role) An IAM role has not been set to the instance. ◆ The specified AZ is invalid. |
| Solution | <p>Confirm that the AWS CLI works normally.</p> <p>Correct the above mentioned settings.</p> |

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| WebManager message | <p>(For EXPRESSCLUSTER internal version 11.33 or later)</p> <p>[Warning] Monitor <i>awsazw1</i> is in the warning status. (105 : Invalid availability zone: [<i>ap-northeast-1x</i>])</p> <p>[Error] Monitor <i>awsazw1</i> detected an error. (5 : Invalid availability zone: [<i>ap-northeast-1x</i>])</p> |
| Possible cause | The specified AZ might not be correct or might not exist. |
| Solution | Specify a correct AZ. |

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| WebManager message | <p>[Warning] Monitor <i>awsazw1</i> is in the warning status. (106 : Timeout occurred.)</p> <p>[Error] Monitor <i>awsazw1</i> detected an error. (6 : Timeout occurred.)</p> |
| Possible cause | The AWS CLI command might not be able to communicate with the regional endpoint because the route table of the NAT setting is incorrect and so on. |
| Solution | <p>Check the following:</p> <ul style="list-style-type: none"> ◆ The NAT instance is running. ◆ The routing for the NAT instance has been set up. ◆ The packet is not excluded by filtering. |