

[Enhancement] No.1 market share in Japan for 19 consecutive years\*

# Version 4.3 **New** Enhancement

April, 2021

NEC Corporation,  
Cloud Platform Division,  
(EXPRESSCLUSTER)

\*Citation: IDC Japan, July,2020 'Japan Computing and Network Infrastructure Software Market Shares, 2019'(JPJ45146920)

## \Orchestrating a brighter world

NEC creates the social values of safety, security, fairness and efficiency to promote a more sustainable world where everyone has the chance to reach their full potential.

# What Is EXPRESSCLUSTER?

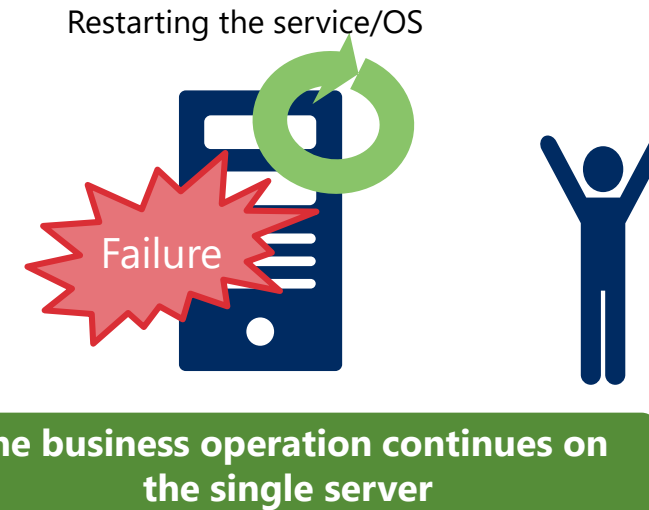
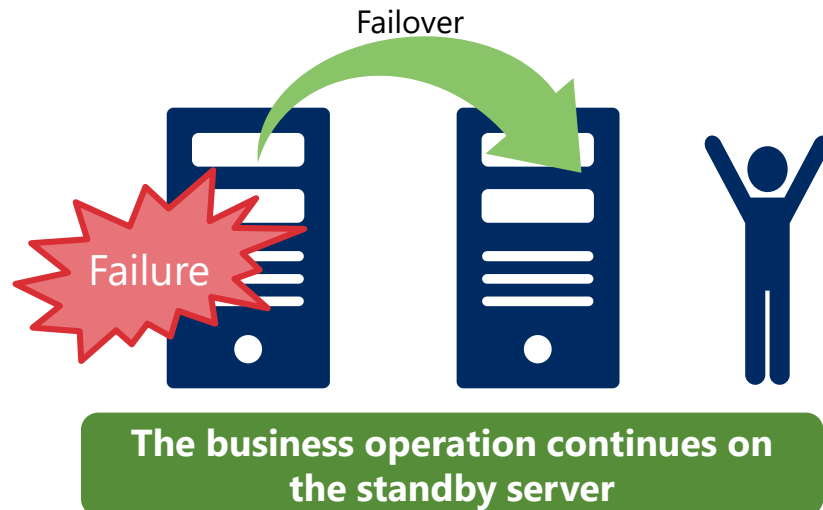
EXPRESSCLUSTER is a solution to maximize the uptime of customer's business operation.

No.1 market share in Japan for 19 consecutive years\*

Prevents any failure from interrupting the business

- Makes the business system (including its hardware and OS) redundant
- Monitors the hardware, OS, and applications for failures; keeps the business in operation with a healthy server even if a failure occurs
- Supports not only multivendor servers and storages, but also public cloud environments (e.g. AWS and Microsoft Azure)

Realizes the maximization with software for HA clustering and for increasing server availability



\*Citation: IDC Japan, July,2020 'Japan Computing and Network Infrastructure Software Market Shares, 2019'(JPJ45146920)

## Background

The trend of lifting to cloud environments and using the services increases a demand for HA clusters as measures against failure and for securing availability. In addition, the market needs a product which makes the most of the cloud's merits: flexibility, operability, and Infrastructure as Code (IaC).

## Main features and their overview

### 1. Enhancements for the cloud market

- **Cooperating with Amazon Simple Notification Service (Amazon SNS)**
- **Cooperating with Amazon CloudWatch**
- Google Cloud DNS resources added
- Disk mirroring feature, for which demand is increasing in cloud industry, enhanced
- Pre- and post-processing commands added for snapshot backup/restoration
- Mirroring path encrypted
- **Infrastructure as Code (IaC) supported**

### 2. Improved usability (enhanced Cluster WebUI)

### 3. Newly supported platforms

# Highly Recommended Points of EXPRESSCLUSTER X 4.3

## Highly recommended points

### For the cloud market

EXPRESSCLUSTER can now be enriched by cooperating with cloud services such as **Amazon SNS** and **Amazon CloudWatch**.

In addition, **cloud-based, hybrid-disk type clusters have become more proposable!**

### Ideal for expansion

**Ansible has been supported.** This open-source configuration management tool **supports new commands for changing the cluster configuration.** **These allow coding the process of installing, configuring, referring to, and managing EXPRESSCLUSTER.**

### Improved UI

Cluster WebUI has been even more enhanced.

**This makes EXPRESSCLUSTER easier to be used by its beginners and experts.**

## Target/Prospective customers

- Those who want to increase the business availability
- Those who are considering migration to a cloud environment while keeping the availability of on-premises environments
- Those who want to keep the business in operation even during the maintenance of a cloud service itself
- Those who want to automatically recover the business during failure even without a systems engineer

# Why EXPRESSCLUSTER Has Been Used in Clouds?

- The conditions of an IaaS SLA\* often require redundancy. One of the solutions is to configure an HA cluster.
- The IaaS SLA\* is only for infrastructure. The user of a cloud-based system must take measures for building a mechanism to ensure and improve the availability.
- Unlike many other HA cluster applications, EXPRESSCLUSTER officially supports its operation in public clouds. It allows an HA cluster to be configured without a shared disk through data mirroring.
- PaaS, involving functional restrictions and performance differences, often require alterations or additional integration evaluations to cooperate with applications. EXPRESSCLUSTER allows a whole on-premises environment to be lifted to a cloud, reducing the cost of application alteration and reevaluation. EXPRESSCLUSTER also enables the entire environment to be returned from the cloud to the on-premises structure. Therefore, cloud vendor lock-in can be avoided.
- EXPRESSCLUSTER can redundantize all HA-cluster-supporting applications, without using application-side redundantizing functions. This leads to reducing the application cost as well.

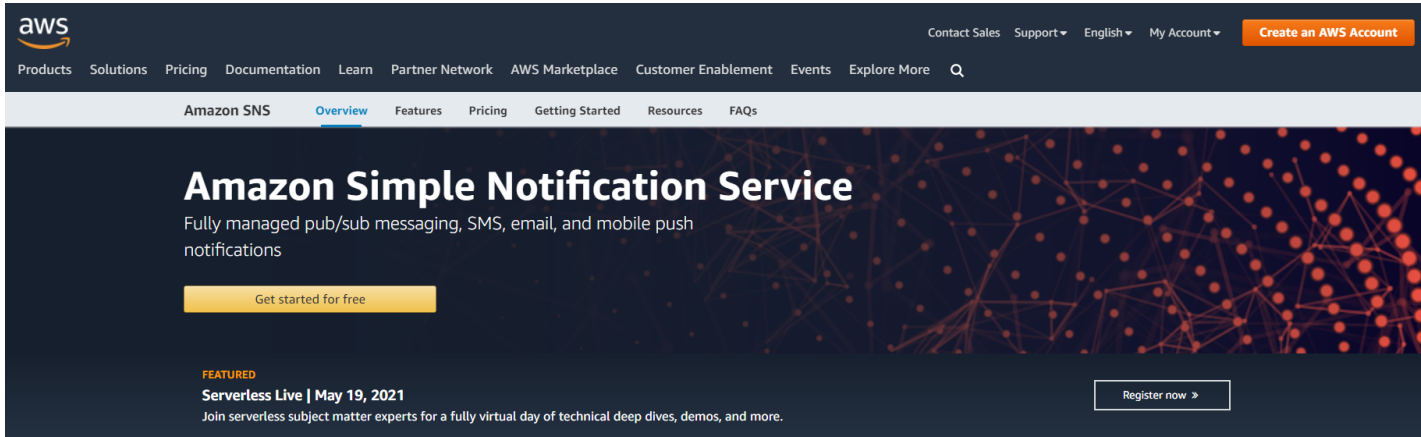
\* SLA (Service Level Agreement): the content, scope, and quality achievement level of a cloud service presented by the cloud vendor

# Enhancements for the Cloud Market

A decorative graphic consisting of several overlapping, curved orange lines that originate from the right side of the slide and extend towards the center, partially overlapping the title text.

# Cooperating with Amazon Simple Notification Service (Amazon SNS)

Amazon SNS has been supported for notifications, enhancing an affinity for server-less architecture.



Amazon Simple Notification Service (Amazon SNS) is a fully managed messaging service for both application-to-application (A2A) and application-to-person (A2P) communication.

The A2A pub/sub functionality provides topics for high-throughput, push-based, many-to-many messaging between distributed systems, microservices, and event-driven serverless applications. Using Amazon SNS topics, your publisher systems can fanout messages to a large number of subscriber systems including Amazon SQS queues, AWS Lambda functions and HTTPS endpoints, for parallel processing, and Amazon Kinesis Data Firehose. The A2P functionality enables you to send messages to users at scale via SMS, mobile push, and



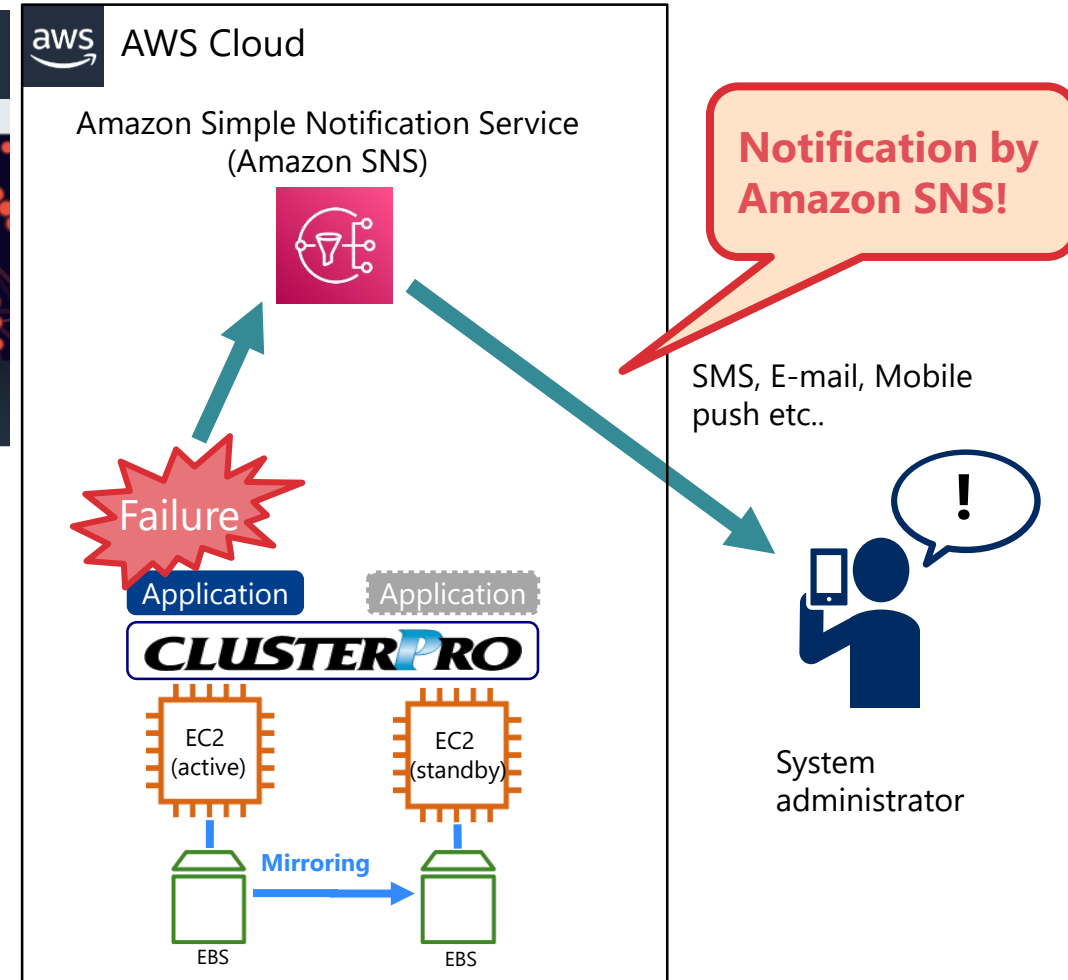
**TUTORIAL:**  
Learn how to use SNS in minutes

Reference: Amazon SNS  
<https://aws.amazon.com/en/sns/>

## Configuration:

From Cluster Properties

- > Open the Cloud tab -> Check Enable Amazon SNS Linkage Function -> Enter a value in TopicArn
- > Open the Alert Service tab -> Check Enable Alert Setting
- > Click Edit -> Click Add -> Check Message Topic

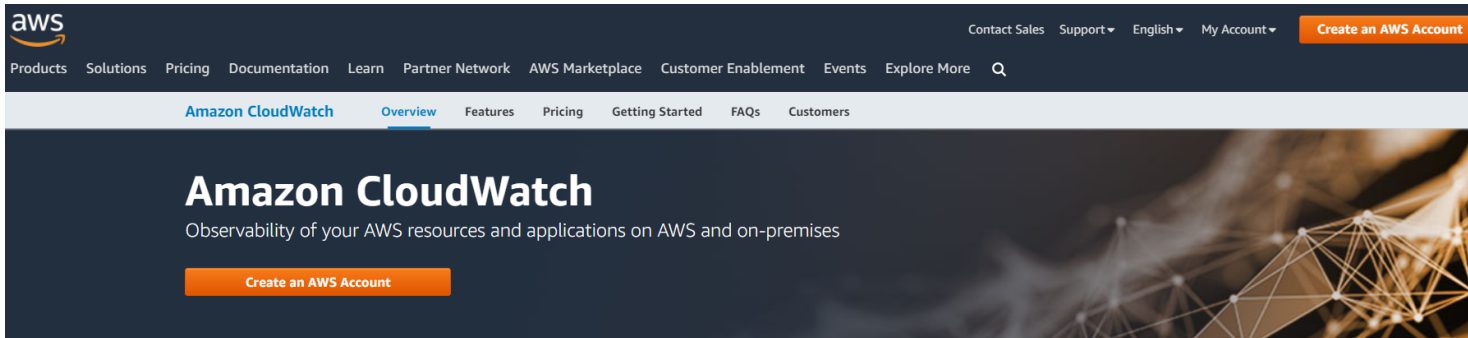


\* This cooperation feature does not require EXPRESSCLUSTER X AlertService, but requires only the base license of EXPRESSCLUSTER.



# Cooperating with Amazon CloudWatch

Amazon CloudWatch has been supported for drawing a graph of response time (monitoring process time).



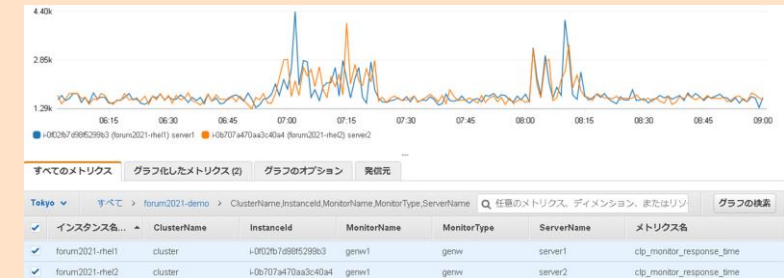
Amazon CloudWatch is a monitoring and observability service built for DevOps engineers, developers, site reliability engineers (SREs), and IT managers. CloudWatch provides you with data and actionable insights to monitor your applications, respond to system-wide performance changes, optimize resource utilization, and get a unified view of operational health. CloudWatch collects monitoring and operational data in the form of logs, metrics, and events, providing you with a unified view of AWS resources, applications, and services that run on AWS and on-premises servers. You can use CloudWatch to detect anomalous behavior in your environments, set alarms, visualize logs and metrics side by side, take automated actions, troubleshoot issues, and discover insights to keep your applications running smoothly.

10 custom metrics and alarms free

with the AWS Free Tier

Get started for free »

EXPRESSCLUSTER sends metrics (data on response time, monitoring process time) for disks, databases\*1, AP servers\*1, and Web/FTP servers\*1 to Amazon CloudWatch\*2, which graphically represents how their performance is changing



Reference: Amazon CloudWatch <https://aws.amazon.com/en/cloudwatch/>

Configuration:

From Cluster Properties -> Open the Cloud tab -> Check Enable Amazon CloudWatch Linkage Function

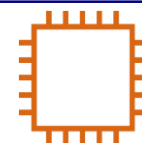
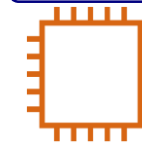
-> Enter a namespace in Namespace

From Monitor Resource Properties -> Open the Monitor(common) tab-> Check Send polling time metrics

Application

Application

CLUSTERPRO



\*1 Using the feature of monitoring them requires EXPRESSCLUSTER X Agent as well.

\*2 This feature is not supported by all the monitor resources.

# Google Cloud DNS Resources Added

Following AWS DNS and Azure DNS, **Google Cloud DNS has been supported**, with which cooperating requires minimum settings!



Compute Engine

Resource Definition of Group | failover

Info → Dependency → Recovery Operation → Details

Type\* Google Cloud DNS resource

Name\* gcdns

Comment

Get License Info

Show All Types

Select the type of group resource and enter its name.

Back Next

Resource Properties | gcdns

Info Dependency Recovery Operation Details Extension

Common server1 server2

Zone Name\* test01

DNS Name\* cluster.test.internal.nec.co.jp

IP Address\* 192.168.0.10

TTL\* 300 sec

Delete the record at deactivation

OK Cancel Apply

The configuration can be completed in the GUI; no need to write complicated scripts

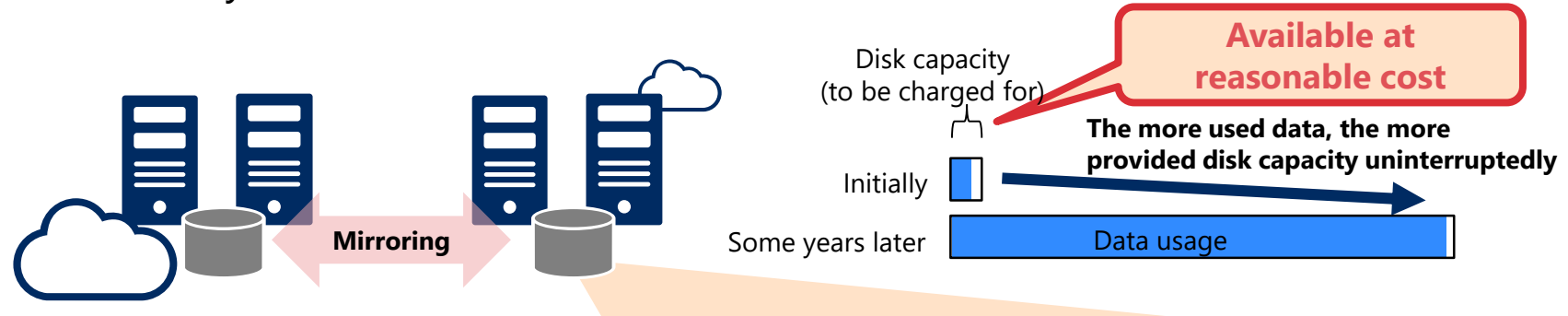
# Disk Mirroring Feature, for Which Demand Is Increasing in Cloud Industry, Enhanced

Available in non-cloud environments as well

The hybrid-disk type configuration in public clouds has become reasonably available.

The uninterrupted expandability now covers hybrid-disk volume size, in addition to mirror-disk volume size

- The mirroring feature of the Linux version has been improved to be equivalent to that of the Windows version



## Whether these features are supported or not by file systems (X4.2→X4.3)

Uninterruptedly expanding the volume size of a hybrid disk<sup>\*1</sup>

Uninterruptedly expanding the volume size of a mirror disk<sup>\*1</sup>

Supporting a volume of **16 TB or more**

Copying used areas<sup>\*2</sup> (to reduce time for initial mirror construction and for full copying)

	xfs (Linux)	ext4 (Linux)	ext3 (Linux)	NTFS (Windows)
Uninterruptedly expanding the volume size of a hybrid disk <sup>*1</sup>	No→Yes	No→Yes	No→Yes	No→Yes
Uninterruptedly expanding the volume size of a mirror disk <sup>*1</sup>	Yes→Yes	No→Yes	No→Yes	Yes→Yes
Supporting a volume of <b>16 TB or more</b>	Yes→Yes	No→Yes	No	Yes→Yes
Copying used areas <sup>*2</sup> (to reduce time for initial mirror construction and for full copying)	No→Yes	Yes→Yes	Yes→Yes	Yes→Yes

\*1 For Linux, an LVM configuration is required.

\*2 This feature means mirroring only blocks which includes data significant to the file system.

# Pre- and Post-processing Commands Added for Snapshot Backup/Restoration

Available in non-cloud environments as well

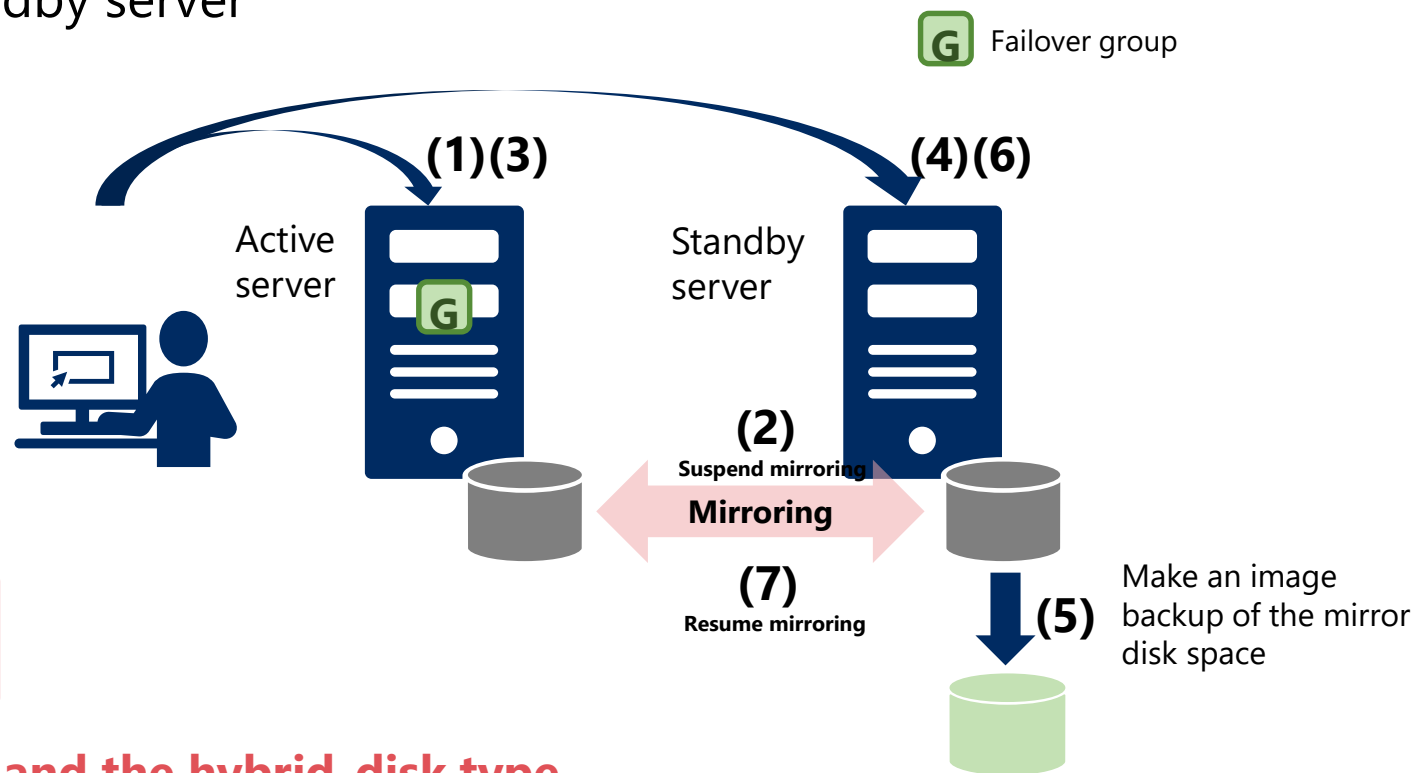
Complicated backup/restoration procedures peculiar to cluster configurations have been organized into simple commands, and the guides have been available.

**Easy backup with minimum downtime and no heavy load on the active server!**

## How to back up the mirror disk on the standby server

- (1) Stop the failover group.
- (2) Suspend the mirror synchronization (to secure the rest point).
- (3) Start the failover group.
- (4) Run **clpbackup --pre** (covering stopping the server).
- (5) Back up the mirror disk space.
- (6) Start the server.
- (7) Run **clpbackup --post**.

**Even for a high-capacity disk, the downtime exists only between (1) and (3)!**



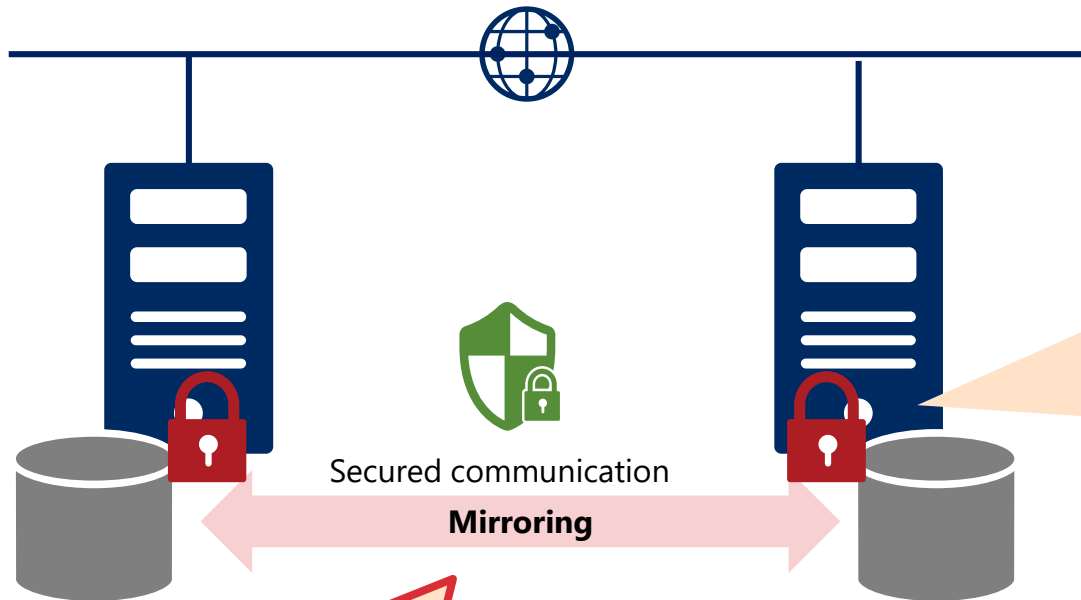
**This feature supports both the mirror-disk type and the hybrid-disk type**

**For the backup and restoration procedures of other patterns, see:** EXPRESSCLUSTER X Maintenance Guide -> 2. The system maintenance information

- How to back up a mirror/hybrid disk to its disk image
- How to restore the mirror/hybrid disk from the disk image

<https://www.nec.com/en/global/prod/expresscluster/en/support/manuals.html>

Secured mirroring through a public network has been available for, for example, configuring a remote cluster.



**A public network can be securely used**

Common-key files for encrypting mirroring communication

Generated with OpenSSL for Linux:

```
# openssl rand 16 -out (key-file name) Generates a 16-byte (128-bit) encryption key.  
# openssl rand 24 -out (key-file name) Generates a 24-byte (192-bit) encryption key.  
# openssl rand 32 -out (key-file name) Generates a 32-byte (256-bit) encryption key.
```

Generated with the key-creating command (clpkeygen) for Windows:

```
# clpkeygen 128 (key-file name) Generates a 16-byte (128-bit) encryption key.  
# clpkeygen 192 (key-file name) Generates a 24-byte (192-bit) encryption key.  
# clpkeygen 256 (key-file name) Generates a 32-byte (256-bit) encryption key.
```

Configuration:

From Mirror Disk Resource Properties -> Open the Details tab -> Click the Tuning button  
From Mirror Disk Resource Tuning Properties -> Open the Mirror tab ->

Mirror Communication Encryption -> Check Encrypt mirror communication ->  
Enter a full path in Key File Path\*

\* You need to store the same encryption key in the same path on all the servers.

# Infrastructure as Code (IaC) Supported

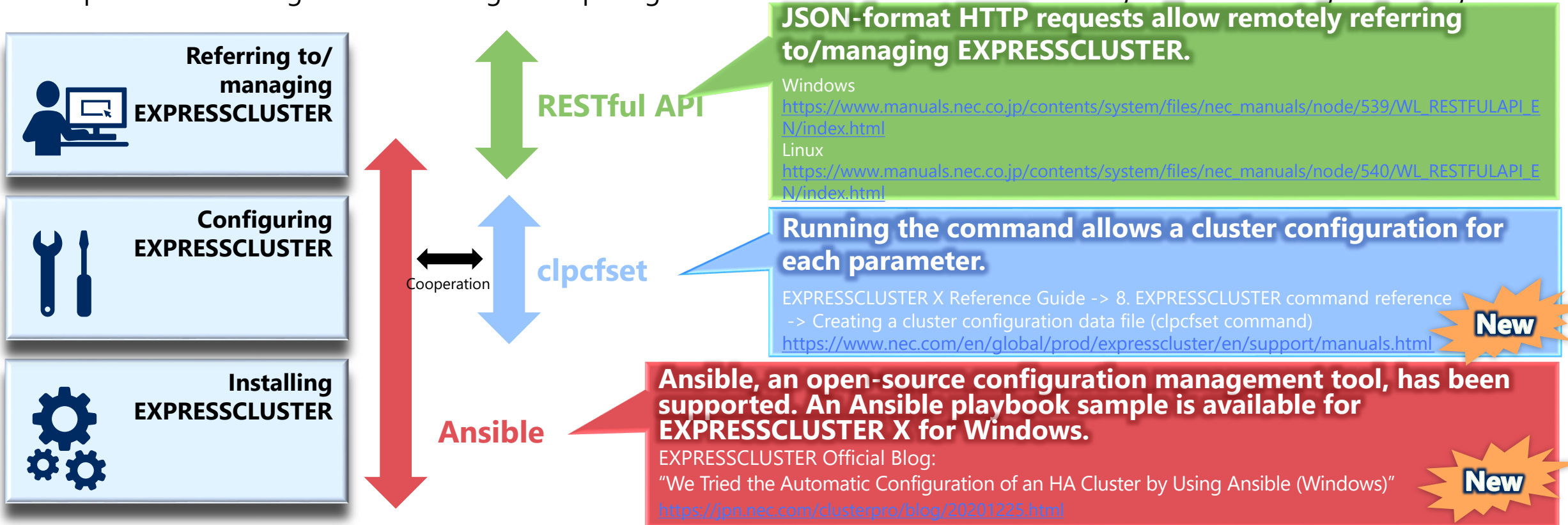
Available in non-cloud environments as well

In addition to RESTful APIs, Ansible has been supported, and clpcfset (a cluster-creating command) has been added. These allow coding the process of installing, configuring, referring to, and managing EXPRESSCLUSTER.

**Ideal for bulk deployment & for configuration application to other systems!**

## What is Infrastructure as Code (IaC)?

- A process of reusing and automating a computing and infrastructure environment through code to manage its configuration



# Improved Usability

(Enhanced Cluster WebUI)

# Linking Cluster WebUI to EXPRESSCLUSTER Reference Guide

Any message displayed on Cluster WebUI has been linked to its description in the reference guide of EXPRESSCLUSTER. This allows quickly identifying the measure when an error occurs.

The screenshot shows the Cluster WebUI interface with a table of alert logs. The table has columns for Type, Received time, Time, Server name, Module name, Event ID, and Message. The Event ID '32' is circled in red, and a red arrow points from it to a 'Messages' popup window. The popup window displays details for the selected message, including the module name 'rc', the event ID '32', and the message text: 'Activating %1 resource has failed.(%2 : %3)'. The popup also includes a link to the reference guide for this message.

Displays a page describing the message and its measure

Clicking the event ID of a message

Type	Received time	Time	Server name	Module name	Event ID	Message
Error	2021/04/14 21:19:32.090	2021/04/14 21:19:32.081	server1	rc	20	Stopping group failover has st
Warning	2021/04/14 21:19:32.057	2021/04/14 21:19:32.048	server1	apisv	130	A request to start group(failov
Info	2021/04/14 21:19:32.046	2021/04/14 21:19:32.026	server1	rc	201	Group(failover) will be moved
Warning	2021/04/14 21:19:32.013	2021/04/14 21:19:32.004	server1	rc	12	Activating group failover has f
Warning	2021/04/14 21:19:31.992	2021/04/14 21:19:31.970	server1	rc	32	Activating resource has f

Type	Received time	Time	Server name	Module name	Event ID	Message
Error	2021/04/14 21:19:32.090	2021/04/14 21:19:32.081	server1	rc	20	Stopping group failover has st
Warning	2021/04/14 21:19:32.057	2021/04/14 21:19:32.048	server1	apisv	130	A request to start group(failov
Info	2021/04/14 21:19:32.046	2021/04/14 21:19:32.026	server1	rc	201	Group(failover) will be moved
Warning	2021/04/14 21:19:32.013	2021/04/14 21:19:32.004	server1	rc	12	Activating group failover has f
Warning	2021/04/14 21:19:31.992	2021/04/14 21:19:31.970	server1	rc	32	Activating resource has f
Info	2021/04/14 21:19:31.992	2021/04/14 21:19:31.970	server1	rc	33	A request to activate %1 resource on server %2 has been started.
Info	2021/04/14 21:19:31.992	2021/04/14 21:19:31.970	server1	rc	34	A request to activate %1 resource on server %2 has been completed.
Error	2021/04/14 21:19:31.992	2021/04/14 21:19:31.970	server1	rc	35	A request to activate %1 resource on server %2 has been failed.



# Automatically obtaining AWS environment information

This simplifies the configuration of AWS-related resources even more.

Resource Definition of Group | failover awsvip

Info ✓ → Dependency ✓ → Recovery Operation ✓ → Details

Common server01 server02

IP Address\*

VPC ID\*

ENI ID\*

Tuning

◀ Back Finish Cancel

Clicking the pull-down button

Resource Definition of Group | failover awsvip

Info ✓ → Dependency ✓ → Recovery Operation ✓ → Details

Common server01 server02

IP Address\*

VPC ID\*

ENI ID\*

Tuning

◀ Back Finish Cancel

Automatically obtains AWS environment information. Then you have only to select an item!

# Improved Listing of Available Group Resources

The list now displays only group resources appropriate to the system environment, allowing choosing from them easier.

## Before

Screen for adding a resource in an AWS environment on X 4.2

Resource Definition of Group | failover awsdns ✕

Info → Dependency → Recovery Operation → Details

Type\*

Name\*

Comment

Get License Info

Select the type of group

Cancel

Displays unavailable resources as well

## After

Screen for adding a resource in an AWS environment on X 4.3

Resource Definition of Group | failover awsdns ✕

Info → Dependency → Recovery Operation → Details

Type\*

Name\*

Comment

Get License Info

Show All Types

Select the type of group

◀ Back Next ▶ Cancel

Displays only available resources

# Group Resource and Monitor Resource Lists Added

This allows cross-checking configuration information on multiple group resources and monitor resources, simplifying checking set values!

The screenshot shows the Cluster WebUI interface. At the top, there's a navigation bar with 'Cluster WebUI cluster' and 'Config mode'. Below it are buttons for 'Import', 'Export', 'Get the Configuration File', 'Apply the Configuration File', 'Update Server Data', and 'Check the Configuration File'. The main area is divided into three sections: 'Servers' (server1, server2), 'Groups' (failover group containing awsvip and md), and 'Monitors' (awsvipw1, mdnw1, mdw1, userw). Red circles highlight the configuration icons (gear) for the 'failover' group and the 'awsvipw1' monitor. Red arrows point from these icons to the 'Group Properties | failover' and 'Monitor Common Properties' dialog boxes on the right.

Group Properties | failover

Resources Info Startup Server Attribute Start Dependency Stop Dependency Entire Dependency

Name	Type	Resource Startup Attribute	Retry Count	Final Action
awsvip	AWS Virtual IP resource	Automatic startup	5 time	No operation (not activate next res
md	Mirror disk resource	Automatic startup	0 time	No operation (not activate next res

OK Cancel Apply

Monitor Common Properties

Name	Type	Interval	Timeout	Retry Count	Monitor Timi
awsvipw1	AWS Virtual IP monitor	60 sec	180 sec	1 time	Active
mdnw1	Mirror disk connect monitor	60 sec	120 sec	0 time	Always
mdw1	Mirror disk monitor	10 sec	60 sec	0 time	Always
userw	User mode monitor	3 sec	90 sec	0 time	Always

Close

You can cross-check configuration information on multiple group resources and monitor resources!

# Newly Supported Platforms

# Newly Supported OSs and Applications

## OSs

- Windows Server, version 2004 Standard
- Windows Server, version 2004 Datacenter
- Red Hat Enterprise Linux 8 (Update2)
- Red Hat Enterprise Linux 7 (Update9)
- Oracle Linux 8.2 (Red Hat Compatible Kernel)
- Oracle Linux 7.9 (Red Hat Compatible Kernel)
- Amazon Linux 2 (4.14.203-156.332.amzn2.x86\_64)
- Novell SUSE LINUX Enterprise Server 15 (SP2)\*
- Novell SUSE LINUX Enterprise Server 12 (SP5)\*
- Ubuntu 20.04.1 LTS\*

## Applications

- WebOTX V10.3
- Oracle WebLogic Server 14c (14.1.1)
- Samba 4.13
- Java11

\* Supported only for shared-disk type clusters

# Notes and Contact Address

## Supporting RHEL

- Supporting RHEL 8.3 is not scheduled.

If you have used the default values, some of which have been changed, upgrading may change your settings as well. For more information, see the following:

- Getting Started Guide -> 6. Notes and Restrictions -> Notes on VERSION UP EXPRESSCLUSTER -> Changed Default Values
  - <https://www.nec.com/en/global/prod/expresscluster/en/support/manuals.html>

# Thank You

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For more product information & request for trial license,  
visit >> <https://www.nec.com/en/global/prod/expresscluster/>

For more information, feel free to contact us - [info@expresscluster.jp.nec.com](mailto:info@expresscluster.jp.nec.com)

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