



EXPRESSCLUSTER X for Windows

Quick Start Guide for Windows Server 2016 Hyper-V

Version 1
Mar 27, 2018

Disclaimer

The contents of this document are subject to change without notice. NEC Corporation assumes no responsibility for technical or editorial mistakes in or omissions from this document. To obtain the benefits of the product, it is the customer's responsibility to install and use the product in accordance with this document. The copyright for the contents of this document belongs to NEC Corporation. Copying, altering, or translating this document, in full or in part, without the permission of NEC Corporation, is prohibited.

Trademark Information

Information in this document is subject to change without notice. No part of this document may be reproduced or transmitted in any form or by any means, electronic or mechanical, for any purpose, without the express written permission of NEC Corporation.

Microsoft® and Windows® are registered trademarks of Microsoft Corporation. Other system names, company names, and product names are trademarks and registered trademarks of their respective companies.

Contents

1	About This Guide	5
1.1	Using This Guide	5
1.2	Revision History	5
1.3	Evaluation Environment.....	5
1.4	For More Information.....	5
2	Overview	7
3	System Requirements and Planning	8
3.1	System Requirements	8
3.2	System Planning.....	8
4	Hyper-V Setup	10
4.1	Install Hyper-V Role (Primary Server)	10
4.2	Install Hyper-V Role (Secondary Server)	10
4.3	Create Virtual Switch (Primary Server)	10
4.4	Create Virtual Switch (Secondary Server)	10
5	EXPRESSCLUSTER X Installation	11
5.1	Install EXPRESSCLUSTER X (Primary Server)	11
5.2	Install EXPRESSCLUSTER X (Secondary Server)	11
5.3	Confirm Connectivity Between Servers.....	12
6	Base Cluster Setup	13
6.1	Start WebManager	13
6.2	Create Cluster	13
6.3	Setup Network Configuration	13
6.4	Create Failover Group	13
6.5	Create Mirror Disk Resource	14
6.6	Upload the Cluster Configuration and Start Cluster.....	14
7	Hyper-V Cluster Setup	16
7.1	Create Virtual Machine	16
7.2	Add the Script Resource for Virtual Machine.....	16
7.3	Add Custom Monitor Resource.....	18
7.4	Upload the Cluster Configuration	18
8	Verify Functionality	19
8.1	Move the Failover Group.....	19
8.2	Failover on Server Shutdown	19
9	Appendix	20
9.1	System Planning Worksheet.....	20

1 About This Guide

1.1 Using This Guide

This guide provides a hands-on “Quick Start” set of instructions to create Windows Server 2016 Hyper-V cluster with EXPRESSCLUSTER X for Windows. The guide assumes users have Microsoft Windows system administration knowledge and skills with experience in installation and configuration of Microsoft Windows operating systems, networks, and Hyper-V.

1.2 Revision History

Version	Date	Description
1	Mar 27, 2018	Initial Version

1.3 Evaluation Environment

This clustering method has been evaluated with the following OS and software.

- Windows Server 2016 Datacenter (Desktop Experience)
- Windows Server 2016 Hyper-V
- EXPRESSCLUSTER X 3.3 for Windows (internal version: 11.35)

1.4 For More Information

The following guides are available for instant support.

- **Getting Started Guide** – This guide explains general cluster concepts and overview of EXPRESSCLUSTER functionality.
- **Installation and Configuration Guide** – This guide explains EXPRESSCLUSTER X installation and configuration procedures in detail.
- **Reference Guide** – This is a reference of commands that can be put in EXPRESSCLUSTER X scripts and maintenance commands that can

be executed from the server command prompt.

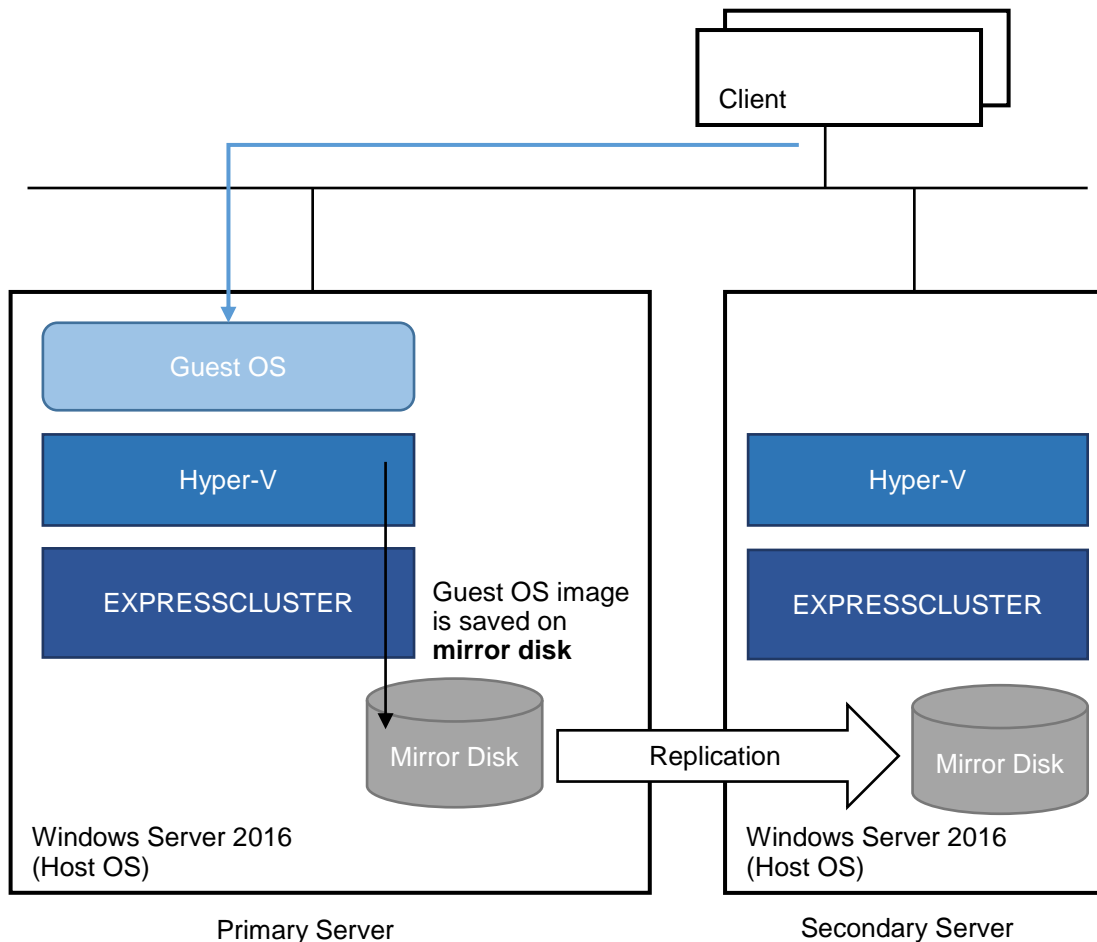
The above stated guides can also be found at

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

.

2 Overview

- EXPRESSCLUSTER is installed on the host OS (i.e. Windows Server 2016).
- The virtual machine (guest OS) files is saved on a partition controlled by **mirror disk resource**.
- The guest OS on the virtual machine is controlled by **script resource**.



Note:

This clustering method does not support the following capability.

- Take over checkpoints of the virtual machine
- Live Migration/Quick Migration

3 System Requirements and Planning

3.1 System Requirements

- Windows Server 2016 Hyper-V
Refer to Microsoft website.
<https://docs.microsoft.com/en-us/windows-server/virtualization/hyper-v/system-requirements-for-hyper-v-on-windows>
- EXPRESSCLUSTER
Refer to EXPRESSCLUSTER X *Getting Started Guide*.

3.2 System Planning

Here are sample parameters for a cluster. In section 9.1, there is **System Planning Worksheet**. Fill out all tables to create a cluster.

Machine #1: Primary Server (Host OS)

Machine #2: Secondary Server (Host OS)

Machine #3: Virtual Machine (Guest OS)

Machine #4: Test Client Machine

Table 1: Network Configuration

Machine	Hostname/ Container Name	IP Address	Mirror Disk Connect
#1	server1	192.168.0.11/24	mdc1
		192.168.1.11/24	Do Not Use
#2	server2	192.168.0.12/24	mdc1
		192.168.1.12/24	Do Not Use
#3	vm1	192.168.1.21/24	N/A
#4	client1	192.168.1.99/24	N/A

Table 2: OS and Disk Configuration

Machine	OS	Mirror Disk
#1	Windows Server 2016 Datacenter	Cluster Partition: Drive Letter: W Size: 17 MB
#2	Windows Server 2016 Datacenter	Data Partition: Drive Letter: X Size: 10 GB
#3	Windows Server 2016 Datacenter	N/A
#4	Windows Server 2016 Datacenter	N/A

Table 3: Logins and Passwords

Machine	Login	Password
#1	Administrator	passw0rd
#2	Administrator	passw0rd
#3	Administrator	passw0rd
#4	Administrator	passw0rd

4 Hyper-V Setup

4.1 Install Hyper-V Role (Primary Server)

1. Launch **Server Manager**.
2. Click **Manage** and click **Add Roles and Features**.
3. Click **Server Selection** on left pane.
4. Click **Server Roles** on left pane.
5. Check **Hyper-V** and click **Add Features**.
6. Click **Confirmation** on left pane.
7. Click **Install**.
8. After installation is complete, restart OS.

4.2 Install Hyper-V Role (Secondary Server)

Perform all of the steps in section 4.1 on the secondary server.

4.3 Create Virtual Switch (Primary Server)

1. Launch **Hyper-V Manager**.
2. Click **Virtual Switch Manager** on right pane.
3. Select virtual switch type (e.g. External) and click **Create Virtual Switch**.
4. Enter **Name** (e.g. vswitch) and select actual network interface card (e.g. Broadcom NetXtreme Gigabit Ethernet). Click **OK**.

4.4 Create Virtual Switch (Secondary Server)

Perform all of the steps in section 4.3 on the secondary server. The virtual switch name must be the same as primary's virtual switch (e.g. vswitch).

5 EXPRESSCLUSTER X Installation

5.1 Install EXPRESSCLUSTER X (Primary Server)

1. Insert the EXPRESSCLUSTER X CD-ROM into a CD-ROM drive on the primary server (container host).
2. In the pop-up window, click **NEC EXPRESSCLUSTER for Windows**.
3. Click on **NEC EXPRESSCLUSTER X 3.x for Windows**.
4. In the **Welcome** window, click **Next**.
5. In the **Choose Destination Location** window, click **Next**.
6. In the next window, click **Install**.
7. In the **Port Number** window, if necessary, modify the default port numbers. Click **Next**.
8. In the **Filter Settings of Shared Disk** window, click **Next**.
9. Click **Yes** in the **Confirmation** window to skip shared disk filtering.
10. In the **License Manager** window, click **Register**.
11. In the **License Registration** window, click **Register with License Information**.
12. In the **Product Selection** window, select the **OS** and **Product/Trial** types. For **Product Name**, click **EXPRESSCLUSTER X 3.x for Windows**. Click **Next**.
13. In the **License Unit Selection** window, depending on the type of license, enter the number of **CPU** or **Node Units**. Click **Next**.
14. In the **License Key Entry** window, enter the **Serial No.** and **License Key**. Click **Next**.
15. In the **License Registration Confirmation** window, confirm the information entered is correct. Click **Next**.
16. Click **OK**. If the license registration fails, start again from step 10.
17. Repeat steps 10 - 16 again for the **EXPRESSCLUSTER X Replicator 3.x for Windows** product license. Select **EXPRESSCLUSTER X Replicator 3.x for Windows** as the **Product Name** in step 12.
18. When the licenses have been successfully registered, click **Finish**.
19. On the **InstallShield Wizard Complete** window, click the **No, I will restart my computer later** option button, and then click **Finish**.
20. In the next window, click **Exit**. Click **Exit** (two times total).
21. Restart the primary server.

5.2 Install EXPRESSCLUSTER X (Secondary Server)

Perform all of the steps in section 5.1 on the secondary server.

5.3 Confirm Connectivity Between Servers

Ping the servers in the cluster to confirm that there are no issues in connectivity. Also be sure that all ports used by EXPRESSCLUSTER are able to communicate through the Windows Firewall.

6 Base Cluster Setup

6.1 Start WebManager

Confirm that Java Runtime Environment (JRE) is installed on a machine to be used for cluster management. See the installation requirements section of the EXPRESSCLUSTER X **Getting Started Guide** for a compatible version. For this guide, use the primary server for cluster management. Install JRE if necessary. Then start by accessing port 29003 of the primary server from the web browser of the cluster management machine, using the primary server's IP address (e.g. http://192.168.1.11:29003). When the security warning window displays, select the **Always trust content from this publisher** check box. Click **Run**.

6.2 Create Cluster

1. When WebManager is opened for the first time, there is a pop-up window with two options. Click **Start cluster generation wizard**.
2. In the confirmation window, click **Start Cluster Generation Wizard for standard edition**.
3. In the new window, type a **Cluster Name** (e.g. cluster), and click **Next**.
4. In the next window, to add another server to the cluster, click **Add**.
5. Type the **Server Name** or the **IP Address** of the secondary server, and then click **OK**.
6. Both servers are now on the list. If the primary server is not in the top (Master Server) position, then move it up. Click **Next**.

6.3 Setup Network Configuration

1. EXPRESSCLUSTER X automatically detects the IP addresses of the servers. The primary network is for heartbeat and data mirroring; set the **MDC** on this row as **mdc1**. The secondary network is for heartbeat only. Click **Next**.
2. In the **NP Resolution** window, click **Next**.

6.4 Create Failover Group

1. To add a group, in the **Cluster Generation Wizard**, in the **Group**

section, click **Add**.

2. In the next window, select **failover** for group **Type**. Name the group (e.g. failover-vm), click **Next**, and then click **Next** (two times total).
3. Select the default options for the **Group Attribute Settings**, and then click **Next**.

6.5 Create Mirror Disk Resource

1. In the **Group Resource** section of the **Cluster Generation Wizard**, to add a resource, click **Add**.
2. Click **Get License Info** to retrieve the active license.
3. To add a mirror disk resource, from the **Type** drop down menu, select **mirror disk resource**, and then click **Next**.
4. Confirm the **Follow the default dependency** box is selected, and then click **Next**.
5. Confirm the default options are correct, and then click **Next**.
6. Select the primary server name and click **Add**.
7. Click **Connect** to populate the server partitions.
8. Select the drive letter of the data partition for mirroring (e.g. X:) in the **Data Partition** box, and the drive letter of the cluster partition (e.g. W:) in the **Cluster Partition** box. Click **OK**.

Warning:

Specify different partitions for data partition and cluster partition. If the same partition is specified, data on the mirror disk may be corrupted.

9. Repeat steps 6 – 8 for the secondary server.
10. Click **Finish**.
11. Click **Finish**, and then click **Next**.
12. Click **Finish**.
13. Click **Yes** to enable recovery action when an error occurs in a monitor resource.

6.6 Upload the Cluster Configuration and Start Cluster

1. In WebManager window, click the **File** menu and then **Apply the Configuration File**. Click **OK**. Click **OK** (two times total).
2. After the upload is complete, change from **Config Mode** to **Operation Mode**.
3. Restart **Cluster Manager**. Click the **Service** menu, and then click

Restart Manager. Click **OK**.

4. Click the **Service** menu, and then click **Start Cluster**. Click **OK**.
5. When the cluster tree displays after a few seconds, in the left pane of WebManager window, expand the **%failover group%** section, right click **%mirror disk%**, and click **Details** to monitor the disk synchronization progress. Mirror disk copy starts automatically, replicating data from the primary server to the secondary server.

Note:

This step may take a while depending on the size of the data on the mirror disk partition.

6. After the copy completes, in the **Mirror Disk Helper** window, click **Close**.
7. In the Cluster Manager window, all icons in the tree view should now be green.
8. Confirm that the cluster is functioning.
 - Move the **%failover group%** to the secondary server.
 - Move the **%failover group%** back to the primary server.

Note:

These tests do not affect server functionality. They confirm that the mirror disks on each server in the cluster are functioning properly. The mirror disk is now controlled by EXPRESSCLUSTER X and is only accessible from the active server.

7 Hyper-V Cluster Setup

7.1 Create Virtual Machine

1. Move the **%failover group%** to the primary server.
2. Launch **Hyper-V Manager** on the primary server.
3. Click **New** and click **Virtual Machine** on right pane.
4. Click **Specify Name and Location** on left pane.
5. Enter the virtual machine name. Check **Store the virtual machine in a different location** and a directory on the mirror disk (e.g. X:\vm). Click **Next**.
6. Choose the generation of the virtual machine and click **Next**.
7. Specify the amount of memory and click **Next**.
8. Select the virtual switch and click **Next**.
9. Enter the VHDX file name and click **Next**.
10. Choose installation method and click **Next**.
11. Check the parameters and click **Finish**.
12. On Hyper-V Manager, select the virtual machine and click **Start**. And click **Connect**.
13. Install OS on the virtual machine.
14. After the installation is complete, shutdown the virtual machine.
15. Create a directory (e.g. X:\vm\vm1\bak) to take a backup of the virtual machine files.
16. Copy the all directories and files from the source to the destination.
Source: X:\vm\vm1\Virtual Machines
Destination: X:\vm\vm1\bak
17. On Hyper-V Manager, select the virtual machine and click **Delete**.

7.2 Add the Script Resource for Virtual Machine

1. Download the script files for Windows Server 2016 Hyper-V from the NEC web site:
<http://www.nec.com/en/global/prod/expresscluster/en/support/Setup.html>
2. Start WebManager and change to **Config Mode**.
3. Right-click on the **%failover group%**, and then click **Add Resource**.
4. From the **Type** drop down menu, select **script resource**. As the resource **Name**, enter **script-vm** and click **Next**.
5. Confirm the default dependency (**Follow the default dependency** box

is checked), and then click **Next**.

6. Confirm the default options are correct, and then click **Next**.
7. Select **start.bat** in the left pane and click the **Replace** button.
8. Navigate to the scripts that were downloaded, select the new **start.bat** file, and click **Open**.
9. Click **Yes** to replace.
10. Select **stop.bat** in the left pane and click the **Replace** button.
11. Navigate to the scripts that were downloaded, select the new **stop.bat** file, and click **Open**.
12. Click **Yes** to replace.
13. Click **Add** and navigate to the scripts that were downloaded, select **SetEnvironment.bat**, click **Open**, and click **OK**.
14. Click **Add** and navigate to the scripts that were downloaded, select **start.ps1**, click **Open**, and click **OK**.
15. Click **Add** and navigate to the scripts that were downloaded, select **stop.ps1**, click **Open**, and click **OK**.
16. Click **Add** and navigate to the scripts that were downloaded, select **vmstate.ps1**, click **Open**, and click **OK**.
17. Check if the following files are displayed, and click **OK**.

Type	Name
Start script	start.bat
Stop script	stop.bat
User script	SetEnvironment.bat
User script	start.ps1
User script	stop.ps1
User script	vmstate.ps1

18. Select **SetEnvironment.bat**, click **Edit**, and change the following parameters. ID should be the same as folder name on the DestPath (e.g. X:\vm\vm1\bak\12345678-ABCD-1234-ABCD-12345678ABC).
set VM=vm1
set ID=12345678-ABCD-1234-ABCD-123456789ABC
set SourcePath=X:\vm\vm1\Virtual Machine
set DestPath=X:\vm\vm1\bak
19. Click the **Tuning** button.
20. Enter 0 for **Normal Return Value** for the **start** and **stop** sections. Click **OK**, and click **Finish**.

7.3 Add Custom Monitor Resource

1. Right-click on the **Monitors**, and then click **Add Monitor Resource**.
2. From the **Type** drop down menu, select **custom monitor**. Click **Next**.
3. Select **Active** for **Monitor Timing**, and click the **Browse** button to select the **Target Resource**. Select the recently configured **script** resource (e.g. **script-vm**) and click **OK**. Click **Next**.
4. Click **Replace**, navigate to the scripts that were downloaded. Select the new **genw.bat** and click **Yes**.
5. Click **Edit** and check the following path name. Click **Next**.
cd "C:\Program Files\EXPRESSCLUSTER\scripts**<failover group name>**\script resource name>"
6. Click the **Browse** button to select the **script** resource (e.g. **script-vm**) for **Recovery Target** and click **OK**.
7. Click **Finish**.

7.4 Upload the Cluster Configuration

1. Click the **File** menu, and then **Apply the Configuration File**. Click **OK** on the confirmation message popup. If the changes are applied successfully, click **OK**.
2. After the upload is complete, change to the **Operation Mode**.
3. Right-click on the **%failover_group%** and select **Start**. Select the primary server to start the group on and click **OK**.
4. Confirm that all icons of group resources and monitor resources are green.
5. Confirm that the virtual machine is running.

```
PS> Get-VM -VMName <virtual machine name>
```

```
Name State      CPUUsage(%) ...
---- ----      -
vm1  Running  10          ...
```

8 Verify Functionality

8.1 Move the Failover Group

1. Using WebManager, move the **%failover_group%** from the primary server to the secondary server and confirm the following.
 - The virtual machine on the primary server should be in a stopped state.
 - The virtual machine on the secondary server should be started.
 - The client can access to the virtual machine.
2. Using WebManager, move the **%failover_group%** back to the primary server and confirm the following.
 - The virtual machine on the primary server should be started.
 - The virtual machine on the secondary server should be in a stopped state.
 - The client can access to the virtual machine.

8.2 Failover on Server Shutdown

1. Restart the primary server and confirm the following.
 - The virtual machine on the secondary server should be started.
 - The client can access to the virtual machine.
2. After the primary server comes back to the cluster, restart the secondary server and confirm the following.
 - The virtual machine on the primary server should be started.
 - The client can access to the virtual machine.

9 Appendix

9.1 System Planning Worksheet

Machine #1: Primary Server (Host OS)

Machine #2: Secondary Server (Host OS)

Machine #3: Virtual Machine (Guest OS)

Machine #4: Test Client Machine

Table 1: Network Configuration

Machine	Hostname/ Container Name	IP Address	Mirror Disk Connect
#1			
#2			
#3			N/A
#4			N/A

Table 2: OS and Disk Configuration

Machine	OS	Mirror Disk
#1		Cluster Partition: Drive Letter: Size:
#2		Data Partition: Drive Letter: Size:
#3		N/A
#4		N/A

Table 3: Logins and Passwords

Machine	Login	Password
#1		
#2		
#3		
#4		