
NEC

EXPRESSCLUSTER X for Linux
Quick Start Guide for MYSQL

Version 1



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About this Guide

Using this guide

This guide provides a hands-on “Quick Start” set of instructions for the EXPRESSCLUSTER X (ECX) for Linux. The guide assumes its readers to have Linux system administration knowledge and skills with experience in installation and configuration of Red Hat operating systems, Networks, MYSQL Server. The guide includes step-by-step instructions to install and configure EXPRESSCLUSTER X with MYSQL.

This guide covers the following topics:

Chapter 1: [Overview](#) – describes the general steps of setup procedure.

Chapter 2:

[System Requirements and Planning](#) – describes the overall system and network requirements and includes a set of tables for planning the installation and configuration.

Chapter Error! Reference source not found.: [Error! Reference source not found.](#) – describes the configurations required for each system before installing target application.

Chapter 4: [MYSQL Server](#) installation– describes the installation of MYSQL Server on the Primary and Standby Servers.

Chapter 5: [EXPRESSCLUSTER Server Installation](#) – describes EXPRESSCLUSTER installation for the Primary and Standby Server(s).

Chapter 6: [Base Cluster Setup](#) – describes the process of generating a cluster, creating a failover group, and uploading a configuration.

Chapter 7: [MYSQL Cluster Setup](#) – describes required configuration to enable full cluster functionality.

Chapter 8: [Final Deployment in a WAN Environment](#)– describes steps to verify basic WAN infrastructure functionality and how to move the standby server from a primary to standby site location.

Chapter 9: [Common Maintenance Tasks](#) – describes how to perform common maintenance tasks using the EXPRESSCLUSTER Manager.

Where to go for more information

Refer to additional documentation under the “documentation” directory on the EXPRESSCLUSTER X distribution CD or archive file.

For any further information, please visit the EXPRESSCLUSTER web-site at <http://www.nec.com/EXPRESSCLUSTER>

The following guides are available for instant support:

- **GettingStartedGuide.pdf** – This guide explains general cluster concepts and overview of EXPRESSCLUSTER functionality.
- **InstallationGuide.pdf** – This guide explains EXPRESSCLUSTER installation and configuration procedures in detail.
- **ReferenceGuide.pdf** – This is a reference of commands that can be put in EXPRESSCLUSTER 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/global/prod/EXPRESSCLUSTER/en/support/manuals.html>

The EXPRESSCLUSTER team can also be contacted via the following E-mail address: info@EXPRESSCLUSTER.jp.nec.com

1 Overview

The general procedure to deploy MYSQL Server with EXPRESSCLUSTER X on two server machines (Primary and Standby) for high availability of MYSQL Server consists of the following major steps:

1. Perform system planning to determine requirements and specify specific configuration settings prior to start of actual system installation and configuration.
2. Prepare the Primary and Standby Servers including OS installation, network configuration and other configuration if necessary.
3. Install, configure, and verify MYSQL Server on the Primary and Standby Servers respectively.
4. Install and configure EXPRESSCLUSTER Server on the Primary and Standby Servers.
5. Create and configure EXPRESSCLUSTER failover group to enable continuous protection and automatic recovery for MYSQL Server.
6. Upload the configuration file on the server and start the cluster to complete the deployment.

The initial installation and configuration steps (2-5) should be done at the Primary and secondary server including a basic functional test.

2 System Requirements and Planning

2.1 System Requirements

1. Machine 1: Primary Server
2. Machine 2: Standby Server
3. Machine 3: Management Console/Test Client system

	Machine 1 Primary Server	Machine 2 Standby Server	Machine 3 Management Console/Test Client system
CPU	1 GHz Pentium III or better		1 GHz Pentium III or better
Memory	1GB or more		256MB or more
Disk	1 physical disks (having at least 3 partitions, one for OS, one for cluster partition and one for data partition) OS disk: 5GB or more space available Cluster disk: 10MB partition available for EXPRESSCLUSTER management The same size for each server system Data disk: minimum 5GB required for MYSQL database The same size for each server system		1 physical disk with 100MB or more space available
OS	Red Hat EL 5.5, Centos 6.5		Windows 2003/XP
Software	Java 1.5 enabled web browser		Java 1.5 enabled web browser
Network	2 100Mbit or faster Ethernet network interface cards		1 100Mbit or faster Ethernet network interface card

2.2 System Planning

Review the requirements from last section and then fill out the tables of the worksheet below. Use for reference in the following sections of this guide. See Appendix B for an example worksheet.

Machine 1 Primary Server

Machine 2 Standby Server

Machine 3 Management Console/Test Client system

Full DNS domain name: _____

Table 1: System Network Configuration

Machine	Host name	Network Connection	IP Address	Subnet Mask	Default Gateway	Preferred DNS Server
1		Public:				
		Interconnect:				
2		Public:				
		Interconnect:				
3						

Floating IP (FIP) address:

Web Management Console FIP: (1) _____

Table 2: System OS and Disk Configuration

Machine	OS	Disk 0 (OS Disk)	Disk 1 (Data Disk)
1		Boot Partition: Partition Name: Size:	Cluster Partition: Partition Name: Size (>=10MB) :
2		Boot Partition: Partition Name: Size:	*Data Partition: Partition Name: Size:
3			

* The size must be large enough to store all data, log, and control files for a given Database instance for meet current and expected future needs.

Table 3: System Logins and Passwords

		Login	Password
Machine	1		
Administrator			
Machine	2		
Administrator			
MYSQL	DB		
Administrator			

3 Base System Setup

3.1 Management Console/Test Client (Machine 3)

Setup a Windows desktop or laptop with specified OS and network configuration from previous section. A Java enabled web browser should also be installed to enable access to EXPRESSCLUSTER management console.

3.2 Setup the Primary Server (Machine 1)

1. If necessary, install required hardware components and a supported OS as specified in [Chapter 2](#).
2. Verify basic system boot and root login functionality and availability of required hardware components as specified in [Chapter 2](#).
3. Configure network interface names
 - a. Rename the network interface to be used for network communication with client systems to **Public**.
 - b. Rename the network interface to be used for internal EXPRESSCLUSTER management and data mirroring network communication between servers to **Interconnect**.
4. Configure network interface Settings:
 - a. In the “System” tab go to “Administration” further go to “Network”.
 - b. In the Network Connections window, double-click **Public**.
 - c. In the dialog box, click the **statically set IP address:** option button.
 - d. Type the **IP address**, **Subnet mask**, and **Default gateway** values (see [Table 1](#)).
 - e. Go back to the Network Connections window. Double-click **Interconnect**.
 - f. In the dialog box, click the **statically set IP address:** option button.
 - g. Type the **IP address** and **Subnet mask** values (see [Table 1](#)). Click **OK**.
 - h. On the terminal, run the command “service network restart”.
5. Configure the Data Disk:
 - a. Make sure the disk device or LUN is initialized as a Linux Basic disk device
 - b. Create swap partition of 2*size of RAM.
 - c. Create a mirrored disk cluster partition on the disk with specified size in [Table 2](#) and make sure it is 10MB or greater. Assign partition name as specified in [Table 2](#) to the partition but do NOT format it.
 - d. Create a mirrored disk data partition on the disk with specified size in [Table 2](#). Assign partition name as specified in [Table 2](#) to the partition and format it.

-
- e. Verify the mirrored disk cluster and data partitions are visible in command prompt using “fdisk” command under their respective assigned partition names.

3.3 Setup the Standby Server (Machine 2)

Perform steps 1-5 in Section [3.2](#) on the Standby Server

4 MYSQL Server installation

Installation Steps Of MYSQL:-

To install the MySQL server 5.6, follow the given below steps.

Step 1: Login into the Server and download the yum repo rpm package.
(URL: <http://dev.mysql.com/downloads/repo/>)

```
yum install wget
```

Step 2: Now install the downloaded rpm package.

```
rpm -ivh mysql-community-release-el6-5.noarch.rpm
```

Step 3: Now install the mysql server by using yum command.

Note: The yum command by-default also install the dependencies

```
yum install mysql-server
```

Step 4: After installation start the mysql server

```
service mysqld start
```

Note: After the installation, kindly make sure that the checkbox for the services “mysqld” are unticked and service is stopped, so that the control of these services is given to EXPRESSCLUSTER. (System → Administration → Services)

5 EXPRESSCLUSTER Server Installation

5.1 Install EXPRESSCLUSTER on the Primary & Standby Server (Machine 1&2)

Install EXPRESSCLUSTER Server RPM on all server(s) that constitute the cluster by following the procedures below.

Note: Log in as root user when installing the EXPRESSCLUSTER Server RPM.

1. Mount the installation CD-ROM.
2. Run the rpm command to install the package file. The installation RPM varies depending on the products. Navigate to the folder, /Linux/3.0/en/server, in the CD-ROM and run the following:

```
rpm -i expresscls-[version].[architecture].rpm
```

Note: EXPRESSCLUSTER will be installed in the following directory. You will not be able to uninstall the EXPRESSCLUSTER if you change this directory.

Installation Directory: /opt/nec/clusterpro

1. When the installation is completed, unmount the installation CD-ROM.
2. **License Registration:** Log on to the master server as root user and run the following command:

```
clplcncs -i <filepath> -p <PRODUCT-ID>
```

When the command is successfully executed, the message "Command succeeded." is displayed in the console

Note: Here, specify the in filepath to the license file by the -i option & the productID by the -p option.

For Base License: Enter the product ID as BASE32. Here 32 is the EXPRESSCLUSTER version & this number will vary as per the EXPRESSCLUSTER deployed. Example for EXPRESSCLUSTER X 2.1 version, command param would become BASE21. The Base license needs to be applied on only one server.

For Replicator license: Enter the product ID as REPL32. This license should be registered on both the servers

Note: For registering the license from the command line refer to EXPRESSCLUSTER, Installation and Configuration Guide.

5.2 Restart the Primary and Standby Servers (Machines 1 & 2)

First restart the Primary Server and then restart the Standby Server

6 Base Cluster Setup

This section describes the steps to create a cluster using EXPRESSCLUSTER Manager running on the Management Console/Test Client (Machine 3).

6.1 Install Java Runtime Environment (JRE)

Verify JRE v.1.5.0.6 or newer is installed on the Management Console/Test Client (Machine 3). If necessary, install JRE by performing the following steps:

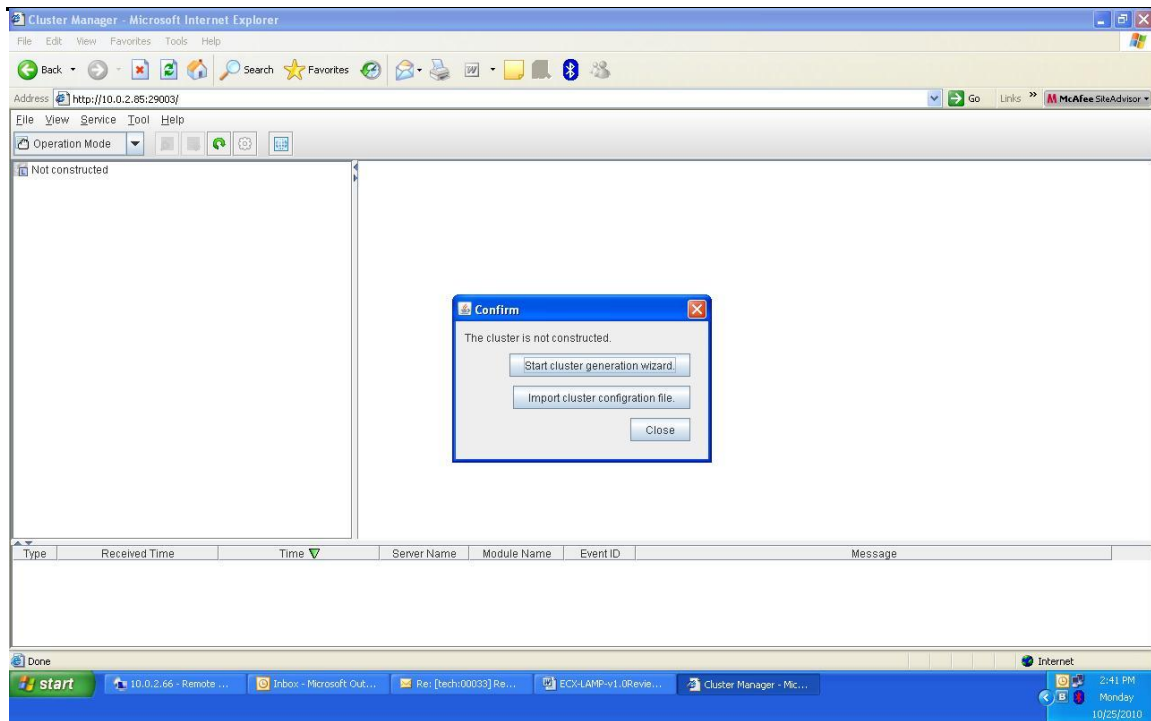
- a. Run **jre-1_5_0 <build and platform version>.exe** (a compatible JRE distribution can be found in the jre folder on the EXPRESSCLUSTER CD).
- b. On the License Agreement screen, verify the default **Typical setup** option button is selected. Click **Accept**.
- c. On the Installation Completed screen, click **Finish**.

6.2 Start Cluster Manager

- a. On the Management Console/Test Client (Machine 3), on the **Start** menu, point to **Programs** and click **Internet Explorer**.
- b. Type the URL of the Primary Server: `http://%Public IP address of the Primary Server%:29003`
For the URL, see Table 1. 29003 is the default port.

6.3 Start Cluster Generation Wizard (Config mode)

In the Cluster Manager window, a pop up window will open. (Refer below snapshot)

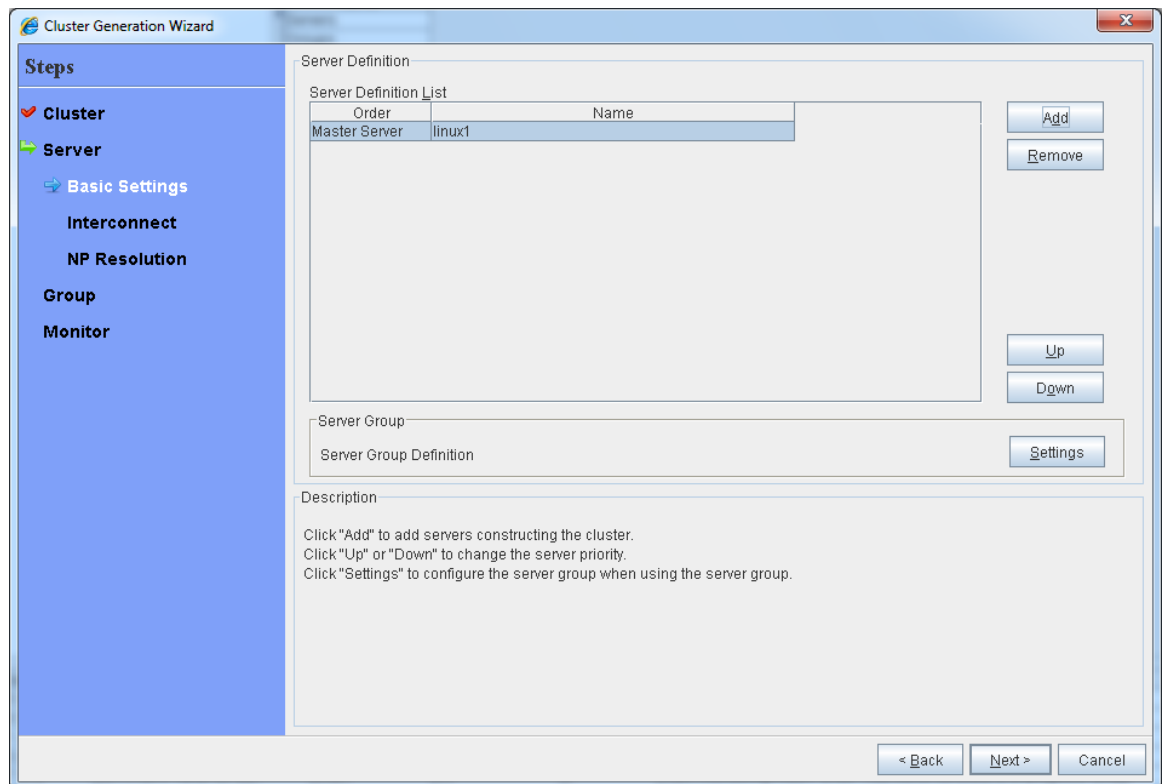


To create a fresh configuration, Click on “Start Cluster Generation Wizard” and follow the steps given below

6.4 Create a cluster

For all of the steps below, refer to Table 1 for the IP addresses and server names.

1. Type a cluster name and Management IP address for managing the cluster from client machine and click **Next**. (Default Cluster name): cluster
2. In the Server Definition window, the hostname of the Primary Server (Machine 1) will be automatically detected and displayed (Refer below snapshot)



3. Click ADD button to add standby server, on the “Add server” pop up window, enter the hostname or IP address of the standby server and click NEXT.
4. EXPRESSCLUSTER X 3.2 automatically detects the IP addresses of the servers, which can be seen on this screen. Select the network to be used for the Heartbeat path as type Kernel Mode. If Mirroring is also occurring through the same network cards, then specify the Mirror connect settings in the respective network fields. Click the dropdown button on the “Mirror Disk Connect” and select the connect number (eg: mdc1). Click **Next**.
5. For this guide, the NP resolutions resources are not configured. Click **Next**.

6.5 Create a failover group

For all of the steps below, refer to [Table 1](#) for the IP addresses and server names.

1. Now the cluster generation wizard is in the **groups** section.
2. Click **Add** to add a group.
3. In the newly opened window, select the type of the group as Failover and give this group a name (e.g.: MYSQL_Failover) and click **Next** and then click **next**.
4. Leave the default options for the group attribute settings and click **Next**

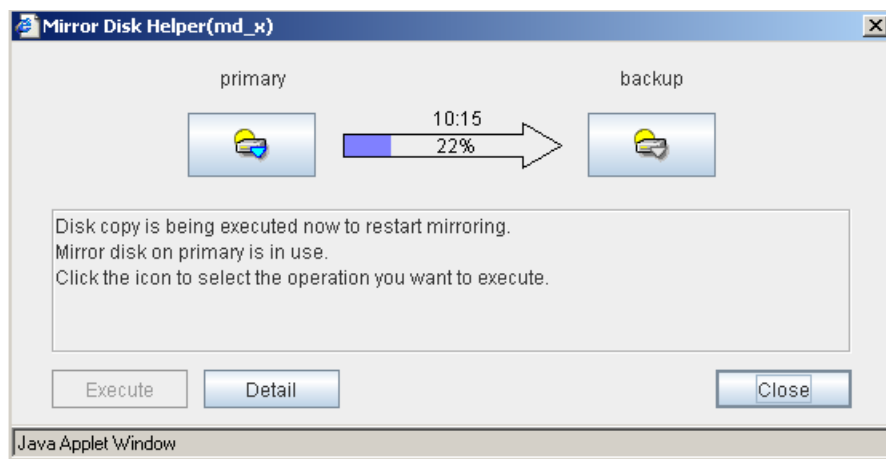
6.6 Adding Group Resources

1. On the “Group Resource” window, click ADD to add a Floating IP Resource (FIP) and mirror resource.
2. In the “Group Resource Definition” window, for Type, select floating ip resource from the pull-down box. For Name, use the default (fip). Click Next.
3. In the next window (Dependent Resources), click NEXT.
4. On the window for “Recovery Operation at Deactivation Failure Detection”, make the final action as “No Operation (deactivate next resource) and click NEXT.
5. In the next window, type the Cluster IP address and then click Finish. See Floating IP addresses for Express Cluster – Floating IP (FIP) address: (2) on Table 1.
6. In the next window, click add and for Type, select mirror disk resource from the pull-down box. For Name, leave it to default and Click Next.
7. On next window, make sure that checkbox “Follow the default dependency” is checked and click NEXT.
8. On next window for “Recovery Operation at Deactivation Failure Detection”, make the final action as “No Operation (deactivate next resource) and click NEXT.
9. In the next window, under Mirror Partition Device Name, leave it as default. (Eg: /dev/NMP1)
10. Define a mount point for data. (Eg: /mnt/mysql)
11. Specify the Data Partition Device Name that will be used to store the data of the mysql database. (Refer Table 2)
12. Specify the Cluster Partition Device Name that will be used for management of the mirror disk.
13. Select the file system that is used.
Click FINISH. See Table 2 (Appendix B) for appropriate values.
14. On “Group Resource” window, click FINISH.
15. On “Group List” window, click NEXT and then click FINISH.

6.7 Upload the cluster configuration and initialize the cluster

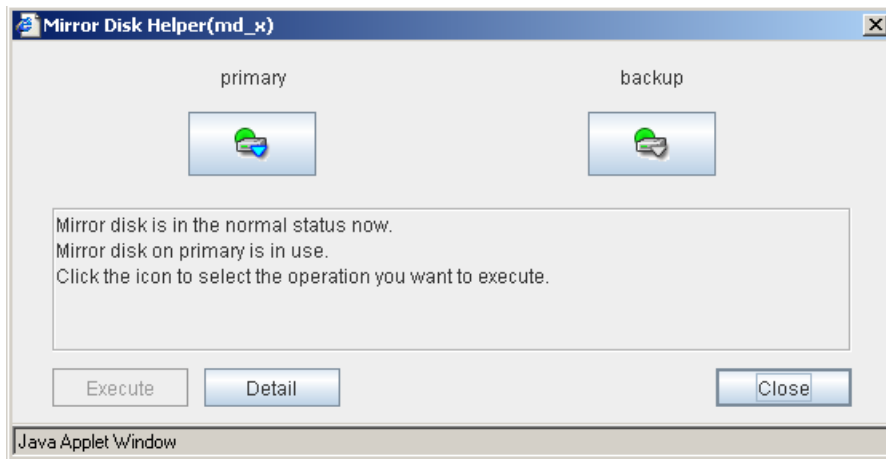
16. In the Cluster Builder window (Config Mode), to apply the configuration, click the **File** menu and then click “**Apply the Configuration File**”.
17. After the upload is completed, in the Cluster Builder (Config Mode) window

-
- “The upload was completed successfully” message is displayed. Click **OK**.
18. For moving to the manager view, from the drop down on top left corner, select “Operation Mode”.
 19. From Service menu, click restart Cluster Manager.
In the **Confirmation** window, “Are you sure to restart the manager service?” Is displayed. Click **OK**.
 20. To start the cluster, on the **Service** menu, click **Start Cluster**.
In the Confirmation window, “Are you sure to start the cluster?” is displayed. Click **OK**. Wait for the window to update.
 21. In the Cluster Manager Window (Operation Mode), in the left pane, right-click **Servers** and then click **Mirror Disks**. Mirror disk copy starts automatically, but is not completed.
 22. In the Mirror Disks window, click the **Details** button.
 23. Clicking **Details** in the previous step brings up the Mirror Disk Helper window.



Note:

1. This step may take a while depending on the size of the mirrored disk data partition. In the above snapshot, in place of primary, host name of the primary server will be displayed and in place of backup, host name of Standby Server
2. Server will be displayed.
3. After the copy is completed, the following screen is displayed:



4. In the Cluster Manager window (Operation Mode), all icons in the tree view are now green:

Type	Received Time	Time	Server Name	Module Name	Event ID	Message
U	2015/02/10 22:18:47.291	2015/02/11 16:00:56.903	test1	rc	21	Stopping group failover has completed.
U	2015/02/10 22:18:45.279	2015/02/11 16:00:55.814	test1	rm	2	Monitoring fipw1 has stopped.
U	2015/02/10 22:18:35.266	2015/02/11 16:00:44.366	test1	rc	20	Stopping group failover has started.
U	2015/02/10 22:18:35.264	2015/02/11 16:00:44.260	test1	apisv	36	There was a request to move group(failover) from the Web Manager(IP=...fff.10.0.7.79).
U	2015/02/10 22:09:43.669	2015/02/11 15:51:53.645	test1	rc	51	Moving group failover has completed.
U	2015/02/10 22:09:43.667	2015/02/11 15:51:53.629	test1	rc	11	Activating group failover has completed.
U	2015/02/10 22:09:39.860	2015/02/11 15:51:50.385	test1	md	3	fsck to /dev/NMP1 was successful.
U	2015/02/10 22:09:39.658	2015/02/11 15:51:50.244	test1	md	2	fsck to /dev/NMP1 has started.
U	2015/02/10 22:09:37.653	2015/02/11 15:51:48.721	test1	rm	1	Monitoring fipw1 has started.
U	2015/02/10 22:09:35.647	2015/02/11 15:51:44.816	test1	rc	10	Activating group failover has started.

7 MYSQL Cluster Setup

To configure MYSQL cluster we will configure its services with EXPRESSCLUSTER. Change the default path of the database to a path on the data partition.

7.1 Change the data directory path in my.cnf file to mount point

Perform the following functions on the primary server:

- a. On terminal type “vi /etc/my.cnf”.
- b. Change the data directory path to mount point path. (eg: /mnt/mysql)

7.2 Moving MYSQL Database File to the Data Partition

Using the below command move the database files from default location i.e. /var/lib/mysql to mount point i.e.(/mnt/mysql)

Command: - [root@test ~]# rsync -avH /var/lib/mysql/ /mnt/mysql/

7.3 Configure the failover group scripts

7.3.1 Stop the failover group and start Cluster Builder

4. On the Management Console/ Client Machine, start the Cluster Manager. On the Windows desktop, on the **Start** menu, point to **Programs** and click **Internet Explorer**.
5. In the address bar, type the URL of the Management IP address, followed by the default port.
6. To start Cluster Builder, on Cluster Manager (Operation Mode), from the drop down box on top left corner, select “Config Mode”.

7.4 Configuration of Resources involved in MYSQL configuration

1. On Cluster Builder (Config Mode), in the tree view, under **Groups**, right-click **failover** and then click **Add Resource**.
2. In the “Group Resource Definitions” window, for Type, select execute resource from the pull-down box. For Name, use the default (exec). Click Next.
3. On next window, make sure “Follow the default dependency” check box is checked and click NEXT.
4. On next window “Recovery Operation at Deactivation Failure Detection”, make the final action as “No Operation (deactivate next resource) and click NEXT.
5. In the next window edit the start.sh file and replace the source with source code shown at end of this document.
6. In the same window select the stop.sh file and edit the stop.sh file and replace the source with source code shown at end of this document and click **FINISH**.

7.5 Activate new configuration

7.5.1 Suspend the cluster to enable configuration changes

1. From the top left drop down box, select “Operation Mode”
2. Right-click the **failover** group and click **Stop**, and then click **OK**.
3. In the Cluster Manager (Operation Mode), click **Service** and then **Suspend Cluster**.
4. In the Confirmation window, click **OK**.

7.5.2 Upload changed configuration

5. Again change back to the Cluster Builder (Config Mode), on the **File** menu, click **Apply the configuration file**.
6. In the Cluster Builder (Config Mode) window “The upload is completed successfully” is displayed. Click **OK**.

7.6 Verify script involved in resource functions

7.6.1 Start the failover group on the Primary Server

7. In the Cluster Manager (Operation Mode), click **Service**, and then **Resume Cluster**.
8. In the Confirmation window “Are you sure to resume the cluster” is displayed. Click **OK**.
9. Right-click **failover** (under groups), and click **Start**.
10. Select the **%machine name%** of the Primary Server (Machine 1) and click **OK**.
11. Verify the target MYSQL services (mysqld) are running on the Primary Server.

7.6.2 Stop the failover group on the Primary Server

12. Right-click **failover** (under groups), and click **Stop**.
13. Verify the target MYSQL services (mysqld) are stopped on the Primary Server.

7.6.3 Start the failover group on the Standby Server

14. Right-click **failover** (under groups), and click **Start**.
15. Select the **%machine name%** of the Standby Server (Machine 2) and click **OK**.
16. Verify the target MYSQL services (mysqld) are running on the Standby Server.

7.6.4 Stop the failover group on the Standby Server

17. Right-click **failover** (under groups), and click **Stop**.
18. Verify the target MYSQL services (mysqld) are stopped on the Standby Server.

7.6.5 Restore normal cluster operating condition

19. Right-click **failover** (under groups), and click **Start**.
20. Select the **%machine name%** of the Primary Server (Machine 1) and click **OK**.

You have now successfully configured MYSQL under EXPRESSCLUSTER control.

Scripts

start.sh

```
ulimit -s unlimited  
  
service mysqld start
```

```
ulimit -s unlimited  
  
service mysqld status  
  
if [ $? -eq 0 ]; then  
    service mysqld stop  
fi
```

8 Final Deployment in a WAN Environment

This chapter describes the steps to verify a proper WAN infrastructure and to move the installed and configured Standby Server to the standby site location.

1. Configure and verify the WAN infrastructure between the primary and standby sites to meet the following requirements:
 - Two logically separate IP protocol networks: one for the Public Network and one for the Cluster Interconnect.
 - The Public Network must be a single IP subnet that spans the primary and standby sites to enable transparent redirection of the client connection to a single virtual server IP address. Typically, a single IP subnet across geographically distant sites can be achieved using various networking technologies including point-to-point physical network link (Example: T1), VLAN, VPN, and Metro Ethernet.
 - The Cluster Interconnect should be a single IP subnet that spans the primary and standby sites to simplify system setup.
 - If using synchronous disk mirroring, the Cluster Interconnect must guarantee a minimum available bandwidth of 1.5Mbps or higher and a maximum round-trip latency of 70ms or lower between the Primary and Standby Servers. Higher bandwidth and/or lower round-trip latency may be required to meet target application data write volume and performance requirements.
 - If using asynchronous disk mirroring, the Cluster Interconnect should provide average available bandwidth and round-trip latency between the Primary and Standby Servers that support the average write volume and performance requirements of the target application.
 - Proper IP network between client and server machines on the Public Network at both the primary and standby site locations.
2. At the standby site, make sure you have a Test Client machine with target application client software that you can reconfigure (Example: IP address). Use it to verify proper network connectivity and target application functionality.
3. At the primary site, make sure the Primary Server is in active mode with a fully functional target application and the Standby Server is running in passive mode.

-
4. At the standby site, configure and connect the Test Client machine to the Public Network over WAN. Then verify you can ping the Primary and Standby Server Public Network IP addresses, and the target application cluster floating IP address. Finally, setup and run a target application client to verify proper target application functionality over the WAN.
 5. At the standby site, configure and connect the test client machine to the Cluster Interconnect over the WAN. Verify you can ping the Primary and Standby Server Interconnect IP addresses.
 6. At the primary site, make sure the cluster is configured for manual recovery. Isolate and shutdown the standby server (see section **Error! Reference source not found.** for instructions).
 7. At the primary site, verify the target application is fully functional on the Primary Server.
 8. At the primary site, pack and prepare to move the Standby Server to the standby site location. Do not make any cluster configuration changes until the deployment is complete.
 9. Move the Standby Server to the standby site location. Take proper precautions to avoid damaging the Standby Server in transit.
 10. At the standby site, unpack the Standby Server and power it up without connecting its network interfaces. Verify basic hardware and OS functionality.
 11. At the standby site, connect the Standby Server Public network interface to the Public Network. Then connect the Interconnect network interface to the Cluster Interconnect network. Verify you can ping the Public and Interconnect IP addresses of the Primary Server over the WAN.
 12. At the standby site, start the Cluster Manager (see section 9.1 for instructions) on the Test Client machine and verify the Standby Server has been recognized as an isolated server. Then manually recover the standby server (see section **Error! Reference source not found.** for instructions) to restore normal cluster operating condition. Once the recovery process is complete, verify all cluster resources are normal and the target application is functional.

-
13. At the standby site, first manually move the target application to the Standby Server (see section 9.3 for instructions). Then verify proper target application functionality using the Test Client machine. Finally, manually move the target application to the primary server and then verify proper target application functionality using the Test Client machine.

 14. At the primary site, first manually move the target application to the Standby Server (see section 9.3 for instructions). Then verify proper target application functionality using the Test Client machine. Finally, manually move the target application to the Primary Server and then verify proper target application functionality using the Test Client machine.

 15. Deployment is completed.

9 Common Maintenance Tasks

This section describes how to perform common EXPRESSCLUSTER maintenance tasks using the EXPRESSCLUSTER Manager.

9.1 Start Cluster Manager

There are two methods to start/access Cluster Manager through a supported Java enabled web browser. The first method is through the IP address of the physical server running the cluster management server application and the second method is through the floating IP address for cluster management server within a cluster.

The first method is typically used during initial cluster setup before the cluster management server floating IP address becomes effective:

1. Start **Internet Explorer** or another supported Java enabled Web browser.
2. Type the URL with the IP address of the active physical server followed by a colon and the cluster management server port number.

Example:

Assuming cluster management server is running on active physical server (10.1.1.1) on port number 29003, <http://10.1.1.1:29003/>

The second method is more convenient and is typically used after initial cluster setup:

1. Start **Internet Explorer** or another supported Java enabled Web browser.
2. Type the URL with the cluster management server floating IP address followed by a colon and the cluster management server port number.

Example:

Assuming cluster management server is running with floating IP address (10.1.1.3) on port 29003, <http://10.1.1.3:29003/>

9.2 Reboot/shutdown one or all servers

9.2.1 Reboot all servers

3. Start Cluster Manager (Operation Mode). (see above)
4. Right-click the **%cluster name%** and click **Reboot**.
5. In the Confirmation window, click **OK**.

9.2.2 Shutdown all servers

Same as “Reboot all servers,” except in step 2 click **Shutdown**.

9.2.3 Shutdown one server

1. Start Cluster Manager (Operation Mode).(See above)
2. Right-click the **%machine name%** and click **Shutdown**.
3. In the Confirmation window, click **OK**.

9.3 Startup/stop/move failover groups

1. Start Cluster Manager (Operation Mode).(See above)
2. Under **Groups**, right-click **Failover** and then click **Start/Stop/Move**.
3. In the Confirmation window, click **OK**.

9.4 Rebuild a mirror disk

1. Start Cluster Manager. (See above)
2. In the Cluster Manager window, in the left pane, right-click **Servers** and then click **Mirror Disks**.
3. In the Mirror Disks window, click the **Details** button.
4. In the next window, click the button below the **%machine name%** of the machine you want to copy files from [Primary Server (Machine 1)] and then click the button below the **%machine name%** of the machine you want to copy files to [Standby Server (Machine 2)].
5. Click the **Execute** button. In the **Confirmation** window, click **OK**.

10 Appendix A: EXPRESSCLUSTER Server Uninstallation

Follow the steps below to uninstall EXPRESSCLUSTER from each of the server systems.

1. On the Management Console/Test Client, in Cluster Manger (Operation Mode), under **Groups**, right-click **Failover** and then click **STOP**.
2. Close Cluster Manger window.
3. On the server system that you are starting the uninstall process for EXPRESSCLUSTER, stop all EXPRESSCLUSTER services. To stop all services, follow the steps below:

On the terminal stop the following services by running the below commands:

- `service clusterpro stop`
 - `service clusterpro_md stop`
 - `service clusterpro_evt stop`
 - `service clusterpro_trn stop`
 - `service clusterpro_alertsync stop`
 - `service clusterpro_webmgr stop`
4. On the terminal run the below specified command:
 - `rpm -e expresscls-[version].[architecture].rpm`
 5. Restart the machine.

This completes the uninstall process for an individual server system.

Note

You must be logged on as a root or an account with administrator privileges to Uninstall Express Cluster Server.

If a shared disk is used, unplug all disk cables connected to the server after Uninstallation is completed.

11 Appendix B: Example System Planning Worksheet

Machine 1 Primary Server

Machine 2 Standby Server

Machine 3 Management Console/Test Client machine

Table 1: System Network Interfaces

Machine	Host name	Network Connection	IP Address	Subnet Mask	Default Gateway	Preferred DNS Server
1	Primary	Public	10.1.1.1	255.255.255.0	10.1.1.5	10.1.1.5
		Interconnect	192.168.1.1	255.255.255.0	-----	-----
2	Standby	Public	10.1.1.2	255.255.255.0	10.1.1.5	10.1.1.5
		Interconnect	192.168.1.2	255.255.255.0	-----	-----
3	Client		10.1.1.5	255.255.255.0	-----	10.1.1.5

Floating IP addresses for EXPRESSCLUSTER (Public):

Management IP: (1) 10.1.1.3

Cluster IP: (2) 10.1.1.4

Table 2: System OS and Disks

Machine	OS	Disk 0 (OS Disk)	Disk 1 (Data Disk)
1	Red Hat	OS Partition: Partition: /dev/hda1 Size: 8GB	* Cluster Partition: Partition: /dev/sdb1 Size: >10 MB
2	Red Hat	OS Partition: Partition: /dev/hda1 Size: 8GB	Data Partition: Partition: /dev/sdb2 Size: 20GB (Depends on the size of the data to be replicated)

3	Win XP	C: 20 GB	-----
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*** Must be a raw partition and larger than 20MB.**

Table 3: System Logins and Passwords

		Login	Password
Machine Administrator	1	root	admin1234
Machine Administrator	2	root	admin1234