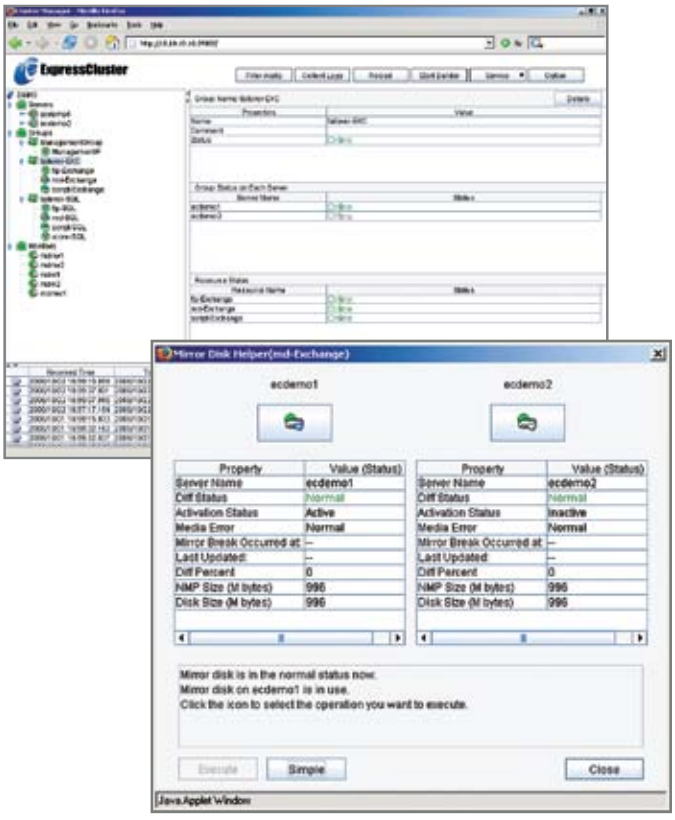
ExpressCluster X

< WAN Configuration >



At a Glance

NEC ExpressCluster X is an integrated application and data disaster recovery software solution for Windows® and Linux®-based systems. It offers continuous monitoring and fast recovery of applications and real-time data mirroring over WAN.

Benefits

- Fast application recovery with virtually no data loss maximizes business continuity
- Unified disaster recovery solution for multiple application systems simplifies manageability
- Support for standard application, OS, server, storage and network minimizes total cost of ownership (TCO)

Empowered by Innovation NEC

Ultimate Integrated Disaster Recovery Solution

ExpressCluster® X is the next generation, integrated disaster recovery solution that provides continuous protection of critical applications and data with near-instant recovery across wide area networks (WAN) over hundreds of miles. Built on the award winning and field-proven technology foundation, it has been helping customers worldwide maintain critical system continuity for over a decade.

Unlike other solutions, it dramatically simplifies the recovery process and reduces maintenance and operational costs. ExpressCluster X offers an intuitive Web Manager GUI and remote management capabilities which streamline deployment and management of disaster recovery solutions, it reduces the total cost of ownership, while significantly improving critical application and data availability and accessibility.

Comprehensive Protection for Applications and Data

ExpressCluster X provides protection for virtually all standard applications and associated data. They are supported without requiring source code changes or specially-designed versions. Standard data repositories such as file and databases stored on conventional disks are also readily supported without requiring data format changes.

Rapid Failure Detection & Transparent Recovery

ExpressCluster X can recover all data committed to a primary system disk without loss should a primary application, system, or site outage occur. Using a periodic network request or heartbeat signal, it can automatically execute recovery procedures if a standby system fails to receive required heartbeat signals from a primary system.

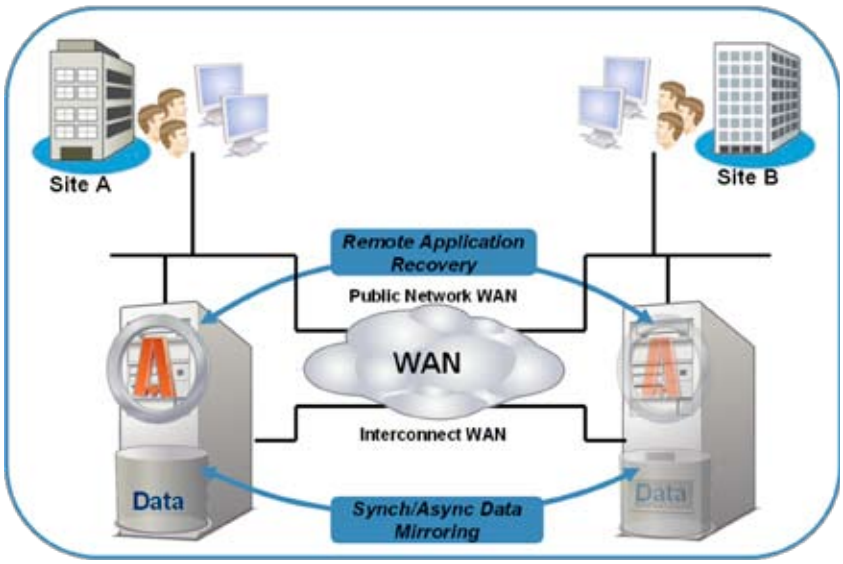
The software can quickly detect application and resource (e.g. disk) failures to trigger appropriate recovery actions including failover to a standby system. In the failover process, the standby system takes over the virtual host identity from the primary system so large client systems can easily reestablish access to target server applications without manual reconfiguration.

In addition, all application processes and resources are activated on the standby system so business critical applications and data are recovered within minutes instead of hours or days. Once a failed system is detected and repaired, the system can automatically restore itself to its normal operating state without manual intervention. Administrators can also customize tasks such as system startup, shutdown and restart, based on requirements.

Flexible Data Mirroring For All Critical Data Protection Needs

ExpressCluster X provides an application transparent data mirroring function that allows users to easily choose between synchronous and asynchronous data mirroring modes to meet a wide range of data protection needs.

Synchronous data mirroring technology enables full data protection by ensuring data written to the mirrored disk on the primary system is also written to the mirrored disk on the standby system in real time as a single transaction. Under normal operating conditions, applications will only see successful data write operation results if data has been successfully written to both the primary and standby



systems. In the case where the standby system is unavailable (e.g. hardware upgrade), it will allow write operations to complete on the primary system but all changes will be tracked so when the standby system becomes available again, it will be quickly resynchronized with the primary system via the FastSync feature where only the changed data are mirrored.

Using synchronous mirroring technology, ExpressCluster X ensures that no data committed to the mirrored disk on the primary system is dropped and no data is lost. If a failure occurs, users can readily access an up-to-date copy of all data on the standby system. Although synchronous data mirroring offers the highest level of data protection, there are some situations where some data loss is acceptable. In these situations, the asynchronous data mirroring capability could be used to further reduce network requirements.

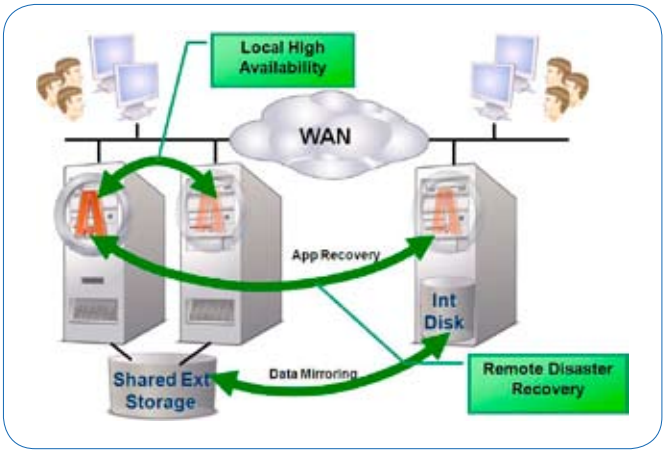
Asynchronous data mirroring differs from synchronous data mirroring by allowing data write operations to complete to the mirrored disk on the primary system without verifying data write completion on the standby system. Instead, data write operations to the standby system will be performed on a best-effort basis depending on system and network conditions with the risk that some data will be lost if the primary system fails before the write operations to the standby system can be completed. Depending on specific user data protection needs, ExpressCluster X supports a combination of different mirrored disks using synchronous and asynchronous data mirroring in the same system. Unlike other solutions, ExpressCluster X allows users to easily change between synchronous and asynchronous mirroring.

Advanced Option for Integrated Local and Remote Recovery Solution

ExpressCluster X provides an advanced option for hybrid disk cluster configuration support. With the hybrid disk option, ExpressCluster X provides both local and remote recovery capabilities. For localized system failures such as hardware or software failures on the primary system, ExpressCluster X performs automated recovery to a local standby system at the same site with access to the same shared storage system as the primary system. For site wide failures due to events such as network disruption or earthquakes, it will perform automated recovery to a remote standby system at the remote standby site with access to the mirrored data. The key benefit for such a solution is to enable the fastest possible system recovery for the different types of failures using a single integrated solution.

Key Features

- Continuous application monitoring and fast recovery over WAN
- Flexible synchronous and asynchronous data mirroring configurations
- Easy-to-use pure Web-based management console
- Option for integrated local high availability and remote disaster recovery in single solution
- Support for low bandwidth and long latency WAN
- Support for standard and enterprise versions of applications and OS including MS SQL, Oracle DB, MS Exchange
- Data mirroring between multi-vendor internal disks and external storage arrays



Easy Workload Migration Mitigates Planned Downtime

Planned downtime is often scheduled to perform necessary maintenance at times that minimize business impact. In such situations, ExpressCluster X can be used to easily move application and data workloads between systems with minimal disruption and still allow planned maintenance on all systems to be performed with little or no restrictions. ExpressCluster X can effectively eliminate the need to schedule extended planned downtime during off-business hours for maintenance purposes. It can reduce planned system downtime from hours to minutes.

Broad Platform and Application Software Support

ExpressCluster X supports general purpose x86 compatible servers and NEC's x86 fault-tolerant physical servers or virtual servers running industry standard operating systems. In addition, standard versions of popular applications including database servers, application servers, web servers, and email servers are supported to minimize the total cost of ownership of disaster recovery.

World Class Service and Support

NEC is committed to provide the best services and support with ExpressCluster to ensure proper solution design and deployment. In addition, NEC offers a full range of support options.

System Requirements

At least 2 servers are required for each cluster and each server must meet the following requirements:

CPU & Memory

- 32-bit system: Intel x86 compatible 32-bit 1GHz or faster CPU
- 64-bit system: Intel EM64T compatible 64-bit 1GHz or faster CPU
- 128 MB available minimum

Disk & Network Interface

- 80 MB available minimum OS boot disk and 1 or more additional data disks
- 2 or more 100Mbps or faster network interface cards

Operating System

- Windows Server 2003/2008 (Standard or Enterprise)
- Red Hat Enterprise Linux 4/5
- Novell SUSE Linux Enterprise Server 9/10

Network Requirements

The network connecting 2 servers must meet the following requirements:

Cluster Interconnect Network

- 1 IP network between servers
- For synchronous disk mirroring, maximum network round-trip latency between servers of 70ms or less
- For asynchronous disk mirroring, maximum network round-trip latency must be low enough to support sustained disk data write rate
- For synchronous disk mirroring, minimum available bandwidth of 1.5Mbps or more
- For asynchronous disk mirroring, minimum available bandwidth must be high enough to support sustained disk data change rate

Cluster Public Network

- 1 IP network between servers

Available Options

The following add-on options are available:

Database Agent

- Proactively monitor proper functional state of database servers and trigger recovery in case of malfunction.

Internet Server Monitor

- Proactively monitor proper functional state of web and e-mail servers and trigger recovery in case of malfunction

Hybrid Disk Option

- Enable recovery to local standby server with shared disk storage protection and recovery to remote standby server with mirrored disk storage protection

NEC Corporation
info@ExpressCluster.jp.nec.com
www.nec.com/ExpressCluster

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