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## High Availability in Large-Scale Server Clusters

Business processes and operations depend on uninterrupted access to data and applications. Organizations may invest in shared storage systems for storage consolidation benefits. However, ensuring that all data and applications are accessible at all times despite possible system failures is challenging in a data center. System recovery following a failure event must be fast and reliable so that business operations can get back on track quickly with minimal data loss. A robust, powerful clustering solution for many servers using shared storage systems such as a SAN storage array, maximizes resource utilization while providing high availability of data and applications in server and storage consolidation environments.

## Maximizes Server & Storage Resource Utilization

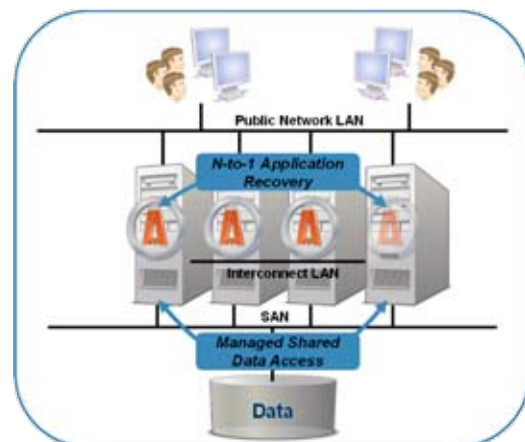
Expresscluster X helps organizations make the most of their server and shared storage investments with high availability clustering capabilities for servers connected to external shared storage on the same local network. The solution supports large numbers of servers in a single cluster to maximize resource sharing. Organizations can even leverage the active/active configuration support in ExpressCluster X to create a robust and cost effective high availability solution without purchasing additional server hardware.

## At a Glance

NEC ExpressCluster® X is a high availability solution for multiple servers with shared storage systems within the same data center. It is especially well suited for consolidated server or application environments such as web, application or database server systems with shared data storage.

## Benefits:

- » Fast local recovery of critical application and data in SAN environment.
- » Unified management of all protected application and data resources
- » Maximizes server hardware utilization with active/active configuration



## Rapid Recovery for Unplanned System Outage

The software ensures quick and automatic recovery in case of system failures due to hardware and/or software problems. In normal operations, one or more standby servers continuously monitor the health of an active server. Upon detection of an active server failure, a standby server takes over all target application and data resources, so that business-critical system services are recovered within minutes, instead of hours or days. Once a failed server is repaired, the system can automatically restore itself to its original state, without operator intervention. Administrators can also customize tasks such as system startup, processing, recovery/failure and resource re-allocation based on business requirements.

## Planned Downtime Mitigation Just Made Easier

ExpressCluster X enables administrators to execute hardware and software maintenance tasks that require a system reboot with minimum system outage. Hardware and software maintenance can be performed with little overall system service outage by leveraging the easy and fast on-demand failover capability to move target applications from one server to another with minimum disruption.

## Flexible Platform and Application Software Support

ExpressCluster X supports general purpose Intel x86 compatible servers and NEC's Express5800 series of fault tolerant

servers running industry standard operating systems. In addition, standard versions of popular server applications including database servers, application servers, web server, and email servers are supported for reduced cost of ownership.

## Ready for the Next Generation Data Center

As the challenge of managing a large number of networked servers continues to grow in data centers, ExpressCluster X is ready to help. It includes full support for IPv6, the next generation IP network protocol, designed to accommodate expected growth of networked servers and automated lights-out server management. This is done through the use of the Intelligent Platform Management Interface (IPMI) protocol to minimize complexity and operational costs of highly available server environment well into the future.

## World Class Services and Support

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

### Key Features

- » Supports up to 32 nodes per cluster
- » Transparent application and data workload migration
- » Broad OS and application support including low-cost standard editions

System Requirements	Network Requirements	Available Options
<p>2 or more servers are required and each server must meet the following requirements:</p> <p><b>CPU &amp; Memory</b></p> <ul style="list-style-type: none"> <li>• 32-bit system: Intel x86 compatible 32-bit 1GHz or faster CPU</li> <li>• 64-bit system: Intel EM64T compatible 64-bit 1GHz or faster CPU</li> <li>• 128 MB available minimum</li> </ul> <p><b>Disk &amp; Network Interface</b></p> <ul style="list-style-type: none"> <li>• 80 MB available minimum OS boot disk</li> <li>• 2 or more 100Mbps or faster network interface cards</li> </ul> <p><b>Operating System</b></p> <ul style="list-style-type: none"> <li>• Windows Server 2003/2008 (Standard or Enterprise)</li> <li>• Red Hat Enterprise Linux 4/5</li> <li>• Novell SUSE Linux Enterprise Server 9/10</li> </ul>	<p>The network connecting all cluster servers must meet the following requirements:</p> <p><b>Cluster Interconnect Network</b></p> <ul style="list-style-type: none"> <li>• 1 IP network segment across all cluster servers</li> <li>• Maximum network round-trip latency between servers of 10ms or less</li> <li>• Minimum available bandwidth of 1Mbps or more</li> </ul> <p><b>Cluster Public Network</b></p> <ul style="list-style-type: none"> <li>• 1 IP network segment across all cluster servers</li> </ul>	<p>The following add-on options are available:</p> <p><b>Database Agent</b></p> <ul style="list-style-type: none"> <li>• Proactively monitor proper functional state of database servers and trigger recovery in case of malfunction.</li> </ul> <p><b>Internet Server Monitor</b></p> <ul style="list-style-type: none"> <li>• Proactively monitor proper functional state of web and e-mail servers and trigger recovery in case of malfunction</li> </ul>

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