

## WHITE PAPER

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### Advancing Availability and Clustering Software Worldwide

Sponsored by: NEC Corporation

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May 2009

#### EXECUTIVE SUMMARY

IDC tracks the availability and clustering software (ACS) market, which is characterized by software products that coordinate the processing of multiple server systems so that applications view them as a single computing resource. This market includes clustering/failover software and workload balancing software that routes user requests to alternate computing resources supporting applications or services. These capabilities are important for supporting high availability (HA) of applications and for improving IT flexibility by moving workloads from one server to another.

This paper describes the overall trends within the ACS marketplace worldwide and the IT and business requirements for availability software that are driving growth within the ACS market. It describes NEC's ACS products, including NEC ExpressCluster and NEC CLUSTERPRO (as sold in Japan), which support market requirements for HA and IT flexibility as well as business requirements for business continuity with disaster recovery capabilities. This paper describes how these NEC ACS products address IT and business requirements for availability on behalf of IT and business operations within the enterprise.

#### SITUATION OVERVIEW

The ACS market has been growing faster than the server market, demonstrating both the need for high availability in an IT world where scale-out configurations of small and midrange enterprise servers are gaining importance and the need to ensure availability for applications running on large, scalable high-end enterprise servers within the datacenter. Increasingly, ACS products are being combined with virtualization software to protect workloads, whether they are running on physical servers or virtual machines, for the purposes of moving applications to alternate resources, if needed.

Unplanned downtime, which is caused by power outages, network outages, or manmade or natural disasters — or by the failure of hardware or software components — is the primary reason for moving workloads to alternate computing resources. ACS can also be used for purposes of planned downtime — that is, to support planned maintenance for purposes of hardware repairs, software updates, or replacements of physical servers.

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## **A Spectrum of High-Availability Solutions**

IDC believes that a "spectrum" of HA software solutions — each of which addresses a different set of features and functions — is needed within the enterprise. This HA spectrum illustrates the range of IT requirements to protect applications that run in a number of computing "tiers" within the larger enterprise. The most dramatic part of the virtualization revolution is coming from the x86 server tiers, which traditionally did not have built-in HA support that was similar to the HA software capabilities of mainframe servers or scalable Unix servers in the datacenter.

The wide adoption of virtualization is expected to lead to rapid growth for virtual machines (VMs). IDC notes that 2009 is expected to be a crossover year, when the number of VMs shipped during the year will be greater than the number of physical servers shipped during that same year. In all, the total number of servers — physical and virtual — is expected to be more than 16 million worldwide.

The growth in both physical servers and virtual servers within the worldwide installed base of servers demonstrates the increasing need to be able to manage across both physical servers and virtual servers and to support a number of application restarting scenarios — including the moving of a VM via live migration or the moving of an application from one location to another — as IT resources and application "services" are increasingly mapped to business processes within the enterprise.

NEC sees opportunities in the areas of "preemptive recovery" through migration of VMs from one server to another and of integrated dynamic load balancing between multiple servers via the use of network load balancing software and network switches. As IT resources are aggregated into virtualized server and storage pools in next-generation datacenters, these techniques will become part of the overall "mix" of HA-related technologies that ensure end-user access to applications and data, even in the event that, from time to time, outages emerge at some points within the IT infrastructure.

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## **Product Functionality**

Product functionality in the ACS market space is changing in order to reduce operational expenditure (opex) — both for IT and for the business — with support for virtualization becoming increasingly important. ACS increases availability of applications so that end users can continue to access the applications, even in the event that they have to restart on another server. The restarted application can run on another server within the same datacenter, across the campus, or across the country, depending on the type of high-speed data connection used.

The addition of more virtualization into the x86 server environment is making it more important to protect all the VMs on the physical servers to avoid the "all the eggs in one basket" syndrome, in which one physical server that goes offline affects all of the VMs running on it. IDC research shows that the average number of VMs per physical server is rising; several years ago, the average number was two to four VMs per physical server; in 2008, the average number grew to eight VMs, or more, per physical server. If a physical server with many VMs goes offline, it would affect dozens to hundreds of end users and end customers who would be trying to access that physical server, therefore disrupting business processes.

Importantly, it is possible to restart applications on another virtual machine so that IT organizations no longer need to keep an unused physical server standing by for use only in the event of failover. Virtual machines require only a fraction of a physical server's resources in order to run so that servers can be used in active/active mode, without having to "stand by" while waiting for a failover to occur. Further, additional functionality is being incorporated into the ACS product market space, including support for policy-based management and automation of all managed servers. This automation technology lowers operating expenses by reducing the amount of system downtime and by reducing the IT staff time required to administer the HA software.

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## **Customer Requirements for ACS**

Customers' need for HA software is increasing over time. Today's business environment requires Internet sites, used in Web-enabled businesses, to be available around the clock and across global time zones. Today's business environment also requires that IT systems be kept operational, even when an outage causes an interruption to one or more server systems within the IT infrastructure. This ensures uptime for servers running applications or databases.

### ***The Effects of Downtime***

Downtime is no longer acceptable to today's business because of the costs associated with it. The lack of business continuity affects all business units throughout the enterprise, as the downtime effects "ripple" through the organization. For example:

- Downtime in the accounting department delays the collection of revenue for the products and services being sold by the business.
- When a retail company's Web site experiences downtime, business customers may be unable to contact the business to place new orders.
- When a bank's ATM network experiences downtime, customers cannot access their money or make new deposits.

### ***Compliance and Regulation Requirements***

Compliance regulations are making uptime an important business priority for many enterprises. End customers need access to mission-critical business systems on a 24 x 7 x 365 basis.

As has been said over the years, "there is no time for downtime" — otherwise, substantial loss of revenue and business would occur. Many businesses must now comply with government regulations providing oversight to business processes. These regulations require that transactional data be preserved and archived for later retrieval when business audits are conducted. Emails, and longtime records of emails, must often be saved and stored for later access due to regulations. In addition, many businesses and government agencies want to preserve records about how decisions were made, which requires such organizations to maintain business processing and records of the results of that business processing for long periods of time.

### ***Support for Both Physical Servers and Virtual Servers***

It has already become a customer expectation that HA software will operate with physical and virtual servers. Both types of servers must be supported, and managed, to work with highly available applications because the applications, or workloads, will move from place to place on the network, whether they end up running on a physical server or on a virtual server. This is why both types of servers, physical and virtual, must be supported by ACS today — and by future generations of ACS. Management of workloads, across physical and virtual servers, is required in today's virtualized computing environments.

### ***Need for Improved Management Across Multiple Servers***

Customers need a unified view of all workloads under management, within a highly available configuration of servers and across the network to remote sites. This unified view is a key to preserving application uptime throughout the network because administrators must be able to visualize and to manage all servers supporting applications and databases. Because of the ability to start applications on remote servers in faraway datacenters, administrators need a "global" view that allows them to see — and to move — workloads between all networked servers. This capability must be supported over LANs, campus networks, and WANs.

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## **Trends in the ACS Market**

Major trends within the worldwide ACS market include the following key drivers:

- ☒ **Demand for high availability.** Drivers creating demand for high availability include compliance with governmental regulations and oversight, support for mission-critical workloads, the need to reduce IT staff time related to maintenance, and the need to reduce system downtime due to outages or restart of applications. A number of factors, as discussed earlier, have combined to make HA more important for a wider range of applications than was the case several years ago. Among these factors are support for mission-critical workloads on x86 servers, the need to reduce downtime and to preserve business continuity, and the need to reduce IT staff time devoted to maintaining x86 servers. At the same time, government oversight, and compliance with regulations, is now a top-of-mind issue for IT managers.
- ☒ **Use of virtualization/consolidation to reduce operational costs.** The use of virtualization software, especially in x86 server environments, is changing the way that HA software is deployed and managed on x86 server infrastructure. Customers have gained near-term benefits from consolidating workloads that formerly ran on inefficient, older systems and moving them to power-efficient systems based on multicore x86 processors. This use of the more powerful multicore hardware, when combined with virtualization software, has resulted in an increase in the average number of VMs supported per physical server, as noted earlier. The increased number of VMs — and of applications supported — means that IT organizations must protect these highly virtualized servers more carefully than before. Any downtime to one physical server will affect many hundreds of end users rather than the several dozens of end users who might have been affected several years ago.

- ☒ **Ability to support both shared disk storage and replicated data via high-speed network links.** The traditional model for clustering/failover was to rely only on shared storage — that is, storage that was physically accessible to all of the servers within a cluster. Today, high-speed networking is allowing the cluster to be a "stretch" cluster that links servers that are located in another section of the same datacenter — or across the network in a remote datacenter. Therefore, networked storage, typically storage area networks (SANs), is increasingly the type of storage that is shared among all of the clustered servers. One consequence of using SANs in this way is that they also become a repository for sharing server images via "golden images" of a software configuration for a physical server or via storage of VM images for a virtual server.
- ☒ **VM migration, data migration, and data mirroring.** Over time, customers will be able to migrate these images more easily — and the process of migration will itself become more automated, easing management and reducing IT maintenance costs. At the same time, replication of production data, through a data mirroring process, is becoming more important, not only for traditional datacenter servers running Unix operating systems but also for x86 servers running enterprise workloads and supporting VMs.

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## **IDC's ACS Market Size and Forecast Data**

The worldwide ACS marketplace is growing, and even in the face of the economic downturn affecting many IT market segments worldwide, IDC forecasts that the ACS market will continue to grow through 2012, the end of the forecast period (see Figure 1). This growth is driven by the need to ensure high availability for important enterprise applications, whether they are running on physical servers or on VMs that are hosted by physical servers.

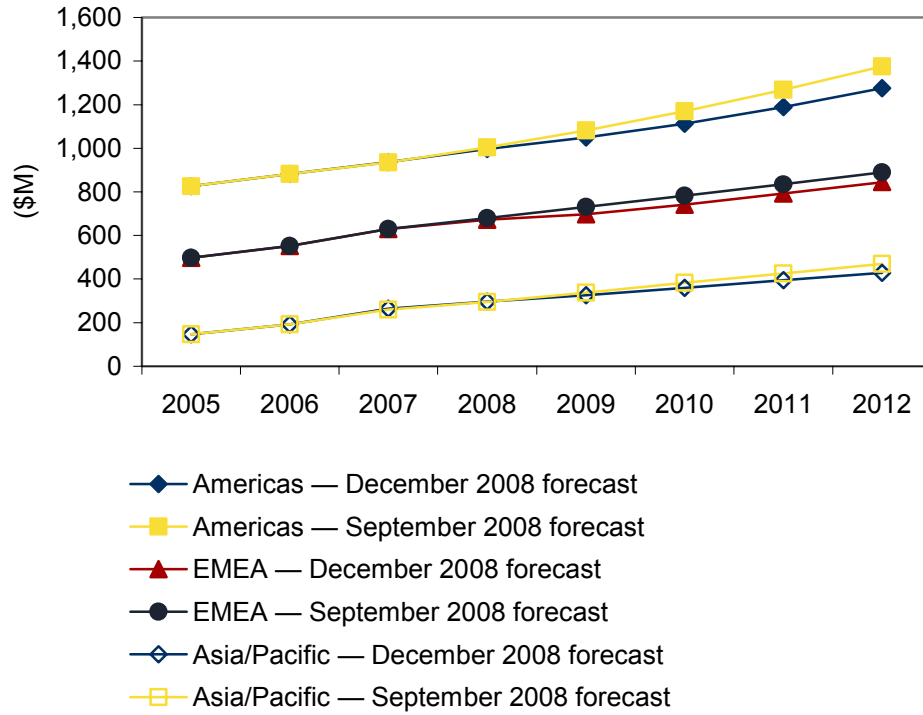
Growth in the ACS market has been strong in recent years. Specifically, the ACS market generated \$1.83 billion in annual revenue in 2007, compared with \$1.63 billion in 2006. This represents 12.6% growth year over year from 2006 to 2007. The growth rate has been accelerating over time as well, with 10.5% ACS revenue growth from 2005 to 2006 and 9.8% ACS revenue growth from 2004 to 2005. IDC sees growth in this market moderating, largely due to the economic downturn, at about 5.5% for 2008–2009 worldwide.

The increasing adoption of virtualization on x86 servers is allowing IT customers to achieve operational efficiencies through consolidation of workloads on x86 machines. For example, many older x86 servers have been running dedicated workloads in an inefficient way, with low resource utilization.

Today, with multicore x86 processors, more workloads can be gathered together to run on a single physical server — with four to eight VMs, or more, per physical server. This kind of consolidation saves space within the datacenter, as fewer "server footprints" are deployed for each new workload, and it saves on power/cooling costs for the same reason. But the high "density" of VMs on physical servers also requires new thinking about the need for protecting important workloads running in that virtualized, consolidated IT infrastructure. So, while IDC believes that the economic crisis of 2008 will affect worldwide server market sales, IDC also believes that ACS market revenue growth will outpace the overall growth of the server market worldwide.

**FIGURE 1**

Worldwide Availability and Clustering Software Revenue, 2005–2012:  
Comparison of September 2008 and December 2008 Forecasts

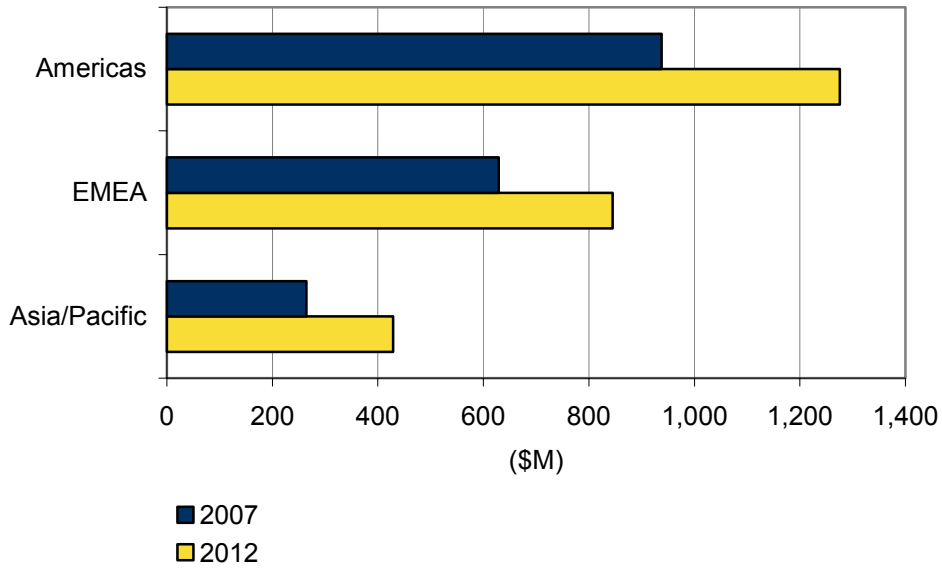


Source: IDC, December 2008

Further, the ACS market is expected to grow revenue across geographic regions and across platform types (see Figures 2 and 3).

**FIGURE 2**

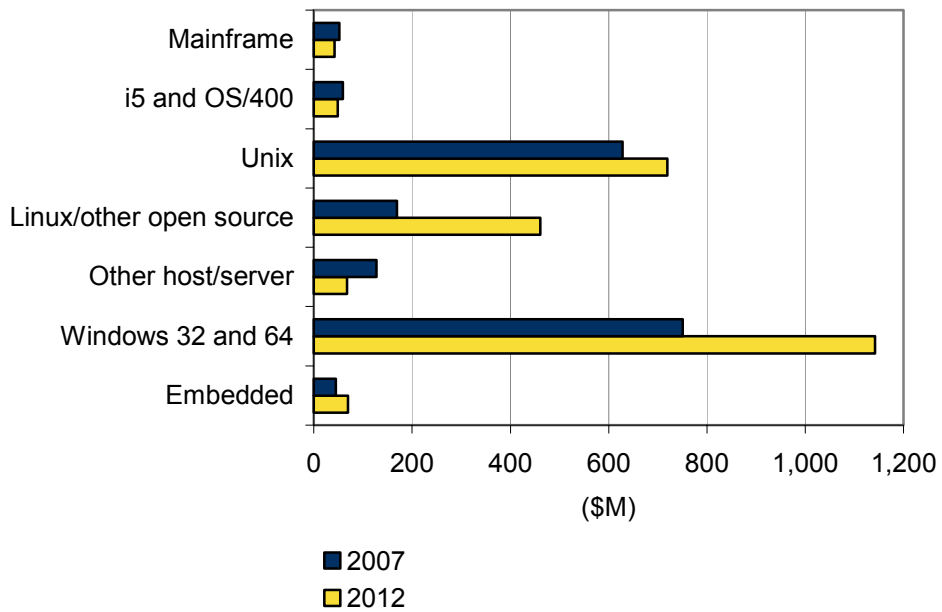
Worldwide Availability and Clustering Software Revenue by Region, 2007 and 2012



Source: IDC, December 2008

**FIGURE 3**

Worldwide Availability and Clustering Software Revenue by Operating Environment, 2007 and 2012



Source: IDC, December 2008

The ACS market has been growing faster than the server market, demonstrating the need for HA in an IT world where scale-out configurations of small and midrange servers are gaining in adoption, both inside the datacenter and in the business units throughout the enterprise. Worldwide revenue for the ACS market is greatest in the Americas, followed by EMEA and Asia/Pacific.

As Figure 3 shows, the greatest growth is occurring in the Windows server and Linux server segments; even so, Windows servers and Unix servers remain the two largest segments by total revenue expected to be generated in 2012. That is due to the depth of the ISV portfolio for business applications that are available in the Windows and Unix segments of the worldwide server market.

On a worldwide level, NEC has grown to be ranked among the top 10 ACS vendors worldwide; in 2008, NEC was ranked number 8 in the ACS market worldwide, rising up from its number 10 position worldwide in 2007. This change shows the steady progress that NEC has made in the ACS market, benefiting from stronger sales and from continued marketing focus on its availability software products.

NEC is well-positioned to continue to grow, with products aimed at two of the fastest-growing segments of the ACS market — those for Windows and Linux operating systems. Although ExpressCluster and CLUSTERPRO (as sold in Japan) have advanced functionality, these capabilities may not be well known in the United States and EMEA. Therefore, it is important for NEC to discuss its ACS products more widely and to improve market awareness of ExpressCluster on a worldwide basis.

To achieve greater presence worldwide, NEC is already identifying more OEM and ISV partners worldwide — and it is looking to highlight the functionality of ExpressCluster to gain faster adoption in the geographic regions outside Japan. NEC believes that increased adoption of virtualization on x86 server platforms, with increased numbers of VMs per physical server, will only accentuate the need for more HA software in order to protect the enterprise workloads being hosted on those VMs. By partnering with more systems integrators and value-added resellers, NEC believes it will be more widely recommended, and installed, in North America, EMEA, and Asia/Pacific than it is today.

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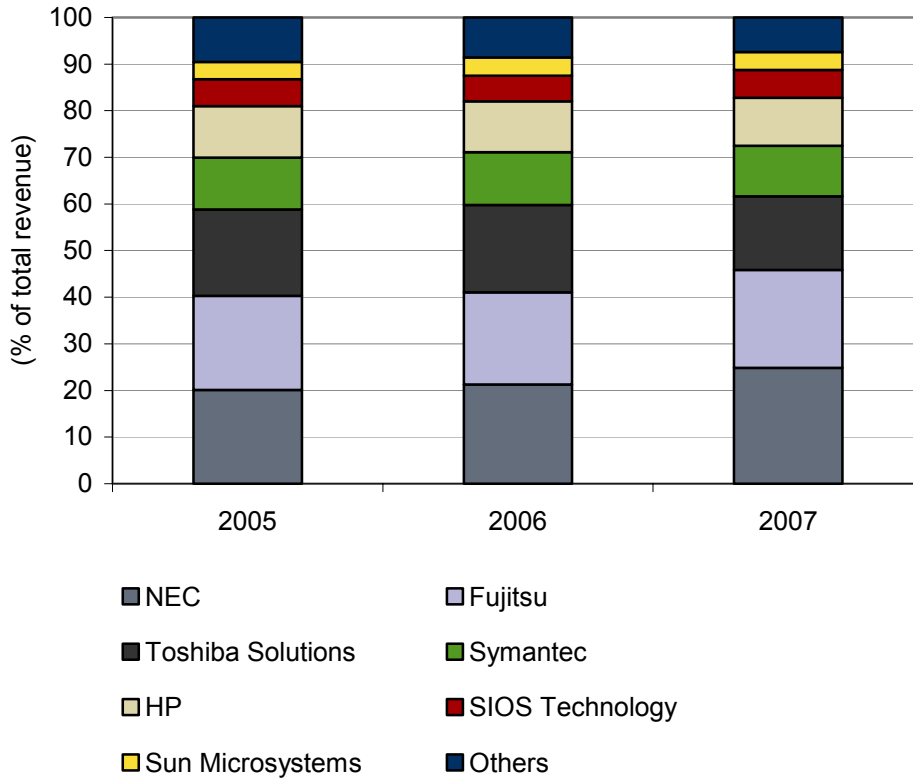
## **ACS Growth in Japan**

IDC tracks market share data for the ACS market in Japan and in the rest of the world. In that regard, IDC Japan has published reports about vendor share in Japan, and that data shows that NEC captured the top position in the Japan ACS market in CY2006 and CY2007. In those years, NEC grew its market share from 21.3%, based on revenue, to 24.8%.

In 2007, the overall ACS market in Japan grew 14.4%, compared with 2006. The top 3 companies in the Japan ACS market had combined market share of 61.6%. Individually, NEC had 24.8% market share, Fujitsu had 21.1% market share, and Toshiba Solutions had 15.7% market share (see Figure 4). Overall, the Japan ACS market grew from 15.6 billion yen in 2006 to 17.8 billion yen in 2007.

**FIGURE 4**

Japan Availability and Clustering Software Revenue Share by Vendor, 2005–2007



Source: IDC Japan, 2009

In 2006, when the Japan ACS market grew by 11% year over year, the top 3 companies in this market — NEC, Fujitsu, and Toshiba Solutions — continued to compete strongly for market share and had combined share of 59.8%. Individually, NEC had 21.3% market share, while Fujitsu had 19.8% market share and Toshiba Solutions had 18.7% market share.

### **ExpressCluster Enterprise Clustering Software**

ExpressCluster, which was originally introduced as CLUSTERPRO in 1996 in Japan, has evolved over time in terms of the functionality that it offers. Today, it supports both physical servers and virtual servers, providing a comprehensive approach to protecting workloads running in virtualized computing environments. The company sees opportunities in the areas of "preemptive recovery" through the use of live migration of VMs and of integrated dynamic load balancing between multiple servers via the use of network load balancing software and network switches.

As resources are consolidated into virtualized server and storage pools in next-generation datacenters, these techniques will become part of the "mix" of HA-related technologies that ensure end-user access to applications and data, even in the event that outages emerge at some places in the IT infrastructure. Overall, ExpressCluster and CLUSTERPRO are designed to support a wide range of HA software functionality — and to account for a variety of IT scenarios that could result in downtime. The following list highlights key features of ExpressCluster and CLUSTERPRO and how those features address IT needs and business needs:

- ☒ HA failover and disaster recovery scenarios are both supported, providing IT flexibility and business agility, in case of unplanned downtime. Disaster recovery involves planning and preparation for restarting applications in another location in the event of an outage affecting the primary datacenter. Examples include power outages, network outages, and natural disasters. IDC notes that the NEC ACS products can be used for purposes of planned downtime or unplanned downtime — and for disaster recovery activities (e.g., periodic testing for disaster recovery readiness).
- ☒ ExpressCluster and CLUSTERPRO support up to 32 nodes per clustered configuration of servers. This node count represents many years of product development aimed at expanding the number of servers that could be included within a single clustered configuration.
- ☒ Many types of x86 server hardware (e.g., servers based on Intel or AMD x86 microprocessors) running either Microsoft Windows or Linux computing environments are supported by ExpressCluster and CLUSTERPRO. Examples of key workloads protected by ExpressCluster and CLUSTERPRO include Microsoft SQL Server and Microsoft Exchange in the Windows environment and line-of-business (LOB) applications and relational databases in the Linux environment.
- ☒ ExpressCluster and CLUSTERPRO run on many types of x86 servers, which are manufactured by a number of vendors worldwide (e.g., HP, Dell, IBM, Fujitsu, Hitachi, and NEC). ExpressCluster and CLUSTERPRO are software products that can be sold independently of NEC's server products.
- ☒ ExpressCluster and CLUSTERPRO can operate with multiple hypervisors, including VMware ESX Server, Microsoft Hyper-V, Xen, and others. One reason for this broad support is the recognition that customers have already deployed multiple virtualization technologies within their IT infrastructure and that HA software should be prepared to supply many types of customer deployments.
- ☒ Multiple modes of operation (e.g., active/active, active/standby, "M+1" standby, or "M+n" standby) are supported. The ability to support many styles of configurations is again in recognition of different customer deployments already in the field, each of which needs to be supported by HA software.
- ☒ ExpressCluster and CLUSTERPRO support many LOB applications (e.g., Microsoft Exchange, SAP, and Oracle) and enterprise databases (e.g., Oracle, Microsoft SQL Server, Sybase, IBM DB2, and open source MySQL). Historically, customers have found the task of custom scripting to be time-consuming and costly. Many customers prefer that the ACS vendor provide preconfigured, pretested scripts that are ready to deploy.

- ☒ ExpressCluster and CLUSTERPRO are compatible with multiple system management frameworks, including IBM Tivoli, HP OpenView, and NEC's MasterScope (sold as WebSAM in Japan). Customers often select one type of framework as their primary enterprisewide system management framework — and the ACS selection must be able to fit into that framework through "plug-in" technology that allows the framework to monitor the performance of the cluster as a whole and the servers within that cluster.
- ☒ Both ExpressCluster and CLUSTERPRO leverage disk clustering for SAN environments and also support data mirroring across LANs and WANs. This functionality is designed to accomplish data replication so that in the event of a failover, the restarted applications can access production data. Data mirroring can be done in both synchronous modes and asynchronous modes, depending on the geographic separation of the datacenters.
- ☒ A new "hybrid" disk resource option for ExpressCluster and CLUSTERPRO enables a single integrated solution for local high availability and remote disaster recovery of application and data.

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## **Key Hardware and Software Channels**

To grow its market share worldwide, NEC has engaged with multiple channel partners, including systems vendors, channel partners in the server distribution channel (e.g., Synnex, Adistec in North America), and ISVs worldwide, including Microsoft, Novell, Oracle, and Red Hat. In Europe, NEC is working with two service providers: Infodis and Prologue. In Japan, NEC is also working with systems integrators, including ARK Systems Co. Ltd., Comsquare Co. Ltd., NEC Soft Ltd., SOFTBANK BB Corp., and Japan Business Systems Inc.

By partnering with hardware companies, NEC is focused as a software provider, even though it also makes server hardware systems that compete directly with those of other system vendors' OEMs. This emphasis on software products that can be run on other vendors' server platforms, as they can also be run on NEC server platforms, shows NEC's focus on being an important worldwide software provider when it distributes ExpressCluster worldwide and CLUSTERPRO in Japan.

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## **NEC Product Road Map for ExpressCluster**

NEC has presented a road map that outlines the path that the ExpressCluster product will take in coming years. Customers can expect increased support for virtualization and virtual servers, enhanced support for disaster recovery procedures linking one datacenter with a remote datacenter, and improvements in making management more policy driven and more automated over time.

Key goals for this NEC technical road map include:

- ☒ Addition of advanced functionality to improve competitive differentiation in the marketplace
- ☒ Extension of operating systems supported on x86 server platforms and improved support for hypervisors that are contained within virtualization software

These goals, when achieved, will ensure the continued evolution of the ExpressCluster and CLUSTERPRO products and will keep the products highly relevant to heterogeneous sites supporting multiple operating systems on x86 server platforms.

Like other ACS vendors, NEC sees the emerging requirements for highly granular controllability of virtualized computing infrastructure and for managing workloads across the enterprise in more unified, and precise, ways. However, NEC will likely choose to differentiate based on the features/functions of its availability software and based on the ability to integrate the management of ACS with the management of distributed systems across the enterprise.

Availability for business applications must be in place, and reliable, no matter where the application resides and no matter how many end users need to access it simultaneously. The approach to management of distributed workloads across the network must be seamless and easy to use to avoid increasing operational costs related to the costs of in-house IT skill sets (on staff) and to unacceptably long periods of downtime following an outage.

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## **Customer Snapshots: Usage Scenarios**

Customers that have installed ExpressCluster and CLUSTERPRO have found that it addresses their requirements for improved high availability for important applications. Three examples from customers around the world are as follows:

- ☒ **Dream Island Department Store Co. Ltd., Nanning, Guangxi, China.** The demands of point-of-sale (POS) systems in this large department store led to requirements of highly available computing resources to ensure that store sales would continue, even in the event of an outage — such as a power outage or a network outage. The idea was to prevent any amount of downtime because downtime would cause business to stop and would interrupt sales to customers. Recovery of the POS systems within two minutes was achieved during one database outage event in 2008, proving that rapid failover could be expected in the event of an outage. That is important because it has been estimated that an hour of downtime at the store would cause a loss of about 1 million RMB (Chinese currency). Without rapid failover to another production system, the store would have had to troubleshoot and recover the database problem, a process that can take four to eight hours to complete.

☒ **Senshukai Co. Ltd., Osaka, Japan.** This company maintains credit "servers" to process credit-card transactions. It has one "active" system and one "standby" system, along with data replication for production data. This means that two important steps can be taken: The application can be restarted on the standby server, and the production data is made available at the remote site for the restarted application. The result is a rapid failover of the credit applications from one server to another, along with a rapid return to normal credit lookup during store sales. The credit system is a key component for supporting online retail operations, which combines Web servers and application servers and therefore requires 24 x 7 x 365 uptime to protect business continuity.

☒ **Sumitomo Electric Semiconductor Materials Inc. (SESMI), Hillsboro, Oregon.** A manufacturing operation of \$20 billion (2006 data), Sumitomo Electric produces Gallium Arsenide (GaAs) semiconductor components in Hillsboro, Oregon. The company relies on x86 servers running Novell SUSE Linux and the open source Tomcat application server layer. In this company, ExpressCluster monitors systems on an ongoing basis and maintains links to standby servers that could take on the role of supporting restarted applications in the event of failover. Following that failover, the alternate server would resynchronize with the originating server when that server returned to online service. However, in more than two years of operation, no significant outages have occurred.

### Ryoyo Electro

Ryoyo Electro, a systems integration partner and channel partner of NEC in Japan, works with its end customers to deliver server-based solutions. From its headquarters in Tokyo, the company builds systems, based on custom requirements, for enterprises and government agencies throughout Japan. Ryoyo Electro has been building these solutions using CLUSTERPRO high-availability software for more than two years across a variety of hardware platforms, including systems based on servers from NEC, HP, Dell and others running a variety of operating systems, including Microsoft Windows, Linux, and HP-UX 11i Unix.

One of the key reasons CLUSTERPRO was selected for the HA solutions that Ryoyo Electro provides to customers is the product's versatility. It can be deployed on many types of hardware, including Itanium-based servers and x86-based servers, and it can work with many types of operating systems. Also important to Ryoyo Electro, according to Kenji Otokawa, manager of the Sales Department for the company's Computer System Products Division, is that the product is easy to use and to maintain. The fact that the high-availability software can be used across multiple types of hardware systems helps to reduce IT costs, especially operational costs associated with systems management, noted Otokawa. System administrators at customer sites using the servers can leverage the same skill sets to manage different systems, which reduces IT training costs. This is also very useful to Ryoyo Electro because its systems integration business is used to address a range of business requirements, using different operating systems in its work with many types of customers.

Customer examples cited include a government agency that monitors earthquake activity throughout Japan's 47 prefectures (which is equivalent to 50 U.S. states), a music/audio distribution service that delivers content via the Internet and satellite services, and a drugstore chain that has hundreds of branch operations in Japan.

Some of these customers operate up to eight server "nodes" supporting CLUSTERPRO software, including both "active" servers and "standby" servers. If downtime should ever occur, a failover would be triggered, which would restart production applications on alternative servers, if needed. But so far, Otokawa said, these customers have not needed to trigger a downtime-based failover. Other scenarios for use of the software include support for business continuity and protection planning related to disaster recovery.

## **ADDRESSING THE CHALLENGES AND OPPORTUNITIES IN THE ACS MARKET**

Like every other market, the ACS market is competitive. Products must be enhanced and updated on a regular basis in accordance with IT requirements and customer expectations. Each vendor must also compete with respect to pricing, which becomes increasingly competitive as new suppliers enter the market and more innovation brings new product features and solutions to the ACS market space.

The list of vendors competing in the ACS market is long, and it includes system vendors (e.g., HP, IBM, NEC, and Sun) and software vendors (e.g., Microsoft, Oracle, and Symantec). The entire list is too long to include in this document, but IDC notes that these large vendors generate the majority of revenue in the ACS market worldwide.

IDC also notes the presence of a number of smaller ISVs in the ACS space, including Data Synapse, Scalent, and SteelEye (a business unit of SIOS of Japan). These smaller vendors do not generate as much revenue as the larger vendors, including system vendors such as NEC. However, their product offerings show a number of evolving feature sets that may increasingly interest the larger vendors, such as new types of support for virtualization, consolidation of VMs, and management of VMs.

NEC is addressing the challenges in the ACS marketplace by innovating and by including new technologies in its ACS products, including support for virtualization, policy-based management, and the need for a unified point of control for system administrators. The company is well-positioned to remain an innovator and, increasingly, a leader in the ACS marketplace in Japan and worldwide.

## **CONCLUSION**

In a Web-enabled, highly virtualized computing world, the importance of ensuring high availability for business applications is increasing day by day. More end users are accessing enterprise applications that are running in this increasingly virtualized computing infrastructure, and the components of these important end-to-end applications must remain online on a continuing basis, or expensive downtime for business will be the result.

Companies such as NEC see the need to continue to improve the availability for such business applications — supporting failover and restart on alternative resources, including both physical servers and virtual servers. At the same time, the presence of data replication is gaining importance, providing the most current "snapshot" of the production data at the time the restart occurs. Finally, disaster recovery software functionality is evolving — allowing for restart of applications across WANs using production data that has also been copied across the network. For companies with disaster recovery plans in place, an outage in one geographic area (resulting from a power outage, network outage, or server outage) will not prevent a quick restart of important business applications in another place across the enterprise network. NEC is well-positioned to address the full spectrum of

HA requirements for business, from high-availability failover software to data replication to disaster recovery, and it continues to field competitive offerings in the ACS market space.

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