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WHITE PAPER

High-Availability Solutions' Increasing Importance and Diversification Needs: Analysis of Market Trends and Best Practices

Sponsored by: NEC

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January 2013

IDC OPINION

Increasing the availability of IT systems to support business processes and services is an important challenge for enterprises and organizations. High-availability (HA) solutions that rely on availability and clustering software are one of the most effective means of improving availability. NEC aims to increase reliability in enterprises and organizations by promoting HA strategies based on EXPRESSCLUSTER (known as CLUSTERPRO in the Japan market).

The following are the key points of this white paper.

- Availability and clustering software is registering robust growth in the Asia/Pacific region (AP), and demand for HA is growing. NEC gained the top vendor market share in 2011 for the third consecutive year since 2009.
- Availability and clustering software is seeing an increase in deployment in the x86 server platform that runs Linux and Windows. NEC has established itself as the leader in the AP Linux and Windows markets. It had a particularly large vendor share of 36.0% in Linux systems in 2011, putting it in the top position.
- Increasing availability in virtualized environments is an important challenge due to the penetration of server virtualization. In this case, HA needs to be applied to all layers, that is, the physical machine, virtual machine, and applications running on the virtual machines.
- NEC provides best practices for the diversifying HA solution needs of customers. This study analyzes two NEC user case studies: securing stability of a point of sale (POS) system of a department store in China, and disaster recovery in an insurance company in Saudi Arabia.
- NEC's HA solution EXPRESSCLUSTER-based strategy broadens the possibilities of HA solutions based on its threefold philosophy of early compatibility with various platforms, improved reliability by enhancement of core functions, and wider scope of application such as with disaster recovery. NEC is also focusing on expanding into new growth markets such as China, India, and Southeast Asia (commonly referred to as the ASEAN region), aside from the AP region, the Middle East, and South America.
- Enterprises and organizations need to invest sufficiently in implementing HA in IT systems to win employees' trust as well as customers and partners. IDC believes that enterprises/organizations should choose a vendor with HA solutions that can respond flexibly to users' needs and has highly reliable HA solutions.

High-Availability Solutions for IT Systems Is the Most Important Challenge

IT plays an important part in the various activities of enterprises and organizations. Many business processes are supported by IT systems and it has become a matter of course for services to be offered 24 hours a day 365 days a year across countries and regions. In other words, various activities of enterprises and organizations have become reliant on IT systems. As a result, IT systems need to be that much more reliable and the application of HA to IT systems is one of the most important challenges in IT strategy.

IT administrators have to pay most attention to unscheduled downtime. The disruption of business processes and services due to system downtime naturally leads to a loss of business opportunities, but the loss of credibility from stakeholders such as customers, partners, and shareholders is immeasurable. IT managers thus need to protect data and application assets that are indispensable to business processes and services from sudden hardware, OS, and application failure, or from natural disasters such as an earthquake, to prevent such loss. It is particularly vital to ensure a high level of availability in mission-critical systems such as financial accounting and sales management tasks in enterprises including finance, accounting, and sales administration, as well as electronic commerce (EC or ecommerce) sites, online transactions, and other such Web services.

Various methods of increasing the availability of IT systems are available but they share the common objective of continuing workflows on standby systems without stopping business operations and services when faults strike. This objective is often best achieved with HA clustering software. There are many solutions involved in the software, including failover to switch the system over from the working servers to standby servers, disaster recovery, application of HA to virtual environments, and the like.

IDC defines software that functions to increase system availability, including HA clustering software, as "availability and clustering software." This study summarizes trends in availability and clustering software in the AP region and explores the future prospects for NEC's HA solution strategy, based on its EXPRESSCLUSTER HA clustering software, citing user case studies.

High-Availability Solutions: Market Growth and Diversifying Needs

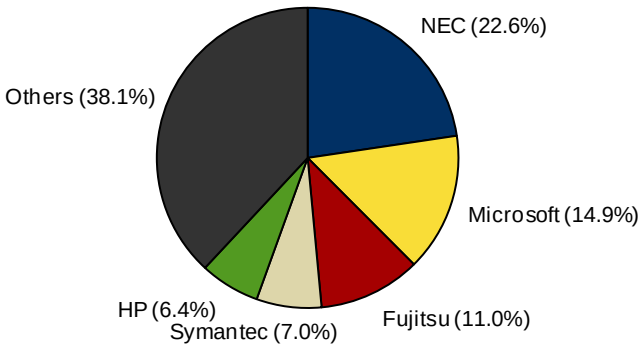
Availability and Clustering Software Market Trends in the Asia/Pacific Region

The availability and clustering software market in the AP region grew at a high rate of growth of 8.5% year over year (YoY) in 2011, totaling US$327.82 million. There is growing awareness about business continuity since the Great East Japan Earthquake, and availability and clustering software is increasingly being utilized for disaster recovery. The same trend is seen in other AP countries such as China, Korea, and Singapore. Virtualization software is rapidly gaining traction in datacenters — a trend in place since 2010 — and initiatives to enable high availability of virtual infrastructure based on availability and clustering software are stimulating market growth.

Figure 1 shows vendors' revenue shares in the AP availability and clustering software market in 2011. NEC, which developed and sells EXPRESSCLUSTER, held the top share for the third consecutive year since 2009, with a share of 22.6%.

FIGURE 1

Asia/Pacific Availability and Clustering Software Market: Revenue Share by Vendor, 2011



Total = 328US$M

Note: The AP region covers Australia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore, Taiwan, Vietnam, and Thailand.

Source: IDC Asia Pacific, December 2012

High-Availability Solutions in the Main Asia/Pacific Countries Where Enhancement Is Making Progress

Figure 2 shows the forecast 2011–2016 compound annual growth rate (CAGR) of the AP availability and clustering market for Japan, China, India, and the five main Southeast Asia countries (Indonesia, Malaysia, the Philippines, Singapore, and Thailand). The CAGR for Japan is 3.2%, China 6.1%, India 14.3%, five ASEAN countries 4.7%, and other AP countries 4.3%. The following section explains the trends in each region.

Japan

The Japan market in 2011 totaled US$234.51 million, accounting for 70% of AP as a whole. Availability and clustering software is increasingly being used for disaster recovery since the Great East Japan Earthquake. This trend is seen in small and medium-sized businesses (SMBs) as well as in large corporations. The increasing adoption of HA solutions in VMware vSphere and Windows Server Hyper-V virtual environments is also a factor in market growth.

China

The China market totaled US$16.16 million in 2011, taking third place after Japan and Australia. Large mission-critical systems are being constructed in banks, securities, telecommunications, and manufacturing industries in the wake of the rapid economic growth and globalization. HA solutions are indispensable to such systems and there is growing demand for availability and clustering software. Enterprises are also increasingly taking on business continuity initiatives in preparation for disaster and disturbances, and enterprises are expected to utilize HA solutions for disaster recovery. Datacenters are also virtualized in many enterprises and mission-critical applications such as databases and email systems are being migrated to virtual environments. As a result, there are heightened expectations for HA solutions in virtualized environments, and potential demand for availability and clustering software is growing with the 2011–2016 CAGR forecast at 6.1%.

India

The India market totaled US$15.71 million in 2011, roughly neck and neck with China. The 2011–2016 CAGR is forecast at 14.3%, the highest rate among the main AP countries. The industries driving the market are finance, telecommunications, government, and IT services. HA solutions are also gaining traction in the growing call center systems of global corporations. Many of the platforms are based on Windows Server, with Windows' availability and clustering software accounting for a large part of shipments. HA solutions based on failover of virtualized environments implemented on the Windows Server Hyper-V platform are also seeing increasing deployment. Meanwhile, Linux servers have been increasingly adopted by SMBs over the last few years and HA solutions for Linux environments are attracting attention. A trend to deploy Linux can also be seen in large corporations, and it is expected that HA solutions will be required for mixed Windows/Linux environments in the future.

Five Main Southeast Asia Countries

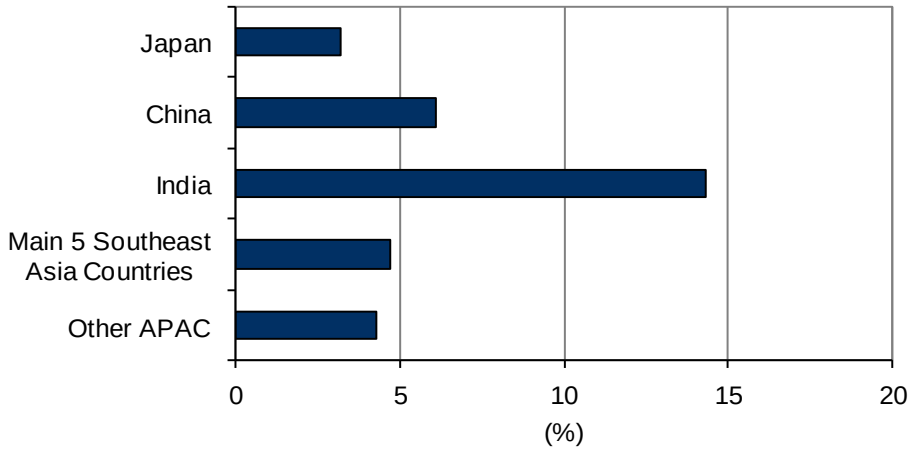
The market for the five main Southeast Asia countries (Indonesia, Malaysia, the Philippines, Singapore, and Thailand) totaled US$16.57 million in 2011, with Singapore as the main market driver. The five main Southeast Asia countries accounted for approximately 60% of the market, growing at a rate of 10.6%. Many global enterprises have presence in Singapore with many datacenters installed in the city state. Cloud-oriented datacenters, in particular, are increasing and there is an extremely high awareness of availability, with the need for HA solutions growing rapidly. Furthermore, in Thailand, where the large floods occurred, or the Philippines, where factories and call centers are growing rapidly, global firms with presence in these countries are increasingly spending on disaster recovery.

Other Asia/Pacific Countries

The market covering the other AP countries (Australia, Hong Kong, Korea, New Zealand, Taiwan, and Vietnam) totaled US$44.87 million in 2011. The largest of these countries, Australia, which is second only to Japan in market size among the AP countries, registered an extremely high growth of 12.3% YoY in 2011. In Australia — which is one of the first AP countries to popularize virtualization — mission-critical applications are increasingly being run in virtualized environments, resulting in growing demand for HA solutions. In Korea and Taiwan, where many leading manufacturers of electronic and electrical goods are based, implementation of disaster recovery is gaining momentum since the Great East Japan Earthquake.

FIGURE 2

Asia/Pacific Availability and Clustering Software Market: CAGR Forecast, 2011–2016



Notes:

- The main five Southeast Asia countries are Indonesia, Malaysia, the Philippines, Singapore, and Thailand.
- Other AP countries are Australia, Hong Kong, Korea, New Zealand, Taiwan and Vietnam.

Source: IDC Asia Pacific, December 2012

Growth of High-Availability Solutions for the x86 Server Platform

The 2011 availability and clustering software market for Linux in the AP region totaled US$111.28 million, growing at 6.8% YoY. Linux has continued to grow year after year to reach a market size similar to that of Windows. This growth is due to Linux taking over from UNIX's previous role in mission-critical systems, which are required to have a high level of availability. For example, Linux has been adopted for the trading system platforms in the New York Stock Exchange and the Tokyo Stock Exchange, while the London Stock Exchange also announced a switchover to Linux. These are the most well known cases globally; and Linux is also seeing increasing adoption in enterprises and organizations, such that solutions to increase availability by the deployment of availability and clustering software are being rolled out as a result.

The market totaled US$129.93 million in 2011 and Windows, the largest market segment, registered a very high growth of 12.6%. Virtualization is being increasingly adopted in x86 servers where in many examples Windows and applications run on top of a hypervisor. Users have started seeking out HA solutions for such environments leading to increased opportunities for the utilization of availability and clustering software in Windows environments.

Growth in the market for Windows and Linux availability and clustering software is being driven by the increasing deployment of HA in x86 servers. x86 servers are seeing increasing deployment in systems where downtime is not permissible such as mission-critical systems, finance, online systems such as EC sites, and social networking platforms. In more and more cases, HA solutions are being required thus leading to increasing demand for availability and clustering software.

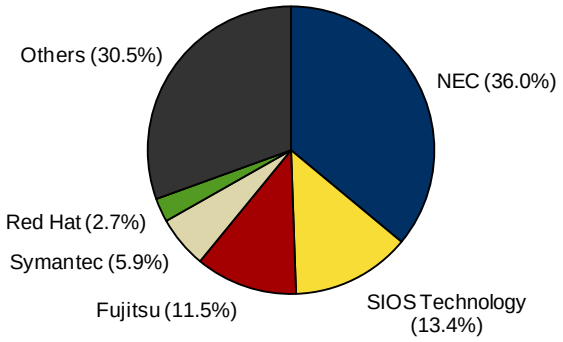
Vendors thus need to take into account the mix of Windows environments and Linux environments, and many enterprises and organizations with x86 servers must utilize both Windows and Linux together. It must also be kept in mind that even organizations that currently only use Windows could adopt Linux servers for newly constructed systems out of consideration for cost reductions and scalability. It is not efficient to manage separately the availability of the Windows and Linux servers in such mixed environments, meaning vendors must aim for more efficient and centralized management.

Linux Availability and Clustering Software Market Shares

Figure 3 shows revenue share of the AP availability and clustering software in 2011 by vendor. NEC has the top share of the market as a whole, including non-Linux segments, and is the market leader with 36.0% share of the Linux market. NEC was quick to note the growth potential of the Linux market and has taken the lead over other vendors in launching Linux products on the market and improving on them, such as by aiming for compatibility with various distributions. NEC has gained various client segments, including large deployments of 100 nodes or more in the finance industry, where Linux is being increasingly adopted for mission-critical systems, and clients in telecommunications, government offices, and the manufacturing industry. NEC also holds the second largest share of revenue in the AP Windows availability and clustering software market at 27.0%. NEC has established itself as the leader in the AP availability and clustering software market for the x86 server platforms.

FIGURE 3

Asia/Pacific Linux Availability and Clustering Software Market Revenue Share by Vendor, 2011



Total = 108US$M

Note: The AP region covers Australia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore, Taiwan, Vietnam, and Thailand.

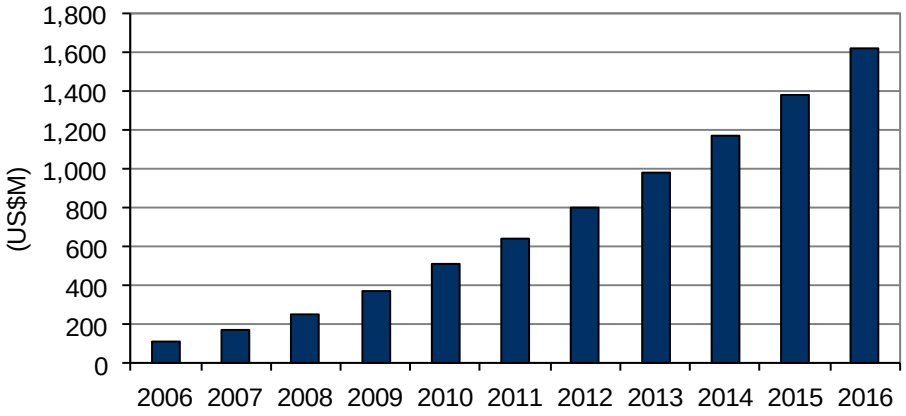
Source: IDC Asia Pacific, December 2012

Increased Importance of High-Availability Solutions Due to Growth in Virtual Environments

Server virtualization based on virtual machine software, typically a hypervisor, is growing rapidly. Figure 4 shows our forecast for the AP virtual machine software market. In 2011, market revenue grew astonishingly to over six times that of 2006. The 2011–2016 CAGR is forecast at 20.5%, showing potential for even more growth. Such market growth significantly outpaces North America's 12.9% and the 11.9% for Europe, the Middle East, and Africa (EMEA), indicating that virtual environment-based systems look set for unabated growth.

FIGURE 4

Asia/Pacific Virtual Machine Software Market Revenue Forecast, 2006–2016



Note: The AP region covers Australia, China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore, Taiwan, Vietnam, and Thailand.

Source: IDC Asia Pacific, December 2012

The reductions in hardware costs and consequently operations and maintenance costs gained from consolidation of physical servers lie behind the rapid growth of server virtualization. However, the risks associated with each physical server are that much greater because several applications are aggregated onto a single physical server. For example, if a physical server is down, all of the virtual machines running on the server will also be stopped. This risk will intensify as server virtualization gains more traction, which will lead to greater demand for HA in the future.

Some virtual software packages that include a module for management of hypervisors or virtual environments, also contain a module to provide HA functions, but the functions are often insufficient to deal with sudden failure, or they are unable to monitor applications running on guest OSs, so that the HA functionality still leaves much to be desired. This makes it important to utilize third-party availability and clustering software to implement HA functionality in all layers of physical machines, virtual machines, and applications.

Currently, there are multiple options for hypervisors including VMware vSphere, Windows Server 2008 Hyper-V, Windows Server 2012 Hyper-V, and the open source options of Xen and KVM. All options have their own specific functionality, performance, and cost considerations, but users are beginning to distinguish between them depending on the intended purpose of the system. Just as with Windows/Linux mixed environments, there will be more mixing and matching of hypervisors within the same environment in the future, meaning that vendors will have to consider centralized management of availability of virtual environments based on different hypervisors.

Business Continuity and High-Availability

The Great East Japan Earthquake of 2011 is still fresh in the memory of users. Such major disasters are not limited to Japan, but can potentially occur in any part of the AP region, and indeed, all around the world. It must be borne in mind that corporate activities are at risk not only from earthquakes, but also from natural disasters, terrorism, disturbances, war, and the like. Earthquakes are a particularly frequent visitor to Asia. There is also the risk of secondary damage such as the collapse of buildings, blackouts, and other infrastructure failure. Corporate information system departments need to implement disaster recovery systems for datacenters to avert such risks from disasters.

What is most important in implementing disaster recovery systems is to minimize downtime in the event of a disaster. This means that it is no use if system recovery takes time until normal operations can be resumed even if data and applications can be migrated to another datacenter from a backup and no data is lost. The opportunities lost in the meantime will be unrecoverable. What is needed is a setup for operations to be continued at another datacenter without downtime.

Implementing such a disaster recovery setup can be achieved through utilization of an HA solution based on availability and clustering software. A clustering system based on remote datacenters and failover can be used to construct the production environment running on the primary datacenter. Disaster recovery covers many different solutions but this particular solution is highly reliable and can be implemented at a low cost, and is being increasingly adopted by enterprises.

NEC's Global High-Availability Solution Strategy

The Leader in Availability and Clustering Software

NEC boasts of the top share of the Japan x86 server market. In a report published by IDC in June 2012, NEC had a 26.0% share of x86 server unit shipments in Japan, putting it in first place (see Note 1 on the following page).

As previously stated, NEC — which developed and markets the EXPRESSCLUSTER HA clustering software — had the top vendor revenue share in the AP availability and clustering software market in 2011. It has a particularly good track record in Japan, having the top share in the Windows segment, Linux segment, and in the market as a whole (see Note 2 on the following page).

- ***Note 1:*** *Japan Server 2012–2016 Forecast and 2011 Analysis (IDC #JP1573104U, June 2012)*
- ***Note 2****: Japan System Software 2012–2016 Forecast and 2011 Analysis (IDC #JP1677107U, October 2012)*

EXPRESSCLUSTER, the Core of High-Availability Solutions

NEC has announced its global HA solution strategy based on EXPRESSCLUSTER in the following three directions.

- **Expansion of support platform to support mixed OS and virtualization infrastructure.** We are seeing more and more cases where the IT systems in enterprises and organizations include different OSs such as Linux and Windows; OS versions are also mixed such as Windows Server 2003, 2008, 2012, and so forth. What can further complicate the administration of IT systems is using different hypervisors to implement the virtual environment. NEC is increasing the number of platforms supported by EXPRESSCLUSTER for the sake of compatibility with such platform environments encompassing mixes of OSs and virtualization infrastructure. At the present stage where it is unclear which cloud computing platforms will be mainstream, NEC is keeping all options open in terms of compatibility.

- **Increased reliability through improvement of core functions.** There are various reasons for system failure. It is important to first perform extensive, constant monitoring to find out whether the fault originates in the hardware, OS, or an application and accurately detect the fault. Then the failover must be performed robustly and swiftly, and only then can system availability be maintained. If a EXPRESSCLUSTER predicts a failure based on something it has detected and switched to a safe server, system downtime can be reduced. NEC is improving core functions such as the detection of failures, symptoms, and failover to provide ever more reliable HA functions. Such functions will have a great effect in mission-critical systems.

- **Expansion of scope of application of clustering such as to include disaster recovery.** NEC aims to roll out high added-value HA solutions based on its HA clustering software. It is particularly focusing on disaster recovery. EXPRESSCLUSTER can cluster sites situated at large distances from each other and is equipped with functions to recover both data and applications in the event of a disaster. NEC is undertaking research and development (R&D) to further expand the scope of application of clustering and undertaking initiatives to provide HA solutions with higher added value.

New Product Improvements

NEC is aiming to add new functions and improve existing functions in the latest version, EXPRESSCLUSTER X 3.1. The main new functions are as follows:

- **Smart failover.** The EXPRESSCLUSTER X System Resource Agent that analyzes and predicts utilization of system resources, such as CPU and memory, has been included. This implements failover by sniffing out symptoms of failure and automatically switching processes to the most appropriate server. This enables downtime to be greatly reduced in the event of a failure by a proactive, automated failover through detection of fault symptoms.

- **Dedicated package for SAP NetWeaver.** EXPRESSCLUSTER has obtained SAP's certification system, namely, SAP HA Interface Certification, and a package of the module and procedure manual for SAP NetWeaver clustering has been made available. The dedicated package for SAP NetWeaver enables failover for all the components of NetWeaver, keeping downtime to a minimum. This increases the availability of SAP solutions that handle mission-critical tasks of enterprises, including ERP.

- **Compatibility with Windows Server 2012 Hyper-V.** Compatibility with Windows Server 2012 Hyper-V, the latest version in live migration with the hypervisors, vSphere, Hyper-V, Xen, and KVM, and in integrated failover solutions has been added.

Global Strategy

NEC is rolling out products under the EXPRESSCLUSTER brand in North America, Europe, and other regions, based on its track record in Japan, and is aiming to promote HA solutions. In recent years, it has been concentrating on sales in the AP region and has increased sales in China and Southeast Asia, and is also increasing its presence in India. With future expectations for market growth, it is also venturing into Central and South America and Africa. At the same time, NEC is utilizing its global network to support Japan enterprises expanding overseas. The following is a summary of NEC's strategy in the main countries and regions.

- **China:** NEC is rolling out HA solutions mainly for telecommunications, finance, government, medical, and educational institutions, and is gaining good results. As in the user case study of a department store utilizing HA solutions (see page 12 of this White Paper), its track record is mounting in other industries. Partner cooperation is important to NEC in the vast country of China, and NEC is making a point of deepening cooperation with existing local partners, including such solution vendors as hardware vendors, software vendors, and systems integrators, in addition to securing new partners. NEC's main direction for strategy in China includes improving the 24-hour support system, provision of packages for SMBs, and expansion of its business and support to new areas.

- **India:** NEC's EXPRESSCLUSTER support team for English-speaking countries is stationed in an offshore development center in India where it has implemented a 24-hour maintenance system. Sales are performed by NEC's sales company, which teams up with the support team to offer the customer a coherent solution from sales to support that is oriented to the local community.

- **AP:** NEC is augmenting its AP strategy, in addition to its China and India strategies. It aims to expand its market in this region in collaboration with local distributors.

- **Europe:** In October 2012, NEC obtained SAP HA Interface Certification for EXPRESSCLUSTER from SAP, an ISV. It packages the module and procedure manual for using clustering with SAP NetWeaver and has started selling it globally. It aims to continue to strengthen its ISV partnership and expansion into Europe.

- **Middle East:** NEC's expansion into the Middle East is focused mainly on Saudi Arabia and Qatar. As in the user case study in Saudi Arabia, the government has been forced to take anti-disaster measures to prevent water damage due to global warming, to which they were unprepared because of its unfamiliar nature. NEC is keenly promoting disaster recovery solutions.

- **North America:** NEC is enhancing cooperation with local ISV partners. As a case in point, it is rolling out its disaster recovery solutions, which combine applications of physical security vendor partners which have been aforementioned and EXPRESSCLUSTER, to customers requiring high availability. NEC will continue to strengthen similar ISV partnerships.

- **South America:** NEC has much experience in the field of networking in Brazil. Aside from planning to roll out HA solutions to those customers, it is also seeking partnerships with local software vendors. NEC is also exploring further expansion into Argentina.

User Case Studies

This section presents case studies of users that have deployed HA solutions, particularly utilizing NEC's EXPRESSCLUSTER.

User Case Study 1: Ensuring Stability of POS Systems, the Lifeline of the Retail Industry: Dream Island Department Store (China)

Dream Island Business Management Co. Ltd. of Nanning, Guangxi Province, China, is located in a major city of the Guangxi Zhuang Autonomous Region, a hub for trade in Southeast Asia. Its outlets consist of eight Dream Island Department Stores. With a workforce of 10,000 employees or more, its revenue increases year after year. In this region of continuing commercial development, the entry to the market of many competing companies made it imperative to improve the quality of service to the customer.

Challenge: Downtime of the POS System Due to Heavy Load

The server for the POS system in Dream Island Department Stores would frequently go down due to the heavy load on it, making it impossible to use the cash registers. POS systems are the lifeline of the retail industry and downtime is a major hindrance to business. For example, if the cash register server went down, it would take three hours or more to recover the data. In financial terms, this would equate to losses of around RMB 1 million (approximately US$161,000 as of January 2013) per hour. Meanwhile, as business grows the system also becomes more complex and the load becomes heavier. Hence, the IT department of the Dream Island Department Store looked into constructing a highly reliable system in order to solve server breakdown issues.

Solution: Hybrid Cluster Configuration

The new system had to meet the requirements of nonstop operation of the business system, normal operation of cash registers in its branches, reduction of time needed for transmission of data between the main store and its branches, and low-cost deployment and operation. Many different software options were evaluated for the choice of availability and clustering software and in the end, NEC's EXPRESSCLUSTER was selected. The quality and user friendliness of the product were the decisive factors in satisfying the aforementioned requirements. Dream

Island management also noted the excellent response of the NEC-AS engineers, who handle sales of EXPRESSCLUSTER in China, which provided reassurance for future support.

Coexistence of Mirrored and Shared Disk Clustering

The main store and its branches' system was configured with mirrored clustering, which has superior cost performance because it does not require storage. The servers for the email system, accounting, and various business processes were constructed between the servers for the POS front end at the branches. A highly reliable, shared disk cluster was utilized in the backend server of the POS system in the main store to ensure availability of the database. Hybridizing the cluster configuration in this way enabled failover for each process to ensure nonstop operation 24 hours a day, 365 days a year.

Reduction of TCO by Efficient Utilization of Resources

The previous servers were used as standby servers for the mirrored cluster, reducing the number of new servers to be purchased. Cost reductions are further implemented by strategic utilization of servers under load and those not under load.

Results of Deployment: Failover in Merely Two Minutes

The adoption of EXPRESSCLUSTER has made the system robust and sufficiently able to handle the heavy loads generated by sales campaigns and the like. During one of the store branches' second anniversary ceremony, the POS system database developed a fault, but the POS system was switched to a standby server and major loss was averted. Mr. Fan, IT department manager at the Dream Island Department Store, expressed his real sense of achievement, and stated that, "The deployment of EXPRESSCLUSTER has been a resounding success."

User Case Study 2: Disaster Recovery of Zero-Downtime Insurance Systems: UNITED COOPERATIVE ASSURANCE COMPANY (Saudi Arabia)

UNITED COOPERATIVE ASSURANCE COMPANY (UCA) is a prominent Saudi Arabia insurance company listed on the Saudi Stock Exchange. Since its inception in 1974, it has rolled out various services including asset, damage, liability, marine cargo, marine, aviation, life, medical, and credit insurance.

Challenge: Toward the Implementation of Zero Downtime

UCA's business, by its nature in the insurance industry, is not permitted to stop no matter what happens, and it has an even greater role to play during disasters. UCA must also be careful in handling the various personal data of its customers that it holds and not allow any loss. UCA needed to find an HA solution equipped with disaster recovery functionality in order to realize zero downtime of its system based on Oracle applications and serving approximately 200 outlets. Such an HA solution would simplify operation and management of the primary site in addition to the secondary site, the recovery source, and would have to fulfill the high availability requirements of the Saudi Arabia government.

Solution: High Availability Equipped with Disaster Recovery

UCA upgraded the Oracle database it was using as main database and its Windows version, and looked into deploying an HA solution at the same time that it migrated to new servers. In response, NEC teamed up with its local partner, NajTech, and combined EXPRESSCLUSTER with a fault-tolerant server (no-downtime server), and

proposed a robust clustering solution that was simple to manage. UCA was very pleased with this proposal, in addition to highly evaluating NajTech's support, and accepted. The system was set up in the space of a mere three months by four of NajTech's NEC certified engineers and two of NEC's engineers in charge of the Middle East region. Only two engineers from UCA's IT department needed to be involved in the project.

Implementation of a Disaster Recovery Site 30Km Away

A fault-tolerant server equipped with EXPRESSCLUSTER and SAN storage was used to implement the insurance system. A branch of the company located 30km away from head office was used for the disaster recovery site and both sites were connected to an internal WAN. Failover would be conducted in the event of a problem at the working site and operations would be resumed within 20 minutes. The disaster recovery site was further used for other purposes including as a file server, email, database, backup, and others.

Results of Deployment: The Effectiveness of NEC's High Availability Solution Proven by Flood

UCA gained the following results from adopting NEC's disaster recovery solution.

- 15% increase in productivity of operating staff
- 90% reduction in downtime of main database
- 20% increase in user satisfaction

When Jeddah, a prominent Saudi Arabia commercial city, was hit by a flood in 2011, the company was switched over to online mode via the disaster recovery site in a matter of minutes. Mr. Labib Assaf, UCA IT technical manager, stated, "It was really a wise decision to select NEC and NajTech as technology partners. Our choice proved to be right even given the sad occurrence of the Jeddah floods of 2011."

FUTURE OUTLOOK

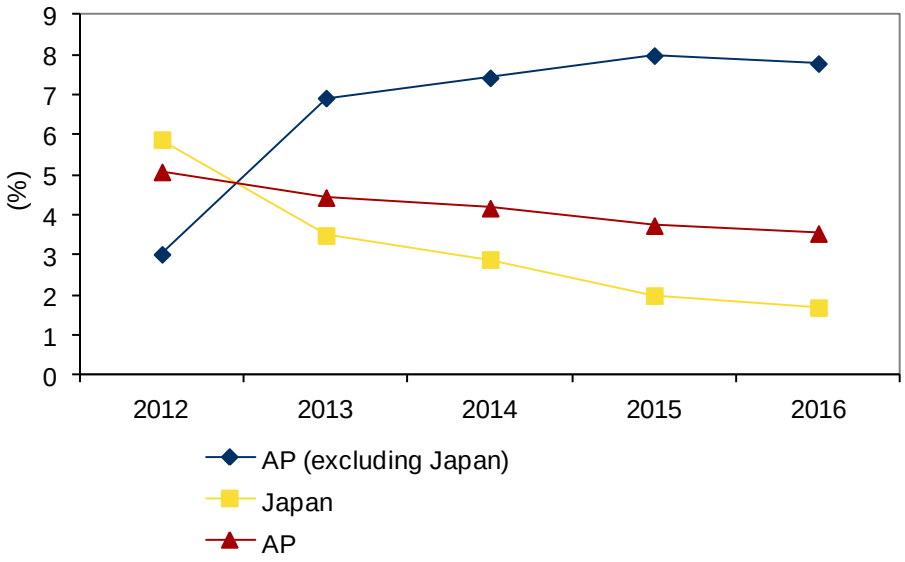
Availability and Clustering Software Market Forecast

IDC forecasts that the AP availability and clustering software market will continue its high rate of growth, increasing at a CAGR of 4.2% over the 2011–2016 period. Figure 5 shows the forecast for YoY revenue growth over 2012–2016. The chart shows separate forecasts for Japan and the AP region excluding Japan (APEJ).

The APEJ region looks set to continue to grow at a high rate. IDC forecasts that growth will continue at over 7% from 2012 onward and the CAGR over the 2011–2016 period will be 6.6%. The need for HA solutions based on availability and clustering software is high; deployment of these solutions is accelerating in China, India, and the Southeast Asia countries. It also looks set for more utilization in disaster recovery systems. In Japan where the market is mature, growth looks set to continue at a robust pace. IDC believes that the market for x86 server Linux and Windows platforms will continue to register high growth throughout the AP region.

FIGURE 5

Asia/Pacific Availability and Clustering Software Market Year-Over-Year Growth Forecast, 2012–2016



Note: In the third label, AP includes Japan.

Source: IDC Asia Pacific, December 2012

Future of High-Availability Solutions

Possibilities of Expanding High-Avaialbility Solutions

Unscheduled system downtime due to hardware and software failures, natural disasters, terrorism, and other such unexpected events is an ever-present challenge faced by enterprises and organizations. It is no exaggeration to say that the reliability of IT systems that serve as service infrastructure to cater to customers, business partners and employees, is currently an indicator of performance of enterprises and organizations. In this context, HA solutions based on availability and clustering software will play an even more important role in the future.

The greatest advantage of availability and clustering software is that it can be used to flexibly implement diverse HA solutions. It is able to meet diverse needs, from one-to-one failover to disaster recovery from a remote site. It is able to offer many options for solutions tailored to varied user budgets, system implementations, uses, and operation after deployment. The range of options is also growing thanks to new combinations of servers and storage that are offering more and more functionality.

NEC's two user case studies are examples of success in meeting such diversifying HA needs. In one case, the provision of mirrored and shared clustering brought a stable, highly available system as well as reduced cost to a department store in China. In the second case, a robust disaster recovery system was implemented in a Saudi Arabia insurance company enabling the company to overcome disaster without much

difficulty. These are best practices for HA solutions. Best practices based on availability and clustering software are expected to increase in the future.

Compatibility with Virtualization and Cloud Computing

IT systems are undergoing continual change with the evolution of technology. Virtualization is playing a large role in this and is significantly changing the nature of the platform. As a result, improving availability in virtual environments becomes an important challenge that arises. If virtualization continues to gain traction in mission-critical areas, the importance of HA would become much greater. Increased mixing of virtualization infrastructure such as hypervisors and guest OSs will continue to make management of availability more and more complex. If this happens, using the functions of the OS or virtualization software to take care of the management will not result in sufficient reliability of the HA solution or efficiency in managing it, which will serve to highlight the value of third-party availability and clustering software compatible with cross-platform environments all the more.

This could be considered to be the same in the world of cloud computing. Various forms of cloud computing, including public cloud and private cloud are currently being put to the test and no matter what form is ultimately selected, the availability of cloud platforms will undoubtedly be the most important factor in the choice. HA based on availability and clustering software will play a large role in this. Many methods to implement a platform on the cloud are being explored, such as which OS and hypervisor to use, but there is a large probability that many different platforms will be implemented on the cloud to cater to the diverse needs of users. Consequently, compatibility with cross-platform environments based on mixtures of OS and virtualization infrastructure could lead to compatibility with cloud computing platforms.

CONCLUSION

To conclude this whitepaper, we summarize NEC's opportunities and challenges in the HA solution business, and provide recommendations for users.

NEC's Market Opportunities and Challenges

Market Opportunities

- NEC is already firmly entrenched as market leader in the APAC availability and clustering software market for Windows and Linux environments, a market set to grow, and NEC's HA solutions look set for further growth. NEC's HA solutions, which are based on the abundant experience and know-how it has gained in Japan where availability requirements are high, are thought to be gaining the trust of customers around the globe.

- Many different disasters, including earthquakes, are striking in various parts of the earth and enterprises' awareness of business continuity is increasing year by year. The disaster recovery solutions offered by NEC are low cost and simple to deploy, and many users will find them to be an attractive solution.

- Virtual environments and cloud environments are heading toward becoming more cross-platform in nature with mixes of various OSs and virtualization platforms. NEC's initiatives to provide early compatibility with various platforms will play a large role in the coming era of cloud.

Challenges

- HA functions included in OSs and virtualization software packages could possibly diminish the opportunities for the third-party availability and clustering software market. NEC needs to offer users more powerful HA solutions by supplementing or integrating with these built-in functions.

Recommendations to Users

- **Spending on reliability.** The level of availability required from IT systems depends on the industry of the enterprise, its size, business tasks, and services. In systems requiring a high level of availability, users must not compromise on HA solutions under any circumstance. A small compromise can often lead to a large loss. It is important to invest sufficiently in HA solutions, including availability and clustering software, in order to increase availability.

- **Effective use of diverse HA solutions.** You do not know when they will happen. Users need to always expect and be prepared for various unexpected events. The scope of application of availability and clustering software, including disaster recovery, is expanding. Various possibilities should be explored and tried as there are many HA solutions that can be implemented at low cost without decreased reliability compared with other methods.

- **HA measures in virtual environments.** There are great risks to reliability when applications are run on virtual environments. Sufficient consideration needs to be given to what sort of applications should be virtualized in the future, or what virtualization infrastructure and OSs, including mixes of these, need to be selected, and such questions should be answered, in addition to future platform plans and HA in virtual environments, and furthermore HA in cloud environments.

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Vendor Shares of the Global Availability and Clustering Software Market

TABLE 1

Global Availability and Clustering Software Market Vendor Revenues, 2010–2011 (US$M)

	2010	2011	2011 Share (%)	2010–2011 YoY Growth (%)
Microsoft	448	478	23.4	6.5
HP	262	225	11.0	-14.0
Symantec	207	209	10.2	1.1
IBM	161	178	8.7	10.6
VMware	101	132	6.5	31.5
Vision Solutions	94	95	4.7	1.2
NEC	70	77	3.8	9.4
Platform Computing	73	75	3.7	2.2
NetApp	50	56	2.7	12.0
EMC	39	46	2.3	17.8
Others	418	470	23.0	12.4
Total	1,923	2,040	100.0	6.1

Source: IDC, December 2012