

Introduction to Special Issue on Advanced Technologies Driving “Dynamic Collaboration” — Featuring Hardware Platforms

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ABSTRACT As hardware platforms to support “Dynamic Collaboration” age, NEC provides computer products into which we have greatly invested the world’s highest standards of technologies acquired from experience with mainframes and supercomputers, as well as storage products that meet increased data capacity and data protection requirements, and network products that are indispensable in broadband and mobile environments. In addition, we offer the UNIVERGE family of products that combine our proprietary computing and networking technologies. NEC will continue to deliver “high-performance,” “high-reliability” platforms suitable for the forthcoming broadband age, in addition to other products that will contribute to the innovation of the customer’s work style and the creation of enterprise value.

KEYWORDS Dynamic Collaboration, VALUMO, Servers, IPF server, Itanium, HP-UX, Windows, Linux, Autonomous operation, High-reliability, High-performance, FT (Fault Tolerant) server, BladeServer, Storage, SAN, NAS, UNIVERGE, Switch, Router, QoS

1. INTRODUCTION

NEC believes that a company’s enhancement of its core competencies and the mutual linkage of those competencies between companies is the way of the next generation of business. NEC calls this concept “Dynamic Collaboration.” VALUMO, our platform technology supporting “Dynamic Collaboration,” is a comprehensive package of technologies for implementing more flexible, more robust information systems. It is a result of integrating NEC’s watermark technologies acquired through our experience with mainframes and supercomputers and the construction technology for OMCS (Open Mission Critical Systems) that the company has been working on over an extended period.

The following sections introduce our hardware products including server, storage and network devices that realize at a high level three values that VALUMO provides: business continuity, cost reduction, and business expansion.

2. SERVERS

The objective of NEC’s computing business is to become the global technology leader. We develop and manufacture the world’s top-class products including

supercomputers, mainframes, UNIX servers, IPF (Itanium® Processor Family) servers, FT (Fault Tolerant) servers, and blade servers (**Fig. 1**).

Supercomputers are a highly technology-dependent product. And due to our efforts to improve LSI, high-speed signaling, high-density substrate implementation, cooling, and large-scale software technologies to their maximum extent, NEC is now the world leader in the production of vector supercomputers. NEC’s supercomputers are the technological foundation for computing, with a considerable ripple effect on other server products, and worldwide usership (**Fig. 2**). Furthermore, NEC continues to develop and manufacture mainframes for customers’ mission critical operations, cultivating such features as autonomous operation, virtualization, fault tolerance, and non-stop operation from our efforts. These technologies for increased reliability are now expanded to VALUMO, forming the foundation for technology-leading products (**Fig. 3**), in the same way that supercomputer technology spread to various other server product lines.

2.1 IPF Server

First group of products is the high-performance, high-reliability IPF Server for mission critical operations. The IPF Server is powered by Itanium®, which transcends the limits (complexity and scale) of conventional architecture by parallel processing via a compiler. A proprietary chipset incorporating Itanium® and supercomputer technology, firmware

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technology and high-speed crossbar switching realize both high-performance and high-scalability. The world’s No.1 performance has been proven with a 32 CPU server in terms of transaction capability (TPC-C), scientific computing (LINPACK HPC), order processing (SAP SD) and Java performance (SPECjbb2000). Combined with VALUMOWare, the IPF Server realizes mainframe-class robustness such as the virtualized connection of CPU cells and I/O units (realizing flexible configuration change), quick replacement of failed hardware components (autonomous recovery) and additional resource allocation for heavily loaded nodes using open architecture. Furthermore, we conducted product development efforts with the goal of making the IPF Server operable for a variety of customers and operating systems, including Windows, Linux and HP-UX (Fig. 4).

2.2 FT Server

Next group of products is the FT server. That realizes non-stop business operations. The stoppage of public agency, banking and medical systems as well as manufacture production lines and distribution systems is not an option. If operation is stopped, service credibility and sales opportunities, to name but a few, are adversely affected. Therefore, high-reliability is required of all servers, even the lower-priced ones. It is not an exaggeration to say that the competitiveness of servers is determined by their reliability. The Express5800/ft server is NEC’s answer to requirements for highly reliable servers. This server combines a reasonable price tag with high-reliability by integrating open technologies that do not allow system failure to occur if any part of the hardware fails. The Express5800/ft server operates the same program on two systems in a completely synchronized manner, therefore, if any fully duplexed hardware components fail, the system will be able to continue operating with no downtime. Also, it has superb maintainability in that any failed part can be easily replaced while the system is operating. The Express5800/ft server is internationally recognized as an IA (Intel Architecture) based fault-tolerant server and has received a number of awards (Fig. 5).

2.3 BladeServer

The Express5800/BladeServer is a good example of one of the servers carrying the proven



Fig. 1 NEC's computer strategy.

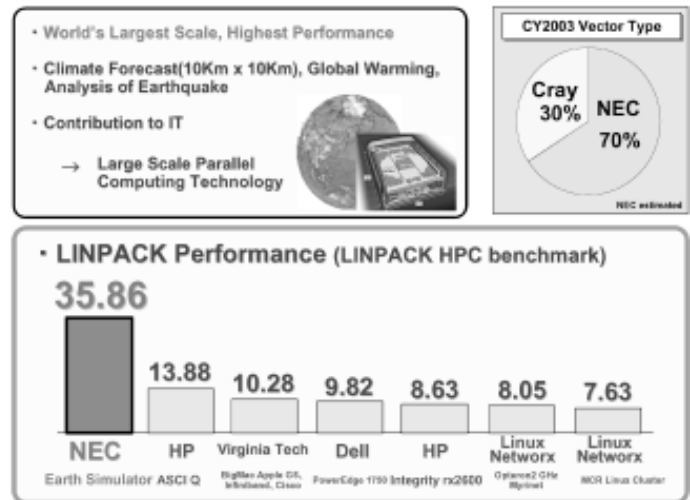


Fig. 2 Supercomputers.

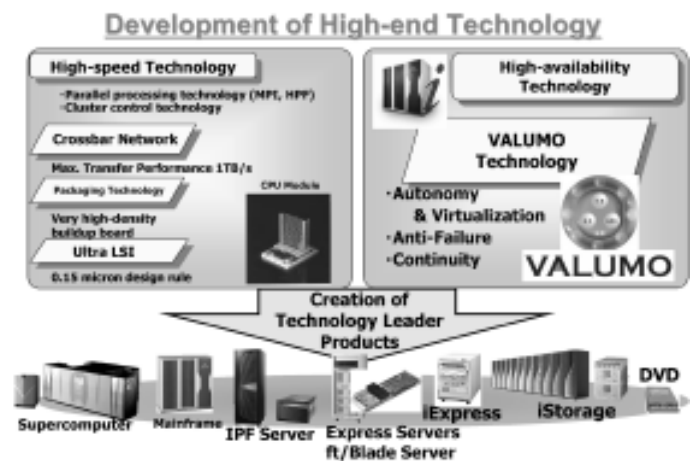


Fig. 3 Technology leader strategy.

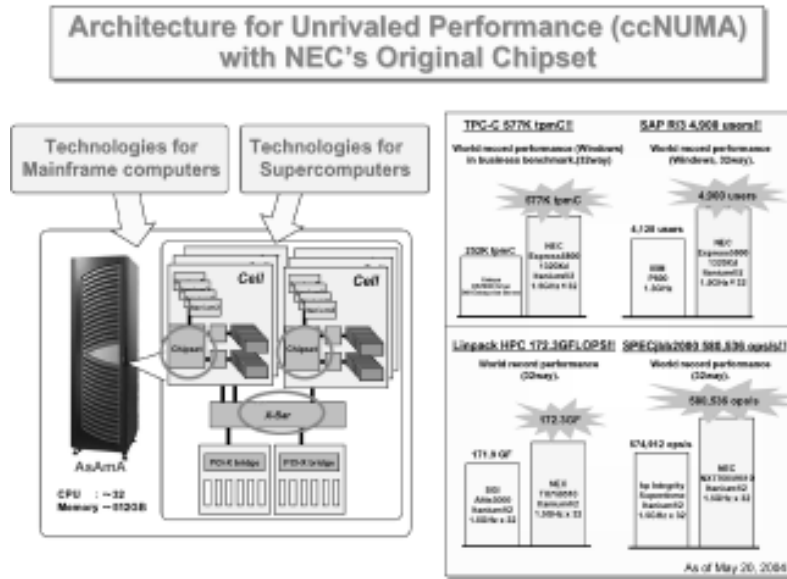


Fig. 4 IPF server “AsAmA.”

technologies cultivated from NEC’s supercomputers and high-end servers. The “BladeServer” is an architecture in which server functions are realized on a single board (blade). The Express5800/BladeServer generously integrates the world’s top-class technologies so as to obtain high performance, maintainability, operability and reliability. As a result, it attains superior performance and scalability due to a mounting density greater than one or more rack servers. Connected with BladeSystemCenter, a VALUMOWare product, the blade can be automatically switched over to a backup blade (N+1 failover) upon blade failure so that repair and maintenance work can be conducted while the system is running. When an excessive number of users access the server system, such as during intensive use of Web services, an additional blade server can be added by merely inserting it into the system (autonomous scale-out). This greatly contributes to a reduction in TCO. NEC continues making efforts to gain higher performance, reliability and availability (Fig.6).

3. STORAGE

The volume of data that requires management is ever growing due to the rise in data exchange frequency caused by the popularity of commercial transactions and emails, the significant increase in data such as files, music and still/moving images, and the growing services related to the spread of ADSL and fiber optics.

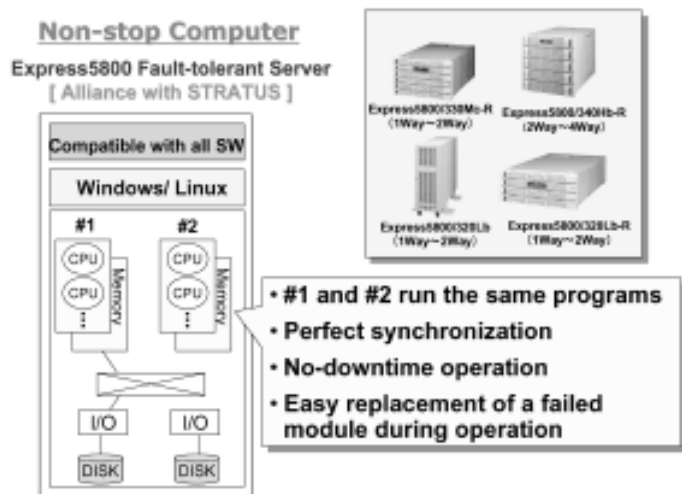


Fig. 5 FT server.

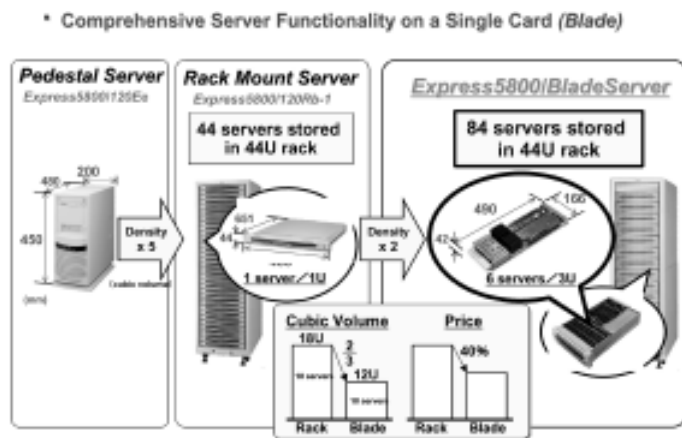


Fig. 6 BladeServer.

People have also become concerned with preventing data losses caused by storage failure, operation mistakes or disasters, and protecting data from leakage. The lack of a timely response to these potential problems may result in lost opportunities for business expansion or put the continuation of business at risk. To deal with these customer concerns, NEC has made full use of its technologies in order to offer a full lineup of storage types in various sizes for a variety of applications, with a focus on SAN and NAS products.

NEC’s SAN products are the world’s best performers with a high transfer rate through employing a high-speed internal crossbar applied from supercomputer memory bus technology. An extensive product lineup is available for from departmental servers and Internet systems to large-scale data centers including ISPs and ASPs (Fig. 7). NEC’s NAS products are also ranked among the world’s top models due to our proprietary high-speed hardware engine (TCP/IP off-load engine: TOE), NVRAM (non-volatile memory), high-performance RAID engine and high-performance NAS software (Fig. 8). These products use technologies such as “Phoenix Technology” that reduces the HDD failure rate to between one-third and one-half, multiple hot-spare discs that provide a spare disc in case one unit degenerates, and RAID 6 that protects data when two units degenerate. In addition, duplexed and redundant structures achieve NoSPOF* (in all SAN products and those NAS products in cluster configuration) and permit non-stop operation (24/7).

By utilizing its abundant experience with supercomputers and PC clusters, NEC has also successfully developed GFS (Global File System), a high-performance, high-reliability technical computing system for heterogeneous environments in which servers of various OSes are interconnected in an open manner and can be linked with various storages. Computers are extensively used for most technology development of automobiles and electronic device products such as body design, electric design, heat generation analysis, noise analysis and operation checks. Generally, tens or even hundreds of

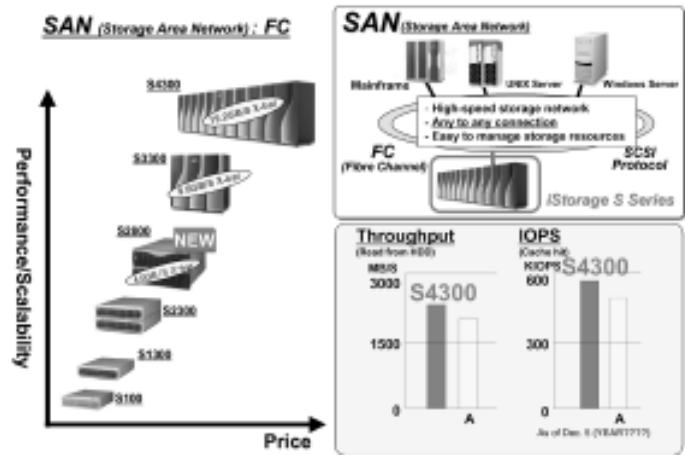


Fig. 7 Storage - iStorage S Series.

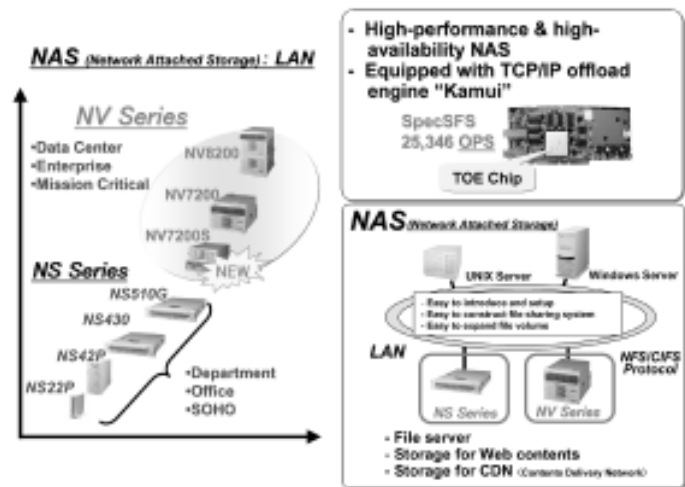


Fig. 8 Storage - iStorageNS/NV series.

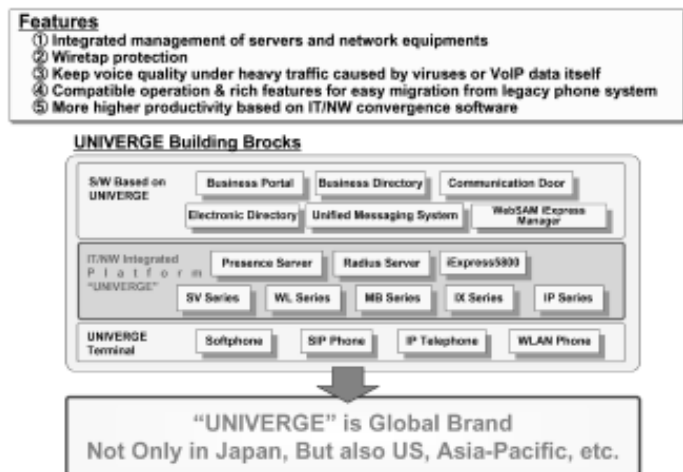


Fig. 9 UNIVERGE.

* NoSPOF: No Single Point Of Failure

engineers work in concert with each other to carry out development. Thus, it is critical that technical information files including design information can be commonly shared by all staff members. Since such technical information files are usually several tens to several thousands times larger than business information files, off-the-shelf database software cannot be used. Servers see this GFS as a widely used NFS (Network File System), yet it can process 1 terabyte or more of data at high speeds.

4. NETWORK

On March 1, 2004, NEC commenced the global launch of “UNIVERGE,” a product family for supporting “IT/network converged solutions” to unify systems for various operations and industries with communication networks, enhance intra-company and inter-company collaboration and operation efficiency, and improve service quality. UNIVERGE was coined by combining “universal” and “convergence,” showing our resolution of “NEC’s initiative to create and expand globally its new value-added products born through the integration of IT and network using open technologies” (Fig. 9).

Key hardware products in the UNIVERGE family include;

1) UNIVERGE iExpress5800 Series

Provides more effective use of various business applications that link voice and data as well as offering ubiquitous environments by converging IT and

network functionalities.

2) UNIVERGE SV Series

A VoIP server series supporting the international standard SIP protocol, and providing abundant PBX functions comparable with the NEAX Series.

3) UNIVERGE IX/IP Series

Provides a stress-free operation environment with its high-speed IP routing/switching functions and QoS technology.

4) UNIVERGE WL Series

- Provides a highly scalable wireless LAN environment while delivering a high degree of security and possessing industry top-class specifications.
- Ensures stable voice quality due to its QoS technology even when voice data are shared.

5) UNIVERGE MB Series

Utilizes mobile IP technology to realize a remote access function with which business systems can be securely used from outside the company or from in-house meeting rooms in order to provide a location-free office environment.

Whichever is chosen, these products possess technologies that are only possible with NEC, a worldwide leader of IT and network technologies.

The following part introduces the next-generation switch and router products as well as their incorporating NEC’s core technologies, which are most

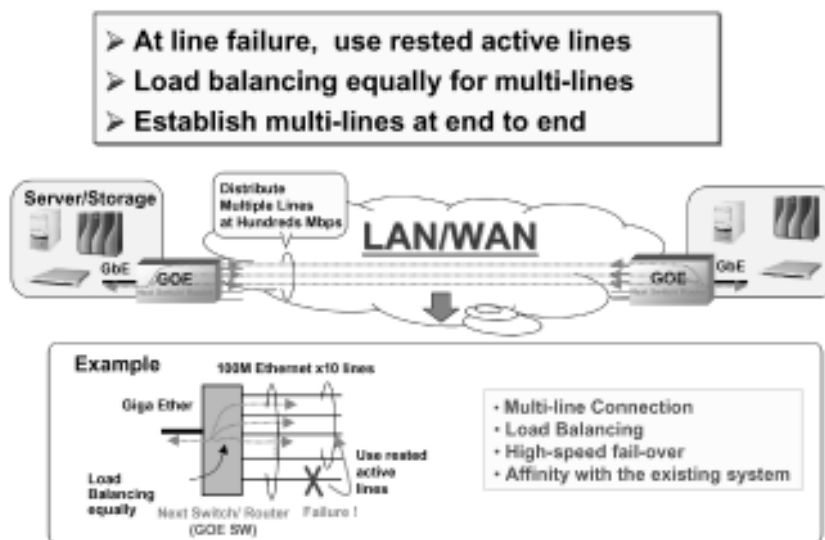


Fig. 10 Core technology of next switch/router.

advanced in the world.

These technologies are Global Open Ethernet technology, enabling low-cost, highly reliable large-scale communication networks, and URL filter engine technology, delivering a high-speed search engine. Global Open Ethernet technology provides operation continuity by enabling other active lines to operate even when a line in operation. It also equally disperses traffic loads by establishing end-to-end multiple lines, and furthermore, considerably strengthens network fault tolerance so that both high performance and speed as well as easy operation are realized (**Fig. 10**).

As networks grow larger and evolve, it becomes more important to protect them from attacks, data leakage, spam mails and other adverse affects. To this end, NEC has developed a URL filter engine that can quickly identify data streams at an application or content level and filter out unauthorized and/or harmful packets. This technology makes it possible to discover malicious contents including viruses and

hacking at a gigabit level, no matter in what part of incoming packets they exist, nor their quantity, and to delete all of them (block off the source).

By combining and using the UNIVERGE family and other NEC innovative networking technologies, network operation-related services, and security-related services, our customers can improve communication and business efficiency as well as reform work styles in a safer and more secured network environment.

NEC will continue developing technology-leading products for the world that harness its originality in order to offer platforms with “high performance” and “high reliability” suitable for the broadband age.

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