

# Commercialization of the “Cloud Platform Suite” and Endeavors toward a High-Efficiency Server

SUZUKI Kumiko, MATSUMOTO Shintaro, YOSHIZAWA Kentarou  
 OCHI Ichiro, SHIMADA Hiroshi, KOGUCHI Kazuto

## Abstract

This paper introduces the Cloud Platform Suite product packages consisting of innovative cloud computing platforms. These include servers, storages, net work devices, software for their integrated management and basic building services for use in creating a cloud environment easily and quickly. It also describes the development of products designed to serve the “REAL IT PLATFORM G2” concept.

## Keywords

cloud computing, data center, server, storage, network, administration, high-efficiency server

## 1. Introduction

The momentum for use of “cloud services” has recently been showing strong gains among enterprises. This is a result of dissemination of the new IT usage mode, which is to use IT without ownership. Under these circumstances, the trend of optimizing the cost of enterprise data centers that use the above technology is becoming increasingly active as also are the service carriers providing cloud services.

Recently there has been a trend toward an increased use of cloud-oriented computing services composed of a large number of IT devices, among both service carriers and enterprise data centers. Interest has also been increasing regarding overall cost reduction, including facility costs (power consumption, air conditioning) as well as the system administration/management costs.

## 2. Cloud Platform Suite

In order to meet the needs deriving from the above trends, we are marketing the Cloud Platform Suite based on the “REAL IT PLATFORM G2” IT platform vision. The Cloud Platform Suite offers highly-efficient platform equipment in a single package, ranging from servers, storages and network devices to administration/management tools. In addition to the excellent cost efficiency and smooth introduction program, total optimization of the administration/management and facility costs across the system domains from hardware to software has also been realized. This achievement is thanks to the advanced affinity between the products in the package.

### (1)Reduction of Introduction Lead Time

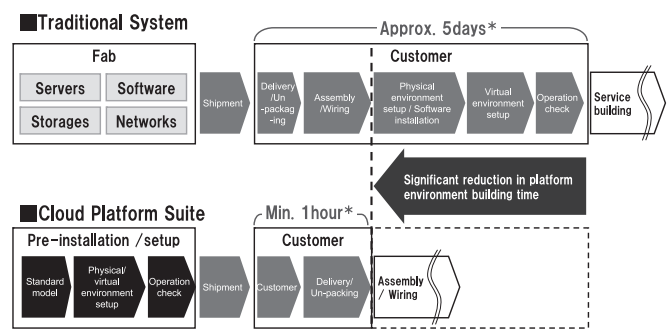
The time and labor required for platform building are reduced by providing the basic settings of a virtualized platform. This strategy also significantly reduces the introduction lead-time and builds a cloud environment smoothly and quickly ( Fig. 1 ).

### (2)Selection of an Optimum Environment According to Various Needs

To provide each customer with an optimum environment, three packages are provided according to the purpose, scale and installation environment ( Fig. 2 ). Every package is capable of optimizing costs of facilities thanks to the efficient use of space, high-density packaging and the use of innovative power-saving technologies.

### (3)Facilitation of Administration Management over the Entire System

A virtual resource controller that features optimum resource deployment and various settings is available for



\* Assuming a configuration equivalent to the Standard Package ( Trial calculation by NEC ).

Fig. 1 Mechanism of lead time reduction.

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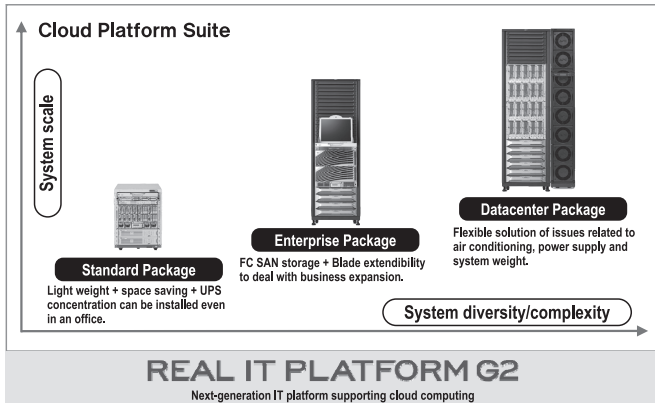


Fig. 2 Choice of three products according to customer environments.

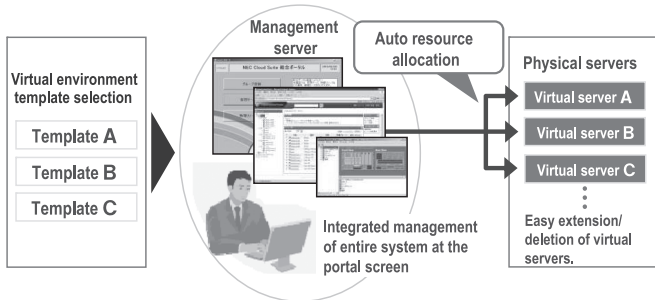


Fig. 3 Resources allocations and other settings.

facilitating the troublesome work required in building a virtual machine. This approach allows even those who are not accustomed to virtualization to allocate and set resources easily ( Fig. 3 ).

### 3. Features of Each Package

#### (1)Standard Package

In consideration of introduction in a general machine-room environment, this package is compatible with 100 V AC power supply and offers products featuring light weight and space saving. It offers a comfortable cloud environment while reducing the introduction cost and administration/management cost.

#### (2)Enterprise Package

This package can flexibly deal with extensions of servers or

Example of installation

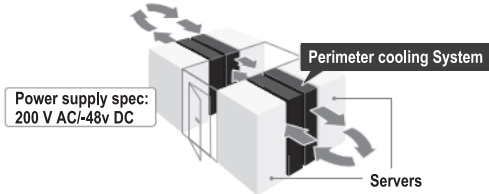


Fig. 4 Example of data center package installation.

capacity in an enterprise data center. It supports business growth both from aspects of extendibility and of reliability.

#### (3)Data Center Package

This package provides servers, storages and network devices featuring high density, light weight and power saving as well as perimeter cooling systems \*1 that can ease cooling restrictions. It is compatible with a -48 V DC power supply that enables effective use of the existing exchange station equipment of communications carriers. This package is capable of optimizing the power consumption, floor withstanding load and air conditioning from the perspective of the entire floor area ( Fig. 4 ).

## 4. Features of the Service Products in the Cloud Platform Suite

### 4.1 NEC Express5800/SIGMABLADE

NEC Express5800/SIGMABLADE (hereafter abbreviated to “SIGMABLADE”) is a product we released in July 2006 as the third-generation blade server. From the initial stage, this product has been providing easy administration/management functions based on the REAL IT PLATFORM vision. Specifically, thanks to its architecture in which the servers, networks and storages are housed in an enclosure, as well as to the unified means of management.

The Cloud Platform Suite also adopts and implements the features and technologies of SIGMABLADE. Among them, in the following paragraphs we will discuss the virtualization technology (vIO control function) and the dynamic power control technology (power capping control), which are implemented by the EM card used to manage the enclosure.

#### (1)vIO Control Function

The vIO control function facilitates CPU blade replace-

\*1 The perimeter cooling systems are the products of American Power Conversion (APC) Corp.

ment by supporting quick restart of operations without affecting the external devices (networks and storages).

Previously, when the CPU blade was replaced, it had been necessary to re-register the addresses or reroute the path for the external devices according to the changes in the physical addresses (MAC addresses and WWN addresses) in the CPU blade. The vIO control function assigns a virtual address to the CPU blade slots in the enclosure and provides the means for substituting the physical addresses of the CPU blades installed in the slots with virtual addresses. Communications with external devices are held via virtual addresses, so it is not necessary to be aware of changes to the physical addresses ( Fig. 5 ).

This function eliminates the need for the server manager to reconstruct the environment based on knowledge of the networks and storages so that a quick start of operations is possible.

**(2)Power Capping Control**

This is the function for continual administration of the over-

all power consumption inside the SIGMABLADE enclosure by controlling it up to a pre-determined Power capping value. The function enables effective use of a limited power supply per datacenter or for continual system operation without generating excessive power.

Specifically, this function sets the power upper limit value to be controlled in the EM card. The EM card monitors the power of all the equipment in the enclosure. When, for example, extension of a CPU blade increases the power consumption to exceed the pre-determined upper limit, this function puts the desired CPU blades into the power-saving mode via the EM card in order to secure the power so that the extended CPU blade can be used ( Fig. 6 ).

This function is not closed within a single enclosure, but it can also set the power upper limit value of the entire system including multiple enclosures. In this case, the EM cards inquire power status between each other and the system operation is continued while controlling the overall power consumption of the system ( Fig. 7 ).

**EM card function: Virtual I/O management “vIO control function”**

Management of virtual I/O (virtual MAC addresses, virtual WWN, etc.) using the EM card significantly reduces work for switch settings, etc. in the case of replacement of servers or switching to standby equipment.

**Previous** Since replacement of a server or switching to a standby system causes changes of the MAC addresses and WWN, it is required to change the settings of switches, etc. based on liaison with the network and storage managers.

- vIO control function**
- Freedom from physical address management
  - No need for switch setting changes, even after server replacement or server switching to standby system
  - Facilitation of liaison with network and storage managers

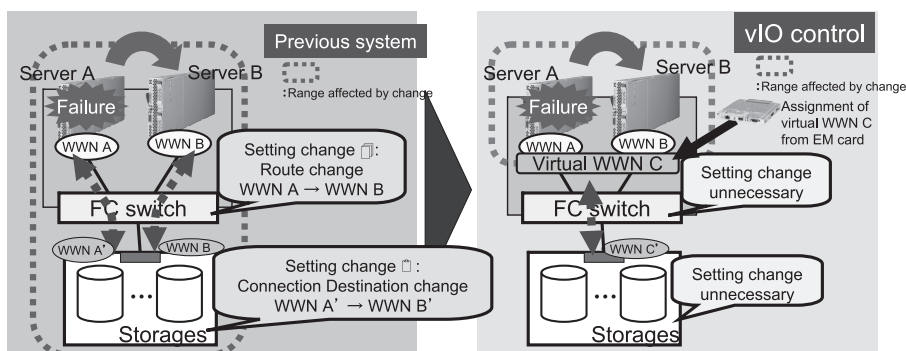


Fig. 5 vIO control function.

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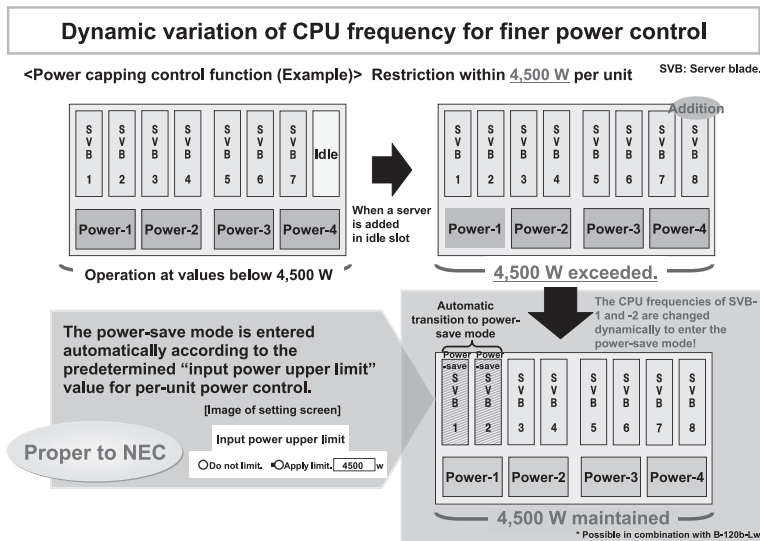


Fig. 6 power capping control.

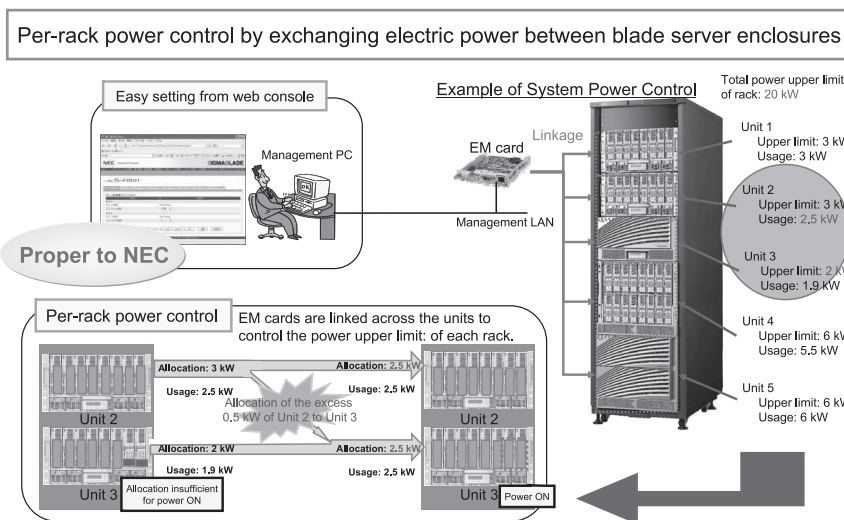


Fig. 7 Inter-enclosure power control.

### 4.2 NEC Express5800/ECO CENTER

NEC Express5800/ECO CENTER (hereafter “ECO CENTER”) is an environmentally-friendly product equipped with the three requisite features; high density, light weight and

power saving. The Server Module “NEC Express5800/E120a”(hereafter “E120a”: Fig. 8 ) achieves up to 54% power consumption reduction <sup>\*2</sup>, 50% footprint reduction <sup>\*2,\*3</sup> and 60% weight reduction <sup>\*2,\*3</sup>.

The Data Center Package of the Cloud Platform Suite boasts

<sup>\*2</sup> Comparison with the previous 1U rack-mount server NEC Express5800/120Rh-1.

<sup>\*3</sup> Comparison at 80 server system.

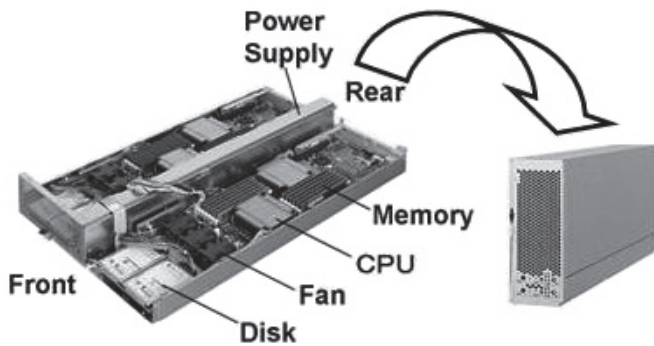


Fig. 8 Internal structure (left) and external view (right) of NEC Express5800/E120a.

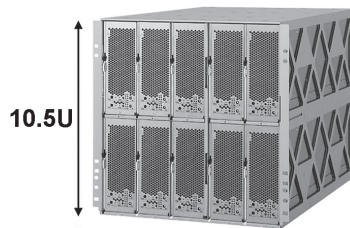


Fig. 9 Server Module Enclosure.

high convenience of installation and high efficiency by making use of these features of ECO CENTER.

#### (1) High Density/Light Weight

One of the most remarkable characteristics of E120a is its unique structure. The module structure composed of two servers and a power supply has made it possible to reduce the volume by more than a half<sup>\*4</sup>. When using a Server Module Enclosure which can have 10 Server Modules (20 servers) (height of 10.5U: **Fig. 9**), up to 80 servers can be mounted in a 42U cabinet.

In addition to the module structure that could reduce the volume of the material used in the Server Module, using lightweight aluminum as material for the Server Module contributes to achieving the ultra-light weight of 4.8 kg per server.

#### (2) Power Saving

Various power-saving components are used extensively for E120a. It uses a highly efficient 80 PLUS Gold power supply with a power conversion rate of 92%. Sharing this power supply by two servers, the high conversion efficiency do-

main of the power supply can be effectively used. A DC (-48 V DC) model is also lined up for use mainly by communication carriers.

CPU is a Low Voltage Intel Xeon Processor. SSD for power saving and high reliability can also be available. The use of these power-saving components not only helps to reduce the server power consumption but also minimizes the heat generated from the servers and thereby contributes to the reduction of the data center cooling cost.

ECO CENTER aims at not only saving the server power consumption but also saving power consumption at the cabinet level. By its unique and dedicated mechanism of “ECO CENTER cabinet”, various cables such as the LAN and power cables can be bundled compactly, while securing a pathway for the exhaust air from the server.

### 5. Toward the “REAL IT PLATFORM G2” Vision

The Cloud Platform Suite described above is a part of our endeavors toward realization of the “REAL IT PLATFORM G2” concept. This concept declares roughly two orientations for the technologies for supporting high-efficiency platforms for cloud computing in the future, including; 1) power-saving, high-density packaging technology for efficient operations, and; 2) HA technology for high reliability and high availability.

To achieve power-saving, high-density packaging, we are tackling the shared, concentration type power supply (Power Bay), which eliminates power supply from individual servers and concentrates the power module outside the servers. This design will enable particularly efficient packaging and operation of servers that are introduced intensively by a large quantity. The shared concentration type power supply enables power operation with the highest power conversion efficiency according to the operating status of multiple servers.

Furthermore, we also aim at practical implementation of the hybrid shared concentration type power supply by combining the shared concentration type power supply and a battery. This power supply can render a large dedicated UPS unnecessary by incorporating the UPS function in the power supply and the power supply assistance by the battery under peak load can equalize the power demand and thereby contribute to power saving.

To provide a cloud platform with high reliability, we will

\*4 Comparison with the previous 1U rack-mount server NEC Express5800/120Rh-1 at 2 server system.

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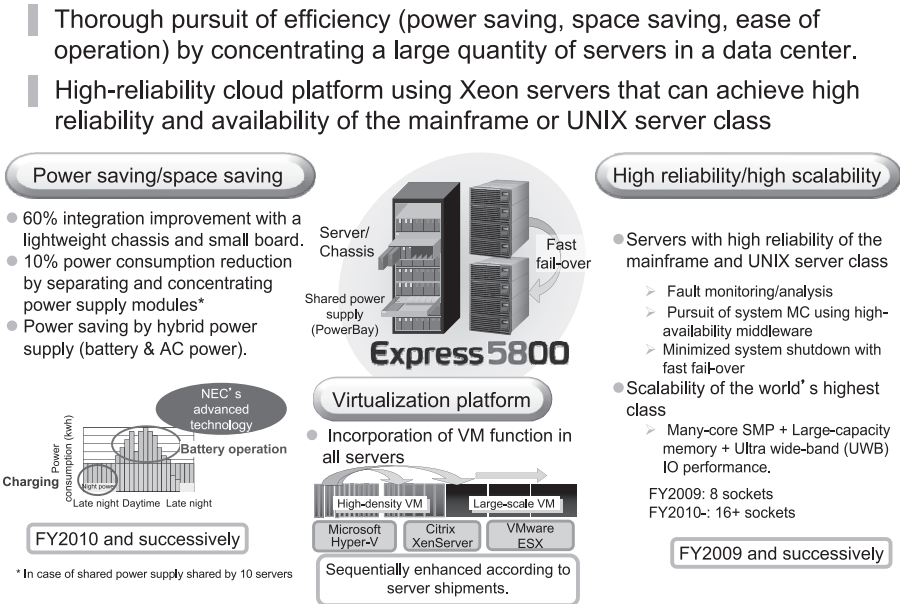


Fig. 10 REAL IT PLATFORM G2 high-efficiency server.

introduce the high-reliability, high-availability, high-scalability technology of mainframes and UNIX servers in the Xeon server. This will lead to the provision of large-scale CPU, memory and IO with the world's highest-class scalability, minute monitoring of faults, localized HW that enables continual operation even after isolation, modularized HW components featuring easy maintenance and replacement, etc. ( Fig. 10 ).

### 6. Conclusion

In this year 2010, we have commercialized the Cloud Platform Suite, a platform optimized for construction of the cloud environment by incorporating the most advanced power saving and high-reliability technologies that have evolved from long years of mainframe development. In the future, we will continually provide products implementing the “REAL IT PLATFORM G2” concept in order to effectively serve expansion of our customers' businesses.

\*The brand names and product names mentioned in the above are the trademarks or registered trademarks of their respective owners.

### Authors' Profiles

**SUZUKI Kumiko**  
 Manager  
 Application Appliance Division  
 IT Hardware Operations Unit

**MATSUMOTO Shintaro**  
 Assistant Manager  
 Platform Planning Division

**YOSHIZAWA Kentarou**  
 Manager  
 IT Hardware Operations Unit

**OCHI Ichiro**  
 Manager  
 IT Hardware Operations Unit

**SHIMADA Hiroshi**  
 IT Hardware Operations Unit

**KOGUCHI Kazuto**  
 Manager  
 IT Hardware Operations Unit