Cloud-oriented Data Center Platform

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Abstract

The “cloud-oriented data center platform” is the foundation for the provision of all NEC’s cloud services, including SaaS and the consortium center services. This paper introduces advantages and features for the customer including technological ones that are based on NEC’s acquired knowledge and expertise.

This paper also describes the service deployment strategies that are planned for inside as well as outside Japan.

Keywords

cloud computing services, data center, system administration
integrated monitoring, service management

1. Introduction

The dissemination of cloud services has been changing the business environment that surrounds the data center, which functions as the foundation of the provision of cloud services.

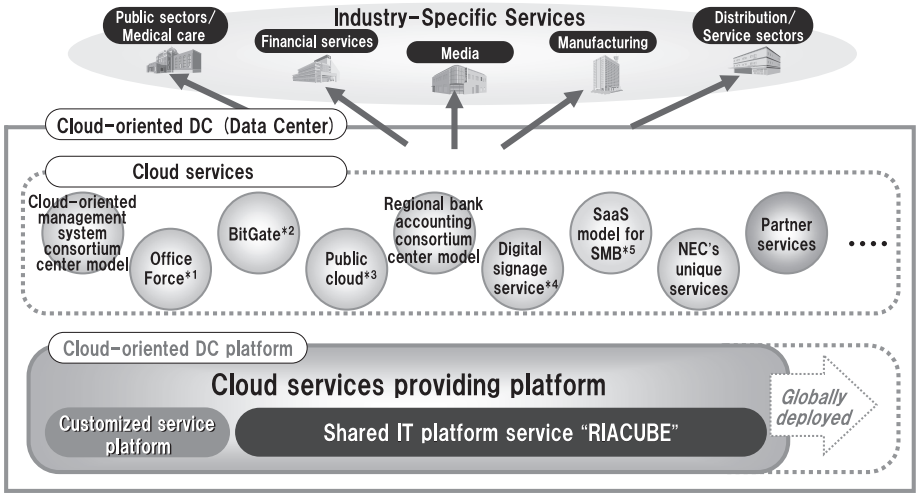
The advantages for the users of cloud services include cost reductions and speedy installation. These benefits are enabled thanks to the advanced preparation by the service providers of standardized IT services.

In order to provide these advantages, the data center is required to offer: a choice of functions, reliability, security & compliance, eco-friendliness and flexibility at levels that have hitherto been unavailable.

This paper introduces the cloud-oriented data center platform proposed by NEC to support the era of cloud services.

2. Outline of the Cloud–oriented Data Center Platform

At NEC, we have established a mid-term program aimed at increasing the services business of enterprises organizations



*1) Collaborative ware “StarOffice X series” SaaS model service (announced July 15th, 2009).
*2) PaaS model platform service “BitGate” (announced May 12th, 2009).
*3) GPRIME for SaaS released (announced January 22nd, 2010).
*4) Digital signature service solution started (announced July 1st, 2009).
*5) Enhanced Service business for middle- and small-enterprises (announced February 15th, 2010).

Fig. 1 Positioning of the Cloud-oriented Data Center Platform.

(including private firms and governmental agencies) to 500 billion yen by FY2012. The service business consists of two pillars. These are the outsourcing business, which is a traditional service in which the systems of each customer are deposited in the data center and the cloud services business, which is a newly introduced business model. In the future we are planning to place emphasis on the cloud services business.

In the traditional SI and outsourcing services, we were entrusted with the administration and maintenance of systems that were created specifically for each company and which were operated individually. On the other hand, with the cloud service, we standardize the IT resources (HW, middleware, management tools and business applications) based on the past achievements of NEC, prepare them at a data center and provide them via cloud services such as SaaS and consortium center service [*1] .

This policy allows us to provide customers with expertise in the construction and operation of business applications, focused on the mission-critical systems that have been developed over the course of our past SI (System Integration) business. It also enables us to benefit from safe, secure and highly reliable application services that are able to apply NEC's original technologies quickly and flexibly and in a form that can assure cost advantages to the customer (**Fig. 1**).

3. Customer Advantages

The cloud-oriented data center platform offers the customer the following four key advantages.

(1) Possibility of System Building/Maintaining Cost Reduction

The cloud-oriented data center platform concentrates and standardizes the requisite IT resources to enable system retention so that effective utilization of the entire range of IT resources may be advanced.

In addition, active utilization of the results of NEC's research & development program, such as system service management, high-efficiency infrastructures and the automation/autonomy of its operations and monitoring procedures can achieve significant improvements in IT resource availability. This situation has hitherto not been possible due to the nature of individual company operations. The resulting cost reductions lead to good returns for the customers.

(2) Improved Response to Changes as a Result of Enhanced Flexibility of IT Resource Utilization

The pooling of servers, storages and network devices at the data center and the active creation of system environments to suit each customer by using virtual software (SW) and programmable flow switches enable the effective use of resources (Resource pooling).

When SW is required, its distribution, installation and setting modifications are performed automatically based on predetermined specifications (Provisioning).

Thanks to the functions discussed above, customers do not have to prepare IT resources while assuming a peak value assessment for business volume in the system before actual operations commence or in consideration of projected seasonal fluctuations. Instead, they can now use the required IT resources for the required amount and the required period.

In addition, in case a hardware (HW) fault occurs or if the system load increases, isolation of the effected module, alternative resource allocation to the standby HW in the pool and any additions are performed automatically so that the fault recovery time can be shortened (System reallocation).

(3) Possibility of Use of Required Services without the Need for Data Centers

The individual cloud-oriented data center platforms are interconnected via an inter-data center NW. The customers can utilize NEC's cloud service by connecting their own intranets to the inter-data center NW.

(4) Creation of New Values Based on Service Linkages

The cloud services of partners as well as of NEC and other associated services are linked via the cloud-oriented data center platforms and service centers (bases of service provision).

Thanks to this function, the cloud service is capable of creating new value that matches customer needs when it is combined with an operation such as the BC/DR (Business Continuity/Disaster Recovery) operation to prepare for disasters or to support the sealing/stamping operations of local governments.

4. Features

The technological features and service operations of the cloud-oriented data center platform are discussed below, from

[*1] Service model in which multiple customers belonging to the same industry and having the same motivations together form an industry wide organization and utilize business applications on a shared system platform. NEC supports inter-industry collaborations aiming at the standardization of business processes and applications.

Cloud-oriented Data Center Platform

six viewpoints.

(1) Data Center Facilities

Any cloud-oriented data center platform must have either a quake-absorbing or quake-resistant construction. Furthermore, two-line power reception from power generation plants, an emergency power generator for use in the case of power failure and redundancy of UPS (Uninterrupted Power Supplies) are also adopted. In order to ensure continual service provision, even in the case of a broad-area disaster, the data centers distributed nationwide back up the data of other data centers by using the inter-data center NW.

(2) Security and Compliance

The platform features enhancement of internal auditing and external guarantees. This is in addition to the physical security measures possessed by ordinary data centers such as the entrance/exit management system and invasion detection sensors and the acquisition of/compliance to ISMS and privacy marking. The pathways are managed and the transparency is guaranteed by automation of monitoring (log collection, analysis and reporting) and implementation of the operations platform as an information system (auto provisioning, monitoring and reporting).

The provision service of the statement based on the Practical Guideline No.18 issued by the JICPA Auditing Standards Committee Statements [*2] titled "Assessing Control Risk for Entities Using Service Organizations" is also provided for customers.

(3) Eco-friendliness

It is said that about 1/3 to a 1/2 of the costs of a data center is a result of its power cost. The reduction of the power consumed by a data center is therefore an important issue, not only from the environmental viewpoint but also with regard to cost considerations.

The cloud-oriented data center platform performs optimum control of the power consumed by the entire data center by using environmentally-friendly platform products such as power-saving servers and by interconnecting with facilities such as sensors. Other technologies adopted include floor design in consideration of the airflow and local cooling based on heat simulation studies.

In addition, sensors are installed at the data center to monitor the power and temperature conditions. Steps are also taken to improve the power utilization efficiency of the data center by means of benchmarking by using indices such as PUE [*3] .

It is planned to conduct research into next-generation technologies including free cooling [*4] using outdoor air, high-voltage DC power supply and ultrahigh-efficiency UPS using lithium ion batteries.

(4) Integrated Operations Monitoring

The services of the cloud-oriented data center platform are subject to 24-hour, 365-day centralized monitoring by the integrated operations monitoring center. The integrated operation monitoring center performs rule-based alerts sorting and automates the corresponding operations aimed at reducing the burden of operator mistakes and supports the rapid implementation of operations.

Also, the unified management of multiple virtual environment systems with different HW, OS, middleware and business applications enables scenario-based automation and autonomous running of various operational procedures that have hitherto been executed manually. These include the modification of physical configurations or virtual environments, application of patches, startup and completion confirmation of jobs. This enables improved operational efficiency of server systems at a scale of some tens of units.

The experience and expertise obtained via operations are accumulated in a knowledge database, which is referenced during normal operations as well as in the case of an incident or fault. The business process is also linked with NEC Fielding, Ltd., which as the company in charge of NEC's maintenance services, contributing thus to the improvement of operational efficiencies and provides an early solution to faults.

(5) Service Platform

The cloud-oriented data center platform offers an IT service platform targeting the accommodation of business applications.

Combinations of HW and SW products are designed for each system application or characteristic in advance. After evaluation and verification, the system models are built into the virtualized environments to enable provision of services

[*2] When development, administration and/or maintenance are outsourced to another party, the Japanese SOX law requires assessment of internal governance situation of the outside party. If this is not done by the outsourcing enterprise, it is necessary to acquire a statement based on Practical Guideline No.18.

[*3] An index of data center energy efficiency improvement proposed by The Green Grid (TGG). It is calculated with the following formula.
PUE = Power consumption of entire data center/Power consumption of IT devices in the data center

[*4] System for producing cold water for use in air conditioning, etc. using outdoor air from seasons with low air temperatures. This procedure can bring a significant energy-saving effect because it does not need a cooling machine for producing the cold water.

(RIACUBE service).
We do not offer details of the RIACUBE service on this occasion as this is introduced in another report.

(6) Service Delivery (Service Management)

Application of operations standards, rules and methodologies that are effective with traditional outsourcing and hosting services is provided for the management of cloud services in order to achieve highly reliable, continual delivery of services.

Specifically, the operations rules that have been prepared for the service design/development phase include the operations design procedures incorporated in APPEAL. This is the standard development methodology of NEC and is the operations design process methodology that defines formats for the required operations documents. Also prepared are those rules prepared for the operation/maintenance phase, including the standard operations process rules, SLA (Service Level Agreement) rules and SOW (Scope Of Work) that define the service layers and the operations work and the roll allotments of each layer.

Fig. 2 shows diagrammatically the technologies that are concentrated in the cloud-oriented data center platform.

5. Domestic/International Deployment

In addition to the cloud-oriented data center and the outsourcing data center for all industries outlined above, NEC is also preparing improvements for the data center to be compliant to the FISC [*5] Security Guidelines for Banking and Related Financial Institutions. To support these three types of data centers, we have appointed about ten centers in Japan as the main data centers and are concentrating investment in these (some of the centers have their outsourcing service floor separate to the cloud service floor).

With regard to the Japanese regional markets that cover local governments, etc., we will establish regional block data centers of the locally-based type by enhancing some of the data centers of the traditional partners and group companies.

The regional block data centers will be connected to the

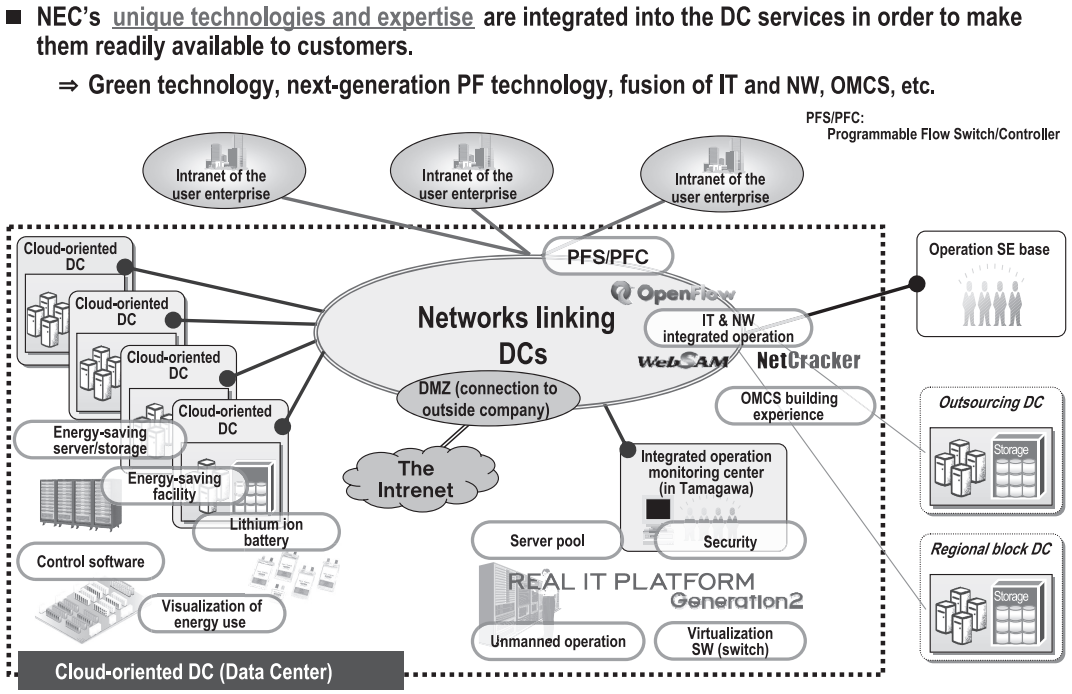


Fig. 2 Technologies concentrated in the Cloud-oriented Data Center Platform.

[*5] The Center for Financial Industry Information Systems.

cloud model data centers via the inter-data center NW as required. The provision of services closely associated with local regions and customer properties such as local consortium centers for local governments will offer further enhanced value for the cloud service.

For overseas policy, we will deploy cloud services for Japanese enterprises that are expanding overseas as well as for local enterprises. The cloud-oriented data center platforms required for this purpose will be built by leasing data center facilities based on partnering agreements with local IT enterprises and by supporting them with NEC technologies and expertise as described in previous sections.

The operation monitoring service for these data centers will be provided based on role allotments in which the local IT enterprise partnering NEC performs the actual monitoring based on standard system model design/construction procedures and the standard operation procedures provided by NEC. The platform products installed at the local data centers (HW and SW) will not always be NEC products but will be selected flexibly in consideration of the needs of the local markets.

6. Conclusion

We believe that the expectations of customers regarding cloud services will grow more and more in the future. With regard to the cloud-oriented data center platform that is the foundation for the provision of cloud services we plan to further advance technological research, service developments and service delivery efficiency improvements. This strategy aims at meeting the market expectations for lower prices, higher quality, higher safety/security and higher flexibility.

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