Fujitsu's Approach to Cloud Computing

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Cloud computing (hereafter cloud or clouds) has come to be specifically used in various fields. Private clouds are used in enterprises. Groups and individuals use public clouds. Clouds are also used by new businesses and for innovation. The cloud that Fujitsu is focusing on is one that serves as ICT infrastructure and that creates value when used to build new businesses and services with customers. Fujitsu is developing technology, products and solutions for this cloud as a comprehensive service. Fujitsu is aiming to help build an environmentally friendly and human-centric intelligent society by having this cloud used widely and safely in the social infrastructure field where ICT has yet to advance. This paper introduces the areas of application of such cloud, the strong points of Fujitsu's cloud, the use of cloud in society's infrastructure and the future direction to take in developing clouds.

1. Introduction

Cloud computing (hereafter cloud or clouds) has come to be used in practical applications in various fields following the dissemination of it as a keyword or of its image. In enterprise information systems, private clouds are increasingly widely used for overall optimization of ICT and use of public clouds by groups and individuals is becoming more and more popular. Cases where clouds are used for new businesses and innovation have appeared.

Fujitsu sees clouds as "ICT infrastructure that creates value when used to build new businesses and services with customers." To offer its technology, products and solutions to customers as a comprehensive service, Fujitsu is developing a new service business that makes use of clouds. The aim is to expand the areas where clouds are applied to social infrastructure by applying them to fields where ICT has yet to advance.

This paper presents the areas of application of clouds, strong points of Fujitsu's clouds, use of clouds in society's infrastructure and the future direction to take in developing clouds.

2. Areas of application of cloud

At present, ICT has roughly four major challenges:

- To structurally reform ICT costs to achieve strategic investment by reducing costs
- To achieve a better and quicker response to management needs, accelerate management decision making and thus enhance the response at the frontline
- To strengthen the basis of enterprise group and enterprise global management by integrating and standardizing business systems
- To create new businesses and launch new businesses by starting small

Aiming to find solutions to these challenges by taking advantage of cloud, Fujitsu offers various services and products including private

and public clouds in a systematized manner.[1] Fujitsu also provides hybrid cloud integration, in which the areas of application of clouds are defined as the following three, and clouds are combined in the most suitable manner (**Figure 1**).

1) Mission-critical system (back office)

Use of cloud technologies such as virtualization and automation to integrate individual systems and thus achieve overall optimization of ICT

2) Front system (business frontline)

Use of clouds that allow prompt construction of systems by starting small and thus enabling unsystematized frontline operations to be conducted and new businesses to be launched

3) Social system (social infrastructure)

Realizing new services and businesses via cloud, which is capable of collecting, analyzing and utilizing large amounts of data, for industries and social systems where use of ICT has not yet been popular

3. Merits of Fujitsu's clouds

Fujitsu's strength is its ability to provide and build different types of clouds in various areas. That is, Fujitsu can comprehensively offer cloud platforms and support services with high reliability, SI services backed by many years of experience, and support that help customers to expand around the world. Offering these three merits in a comprehensive manner allows customers to make use of clouds to create new value. The following sections describe these three merits.

3.1 Trustworthiness (reliability of Fujitsu)

To make customers' systems reliable with cloud and provide full support 24 hours a day, 7 days a week, Fujitsu devotes all its energy to ensuring a trusted cloud environment.

To this end, Fujitsu has built a cutting-edge data center in Tatebayashi City, Gunma Prefecture, to realize top-class facilities in Japan in every respect of being resistant to earthquake disasters, ensuring security and conserving energy. Added to these are support services bolstered by many years of know-how in operating data centers, which makes Fujitsu able to provide high-quality services for public and private clouds.

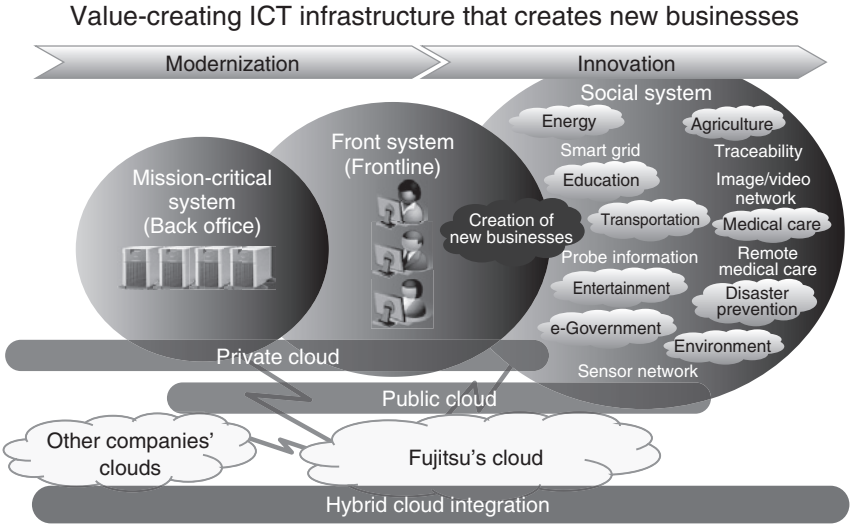

Figure 1
Areas of application of cloud.

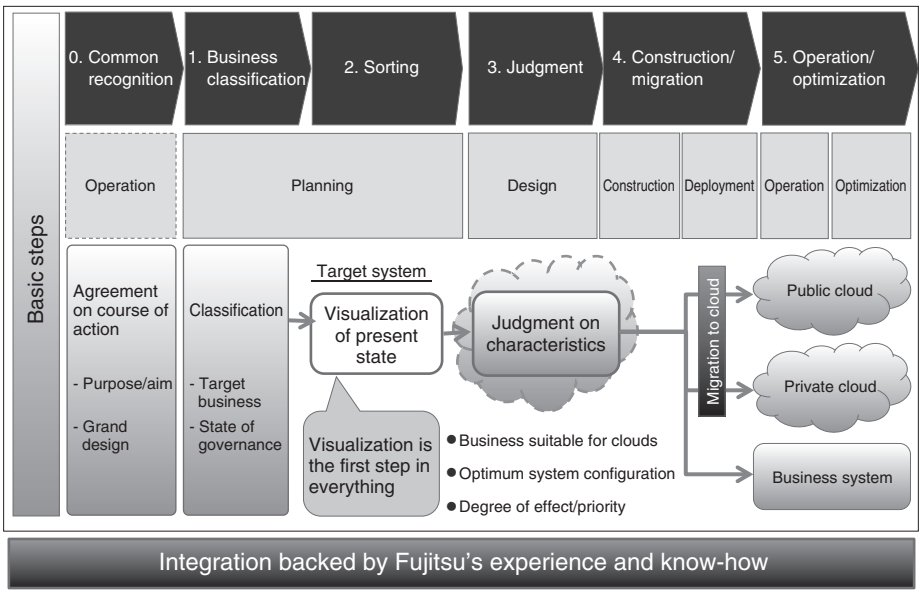

Figure 2
Approach to switching to cloud.

The On-demand Virtual System Service[note)] that started as a commercial service in 2010 is IaaS with high reliability, as demonstrated by its availability rate of 99.99%. The service is equipped with highly reliable functions to allow full-scale use in business environments. Such functions include excellent fault tolerance with automatic fail-over, which copes with failures of physical servers by restarting a virtual machine on another physical server; performance-ensured service provision, which ensures the performance of the virtual machine assigned; high-data integrity, achieved by using a redundant disk configuration; dual network backbone; and network connection flexibility that supports the Internet and Intranet (VPN).

Regarding security measures, Fujitsu has established Cloud CERT. This is an organization that promptly deals with security threats, to ensure a high level of global security with unified security policies and intensively monitor any vulnerabilities and attacks. In this way, Fujitsu offers tight security.

3.2 Optimum integration (Fujitsu's comprehensive strengths)

The optimization of an entire ICT system with cloud requires rich experience and know-how in system integration. Viewed from the perspective of systems alone, it is not possible to come up with the best possible answers to questions such as what results can be achieved by migrating the existing system to a cloud-based one, or which operations should be the first to put into a cloud environment so as to reap greater benefits.

Fujitsu has a methodology based on its experience of integrating as many as 25 000 systems, a thorough knowledge of customers' businesses and ability to make proper analyses and judgments. That is what Fujitsu believes is the basis of its ability to propose the optimum cloud environment (**Figure 2**).

note) In June 2011, it was named as Fujitsu Global Cloud Platform "FGCP/S5" service in Japan market and Global Cloud Platform (GCP) service in overseas markets.

3.3 Quality in global services (Fujitsu's world-class quality)

Fujitsu offers highly reliable cloud services of a uniform quality all over the world. The global expansion of cloud platforms is being promoted in various parts of the world including Australia, Singapore, the U.S., the U.K. and Germany. In June 2011, Fujitsu started Fujitsu Global Cloud Platform "FGCP/S5" service in those countries in addition to Japan where the service has already been available since October 2010. In Europe, the service system is reorganized into an area-specific total solution type of system that can quickly respond to needs in the cloud age. In China, Fujitsu is building a new data center.

In addition, Fujitsu is continuing to make alliances with world-class ICT and cloud vendors as mentioned below to offer the most appropriate cloud services to customers that are expanding globally.

1) Microsoft

Provision of Fujitsu's cloud services, FGCP/A5 Powered by Windows Azure, started in August 2011. Fujitsu's hardware including servers and storage is extensively adopted to provide public cloud services based in the Tatebayashi System Center.

2) salesforce.com

System integration services in relation to the introduction of cloud will be offered on a global scale. Fujitsu has worked with over 200 customer companies in areas such as applying the Salesforce CRM, building business applications on Force.com, which is salesforce.com's platform, and linking with Fujitsu's middleware services. Based on this track record, Fujitsu will combine its unique technologies and services to propose ways in which customers can optimize their overall ICT systems.

4. Use of clouds in social infrastructure

Fujitsu aims to make the most of these distinctive strengths of Fujitsu's clouds to optimize customers' ICT infrastructure, found new businesses and foster new business development and business incubation on cloud platforms intended for social infrastructure including medical care, agriculture, education, energy and transportation. In this way, Fujitsu will globally expand new business models to realize intelligent societies (**Figure 3**).

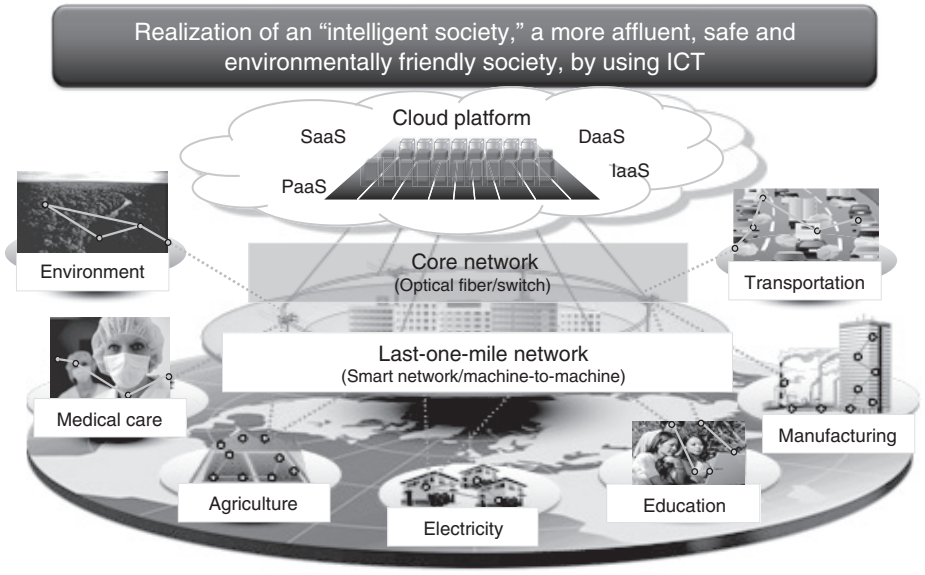

Figure 3
Intelligent society.

This section presents examples of using clouds in three fields that are not mentioned in this special issue.

4.1 Education

In the field of education, clouds are used in the Future School Promotion Project[2], which is currently undergoing demonstration trials by the Ministry of Internal Affairs and Communications in Japan. In this project, the Fujitsu Group is supporting activities at five elementary schools in Western Japan, such as by providing each child with a tablet PC, building infrastructure such as wireless LANs and interactive whiteboards, setting up portal sites for information sharing, and building a cooperative educational platform for delivering education materials (education cloud). The following describes the practical support Fujitsu is providing for new cooperative education by making use of ICT (**Figure 4**).

1) Intra-school cooperative education

Fujitsu is helping to make classes more practical so that children can learn more actively, and mutually learn and teach by making use of tablet PCs and interactive whiteboards.

2) Inter-school cooperative education

Fujitsu is taking advantage of the features of ICT that allows information to be shared between different places and at different times to realize classes that cooperate with other schools.

3) School-home cooperative education

Fujitsu is supporting school activities in which the state of children's learning is shared with their parents to foster a feeling of trust between the parents and the school and get parents more involved in children's home learning.

As a part of the system to support these types of cooperative education, a help desk (support contact) to encourage the use of ICT will be established and at least one ICT support personnel that supports demonstration experiments will be assigned to each school.

4.2 Industry

Aircraft maintenance services are one example of using clouds in the field of industry. Based on strategic cooperation between Fujitsu and Boeing of the U.S., these services make use of automated identification technologies (AITs) such as RFID for the efficient maintenance of aircraft.[3] For the services, RFID tags are

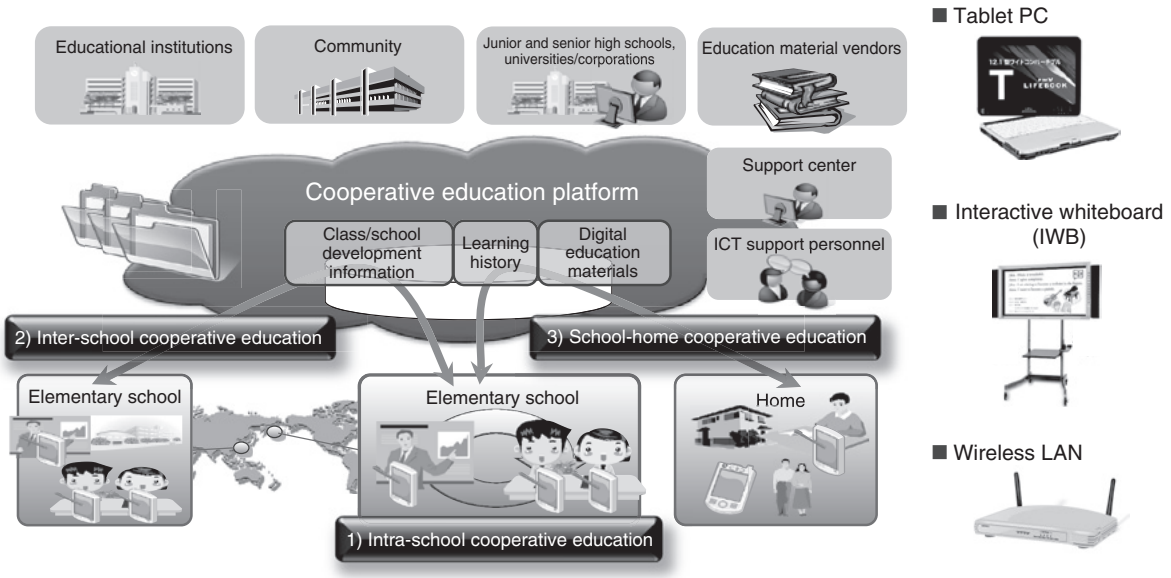

Figure 4
Future school.

attached to about 2000 parts per aircraft and they automatically gather data when the aircraft are undergoing maintenance. The data are stored in a cloud system and analyzed to manage the aircraft parts, the way they are applied and inventory so that aircraft materials are used efficiently. Furthermore, there is a long-term plan that aims to develop solutions for all airline operations by utilizing data from AITs and Boeing plans to offer these services to airlines.

4.3 Disaster restoration support

Following the recent and unprecedented disaster of the Great East Japan Earthquake, Fujitsu had been implementing the "Great East Japan Earthquake Special Cloud Support Program" by the end of July 2011. This offered cloud services that allow people to promptly use systems gratuitously for three months, and was intended for corporations, local governments and nonprofit organizations engaged in activities for recovery and restoration, with the highest priority given to supporting disaster restoration.[4)]

1) Cloud infrastructure gratuitous offering program (five services)

The On-demand Virtual System Service and On-demand Hosting Service allowed people to use the server and storage environments established in Fujitsu's data centers, backup environments for important data and disaster recovery environments. Network environments for closed user groups between offices in disaster-hit areas and/or work environments of employees standing by at home and internal systems of the corporation were also offered.

2) Application gratuitous offering program (seven services)

To help corporations and organizations in need of a way to confirm the safety of their employees, obtaining information on damage and offering livelihood support and E-mailing reports on their activities in disaster-hit areas, SaaS applications for SNS, E-mailing, Web conferencing and e-learning were provided.

Fujitsu received about 40 inquiries in just one month after the launch of this program. The system was mainly intended to aid in early recovery, which indicates that cloud's distinctive capability of allowing systems to be promptly established is the reason for its effective use.

Some examples are shown below.

- Use of groupware for gathering and sharing information about the damage in disaster-hit areas
- Use of SaaS-based E-mail service to cope with the loss of E-mail servers among corporations in disasters-hit areas
- Use of a network from temporary offices or homes after restrictions were placed on people entering offices in disaster-hit areas
- Use of the On-demand Virtual System Service by ISV as infrastructure for offering free SaaS to disaster-hit areas
- Measures for increasing access to Web servers which offer disaster-related information

5. Conclusion

With the vision of achieving a human-centric intelligent society, Fujitsu aims to build a more affluent, safe and environmentally friendly society by making use of ICT. To achieve social and business reform by making the most of the value created by human wisdom and behavior and environmental changes, highly reliable ICT infrastructure that allows secure use of large amounts of data is indispensable, and Fujitsu's cloud with its strengths will play an important role.

Social infrastructure is expected to increasingly become enhanced in the future. Under such circumstances, Fujitsu is committed to providing the most advanced ICT including cloud technology, devices, mobile and volume data gathering and analysis. In this way, Fujitsu will help achieve an affluent, safe and environmentally friendly society through conducting practical activities with its customers.

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Mr. Miyazawa is currently engaged in developing a business strategy for and promoting Fujitsu cloud in general.