

Fujitsu's Approach to Server System Development

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In 1954, Fujitsu released FACOM100, the first relay computer to go on general release in Japan. Since then, it has been developing and providing new technology, under the theme of high performance and high reliability, to meet customer requirements amid the paradigm shift in ICT. Currently, the computer paradigm is changing owing to changes in corporate needs for ICT, technological innovation (e.g. virtualization technology), and changes in social environments such as global warming. There are needs for servers, which are part of ICT and Cloud computing infrastructure, to cope with these changes. This paper introduces Fujitsu's efforts for server strategies, server development and new server platforms against the background of the new computing paradigm and developments in Cloud computing.

1. Introduction

Currently, a paradigm shift toward next-generation computing is going on.

The propagation of broadband infrastructure and development of virtualization technology have promoted full-scale introduction of Cloud computing, spurred on by requests from society. Cloud computing is a computing model that allows ICT resources in a data center such as servers, storage, middleware and applications to be used as many times as needed, from any place at any time.

Since 1954, when Fujitsu released FACOM100, the first relay computer to go on general release in Japan, it has been developing and providing the latest technology, under the theme of high performance and high reliability. The aim is to meet customer requirements amid the paradigm shift in ICT, while encompassing the stages in this shift based on mainframes, personal computers and the Internet.

This paper introduces Fujitsu's efforts for server strategies, server development and new

server platforms against the background of the new computing paradigm and developments in Cloud computing.

2. Background to the development of Cloud computing

Changes in corporate needs for ICT, technological innovation and changes in social environments are three key contributing factors that promote Cloud computing.

2.1 Changes in corporate needs for ICT

Since the economic crisis triggered by the collapse of Lehman Brothers in 2008, the corporate environment has changed drastically. With deteriorating economic environments, companies are keen to reduce costs and expenses. This has led to companies cutting back on their ICT budgets.

However, to cope with increasing market pressure to ensure corporate social responsibility (information security, corporate governance, IFRS, sustainable business), companies need

to deploy ICT that can cope with this kind of uncertain business environment in a flexible and prompt manner while reducing costs.¹⁾

As a consequence, companies' general awareness about actively using ICT has been changing drastically. Companies are going from the stage of reducing total cost of ownership (TCO)—total costs related to the introduction, maintenance and management of a computer system—to the stage of improving intra-company utilities and developing utility services (Figure 1).

2.2 Technological innovations

Technological innovations such as network and virtualization technologies also support the deployment of Cloud computing.

1) Faster network systems

Broadband communications such as motion picture distribution and online shopping have become part of our everyday life. Since the Next-Generation Network (NGN) started commercial operations and versatile access technologies

such as optical fiber connection and broadband wireless connection in households became widespread, people can access networks at any time or any place.

2) Progress of virtualization technology

A provisioning technology that enables a system to provide resources to multiple devices, and a live migration technology that transfers a virtual machine in execution to another physical server, have made it possible to have automatized management such as load distribution across multiple physical servers. This automatized management makes large-scale system management feasible.

2.3 Changes in social environments

Japan is faced with a host of social challenges including an aging society with a low birth rate, global warming and economic revitalization. Extended application of ICT in the social field is expected to be a solution that can address these issues.²⁾

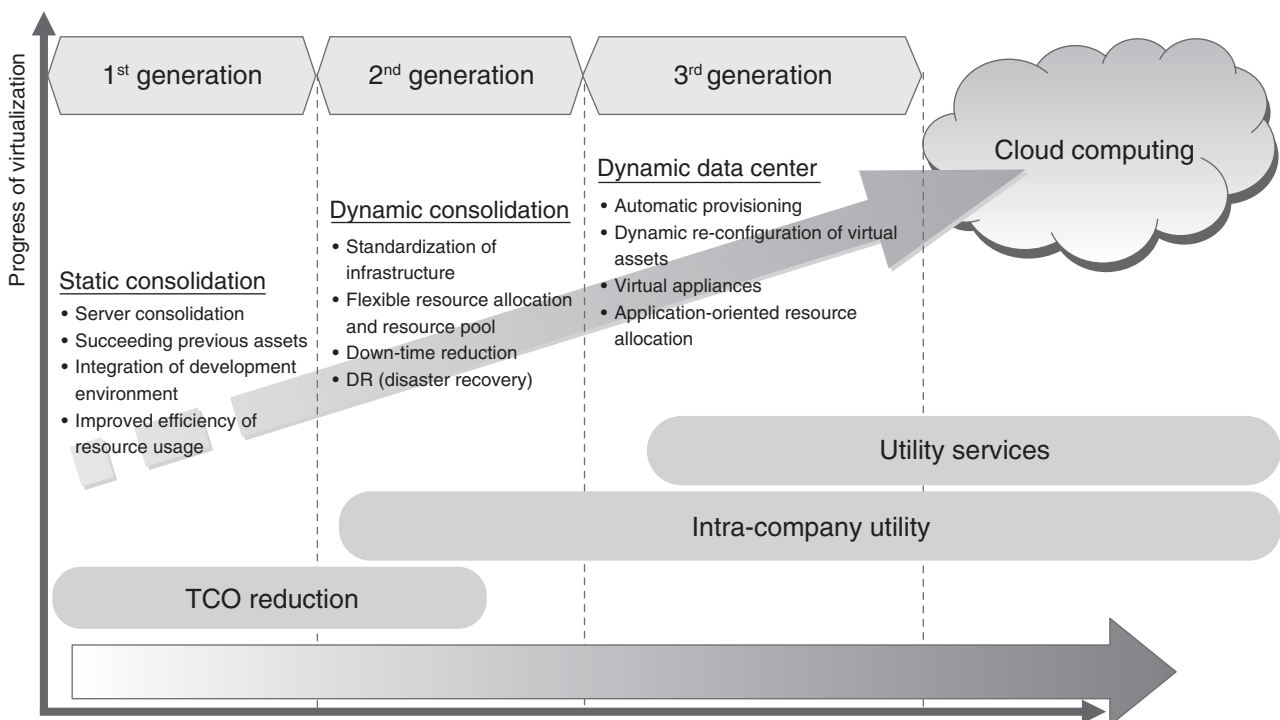


Figure 1
Changes in utilization of ICT.

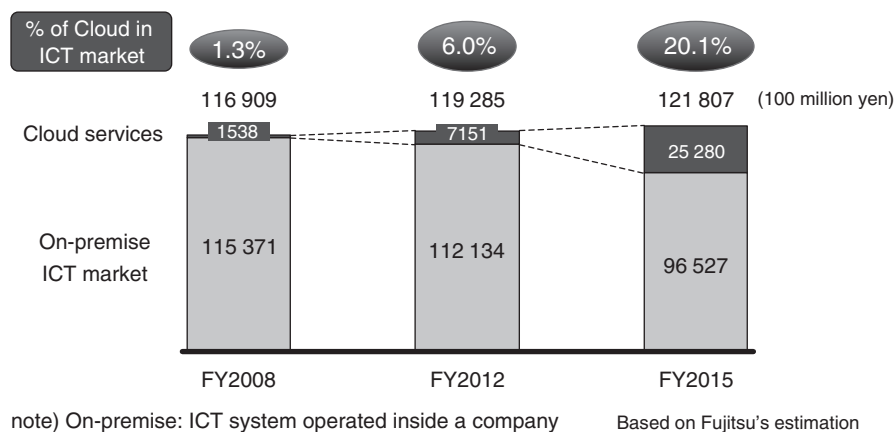


Figure 2
Japan's Cloud service market.

For instance, in the field of social systems such as public enterprises, costs associated with infrastructure can be drastically reduced by actively using Cloud computing. In addition, this significantly expands the range of applications and utilization of services to areas not available before, based on collection, analysis and active use and reuse of an enormous amount of data. It is likely that new types of services and businesses will be created by fully using this new feature.

Thus, the changes in corporate needs for ICT, technological innovation and changes in social environments are accelerating the propagation of Cloud computing.

In the following sections, we will introduce Fujitsu's efforts for server strategies and server development in the field of server systems, which is an infrastructure to support ICT.

3. Fujitsu's server strategies

3.1 Promotion of enterprise Cloud

The Cloud service market in Japan is forecast to see drastic growth from 1.3% in FY2008 to above 20% in FY2015 as a proportion of the total ICT market, which is a growth of about 16 times from the baseline. Nevertheless, even in such a stage, the on-premise ICT (intra-company operation of ICT systems) market is expected to occupy as much as 80% of the total

ICT market in Japan (**Figure 2**).

By focusing on this on-premise ICT market, Fujitsu will offer optimal products at each phase of infrastructure innovation for on-premise-type ICT so that each client can construct the Cloud computing environment required (**Figure 3**).

3.2 Global deployment

Supported by many customers, Fujitsu has been honored to achieve the top share for four consecutive years in the Japanese server market.³⁾ However, in the global arena, its share remains as low as 4%.

Fujitsu considers it imperative to reinforce its business development in the global market in future, since the size of the global market is said to be about 10 times that of the Japanese market. Among them, its industry standard servers for Windows and Linux are a key element. Fujitsu will strive to provide value to customers in the global arena with its industry standard servers.

4. Efforts for server development

Giving consideration to the aforementioned circumstances, we hereby report our specific objectives and approaches for server development.

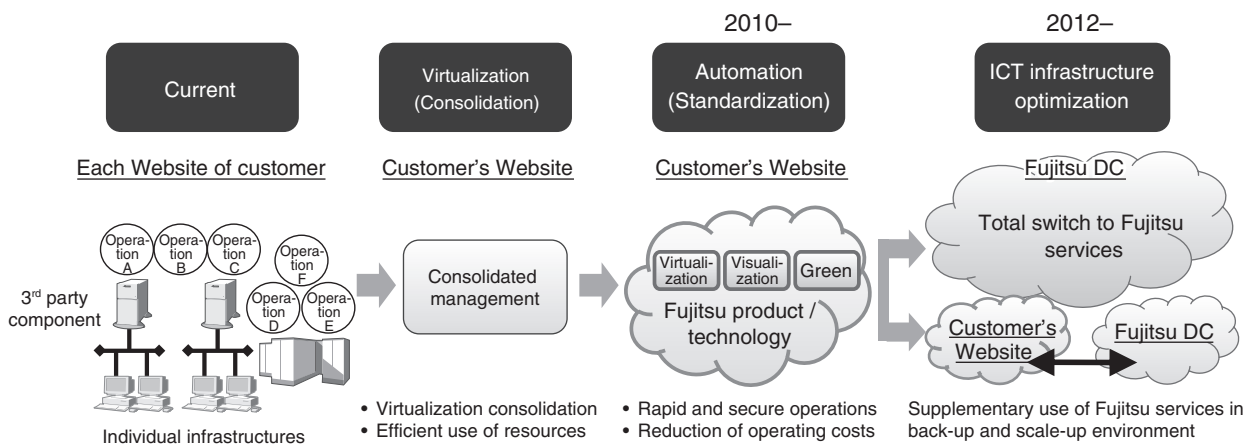


Figure 3
Server strategy for enterprise Cloud.

4.1 Provision of mission critical system and long-term support

Many customers have amassed a great many assets and they want to continue using these assets in future. To protect the precious assets of customers using various types of systems, Fujitsu believes that its important mission is to provide the optimal server for each customer on a long-term basis. To accomplish this mission, Fujitsu will offer high-reliability server platform products with excellent quality and performance using advanced technologies on a continuous basis to support the mission critical operations of each customer.

An essential concept to ensure a sustainable supply of optimal server platforms to customers is technology for sharing and virtualization. Through fully sharing and improving efficiency, we will offer a migration path to all customers.

4.2 Approaches to Cloud computing

While ensuring a sustainable supply of optimal servers to customers, taking approaches to Cloud computing is also important. Therefore, we plan to take the following approaches in offering optimal platforms for Cloud computing.

1) Eco-conscious approach

Reducing power consumption is essential

for Cloud computing environments that carry out large-scale integration of ICT resources. Fujitsu is committed to reducing power consumption.

2) Offering optimal platform for Cloud computing environment

Fujitsu will offer an open and standardized Cloud computing environment with high reliability and high quality that allows assets for open architecture and open platforms to be passed on. Fujitsu will do this by using its in-house technologies as core technologies.

4.3 Improved approaches for global business

Fujitsu's industry standard servers have been developed in a joint effort between Fujitsu Siemens Computers (a joint venture of Fujitsu and Siemens) and Fujitsu. In April 2009, Fujitsu Siemens Computers became Fujitsu's wholly affiliated company to be Fujitsu Technology Solutions (FTS) established in Germany. Various regional needs for industry standard servers have been consolidated in FTS in conjunction with the consolidation of development functions. Starting from the approach of making Fujitsu industry standard servers a global standard, Fujitsu aims to optimize quality, manufacturing and sales. Based on this initiative as a core of

our global innovation, we will reinforce our global business in an effort to offer consistent products and services to customers.

5. Server platform

Figure 4 shows Fujitsu's server platform. The future development of each server platform is explained in the following sections.

5.1 Mainframe: GS21/PRIMEFORCE

Fujitsu has offered mainframes to customers for over 40 years as a highly reliable and high-performance platform to support social and business systems.

In January 2010, Fujitsu announced the release of the GS21 1600/1400, a product that integrates the latest technology. Fujitsu plans to continue development to make it possible for customers to succeed and use their assets, while offering related software that allows them to actively use their assets in business operations.

At the same time, Fujitsu offers long-term support for up to 10 years. Further, upon requests from corporate customers, Fujitsu will promote development from the standpoints of low power consumption, installation convenience and environmental conservation based on the Green Mainframe Concept.

To customers who wish to have an open platform, Fujitsu will offer the OSIV/XSP operation mechanism that operates mainframe assets on PRIMEQUEST. This allows safe, secure and cost-effective transfer of customers' important core applications and data on an OSIV/XSP basis.

5.2 Office computer: PRIMERGY 6000

PRIMERGY 6000 is a highly reliable and high-performance server that adopts the latest Intel CPU. It also runs an OS (ASP) that allows customers to completely succeed their existing assets. At the same time, it ensures features

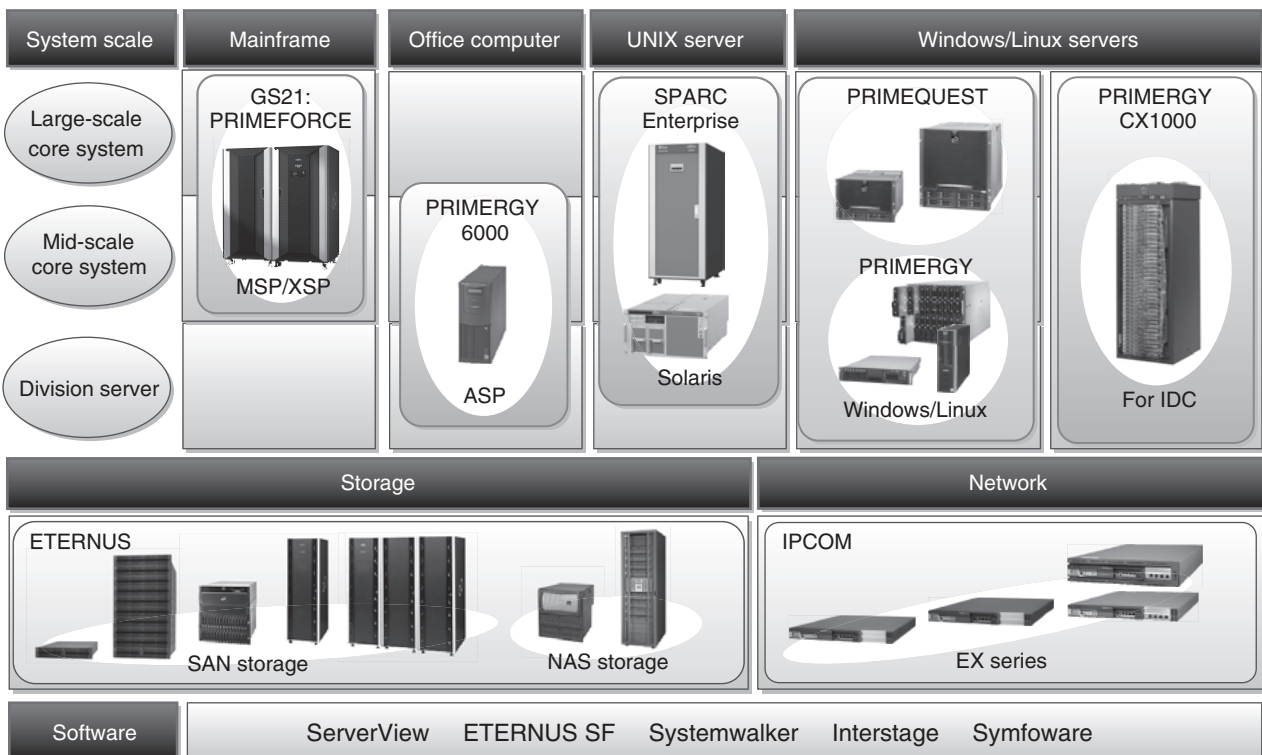


Figure 4
Fujitsu's server product lineup.

essential for a core system in office use such as quietness, power saving and robustness. Even for office computer users, optimizing ICT infrastructure is an important need in achieving stable operation in the long term. To satisfy this need, Fujitsu offers functions to operate ASP on PRIMEQUEST.

5.3 UNIX server: SPARC Enterprise

SPARC Enterprise, developed within the framework of joint R&D between Fujitsu and Sun Microsystems (currently "ORACLE"), is based on an amalgamation of the mainframe technologies accumulated by Fujitsu and the open architectures offered by Sun Microsystems.

SPARC Enterprise that integrates SPARC64 VI/VII, originally developed by Fujitsu, demonstrates high processing performance, high scalability of up to 512 threads, and a reliability equivalent to that of a mainframe. It is a server that can support customers' mission critical operations that should be continued on a 24/7 basis.

In Oracle OpenWorld 2010 in September 2010, Fujitsu declared that it will continue to supply products that contribute to customers' business by further reinforcing its partnership with ORACLE.

Further, to maintain and improve its competitive strength, Fujitsu plans to promote joint R&D with ORACLE also in future, and is positively engaged in alliance activities in the global market. Such activities include the development of solutions combining SPARC and Solaris.

5.4 Mission Critical IA Server: PRIMEQUEST

Based on industry standard open architectures such as Intel Xeon Processor, Linux and Windows Server, Fujitsu announced a new lineup, the PRIMEQUEST 1000 series, in March 2010. This is an open mission critical server that integrates highly reliable and highly available

technologies that Fujitsu has been accumulating in the mainframe area.

This series represents open servers most suitable for reconstructing core business systems, using database servers, implementing ERP solution platforms and integrating operational servers. The servers in this model demonstrate their excellent performance also in the trusted intra-company Cloud computing infrastructure.

Compared with conventional models, this series has reduced its power consumption by approximately 68%, installation space by about 66% (equivalent to going from 1 rack to a rack mount [12U]) and weight by about 80%. This series makes a great contribution to Fujitsu's space-saving target as well as being an improved approach to Green ICT.

5.5 Industry Standard Server: PRIMERGY

PRIMERGY adopts the latest Intel processor. Fujitsu has a full lineup of this model to address the needs of customers with various business scales from small to large. At the same time, it aims to have the most advanced specifications in terms of performance, power reduction and innovative design.

In the entry class, PRIMERGY offers merits of noise reduction, power reduction and space saving. Among others, PRIMERGY TX100 S2, developed for installation in offices, has a noise level as low as 24 dB. This is equivalent to the sound of rustling leaves. PRIMERGY TX120 S2 is the world's first model that qualifies for International Energy Star Program Ver. 4.0.

In addition, Fujitsu's lineups for blade servers have been enhanced in preparation for the age of Cloud computing. As a platform with enhanced novelty, Fujitsu announced PRIMERGY CX1000 as a model suitable for data centers. CX1000 achieved the world's best mark in SPECpower_ssj2008 (as of April 7, 2010), contributing to TCO reduction through its high energy efficiency and server performance.

6. Technologies to support servers

Fujitsu is a unique Japanese vendor that can develop a full range of components in-house including processors, servers and networks. As such, Fujitsu has fully utilized its development performance to supply servers with high reliability and excellent performance. In addition to this pursuit of high reliability, high performance and virtualization as core competence of Fujitsu, it is striving to differentiate its products from those of its competitors by developing next-generation technologies.

1) Eco Green Technology

Reduction of power consumption is essential for Cloud computing that carries out large-scale integration of ICT resources to a data center. We plan to carry out joint R&D with Fujitsu Laboratories in areas such as high density packaging of high-efficiency power sources, reduction of power consumption and heat by optimal cooling, and technology to reduce electric power. We will deploy these technologies in our server platform lineups.

2) Development of server platform products most suitable for next-generation data centers

We will place emphasis on areas such as development of top-level data transmission technology allowing the fastest data transmission,

development of next-generation semiconductor technology and technology to develop a resource pool with high flexibility and failure-resistant properties.

7. Conclusion

This paper introduced Fujitsu's efforts for server strategies, server development and new server platforms to address ICT at the threshold of the age of Cloud computing.

Fujitsu has been continuously supplying servers that meet the expectations of customers by tactically addressing ICT changes so far. It is eager to meet the changing needs of customers also in future. Fujitsu is determined to contribute to global customers by sustainably providing robust ICT platforms as a reliable and relevant partner.

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