Fujitsu's Approach to Platform as a Service (PaaS)

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Software as a service (SaaS) has been deployed primarily for general-purpose applications, but recently it has been increasingly used for industrial applications. In addition to being used for existing non-routine tasks, it is beginning to be introduced in individual businesses as part of the systems integration for mission-critical tasks. Although investment in information technology (IT) is starting to show signs of recovery for corporate information systems, a long-term vision still remains hard to achieve. This has resulted in a growing tendency for investment decisions to be made on the basis of concepts such as small-scale rapid development and in-house design/development/operation in order to construct systems that are not contingent on external factors. At the same time, service provider customers are increasing their expectations and demanding not only a simple provision of functionality but also the proposal of a framework that contributes to the success of their business. Using case examples, this paper describes Fujitsu's efforts to address these evolving market demands by providing a platform as a service (PaaS), where an application development and execution environment is provided as a service. It also introduces our future plans and the services we will provide.

1. Introduction

The trends of software-as-a-service (SaaS) utilization in Japan show that SaaS achieved 20% penetration into businesses in 2009 (or 40% including businesses considering introducing SaaS). By achieving a market share of over 16%, it has "crossed the chasm"[note 1] of technology adoption and can be expected to perform well in the future.[1] The number of applications, mainly the information infrastructure (groupware, E-mail, etc.), being provided is also rising and a trend towards SaaS introduction has appeared recently in business applications as well.

At the Fujitsu Group, we are planning to provide roughly a hundred SaaS applications by the end of fiscal year 2010, and nearly half of them will be business SaaS applications (for local government, agricultural businesses, etc.), which will be developed and provided mainly by business-oriented systems engineers. Platforms that can be used for running these SaaS applications currently include infrastructure as a service (IaaS), where hardware resources such as servers are provided as a service, and platform as a service (PaaS), where an application development and execution environment is provided as a service. The left side of **Figure 1** illustrates the range of use of IaaS, PaaS, and SaaS, each of which is provided as an independent service tailored to an individual use application and the aims of a particular customer. A recent

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note 1)   In the marketing of high-tech industrial products such as information technology solutions, there is a crucial gap between initial market introduction and mainstream acceptance that must be crossed if a product is to achieve success. In an influential marketing book by Geoffrey A. Moore, this is referred to as "crossing the chasm."

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trend has been towards the implementation of PaaS by reconfiguring in-house systems mainly in corporate information technology (IT) departments.

In this paper, I describe the customer expectations for IaaS, PaaS, and SaaS and how Fujitsu is working to meet them, including some examples of applications chiefly involving PaaS. I also describe the future prospects of PaaS as a practical tool.

2. Fujitsu's role as a service provider

We expect over 40% of the fiscal year 2010 IT investment plans of companies that use IT services to show increased levels of investment, and this figure exceeds 90% if we include companies that will maintain their existing investment level, so we can say that these businesses have become more forward-looking. However, the basic idea behind corporate investment is still to create a more profitable system. Since there is no change in the inability of businesses to foresee the future, we regard it as essential that the structures and systems of businesses are made more profitable by

incorporating systems for handling unexpected changes, preparing a system infrastructure that can install and run applications quickly, and creating a development/operation organization that increases IT system utilization. Amid this trend for reducing external dependencies, sourcing optimization (striking the ideal balance between outsourcing and insourcing) is an important goal for the introduction of services by customers, and it is thought that the service provider's role includes providing customers with added value by way of various solutions such as rapid development and the provision of systems (and system operations) that are robust against external changes.

Providing added-value appeal involves a considerable burden in terms of know-how, man-hours, and such like for (individual) in-house production work by customers who want to keep up with the latest technological developments in application operating techniques and virtual server configuration techniques and who want to operate their systems and applications accordingly. We must provide solutions that are available only from Fujitsu and that customers feel are in the best interests of their business
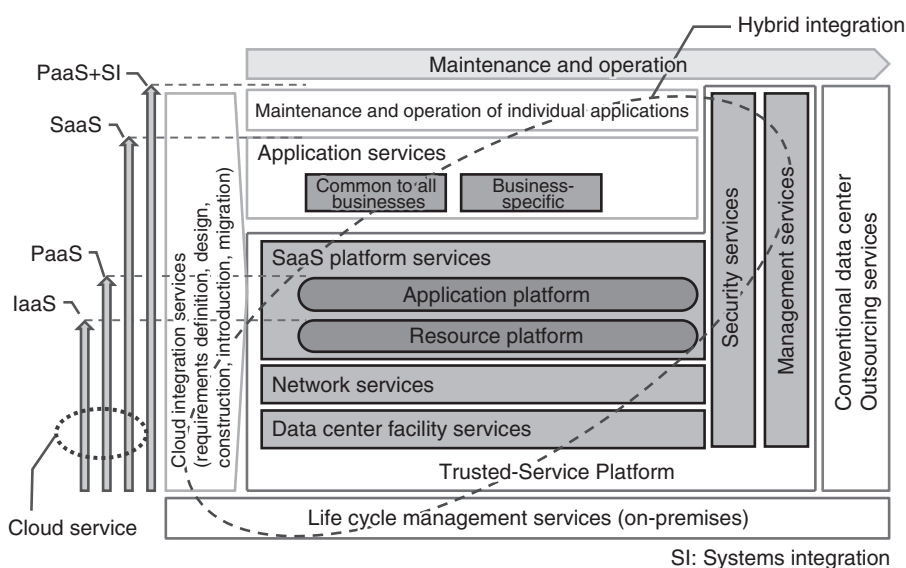

Figure 1
Cloud service and related services.

when they need Fujitsu's help. This is the role that Fujitsu should perform. Providing customers with frameworks for in-house production is part of this role.

3.   Fujitsu's activities

As mentioned above, Fujitsu as a service provider should be aware of the sourcing balance and provide the added value demanded by customers. This is put into practice by the Cloud service and related services that form the core of the "Trusted Service Platform" being deployed on Fujitsu's next-generation data centers (Figure 1).

By visualizing the items of the promises made to customers to provide a sense of trustworthiness, Fujitsu not only simply provides the promised functionality, but also provides services that are aware of non-functional conditions such as usability checks that include network usability, data integrity and disaster recovery measures, and comprehensive security/IT system measures.

For this purpose, we provide SaaS-PF as a platform for Cloud service integration (PF stands for platform). It comprises an "application platform," which is an environment for the development and execution of applications, and a "resource platform" that supports (incorporates) this environment. Provided service units are IaaS provided by the resource platform, PaaS provided by the application platform, and SaaS provided by the applications themselves.

SaaS-PF is also used to build and operate customer systems for the maintenance and operation of individual applications and for cooperating with an on-premises[note 2] environment, and solutions that combine PaaS and systems integration are being deployed together with system engineers.

To respond to the needs of customers when SaaS-PF is provided as a service, we are

note 2)   This term refers to IT systems and the like where software is introduced and operated on equipment that is managed in-house.

working on the development of related services such as Cloud integration to migrate customer environments to Cloud environments, and cooperation with the life cycle management service that is the on-premises provision of services. Using this service platform, we will help our customers to develop a profitable structure. SaaS-PF is described below with particular reference to the application platform (**Figure 2**).

As a development/execution environment for SaaS applications together with resources such as servers and storage, it provides a variety of function groups as a service. For SaaS applications, we provide authentication/authorization management [2)], service operation management [3)] and a Java version/.NET version application execution platform [1)], which are also needed for data/service cooperation. We are continuously aiming to strengthen the capabilities of management functions, e.g., by expanding the dashboard of controls and by using service state visualization. To actively promote use of the application platform, we are creating a technical support menu that is needed when starting SaaS businesses, and we are strengthening the SaaS utilities (a group of functional tools such as portable document format [PDF] document creation that supplement SaaS applications) [4)].

SaaS-PF is provided to support the business startup activities of SaaS service providers, while Fujitsu itself also has an active track record in providing SaaS applications. We are also active in the systems integration field, where we are building and operating system environments for our customers. On the basis of this experience we aim to make continuous improvements from the user's perspective by gathering feedback for SaaS-PF improvement. The next section describes how SaaS-PF is used in practice, the benefits that it can be expected to bring, and some examples of its applications.

4.   Applied examples of SaaS-PF

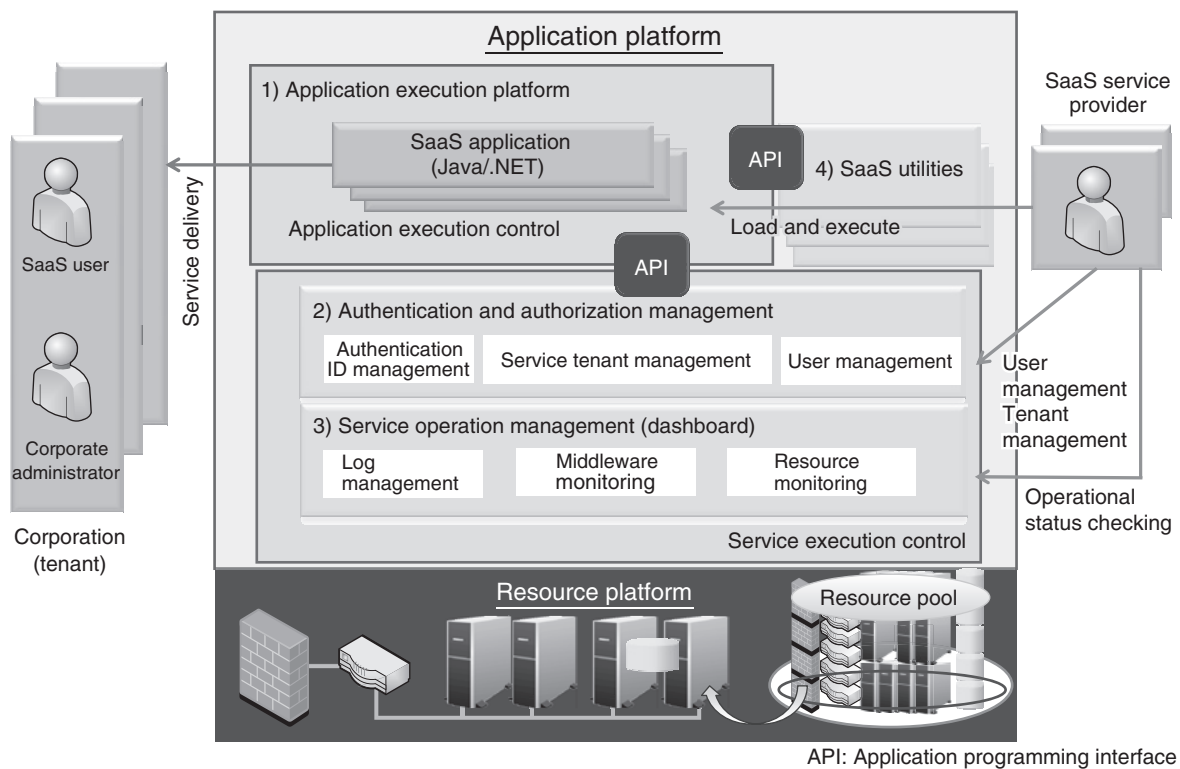First, I introduce an example applied to a

Figure 2
SaaS-PF overview.

SaaS service provider and then one applied to a corporate information system. In the future, there will probably be a growing number of cases in which SaaS-PF is used to strengthen the infrastructure so that businesses can adapt promptly to changes in the business environment.

4.1 Example of SaaS-PF applied to SaaS service provider

For medium-scale markets, SaaS is being introduced for business applications (in-house development packages) owned by a certain company (company A) that promotes systems integration business by utilizing its own packages, and in some cases the target is being broadened to SaaS-type implementations in parallel with a business model where packages are introduced. Company A has implemented marketing management in a group of multiple packages, and in the future it plans to add other

packages (**Figure 3**).

One of the aims of SaaS service providers in switching to SaaS is to make it possible to anticipate changes in the market and bring new products to the market promptly. For this purpose, it is naturally important to be aware of three items, even after the system has been set in motion: i) rapid development, ii) flexible adaptation, and iii) cost reduction.

SaaS-PF is useful for suppressing operating costs and is also expected to support work that is closely associated with the operation of services, including security measures, monitoring, and fault recovery. Since SaaS service providers must also be able to adapt rapidly and flexibly to changes in the business environment, such as systematic reform, it is hoped that tools and mechanisms will be provided to reduce the amount of development work needed for this purpose.
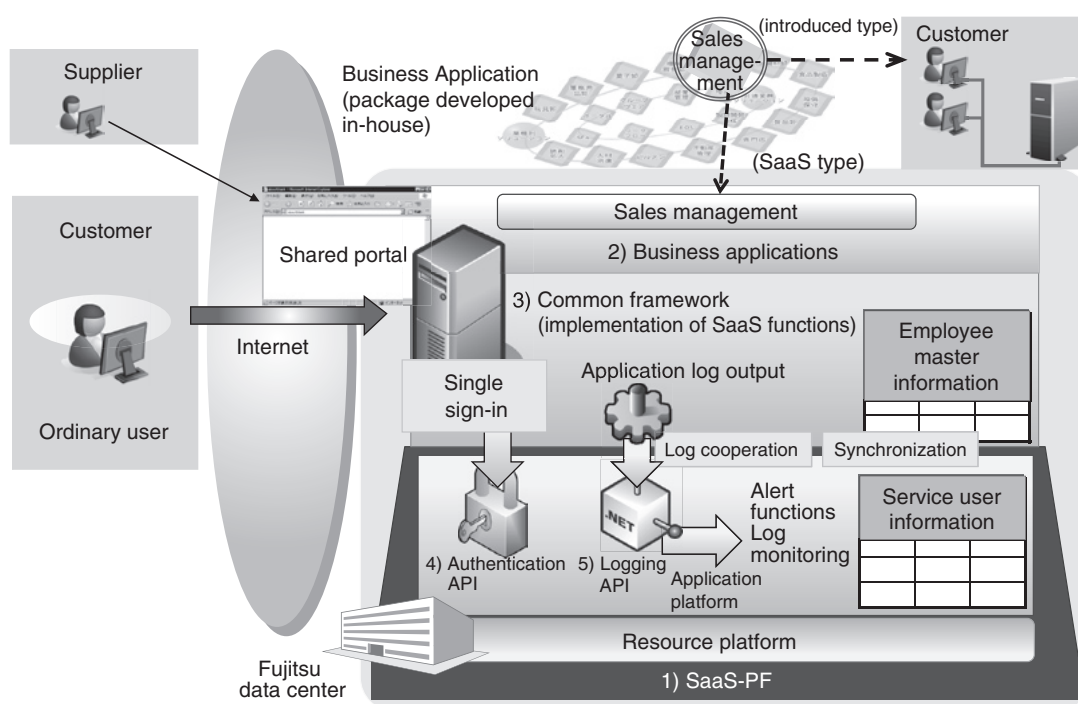
Company A develops its own common

Figure 3
Example of SaaS-PF applied to service provider.

framework [3)] to implement SaaS functions between SaaS-PF [1)] and the business applications [2)] that are mounted on it, and by absorbing the cooperation with SaaS-PF, it is possible to use the mounted packages themselves in both on-premises type and SaaS-type modes. This is an effective scheme for future rapid and flexible adaptation. For SaaS service providers that possess multiple applications, this should provide a useful reference for how to use SaaS-PF techniques.

With regard to the environment and functions for implementing the switch-over to SaaS, Company A utilized many of the services provided by SaaS-PF, including the authentication application programming interface (API) [4)] and logging API [5)], and aimed to achieve their early introduction into SaaS (including subsequent applications), early investment, and reduction of the amount of labor (development and operation) including future maintenance.

4.2 Example of SaaS-PF applied to corporate information system

Here, I describe an example of SaaS-PF applied to the restructuring of internal business systems (integration and application restructuring) at a certain manufacturer (company B) and the other companies in its group (including some located overseas) (**Figure 4**).

The problems with company B's information system arose from the introduction of separate independent systems at locations and group companies outside the information system division, making system control ineffective. The introduction of different systems caused inconsistency when people tried to coordinate tasks between different locations and perform organizational integration, and more importantly it caused an increase in the integration costs and the operational maintenance costs. We therefore started to investigate the introduction of a common platform to regulate the introduction of systems including the individual development

departments and the expectations of future development. In addition to the use of shared services, there will also be increased use of hybrid service usage modes such as cooperation with the dedicated environments used by customers. Under such conditions, SaaS-PF will lie at the center of Cloud service and related services (Figure 1) and will be the core technology for maintaining the integrity of services. We aim to develop it into a system that provides customers with stable, trusted services.

Towards the implementation of this system, in addition to already provided functions and platforms for SaaS service providers, to meet the needs of SaaS service providers and corporate information system divisions that intend to deploy SaaS-PF for cooperate systems, we plan to strengthen the following five functions/platforms and strengthen and expand services including cooperation with related services in Figure 1, as shown **Figure 5**.

1) Application execution platform: A verified task application execution environment aimed at increasing the systems integration

efficiency

2) Shared platform: Shared functions for applications such as user management and cooperation with other systems

3) Development platform: A development/verification/maintenance environment for loaded applications

4) Operation management platform: Runtime optimization of the application execution platform [1]] and of applications running on this platform

5) Business platform: Functions that support the business flow in the sale and supply of applications

In the future, with regard to non-routine tasks for providing services to customers utilizing SaaS-PF, Fujitsu aims to cooperate with SaaS service providers by providing SaaS-PF to SaaS service providers. For tasks surrounding mission-critical areas, in addition to the measures for non-routine tasks, we aim to provide SaaS through cooperation with system engineers, and for mission-critical tasks we aim to provide services with optimized sourcing by using PaaS
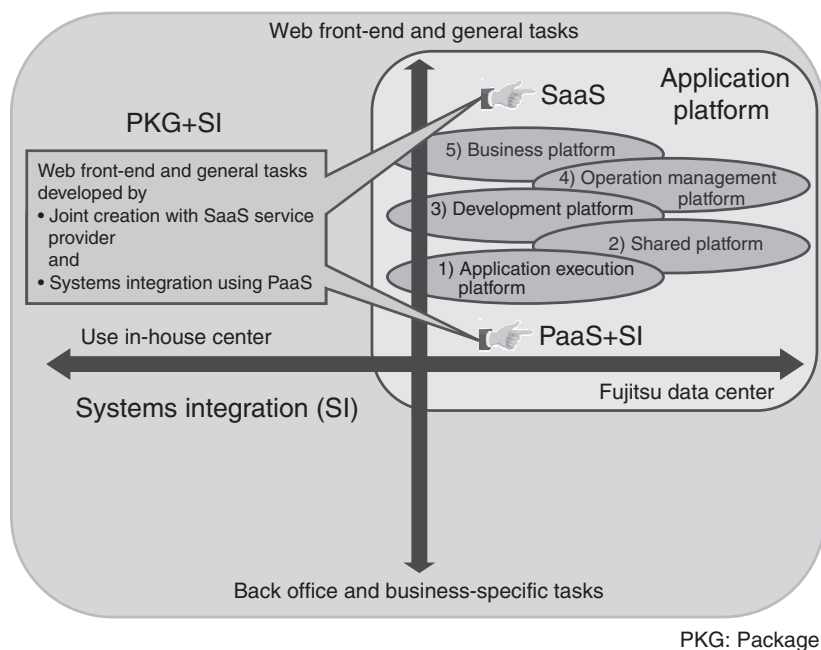

Figure 5
Future deployment of business using application platform.

in systems integration.

6. Conclusion

The future Cloud market including SaaS/PaaS is transitioning from being a notable issue to being popularly accepted. Moreover, in practice, we can expect new demands for strengthened governance related to matters such as the International Financial Reporting Standards (IFRS), ongoing work on the so-called J-SOX law, and concerns over the environment (green IT). We can also expect a demand for compatibility with the systems and rules that exist in each business field, such as the FISC standard safety measure criteria in the financial world and computerized system validation (CSV) in the pharmaceutical world. Fujitsu must lead the way forward by investigating how to address these requests in a Cloud environment. In this investigation, since we are aware that we provide systems that contribute to the success of our customers, we will:

1) Provide information systems that can respond immediately to changes in the business environment.

2) Provide on-site information to users in real time (taking steps to eliminate delays within the system).

Finally, towards the implementation of measures for resolving and responding to the issues raised in this paper, we aim to put ourselves in our customers' shoes through cooperation and the use of various functions of next-generation data centers for all platforms. Therefore, to implement human-centric information and communications technology (ICT) as we move towards a human-centric network society, we will continue to investigate SaaS-PF.

References

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