

Integrating Multi-Cloud Environment with FUJITSU Cloud Services Management

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In recent years, an increasing number of businesses have come to rely on public cloud computing, employing multiple cloud systems (multi-cloud) simultaneously. Also spreading widely among these multi-cloud operating companies is what is called shadow IT, which refers to public cloud services contracted directly by each department outside the official framework of the organization's systems for less red tape and greater speed. Such use of shadow IT may compromise the organization's governance of information and communications technology (ICT), and differences in specifications and usability between clouds can give rise to issues such as increased operational workload and operational complexity. To address these challenges, Fujitsu offers FUJITSU Cloud Services Management, a service that allows users to integrate multi-cloud management. It provides features and portal sites designed for a multi-cloud environment to centrally manage enterprise-wide usage, contracts and costs. This solution helps enhance ICT governance and optimize ICT operation and spending. This paper presents some of the challenges pertaining to multi-cloud environments, and describes the solutions our service offers.

1. Introduction

Enterprises' expectations of the cloud are increasing year after year. Led by cost reduction, these expectations include also higher speed and operational simplicity. Moreover, in recent years, cases of use of the cloud as a platform for business innovation using advanced digital technologies such as the Internet of Things (IoT), big data, and artificial intelligence (AI) are being seen here and there.

In order to use increasingly sophisticated cloud services for business, the corporate information system departments need more advanced operations. In addition to conventional on-premise information system operations, this requires the introduction of new technologies, including moving operations over to the cloud and building new business innovation infrastructure. Furthermore, there is more than one kind of cloud. A combination of multiple clouds (hereafter, multi-cloud), including public clouds and private clouds, and multiple services provided on them, such as Infrastructure as a Service (IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS), needs to be managed, and the burden this imposes on information

system departments is increasing year by year.

This paper introduces the issues faced by enterprises looking to adopt the multi-cloud model, and solutions based on FUJITSU Cloud Services Management,¹⁾ a service which allows users to integrate multi-cloud management.

2. Issues faced by enterprises

The services offered by cloud vendors differ in terms of features, such as functions, performance, fee structure, and location. Most enterprises that adopt the multi-cloud model seek cost and operation optimization by carefully assessing the features on offer and selectively using cloud resources to best serve their application and usage requirements.

On the other hand, multi-cloud operations involve also various issues as follows.

1) Inability of information system departments to fully grasp cloud usage within the enterprise

Private clouds being centrally managed by information system departments, they are comparatively easy to operate and manage, optimize, and so on. On the other hand, public clouds being easier to introduce,

departments within enterprises increasingly bypass the information system department, directly making contracts with vendors for the use of public cloud services. These ICT resources not under the management of the information system department are called shadow IT. The appropriateness of security measures is difficult to assess for shadow IT, raising concern about the increased risk of leakage of enterprise and business-related information. Moreover, as information system departments are not fully aware of the underlying specificities covered by contracts for shadow IT, such contracts risk being poorly designed and unnecessarily costly, resulting for example in overcapacity with paid-for resources such as virtual machines going unused. Based on the foregoing, the elimination of shadow IT is a high-priority issue that enterprises need to solve.

2) Increased operation and management complexity

To differentiate themselves from competitors, besides cost competitiveness, cloud vendors seek to offer clouds with distinctive features such as diversified functions and support of a variety of applications. End-user departments incur a higher learning cost as they need not only to selectively use login IDs for different clouds, but also learn how to configure virtual machines, storage, networks, security, and other functions. Such impediments are disincentives for cloud utilization.

Further, mechanisms such as monitoring and backup and methods of operation depend on management interface, requiring complex operation management that takes into account vendor-unique service specifications.

3) Increased cost management complexity

Many public clouds do not require initial outlays as they use pay-as-you-go billing, making them easy to introduce. However, the absence of service usage limits is an invitation to wasteful use and the use of various value-added services, resulting in cost run-ups and possibly negating any potential cost benefits. Moreover, in multi-cloud environments, information such as billing data is scattered across multiple clouds, making it difficult to grasp total costs in a timely manner. There is also the problem that costs cannot be centrally managed as users are able to freely select value-added services.

3. Solutions offered by FUJITSU Cloud Services Management

Fujitsu offers solutions such as the following to the challenges posed by operations in a multi-cloud environment described in the previous section. Fujitsu offers also FUJITSU Cloud Services Management services for the implementation of solutions and FUJITSU Software Cloud Services Management software²⁾ allowing their introduction in the on-premise environments of enterprises. By simultaneously offering services and software, Fujitsu allows enterprises to select service configurations optimally suited to their system operation policies and operational structure.³⁾

- Elimination of shadow IT through centralized management of contract information

Measures including the provision of rules for the use of cloud services by each department are required to eliminate the use of shadow IT and ensure enterprise-wide ICT governance. Besides such system-level reform, information system departments also need a system for allocating bulk-contract cloud services to end-user departments and for charging them based on their use of these services. The provision of cloud services by information system departments in a timely manner eliminates the need for individual contracts by end-user departments. Moreover, central management of cloud service contract information by information system departments helps establish enterprise-wide ICT governance.

Fujitsu offers functions that allow information system departments to create service catalogs that list all the bulk-contracted cloud services and register and present these catalogs on portal sites, functions that allow end-user departments to purchase and use services from portal sites, and functions that allow information system departments to calculate monthly usage fees and invoice the respective end-user departments (**Figure 1**).⁴⁾

The service catalogs registered on portal sites consist of technical parameters to be set for cloud service and pricing information for cost invoicing. Technical parameters are configuration values for cloud services such as the names and types of virtual machines that have been parameterized. Information system department can make users use the recommended configuration settings or allow end-user departments to freely set preferred configurations.

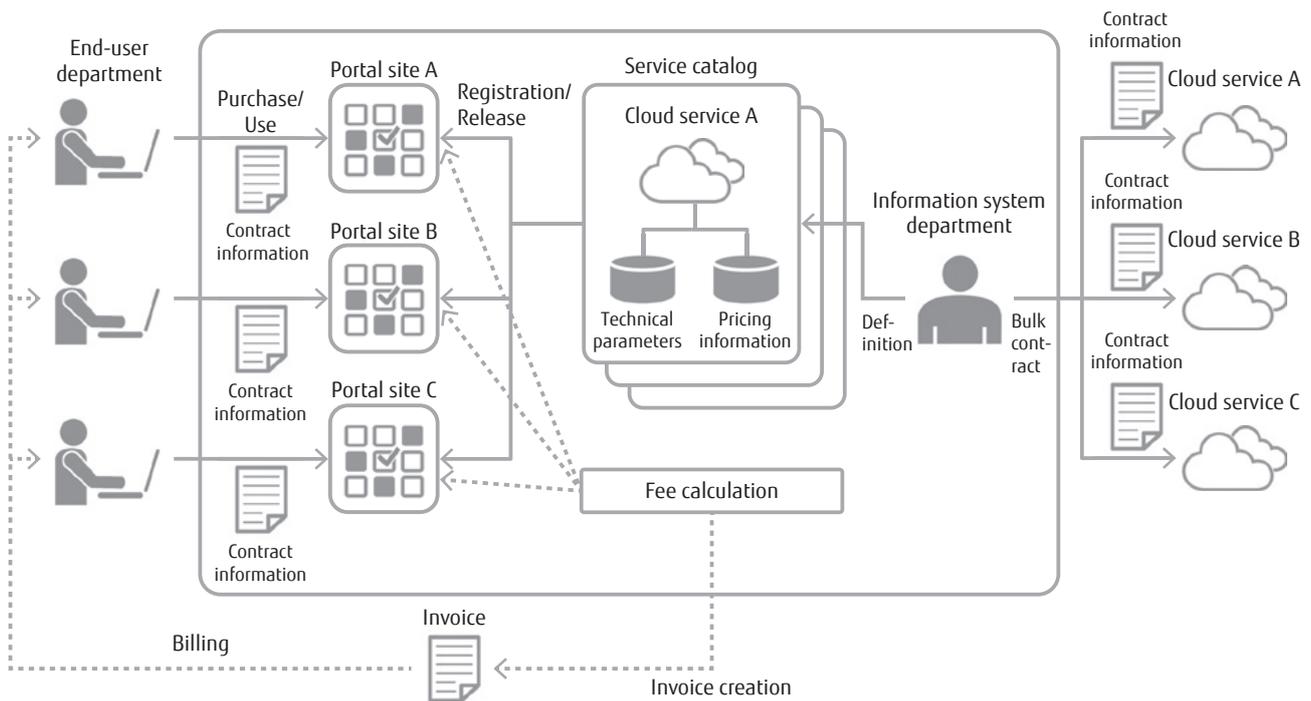


Figure 1
Centralized management of contract information.

Pricing can take the form of either a simple flat monthly fee or be based on monthly pay-as-you-go billing. With these functions, information system departments are able to centrally manage public cloud contracts and visualize contract information in the enterprise, thereby ensuring ICT governance across the enterprise while achieving the elimination of shadow IT.

- Greater operation efficiency through unified user interface (UI) and operation

Efficient multi-cloud environment operation requires the elimination of parts that depend on specific cloud services, the standardization of virtual machine, storage, and network configuration settings at the time of environment building, and the unification of operation management, including monitoring, backups, security protection, and so on after service start. Further, as the deployment of virtual machines and the like differs among individual cloud services, not to mention great differences in operation UI, including the functions offered, and the scope of visualization, an operational scheme that can be used with an UI that integrates all cloud services is needed.

In this respect, Fujitsu employs an architecture

that unifies the UI of the portal site for purchasing services and absorbs differences among cloud services by using adapters that call the application programming interface (API) of each cloud in the background. These adapters support the cloud services of the various companies, including FUJITSU Cloud Service K5 (hereafter, K5), FUJITSU Cloud Service A5 for Microsoft Azure, as well as Amazon Web Services (AWS), VMware, and Microsoft Office 365 (Figure 2).

Moreover, in terms of operation management including monitoring, backup, security protection, and the like, an approach that incorporates third-party operation management products instead of functions provided by each individual cloud service is used. The coordination targets are the following three (Figure 3).

- 1) Portal site coordination

This consists in unification of the design of the Fujitsu portal site and the portal sites of operation management products, and implementation of single sign-on (SSO).

- 2) Agent coordination

This consists in automatic installation of agents for operation management products (software introduced at management targets) during the deployment

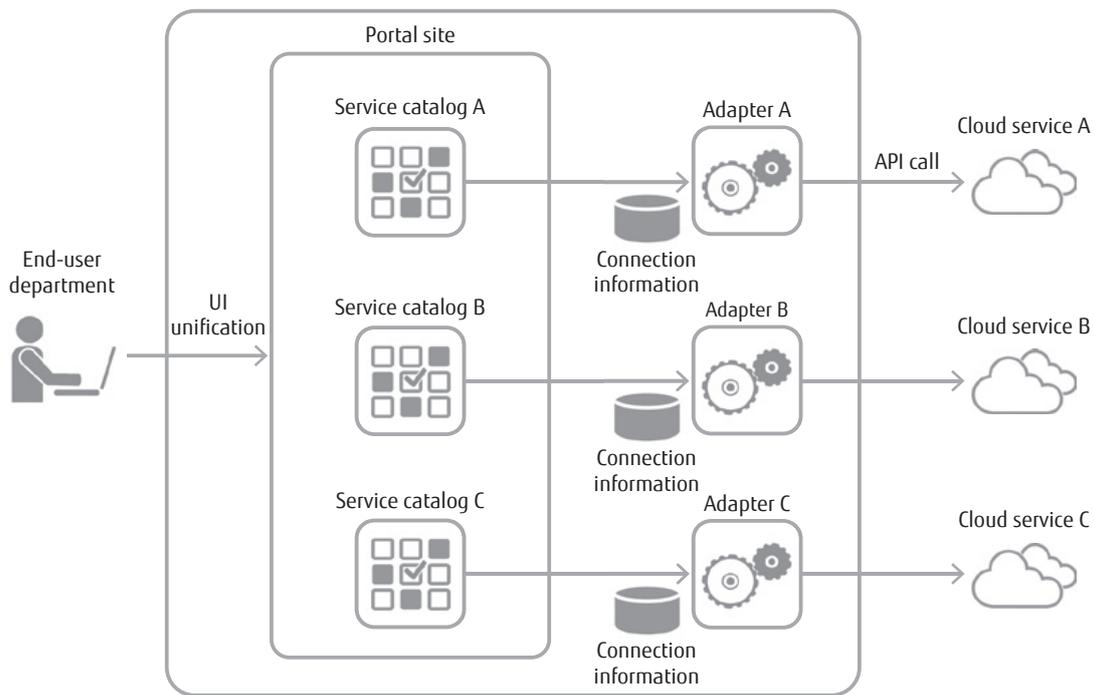


Figure 2
Improved virtual machine deployment efficiency through unified UI.

of virtual machines and their automatic registration to a manager.

3) Pay-as-you-go billing coordination

This consists in billing proportional to the usage amount of operation management products (number of monitoring and security protection targets and items, backup data capacity).

The above functions allow management through a UI and procedures unified for all cloud operations, resulting in low operating cost. This results also in improved convenience because users are able to use the cloud services that match their needs at low learning cost.

- Timely visualization and optimization of utilization costs

In considering the optimization of enterprise-wide ICT cost, a system that allows the usage status of each cloud service to be monitored and managed in a timely manner is required. The following two perspectives are required for cost visualization in particular.

1) Internal billing management (income)

This concerns costs billed to end-user departments by the information system department. Besides resources such as the virtual machines used by the

various departments, the cost that is billed includes also shared equipment costs such as dedicated line connections and the administrative cost of information system departments.

2) External billing management (expenditures)

This concerns costs paid by the information system department for bulk-contract cloud services.

Moreover, management and control for cost optimization such as setting and enforcing an upper limit on usage fees so as to prevent ICT budget over-runs are also required. Fujitsu provides the required functions for each of the above-described perspectives.

For internal billing management, Fujitsu offers functions that allow centralized management of the billing information for the use of multiple clouds by each department, and verification of the current billing information. Further, when end-user departments purchase services, the in-house price factors in the costs for contract handling and management by the information system department that is responsible for such tasks.

Additionally, for external billing management, a dashboard function that uses collectors to call APIs that are offered by various cloud services in order to obtain

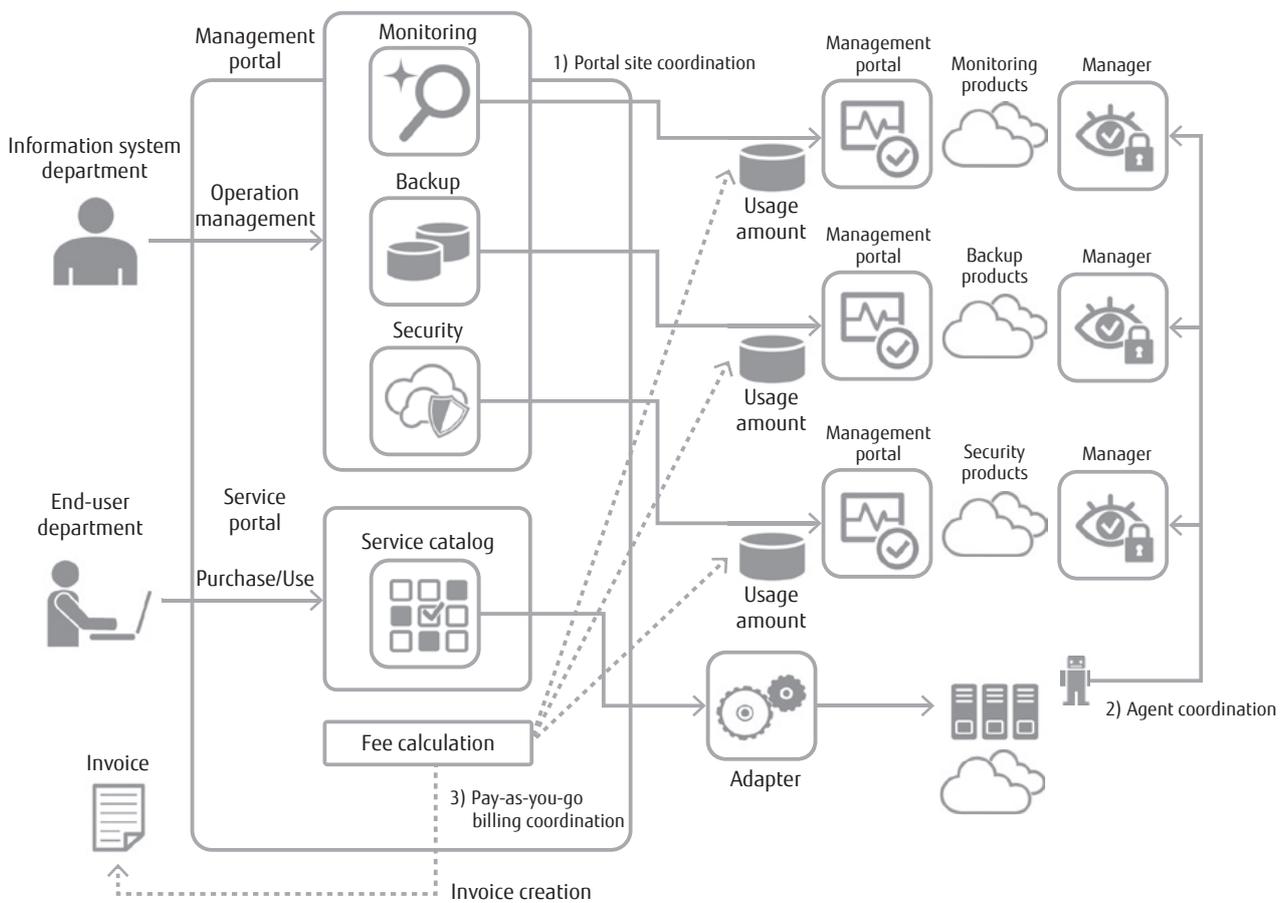


Figure 3
Improved operation management efficiency through unified UI.

usage amount and pricing information, distribute it to the various end-user departments, and visualize it, is also provided.⁵⁾ For the enforcement of upper limits on usage fees, a function that checks that service use does not exceed allocated budgets, issues warnings and restricts use as needed, is also provided. The collectors support all the major cloud services of the various cloud vendors (Figure 4).

All these features combined allow the timely grasp of costs and the management of upper limits on usage fees, thereby enabling total cost optimization including both internal and external billing.

4. Fujitsu's strengths

Fujitsu's strengths in multi-cloud integrated management are introduced below.

1) Broad support ranging from IaaS to SaaS

A wide range of services, including PaaS and SaaS in addition to IaaS, can be managed. As most

multi-cloud integrated management services focus only on system management efficiency, they target only IaaS. However, this falls short of the needs of customers who use SaaS in terms of contract management and billing management. In order to achieve interoperability and cost savings, a system that integrates management to cover all cloud types by supporting IaaS, PaaS, and SaaS, is required.

2) High-level of customizability

The FUJITSU Cloud Services Management architecture is designed to allow customization through the addition of adapters that call APIs. As a result, even cloud services that are not supported by Fujitsu products can be allocated and billed through the addition of adapters. Moreover, in terms of authentication infrastructure, Active Directory Federation Services (ADFS) are used, allowing SSO for many different services.

3) Support of global business practices

Fujitsu products are offered not only in Japan but

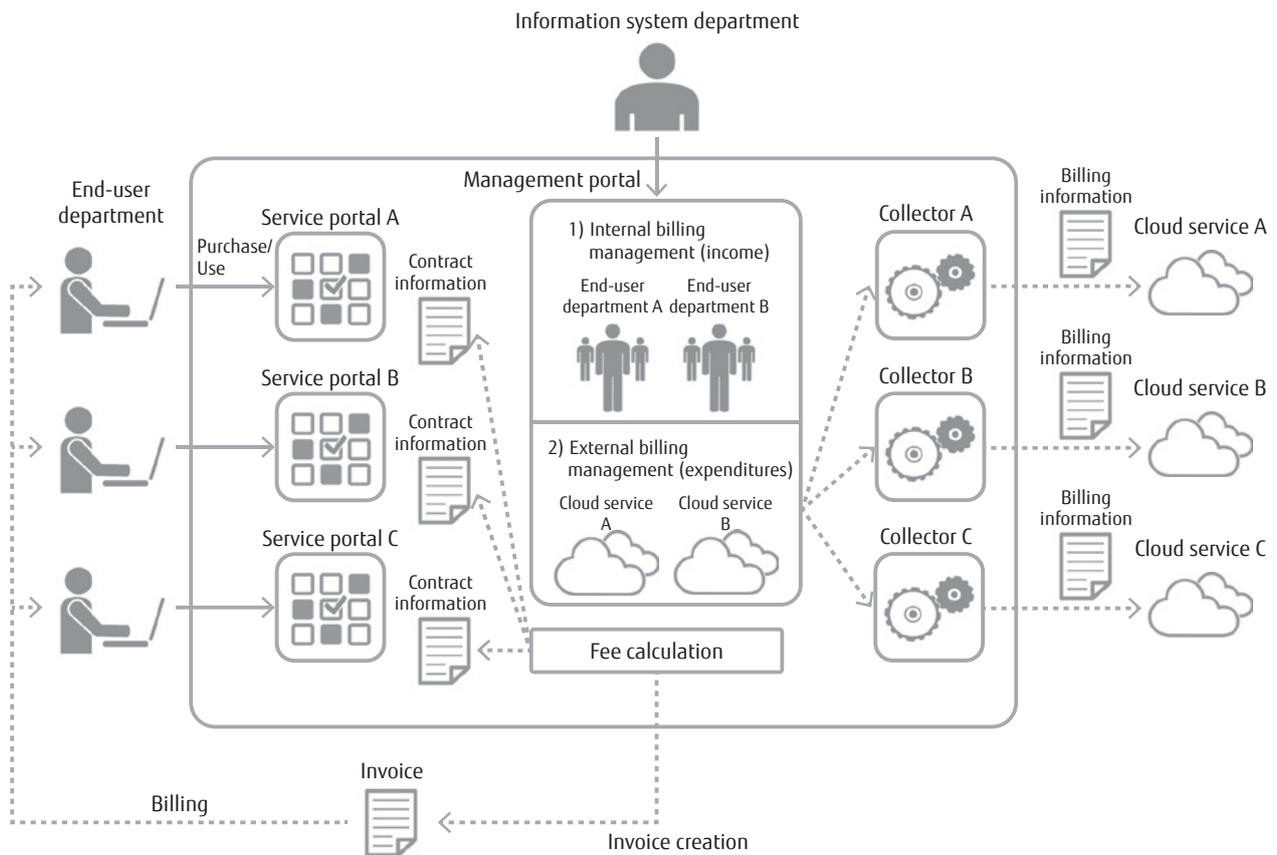


Figure 4
Timely visualization and optimization of cloud costs.

overseas as well. Since our products are designed for global distribution, they provide as standard all the functions needed for use in each country, including multilingual UIs and support of various currencies. Furthermore, as products with the same specifications can be used in each country, this means for example that the overseas subsidiary of a Japanese company can use products with the same specifications as the parent company. By carrying out business planning at the parent company and then rolling out implementation to overseas subsidiaries, companies are able to achieve governance at the global level.

4) Support from planning and introduction to operation

We offer full-range support through all phases, from planning to introduction and operation, according to the life cycle of customer operations. The adoption of cloud services does not always go as initially planned in terms of cost reductions, and it occasionally leads to unexpected operational burdens. Most of these failure

cases are due to insufficient consideration in one or more of the phases, and failure to cover all bases due to lack of experience or know-how. Thus, cloud selection based on due consideration to the introduction and operation phases, and design making full use of cloud utilization expertise, and this from the planning stage, are essential.

5. Future plans

This section introduces various service enhancements planned for the future.

1) Improvement of inter-cloud portability

A problem often faced by enterprises is that while they wish to make selective use of cloud services to meet their unique requirements and do not want to be tied down to a particular vendor, they find inter-cloud portability to be a challenge. At present, service catalogs must be created separately for each cloud. To solve this problem, Fujitsu is planning to offer various functions for improving inter-cloud portability by creating

linkage between the following: system template specifications such as OASIS TOSCA that are not dependent on a particular cloud, build automation tools such as Ansible, which have become popular in recent years, and container-type virtualization technology such as Docker.

2) Cost prediction

Fujitsu currently performs only past billing records management, but plans to offer intelligent functions such as statistical analysis, simulation-based trend forecasting, and proposals for switching to cheaper plans.

6. Conclusion

This paper has described the various challenges of multi-cloud use and Fujitsu's proposed solutions.

Going forward, use of conventional information systems will be complemented by the use of the advanced digital technologies of IoT, big data, and AI, and system operation management is expected to become increasingly complex. By quickly catching on to global customer needs and translating these needs into actual product features, we will contribute to making digital innovation a reality for all our customers.

References

- 1) Fujitsu: FUJITSU Cloud Services Management, a Multi-Cloud Integrated Management Service (in Japanese). <http://jp.fujitsu.com/solutions/cloud/paas/services-management/>
- 2) Fujitsu: FUJITSU Software Cloud Services Management, a Multi-Cloud Integrated Management Service (in Japanese). <http://software.fujitsu.com/jp/csm/>
- 3) Fujitsu: FUJITSU Software Enterprise Service Catalog Manager, Marketplace Management for On-Premise Cloud (in Japanese). <http://www.fujitsu.com/jp/software/enterprise-catalogmgr/>
- 4) Fujitsu: Fujitsu Launches Cloud Services Management Offering for Managed Integration of Multi-Cloud Environments. <http://www.fujitsu.com/global/about/resources/news/press-releases/2015/0827-01.html>
- 5) Fujitsu: Fujitsu Cloud Service PICCO, a Billing Management Service. <https://cloudservicepicco.com/>



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