

“NetCracker”, the Solution Products to Realize the Integrated Operations of Cloud Data Centers

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Abstract

Enterprise companies are continuously challenging to adopt the ever-changing business environment. One of the solutions for enterprises is the innovation of IT system. The cloud data centers where IT systems can be used as services presents a significant evolution for the enterprise, and the need of cloud data centers is increasing more and more. Communication service providers which now start business on cloud data center services for enterprises need to provide services in a timely manner. This paper describes “NetCracker,” the solution products to realize the integrated operations of cloud data centers and to provide the services as quickly as possible.

Keywords

reliability and safety, management of virtualization, management of the integrated operations of cloud data centers, configuration management, service order management, resource management, service management, customer management, provisioning

1. Introduction

Today, enterprise business environments are changing drastically and vertiginously. The reduction of TCO, flexible management and further improvement of compliance (internal control) has become important tasks for the enterprises. Under such business environments, demands of “cloud-oriented” IT systems are increasing to pursue the reduction of IT costs and the establishment of flexible IT systems, and the use of cloud data centers (hereinafter called “cloud DCs”) provides a significant solutions.

At the same time, in order to correspond to such business needs, communication service providers provide them with cloud DC services. These work as infrastructure support, hosting services and application services with the goal of effective utilization of communication network assets, improvement of the added values of communication network services and further increase of profits (**Fig. 1**).

As the number of cloud DC service users (enterprise users) increases, the need for the services of cloud DCs is escalating as well. These needs include reliability, safety and the quick provisioning of new services. To correspond to these needs, cloud DCs are now required to provide advanced integrated operations.

This paper describes the integrated operations functions of the large scale cloud DC of communication service

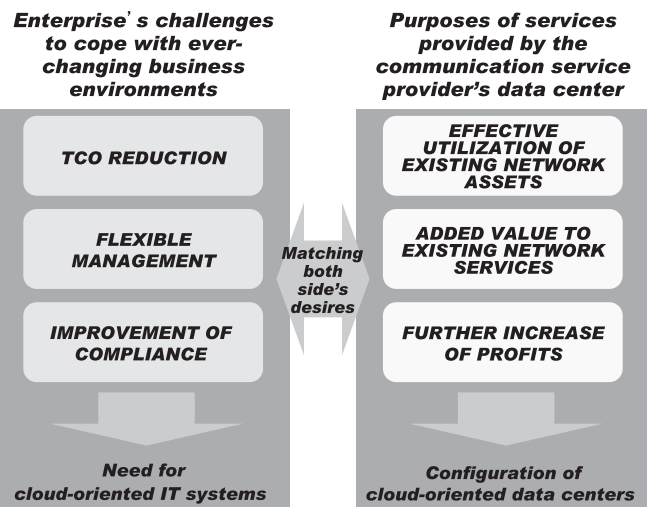


Fig. 1 Background to the popularity of cloud DCs.

providers, especially configuration management functions and service management functions used when service subscription and modifications.

2. Value of the Cloud DC Services Provided by Communication Service Providers

The advantages of the cloud DC services provided by

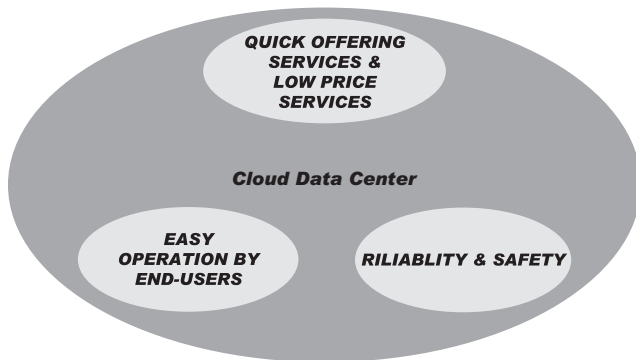


Fig. 2 Value of the cloud DC services.

communication service providers include (1) quick offering services and low price services, (2) easy operation by end-users, and (3) reliability and safety services (Fig. 2).

(1) Quick Offering Services and Low Price Services

It is necessary to implement virtualization technology in order to provide server resources at low cost and to provide users with necessary resources (e.g. servers’ CPU, memory and storage space) on demand. In addition, it is necessary to provide application services (SaaS: Software as a Service) on virtualized infrastructure as soon as possible to meet the demands of enterprise users.

(2) Easy Operation by End-Users

It is necessary to build a system enabling users to perform online operations easily. These operations include applying for services and adding and modifying server resources (e.g. allocation of CPU, memory and storage capacity).

(3) Reliability and Safety

Since communication service providers are providers of cloud DCs, it is necessary to provide users with services unique to communication service providers. These services include provision of secure network services, advanced maintenance/operation services and BCP (Business Continuity Plan)-conscious secure facilities (e.g. earthquake resistance, fire protection, power supply, air conditioning, disaster recovery).

3. Management of the Integrated Operation of Cloud DCs

3.1 System Configuration of Communication Service Providers’ Cloud DCs

The cloud DC system of a communication service provider consists of a group of virtualized servers, routers, network

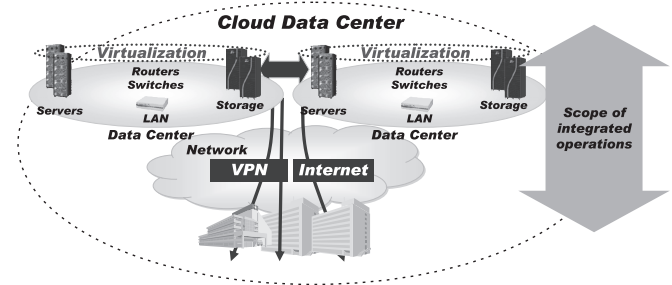


Fig. 3 System configuration of communication service providers’ cloud DCs.

switches and shared storage. In addition, the big feature of communication service providers’ cloud DCs is to provide network (e.g. internet, VPN) by which cloud DC services are delivered to users’ sites (Fig. 3).

Therefore, it is necessary to manage the network through users’ sites as well as through the facilities in the cloud DC, in order to manage the operation of the whole cloud DC system and to realize the aforementioned values.

3.2 Management of the Integrated Operation of Cloud DCs

Roughly speaking, management of the integrated operation of cloud DCs can be divided into “faults and SLA management” and “configuration and service management.” In this section, we would like to explain the key points of operation which are required for (1) configuration management and (2) service management.

(1) Configuration Management

In terms of the configuration management, it is indispensable to manage infrastructure to provide cloud DC services which are physical facilities (e.g. network equipment,

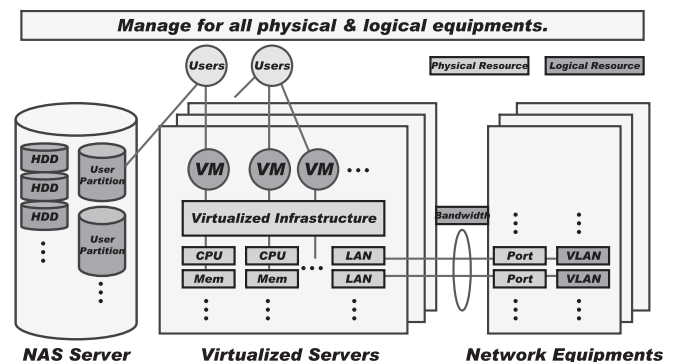


Fig. 4 Configuration management.

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servers, storage) and network facilities (e.g. network facilities to user sites, logical network lines such as MPLS paths). In addition, it is necessary to manage what is unique to cloud DCs. This includes installation information on VMs (Virtual Machines) in virtualized servers and logical network topology on LANs (e.g. VLAN). Configuration management includes managing the status of users and virtual machines (i.e. which user uses which virtual machines). Such information is needed to understand which virtual machines installed in which servers will affect which users when server failure occurs (Fig. 4).

(2)Service Management

For the service management, it is necessary to get customer service orders and to enable services to the customer. When receiving applications for services, user contract information is entered based on the contents of basic contracts and optional contracts, and the resources of the cloud DC are allocated accordingly. The resources to be allocated include network segments and VLAN tags for networks, virtual machines in physical servers, server CPU and server memory, and user partitions for shared storage (e.g. NAS servers).

In terms of configuration for enabling services, it is necessary to perform service configuration (i.e. provisioning) for all facilities using cloud DC services based on the contents

of user applications (Fig. 5).

NEC offers many software products necessary for the management of the integrated operation of cloud DCs. This software includes NetCracker, which is a solution product featuring functions to manage facility configurations and service configurations. There are also WebSAM series products, which are software products for the management of virtualized servers, NAS servers, network server failures, service quality and so on (Fig. 6).

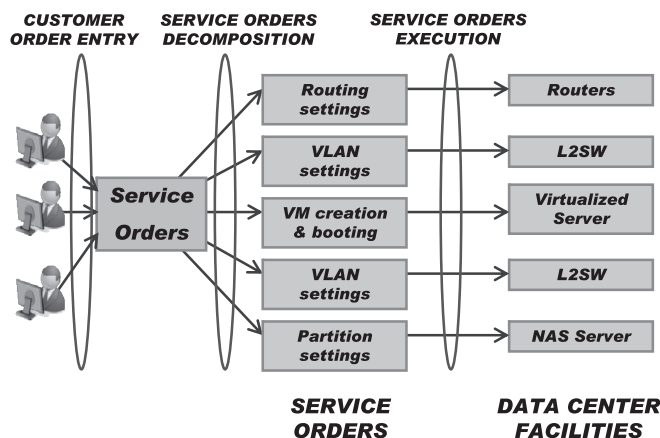


Fig. 5 Service management.

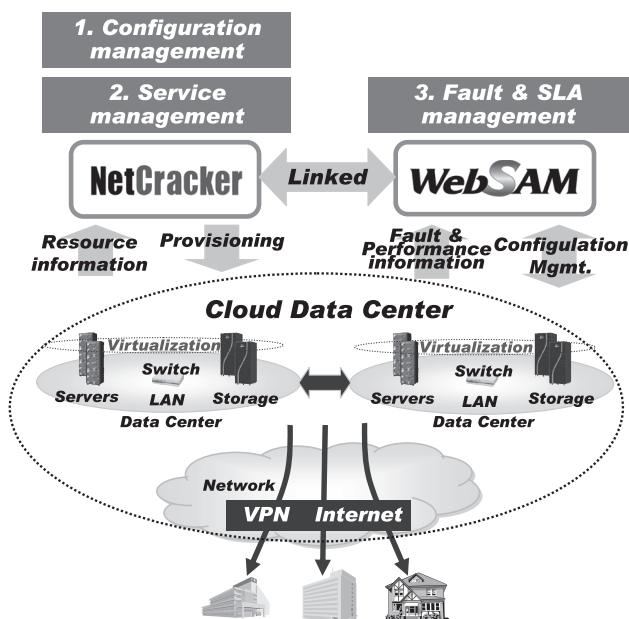


Fig. 6 Products for managing the integrated operation of cloud DCs.

1. Configuration mgmt.

- Manage for all physical and logical resources such as services, virtualized servers and network facilities.

2. Service mgmt.

- Manage for all service orders processing, resource allocation and provisioning execution.

3. Fault & SLA mgmt.

- Manage for all fault and SLA information of services, servers and network facilities.

4. NetCracker and the Management of the Integrated Operation of Cloud DCs

NetCracker is the Operation Support System (OSS) software for communication service providers and features a service introduction support function (i.e. fulfillment: providing management and operation functions from the time of receiving a customer's application for services through the start of service provision).

In the following, the functions of NetCracker are introduced on the lower layer (Fig. 7).

(1) Resource Management

NetCracker's resource management includes functions for the management of facility configurations, which is explained in Section 2 of Chapter 3. With NetCracker, it is possible to define logical resources (e.g. VM, VLAN) in

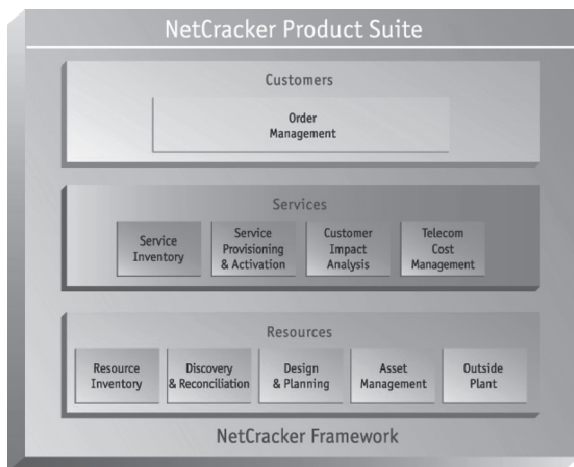


Fig. 7 NetCracker Product Suite.

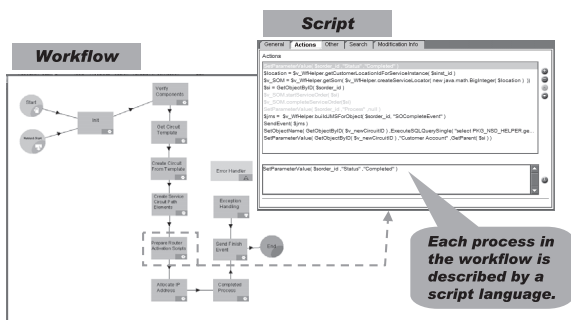


Fig. 8 Workflow of NetCracker.

addition to physical resources (e.g. servers, network equipment) by using object models. This resource data is stored in the NetCracker database in a format compliant with SID (Shared Information/Data Model), and it is possible to use a GUI to modify and add models.

In addition, the software features a function to detect resources from other OSS, and it is possible to synchronize resource information on the differences between NetCracker and other OSS.

(2) Service Management

NetCracker service management includes functions for the management of facility configurations and the management of service configurations which are explained in section 2 of chapter 3. With NetCracker, it is easy to define the services communication service providers provide to their end-users. Like resource data, it is possible to define service information using object models. It is easy to modify defined services and add new services; therefore, it is possible to get services to market fast. In addition, NetCracker's service configuration management includes a workflow function to automate a series of processes required for a service configuration when starting the services explained in Fig. 5 (Fig. 8).

In addition, there is a function to associate users with service information and resource data. Thus, it is possible to analyze the effects on users and services when failures occur in cloud DC facilities.

(3) Customer Management

NetCracker's customer management includes functions for the management of service configurations, explained in section 2 of chapter 3. With NetCracker, it is possible to manage a series of processes including the registration of user information and users' applications for contracts (e.g. new contracts, contract modifications, contract cancellations, etc.), and to perform the processes necessary for service orders. In addition, NetCracker customer management makes it possible to comprehend users' applications for services in an integrated fashion, and to output billing information to charge usage fees.

With NetCracker, when introducing a management system for integrated operation, it is possible to build an optimized cloud DC system by combining functions in the management layer (see Fig. 6) to correspond to the business flow of the user corporation.

In addition, as can be seen in Fig. 6, NetCracker is elaborately designed to work together with other systems, and integrated operation with legacy systems is possible as well.

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NetCracker can work closely with other operation management systems owned by communication service providers, so that it is possible to perform integrated operation optimized for the business needs of communication service providers.

5. Conclusion

In order to provide the cloud DC services expected by enterprise users, the cloud DCs of communication service providers are required to manage integrated operations, including network facilities through to user sites, as well as data center facilities using virtualization technology. Especially from the time to accept users' applications for services through the time to start new services, it is useful to start providing services to users early in order to avoid the loss of business opportunities and to improve user CS (customer satisfaction).

We believe that NetCracker, as introduced in this paper, is the solution product for integrated operations. This software can contribute to the various business needs of communication service providers.

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