Architecture of the Cloud Computing Platform for Enterprises

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Abstract. The paper analyzed the current actualities of the IT application for enterprises, and pointed the main deficient issues existed. Based on the target analysis, it then gave a four-layer architecture of the cloud computing platform for enterprises: physical layer, platform layer, supporting layer and application layer. Meanwhile, it gave the data management and operation mode of the cloud computing platform, as well as its network configuration. Finally, the paper put forward that, once the cloud computing platform structured, it could benefit enterprises to reduce the input cost on IT tremendously, and improve the availability and expandability of IT resources immensely.

Keywords: Cloud Computing Platform, IT Resource, Data Center.

1 Background

IT (Information Technology) is now indispensable for most modern enterprises. It is extensively used in every aspect of their production and management, such as OA (Office Automatic), ERP (Enterprise Resource Planning), SCM (Supply Chain Management), CRM (Customer Relationship Management), CAM (Computer Aided Manufacturing), E-Business, etc. However, with the rapid popularity and promotion of IT application process and the mushroom expansion of data size, enterprises having to increase input in IT continuously, more and more problems hereby arise in data storage and management, shown as follows:

a. The current data centers in enterprises pay most attention on the IT equipment, but not the operational management. This obsolete mode of data management makes it difficult to satisfy the demand of the operational management.

b. Weak carrying capacity, isomeric information islands and incompatibility between different information systems are featured prominently in the rigid architecture of current data center.

c. The information Resources cannot be configured rationally or dispatched in time, which caused the low utilization and the serious waste of them.

d. Enterprises have to consume a tremendous amount of time and money for the construction, upgradation, configuration and management about IT.

2 The Objective

Hereby, it is imperative to rebuild the IT data center and improve the data management mode. A brand-new platform--- Cloud Computing, directing the trend of demand

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& future and being of great extensibility, is urgently needed. With it, dynamic computing and storage resources allocation management can be easily implemented, and automatization of service could be achieved as well. Simultaneously, the cost of IT equipment, operation expense, manpower and energy consumption could be drastically reduced.

3 Design of the Cloud Computing Platform

A veracious evaluation of enterprises' IT service demand and data size is needed before the design of the cloud computing platform. Take the case of a typical minor enterprise for instance. Its cloud computing platform should be structured in 4 layers: physical layer, platform layer, supporting layer and application layer, as illustrated in Figure 1.

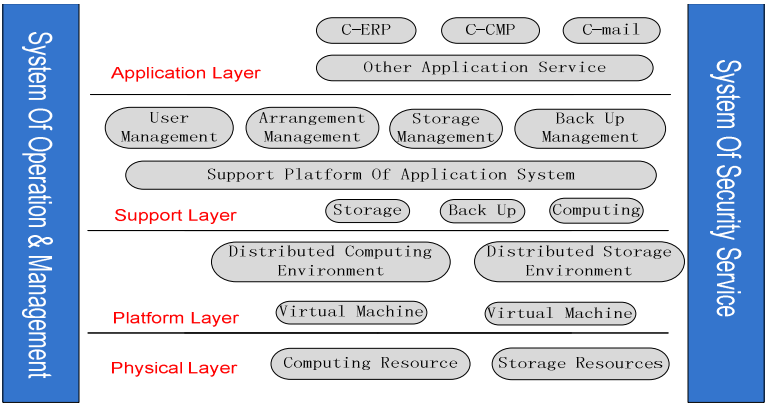

Fig. 1. Overall architecture of the cloud computing platform

3.1 The Resource Pool

The resource pool of cloud computing is distributed on the physical layer, including computing and storage resources, making up of a group of prefabricated server nodes and one-bit memories which can be automatically supplied and recovered. It is of great necessity to arrange disk arrays and servers according to the demand assessment of enterprises' functions and performances, such as the data scale, load balancing, dynamic configuration, etc. For a typical minor enterprise, customarily, 3 or 4 medium servers and an IBM or DELL disk array with a capacity of one-hundred T are enough as its resource pool. Meanwhile, for optimum efficiency,it is better to adopt servers with the same mode.

3.2 The Virtual Platform

On the platform layer, computing and storage resources are virtualized. We can integrate XenServer as the virtualized platform, as well as KVM, VMware, etc. Based on original hardware and software, we install virtualized applications on the bare servers,

and then virtualize several computing and storage environments, forming just as several cloud machines.

With the virtualized platform and its mighty cloud management capability, we could implement from application to virtualized arrangement, and the standardized installation of OS to the application arrangement.

3.3 The Support Layer

The support layer renders the basic service upon the administrator and users, including functions as follows:

- User management

There are 2 major roles on the platform: The administrator and users.

Users can submit applications when they need to acquire, increase or reduce their computing and storage resources, or when ending their projects or change the time. Moreover, they could operate most services on their own, such as restart the virtualized servers or reset the password.

- Disposing management

Disposing management provides fullly automatic services to users' applications. It deals with the applications from users automatically at a certain time,Thus what the administrator has to do is just to monitor the execution status and maintain the regular operation of the OS and applications.

- Storage management

The cloud computing platform manages to supervise both the internal and external storage resources. To meet users' requirements of large storage capacity and high transmission rate, SAN (storage area network) is a fairly good choice.

- Back-up management

The huge data sets emphasize the importance of back-up. The backup agent software is arranged into every business server. Once the backup resources and programs are defined, the data will be backed up from servers to designated memories on time. The backup procedure schema is shown in Figure 2.

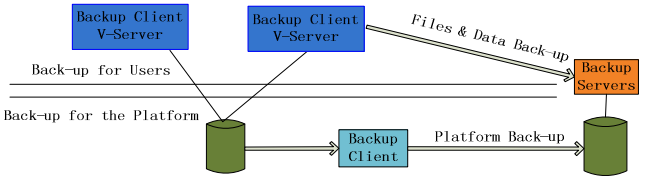

Fig. 2. The backup procedure schema

- Operation monitoring

The function of opeartion monitoring mainly carries on the real-time monitoring to the operation status of the virtual servers applied. It includes the basic computing status, the resources assigned, the utilization ratio, etc. The administrator is in charge of the monitoring, while users can keep abreast of the operation status of their resources.

- Security management

The cloud computing platform is capable of ensuring the isolation and security of each item. Users have easy access to the platform by login with authorized username and password, or the virtual machines of items with VPN authentication and VLAN authorization. It is the isolation of virtual machines and VLAN that ensure the security of the data, as illustrated in Figure 3.

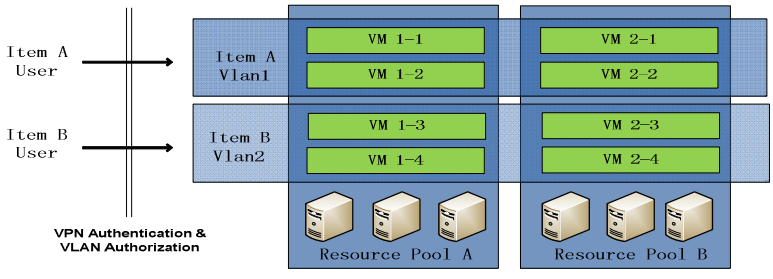

Fig. 3. Arrangement for the security management

3.4 The Application Layer

Enterprises can arrange Cloud-CMP, Cloud-ERP, Cloud-Mail and other cloud applications to demand on the application layer.

4 Design of the Network Configuration

Considering that the cloud computing platform is a complex system with numerous servers and immense data size, the design of the network configuration should comply with the principle of high security, high reliability, good extensibility and good compatibility.

The network configuration is divided into 3 layers: the entrance, the exit, and the core. The exit and the core adopt 2 core switches, and 2 firewalls are applied for a full redundancy connection. Furthermore, considering the extensibility and the compatibility of the network technology of future generation, we'd better choose ten-gigabit smooth transition equipment between the core layer and the entrance.

Taking a full cosideration of redundancy, arranging a gigabit link between the 2 core switches is essential in designing the backbone network.

When designing the exit, policy routing support should be considered, as well as the rational QoS control. In addition, we should ensure the security of the network system while executing the auto-switch between the 2 exits.

5 Conclusions

To see the tangible effect of the cloud computing platform, we take an ordinary company with a scale of one-thousand staffs as an example, as illustrated in Table 1.

Table 1. A compare between cloud computing & traditional mode

Items	Mode 1: traditional	Mode 2: cloud computing	Remarks
IT resources utilization ratio	20%	70%	The IT resources being demand-assigned & dynamic- allocated in mode 2
Human resourse time input	90min	10min	Taking the cost of per capita time input in IT software environment as an example
Capital investment	RMB5500	RMB3000	Taking the cost of per capita IT hardware for instance
Hardware life cycle	3-5 years	5-8 years	Update needed when the hardware is obsolete

In sum, the architecture of the universal cloud computing platform for enterprises can greatly improve the IT resources utilization, and drastically reduce the cost of IT equipment, its operation expense, human resource and energy consumption. However, enterprises differ in type, scale and business scope. Therefore, when designing the architecture, we should take into full consideration enterprises' actual demand and hereby take the superiority and availability of cloud computing platform to extremes.

References

[1] CSA. Security Guidance for Critical Areas of Focus Cloud Computing V2.1 (2009)
[2] Chen, K., Zheng, W.: Cloud Computing: System Instances and Current Research. Journal of Software 20(5), 1337–1348 (2009)
[3] North, K.: Cloud computing platform as service. Information week (2009)
[4] Wikipedia. Cloud computing (EB/OL) (March 10, 2009), http://en.Wikipedia.org/wiki/Cloud_computing
[5] Cloud computing versus grid computing (EB/OL) (March 03, 2009), http://www.ibm.com/developerworks/web/library/wa-cloudgrid
[6] Amazon elastic compute cloud(AmazonEC2), http://aws.amazon.com/ec2 (2008)
[7] Gannon, D.: Head in cloud. Nature (2007)
[8] Weiss, A.: Computing in the Clouds. Networker 11(4), 15–25 (2007)