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The research on the scenarios of cloud platform and traditional platform for resource delivery

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ABSTRACT. *The cloud computing technology is based on cheap PC servers of X86 framework, utilizing plenty of virtualization technology, distributed computation technology, distributed storage technology to provide computation and storage services. Compared to traditional mode, it has both advantages and disadvantages. This page will make a comparison of them in the four aspects of resource distribution method, expansion modes, operating character, construction and maintenance cost to find the most suitable scenarios for application.*

KEYWORDS: *Cloud platform; Traditional resource service; Delivery platform scenario; Resource allocation*

1. Introduction

The cloud computing technology is a novel computing mode[1]. It has been used by excellent Internet companies such as Google, Amazon, and Alibaba.

The cloud computing is mainly based on cheap PC servers of X86 framework, utilizing plenty of virtualization technology, distributed computation technology, distributed storage technology to provide computation and storage services so as to meet customers' requirement. The relative mainstream cloud computing technology mainly includes virtualization technology and distributed computation technology of which the realization includes KVM, XEN, VMWARE, etc., while the main framework of distributed computation include hadoop, storm, spark, yarn etc.

Traditional service generally refers to the utilizing the mode in which entity server is combined with shared storage for applicable delivery environment. The entity server for traditional service mainly includes minicomputer and PC server; shared storage generally includes SAN storage, NAS storage, etc. The specific time for the emergence of traditional service models can not be verified, but it is certain that it was established with the development of computers and the Internet after the third scientific and technological revolution. It has been a few decades now. There are verified architectural models and operation and maintenance methods., more

mature.

Along with the application models increase, the cloud computing model is developed. Now it comes to a critical point for the balance between the traditional resource delivery mode. The advantages and the respective applicable scenarios of the two modes will guide the selection of migration objects. This paper will make approach to this subject.

The cloud platform includes the two technologies of distributed computation and virtualization. As the distributed computation is the programme modification and compilation aiming to some specific framework, the discussion of which is not included in this paper. Only the virtualization technology is discussed in this paper.

2. The difference between the two modes

In this paper, the comparison and analysis for the cloud platform mode and the traditional mode will be carried out based on the four aspects of resource delivery mode, expansion mode, operating character and construction cost.

2.1 The difference in the resource delivery modes

The services provided by the cloud computing platform mainly include three types of IaaS: Infrastructure-as-a-Service, PaaS: Platform-as-a-Service, SaaS: Software-as-a-Service. The feature of the service is that the terminal users just need to put forward the requirements of calculations and storage capacity meeting requirements, without thinking about on which hardware platform or where the service is carried out. During the process, it is not required to consider the status of many restricted conditions such as physical position, network, power supply, etc[2].

During the course of the resource delivery on traditional service platform, several processes of physical position search, server installation, network configuration, system deployment, etc., are needed to be carried out, which requires huge human cost and a long delivery time.

The delivery amount and time summary for the two modes in the years of 16, 17 and 18 for some giant company is showed below:

Table.1 Resource delivery.

Year	Cloud platform		Traditional	
	Quantity	Average duration	Quantity	Average duration
2016	56	<3 days	122	> 7 days
2017	138	<2 days	81	> 7 days
2018 (as of July)	155	<1 day	53	> 7 days

It is showed in the table that average duration of resource delivery through

virtualization machine on cloud platform is half of the duration of traditional mode. The resource delivery rate is high. Furthermore, based on the trend analysis for the distribution quantity, the delivery through virtualization machine on cloud platform is increasing, which takes up a larger share in the total delivery.

2.2 The difference in expansion

For the traditional service platform, when the processing capacity of server reaches to the upper limit, expansion can be only carried out by means of scale-up (increase the quantity of CPU and memory for each server, as showed in figure 1). In case the capacity of storage device is not sufficient, the expansion can only be carried out through the increase in dedicated hardware[3]. When the device can not meet requirements, it must have to be replaced, with the hardware is in tight coupling with the working style of the software. Cloud platform utilizes the general X86 server hardware, and is supported by vertualization and distribution technology. All the hardware resources are provided in the manner of vertualization. Hardware is in loose coupling with the working style of the software.

When the transaction processing is confronted with the choke point, the scale-up method as well as the scale-out (increase the number of the devices, as showed in figure 2) method can be applied for. Theoretically, cloud platform embraces an unlimited expansion.

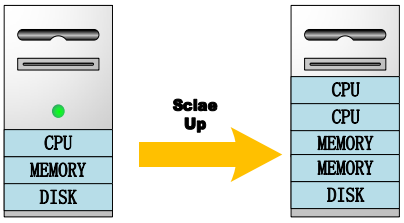

Figure.1 Scale Up.

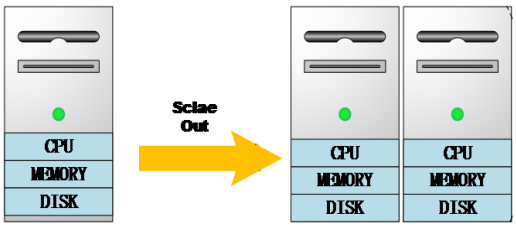

Figure.2 Scale Out.

2.3 The difference in operation character

Cloud platform carries out resource delivery by means of vertualization. In the traditional mode, delivery is carried out through physical machine. With regard to the characters of resource delivery methods, there is difference in the operation modes of the two platforms[4].

Cloud platform has the advantages such as dynamic flexibility regarding the occupancy of resources, and disaster recovery of virtualized devices, etc. In the meantime, cloud platform also has the shortcomings of resource contention, low level of resource utilization, and difficult pre-planning, etc.

The dynamic flexibility of resource refers to that the operating resource with the capacity under application is distributed by the operating system of host machine to each virtualized machine based on actual operation. And resource distribution is decreased in case that the operation is not heavy, so as to reduce operation cost; Virtualized device disaster recovery is applicable to virtualized machines of high level. If a virtualized machine is crashed, another virtualized machine in identical operating condition will automatically start up, and the operation on the machine is transparent to ensure the non-perceived recovery of the system (it is showed in figure 3)[5].The resource contention is resulted when a host machine needs to carry the common resources such as the shared network for several virtualized machines, hardware, etc. The resource contention will occur when the scanty common resources are used by the virtualized machines, and some of the virtualized machines are influenced; the low level resource utilization is because that the virtualized machine is operating at low applied programme level[6]. When the orders of operating system are executed, rather than direct execution, the environmental switches between the host machine and the virtualized machine are frequent, so as to reduce the execution efficiency.

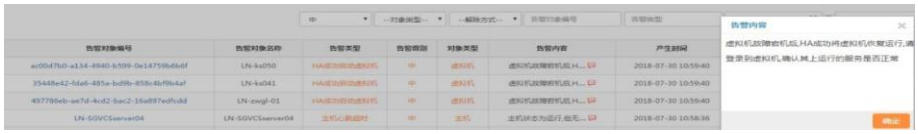

Figure.3 Fast recover.

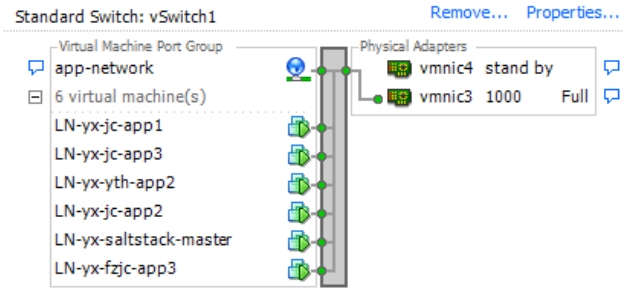

Figure 4. 6 machines shared networks.

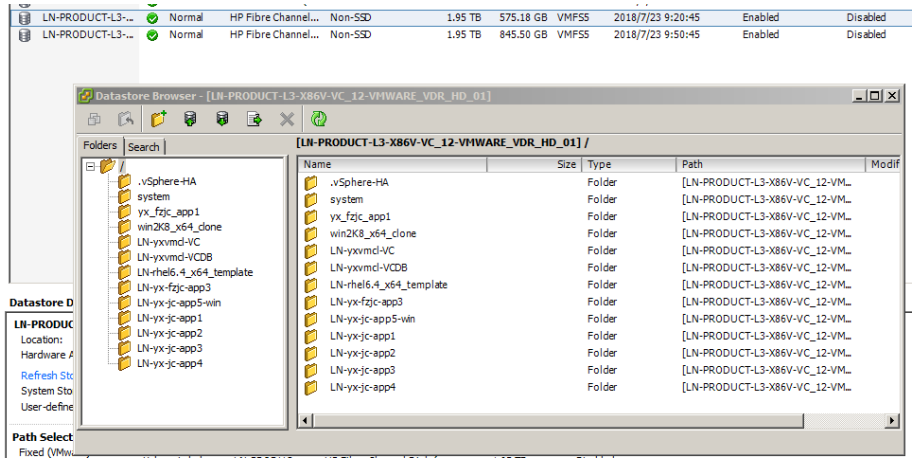

Figure 5. 12 machines shared disks.

The traditional mode for resources is a dedicated mode, in which the contention of computation resources and memory resources are not existing[7]. It can be ensured that high resource utilization will not have effect on other mainframe machines. But in the case of high recovery application, the application configuration is necessary. The high applications rely highly on the applied software in operating system, therefore, there exists high risk in recovery[8].

By the comparison of resource contention and the characters of application recovery between the two modes, cloud platform is more suitable for different kinds of application deployments with low resource occupancy or high resource occupancy; traditional mode is suitable for the application deployments with high resource occupancy or extremely high occupancy of some resource.

The resource occupancy rates of WEB servers, database servers and data acquisition servers in some company are showed below:

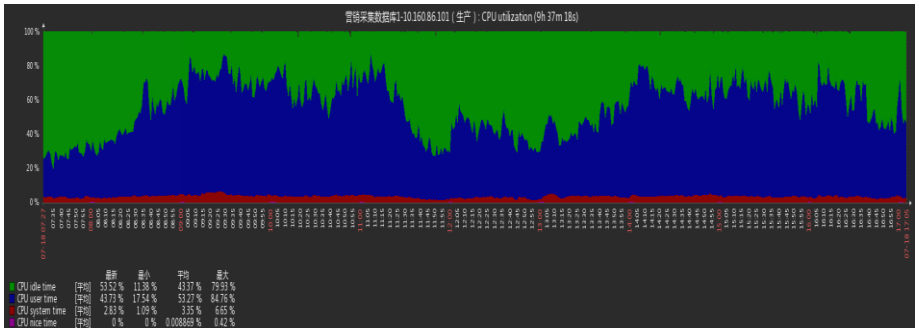

Figure. 6 CPU utilization rate in operating period of the database servers.

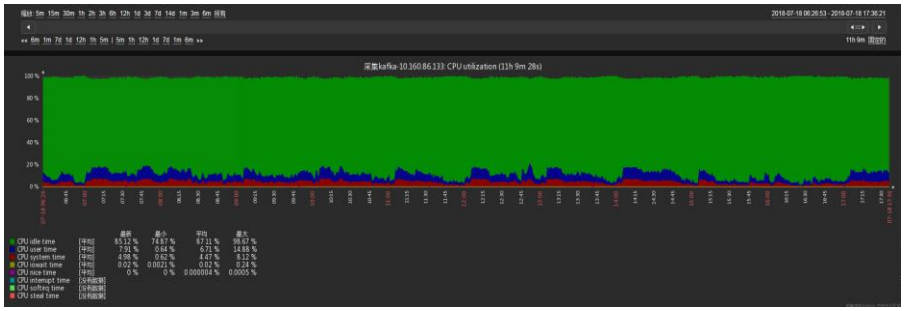

Figure.7 CPU utilization rate in operating period of the data acquisition servers.

Figure 8. CPU utilization rate in operating period of the WEB servers.

It can be learned from the operation that the average resource utilization of the database servers is relatively high. In order to prevent the resource contention, traditional mode is more suitable for deployment; for the WEB servers and acquisition servers, the average utilization rate is relatively low, cloud platform is therefore suitable for deployment, and the increase in resource utilization and automatic recovery of applications are achieved without influencing operation.

2.4 The difference in operating cost

Most cloud computing platforms utilize general X86 servers as the hardware platform, along with open source software. The X86 framework server platform is open and of sufficient market competition with a diversity of product types. It features low cost during the initial input as well as the following operating.

The cost comparison between the traditional delivery mode and the following

integration to cloud platform is showed in table 2 for the front end utilization of the major information system in the company

Table.2 Operating Costs.

General information and cost		Traditional platform	Cloud platform
General information	Application modes	30	30
	Servers	8	4
	Utilization of CPU	10%	35%
Construction cost (10thousand)	Hardware	64	20
	Software	0	10
Maintenance cost (10thousand, 5years)	Maintenance cost	8	2
	Operating cost	4	2
Operating cost	Power rate cost	35.04	8.76
Total cost within 5 years (10 thousand)		111.04	43.16
Transaction availability		Application cluster	Application and server cluster

In the table, the totol cost within 5 years is calculated as follows:

TCO=HardwCost/tai*N+ SoftwCost + HardwMaintCost/tai*N+ SoftwMaintCost + PowerRate * Power (1)

Power = Rate/tai * N * 5 * 365 (2)

It can be learned from the calculation result that, under the assurance of transaction performance, through the virtualization integration of cloud platform, for the support platforms for transaction hardware, 8 servers are integrated into 4 servers (16 virtualized machines in total). the integration ratio is 1:4. The space for equipment cabinets is reduced. In the meantime, the hardware cost is saved by 44. As calculated on a life cycle of 5 years, the operating cost is saved by 20 thousand Yuan; power rate cost is saved by 262.8 thousand Yuan; total cost is reduced by 61%. Furthermore, the total transaction availability is higher than that of traditional transaction platform.

Based on the actual application, the cloud computing virtualization platform functions well. It is found that the utilization rate of physical server CPU is around 10% before integration. The utilization rate of virtualized machine CPU is around 35% after integration. The overall utilization as well as operation and maintenance efficiency are increased.

2.5 Other features

In addition to the characteristics of resource delivery and operation, the cloud platform also has certain features in its use, such as multiple tenants, DOCKER, and

so on[9]. Multi-tenant characteristics can give resources to the applicant, which is created by the applicant according to the needs of use, and allows flexibility in the use of methods while maintaining resource isolation; DOCKER technology provides lightweight running resources for applications, avoids resource waste that traditionally provides resources through the operating system, and increases the convenience of resource delivery.

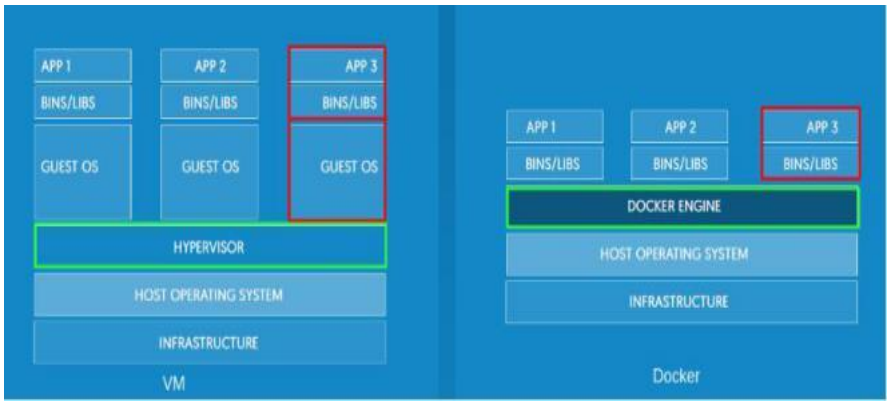

Figure. 9 The difference between Docker and virtual machine.

3. Conclusion

In this paper, the four aspects of resource distribution method, expansion modes, operating character, construction and maintenance cost are compared and analyzed. Compared to traditional mode, cloud platform has obvious advantage regarding resource utilization, delivery time, expansion property and construction cost. It will be the focus for the development of resource delivery in the future. In the meantime, cloud platform virtualization is faced with the problems of resource contention during operation, low operating efficiency, open source software without technical support. Such disadvantages should be tried to avoid when application[10].

Therefore, during the system deployment, at the time of enjoyment of convenience provided by cloud platform, the realization method should be formulated in advance. For example, database is more suitable for physical machine; WEB is more suitable for cloud platform. Perform scientific planning and make use of different advantages. By means of reasonable application of cloud platform and traditional delivery methods, ensure the operating efficiency along with the increase in the resource utilization. Apply cloud platform as well as traditional mode to various applications, so as to create more operation and maintenance value.

Acknowledgments

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