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Performance Analysis and Massive Concurrent Access Response Test of Sichuan Top IT Vocational Institute Data Center Based on Virtualized Cloud Computing

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Abstract

Prior to 2017, the data center at Sichuan Top IT Vocational Institute adopted a centralized and traditional mode of "foundation-based support" with a high degree of coupling between network applications and physical servers. With the type of network services and business volume continuing to increase, the centralized and highly coupled architecture model cannot meet the growing demand for huge amounts of data and services, which exposed more and more disadvantages in resource integration, energy consumption, QoS, utilization, reliability, economy, manageability, security, etc. After full technical demonstration it is decided to adopt the H3C CAS virtualization cloud computing platform to transform and upgrade the data center[1]. The project has been completed its implementation in January 2017. After nearly three months of routine operating conditions and statistics analysis, in terms of energy consumption, qos, resource utilization, failure rate and so on it has achieved the intended expectations. Meanwhile a typical test program has been designed to simulate the mass visit, which verified that the system is fully capable of peak concurrent access.

Keywords: data center; cloud computing; virtualization; TTFB

1. Introduction

Sichuan Top IT Vocational Institute is IT-based, with nearly 11,000 students. The campus network platform relies on data centers, and provides common basic network services to inside and outside college users.

Before the implementation of the project, the traditional data center architecture mode is adopted. The related

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network application services are directly deployed on the physical server. The corresponding mode of "one to one" or "one to many" is adopted between the physical server and the network application system.

However, the data center is facing several serious problems: Firstly, the data center resources are based on the peak equipment, which is not normal. Under normal conditions, the utilization of resources is very low. Secondly, it is in poor resource integration as well as equipment fragmentation and there is a lack of centralized and unified management tools, causing high management costs[2]; Thirdly, poor flexibility and reliability: due to the lack of load balancing mechanism and fault migration mechanism the data center cannot allocate resource flexibly based on user business needs, therefore system failure is inevitable. Fourthly, energy consumption is amazing as for inadequate equipment utilization. A lot of purchased equipment means the more energy consumption, while air conditioning and cooling also consumes a lot.

After sufficient technical demonstration, the data center decided to adopt virtualized cloud computing technology to transform and integrate resources to completely solve the above problems.

2. Brief Introduction to Project Renovation

To form the resource pool ---- "cloud", H3C CAS virtualized cloud computing management platform is introduced into the data center to complete the virtualization of the existing data center IT infrastructure, including computing (server), network, storage and other devices through the CVK system. The network administrator completes the data center resource management through the CVM system. Based on the user's business needs, the network administrator customizes the virtual machine and deploys related services, providing related network application services for the teachers and students in the college.

3. System routine performance analysis

According to the program design, the data center renovation had been completed by the end of January 2017. Up to now, the data center has been running for three months and works well. Its business performance and reliability has been greatly improved, while the equipment investment costs, operation and maintenance costs, as well as power consumption costs have dropped significantly overall. The system has achieved the following goals[3]:

(1) Due to the improved system integration the equipment utilization has also been improved. The newly-built system consolidate resources through the CAS platform and deploy network application services on virtual machines, thus greatly improving resource utilization. The following is a comparison between data center CPU, memory utilization before and after the project, which is shown in Table 1.

Table 1 comparison between data center CPU, memory utilization before and after the project

	Before	After	Degree of Improvement
Average memory utilization	About 10~20%	About 60~70%	About 50%
Average CPU utilization	Below 30%	Above 70%	Above 40 %

(2) Operation and maintenance manpower costs dropped significantly. Before it, due to poor system integration, there is a lack of unified management tools. A total of three full-time staff manage the data center system of our network center. After the project, the CAS virtualization cloud platform has greatly integrated resources, demanding only one administrators who can log in to the platform via only one PC to schedule, manage, and deploy the entire system resources[4].

(3) The system operating performance has been greatly improved. The CAS cloud platform has the ability to automatically monitor the operation of the system and deploy resources in order to achieve efficient load balancing based on the network real-time demand. Besides the CAS cloud platform has automated failover capabilities. The following is a comparison of the number of system performance emergency between the system before and after the implementation of a month of operation. which is shown in table 2.

Table 2 Before and after the implementation of the project data center emergencies comparison