Research on Application of Private Cloud Platform

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Abstract. This paper introduces the current development status of cloud computing technology at home and abroad, analyses the history and realistic needs of Enterprise Cloud computing, introduces the IaaS, PaaS and SaaS services in the construction of Enterprise Cloud Computing center, and puts forward seven key technologies of operation and development that need to be solved urgently at present.

1. Introduction

As the fourth IT industry revolution after the mainframe computer, personal computer and Internet, cloud computing is rising rapidly all over the world. Internationally, Google, Amazon, IBM and Microsoft, as well as domestic IT giants such as Huawei, Lenovo and Dawn, have focused their business on cloud computing. Cloud computing, as a new computing model, can be commercially successful because it has more advantages than traditional computing model. These characteristics include: super-large-scale resource virtualization, on-demand service, high reliability, high versatility, high scalability and low life-cycle cost. Among them, on-demand service is an important feature of cloud computing. Resources in resource pool can be flexibly allocated to needed services, which can turn capital expenditure into operational expenditure; can improve the agility of resources, more effectively respond to business needs; can improve business agility, focus on solving business problems rather than infrastructure problems; can reduce resources; Consumption.

At present, our country is in the critical period of information construction. Cloud computing, as an important technological innovation, is bound to become the basic platform of information system construction in the future. Faced with the demand for server resources brought by the rapid growth of various information systems, private cloud platforms such as Huawei Fusion Sphere and Dawn Cloudview are being deployed in many places. The cloud computing platform based on virtualization technology greatly improves the utilization rate of server resources and saves the cost of information system construction and maintenance. At present, it only takes several minutes to set up a virtual server on the cloud platform. The performance of the virtual server, such as computing, storage, network access, is basically the same as that of the independent hardware server. Moreover, all the virtual servers currently running on the cloud platform can be managed and the main performance indicators can be monitored. Therefore, it is necessary to conduct in-depth research on the application, performance analysis and security of private cloud platforms, accelerate the application of cloud computing, fully tap the application efficiency of private cloud platforms, and lay a solid foundation for the migration of enterprise information systems to cloud platforms.

2. Current Development of Cloud Computing Technology at Home and Abroad

The concept of cloud computing usually starts with the concept proposed by Google in 2006. The global cloud computing centers are dominated by the United States. Most of the top cloud computing
companies in the world are Amazon, VMware, Microsoft, Salesforce, Google, IBM, and Citrix and so on. At present, cloud computing and big data technology have matured. The major powers in the world have positioned cloud computing technology and industry as the means of national core competitiveness, formulated special policies, and actively nurtured the market.

The development of cloud computing in China started in 2008, and in 2008 it was mainly in the stage of conceptual cultivation. In 2009, small-scale construction began, and after several years of development, government resources cloud, government information cloud, intelligent transportation cloud and other government clouds, as well as education cloud, industry cloud and other industry application cloud were formed. After 10 years of development, cloud technology and big data technology in China have basically matured and applied to the Internet industry and government departments. At present, the public cloud represented by Aliyun and Tencent cloud has become more competitive in the world. The domestic IT giants such as Huawei, Lenovo and Dawn also have their own mature public cloud and private cloud construction schemes, and have a large number of successful application cases. Huawei has achieved market leadership in the government cloud. The Cloud View cloud platform of Dawning adopts VMware mature open source platform. Combined with Dawning's years of hardware server experience, it can provide many private cloud solutions, such as government, enterprise and so on.

3. Construction of Enterprise Cloud Computing Service Platform

Cloud computing center can provide three levels of services: IaaS: the services provided to consumers are the use of all computing infrastructure, including processing CPU, memory, storage, network and other basic computing resources. PaaS: The service provided to consumers is to deploy applications developed or purchased by customers using development languages and tools (e.g. Java, python, Microsoft. Net, etc.) To the supplier's cloud computing center. Customers do not need to manage or control the underlying cloud infrastructure, including networks, servers, operating systems, storage, etc. SaaS: The service provided to customers is an application run by the operator in the cloud computing center. Users can access it through the client interface on various devices. Enterprise cloud computing centers currently mainly provide IaaS services and establish large private clouds in various networks. Each business port can apply for a virtual server to meet the current needs in the unit network center according to the needs (follow-up resources can be added directly), replacing the original large number of independent servers. This not only greatly reduces the consumption of resources, but also provides a broad space for the follow-up information development of the unit. In addition, the private cloud units have also carried out application exploration, established common functional components such as document data exchange center, cloud database, and so on, studied to provide PaaS services for the development of information systems for various departments of enterprises, and established applications such as unit general mailbox, website general station building system, personnel basic database, etc., to provide SaaS services for the users of the whole unit.
Although cloud computing technology has brought great convenience and led to subsequent technological changes, if we do not fully study, study the hardware and software equipment we purchased, and design integrated reliable technical solutions, the consequence is not only that we cannot make full use of the performance of cloud computing equipment, but also may bring greater security risks. Therefore, the following key technology research needs to be carried out in the following key technologies of the enterprise cloud computing center:

(a) Data Backup and Data Recovery Technology for Cloud Platform

The data managed by cloud platform is massive data, and it has its own data security management scheme. At present, the virtual machine fails and cloud platform provides data protection by means of thermal migration. Combined with third-party data backup equipment, the timing backup mechanism of key business systems after data acquisition is adopted. The research of data backup in business system runtime and the exploration of using distributed and redundant mechanisms to achieve real-time backup can greatly reduce the time of business system failure disposal. This paper discusses the data emergency plan of enterprise network center under cloud platform to ensure data security and business continuity of important information systems. Due to the huge amount of private cloud data in some enterprises and the distribution of enterprises in many locations, in order to ensure the security of data, if the conditions are met, the third-party public cloud can be used for data backup and recovery. At present, the available public cloud mainly includes Aliyun and Tencent cloud in China, Amazon, Microsoft and Google in other countries, and smaller data centers can also consider using the public cloud services provided by operators such as China Telecom.
(b) Research on Business System Migration and Data Security

To carry out business system migration and application research, focusing on the application performance comparison between independent servers and virtual servers under the same resources, including CPU and memory occupancy, hard disk reading and writing, network speed and so on. On the basis of the research of performance, according to the operation status of the current business system, the virtual machine resources are reasonably divided. Combining with 118 existing information systems, the migration strategy of the system is studied and the basic steps of migration are determined. Develop data security research on cloud platform, especially for important business applications, study data backup and recovery mechanism such as virtual machine downtime, business system failure, avoid the risk of server centralization, and effectively ensure that "core business is not downtime, important data is not lost".

(c) Daily Management and Optimization of Cloud Platform

The application of cloud computing technology has been mature, and there are more complete schemes for platform resource division and virtual machine allocation. Based on the current application system status of enterprises, the daily management and Optimization Research Based on the platform is carried out, mainly including: operation and maintenance research, focusing on dynamic resource management of cloud platform, dynamic adjustment of computing resources, storage resources and network resources; emergency plan research based on cloud platform, focusing on common fault analysis and location, virtual machine fault location. The research of cloud platform application performance includes resource virtualization utilization rate, analysis of computing resources, storage resources virtualization effective utilization rate and loss rate.

(d) Performance optimization of cloud platform business system

At present, the related technologies of cloud platforms are relatively mature, but the performance of platforms based on specific underlying physical resources is lack of actual evaluation, resulting in the lack of scientific basis for resource allocation. Combining with the existing server application performance evaluation technology, we can try to use performance indicators such as throughput, response time, and resource occupancy to evaluate the performance. Finally, combined with the performance analysis results, the performance optimization of cloud-based business system is carried out, focusing on the concurrency and load balancing of the system, and tracking the performance changes of users in the use process. The resources allocated by cloud platform are adjusted according to the test results and user needs. If necessary, the business system can be adjusted and the program can be
redeveloped. Data redeployment. For those information systems that may affect the security of the entire platform, we can temporarily consider not migrating them to the cloud platform.

(e) Application Research on Three Service Models of Cloud Computing

Cloud computing mainly includes infrastructure as a service (IaaS), platform as a service (PaaS), and software as a service (SaaS) and so on. Cloud computing center can use IaaS mode to provide its resources to customers. Through virtualization technology, virtual data center can virtualize the corresponding physical resources into multiple virtual data centers. PaaS can bring more flexible and personalized services to customers, including middleware as a service, messaging as a service, integration as a service, information as a service, connectivity as a service, etc. In SaaS mode, only a certain rental service cost is needed to enjoy the corresponding hardware, software and maintenance services, which is the most effective mode of operation for network applications. Considering the application requirements of large data and distributed computing, which are badly needed by many enterprises, it is necessary to explore the use of cloud middleware, cloud database, data exchange platform to provide PaaS and even more advanced SaaS services on the basis of existing IaaS services.

(f) Application Research of Big Data, Cloud Middleware, Distributed Computing and Distributed Database Technology in Cloud Platform

This paper studies distributed computing frameworks such as Hadoop and Spark, and explores how to use cloud platform to provide sufficient and appropriate infrastructure for deployment of these frameworks, which lays a good foundation for subsequent large data applications based on these distributed computing frameworks. This paper discusses how to use appropriate resources to build a virtual machine. This virtual machine can exceed the number of CPUs, memory capacity and network bandwidth of physical single machine, thus forming a virtual high-performance computing node, which provides a computing environment for complex algorithms that are not suitable for distributed implementation in large data. The deployment of distributed database and cloud middleware, such as HDFS, Hive, MongoDB, Neo4j, DRMS, and cross-host backup and migration of data storage are studied to ensure the security of stored data.

(g) Remote Management Technology of Cloud Platform

The remote management of cloud platform mainly realizes status monitoring, dynamic application of resources, multi-level management and control of resources. On the basis of the secondary development method of the underlying interface of cloud platform, it focuses on solving the problem of data visualization, displaying the current monitoring data of cloud platform in a beautiful and readable way, setting alarm threshold for key parameters, and alarming the attendants once exceeding. Explore the online application and approval function of virtualized resources, effectively improve the level of resource management, and achieve hierarchical management and control of resources.

4. Summary

This paper is a technical paper which combines the transformation and construction of traditional enterprise information service center to cloud computing information service center (private cloud). Through the transformation, we complete the migration of the original information system to cloud computing platform, optimize the operation and maintenance of the follow-up cloud platform, improve the utilization and security of the cloud platform, and provide support for the follow-up unit large data and other information system construction. Cloud computing technology represents the development direction of information center technology at present. Only by doing well the related technology research of Information Center Based on cloud computing can we solve the key problems of technology development of large-scale enterprise information center in China.

References
[1] Zhang Yanyan-yan. A Cloud Resource Allocation Method Based on Simple Harmonic Oscillation. Journal of Shenzhen University (Polytechnic Edition). 2017, 06, 1 - 1.
[2] Tao Xinquan. The Application of Cloud Computing in Libraries. Journal of Library. 2010, 02, 2 – 3.
[3] Wang Wei. A Cloud Operating System for Cloud Architecture Software. Computer Science. 2017, 11, 3 - 3.