Review of cloud computing technology

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Abstract

This paper first discusses the development background, definition, main features and service model of cloud computing, and then introduces the key technologies of cloud computing, programming model, data and platform management. At last, the paper analyzes the challenges of cloud computing.

Keywords

cloud computing, cloud services, virtualization, data management.

1. Introduction

With the rapid development of Internet and digital technology, the real world data is explosive growth, and the data processing capacity in the existing industry has not met the needs of data growth, in order to meet the needs of massive data processing, increasing the investment of IT facilities has become the urgent need to be. However, the use of IT resources is very uneven: the industry has a large number of computing resources are often not have the ability to supply resources, and has the ability to provide resources and the industry has a small amount of computing resources, thereby greatly reducing the business response rate. Emerging cloud computing model to solve the above problems has brought opportunities, cloud computing can greatly improve the efficiency of resource utilization and business response speed, efficient and efficient aggregation of related industrial chain.[1][2]

2. Basic concepts of cloud computing

2.1 Cloud computing definitions

In 2006,Google for the first time to cloud computing related concepts and theories, cloud computing is distributed computing, parallel computing and grid computing, it is a new development, implementation in the computer science concepts of the new business, it is a adjusting service mode of computing resource utilization rate.

The cloud computing based on the network, including server, storage, applications and services, such as shared computing resource pool can be configured to facilitate access to a model based on demand by The National Institute of Standards and Technology. And resource pool to minimize the management or through the interaction with the service provider can quickly provide and release.

2.2 Main characteristics of cloud computing

(1) ultra large scale. At present, the main cloud service providers have a large number of servers, including Google cloud computing has more than about 1000000 servers, IBM, Microsoft, Amazon and other's server number has exceeded several hundred thousand, which can provide a strong computing power of cloud users.

(2) on-demand self-service. Users do not need to interact with the service provider to automatically get a self - Computing resource. Cloud system for the type of service through econometric methods to control and optimize the use of resources, resources usage can be monitored and controlled and can provide the demand model of suppliers and users.

(3) high scalability. Cloud computing is not limited to a specific application, can be constructed in a variety of applications, the same cloud can support different applications at the same time. While cloud computing can be seamlessly extended to large-scale clusters, and even contains thousands of

nodes at the same time. The size of the cloud can be dynamically scalable to meet the needs of application and user scale growth.

(4) virtualization. Cloud Computing supports users in any position, use any terminal to obtain the application services. The requested resources come from the cloud, not a fixed tangible entity; the application is running somewhere in the cloud, where users do not need to understand the specific location of the application running. Only need a computer or even a mobile phone, you can through the network to request the required services.

2.3 main service model of cloud computing

With the development of cloud computing, all kinds of manufacturers are developing different cloud computing service model. At present, there are three main types of services in cloud computing:

(1)Infrastructure as a Service (IaaS)

IaaS is the manufacturer's cloud infrastructure consisting of multiple servers,

which as a measurement service to customers. Memory, I/O equipment, storage and computing ability is integrated into a virtual resource pool, to provide the required storage services and the virtual serverfor the entire industry This is a managed hardware mode, the user pays hardware facilitiesfor the use of manufacturers.

(2) Platform as a Service（PaaS）

Development environment as a service to provide in PaaS. In this distributed platform services, Manufacturer provide the development environment, server platform, hardware resources and other services to customers, users develop their own applications on the platform and pass through their servers and the Internet to other customers. PaaS provides the middleware platform for enterprises and individuals to provide the application development, database, application server, experiment, hosting and application services.

(3) Software as a Service (SaaS)

SaaS service providers will be deployed on their own server, the user needs to order the application software services based on the needs of the Internet, service providers charge according to the number of software, the length of time, and through the browser provide softwareto customers. The model is maintained and managed by the service provider and the hardware are provided by the facilities, users can access the Internet terminal, then use the software anytime and anywhere. Customers are no longer spends a lot of money in hardware and software as the traditional model,only need to spend a certain amount of rental services, through the Internet can enjoy the corresponding hardware, software and maintenance services.

3. key technologies of cloud computing[3]

3.1 virtualization technology

Virtualization is the most important technology of cloud computing, it realizes the logical abstract and unified representation of physical resources.V irtualization provides a platform for physical computing logical resources, whichbe presented to the operation of the operating system, so that multiple operating systems also share a physical computing devices, and each operating system think that the physical device has exclusive control by themself, it provide external unified logic interface, and brought about the diversity of physical shielding equipment differences.[4]

3.2 programming model

Cloud computing must ensure the complex implementation and task scheduling in the backgroundis transparentto users and programmers, and therefore need a new programming model to support cloud computing. At present, most of the cloud computing uses MapReduce programming model, which is a simplified distributed programming model and efficient task scheduling model, the specific process is the user input their own procedures, and then through the Map function to be divided into different regions, and then adjust the computer to deal with the distributed computing, which makes the

computing speed faster, and finally in the use of Reduce function will be all the results summary and output.[5]

3.3 data storage and management

Cloud computing usually uses distributed storage to store data, and the method of redundancy storage can guarantee the reliability of data, and can achieve high throughput and high transmission rate. The data storage system which is widely used in cloud computing system is GFS of Google, which is a scalable distributed file system and consists of a Master and a large number of blocks, each of the data in the system is saved more than 3 backup, through strict version control to ensure data consistency.

Google BT (Big Table) data management technology is commonly used in cloud computing system, BT is a large distributed database, which takes all the data as an object to process and form a huge table to store large scale structured data.

3.4 platform management

Cloud computing resources are huge, and a large of servers are distributed in different locations, and the platform is running hundreds of applications, how to manage these servers to provide uninterrupted service is a huge challenge. Management platform must be able to make a large number of servers to work together, to facilitate the deployment and operation of the business, fast discovery and recovery the system fault, through automated, intelligent means to achieve reliable operation of the large-scale systems.

4. cloud computing challenges

The overall development trend of cloud computing is to be the information technology foundation of the whole social, but now its development also faces the following challenges[6]:

(1) standardization and openness. At this stage, the technology and service of cloud computing is still immature, the standardization is the propulsion of rapid development and go to the public of cloud computing. Open cloud computing, including interoperability requirements and product requirements of the open interface, the alliance composed of by many cloud computing vendors issued “the open cloud declaration”which is a big step to the openness of cloud computing.

(2) security. Cloud computing has become an important part of the development of the new generation information technology, and cloud security has become the biggest concern of people using cloud computing. Cloud computing is facing the emerging security issues including the abuse of cloud computing resources, the cloud computing environment security, the trust of cloud service providers, the backupof system and important data, etc.. How to solve these security problems will directly affect the future development and comprehensive extension of cloud computing.

(3) policy regulation. The virtualization and international characteristics of cloud computing will lead to many legal and regulatory issues, cloud computing regulators should take into account the cloud computing service providers’ qualification, because cloud computing services apply and deposit the data of users, so how to ensure the security of user information and privacy, which requires the cloud computing service providers have the appropriate regulatory mechanism. Secondly, the boundary of data and applications, cloud computing makes data storage may break through the regulatory scope of the local government, or the local policy incompatible data storage situation, which requires legitimate and effective management using of technical, legal and other regulatory measures to cloud computing’s data and the boundary of application.

5. Conclusion

As a new type of computing model, cloud computing using high speed Internet transmission capability to make the data processing process from personal computer or server to the computer cluster on the Internet, bring an unprecedented computing power. Although the current cloud computing is not a good solution to all the problems, but the future will have more cloud computing system is put into use, so as to become an essential part of human information society.

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