Strategy To Optimize The Cloud Computing Architecture

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Abstract

The Cloud Computing is a kind of technique to satisfy the demand make on the basis of user's service application by dispatching the resources form the Internet. It makes use of the transverse extension method of computer clustering to assign the data and computing task on different machine hoping to finish the task cooperatively. The growth of the Cloud computing will lead to the development of our society, but at multi-user the fundamental environment may lead to many problems which focus on users is raised in this paper. It describes group strategies which are suitable to set up the Cloud computing system in an enormous environment to solve the issues such as Storage, Data Computing and the Resource Dispatching.

1.INTRODUCTION

In recent years, the rapid growth of the amount of information from the Internet, computer's storage capacity and computing power hasn't able to meet the explosive growth of the process data to be cop up with the user's changing needs of service. The problems have become the main contradiction between the user and the computer. In this condition, the concept of cloud computing was introduced. [1] [2]

To store more and more information and data, storage servers are failed to deal with it as the storage server may be one or limited in numbers. Recently, such problems are solved using high performance computer using scientific fields, but using them means high cost and low scalability. Instead of this it should be a normal computer that can make distributed storage and computing.

Concept of cloud computing is same as distributed computing, parallel computing and grid computing.

A recent technical report published by the University of California, Berkeley, states that there is no commonly agreed upon definition of cloud computing. Instead, a definition is emerging as the various organizations that are developing cloud service evolve their offerings. In addition, there are many shades of cloud computing, each of which can be mapped into a multidimensional space with the dimensions being characteristics, service models, and deployment models.

Normally it s taken as that cloud computing is a commercial packaged term. In fact, it just finds a profitable model for distributed storage and computing which put storage capacity and computing power on the cloud and provide to third partied in the form of services. Combing the various perspective mentioned above, we can generalize some of the essential contents of cloud computing.

Cloud computing applies a form of comprehensive thinking where the Internet hardware and software of a particular form of organization are connected; it has distributed computing and storage; it is highly scalable, user friendly, good natured and capable of meeting the end-user application's need [3] [4] [5]. It may be noted that whatever kinds of definition of cloud computing proposed by each of the parties under their own interest, the user's needs are standard guide.

So, a definition of cloud computing from the perspective of the user by the author: Cloud computing is a technology to meet the user's demand which is to attempter the Internet resources according to the user service application.

Now Cloud computing is a future trend because its characteristics meet the market needs. In addition to it, the service of the cloud computing should not be limited to corporation user. In the future, personal user should also be the member of cloud computing.
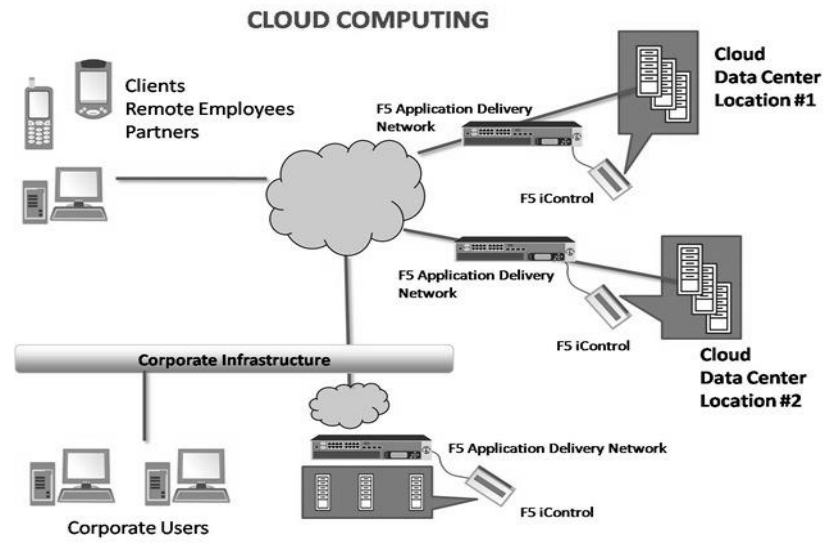
Figure 1. Example of Cloud Computing Architecture

2.THE MAIN ADVANTAGES OF CLOUD COMPUTING:

A. High Quality of Customer Service

Cloud computing platform provides flexible and customized services, in which user can customize, according to their personal needs, the services, resources and applications according to their personal needs. Cloud computing platform can deploy the appropriate solution in accordance with the need of users. User's data are stored directly in the clouds and the customers can download the data directly from the cloud when they need. Service providers offer all services, maintenance service is provided by cloud servers.

So, the use of the product has nothing to do with the client machine which reducing the probability of making error. The user do not need to care about the location of the resources, how to deploy them. All they need to do is tell the cloud their need and the remaining work will be done by the cloud.

B. Dynamic Infrastructure

Cloud computing is set up based on incredible large scale cluster based servers which are made up of distrusted server cluster composed of heterogeneous machines and whose storage components is not a high-level disk arrays. The architecture enables us to add the server to the existing server farm from time to time. . This dynamic scalability can reduce the erection by the maintenance burden and through a number of strategy, cloud computing can tolerate a large number of nodes in error and will not affect the

normal process run because if a computing node fails, its task will be handed over to another node, and this node will screened out by using the appropriate strategy for the time being and then when the real time troubleshooting this node to join an existing cluster.

Real cloud computing platform greatest feature is to use software to realize hardware resources, virtualization management, scheduling and application. Cloud computing virtualization technology can also choose the flexibility to achieve rapid deployment of resources, virtualization and application. Virtualization technology can provide a good underlying technology platform for cloud computing technology.

C. Cost – effective

Formation of a large number of low-cost PC cluster composed of unauthentic servers need low cost. Compared to the use of supercomputers, it has an advantage of price. Cloud computing platform can be more capable that a lot of supercomputers. On the other hand, cloud computing has low requirement on the client hardware, high ease of use. Users only need to care about the use and customization not to purchase and upgrade it. These advantages allow user to maintain and upgrade the hardware and software investment easily. The nature of cloud computing is through consolidation, sharing and dynamic supply to realize the maximum utilization of user investment, including investment in new and existing resources. Therefore, the implantation of cloud computing does not mean abandoning the existing IT infrastructure resources and cloud

computing management system can efficiently monitor the existing and new IT infrastructure resources[6]. Ordinary user can rent resources from clouds suppliers rather spend lot of money and technology to maintain such a large infrastructure. At the same time, advance user can create private cloud and build their own cloud computing infrastructure for internal users or external customers to provide flexible and fast cloud computing services.

3. THE PROBLEM OF CLOUD COMPUTING

The implementation of cloud computing system faces many challenges. There are still a series of issues to be resolved during the standardization process of cloud computing system architecture. In contrast, most of the traditional cluster system is made up of cluster system and they are the isomorphic machines. These simple difference will bring huge difference in the assumption of cloud computing. This distinction determines many designing strategies of cloud computing architecture. The existing cloud computing differ greatly in architecture. Most system deployment are quiet decentralized. The methods which make various systems realize the function of storage, computing, resource allocation and management are difference from one to another. There is no uniform standard in the interoperability between cloud computing systems at resent.

A. Safety problem of cloud computing

The safety of data is always a problem which attracts people's attention. User data is stored in a cloud. The cluster needs inter-regional link. How to protect the data from being illegal visiting and disclosing, how to supervise all the time and respond to emergencies quickly are the important issues the system must to resolve. Cloud computing system need to provide storage service for many different users [7]. Cloud storage system is composed of widely distributed storage nodes. It needs to solve a lot of problems like how to integrate computing and storage to meet the computation-intensive and data intensive tasks, to isolate storage and computing between different services and difference user data, to allow owner of privileged to receive the service from anywhere. Storage node cluster and application node cluster is equivalent to the memory part, but there are slight different between them. Storage node cluster depends on a storage

system that consist a large disk array system or several cluster system group which has massive storage capacity to deal with data processing resources[8] . Because of huge system, system reliability is not high. So, it often needs software to realize multi copy software storage in order to balance the load and improve data security.

B. Complexity of heterogeneous environment

The most important advantage of cloud computing are low-cost equipment and highly universal functions. So the hardware can easily extended, for the cluster data, it need to divide the task as much as possible. The way of programming have to make a program could automatically run on different scalable processing nodes/ The unusual fault conditions of the low-cost machines are far more that the proprietary hardware platform. Firstly, the design of the cloud system must take full account of the machine anomalies. Secondly, it also need to consider about the problem that the speed does not match the heterogeneous environment and this has a great influence on the execution of parallel task.

At present, many popular parallel databases on the same machine can't dispatch and migrate the task flexibly. So, if we put them in the cloud which is heterogeneous environment, the smallest nodes will constraint the final implementation of the result of the task, resulting in decreased performance throughout the task execution. Cloud computing system can't achieve its high performance target. When the two cloud system need resources aid from each other, it need to provide the technique of scheduling resources of inter-cloud resources to make cloud system to automatically interact. Cloud system should be able to monitor the SLA to ensure that not to run against to the SLA. When the service fails, the is need of excellent resources allocation mechanism to shield the user's experience of using process. On the infrastructure level, the performance of virtual machines of heterogeneous host implementation has some differences because of scheduling [8] One problem of system design is how to track the slow implementation of the task in order to reschedules or transfer task.

C. Diversiform of user's demand

Cloud computing system must find a way to solve the problem of service description and conversion, that is, to convert the user's service demand into infrastructure needs. Cloud service user will be a huge user group and different consumers have different levels of requirement toward Qos. Therefore when cloud system setup it should consider the multiple Qos needs of different users. Static algorithm which is widely used currently existing scheduling algorithm is only have one single object. Facing the multiple Qos constraints that cloud computing required, how to ensure multi-level QOS, How to meet the multi workflow, we need to find out new solutions.

4. STRATEGIES ERECTED BY CLOUD COMPUTING SPECIALISTS

A. *Security Strategy in the cloud*

During cloud computing time, lots of data will not ne stored in one's hard disk. Those data which only be accessed through the network will bear more risk. Then data security has become user's first concern. Here, you may think that the security of cloud computing depend on the user's choice. Many specialists tale this views that the users won't put the data concerning privacy n the cloud whenever the suppliers take what ways to keep secret.

1.) The data store in the cloud is very important. But when the cloud system is built up the server should supply the user a way of storage that has nothing to do with cloud to store the private information in the user side. On the other hand. Based on the flexible service of cloud computing, different user will put forward different requirements on the security of their data, so cloud computing system should provide different levels of data security for different users [9]. Cloud service providers privileged access may result in data damage or the subsequent impact. The user will take this into account when considering of the data security issues [8].

2.) To ensure the confidentiality of the data cloud, limited privileged user access can be achieved by a way: first, the data can be encrypted once and then refer the encrypted data to the cloud service provider.

5. STRATEGY OF STORAGE AND COMPUTING INTEGRATE

From the perspective of user-oriented, the goal of setting up cloud computing system is through various networks to connect a huge number of server nodes into a large system. The method will package it into a common computer user to maintain the operation experience; we need to shield the complexity of the system and to afford calculating and storage of different level according to different user needs. Setting up the cloud system is a very complicated work. It consists of network equipment, storage equipment, server software, client software etc. We divide the construction of cloud system into different levels. We put forward the following blue prints aiming at the most important one i.e. Management Layer:-

1) The core idea of cloud computing storage and computing is to use multiple nodes to deal with one problem. Through the cloud computing system to make mass storage and finish high performance computing which usually wastes a lot of resources to complete the task. However, for the majority of ordinary user, the real need for large capacity storage and high performance computing is limited. In most cases, the user is only using low required service, For these procedures, because of network transmission problems calling the data from multiple nodes and computing resources will reduce the efficiency. Therefore, we propose a basic method judging if it is needed to call the multi-node resources to deal with.

2) To analyze the dependency relationship among the statements of calculating program is called Dependency Analysis. A program consists of a number of statements and the number of statements with dependency relationship determines whether the program is the suitable for multi-processing [10]. Set up for the statement associated with the rate in the whole process, p is the higher the more the program is not suitable for multi-node processing. If the sequential statements ST1 and ST2 have the following relation between statements, then explain the associated between the two statements:

$$\textbf{ST1: A=B+C;}$$
$$\textbf{ST2: D=A+E;}$$

That is, statement 2 should be taken after statment1 and the variable in the statement 2. A is the result of the implementation of the statement 1. There is correlation between the two statements. This law assumes that a serial implementation of the algorithm contains serial implementation and parallel implementation. And the ratio of the part which is suitable for serial implementation in the whole part is P, if we perform this procedure in N nodes, the acceleration factor is:

$$S(n) = \frac{n}{1 + (n-1)p}$$

Whether the data is distributed storage can also be judged in the same way and to divide the data into two types: appropriate for distributed storage and appropriate for single node storage. Through the method propose previously, for the task files with large volume of data and easy to split should be stored by blocks. These files will be divided into several data block by system and stored in different nodes of the clouds. Files that the amount of data is small or not easy to split are stored at a single node.

3) After the first discrimination, store the information of classified task storage and classified calculation in the master control server first. If it is just simple data read, send the store information to the primary node only, user through store information to complete data block's read. Task required computing implementation calculation at a single or multiple nodes stored by files directly, after the completion, transmit the result to the master node only, after summarized by the master node, generate the final results and return to user.

6. AN OPTIMIZED ALGORITHM OR TASK SCHEDULING

(1) The cloud system task dispatching modules should consist of authentication modules, input modules, dispatching algorithm and the dispatching of the task. Firstly, task dispatching modules accept the user's working task. After making authentication of the user by authentication module, it can be in resource state. Then using dispatching algorithm to analyze the user's

task which is based on the task's character and services nature supplied by the nodes aims at dispatching the tasks IO the resources. Now, we rise resources dispatching computing in this way.

(2) A request user put forward about the cloud system can be viewed as a task set. The master node is responsible for handling various kind of resources which is used to deal with the tasks. The data resources of this task are distributed in different vice-nodes. The vice-node executes the task assigned from the master node. After receiving the assignment of the primary node, sub node beings find a suitable computing node for its subordinate storage node. There is priority constraint among the task of all tasks. If the remaining computer resources of the current node are sufficient to meet the dosage of the jobs the user submitted. It will assign their computing resources first. For a task that can use multi-node processing, if the current resources are not adequate or multimode calculation can provide higher operating efficiency and the system in the cloud being to search for other suitable computing resources. The aim of scheduling is that on the premise of satisfying the quality index and the priority to determine an order of assignment and execution by following distributed strategy to improve execute efficiency. It is a NP here we present a scheduling strategy base on genetic algorithms. It can help improving the quality of scheduling cloud system. The task scheduling problem of cloud computing is an extremely complicated problem, which in general form is a NP complete problem. Genetic algorithm based on natural selection and inheritance theory has been widely and successfully applied to scheduling problem of parallel computing [11]. Genetic algorithm can be applied to the cloud system, it can provide an optimized solution for resources scheduling of chief server nodes [12] [13].
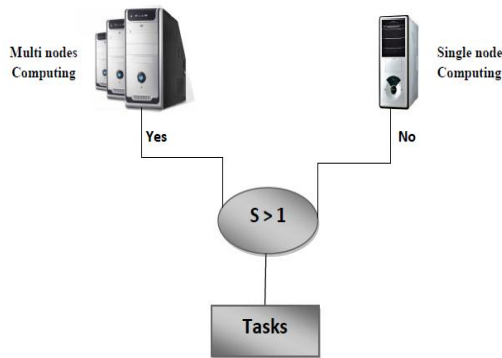
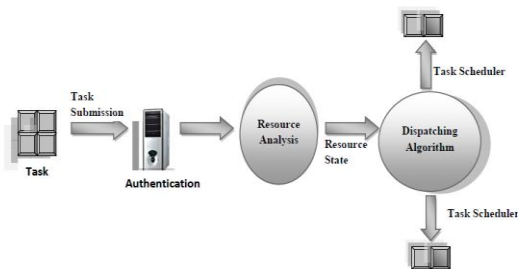Figure 2. Judge the Compute nodes

Figure 3. An overview of the scheduling strategy

We are going to introduce a general algorithm here:-

(1)   From Figure 3, in accordance with Task of levels of initialization sequence:-

➔ Ti is the ith task.
➔ Rn is the ith resource
➔ Ui is the required time to complete the ith task for the standard resource.
➔ PCi id the operation speed ratio relative to the standard resources.

(2)   Generate the initial population that size in n randomly, according to the sub-task execution sequence on each of resources to calculate the fitness of each chromosome.

$$\text{Fitness (Fi)} = \frac{Fzi}{MAX \sum_{n=2}^{n=i} Ui}$$

(3)   Select chromosome to do the cross and mutation operation, calculate the fitness of the new generation of chromosome, generate a new population.

(4)   Judge whether it meets the conditions for the termination of the genetic algorithm, if satisfied, then output chromosome of the best fit, it not, then return (3).

7. Conclusion and Future work

This paper introduces an overview of the development of the cloud computing as well as some of the problem encountered when it is set up. It put forward a building strategy of cloud computing infrastructure towards the characteristics of cloud computing like the high reliability, large-scale, general, high scalability, heterogeneity etc. This tactic make some suggestion on the cloud computing security, resource dispatching, storage and computing integration, hoping to build more effective system in the cloud and supply the users with more stable and various experience. In the future research, it is hope that the normal users can join the cloud computing and become the supplier and beneficial owner of it. To achieve this goal, we have to do more research on resource dispatching and intercommunication of the clouds.

8.   References

(1)   Amazon Elastic Compute Cloud (Amazon EC2), http://aws.amazon.com//ec21.

(2)   Wikipedia, Cloud Computing, http://en.wikipedia.org/wiki/cloudcomputing.

(3)   W.Kim,"Cloud Computing: Today and Tomorrow", Journal of Object Technology, 8, 2009.

(4)   M.Armbust, Above the Clouds: A Berkeley View of Cloud Computing, EECS Department, University of California, Brekeley-2009.

(5)   L. Vaquero and L. Reodero-Merino and I. Caceres andm, Linder, " A break in the cloud: towards a cloud definition", ACM SIGCOMM Computer Communication Review, vol. 39, no, 1,2009.

(6)   J. Dean and S. Ghernawat, Map Reduce: Simplified Data Processing on Large Clusters, In Processdings of the OSDI'04:Sixth Symposium on Operating System Design and Implementation, 2004.

(7)   Q. Wang, C. Wang, J. Li, K. Ren and W. Lou, " Enabling public verifiability and data dynamics for storage security in cloud computing", in Proc. Of ESCRICS'09, Saint Malo, France, Sept. 2009.

(8)   CPNI Infonnation Security Briefing 0112010, Cloud Computing: http://www.cpni.gov.uk.

(9)   S. Yu, C. Wang, K. Ren, and W. Lou,"Achieving secure, scalable and fine-grained access control in cloud computing", in

Proc. Of IEEE INFOCOM'10, San Diedo, CA, USA, march 2010.

(10) J.Dean and S. Ghernawat, Map Reduce: Simplified Data Processing on Large Clusters, In Processdings of the OSDI'04: Sixth Symposium on Operating System Design and Implementation, 2004.

(11) Rasooli A., M.Mirza-Aghatabar and S. Khorsandi, Introducing of Novel rule Based Algorithms for scheduling in Grid Computing Systems, in Modeling and Simulation, 2008, ACIMS, Second Asia International Conference on 2008.

(12) L.Ozdamar., A genetic algorithm approach to a general category project scheduling problem. IEEE Trans Syst man Cyber 1999,29

(13) Mitchell, Melanie (1996), An Introduction to Genetic Algorithm, MIT Press, Cambridge, MA.