International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 3 Issue 1, January - 2014

Effective DRA in Green Cloud Computing Environment

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Abstract

Cloud computing allows the user to use the resources based on the needs of the application. The one of the most important technique in the cloud computing is Virtualization technique which is used for the multiplexing of resources, servers, etc. In this proposal, the issue of the cloud computing is resolved by SPAR algorithm and LB algorithm. This system that uses Virtualization technique to allocate resources dynamically based on the demands. It supports Green computing. The overall utilization of server resources is controlled by SPAR algorithm and the load between the servers are balanced by the LB algorithm. Experiment shows that the performance of this proposal is better than the existing methods in most situations.

Index Terms – Cloud Computing, Green Computing, Virtualization, Load Balance.

Introduction

Cloud computing allows transformational changes with usability, scalability, performance, elasticity, and security over measurement and characterization for load prediction and balancing. But based on the specifications from the cloud users It cannot be modeled accurately and based on the raw measures which shows little variability and less auto-correlation. Virtualization is the one of the most important techniques used in Cloud computing. It supports the cost efficiency while the usage of resources, on demand services and provides resource scalability. The comparison between the traditional data center oriented models over the enhanced models and computational services is satisfying the users by providing the quality of service (QoS). Towards to provide the optimum in both computing environment and resources used must give the efficiency, reliability with the co-ordination of the above. This requires the delivery of a set of virtual resources, dynamically allocated to the corresponding server within networked clouds. Pay-per-use infrastructure method is the main advantage of cloud computing. Because it is used to host hundreds of thousands of applications to face the challenges in the resource management, resource pre reservation [1], [2]. So with the vast positive advantages of Virtualization is becoming most popular technology to frame the infrastructures in the virtualized cloud environment. Among all the Virtual Machine Monitors (VMMs), Xen is defined to be a conspicuous hypervisor based VMM [3]. This VMM is actually used to provide the communication between the Virtual machines (VMs) and Physical Machines (PMs). This communication is hidden from the cloud users. In such cases the each PM must have the sufficient resources which will be requested in the future by the VMs. The mapping between the above two machines is possible means, then the mapping is migrated using the migration list in the VM in order to support green computing by minimizing the number PMs [4], [5], [6].

In this paper, we presented the design and implementation of dynamic resource allocation in the Virtualized Cloud Environment which maintains the balance between the following goals:

Overload Avoidance: The capacity of the Service Provider must satisfy the resource needs from all the Service Requestors running on it. Or else, the service provider is overloaded and leads to provide less performance.

Load Balancing: The load between the different machine is balanced by the LB algorithm. The implementation leads to balance the load.

Green Computing: The number of PMs used should be optimized as long as they could satisfy the needs of all Requestors. And idle Providers can be turned off to save energy.

There is an in depth trade off between the two goals in the face of changing resource needs from all VMs. To avoid the overload, should keep the utilization of PMs low to reduce the possibility of overload in case the resource needs of VMs increase later. For green computing, should keep the utilization of PMs reasonably high to make efficiency in energy [7].

System Overview

The architecture of the system is represented in Figure 1. Each Virtual Machine (Service Requestor) encapsulates one or more applications such as Webserver,

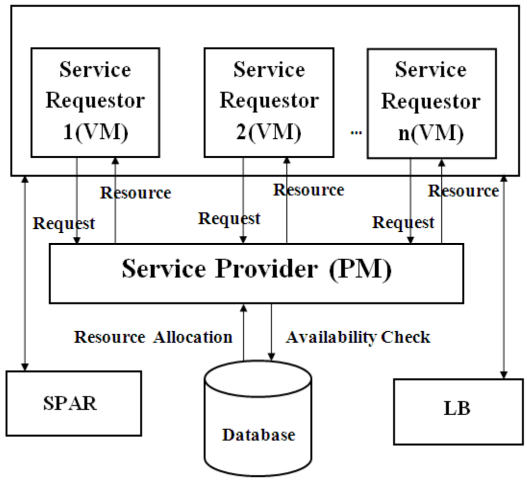

Figure 1. System Architecture.

DNS, Map/Reduce, etc. the specifications of each VMs are sent to the service provider(Physical Machine). Then the PM checks for the availability of the resource and checks for the efficiency. If there is possibility to allocate the respective resources with no violation in memory means the dynamic resource allocation is achieved in the VM. The Database contains datum which are all needed for the communication between the Service Provider (PM) and corresponding Service Requestors (VM). It updates according to the changes when appears during the process of communication. Service Provider (PM) communicates with the Database and the number of clients (VMs) based on the needs of the application. The implementation of two algorithms which are SPAR and LB are explained in the next Section.

Algorithms

All the conventional algorithms from being utilized for the placement and routing the systems in the cloud network. An implementation in which the algorithm is executed in parallel on separate computers and separate computers and intra computers. The algorithm we introduced here is SPAR (Simultaneous Placement And Routing). The partitions of Spar algorithm are hotspot solver, coldspot solver. The hotspot solver connected with the VMs collection and detects if any PM's rate of resource utilization is above the hot threshold (i.e.,*hot spot)*. If, so the VM running on the corresponding PM will be reduce its load by implementing the SPAR technique the above technique the system achieves load balancing using the two threshold values. Similarly the cold spot solver checks if the rate of resource utilization is below the green computing threshold (i.e.,*cold spot*). If so, those PMs will be turned off in order to save energy or those Service Providers will be utilized by the any one of the Service requestors. By implementing the above functions the system achieves "Green Computing". Finally moderately system must maintain warm threshold in order to balance the utilization of resources. To avoid the uneven delays of resource utilization in different Service Providers, here we introduced the concept of "Skewness" in order to measure the heterogeneous resources. By minimizing skewness we can improve the overall resource utilization. This concept is associated with the following formula.

$$\text{Skewness (i)} = \sqrt{\sum_{j=1}^{n}\left(\frac{r_j}{r}-1\right)^2},$$

Where r_j is the average utilization of all resources for server i. In practice not all the heterogeneous resources are performed critically and hence we need to consider the bottleneck problem of resources in the above calculations. This is a method for improving efficiency. And it helps to remember something for long term usage.

The LB algorithm is implemented additionally to enhance the efficiency of the system. It can be implemented in case of any further load existence or load in under estimation. LB algorithm is implemented for all the systems connected in the environment in order to achieve the load balance among all the systems. The concept of the distributed in LB algorithm is achieved. Because all the systems must not to be overloaded. So each of the system can communicate with each other cooperatively. Finally the overload in any of the systems connected in the environment can dynamically balanced using LB algorithm. The result of this system is effective when compared to the existing system. The improved performance is achieved.

Experimental Results

Our experiments are conducted using the group of 10 Lenovo hosts with Intel Dual core and 2GB of RAM. The system runs on the Windows XP Operating System. We update the resource allocation by the resource management. The hosts are connected in LAN (Local Area Network). The server host contains the storage of the updated dataset. All the client hosts can access that dataset through server hosts.

(i) Efficiency:

We started our evaluation to achieve the effectiveness of the method used here in overload avoidance and green computing. We start with a small scale experiment consisting of one PM and two VMs. By this connection setup we can present the results for all servers in Figure 2.

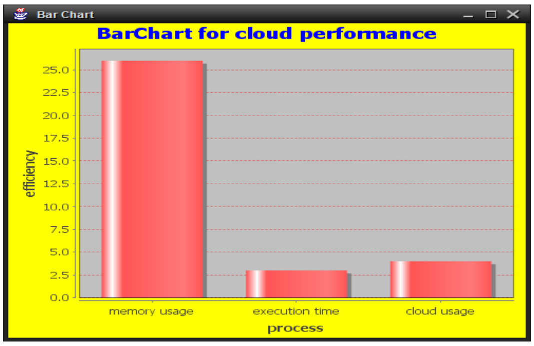

Figure 2. Efficient Usage of 2 VMs.

Here the memory utilization is high, but when we combine the number of VMs, the memory utilization is distributed among a set of VMs [8]. The increasing number of VMs will be implemented in the future in order to increase the efficiency (Figure 3).

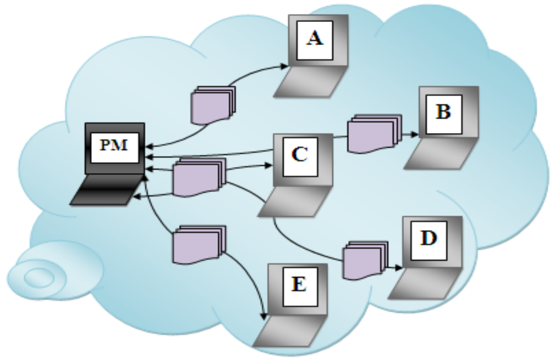

Figure 3.Cloud Environment Establishment.

Associated with the increased usage of cloud in a variable execution time on demand.

(ii) Resource Balance:

The goals of this paper are balanced by the resource management method we introduced here i.e., by minimizing the number of hosts in the cloud environment the memory utilization may be high. But in case of maximizing the number of VMs the overload can be avoided by distributing the load in the connected VMs. So we aim to balance the goals which were mentioned in the Section I by means of providing the best balance between the goals. This balancing implementation will be achieved in later and this achievement supports green computing.

Related Work

(i) Online Load Balancing:

Even for the website of e-commerce sites are not clearly known by the users. To access that website the user must know how the various servers will handle the load in online. Actually this type of online loads, performance are characterized by the HTTP requests [9]. So we can implement this system for the load balancing concept of online applications.

(ii) Power Management:

The modern data centers have two issues such as Better Performance and the management of power in the Virtualized Environment. The challenging complexity of application with balanced workload and shared virtualized infrastructure [10], [11]. Our goal is to develop a technique which is similar to the GNP which deals with the virtualized dynamic environments in the efficient manner based on the connections established between the PMs and VMs. The limitations of GNP are as follows: (1) The environment composed of VMs with the PMs which make the communication easier than other models. (2) High degree of Re-usability [12]. The effective and smart utilization of Virtual machines (VMs) in cloud computing offers the Service Providers an opportunity to combine the various workloads from few server hosts, finally it improves the resource utilization as well as eliminating the power consumption by the idle machine. [14].

(iii) Resource Balance:

The process of allocating resources in a dynamic manner is an way to improve the resource utilization as well as the energy efficiency in cloud data centers. Determining the best re-allocation of VMs when overload occurs in order to provide the Quality of Service (QoS). Based on the implementation of Markov Chain Model the problem of overload is identified and the optimal solutions are achieved [13]. Dynamically allocating resources is the one of the important issues in a cloud environment. Particularly some of the Service Level Agreement (SLAs). So the overall profit of that environment depends on how much amounts of SLAs of the systems met [15].

Conclusion

we have presented the design, implementation and the evaluation of virtualized cloud environment for dynamic resource allocation. This system multiplex the virtual machines based on the demands of the end users. We use SPAR and LB algorithms in order to provide the improved efficiency of the resource utilization among the machines. Finally this system achieves green computing and load balancing between heterogeneous end users.

Acknowledgement

I would like to express my deep gratitude and respect to Mrs. R. Kanagaselvi whose advices and insight was valuable to me. She inspired me to continue the development of my Post Graduate Project work by spending her golden time with me. The authors would like to thank the anonymous reviewers for their valuable feedback.

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