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Research Paper

TRUSTWORTHY RESOURCE MANAGEMENT FOR CLOUD ENVIRONMENT

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Cloud computing attracting the attention of several researches in both IT industry and academic by providing efficient storage space and computing services over the internet to the users. Several issues need to be addressed in cloud computing, in that resource management is one of the implicit challenges that have to be addressed in cloud. Since resources are very limited, cloud provider has to manage and provide the resources efficiently to the user. In our paper, requested resources are allocated dynamically based on trust evaluation using virtualization and it well utilize the capacity of virtual machines. Prediction algorithm is used to predict the future resource usage of virtual and physical machines based on past statistics to balance overloaded virtual machines. This paper achieves overload avoidance and saves more energy.

Keywords: Cloud computing, Load balancing, Virtualization, Trust evaluation

INTRODUCTION

Cloud computing is a type of computing that relies on sharing *computing resources* rather than having local servers or personal devices to handle applications demands. It uses networks of large groups of servers typically running low-cost consumer PC technology with specialized connections to spread data processing chores across them. Cloud computing consists of hardware and software resources made available on the Internet as managed third-party services. These services typically provide access to advanced software applications and high-end networks of server computers. Cloud computing provides three types of services Software as a Services (SaaS), Platform as a Services (PaaS), Infrastructure as a Services (IaaS). Often, virtualization (Barham *et al*., 2003) techniques are used to maximize the power of cloud computing. In computing, virtualization means to create a virtual version of a device or resource, such as a server, storage device, network or even an operating system where the framework divides the resource into one or more execution environment (Figure 1).

Virtualization consists of two types (1) Full virtualization (2) Paravirtualization. Full virtualization is a technique in which complete installation of one machine is run on another. The result is a system in which all software running

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on the server is within a virtual machine. In Paravirtualization (Barham *et al*., 2003) it allows multiple operating systems to run on a single hardware device at the same time by more efficiently using system resources, like processors and memory. Paravirtualization works best in disaster recovery, migration and capacity management of virtual machines. Paravirtualization run better than the full virtualization, because fully virtualized deployment, all must be emulated. In this paper it supports paravirtulization for the creation of virtual machines.

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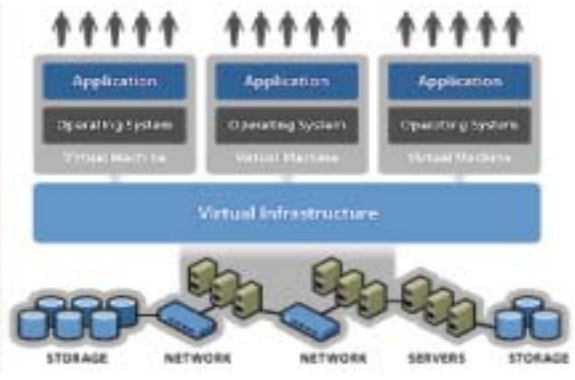
Figure 1: Virtualization



In cloud it has to handle the growing amount of resources, users, but also scope of devices, use cases etc. some form of automated resource management (Lutz Schubert and Keith Jeffery, 2012) is required that reduces the overhead for the administrator to cater for this diversity and scale. This relates not only to the machines (respectively processing units) themselves, but also to the communication network and to handling the data. The amount of data consumed, produced and distributed increases constantly – way faster than the underlying network, thus leading to increasing challenges with respect to replicating and distributing data, localising it, routing to it, compensating for bandwidth and latency limitations etc. Resource management must thereby respect multiple positions, i.e. not only does the own infrastructure grow and become more complex in management, but also the connection to the user, the user devices, the usage context etc. all vary increasingly and have to be handled by the providers. This obviously also relates to protection of data, separation of environments and dealing with multiple tenants. We can therefore identify the following main sub-concerns without going into technical details (1) Efficient handling of an increasing amount of more and more heterogeneous resources. (2) Efficient handling of an increasing amount of information and communication (3) Efficient handling and processing of large quantities of data (4) Interoperability and portability between the resources employed. To achieve this, it is necessary that resources, their usage etc. can be monitored and dynamically reconfigured.

The main goals of this paper overload avoidance in VM. Prediction algorithm is used to predict the resource usage of virtual machines based on that we can predict the future resource usage of all the virtual machines. By doing this we can identify the load in advance. Live migration is used to balance the load and requested resources are allocated to virtual machines which has higher trust value that is the machine which has lower load. Trust value is calculated based on the historical information of a particular virtual machine.

The rest of the paper is organized as follows: Section 2 discusses related work of this paper and section 3 describes the overview of this system. Description of our algorithm, modules present in section 4. Screenshots of this paper is present in section 5, Finally the conclusion of the paper is given in section 6.

RELATED WORK

This trust model (Hyukho Kim *et al*., 2010) evaluates cloud resources of IaaS (Infrastructure as a Service) providers by means of Trust Resource Broker. The Trust Resource Broker selects trustworthy cloud resources based on the requirements of customer. The proposed trust model evaluates the trust value of the resources based on the identity as well as behavioural trust.

This paper summarized various Trust models (Mohamed Firdhouse*t al*., 2011) for distributed system. The trust management systems proposed for cloud computing have been investigated with special emphasis on their capability, applicability in practical heterogonous cloud environment and implementabilty.

Sandpiper (Wood *et al*., 2007) implements a black-box approach that is fully OS and application-agnostic and a gray-box approach that exploits OS- and application-level statistics. Since a black-box approach is more general by virtue of being OS and application-agnostic, an important aspect is to understand if a black-box approach alone is sufficient and effective for hotspot detection and mitigation. But Sandpiper system supports black-box, gray-box, or combined techniques. Drawback of this paper is BG algorithm requires more number of migrations to resolve the hotspot.

According to the design in (Singh *et al*., 2008), Data centers form a key building block for new cloud computing. Agile data center is designed with integrated server and storage virtualization using load balancing algorithm called *Vector Dot* that handles the hierarchical and multi-dimensional resource constraints. HARMONY and *Vector Dot* through experiments on a real large scale data center environments. The drawback of this paper is uneven distribution of residual resource makes it hard to be fully utilized in the future and prediction is not convincing.

This system uses virtualization technology to allocate data center resources dynamically based on application demands. “Skewness” (Zhen Xiao *et al*., 2013) concept is used to measure the unevenness in the multidimensional resource utilization of a server. It support green computing [12] it is environmental responsible use of servers and also it reduces the resource consumption and saves energy.

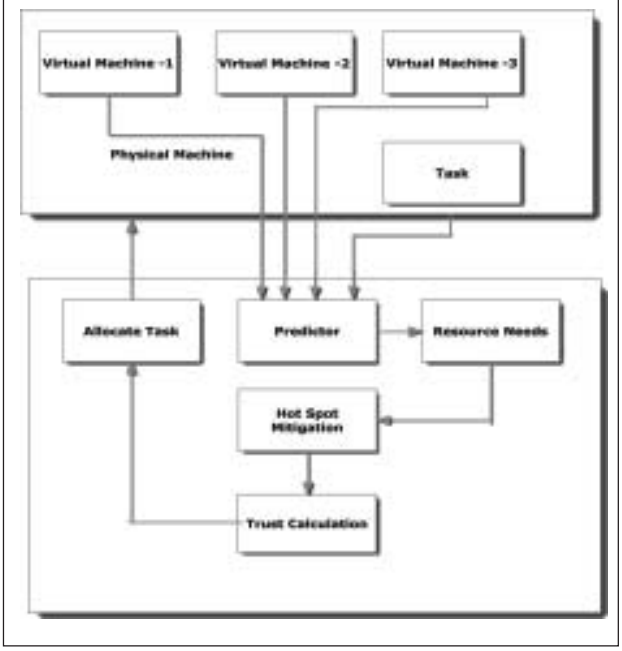
AutoControl (Padala *et al*., 2009), a resource allocation system that automatically adapts to dynamic workload changes in a shared virtualized infrastructure to achieve application SLOs. *AutoControl* is a combination of an online model estimator and a novel multi-input, multi-output (MIMO) resource controller. It is mainly affected by time taken to collect statistics from clients.

This paper introduces several novel ESX Server (Carl A Waldspurger, 2002) mechanisms and policies for managing memory. A *ballooning* technique reclaims the pages considered least valuable by the operating system running in a virtual machine. An *idle memory tax* achieves efficient memory utilization while maintaining performance isolation guarantees. *Content-based page sharing* and *hot I/O page remapping* exploit transparent page remapping to eliminate redundancy and reduce copying overheads.

SYSTEM OVERVIEW

The architecture of this system is shown in Figure 2. Each physical machine runs VMware. VMware is a virtualization technology which allows multiple operating systems to simultaneously share processor resources in a safe and efficient manner. Here VMware is used to create virtual machines to maximize the power of cloud computing. User is requested to allocate task in the cloud. The issue is where to allocate the task which is requested by the user. MxbeanOS (McNett M *et al*., 2007) is act as an interface which is used to collect all the statistics (CPU usage, Memory) from the VM and its forward to the scheduler for scheduling. Prediction algorithm used to predicts the resource usage of all the virtual machines and the future demands of virtual machines in scheduler. Based on the future demands we can identify which machine has higher load, lower load and ideal machine. Priority based scheduling is used which is mainly concentrate on the virtual machine which has hot spot i.e. higher load, on that time some of the files is to be migrated to the another VM which has lower load. After migrating load of the VM is calculated again and trust is evaluated based on existing and current load information. The requested resource is allocated to the machine which has higher trust value. By doing this, we can well utilize the capacity of all the virtual machines and energy also saves.

Figure 2: System Architecture



MODULES DESCRIPTION

In this paper, we present the design and implementation of an automated resource management system that achieves a good balance between the two goals by developing a resource allocation system that can avoid overload in the system effectively while minimizing the number of servers used. The proposed work also concentrates on trust evaluation which is used to allocate the resources to the Virtual Machine which has lower load. Prediction algorithm captures the future resource usages of applications accurately without looking inside the VMs. The following modules are listed as.

- Prediction
- Higher, medium and lower load alleviation

- Trust Evaluation

Prediction

Predict the resource usage (CPU usage, Memory) of virtual machines based on that we can predict the future resource needs of VMs using past statistics.

Higher, Medium and Lower Load Alleviation

If the resource utilization of a machine exceeds the threshold value we define it as *higher load.* First it mainly concentrates on higher load because we are priority based scheduling algorithm. Based on the priority first it listed out the virtual machine which has higher load. If the resource utilization is below the threshold value means we define it as *medium load*. We define a machine as *lower load* if the resource utilization of a VM is too low. By using live migration (Clark *et al*., 2005) load is to be balanced.

Trust Evaluation

The physical machines provide a set of virtual machines which are configured dynamically according to user requests. Here we calculate the trust model based on the historical information. By analyzing the VM load and future resource needs of VM the trust value is calculated. The virtual machine which has higher trust value the requested are allocated dynamically.

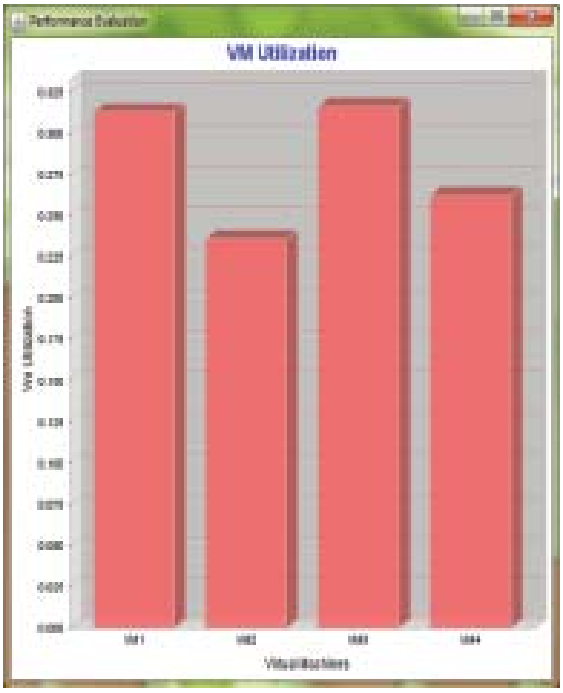
Cloudme (formerly cloud) is shown in Figure 3, which is used as a file storage service operated by *Cloudme* that offers cloud storage, file synchronization and client software. It features a blue folder that appears on all devices with the same content; all files are synchronized between devices. Cloudme features a Cloud storage and sync solution that allows the users to store, access and share their content, both with each other and with people outside the service. Sharing can be done by email, text messaging, Facebook and Google. In Cloudme all the virtual machines files (resources) are allocated. Trust value is evaluated based on the load. The requested file is allocated to the VM which has highest trust value. Here VM2 has low load compare to all the VM. The requested task is allocated to VM2 which is shown in Figure 4. Utilization of virtual machines is shown in Figure 5. charts shows the utilization of virtual machines. This paper is implemented in real-time by using net beans.

SCREENSHOTS

Figure 3: Cloudme

Figure 4: Requested File is Uploaded in the VM

Figure 5: VM Utilization



CONCLUSION

The Cloud system consists of many commodity servers and provides virtualized resources to users. However, it needs to reconfigure virtualized resources dynamically when the user requests increase unexpectedly. So we proposed the trust model which analyzes the history information of each node and allocates reliable resources according to user requests. It can efficiently utilize the limited resources in the Cloud environment and provide reliable Cloud services to users. It also has the advantage of providing the requested resource immediately because it prepares and selects highly efficient nodes by analyzing the history information of each node. It also achieves overload avoidance and saves its energy efficiently.

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