

Dynamically Allocating the Resources Using Virtual Machines

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Abstract-Cloud computing become an emerging technology which will has a significant impact on IT Infrastructure. Still, Cloud computing is infancy. Cloud computing becomes quite popular among cloud users by offering a variety of resources. In the current cloud computing environment there is numerous of application, consist of millions of module, these application serve from large quantity of users and the user request becomes dynamic. This is an on demand service because it offers dynamic flexible resource allocation and guaranteed services in pay as-you-use manner to public. In this paper, we present the several dynamic resource allocation techniques and its performance. The resource provisioning was done by considering Service Level Agreements (SLA) and with the help of parallel processing using different types of scheduling heuristic. In this paper we realize such various policies for resource provisioning and issues related to them in current cloud computing environment. This paper provides detailed description of the dynamic resource allocation technique in cloud for cloud users and comparative study provides the clear detail about the different techniques.

1. INTRODUCTION

Cloud computing is the delivery of computing as a service rather than a product, whereby shared resources, software and information are provided to users over the network. Cloud computing providers deliver application via the Internet, which are accessed from web browser, while the business software and data are stored on servers at a remote location. Cloud providers are able to attain the agreed SLA, by scheduling resources in efficient manner and by deploying application on proper VM as per the SLA objective and at the same time performance of the applications must be optimized. Presently, there exists a more work done on scheduling of applications in Clouds [1], [2], [3]. These approaches are usually considering one single SLA objective such as cost of execution, execution time, etc. Due to combinatorial nature scheduling algorithm with multiple SLA objective for optimal mapping of workload with multiple SLA parameters to resources is found to be NP-hard [4]. The available solutions are based on the use of heuristics. When a job is submitted to the clouds, it is usually partitioned into several tasks. Following two questions are needed to consider when applying parallel processing in executing these tasks: 1). how to allocate resources to tasks; 2) task are executed in what order in cloud; and 3) how to schedule overheads when VMs prepare, terminate or switch tasks. Task scheduling and resource allocation can solve these three problems. In embedded systems [5], [6] and in high performance computing [7], [8] task scheduling and resource allocation have been studied. Typically, efficient provisioning requires

two distinct steps or processes: (1) initial static planning step: the initially group the set of VMs, then classify them and deployed onto a set of physical hosts; and (2) dynamic resource provisioning: the allocation of additional resources, creation and migration of VMs, dynamically responds to varying workload. Step 2 runs continuously at production time where in contrast Step 1 is usually performed at the initial system set up time and may only be repeated for overall cleanup and maintenance on a monthly or semi-annually schedule. In this paper we focus on dynamic resource provisioning as mentioned above in step 2. In order to attain the agreed SLA objective our proposed algorithm dynamically responds to fluctuating work load by preempting the current executing task having low priority with high priority task and if preemption is not possible due same priority then by creating the new VM from globally available resources.

2. RELATED WORK

2.1 Cloud Computing

The concept of cloud computing [5] represents a dynamic allocation of resources. Through a cluster of multiple servers, cloud providers can provide services to users. In the cloud computing environment, the virtualization technology can be applied to allocate resources to achieve the purpose of the dynamic adjusting of resources. Cloud computing is a computing environment based on the Internet and can be extended dynamically. It uses "As a service" network technology to provide users with a large number of service nodes. Providers who provide cloud services, rapid deployment of resources based on virtualization technology, can provide users with a variety of services. Furthermore, users can obtain resources and a variety of services according to their needs. Therefore, regardless of the computing power of software resources or storage capacity of network, users can obtain those resources through the cloud services supplier, and significantly reduce the cost of the software and hardware purchasing.

2.2 Virtualization Technology

Virtualization technology [6, 7] can be classified into two categories, full virtualization and para-virtualization. The advantage of full virtualization is that it can maintain consistent compatibility regardless of hardware environments, however, will increase a greater system loading of the physical machine relatively. While the advantage of para-virtualization is that it may share hardware resources with the original operating system, but the system kernel is necessary to be modified. In terms of

performance, the para-virtualized is better than that of the full virtualization, but the corresponding hardware support is insufficient. Virtualization architecture consists of three components, hardware, Virtual Machine Monitor (VMM), and Virtual Machine (VM). VMM is one of the core implementation of virtualization, and is responsible for providing virtualization and managing hardware resources. There are many virtual machines exist, such as Xen and KVM [8].

3. PROPOSED DYNAMIC VM ALLOCATION ALGORITHM

Mainly Clustering is the method which includes the grouping of similar type objects into one cluster and a cluster which includes the objects of data set is chosen in order to minimize some measure of dissimilarity. For scheduling the virtual machines, K-Means clustering algorithm is used. K-Means clustering is a clustering method in which the given data set is divided into K number of clusters. K-means clustering is a well known partitioning method. In this objects are classified as belonging to one of K-groups. The results of partitioning method are a set of K clusters, each object of data set belonging to one cluster. In each cluster there may be a centroid or a cluster representative **Dynamic VM allocation using Clustering algorithm:** K-Means follows the partitioned or non-hierarchical clustering approach. It involves partitioning the given data set into specific number groups called Clusters. Each cluster is associated with a centre point called centroid. Each point is assigned to a cluster with the closest centroid. Proposed dynamic VM allocation algorithm using clustering is as: Input: List V of Virtual Machine's with their location around the globe List D of datacenters Algorithm:

1. Select K points according to the number of datacenters in D
2. Choose datacenter from D
3. Form K clusters of VM's from V by assigning closest centroid
4. Recomputed the centroid of each cluster
5. Arrange all the requested VM's in cluster form
6. Allocate the VM's to the available Host
7. If all the VM's are allocated
8. Assign the VM's cluster to the selected datacenter
9. Endif
10. Repeat [2] until D is empty
11. If all the VM's are created in the datacenters
12. Send the cloudlets to the created VM's
13. Endif
14. compute the results

The Initial centroid will be chosen randomly. The centroid is nothing but the mean of the points in the cluster. Euclidean distance is used to measure the closeness. K-Means generates different clusters in different runs.

4. IMPLEMENTATION OF PROPOSED ALGORITHM IN CLOUDSIM

Before perform the implementation, it is required to know the places where modification can be made. In CloudSim different classes are there that support the simulation

environment for the cloud computing. So in order to implement our own policy, it is essential to have knowledge about existing allocation policies and the classes that support these allocation strategies. As in the previous sections, we have studied the required classes that are for our purpose. DatacenterBroker class is the place where the VM allocation policies are carried out. Different functions are there in this class that help to process the virtual machines and their assignment to the datacenters. Since clustering is the new concept in the CloudSim, so some new classes are also created in CloudSim to compute our working policies. **Implementation of CloudSim in Eclipse** CloudSim is a java based simulation tool, so it can be used either with the eclipse IDE or NetBeans IDE. For our work, we select eclipse IDE to implement proposed VM allocation policy. Different versions of eclipse IDE are available to run the CloudSim such as eclipse Indigo, eclipse Juno etc. Our work is implemented on the eclipse Juno. To run the CloudSim in eclipse Juno, we have to download the eclipse IDE and install it. Since eclipse is java base platform, so a java run time environment is needed before installing it. When this installation is completed, latest CloudSim package is extracted and it is imported in the eclipse. CloudSim package contains list of source files, jar files, list of supporting classes and some examples to understand the behaviour of cloud computing simulation. When we import the CloudSim in eclipse, it asks for the path where the extracted CloudSim package is available. This package is then copied into the workspace of eclipse from where it can be easily configured and run. **Implementing Dynamic VM Allocation Using Clustering Algorithm** K-Means follows the partitioned or non hierarchical clustering approach. It involves partitioning the given data set into specific number groups called Clusters (NavjotKaur et. al [19]). Each cluster is associated with a center point called centroid. Since our concept is to allocate the virtual machines dynamically, as per user request. So a graphical interface is prepared for selecting the position of virtual machines. From here lists of virtual machines and their location are created that are used for further processing. When these lists are submitted, simulation with CloudSim starts. A broker is created first, that runs the datacenters. Number of datacenters is assumed to be known in advance. On the basis of datacenters, clusters of VM's are created. When each element is processed through simulation methods. In the CloudSim, DatacenterBroker class is the base class for any VM level event. When createVmsInDatacenter (intdatacenterId) function is called, it performs the VM allocation to the respective datacenter.

5. CONCLUSION

This paper proposed a dynamic resource management with energy-saving mechanism in the cloud computing environment to reduce the energy consumption. DVFS technique can be applied by monitoring the CPU utilization. When the workload is heavy, real-time migration can be provided for achieving more effective usage of resources under the user unaware situation. The experimental results show that the energy consumption can

be saved significantly by applying the proposed dynamic resource management mechanism. Since a lot of migration will possibly lead to serious increasing of the extra energy consumption in the proposed architecture by applying the migration mechanism, in the future, multi-core architecture will be used to support multi-VMs. The number of acting VCPUs can be adjusted in accordance with the utilization of individual VCPU and the number of the CPU cores.

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