Applying Scheduling Algorithms with QoS in the Cloud Computing

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***Abstract*—Cloud computing is new model to use existing computing resources that are delivered as a form of service. These services can be divided into three parts with software, platform, and infrastructure. It is important to evaluate the performance of cloud computing environment to predict valid cost to manage the cloud computing system. We can use tool such as SimJava and GridSim to measure its performance. They are well-known simulation tools in grid computing but they do not support the virtualization of cloud computing. CloudSim is only tool which can evaluate the performance of this environment and it is based on SimJava and GridSim. It is suitable to simulate the situation with large amount of devices and data in cloud computing. Also, it can simulate the virtualization of computing nodes, network devices, and storage units. In cloud computing, a service provider has to guarantee quality of service to offer stable services. For this, we should use scheduling algorithms. However, there is no consideration of data priority in CloudSim. It is important to support QoS to keep the service level agreement. Thus, it is needed to research a scheduling algorithm to support QoS in Cloudsim. In this paper, we propose the way to support various scheduling algorithms in CloudSim.**

Keywords—Cloud Computing, QoS, Scheduling Algorithm

I. INTRODUCTION

According to Wikipedia, cloud computing is new paradigm in IT industry. It indicates a computer model that users are provided with computing resources. These services include three parts such as Software as a Service(SaaS), Platform as a Service(PaaS) and Infrastructure as a Service(IaaS). Figure 1 shows the relationship of these services.

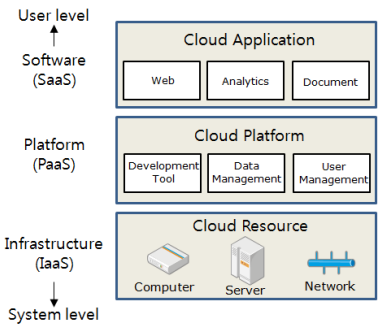

Fig. 1. Services in cloud computing

IaaS locates in bottom layer of cloud computing systems and it provides virtualized resources such as computation, storage and communication on demand. PaaS provides a higher level of IaaS to make a cloud easily programmable. SaaS is a software delivery model[1]. Gartner are expected that the access point to internet is almost changed from current personal computing environment to cloud computing environment by 2014. As the importance of cloud computing is growing bigger and bigger, there are many researches are beginning. It is important to simulate the performance of cloud computing system. However, there are numerous factors of a cloud infrastructure such as a hardware, software and services. Therefore, it is hard to quantify the performance of cloud computing system.

CloudSim is simulation tool to predict and measure the performance of cloud computing system. Customers can evaluate services and customize the various problems before initializing these services. Service providers can simulate the different kinds of scenarios which are related to manage their services. CloudSim provides novel features to users. It helps us to predict its performance easily and to develop new algorithms and protocols for the cloud computing system[2]. There are many kinds of data type and we need to dispose of them according to their importance. However, there is no consideration of task's priority and existing scheduling algorithm of CloudSim is only FCFS(First-Come First-Served). CloudSim should support various scheduling algorithms to apply the priority for more realistic environment. In this paper, we propose a method to apply scheduling algorithms to CloudSim. It can evaluate the performance of cloud computing system in the various situations according to data priority.

The remainder of this paper is divided into three sections. Section 2 discusses the architecture of CloudSim and its features. In section 3, we discuss the suitable method to guarantee the quality of service. Finally, section 4 concludes the paper.

II. ARCHITECTURE OF CLOUDSIM

CloudSim is a simulation tool to figure out the performance of cloud computing systems. It has several features that are different from existing tools such as SimJava[3] and GridSim[4]. First of all, CloudSim can support for large scale cloud computing infrastructure such as many computing nodes

978-1-4799-0604-8/13/$31.00 ©2013 IEEE

and virtual machines. Also, it offers a self-contained platform to simulate data centers, service brokers, scheduling, and allocation policies to specialized environment of cloud computing. In aspect of virtualization environment, CloudSim provides availability of virtualization engine and flexibility to switch between space-shared and time-shared allocation[1]. Figure 2 shows a layered CloudSim architecture.

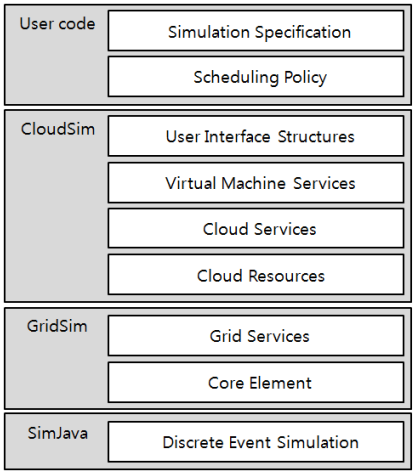

Fig. 2. CloudSim architecture

CloudSim is base on the functions of SimJava[3] and GridSim[4]. In these layers, there are core functions such as queuing and processing of events, formation of system components, communication between components, and management of the clock. In cloudsim layer, it is offered the way to simulate the data center which is base on the virtualization. Also, it manages the formation and execution of core entities such as VMs, hosts, data centers, and applications. User code layer exposes configuration related functionalities requirements for hosts, applications, VMs, number of users, and broker scheduling policies. In these layers, we revise user code and CloudSim layer to support scheduling algorithms.

III. PROPOSED SCHEME

Basically, CloudSim figures out execution time of cloudlets. The basic information of virtual machine is given by users. It includes process speed, image size, ram size, bandwidth, and number of CPUs of virtual machine. Also, there are cloudlet properties such as length, file size and output size. CloudSim uses these factors to configure datacenters, brokers, and virtual machines. To simulate the system, *startsimulation* method is called in the user code. This method calls other methods such as *run*, *runStart*, *runClockTick*, and *runStop* in sequence. Only these methods dispose of entered cloudlets by a FCFS scheduling policy. We need to new variable which defines priority of cloudlet to apply a scheduling algorithm. Also, we need to implement the new method which defines each priority of cloudlet. In new method, the priority of cloudlet is calculated and cloudlet with high priority inserts the list first. Then, CloudSim processes from a cloudlet with the highest priority. Figure 3 shows the idea of our proposed scheme.

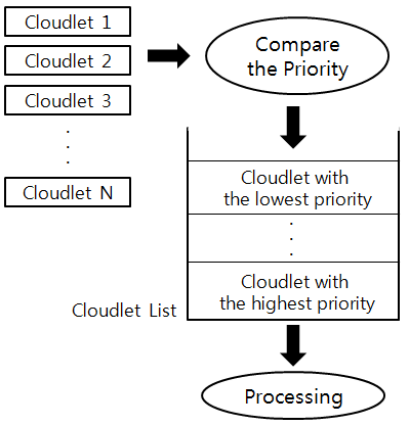

Fig. 3. Priority of Cloudlets

IV. CONCLUSION

Cloud computing is the model to use existing computing resources that are delivered as a form of service. CloudSim is simulation tool which evaluates the performance of this model. Since there are large amount of data and number of clients, service provider has to guarantee quality of service to provide stable services. However, there is no consideration of data priority in CloudSim. Thus, it is needed to research a scheduling algorithm to support its priority. In this paper, we revise the user code and cludsim layer and propose the way to support scheduling algorithms in CloudSim. Service providers can apply the system to data priority and guarantee the stable service. In the future, we wish to evaluate at realistic environment by using various factors and try to find optimal algorithms to dispose numerous cloudlets.

ACKNOWLEDGEMENT

This work was supported by Priority Research Centers Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Education, Science and Technology(2012-0005861).

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