Enhancement in Execution Time and Resource Utilization using Scheduling in Cloud Computing

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Abstract —Cloud computing is a popular topic all over the world nowadays, through which customers can access different types of resources and computer power via a web browser as a service . Cloud computing has emerged as a popular solution to provide easy access to externalized IT resources. One of its major advantages leading to its widespread application includes concepts of virtualization. There are different resources in cloud environment like Virtual Machine ,CPU resource, Memory ,Hard disk space of server machines located in datacenter. The server machines are consuming energy to provide services to users in cloud computing. For analyzing the resource allocation as well as utilization in cloud computing environment which is scalable to n servers then we will require Cloud scheduling which will create the virtualized resources as per requirement. The main aim of this work is to enhance the execution time and resource utilization of different in form of a cloudlets using Cloudlet scheduling algorithm.

Keywords: Cloud computing, Virtual Machine, Cloud Reports, Cloudlets, Pre-emptable Shortest Job Next

I. INTRODUCTION

Cloud computing is a marketing term for technologies that provide computation, software, data access, and storage services that do not require end-user knowledge of the physical location and configuration of the system that delivers the services [1].

Cloud computing describes a new supplement, consumption, and delivery model for IT services based on Internet protocols, and it typically involves provisioning of dynamically scalable and often virtualized resources [2][3].

Cloud computing is a concept used to describe a variety of computing concepts that involve large number of hosts connected through a communication network such as the Internet. Cloud computing is useful in distributed computing over a network, and means the ability to run a program or application on many connected computers at the same time. It is similarly referred to network-based services, which appear to be provided by real server hardware, and are in fact served up by virtual hardware, simulated by software running on one or more real machines [8].

The success of clouds has been driven in part by the use of virtualization as their underlying technology. It is a technology that allows running two or more operating systems side-by-side on just one PC or embedded controller. Virtualization greatly helps in effective utilization of resources and builds an effective system. Many applications are having a limited number of concurrent tasks, thus having a number of idle cores. This problem can be solved by using virtualization, allocating a group of cores to an OS (Operating system) that can run it concurrently. It enables the service providers to offer virtual machines for work rather than the physical International Journal of Science, server machines. Virtual machines (VMs) provide flexibility and mobility through easy migration, which enables dynamic mapping of VMs to available resources [7].

II. SCHEDULING

Cloud computing involving distributed technologies to satisfy a variety of applications and user needs. Shared resources, software, information via internet are the main functions of cloud computing to reduced cost, better performance and satisfy needs. To improve the response time of the job, distribute the total load of the collective system [4]. By this removing a condition in which some of nodes are overloaded while some other are under loaded. Scheduling algorithms does not take the previous state or behavior of the system, it depends upon the present behavior of the system because it is dynamic in nature Round robin algorithm process on circular order by handling the process without priority but Pre-emptive Shortest Job Next handle the process with priorities [8].

III.   CURRENT SYSTEM

In Current Scenario, with a prior disquisition of the subject, the task is divided and disseminated into same size cloudlets. These Cloudlets as well as Virtual Machines are scheduled according to the Round Robin Scheduling [5]. In general Cloud Computing scenario user submits the task to be performed / executed. Cloud Coordinator (CC) divides the task into equal sized cloudlets and passes it to DataCenter (DC).Due to default policy, it takes a lot of time because the cloudlets are processed and emanates one at a time in FCFS manner as and when they reach to VM. In addition to the time consuming factor, the cost factor also acts negatively this scheduling policy. VM executes the cloudlets present in the queue as they reach the VM's. In a gist, this default policy is extremely Time-Consuming, Cost insensitive and inefficient [4] [6].

Round Robin (RR) Algorithm

The RR algorithm is designed especially for time-sharing systems and is similar to the FCFS algorithm. Here, a small unit of time (called time quantum or time slice) is defined. A time quantum is generally from 10-100 milliseconds. So, the RR algorithm will allow the first process in the queue to run until it expires its quantum then run the next process in the queue for the duration of the same time quantum. The RR keeps the ready processes as a FIFO queue. So, new processes are added to the tail of the queue. Depending on the time quantum and the CPU burst requirement of each process, a process may need less than or more than a time quantum to execute on the CPU. In a situation where the process need more than a time quantum, the process runs for the full length of the time quantum and then it is pre-empted. The pre-empted process is then added to the tail of the queue again but with its CPU burst now a time quantum less than its previous CPU burst. This continues until the execution of the process is completed. The RR algorithm is naturally pre-emptive. RR algorithm is one of the best scheduling algorithms that developed by many researchers [5][8].

Cloudlet Scheduling Algorithm

Step-1: Execute Round Robin Scheduling with dynamic calculated quantum.
Step-2: Executed cloudlets are returned to Cloud Coordinator.
Step-3: Cloud Coordinator combines all the cloudlets to form task.
Step-4: Executed Task returned back to User by Cloud Coordinator.

Basic simulation of Cloudlet Scheduling is done using GUI tool of Cloudsim called CloudReports. For the Cloudreports, CloudSim acts as its simulation engine and provides an easy interface, report generation features and creation of extensions. The application simulates an Infrastructure as a Service (IaaS) provider with an arbitrary number of datacenters. Each datacenter can be customized as per need. The user can easily set the amount of computational nodes (hosts) and their resource configuration, which includes processing capacity, amount of RAM available [9].

Cloudsim implements generic application provisioning techniques that can be extended with ease and limited efforts. The cloudsim architecture is given below in figure 1. As shown in figure below the datacenter which is the Backbone of the cloud which is having set of host(s), virtual machine(s) [10].
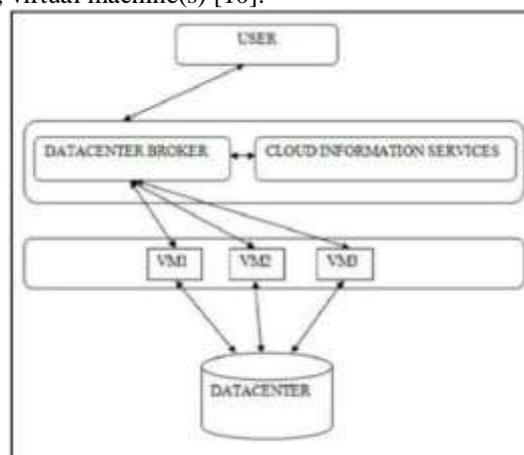

Figure 1 Basic Architecture.

IV.   *PROPOSED SYSTEM*

The proposed work is to schedule the jobs according to execution priorities defined with pre-emption combining Round Robin Scheduling with Shortest Job Next. It will work on following for cloud computing:-

- Cost Benefit Analysis.
- Time Management analysis.
    -improves response and execution time.

The SJF algorithm associates the lengths of the next CPU burst with each process such that that the process that have the smallest next CPU burst is allocated to the CPU. The SJF uses the FCFS to break tie (a situation where two processes have the same length next CPU burst). The SJF algorithm may be implemented as either a pre-emptive or non-pre-emptive algorithms. When the execution of a process that is currently running is interrupted in order to give the CPU to a new process with a shorter next CPU burst, it is called a pre-emptive SJF. On the other hand, the non-pre-emptive SJF will allow the currently running process to finish its CPU burst before a new process is allocated to the CPU [5].

Combine pre-emption of round robin (RR) with shortest process next (SPN). PSPN pre-empts the current process when another process is available with a total service requirement less than the remaining service time required by the current process. The following is proposed architecture shown [9].

Algorithm of Proposed System

Step-1: Execute PSJN with defined/calculated time quantum.
Step-2: Executed cloudlets are returned to Cloud Coordinator.
Step-3: Cloud Coordinator combines all the cloudlets to form task.
Step-4: Executed Task returned back to User by Cloud Coordinator.

V.   RESULTS

Following table show the performance analysis of Datacenter Resource utilization by Round Robin and Pre-emptable Shortest Job Next.

Table1. Resource Utilization for Datacenter

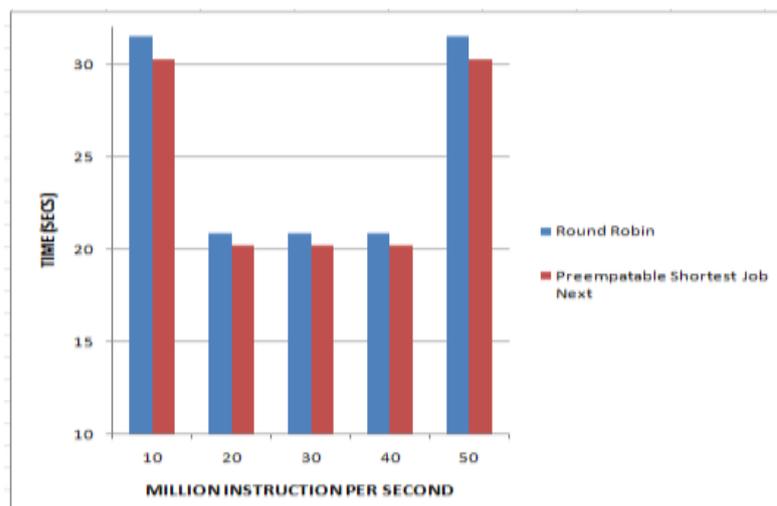| Resource Utilization for Datacenter		
MIPS	Round Robin	Pre-emptable Shortest Job Next
10	31.5	30.25
20	20.85	20.2
30	20.85	20.2
40	20.85	20.2
50	31.5	30.25

Figure 2. Resource utilization for datacenter

The above graph shows the time taken by the Datacenter to execute n million instructions within the shown range of time in seconds for both the algorithms.

Following table show the performance analysis of Customer Resource utilization by Round Robin and Pre-emptable Shortest Job Next.

Table2. Resource Utilization for Customer

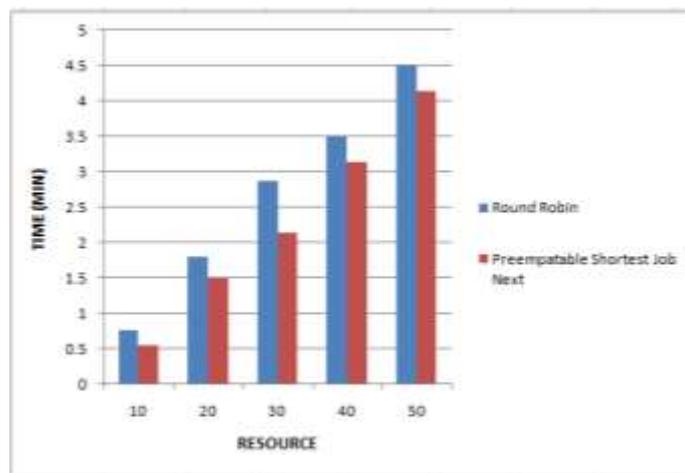| Resource Utilization for Customer		
Resource	Round Robin	Pre-emptable Shortest Job Next
10	0.77	0.55
20	1.8	1.5
30	2.87	2.15
40	3.5	3.15
50	4.5	4.15

Figure 3. Resource utilization for customer

The above graph shows the time taken by the parallel execution of resources assigned to the Customer within the shown range of time in minutes for both the algorithms.

Following table show the performance analysis of Execution Time by Round Robin and Pre-emptable Shortest Job Next.

Table3. Execution Time

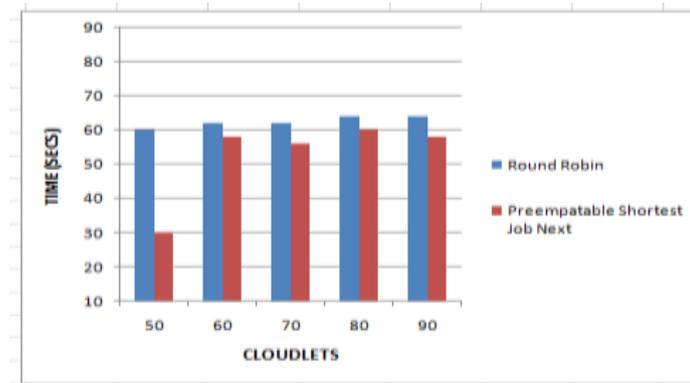| Execution Time		
Cloudlets	Round Robin	Pre-emptable Shortest Job Next
50	60	30
60	62	58
70	62	56
80	64	60
90	64	58

Figure 4. Execution time

The above graph shows the execution time taken by series of Cloudlets for its execution within the shown range of time in seconds for both the algorithms.

VI.   CONCLUSION

The real test bed limits the experimentation and makes reproduction of results a tough task. The VM allocation best packed policy is implemented at host level to enhance execution time and resource utilization. The proposed scheduling algorithm considers the processing requirement of the Job (Cloudlets) execution and time limit of the resource while taking scheduling decisions. Overall total execution time is considerably reduced making the cost also go down considerably. CPU utilization and overall performance has improved efficiently by making use of proposed algorithm.

With proper scheduling in cloud computing environment through the better resource allocation and optimization, better performance and efficiency can be achieved.

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