ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 4, Issue 7, July 2015

Load Balancing in Cloud Computing Using Task Scheduling

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Abstract: Cloud computing enables a large range of users to access scattered, scalable, virtualized hardware and/or software infrastructure over the Internet. Load balancing is a methodology to allocate workload across many computers, or other resources over the network links to achieve optimal resource utilization, make the most of throughput, minimum response time, and avoid overload. This paper presents a load balancing Task Scheduling algorithms or technique in cloud computing. This scheduling algorithm measures both resource cost and estimate performance, it also improves the calculation/communication ratio by grouping the user tasks according to a particular cloud resource's processing capability and sends the grouped jobs to the resource.

Index Terms: CLOUD Computing, Cloud SIM, Load Balancing.

I. INTRODUCTION

Cloud computing refers to the provision of computational resources on demand via a computer network. User or clients can present a task, such as statement processing, to the service provider, such as Google, without really possessing the software or hardware. The clients computer may contain very little software or data (perhaps a minimal operating system and web browser only), helping as little more than a display terminal connected to the Internet. Since the cloud is the fundamental delivery method, cloud based applications and services may support any type of software application or service in use today.

Cloud computing builds on established trends for driving the cost out of the delivery of services while increasing the speed and agility with which services are deploy. It shortens the time from sketch out application architecture to real deployment. Cloud computing incorporates virtualization, on-demand deployment, Internet release of services, and open source software. From one viewpoint, cloud computing is nothing new because it uses approach, concepts, and most excellent practice that have already been establish. From another viewpoint, everything is new because cloud computing changes how we create, develop, deploy, scale, update, maintain, and receive for applications and the infrastructure on which they run.

II. RELATED WORK

In [1] in cloud computing, each application of users will run on a virtual process system, the cloud systems distributed resources among these virtual operation systems. Every request is completely different and is independent and has no link between each other whatsoever, for example, some need more CPU time to compute complex task, and some others may require more memory to store data, etc. Resources are sacrifice on behavior performed on each individual unit of service. In order to calculate direct costs of applications, every individual use of resources (like CPU cost, memory cost, I/O cost, etc.) must be calculated. When the direct data of each individual resources cost has been calculated, more accurate cost and profit analysis.

In [2] Greedy and priority based scheduling are beneficial to user based scheduling is concerned with better utilization of available resources. The priority based scheduling may lead to long waiting time for low priority tasks. Greedy scheduling from users point of view lead to wastage of resources whereas greedy scheduling from service providers point of view may lead to disappointment for user on QoS parameters. New scheduling strategy need to be proposed to overcome the problem posed by network properties and user requirements. The new strategies may use some of the predictable scheduling concepts to merge them with some network and requirement aware strategies to provide solution for better and more efficient task scheduling. Grouping means collection of components on the basis of certain behavior or attribute.

In [3] the proposed scheduling approach in cloud employs an improved cost-based scheduling algorithm for making efficient mapping of tasks to available resources in cloud. This scheduling algorithm procedures both resource cost and computation performance, it also improves the computation ratio by grouping the user tasks according to a particular cloud resource's processing capability and sends the grouped jobs to the resource. Usually tasks are scheduled by user requirements. New scheduling approach need to be proposed to overcome the problems posed by network properties between user and resources. New scheduling strategies may use some of the conventional scheduling concepts to merge them together with some network aware strategies to provide solutions for better and more efficient job scheduling. Activity-based costing is a way of measure both the cost of the resources and the computation performance.

DOI 10.17148/IJARCCE.2015.4737

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III. CLOUD SIM

The Cloud Sim simulation layer provides support for modeling and simulation of virtualized Cloud-based data center environments including dedicated management interfaces for virtual machines (VMs), memory, storage, and bandwidth. The basic issues such as provisioning of hosts to VMs, managing application implementation, and monitoring dynamic system condition are handled by this layer. A Cloud source, who wants to study the efficiency of different policies in allocating its hosts to VMs (VM provisioning), would need to realize their strategies at this layer. Such execution can be done by programmatically extending the core VM provisioning functionality. There is a clear division at this layer related to provisioning of hosts to VMs. A Cloud host can be parallel allocated to a set of VMs that execute applications based on SaaS provider's distinct QoS levels. This layer also exposes functionalities that a Cloud application developer can extend to perform complex workload profiling and application performance study. The highest layer in the Cloud Sim stack is the User Code that exposes basic entities for hosts (number of machines, their specification and so on), applications (number of tasks and their requirements), VMs, number of users and their appliance types, and broker scheduling policies. By extend the essential entity given at this layer, a Cloud function developer can perform following activities:

(i) generate a mix of workload request distributions, function configurations;

(ii) Model Cloud availability 7 scenarios and perform robust tests based on the custom configurations

IV. PURPOSED WORK

Load Balancing Using Task Scheduling

Cost of every individual resources use is dissimilar. The priority level can be sorted by the ratio of task's cost to its profit. For simple management, three lists can be built for the sorted task; each list has a marker of priority level such as HIGH, MEDIUM and LOW. Cloud systems can take someone out from the highest priority list to compute. Maps should be scanned every turn to transform the priority level of each task. Parameters are defined as followed:

- Ri,n: The ith individual resources by the nth task.
- Ci,n: The cost of the ith individual use of resources by the nth task.
- Pn: The profit earned from the nth task
- Ln: The priority level of the nth task.

The priority level of each task can be calculate as in formula , the total individual resources use is supposed to be n time so the priority level of the kth task is

$$L_n = \sum R_{i,n} \times C_{i,n} / P_n$$

Algorithm

This section describe how to design an algorithm of activity based costing method in cloud computing.

Algorithm of preprocess:

- **For** all available tasks **do**
- Calculate their priority levels L_n
- **End for**
- **For** every L_n **do**
- Sort them and then put them into an suitable list
- **End for**
- **While** the system is running **do**
- **If** there is new task coming **do**
- Calculate its priority and then set it into an suitable list
- **End if**
- **End while**
- Algorithm of process:
- **Do** pre-process **as a thread**
- **While** the system is running **do**
- **If** every list is not empty **do**
- Scan every list to change the priority base on the restrictive conditions
- **End if**
- **End while**

This Paper use Clou3.0.3 to simulate the algorithm of task scheduling described previously. CloudSim 3.0.3 provides a series of core function for the establishment and simulation of heterogeneous distributed computing environment, particularly appropriate for simulation and research of task scheduling on cloud.

- ✓ six nodes
- ✓ five seconds of granularity time
- ✓ Average MI of tasks 10.

We have tabulated the for the results in Table 4.1 and Table 4.2 below

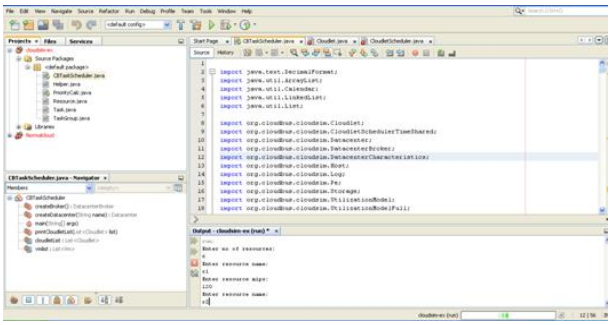

Table 4.1 Mips of cloud resources

Resource	MIPS
R1	120
R2	131
R3	153
R4	296
R5	126
R6	210

Table 4.2 Process Time in Seconds

No of Cloudlets	Priority Based
25	152.23
50	272.34
75	422.4
100	532.12

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Table 4.3 Process Cost in Rs.

No of Cloudlets	Priority Based
25	324.21
50	745.02
75	881.45
100	1034.41

We have compared the results for processing time and processing cost for various numbers of Cloudlets namely 25, 50, 75 and 100. a) Fig. 4.1 Profit Based Task scheduling algorithm with and without grouping on the basis of time taken for completion of the tasks for the values in Table 4.2 From the below Figure it can be seen that for Profit Based Task Scheduling the time taken to complete tasks after grouping the tasks is very less when compared with time taken to complete the tasks without grouping the tasks.

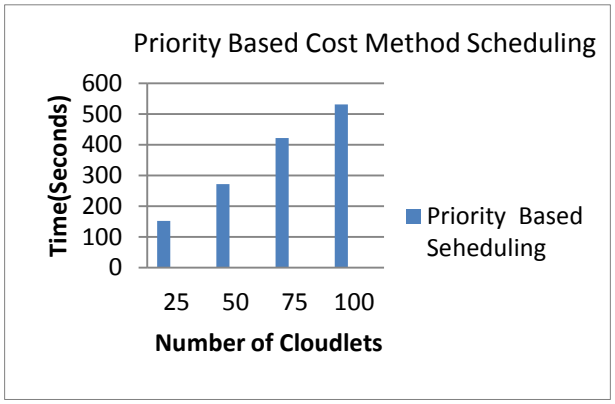

Fig4.1: Profit Based Task Scheduling for Processing Time

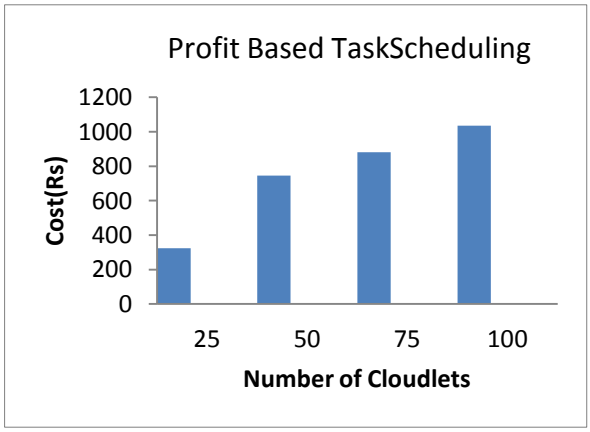

Fig 4.2: Profit Based Task Scheduling for Processing Cost

Process Time in Seconds

No of Cloudlets	**Purposed Priority Based Algorthim**	**Sequential Algorithm**
25	152.23	159.1
50	272.34	294.01
75	422.4	460.03
100	532.12	657.5

Table 4.4 simulation of processing cost for profit based Task Scheduling cloud computing

Table 4.3 From the above Figure it can be seen that for Profit Based Task Scheduling the processing cost spent to complete tasks after grouping the tasks is very less when compared with the processing cost spent to complete the tasks without grouping the tasks

Process Cost in Rs.

No of Cloudlets	**Purposed Priority Based Algorthim**	**Sequential Algorithm**
25	324.21	453.31
50	745.02	875.61
75	881.45	978.61
100	1034.41	1178.31

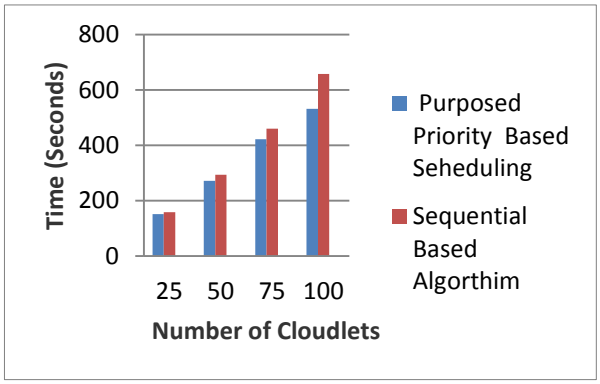

Fig4.3: Profit Based Task Scheduling for Processing Time

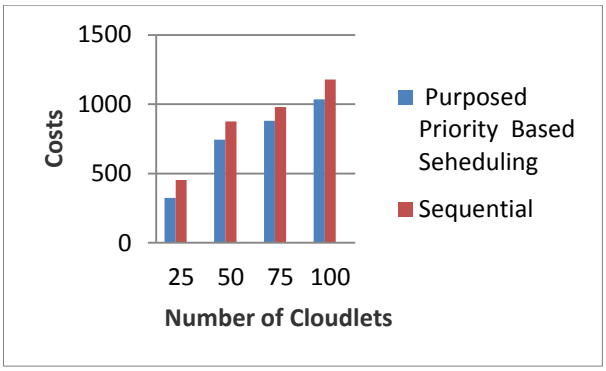

Fig4.4: Profit Based Task Scheduling for Processing Cost

From the 4.1 and 4.2 graphs, which show the comparison of completion time taken and processing cost spent for sequential based algorithm scheduling algorithm and purposed priority based scheduling algorithm, we can conclude that and purposed priority based the scheduling algorithm is better than sequential based algorithm scheduling algorithm.

IV. CONCLUSION

Task scheduling in cloud computing tended to use the direct tasks of users as the overhead application base. Load Balancing Based Task Scheduling is a way of measuring both the cost of the objects and the performances of activities and it can measure the cost more accurate than traditional ones in cloud computing. This paper introduces an optimized algorithm for task scheduling based on Load Balancing based Scheduling in

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ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering
Vol. 4, Issue 7, July 2015

cloud computing and the implementation of it. Compared with the sequential way of task scheduling, Load Balancing based Task Scheduling method has its own advantages.

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