COMPARATIVE STUDY OF RESOURCE UTILIZATION IN CLOUD COMPUTING USING LOAD BALANCING ALGORITHMS

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ABSTRACT

Cloud Computing offer huge power of computation to the user by paying for the services on demand. The user can access these services with the help of Internet. For the distributed computing environment it is necessary to manage all the resources among different users with the help some load scheduling algorithms. This paper compares the performance of basicscheduling algorithm of cloud computing such as Min-Min, Max – Min and RASA algorithm.

KEYWORD

Cloud Computing, Load Balancing, Min-Min, Max-Min, RASA Algorithm

1. INTRODUCTION

Cloud Computing started with sharing of information and resources at intervals a company as however currently it's wide used for accessing software package and hardware on-line, on-line knowledge storage [12] without concern concerning infrastructure value and process power [12]. Organizations will offload their IT infrastructure within the cloud and gain quick access and low maintenance value.. These organizations don't solely embody little business however Yankee government is moving some components of its IT infrastructure to cloud in addition. [10]

1.1 CLOUD COMPUTING ARCHITECTURE

The cloud computing is a distributed computing over the internet which adds distributed surroundings and provides variety of services to the user as needed by the particular user. The most common services are PaaS, SaaS and IaaS cloud computing can provide anything as service as needed by the user. It is providing computing at one place and centralized computing services over a network isn't new – mainframe timesharing technology was widespread approach back within the 1960 - 1970. however with the time procedure power of the processor is being magnified by several folds.

The software system was put in machine, and most of the servers hosted multiple applications at intervals identical software system while not providing physical or virtual isolation. Because it was tough to quickly move and rebalance services across servers, server resources weren't utilized most effectively.

"Cloud computing allows convenient, on-demand services to the user like network access to a shared pool of configurable computing resources (e.g., networking devices, servers, storage, applications and services) that may be managed by the services supplier. This cloud computing promotes accessibility and delivery of the services and infrastructure."

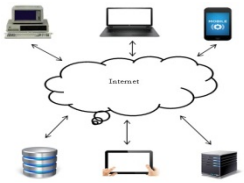

FIG: 1.1 CLOUD MODEL

2. SERVICE MODEL

Cloud computing will be divided into completely different model by the supply of services. The Following section provides the outline concerning the every service offered by the cloud computing. The table one shows edges of cloud services provided by completely different cloud vendors within the gift market.

(i) *Software- as- a –Service (SaaS)*: Saas provides pre-tested and authorized application such enterprise resource and coming up with (ERP) through web. Users is given services as per the demand of the user on the payment basis the services such email and Google app provide giant internet primarily based applications for the enterprise use. The user of the service doesn't got to manage cloud infrastructure like the servers, software and storage devices.

(ii) *Platform-as-a-service (PaaS*) : PaaS offers platform as service full or partial application development that user will access. The consumer will produce software package development with the assistance of tools and library accessible at the service supplier. Example of PaaS includes Google App Engine. The user possess complete management over the services however needn't manage them. These managed by the service suppliers.

(iii) *Infrastructure –as-a-Service (IaaS)* : A user or shopper will build use full laptop resources with the assistance of net. Services is provided on to the user. Example of IaaS embrace Amazon Elastic cypher (EC2). It provides users with special virtual machine (VM) that may be deployed and run EC2 infrastructure. The user doesn't management the hardware and networking elements once more these also are managed by the service supplier.

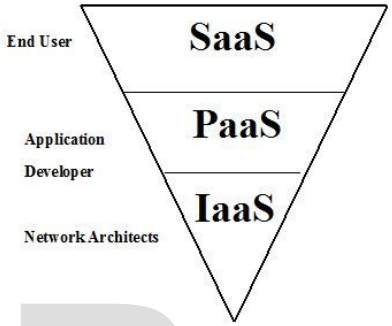

FIG: 1.2 CLOUD SERVICES

3. LOAD BALANCING ALGORITHM

Cloud Computing is needed to handle networked system with complex configuration which needs load balancing. For simplifying load balancing globally in cloud computing a proper scheduling algorithm is needed. Load leveling is distribution of the load instruction to the multiple laptop across the network. The responsibility of load leveling algorithmic program is to pick next task in such a fashion to attenuate the execution time, utilization of resources at the datacenters.

The goals of load balancing are:

1. Maximize the throughput of network.
2. Minimize the system overhead
3. Ensure the reliability in the service.
4. Scalability of the system

3.1 MIN- MIN LOAD BALANCING ALGORITHM

Min-Min may be an easy and quick formula capable of providing improved performance. Min-Min schedules the ideal tasks initially which ends in best schedules and improve the general create span. Assignment tiny task 1st is its draw back. Thus, smaller tasks can get dead 1st, whereas the larger tasks keeps on within the waiting stage ,which will finally ends up in poor machine use. Min-Min illustrate minimum completion time for jobs that square measure un assigned and later allocating the roles with minimum completion time (hence min-min) to a node that is capable of handling it.[4][5][6]

3.2 MAX MIN LOAD BALANCING

At first for all the accessible tasks area unit submitted to the system and minimum completion time for all of them area unit calculated, then among these tasks the one that has the completion time, most is chosen which is allotted to the corresponding machine. If in a very task set solely one long task is conferred then, Max Min rule runs short tasks at the same time at the side of long task. Max-Min is sort of a twin of Min-Min, except it selects the task with the maximum completion time and allotment to the corresponding machine. The rule suffers from starvation wherever the tasks having the most completion time can get dead initial whereas dropping the tasks having the minimum completion time.[1][2][3][16][17]

3.3 RASA ALGORITHM

RASA is Resource Aware Scheduling Algorithm works on the combination of Min-Min and Max –Min algorithm. [14][16]

1. It picks a task T_i with maximum computation time on node N_k. It then assign task T_i to node N_p which takes minimum computational time for task T_i.
2. Select a task T_i with minimum computational time on node N_k. Next find node Np such that it has highest computationalpower assign task T_i to node N_p.
3. Repeat above steps.

4. ALGORITHM PERFORMANCE COMPARISON

In order compare performance of above two algorithms we have generated 10 tasks and 5 nodes with the following parameter values.[3][8]

Task	Number of instructions in million
1	101
2	110
3	115
4	125
5	150
6	345
7	456

Table: Parameters of Task

Node	Million instruction per second
1	32
2	35
3	45
4	70
5	90

Nodes speed

Task	Nodes				
	1	2	3	4	5
1	3.15	2.88	2.24	1.44	1.12
2	3.43	3.14	2.44	1.57	1.22
3	3.59	3.28	2.55	1.64	1.27
4	3.90	3.57	2.77	1.78	1.38
5	4.6	4.28	3.33	2.14	1.66
6	10.78	9.85	7.66	4.92	3.83
7	14.25	13.02	10.13	6.51	5.06

Table : Completion of Task Time in seconds

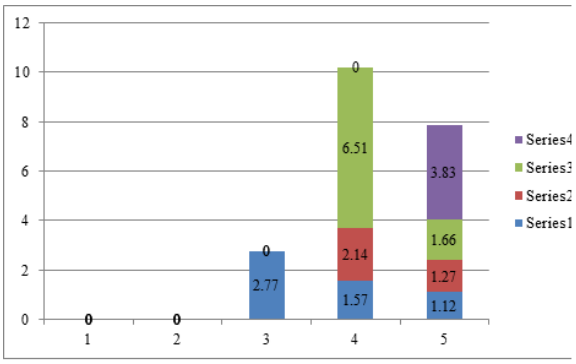

Fig 1 : Execution in Min-Min Algorithm

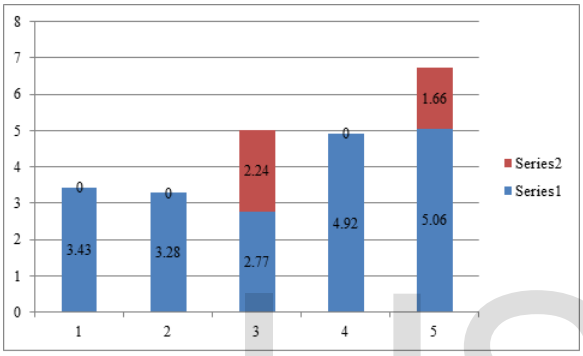

Fig 2 : Execution in Max-Min Algorithm

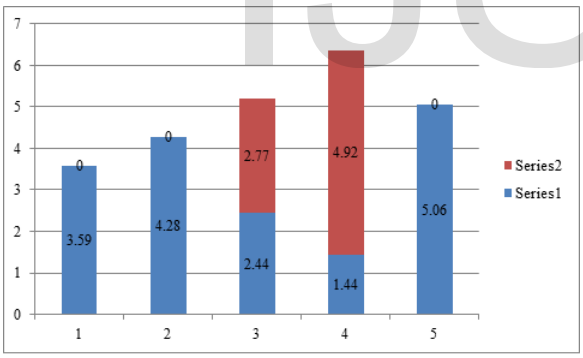

Fig 3: Execution in RASA Algorithm

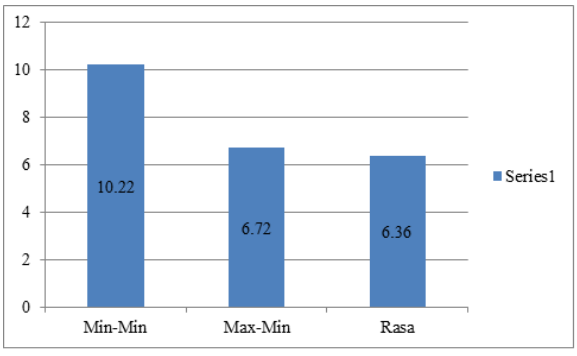

Fig: Makespan Comparison

5. RESOURCE UTILIZATION USING ABOVE ALGORITHM

The average resource utilization can be calculated by the following formula:

$$U_a = \frac{\sum_{i=1} c_i}{Nm} * 100$$

N = No. of nodes, m= makespan, c_i = completion time.

(i) Min-Min Algorithm

$$Ua = \frac{20.87}{7 * 10.22} * 100 = \mathbf{29.17\ \%}$$

(ii) Max – Min Algorithm

$$Ua = \frac{23.86}{7 * 6.72} * 100 = \mathbf{50.72\%}$$

(iii)RASA Algorithm

$$Ua = \frac{24.5}{7 * 6.36} = \mathbf{55.03\ \%}$$

6. CONCLUSION

Load balancing is a vital task in Cloud Computing surroundings to realize most utilization of resources. during this paper, we have a tendency to mentioned numerous load reconciliation schemes, every having some professionals and cons. The load balancing aims at the high throughput, high resource utilization and less turnaround time. Between the scheduling algorithm Min-Min , Max – Min, and RASA algorithm is being compared .

Unlike centralized algorithmic program, distributed nature of algorithmic program provides higher fault tolerance however needs higher degree of replication and on the opposite hand, ranked algorithmic program divide the

load at totally different levels of hierarchy with higher level nodes requesting for services of lower level nodes in balanced manner.

6.1 FINDING

- The RASA algorithm produces minimum response time and higherthroughput when compared with Min-Min and Max-Min.
- For the two algorithm Min-Min and Max – Min, Max-Min produces higher throughput and better response with reduced makespan in Max-Min.

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