

## Improved Hybrid Approach for Load Balancing In Virtual Machine

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**Abstract**— Cloud computing is a term generally used for the delivery of hosted services over the internet. In simple terms can be stated as “PAY-AND-USE Online Software resources”. Cloud computing makes to use the computing resource online. Balancing the load in the cloud is one of the important parameter which is to be focused. Hybrid Approach to Load balancing in Cloud Environment is a combination of two or more algorithms to achieve the betterment in the Cloud Service to the clients. With the observations it looks that RT Hybrid Algorithm would make the improvement for the better implementation.

**Keywords**— Cloud computing, Servers, Virtual machine, Data centers, Load balancing, Hybrid approach

### I. INTRODUCTION

Cloud computing is a pay and use online computing resource provider for example Gmail [5]. There is at least four decades of long standing history [2] is there for cloud computing such as batch processing of 1965, time sharing of 1970, LANS of 1980, distributed memory of 1990 now leading concept and betterment as today’s cloud computing. A standard cloud definition is given by NIST ‘Cloud computing is a model for enabling ubiquitous which means being present everywhere at a time, convenient, on demand network access to a shared part of configurable computing resources such as networks, servers, storage etc., applications and services that can be rapidly provisioned and released with minimal management effort or service provider interaction’

Cloud computing working mechanism differs from other technologies such as it is not a combination of clusters like grid computing, but next generation to grid computing, and it is not like client server architecture [1]. It is ubiquitous which means being present everywhere in all the time for simultaneously accessible. It uses virtualization technology [7] which allows sharing single resource among multiple users.

Cloud computing architecture consists of front end, middle ware and backend which would be considered as the working nature of cloud computing. Front end is intended for the user interface, middleware for middle management and the backend for cloud administration with a committed server. Cloud computing has two working models [3] such as (i)Deployment model and (ii) Service model. In case of

deployment model (a)Public deployment [12] model can be accessed by all, low cost but no security(b)Private deployment model is only for private use, with high cost but more security (c)Hybrid deployment model: is a combination of public and private models but it is flexible (d)Community deployment model: medium cost and secured

Resource allocation in a better way and scheduling in a better way are not only the key requirements to provide better services to the client but also the key points to evaluate the total cloud computing system performance. It is needed more to check the existing load balancing [11] algorithms, evaluate on virtual machine and provide a better algorithm. Although there could not be the best load balancing our efforts to make a better algorithm is very much needed. In cloud computing it is allowed for cloud service providers to share the computing resources on internet, with this act cloud stands as the ever growing technology, not only today but also in future by accessing the new upcoming technologies. Due to the virtualization it made a chance to exist number data centres. Cloud Computing does not works on assigning the computing tasks to the local computers or remote servers; [8] perhaps it assigns too many heterogeneous distributed computers.

(1) Round-Robin Algorithm: is a static algorithm performs on the basis of random choices of virtual machine. Data center controller allocates a pool of virtual machines in a cyclic manner such as given below in Fig.1.

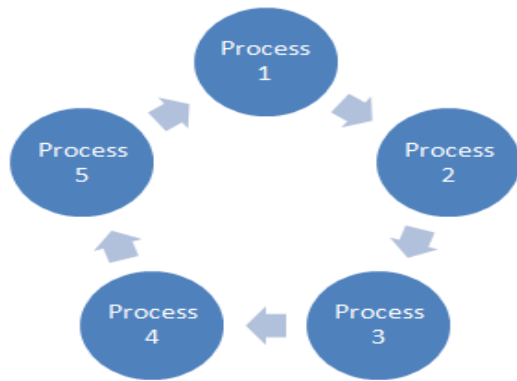


Fig.1: Round robin algorithm working mechanism

Observational results:

Resp. Time	Exe. Time	Turn around Time	Proc. Time	Throughput	Network Delay
300.41	0.03448	0.29	0.29	3.31214	13.88

Table 1: Results Obtained on Round robin Algorithm

Drawbacks of Round robin algorithm: Its main drawback is such as given below:

1. Clients has to wait in the waiting queue until and un less the suitable virtual machine is available
2. Additional Load on Scheduler to decide the size of quantum
3. It has the longer average waiting time, higher context switches, higher turnaround time and low throughput
4. It does not consider the previous load state of a node at the time of assigning the jobs
5. Requires the prior knowledge of user tasks and system resources, does not makes the use of current state of the system [9].
6. It fails to model the heterogeneous nature of cloud computing environment.

In order to improve this, it can be considered “Throttled Load Balancing Algorithm”.

Any Modified load balancing algorithm gives some modifications to the existing algorithm. This makes the user to get the flexibility in getting the services from the cloud provider. As it is known that while providing resources as services it is possible to have a number of requests at the same time and due to some requestor need to remain in the queue though they have possibility to send requests to the other provider. Thus to overcome such situations it can be modified the existing algorithm.

(2) Throttled Algorithm: It is completely virtual machine based algorithm. It is much efficient of in keeping tracking of present status of virtual machine [10] in data center. The working mechanism looks like such as given below Fig.2.

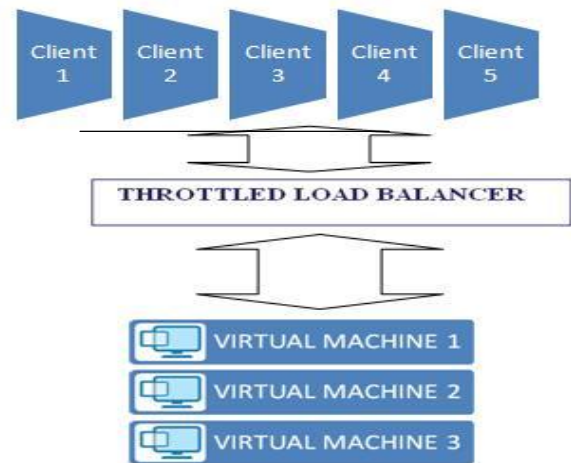


Fig.2: Throttled algorithm working mechanism

Observational results:

Resp. Time	Exe. Time	Turn around Time	Proc. Time	Throughput	Network Delay
300.41	0.03571	0.28	0.28	3.31214	13.88

Table 2: Results Obtained on Throttled Algorithm

Drawbacks of Throttled Algorithm:

It works properly only if all virtual machines in data center have the same hardware configuration.

It should be made some Modifications in the existing algorithm so that it could achieve the flexibility in its implementation.

Combination of Round Robin and Throttled Algorithm:

In order to reduce the context switch and reduce the turnaround time and increase in throughput it can be combined round robin with throttled algorithm to call it as ‘RTH Algorithm’.

Round Robin – Throttled Hybrid Algorithm (RTH) Proposal:

It is a clear intension is to make a flexible algorithm for a better usage. Therefore it can be added round robin and throttled algorithm with their original characteristics such as

1. Data centre controller should receive the new user cloudlet request randomly.
2. RTH Load balancer keeps a list of virtual machines and their status whether they are busy or Idling i.e., Index table.

RTH Algorithm PSEUDO Code:

Inputs: User bases- UB1, UB2, UB3, UB4, UB5, UB6 are Cloudlet User Requests.

Virtual machines- VM1, VM2, VM3, VM4, VM5, VM6 are within the data center.

Step: 1: Round robin throttled hybrid load balancer (RTH LB) maintains an index table of available virtual machines and the number of cloudlet user requests.

Step: 2: Data center controller receives a new request

Step: 3: At the beginning RTHVMLB checks the virtual

machine state either it is busy or idle, it means available to provide service.

Step: 4: When a request comes for virtual machine allocation from the data center controller, it parses the table and identifies the latest load balanced virtual machine. If more than one is there in that the 1<sup>st</sup> identified will be selected.

Step: 5: Data center controller queries the RTHVMLB for next allocation.

\*Step: 6: RTH VMLB parses the allocation table from top until the 1<sup>st</sup> available virtual machine is found or the table is parsed completely.

If found: (i)RTH VMLB returns the VMID to the Data center controller (ii)Data center controller sends the request to the virtual machine identified by that ID (iii) Data center controller notifies the RTHVMLB of the new allocation (iv) RTHVMLB updates the allocation table as per the requirements.

Step: 7: When the virtual machine finishes the processing the request and the data center controller obtains the response cloudlet, it informs the RTHVMLB of VM for the de allocation.

Step: 8: Data center controller checks if there are any requests are in waiting, if there are some are waiting or if there are any other requests are waiting it carries on from step:5

Step: 9: Continue from Step: 2

Observational results:

Resp. Time	Exe. Time	Turn around Time	Proc. Time	Throughput	Network Delay
300.36	0.031	0.26	0.26	3.311	13.89

Table 3: Results Obtained on RTH Algorithm

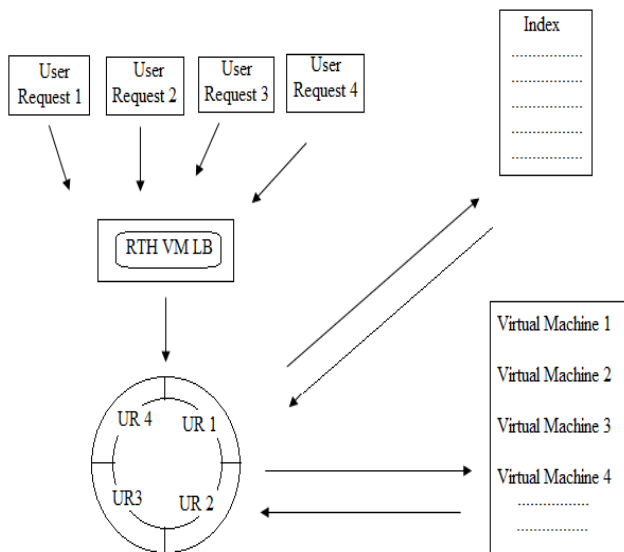


Fig.3: RTH working mechanism architecture

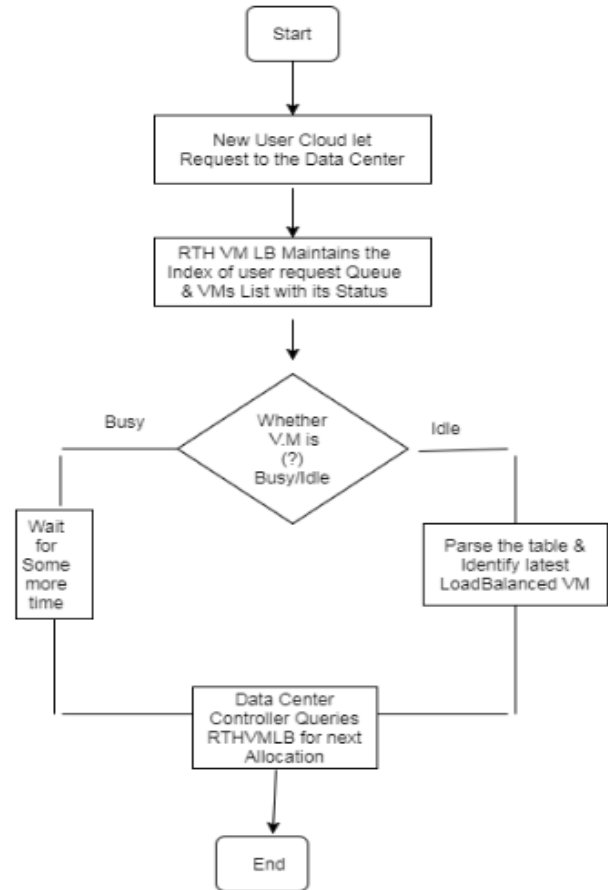


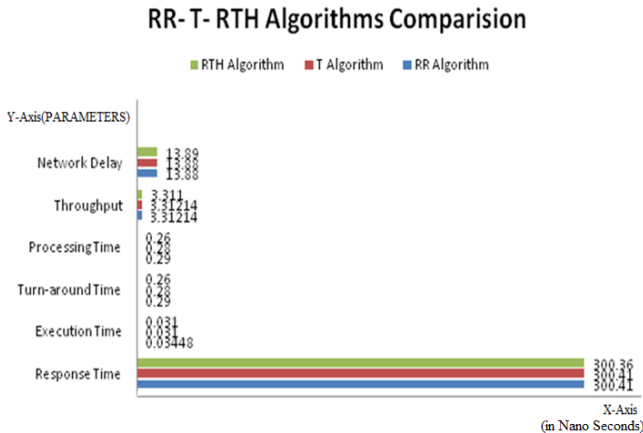
Fig.4: RTH flow chart

Advantages of new RTH algorithm:

At an average this algorithm has considerably reduced the context switch and turnaround time and also increased throughput.

RR-T-RTH Algorithms Comparison				
SL.NO	*	RR Algorithm	T Algorithm	RTH Algorithm
1	Response Time	300.41 (Nano Seconds)	300.41	300.36
2	Execution time	0.03448	0.031	0.031
3	Turn-around Time	0.29	0.28	0.26
4	Processing Time	0.29	0.28	0.26
5	Throughput	3.31214	3.31214	3.311
6	Network Delay	13.88	13.88	13.89

Table 4: RR-Throttled-RTH Algorithms Execution Results comparison



Graph 1: RR-Throttled-RTH Algorithms comparison

#### Disadvantages of New RTH Algorithm Observed:

It is experimentally found in its execution that this algorithm shows better performance only when data center has the virtual machines of all are of the same configuration.

Search for a new Algorithm for the betterment in RTH Algorithm:

The main drawback of RTH virtual machine is shows better performance only when data center has the virtual machines of all are of the same configuration. In order to improve this, it is needed to consider an algorithm which can load balance the algorithm very efficiently.

**Conclusion:** Round robin algorithm is a static algorithm performs on the basis of random choices of virtual machine. It has the drawbacks such as it has the longer average waiting time, higher context switches. Throttled algorithm is also a static algorithm which is completely virtual machine based. It has a drawback too, it works properly only if all the virtual machines have the same hardware configuration. It can be added both algorithms with their original characteristics and can be called as RTH Algorithm. At an average this algorithm has considerably reduced the context switch and turnaround time and also increased throughput.

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#### Authors Profile

*Mr. G. Srinivasa Rao* pursued Bachelor of Science from Osmania University of Hyderabad, India in 2006 and Master of Computer Applications from Osmania University in year 2013. He is currently pursuing Ph.D. in the Department of Computer Sciences, Dravidina University , Kuppam since 2014. He is a member of Internet Society (Global), also the Member of International Association of Engineers. His main research work focuses on Load balancing, and Cloud computing.

