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Cloud Load Balancing Algorithms

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Abstract:
CLOUD COMPUTING is one of the most emerging and new way of computer science engineering, where flexible environment gives number of user can get access desired services as per their requirement where any information may available at anytime and anywhere in world. So there is lots of possibilities arisen to access public and private information by using internet. User needs to be begin to use computing services at remote location store the information in private cloud for confidentiality and share in public cloud.
In this paper we are proposing a novel Load Balancing approach. The Load balancing is the process of distributing load over the different nodes which provides good resource utilization when nodes are overloaded with job. Load balancing is required to handle the load when one node is overloaded. When the node is overloaded at that time load is distributed over the other ideal nodes. Many load balancing algorithms are available for load balancing like Static load balancing and Dynamic load balancing. The performance of proposed load balancing method is better.

1. Introduction:

Cloud Computing refers to distributed architecture that provides computing resources over the internet. Than name of the cloud computing services given because cloud is metaphor for internet, where user can see the cloud but doesn't know what inside it. This provides services pay per consumption basis, reduce the cost of operating system and networks. No need to purchase hardware and software licenses and other benefits to unlimited processing power and storage capacity, high efficiency. While the cloud virtually enables network access and services that combines various distributed resources all over the world, security is an important issue to be dealt in order to protect outsourced data accessed via third-party clouds from network intruders. Hence, the main focus of this paper is to develop a model to securely transfer data with all the three main cloud service layers such as Infrastructure as a service (Iaas), Platform as a service (Paas) and Software as a service (Saas).

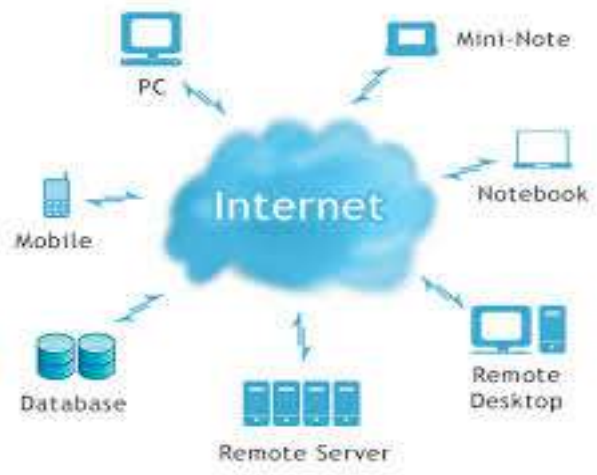

Figure 1: Cloud Computing Scenario

2. Related Work:

A method using Estimated Time to Compute (ETC) matrices was presented to model heterogeneous systems; it is found that the Minimize Completion Time (MCT) scheduling algorithm [2] attempts to minimize the total computational time, required for any job performed for the best out of a set of well-known scheduling algorithms.

The work done by A. Singh et al. [3] proposed a novel load balancing algorithm called Vector Dot. This algorithm handles the hierarchical complexity of the datacenter and multidimensionality of resource loads

across servers network switches and storage in an agile data center that has integrated server and storage virtualization technologies.

The work done by Stanojevic et al. [4] proposed a mechanism CARTON for cloud control that unifies the use of LB and DRL. The LB (Load Balancing) is used to equally distribute the jobs to different servers so that the associated costs can be minimized and DRL (Distributed Rate Limiting) is used to make sure that the resources are distributed in a way to keep a fair resource allocation.

Author Y. Zhao et al. [5] addressed the problem of intra-cloud load balancing amongst physical hosts by adaptive live migration of virtual machines. The load balancing model is designed and implemented to reduce virtual machines migration time by shared storage to balance load amongst servers according to their processor or IO usage.

Work done by V. Nae et al. [6] presented an event driven load balancing algorithm for real-time Massively Multiplayer Online Games (MMOG). The algorithm after receiving capacity events as input, also analysis its components in context of the resources and the global state of the game session, then generating the game session load balancing actions.

The J. Hu et al. [7] proposed a scheduling strategy on load balancing of VM resources that uses historical data and current state of the system. Proposed strategy achieves the best load balancing and reduced dynamic migration by using a genetic algorithm.

The A. Bhadani et al. [8] proposed a Central Load Balancing Policy for Virtual Machines (CLBVM) that balances the load evenly in a distributed virtual machine/cloud computing environment.

The LBVS H. Liu et al. [9] proposed a load balancing virtual storage strategy (LBVS) that provides a large scale net data storage model and Storage as a Service model based on Cloud Storage. The Storage virtualization is achieved using an architecture that is three-layered and load balancing is achieved using two load balancing modules. It helps in improving the efficiency.

The Y. Fang etal.[10] discussed a two-level task scheduling mechanism based on load balancing to meet dynamic requirements of users and obtain high resource utilization. Algorithm achieves load balancing by first mapping tasks to virtual machines and then virtual machines to host resources thereby improving the task response time, and resource utilization also overall performance of the cloud computing environment.

3. Cloud Load Balancing Algorithms:

Round Robin Round robin performs the basic type of load balancing and functions simply by providing the list of IP address of cloudlet. It allocates first IP address to the first requester then second IP address to the second requestor for a fixed interval of time known as time slice. If the request is unable to finish within the given slice time, it will have to wait for the next cycle to get it turn for execution. This will continue till submitted tasks are not completed.

Active Monitoring Load Balancer This load balancer find outs the active VM and also to event out the active task at any point of time.

Throttled Load balancer This load balancing technique ensures that only a per-defined number of internet cloudlets are allocated to a single VM at any point of time. If more groups are presents in the data center than the number of available VM than some of the requests have to be queued until the next VM is available.

4. Proposed Load Balancing Algorithm:

Input:

- Data centre requests r1,r2,….., rn
- Available virtual machines vm1, vm2, vmn

Output:

- Data centre requests r1, r2, ……, rn are allocated available virtual machines vm1, vm2, ……, vmn

Process:

1. The updated throttled algorithm maintains a hash map table of all the available virtual machines which their current state and the expected response time. This state may be available or busy. At the beginning, all the virtual machines are available.

2. When data centre controller receives a request then it forwards that request to the updated throttled load balancer. The update throtteled load balancer is responsible for the virtual machine allocation. So that the job can be accomplished.

3. The updated throttled algorithm scans the hash map table. It checks the status of the available virtual machine.

3.1 If a virtual machine with least load and the minimum response time is found.

- Then the updated throttled algorithm sends the VM id of that machine to the data centre controller
- Data centre controller sends a request to that virtual machine
- Data centre controller sends a notification of this new allocation to the updated throttled
- The updated throttled algorithm updates the hash map index accordingly

3.2 If a virtual machine is not found then the updated throttled algorithm returns -1 to the data centre controller

4. When the virtual machine finishes the request.

- The data centre controller sends a notification to updated throttled that the vm id has finished the request.
- Updated throttled modifies the hash map table accordingly

5. If there are more requests then the data centre controller repeats step 3 for other virtual machines until the size of the hash map table is reached. Also of the size of hash map table is reached then the parsing starts with the first hash map index.

5. Conclusion:

A number of load balancing algorithms existing which are distributing the load among the data center. Each of them has their own functionality. Load Balancer contains algorithms for mapping virtual machines onto physical machines in a cloud computing environment, for identifying the idle virtual machines and for migrating virtual machines to other physical nodes. In this paper we have proposed a novel Load Balancing approach. The performance of proposed load balancing method is better.

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