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Power & Load Aware Resource Allocation Policy for Hybrid Cloud

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Abstract

Cloud computing is now trending and more popular in these days for the computation and adopted by many companies like google, amazon, Microsoft etc., As the cloud size increases with increase in number of data center power consumption over a data center increases. As number of request over the data center increase with increase in load and power consumption of the data center. So the requests need to be balanced in such manner which having more effective strategy for utilization of resources, balance load over data center and reduction in power consumption. Hybrid cloud computing made it more complicated with respective to requests type that may increase or decrease power consumption. A recent survey on cloud computation shows that the power consumption of a server, increasing in a linear way due to utilization of resource (processors). Request balancing in such manner without having knowledge of load over data center maximize resource utilization but also increasing power consumption at server. So to overcome these issues in cloud Infrastructure as a service (IaaS), we have proposing a load balancing algorithm to minimize the power consumption and cost over a data center. Proposed algorithm has proven to have better performance in term of load and power efficiency as compared to previously proposed load balancing algorithm for cloud IaaS.

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Keywords: Cloud computing;;Power aware computing; Resource Utilization; Hybrid Cloud; Cloud Infrastructure as a service..

1. Introduction

Cloud computing is more popular and promising epitome for both consumer and provider in different field like engineering mathematics and highly used in business industries in homogeneous and heterogeneous way. Request from different kind of area are served by data centers in cloud environment also increase power consumption as well load. However, to keep computing large scale requests on data centers required huge amount of power, which leads to high power consumption and balance the load to increase the productivity. Request type also affect the services

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i.e., private or public requests. As per survey in 2006, data center consumed around 4.5 billion kWh, which is equal to 1.5% of total power consumed by USA, and increasing 18% yearly[1]. In general Cloud Computing deals with various power issues listed as follows: 1) as cloud computing adopted by industry and number of user also rapidly growing with number of data centers with increasing power consumption. 2) Load distributed among data centers without having information of power consumed by them compare to usually consumed power in under loaded datacenter.3) Current load balancing algorithms focus on load balance when request load increases but not as consumed power increases. 4) High loaded data centers consume more power to compute requests and may be due to high load theses data center slow down which is not good for user as well cloud provider.5) Some data centers having less load compare to highly loaded data center and they are under maximum load but high loaded data center computing them with high energy consumption.6) Some request are need to be computed within it's time line but due to high load they may miss their deadline which is not appropriate to user and will be a critical issue. Request which are having less completion time line can be compute on least or power consuming data centers. 7) As per recent study[4-7], utilization of data centers is major problem because 60% data centers are idle and most of 20% data centers are fully utilize and wastes of power respectively. This show poor utilization of resources and unbalanced load distribution as well power but this shows importance of new approach that have sufficient strategy to minimize wastes of power as much as. 8) Request type make big difference of services, if requests are private then service provider has to take it as high priority and low priority to public.

This paper focus on the VM allocation and load share algorithm that emphasis hardware capability and functionality of hybrid cloud computation. Proposed algorithm lead computation in efficient energy consumption in new directions and improved utilization of all resources as well load balance among data centers accordingly. There are many factors of cloud computing which are untouched and can give best results and optimize the computation schema, load balancing, power consumption are of them. Power or energy consumed by a datacenter depends on configuration of server hardware; high configuration of hardware will defiantly consume much power as compared to less configured, Similarly over loaded data center also consume more than less loaded data center. Data centers are processing the requests which are scheduled by scheduler using a scheduling algorithm and at the end of data center there is one more algorithm applied to balance the load over data center and optimistically increase the data center performance, but there should be policy to make priority factor to check whether request is public or private as well load among the data centers. There is always a fixed capacity of data center to serve request beyond that data center need extra resource to do extra computation with the same hardware configuration, here is chance of task failure or some interruption during the process due to limited resource. If task is private, it has to be done without any problem and public request may server later or wait for a while. This paper proposed an approach to avoid such situation with minimum load and cost efficient manner as well continue task computing without any interruption. Data center applies an algorithm to allocate resource to complete request with some configuration which makes it computable as soon as possible to serve request and response them, but some time due to more than its request server capability or due to over load, requests comes and queued and data center compute the task with its maximum serve capability and finish the computation and if data center is under load then is will be fine and if over loaded then it's increase the power consumption and there are chances of system failure which is not appropriate and cause loss of money. This scenario may be coming into existence and decrease the productivity and down the system performance. There are many algorithms to find least loaded server, which can provide service efficiently and economically.

Private and public cloud computation are basis of data which is going to compute, public task can wait and can wait for some time and compute later, but the same thing cannot be applied to private, somehow it has to be done. If a private task has to be complete within the time-line, then scheduler has to be make sure it will be finished within time line, if lost its time line, then it's going to be a big problem to server provider and customer. This paper propose and dynamic way to minimize the load and computation and maximize utilization of resource by allocation resource to request by getting energy efficiency and load distribution among data centers which make it more efficient and reliable computation over cloud environment. Power consumption based load balancing lead to efficient computation and increase computation of data center economical.