Data Center Energy Efficient Network Aware Scheduling

Radhika Vaidya
Dept.Of Computer Engg.
MITAOE,Alandi

Amruta Kharat
Dept.Of Computer Engg.
MITAOE,Alandi

Debashish Mohapatra
Dept.Of Computer Engg
MITAOE,Alandi

ABSTRACT
Over the last few years, cloud computing service have become more popular due to the evolving data centers and parallel computing. Thecloud is defined as a pool of computer resources to provide a computing function . The cost and operating expenses of data centers increase in computing capacity. According togovernmental, industrial, and academic surveys the energy utilized by computing and communication units in the data center leads to small amount of the data center operational costs. We build a system using virtual machine environment for energy aware cloud computing data centers. Along with that the workload distribution, the virtual machine environment is designed to capture all the information of the energy consumed by data center units such as servers, switches, and links as well as packet-level communication patterns in realistic setups. The work output is consider for different tier data center architectures show the effectiveness of utilizing power management schema, such asfrequency scaling, voltage scaling and dynamic shutdown(hibernation)that are applied to the computing and networking components.

General Terms
Energy Efficiency,Traffic Congestion.

Keywords
Cloud Computing, Data centers, Energy Efficient, Traffic Congestion.

1. INTRODUCTION
Internet is the most useful tool in today's world. Due to internet everything that become a little more faster, more simpler and people all around the globe can communicate with each other at any point of the their time. This shows the technology has made our lives simpler than ever before. With the invention of such powerful tool comes the greater risk and greater possibilities. With the increase in the number of users of the internet there is the problem of handling user's data. Our lives have become simpler and more over are most valuable are at greater risk. From the personal data to our other data are digitally saved. But who knows what's going with the information of the users. We need to control all these data and control the traffic over the network. More access to data has lead to increase in huge amount of energy in data center.[1]

2. LITERATURE SURVEY
In the world of technology, every user is connected to the internet. Due to increase in the number of users each day, there is big need of controlling the traffic of data over the network and minimize the energy consumption in. In order tosolve such issues a lot of architectures and algorithms are being made to minimize the problem. To solve the problem of energy efficiency we need to provide them with quality of the

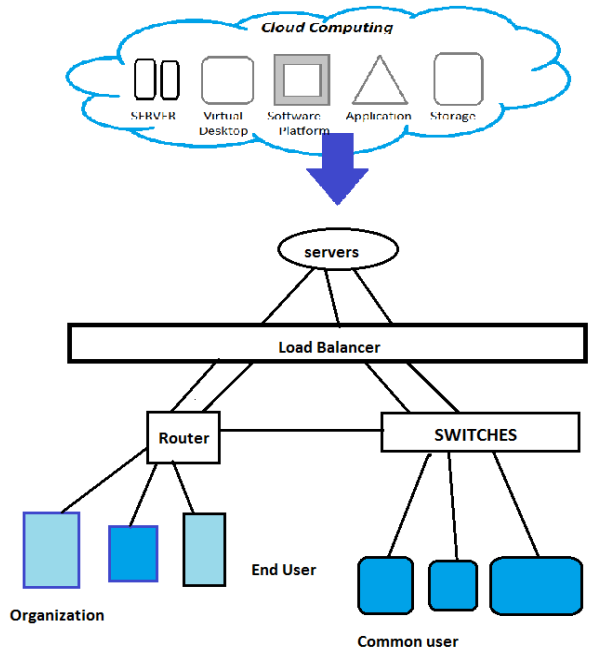

Figure 1: Basic Cloud Architecture

Services by reallocating of data and scheduling them. Moreover theuse of cloud computing has lead to use of less infrastructure and helps in cost reduction.[2] In order to minimize the SLA violation we have gone through some algorithms which helps in reduction of energy and infrastructure .The migration of various VM's which helps in minimizing the energy and hence helps in reduction of the traffic over the network..[5][6][7] This is basically to keep balance between the service providers and the customers. Cloud is a virtual storage space which keep the user data in distributed way. There are many types of clouds private, public and hybrid. Private clouds are those storages that can be used by the users but they have to pay in order to continue the service. Public cloud is the most utilized cloud service. As it is a free source to use, it is also very popular but provides very less security. Hybrid cloud is basically combination of private and public cloud. This cloud gives best performance of both work load balance and flexibility. Thus ,helping the users to access the data over the cloud anywhere and any point of time. Hence, cloud computing can become the technology of biggest use of this era.[7][8][9]

3. PROPOSED SYSTEM
The project basically focuses on minimization of energy and traffic congestion of data over the network in the data center.In order to control the flow and reduce the energy consumption by the server we need to need distribute the workload in such a manner that lessresources are used.

Aggregation basically in reducing the traffic over the network as it shares the data in other cloud databases. So the data get distributed and access to the data become faster due to low traffic. But handling all these data at so much speed can lead to slower access to all services so we need to balance all these data.The role of load balancer comesin picture. It basically distributes the workload, minimize theresponse time and maximize throughput and aim to minimizeresource use. Thus the end users,gets the data easily and withfaster response at any point of time as and when they areconnected to the internet.[8]

4. ENERGY USAGE IN DATA CENTERS

With the increase in the cloud computing, large scale data centers have become common in the computingindustry,and thereis significant increase in energy consumed by these data centers, which has becomes a key issue to address. As most of the time a data center remains unutilized, the amount of energy can be reduced by migrating virtual machines (VM) running on unutilized machines to other hibernating such unutilized machines. As the data center machines and industry grows increasingly attracted with energy efficiency, cloudcomputing provides the services where the energy consumed by the IT equipment in the industry can be reduce using various techniques such as DVFS, DPM etc. Usage of energy is a main issue for data centers. Power consumed by data centers ranges from a few kW for a rack of servers to several tens of MW for large requirement. And value of these is going to increase 100 times in future. Therefore actionmust be taken to build energy efficient data center.[7][9]

5. DESIGN(FLOW DIAGRAM)

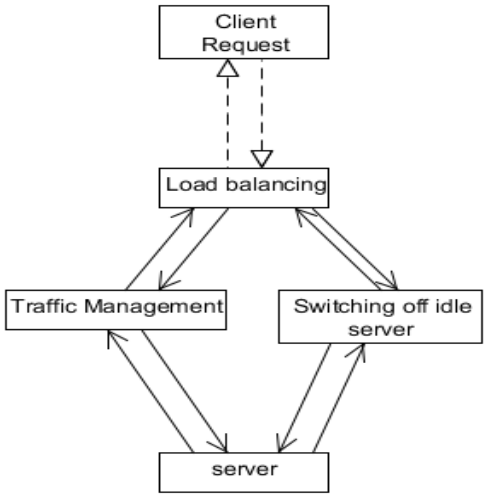

Figure 2. Flow Diagram

6. PROPOSED SYSTEM

This model calculate the total power consumed by the data center i.e. servers while transferring the data or extracting the data. This help in comparing the different scenario in the data center.

S->Solution set
Where,
S={ s, I, O, F, fi, fo }
s->start state

I->Input{packet1,packet2,packetn}

F-> load Balancer function

fi-> Input function

fi= {f1}, Where

f1->request for cloud storage

fo->Output function

fo= {f3}, Where

f3->response from cloud storage

To find a optimized solution such that energyand traffic congestion of data over the network isminimized. The load balance function F is used as loadbalancer which distributes the workload, minimize theresponse time and maximize throughput and aim tominimize resource use. The function F assumes that CPUutilization as main factor in the power model and presentsan approximation for total system power against CPUutilization (u).Therefore Total System Power can becalculated as:

Total System Power =Pidle + (Pbusy -Pidle) * u(1)

If CPU Utilization (u=1) is 100 percent, then the power of SystemP_busy is P_max.

k = P_idle/P_max(2)

Assuming that k=0.7 in which 30 percent of CPU Utilization i.e.0.3,then

P(u) = k * P_max + (1 - k) * P_max *u = P_max(0:7 + 0:3u) (3)

Power calculation with respect to time t
Pt = P_max(0:7+0:3_u(t))(4)

E =∫tP(u(t) (5)

According to this model, the amount of energy consumed by a serveris determined by the Utilization of CPU,hence to reduce theenergy consumption our approach is to improve the CPUutilization of physical nodes in a data center.

7. CONCLUSION

This paper underlines the energy consumed by the data center, traffic demands and individual job performance. The proposed approach optimizes the distribution of traffic patterns and reduce the energy usage in the data center by making efficient use of the resources(servers ,links ,switches) in the data center and also calculates the total power consumed by the server .For future , work on have various techniques called DVFS,DPM and DNS can be done which help in making data center more energy efficient. Various simulators(Greencloud , Cloud Sim)are available which provide DVFS and DPM techniques providing idle scenario for the data center practically which is costly to implemented.

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