Energy Consumption Survey on Cloud Environment

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Abstract: In today era, user wants to use internet facility pay-per-use. This facility is provided by cloud computing. So the use of cloud services has gain popularities bit by bit. Clouds provide facilities like n file sharing, file storage, backing up data. Cloud database Scalability, inflexibility, Reduced Administrative Burden. But the energy consumption is too much. There are different factors explain in the paper.

Keywords: Cloud data centers, energy consumption, Green cloud.

1. Introduction:

Cloud data centers are group of heterogeneous resources which are interconnected with each other (incorporate storage, networks, hosts and services), it provides on –request network access to number of resources [4][5][6].Cloud data centers(CDCs) include numbers(May be in thousands) of physical servers. The acclaim of the cloud is increased day by day due to the facilities provided like pay per use, security, fast access, reliability, and energy optimization.

As the use of cloud is increased that also increase the number of data centers. So energy consumption by different server will also increase. Energy is the most important factor of consideration in today era. This consumption of energy reduce the efficiency and produce heat and CO_2 that's the environmental issue [1].The main challenge is to reduce the energy consumption without effecting on the efficiency of the services as the computing application and data are increased, there are also required to increase to increase disk and server for the processing as fast as possible [3]. Different researchers perform research to perform energy efficiency. Such as enhancement of energy well-organized hardware, improvement of application algorithms, Dynamic Voltage and Frequency Scaling (DVFS), client, server and virtualization [2]. In cloud computing when execution is performed, some energy is consumed by virtual systems for execution. The computing that work on pruning of energy use is called *Green Cloud Computing*. The main focus of Green Cloud Computing is to rise Energy Efficiency over the computing device's lifecycle, decrease the use of hazardous materials, and boost the biodegradability or recyclability of materials.

2. Architecture for Energy Consumption:

Optimization, Monitoring and Reconfiguration is the main base for the architecture of our energy-saving mechanism. All states of cloud environments are spontaneous supervised. For the performance of the task Monitoring and Reconfiguration modules communicate with clouds. With Energy calculator Module, energy consumption is predicted without violating existing Service Level Agreement (SLA). SLA is the accord allying the customer and service provider so
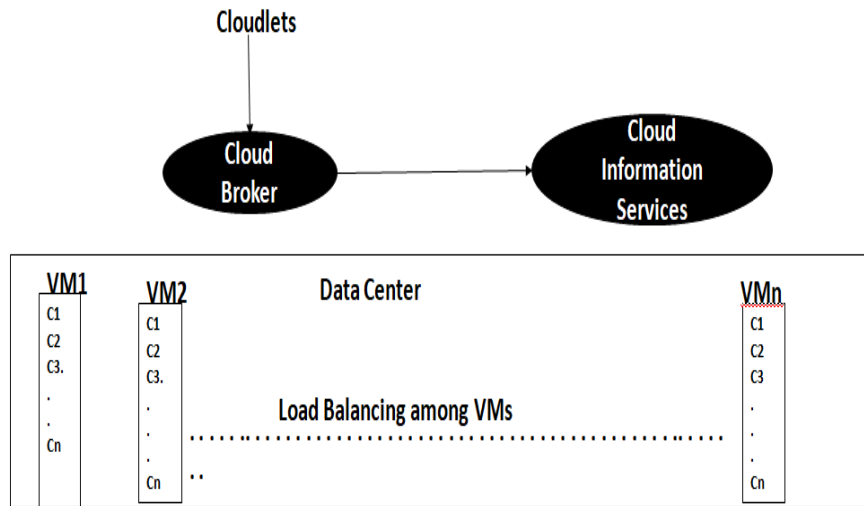
Fig: Data Centers with different Virtual Machine

that expectation of both service provider and service users are met at same level. SLA is documented between both parties.

3.   Energy consumed by Data Centers:

When data is transfer from one node to other node there is lots of production of energy. This energy produces heat that decreases the life time of the data centers and also very harmful for the environment. So Energy optimization has too much importance in today life. So it's the major issue of electronic industry. With energy optimization heat is reduced, life of the device is improved. Most of the time Virtual Machines (VM) are not fully engaged for the transformation of data. So the wastage of energy is too much in such cases. Such VM"S are lie torpid upto that time, with this energy optimized.

Power Usage Effectiveness (PUE) is acclimated predict the energy efficiency of data centers. The power used by IT equipment is the simple proportion of the total power entering data centers. Overhead load is a power used by support equipment that mainly contains power delivery, cooling systems, and other facilities like lighting. Hardware utilization can be improved via roll on computing loads beyond many users and time zones. Virtual servers on cloud are easy and cheaper to manage than physical server. The shifting of data over cloud provides more efficiency in terms of cost and time than physical server [3].

4. ANALYSIS FOR ENERGY CONSUMPTION:

According to Green Grid [8], two metrics are established to calculate the total energy used by data centers. The Benchmarks are Power Usage Effectiveness (PUE) and Data Centre Infrastructure Efficiency (DCiE) as given below:-

PUE=Total Facility Power / IT Equipment Power

DCiE=1/PUE= (IT Equipment Power/ Total Facility Power)*100

In cloud infrastructure a node consist of network topology, storage capacity, power supply unit, server with parallel processing unit. In cloud computing environment total energy consumption is defined as[7]:

$$Ecloud = ESwitch + ENode + EStorage + Eothers$$

Consumption of energy in cloud environment having n number of nodes and m number of switches elements are defined as:

$$ECloud = n(EMemory+ENIC+EDisk+ECPU)+ M(EChassis+ EPorts+ELinecards) + (EStorageConroller + EDiskArray) + EOthers [4].$$

5. Different Energy Reduction Techniques:

Green cloud computing is implement three different approaches. These are software approach, hardware approach and network approach These techniques are used for the depletion of energy consumption.

i.   Software approach used for Energy Reduction

a.   Depletion Server Consumed Energy:

There are number of servers attached on clouds. Sometimes the work can be handled by few of them. So by decreasing the number of active servers energy consumption can also be reduced. This can be performed by execute scheduling optimization, It is the main perspective of Green Cloud which are more well planned than hardware optimization [10] with reference to consumed resource, cost and scalability. Energy optimization techniques with the capability to adhere SLA are provided by network optimization technique.

b.   Depletion Memory Consumed Energy

Scheduling algorithms are evaluated by MPSim (Memory Power Simulator). For the measurement of the average elapsed time to schedule , the consumed energy and average waiting time of VMs is computed.

ii.   Hardware approach for Energy Reduction:

Other techniques used for the depletion used for energy reduction make use of tensile hardware that range the server computing capability with the help of controlling the voltage and frequencies in the server that influence the energy expenditure., In Green Clouds, special hardware are used for such purpose which are costly and have scalability problem.

iii.   Network approach for Energy Reduction:

Datacenter is used energy for the communication between virtual machine [9]. Energy consumption is controlled with the depletion of network traffic between the servers. DENS (Datacenter Energy-efficient Network-aware Scheduling has main focus to reduce energy consumption, this is done by amend balance between traffic pattern distribution and task consolidation.

6. Conclusion:

As the use of cloud computing increased day by day. With its growth the use of data centers also increased. The energy produced by these centers also increased that cause side effect on environment and also reduce the life of the devices. Green computing produce friendly environment. It optimize the energy efficiency. Green computing use three different approaches and each optimize energy consumption with their own way.

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