A Survey on maximize resource utilization and Minimized power Consumption and carbon emission in Cloud Using Green Computing

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ABSTRACT

In recent years energy consumed and heat produced by computers are so high which creates more harmful problems in environment. To reduce this, industries and organizations are concentrating more on Green Computing. It is the technology which makes us to know how to utilize computers an efficient manner and how to save the environment. In this paper, we analysehow the resource utilization is maximized and power consumption and carbon emission is minimized. Green computing can facilitate us to safe, secure place and healthy environment all over in the world. This paper will help us to take some initiatives currently under in the field of computers/electronics industry and new ways to save vast amounts of energy which is wasted in very large scale.

Keywords: -Cloud Computing, Green Computing, resource utilization, power consumption, Environment, Energy, Power, Local Cooling.

I. INTRODUCTION

Cloud Computing is an appearing paradigm in the latest computer industry where the computing is moved to a cloud of computers. Cloud Computing is appraised as one of the transpiring arena which incorporates technologies, concepts and generates a platform for IT framework and cost-effective business applications. Some of the main benefits of cloud computing are: elasticity, self-service provisioning and pay per use. Green computing concept is to improve environmental condition. Green computing can facilitate us to safe, secure place and healthy environment all over in the world. This paper will help us to take some initiatives currently under in the field of computers/electronics industry and new ways to save vast amounts of energy which is wasted in very large scale. The green computing technologies can reduce energy consumption. The temperature of global world is increasing very quickly. The energy consumption may be reduced by introduction of green computing. The data centres use a large amount of power/energy and release a lot of amount of heat and gases. In our daily life we use AC's. Refrigerators, inverters, UPS and computers. These items take a large amount of energy and evolve heat and gases. These gases are very harmful our lives. It has been seen that AC and refrigerators release CFC type gases. It causes lungs type diseases like cancers, asthma. The large amount of heat destroys greenhouses gases like CO2 which create global warming. A large amount of heat creates floods, melting of glaciers, drought and increase the temperature of the earth. Many companies are trying to resolve

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these problems. Companies are trying to establish such devices which can take low consumption of energy and release low amount of heat.[1]

Cloud computing system is made of three components that are clients, datacenter and distributed servers

1) Client: End users communicate with the clouds to direct information associated to the cloud. Clients mainly categories in three:

2)Data centre: Data centre is collection of servers hosting various applications. End user connects to the datacenter to subscribe various applications.

3) Distributed Servers: Distributed servers are those which actively check the services of their hosts. Distributed servers are a part of a cloud which present throughout the internet hosting various applications.

Deployment Models

Public Cloud

The resources of public cloud are being obtainable to the public by the provider itself. Public clouds are those which are mainly stand-alone clouds and are present off premises and run by third party organizations.

Private Cloud

Resources those are only obtainable for limited group of customers. This cloud infrastructure executes in the organization's physical data center or it might be third party co-location. It is formed generally to provide internal services to an organization. Private clouds are formulated and organized by an IT segment within an organization.

Hybrid Cloud

Hybrid cloud may be described as a cloud which incorporates of both private and public cloud. It may considered as private cloud for carrying out day to day operations and it may be considered as the public cloud when need to scale out.

Community Cloud

The cloud infrastructure is shared by several organizations and supports a specific community that has shared concerns. It can be organized by the organizations or a third party and may exist on premise or off premise.

Cloud Service Models

Software as a Service -SaaS is a model where applications are managed by a vendor or service provider and build obtainable to clients across a network, typically the Internet.

Platform as a Service -The service delivery model allows the client to rent virtualized servers and associated services for running prevailing applications or developing and testing new ones.

Infrastructure as a Service -IaaS is a model in where an organization outsources the equipment used to support operations, including storage, servers and hardware and networking components.

Green Cloud Computing

Green computing is also known as green IT. It is the process of using computer and other resources in an environment efficient way. Recent computer systems are the combination of people, hardware, software and networks, etc.,[1] which produce more hazards to environment. Green is used to reduce power consumption and increases energy efficiency. Computer / Laptop sale is increasing day by day so power consumed by them is too

large. By reducing energy consumption, global warming can be reduced. Green Computing tries to provide solution to various environment related issues and provides an alternative technology. Nowadays more research works are going in this area to reduce the harmful impact to save the environment. Government has also made various steps to reduce environmental problems because of Computers. In this paper we compared various power options in Laptops and Desktops with the help of the software Local Cooling and provided better practices to be followed which reduces power consumption Green computing is an art in which efficient utilization of computing resources is advocated. The main goal of green computing is to promote the utilization of eco cordial products which are facilely recycled and reused. It is not only confined to research studies but withal to be adopted by organizations depending largely upon IT products. The goals are analogous to green chemistry; reducing the utilization of harmful materials, maximizing energy efficiency during the product's lifetime. The IT function of business is motivating an exponential increase in demand for energy, and, along with it, it is bearing the related cost increases.

II.LITERATURE SURVEY

YuyangPenget. al (2016) has proposed anevaluation energy efficient virtual machine allocation and genetic based algorithm based meta heuristic which support a power aware VM request allocation of multiple sustainable cloud data centers. This approach provides a novel metrics which diagnoses the efficiency of power of each cloud datacenters.

HuiguiRonget. al (2016) has reviewed the progress of energy-saving technologies in high-performance computing, energy conservation technologies for computer room and renewable energy applications during the construction and operation of data centers. From multiple perspectives of energy consumption and environment protection, a comprehensive set of strategies are proposed to maximize data centers efficiency and minimize the environment an impact. This research also provides energy-saving trends for data centers in the future.

FahimehFarahnakianet. al (2015)has investigated the effectiveness of VM and host resource utilization predictions in the VM consolidation task using real workload traces. The experimental results show that the approach provides substantial improvement over other heuristic algorithms in reducing energy consumption, number of VM migrations and number of SLA violations.

Maurizio Giacobbeet. al (2015)has applied a new strategy to reduce the carbon dioxide emissions in federated Cloud ecosystems. More specifically, they have discussed a solution that allows providers to determine the best green destination where virtual machines should be migrated in order to reduce the carbon dioxide emissions of the whole federated environment.

MoonaYakhchiet. al (2015) has presented an approach based on Cuckoo Optimization Algorithm (COA) to detect over-utilized hosts. They have employed The Minimum Migration Time (MMT) policy to migrate Virtual Machines (VMs) from the over-utilized hosts to the under-utilized hosts. The results generated by Cloud sim

simulator, demonstrated that the proposed approach has lowest energy consumption compared to the other famous algorithms.

ChenxiQiuet. al (2015) has stated the functioning of CSB (Cloud Service Brokerage) as an intermediary between tenants and cloud providers that can bring about great benefits to the cloud market. CSBs buy the cloud resources, i.e., servers, with lower prices from cloud providers and sell the resources to the tenants with higher prices. To maximize its own profit, a CSB may distribute tenants' requests to the clouds that waste energy resources.

Yibin Liet. al (2015) has proposed a novel Energy-aware Dynamic Task Scheduling (EDTS) algorithm based on DVS (Dynamic Voltage Scaling) to minimize the total energy consumption for smart phones, while satisfying stringent time constraints and the probability constraint for applications.

YunNi Xiaet. al (2015) has presented a novelstochastic framework for energy efficiency and performance analysis of DVS-enabled cloud. This framework uses virtual machinerequest arrival rate, failure rate, repair rate, and service rate of datacenter servers as model inputs.

Mahesh b. Nagpureet. al (2015) has proposed dynamic resource allocation system which allocated resources to cloud user. The skewness algorithm measure uneven utilization of multiple resources of each VMs and accordingly balances across VMs.

III.MAIN PROBLEM AND ISSUES

Today the main issue is that the manufactures are preparing such devices which are however more efficient and accurate but they use more energy and evolve very toxics, dangerous gases and chemicals. Many electronics companies especially in computer use lead, mercury, cadmium and other toxics chemicals. It has been calculated that during manufacturing of computers can 4 to 8 pounds of lead alone. According to a new research it is estimated that computers and other electronics devices make up two-fifth of all lead in land-fills on the earth. Due to this reason pollution is increasing very rapidly. Data center servers use 50 times more the energy per square foot as in office. Data centers are the main energy consumption sources. In a survey in America energy consumed by data center in USA and all over the world will be doubled in next few years.Green Computing can help us to secure and safe place for us in the world. If each person try to safe the environment then our mother earth will healthy and happy for survival. Here are given some benefits of green computing, It helps us to reduce the amount of pollution in air or surrounding. It saves the power consumption and decreases the amount of heat which evolved the products.

IV.GREEN COMPUTING ECO FRIENDLY

It was realized that the conventional computers take much energy and produce heat. So the manufacturer of the computer designed laptop, desktop and note book type computers. The main aim of the manufacturer is to reduce the e-waste in the environment. In these computers hazardous material such as PVC's Brominated flame-

retardants and heavy metals such as Cadmium, Mercury and Lead are not used like commonly used computers. In laptop computers and other electronics industry Lead-Tin solder is used. It has some qualities i.e. ideal shock absorber. Now its replacement is being taken the alloy of the Tin/Copper/ Silver. Some precautions may be taken to make future computers more eco friendly.[4]

□ Computer Company manufactures such parts of computers which use low energy consumption.

□ Petroleum filled plastic may be replaced by Bioplastic (plant based polymers) which require less oil and energy. Bioplastic materials made computer are more secure and cool.

□ E-waste is also a big problem; it can be controlled by avoiding discarding the computer. Replacement and upgrading their devices is also helpful. In this way we can save energy, pollution and materials for dumping.

□ Traditional monitors are also power sucking displays. These monitors can be replaced with green light display made of OLED or Organic light emitting diodes or LCD or Liquid crystal display.

□ Lead is a toxic material, (it is expensive and time consuming) which is used in computer may be replaced by silver and copper making devices of computers.

□ Use smaller monitor/LCD- a 14-inch display uses 40 percent less energy than a 17-inch one.

 \Box Remote control is used on/off the products. During off in remote control. The product is still consuming energy. So it is advised to plug off the switch.

V.CARBON FREE COMPUTING

It has been estimated that the concentration of CO2 is increasing day to day very quickly. The other gases which affect the greenhouse are methane (CH4), nitrous oxide (NO2) and fluorocarbons (CCl4). These gases are able to increase the temperature of the earth, which causes to lead the drought and floods and rising the sea level. These also affect the life on earth. In 1997 Kyoto in USA tried to reduce the emission of CO2 from electronic devices and other devices. These devices are manufactured in such way that they take less energy.

VI.DATA CENTERS

In data centers many devices are used which are servers, laptops, desktops, printers, wireless APs, fax machines, routers, switches and other electronics devices. These all devices emit heat and CO2. Here we see only two devices laptop and desktop. It has been estimated that desktop computer take 100 watts and laptop take only 17 watt. The ratio is about 6:1. It is estimated that data centers use a large amount of energy and emit a very huge amount of heat. It is shown in the given below table in which different peripheral are attached with one another



In recent years energy consumed and heat produced by computers are so high which creates more harmful problems in environment. To reduce this, industries and organizations are concentrating more on Green Computing. It is the technology which makes us to know how to utilize computers and computer related resources in an efficient manner and to save environment. In this paper, we analyze the power consumed by various hardware parts in the computer with different configuration and based on this, we ten to provide a solution for less power consumption. The analysis is prepared with the help of the software "*Local Cooling*"

General	My Power	Advanced	My Account	General	My Power	Advanced	My Account
Sel	ect your pov	wer save mo	de:	_		-	
Low O	Medium	High O	Custom	Mon 17-1	itor: 9" Screen @ :	.366*768	36 Watt
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VII.POWER CONSUMPTION IN CLOUD COMPUTING

Modern data centers, operating under the Cloud computing model, are hosting a various applications ranging from those that run for a few seconds to those that run for longer periods of time. Cloud Data Centers consume excessive amount of energy. It is accountable for global increase in energy consumption, and energy cost

additionally as a proportion of IT costs. Now days the incipient software which are being used are devouring more and more power per year. Some of them require virtually steady access to the hard drive which drains power more rapidly than precedent software did.

VIII.POWER AND ENERGY MANAGEMENT FOR SERVER SYSTEM

Power and energy consumption are key concerns for data centers. These centers abode thousands of server and support infrastructures for cooling as well. Researchers have now made resultant tread in making their effort to conserve energy in servers because they have been given these benefits, By calculating the greatest power utilizing HP's power calculator the power consumption for each server can be found. Then we can follow the convention which average power usage either for midrange or for high-end servers which is around 66% of the utmost potency. Hard disk arrays comprise fortifying the functions like cache recollections, disk array controllers, disk enclosures and redundant power supplies. When we verbalize about cloud computing data centers the storage spaces which have in the data center is consolidated and hard disk utilization is centrally harmonized. Multiple numbers of users can share a single server through server virtualization, which ultimately increases resource utilization and in turn reduces the total number of server's desideratum. Users do not need to aware the operations being performed by other users and can facilely utilize the server cerebrating themselves to be the only utilize on that server. Wherein some servers enter into a sleep mode, when they are not in demand, which ultimately reduces energy consumption.

Workload diversification: Since many diverse users will avail themselves of different resources which are there on cloud – different applications and different usage volumes different feature preferences set – this will get better hardware use and consequently make worthy usage of power that is used to keep a server up and running.

Power-management flexibility: Virtual servers are not difficult to manage though physical servers are if we think from a power perspective. The load can automatically be deployed somewhere else if hardware failure occurs. Likewise theoretically all virtual loads could be relocated to certain servers when they are under loaded or power-down and idle.

Usage of solar PV array: Solar Photovoltaic (PV) is a process that transforms sunlight into electricity. Solar PV modules can be merge together as parallel connected modules and an array of series to facilitate any level of power requirements from watts to kilowatt and megawatt size.

Green use: This approach is used to minimize electric consumption in computers and other peripheral devices and using them in eco-friendly manner. It is the recycling of unwanted electronic materials. To design energy efficient computers, servers, printers and other peripheral devices. The wastage that comes out from electronic devices should be minimized so as to decrease the impact on environment.

MINIMIZING ENERGY SOURCE BY USING GREEN COMPUTING TECHNIQUES

To minimize electricity usage in computers is necessary and can be improved in the following manner: • Buy energy efficient computers.

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• Buy appropriate hardware for the job for example a 19-inch monitor uses more power than 17-inch monitor and also the usage of hardware that is prepared from harmful materials should be reduced.

• Solar computers may be used as a new source of energy which is the natural source available and can be involved in computers to make green computing successful.

• The efficient power management should be used to increase the life-span of the product.

IX.MINIMIZING COMPUTING POWER

1.In parallel computing we need to utilize processing power of each parallel computer otherwise it will result in loss of energy.

2. Applications should make connection to the network only when required otherwise if connection is maintained unnecessarily for large amount of time without communication, it will lead to loss of energy.

3. Various virtualization models have been developed based on architecture design and the number of maturity levels achieved are as follows [9].

4.Design of software should be optimum. Computers should not be indulged in doing unnecessary processing. However, algorithms should be designed to fully optimize the processing time. Load balancing also plays an important role here [11].

5.Cooling: Huge amount of energy is consumed in data centers and it can be reduced. At the initial stage, it was reduced by using mechanical refrigerator. It supplied chilled water to the IT equipment's. Now pre cooling also known as free cooling is used. The use of mechanical cooling is minimized by free cooling. For instance, the data- Centre's of Facebook are in Sweden which has dry and cold. Microsoft kept their servers in open air in order to cool the servers. River water is used by Google to cool their data Centre [2].

6.Shut down your computer when not in use for large amount of time.

7.Print smarter! Take print out only when required. Complete the transaction via e-documents that supports green computing. Keep printer switched off in idle state also print double sided.

8. Make efficient usage of server by adopting virtualization techniques.

9.Use monitor sleep mode, hard disk sleep mode, system standby mode or hibernate mode when your computer is in idle state.

10. Batteries should be disposed without polluting environment as it contains carbon mixture chemicals. Further upgrade the equipment's when necessary instead of replacing entirely computer system.

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