

A Novel Scheme of Computing : Green Cloud Computing

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ABSTRACT

Now a day's, internet plays a major role in a person's daily life. For that internet we need some remote servers to run. In cloud computing, the network of remote servers are used to deliver the host services to the user. The word Cloud Computing elucidates that using the remote servers in internet we can store, manage and process the data. The users of cloud computing are increasing day by day. So, to host the services efficiently the cloud service providers compelled to open more data centers. Due to this high pursuing of humans on cloud computing it leads to high energy consumption of data centers. This high energy consumption leads to increase in operational cost. It not only increased the operational cost but also it affects the environment by emission of the carbon gas. So, to make cloud computing as eco-friendly, we need some solutions for energy-efficient. Hence, this paper provides a better understanding and incentive on green computing. It also discusses the usage of compelling the green computing.

Keywords: Recycle, Reuse, Energy Efficiency, Power Management and Green Cloud.

I. INTRODUCTION

The word green in green cloud computing refers to the environment, the classical symbol of the cloud refers to the internet and the short name of the delivery model of the cloud computing is the cloud. The concept of green cloud computing refers to green technologies. Too much energy consumption leads to over emission of the greenhouse gases, and one of the main problem at present day is to depletion of fossil energy to sustain the civilization. And these greenhouse gases are the root cause of the global warming, so, therefore, it is essential to mankind to achieve green technologies that can reduce the energy consumption.

The main goal of the green technologies is to manufacture or usage of technology which will not affect the environment. Information and Communication Technologies (ICT) industry generates about 2% of the total global CO₂ emissions, which is equal to the aviation industry as given by [1]. So that IT companies realized that using green technologies will not only save the environment but also decreases the cost of the system.

II. GREEN COMPUTING OVERVIEW

A. Do you want to know about Green Technology? So, Here, it is

As we know now a day's there was a lot of pollution, an in addition to it heat produced through our gadgets. Which leads to demolishment of the environment. For the prevention of this demolishment green technology is introduced to safeguard the environment from getting demolished.

B. Green computing which provides the following standards:

- ✓ Which reduces the environment from getting worse.
- ✓ The utilization of renewables will be increased.
- ✓ The energy of natural resources will be stored and used for further use i.e.; called recycling.

C. Advantages of green cloud computing:

The core green computing technologies are: Virtualization, Green Data Centres, Green Cloud Computing, Power Optimization and Grid

Computing [2]. The benefits of usage of these technologies are: -

1. During peak hours, it reduces the energy consumption of the computing resources.
2. It uses environment friendly resources of energy.
3. Computing wastes will be reduced.
4. Harmful effects of the computing resources will be reduced.
5. It saves the energy when not in use.

It can also be done by manufacturing and disposing of computer devices which will not affect the environment.

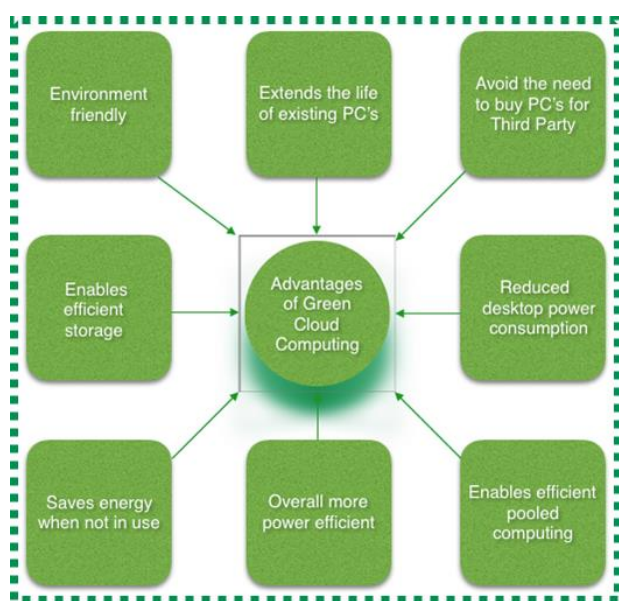


Figure 1. Pros of Green Cloud Computing

The above all are the advantages of the green cloud computing. As we all know that if light exists then dark also exists. So, advantages of the green cloud computing exist then disadvantages of green cloud computing also exists.

D. Disadvantages of green cloud computing:

- ✓ If there is a rapid change in technology, then it affects the usage green cloud computing.
- ✓ As we talk about cost the green cloud computing could be quite costly.
- ✓ If we don't know any alternative raw material inputs, then it would be tough to implement green cloud computing.

- ✓ It can be difficult when we don't have sufficient information about that source.

The advantages of Green Cloud Computing is more than these disadvantages. so these are basically negligible.

E. Recycling:

The word recycle itself defines that reusing the old product without wasting it or burying it.

Cloud computing needs very harmful and powerful materials for storing and managing the data. These products can't be used for recycling or reused further. So, if we change these type of materials with efficient and recyclable materials/products it would be very safety for the environment.

Recycling is not an easy part we need to reduce the consumption of natural resources, and reuse the old products rather than buying the new product. Because, it plays a very important role in protecting the environment. Recycle can be occurred in two places one at manufacturing the product and the other at waste formation of that product.

F. Reuse:

The word Reuse itself defines that using the same product more than once. As we all know now a day's production of materials is increased due to increase in population needs. We should use the product as long as it meets its requirements. For example, if we are using a desktop we should use that desktop till its requirements meets our needs it is better using the old desktop rather than buying the new desktop and using it. It will decrease a lot of pollution in the environment. So, by reusing the old product we can achieve green cloud computing.

These fields/concepts of recycling and reusing in green cloud computing plays a major role in protecting the environment. It will be very helpful to us if we cooperate with these recycling and reusing of the products.

III. EVOLUTION OF CLOUD COMPUTING

Back in 1980's the business data were stored and processed in paper documents. As the business were growing it became difficult to manage with the data storage and manual processing. When the computers were admitted then the data storage and processing were becoming very efficient. This mark the beginning of digital era. With the power and speed of the computers business started growing even more faster. This led to the racks of computers, virtualization, data warehousing. This worked for a few years but after that organization started facing some problems like handling the complexity of entire IT infrastructure. Also the full setup has become expensive therefore, in the year 2005 the concept of the cloud computing started gaining popularity. Everyone and everything started moving into cloud. As per the market insight report largest organizations and vendors are adapting the cloud computing policies by 2019. The first policy of the cloud computing that every enterprise should follow is that they are require to consider the cloud option first when they are implementing any software deployment. The projected cloud computing market size by 2019 would be 150 billion us dollars. The top free cloud leaders are:

Amazon web services, Microsoft Azure, Google cloud platform. Here, AWS is having the big market covering over 35-40 % of overall market. This became a very big demand in India. In a few years all the work done in internet will be through the cloud computing only. In future cloud computing plays a major role in the internet.

As computing technology became smaller, cheaper and more accessible to more businesses and consumers, computing power began to decentralize itself [3]. The main reason for the evolution of the cloud computing is that evolution of pc-based software's to internet based applications. So, we have to manufacture the products with the help of cloud

computing so, that it will be efficient to use and less costly.

IV. FEATURES OF GREEN CLOUD COMPUTING

Cloud computing has become a key to environment concern thinking about the carbon emission and energy consumption. So, for that a key concept came into execution i.e.; green cloud computing, which enabled the cloud computing to lower the energy consumption and carbon emission from ITC.

There are two key features that enabled green cloud computing in cloud computing:

1. Datacenter Efficiency
2. Dynamic Equipping

Data Efficiency: The cloud computing energy usage mainly depends on the datacenters. Because, the datacenters consume more power. To get rid of the problem we have to use most energy efficient technologies.

Then, these technologies came into existence which reduces the energy consumption and provides high internet speed for datacenters to transfer the multiple data from one datacenter to the other datacenter. This Data efficiency provides an eco-friendly relationship between nature and human. This feature of the green cloud computing which reduces the power consumption and carbon emission in the environment.

Dynamic Equipping: In olden days i.e., when cloud computing didn't come into existence. Then the IT companies used to manufacture more products than needed so they end up by manufacturing the more infrastructure. So, it became very difficult to predict the requirement. But, when the cloud computing came into existence then these problems were gone because, cloud computing uses virtual machines where these virtual machines can be live migrated with other host if in case the user needs more resources. It, provides a monitor which will predict the number of resources needed by the user. If

suppose the user needs less resources, then it will be remaining on the same server and doesn't use the extra resources. The datacenter will always maintain the active server and uses it according to the user demand, which leads to low energy consumption. This feature of the green cloud computing which uses low energy than the conservative approach.

V. RELATED WORK

Truong Duy et.al [5], presented a "Green Scheduling Algorithm" in combination with neural network based predictor to save energy in cloud computing. It makes prediction to turn servers on/off depending on the pre-collected data. Hence, depending on the prediction of load demand, it minimizes the number of servers running.

Fumiko Satoh, [6], developed an "Energy Management System" for future energy management using "sensor management function with an optimized VM allocation tool", the results show that this will help in reduction of energy consumption up to 30% in multiple data centers and reduction of energy in carbon emissions.

RasoulBeik, [7], for calculating energy consumption in data centers proposed an "energy aware layer in software -architecture", and also provides energy efficient services to user.

Rocha et.al [8], proposed a "Hybrid Optimization Model" for Green Cloud Computing, produces "non dominated solutions" that allow the cloud provider to select the better bargain in terms of energy consumption and Network Quality of Service. Another advantage of this strategy is best routes are provided to the network traffic via constraint-based routing techniques. These routes are energy efficient and maintain QoS.

Garg, Yeo and Buyya et al., [9], presented a "Carbon Aware Green Cloud Architecture", to improve the carbon

footprint of cloud computing. It consists of three elements Third Party: consist of two directories "Green Offer", for available green cloud services and "Carbon Emission", for energy efficiency of those services. User: "Green Broker" selecting the greenest cloud service provider. Provider: "Green Middleware" that provides the greenest or energy efficient service. Its components may vary according to SaaS, PaaS or IaaS.

D. Kliazovich et.al [10], presented their analysis in "Green Cloud: A Packet-level Simulator of Energy-aware Cloud Computing Data Centers" highlighted the steady increase in cost of cloud data centers maintenance due to the respective operations done in cloud. The study aims at identifying the need of optimum distribution of workload among the available servers and data centers to develop an energy consumption metric in terms of packet level. This allows for packet level communication and convenient synchronization of operations. The NS2 simulator, for green cloud; and "cloudism" for cloud only, are a few instances of packet level simulators employed to achieve the simulation, which is done at three levels, "two-tier, three-tier, and three-tier high-speed data center architectures".

VI. RESEARCH AREAS FOR GREEN CLOUD COMPUTING

It is forecasted that the environmental footprint from data centre's will get triple between 2002 and 2020, which is currently 7.8 billion tons of CO₂ per year [4].

In order to modify/develop the cloud computing into green cloud computing some of the areas

Should be focused such as:

- ✓ At present the cloud computing is providing the efficient time behaviour on the software but we know that now a day's we all uses that type of

software where it takes less time. so cloud computing should work more on time behaviour of the software's.

- ✓ Now a day's we need more data spaces to store our data so, cloud computing should work on data centre's so, that it will be very efficient to access our files. For these, data centre's we need more energy the main problem is here again more energy consumes more pollution releases. So, we should take precautions while installing new data centre's so that there will be no excess use of energy.
- ✓ It is the main responsibility of both manufacturer and user that making/using the new technology should not affect the environment and produces the harmful gases in the atmosphere.

VII. SUMMARY

In this paper, I have discussed and presented a brief introduction of cloud computing as well as green cloud computing that how cloud computing can be more environment friendly and how to use the available resources in a utilized manner. To make computing user friendly is a traditional thing. We are living in the era where technology should not harm the environment rather it should be more environment friendly. Here, the main concepts like Recycle and Reuse are also discussed, both are the core concepts whenever it comes to environment. Still, there are some problems which should be resolved to make the cloud computing as eco-friendly. The features of green cloud computing proves that it is more efficient and safe than the cloud computing for both human society and environment.

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