

A Proposed Model to Control the Environmental Pollution due to Carbon Emission from Cloud Data Center

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Abstract— Cloud computing provides all the basic level of computing facility to complete the daily needs of a general or public community. In this paper, we concerned about the topic of cloud computing and its environmental effects. Due to global warming and greenhouse effect temperature of the environment is increasing. For this reason, the temperature of the environment rises day by day and pollution of the environment of the whole world increase. The Carbon Monoxide and other greenhouse gas emission of cloud computing increase day by day due to the increase of consumer demand. Cloud computing is providing the basic facility of computing to general community but at the same time, it is playing the major role in increasing the temperature of the whole world due to Carbon Monoxide, carbon dioxide, and other greenhouse gas emission. In this paper, we concerned how to control the problem of carbon emission of cloud computing. We use solid sodium hydroxide at 130 °C and 6-8 bar pressure then this produce sodium format reaction with carbon monoxide and produce sodium carbonate reaction with carbon dioxide. In this way, we reduce the emission of carbon of cloud computing.

Keywords— Cloud Computing; Greenhouse gases; Environment Pollution; Carbon Footprints; greenhouse effect.

Introduction

Cloud computing is an emerging technology of computing rather it is becoming a future computing field. Cloud computing is helpful in services, moving data and computing away from portable, mobile, or desktop into the larger cloud data center or the environment. When information or data and services are a move toward a cloud data center then cloud data centers become over-sized. Then such types of data centers will require massive power, more space, expert human and foolproof air-conditioning system, resources also other infrastructures to meet the requirements. The main advantage of cloud computing is that consumers or users have not to pay for infrastructure, expert manpower is responsible to handle such type of infrastructure and maintenance. Also, there is no need of installation for the customer or user but there are some problems regarding cloud data centers like security-related

issues, high deployment and operational cost, energy consumption, greenhouse gas emission carbon footprint, and pollution of the Environment. But in this paper, we are only addressing the problem of the environmental effect of cloud computing.

Cloud computing, is an emerging technology also raises important questions about its environmental sustainability. Through the use of large shared virtualized data center of Cloud computing can attempt large energy savings. However, Cloud services can also increase Internet traffic. Thus, this paper discusses the environmental sustainability of Cloud computing by analyzing various mechanism and technologies to reach the goal. Our analysis is significant for the organization that is looking at Cloud computing as a solution for their, infrastructural, administrative and management problems. That will require a huge amount of energy for an operation which is becoming the main source of environmental pollution with the emission of carbon monoxide gas or CO₂.

In Section II, discussed the related work and Section III is about the proposed work and how to control the greenhouse gas in the cloud data center with the architecture. Simulation result and equation are discussed in Section IV. In Section V is all about the conclusion and future work.

I Related Works

In Cloud computing, the user data reaches a data center through many devices. In general, the user computer is connected to the Ethernet switch of user ISP where traffic is aggregated. Public Cloud is estimated to consume about switching in comparison to 0.46J/b and 2.7 J/b in transmission for a private Cloud. By using typical network energy consumption can increase three to four times more in public Cloud storage than one's own storage infrastructure in cloud computing. Energy consumptions are taken in the form of transmission, switching, data storage & data processing for cloud computing. Energy consumption for transportation and switching contribute a significant percentage of total energy consumption in case of the cloud computing environment. Also, we say that cloud computing is not a hundred percent greenest computing technology [1].

For controlling virtual machine a new power based scheduling algorithm [2] is being used for the optimal utilization of the virtual machine with minimum power consumption, also management of virtual machine being performed with the help of virtual machine migration, designing & dynamic shutdown according to the requirement, with the use of specified model energy can be saved to the maximum extent, also the operational cost can be reduced of cloud computing to a large extent.

The architectural principles for cloud data center, and scheduling algorithm and resource allocation policies and open research challenges, considering Quality Of Service (QoS) and power consumption algorithms regarding and resource allocation of dynamic consolidation for virtual machine give good results as compare to associated methods are being used to reduce the cost of software engineering and techniques using static resource allocation cloud middleware [3].

The green management is being helpful to reduce environmental pollution. Global warming, environmental pollution, destruction of ecological resource and climate change are badly affecting the human health, lifestyle, and quality. These things are threatening the human living standards. The 6R Principle which is being an alarming condition for human life. The 6R principle includes reuse, research reduces, rescue, recycle and revive, which should be adopted to reduce carbon emission & save energy in the cloud data center. In cloud computing, some measures should be taken for saving energy for the environment and reduce carbon emission [4].

Energy consumption, emission of greenhouse gas, carbon footprints have been reducing using some extent using different software techniques. Among the other techniques visualization is an important technique which is playing the major role to reduce the problem of the environmental effect of cloud computing [5].

Global change is in its environmental dignity using power generation. The present study is to concentrate on the greenhouse effect on the environment, the greenhouse gases and their impacts [6].

Nowadays Smart Greenhouse android app also uses which observe and managing the microclimatic environment inside a Greenhouse. From the greenhouse easily get soil moisture, temperature and humidity sensor value to android app, according to sensors values and we set predefined threshold values for each sensor, depending on sensor readings we are going to control using water sprayer, cooling fan, rooftop and focus light and just press the button in android app we can make on/off motors and it also has data sheet of all horticulture plantation and season wise precaution material for monitoring and controlling [7].

Energy preserving self-adaptive Commodity Green Cloud storage is known as Lightning. The Lightning file system divide the storage servers into hot logical zones and Cold using data classification [8].

The greenhouse is built using different material like plastic and glass. The infrared radioactive cooling effect is not

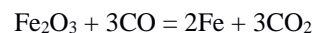
negligibly small and may have an economic presumption in a heated greenhouse [10]. Greenhouse gas emissions from different sources and other farming systems and nitrogen (N) and carbon (C) fluxes in the system soil-plant-animal-environment [11].

II Proposed Work

Due to establishment of more cloud data center the greenhouse gas emission increase rapidly. In this paper some problems like the emission of greenhouse gas mainly carbon monoxide, carbon footprints have been addressed and try to reduce these problems using some extended techniques.

When the carbon monoxide reduce from cloud data center then we use solid sodium hydroxide at 6-8 bar pressure and 130 °C this solid sodium hydroxide do reaction with carbon monoxide and produce sodium formate which is not harmful to the environment also when the carbon dioxide emission from the cloud data center then this carbon dioxide do reaction with sodium hydroxide and produce sodium carbonate which is also not harmful to the environment. Actually, we don't know when which gas will be emission in this new model we use solid sodium hydroxide at 6-8 bar pressure and 130 °C at the end of the data center and this will be contained into a chamber all the gas from cloud datacenter enter into this chamber. Carbon monoxide and carbon dioxide are more harmful to the environment so we try to reduce the emission of those gases so among those gas when carbon monoxide come this automatically convert into the sodium formate after the reaction with solid sodium hydroxide and when carbon dioxide comes from cloud data center then this automatically convert into the sodium carbonate after the reaction with solid sodium hydroxide which is store into chamber from before both are not harmful to the environment. In this way, we try to reduce the carbon monoxide and carbon dioxide emission from the cloud data center.

For reducing carbon monoxide we also use Fe₂O₃ into the chamber but problem is that Fe₂O₃ do a reaction with CO but after the reaction, it produces carbon dioxide which also harmful for the environment although we reduce the carbon monoxide emission but carbon dioxide emission increase.



In this paper, we proposed we use solid sodium hydroxide at 130 °C and 6-8 bar pressure which reacts with carbon monoxide as well as carbon dioxide. By using sodium hydroxide we can reduce the emission of carbon monoxide as well as carbon dioxide.

III Simulation and Equation

Carbon monoxide under pressure in solid sodium hydroxide at 6-8 bar pressure and 130 °C produce sodium formate.



Also, carbon dioxide comes from cloud data center then this automatically converts into the sodium carbonate after the reaction with solid sodium hydroxide.

$2\text{NaOH} + \text{CO}_2 \rightarrow \text{Na}_2\text{CO}_3 + \text{H}_2\text{O}$ (Sodium Hydroxide + Carbon Dioxide = Sodium carbonate + water)

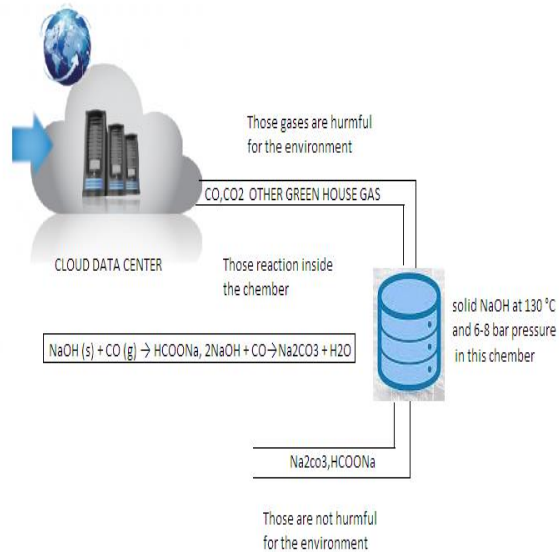


Fig 1:
Basic Block Diagram of our proposed model

V Conclusion and Future Works

Nowadays one of the most challenging problems is environment pollution due to greenhouse effect or greenhouse gas emission. There are reports on Green IT analysis of Clouds and data centers that show that Cloud computing is “Green”, while others show that it will lead to an alarming increase in Carbon emission.

In this paper some problems like the emission of greenhouse gas, carbon footprints have been addressed and try to reduce carbon emission from the cloud data center using some extent model of cloud computing. We proposed a model to reduce the problem of the environmental effect of cloud computing. By using this model cloud computing may be claimed as green and can control environmental pollution due to the cloud data center.

In the future, we try to reduce the other greenhouse gas like nitrogen (N) from cloud data center using some different technique and also we try to reduce the heat consumption of the cloud data center. Because of the heating problem one of the major problem of cloud computing.

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