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RECENT TRENDS IN GREEN CLOUD COMPUTING

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Abstract - *The complicated task of organizations is to set up an infrastructure from scratch to store the terabytes of data. So, now-a-days the business is upgrading to store their valuable information in cloud that is with third party service provider. But, the data centers will make use of 'n' number of servers to store the data. Thereby, it requires very high power consumption and have an impact over environment and emits lots of carbon-di-oxide to nature. To overcome this type of issues green computing technology is used and it is eco-friendly. Green computing is the study and practice of environmentally maintainable computing. Most of the companies is reducing their harmful effects over the nature. Data centers are utilizing energy for cooling the server systems and for unwanted resources. This has to be avoided. This paper presents the major solutions for the problem by using virtualization and docker.*

Key Words: Green computing, Virtualization, docker.

1. INTRODUCTION

To reduce the impact on environment due to the operations performed by companies the technology green computing is used. It is eco-friendly because the emission of carbon-di-oxide in nature is reduced by using this technology. Green computing is an attractive topic now-a-days and used in numerous business because of its cost effectiveness and the lifespan of IT products is also increased. The efficiency in utilization of IT equipment such as servers, CPU is improved by lowering the power consumption. Five core technologies proposed for green computing they are cloud computing, grid computing, virtualization, Green data center and power optimization. Most of the energy is consumed and wasted at data centers due to the maintenance of unwanted resources and cooling infrastructure. Cooling systems it consume 45% of energy for cooling up the servers. Since, there is an increase in a greenhouse gases effect on environment brings a changes such as rise in temperature level in oceans and air. The rise in temperature has an adverse effect on melting the snow and thus results in rise in sea-level. At the same time, the consumption of power by data centers to run and cool up the server is also increased. So, companies are emerging with a new technology such as green computing which is eco-friendly. A new user wants to make use of cloud computing technology may require browser, good internet connection, personal computer. Two advantages of using cloud computing by companies that is to maximize their business profit and minimize their cost investment for purchasing hardware equipment's and developing the infrastructure from scratch. Such business who are investing to store in cloud need not to have a physical space to store their valuable information but pay for the space provided by service provider. The performance is maximized in servers. This system boot up fast because few programs load into memory. There are three different models used in cloud computing such as IaaS (Infrastructure as a service), PaaS (Platform as a service), and SaaS (Software as a service). Virtualization is made used to reduce the energy consumption by servers in data centres.

2. RELATED WORK

Green computing is used in various fields such as recycling of E-waste, consumption of energy, IT products, Virtualization given by Soomro [2]. There exist so many number of techniques to make use of cloud efficiently said by Usvuv et al [1]. Han et al [4] proposes an algorithm known as a resource utilization aware energy saving server consolidation (RUAEE). The resources that are stored in cloud by companies should be efficiently utilized. This can be done by using RUAEE algorithm. So that number of servers required is reduced and there by power consumption is also decreased. Green cloud computing uses various number of practices and Farooqi et al [6] made a comparison of results among the practices. Energy consumption is increased in data centers due to the bulk data received by companies is also rising day to day because there is a rise in number of users using the internet via social media such as Facebook, twitter said by Asad et al [5]. Green task scheduling (GTS) algorithm is a scheduling algorithm proposed by Sofia et al [7] to reduce the usage of resources of cloud. Biswajit have made analysis about various issues related to green computing like the relation between the environment and information technology. Data centers faces a basic problem such as setting up a cooling infrastructure for servers. In earlier days, Refrigerator were used to supply the cold water for producing cooling effect for IT equipment's. Now-a-days pre cooling techniques are used to minimize the use of refrigerator cooling techniques. Google has set up its data center near river to supply river water to cool data center. Whereas the servers are kept in open space by Microsoft.

3. VIRTUALIZATION

The recent trends in using green computing is virtualization. Hypervisor is one of the layer of abstraction present over the hardware of computer. Hypervisor is a software program that allows various number of operating systems to run on a single machine which focus on logical view rather than a physical view. Virtualization is applied to computing devices such as processor, primary memory, and external storage. There are two techniques used in virtualization such as

server and desktop virtualization. There is an advancement in server virtualization but desktop virtualization is still evolving field.

3.1 SERVER VIRTUALIZATION

Since the data increasing day by day the number of servers required for data storage also increases, thus it requires high power consumption. Server visualization focuses on reduction of usage of server and maximizing their performance. 70% of energy depletion is reduced by using server virtualization. If the number of server utilized is reduced then cooling infrastructure setup is also minimized. One of the important benefit of using this technique is load balancing. Load balancing is required to distribute load among the servers used in data centres. There is a reduction of the backup servers from 3 to 1. Nowadays only one backup server is used to store backup information of all servers.

Example: Consider a company which has set up a data centre with 4000 server, the power consumption in this situation is increased and a small companies with lesser budget cannot maintain it because 45% of energy is consumed by cooling infrastructure. So server virtualization is used to reduce the number of server to 1/3. Thus there is a reduction of computing and maintenance cost. To increase their profits companies are virtualizing 80% of servers.

3.2 DESKTOP VIRTUALIZATION:

This virtualization has already created its mark in IT sector even though it is still in evolving stage. It has similar advantage of server virtualization such as reduction in energy and power requirement. All the desktop works as server in data centres and consumption are performed in the desktop and it is quite different from normal computing. Even though there are various uses of Using virtualization it has got some disadvantages such as cost of setting up of an infrastructure.

4. DOCKER

The distributed applications are processed by using new technology, such as docker. One of the component used in Docker is Docker Hub. There are three stages in docker such as building part, distribution part and running part. Docker images knob the building part, Docker register will handle the distribution part and running part is handled by Containers. Docker is widely used compared to virtualization because of its cost effectiveness, low CPU and memory requirement and it is fast. Docker is efficient since containers handle the running part and this can share the resources. The disadvantages of using Docker is issues regarding the security isolation. It is less matured compared to computer program hypervisor.

5. GREEN COMPUTING

The performance is not improved even after using of various technique such as virtualization, containers. There are numerous number of operational factors to be considered such as portability, security, performance, and flexibility. The portability for any application is provided with containers. But portability itself cannot be considered. Virtualization is used in this as a matured technology. Even though virtualization and docker are different technologies they are combined in such a way that application is placed initially in container and run it in virtual machine. Linux based systems containers are in advance level compared to windows based. Windows based containers do not involve the techniques of virtualization. They have their own customized virtualization.

6. CONCLUSION

In the upcoming years the researchers should perform various work in the field of green computing. They have to focus on efficient energy utilization either in cloud computing and data centers. This technology is improved based on initiative taken by companies. The greener world is possible only because of all stake holders must work and support together. Otherwise, the human should face severe problems in the coming years. In future there will be a lot of research in this field.

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