CC Assiginment - 2

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Summary 1

Title

An Analysis Report on Green Cloud Computing Current Trends and Future Research Challenges

Introduction

Cloud computing is an impressive solution to address the challenges in storage and processing of high volume data, with on-demand, high-speed and pay-per-use characteristics. As the need for better clouds keeps on increasing, there is also a need for green clouds as maintaining clouds is a heavily power consuming and water consuming task with huge carbon emissions. Green cloud computing is an architecture to reduce the need of physical hardware peripherals, infrastructure which in-turn reduces the harmful carbon emissions of the clouds. This paper written by Archana Patil and Rekha Patil focuses on having a discussion on current trending concepts on green cloud computing and the future research challenges.

Objective of the work

The objective of the work is to discuss the challenges that are faced by the current green clouds technologies and about what are the future challenges that need to be addressed by green cloud engineers in the future.

Approach Referred

Green cloud computing

The major characteristics of green cloud is energy efficiency, virtualization, multi-tenancy, consolidation, recycling and eco-friendliness. That is green cloud is a win-win between could and the environment. It is easy to convert normal cloud into a green cloud by simply changing some management policies and base characteristics in the existing cloud infrastructure.

Energy Efficiency

Energy efficiency is the basic building block of green cloud computing. It is achieved by deploying the efficient power management techniques to reduce the power consumption of the cloud components. A major improvement in this sector is the replacement of the previous Static power management system which turns on all the associated cloud components irrespective of the usage/load characteristics on the cloud, with the Dynamic power management system(DPM). This system only starts the required components based on the usage/load characteristics and power management techniques are implemented to ensure no component receives more voltage than it requires.

Virtualization

The concept of virtualization is based on the simple principle of running multiple logical systems on a single physical system. This helps the cloud run multiple tasks at the same time which reduces the execution time of the processes which in turn reduced the on time of cloud and hence it's power consumption. By dynamically allocating and reallocating the number of virtual machines based on the work load also helps reduce the power consumption at a considerable rate. High speed processing, low power consumption, high-end resource utilization and cost saving are the aspects of virtualization that help advance green clouds a lot.

Multi Tenancy

Multi tenancy is the process of using a single instance to service multiple clients of same category at the same time. This saves a lot of resources as multiple instances need not be initiated to serve clients of same category which require similar type of resources. The only issue is the privacy concern of this setup as multiple clients will be serviced by the same instance which need to be dealt with by using access control to handle these security issues.

Consolidation

It is the process of deploying different data centres related to data processing applications on a single server with virtualization technology. There are two approaches to this the one-many approach where we consolidate a single physical server with multiple virtual machines and the many-many approach where we consolidate many physical servers with many virtual machines. By using dynamic consolidation, threshold based consolidation and optimization of the consolidation process the green clouds can become very energy efficient.

Conclusion

As the cloud computing industry is always growing and as there is always a need for more storage space or computation power, it is even more important to look into green cloud solution in order to have a sustainable cloud. As the cloud consume a lot of power and results in omission of harmful oxides and dioxides, The world need to turn to green clouds as they are more eco-friendly and also help have the maximum utilization of the available resources.

Future Research Problems

There is need for future research to done on the issues of better power utilization monitoring tools, design of power utilization simulators and decision making algorithms in DPM. Dynamic work load balancing with VM's, Resource sharing across VM's, design of secured VM's and energy optimization techniques need to be researched more for virtualization in green clouds. These are the future research problems that needs to be addressed for improvement of green clouds.

Observations of the study

How does the design of the study address the research questions?

The study was designed to give a detail analysis report on the current green cloud technology trends and what are all the future problems that need to be researched in order to advance the concept of green cloud.

How convincing are the results? Are any of the results surprising?

The result of the study is that we need to improve research on the field of green cloud and the optimization of load/power balancing algorithms.

This is expected as we need to consider the ecological drawbacks of the clouds we are using with increasing demand.

What does this study contribute toward answering the original question?

This study contributes toward the current research achievements of green clouds and the future requirement and scope for improvement in green cloud technologies.

What aspects of the original question remain unanswered?

The study only discusses about what future problems needs to be addressed but does not point toward a solution to those problems.

Summary - 2

Title

Effect Of Green Cloud Computing And Environmental Sustainability Approaches

Introduction

Cloud computing is a highly scalable and cost-effective infrastructure. But the growing demand for cloud has drastically increased the energy consumption of the data centres. Hence, energy-efficient solutions are required to minimize the impact of clouds on the environment. To achieve this we need a deep analysis of the cloud with respect to it's power efficiency. Then we discuss the implication of these solution for future research in green cloud computing. This paper written by Gayathri.B and Dr.R.Anbuselvi also discusses the role of cloud user in achieving green cloud computing.

Objective of the work

The objective of the work is to deeply analyse the cloud with respect to power efficiency and getting environmental sustainability solutions.

Approach Referred

Dynamic Provisioning

The cloud provider monitors the demand and manages the allocation of resources accordingly. The applications that require less number of resources are consolidated onto one server. In this type of provisioning the data centres always maintain active servers according to demand which results in low energy consumption than the conservative approach of over-provisioning.

Server Utilization

On an average with out proper green cloud architecture and on an on-premise infrastructure there is only a server utilization of 5-10 percent. Using virtualization the core concept of green clouds we can boost the utilization of the servers to up to 70 percent. This drastically reduces the number of active servers and hence, reduces the power consumption.

Datacentre Efficiency

The server design in the form of modular containers, advanced power management through power supply optimization, water or air based cooling are the different approaches that have significantly improved the PUE of the datacentres. In addition, in cloud architecture it is easy to move services between multiple datacentres which are running with better PUE values.

Dynamic Voltage frequency scaling technique(DVFS)

In this technique we control the power consumption of a cloud component by adjusting the operational frequency of the operation clock associated with it's circuitry. This method is not as effective as other method and is mainly dependent on the hardware. The power saved to cost incurred to implement ratio is also low.

Resource allocation techniques

This technique focusses on the migration of VMs from one node another such that the power consumed by them is the least. This is done by selecting the most efficient node first and migrating the VM to that node. This is possible as cloud architecture allows us to transfer VMs across multiple hosts according to the needs.

Algorithmic Approaches

In this technique we use a neural network predictor to help the green scheduling algorithms estimate the required dynamic workload on the servers. Using this information the unused servers are then turned off in order to minimize the number of running servers and the energy usage at the point of consumption. This technique is useful as it has been experimentally determined that an ideal sever consumes about 70 percent of the power utilized by a fully utilized server.

Conclusion

In conclusion, by simply improving the efficiency of equipment, cloud computing cannot be claimed to be green. What is important is to make its usage more carbon efficient both from use and providers perspective. Cloud providers need to reduce the electricity demand of clouds and take major steps in using renewable energy sources rather than just looking for cost minimization.

Future Research Problems

Energy-aware Dynamic Resource Allocation

Three major issues that need to be addressed here are:

- Excessive power cycling of a server could reduce its reliability.
- Turning resources off in a dynamic environment is risky from a quality of service point of view.
- Ensuring SLA brings challenges to accurate applications performance management in virtualized environments.

Qos-aware resource selection

There is a need to research this problem more as Qos-based Resource Selection and Provisioning Data centre resources deliver different levels of performance to the clients.

Observations of the study

How does the design of the study address the research questions?

This study was designed to discuss the emerging concerns about the environmental effects of cloud, the need for green cloud computing. Many of the technologies used by green cloud was also explained in detail, including a detail analysis on green cloud architecture.

How convincing are the results? Are any of the results surprising?

The results of this study were to be expected as nowadays there is huge uproar in the need to go green in many sectors. This also includes the cloud computing sector as even this field has a considerable huge carbon footprint which needs to be reduced.

What does this study contribute toward answering the original question?

This study contributes towards giving a detailed analysis to the provider and user on the cloud architecture, so that we can analyse all the power consuming components of the cloud and can implement/ research techniques to reduce their power consumption.

What aspects of the original question remain unanswered?

This study discusses about the possible environmental sustainability approaches but does not give an explanation on future progress of them or what optimization can be done to the already existing legacy techniques.