

Green Cloud Computing: A Sustainability Focused Approach

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Abstract: Without an effective solution for the industry, the future of the IT industry is at stake and could mean the end of the world. Most of the energy used in the field is used by data centers; that is why it is urgent that these power plants switch to green and clean and green energy. To assess the need, barriers, and styles of computer cloud computing, this study looks at the capabilities of computer cloud computing services and conducted literature reviews. The report makes the claim that the future of IT is firmly entrenched in green energy by exploring various aspects, barriers, and styles. According to the findings of this study, Green Cloud Computing can be very effective in maximizing the benefits of cloud computing while minimizing its negative environmental effects.

Keywords: Cloud Service Models, Cloud Architecture, Data Centers, and Green Cloud Computing

Introduction

The 21st Century is driven by the issue of sustainability. This is because sustainable development is a strategy to survive both humanity and the world. Phuthal et al. [1] emphasizes that one of the biggest threats to the environment is the computer industry. The reason is that reliance on computer technology is essential to the performance of today's world. Since their day-to-day operations can be extremely risky without cloud computing, almost all major firms switch to using it. The power required by cloud computing poses a significant environmental risk as a result. Cloud computing is one of the largest industries that use energy resources, according to a study by Mishra et al. [2], which further examined such an issue. The cloud computing industry needs to be converted to green energy in order to achieve sustainable development. Working in the cloud of renewable energy is called "Green Cloud Computing." The development of a green cloud computing strategy is critical to sustainable development and reducing climate change as it is one of the most important areas for both domestic and global business. However, given that many organizations still use cloud computing technology that relies on fossil fuels, this is a very strong field. As a result, any conservation efforts should begin with "Green Cloud Computing," in which all organizations around the world go from renewable energy source to sustainable and green energy. The main goal of this study is to look at the Green Cloud Computing movement.

Related Work

Because of the importance of the topic, dozens of researchers and scientists have delved into it and developed critical technologies and solutions. This research is an attempt to raise awareness of such creative solutions and to initiate a discussion about the evolving Green Cloud Computing field. Below is a discussion of the relevant job:

Energy efficiency

Energy Efficiency is a measure of the efficient and effective use of energy by data centers, according to Atrey et al. [3]. By examining the total energy efficiency of energy used by IT resources only, it assesses energy efficiency. Created by scientists at Green Grid, their goal is to quickly transform Data Centers into Green Energy. Energy efficiency is one of the most important metrics to show how much energy is wasted and wasted on data centers.

Green Cloud Architecture (GCA)

The GCA has been suggested in Pandya paper [4] as a means of revitalizing the structures of an environmentally sound data center. The GCA is aware of the energy used and wasted on all common cloud computing operations. By removing the intangible part in cloud architecture and harmonizing the environment, it often provides a long-term solution for both private and public cloud-based services.

Model Cloud Services

Software as a Service (SaaS), Storage as a Service (SaaS), and Processing as a Service (PaaS) several different service models are available. The long-term success of these services depends on the fact that all of these models are compliant with the cloud computing environment [4]. These services are the main objectives of cloud computing, and in order to improve green cloud computing, these services must be provided

Work Flow

The study will follow a pre-determined approach to understanding the evolution of the cloud computing cloud. This requires looking at multiple study papers, separating the various topics related to the topic, and then placing the author's analysis in context.

Below is the complete process:

Research Method

A high-level framework is used to address this investigation. In order to understand the research issue, non-numerical data will be collected. Gathering experiences, ideas, and thoughts on a topic is another important part of a high-quality research approach.

Data Collection

Secondary sources used to collect most of the data. This means that publications published on this subject will be reviewed. Educational research by academics and researchers from around the world will be included in these published books.

Data Analysis

Theme analysis will be used to evaluate the data. The researcher can discover many important and important topic topics using theme analysis, in line with Neuendorf [5] highlights the important approach to Green Cloud Computing. These topics will be selected based on their relevance to the cloud computing industry. As mentioned earlier the researcher intends to analyze different academic texts; as a result, the themes in these published articles will be highlighted.

Results and discussion

Green cloud computing characteristics

Model construction is necessary because the Green Cloud Computing industry is not yet very developed. It is important to emphasize the basic concepts of cloud computing and how they can be effective while ensuring environmental sustainability in this way. In this way, the research of Patil and Patil [6] laid the foundation for the future development of cloud computing.

These features include virtualization, integration, multiple hire, energy efficiency, and environmental friendliness. Virtualization and multiple hires are two of the most important traits that have not yet been included in this study. The concept of virtual reality uses the same extraction process for all several virtual computers. This will fall under the use of cloud computing and include the use of several computers to process shared work, which will ultimately result in a decrease in power per computer and an increase in efficiency [7].

Similarly, most hiring refers to the provision of cloud services to a few employers who fall under the same category to reduce or eliminate the cost and performance of the single employer [8]. Therefore, it is likely that the many hiring features of Green Cloud Computing will continue to increase. The final component of a workflow diagram is integration, which is described by Patil and Patil [6] as "the process of placing different data centers associated with data processing applications on a single server using virtualization technology." In general, reference is made to the process of using a cloud computing cloud and making it more compatible with environmental sustainability. These processes are usually related to the application, network, and security on which the Cloud Computing concept is based.

Need of Green Cloud Computing

Pirani [9] states that about 2% of the world's total gas emissions are generated by the IT industry. Furthermore, it does not mean that when analogue business models provide a digital approach, there will be a greater need for cloud computing. As a result, global gas emissions from the IT sector will also rise, which could be detrimental to safety and environmental health. Additionally, because of this, the IT industry may begin to place among the major carbon dioxide products. Therefore, it should be clear that for the IT industry to grow in the future, it must be made more environmentally friendly and sustainable. Therefore, the need for green cloud computing is crucial in this field. It is not possible to create an IT sustainability solution without installing a sustainable solution for these institutions, which are among the most demanding components of IT solutions [10]. Also, research emphasizes the importance of energy efficiency and energy management in existing data centers. The following discussion will cover some of the obstacles facing the green cloud computing platform.

Challenges of green cloud computing

Cost is a major obstacle to the widespread adoption of green cloud computing. Burton [11] talks about this. The cost of using a data center for renewable energy, according to the researcher, is already very high. According to the report, data centers cost between \$ 10 million and \$ 12 million per megawatt. This is also one of the main reasons why so few businesses have their own data centers. Additionally, there are costs associated with building a cloud computing data center. It is important to note that the virtual environment is what makes cloud computing different from conventional data centers. Cloud computing happens almost exclusively, while data centers are stored and stored locally. Agrawal et al. [10] point to a second obstacle to the use of computer cloud services such as a lack of administrative support. The IT department often ignores adherence to climate policy, and there is a low level of understanding of the natural processes in the department. As a result, it may be difficult to persuade IT administrators of the benefits of using green energy to use cloud computing. This is already a major obstacle to the development of green cloud computing. This

assertion is supported by the fact that many IT businesses do not use green energy, mainly due to the lack of international standards that can promote full-fledged IT operations. Because cloud computing is such a complex industry, environmental organizations do not care how much energy data centers or the need for a cloud computing platform to switch to green energy.

Trends in Green Cloud Computing

It is necessary to show the current progress in this field because the purpose of this study is to emphasize the importance of Green Cloud Computing. Radu [12] goes into more detail on this. According to the analyst, Community Cloud is a significant milestone in the industry. Pal and Singh [10] view the community cloud as a collaborative effort where companies from various locations share a repository and processing of works, and communicate with the public cloud. This is included in the study because, while using a renewable energy source, social clouds conserve energy, complying with the principles of green cloud computing. The next step should be for large companies such as Amazon Web Service (AWS), one of the world's largest public cloud computing services, to acquire such technology on the basis of green energy. A study by Kaushal et al. [11] highlighted virtualization as an important new development in terms of cloud computing. Researchers say that virtualization is a very reliable Cloud Computing theme with the need to move away from powerful data centers. The term "Hypervisor" was used by the authors to make the virtualization process more widely understood. It is a piece of software tools that allows the use of various applications on a particular computer. The basic premise behind cloud computing is this, and it is fully compatible with green cloud computing.

Virtualization can provide up to 70% energy savings, according to research estimates, which are undoubtedly successful in the cloud computing industry. This is also true because sharing servers and not using them specifically can reduce the power required to cool equipment. Virtualization therefore has the potential to ensure the long-term performance of the IT industry. This type of technology, like green cloud computing, is still in its infancy, and key areas still need to be upgraded for widespread use. These are important areas for improving safety and performance. According to research, customers should consider green label as a type of testing level when choosing cloud computing providers. In a highly competitive industry, in particular, this can be used as a long-term benefit. On the other hand, green label is a concept where businesses evaluate each other in terms of the level of environmental sustainability they provide. Energy efficiency and carbon dioxide emissions are two important factors to consider when raw label products. Because only large firms have the money and the ability to switch to green energy, it is primarily the responsibility of big and small businesses. Performance is one of the biggest problems with virtualization, especially because when computers are shared, performance becomes compromised. Similarly, since the last device used by several systems is the same, it can greatly increase the risk of security breaches and burglaries. Eco-labeling is a progressive development in the Green Cloud Computing industry. Companies use natural certificates to present themselves as eco-friendly, which is a great compliance strategy. Di Salvo [15] explains many details about it. If the industry leader accepts it, it becomes a standard and may encourage other businesses to seek the same goal.

Awareness is another important part of the cloud computing program. Although briefly mentioned in the preceding discussion, this is one of the most striking modern methods. According to Abugabah and Abubaker [16], understanding about the benefits of green cloud computing is primarily driven by a discussion that should be high up and down naturally. This should be done both in the company and in the industry. This means that the major responsibility for educating members of the IT community lies with the managers who must work to increase public awareness of the benefits and capabilities of raw IT. Discussions about the company's efforts to switch to green energy should take place regularly at workplace meetings. The industry should use literature highlighting the need for clean energy to further the company's operations.

Conclusion

The purpose of this study was to demonstrate the importance of the cloud computing cloud as a strategy for promoting sustainable development. It should be noted that this is a recent topic in the IT business model and that the need to move from non-renewable energy sources to sustainable ones is not sufficiently emphasized in the current discussion. This is very worrying because data centers use a lot of electricity and endanger the lives of millions of people. The term "green cloud computing" is definitely needed because it emphasizes the methods and techniques used to improve computer and other IT resources in line with climate protection. One of the problems a business has is that these decision-making methods are often not used as a basis for review. When it comes to carbon dioxide emissions or energy efficiency, users of cloud computing are inexperienced, which encourages producers to continue with activities that threaten to create a global catastrophe. The report then goes on to emphasize the key features of the cloud computing program, which include more hiring, power consumption, and virtualization. These are some of the styles that are now sweeping the market. The final barriers to the widespread adoption of green cloud computing are resources and prices. It is clear that the industry has a full responsibility for implementing green cloud computing, and both large and small businesses need to move quickly towards sustainability.

Further Studies

This paper examines the current state of the blue cloud computing from a wide angle. In doing so, it leaves behind accurate information that can also be investigated. For example, certain areas such as Mobile Clouds, Edge Computing, and Electronic Recycling Programs require further research. Future research on this topic may focus on specific applications that the IT sector needs to implement in order to increase its sustainability. To begin the discussion of how companies should use cloud computing services, future research could also focus on creating standards such as eco labeling or green labeling. The main goal of Green IT, which is to increase sector compliance and climate change regulations by IT organizations and professionals, is more important than the research context of the sector.

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