



The Impact of Green Computing on the Environment

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ABSTRACT:

There is documentation from the very beginning of information technology regarding the positive and negative effects it has had on people's lives and the advancement of humanity. One area that has significantly changed how people think and behave in institutions is information technology. Numerous improvements have resulted from it, like bringing people together and enabling them to complete their task more quickly, among other things. The "impact of green computing in higher institutions" research project will focus on how green computing can assist organizations in reducing their energy use by using IT. Green computing is a technology that focuses on how computers are used in an environmentally responsible manner.

Keywords: Computational science, sustainability, e-waste, cloud, green computing, and environment.

INTRODUCTION:

The goal is to assess green computing critically in terms of both its benefits to society and our schools. To critically assess green computing using cloud computing technology, weighing the advantages and difficulties associated with its implementation in our schools, and considering how IT can be used to address environmental problems by reducing its detrimental effects on institutions. This study will demonstrate how organizations can create a sustainable environment by, for an example, lowering the energy usage of computers and connected devices. This will reduce the usage of non-biodegradable components and increase the use of recyclable resources.

Methodology:

A system of research technique was selected in order to gather and analyze the sample data in order to meet the stated goals of the study project. It was chosen as a successful research design in the virtual computing and green computing domains, in addition to being an interpretive research pattern.

An Overview of Green Computing:

There is no better definition of green computing because so many researchers have defined green computing or green IT differently. However, I like this definition because it captures the essence of what green computing is all about and offers a broad paradigm for the efficient use of computing technology through e-waste reduction, telecommuting, regulatory compliance, server resource virtualization, thin solution accounting, and cost accounting, among other things. (D-Link Corp, 2009). The scientific study of efficiently and effectively designing, producing, using, disposing of, and recycling computers, handheld devices, and computer-related products like servers, network systems, communication systems, monitors, USBs, printers, etc. is known as "green computing" (Koshers 2010).

As per Tech-FAQ, N.D., the term "green computing" refers to the effective utilization of resources in computing with the aim of reducing the ecological footprint, enhancing a country's economic sustainability, and fulfilling social obligations.

The term "green computing" was first used shortly after the United States Environmental Protection Agency (EPA) introduced the Energy Star program in 1992. The primary objectives of Energy Star were to encourage and acknowledge energy-efficient technology in major appliances, computers, monitors, lighting, climate control equipment, and other areas.

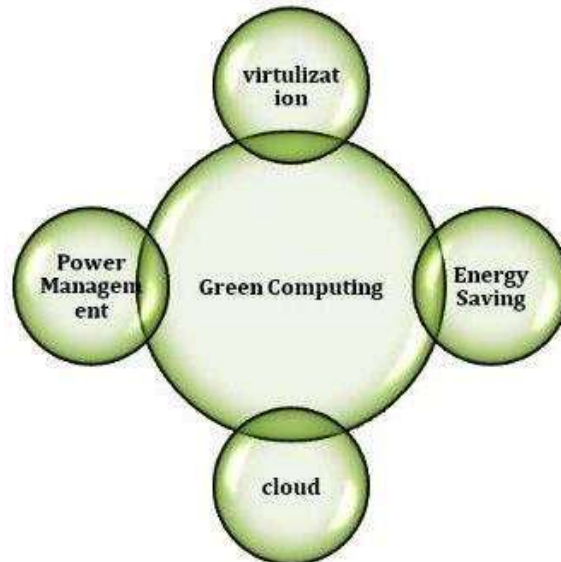
Green schools save energy, money, and resources while establishing hygienic, suitable learning environments.

Green computing is a broad field of technology with numerous applications. The subject above centers on education and awareness as the sole advocates for preserving the environment's natural resources.

Problem Statement:

Like other devices, computers have created significant environmental issues. Hazardous substances that damage the environment, such as lead, mercury, and arsenic, are found in computers. It makes sense that increased electricity use by computers contributes to the global warming, CO₂ emissions, and energy problem. Several computers wind up in landfills when their useful lives are done.

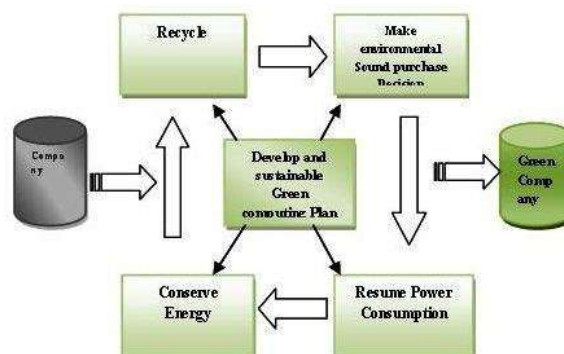
Finding ways to use green computing to address the major environmental and health issues that affect humans has become necessary as data centers grow in number and require more servers to meet the demands of cooling and ventilation equipment. This has increased energy demand and the amount of hazardous and toxic chemicals like lead, cadmium, and mercury.



Literature review:

The need for processing and communication is increasing as the information technology sector expands daily. As a result, servers, networks, and data centers will require increasing amount of energy. The toxic environment in our classrooms is largely caused by the carbon dioxide and other harmful chemicals that computers release, as well as by the energy that different computing devices consume. As of 2006, the data centers of few US colleges were estimated to have consumed 1.5% of the nation's electricity at a cost of \$4.5 billion.

Arun Kumar (2011, Power cutIn) stated in his essay that schools can prolong their budget, save money on electricity bills, use less energy, and contribute to environmental preservation by implementing green computing. Numerous chemicals that are extremely detrimental to human health, such as mercury, lead, cadmium, and others, are present in e-waste.



Importance of e-waste as it relate to green computing:

- i. To guarantee that your environment and your data privacy will receive the highest level of protection, make sure the businesses recycling your equipment are accredited by R2 Solutions or e-Stewards.
- ii. Disposal plan: Draft and implement a formal disposal strategy.
- iii. Saving time: It's important to consider how long a project activity will take to do.

iv. Saving money: For most organizations, the expense of acquiring, implementing, and maintaining technology has always required labor-intensive work.

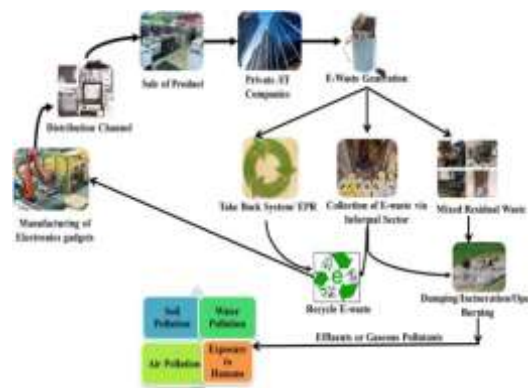
Under a program called IBM's Big Green Innovations, the company buys back and disposes of used computer systems in addition to assisting educational institutions in designing more energy-efficient data centers to cut down on power usage.

Green computing offers higher education institutions a number of options to dramatically increase their bottom line, including e-waste, cloud computing, power management, and computer and printer energy efficiency. This has always been the goal of green computing, which got its start with the Energy Star program back in 1992. It aims to make sure that the IT industry adopts various environmentally sustainable methods in order to produce more environmentally sound goods, etc.

It also offered chances to cut down on energy use, enhance mobile computing capabilities, use more large data, promote sustainable behavior, and cut costs for both environments and institutions.

However, this technology is moving toward intelligent computation in order to optimize resource and energy consumption without sacrificing performance. Intelligent computations are carried out with the aid of new computing technologies' techniques and mechanisms, such as pay-as-you-go business models to cut costs, application and virtual machine consolidation to optimize resource consumptions, and hardware and software co-design. High performance computing in the industry is predicted to be driven by green computing. (November, IEEE Computer Society)

When green computing is implemented in schools, not only will electricity costs decrease but so will the schools' emissions of CO₂, the biggest environmental problem of our day and the primary cause of global warming. For instance, Georgetown University in the United States reported that by combining demand reduction, efficiency, and the use of cleaner fuels, they had been able to reduce CO₂ emissions by more than 20% since they made an investment in green power computing. Through a cooperative student-staff initiative, Georgetown initiated new on-site renewable energy project in the spring of 2013. The project involved the installation of 18 KW of solar panels on a block of historic university-owned row houses, making it the first campus project in Washington,DC



Key areas of green computing:

Energy efficiency: Energy efficiency is the process of making changes to computers and related technology so that they consume less electricity and use it more effectively in our homes, businesses, etc. An ordinary desktop computer, for instance, uses 868 kW of electricity year.

E-Waste: The computers we use are filled with a veritable rainbow of poisons, including mercury, arsenic, nitric acid, and more than a kilogram of lead.

Using IT to address environmental issues: While technology is undoubtedly contributing factor to some environmental issues, it is also one of the best resources accessible to people for understanding solutions. We utilize really fast computers, for instance. Compute and simulate climate change for hypothetical futures, etc.

Achieving green computing via cloud computing:

The newest trends in the information technology sector are green computing and cloud computing. We'll look at how cloud computing can support organizations in achieving their green computing objectives, though it's possible to mistakenly believe that using cloud computing is necessary to support green computing initiatives. Cloud computing may be able to help organizations save money and energy in the IT department, where power consumption is a major budgetary problem. According to Gartner (2011), cloud computing is a type of computing where scalable IT-enabled capabilities are provided as a service via internet technologies to external clients.

According to Jay (2010), cloud computing allows small and medium-sized businesses and institutions to avoid investing in costly and difficult IT capabilities that they aren't good at and that won't help them become more competitive. It also allows some large businesses or organizations to use cloud computing as a model for more efficient use of their internal data center resources. Vendor companies such as Google, Microsoft, Amazon, and salesforce.com have made millions of dollars to establish cloud computing platforms that they make available to outside parties. Though it's a relatively new technology, it offers benefits and drawbacks.

Methods to implement green computing:**a. Carbon Free Computing:**

As part of the VIA Green Computing Initiative, VIA Technologies launched the Carbon Free Computing initiative in October 2006 with the goal of producing the first line of PC products in history to be certified as carbon free. A range of products and initiatives designed to lessen their environmental impact make up the VIA Carbon Free Computing effort.

b. Solar Computing:

Computers must be used everywhere in the nation these days. The use of ICT is essential for the efficient operation of the government, BFS, education, and FMCG sectors. However, a lot of rural India cannot utilize computers due to the country's power issue. For places without access to the electrical grid, SPV-based solar power generation has shown to be a dependable and effective power source. The purpose of Thin vents' solar computing solution is to enable computers to be powered by solar power generated by photovoltaic cells.

We shall examine a few aspects of a solar computing system in this text. We will also examine the distinctions between this type of system and a standard PC linked to a solar-powered generator. In summary, a solar computing system ought to:

Be portable, durable, and dependable to save down on maintenance and shipping expenses.

Possess the ability to operate in hot, dusty conditions.

Run on direct current rather than alternating power, which is produced by the battery and SPV.

Be extremely power-efficient and low-energy, while solar energy is still rather costly.

c. Quiet Computing:

Many folks immediately don't get what we mean when we discuss silent PCs with them. But the urge for greater solitude seems appealing when they consider the incessant hum emanating from their PC. As a pioneer in the field of silent computer system design, Puget Systems has even managed to get some high-end setups to function below the threshold of human hearing.

CONCLUSION:

Green computing has a profound impact on both the environment and computational science. By promoting energy efficiency, renewable energy use, and e-waste reduction, green computing helps minimize the environmental footprint of computing devices and systems. In computational science, green computing practices lead to more sustainable and efficient simulations and data analysis. Embracing green computing is crucial for mitigating the environmental impact of computing and ensuring a sustainable future for generations to come. Green computing is an important strategy that supports environmentally friendly, low-emission, and energy-consuming activities in the IT sector. Organizations has a huge impact on a greener digital future through the adoption of energy-efficient technology, ethical procurement practices, and appropriate disposal of IT equipment. Using green computing not only saves money and energy, but it also demonstrates corporate social responsibility and clears the path for an IT ecosystem that is more environmentally conscious and sustainable

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