AWARENESS OF GREEN COMPUTING IN EDUCATIONAL INSTITUTIONS:
A REVIEW

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Abstract

With rising energy cost and growing environmental concerns, green computing is receiving more and more attention. The concept of green computing can be used very efficiently in colleges and universities. This paper aims at creating the awareness of green computing among the students and staff of our College. Green Computing is a trend towards designing, building and operating computer systems to be energy efficient as well as reduced resource consumption and proper disposal of electronic waste. The objective of the study is to save electricity by turning the computer and monitor off when they are not in use, replacing CRT monitors with LCD or LEDs, having a ventilated lab instead of using fans and air conditioners, reusing the old systems in other places that is they can be donated to our other institutions which are located in the outskirts of the city. Since most the systems have to run till the working hours of the college, the energy consumption of a system must be managed based on specific architecture which is of great importance.

Keywords: Green Computing, Cost of Energy, Environment, Electricity Consumptions, Go Green Measures, Hazardous materials

Introduction: Green computing is the study and practice of designing, manufacturing, using and disposing of computers, servers, and associated subsystems such as monitors, printers, storage devices, networking and communications systems efficiently and effectively with minimal or no impact on the environment as defined by San Murugesan. It also lays out four paths along which the environmental effects of computing should be addressed. Green use, green disposal, green design, and green manufacturing is the path for green computing. Green computing can also develop solutions that offer benefits by aligning all IT processes and practices with the core principles of sustainability, which are to reduce, reuse, and recycle; and finding innovative ways to use IT in business processes to deliver sustainability benefits across the enterprise. Green Computing deals with different green computing factor applied to reduce environment hazards and deals with latest invention regarding green computing to reduce the thermal power from the processor. As 21st century belongs to computers and electronic items, energy issues will get a serious ring in the coming days, as the public debate on carbon emissions, global warming and climate change gets hotter. Taking into consideration the popular use of information technology industry, it has to lead a revolution of sorts by turning green. The computer manufacturing process accounts for 70% of the natural resources used in the life cycle of it. Therefore, the biggest contribution to green computing usually is to prolong the equipment's lifetime. Another method is to look for
product longevity, including upgradability and modularity. For example, manufacturing a new system makes a far bigger ecological footprint than manufacturing a new RAM module to upgrade an existing one, a common upgrade can save the user from having to purchase a new computer. An open industry standard “Advanced Configuration and Power Interface” (ACPI), allows an operating system to directly control the power-saving aspects of its underlying hardware.

This allows a system to automatically turn off components such as monitors and hard drives after set periods of inactivity. In addition, a system may also hibernate, where most components (including the CPU and the system RAM) are turned off. ACPI is a successor to an earlier Intel-Microsoft standard called Advanced Power Management, which allows a computer's BIOS to control power management functions. Undervolting is a process which involves the user to manually adjust the voltages supplied to the CPU, which reduces both the amount of heat produced and electricity consumed. SpeedStep is a technology on Intel processors where some CPUs can automatically undervolt the processor depending on the workload. Global warming is the continuing rise in the average temperature of the Earth’s climate system due to a range of factors. Scientific understanding of the various causes of global warming has been increasing since the last decade.

Telecommunicating technologies that are implemented in green computing initiatives have advantages like increased worker satisfaction, reduction of green house gas emissions related to travel and increased profit margins. Cloud computing is a recently evolved computing terminology based on utility and consumption of computing resources. In these software applications, processing power, data and potentially even artificial intelligence are accessed over the Internet. It involves deploying groups of remote servers and software networks that allow centralized data storage and online access to computer services. This is also a method that can be used in green computing.

**Research methodology:** The purpose of this paper is to identify the benefits to organizations seeking to utilize green computing. Although there are many aspects associated with green computing, this paper will focus on the hardware and infrastructures needed for an organization to achieve cost and power savings. Computing also harms the environment. Green computing is a new technology whose goal is to design better computer system, their processing and must consume less amount of energy. Use of computer system and IT services makes life easier and work faster, its increase results in greater power consumption, which increase emission of green house gas like carbon dioxide. This study is taken in order to solve the problems faced due to excess use of air conditioners in the labs, systems emitting carbon diode, same inhale and exhale of carbon dioxide given out during the breathing process of students. So all these problems can be solved by having a good ventilated lab where there is good supply of fresh air.
In this paper I have tried to focus on the green computing concepts. First of all how to save energy in the lab during the lab hours and also during lunch interval when the systems are not in use, changing CRT monitor to LCD, reduced usage of CDs and DVDs. Second to adopt green PCs, how to reuse the old systems, how to manage e-waste of the dead systems. Third to reduce the use of paper used for printing by going for double sided printing and printing only when it is required. What are the financial benefits of adopting green technology in the lab.

**Results and Discussion:** Measures for greener computing are
- Lower power hardware
- Virtualization
- Cloud computing
- Energy efficient coding
- Improved repair, re-use, recycling and disposal
- Less pollutant manufacture

Unnecessary printing and printers have a major environmental impact both in consumption of resources and the energy required to manufacture paper product. We can help save paper, toner, energy and also money. Printing can be done in draft mode to save ink, only final copies should be printed or go for double sided printing, the narrow margins can also be tried if it doesn’t conflict with the report style. Instead of using fax go for emails. Keep the printer, copiers, scanners and peripherals off when it is not in use. Don’t turn the equipment on in the morning until it is actually needed. Put laptops in "sleep" mode when not in use. It is estimated that this reduces the energy use by 60 to 70 percent and ultimately could save enough electricity each year and reduce carbon dioxide emissions by the equivalent of 5 million cars. The used computer equipments must be re-cycled. Also, Staples, the office supply retailer, has now started a recycling program. They will accept any brands of used desktop and notebook computers, monitors, printers, fax machines and all-in-one devices.

Reduce the usage of number of CDs or DVDs as they may seem convenient way to store data but they also have large impact on our environment. They and their jewel cases are made up of primarily of a poly carbonate plastic which doesn’t break down quickly and also contain aluminium which may be toxic at certain level. When storing large amount of data use single DVD instead of multiple CDs as a DVD can hold six times more amount of data than a CD. For temporary storage even USB flash drive can be used. This device can share files from computer to computer. It is quicker than burning CD and are also reusable. Thought for recycling of IT products. If we can extend the working life of our IT products, we reduce the environmental consequences of
mining, manufacture, packaging, shipping and disposal. Many organizations, including some manufacturers themselves, are willing to take equipment back and recycle the components into new products.

If everyone tries to follow some of these suggestions and make the changes then our world will be a better place to live in. We must spread this message to our friends, colleagues and family members. Due to the hike in fuel prices and greater awareness of harm caused by greenhouse gas emissions, many wish to reduce travel to cut costs and decrease negative impact on the environment. The initiatives in this study consist of Remote conferencing and telecommunication.

**Conclusion:** In this paper, I conclude that green computing is the emerging technology which will help to reduce IT waste. The main objective of this is to reduce the energy consumption of computer related products. This paper aims to create awareness among students and staff of our college with regards to Green Computing. By incorporating the green computing techniques discussed in this paper, our college campus can have an immediate impact by reducing power consumption by computers and associated peripherals. So far we had not thought of all these measures of using old systems and also donating them, reducing use of papers, CDs and DVDs, managing e-waste charity funds, having ventilated labs which help to reduce power consumption, shutting down systems when they are idle. The plan towards green IT should include new electronic products and services with optimum efficiency and all possible options towards energy saving. The study will also tells the approaches of green computing. The concept of green computing is popularized in the past few years. Apart from ecological issues, this also deals in economic needs.

This paper aimed to provide a survey on the different measures in green computing. In the future we can save more energy through several approaches. It can be observed that green computing is the need of the hour to protect the environment. As more and more time passes the need of computers as a dependable machine increases and so does its use. So computer penetration is increasing globally at an amazing rate. This makes it all the more necessary to maintain green computing procedures throughout the life cycle of a computer from manufacturing through day-to-day operation till the end of its operating stage. It can be safely concluded that in order to have a healthy and clean environment all must work collaboratively and implement all the techniques and methods that are discussed in this paper so we can have a healthier and greener environment for our future generations.

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