

Green Computing–An Environment Friendly Approach towards Computing

Dr. Pragati Bhatnagar¹, Manish Bhatnagar²

¹*Assistant Professor, Acharya Kalu Kanya Mahavidhyalaya, Jain Vishva Bharati Institute
(Deemed University), Ladhun, Rajasthan, India*

²*Assistant Professor, Department of Education, Jain Vishva Bharati Institute
(Deemed University), Ladhun, Rajasthan, India*

Abstract

Computers are used almost in every facet of life like business, home, entertainment, schools and offices. Although computer have made our life easy but it has also given burden to us. Electronic waste is a global problem and is increasing day by day. E-waste disposes toxins that are hazardous to the environment and are dangerous to humans that are exposed to them. These toxins consist of mercury, lead, cadmium, arsenic, and selenium and when they are burnt they create toxic emissions that harm human health. Presently computing is not environment friendly. The study and practice of using computing resources efficiently is known as Green Computing. Green computing helps in reducing the use of hazardous materials, promote biodegradability of defunct products and factory waste and also maximizes energy efficiency during the product's lifetime.

Green computing is considered as one of the most important factor which contributes to green environment. It has a prominent impact on green environment as modern society is dependent on information technology for all works and operations and the production and disposal of computer wastes directly destroys our green environment. My paper is about how green computing can be helpful in making computing environment friendly.

Keywords: Green Computing, Green Environment, Electronic Waste.

Introduction

Computers are used almost in every facet of life. Computers are used in business, home, entertainment, schools and offices. Newer and faster computers are regularly introduced as companies want to improve profit margins. Although computer have made our life easy but it has also given burden to us. Electronic waste or e-waste is a major problem of this global world and is increasing continuously. E-waste disposes toxins that are hazardous to the environment and dangerous to humans that are exposed to them. Some of the toxins include mercury, lead, cadmium, arsenic, and selenium. Toxic emissions are created by burning the toxins harm human health. So presently computing is not environment friendly.

Green color is a mixture of yellow and green and has pleasant effect on eye. In the 21st century, green is realized to have a deeper meaning related to environmental aspects. We all are aware that behaving in an environmentally sound way will be essential to our future. The living environment will not be sustainable for any creature if we do not reduce the rate and amount of toxic waste, such as carbon, nitrogen, and sulfur dioxide, which were released as emissions into our air, water, and land. The Greenhouse Effect (which may directly link to an escalation of the

effect of global events such as the tsunami of 2004, and various earthquakes and typhoons) is perhaps be the final signal from Earth which warns us that we must strictly act now to rescue future generations. The three main approaches to accomplish sustainable environment are social responsibility, environmental protection, and economic progress.

Study and practice of using computing resources efficiently is Green Computing and its main objective is to minimize the pollutions of environment. Green computing has a significant impact environment as our modern society is dependent on information technology for all works and operations and the production and disposal of computer wastes directly pollute our green environment. My paper discusses what is green computing and how it is an environment friendly approach towards computing.

What is Green Computing?

- Computing which is environmentally sustainable is Green Computing.
- Environmentally responsible usage of computer systems and related resources can be described as Green Computing.
- The study and practice of effectively and efficiently designing, manufacturing, using and disposing computers, servers

and associated sub- systems such as monitors, printers, storage devices etc. is green computing.

- It can also be termed as practice or study of efficient and eco-friendly computing.

Green computing means using computers or devices to preserve or save the environment, energy and money.

What is the need of Green Computing?

- Increases in power consumption is responsible for generating a large amount of heat and this results greater emission of greenhouse gases like carbon dioxide(CO₂) . It produces harmful impacts on our environment and natural resources.
- Personal computers and data centers using old techniques and with improper cooling system consume a lot of energy and pollute our environment.
- Large amount of CO₂ produced by all the Data Centres, Pc & its peripherals & networking. Large amount of CO₂ produced from Pc's are hazardous for environment because they are not biodegradable and the parts and pieces are not recyclable.
- Defective manufacturing techniques, packaging, disposal of computers and components causes environmental pollution. Manufacturing of computers

uses toxic chemicals and when we use informal disposing they pollute our environment.

- Often computers are left switched on when not in use (CPU and fan consume power, screen savers consume power).

Core Objectives of Green Computing Strategies

- Energy consumption should be minimized
- Purchase green energy
- Reduce paper and other consumables
- Equipment disposal requirements should be minimized
- Reduce the travel requirements for employees/customers

Roads to Green Computing

- Green use: the electricity consumption of computers and other devices should be minimized
- Green disposal: Unwanted electronic equipment should be recycled
- Green design: Energy-efficient computers, servers, printers and other digital devices should be designed
- Green manufacturing: Waste produced during the manufacturing of computers and other subsystems should be minimized.

Approaches to Green Computing

Virtualization

Running two or more logical computer systems on one set of physical hardware is called as Computer virtualization. Virtualization allows system administrator to combine many physical systems into virtual machines on one single, powerful system. It allows to unplug the original hardware and reduce power and cooling consumption. The main goal of virtualization is to efficiently use available system resources. It focuses the idea of “Green Computing”; by consolidating servers and maximizing CPU processing power on other servers. Accessing of shared storage subsystem is possible by storage virtualization. This approach definitely helps to reduce the number of storage devices required, the amount of power needed, the heat produced and, as a wonderful side effect, would help in reducing the operational and administrative costs of back up, archival storage etc.

Power Management

If power consumption is reduced it will lead to lower heat dissipation, which will enhance system stability, and less energy will be used. It will save money and will reduce the impact on the environment. The Advanced Configuration and Power Interface (ACPI) is an open industry standard and permits an operating system to

have direct control the power saving aspects of its underlying hardware. This lead to automatically turn off of system and other components such as monitors and hard drives after set periods of inactivity. The facility of system hibernation allows most components (including the CPU and the system RAM) to turn off. ACPI which is a successor to an earlier Intel-Microsoft standard called Advanced Power Management, allows control power management functions to be controlled by computer's BIOS .

There are many reason to have power management for computer systems. They are

- To have prolonged battery life for portable and embedded systems.
- To reduce cooling requirements.
- To reduce noise.
- Have reduced operating costs for energy and cooling.

Power Supply

Power supplies in most computers are not energy efficient. During normal operation usually most of the computers usually drain more power than they need during normal operation. This increases electricity bills and a more terrible environmental impact. There is a program known 80 Plus program which is a voluntary certification system for

power-supply manufacturers. A PSU that meets the certification, will use only the power needed at a given Load. Various initiatives are being taken to improve the efficiency of computer power supplies. Climate savers computing initiative promotes energy saving and reduces emission of greenhouse gas by encouraging development and use of more efficient power supplies.

Storage

For storage are three routes available which vary in according to their cost, performance, and capacity. The most traditional route is the 3.5" desktop hard drive. To reduce power consumption reduced RAM low power idle mode with fixed rotation speed is preferred. Its provides highest possible capacity and best performance. The another option is to use a 2.5" laptop hard drive. Here the power consumption is less than larger disks as a result of their smaller platters, smaller motors, and firmware. To have lowest power option is to use a solid state hard drive (SSD), which draw less than one-third the power of a 2.5" disk. The SSDs are latest, highest-performance and consume less energy.

Displays

To provide light for display LCD monitors use a cold-cathode fluorescent bulb. Some

novel display uses an array of light emitting diodes (LEDs) in place of the fluorescent bulb, which results in reduction of the amount of electricity used by the display. LCD monitors uses three times less power when active, and ten times less energy when in sleep mode. LCDs are 66% more energy efficient than CRTs, LCDs are also 80% smaller in size and weight, leading to fuel savings in shipping. LCDs produce less heat, meaning you'll need less amount of air conditioning. LCD screens have soothing effect on the eyes and their lower intensity and steady light pattern result in less fatigue as compared to CRTs. Now a days we use LEDs which use energy-efficient light emitting diodes for backlighting which uses less power, gives brighter display and good contrast and less heat dissipation as compared to conventional LCDs.

Materials Recycling

Computer recycling refers to reuse computer or electronic waste. Certain retail and municipal or private recycling center should help to salvage outdated systems parts. Recycling computing equipment enables us to keep harmful materials such as lead, mercury, and hexavalent chromium out of landfills. Components such as computing supplies, printer cartridges, paper, and batteries can also be recycled. Outdated or non-working computers are a

valuable source for secondary raw materials, if they treated properly and if not treated properly they become major source of toxins and carcinogens.

Telecommuting

Green computing initiatives are implemented in area of teleconferencing and tele-presence. The main benefits are less emission of greenhouse gas related to travel, increased worker satisfaction and increase in profit margins because of reduction in overhead costs for office space, heat and lighting. Now a day instead of traveling great distances to have a face-face meeting teleconferencing can be used. Each member of the meeting, or each party, is visible to another on screen, and can talk to each other as if they were in the same room. This helps in saving time, leads to cost benefits and reduces impact on the environment by reducing the need for travel - a damaging source of carbon emissions.

Conclusion

The main motto behind “green computing” movement is to initiate the some major steps in various areas of computing say software, hardware or middleware so as to restrict limited use of eco-harming elements and to awake human beings to use computers and related devices in eco-friendly manner.

References

1. Donnellan, Brian, Charles Sheridan, and Edward Curry (2011) "A capability maturity framework for sustainable information and communication technology." *IT professional*, vol 13, no.1, pp. 33-40.
2. Kaul, A., Kaul, S. (2019) “Green Computing: Emerging Issues in IT” *International Journal of Trend in Scientific Research and Development*, vol. 3, no. 5, pp. 438-440.
3. Kaur, N., Singh, J. (2016) “Review on Green Computing: The next movement in computing”, *International Journal of Advanced Research in Computer and Communication Engineering*, vol. 5, no. 4, pp. 1095-1097.
4. Meena D. (2016) “Green Computing Turns Green IT,” *International Journal of Advance Research in Computer Science and Management Studies*, Volume 2, Issue 4, pp. 204-208.
5. Mishra, Sushree (2013) "GREEN COMPUTING." *Science Horizon*, pp. 21.
6. Wright, L., Kemp, S., Williams, I. (2011) “Carbon foot printing: towards a universally accepted definition.” *Carbon Management*, vol. 2, no. 1, pp. 61-72.