

GREEN COMPUTING: THE ENVIRONMENTAL BENEFITS OF GOING GREEN

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Abstract: Green computing is the utilizing of computers and its resources in environment friendly manner. Green computing was introduced to reduce the environmental problems occurred during the time from developing to disposing of different computer modules and devices. The green computing makes the computer and other devices more energy-efficient.

Keywords: Green Computing, Environment, Computer, IT

I. INTRODUCTION

Computers are being employed not only in offices, but also in homes. As the number of computers grows, so does the quantity of electricity they consume, raising the carbon concentration in the atmosphere. People are becoming more aware of the issue, and steps are being taken to reduce computer power use. This is referred to as Green Computing. Green computing refers to the use of computers and their resources in an ecologically responsible and environmentally friendly manner. In a broader sense, it's the study of how to design, engineer, manufacture, use, and dispose of computing systems in a way that has a low environmental impact. Green computing, often known as green information technology, is an ecologically beneficial kind of computing (green IT). Green IT programmes are being considered by many IT businesses in order to meet goals such as improving energy efficiency and power management methods, boosting hardware utilisation, lowering life-cycle costs, and minimising computer waste.

The key activities related with these programmes are divided into the following categories;

- Energy consumption
- Power consumption
- Cooling
- Green procurement and asset management
- Technology based solution

There are a number of basic procedures that can be made to drastically reduce electricity consumption and environmental effect. Some of them are;

Lower-power hardware - Computer systems are made up of hardware like as processors, onboard graphics, discs, fans, and other components that should use less power.

Virtualization -It's when software is used to emulate hardware. We can more efficiently use computer resources in the data centre by replacing stand-alone server systems with virtual servers that run as software on a limited number of bigger computers.

Cloud computing -It allows anybody to benefit from the environmental benefits of virtualization. It also eliminates the requirement for users to operate high-power PCs because infrastructure as a service is provided.

Wireless Network Sensor - Sensors are used in various regions of a data centre to determine the temperature of each location, indicating which areas require more cooling and which require less cooling.

Recycle -We can lessen pollution in the environment by recycling waste or equipment.



II. GREEN COMPUTING – WHY?

In today's corporate world, transactions are conducted practically continuously across all accessible channels, and they must collect, store, track, and analyse vast amounts of data from several servers located all over the world. However, both corporations and the environment pay a price for all of this. Data warehouses and the massive data centres that host them consume a lot of energy, both to run and cool legions of servers. How much is it, totally? A staggering 61 billion kilowatt-hours of electricity, at a cost of \$4.5 billion every year. On the one hand, industries have improved comfort and efficiency, but on the other hand, CFCs have been introduced. That is, Global warming is caused by chloro-fluoro chemicals, carbons, and CO₂. Global warming, as well as the issue of reducing the environmental impact of fossil-fuel emissions, have risen to the top of the international public policy agenda. As a result, businesses and consumers alike have begun to embrace ecologically sustainable products that provide low-carbon solutions that can not only cut global greenhouse gas (GHG) emissions, but also slash costs through more effective energy consumption. Balanced growth in terms of social and environmental factors will be the key to living a long and healthy life. This can be accomplished by employing machinery that require less maintenance, such as;

- Auto Stop software is used to turn off equipment that have been idle for a long time.
- Biologically compostable materials are used.
- Proper management, such as turning off the systems before leaving the office for the day, is essential.
- Recycling and donating computers from earlier generations to the less fortunate as a form of social duty, and so on, will assist us in maintaining a balance between NEED and WANTS or GREED.

So, the primary function of Green Computing is to ensure that computers and related resources are used in an environmentally appropriate manner. Implementing energy-efficient central processing units (CPUs), servers, and peripherals, as well as reducing resource usage and properly disposing of electronic waste, are examples of such approaches (e-waste). The study and practise of efficient and environmentally friendly computing (including communication) is known as green computing. Green computing is a hot topic right now, not just because of rising energy costs and potential savings, but also because of its environmental impact. The amount of energy used to create, store, operate, and cool computing systems has increased dramatically in recent years, owing to the large number of systems and computing those businesses increasingly rely on.

III. APPROACHES TOWARDS GREEN COMPUTING

Green computing is an environmentally friendly technique to reduce power consumption and e-waste. Green computing technologies include virtualization, green data centres, cloud computing, grid computing, and power optimization. Green computing's main goals are to limit the use of poisonous and hazardous chemicals, enhance energy efficiency, and recycle industry waste. The efficient implementation of server and peripherals, as well as the reduction of power consumption, are examples of such practises. Aside from the primary technology, some approaches for achieving Green from persons are described here. They are;

- Terminal servers - Users at a terminal connect to a central server when utilising the system; all of the real computing is done on the server, but the end user interacts with the operating system on the terminal.
- Power management -This enables a system to turn off components like displays and hard drives after certain periods of idleness. A system can also hibernate, in which case most components (including the CPU and system RAM) are turned off.
- Avoid Screensavers -Never believe that screen savers may help you save energy or keep your monitors healthy. They used to use more electricity than monitors that could be dimmed when they weren't in use.
- Display -CRT displays have a higher power consumption than LCD monitors. They also have a considerable quantity of lead in them. The display of LCD displays is typically lit by a cold-cathode fluorescent lamp. Some newer displays replace the fluorescent bulb with an array of light-emitting diodes (LEDs), which minimises the amount of electricity needed by the display. LED backlights do not contain mercury, however fluorescent backlights do.
- Materials recycling -Recycling computer equipment keeps dangerous materials like lead, mercury, and hexavalent chromium out of landfills, and it can also be used to replace equipment that would otherwise be built, saving even more energy and emissions. Computer systems that have outlived their usefulness can be repurposed or donated to a variety of charities and non-profit's. The disposal of old computers creates a serious privacy concern. The disposal of old computers creates a serious privacy concern.
- Product longevity -Consider upgrading your old PC before purchasing a new one. Manufacturing a new PC, for example, has a much larger environmental impact than manufacturing a new RAM module to update an existing one, a typical upgrade that spares the consumer from having to buy a new computer.
- Video card -A powerful GPU could be the most power-hungry component in a computer. The following are some examples of energy-efficient display options: No video card -If a display is necessary, utilise a shared terminal, shared



thin client, or desktop sharing software. Use motherboard video output - Low 3D performance and power consumption are normal. Choose a GPU that has a low idle power, a low average wattage, or a high performance per watt.

□ Telecommuting -Green computing efforts frequently use teleconferencing and telepresence technologies. Better worker satisfaction, reduced greenhouse gas emissions connected to travel, and increased profit margins due to lower overhead expenditures for office space, heat, lighting, and other items are just a few of the benefits. By using IT equipment sensibly, we can contribute our own effort to protect the environment as IT users.

For our reference, we have gathered the following information from several sources:

- 1) Overnight and on weekends, do not leave your computer on. The computer or monitor will not be harmed by a small amount of turning on and off. The amount of time a monitor is in use, not the number of on and off cycles, determines its lifespan.
- 2) Turn on the printer just when you're ready to print. Printers use electricity even when they are turned off. Unless absolutely required, do not print copies of emails.
- 3) Consider lowering the light level in your workspace if you spend a lot of time at your computer. This could improve the visibility of CRT (cathode ray tube) screens while also saving electricity.
- 4) The majority of computer equipment now has power management capabilities. Make sure these functions are turned on if your machine has them.
- 5) Use "paperless" communication options like email and fax modems.
- 6) Use a smaller font and reduce line space between lines while typing documents, especially draughts, or reformat to keep your text to as few pages as possible.
- 7) Instead of printing a draft, review your document on the screen. Use the blank reverse side of used paper if you need to print a copy.
- 8) Use a printer that can print documents on both sides. Use double-sided copying when producing copies.
- 9) Purchase and utilise recycled-content paper whenever possible. Look for papers that are nonchlorine bleached and include 50-100 percent post-consumer waste. Also, when you're finished, recycle your paper.
- 10) Purchase a monitor that is only as large as you require. Although a larger display may appear to be more appealing, keep in mind that a 17-inch monitor consumes 40% more energy than a 14-inch monitor. Furthermore, the higher the resolution, the greater the amount of energy required.
- 11) Ink-jet printers consume 80 to 90% less energy than laser printers, although being a little slower.
- 12) Request that your computer seller use recycled or recyclable packaging.
- 13) Invest in vegetable (or non-petroleum) inks. These printer inks are manufactured from sustainable materials. Using less harmful chemicals results in brighter, cleaner colours in many circumstances.

CONCLUSION

This paper provides a survey or a quick investigation of green computing. Green computing approaches are also be discussed in the study. What is being done in green computing, how much work is being done, and how power consumption is being lowered through various ways and main problems that are being faced in order to achieve the aim. In recent years, the concept of green computing has gained traction. Aside from environmental concerns, this also addresses economic requirements. The goal of this study was to present a survey of the current state of green computing. In addition, specifics of several real-world solutions were shown.

“We are not passive spectators, but active contestants in the drama of our existence.

We need to take responsibility for the kind of life we create for ourselves”

- Nathaniel Branden, Ph.D.

As a result, saving the environment is our obligation.

Save the environment by going green!

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