Relevance and Impact of Green Computing in IT

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***Abstract*- "Green Computing," is especially important and timely. As computing becomes increasingly pervasive, the energy consumption attributable to computing is climbing, despite the clarion call to action to reduce consumption and reverse greenhouse effects. At the same time, the rising cost of energy — due to regulatory measures enforcing a "true cost" of energy coupled with scarcity as finite natural resources are rapidly being diminished — is refocusing IT leaders on efficiency and total cost of ownership, particularly in the context of the world-wide financial crisis. As the commitment to reduce environmental impact and power consumption are becoming increasingly important objectives for organizations. This paper discusses the holistic issues for environmental sustainability While new technology from the industry continues to drive efficiency into the IT infrastructure, environmental systemic quality metrics need to be built into at every part of the IT .**

Keywords:- Greeen computing ,Green IT

I. INTRODUCTION

The Green IT or Green Computing, aims to reduce the carbon footprint generated by the Information Systems business while allowing them to save money. The green-IT, as defined are information technology and communication which design or use can reduce the negative effects of human activity on the environment.Green computing or green IT refers to environmentally sustainable computing or IT. In the article Harnessing Green IT: Principles and Practices, San Murugesan defines the field of green computing as "the study and practice of designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, and networking and communications systems—efficiently and effectively with minimal or no impact on the environment." The goals of green computing are similar to green chemistry; reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime, and promote the recyclability or biodegradability of defunct products and factory waste. Research continues into key areas such as making the use of computers as energy-efficient as possible, and designing algorithms and systems for efficiency-related computer technologies.

II. WHAT IS GREEN COMPUTING?

Green computing is the environmentally responsible and eco-friendly use of computers and their resources. In broader terms, it is also defined as the study of designing, manufacturing/engineering, using and disposing of computing devices in a way that reduces their environmental impact.

Many IT manufacturers and vendors are continuously investing in designing energy efficient computing devices, reducing the use of dangerous materials and encouraging the recyclability of digital devices and paper. Green computing practices came into being in 1992, when the Environmental Protection Agency (EPA) launched the Energy Star program. Green computing is also known as green information technology (Green IT).

III. HISTORY

In 1992, the U.S. Environmental Protection Agency launched Energy Star, a voluntary labeling program which is designed to promote and recognize energy-efficiency in monitors, climate control equipment, and other technologies. This resulted in the widespread adoption of sleep mode among consumer electronics. The term "green computing" was probably coined shortly after the Energy Star program began; there are several USENET posts dating back to 1992 which use the term in this manner. Concurrently, the Swedish organization TCO Development launched the TCO Certification program to promote low magnetic and electrical emissions from CRT-based computer displays; this program was later expanded to include criteria on energy consumption, ergonomics, and the use of hazardous materials in construction.

IV. CORE OBJECTIVES OF GREEN COMPUTING

- To reduce the power consumption of the products
- To reduce the harmful effects to the environments through the use of hazardous materials
- To increase the life time of the product
- To maximize energy efficiency during the product's lifetime
- To promote recyclability of defunct products and factory waste.

V. WHY GO GREEN?

The extensive use of computers and IT has made our life easier and as such the use of IT is ever on the increase resulting in greater power consumption. Greater power consumption means greater emission of greenhouse gases

like carbon dioxide. It is observed that most of the computer energy is often wasteful. This is because we leave the computer ON even when it is not in use. The CPU and fan consume power; screen savers consume power even when the system is not in use. Insufficient power and cooling capacities can also results in loss of energy. It is observed that most of the datacenters do not have sufficient cooling capacities. This results in environment pollution. This could be because of defects in Manufacturing techniques, packaging, disposal of computers and components. Another effect is because of toxicity. There are toxic chemicals used in the manufacturing of new computers as well as disposal of old computers and components which can enter the food chain and water.

VI. PATHWAYS TO GREEN COMPUTING

- Green use — reducing the energy consumption of computers and other information systems as well as using them in an environmentally sound manner.
- Green disposal — refurbishing and reusing old computers and properly recycling unwanted computers and other electronic equipment.
- Green design — designing energy-efficient and environmentally sound components, computers, servers, cooling equipment, and data centers.
- Green manufacturing — manufacturing electronic components, computers, and other associated subsystems with minimal impact on the environment

VII. METHODS TO IMPLEMENT GREEN COMPUTING

A. Carbon Free Computing

Carbon Free Computing is a project started by VIA technologies in October 2006 as part of the VIA Green Computing Initiative, which aims to manufacture the world's first line of PC products that can be certified carbon free. The VIA Carbon Free Computing initiative consists of a set of programs and products that are developed to reduce their impact on the environment.

B. Solar Computing

The need today is to run computers in every corner of the country. Government, BFSI, Education and FMCG, all sectors depend on ICT for effective execution. However, the power situation in India does not permit the use of computers in large parts of rural India. SPV based solar power generation has emerged as a reliable and efficient power source for those locations that are not connected to the electricity grid. Thinvent's solar computing solution is designed specifically to allow computers to be run from SPV based solar power.

In this document, we will study some of the facets of a solar computing system. We will also see how such a system is different from an ordinary PC connected to a solar power generator. Briefly, a solar computing solution should:

- Run from the direct current generated by SPV and battery, not alternating current.
- Be highly energy efficient and low power, since solar power is still quite expensive.
- Be lightweight, rugged and reliable, to reduce transport and service costs.
- Be able to operate in a hot and dusty environments.

C. Quiet computing

When we talk with people about quiet computers, many don't understand what we mean right off the bat. However, when they think about that constant hum that comes from their desktop, the desire to have more peace and quiet is quite attractive. Puget Systems has become an industry leader in the design of quiet computer systems and has even been able to get certain high performance configurations to operate under the level of human hearing limits!

VIII. ADVANTAGES OF GREEN COMPUTING

Reduced energy usage from green computing techniques translates into lower carbon dioxide emissions, stemming from a reduction in the fossil fuel used in power plants and transportation.

- Conserving resources means less energy is required to produce, use, and dispose of products.
- Saving energy and resources saves money.
- Green computing even includes changing government policy to encourage recycling and lowering energy use by individuals and businesses.
- Reduce the risk existing in the laptops such as chemical known to cause cancer, nerve damage and immune reactions in humans.

IX. DISADVANTAGES OF GREEN COMPUTING

- Green computing could actually be quite costly.
- Some computers that are green may be considerably underpowered.
- Rapid technology change

X. RECENT IMPLEMENTATIONS OF GREEN COMPUTING

A. Blackle

Blackle is a search-engine site powered by Google Search. Blackle came into being based on the concept that when a computer screen is white, presenting an empty word page or the Google home page, your computer consumes 74W. When the screen is black it consumes only 59W. Based on this theory if everyone switched from Google to Blackle, mother earth would save 750MW each year. This was a really good implementation of Green Computing.

B. Zonbucomputer
The Zonbu is a new, very energy efficient PC. The Zonbu consumes just one third of the power of a typical light bulb. The device runs the Linux operating system using a 1.2 gigahertz processor and 512 meg of RAM. It also contains no moving parts, and does even contain a fan.

C. Fit PC
Fit-PC is the size of a paperback and absolutely silent, yet fit enough to run Windows XP or Linux. Fit-PC is designed to fit where a standard PC is too bulky, noisy and power hungry. If you ever wished for a PC to be compact, quiet and green – then fit- PC is the perfect fit for you. Fit-PC draws only 5 Watts, consuming in a day less power than a traditional PC consumes in 1 hour. You can leave fit-PC to work 24/7 without making a dent in your electric bill.

D. Sun Ray thin client
Sun Microsystems is reporting increased customer interest in its Sun Ray, a thin desktop client, as electricity prices climb, according to Subodh Bapat, vice president and chief engineer in the Eco Responsibility office at Sun. Thin clients like the Sun Ray consume far less electricity than conventional desktops, he said. A Sun Ray on a desktop consumes 4 to 8 watts of power, because most of the heavy computation is performed by a server.

E. Eee PC
The "ultra-portable" class of personal computers is characterized by a small size, fairly low power CPU, compact screen, low cost and innovations such as using flash memory for storage rather than hard drives with spinning platters. These factors combine to enable them to run more efficiently and use less power than a standard form factor laptop. The Asus Eee PC is one example of an ultraportable. It is the size of a paperback, weighs less than a kilogram, has built-in Wi-Fi and uses flash memory instead of a hard drive. It runs Linux too.

XI. APPROACHES TO GREEN COMPUTING

A. Virtualization
Computer virtualization is the process of running two or more logical computer systems on one set of physical hardware. The concept originated with the IBM mainframe operating systems of the 1960s, but was commercialized for x86- compatible computers only in the 1990s. With virtualization, a system administrator could combine several physical systems into virtual machines on one single, powerful system, thereby unplugging the original hardware and reducing power and cooling consumption.

B.Power management
Power management for computer systems are desired for many reasons, particularly:

- Prolong battery life for portable and embedded systems.
- Reduce cooling requirements.
- Reduce noise.
- Reduce operating costs for energy and cooling.
- Lower power consumption also means lower heat dissipation, which increases system stability, and less energy use, which saves money and reduces the impact on the environment.
- The Advanced Configuration and Power Interface (ACPI), an open industry standard, 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 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.

The power management for microprocessors can be done over the whole processor, or in specific areas. With dynamic voltage scaling and dynamic frequency scaling, the CPU core voltage, clock rate, or both, can be altered to decrease power consumption at the price of slower performance. This is sometimes done in real time to optimize the power-performance tradeoff.

C. Storage
There are three routes available, all of which vary in cost, performance, and capacity.The most conventional route is the the 3.5" desktop hard drive. Recently, major drive manufacturers have begun to focus on reduced power consumption, resulting in such features as the reduced RPM low-power idle mode with fixed rotation speed for reduced power consumption. The second option, which also lends itself to affordability, is to use a 2.5" laptop hard drive. The lowest-power option is to use a solid state hard drive (SSD), which typically draw less than one-third the power of a 2.5" disk. The latest, highest-performance SSDs are very fast but extremely expensive, and currently top out at only 64GB.

D. Video card
The easiest way to conserve power is to go with integrated video. This is the lowest- performance option, but for office users, casual browsing, and pure 2D use, it's more than adequate—and well worth saving the 10W, 20W, or even 35W from a discrete video card. Motherboards spitting out integrated video via DVI or HDMI aren't that hard to find, so power-users with their massive LCDs don't have to suffer.

E. Displays
LCD monitors typically use a cold-cathode fluorescent bulb to provide light for the display. Some newer displays use an array of light-emitting diodes (LEDs) in place of the fluorescent bulb, which reduces the amount of electricity used by the display.

F. Materials Recycling

Computer recycling refers to recycling or reuse of a computer or electronic waste. This can include finding another use for the system (i. e. donated to charity), or having the system dismantled in a manner that allows for the safe extraction of the constituent materials for reuse in other products.

G. Tele commuting

Teleconferencing and telepresence technologies are often implemented in green computing initiatives. The advantages are many; increased worker satisfaction, reduction of greenhouse gas emissions related to travel, and increased profit margins as a result of lower overhead costs for office space, heat, lighting, etc.

XII. FUTURE OF GREEN COMPUTING

The increase in computing over the years has a direct impact on environmental issues and a primary concern of future green technology is reducing the negative impact of computing on the environment. Several PC manufacturers already use the more sustainable and less toxic recycled plastics and bio-plastics in their tower and monitor casings. HP uses a biodegradable corn-based plastic case in its printers. Other companies use wood and bamboo wood-encased desktops in computer towers, monitors, and mouse controls.

XIII. CONCLUSION

"Green Computing" or "Green Technology", and "Green IT" it is not only a new trend, it is a technology of itself. The move to become more environmentally friendly, healthy is more than just a means to a better corporate image. I conclude that to handle the recycling arrangements, devices use less and less power while renewable energy gets more and more portable and effective. Make the organization 'Being Green' should be understood as a long-term commitment.

REFERENCES

[1] www.ncomputing.com/company/green-computing
[2] www.brighthub.com
[3] www.computerweekly.com
[4] www.journals.elsevier.com/...computing
[5] S.V.S.S. Lakshmi, Ms. I Sri Lalita Sarwani, M.Nalini Tuveera , International Journal of Engineering Research and Applications (IJERA), August 2012- A Study On Green Computing: The Future Computing And Eco Friendly Technology.
[6] Green Computing Endeavor in Higher Educational Institutes – a noble initiative towards Sustainable IT Infrastructure, Shalabh Agarwal, Archana Vimal, Saima Ghosh, Asoke Nath, Journal of Computing(USA), Vol 4, issues 5, May, ISSN- 9617, Page-217-222, 2012
[7] Green Computing - a new Horizon of Energy Efficiency and Electronic waste minimization‖: a Global Perspective, Shalabh Agarwal and Asoke Nath : Proceedings of IEEE CSNT-2011 held at SMVDU(Jammu) 03-06 June 2011, Page 688-693(2011).
[8] Dr. Pardeep Mittal, NavdeepKaur- Green Computing – A Survey, International Journal of ComputerTrends and Technology (IJCTT) - volume 4, Issue4 –April 2013.