

“GREEN COMPUTING – A SOLUTION TO ENVIRONMENT HAZARDS OF TECHNOLOGY”

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Abstract- The concept of green computing is gaining increasing popularity since the past few years as energy costs and electrical requirements of IT industry are growing continuously around the world. As computers are being used in every field now-a-days, the production of computers is increasing day by day. This results in great consumption of electricity by them, causing increase in the carbon content in atmosphere. This is great problem to deal with so steps are being taken to minimize the power usage by computers. Green Computing is a technique to solve this problem. Using Green Computing techniques energy usage can be reduced that in turn prevents the emission of lower carbon dioxide, help in stemming from a reduction in the fossil fuel which is being used in power plants and transportation. The idea behind conserving resources is that less energy is required to produce and use. If we save energy and resources, it will automatically results in money saving.

Keywords- Green computing, Virtualization, Green Data center, Solar computing, Power Management

I. INTRODUCTION

Green computing, also called green technology is defined as the study of designing, manufacturing/engineering, using and disposing of computing and related resources like - printer, monitors, networking and communication systems, storage devices in a way that reduces their environmental impact. It is the eco-friendly use of computers and their resources. Using this technology, energy-efficient central processing units (CPUs), servers and peripherals are implemented as well as resource consumption is reduced and electronic waste (e-waste) is disposed properly. In broader terms, it is the study of designing, manufacturing/engineering, using and computing devices disposal in such a way that reduces their environmental impact. Goals of Green computing are:

- Maximize the energy efficiency of the product during the its lifetime
- Reduction in the use of hazardous materials
- Promote recyclability of damaged or nonfunctional products and factory waste.

Currently 3% of the world's energy is consumed by the ICT industry and is continuously increasing at the rate of 20% a

year, by the year 2030 the consumption of world's energy by ICT industry will get doubled.

II. TECHNOLOGIES

In the era of Green technology following are the technologies to be considered:

A. Green Data Center:

Data production is increasing tremendously so data centers use extraordinarily high energy due to this they have been criticized for such a huge demand of energy. They are a main area of focus in the field of green computing. Data centers can use techniques to potentially improve their energy and space efficiency. These technologies include storage consolidation and virtualization. Many underutilized servers- that are not being used, has been getting eliminated by organizations which results in lower consumption of energy. Google Inc. used a technology known as self-styled ultra efficient evaporative cooling to reduce its energy consumption to 50% of that of the industry average.

B. Virtualization

Virtualization is a process of running two or more logical computer systems on one set of physical hardware. This technology helps in saving both hardware and software resources by creating a “similar environment” like an operating system or a peripheral device using your present resources. Using virtualization, several physical systems can be combined into virtual machines that can be run on one single powerful system, hence the original hardware can be unplugged and power consumption can be reduced.

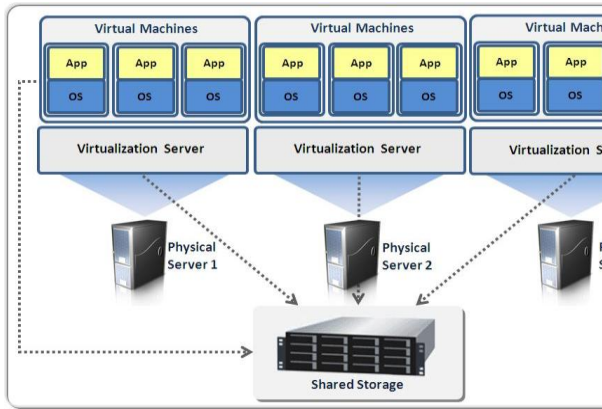


Fig.1: Illusion of virtualization

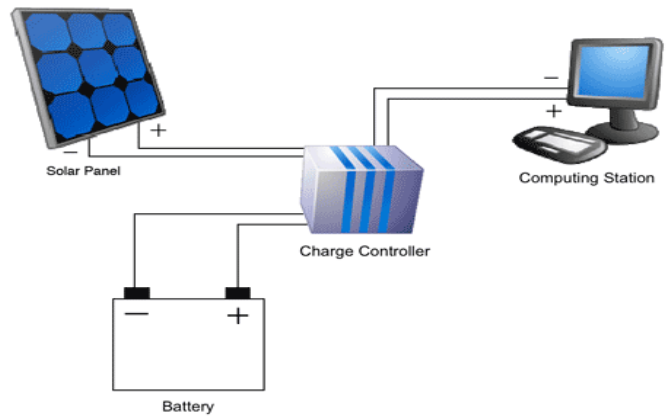


Fig.2: Solar Computing

C. Power Management

The life of physical devices relies on how effectively and efficiently they are being used and managed. For example: we use power management feature of the system, to disable some features or applications of the system that consumes too much battery usage by running the background. This saves electricity as well as increase the system battery life.

D. Energy Consumption

To develop energy-efficient platforms for small-form-factor (SFF), computing devices that require low power, is central goal of GCI (Green-Computing Initiative). Organizations are realizing that the source and amount of their energy consumption significantly contributes to Greenhouse Gas (GhG) emissions. The main cause of Earth's increasing temperature is increase in greenhouse gases that lead to rising sea levels, severe floods and droughts and other environmental effects.

E. Solar Computing:

The alternative eco-friendly energy resources have to be used. A company must take initiative to use Solar Computing that could be a significant part of its green-computing projects.

To develop solar computing, companies must have nonpolluting fully solar-powered devices and the device must be silent, and highly reliable. As in the life time; Solar cells require very little maintenance, they are easy to handle; they also provide energy at nearly no cost once initial installation costs are covered. The production of solar cells has been increased rapidly throughout the world over the last few years because more governments recognize the benefits of solar power and start implementing solar computing.

III. IMPLEMENTATIONS of GREEN COMPUTING

- *Blackle*: It is a Google powered search engine. Blackle was a really good implementation in the area of Green Computing. The idea behind its working is that the different type of displays consumes different amounts of energy; same in the case of different colors on computer monitors.
- *Fit-PC*: It is a tiny PC that requires 5w only. It is too small in size and was implemented because standard PC is too noisy, bulky and requires too much power, so it can easily fit in the places of standard PC. Fit- PC is the perfect combination of compact, quiet and green PC for you. One day power consumption of fit-PC is less than the power consumption of traditional PC consumes in 1 hour.
- *Zonbu Computer*: It is very energy efficient PC. It only consumes one third of the power that is consumed by a typical light bulb. This PC runs the Linux operating system using processor of speed a1.2 gigahertz and RAM of 512 Meg.
- *Sunray thin client*: a thin desktop developed by Sun Microsystems. It consumes far less electricity than conventional desktops. Power

Consumption of Sun Ray on a desktop is 4 to 8 watts. It is well suited for cost-sensitive environments such as call centers, education, healthcare, service providers, and finance.

- The Asus Eee PC and other ultra portables: The "ultra-portable" class of PC that can be characterized by a fairly low power CPU, small size, low cost, compact screen and innovations such as using flash memory for storage instead of hard drives. It is a kind of an ultraportable PC. It like a paperback that has very compact size and its weight is less than a kilogram. Wi-Fi facility is built-in; also it uses flash memory at the place of a hard drive.

IV. THINGS TO BE CONSIDERED

- Buy Green. Buy new equipment only when you need it. While buying, select Energy Star-compliant devices; also consider the long-term energy requirements of your devices.
- Reduce Energy Consumption. Enable the power management functions of your computer, and turn off your computer and related devices when not in use.
- Reduce paper consumption: Circulate and edit documents electronically until printing is not required. Use both sides of the paper to print whenever possible.
- Consider recycling Computer: Consider donating system to a community organization. If its useful life has come to an end, here you can find out, if the system can be recycled.
- Spread the Message to Your Friends and Colleagues. Tell others about the ease and importance of green computing.

CONCLUSION

As the applications of computers are increasing, we need to be aware about increasing power consumption and environment hazards of the technology. By adopting lower power technologies, computers can be made significantly more energy efficient. The

computing industry faces rapid change in the technologies used; Old PCs have typically entered a landfill after only a few years in service; it is not a good thing for environment as electronic waste produced toxic material that is hazardous for environment. One's Carbon Footprint must be reduced to reduce the amount of green house gases produced. Green house gases are measured in units of carbon dioxide (CO₂). The goal of Green Technology is to fulfill the needs of society in such a way that do not natural resources are not damaged or deplete. Issue of global warming can be addresses effectively through Green Computing. Green Computing practices must be adopted by businessmen also to protect the environment. It also results in reducing energy consumption and paper costs. IT industry is trying to implement to achieve Green computing in all its sectors. Key initiatives towards Green Computing are: virtualization, power management, equipment recycling, reduction of paper usage, Green manufacturing, cloud computing.

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