

Green Computing: Driving Economic and Environmental Conditions

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Abstract: Green computing concept is to improve environmental condition. The main aim of green computing is to reduce toxic materials. We systematically analyze its energy consumption which is based on types of services and obtain the conditions to facilitate green cloud computing to save overall energy consumption in this system. Today it is the major issue to prepare such equipments by which we achieve efficient energy and to minimize of e-waste and use of non toxic chemicals/materials in preparation of e-equipments. We can implement green computing in computer's fields as CPU servers and other peripheral devices (mobile devices). By using green computing we can reduce resources consumption and disposal of electric waste (e-waste). In this paper, we will elaborate comprehensively survey the concepts and architecture of green computing, as well as its heat and energy consumption issues. Their pros and cons are discussed for each green computing strategy with its friendly approach towards atmosphere. Green computing can facilitate us to safe, secure place and healthy environment all over in the world.

Keywords: Green Computing, toxic material, e-waste, virtualization

I. INTRODUCTION

Green computing is the study and practice of using computing resources efficiently. The primary objective of green computing is an expanded spectrum of values and criteria for measuring organizational and societal success. "Green" in the industry of Information Technology means the more efficient use of computing resources while minimizing the negative impacts on the environment. This campaign started because of the undeniable state of the environment which does not only affect a portion of the world but the entire planet as well.

The goals are similar to green chemistry; reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime, and promote recyclability or biodegradability of defunct products and factory waste. This initiative focuses on the study and practice of designing, manufacturing, using, and disposing of computers and other peripherals which are the associated

subsystems efficiently and effectively with negligible or no impact on the environment. High performance and energy conservation are conflicting goals in green computing. The impact of the toxic wastes that are produced by us through throwing our old computers and peripherals lead to land pollution. The computers have the power hogs that generate pollution by the energy they consume for their processes.

Green computing addresses many problems. To be in precise, the goals are (which are collected from various literatures as mentioned in reference)

- 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

II. MAIN PROBLEM AND ISSUES

As we know that today the main issue is that the manufactures are preparing such devices which are however more efficient and accurate but they use more energy and evolve very toxics, dangerous gases and chemicals. Many electronics companies especially in computer use lead, mercury, cadmium and other toxics chemicals. It has been calculated that during manufacturing of computers can 4 to 8 pounds of lead alone.

According to a new research it is estimated that computers and other electronics devices make up two-fifth of all lead in land-fills on the earth. The results were quite surprising. The companies found out that only 40% out of the energy consumed is being actually used for the devices. The rest of the energy is used for cooling systems, air handlers and power supplies that could not be interrupted. Due to these findings, these companies are now making small changes. Some companies have undergone studies in which they wanted to measure how much energy is used and how

much is being wasted. This environmental impact management decision specifically wanted to know the power consumed by the servers, networking devices and other IT devices in the data center. They used a metric system developed by a certain vendor consortium.

III. STRATEGIC INITIATIVE

Green computing is an initiative that cropped out due to recent environmental concerns. Everybody must make an effort to contribute may it be a big or small company, home or university. Moreover, green computing is not just beneficial for the environment, it is also cost efficient.

Here are a few strategic initiatives that can be done to save energy but still maintain productivity:

1. Using screensavers means that energy is not saved. If a person has a screen saver in his monitor for more than 5 minutes, then there is wasted energy. If a screen saver shows some moving images, this is consuming as much energy as when you are using it. A black screen saver is better but this still consumes energy.
2. A person can enable power management features in his personal computer systems. There are computers and monitors that can be programmed to use lower energy especially if they are not being utilized. Putting computers in sleep mode could reduce as much as 60%. This is a lot of money when converted into cash bills. The good thing is that productivity here is not affected at all.

A person can also turn off his computer when not in use. There is no worry that the computer will be harmed when it is continuously turned on and off. If a person is going out on a weekend, he can also turn the power plug off.

These are small strategic initiatives that anybody can do in their work or in their home. Small things could also mean big things when put together.

IV. CURRENT TRENDS

The industry is the major consumer of the computing devices. The industry relies too heavily with computing devices in their industrial activities. When the computing industry becomes incapable in sustaining the industrial needs in computers and other computing devices, the global market and industry shall surely suffer. Since the resources in computing industry is losing control in the use of the computing resources, the experts in the field have thought about how they can combat the continuing saga in battling the problem of scarcity in computing resources. This movement led to the development of the Green Computing practice.

This Green Computing study reveals that there is a way that can suppress the worsening problem about misuse and abuse in the use of the computing resources. Some of the formidable methods where researchers are putting lots of efforts to achieve desired results:

- a. Virtualization . Virtualization is a technology that can help you save both hardware and software resources by creating a “similar environment” like an operating system or a peripheral device using your present resources. When the need for that virtualized

application is over, then you can put back your original resource into its original state.

- b. Power Management. The life of your physical devices relies on how effective and efficient you manage them. One of the classic examples is the efficient use of the portable system battery. By using the power management feature of your system, you can actually disable some features of your system that consumes too much battery usage. Not only will this save electric charging fee but also saving your battery from easily being worn out.

- c. Energy Consumption

Organizations are realizing that the source and amount of their energy consumption significantly contributes to Greenhouse Gas (GhG) emissions. In response to this finding, organizations are currently using the following equation:

Reduced energy consumption = Reduced greenhouse gas emissions = Reduced operational costs for the data center

V. CHALLENGES

According to researchers in the past the focus was on computing efficiency and cost associated to IT equipments and infrastructure services were considered low cost and available. According to researchers of Green Computing following are few prominent challenges that Green computing is facing today:

- Equipment power density / Power and cooling capacities;
- Increase in energy requirements for Data Centers and growing energy cost;
- Control on increasing requirements of heat removing equipment, which increases because of increase in total power consumption by IT equipments;
- Equipment Life cycle management – Cradle to Grave; and
- Disposal of Electronic Wastes

V. BEST PRACTICES ORGANIZATION IN GREEN COMPUTING

The idea behind best practice is that there is someone that implements a technique or a method that is more effective than others. Best practices organizations are those that set standards for others to copy or emulate. Currently, there are communities that aim to draw information from best practice organizations. These organizations could help other businesses and homes. The end goal is to be able to reduce information technology related carbon emissions.

It was found out that IT is one of the significant contributors of carbon emissions. This is said to be almost the same as the aviation industry. It was also found out that the two principal generators of carbon emissions from IT are PCs and datacenters.

Organizations from the IT industry are now doing something to reduce carbon emissions by using energy efficient hardware. One of the best practice organizations is Google who is now giving a good example of using servers and cooling systems that reduces negative environmental

impact. There are also other best practice organizations that use software that manages and measures their power consumption. To give motivation and encouragement to the best practice organizations, there are communities now that give special awards. The awards are for those organizations that implement the use of hardware and software to reduce power consumption and others.

VI. FUTURE TRENDS

For many years now, responsible environmentalism and energy conservatism were not normally associated with computer systems and technology. But with “going green” currently advocated, there are various ways of practicing Green computing with technology, which are as follows.

1. Maintaining easily managed network systems can save a lot of time and resources . Apparently, an organized network system reduces network maintenance server requirements hence saving use of resources, such as electricity, hardware, and other more.
2. Cutting down on paper, electricity, hardware, and toner . Color settings of printers should constantly be checked. By calibrating printer settings, an individual can eventually save substantial amount of money while producing high -quality printed documents. A floor lamp with an energy efficient bulb is preferable than overhead ones, saves time and energy, and non-stressing to the eyes.
3. Virtualizing the actual work setting offers the employees the capability to work from the comforts of their home without compromising productivity. Such work set-up allows employees to even save money from daily use of gasoline and exposure to various pollutions.
4. Preferring a remote, electronic management system . This system provides a more efficient printing resolution enabling favorable productivity thus, ensuring both customer and employee contentment.

VII. CONCLUSION

The increasing power costs have forced individuals and firms to develop newer methods and technologies to more efficient and lower power consumption. This paper analyzed the role of green computing towards reducing power costs. IT industry is putting efforts in all its sectors to achieve Green computing. Equipment recycling, reduction of paper usage, virtualization, cloud computing, power management, Green manufacturing are the key initiatives towards Green computing. Current challenges to achieve Green Computing are enormous and the impact is on computing performance.

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