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Go Green with Green Computing

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Abstract **- The goal of green computing is simple reduction in the use of harmful materials, maximize energy efficiency, and promote recyclability. Here, we discuss the concept of green computing and its core ideals in detail, including what it is, why it's needed and some ideas for the future.**

In the recent past another focus has got immense importance and that is achievement of energy efficiency, minimization of power consumption of E-equipments. It has also given utmost attention to minimization of E-waste and use of non-toxic materials in preparation of E-equipments.

Keywords- Green IT, Recycle, Reduce, Reuse, Green Computing, Carbon Footprint, Government Legislation

I. INTRODUCTION

The first step toward the green computing movement was the commencement of the Energy star program in 1992. This served as a voluntary label that was awarded to computer products that were successful in proving that they used minimum energy while maximizing efficiency. The rating was awarded to monitors, refrigerators, television sets, air conditioners, and other household appliances.

The first result of green computing research resulted in the Sleep mode function for computer monitors. This function allows the computer to enter standby mode after a pre-set period passes without any user activity. After this, various concepts like energy cost accounting, thin client solutions, e-Waste, and virtualization were developed.

II. GREEN COMPUTING

Green computing is commonly referred as Green IT. The idea is to ensure the least human impact on the environment. Apart from this, it aims to achieve environmental sustainability.

It is clear from the Figure 1 that the decision must be taken depending upon the factors such as CO2 footprint, the availability of the site and cost for choosing that web site from the cloud.

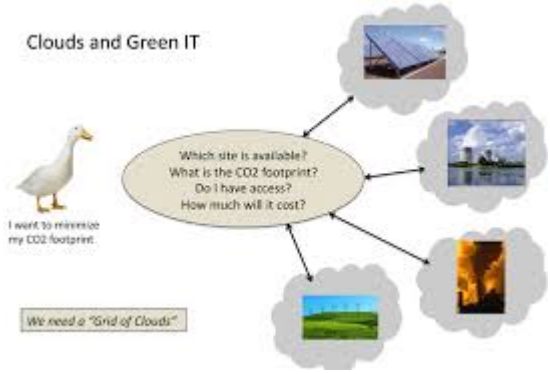

Fig. 1 Factors for Choosing Cloud Application [2]

In simple language, green computing is the scientific study of efficient and effective designing, manufacturing, using, disposing, and recycling of computers and computer related products like servers, network systems, communication systems, monitors, USBs, printers, etc. The study uses science to create technologies that help to preserve natural resources and reduce the harmful impact on the environment.

III. GOALS OF GREEN COMPUTING

Besides other goals of green information technology, most notably objectives of green computing at the design and manufacturing stages are given as follows.

- To cut down to as little as possible the amount of energy used.
- To minimize the inclusion of harmful materials.
- To use as many biodegradable materials as possible.
- To extend as far as possible the life of the equipment.
- To use Energy-Saving Computers

IV. ACHIEVING GREEN COMPUTING

Organizations all over the world are beginning to understand their corporate social responsibility toward the environment. Most companies now believe in conserving energy and power and using environmentally friendly products that help in reducing their carbon footprint. In fact, in many organizations, the need for green computing is put at the top of the agenda. Nowadays, it is imperative for all sized organizations to implement aspects of green computing in their daily workings.

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The most common actions organizations have undertaken are as follows.

- Virtualization - Virtualization is the consolidation of servers and systems to reduce power consumption and energy utilization. It leads to usage of more than one system on a single piece of physical hardware. This allows for minimum power consumption and maximum cooling.

- Power Saving - Industry standards like ACPI design and manufacture computer components in such a way that they result in power controlling and saving. Also organizations must prepare the environmentally sound purchase decisions to reduce the power consumption and to enforce the efficient usage of eco-friendly material.

- Telecommuting - Employees working from home reduce the fuel emission created during commuting by vehicles. Moreover, there is reduction in overhead costs on utilities, etc. All of these initiatives result in increased power and energy savings.

- VoIP - VoIP stands for Voice over Internet Protocol and results in less telephone wiring and lower costs.
- Developing the sustainable green computing plan - Any organization must have proper policies and checklist. The plan should include recycling policies and recommendations for disposal of used equipment, government guidelines and recommendations for purchasing green computer equipment. Green computing best practices and policies should cover power usage, reduction of paper Consumption, as well as recommendations for new equipment and recycling old machines. Organizational policies should include communication and implementation.

- Recycling – the use of unwanted and used electronic equipment should be discarded in a convenient and environmentally responsible manner. Computers have toxin metals and pollutants that can emit harmful emissions into the environment. Never discard computers in a landfill. Recycle them instead through manufacturer programs such as HP's Planet Partners recycling service or recycling facilities in your community. One can donate still-working computers to a non-profit agency.

V. GOVERNMENT LEGISLATION

The Carbon Reduction Commitment (CRC) scheme is designed to reduce carbon emissions, in the UK, by 1.2 tonnes by 2020. Through the use of green technologies the mandatory UK standard aims at improving energy efficiency through cutting UK carbon emissions 80% by 2050. The CRC covers all forms of energy – electricity, gas, fuel and oil – with the exception of transportation fuels.

A. *CRC legislation drives demand for green IT skills*

Companies will soon be forced to hire new staffs that are skilled in green technology due to the mandatory Carbon Reduction Commitment (CRC) scheme brought in recently. The scheme encourages companies to improve their energy efficiency levels.

B. *Knowing which carbon compliance scheme you fall under*

You might find this flow chart useful for finding out whether you will be affected by the Carbon Reduction Commitment (CRC) scheme, the Climate Change Agreement (CCA) or the European Union Emission Trading Scheme (EU ETS). With more and more carbon compliance schemes, being introduced, it is important for businesses to look in to using green technologies for better energy efficiency rates.

C. *CRC Energy Efficiency Scheme tutorial*

There was industry spread confusion when the Carbon Reduction Commitment (CRC) was introduced recently. For those that are still confused about energy efficiency, or those that are yet to read up on how the CRC may affect you, get the latest green technology, advice, news and tips here.

VI. ADVANTAGES OF GREEN COMPUTING

Being part of the universe, it is our priority to maintain the environmental balance and save the life. Making the environment green is the first duty of all beings. The green computing implementation has following obvious benefits.

- 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.

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- 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.

VI. Disadvantages of Green Computing

Green computing could actually be quite costly.

Some computers that are green may be considerably underpowered. Rapid technology change demand for the high computing power or super computer power that can emit lot of heat.

VII. Green Computing implementations

There are various systems available now that help to implement the green computing. Blackle is one of such systems. The principle behind Blackle is based on the fact that the display of different colours consumes different amounts of energy on computer monitors. It reduces the energy consumption of the computer monitor by keeping the screen black. Fit PC is a very tiny computer that can replace the standard, bulky, power consuming and noisy PC. The Fit PC consumes only 5 W and still can work 24/7, without noise, much of the electricity. It is fit to run Windows XP or Linux. Zonbu is also new and very energy efficient PC. Sunray thin client is the product from Sun Microsystem. A Sunray on a desktop consumes 4 to 8 watts of power, because most of the heavy computation is performed by a server. Sun says Sunrays are particularly 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 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.

VIII. Future of green computing

The plan towards green IT should include new electronic products and services with optimum efficiency and all possible options towards energy savings. That is enterprise wise companies are laying emphasis on moving towards Eco Friendly Components in Computers, the use of eco-friendly sustainable components will become the norm rather than the exception in future.

IX. Conclusions

Computing is involved in our day to day lives and it was said that use more computers and less papers. Green Computing is basically elaborates on using less paper, and conserve energy for the environment. Green computing is not about going out and designing biodegradable packaging for products. Now the time came to think about the efficiently use of computers and the resources which are non renewable. It opens a new window for the new entrepreneur for harvesting with E-waste material and scrap computers.

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