

Green Computing: A Practical approach towards environment protection

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Abstract

Green Computing is a way to use of computers and their resources in such a manner that are eco-friendly. It is the process of designing, manufacturing, using and recycling of computing devices in a way that consumes less power and has less harmful effects on the environment. In this paper we have summarized the concept, its components, types, project initiatives and barriers in implementing green computing.

Keywords: Green Computing, Components, Types, Projects, Barriers

Introduction:

Green Computing is a way to use of computers and their resources in such a manner that are eco-friendly. It is the process of designing, manufacturing, using and recycling of computing devices in a way that consumes less power and has less harmful effects on the environment .Government and Some agencies spread a message about Green Computing throughout the world, there for IT companies use or invest in such devices those are energy saver, reducing the use of dangerous material and conveniently use of digital devices. Green Computing Concept is initiated by Environmental Protection Agency (EPA) launched the Energy Star Program in 1992.



Fig 1: Components of Green Computing

- **Green use:** Everyone knows about the importance of saving energy in form of cost, demand environmentally feasible. So, use of computers and their peripheral devices in an eco-friendly manner.
- **Green disposal:** The right way to dispose of electronic equipments and recycled properly.
- **Green design:** Designing energy-efficient or energy saver computer devices so, these cannot effect on the environment and they use long life.
- **Green manufacturing:** Reduce the wastage, while manufacturing of computers devices to decrease the effect on environment.

Green computing effects

Green computing is emerging concepts to use computer devices in such a way so these devices use less power and produce less energy. Now a day's everyone need a computer in daily life and it makes a life become easier but more the use of computers more the power consumption is used due to this harmful gases are produced. These gases are like CO₂ effect are environment and natural resources. Computers as well as data servers consume more power because most of them are based on old technology. These old devices are not possible to use or recycled so, change these old technologies and damage these devices properly. While using or adopting these devices the following harmful effects are generated:

1. While using these devices they consume more power.
2. Decomposing of these electrical parts produce heavy metal like lead, mercury, cadmium into air.
3. While adoption of these computers and such peripheral devices generates a large amount of hazardous waste which is harmful for the environment.
4. Continuous usage of these devices produces harmful gases in the environment.

How can computer users contribute to green computing?

Everyone wants to live in eco-friendly environment so, they took steps to protect an environment by the use of eco-friendly products or cars, consumes less energy, recycled products etc. Green Computing is very important because of day by day our climate change, increase computing power and increase power consumption. Green Computing reduces all these things for protecting an environment and guides the society how to use and expand natural resources. Green Computing can be started from home by considering the following points:

- While using laptops don't put in "sleep" mode .Due to EPA it decreases 60-70 percent energy.
- Turn-off the computer while it is not in use due to this it saves electricity.
- Screen savers use more energy so don't use screen savers on computers.
- Recycle your products and replace computer resources with consumes less electricity and produce less energy.

- Every time use the power saving features and look out for energy saver components while buying a new computer .So use laptops rather than desktop computers because laptops consumes less power.
- Computer hardware is made up with harmful material which is responsible to harmful the environment. So decompose of material properly.
- Don't change the equipments, upgrade and maintain them time to time.

Types of Green Computing:

1. Virtualization:

Virtualization is a concept followed by IT companies. According to research IT departments consumes 70% of budget on their maintenance. Today's X86 servers run just one operating system and run only one application at a time. So, at their virtualization software solves such kind of problem on some extent. By the use of virtualization installing several operating systems and run more than one applications on a single physical server. Therefore it works as a host as well as server and providing resources. Virtualization helps the companies by the server works more than 80%, less requirement of hardware, as well as companies saves money per year \$1500 for each server and saves 7000 kilo energy per year.[3]

Benefits of Virtualization

- Reduction in operating costs

(For 300 servers)	Physical	Virtual
Floor space (Assuming \$2/month/sq.ft.)	150 sq. ft. (25 racks) \$3,600	12 sq. ft. (2 racks) \$268
Cooling requirements (HVAC tonnage) (Assuming \$0.08/kWh)	8,760 hours/year 42 \$29,434	8,760 hours/year 27 \$18,922
Power requirements (Assuming \$0.08/kWh)	125kW \$105,120	95.4kW \$66,856
Hardware costs	\$3.84MM	\$2.7MM

• Total savings by virtualization: \$1.2 Million

Fig 2: Benefits of virtualization

2. Power Consumption:

“Less use of Power leads to less energy consumption”.

The power can be saved by following some little steps like after using computer turn-off all the computing devices. The estimated amount of energy spend in a single year due to round -the-clock is \$115-\$160. So do not follow the myth that turning off the computer is harmful. Computers are designed in a manner that around 40,000 on/off cycles does not affect their efficiency. Other peripheral devices like scanner, printer should be switch off, whenever not in

used . Following these entire activities one can save power and energy. The following figure shows the power consumption in various activities held in computers.[3]

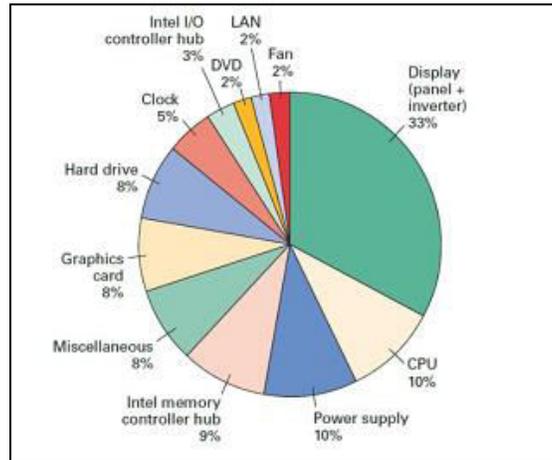


Fig 3: Power consumption components

3. Cloud Computing:

Cloud Computing is a method for transferring the data on cloud rather than save on hard disk or other storage devices. The employees can access the data remotely through the internet. According to study by WSP environment that a company with 100 employees could save 90% of the energy spent with the help of Cloud computing. This could be converted into \$12.3 billion by the year 2020. Cloud Computing helps to protect the environment in the form of less consumption of carbon footprints. IBM launched a new data center that will use less carbon footprints of clients those uses cloud computing. [3]

4. Display:

CRT (Cathode ray tube) consumes high power rather than LEDs (Light emitting diode). CRT consumes 150 watts but LED's consumes less than 12 watts of power. According to research CRT uses cathode ray tube for displaying an image on the screen but LEDs use an array of light-emitting diodes, which uses less amount of electricity while displaying an image. So, replace of LED in place of CRT.

5. Recycle:

Technologies are improving day by day. Same as computer systems have change their functions even a display CRT to LED. So time to time companies donate the computers and other peripheral devices to non-profit agencies and recycle their outdated material. Recycled material is very harmful for the environment as it contains lead, mercury or other harmful toxins. Some developing countries shipped recycled products to other countries as there is less restriction.

Computers and other devices are damaged and recycled properly so protect the environment by using these kinds of things.[2]

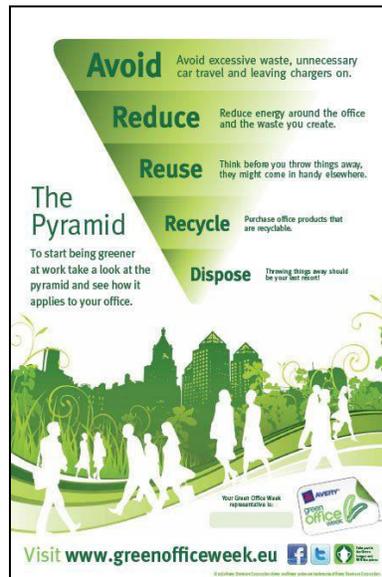


Fig 4: The pyramid

6. Teleconferencing:

Teleconferencing technologies are very helpful to promoting Green computing concept by holding a meeting without the use of an office. It also leads to the same results as normal meetings. In US annual energy consumption in offices is approx 23 kilowatt hours per square foot in form of heat and electricity consumption [1]. Five major things these are helpful to protect the environment by teleconferencing:

- a) Save Energy
- b) Limited use of Printer, Toner and Paper
- c) Limited use of plastic products.
- d) Less wastage of Food
- e) Save Time and Increase Flexibility [4]

Projects initiatives taken under Green computing:

There are various projects that are started under Green Computing” initiative. Some of them are explained below

- **IBM Project Big Green:** The IBM's Project Big Green is a project stated to support green computing .As the demand of electricity is increasing day by day for various IT companies. The increased price of natural gases and oil has increases the rate of electricity. Thus large amount of energy consumption leads to increased electricity bills. As the requirement of electricity increases day by day the cost will also increase and it also hasan effect on company's financial condition. Company's aim is to reduce power consumption at this time IBM's PROJECT Big Green is helping them to accomplish it. Project Big Green helps the companies to understand how to reduce power consumption in various phases like planning, designing and upgrading of computer systems. With the help of this project more than 2000 companies have reduced their power consumption on an average of 40%.This project has Green Data Center to save energy consumption.
- **Dell GreenPrint Advisor:**The Dell company has a vision towards greenier planet it is the greenest technology company. This company has launched an online resource Green printAdvisor for the organizations to check their green rating and recommendation for implementing green computing.
- **Apple's solar Data center:** The most famous brand Apple has announced that the solar data center is going to be established in Reno, Nevada. According to press release Apples using 100% renewable energy in to its datacenters. It is also involved in some recycling programs to save energy and making environment pollution free.[6]

Barriers in implementing Green Computing:

Although there are so many advantages of Green computing as it is eco – friendly, saving environment, better resource utilization, etc there are some barriers in implementing it.

1.Initial Cost:To implement Green Computing the energy saving resources need to beimplied, which may have higher costs as compare to others.

2. Lack of motivation: Although there are so many reasons for implementing it .The companies are not so motivated to implement it. Also it is not supported by management and it also faces financing problems. Employees of a company also think that it leads to loss of their job and a lot of rework needs to be done.

3. Lack of expertise:As it is emerging trend there is a lack of expert persons who can implement it. To implement it a great amount of reengineering is required and a lot of rework needs to be doneleading itto difficult to implement.

4. Privacy issues: Green Computing also leads to privacy problems to the company. As to save company's data in to green data center the company has to give its data to be saved which leads to problems such as data theft, misused data and other privacy issues related to data.[5]

Conclusion

Green Computing is not a word it's a new concept. Latest Technologies helps of Green Computing for saving an environment. Every new technology reduces the failure of Old technologies .In last ,practice steps for a green computing is a simply a little effort to protect an environment by using harmful product and make a environment Green.

Refreencs:

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