



# A review of GREEN COMPUTING: GOING GREEN-GROWING SUSTANABILITY

Mrs.Rupali.S.WAGH  
Asst. Professor  
C. M. C. S. COLLEGE  
Nashik, Maharashtra

Mrs.Ashwini .R.Patil  
Asst. Professor  
Dr.D.Y.Patil ACS College,  
Pimpri, Pune-18

Ms.Rohini R. Bhoware  
Asst. Professor  
Dr.D.Y.Science & Comp.Science Patil College,  
Akurdi,Pune-44

## ABSTRACT:

This paper presents detailed study about green computing. Green computing is study of designing, manufacturing and disposing computing devices which are the E-waste. We emphasize on process of green disposal which is repurposing an existing computer or appropriately disposing, minimizing and recycling unwanted electronic equipment. This paper also focuses on importance of green computing and solutions for going green.

## KEYWORDS:

Green computing, green disposal, E-waste, Green use, Green design, Green manufacturing

## INTRODUCTION:

Today's world constantly searching for an advance set of devices such as computers. Computers are an essential part of every aspect of living. It is useful for business, home and entertainment. But at the same time electronic waste is now major problem world- wide and is increasing day by day. Computing devices are great source of heat, CO<sub>2</sub> gas, electronic waste and energy consumption in large amount. This adversely affects the environment.

Computer manufacture users energy resources and disposes e-waste in environment. Computer resources use materials which are non-renewable in nature and are made useful after long processing; this processing consumes significant energy and other resources. [2]

“Going green” means to create an awareness to protect the environment and encourage practices which are environment friendly.

Green computing should be adopted to reduce the use of harmful and unsafe materials and improve the energy efficiency, recycling of e-waste. The efficient implementation of server and peripherals may reduce the power consumption. [5]

There are many solutions which can help to implement green computing practices. Green disposal is one of the solutions to get control of these problems. This minimizes e-waste and increases the sustainability of computing devices.

## DEFINITIONS:

**Green computing:** Green computing is the use of computers and its resources in an environmentally responsible manner. It is study of designing, manufacturing as well as using and disposing of e-devices efficiently and effectively with minimum impact on environment.

**Green disposal:** Repurposing existing equipment or accordingly disposing and recycling of used electronic equipment.

**Green design:** Designing energy efficient computers, projectors, servers, printers and other digital devices.

**Green manufacturing:** Minimizing waste during the manufacturing of computer and to reduce the environment impact of this activities.

**Green Use:** Reduce the use of toxic materials and optimize energy efficiency.

## IMPORTANCE OF GREEN COMPUTING:

Today computers are integral part of everyone's life. It solves almost every problem efficiently but it has some disadvantages and one of it is environmental effect. Computers are made of harmful chemicals such as mercury, polyvinyl chloride (PVC), cadmium, chromium, aluminium, radioactive isotopes and lead glass. Computer manufacture uses energy resources and disposes e-waste in environment. Transportation and packaging of computers with plastic consumes fuel and spoils the environments. Server needs 24 hours electricity supply and cooling machines which increases carbon footprint [2]. A lot of energy is using everyday and lots of waste is available which is unhealthy and can lead the human being to a termination point [3]. Pollution and toxicity increases due to manufacturing, packaging and disposal technique which affects the human health. Computer energy as well as printing is often wasteful [1].

Green design influences the cost of disassembly, component repair and inspection, recycling the reusable materials and remanufacturing. Encouraging recycling and reuse product components with eco design, less use of harmful and non-renewable materials in product build-up reduces the environment load. Less fossil fuel will be burned by reducing the use of electricity. [3]. Power management ways can save energy and help to protect the environment.

Green Data Centre, Virtualization, Power optimization, Cloud computing and grid computing are some of the technologies of green computing [5].

## Features of Green Computing:

Some of the important features are as follows:

### 1) Reduce power consumption

- i) Minimize electricity used by server and data centre.
- ii) Decrease screen brightness.
- iii) Switch to LCD from CRT.
- iv) Do computer related task during contiguous, leaving hardware off other times.
- v) Avoid use of screen saver and allow a monitor to enter in standby mode.
- vi) Use Energy star labelled products.
- vii) Replace components of a system with a more power efficient alternative which can perform the same task with less energy. e.g. Optics can replace conventional networking and energy efficient non volatile memory can replace a disk drive.
- viii) Use customized evaporative cooling to reduce data centres' energy consumption like Google
- ix) Create energy proportionality by scaling down energy for unused resources [4].

## 2) Reuse and Recycle resources

- i) Donate or recycle a non-working computer for further use.
- ii) Update software's online.
- iii) Through recycling the waste or equipment we can reduce the environmental pollution.

3) **Reduce Paper Consumption.** There some easy ways to reduce paper consumption which includes use of e-mail, electronic archiving, use the "track changes" feature in electronic documents instead of redline corrections on paper. Use both sides of paper to print out documents. Use small margins and fonts, recycle frequently, and print required and selective pages only.

4) **Virtualization:** It is the use of software to put on hardware. In the data centre stand-alone server system replaced with virtual server that runs as software on a small number of larger computers via a virtualized server. We can efficiently use computer resources.

5) **Cloud computing:** It has many benefits it enables anybody to obtain environmental benefits of virtualization. It also remove the need for the user to run high power PCs since it provide infrastructure as a service.

6) **Wireless Network Sensor:** Sensor occupied in different areas to determine the temperature in a data centre of each area. This helps us to know where to minimize cooling and which area need to be cooler. [5]

7) **Green Data Centre:** A green data centre is a data centre which has an adequate management of the system and linked system less power consumed environment. Use customized evaporative cooling to reduce data centres' energy consumption [4].

## CONCLUSION:

Green computing have a positive effect on our lives and world. Efficient use of computers and the resources is very important for future. Hardware design the machines to conserve energy and minimize the e-waste disposal. Need of organization to achieve cost and power saving and increased performance can be achieved by incorporating green computing methods. Green computing reduces the energy cost and increases the productivity. Key factors of green computing are low power consumption, low waste, sustainable life, reusable energy and recycle.

## REFERENCES:

- 1) <http://www.slideshare.net>neenasahni>
- 2) K.Brindha, S.Sudha, Spana saini, " Green computing :An Eco-friendly Approach towards Computing", ijarcse vol 5,issue 5, May 2015.
- 3) I. D. Paul, G. P. Bhole, J. R. Chaudhari, "A review on Green Manufacturing: It's important Methodology and its Application" Elsevier Ltd. 2014
- 4) Communication of the ACM, April 2010 vol 53, No. 4
- 5) Pushtikant Malviya, Shailendra Sing, "A Study about Green Computing", ijarcse vol 3, issue 6, June 2013