Green Computing for Eco Enriched Information Services and Systems: Environmental & Bio Informatics Perspective

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Abstract: Green Computing is one of the emerging concept and practice towards design and development and maintenance of computing and information system which are eco friendly, releases less harmful material and chemical and based on less carbon [CO_2] emission. Green Computing is the practice of using computing resources efficiently. Green Computing can facilitate safe, secure place and improved environment all over in the world. Virtually Global temperature is increasing day by day and Electronic goods are many ways responsible for such; hence technologist and scientists are dedicated to building sustainable electronic product and system worldwide. This paper is talks about Green Computing including its nature and feature and requirement. Paper highlighted the bad side of Electronic and Computing goods and side by side possibilities to overcome such Electronic Goods.

Keywords: Green computing; Information systems; Green information science; CO_2; Harmful chemical; Toxic material; CFC; Green house gas; Environmental science.

1. Introduction

Green Computing is a study as well as practicing field towards design and development, implementation of environment friendly hardware, software and complete Information Technology infrastructure building [1],[2],[3]. The ultimate aim of Green Computing and similar technologies such as Green Information Technology and Energy Informatics is minimizing the hazards material, increase energy efficiency during lifetime of the equipment as well as promote recyclability of biodegradability of defunct product and factory waste. Global temperature is increasing day by day and the increasing heat result so many bad effects such as floods, melting of glacier, drought and increasing sea level and so on [4], [5], [6]. Hence global warming is many ways result of bad practice of computing and other technologies. Such technologies are also very bad in terms of human began for chances of so many diseases.

Fig-1. Depicted possibilities of world of Green Technologies
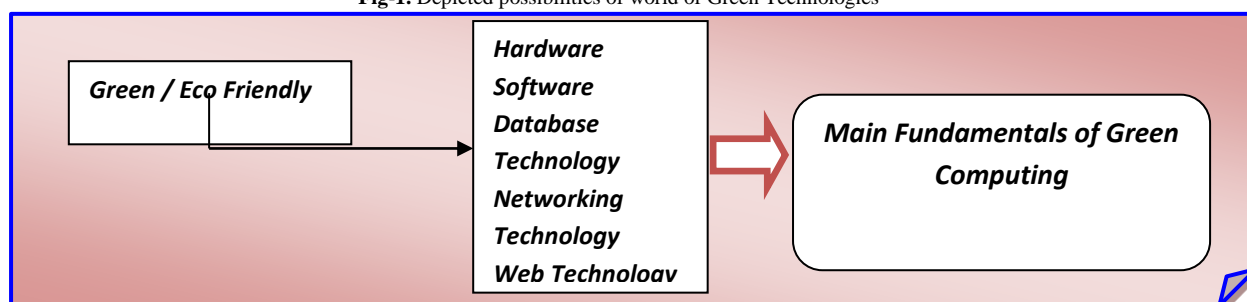
2. Objective

The main aim and objective of this paper is includes but not limited to as follows—

- To know basic about Green Computing. Including its basic feature and characteristics.
- To learn about the Green Computing and similar technologies and domain and their need to promote environmental information system practice.
- To know about Green Computing and way to practice it in the organization and institutions.
- To learn the fundamental about the possibilities and way to remote bad effects from the tool, techniques and electronic goods.

2.1. Green Computing: Fundamentals to Need

Green Computing and its practice is today an important issue to prepare such equipment to save complete energy consumption. Green Computing is a practice and methodologies rather than technologies [2], [7], [8]. This is a concept and method to bring sustainability towards IT product development and uses. In Green Computing, some things are followed. First of all, Green Computing is talks about the design and development of hardware and electronic equipments which are less energy consumed, releases less harmful chemical and toxic material. Then with such hardware and equipments, engineers implement computer to bring sustainability in computers [4], [9], [10]. In Green Computing, computer and software engineer basically engage in a particular computer manufacturing which is cost effective, speedy and return less harmful material and temperature.

The concept of Green Computing was emerged after 1992 after launch of US Environmental Protection Agency's 'Energy Star' [11]. Initially, Green Computing is practices among the Engineer and Environmental Scientist to promote and recognize energy efficient monitor, CPU, climate control equipment and other tools and technological preparation [12], [13]. Green Computing today practices in the manufacturing unit as well as organizational information system implementation [14], [15].

Fig-2. Depicted Information Professional who are any how related with Green Technologies
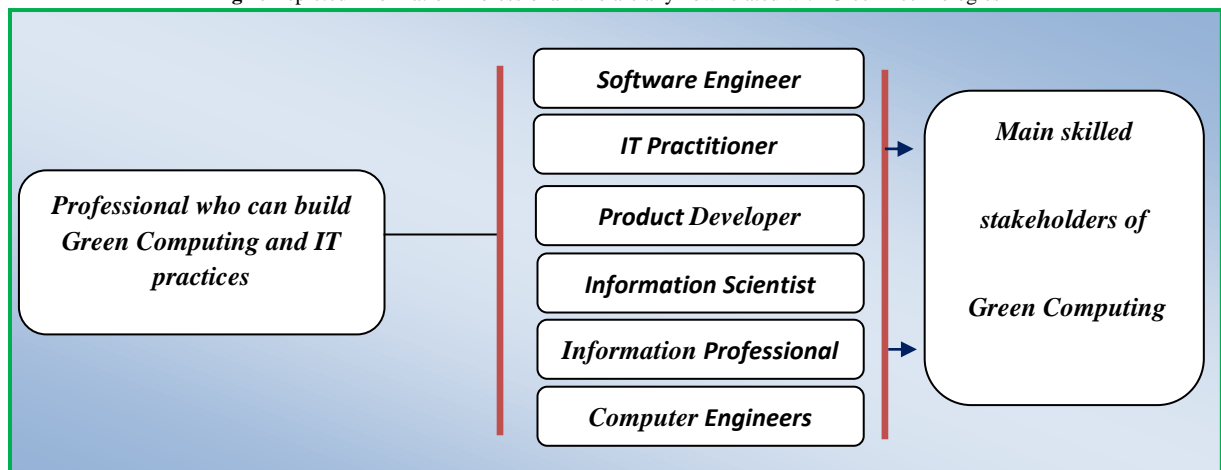

2.1.2. Some Fact and Requirement

Green Computing is desired for many reasons first of all it reduces global temperature. The global temperature is increasing day by day for many reason and electronic tool and equipments are many way's harmful in global warming [16], [17], [18]. Green Computing is also needed for the less carbon emissions. Computer and other electronic gadgets basically built with many *harmful materials and chemicals*, lead is one of the harmful facet, which is uses during manufacturing of computers can use 4-8 pound. More importantly computer as well as other devices make up to two-fifth of all lead in landfills. Mercury is another harmful material to the sustainable computing and IT practice. In broader sense computing is not only restricted to the conventional computers, it is more than that and also includes other electronic gadgets which are directly and indirectly run with computing systems [19], [20]. Hence, the Green Computing is also with television set, refrigerator, air conditioning system, and display unit and so on. And technologies and Engineers are engaged to manufacturing and use of such devices according to the principle of Green Technology and Environmental Science. Today many companies are working towards Green Computing and technological practices which are listed in the *Table 1.*

Table-1. Showing some information on 'MNC's involvement towards Green Information System building

Corporate Involvement in Green Computing agenda
IBM- The International Business Machine [IBM] engaged in computer practice which are much more eco-friendly and sustainable. According to a report, IBM saved 4.6 billion KWH of electricity and also presented million metric tone of CO_2 emission.
Google- Google is going to establish a Data Centre which will build by the Hydroelectric power.
Microsoft- As like Google, Microsoft is also engaged in building Cloud Computing system which is run by the hydro electric power.
HSBC- The financial service company is engaged with building of Data Centre near Niagara fall for cooling and low energy consumption.

According to latest Research, it is observed that, 1.2 % of total electricity is utilized in USA only for computing devices and companies are spending much more for energy consumed Data Centre building than that of hardware budget [21], [22]. According to a new research, the IT companies are spend around 10 % only in Computing is 'On' then it is consume 60 watts and during stand by 13 watts. A separate list is provided in Fig. 3.

As far as IT products and tools is concerned, in a computer, Display unit is much more energy dependent and needs around 33 % of total energy utilization. Hence faster processor uses more energy and slower or inefficient processor may also use double power which is the wastage of energy in form of heat which creates population in our environment [19], [23], [24]. Computing with cloud platform and virtualization is also important tool; many companies are working on cloud computing for 'Green Information System' building. IT manufacturer are building processor which use low energy. SUN has designed multicore processor which is very efficient relating. Hard disk drive is takes higher energy than that of solid state driver as 'Flash Memory' or DRAM; hence today's computers are coming with such system [25], [26], [27], [28]. In printing we can use the printer which is able to print out both side and recycling of used ink in powder form and toner of the printer can be used again. As lead is very harmful so manufacturer are moving towards Tin/ Copper/ Silver. In Multimedia systems which are less energy based and for that VGA card, 3D and Graphic Card are essential to use, as per the energy consumption principle. Petroleum Filled Plastic may be replaced by the Bioplastic which requires less oil and energy [25], [29], [30].

Fig-3. Showing ultimate problem and challenges of Green Computing and Information Technology
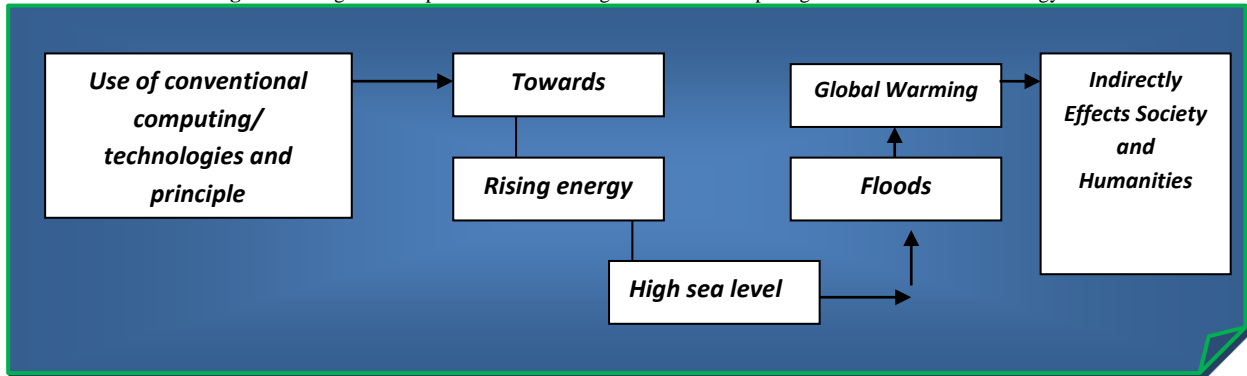
3. Suggestion

- Wireless Information System may be used in use and organization and use of virtualization of hardware, software and IT system may save energy many ways.
- Instead of heavy metals such as cadmium, mercury and lead, manufacturer may use less harmful material such as Tin/ Copper/ silver.
- Use of LED/ LCD instead of CRT monitor will be helpful many ways; use of projector also is important in this regard instead of big screen.
- E-Waste management, recycling of printed documents are very much essential and utilization of algorithm and logic which take less time for Information System and Decision Support System.

4. Conclusion

World is changing day by day in terms of socially, culturally and technologically and obviously environmental. The world is getting tempted each and every day and electronic goods are many ways responsible for such. Apart from manufacturer, IT companies and general users of computer and information system of an organization, common people need to involved in Green Computing and Technology agenda for Energy Consumption and power management and environmental friendliness. Hence we need to obey (*or may be initially started as*) some practices such as keep switch off, log mode if not used and during designing of Information Architecture according to time is also very much important.

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