



Green Computing: An Eco-friendly Approach towards Computing

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Abstract: *This paper presents a detailed study about different methodologies and algorithms which are helpful in green computing. Green computing is a method of using computer systems and other peripheral devices in eco-friendly manner. As in the last some years there is dramatically hype in IT industries. There should be some methods defined for designing computing systems and handheld devices so that concept of green computing can be improved. The goal of green computing is to decrease carbon footprint and e-waste which is generated due to electronic items.*

Keywords: *Green computing, methodologies, algorithm, industries, designing, computing systems.*

I. INTRODUCTION

Computer is an advance set of devices which helps human in every aspect of living. But there are negative effects of computer. Computing devices are great source of heat, CO₂ gas, electronic waste and energy consumption in large amount. This side of computer society is affecting environment. Green computing is an initiative towards environment by using computer systems efficiently and utilizing energy resources so that computing devices such as central processing unit, servers and other peripheral devices affect the environment minimum. Green computing is not restricted till usage of an electronic device but it can be implemented in various phases of a device such as designing, manufacturing, and disposing of product. Green computing involves designing and manufacturing recyclable products with minimum e-waste and less pollution. Green technology aims to minimize carbon footprint and its impact on environment. [3] The idea of green computing was first activated when U.S. Environmental Protection Agency launched *energy star* in 1992. Energy star is a labeling program which is used with monitors, cooling devices etc. Sleep mode in devices was the very first result of green computing. Sleep mode helps us in saving energy when we are not using devices. Currently green computing is emphasizing on e-waste and energy saving.

II. IMPACT OF COMPUTING

Computer is one of the most successful inventions of human. It has made major impact on working methodologies on individual. We use computers for education, knowledge, information, business, communication, e-commerce, entertainment purpose. Computer provides services in various fields including medical, military, government, research work, knowledge processing, space theories and many more. Computer solves a problem in effective and time efficient manner. We cannot neglect the benefits of a computer system. However with all these advantages, computer still have some negative side. We can differentiate disadvantages of computers in three categories such as environmentally, physically and socially. Here in this research paper we are emphasizing on environmental effects of computers. Computers are made of heavy metals and harmful chemicals such as mercury, polyvinyl chloride (PVC), cadmium, chromium, aluminum, radioactive isotopes and lead glass. These materials affect the environment in some or more way. Computer manufacture uses 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 amount energy and other resources. The process of converting refined raw material into final product also consumes energy and fuels. [1] According to a research, the fuel fossil required to manufacture a desktop computer is almost ten times the weight of its own weight. Intensely poisonous dissolved metals are moving into our local water supplies during its creation. Computer is not made with a single unit of device, there are other electronic parts which completes a computer such as hard disk, screen, small circuits. Each of these components uses heavy materials. Once a computer system is manufactured completely next task is to distribute the system where it is required. Transportation can be with in a city or worldwide. Transportation and packaging of computers with plastic consumes fuel and spoils the environment respectively. These computers are used in various sectors which can be a personal computer or information server or a programming computer or data center. Computers which are connected to network and work as server need 24 hours electricity supply and cooling machines. These heavily loaded machines increase carbon footprint. [2] According to a research desktop computers consumes 80 to 150 watt/hour and laptop uses 20 to 50 watt/hour. It is observed that most of the computer resources and energy is not used in efficient manner. These devices consume energy when in no use as generally people do not turn off their system on time.

III. SOLUTIONS

There are several solutions are possible which can help in implementation of green computing. Implementation of green computing mainly refers to reduction in power consumption and carbon footprint. This also involves minimization in e-waste. [4]According to a research held by HP if we implement proper power management we can save up to \$100 per computer. The followings are some main methods which can be helpful:

(A). Energy star products:

Energy star labeled products are energy efficient and uses less power consumption. Initially energy star was designed for computers but now it qualifies computers, servers, cooling devices, home electronics and heating devices.

(B). Recycle and Reuse:

Computers contain toxic chemicals and pollutants that leave harmful effect on environment. We should recycle a non-working computer instead of manufacturing a whole new system. Recycling a system can eliminate development cost. Reuse a computer in working condition or donate it to a nonprofit agency for further use. One should not change a system only for hardware design and features. Computer software can be updated online.

(C). Conserve Energy:

Turn off the system when in not use. One should use power management plans such as sleeping mode and hibernate facility. Power management allows computers and monitors to wait idle in low power state. Computer monitors consumes more power when brightness is higher compare to normal brightness.

Screen saver also consumes electricity when monitor is not in use. One should switch off monitor for better results. LCD monitors are also designed to emit less CO₂ compare to CRT monitors.

(D). Less Paper Consumption:

Paper consumption is not directly related to computers but we can reduce paper consumption by using technology such as e-mails, electronic archiving, and electronic notepads. We can reduce paper consumption using smaller fonts for printing and using both side of paper for printing. We should avoid printing unnecessary documents and spam mails.

(E). Cloud Computing:

Cloud computing allows a user to access resources and services which are located in network. The benefit of cloud computing is that we can have high performance using less resource or centralized resources. Cloud computing reduces technical infrastructure needs. It is more eco-friendly and technical efficient.

IV. CONCLUSION

In this research paper we have shown importance of green computing. Green computing is required for a better and healthier future. We should understand the need of Green computing and should take necessary steps towards it. Today we are suffering from all kind of pollution such as air pollution, water pollution, soil pollution etc. Key factors of green computing are low power consumption, low waste, extended life, reusable energy and recycle. Even though computers are very much required in today's technical world, it is also very important to save the environment. Today we need a model for

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