

Green Computing: Emerging Issues in IT

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INTRODUCTION

Green computing is the way of using computing and IT tools efficiently in an educated environment it is our basic responsibility to protect the environment and conserve energy cost in next generation computing requirements.

Green computing or **Green IT** is the analysis and practice of ecofriendly sustainable computing or IT. According to San Murugesan "designing, manufacturing, using, and disposing of computers, servers, and associated subsystems—such as monitors, printers, storage devices, and networking and communications systems — efficiently and effectively with minimal or no impact on the environment[6]. The need of green computing is to minimize the use of not so ecofriendly equipment, maximizing energy efficiency, and to reuse computing devices and IT garbage. Green computing provides future strategies .Thus, green IT includes the scope of environmental ecofriendly sustainability, the economics of conserving energy, and the total cost of possessing it, which includes the cost of efficiently disposing and reutilizing. This is the practice and study of using computing resources efficiently [7]. Some of the major characteristics of green IT includes consolidation, and cloud computing [8]. Green IT can be achieved through minimizing the use of energy and checking waste. Energy computing and emissions tracking software are abundant. The process that takes place in IT—from computer equipment to small paper – directly impacts how green IT is and how green its vendors are. If an IT company only buy technologies with star rating, EPEAT, energy efficiency ratings, it can drastically reduce its energy consumption and greenhouse gas emission, and it will push manufacturers to develop products that are energy efficient.

ABSTRACT

Green Computing is a way of study of ending reutilizing and rebuilding of computers and electronic devices is overall analysis. The goal of green computing is to reduce the dangerous material increasing the utilization of energy.

Green computing implies to practices and ways of utilizing computing resources in an ecofriendly way while maintaining overall computing .green IT refers to computer and information system and IT applications and predominant strategy to help save and enrich an environment, an increase in the eco logical sustainability in today times. Green computing is under consideration of all the business organization and leading companies with the advancement of new technologies and its varieties of applications. In yester years, especially during last 10 years, computer and IT industries realized the importance of going green an addressing the major concern relating to environment and also to minimize the cost which has led to sharp drift in strategy and policy to IT industry.

The importance behind this change arise from computing demand and emerging cost of energy, global warning issues ,this paper present ecofriendly initiatives under way in IT industry and in brief covers the main research challenges which are still gazing to meet green computing requirements.

KEYWORDS: *Green Computing, Energy, Computer and IT*

At the end, a green IT function needs a waste management program. The green IT or green computing, aims to reduce the carbon emission generated by the Information Systems business while allowing them to reduce their spending.

Green computing is to be responsible about environment and environment friendly use of **computers** and their resources. In large context, it is also defined as the study of designing, manufacturing/engineering, using and disposing of **computing** devices in a way that reduces their environmental impact.

1. CHALLENGES

According to previous researchers focus was on computing efficiency, availability and low cost and cost associated to IT equipment's and infrastructure services.

Now infrastructure is becoming the major problem in IT environments and the reason for this shift is due to growing computing needs, energy cost and global warming. This shift is a great challenge for IT industry. Therefore now researchers are focusing on the energy conservation, cooling up of system, power utilization and data center space. At one end it is the computing power that is important for business and on the other end it is the motivation drive, challenge of environment friendly system, and infrastructure.

Limitations [9].Green Computing challenges are not only for IT company users but also for the IT machine Vendors. Several major vendors have made good progress in this area,

for example, Hewlett-Packard now showed, which they called “the greenest computer ever”—the HP rp5700 desktop PC. The HP rp5700 is more than U.S. Energy Star 4.0 standards, and has a life of minimum five years, and 90% of its materials are recyclable [3]. Dell is improving up its programs to minimize hazardous substances in its computers, and its new Dell OptiPlex desktops are 50% more energy-efficient than similar systems manufactured in 2005, its all credit goes to more energy-efficient processors, new energy management features, and other related factors [3][11]. IBM is doing research to develop cheaper and more efficient solar cells plus many other solutions from IBM to support sustainable IT. According to Researchers of Green Computing following are few prominent challenges that Green computing is facing today [9]:

- Equipment power density / Power and cooling capacities;
- Increase in energy requirements for Data Centers and growing energy cost;
- Control on increasing requirements of heat removing equipment, which increases because of
- Increase in total power consumption by IT equipments;
- Equipment Life cycle management – Cradle to Grave; and
- Disposal of Electronic Wastes.

2. Open Research Challenges

Energy is one of the most important and basic resources available to the world, a major portion of which is now being consumed to switch on computers and power its computing infrastructure.

- **Reduce architectural complexity:** The research area is open to minimize the number of layers and component dependency on each other, to reduce maximum system use. Intel's core 2 duo is a way which uses power to run only those parts which are important at any computation [12].
- **Developing Green Maturity Model:** Full life cycle of equipment is the vital aspect of green maturity model, with energy reduction as the best measure. The need of **maturity models** for equipments, IT organizations, computing techniques is an area of concern which has been taken up by some researchers but is limited to specific areas. Green maturity model for virtualization [14] depicts that each level describes in energy conserving the degree of green characteristics.
- **Green Software's:** Recently, green software inclination has become a research subject for most of the software developers companies because of need for sustainable development [16]. Most of the research has been done on the characterization, metrics and technical answer for green software, but few have addressed green software from the business, company perspective. Business organizations are moving towards green software's and still some important steps need to be taken..
- **New high-efficiency data center design:** Bigger data centers should be made much more energy efficient than smaller data centers. Standards are emerging for measuring and tabulating this, such as the concept of Power Usage Effectiveness (PUE). PUE is defined as the ratio of total facility power divided by IT equipment power [13]. Thus, it is a measure of how much of the power being used by the facility is actually being used to power the IT equipment itself rather than all the

other things. Therefore it will be a major challenge to make the bigger data centers power efficient.

- **Information Resource Tier Optimization:** The information resource tier represents vital data base management systems in the universal computation world. General paradigms include databases, directories, file-systems, and flat files.
- **Wireless Sensor Network for Data Center Cooling:** data center cooling down is a important issue as far as power utilization is concerned. Data centers are basic backbone of any computing organization and must be accurate, reliable and available every time. Measuring the data center accuracy, effectiveness and maintaining the bottom line is an issue. Wireless sensors could play a major role for managing data centers power management [15].

3. Green Initiatives in Information Technology

This has led to widespread adoption of sleep mode among consumer electronics. Concurrently, the Swedish organization TCO Development launched the TCO Certification program to promote low emissions from CRT-based computer displays; this program was later enhanced to include criteria on energy usage, ergonomics, and the use of hazardous materials in construction in IT. With time IT industry has taken many steps towards green ICT (Information and Communication Technologies). The important green initiatives in IT are:

- **Improved Data Center Cooling Methods:** This is achieved by enhancing the data center cooling configuration of machines, minimizing considerable amount of energy leaks. It can make efficient data centers by following new practices in data centre layout and rack and server arrangements. new approach include raised floors to improve airflow, moving cooling equipments closer to servers to concentrate cold air in the right place, varying hot and cool server passageway to improve airflow and using water-based air conditioning systems [9].
- **Efficient Servers usage by Virtualization:** IT companies are using many server farms or data centers, dedicated to a specific task. These data servers must be used efficiently. One of the way is load balancing which chooses the best resource among many. by using virtual software to perform tasks, a single server will be used to power these virtual servers, it will reduce energy consumption.
- **Energy saver initiatives:** It includes energy saving settings and encouraging employees to turn off equipment at the end of the work day.
- **Using Thin Clients:** With less clients, each employee has a virtual desktop that includes a mouse, keyboard and screen while the balance unit is shared by all at a central location.
- **Strengthen Printer's Output Management:** Centrally located printer should be used to handle all printing tasks remotely eliminating many machines being left on all day consuming up energy and driving up costs.

CONCLUSION

Green computing will have major impact in future computing. New computing innovations, designs and applications need to fulfill the green computing requirements for the constant and efficient development of Information and communication technology (ICT). Every

research and development challenge carries a future prospect for employing efficient computing in various areas. We will further assess these challenges for better understanding and future research. Current challenges to achieve Green Computing are huge and its impact on computing performance. Efforts of Governments and Non-Government Organizations (NGOs) are also notice worthy. Government regulations are pushing Vendors to be ecofriendly, reduce energy consumptions as well. All these efforts are still in initial stages and currently stress is mainly to conserve energy, reduce electronic Waste but the future of Green Computing will be depending on e waste, and efficiency. Future work in Green Computing discipline basis research work in academics since this is an emerging discipline and there is much more need to be done. There is need for advance research in this discipline especially within academic sector.

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