Scope and Issues of Green Computing in networking: A Research

Mrs. Manjiri.S.Dixit¹

¹(Department of Computer Science, Dharampeth M.P. Deo Memorial Science College, Nagpur/RTMNU, India)

Abstract: -Green computing, green IT or ICT ability to sustain, denotes to environmentally ecological computing or IT. The objectives of green computing are corresponding to green chemistry; decrease the use of hazardous materials, make best use of energy efficiency during the product's lifetime, and stimulate the recyclability or biodegradability of non-operational products and factory waste. Research lasts into crucial areas such as making the use of computers as energy-efficient as possible, and designing algorithms and systems for efficacy-related computer technologies. Green computing is the environmentally account table for use of computers and connected resources. Such practices consist of the implementation of energy-efficient central processing units, servers and peripherals as well as compact resource consumption and proper disposal of electronic waste (e-waste). We use Green Computing because it lessen energy usage practice from green computing techniques translates into lower carbon dioxide emissions, curtailing from a reduction in the fossil fuel used in power plants and transportation. Sustaining resources means less energy is required to produce, use, and dispose of products. Saving energy and resources saves money. Green computing even take account of varying government policy to encourage recycling and let down energy use by individuals and businesses.

Keywords: Eco Friendly, wireless and wired network, Google green computing, Green initiatives, Communication technologies, Green technologies, Power Consumption.

I. INTRODUCTION

Green computing is defined as the learning and exercising the practice of designing, manufacturing, using, and arraying of computers, servers and related subsystems such as monitors, printers, storage devices, and networking and communications systems-efficiently and effectually with nominal or no control on the environment. The objectives of green computing are analogous to green chemistry, lessen the usage of harmful materials, capitalize on energy efficiency during the product's lifetime, and stimulate the recyclability or biodegradability of invalid goods and factory waste. Research continues into basic fundamental areas such as making the usage of computers as energy efficient as possible and manipulative algorithms and systems for efficiency-related computer technologies.

There are several methodologies to green computing

1. Product longevity
2. Algorithmic efficiency
3. Resource allocation
4. Virtualization
5. Power management.

The Reduction of excessive energy consumption is becoming a foremost anxiety in communication network because of economical, environmental and marketing reasons. There has been tremendous progress in communication networks market both in infrastructure and wireless field. The main purpose of green computing is to scrutinize new computer systems, computing model and applications with the low cost and low power consumption and endorse the
viable development of economy and society. Due to the explosive development of the Internet and reducing cost of computer hardware leads to requirement in development of variety of applications from different domains. Although green computing is becoming progressively more significant in communication network systems, it has challenging problems to network designers.

II. HISTORY OF GREEN COMPUTING

The prominence of green technology was made obvious when computing achieved critical mass in the early 1990s. Energy Star applied to products like computer monitor, television sets and temperature control devices like refrigerators, air conditioners, and similar items. This stemmed in the widespread acceptance of sleep mode among consumer electronics. This green computing theory emerged certainly as businesses find themselves under pressure to get the best out of resources in order to compete effectively in the market.

III. SCOPE

Green computing has recently become a major research issue due to its several economical and environmental impacts. To decrease these environmental problems and maintain a supportable environment, novel paradigms, methods, techniques, tools, and systems are required so as to improve green computing and communication technologies with high energy productivity, low greenhouse gas emissions, and better reclaim resources and material. It also solicits the application of computing, communications and networking technologies towards the expansion of sustainable energy systems that may include upgrading of the electric power grid and the integration of distributed energy resources.

Topics of specific interest include, but are not restricted to the following.

1. Design and study of the smart power grid
2. Energy-aware computing and communications
3. Energy-effective networking and computing infrastructures
4. Energy-competent multimedia systems
5. Energy-proficient cloud computing
6. Energy-aware resource provision and scheduling mechanisms
7. Green materials and devices designs
8. Life-cycle analysis of computing components.
9. Energy harvesting, loading, and recycling Climate and ecosystem testing
10. Energy-efficient data center and cloud technologies

IV. WHY GREEN COMPUTING

Today, almost all fields whether its IT, medicine, transportation, agriculture uses machines which ultimately requires large amount of power and money for its operational functioning. We have great machines and equipments to complete our odd jobs, excessive gadgets with imperial looks and features make our lives more striking and smooth. Green computing which aims to reduce the usage of perilous materials, make the most of energy efficacy during the product's lifetime and stimulate the recyclability or biodegradability of invalid products and factory waste. Therefore we use Green Computing for following benefits-
Fig: Benefits of Green Computing.

V. APPROACHES TO THE GREEN COMPUTING

Data centers, which have been analyzed for their extremely high energy demand, are a prime focus for exponents of green computing. Data centers can possibly advance their energy and space efficiency through practices such as storage consolidation and virtualization. Computer virtualization mentions to the abstraction of computer resources, such as the practice of consecutively running two or more logical computer systems on one set of physical hardware. Virtual machine can be more surely organized and examined from outside than a physical one, its structure is also more flexible. Virtual machine can be just re-located from one physical machine to another as needed.

VI. GREEN INITIATIVES IN NETWORKING

1. Effective Servers usage by Virtualization: IT companies have been using many server firms or data centers, dedicated to annex act task. These data servers must be proficiently used. One of the contrivances is load balancing which selects the most favorable resource among many. Also by means of virtual
software to accomplish these tasks, a single server may be used to control these virtual servers, vividly reducing energy consumption.

2. **Alternate Storage Methods:** Storage drives are additional fundamental element of data center infrastructure and as organizations storage needs escalation; further energy is used to power these hard drives. It can be abridged by using great capacity drives and performing data center audits to decrease redundancies in the system.

3. **Brace Printer’s Output Management:** Centrally located printer may be used to control all printing tasks virtually eradicating various machines being left on all day extracting up energy and driving up costs.

4. **By means of Thin Clients:** With thin clients, each employee has a virtual desktop that contains a mouse, keyboard and screen while the remaining unit is shared by all at a central location.

5. **Energy saver initiatives:** This comprises using energy storing settings and boosting employees to turn off equipment at the completion of the work day and on weekends.

**VII. TECHNOLOGIES OF GREEN COMPUTING**

Following Technologies are associated with Green Computing

1. **Carbon-free computing**

Greenhouse gases naturally cover the Earth and are liable for its more or less constant temperature. A growth in the absorption of the leading greenhouse gases — carbon dioxide, methane, nitrous oxide, and fluorocarbons — is believed to be liable for Earth's increasing temperature, which could lead to unadorned loads and droughts, rising sea levels, and other environmental effects, disturbing both life and the world's economy.

2. **Solar Computing**

Solar cells entail very slight maintenance throughout their lifetime, and once initial installation costs are covered, they provide energy at fundamentally no cost. Worldwide production of solar cells has increased speedily over the last few years; and as more governments originate to recognize the welfares of solar power, and the growth of photovoltaic technologies goes on, costs are estimated to continue to decline.

3. **Lead-Free computing**

It is strictly associated with the Waste Electrical and Electronic Equipment Directive, which sets assortment, recycling, and recovery marks for electrical goods and is measure of a legislative initiative that goals to decrease the large volumes of toxic e-waste. In traditional manufacturing methods, lead is used to assign the silicon core to the inside of the package and to simplify integration on top of the motherboard through minute solder balls on the underside of the package. Lead-free manufacturing technologies do not necessitate a lead bead, and the solder ball now comprises of a tin, silver and copper composite.
VIII. GREEN COMPUTING IN WIRELESS NETWORK

Wireless systems, which take account of cellular phones, have become a crucial part of the modern life. With the expansion of cellular networks, 4G (LTE/WiMAX) has been implemented in order to meet the people’s demand for high information rate. With living standard’s improving, green communication is becoming more focused, for the reasons of less radiation and less communication cost. Most wireless and cellular networks approve an architecture that is established on transceiver Base stations the Green Cellular approach. In order to lessen contact to cellular radiation, the Green Antennas are to be connected to the network organization via wire line or extremely high directional point-to-point microwave connection. This does not involve a reorganization of the network but rather infers an extension of the existing network with Green Antennas.

1. Power consumption in wireless network

Methods of determining global warming issues that include the decline of carbon dioxide emissions are becoming progressively more significant. With the power consumed by networks expected to increase rapidly due to considerable growth forecast in traffic volumes, green networks that lessen CO2 emissions are becoming gradually more substantial.

Several policies are universally hired for power alert routing in WSNs (Wireless Sensor Networks):
1. Minimizing the energy expended for each message.
2. Minimizing the inconsistency in the power level of every single node.
3. Minimizing the cost/packet ratio.
4. Minimizing the maximum energy drain of any node.

2. Technologies associated with Communication Network

These Technologies are related with communication network. They are helpful in energy reserving and consumption.

1. Open Flow - Elastic Tree, a network-wide power manager

It is a system for dynamically adapting the energy consumption of a data center network. Elastic Tree comprises of three coherent sectors - optimizer, routing, and power control. The optimizer’s job is to discover the lowest power network subset which mollifies current traffic conditions. Elastic Tree requires two network capabilities: traffic data (current network utilization) and switch over flow a path which uses Open Flow technology. OpenFlow is an open API auxiliary to commercial switches and routers that provides a flow table abstraction.

2. Google-green-computing

The technology is about energy reserving and carbon footprint of using Gmail via Google Apps. Google’s cloud-based messaging and association suite, as against housing local servers to achieve the same email. Green computing is still at its infancy but it has already established considerable attention. A recent study classifies the prevailing research into four Categories:

i. adaptive link rate,
ii. interface proxying,
iii. energy-aware interfaces
iv. Energy-aware applications.
IX. ACCESS NETWORKS

Table: Difference between Access Networks

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<th>Wired access</th>
<th>Wireless access</th>
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<td>The instance of local area networks differs from WANs by the fact that the recent hardware designs allow operation in low-power idle modes.</td>
<td>Major energy savings could be obtained in a mountainous scenario when the network is planned explicitly using a green strategy.</td>
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X. CONCLUSION

In this paper we tried to briefly address the theory of green computing over communication network. This work suggests about how Energy, Memory and other network resources are efficiently used for environmental and economical perspective by attempting the green technology in communication network. This paper aimed at providing an up-to-date survey on Green computing over communication network which discuss about the strategies for green computing used in both wired and wireless networks. All these strategies explain about how green computing technology could be used over network to mainly reduce power consumption which is a major apprehension for network operators to not only decrease the operational costs, but also to diminish their environmental effects. Green IT programs are representing fundamental economic along with environmental sense; it is understandable why organizations are exploring green computing options with such extreme interest across the IT industry.

REFERENCES


