

Green Computing: A Technique for Environment Effective Computing

Rohini Sharma

M. Tech. Scholar, Department of Computer Science and Engineering, Jayoti Vidyapeeth Women's, University, Jaipur, Rajasthan, India

Abstract

The concept of green computing has begun to spread in the past few years, gaining increasing popularity. Besides the widespread sensitivity to ecological issues, such interest also stems from economic needs, since both energy costs and electrical requirements of IT industry around the world show a continuously growing trend. Green computing is the environmentally responsible use of computers and related resources. Such practices include the implementation of energy-efficient central processing units (CPUs), Servers and Peripherals as well as reduced resource consumption and proper disposal of electronic waste (e-waste). Green computing is the study and practice of efficient and eco-friendly computing. The principle behind energy efficient coding is to save power by getting software to make less use of the hardware, rather than continuing to run the same code on hardware that uses less power. This paper, first discuss the connotation of green computing and sketch researcher's view on the next generation of IT systems for green computing. Subsequently, this paper helps to identify key issues relevant to green computing and evaluate different approaches to these problems. Finally, paper point out future directions of research and conclude the paper.

Objectives

1. To gain an understanding why the green computing is instrumental for the environment.
2. To identify key issues relevant to green computing and evaluate different approaches to these problems

Keywords: Eco Friendly Computing, Energy Efficient Coding, Green Computing, Green IT, Smart Computing.

INTRODUCTION

Green computing is a new technology that is now under attention of business, industries for the energy efficiency and to dispose E-waste in an effective and harmless way. They now come to realize that going green is in best interest, both in terms of public relations and reduced costs. Thrust of computing was initially on faster analysis and speedier calculation and solving of more complex problems. But in the recent past Green computing has got immense importance and that is achievement of energy efficiency, minimization of power consumption of e-equipment. It has also given utmost attention to minimization of e-waste and use of non-toxic materials in preparation of efficient computers and E-electronics. The main objective of this technology is to study and practice computing resources efficient and eco-friendly. Maximizing the energy efficiency and to promote biodegradability are the primary focus of this technology. Due to pollutants generated by it and the steady increase in rates, energy consumption is causing serious environmental and economic problems. Regarding energy efficiency, a branch of Green IT named energy-aware computing has evolved [1]. Green computing is very much essential for the future world. It is required to make our self and our environment healthy. It can be defined as responsibly utilizing the resources available. Many computers are produced from many hazardous

materials like cadmium, mercury and other toxic substances. While disposing the computers, it will lead to pollution and affect the environment to a great extent. This field encompasses a broad range from new generation techniques to the study of advanced materials to be used in daily life. Bringing it to practice will address many problems that are being a threat to human life and our environment. The impact of the toxic wastes that are produced by us through throwing our old computers and peripherals lead to land pollution. The computers have the power hogs that generate pollution by the energy they consume for their processes. Green computing addresses many problems. To be in precise, the goals are (which are collected from various literatures as mentioned in reference) To reduce the power consumption of the products

- To reduce the harmful effects to the environments through the use of hazardous materials
- To increase the life time of the product
- To maximize energy efficiency during the product's lifetime
- To promote recyclability of defunct products and factory waste
- Power dissipation is also a major concern in portable, battery-operated devices that have proliferated rapidly in recent years.

Each of us has experienced the event that the battery of our laptop or mobile phone is depleted. The issue is even more serious in autonomous, distributed devices such as sensor networks where the charging of batteries is difficult or impossible. Finally, energy dissipation causes thermal problems. Most of the energy consumed by a system is converted into heat, resulting in wear and reduced reliability of hardware components [2-5]

II. Literature Review

The idea of green computing has been around a good time, the government themselves play a role in it. For example the Environmental Protection Agency (EPA) launched the 'energy star' program in the 90s, to promote energy efficient methods. The EPA today still plays an active role by providing not only energy effective methods, but also cost effective methods for the consumers.

In 2006 the EPA established a way to save U.S. households and businesses money; "With an eye to saving U.S. households and businesses more than \$1.8 billion in energy costs over the next 5 years, today EPA announced new Energy Star specifications for computers and related equipment.

These new modifications are also expected to prevent greenhouse gas emissions equal to the annual emissions of 2.7 million cars. In upcoming days it will increase enormously. For that several techniques and methods are provided by leading journals. When it comes to PC disposal you need to know everything there is to know in order to be involved in green computing. Basically, the whole green aspect came about quite a few years back when the news that the environment was not a renewable resource really hit home and people started realizing that they had to do their part to protect the environment. [4] Many governments worldwide have initiated energy-management programs, such as Energy Star, an international standard for energy-efficient electronic equipment that was created by the United States Environmental Protection Agency in 1992 and has now been adopted by several other countries. Energy Star reduces the amount of energy consumed by a product by automatically switching it into —sleep mode when not in use or reducing the amount of power used by a product when in —standby mode. Surprisingly, standby —leaking, the electricity consumed by appliances when they are switched off, can represent as much as 12 percent of a typical household's electricity consumption. Basically, the efficient use of computers and computing is what green computing is all about. The triple bottom line is what is important when it comes to anything green and the same goes for green computing.

This considers social responsibility, economic viability and the impact on the environment.

III. Technologies Green Computing

VIA Technologies, a Taiwanese company that manufactures motherboard chipsets, CPUs, and other computer hardware, introduced its initiative for "green computing" in 2001. With this green vision, the company has been focusing on power efficiency throughout the design and manufacturing process of its products. Its environmentally friendly products are manufactured using a range of clean-computing strategies, and the company is striving to educate markets on the benefits of green computing for the sake of the environment, as well as productivity and overall user experience.

A. Carbon-free computing

One of the VIA Technologies'ideas is to reduce the "carbon footprint" of users — the amount of greenhouse gases produced, measured in units of carbon dioxide (CO₂). Greenhouse gases naturally blanket the Earth and are responsible for its more or less stable temperature. An increase in the concentration of the main greenhouse gases — carbon dioxide, methane, nitrous oxide, and fluorocarbons — is believed to be responsible for Earth's increasing temperature, which could lead to severe floods and droughts, rising sea levels, and other environmental effects, affecting both life and the world's economy

B. Solar Computing

Amid the international race toward alternative-energy sources, VIA is setting its eyes on the sun, and the company's Solar Computing initiative is a significant part of its green-computing projects. For that purpose, VIA partnered with Motech Industries, one of the largest producers of solar cells worldwide. Solar cells fit VIA are power-efficient silicon, platform, and system technologies and enable the company to develop fully solar-powered devices that are nonpolluting, silent, and highly reliable. Solar cells require very little maintenance throughout their lifetime, and once initial installation costs are covered, they provide energy at virtually no cost. Worldwide production of solar cells has increased rapidly over the last few years; and as more governments begin to recognize the benefits of solar power, and the development of photovoltaic technologies goes on, costs are expected to continue to decline. As part of VIA's —pc-1 initiative, the company established the first-ever solar-powered cyber community center in the South Pacific, powered entirely by solar technology.

C. Lead-Free and RoHS computing

In February 2003, the European Union adopted the Restriction of Hazardous Substances Directive (RoHS).

The legislation restricts the use of six hazardous materials in the manufacture of various types of electronic and electrical equipment. The directive is closely linked with the Waste Electrical and Electronic Equipment Directive (WEEE), which sets collection, recycling, and recovery targets for electrical goods and is part of a legislative initiative that aims to reduce the huge amounts of toxic e-waste. Driven by these directives, VIA implemented a set of internal regulations in order to develop products that are compliant with these accepted policies, including the use of nonhazardous materials in its production of chipsets, processors, and companion chips.

D. Energy-efficient computing

A central goal of VIA's green-computing initiative is the development of energy-efficient platforms for low-power, small-form-factor (SFF) computing devices. In 2005, the company introduced the VIA C7-M and VIA C7 processors that have a maximum power consumption of 20W at 2.0GHz and an average power consumption of 1W. These energy-efficient processors produce over four times less carbon during their operation and can be efficiently embedded in solar-powered devices.

VIA isn't the only company to address environmental concerns: Intel, the world's largest semiconductor maker, revealed eco-friendly products at a recent conference in London. The company uses virtualization software, a technique that enables Intel to combine several physical systems into a virtual machine that runs on a single, powerful base system, thus significantly reducing power consumption. Earlier this year, Intel joined Google, Microsoft, and other companies in the launch of the Climate Savers Computing Initiative that commits businesses to meet the Environmental Protection Agency's Energy Star guidelines for energy-efficient devices.

E. vision through the pc-1 initiative

VIA isn't focusing only on the technological aspects of its eco-friendly devices, it's also taking a look at their applications. The VIA pc-1 initiative seeks to enable the next 1 billion people to get connected, by providing wider access to computing and communications technologies. The company is concentrating on empowering new, emerging markets, looking at models that reach beyond individual ownership of a PC, such as local pay-for-use facilities. Products built for such a use are characterized by ultra-efficient energy consumption and the ability to withstand heat and dust in harsh environments. In VIA's own words: "Pc-1 brings together business ingenuity with corporate responsibility and altruism. Helping to build skills and literacy throughout

the world and incorporating and preserving cultural content are goals now within our grasp. Information is the oxygen to nurturing social mobility, economic equality and development, and global democracy.

IV. Conclusion

The field of "green technology " encompasses a broad range of subjects — from new energy-generation techniques to the study of advanced materials to be used in our daily life. As part of the VIA Green Computing Initiative, VIA Carbon Free Computing is a natural extension of VIA's leadership in developing the most power efficient computing products on the market. As individuals and organizations around the world look to reduce their impact on the environment, a growing concern is the reduction of one's Carbon Footprint which is a measure of the impact human activities have on the environment in terms of the amount of green house gases produced, measured in units of carbon dioxide (CO₂). It has taken upon itself the goal to provide society's needs in ways that do not damage or deplete natural resources. Mainly this means creating fully recyclable products, reducing pollution, proposing alternative technologies in various fields, and creating a center of economic activity around technologies that benefit the environment. Green IT programs are demonstrating fundamental economic as well as environmental sense, it is understandable why organizations are exploring green computing options with such intense interest across the IT industry. As more and more companies include some form of reporting on their goals and achievements in the area of CSR, there is a growing awareness among business leaders that greening their IT practices offers the —double-win of reducing costs while demonstrating a positive environmental commitment. Use mobile phones for your computing needs whenever and wherever possible

V. Findings

1. If we think computers is none polluting and consume very little energy we need to think again. It is estimated that out of \$250 billion per year spent on powering computers worldwide only about 15% of that power is spent computing- the rest is wasted idling. Thus, energy saved on computer hardware and computing will equate tonnes of carbon emissions saved per year.
2. The plan towards green IT should include new electronic products and services with optimum efficiency and all possible options towards energy savings.
3. Power supplies are notoriously bad, generally as little as 7% efficient. And since everything in a computer runs off the power supply, nothing can be efficient without a

good power supply. Recent inventions of power supply are helping fix this by running at 80% efficiency or better

4. Mobile phones are better than computers – green computing. They have faster processors, more ram, faster wireless Internet connectivity and larger memories. Mobile Phones consume very low power

5. Purchase LCD's monitors which consume less energy than CRT's screen and LCD's is also not harmful for the eyes.

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