Volume : 3 | Issue : 4 | April 2014 • ISSN No 2277 - 8160

Research Paper | Computer Science

Green it: Sustainability Plan of Green Computing

Jinal H. Tailor

Asst. Professor, MCA S.S.Agrawal Institute of Computer Science, Navsari-396445, Gujarat,India, Gujarat Technological University, Ahmedabad, Gujarat.

ABSTRACT

"Green Computing" represents an environmentally re-sponsible way to reduce power and environmental waste. Nowadays Real world is facing with stark reali-ties of global warming and rising energy cost which re-quire to be maintained in a responsible manner. Sus-tainable IT services require the integration of green computing practices such as on impact of environment, but it should also be in terms of corporate and customer requirements. This plan includes Sustainability power management, virtualization, improving cooling technol-ogy, recycling, electronic waste disposal, and optimiza-tion of the IT infrastructure to meet sustainability re-quirements. As sustainability plan of green IT that more emphasis plan for green computing includes cloud computing, digital sharing, environmentally sound pur-chase decisions.

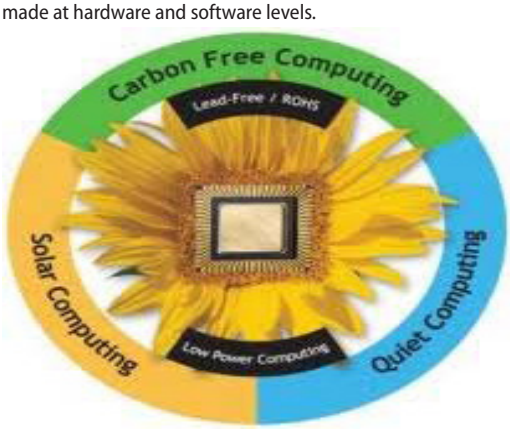
KEYWORDS : E-waste, Life Cycle of Technologies (LCT), Green Market, virtualization

I. Introduction

Green computing is the study and practice of using computing resources efficiently. The primary objective of green computing is an expanded spectrum of values and criteria for measuring organizational and societal success. The goals are similar to green chemistry; reduce the use of hazardous materials, maximize energy efficiency during the product's lifetime, and promote recyclability or biodegradability of defunct products and factory waste.

This initiative focuses on the study and practice of designing, manufacturing, using, and disposing of computers and other peripherals which are the associated subsystems efficiently and effectively with negligible or no impact on the environment. High performance and energy conservation are conflicting goals in green computing.

One way to conserve energy can be to reduce logic voltages; however, this causes slower circuits and low frequencies, which leads to degradation of performance. Cloud computing has gained much popularity as it reduces execution time of a program by distributing it on different machines over a network. To solve a large computationally intensive problem, a cluster of several low capacity machines is more beneficial in terms of cost and performance compared to a high capacity machine. Because a high capacity machine does not fully utilize its resources at a time, hence it consumes more energy. Therefore, significant performance improvement with energy conservation can be achieved through distributed or cloud computing among green strategies implementation. Optimizations for energy conservation can be made at hardware and software levels.

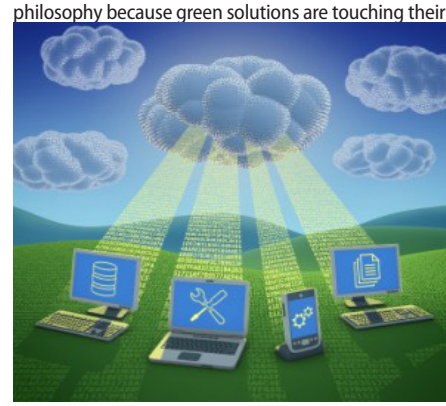


Energy can also be conserved, during software development life cycle such as software analysis and design with green approach.

II. Need and rise in Sustainability plan

The term green computing refers to environmentally sustainable computing. It represents the entire Life Cycle of Technologies (LCT) which constitutes manufacturing, research, use, and disposal of peripherals. Today, industries are brainstorming to find the solution to cut cost and increase profit. Therefore, Green IT takes a much more holistic approach. Green computing is quickly emerging as the most effective means of utilizing technology. No matter whether your organization's needs are big or small, green IT can reduce costs, increase productivity, and helps saving environment. Green Computing is the study and practice of effective usage of computing resources. Earlier, business used to focus only on economic viability of a computing solution. Today, business that incorporate green computing take care of economic viability, social responsibility, and environmental impact too. A green computing system facilitate in implementing environmentally friendly products in an efficient system. According to San Murugesan[1], "Green Computing is the study and practice of 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". Sometimes, green computing can apply strictly to the manufacturing process used to make a computer. Some manufacturers take special measures to ensure that their manufacturing process doesn't pollute the environment. Some others find ways and means to counterbalance any future energy use, involving their computer components. There are a few other organizations that allow individuals and other corporations to pay carbon counterbalance fees. This fee is generally used towards environment friendly activities to make up for the carbon emissions. Some green computing companies take advantage of these services, and they may even use their green status as part of an advertising crusade.

Green Computing Technologies are available for an entire organization or even for a single employee's workstation. Therefore, advantages to green computing are studied on both large and small scales. Many organizations fail to realize the long-term benefits of Green Computing Technologies and are trapped with the fear of initial large investments to go green. Green computing is a rising trend that looks to establish itself as the IT philosophy because green solutions are touching their end results.



III. Power Utilization

Power management for computer systems are desired for many reasons, particularly:

- Prolong battery life for portable and embedded systems.
- Reduce cooling requirements.
- Reduce noise.

- Reduce operating costs for energy and cooling.

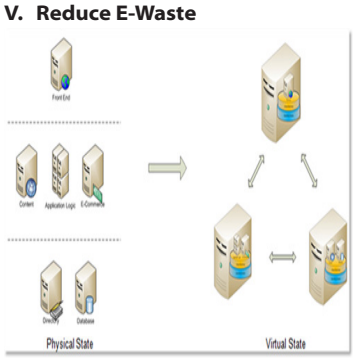
Lower power consumption also means lower heat dissipation, which increases system stability, and less energy use, which saves money and reduces the impact on the environment. The Advanced Configuration and Power Interface (ACPI), an open industry standard, allows an operating system to directly control the power saving aspects of its underlying hardware. This allows a system to automatically turn off components such as monitors and hard drives after set periods of inactivity. In addition, a system may hibernate, where most components (including the CPU and the system RAM) are turned off. ACPI is a successor to an earlier Intel-Microsoft standard called Advanced Power Management, which allows a computer's BIOS to control power management functions. Some programs allow the user to manually adjust the voltages supplied to the CPU, which reduces both the amount of heat produced and electricity consumed. This process is called undervolting. Some CPUs can automatically undervolt the processor depending on the workload; this technology is called "SpeedStep" on Intel processors, "PowerNow!"/"Cool'n'Quiet" on AMD chips, LongHaul on VIA CPUs, and LongRun with Transmeta processors. The power management for microprocessors can be done over the whole processor, or in specific areas. With dynamic voltage scaling and dynamic frequency scaling, the CPU core voltage, clock rate, or both, can be altered to decrease power consumption at the price of slower performance. This is sometimes done in real time to optimize the power-performance tradeoffs.

IV. Recycle

Computer recycling refers to recycling or reuse of a computer or electronic waste. This can include finding another use for the system (i. e. donated to charity), or having the system dismantled in a manner that allows for the safe extraction of the constituent materials for reuse in other products. Additionally, parts from outdated systems may be salvaged and recycled through certain retail outlets and municipal or private recycling centres. Recycling computing equipment can keep harmful materials such as lead, mercury, and hexavalent chromium out of landfills, but often computers gathered through recycling drives are shipped to developing countries where environmental standards are less strict than in North America and Europe. The Silicon Valley Toxics Coalition estimates that 80% of the post-consumer e-waste collected for recycling is shipped abroad to countries such as China, India, and Pakistan. Computing supplies, such as printer cartridges, paper, and batteries may be recycled as well. Obsolete computers are a valuable source for secondary raw materials, if treated properly, however if not treated properly they are a major source of toxins and carcinogens.



V. Reduce E-Waste



By providing virtualization reduce the "Production of E waste" by reducing the wires and internal equipment of "Client and Server machine". The virtualization provides one server which will have partitioned areas to be operated as 1] Development Server 2] Support Server 3] Production Server, its requires only "Single Power Supply", "Single Cooling Mechanism", " Single Synchronized Processing System which approach reduce the "Generation of E-waste". The client machine either connected with server generally by wire or with wireless will not be halving "Centralize Processing System" rather it will be connected with server and "Virtually " it will be getting either development, support or production environment. Virtualization is one of the most effective tools for more cost-effective, greener-energy efficient computing where each server is divided into multiple virtual machines that run different applications and in this way companies can increase their server utilization rates.

This approach is so energy friendly that California utility PG&E offers rebates of $300 to $600 for each server that companies eliminate using Sun or VMware virtualization products, with a maximum rebate of $4million or 50% of the project's cost, whichever is less.

VI. Sustaining the future

As 21st century belongs to computers, gizmos and electronic items, energy issues will get a serious ring in the coming days, as the public debate on carbon emissions, global warming and climate change gets hotter. If we think computers are non-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. Taking into consideration the popular use of information technology industry, it has to lead a revolution of sorts by turning green in a manner no industry has ever done before. Opportunities lie in green technology like never before in history and organizations are seeing it as a way to create new profit centres while trying to help the environmental cause. The plan towards green IT should include new electronic products and services with optimum efficiency and all possible options towards energy savings. Faster processors historically use more power. Inefficient CPU's are a double hit because they both use too much power themselves and their waste heat increases air conditioning needs, especially in server farms--between the computers and the HVAC. The waste heat also causes reliability problems, as CPU's crash much more often at higher temperatures. Many people have been working for years to slice this inefficiency out of computers. Similarly, power supplies are notoriously bad, generally as little as 47% 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.

Conclusion

It is becoming widely understood that the way in which we are behaving as a society is environmentally unsustainable, causing irreparable damage to our planet. Rising energy prices, together with government-imposed levies on carbon production, are increasingly impacting on the cost of doing business, making many current business practices economically unsustainable. It is becoming progressively more important for all businesses to act (and to be seen to act) in an environmentally responsible manner, both to fulfil their legal and moral obligations, but also to enhance the brand and to improve corporate image. Companies are competing in an increasingly 'green' market, and must avoid the real and growing financial penalties that are increasingly being levied against carbon production. IT has a large part to play in all this. With the increasing drive towards centralized mega data centres alongside the huge growth in power hungry blade technologies in some companies, and with a shift to an equally power-hungry distributed architecture in others, the IT function of business is driving an exponential increase in demand for energy, and, along with it, is having to bear the associated cost increases.

REFERENCES

[1] Anderson, D. (2008). IBM "Green Computing". IBM Corporation. | | [2]Applied Virtualization Technology: Usage Models for IT Professionals and Software Developers (Strategic Technology) (Hardcover)-Sean Campbell (Author), Mi-chael Jeronimo (Author) | | [3] San Murugesan, "Making IT Green", IT Profes-sional, volume 12 issue: 2, 2010 | | [4] Joseph Paradiso, Prabal Dutta, Hans Gellersen, Eve Schooler, "Smart Energy Systems", IEEE Pervasive Computing, volume 10 issue:1, 2011 | . | [5] "Green Computing: Whitepaper" |