

Green Computing

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Abstract - Cloud Computing provides the provision of computational resources on demand via a computer network. Here the term "cloud" represents to the Internet. The main purpose of the Computer is to store and retrieve the information. As cloud computing becomes more widespread, the energy consumption of the network and computing resources that underpin the cloud will grow. The main point related to Cloud Computing is that data centres which are hosting cloud computing applications consume huge amounts of energy, contributing to high operational costs and carbon footprints to the environment. With energy shortages and global climate change leading our concerns these days, the power consumption of data centers has become a key issue. So, the main aims of Green Computing is to 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. The plan towards green IT should include new electronic products and services with optimum efficiency.

Keywords - *Green Computing, Power Consumptions, Cloud Computing, Energy*

1. Introduction

Green computing is the term used to denote efficient use of resources in computing. This term generally relates to the use of computing resources in conjunction with minimizing environmental impact, maximizing economic viability and ensuring social duties. Green computing is very much related to other similar movements like reducing the use of environmentally hazardous materials like CFC's promoting the use of recyclable materials, minimizing use of non-biodegradable components, and encouraging use of sustainable resources. The huge amount of computing manufactured worldwide has a direct impact on environment issues, and scientists are conducting numerous studies in order to reduce the negative impact of computing technology on our natural resources.

Companies are addressing e-waste by offering take-back recycling programs and other solutions, with lower energy consumption and less wasted hardware. A central point of research is testing and applying alternative nonhazardous materials in the products' manufacturing process.

Why Go Green

Computing power consumption of companies has reached a critical point. For example, an E-commerce business with 100,000 servers can easily spend up to \$20 million a year on server power. Add another \$10 million for a/c cooling and it tops \$30 million a year in power alone. Clearly there is a huge potential for savings in their

infrastructure.

Despite the huge surge in computing power demands, there are many existing technologies and methods by which significant savings can be made. This series is dedicated to the ways a typical organization can reduce their energy footprint while maintaining required levels of computing performance. So Why should a company promote green, or energy efficient computing?

2. Benefits of Green Computing

- **Savings:** Green Computing can lead to serious cost savings over time. Reductions in energy costs from servers, cooling, and lighting are generating serious savings for many corporations.
- **Reliability of Power:** As energy demands in the world go up, energy supply is declining or flat. Energy efficient systems helps ensure healthy power systems. Also, more companies are generating more of their own electricity, which further motivates them to keep power consumption low.
- **Performance Tuning:** Performance tuning is the process of adjusting a computer so that it will perform to the best of its ability, given its current or aggregate workload. By doing so you can squeeze out every drop of computing goodness that you current systems have, which is often a lot. This will reduce energy footprint by avoiding unnecessary hardware upgrades, cooling, and associated e-waste. Performance tuning and management can also lower the overall energy a given system uses because there are less resource allocated internally for a given software process. Disk I/O, CPU, memory reduction can lead to

measurable energy savings.

- **Capacity Planning:** Capacity Planning allows an organization to grow in a coherent and organized way while minimizing the amount of hardware needed to perform all required computing. Resource utilization is measured over time and analyzed to determine the precise computing infrastructure requirements. Organized growth is important because it avoids having heterogeneous and ill-performing systems that drive up costs and excess energy need. It also avoids purchasing of overpowered or under-powered equipment that must be later disposed or would otherwise sit and suck power.

- **Reliability Considerations:**

Reliability of hardware is an important aspect of green computing because it reduces the overall costs of energy associated with system failures and E-waste. Performing coherent and routine reliability analysis of the IT infrastructure can identify unreliable systems and designs. In addition, companies benefit by realizing a more reliable IT and e-commerce framework. E-waste, or scrapped computer hardware, is a very serious problem because of the energy required disposing of the materials, and the hazardous chemicals embedded in the waste materials. Reliability is directly related to manufacturing, repair, and ROI costs of systems. Increasing the reliability of the IT infrastructure leads to significant energy savings while minimizing hazardous waste materials and their disposal.

3. Some Facts - How Computer effect the Environment

- An average desktop computer requires 85 watts just to idle, even with the monitor off. If that computer were in use or idling for only 40 hours a week instead of a full 168, over \$40 in energy costs would be saved annually.
- One computer left on 24 hours a day costs you between \$115 and \$160 in electricity costs annually while dumping 1,500 pounds of CO₂ into the atmosphere.
- A tree absorbs between 3 and 15 pounds of CO₂ each year. That means up to 500 trees are needed to offset the annual emissions of one computer left on all the time.
- If each household in a region the size of the metro Boston area turned off its computer for just one additional hour per day, it would save \$3.2 million in electricity costs and prevent 19,000 tons of CO₂ from heating the atmosphere.
- Electricity production is the largest source of greenhouse gas emissions in the United States, ahead of transportation.

4. Energy Saving Programs

Many countries now adopted programs to minimize

energy consumption in electronic equipments. The Climate Savers computing initiative is the program launched to reduce power consumption in computers. The Green Electronic Council promotes the manufacturing and sale of Green Computers. The Green Grid is a global consortium promoting the use of energy efficient IT devices in data centers and business firms. The Green Grid is a global consortium promoting the use of energy efficient IT devices in data centers and business firms.

5. Methods

1. Use of a single hardware to run two or more logical computer systems.
2. Use of a terminal server system to connect multiple users to transfer data into a Central server. The central server will process the data .This reduces energy consumption.
3. Power efficiency system can be introduced, so that the computer and peripherals turn off after a period of time if it is not using. The Hibernating mode and Advanced power management of modern computers are meant for this.
4. Power supply efficiency of the PC can be increased to 80% from 70% efficiency of the present power supply system.
5. Replacement of CRT monitor with LCD or LED monitors.
6. Reduction in the uses of toxic chemicals such as lead, cadmium, mercury etc. in computer parts.
7. Introduction of recycling programs in all places to dispose obsolete devices easily.

6. Conclusion

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.

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