Going Green: Lower the Environmental Impact of Computing

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Abstract

The computer industry impacts the environment during the manufacturing, delivery, operation and end-of-life of its devices. Today’s PCs are far more powerful than the earliest room-filling computers. They also use less electricity. Arguably the first general-purpose computer, ENIAC drew roughly 150,000 watts of electricity. By comparison, today’s PCs consume about 110 watts. That seems small. But there was only one ENIAC — and there are 850 million PCs in use today. 850 million PCs consume an immense amount of electricity. Most of it is provided by burning fossil fuels. This process emits pollutants, sulfur, and carbon dioxide into the atmosphere. These emissions cause respiratory disease, smog, acid rain, and global climate change. From the largest scale—the earth—to the smallest scale of a classroom or an office, the environmental impact of today’s PC architecture is a huge and growing problem. Unfortunately, the impact is largely unaddressed and often unrecognized. A single PC generates more heat than a 100 watt light bulb. A classroom, computer lab, or office with PCs warms up very quickly. In fact, PC-filled work areas almost always have to be air conditioned. Air conditioners raise electricity costs and require large capital expenditures to buy, install, and maintain them. Electronic waste is a large and growing problem throughout the world. Tens of millions of PCs are disposed of in landfills and garbage dumps around the world contaminating the soil with toxic e-waste substances like mercury and cadmium. In this paper we discussed major issues of “Green Computing” related to the use of computing resources in conjunction with minimizing environmental impact, maximizing viability and ensuring social duties. We also discussed what motivates organizations to go green, and what IT’s role in that changes.

Keywords: E-waste, Landfills, sulfur, carbon dioxide, smog; acid rain.

1. INTRODUCTION

Today’s PCs are far more powerful than the earliest room-filling computers. They also use less electricity. Arguably the first general-purpose computer, ENIAC drew roughly 150,000 watts of electricity. By comparison, today’s PCs consume about 110 watts. That seems small. But there was only one ENIAC — and there are 850 million PCs in use today. 850 million PCs consume an immense amount of electricity. Most of it is provided by burning fossil fuels [1, 2]. This process emits pollutants, sulfur, and carbon dioxide into the atmosphere. These emissions cause respiratory disease, smog, acid rain, and global climate change. From the largest scale—the earth—to the smallest scale of a classroom or an office, the environmental impact of today’s PC architecture is a huge and growing problem. Unfortunately, the impact is largely unaddressed and often unrecognized. Green computing is the practice of using computing resources efficiently. The goals are 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. 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). In addition to massive power use, tens of millions of PCs are disposed of in landfills and garbage dumps around the world contaminating the soil with toxic e-waste substances like mercury and cadmium.

2. NCOMPUTING

NComputing systems are a major leap forward in green computing. More than 15,000 organizations in over 80 countries have used NComputing to slash their carbon footprint and electric consumption. The NComputing solution is based on a simple fact: today’s PCs are so powerful that the vast majority of applications only use a small fraction of the computer’s capacity [3]. NComputing’s virtualization software and hardware tap this unused capacity so that it can be simultaneously shared by multiple users. The NComputing virtualization software works on a standard Windows or Linux PC. Each user’s monitor, keyboard, and mouse connect to the shared PC through a small and durable NComputing access device. The device itself has no CPU, memory, or moving parts—so it is easy to deploy and maintain. It also consumes very little power [4].
3. AIR CONDITIONING – THE HIDDEN ENVIRONMENTAL COST
A single PC generates more heat than a 100 watt light bulb. A classroom, computer lab, or office with PCs warms up very quickly. In fact, PC-filled work areas almost always have to be air conditioned. Air conditioners raise electricity costs and require large capital expenditures to buy, install, and maintain them. In comparison, a room equipped with PCs and NComputing access devices generates 90% less heat and does not require additional air conditioning [5].

4. CALCULATING ENERGY & COST SAVING
You may not control millions or even thousands of seats. But even if you just control a few hundred, you can make an impact. For example, 500 seats would save over 70,000 kWh and reduce 9 metric tons of CO₂ emissions per year. At the end of the useful life, you will have to dispose of only one metric ton of e-waste instead of five metric tons. Using NComputing is obviously globally responsible [6]. But it is also locally responsible—to your budget. Because of the extreme reduction in electrical consumption, they can pay for themselves just by lowering your electricity bill in as little as a year.

Figure 1. Showing Metric Tons Energy (in millions) for All PC’s and PCs & N Computing

5. THINK GLOBALLY, ACT LOCALLY
In these times of high energy costs and climate change, we all need to think strategically about how to minimize costs and conserve energy. A major cost of running an organization comes from supporting the PC infrastructure. Virtual desktop computing based on NComputing saves money up front and over time. NComputing consumes less power, generates less heat, lasts longer, and produces less e-waste, all while delivering a rich PC experience. Ultimately, the NComputing green advantage helps organizations pursue their missions while they lessen their environmental impact.

6. ROLE OF INFORMATION TECHNOLOGY
IT vendors also are applying green standards to their own operations. The reasons are:
• New revenue opportunities
• Fear of a customer backlash
• Desire to act like good corporate citizens

Sun created a Sun Eco office to oversee all of the company’s green programs, including telecommuting but also core products such as low-power servers.

Dell in February launched “Plant A Tree For Me,” where consumers pay an extra $2 for a laptop or $6 for a desktop to plant trees aimed at offsetting the equivalent computer emissions. It launched www.dell.com/earth to tout its green policies [7, 8].

7. CONCLUSION
So far, consumers haven’t cared about ecological impact when buying computers, they’ve cared only about speed and price. But as Moore’s Law marches on and computers commodities, consumers will become pickier about being green. Devices use less and less power while renewable energy gets more and more portable and effective. The greenest computer will not miraculously fall from the sky one day, it will be the product of years of improvements.

REFERENCES
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Jaydeep Kishore received the B. Tech. degree in Computer Science & Engineering from UPTECH Lucknow and M. Tech. degree in Computer Science & Engineering from UKTECH Dehradun. Presently he is working as an Assistant Professor and Head of Computer Science & Engineering Department at SIT Pithoragarh, Uttarakhand. His area of specialization is Compiler Design, Artificial Intelligence and Computer Network.