

COMPUTER ECOSYSTEMS - IMPACT ON THE ENVIRONMENT

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ABSTRACT

The computer ecosystem starts from the design and production of computer chips and other hardware components, their eventual assembly, packaging, and shipping to retailers, and then to consumers, who then finally dispose them. Then, there are also many other branches of this ecosystem involving the design, creation, transportation, and maintenance of computer networks, data centers, and software. There are also rapidly growing sub ecosystems that will not exist without the computer systems. These include communication devices (such as telephones, PDAs and pagers), digital entertainment (such as mp3 players, DVD players) and navigation devices (GPS devices). There is no doubt that the list of devices in this ecosystem will only grow. The creation and selling of all these devices makes a big environmental impact.

The disposal of all these electronic devices that rapidly become obsolete is now becoming yet another environmental challenge. The National Safety Council estimates that about 75% of these obsolete computers are currently stored in closets and garages, and would be disposed shortly. Computers components include plastics, glass, steel, gold, lead, mercury, cadmium and fire retardants that are toxic to biological beings. According to an EPA study, 40% of the lead in U.S. landfills is from discarded electrical and electronic products. Many of the toxic components, however, can be recaptured through recycling and used again if we dispose them properly. Recycling the resources in computers also eliminates the need to obtain these elements from nature, decreasing production impact on the environment.

As we see above the creation and destruction of computer systems are extremely demanding on the environment. To get the complete picture, we also have to include the environmental cost of operating all these systems, and this area has proved to be very alarming as well. One consequence of having a modern, distributed computing environment is the creation and use of server farms and data centers. According to Dr. Koomey (a Stanford Professor), energy consumption by data centers in the United States and worldwide has doubled from 2000 to 2005, and that was about 1.2% of all the power generated in the USA in 2005. A contributing factor for the “power” problem is that when IT designers develop a data center, they don’t have to traditionally worry about the power consumption, which is paid for by another business unit. Massive energy requirements, as we know now, have a major impact on climate change, and environmental degradation. There are, fortunately, some compelling ways to lessen the impact of data centers.

In summary, the computing ecosystem is a large contributor to environmental degradation, and climate change, and this is an area that is very fertile for future research. Fortunately, by being greener, many organizations will also see more green (profits) – so the key is to provide important incentives. The purpose of this paper is to explore the various ways in which computer systems damage the environment, and study some of the possible solutions to this serious problem.