Chapter 18
Empowering IT with Green Computing

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ABSTRACT
In the existing state of Information Technology one cannot imagine of endurance without computers. The computers are used in such a way so as to help in sustaining the environment. The great amounts of energy consumed by large-scale computing and network systems, such as data centers and supercomputers, have been a major source of concern in a society increasingly reliant on information technology. The experts in the field have thought about how they can combat the continuing saga in battling the problem of scarcity and energy consumption by computing resources. This movement led to the development of “Green IT” and “Green computing”. “Green IT” refers to all IT measures that help in reducing energy either at hardware level, software level or at the service level. IT architect are moving towards new technologies and network system such as Virtualization, Grid Computing, MIMO System, Cognitive Radio and Power Management Techniques to achieve their goal of Green IT. This chapter incorporates the facts that how these new technologies helps in empowering IT.

INTRODUCTION
Modern IT systems rely upon a intricate combination of people, networks and hardware; as such, a green computing initiative must be systemic in nature, and address increasingly sophisticated problems. Elements of such a solution may comprise items such as end user satisfaction, management restructuring, regulatory compliance, disposal of electronic waste, telecommuting. Therefore, there is a wide demand of empowering information technology with Green Computing which may help in sustaining environment. The need to reduce power consumption is obvious. Gone are the days of measuring data centers by square foot of space. Now, data centers are increasingly sized by the watt. More efficient technologies with new capabilities are being promoted as magic cures. Yet, saving energy is a much more complex
architectural problem, requiring a coordinated array of tactics, from architectural power management capacity planning techniques to optimizing operational processes and facilities design.

VIRTUALIZATION

The main enabling technology of Cloud computing is Virtualization. It is a framework to analyze, categorize and put into practice the overall energy savings in a system to attain “Green IT”. Virtualization incorporates the idea of “Green Computing”; by combining servers and maximizing CPU processing power on other servers. It allows sharing of servers and storage devices and increases utilization of the overall system. By creating ‘virtual machines’, computers are able to run multiple operating systems and application on same computer, making better use of its computers capacity. It’s obvious that this mechanism will trim down the number of storage devices needed, the amount of power required, the heat produced and, as a wonderful side effect, would also reduce the operational and organizational costs of back up, archival storage etc. The major advantages of virtualization are convenience and isolation. A virtualized environment can be retrieved anywhere with any equipment accessible to the network. This is the base for cloud computing, for example, Google Apps. In the current environment, approximately every component of IT can be virtualized, including Servers, Desktops, Applications, I/O, Wide Area Networks, Management probes, Local Area Networks, Routers, Switches, Firewalls, Storage, Appliances such as WAN optimization controllers, application delivery controllers, and firewalls.

Some of the types of virtualization that can be implemented is as follows:

- **Server Virtualization**: Multiple physical servers consolidated into virtual servers that run on a single physical server. In server virtualization, the whole machine runs independently. It has a separate operating system as well as hardware and networking capabilities. The virtual server is
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