Green Information Technology (IT) framework for energy efficient data centers using virtualization

Abstract

The increasing demand for storage, networking and computation has driven the escalation of large complex data centers, the massive server farms that run many of today's Internet, financial, commercial and business applications. A data center can comprise many thousands of servers and can use as much energy as a small city. The massive amounts of computation power required to drive these server systems results in many challenges like energy consumption, emission of green house gases, backups and recovery issues, etc. The rising costs of oil and global warming are some of the biggest challenges of today's world. The research proposed in this paper discusses how virtualization can be used to improve the performance and energy efficiency of data centers. To prove this work, Green Information Technology (IT) based framework is developed to seamlessly and securely divide data center components into different resource pools depending on different parameters like energy consumption ratio, utilization ratio, workloads, etc. The framework highlights the importance of implementing green metrics like power usage effectiveness (PUE) and data center effectiveness, and carbon emission calculator to measure the efficiency of data center in terms of energy utilization and carbon dioxide (CO2) emissions. The framework is based on virtualization and cloud computing to increase the utilization ratio of already installed servers from 10% to more than 50%.