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The Role Of Virtualization Towards Green Computing And Environmental Sustainability

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Abstract

The environment has become a key concern by the entire world and global warming is increasingly attracting attention in many conferences. Moreover, energy usage in data centers has become a concern bearing in mind the fact that the more energy is used in data centers, the more it affects the environment with emissions, which eventually cause global warming. This paper studies the role of virtualization towards green computing and environmental sustainability. Server virtualization is emerging as the prominent approach to consolidate applications from multiple applications to one server, with an objective to save energy usage. This research identified the virtualization environments, identified green computing environments, and then established how virtualization could be used to attain environmental sustainability. This paper was developed on an experiment design. The researcher reviewed an empirical experiment to investigate how server virtualization affects the energy usage in physical servers. Through this analysis, the researcher identified a fundamental trade-off between the energy saving from server consolidation and the detrimental effects (e.g., energy overhead and throughput reduction) from server virtualization. This paper found out that a server consumes a substantial amount of energy when idle thus the importance of consolidation. Secondly the energy overhead depends on the type of hypervisor used and the application architecture. Thirdly for a given traffic load, the energy cost can be minimized by launching an optimal number of virtual machines. The analysis and review results show that virtualization brings substantial energy savings, promotes green computing and would be a clear methodology to conserve the environment in the technology world today. Therefore, green computing is a well balanced and sustainable approach towards the achievement of a greener, healthier and safer environment without compromising technological needs of the current and future generations.

***Index Terms*— green computing, virtualization, energy usage, environment**