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PERFORMANCE IMPLICATIONS OF VIRTUALIZATION

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Abstract

Virtualization is a component of cloud computing. Virtualization transforms traditional inflexible, complex infrastructure of individual servers, storage, and network hardware into a flexible virtual resource pool and increases IT agility, flexibility, and scalability while creating significant cost savings. Additional benefits of virtualization include, greater work mobility, increased performance and availability of resources, and automated operations. Many virtualization solutions have been implemented. There are plenty of cloud providers using different virtualization solutions to provide virtual machines (VMs) and containers, respectively. Various virtualization solutions have different performance overheads due to their various implementations of virtualization and supported features. A cloud user should understand performance overheads of different virtualization solutions and the impact on the performance caused by different virtualization features, so that it can choose appropriate virtualization solution, for the services to avoid degrading their quality of services (QoSs). In this research, we investigate the impacts of different virtualization technologies such as, container-based, and hypervisor-based virtualization as well as various virtualization features such as, over-allocation of resources, live migration, scalability, and distributed resource scheduling on the performance of various applications for instance, Cassandra NoSQL database, and a large telecommunication application. According to our results, hypervisor-based virtualization has many advantages and is more mature compare to the recently introduced container-based virtualization. However, impacts of the hypervisorbased virtualization on the performance of the applications is much higher than the container-based virtualization as well as the non-virtualized solution. The findings of this research should be of benefit to the ones who provide planning, designing, and implementing of the IT infrastructure.

Keywords: Cloud computing, Virtualization