

ABSTRACT

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The aim of this work is to evaluate the performance of routing virtual environments built on x86 machines and network devices existing on the Internet today. Among the most widely used virtualization platforms, we want to identify which best meets the requirements of a virtual routing to allow programming of the core production networks. Virtualization platforms Xen and KVM were installed on modern large capacity x86 machines, and they were compared for efficiency, flexibility and isolation between networks, which are the requirements for good performance of a virtual network. The tests results show that, despite being a full virtualization platform, KVM has better performance than Xen in forwarding and routing packets when the VIRTIO is used. Furthermore, only Xen had isolation problems between networks. We also evaluate the effect of the NUMA architecture, very common in modern x86 servers, on the performance of VMs when lots of memory and processor cores are allocated to them. The results show that Input and Output (I/O) network performance can be compromised whether the amounts of virtual memory and CPU allocated to VM do not respect the size of the existing hardware NUMA nodes. Finally, we study the OpenFlow. It allows slicing networks into routers, switches and x86 machines to create virtual environments with different routing forwarding rules. We found that, when installed with Xen and KVM, it enables the migration of virtual networks among different physical nodes, without interruptions in the data streams, and allows to increase the performance of packet forwarding in the virtual networks created. Thus, it was possible to program the core network to implement alternatives to IP protocol.

Keywords: Virtual networks; OpenFlow; KVM; Xen; Virtual routing environments; x86 machines; Virtualizations platforms; Virtual routes; NUMA.