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Increasing performance in KVM virtualization within a Tier-1 environment

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This work shows the optimizations we have been investigating and implementing at the KVM virtualization layer in the INFN Tier-1 at CNAF, based on more than a year of experience in running thousands of virtual machines in a production environment used by several international collaborations. These optimizations increase the adaptability of virtualization solutions to demanding applications like those run in our institute (High-Energy Physics).

We will show performance differences among different filesystems (like ext3 vs ext4 vs xfs) and caching options, when used as KVM host local storage. We will provide guidelines for solid state disks (SSD) adoption, for deployment of SR-IOV enabled hardware, for providing PCI-passthrough network cards to virtual machines and what is the best solution to distribute and instantiate read-only virtual machine images.

This work has been driven by the project called Worker Nodes on Demand Service (WNoDeS), a framework designed to offer local, grid or cloud-based access to computing and storage resources, preserving maximum compatibility with existing computing center policies and work-flows.

Summary

We will show performance differences among different filesystems (like ext3 vs ext4 vs xfs) and caching options, when used as KVM host local storage. We will provide guidelines for solid state disks (SSD) adoption, for deployment of SR-IOV enabled hardware, for providing PCI-passthrough network cards to virtual machines and what is the best solution to distribute and instantiate read-only virtual machine images.

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