Virtualization of the ATLAS software environment on a shared HPC system

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Motivation

- Use University HPC cluster NEMO (388/\textit{top}500, 287280 HEP-SPEC) to gain additional resources

Tasks

- Provide full ATLAS / WLCG analysis and production Tier2/Tier3 environment
- Provide full local user environment
- Generate VM images
- Integration of local Tier3 batch system and NEMO schedulers
- Start VMs on-demand

Batchsystems Integration

- Slurm Elastic Computing offers only very limited control of VMs on remote system
- ROCED accesses and coordinates Slurm and Moab on-demand
- Job wrapper requests VM start from OpenStack framework

Performance Tests NEMO VM vs. Tier3 bare metal

Hardware: All tests on 2x INTEL CPU E5-2630v4 2.20GHz 40cores HT on INTEL S2600KPR board, 128GB RAM
SL6 VM image (4-core) on NEMO, CentOS7 host vs. Tier3 SL6 diskless install, bare metal, multicore

1) Event generation using ATLAS software via cvmfs

Results

- Packer is a useful tool to generate up-to-date VMs elegantly and unattended with full contextualization
- ROCED integrates local Tier2/Tier3 Slurm and NEMO Moab supervising both schedulers
- No loss of performance on NEMO opportunistic SL6-VMs compared to jobs on native Tier2/Tier3 SL6

References / Links:

- https://www.packer.io/
- https://puppet.com
- https://slurm.schedmd.com
- http://w3.hepex.org/benchmarks
- https://twiki.cern.ch/twiki/bin/view/AtlasComputing/CentOS7Readiness
- https://github.com/roced-scheduler/ROCED
- http://www.hpc.uni-freiburg.de/nemo
- https://github.com/flegmatik/linux-rootfs-resize.git

ROCED Batchsystem Management