Virtualization of the ATLAS software environment on a shared HPC system

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**Motivation**

- Use University HPC cluster NEMO (388/\(\text{TOP}^{100}\), 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

**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://www.packer.io/)
- [https://puppet.com](https://puppet.com)
- [https://slurm.schedmd.com](https://slurm.schedmd.com)
- [http://w3.hepex.org/benchmarks](http://w3.hepex.org/benchmarks)
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- [https://github.com/roced-scheduler/ROCED](https://github.com/roced-scheduler/ROCED)
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