

## Motivation

- Use University HPC cluster NEMO (388/TOP500, 287280 HEP-SPEC) to gain additional resources



## Tasks

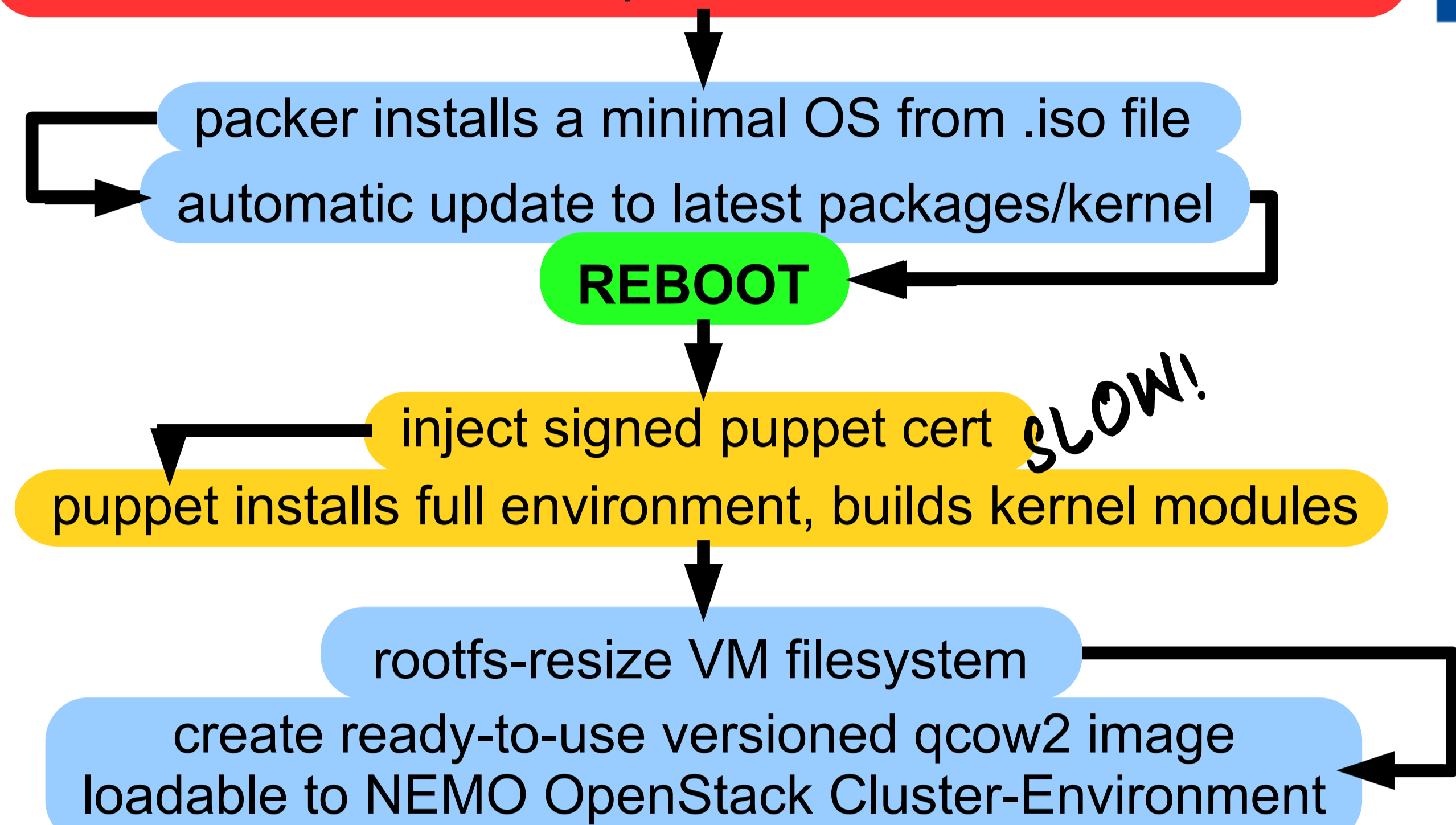
- Provide full ATLAS / WLCG analysis and production Tier2/Tier3 environment
- Provide full local user environment
- Generate VM images
- Integration of local Tier3 batch system and NEMO schedulers
- Start VMs on-demand

## Batchsystems Integration

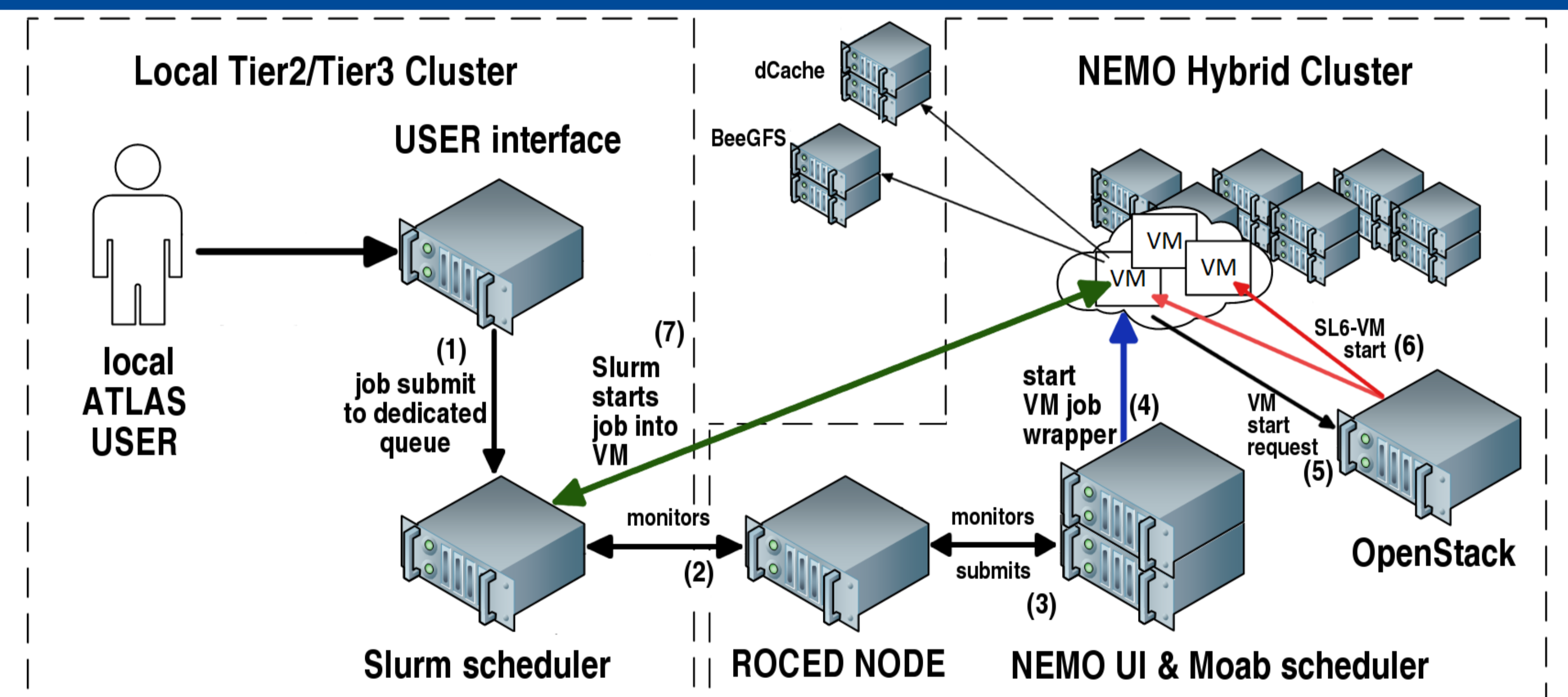
- Slurm Elastic Computing offers only very limited control of VMs on remote system
- ROCED accesses and coordinates Slurm and Moab on-demand
- Job wrapper requests VM start from OpenStack framework

## Packer generates VM

nested KVM in NEMO OpenStack Service-Environment



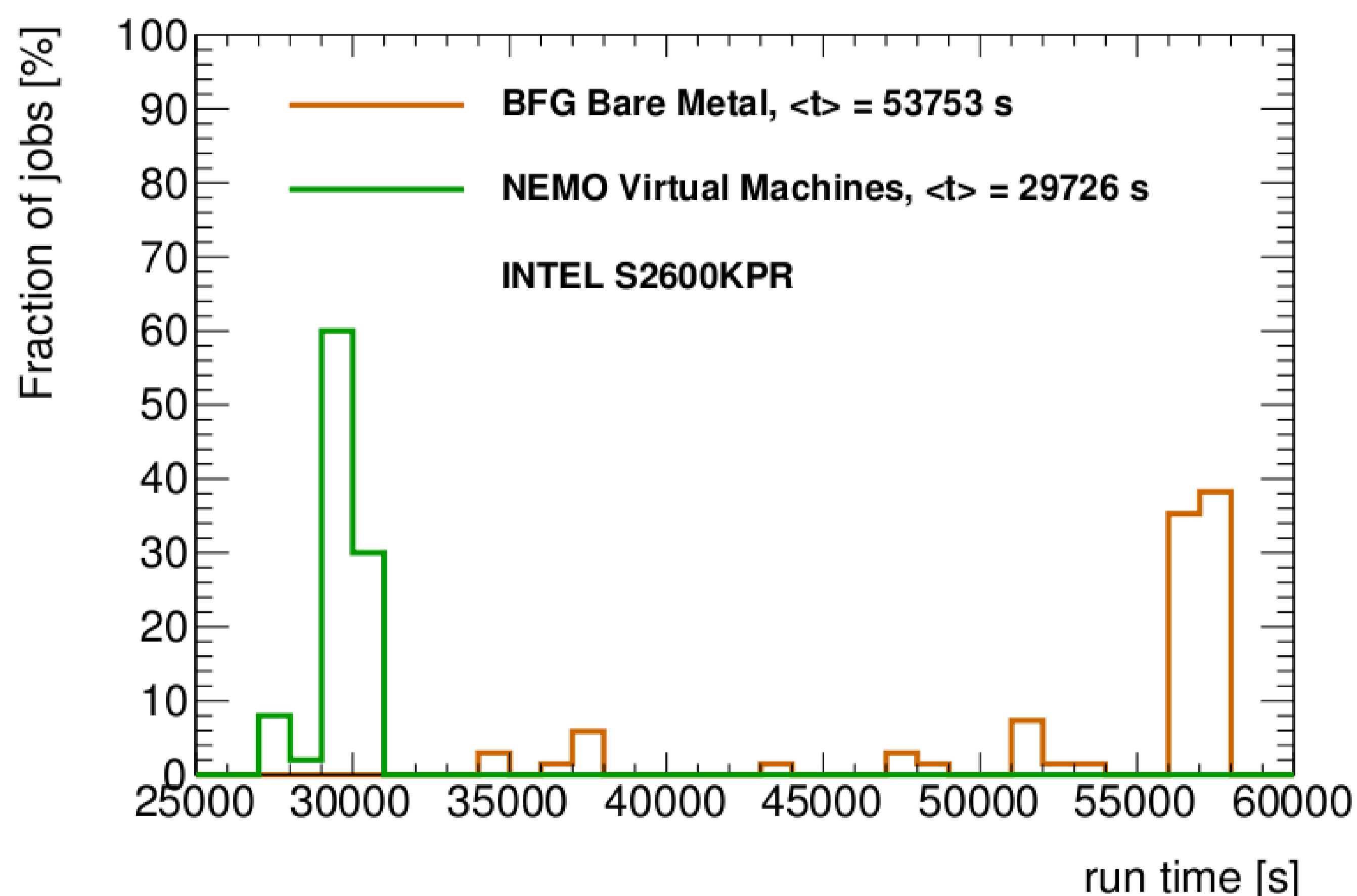
## ROCED Batchsystem Management



## Performance Tests NEMO VM vs. Tier3 bare metal

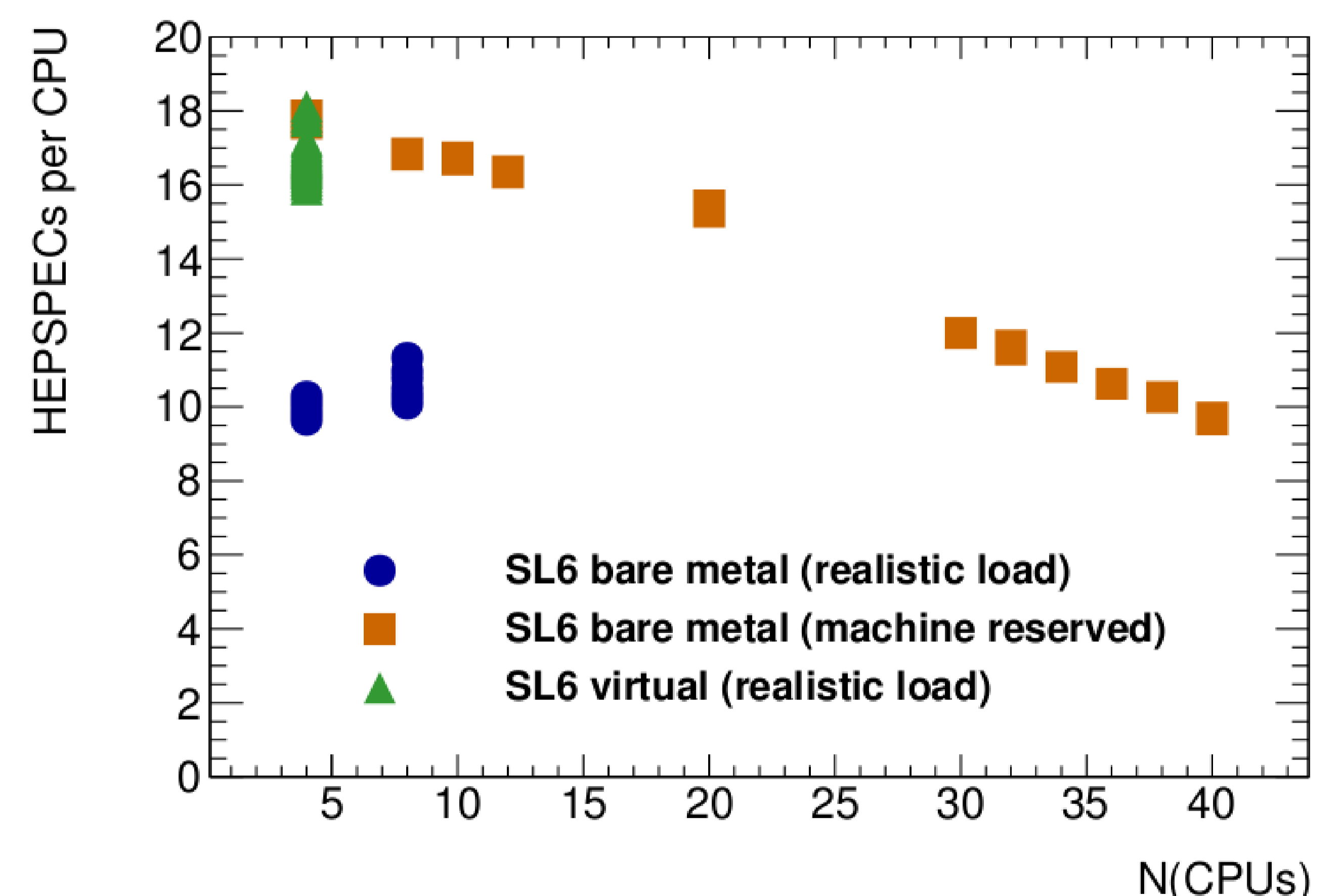
Hardware: All tests on 2x INTEL CPU E5-2630v4 2.20GHz 40cores HT on INTEL S2600KPR board, 128GB RAM  
SL6 VM image (4-core) on NEMO, CentOS7 host vs. Tier3 SL6 diskless install, bare metal, multicore

### 1) Event generation using ATLAS software via cvmfs



VM nodes better performing compared to bare metal

### 2) HEP-SPEC06 Benchmarks



4-core VMs similar to optimal bare metal conditions

## 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