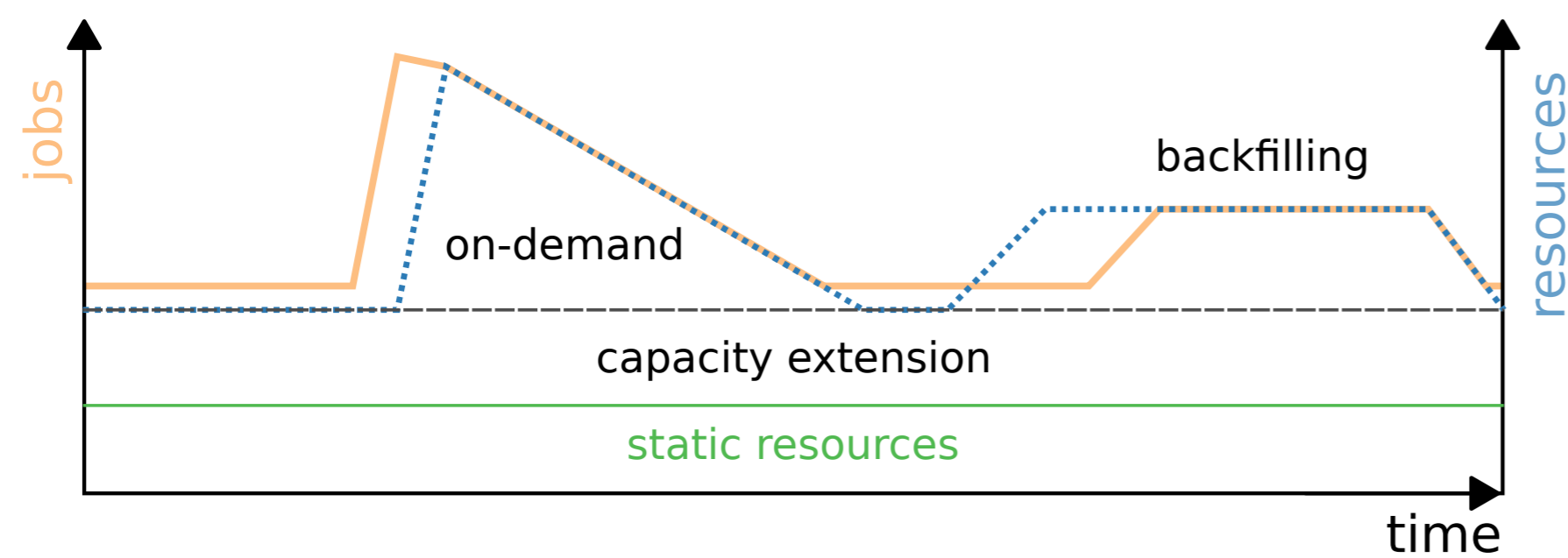


Opportunistic Resources

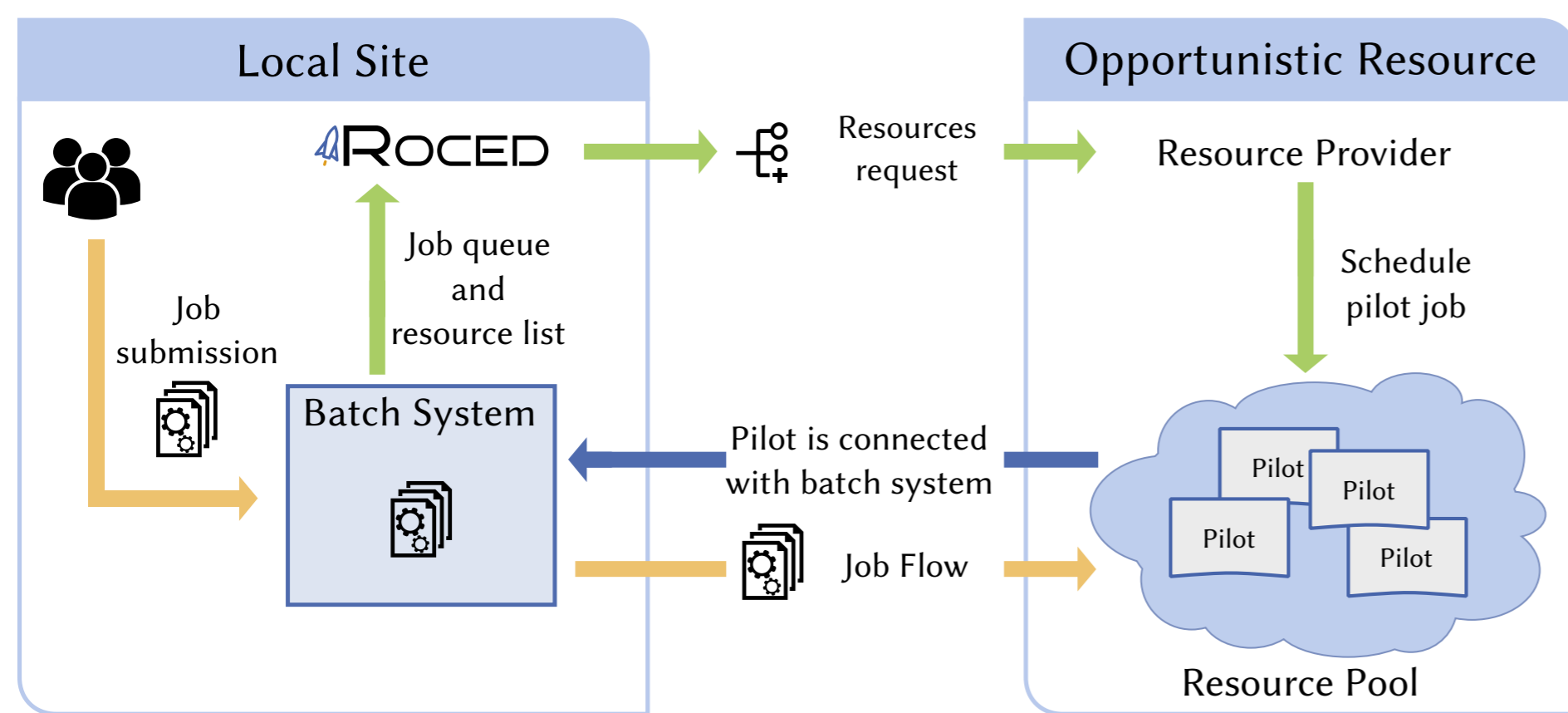
Provisioning Types

- Backfilling for unused resources
- On-demand provisioning for job peak loads
- Constant capacity extension



Resource Scheduler: ROCED

- Broker between batch system and resource providers



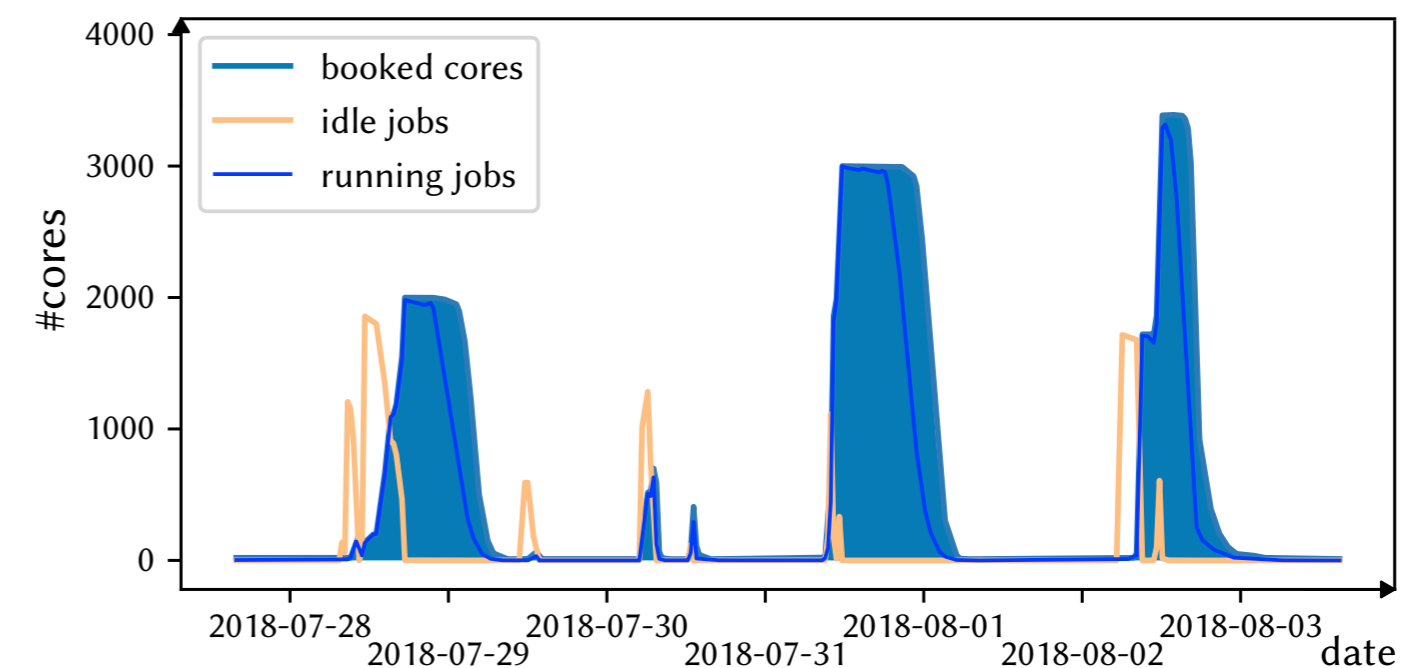
Example Resources

Helix Nebula Science Cloud

- EU research project to provide computing resources by commercial cloud providers
- On-demand provisioning of VMs
- For different scientific communities in Europe

Nemo HPC

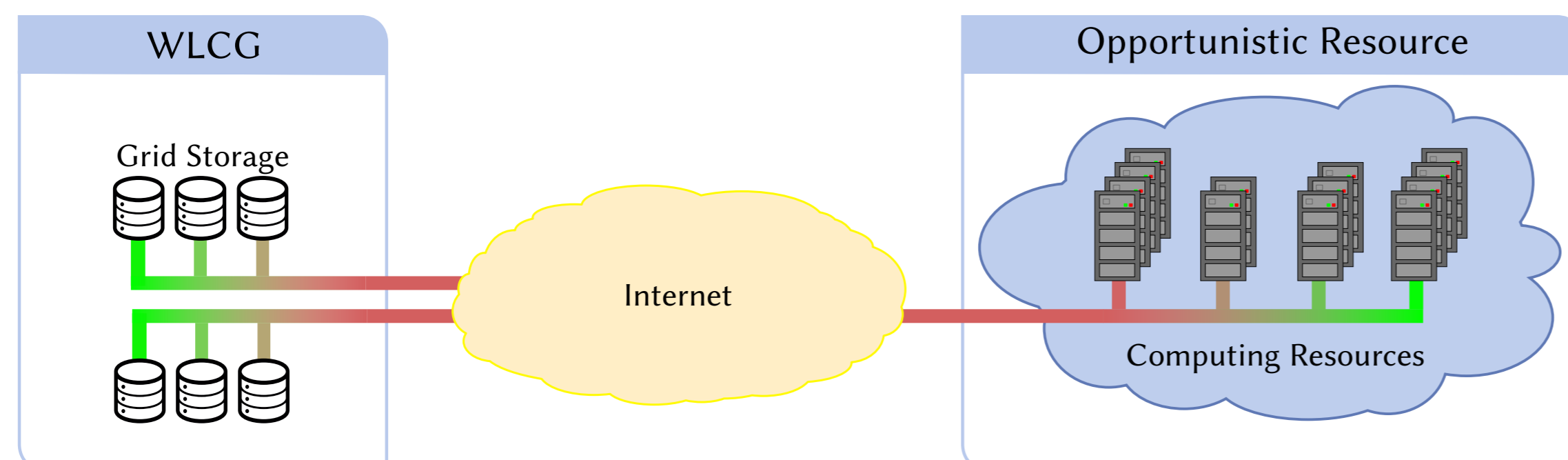
- Research HPC which also provides VMs
- On-demand capacity extension via fair share
- For different exclusive scientific communities



KIT Desktop Cluster

- Local Desktop PCs
- Provisioning of HEP software environment via container and use backfilling of unused resources (cycle stealing)
- For local users

Challenges of Opportunistic Resources



- Persistent storage only at HEP Grid sites
- Storage performance designated for one Grid site
- Shared network at opportunistic resource
- Varying utilization of storage and network

Outlook

Workflow Analysis

- Deploy sample jobs of one workflow to local resources
- Monitor traffic, walltime memory, etc. of job
- Assign attributes to all jobs of an analysed workflow

Resource Benchmark

- Pilots benchmark network bandwidth periodically and coordinated
- Benchmark network capacity between pilots and between pilot and grid storage

Bandwidth Scheduling

- Jobs based on pilot resource and bandwidth
- Pilots based on site resources and bandwidth

