Optimisation of the usage of LHC and local computing resources in a multidisciplinary physics department housing a WLCG Tier-2 centre

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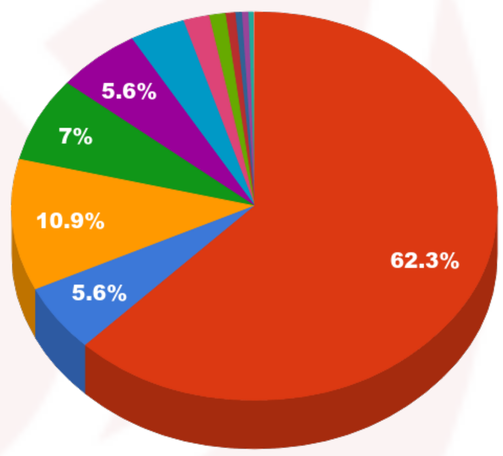
14 groups
~400 active users

~2PB storage capacity
(ATLAS 90%)

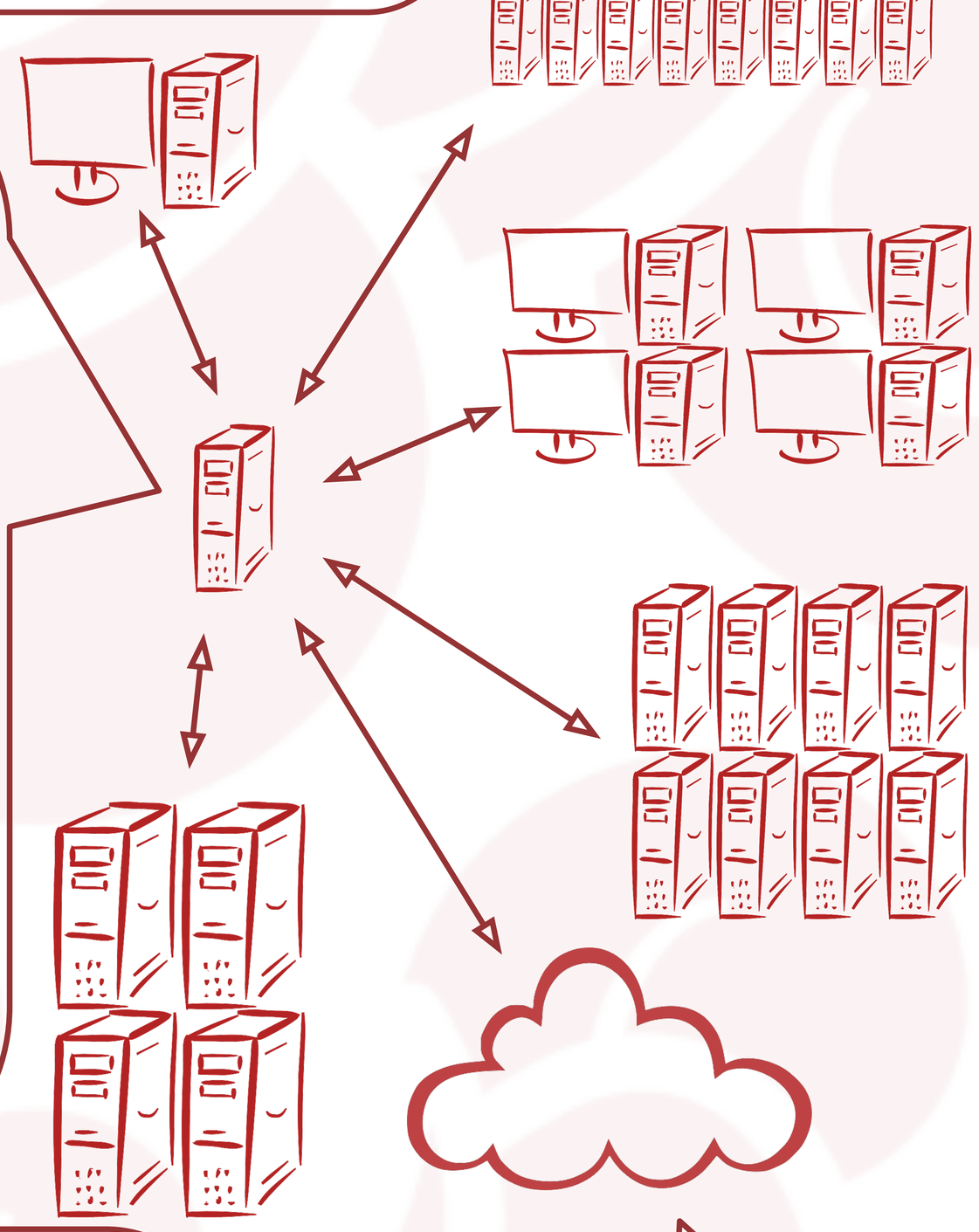
- ATLAS Tier2
- ATLAS Tier3
- Physics of Matter
- Theoretical Physics
- Cosmology
- Gamma Spectroscopy
- Computational Biophysics
- BOREX
- Medical Physics
- Astrophysics and Plasma Physics
- Electronics
- LHCb
- Other

CPU: 28810 HS06 (ATLAS T2 + T3: 67%)



Share resources across groups

- **Groups are encouraged to organise their resources under HTCondor pools**
  - Execute machines report to the central manager of their own pool
- **We add an additional central manager to which all execute machines report too**
  - This provides usage accounting across all the resources together
  - Serves as a top-level pool to submit jobs to when users want to access all possible resources
- **Users get the quality of service they were already enjoying, but excess jobs may be conveniently sent to the other resources**
  - Group pools remain the default pool for job submission, but with the super-pool added to their FLOCK_TO list
  - We give the group's negotiator priority over super-pool's to guarantee high priority to group users on their own machines
- **Coexistence of parallel and batch jobs**
  - Dynamic dispatch of resources allows parallel jobs to run in HTCondor's *standard universe*
    - The use of resources becomes more flexible as they are provisioned dynamically when they are needed
  - HTCondor's *parallel universe* supports a wide variety of parallel programming environments, and it encompasses the execution of MPI jobs
    - A mechanism that allows for this type of jobs to be executed on resources of another pool is still work in progress



Authentication, authorization, monitoring

- **Centralized authentication and authorization**
  - Performed through server and proxy radius, LDAP and Kerberos
- **Different categories of users (University, INFN, guests) are redirected to different authentication servers**
  - Some are external to the Physics Department
- **Local authentication and authorization servers:**
  - Built in high availability configuration
- **Authorizations are managed internally by LDAP**
- **Monitoring with Ganglia**
- **Each node reports to local pool master**
- **Pool masters report to super-pool**

Cloud resources

- **We are testing technologies like virtualisation and cloud computing**
  - Maximise availability and reliability
- **We aim to allow for a dynamic expansion of resources upon need**
  - When local resources are not available
    - usage peaks, donwtimes, ...
- **Transparent to the user**
  - Cloud resources organised under a HTCondor pool

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