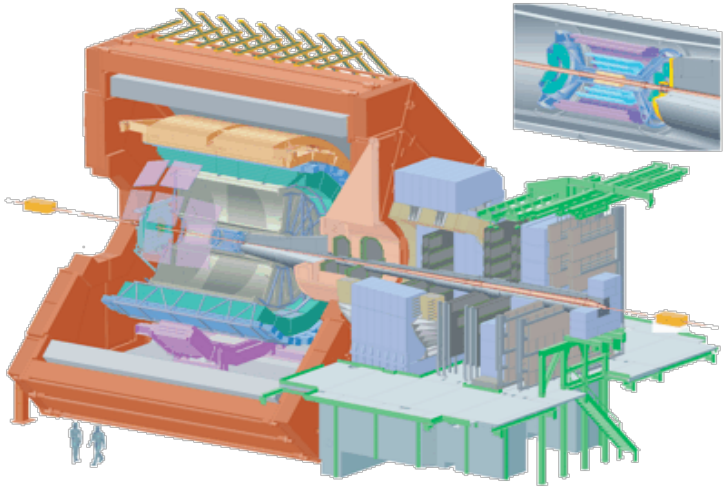
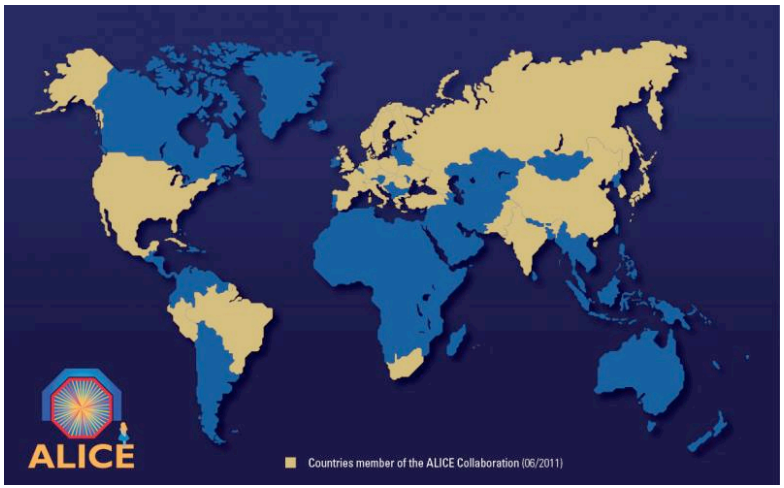
ALICE : A Large Ion Collider Experiment

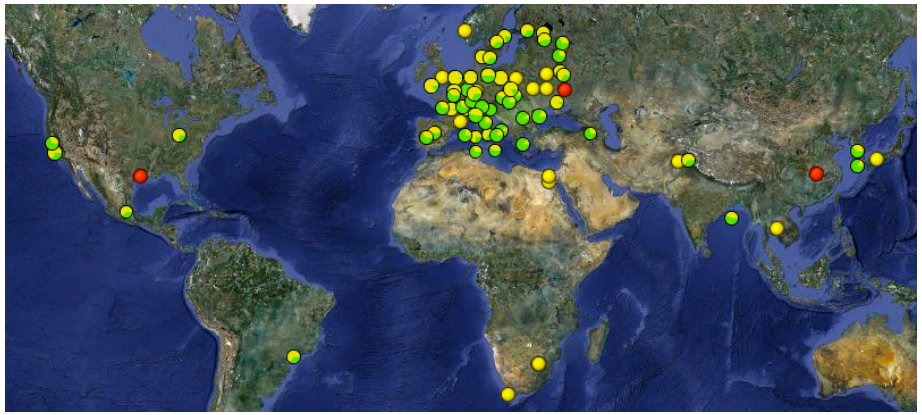
- ALICE: Major Experiment @ LHC (along with ATLAS and CMS)
  - Focus on nucleus-nucleus collisions at LHC energies
    - Study matter @ extreme energy densities → quark-gluon plasma
    - LHC runs Pb beams about 1 month each year
  - 33 countries, ~1000 Scientist & Engineers





ALICE Grid Computing Model

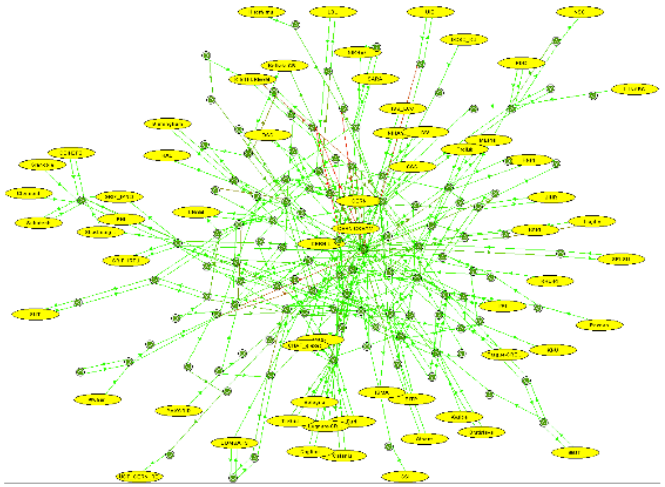
- ALICE Grid framework: AliEn + MonaLisa + Xrootd
  - AliEn developed by ~2001
  - In production since ~2003
  - Over 80 sites worldwide
- AliEn, "Alice Environment"
  - VO Box at each site manages
    - Job submissions (CEs or LRM)
    - Proxy renewal via myproxy server
    - Software deployment (AliRoot, Geant, …)
    - Job & Resource Monitoring
  - Central Task Queue at CERN
  - JobAgents (pilot jobs) submitted to WNs
    - Evaluate local resources
    - pull jobs from the task queue (for 1 user)



Running Jobs

ALICE Grid Computing Model Cont…

- Data Management
  - Single instance AliEn FileCatalog with unix f/s like CLI
  - Xrootd-based Storage Elements
    - AliEn grid authentication pluggin
    - global redirector & LFNs for WAN f/s
  - Distribute multiple copies of production files
    - Useful files kept disk resident
    - Jobs sent to sites with data
- Grid monitoring with MonALISA
  - Job & site status: ~30k jobs on > 80 sites
  - SE capacities & availability: ~10PB of disks, spread over 55 SEs
  - Job statistics: mem, I/O, CPU/wall per job type & per site
  - Dynamic network topology mapping for pulling data to job on demand



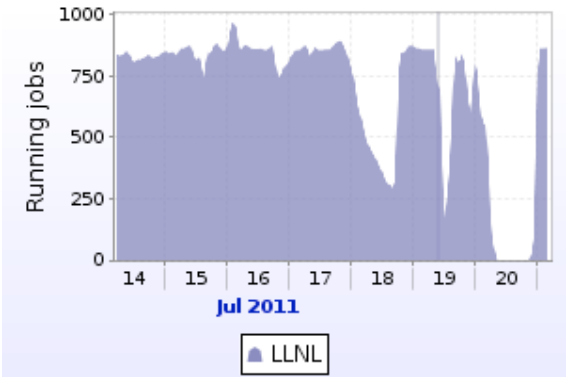
network topology map

ALICE-USA Computing Project

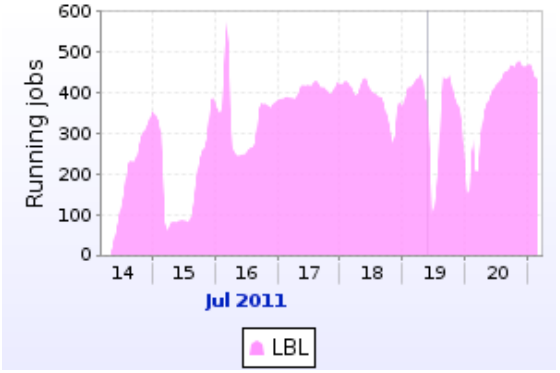
- ALICE-USA Collaboration formed to lead the ALICE EMCal project
- 11 participating institutions
  - 3 National Labs & 8 Universities
  - Approx. 60 Scientists & Engineers: ~6% of ALICE
- ALICE-USA Computing Project was proposed to build a facility to:
  - Enable US ALICE Scientist to pursue research goals
  - Meet ALICE-USA obligation to provide its share of computing resources (relative to scientific participation) for ALICE data analysis and simulations
- Proposal settled on 2 DOE labs as primary sites
  - LLNL's Livermore Computing Center (LC)
  - LBNL/NERSC's PDSF cluster + HPSS tape storage facility

ALICE-USA Computing Project: Two WLCG Tier 2 Sites: LLNL/LC & NERSC/PDSF

- LLNL/LC Computing: Institutional-HPC supporting LLNL Science & Engineering projects
  - Cost effective procurement & operations model
  - Pursuing external collaborations (Green Data Oasis)
  - ALICE Resources
    - 800 cores, 650TB Disk space
    - Fixed resources for 3 year life cycle

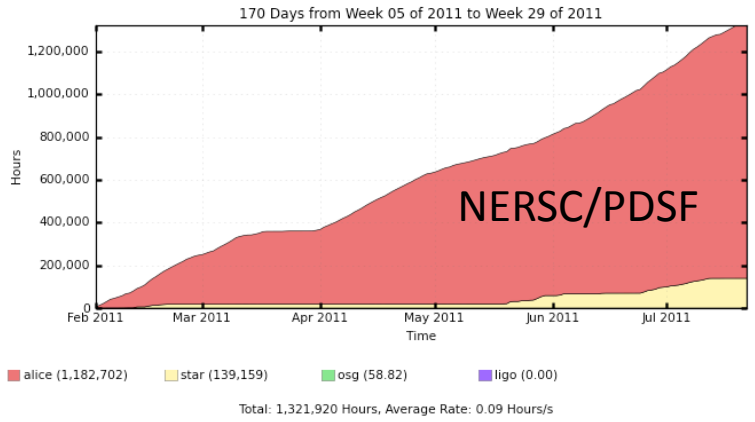


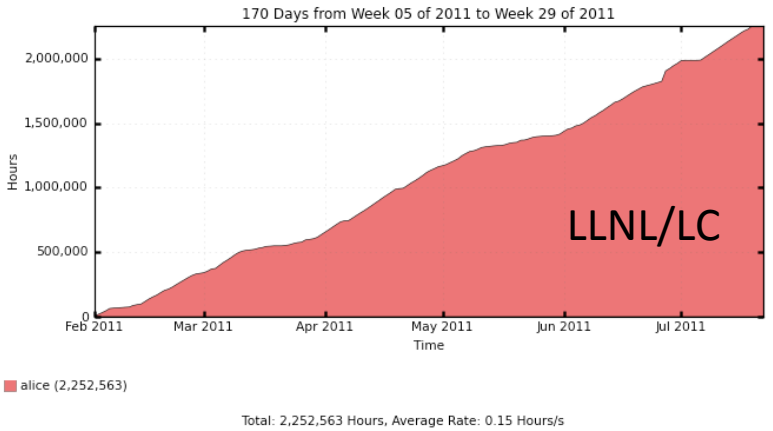
- NERSC: DOE Office of Science Flagship facility for HPC Scientific Computing
  - Supports DOE sponsored research by competitive allocations
  - PDSF: HENP funded cluster operated by NERSC
    - STAR Tier 1, ALICE Tier 2
    - ATLAS Tier 3, IceCube, Daya Bay,
  - ALICE Resources
    - 320 cores, 400TB disk space
    - PB-scale tape storage allocation in NERSC/HPSS
    - Annual growth plan of 400 cores, 500TB disk w/ transition plan to Tier 1



ALICE-USA & OSG

- ALICE-USA Computing Plan calls for leveraging OSG capabilities
  - OSG RA participation
  - Resource Accounting Reports to WLCG
    - Final MOU & WLCG registration completed at both sites
    - Usage reports & installed capacities sent via OSG to WLCG
  - Disposition of unused resources
    - Particularly at LLNL/LC which is a dedicated ALICE site





ALICE-USA & OSG Continued

- Opportunistic use of ALICE-USA resources by OSG VOs
  - PDSF already has multiple user groups and is an OSG resource
  - LLNL/LC has deployed a functioning OSG-CE this past month
    - Working with first user group (Stephan Bass at Duke)
    - Willing to work with others, one at a time (GlueX?)
    - Jeff Cunningham from LLNL will be at site-admin/user meeting in Texas
- Opportunistic use of OSG resources by ALICE-USA
  - ALICE basic requirements
    - "modern linux OS": SL5, MaxOSX, Debian, Ubuntu
    - Pre-compiled downloads → minimal dependence on local software
    - WNs: 2GB/core, 10GB/core local scratch, outgoing network connectivity
  - Ongoing work to relax current on-site VO-box requirement
    - Test ALICE VO-box deployed at LBNL to submit to OSG resources at NERSC
    - Need to extend communication model with VO-box regarding
      - Site Monitoring, software distribution, network measurements