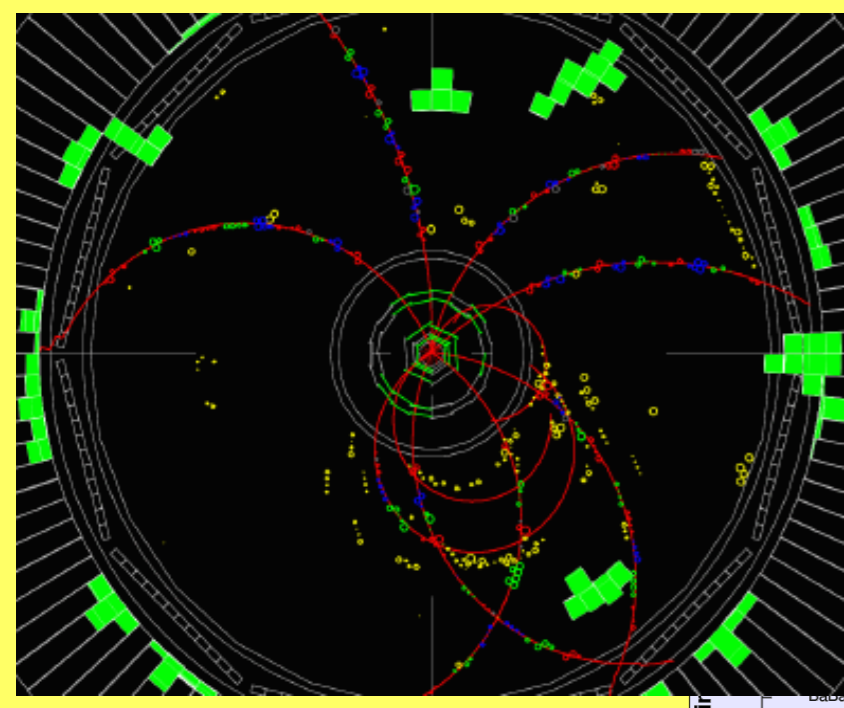


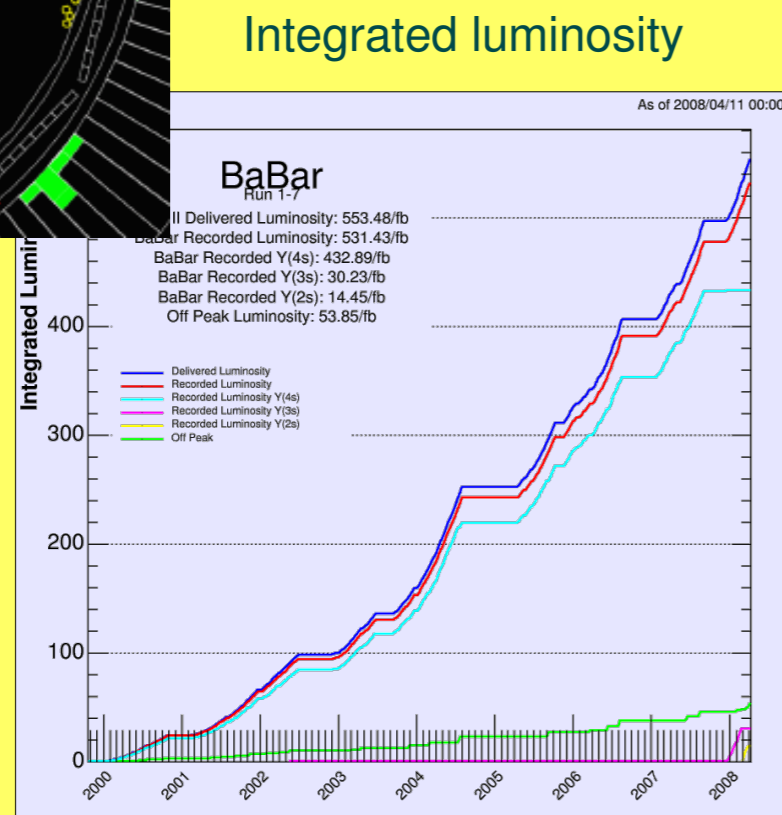
Armando Fella (INFN-CNAF, Armando.fella@cnaf.infn.it), Daniele Andreotti (INFN-Ferrara), Eleonora Luppi (INFN-Ferrara), Luigi Li Gioi (INFN-CNAF)

BaBar: the original computing distributed system

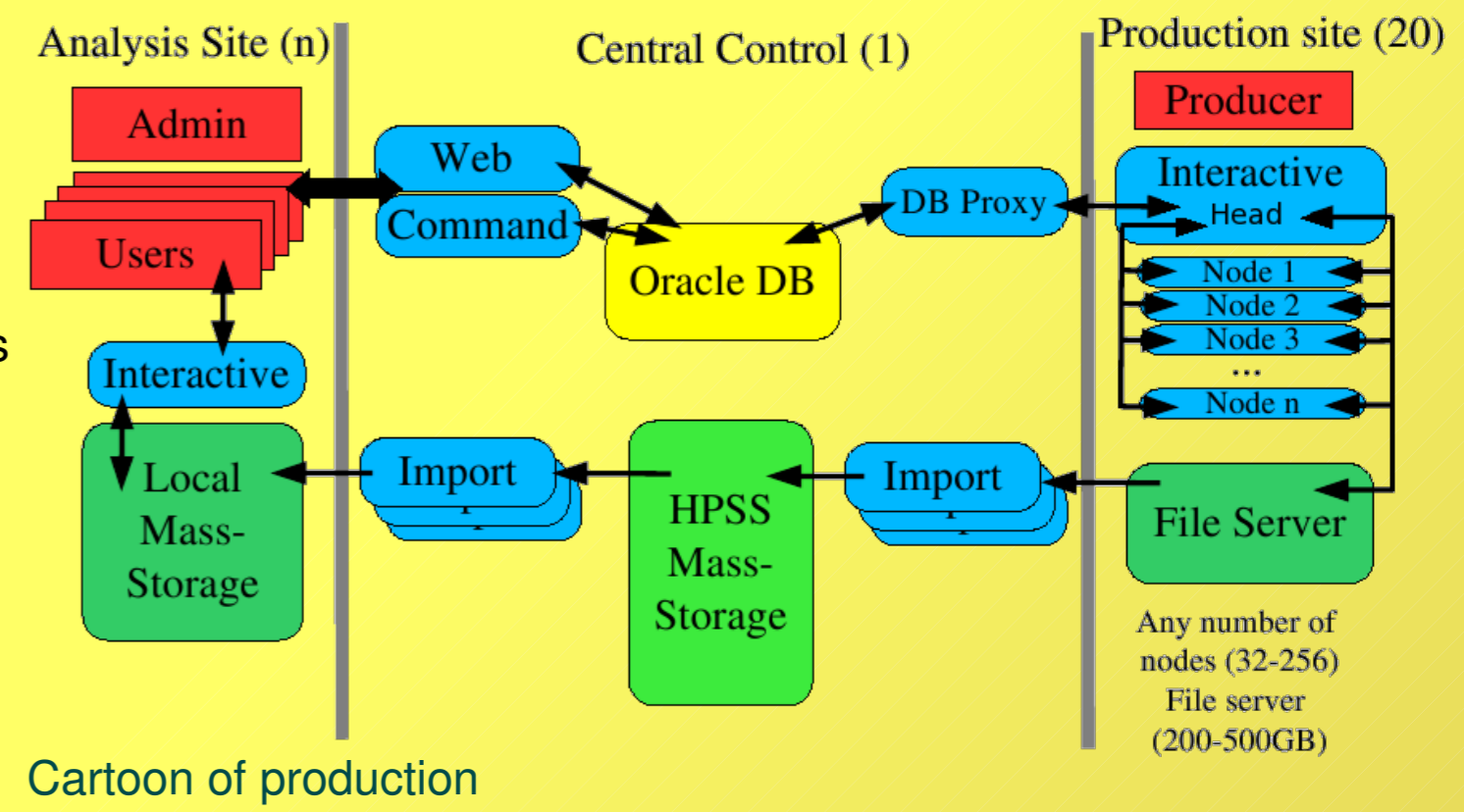
- The BaBar experiment has accumulated about 531 fb^{-1} integrated luminosity, the main goal is the investigation of the violation of charge and parity (CP) symmetry in the field of High Energy Physics.
- The simulation event production is an intensive computing task based on Monte-Carlo method implemented using the Geant engine



Simulated event

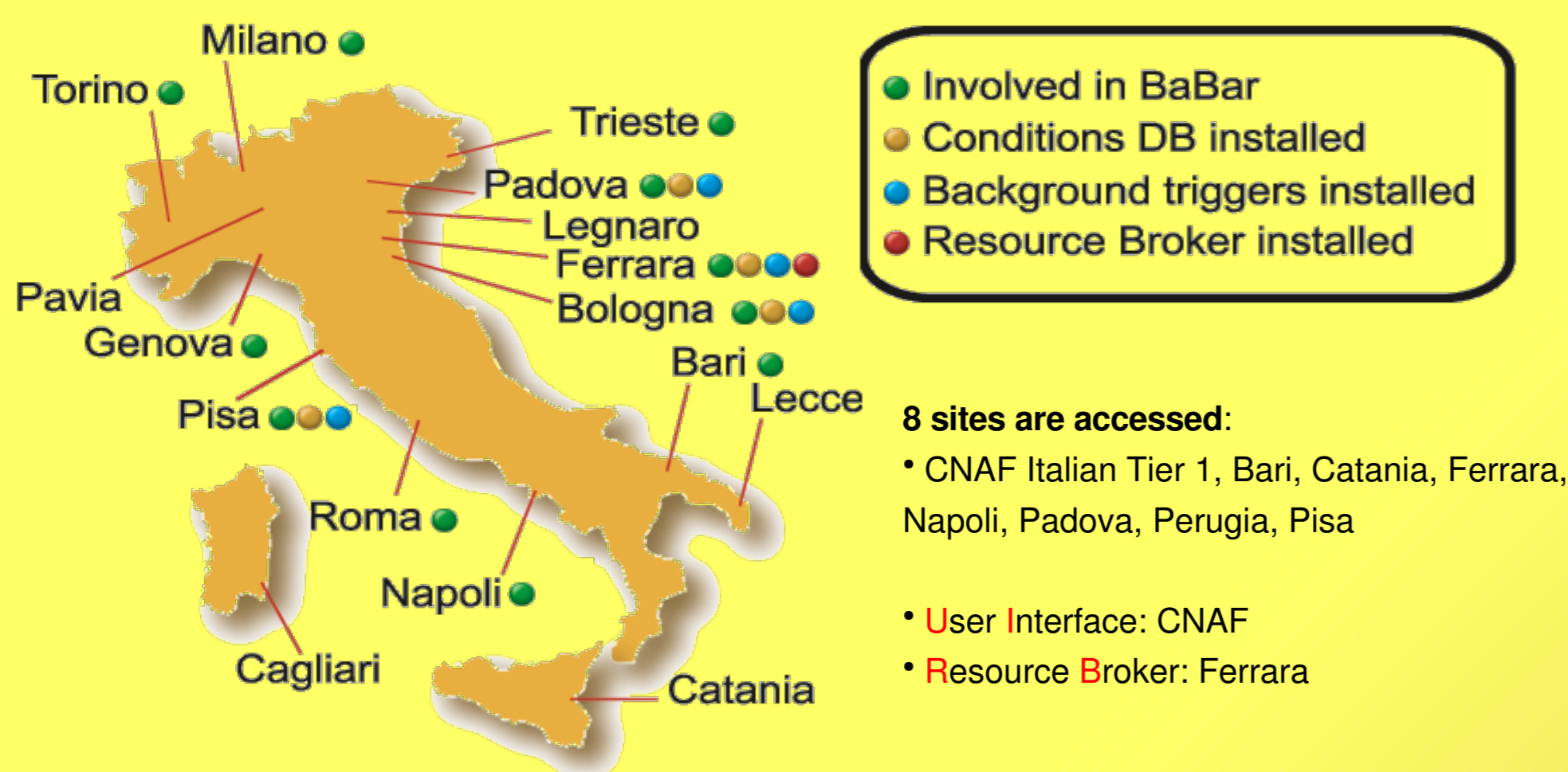


- The SLAC Central Control provides the import/export facilities and Database Access to analysis and MC production environments at remote sites.
- The HPSS Mass Storage System is accessed from remote sites to export produced MC data and to import data for analysis purpose.
- The central Data Base manages metadata on collected physics events, information regarding signals backgrounds, detector configuration and conditions.

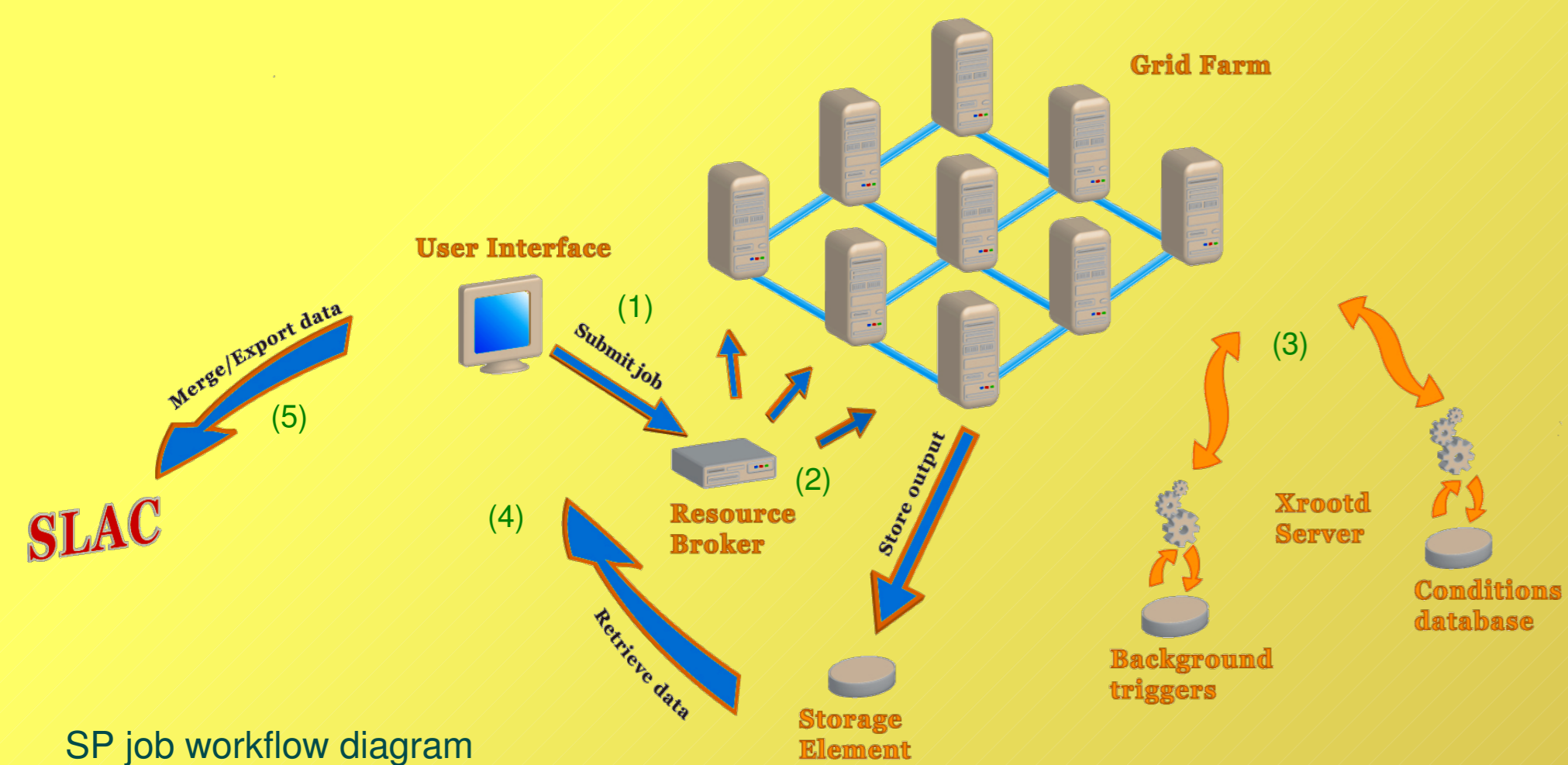


BaBar Simulation Production (SP) with INFN GRID

INFN GRID resources and production workflow



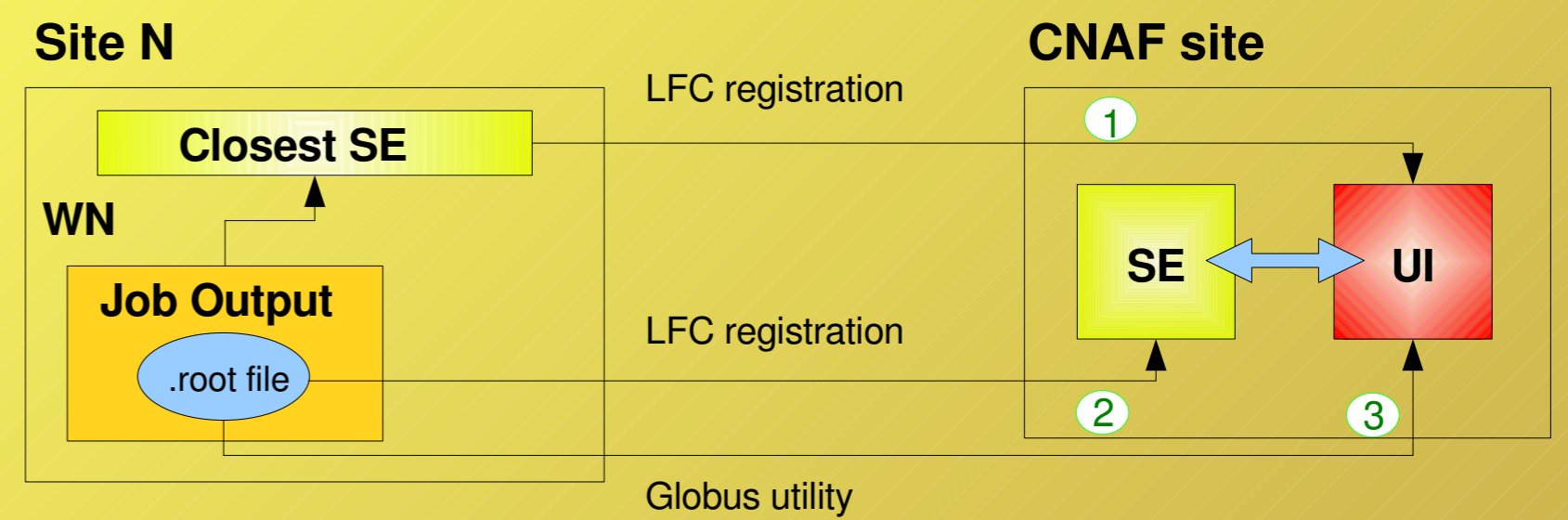
- Jobs submitted from the **User Interface** (CNAF) to a dedicated **Resource Broker** (Ferrara)
- Workload distributed by the **Resource Broker** over Computing Elements of all involved sites
- Jobs access Root input data from **Xrootd servers** locally or via Wide Area Network
- Jobs output registered into LFC catalogue and stored to Closest **Storage Elements** for later retrieving
- On **User Interface** the monitor system daemon checks the jobs status, retrieves the jobs output, and applies submission retry and recovery policies
- On **User Interface** the simulated event files are merged and exported to **SLAC**



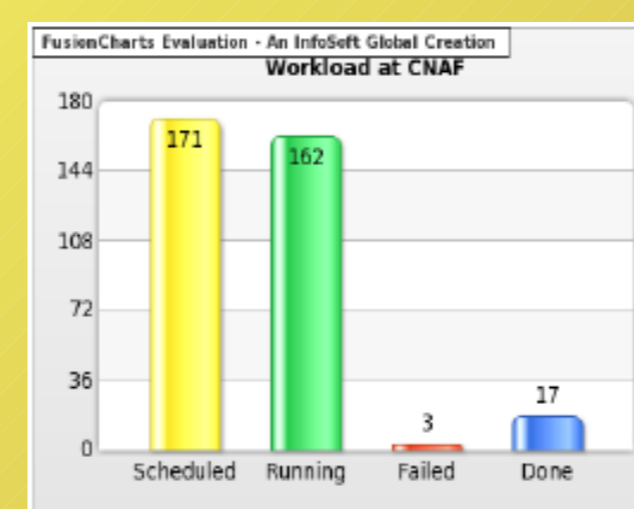
Job output management

- All services are available: the job registers the output file on LFC and transfers it to the Closest SE, via LCG utilities
- Closest SE unreachable: the job registers the output file on LFC and transfers it to the CNAF SE, via LCG utilities
- LFC fails: the job transfers the output file by Globus utility to the CNAF SE

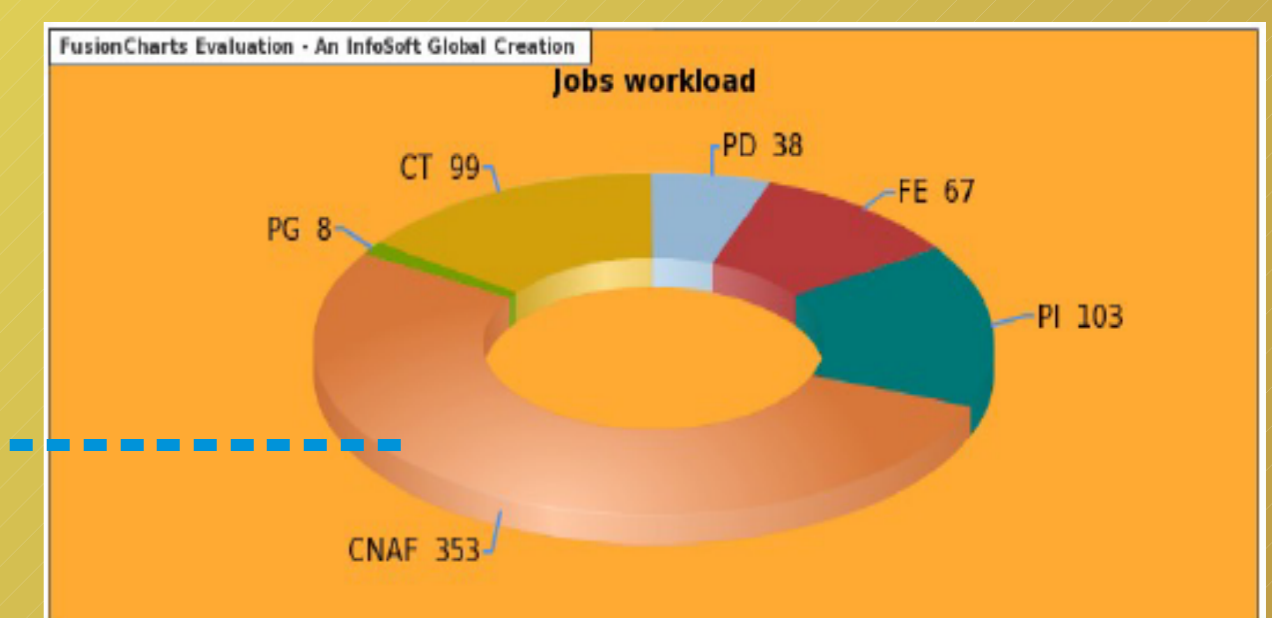
Failure recovery procedures include the LFC clean up by specific LFC utilities and the deletion of ROOT files by globus toolkit or LCG remove utilities.



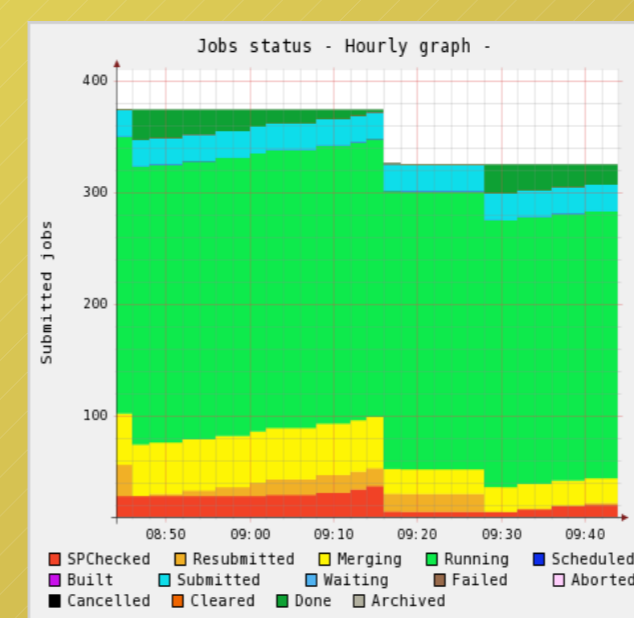
Web monitor



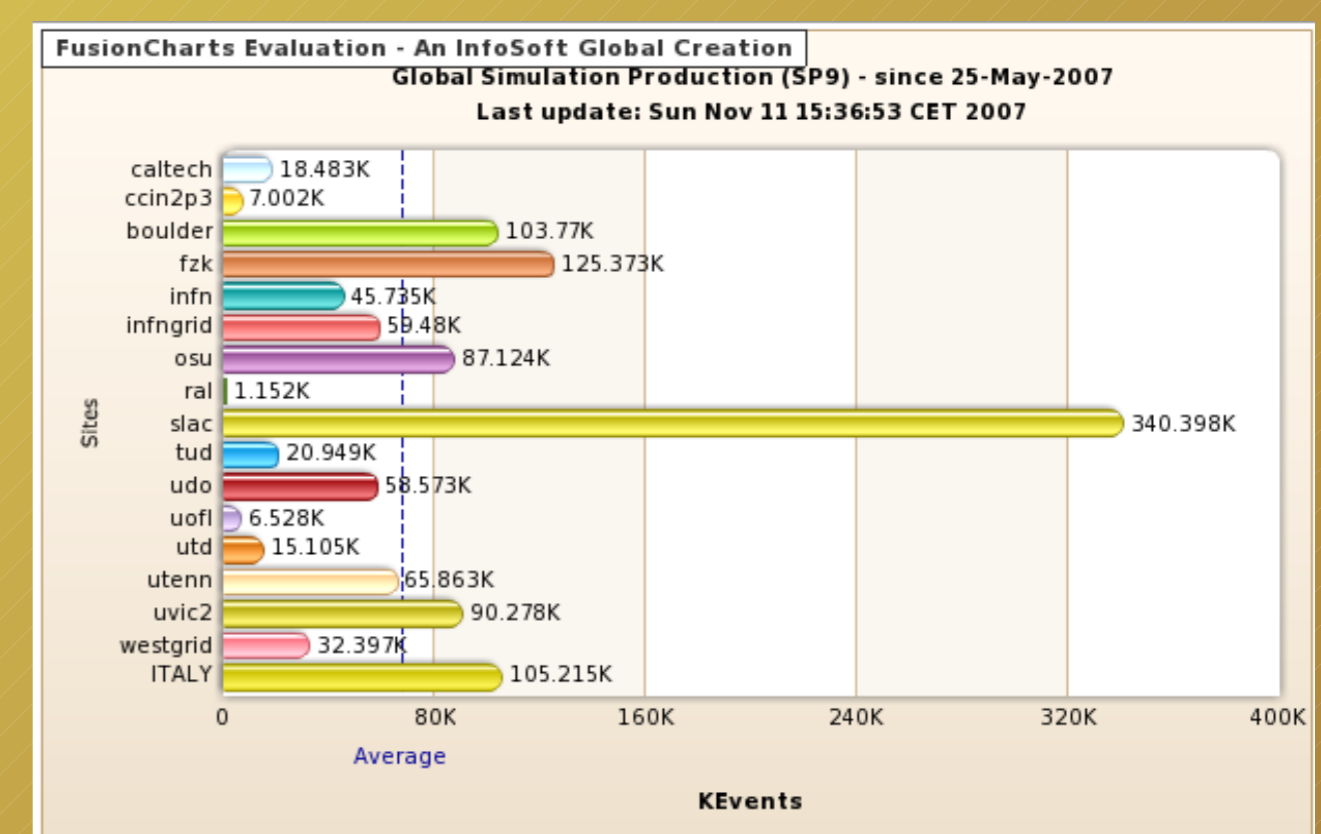
Job status per INFN-GRID site histogram



Job workload per Grid site



Hourly job status



Number of simulated events produced since the beginning of yearly prod. per BaBar site

Present results

The simulation of HEP events is now feasible using Grid architecture:

- BaBar SP in the period 2005-2008 counts > 700 million events (INFN GRID).
- The peak production rate in Italy on INFN-GRID was 14 million events per week.
- The BaBar SP on INFN-GRID is doubled in 2007 respect the 2006 results.

The future

Improvement of merge specific step and use of new GRID technologies

- Simulation Production merge step performed by GRID job submission.
- Complete the transit from LCG to gLite middleware.
- MyProxy server features integration to permit the long term control proxy validity.

References:

- BaBar home page: <http://www.slac.stanford.edu/BFROOT/>
- INFN-GRID production site: <http://grid-it.cnaf.infn.it/>
- BaBar-GRID web monitor: <http://webservice.infn.it/babargrid/index.html>
- IFAE08: <http://www.bo.infn.it/MaKaC/getFile.py?access?contribId=96&sessionId=5&resId=0&materialId=slides&confId=392>
- EELA07: A.Fella, D.Andreotti, E.Luppi Events simulation production for the BaBar experiment using the grid approach content. Proceedings of Third EELA Conference (E-infrastructure shared between Europe and Latin America), 3-5 December 2007. ISBN number is: 978-84-7834-565-6