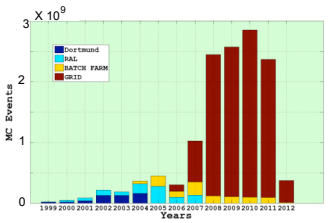
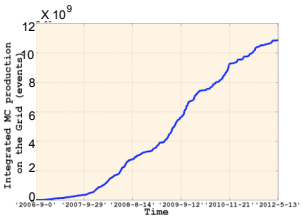
Monte Carlo Production on the Grid by H1 Collaboration

E. Bystritskaya (ITEP, Russia), A. Fomenko (LPI,Russia), N. Gogitidze (LPI,Russia),
B. Lobodzinski (DESY,Germany) on behalf of the H1 Collaboration

Productivity of MC Simulations

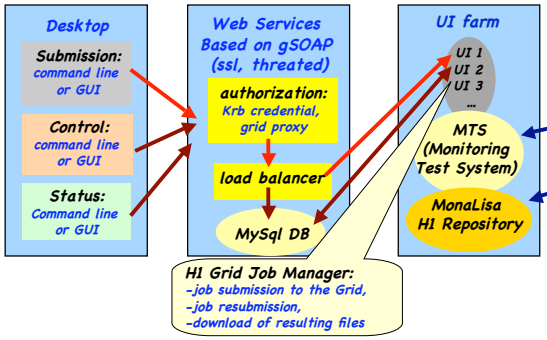
2.8 x 10^9 MC events in 2010





- peak performance: 600 Millions events per 30 days
- simultaneous number of jobs on the LHC Grid: 20 000
- CPU time per event: 2-15 sec

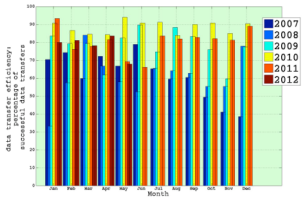
H1 MC Framework

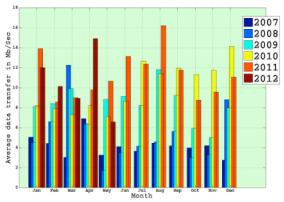


- The central H1 MC Database, located on the MySQL server, is a backbone of the H1 MC Framework.
- Full control of the production cycle can be done from any external host (Desktop) through the GUI or the Command Line interface.
- Access to the central DB is realized through the gSOAP toolkit with the authentication record based on the Kerberos credential and Grid proxy certificate.
- Submission of MC request is realized on the small farm of UIs.
- H1 Grid Job Manager: is the object oriented workflow manager. The manager converts MC requests into grid jobs, supports the existence of the job on the LHC Grid infrastructure and downloads resulting files to the H1 storage tapes.

Efficiency of MC Simulations

Data Transfer Efficiency



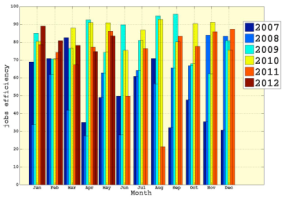


Data Transfer Efficiency is defined as a ratio of successful transfers over all transfers for a given time period.

All necessary input data are replicated between available SEs on the LCG Grid sites opened for HONE VO. Unsuccessful file transfers are due to transfer problems from closest (local) SE to a WN, and from a WN to a final SE.
The most frequent cases are
- very small data transfer rate (~kb/s),
- copying command gets stuck due to unknown reasons.

Both situations are solved by implementation of timeout mechanism in the job execution wrapper.

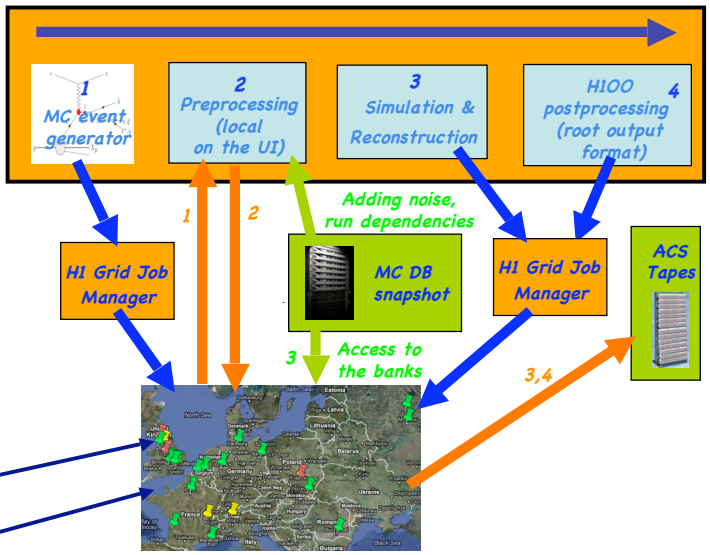
Job Efficiency



Job Efficiency is defined as a ratio of successfully done jobs over all submitted jobs for a given time period.

The inefficiency is due to
- data transfer of input files to a WN and final data files from a WN to SE,
- lack of free space on a WN,
- disturbances in access of the LCG File Catalog (LFC),
- internal H1 software bugs (very rarely).

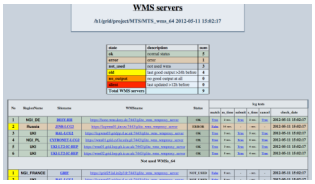
H1 Monte Carlo General Scheme



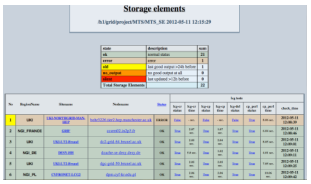
Full scheme of the H1 MC calculations.
- blue arrows show submission of jobs for each step in the MC chain
- green arrows represent access to the H1 servers with run dependencies related to the H1 detector
- orange arrows display the data flow for each step of the simulation

H1 Monitoring Service

Availability of Workload Management Services



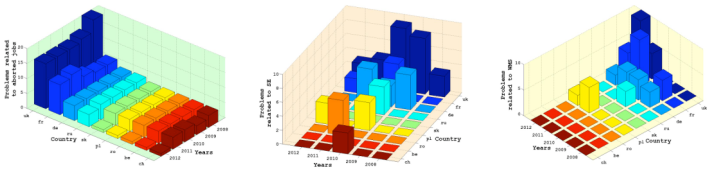
Availability of Storage & Computing Elements



The H1 Monitoring Service build by the H1 Collaboration, which tests each available for HONE VO component of the LHC Grid (WMS, SE and CE services) is based on short versions of production MC jobs. Their exit status, time of data transfer and time in which job is residing in other possible states (Waiting, Submitting, Running etc) is used for automatic creation of white and black list of services which is used in the production cycle.

GGUS Trouble Ticket history

GGUS Trouble Tickets corresponding to the most frequent problems (aborted jobs by a CE, not available files on a SE and malfunctioning of WMS services) are presented on separate plots.



The GGUS Trouble Tickets are created when the problem persist longer then 6 days.

Bottlenecks & scaling boundaries

Limitations are introduced mainly by
- peak-similar rather then constant MC requirement pattern rate,
- access to the local H1 tape storage,
- necessity of manual intervention during handling of the job cycles,
- slow data transfer rate between Tier-2 sites (mainly available for HONE VO)