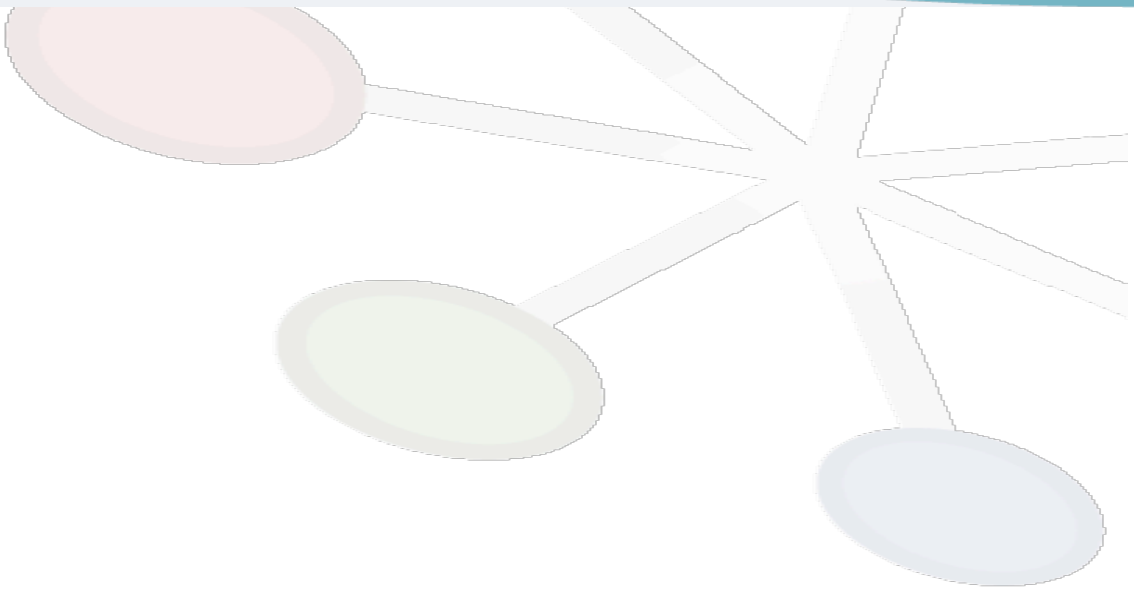
LHCb Status
November2008



Core Software (Gaudi)

- Stable version was ready for 2008 data taking
  - Gaudi based on latest LCG 55a
  - Applications ready for using survey geometry, conditionsDB
    - Still difficulties in commissioning CondDB access at Tier1s
- Plans for the shutdown
  - Use opportunity for "cleaning" part of the framework
    - Unifying some interfaces, remove obsolete parts…
    - Workshop with ATLAS 2 weeks ago…
  - Merger with ATLAS on "configurables"
    - Python-based configuration of applications
  - New ROOT schema evolution
  - Support file-related records
    - Needed for file summary records (luminosity, statistics for skimming etc…)
  - More on interactivity (GaudiPython)
  - Some improvements for Online usage
  - Studies on multi-core support (parallel file processing)
    - In collaboration with LCG-AA / PH-SFT

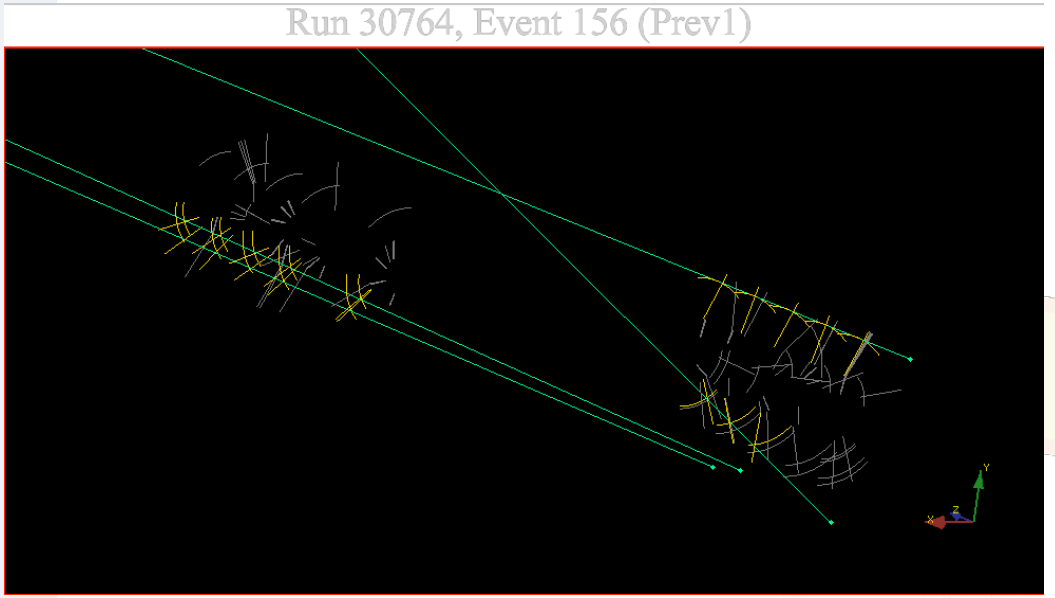
LHCb recent activities

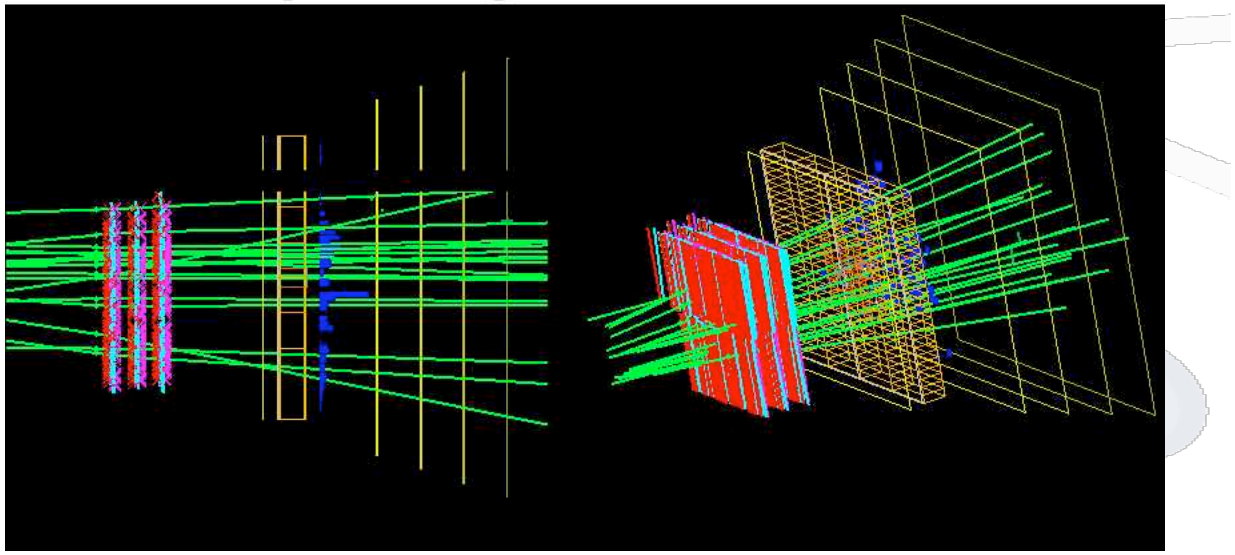
- Commissioning of DIRAC3
  - Fully reengineered system (started in September '07)
  - Main features:
    - Single framework for services, clients and agents
    - Fully integrated Workload and Data Management Systems
    - Supports production and user analysis activities
      - Allow to apply VO policy: priorities, quotas…
    - Uses pilot jobs (as DIRAC2)
      - Ready for using generic pilot jobs (not switched on yet)
      - Full scale test with generic pilots will take place in the coming weeks
    - New integrated bookkeeping system
- Production activities (fully DIRAC3)
  - Complete simulation and stripping of MC data (so-called DC06 as was launched in 2006)
  - Start 2008 simulation
    - Mainly for alignment and calibration studies
    - Physics studies (as of January, currently certifying Geant4 9.1)
    - FEST'09 preparatory phase (see later)

Cosmics and first beam data

- Cosmics used for detector commissioning
  - Of course very few detectors are hit!
  - Allows internal time alignment of subdetectors
    - Using consecutive 25ns slots
  - Partially time alignment between detectors
    - Shifting timing by 12.5 ns and equalising population in consecutive bins…
  - All subdetectors included in global runs as of end August
- TED data
  - LHCb was first to see tracks coming from the injection line!
  - Single shots with ~2 muons/cm^2, but once every 48 ns!
  - First tracks in the VeLo
  - Allowed rough detector time alignment (~2ns)
- 10th September
  - Only muons, calorimeters and short time OT

First data

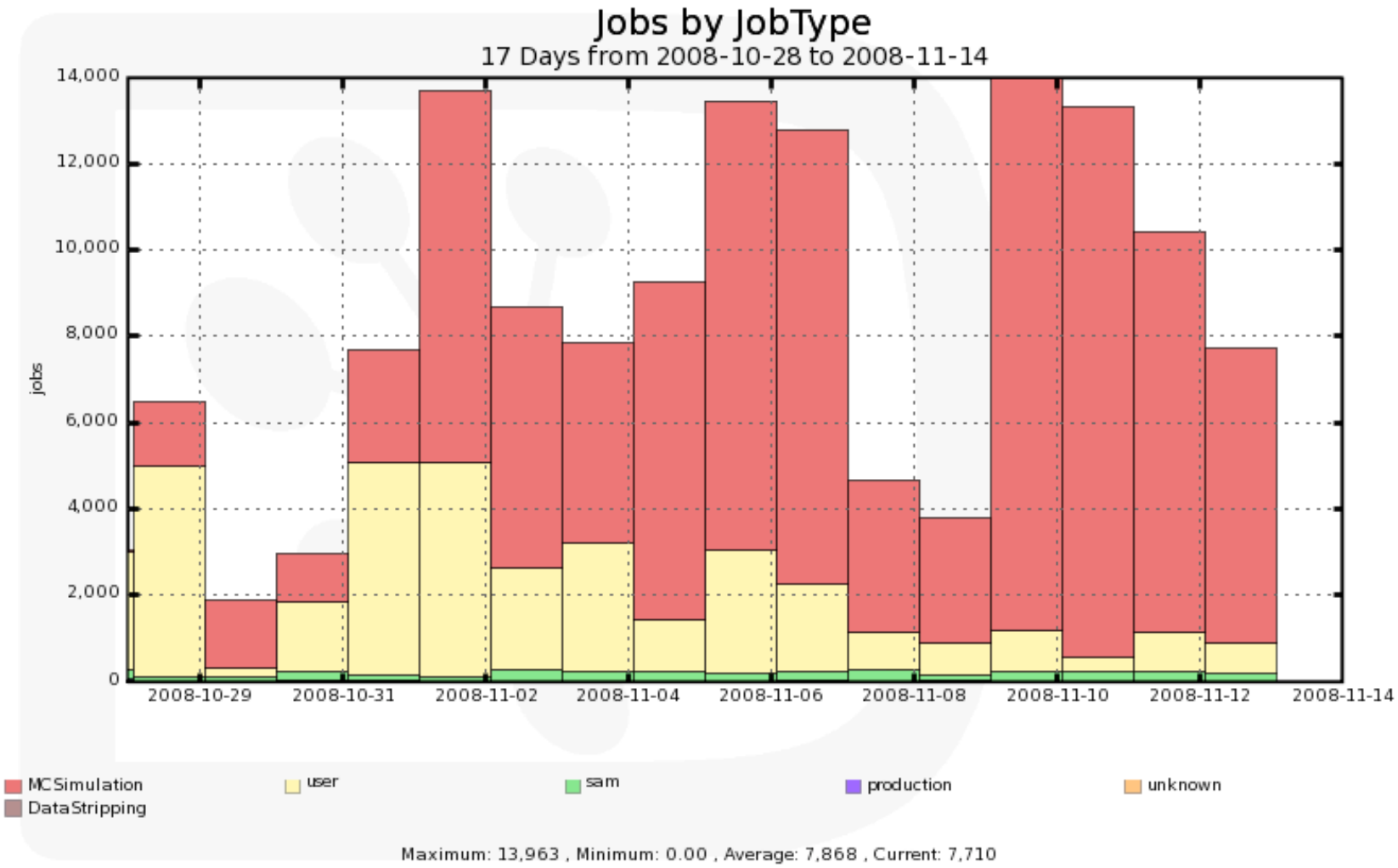




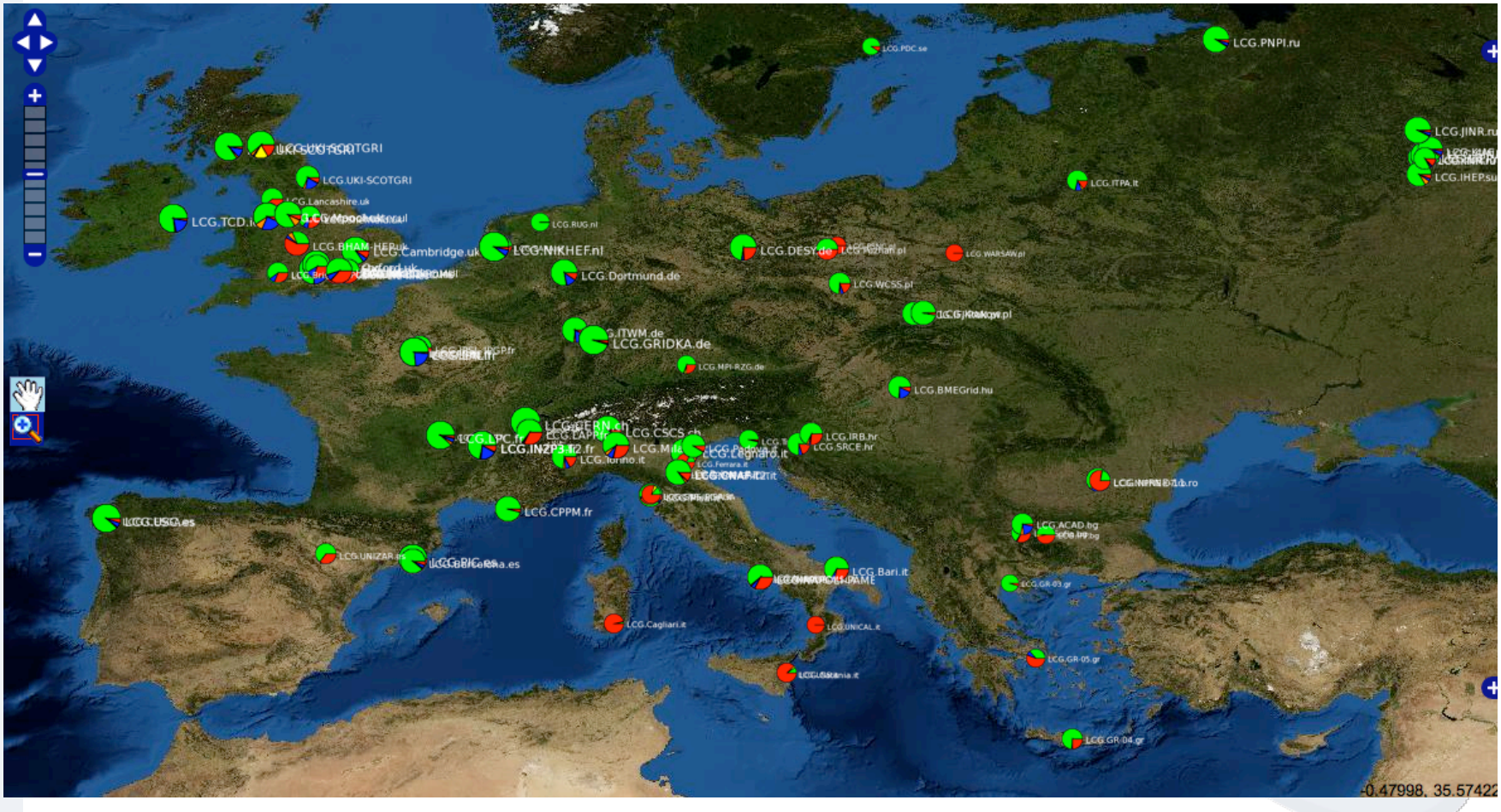
DIRAC3

- DIRAC3 will be fully ready for first data
  - Analysis is being migrated
    - End of 2008: no LCG-RB needed
  - Since end of September: no dependency any longer on SRM v1
- Still to come:
  - Glexec on worker nodes
    - Will allow to exploit the full power of DIRAC
      - Allows late binding of jobs, VO policy etc…
    - Running analysis jobs with higher priority without site intervention
    - DIRAC3 model was certified long ago by the GDB working group
    - Waiting for middleware to be ready (SCAS service)
  - Commissioning of the alignment and calibration loop
    - Setting up an LHCb-CAF (Calibration and Alignment Facility)
      - Requirements are rather modest ("simple" detector)
      - Start with 2 8-core machines, 200 GB of disk
    - Full commissioning of Conditions Database update and streaming
      - Currently very few commits to CondDB

DIRAC3 jobs


Jobs by JobType
17 Days from 2008-10-28 to 2008-11-14
jobs
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
2008-10-29
2008-10-31
2008-11-02
2008-11-04
2008-11-06
2008-11-08
2008-11-10
2008-11-12
2008-11-14
MCSimulation
DataStripping
user
sam
production
unknown
Maximum: 13,963 , Minimum: 0.00 , Average: 7,868 , Current: 7,710

DIRAC3 portal



Recent issues encountered

- Storage
  - Instability of SEs, in particular dCache
    - Very good response from sites and dCache developers
    - Permanent struggle due to various causes:
      - Software issues (addressed with sites and developers)
      - Sub-optimal hardware configuration at some Tier1's
      - Unavailability of files: are in the namespace at site but cannot be accessed or even get a tURL
        - Damaged tapes, unavailable servers…
  - Transfers are OK (low throughput needed: 70 MB/s)
- Workload Management
  - Three severe issues with WMS (fixes being certified)
    - Mixing up credentials of jobs submitted by the same user with different roles
    - Limitation in proxy handling (too few delegations allowed) preventing some users to run jobs (e.g. from French CA)
    - Misbehavior of WMS after some idle time: cannot find suitable sites even for a job without requirements!
- Issues with local shared software repository at sites
  - Stability and access rights (being addressed)

LHCb Computing Operations

- Production manager
  - Schedules production work, sets up and checks workflows, reports to LHCb operations
- Computing shifters
  - Computing Operations shifter (pool of ~12 shifters)
    - Covers 14h/day, 7 days / week
    - Computing Control room (2-R-014)
  - Data Quality shifter
    - Covers 8h/day, 7 days / week
  - Both are in the LHCb Computing Control room (2-R-014)
- Daily DQ and Operations meetings
  - Week days
- Grid Expert on-call
  - On duty for a week
  - Runs the operations meetings
- Grid Team (~6 FTEs)
  - Shared responsibilities (WMS, DMS, SAM, Bookkeeping…)

- **Aim**
  - Replace the non-existing 2008 beam data with MC
  - Points to be tested
    - L0 (Hardware trigger) strategy
      - Emulated in software
    - HLT strategy
      - First data (loose trigger)
      - High lumi data (b-physics trigger)
    - Online detector monitoring
      - Based on event selection from HLT e.g. J/Psi events
      - Automatic detector problems detection
    - Data streaming
      - Physics stream (all triggers) and calibration stream (subset of triggers, typically 5 Hz)
    - Alignment and calibration loop
      - Trigger re-alignment
      - Run alignment processes
      - Validate new alignment (based on calibration stream

FEST'09 preparation (2)

- File merging (into 2-3 GB files)
  - Small files at CERN on a T0D1 space
  - Merging being done at CERN
- Online developments
  - Event injector
    - Read MC files
    - Emulate L0 trigger (conditions my be varied)
    - Creates multi-event packets (MEP as font-end does)
    - Send MEP to an HLT farm node
  - Event injector control system
    - Emulation of the standard Run Control
    - Simulates a regular run, but using event injector as source
  - Multiple streams
    - Using HLT classification as criterion
      - Was not needed for 2008 run, hence was delayed
  - Readiness
    - Tests in December, operational in January

FEST'09 runs

- Description of the activity
  - Define FEST conditions
  - Start a run
    - Events are injected and follow the normal path
  - Files export to Tier0 and distribution to Tier1s
    - CCRC'08 repetition
  - Automatic reconstruction jobs at CERN and Tier1s
- Short test periods
  - Typically a week
  - Depending on results, take a week interval for fixing problems
- Vary conditions
  - L0 parameters
  - Event rates
  - HLT parameters
  - Trigger calibration and alignment loop

2009 resources

- No reason to change drastically the overall amount of data
  - Real data
    - Split year in two parts:
      - 0.5 10^6 s at low lumi
      - 4 10^6 s at nominal lumi (2 10^{32})
    - Trigger rate constant: 2 kHz
  - Simulation: 2 10^9 events
- New assumptions for (re-)processing and analysis
  - Lack of experience from 2008 non-data
    - More re-processings in a first instance in 2009
    - More calibration checks (done at Tier0)
  - Envision more analysis at CERN with first data
    - Increase from 25% (TDR) to 50% (first part) and 35% (second part)
    - Include SW development and testing (LXBATCH)
  - Almost same events sizes and processing times as in TDR
    - Small adjustments due to more precise estimates
      - Some up, some down…
- Need to account for non-flat usage of resources…

Conclusion

- Due to lack of 2008 real data
  - Use MC data for further testing the whole system
  - FEST'09
    - Full system test including HLT, online monitoring, streaming etc…
    - Short periods (one week) from January to March
    - More FEST in May if no beam
- 2009 real data
  - Use TED runs (as soon as SPS is running)
    - Allows completion of calibration and alignment
  - First pilot run
    - Equivalent to 2008 run
    - Useful for detector understanding / tuning
    - First physics results expected even with 10^8 events
  - Nominal (LHCb) luminosity run
    - Assume 4 10^6 seconds
- Resource needs are being re-evaluated
  - Minor changes except for CERN CPU (3 MSI2k)