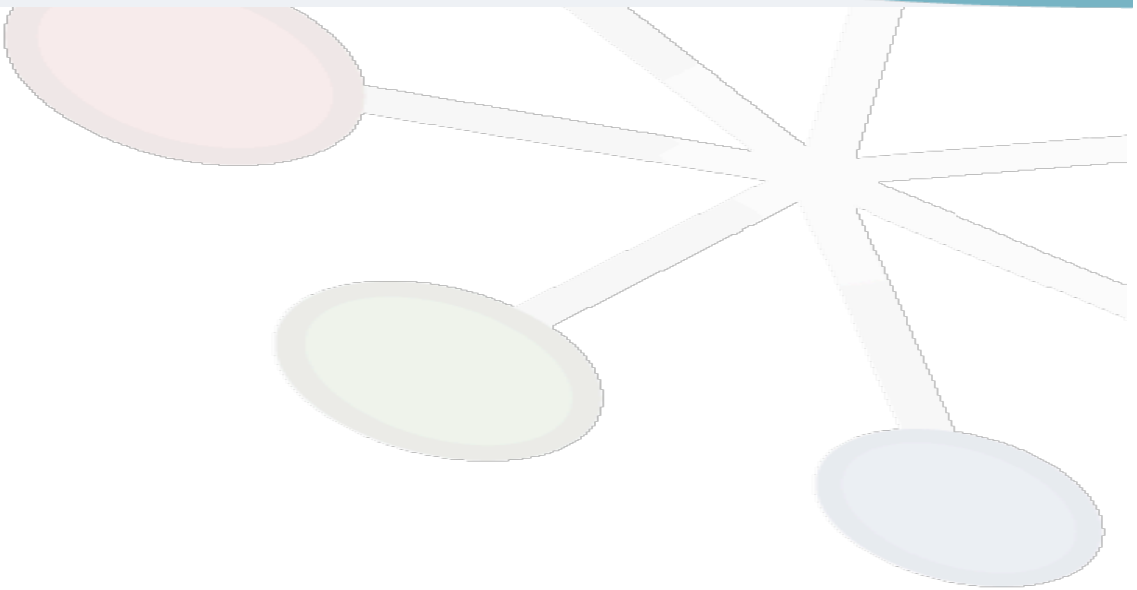
LHCb and LHC running conditions



LHC beam conditions

- Normal conditions
  - Nominal bunch intensity (< 10^{11} protons)
  - ~2800 colliding bunches
  - Luminosity 2.10^{32} (obtained by detuning the beam in LHCb, $\beta^* = 10$ m
  - Average number of collisions per crossing ~ 0.7
- Current conditions
  - Nominal bunch intensity (++)
  - 4 and more colliding bunches
  - Luminosity very low (< 10^{30})
  - … but higher luminosity per bunch ($\beta^* = 3.5$ m)
- Consequences
  - Conditions per crossing "worse" than nominal
  - Larger number of collisions per crossing (1.3 to 2.3!!)
  - Larger events
  - Exponential dependence of reconstruction software
  - Exponential dependence of selection software (stripping)

Consequences of LHCb beam conditions

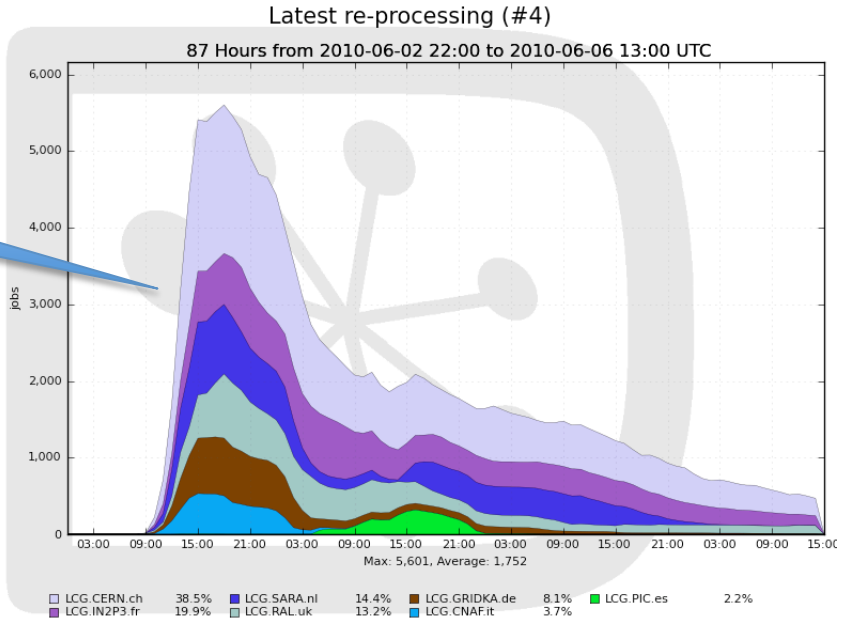
- Events size ~ 60-70 kB instead of 35 kB
- Trigger rate nominal (in order to maximize event rates)
  - 2 kevents/s
  - 120 to 140 MB/s (instead of 70 MB/s)
- Reconstruction time increase
  - ~25 HS06.s (nominal 12 HS06.s)
- Unacceptable stripping time
  - ~80 HS06.s (nominal 1 HS06.s)!!!
  - Reduced now to ~10 HS06.s
- Consequence
  - Limit file size (currently 2 GB, can go down probably to 1 GB)
    - Nominal is 3 GB
  - Reconstruction + stripping jobs take longer than anticipated
    - 40 kevts * 35 HS06.s = 1.4 10^6 HS06.s
    - Requested queue length: 1800 HS06.mn = 1.08 10^6 HS06.s

Processing and reprocessing

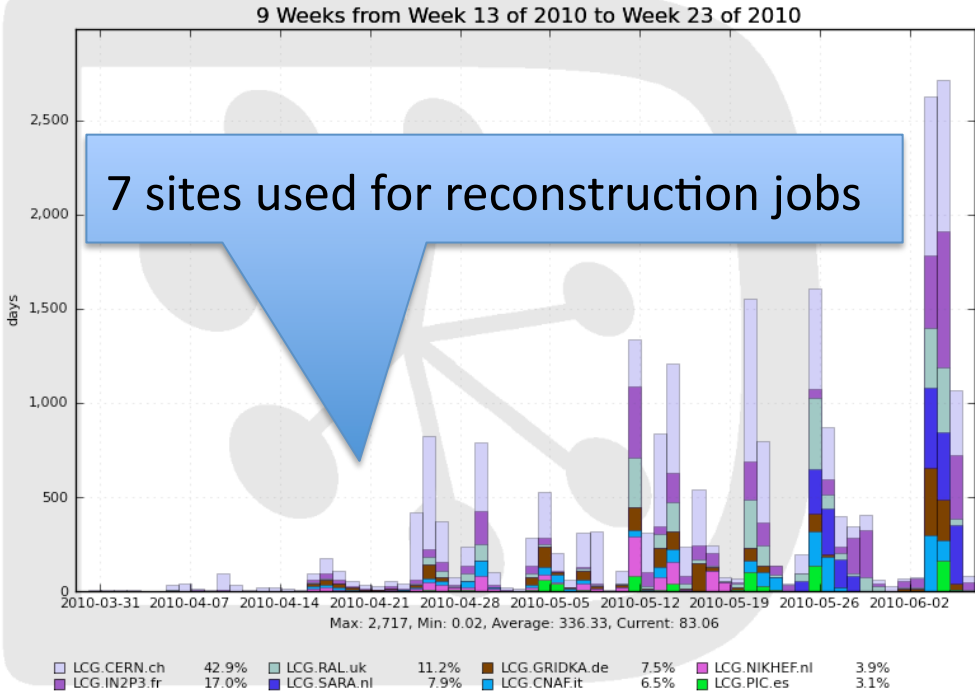
- So far, 5 successful full (re)-processings
  - New production launched on the whole dataset
  - Only 3 are kept on disk, one to be scrapped soon
- Processing #6 was a failure
  - Jobs would have taken more than 7 days wall-clock time to complete!
    - Due to much higher pile-up
- Processing #7 launched yesterday afternoon
  - Only most recent data (as of June 25th with high pile-up)
  - Expect reduction of 5 on processing time
    - Removed stripping lines
- Medium term actions
  - Reconstruction being worked on for optimisation
  - Careful scrutiny of stripping code
    - Factor ~100 to gain from last week's situation!

Production jobs

Re-processing #4 took 3 ½ days

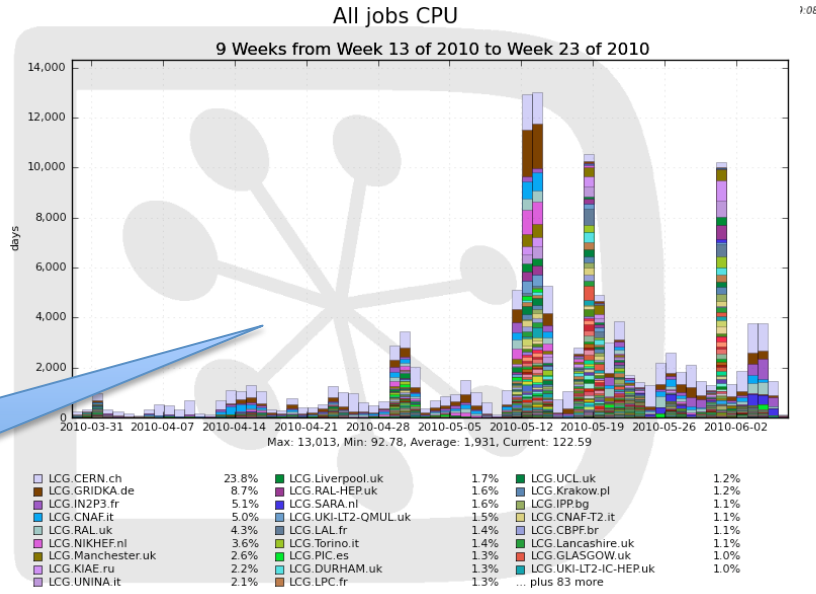


Reconstruction jobs CPU



7 sites used for reconstruction jobs

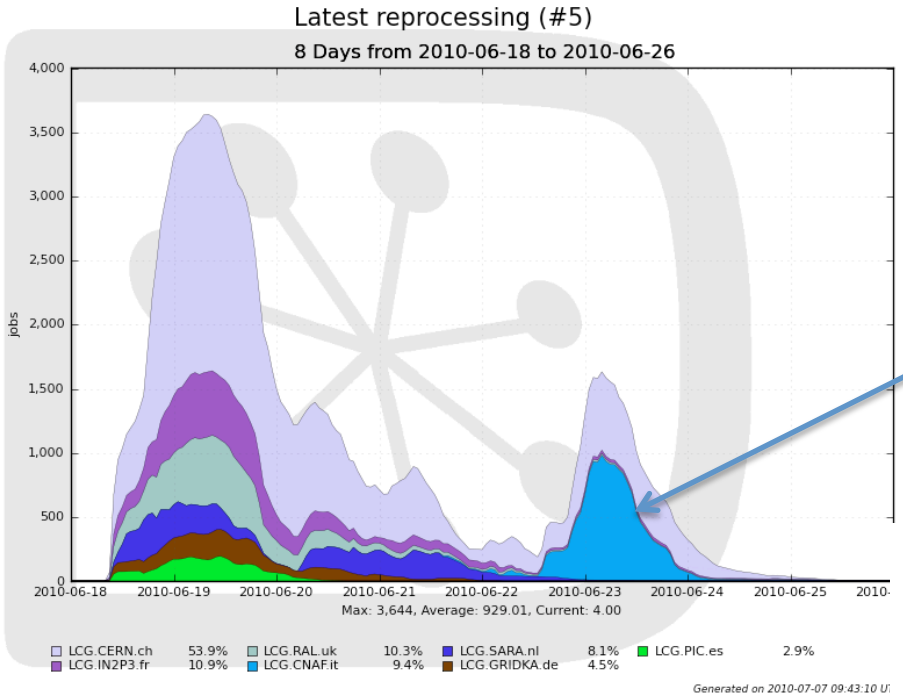
All jobs CPU



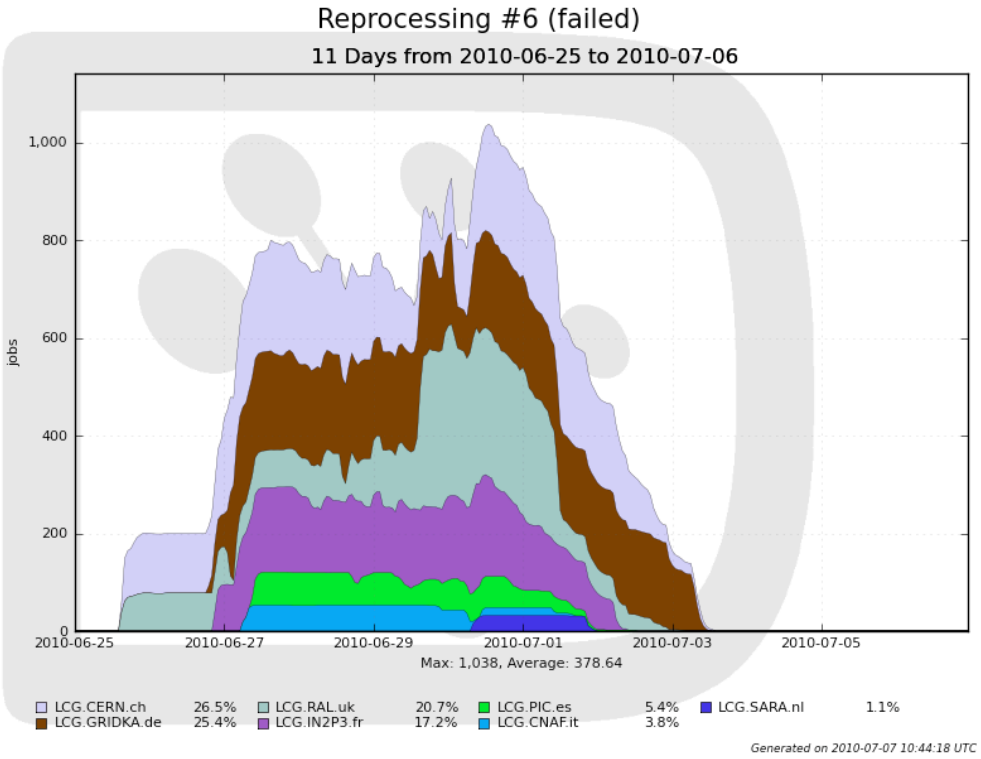
109 sites used in total

- Now stopped running simulation at Tier1s

Latest (re-)processings

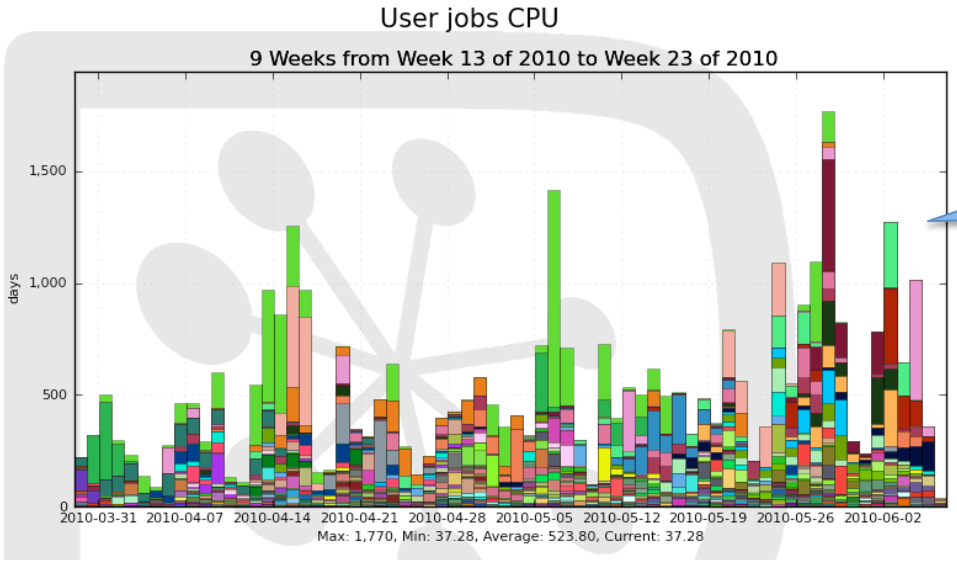


Took a bit longer as CNAF was not usable from the start



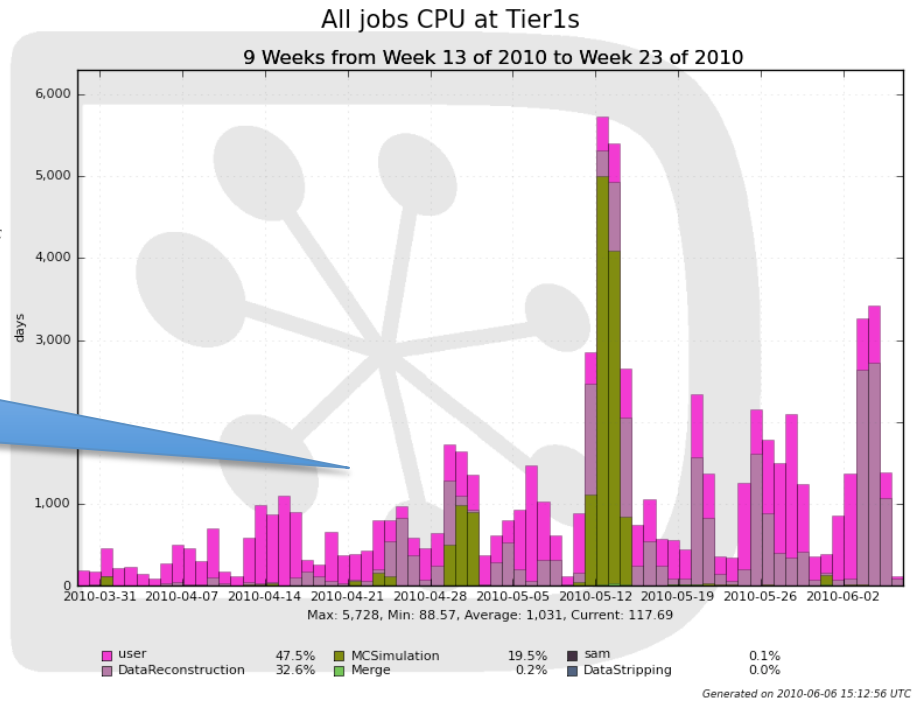
Jobs never completed…
Terminated by CPU time limit
Production stopped

Distributed computing at Tier1s



183 users have been running analysis jobs on the Grid

Resources used by user jobs comparable to (re-)processing



Outlook

- Watch carefully (re-)processing #7
  - #6 was aborted
  - If successful, continue processing new data with this workflow
- Software optimisation necessary
  - Adapt to beam condition
  - Recent conditions are better (LHC had a wrong emittance measurement)
- Possible consequences
  - Longer queues requested to sites
    - Currently 18,000 HS06.minutes
    - Would like to go to 3 GB files if possible
    - Twice longer queues?
  - Possible changes in resource requirements / Computing model
  - CPU normalised estimation essential (see Ricardo's talk)

Hot news (7:53 UTC)