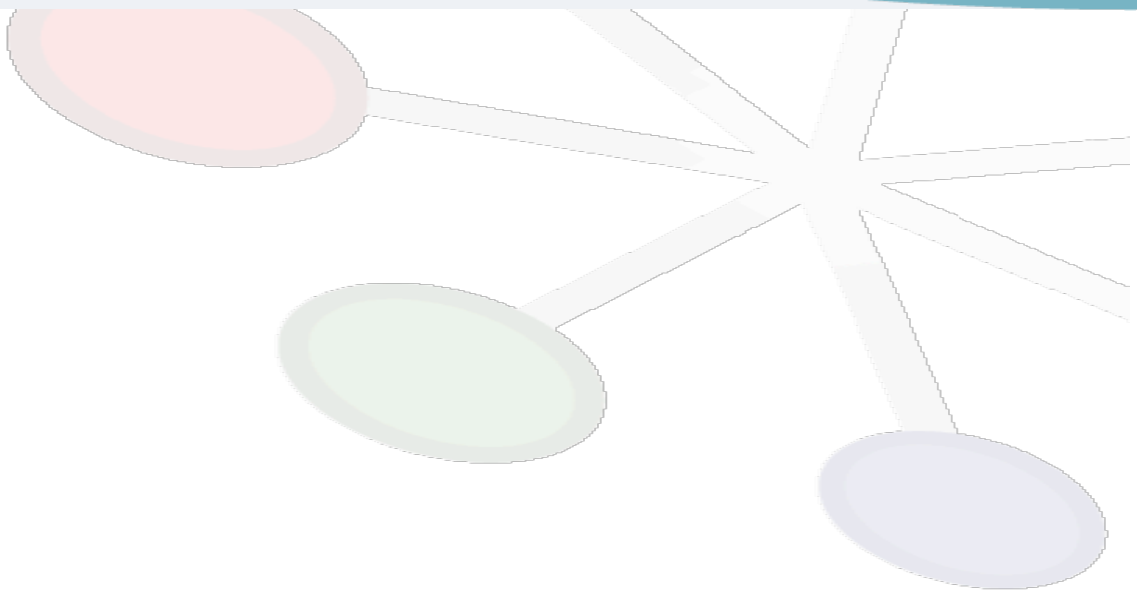
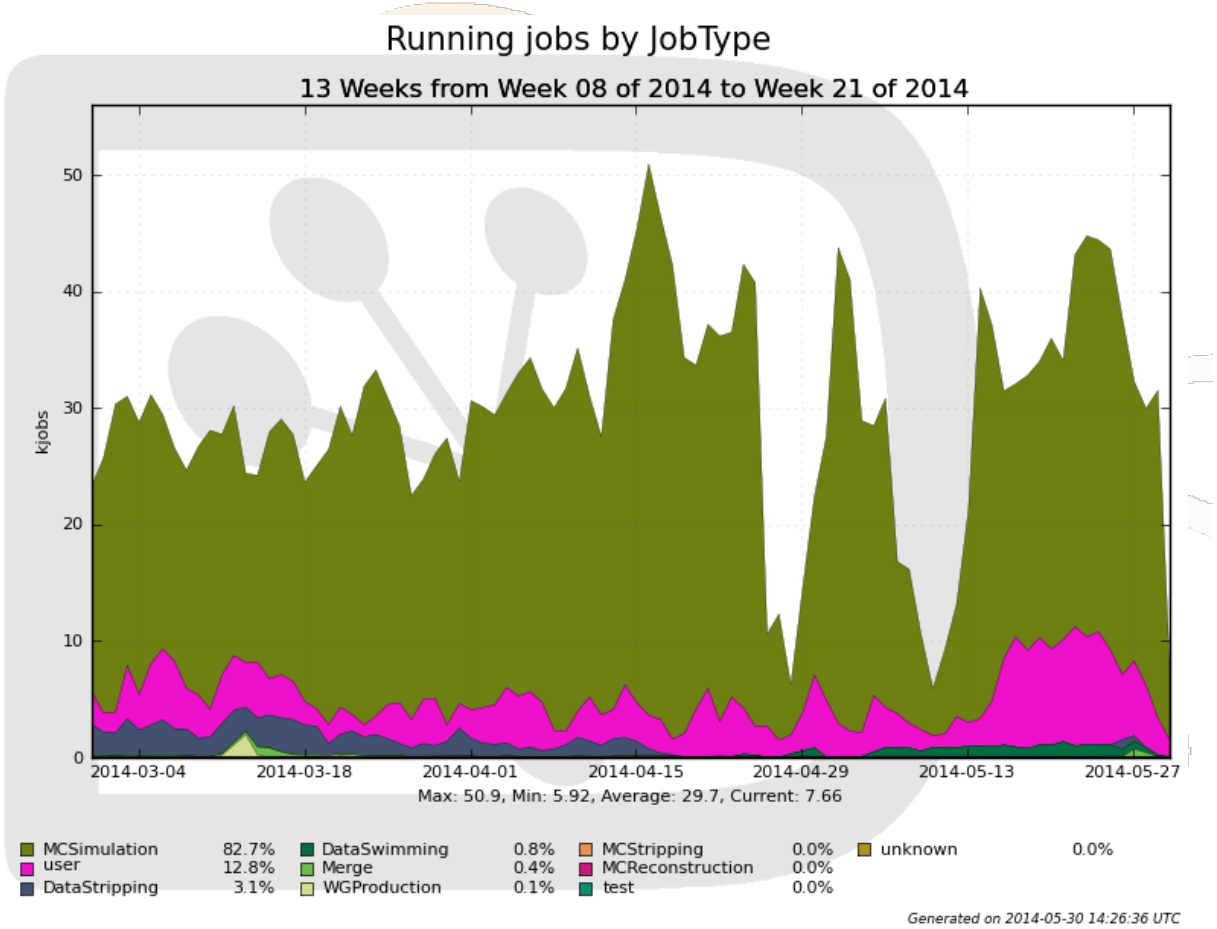
LHCb Computing

News



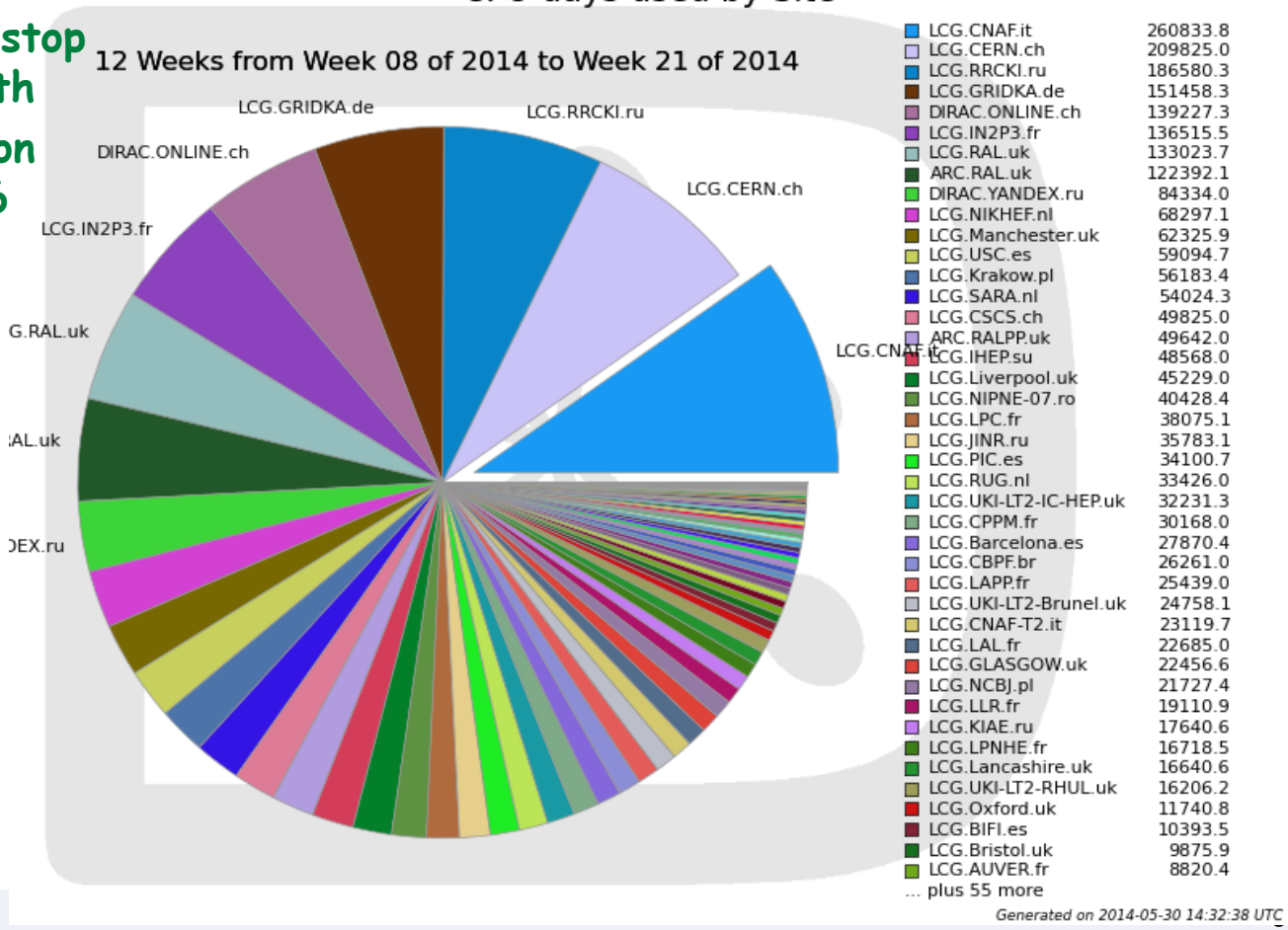
Operations Mar 2014 to May 2014

- Running jobs by activity
  - Montecarlo simulation main activity
    - No issue with CPU resources this quarter
  - User jobs
  - Spring 2014 incremental stripping



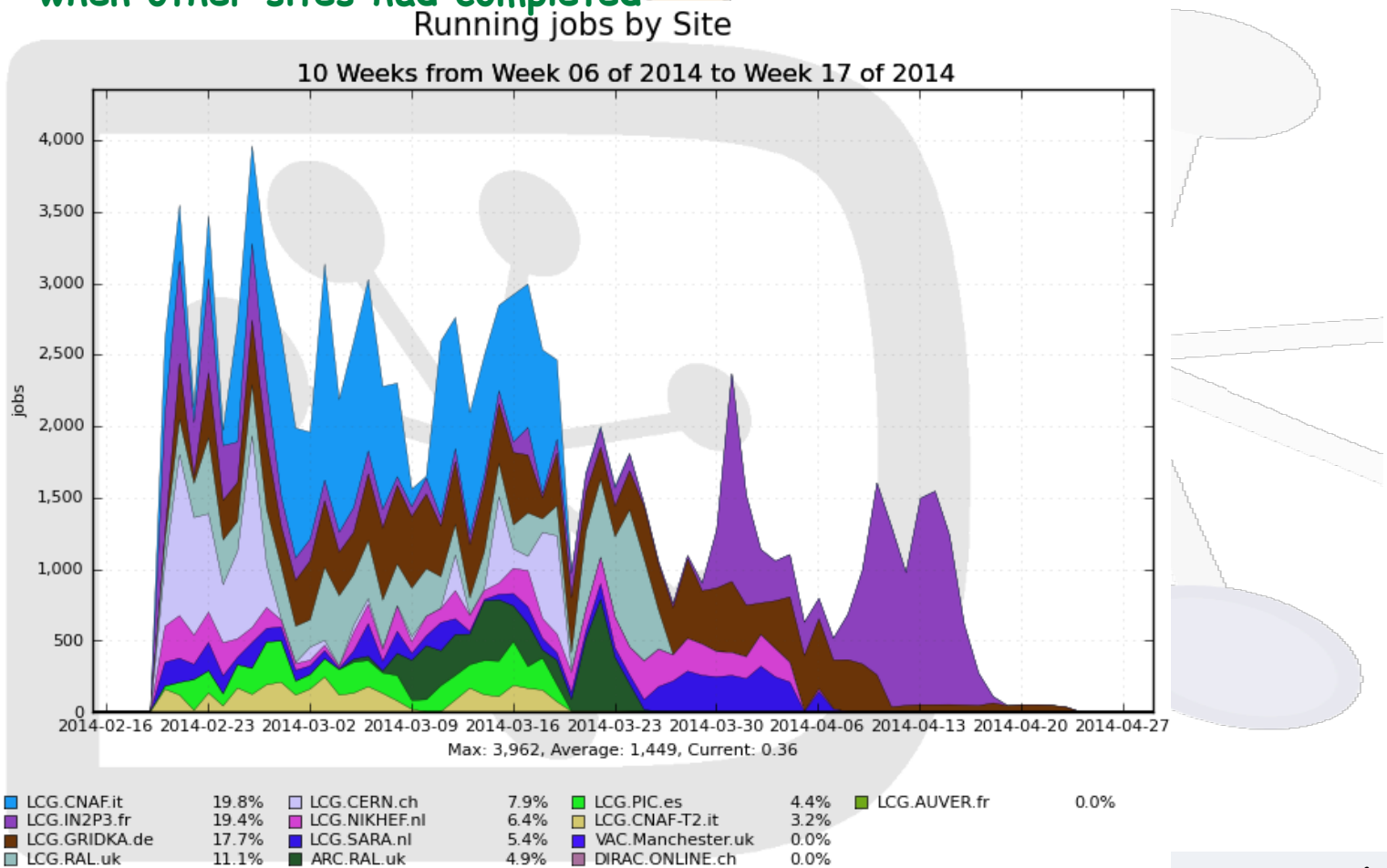
Operations Mar 2014 to May 2014

- CPU usage by site
  - Russia Tier1 (RRCKI.ru) successfully used in production
    - CPU resources as expected
  - Ongoing large scale tests of ARC CE at RAL
  - Sub-optimal use of HLT farm
    - Cooling stop ~1 month
    - Migration to SLC6



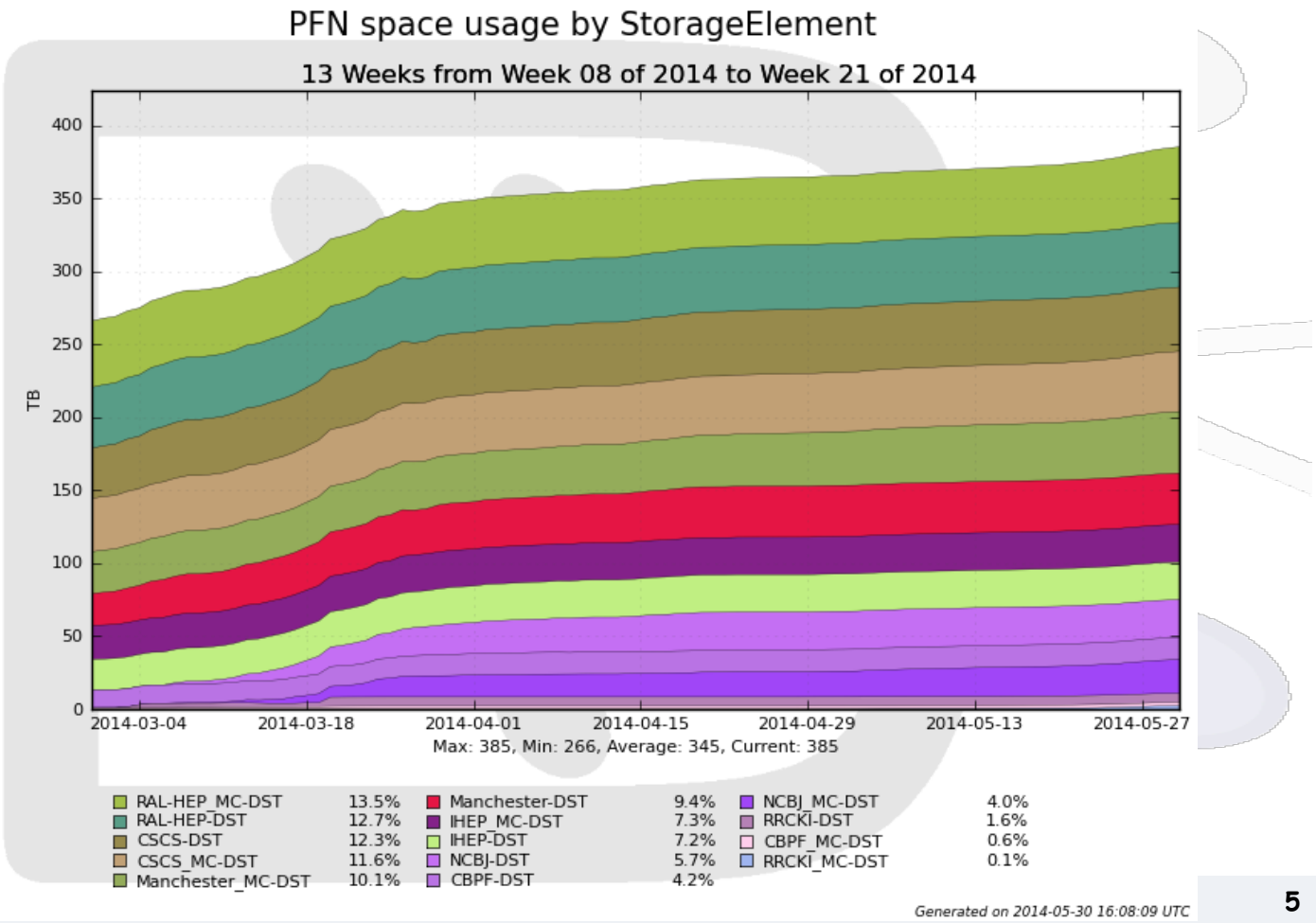
Operations Mar 2014 to May 2014

- Spring '14 incremental stripping
  - Excellent staging performance at all sites
  - Took 8 weeks (6 weeks expected)
    - Due to misconfiguration of one site in DIRAC, problem noticed when other sites had completed



Operations Mar 2014 to May 2014

- Tier 2 disk
  - 1.26 PB now pledged for 2014
    - Two new candidate sites currently under discussion
  - Plus 0.96 PB pledged at Kurchatov (Russia Tier-1)
    - Currently 0.17PB installed, successfully commissioned



Data processing plans, next quarter

- Reprocessing of 2010 data
  - To provide legacy dataset with reconstruction consistent with 2011 and 2012
    - Considerable work to back-port alignment and calibration
    - Used opportunity to further automate, in view of 2015
  - ~Ready to start
- Full restripping of 2011 and 2012 data
  - Applying latest calibrations
  - Intended to be legacy dataset
  - Used also to commission microDST for all stripping lines ahead of 2015 data-taking
  - Plan to commission during summer, run in autumn.
    - Expected to take 6 weeks of staging + processing
- Simulation of 2015
  - Small productions, mainly to prepare HLT

Software commissioning

- HLT commissioning is major software activity for 2014
  - Commissioning of split HLT
    - HLT1 in real time, HLT2 deferred
    - Requires also changes to monitoring
  - Commissioning of automatic online calibration
    - Changes needed to condDB replication policies
  - Optimisation of HLT algorithms
  - Highest priority for 2014 computing effort

- Migration to ROOT 6
  - Decided to migrate to ROOT 6, before run 2
  - Tight schedule:
    - ROOT 6.00.00 out this week
    - ROOT 6.02.00 in December
      - HLT software stack to be frozen before then
  - Still some issues with dictionaries
  - Worries about memory footprint
    - Not an issue for HLT

2015 resources

- Concern about length of 2015 run
  - All experiment computing resources requests based on 3M seconds of LHC live time
    - And 5M seconds in 2016
  - Numbers based on 2010, 2011 experience
    - Surely more efficient commissioning next year?
    - We know there are more days of physics scheduled in 2015 than in 2010
    - We know that LHCb will saturate trigger rate from the beginning
- Too late to change 2015 requests, but can we be more realistic (or less pessimistic) for 2016?
  - Ideally, would like an official statement on the 2016, 2017 and 2018 schedules from the CERN management
    - LHCC can help?

- R&D on many-core computing
  - The main aim of the R&D on the many-core computing is to optimize the cost / performance ratio for the EFF [34]. It would also help to mitigate the risk related to the number of trigger processes per CPU node which might not scale as the Moore's law in the coming years. The R&D would study the relative performance of the trigger algorithms on different computing platforms like the Intel Xeon/Phi and GPGPUs, and the related issues of code portability.
- Continuous benchmarking & optimisation
  - The technology of microprocessors, both x86 and alternative architectures, will be monitored continuously making it possible to choose the most cost efficient option for the EFF. The trigger software will undergo optimisation, both within the trigger group and as part of future collaboration-wide optimisation activities. We foresee an optimisation programme that will adapt the experimental software to optimally exploit modern hardware, both in the general design of the software framework and in individual algorithm.

Run 3 output rate

- Physics program limited by HLT output rate
  - At a total output rate of 20 kHz the physics program at LHCb will need to be restricted. At 50 kHz a diverse beauty program will be possible, while a charm program of similar scope to that of Run 1 can be carried out. At 100 kHz the beauty program reaches its full potential, while the charm program records the legacy dataset of charm physics.

    This study strongly motivates writing data out at a high rate. The limit on what can be written will be determined by the offline-computing resources available. One way to increase the physics output without increasing the need for additional offline-computing resources is to decrease the event size. This may be possible for certain types of events, e.g., those selected by charm triggers. Another option would be to put certain types of data onto tape and delay analysing them until the offline-computing resources required become available. These approaches will be exercised during Run 2.

Conclusions

- Operations
  - Business as usual, no major issues
  - Progress in commissioning of Russia Tier1
- Preparations for Run 2
  - Software commissioning in full swing
  - Concerns about resources planning assumptions
- Upgrade
  - Required software improvements in line with strategy outlined in computing models paper
    - Major new effort has to be found within the collaboration
  - Proposed trigger rate represents up to an order of magnitude more data than in Run 2
    - Even reducing the event size will not compensate
  - In order to achieve this we should get full support from LHCC that LHCb physics program is of highest importance and justifies such an increase in computing resources