

LHCb Software & Computing Status

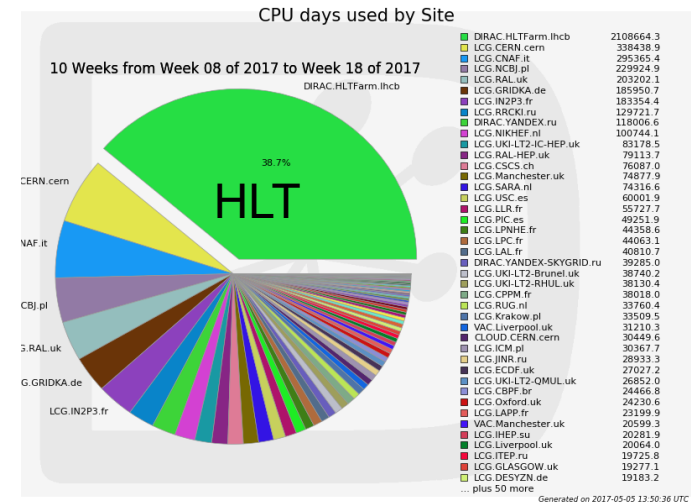
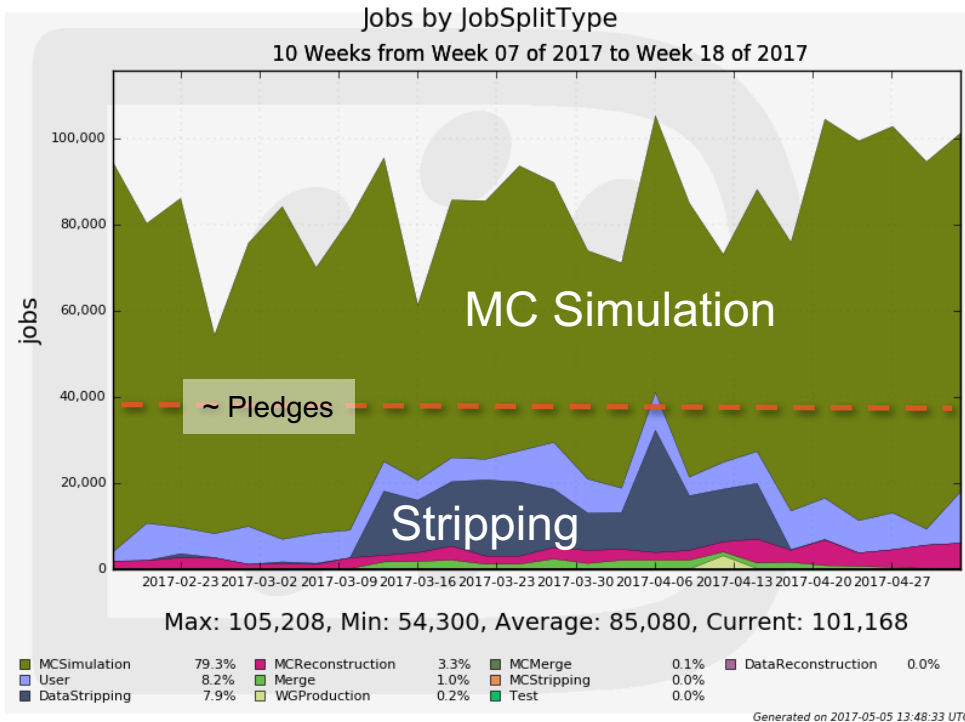
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9 May 2017

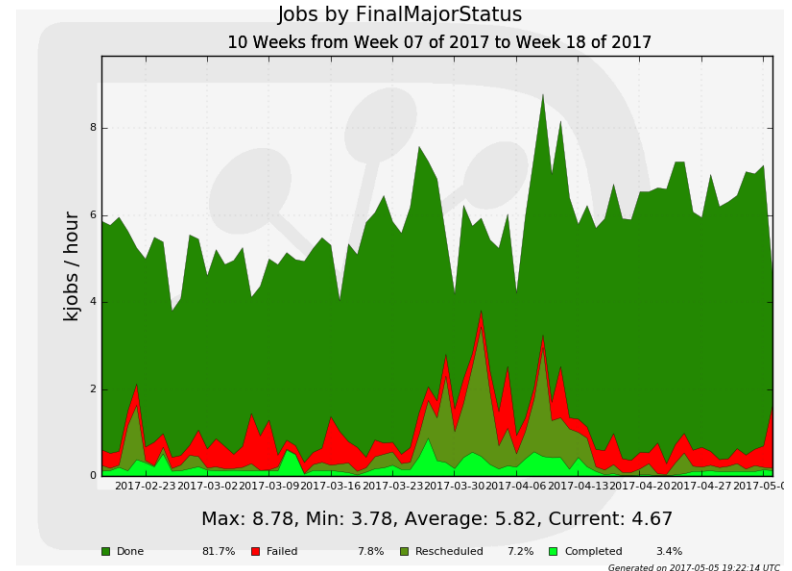
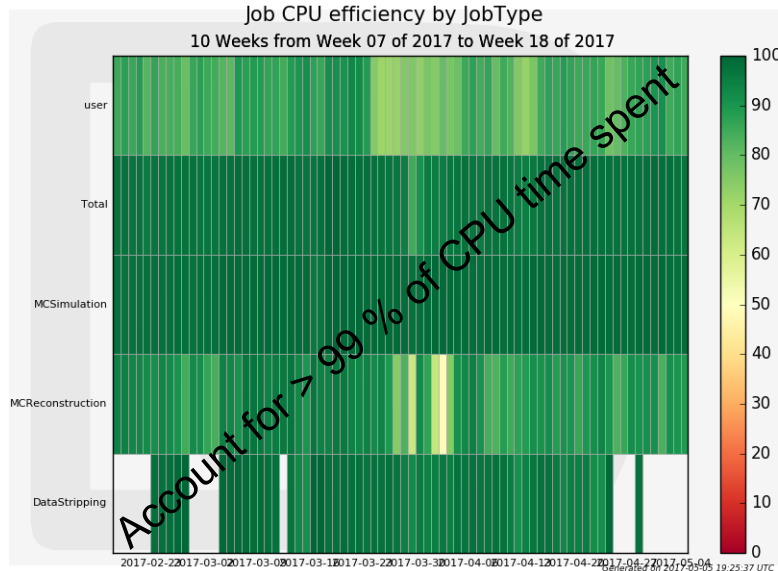


Operations Status



- Period dominated by MC Simulation at ~ 80 %
 - 1 month used for re-stripping of 2016 data
- Usage well above pledges w/ ~ 40 % of resources from HLT farm
 - At peak times HLT farm provided 1/2 of distributed compute resources

CPU Efficiency & Job Success Rate

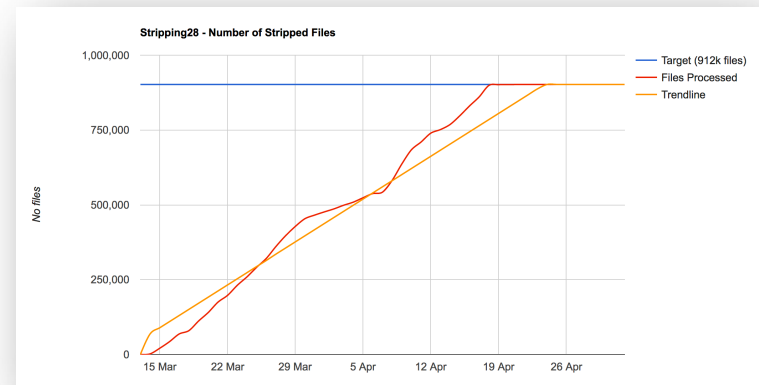


- CPU efficiency for main workflows continued at very high level
- Job success rate at only 85 %
 - ~ 10 % below usual value
 - Main reason were major infrastructure problems ~ end March

Status and Outlook for Computing

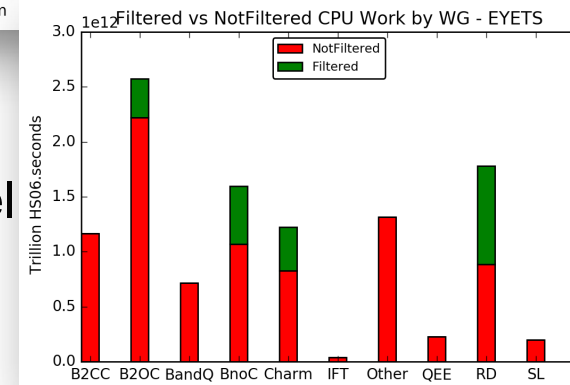
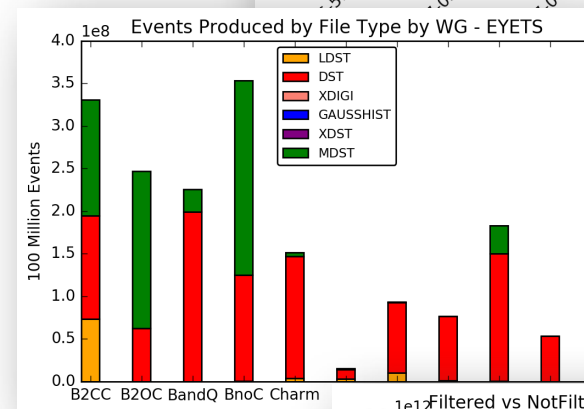
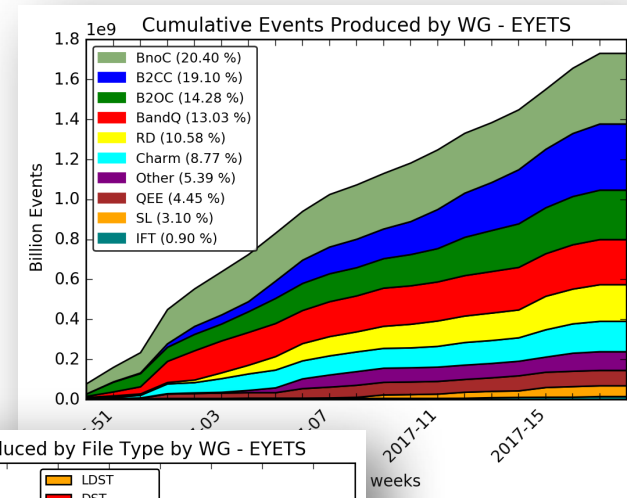
- Re-stripping of 2016 data finished
 - Campaign lasted for 4 weeks
 - B/c of limited resources need to remove previous processing pass
- Incremental stripping of 2015 data to be started soon
 - Data already pre-staged. Shorter campaign b/c of smaller data volume
- Planning to continue to use HLT farm even during LHC '17 ramp up for simulation workflows
 - In parallel to HLT processing, similar to 2016 p-Pb run
- NB: No re-reconstruction of Run 2 data neither done so far nor planned
 - Enabled by final detector alignment & calibration in the trigger process

Stripping 28 number of stripped files



Status of the Software

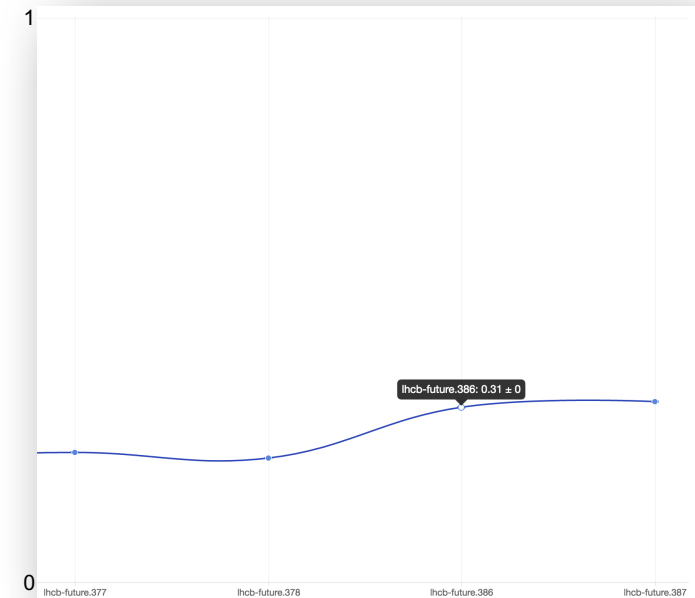
- 2017 data processing software
 - Reconstruction software stack ready
 - Stripping in preparation for June
- Simulation Sim09 in full swing
 - 1.7 Bio events produced in EYETS
 - Resource optimizations with filtered productions or MDST format
- 2017 software stack uses next version of code vectorization
 - Compiled with SSE 4.2 (for gcc 6.2)
 - Needed to adapt matching on grid worker nodes
 - ☞ is the worker node capable of running SSE 4.2?
 - In the future move to AVX2/FMA w/ the same model
 - Done in conjunction with Run3 upgrade developments
 - AVX2/FMA already used at the high level trigger



Software upgrade towards Run 3

- Changes for functional framework have been done
 - ~ 100 algorithms converted so far
 - Metric measurements in place
 - Timing tests for algorithms
 - Branch miss predictions, SIMD instructions, L1 cache misses, ratios, ... for individual algorithms
 - Next step to look into performance optimization for selected algorithms
- Review of software upgrade strategy
 - Started beginning of April
 - Reviewers from ATLAS, CMS, CERN/EP-SFT
 - Goals are to assess efforts, evaluate progress, identify potential problems, review technical viability and estimate person-power
 - Report to be received in the coming weeks

Ratio SIMD/Scalar instructions for 1 alg.



Computing upgrade towards Run 3

- Establishing “working group productions”
 - More efficient data access to Run 3 data needed for analysis workflows
 - Aiming at centrally organized productions
 - First examples setup with some physics working groups

2) Timeline

Ran in parallel to progression on the basic analysis; took advantage of the opportunity to make some adjustments needed for the analysis during this reprocessing and to move S20 → S21

- **9th Feb:** Discussion of WG productions at PPG
- **28th Feb - 7th Mar:** Develop and release code in WG/B2OConfig
 - ▶ User script: [selectB2DDh.py](#)
 - ▶ Generic DaVinci config: [davinci_b2ddh.py](#)
 - ▶ Wrapper for each data type: e.g. [Data_2011_BHADRON.py](#)
- **13th Mar:** Test production (2011 mag up; one strip stream) accepted manually
- **14th Mar:** Test production 98% complete!
- **31st Mar:** Finished checks of the test production
- **3rd Apr:** Submitted all productions (4 years × 2 polarities × 2 streams = 16 requests)
- **11th Apr:** Productions launched
- **20th Apr:** Full production 100% complete. Replication begins

Summary

- Operations well above pledges
 - Mostly smooth except infrastructure problems end of March
 - Mostly Monte Carlo, interleaved with re-stripping campaign(s)
- Very good usage of HLT farm compute resources
 - ~ 40 % of compute resources during the reference period
 - Planning concurrent use with trigger during '17 LHC ramp
- Reconstruction software for 2017 data taking ready
 - Stripping software stack to follow in June
- Upgrade towards Run 3 further progressing
 - New framework ready, now looking into performance optimizations