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LHCb experience during the LHC 2015 run

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- One of the four big LHC experiments
- Forward spectrometer
- **CP-violation**







	Run1	Run2
Bunch crossing	15 MHz	30 MHz
LO	1 MHz	1 MHz
HLT	5 kHz	12.5 kHz (18.5)
Event size	60 kB	50 kB
Mu	1.7	1.1
Bandwidth to Storage	300 MB.s ⁻¹	625 MB.s ⁻¹ (1300)





Run1 DAQ







Split of the HLT









Split of the HLT







- Automatic evaluation at regular intervals
- o Dedicated data sample
- New value computation time O(mn)
- Same alignment & calibration for trigger & offline Reco





TURBO stream



- Store HLT candidate information
- Remove detector raw data
- Save ~90% of space
- ~24h turn-around from data taking to analysis
- Real challenge relying on the good operational performance: no 2nd chance of reprocessing to fix problems









LHCb Run 2015



- Used for early measurement cross-section
- Results presented 1 week after their acquisition!
- Example J/ψ cross-section
 <u>ArXiv 1509.00771</u> accepted by
 JHEP







- Several re-processing campaigns
 - **Re-Reconstruction (gone from Run2 thanks to Online calibration)**
 - Re-Stripping
 - Incremental Stripping
- Requires massive staging
- **Run1:**
 - Bring-on-line from DIRAC stager
 - Jobs waiting for callback
 - Files copied to WN from Tape cache -> garbage collector issue
- o **2015**
 - Bring-on-line using FTS3 prior to the processing
 - **•** Files copied to disk storage
 - **No job waiting for callback**
 - Remove data from disk when done





TURBO in the Offline

- TURBO processing requires special Offline workflow
- $\circ~$ Convert the file format from Online specific to μDST
- TURCAL: used for FULL and TURBO performance measurement (e.g. Particle ID)
- **TURBO validation:**
 - **•** Temporary
 - **Keep the TURBO and the full event**
 - Compare both after Offline processing







Mesh processing





MC Validation

- Motivation: avoid resource waste by buggy requests
- Workflow:
 - **Request from WG to simulate huge number of events**
 - Small number of events generated at selected site
 - Output of the job analyzed
 - **If OK, run full production**
- Principle simple, implementation less
- Relies on the elastic MC jobs (see CHEP 2015)
- Completely automated
- Danger: Working Groups outsource testing to production team



-HCb Run 2015





- 2015 was a big test bench
- Many novelties Online & Offline
- Remarkably successful
- Pave the way for the Upgrade (Run 3)



