ATLAS FDR-1

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Outline

- Data distribution tests

- Simulation production

- FDR-1 (4-8 February) and CCRC-1 (now till end of February)

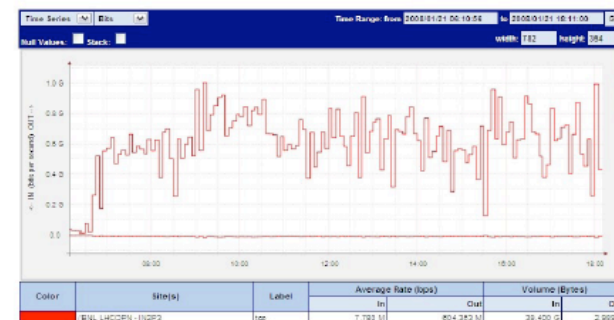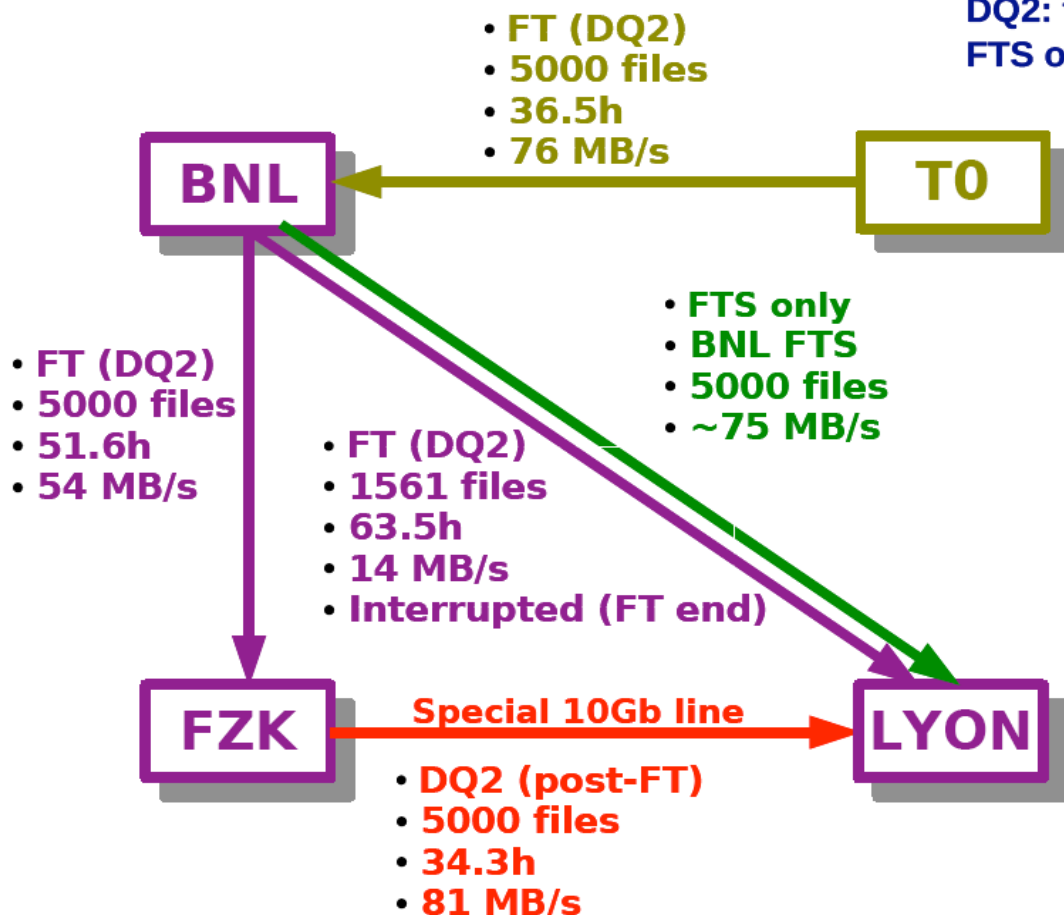- Plan of activities until LHC turn-on

Data Distribution Tests

- The throughput tests will continue (a few days/month) until all data paths are shown to perform at nominal rates
    - This includes:
        a) Tier-0 → Tier-1s → Tier-2s for real data distribution
        b) Tier-2 → Tier-1 → Tier-1s → Tier-2s for simulation production
        c) Tier-1 ⇔ Tier-1 for reprocessing output data
- Test a) is now OK almost everywhere
    - Run again in January (but with SRM v1 end-points, see later slide)
- Test b) is part of simulation production since a long time
- Test c) started with the BNL-IN2P3CC-FZK combination
- The Functional Test will also be run in the background approximately once/month in an automatic way
    - The FT consists in low rate tests of all data flows, including performance measurements of the completion of dataset subscriptions
    - The FT is run in the background, without requiring any special attention from site managers
    - It checks the response of the ATLAS DDM and Grid m/w components as experienced by most end users
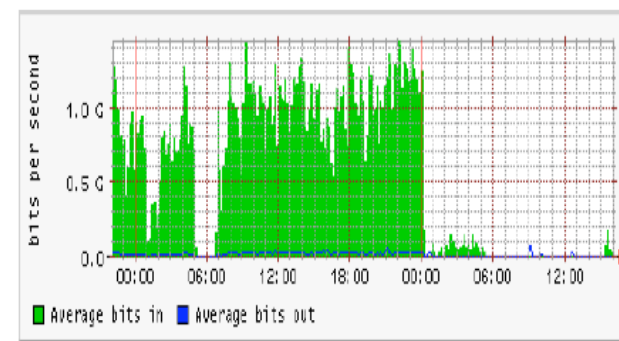
Example of Tier-1-Tier-1 Transfer

TRANSFER RATE SUMMARY

FT: functional test
DQ2: through dataset subscription (pull mode)
FTS only: Hiro load generator

BNL ← T0
- FT (DQ2)
- 5000 files
- 36.5h
- 76 MB/s

BNL → FZK
- FT (DQ2)
- 5000 files
- 51.6h
- 54 MB/s

FT (DQ2)
- 1561 files
- 63.5h
- 14 MB/s
- Interrupted (FT end)

BNL → LYON (green)
- FTS only
- BNL FTS
- 5000 files
- ~75 MB/s

FZK → LYON — Special 10Gb line
- DQ2 (post-FT)
- 5000 files
- 34.3h
- 81 MB/s

Hironori Ito, BNL-LYON "FTS only"

FZK-LYON transfer rate (post-FT)

Distributed Simulation Production

- Simulation production continues all the time on the 3 Grids (EGEE, OSG and NorduGrid) and reached 1M events/day recently
  - The rate is limited by the needs and by the availability of data storage more than by resources
- Validation of simulation and reconstruction with release 13 is still in progress

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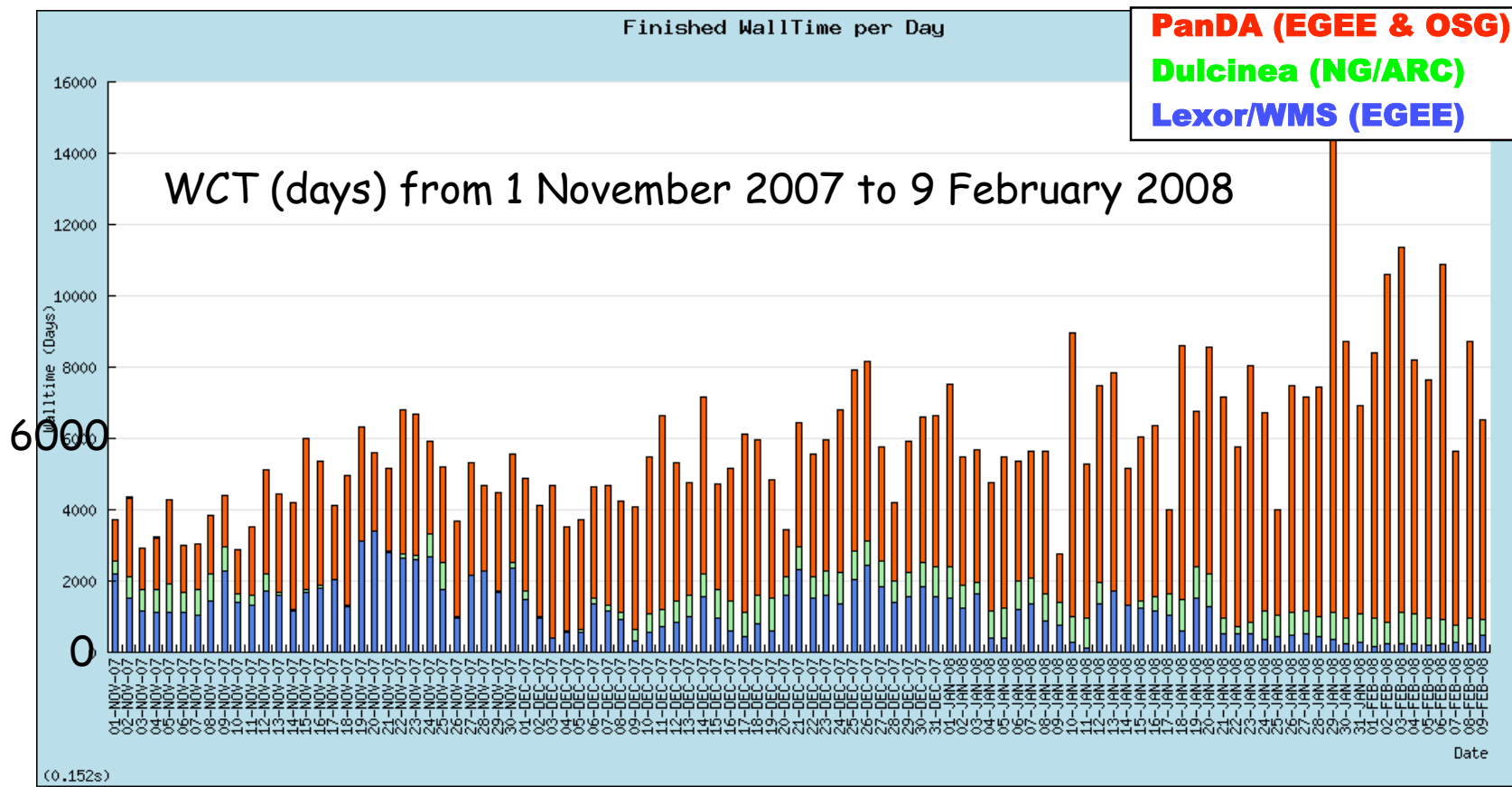
Global schedule: M*, FDR & CCRC'08

- FDR must test the full ATLAS data flow system, end to end
  - SFO → Tier-0 → calib/align/recon → Tier-1s → Tier-2s → analyse
  - Stage-in (Tier-1s) → reprocess → Tier-2s → analyse
  - Simulate (Tier-2s) → Tier-1s → Tier-2s → analyse
- The SFO→Tier-0 tests interfere with cosmic data-taking
- We have decoupled these tests from the global data distribution and distributed operation tests as much as possible
- We booked the SFOs (online) for the first week of February for the FDR (Phase 1) but had to give them back for cosmic data taking at the end of that week
- CCRC'08 must test the full distributed operations at the same time for all LHC experiments
  - As requested by Tier-1 centres to check their own infrastructure
  - CCRC'08 takes event files that are pre-generated at Tier-0 and runs the export tests
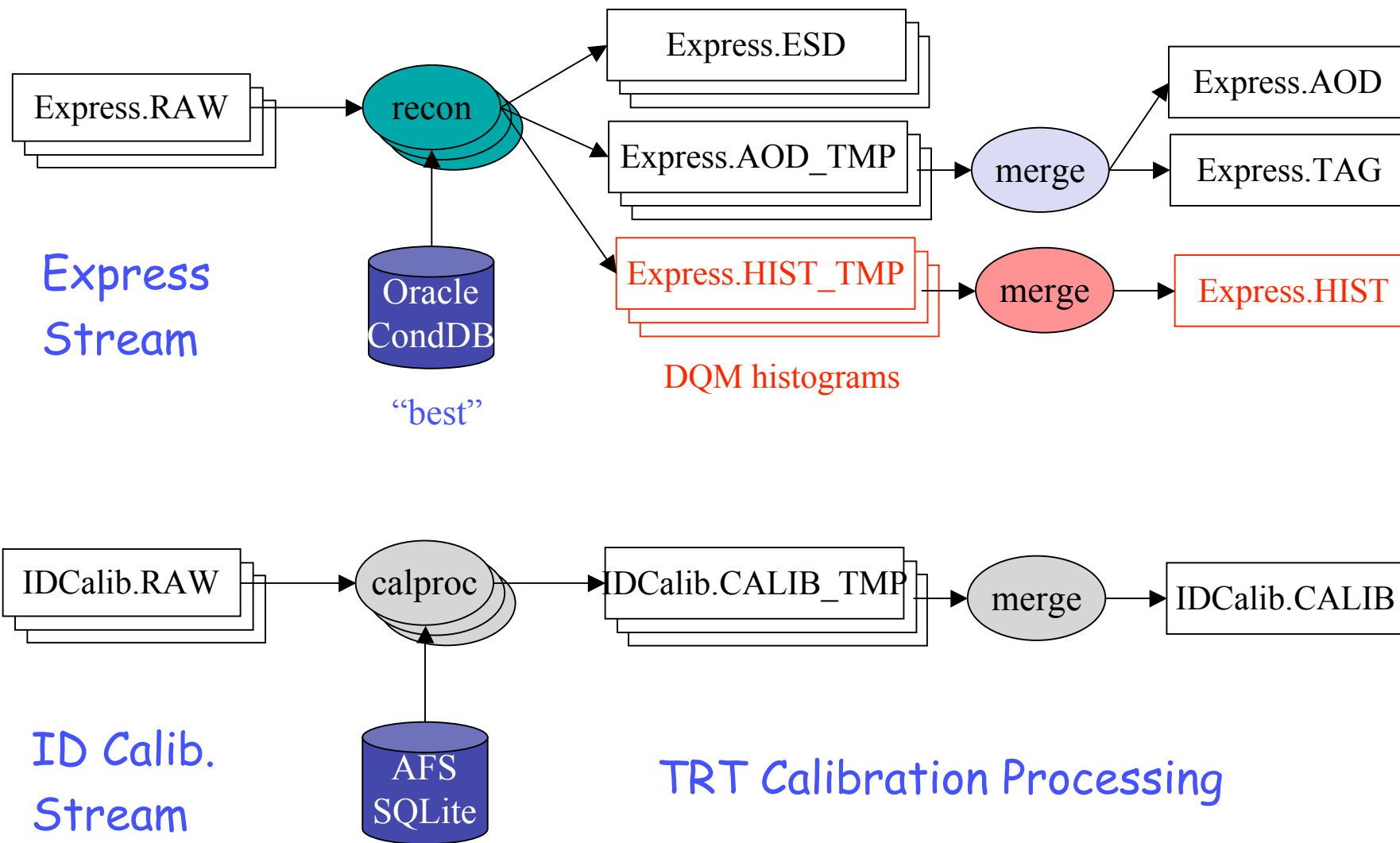
FDR-1: Preparation

- The original aim was to prepare 10 hours of run at luminosity 10^{31} and one hour at 10^{32}
  - Using release 12 for the simulation and release 13 for trigger and bytestream generation code
    - 5 physics streams (e.m., muons/B-phys, jets, taus, min_bias)
    - Express stream (10% of nominal rate)
    - Inner detector alignment stream (as a first example of calib/align data streams)
- Getting trigger and event mixing code to work took much longer than anticipated
  - Event mixing requires lots of simulation output files from different physics channels in the same location (Castor @ CERN)
    - Not easy given the general disk space crisis we are still in
  - Most of trigger selection code was delivered at the last minute and was only superficially validated
    - We found that the trigger rates were a factor 3-4 less than what we wanted to have
- To be able to do anything at all, we had to use the Tier-0 farm in the few weeks leading up to FDR-1
  - Thus delaying or preventing adequate testing of the Tier-0 infrastructure
- In the end we had far fewer events than anticipated, and many small files...
  - Although we had doubled the luminosity block size just to avoid small files!
- Most SRM 2.2 end-points, space tokens and storage areas were really set up and configured only at the end of January
  - We could start testing them in earnest only at the beginning of February (the FDR-1 week)
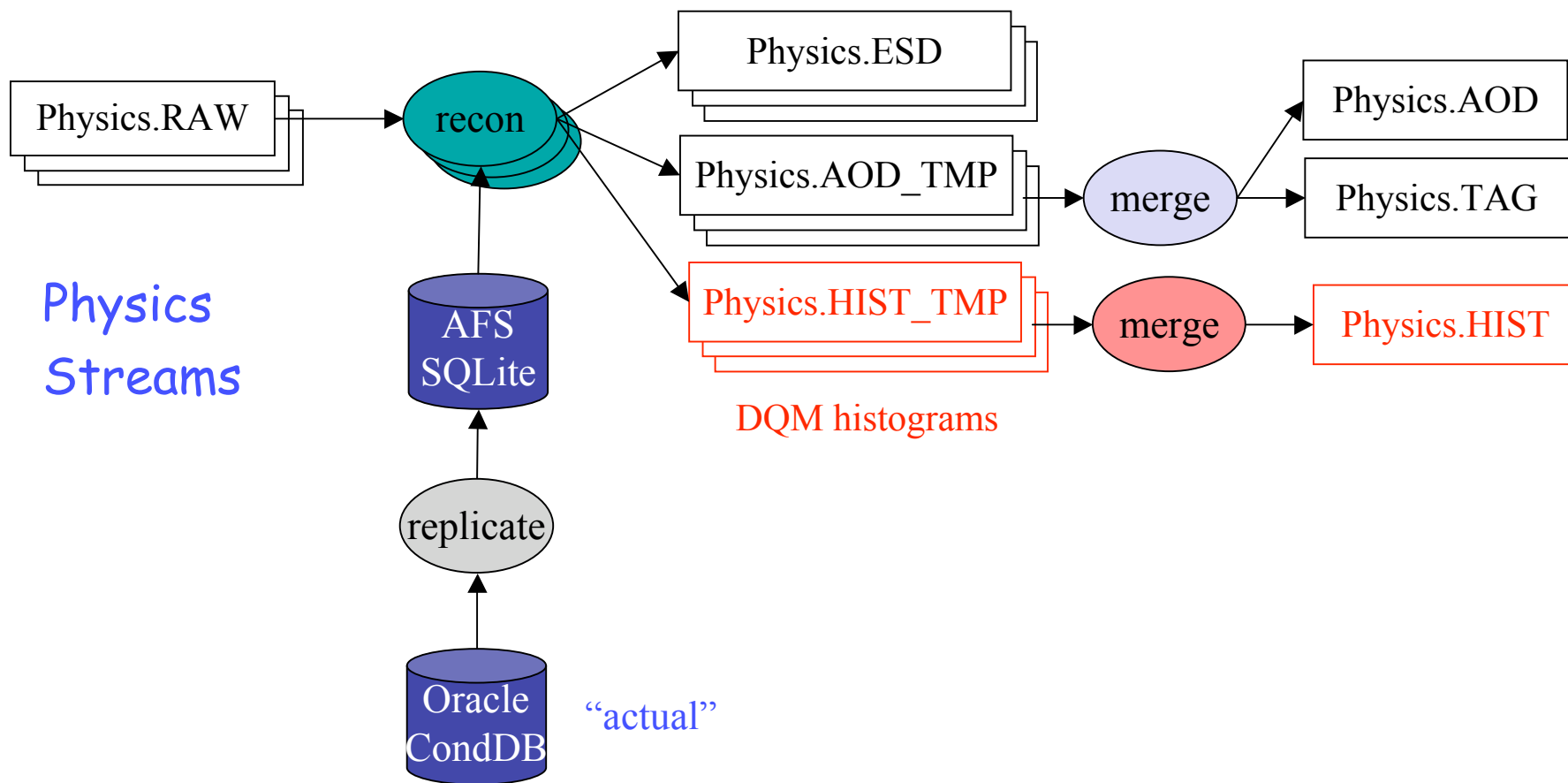
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Calibration Data and Work Flows

Express Stream

Express.RAW → recon → Express.ESD

recon → Express.AOD_TMP → merge → Express.AOD / Express.TAG

recon → Express.HIST_TMP → merge → Express.HIST

Oracle CondDB — "best"

DQM histograms

ID Calib. Stream

IDCalib.RAW → calproc → IDCalib.CALIB_TMP → merge → IDCalib.CALIB

AFS SQLite

TRT Calibration Processing

Reconstruction Data and Work Flows

Physics Streams

Physics Streams: MinBias, Egamma, Jet/Etmiss, Muon/B-Phys, Tau

FDR-1: Execution (1)

- Day 1: Mon 4th Feb
  - Decided to continue event mixing using the Tier-0 farm to have a more reasonable event sample to work with. Start of FDR delayed.
- Day 2: Tue 5th Feb
  - Run started at 9 am. 8 runs, 1 hour each.
  - Processing of express stream on Tier-0 started to produce monitoring and calibration data.
- Day 3: Wed 6th Feb
  - New run started at 9 am. Same events, new run numbers.
  - Processing of express stream as before.
  - 4 pm: sign-off by Data Quality group of Tuesday data; start of bulk reconstruction.
  - More testing of SRM 2.2 end points and storage areas. No transfer yet…
- Day 4: Thu 7th Feb
  - New run started at 9 am. Same events, new run numbers.
  - Processing of express stream as before.
  - 4 pm: sign-off by Data Quality group of Wednesday data; start of bulk reconstruction.
  - Processing of Tuesday bulk completed.
  - More testing of SRM 2.2 end points and storage areas. NIKHEF problem. RAL power cut.

FDR-1: Execution (2)

- Day 5: Fri 8th Feb
    - 4 pm: NO sign-off by Data Quality group of Thursday data as there was a mix-up with updated Inner Detector alignment constants. Express stream processing restarted. Bulk reconstruction started later on.
    - Processing of Wednesday bulk completed.
    - More testing of SRM 2.2 end points and storage areas. NIKHEF problem. RAL power cut.

- Day 6-7: Sat-Sun 8-9th Feb
    - Tier-0 processing completed
    - Should have finally started data transfer to Tier-1s but more configuration problems hit us

- Day 8: Mon 10th Feb
    - Data transferred to Tier-1s. So little data that it took only two hours (not a stress test!)

- Post-mortem meetings
    - Mon 11 Feb: data preparation steps
    - Wed 13 Feb: Tier-0 processing and data export operations
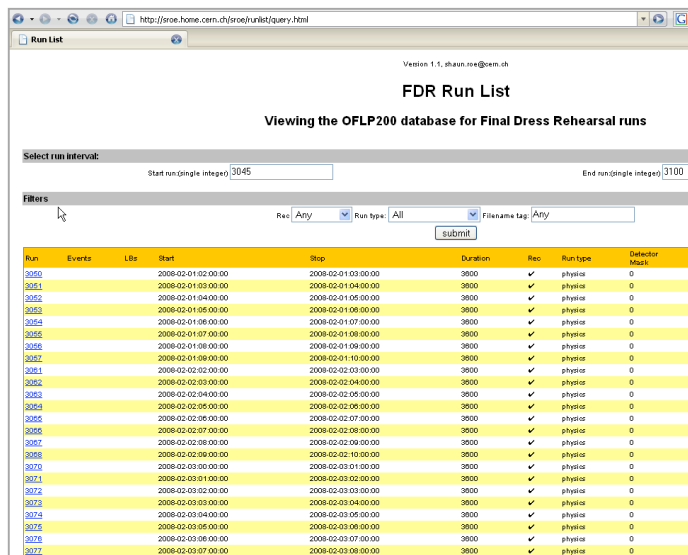   - Tue 19 Feb: data quality assessment and sign-off procedures
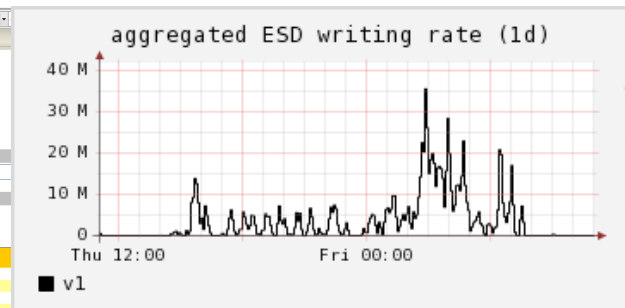
FDR-1: Execution (3)

- Impressions …

Run-summary browser

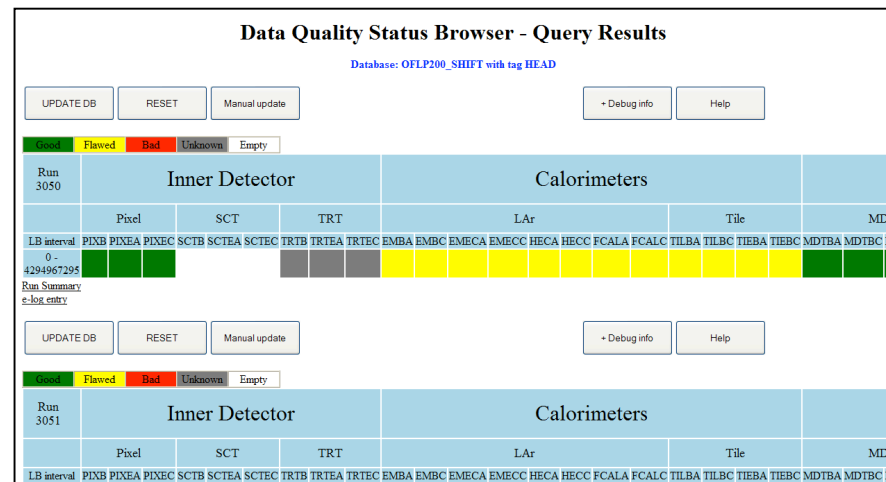**Tier-0 monitoring**

Sub-farm outputs

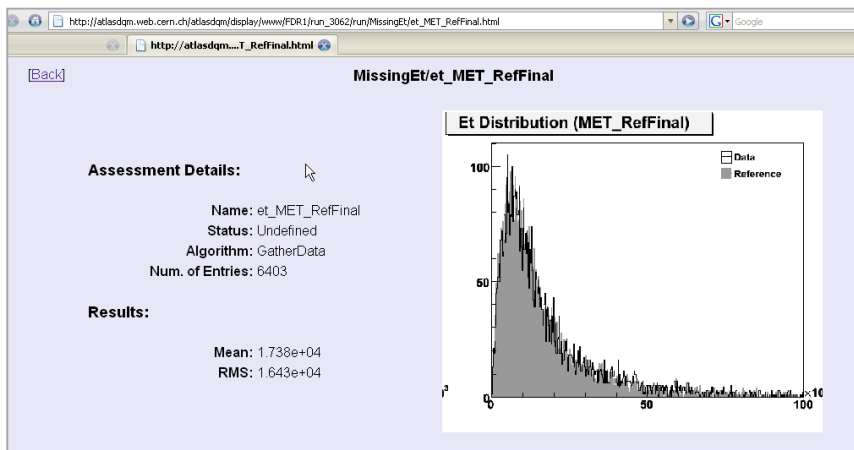**Data quality status in conditions database**
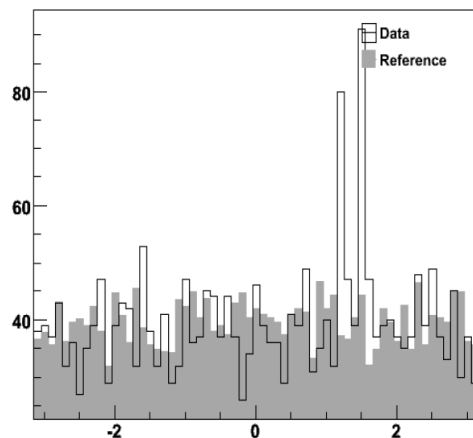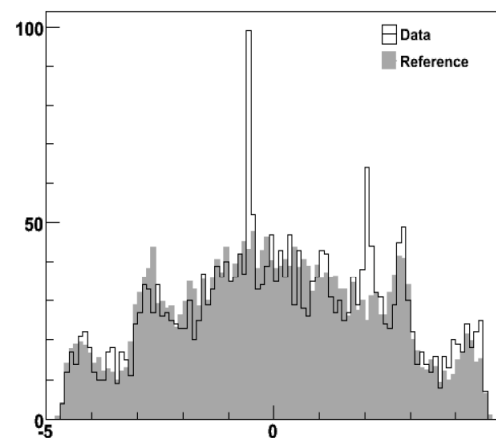
Data quality browser

FDR-1: Execution (4)

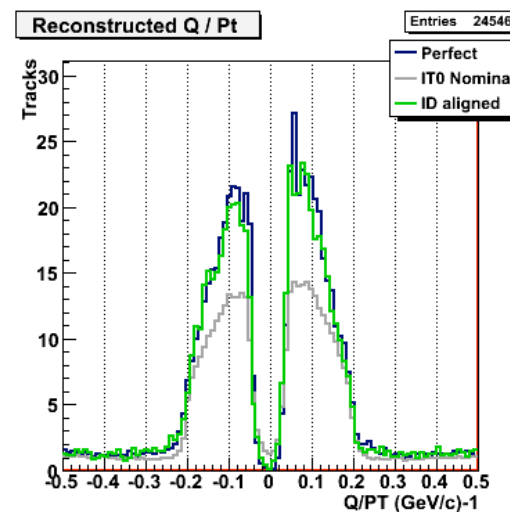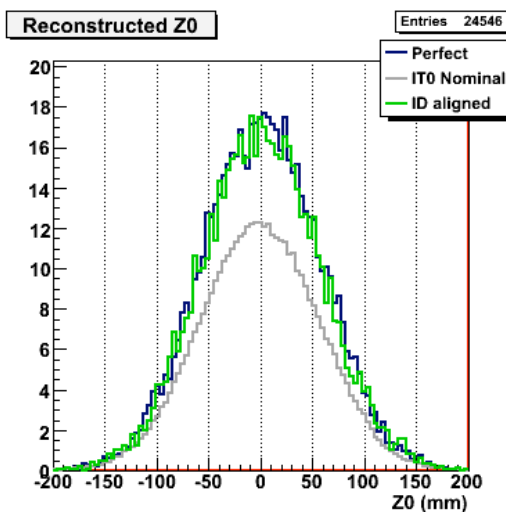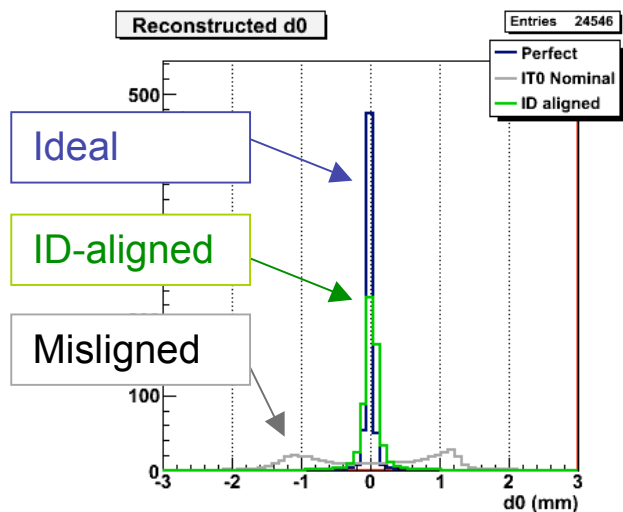- **Data sporadically included hot LAr cells and noisy/dead crates → spotted (all ?) by data quality experts:**

- **Ran fast ID alignment of distorted geometry using dedicated calibration stream:**

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S&C Plans

- Software releases:
  - 13.2.0
    - Last week. Targeted at the M6 run in March.
  - 14.0.0
    - Base release 14.0.0 available early March 2008. Includes LCG_54, new tdaq-common, new HepMC, completion of EDM work for Trigger records and optimisation of persistent representation
  - 14.X.0 releases
    - Controlled production releases every 4-6 weeks.
  - 14.X.Y releases
    - Bug fixes only for HLT/Tier-0 and Grid operations
- Cosmic runs:
  - M6
    - Beginning of March 2008
  - Continuous mode
    - Start immediately with detector-DAQ integration and commissioning weeks
- FDR:
  - Phase II
    - Early May 2008 (to be discussed, possibly before the start of continuous data-taking mode with complete detector)
- CCRC'08
  - Phase I
    - February 2008 (after FDR-1):
      - Test SRM 2.2 everywhere in earnest using realistic loads and file sizes
  - Phase II
    - May 2008 (in parallel with cosmic data-taking activities)

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CCRC'08 Feb08 schedule

Th 14.02	**Data Throughput Test with random generator data**
Fr 15.02	• **DQ2 0.5.x**
Sa 16.02	• **All clouds**
Su 17.02	• **Central T0->T1s data subscription. Data will be deleted from Tiers Mon Feb 18th {TBC}**
	• **T1->T2s {TBC}**
	• datasets project : ccrc08_t0, data volume {TBD}

Data Throughput Test with random generator data

• **DQ2 0.5.x**

• **All clouds**

• **Central T0->T1s data subscription. Data will be deleted from Tiers Mon Feb 18th {TBC}**

• **T1->T2s {TBC}**

• datasets project : ccrc08_t0, data volume {TBD}

DQ2 0.6.x pre-testing, T1-T1s data transfer tests

• DQ2 0.6.x : 1 T1, 1 cloud (? UK ?) , Random generator data

• Feb 21st : T1-T1s data transfer test (*ESD* random generator data), ccrc08_t0%ESD%

• M5 (ddmf5) data preparation (30 TB)

• Central data deletion

Data reprocessing & ATLAS/CMS test : Feb 25th define data sample for reprocessing

   DQ2 0.6.x {TBC}

   All T1s :

      FDR or/and M5 data reprocessing

      'M5' data distribution T0-T1s, T1-T2s

   n T1s : ATLAS & CMS joint test : Feb 29th define DQ2 SW version for M6

      throughput test : T0->T1s

      data reprocessing on T1s

   M6

Th 14.02
Fr 15.02
Sa 16.02
Su 17.02
Mo 18.02
Tu 19.02
We 20.02
Th 21.02
Fr 22.02
Sa 23.02
Su 24.02
Mo 25.02
Tu 26.02
We 27.02
Th 28.02
Fr 29.02
Sa 01.03
Su 02.03
Mo 03.03

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Planning

	December	January	February	March	April	May
CC Readiness Challenge			**1**			**2**
Full DressRehersal	0		1 bis			2 bis
Cosmic Ray tests				M6		
Functional Tests	3	3		3	3	
SRMv2 testing		ongoing				
FDR-2 Simulation Production				100 days		
mixing					30 days	
Sub-detector tests			1 1 1	1 1 1 1 1 1		1 1 1
Re-processing in T1's						

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Conclusions

- We have already learned a lot from the FDR-1 exercise
  - Data concentration at CERN
  - Event mixing (jobs with many input files)
  - Late delivery of crucial software components is not a good idea (no surprise!)
    - Our own software
    - SRM 2.2…
  - The data quality loop was tried for the first time
    - Needs some adjustment but basically works
  - The calibration procedures were also attempted for the first time but they need much more thinking and testing
  - Tier-0 internals are not a worry
    - Except for operations manpower (shifts not yet tried)
- We are looking forward to more new challenges!