Real-time dataflow and workflow with the CMS Tracker data

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CMS Tracker community

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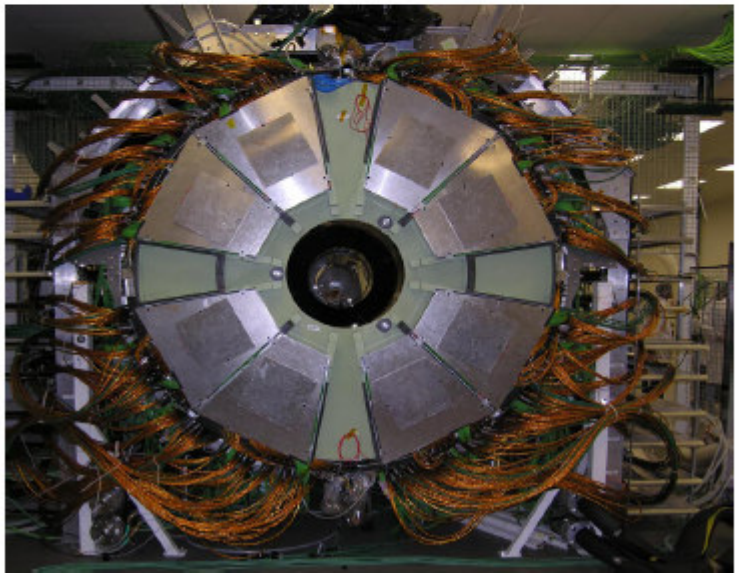
Outline

- Real-time tracker data processing
- Problematic issues
- Migration of tracker processing to the Tier0
- Conclusions

Tracker Analysis Center at Tracker Integration Facility (TIF)

- The CMS tracker has been fully integrated at the TIF
- Commissioning of the 25% of the tracker with Cosmic muons on-going since Feb '07 to
  - verify long-term stable operation of the system & data-acquisition
  - finalise PS, DAQ, DCS, Safety systems
  - deploy Online software, Data Quality Monitor
  - collect a significant cosmic data sample useful to develop and deploy
    - Track reconstruction, Cosmic tracking and alignment algorithms
  - establish data movement and analysis in the Grid computing environment

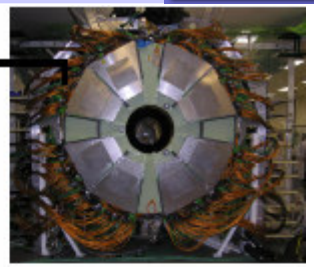


End of data taking: July 15

Steps of Tracker data processing

- Raw data to Event data Model (EDM) format conversion
- Registration in data bookeeping and location services (DBS-1/DLS)
- The data transfer to remote Tier-s (PhEDEX)
- Reconstruction with Monte Carlo simulation tool (ProdAgent)
- Data analysis via the distributed analysis tool (CRAB)

Dataflow/Workflow overview



1. Conversion of Raw data to EDM compatible format
2. Copying Raw and EDM to Castor

DAQ + Filter Farm

StorageManager

Local Disk Storage (temporary before transfer to CASTOR)

D Q M

Visualization (IGUANA)

Copying to CASTOR / Registration in DBS/DLS

Local reconstruction

Shipping to Tier 1 / 2

3. Registration of EDM data in DBS-1/DLS
4. Injection in PhEDEx for the transfer

Reconstruction

Publication Injection Subscription

Skimming User analsysis

5. Reconstruction via ProdAgent
   - Data registered in Bari/CERN/FNAL
   - Publication of Reco data
6. Data analysis via CRAB

- Global Monitoring
  Track TIF data-flow in real-time

DBS-2 registration underway (both Raw and EDM)

Migration of TIF data processing @ Tier-0 in progress

Tracker data processing: **only** example of official dataflow/workflow expected for data taking with **official** CMS tools in a **distributed environment**

RAW to EDM conversion and registration

CONVERSION

Cron jobs running at CERN and developed for:

- **RAW->EDM conversion**

Periodically the new EDM files are **copied to Castor** if they do not exist on castor's side and have not been accessed in the last hour

- Once all the files belonging to a run are copied to Castor, **a catalog is prepared** for that run after a few checks.

REGISTRATION

Software agents watching data every half an hour developed:

- to look for new files archived on CASTOR and to trigger the registration in **DBS-1/DLS** to make them **officially available to the CMS community**
- block of files are **registered in Data Location System** in terms of the "storage element" hosting data file blocks.

Tracker RAW data in DBS/DLS

http://cmsdbs.cern.ch/discovery/expert

Dashboard | DBS/DLS | ProdRequest | PhEDEx

DBS1 discovery page is deprecated in favor of DBS2 page

Navigator
Keyword search
Site

DBS info
- MCGlobal/Writer
- Dev/Writer
- DevMC/Writer
- MCLocal_1/Writer
- MCLocal_2/Writer
- MCLocal_3/Writer
- MCLocal_4/Writer
- MCLocal_5/Writer
- MCLocal_6/Writer
- MCLocal_9/Writer
- RelVal/Writer

Help

Hide panel

Primary datasets | Processed datasets

TauGun

Tracker data

TAC-TOB-Recotest-run2048-9
TAC-TOB-RecoPass2
TAC-TOB-RecoPass0
TAC-TOB-120-DAQ-EDM
TAC-TIF-RecoPass2
TAC-TIF-RecoPass1
TAC-TIF-120-DAQ-EDM
TAC-TIBTOB-RecoPass2
TAC-TIBTOB-RecoPass0
TAC-TIBTOB-120-DAQ-EDM
TAC-TIB-RecoPass2
TAC-TIB-120-DAQ-EDM
TAC-TEC-120-DAQ-EDM
TAC-Minus-120-DAQ-EDM

MTCC data

MTCC-110-os-DAQ-MTCC2
MTCC-091-os-cosmics_BOn
MTCC-091-os-cosmics_BOff
MTCC-090-os-DAQ-MTCC1

7.2 M events registered

1574 runs

DBS/DLS DATA DISCOVERY PAGE

Navigator
Keyword search
History
Help
Hide panel

Navigator menu

Tier sites: All
Application: /CMSSW_1_2_0/Online/FUEventProcess
Primary dataset: TAC-TIB-120-DAQ-EDM
Data tier: All
Find

DBS glossary

Results | Parents | App configs

Processed datasets (plain view):

/TAC-TIB-120-DAQ-EDM/RAW/CMSSW_1_2_0-RAW-Run-0000582

contains 22800 events, 2 files, 205.8MB.

Show: Blocks Summary Both

row	Location	Events	Files	size
1	cmsdcache.pi.infn.it	22800	2	205.8MB
2	srm.cern.ch	22800	2	205.8MB
3	pccms2.cmsfarm1.ba.infn.it	22800	2	205.8MB

Pisa
CERN
Bari

/TAC-TIB-120-DAQ-EDM/RAW/CMSSW_1_2_0-RAW-Run-0000581

contains 16390 events, 1 files, 147.3MB.

Show: Blocks Summary Both

row	Location	Events	Files	size
1	cmsdcache.pi.infn.it	16390	1	147.3MB
2	srm.cern.ch	16390	1	147.3MB
3	pccms2.cmsfarm1.ba.infn.it	16390	1	147.3MB

Injection in Phedex for the transfer

- Data published in DBS and DLS are **ready to be transferred** via the CMS official data movement tool, **PhEDEx**
- The injection ran at Bari via an **official PhEDEx agent** and a **component of ProdAgent** tool
- complete **automatization** is reached with scripts that watches for new tracker related entries in DBS/DLS:
- Once data are injected any Tier-1 or Tier-2 can **subscribe** to them

PhEDEx – CMS Data Transfers

Info | Activity | Data | Requests | Components | Reports

| Replicas | Subscriptions | Delete

DB Instance: **Production** »
Sign in via Cert or via Password
Not logged in
View: **global**

Show Options

Name TAC Filter

	T0_CERN_MSS Files	T1_FNAL_MSS Files	T2_Bari_Buffer Files	T2_Pisa_Buffer Files
» /TAC-Minus-120-DAQ-EDM/RAW	-	183	183	183
» /TAC-Minus-120-DAQ-EDM/RECO	-	105	105	105
» /TAC-TEC-120-DAQ-EDM/RAW	-	1943	1938	-
» /TAC-TEC-120-DAQ-EDM/RECO	-	-	292	-
» /TAC-TIB-120-DAQ-EDM/RAW	-	108	103	108
» /TAC-TIB-120-DAQ-EDM/RECO	-	485	482	485
» /TAC-TIBTOB-120-DAQ-EDM/RAW	-	520	520	520
» /TAC-TIBTOB-120-DAQ-EDM/RECO	-	4175	3302	4175
» /TAC-TIF-120-DAQ-EDM/RAW	-	13432	11147	-

In the last period 1 hour of delay between data taking and transfer at Bari and FNAL.

Problematic issues

Experience of data conversion:

- Castor problems to stagein and out files
- files archived on castor before being closed -> different size
- NFS service slows down processing when a large number of clients access the data volume on the storage machine at TAC

Experience of data registration:

- no hiccups at all, fast and robust

Experience with PhEDEx:

- If Castor fails to deliver files, PhEDEx may wait indefinitely
  - PhEDEx not supposed to identify and work around mass storage problems
- File size mismatch between Castor and PhEDEx TMDB
  - Some EDM files overwritten after injection to PhEDEx
- **CERN to FNAL Raw data transfer**
  - affected by other transfers with higher **priority** (MC Production)
  - eventually importance of tracker data was recognised and transfer streamlined

Standard and FNAL Reconstruction

Standard reco.

Standard Reconstruction runs with official release CMSSW_1_3_2

- The standard reconstruction was executed with ProdAgent and triggered by a Bari machine running some agents.

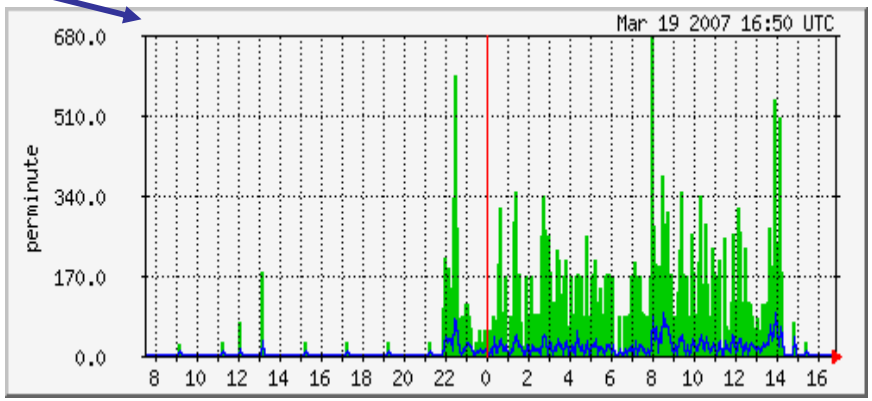
- Jobs ran at **Bari, Pisa, CERN and FNAL** where raw data were published. RECO data were registered in DBS/DLS with the location where they were produced

- The information to be taken from the offline database are accessed in remote sites via frontier/squid cache

FNAL reco.

- **FNAL** uses ProdAgent version that allows to include **not-released code**

- Focus on cosmic runs only to allow **immediate feedback** to the tracking developers by using corrected geometry, latest algorithm changes



FNAL Reconstruction: Pass3

- Start date: Monday, July-30
- End date: Monday, August-12
  →2 weeks in total

- 4.7 M events reconstructed

- Slow start-up due to problems with job priorities:
→ Not getting the promised 10% (~100 nodes at that time) of the FNAL T1 farm

- Situation improved drastically after that fixed. Roughly 2.2M events were processed within 2 days

Reconstructed data in DBS-1/DLS

http://cmsdbs.cern.ch/discovery/expert

Dashboard | DBS/DLS | ProdRequest | PhEDEx

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» MCGlobal/Writer
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» MCLocal_2/Writer
» MCLocal_3/Writer
» MCLocal_4/Writer
» MCLocal_5/Writer
» MCLocal_6/Writer
» MCLocal_9/Writer
» RelVal/Writer

Help

Hide panel

Tip: to send found data to your buddy, use 'bare

Primary datasets | Processed datasets | Applications

mc-hcal-120_leta1-29_lphi1-2_E009
mc-hcal-120_leta1-29_lphi1-2_E005
mc-hcal-120_leta1-29_lphi1-2_E003
mc-hcal-120_leta1-29_lphi1-2_E002
mc-hcal-120_leta1-29_lphi1-2_E001
mc-csa06-111-minbias
TauGun_novtxsmear
TauGun
TAC-TOB-Recotest-run2048-9
TAC-TOB-RecoPass0
TAC-TOB-120-DAQ-EDM
TAC-TIF-120-DAQ-EDM
TAC-TIBTOB-RecoPass0
TAC-TIBTOB-120-DAQ-EDM
TAC-TIB-120-DAQ-EDM
TAC-TEC-120-DAQ-EDM
Spring07_Top_ALPGEN_tt4j_GEN
Spring07_Top_ALPGEN_tt3j_GEN
Spring07_Top_ALPGEN_tt2j_GEN_4
Spring07_COMMON_ALPGEN_z1j_GEN

/TAC-TIBTOB-120-DAQ-EDM/RECO/CMSSW_1_3_0_pre6-DIGI-RECO-Run-0006890 (Description, crab.cfg)
contains 108 events, 1 files, 412.0MB.

Show: Summary Details

Location	Events	Files	size	LFNs
cmsdcache.pi.infn.it	108	1	412.0MB	link
srm.cern.ch	108	1	412.0MB	link
pccms2.cmsfarm1.ba.infn.it	108	1	412.0MB	link
cmssrm.fnal.gov	108	1	412.0MB	link

/TAC-TIBTOB-120-DAQ-EDM/RECO/CMSSW_1_3_0_pre6-DIGI-RECO-Run-0006888 (Description, crab.cfg)
contains 397 events, 4 files, 659.2MB.

Show: Summary Details

Location	Events	Files	size	LFNs
cmsdcache.pi.infn.it	397	4	659.2MB	link
srm.cern.ch	397	4	659.2MB	link
pccms2.cmsfarm1.ba.infn.it	397	4	659.2MB	link
cmssrm.fnal.gov	397	4	659.2MB	link

/TAC-TIBTOB-120-DAQ-EDM/RECO/CMSSW_1_3_0_pre6-DIGI-RECO-Run-0006887 (Description, crab.cfg)
contains 88 events, 1 files, 141.0MB.

Show: Summary Details

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cmsdcache.pi.infn.it	88	1	141.0MB	link
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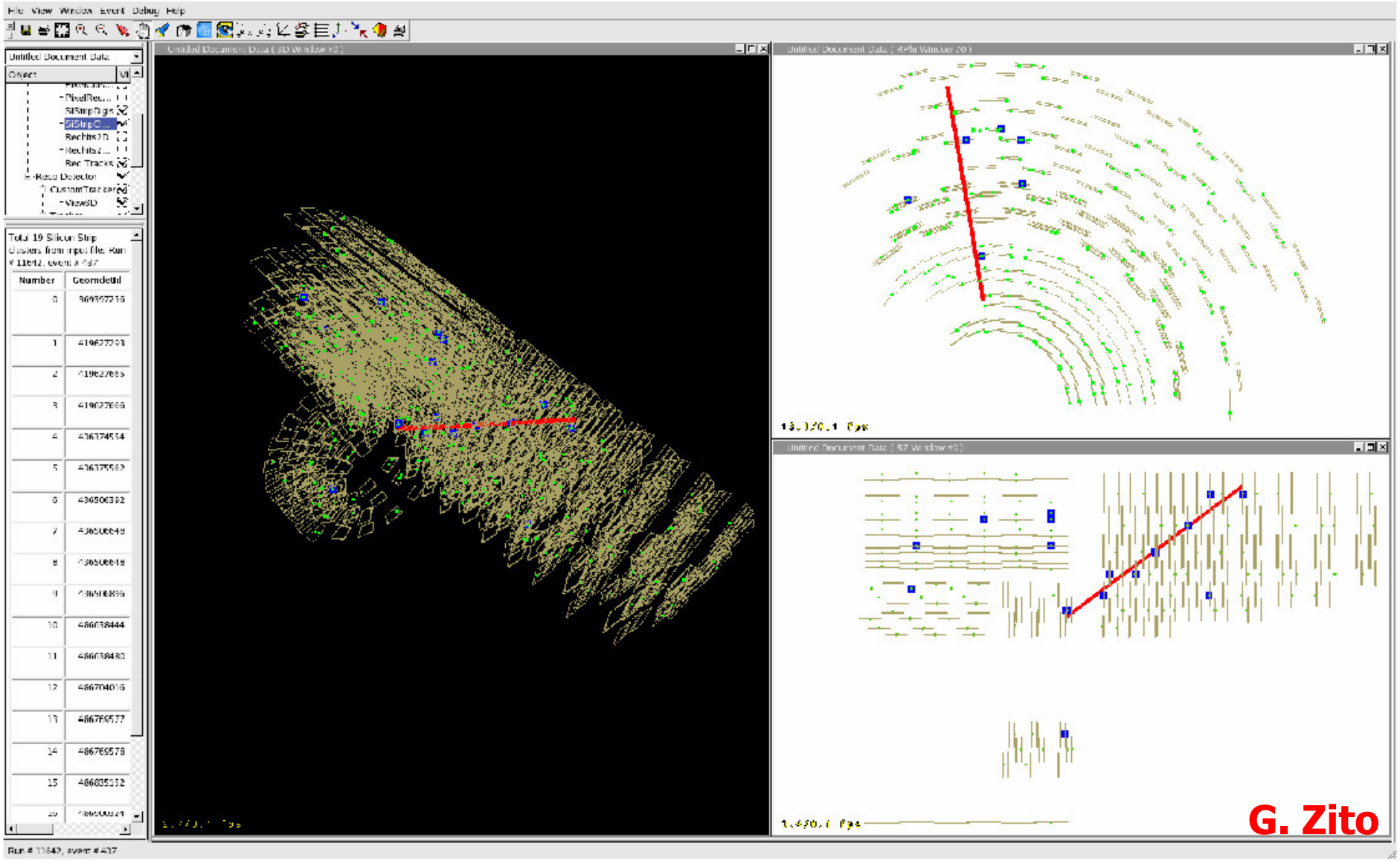
pccms2.cmsfarm1.ba.infn.it	88	1	141.0MB	link
cmssrm.fnal.gov	88	1	141.0MB	link

Tracker Reconstructed Event



Data analysis via CRAB at Tiers

- Data published in DBS/DLS can be processed via the distributed analysis tool **CRAB** **in remote tiers**

- users have to provide their CMSSW cfg, setup the environment and compile their code
- offline DB accessed via frontier at Tier-1/2
- **RAW** data and **RECO** data can be analyzed via CRAB

- **Automatization also of the analysis steps via CRAB was reached**

/TAC-TIBTOB-120-DAQ-EDM/RECO/CMSSW_1_3_0_pre6-DIGI-RECO-Run-0006890 (Description, crab.cfg)
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cmssrm.fnal.gov	108	1	412.0MB	link

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Show: Summary Details

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srm.cern.ch	397	4	659.2MB	link
pccms2.cmsfarm1.ba.infn.it	397	4	659.2MB	link
cmssrm.fnal.gov	397	4	659.2MB	link

/TAC-TIBTOB-120-DAQ-EDM/RECO/CMSSW_1_3_0_pre6-DIGI-RECO-Run-0006887 (Description, crab.cfg)
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pccms2.cmsfarm1.ba.infn.it	88	1	141.0MB	link
cmssrm.fnal.gov	88	1	141.0MB	link

Automatic analysis via CRAB

- Description of the **automatic procedure to analyze all physics runs**:
  - **Run Discovery:** combination of information from
    - RunSumary Page, DBS
  - **Analysis workflow** based on:
    - CRAB for the extraction of interesting quantities from the CMSSW event
      - Run on already processed data (@ Bari and FNAL)
    - Root Macros and bash scripts to extract the interesting quantities
  - **Monitoring via web/Output retrieval**
    - Processing status
    - Log files of CRAB and Macro steps
    - Results (root files with histograms, .ps, .gif, .html)
    - Summary result tables
  - **Physics results**
    - Noisy Strips (Hot, dead, due to peds<128)
    - Modules with low "signal" cluster occupancy
    - Tracks

Example: analysis of Hot Strips

http://cmstac11.cern.ch:

c11.cern.ch:8080/analysis/CrabAnalysis/ClusterAnalysis/Stable_B

RN Google Google Scholar INFN LogBook

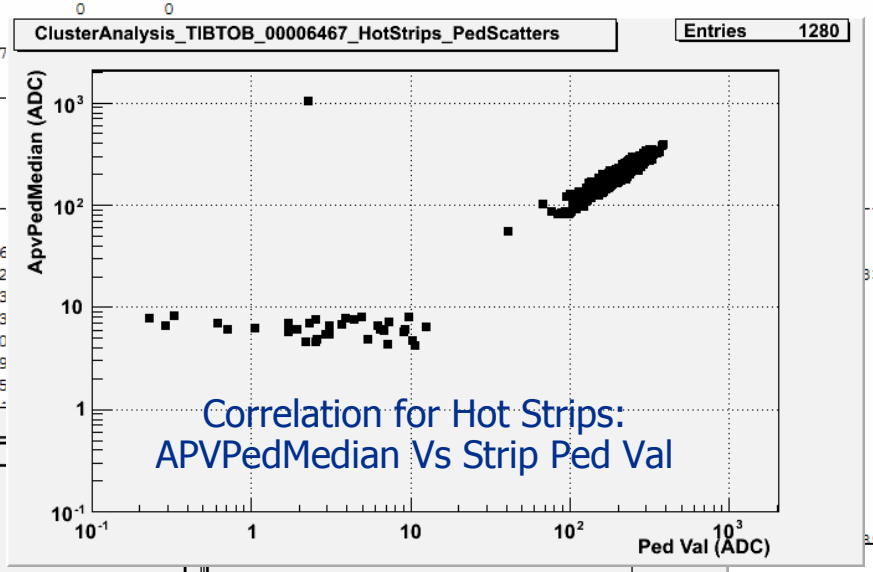
N	Module	Run Number			
1.1	369197573_TIB_1_1_0	6346			
1.2	369197573_TIB_1_1_0	6467			
1.3	369197573_TIB_1_1_0	6884			
1.4	369197573_TIB_1_1_0	6916			
2.1	369198085_TIB_1_1_0	6215			
3.1	369198086_TIB_1_1_0	6215			
4.1	369198349_TIB_1_1_0	6316			
4.2	369198349_TIB_1_1_0	6346			
4.3	369198349_TIB_1_1_0	6462			
4.4	369198349_TIB_1_1_0	6467			
4.5	369198349_TIB_1_1_0	6471			
4.6	369198349_TIB_1_1_0	6507			
4.7	369198349_TIB_1_1_0	6561	1479	0.52	4
4.8	369198349_TIB_1_1_0	6884	7354	0.13	1
4.9	369198349_TIB_1_1_0	6886	560	0.13	1
4.10	369198349_TIB_1_1_0	6898	1707	0.13	1
4.11	369198349_TIB_1_1_0	6901	574	0.13	1
4.12	369198349_TIB_1_1_0	6916	7583	0.13	1
4.13	369198349_TIB_1_1_0	7281	1065	0.13	1
4.14	369198349_TIB_1_1_0	7283	1065	0.13	1
4.15	369198349_TIB_1_1_0	7285	1818	0.13	1
4.16	369198349_TIB_1_1_0	7286	1422	0.13	1
4.17	369198349_TIB_1_1_0	7801	113	0.13	1

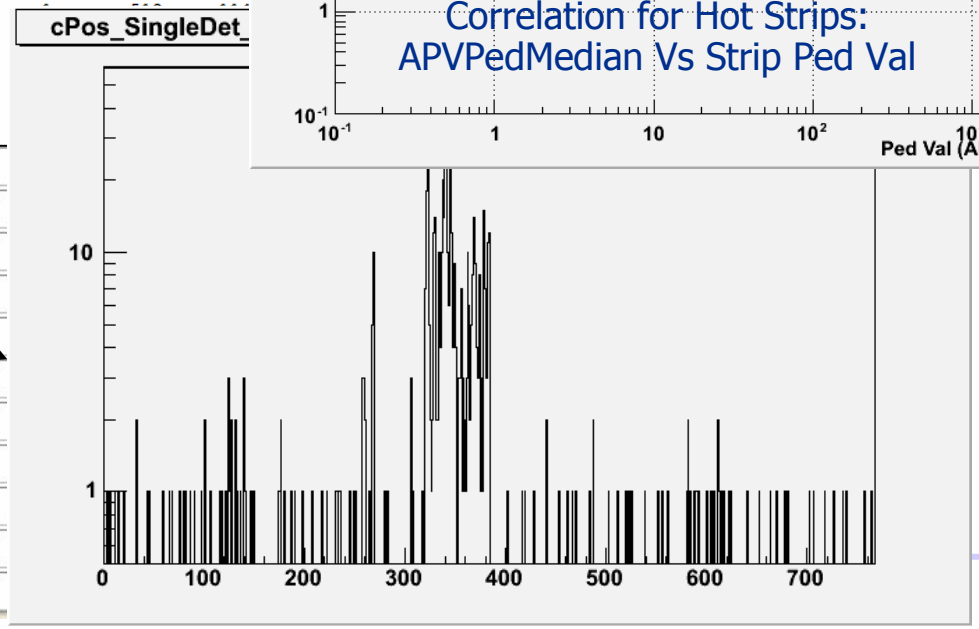
```
*Run 6467

-----------------------------------------------------------------
TotalNumber of Modules with bad strips: 112
-----------------------------------------------------------------
SubDet   |      >0      >4      >9      >24     >49     >99
-----------------------------------------------------------------
TIB      |      16      3       2       2       0       0
TID      |      0       0       0       0
TOB      |      96      52      38      17
TEC      |      0       0       0       0
-----------------------------------------------------------------

#BadStrips                          |
#(all,inside,lEdge,rEdge)           |
# out of Nstrips - HistoEntries |
-----------------------------------------------------------------

* 1      1       0       0       768     156
* 35     34      0       1       768     682
* 3      3       0       0       768     213
* 3      3       0       0       768     253
* 1      1       0       0       768     240
* 1      0       0       1       512     189
* 2      0       1       1       512     295
* 2      0       1
* 2      0       1
* 3      1       1
* 2      0       1
* 5      3       1
* 3      1       1
* 25     24      1
```





Migration of tracker processing at Tier-0

Goal:

- to export the tracker data processing at **Tier-0** where the registration and reconstruction should run.
- to integrate it with the **global data taking** effort
- **Data Operation team** and **DBS team involved too**

Most critical stuff: registration of tracker data in DBS-2

Migration to DBS-2 profits from the **new DBS-2 features** about real data handling that means a hopefully better organization of data

Registration in DBS-2 of tracker data

Description of tracker data in DBS-2:

- Just one primary dataset: **TrackerTIF**
- Use of **Run and Luminosity** tables to describe real data run
- One processed dataset for all the runs belonging to a datatier (RAW, RECO)
- **New concept: Analysis datasets** made of homogeneous runs (such as pedestal runs, physics runs): algorithms to be defined with Tracker experts
- **Scripts developed** to extract informations related to (streamer) files from many sources (Queries to Storage Manager and RunSummary database, etc.)

Status of tracker processing at Tier0

- **Work in progress:**
  - redefine tracker data in DBS-2; **done** at the level of processed datasets with DM and DBS team
  - copy tracker data from current locations on castor to the new one :
    /castor/cern.ch/cms/store/data/TrackerTIF – **in progress – suffers from castor problems**
  - register all of them with conventions **used for Global dataTaking:**
    - streamer files (they were not registered in DBS-1) – **done (see next slides)**
    - EDM converted files – **done (see next slides)**
    - EDM conversion cannot be run at Tier-0 automatically because of incompatibilities between ProdAgent version and the old CMSSW versions used for EDM conversion
  - use ProdAgent for reconstruction by using both direct submission to the LSF queues: **successful tests of tracker data reconstruction performed**
  - run offline DQM, calibration (like bad modules/strips), run quality: to do
  - setup for processing with CMSSW release and prereleases: to do

Tracker Data in DBS-2

DBS instance: *cms_dbs_prod_local_09*
Physics group: Any
Data tier: Any
Sofware release: Any
Primary dataset: TrackerTIF
Site: Any

Number of datasets per page 25

Streamer

Dataset:
/TrackerTIF/Online/RAW « more »
contains 7144013 events, 23438 files, 13.0TB.

Show: Summary Details

Location	Events	Files	size	LFNs
srm.cern.ch	7144013	23438	13.0TB	cff plain

Converted

Dataset:
/TrackerTIF/Online-CMSSW_1_1_0/RAW « more »
contains 7143406 events, 23438 files, 6.7TB.

Show: Summary Details

Location	Events	Files	size	LFNs
srm.cern.ch	7143406	23438	6.7TB	cff plain

Reco

Dataset:
/TrackerTIF/CMSSW_1_3_5-Test-hufnagel-1183804428-unmerge
contains 1 events, 1 files, 2.7MB.

Show: Summary Details

Location	Events	Files	size	LFNs
srm.cern.ch	1	1	2.7MB	cff plain

Show: Summary Details

Location	Events	Files	size	LFNs	status	Block name
srm.cern.ch	22780	65	60.5GB	cff, txt, details	CLOSED	/TrackerTIF/Online/RAW #d137581f-f91b-49bf-ad4a-d9341e87b224
srm.cern.ch	32042	92	85.1GB	cff, txt, details	CLOSED	/TrackerTIF/Online/RAW #b3cfc333-92a6-4851-ae62-69559c711961
srm.cern.ch	71040	202	188.6GB	cff, txt, details	CLOSED	/TrackerTIF/Online/RAW #c99050fd-d329-4353-9595-4ceebbb6830b
srm.cern.ch	3454	10	9.2GB	cff, txt, details	CLOSED	/TrackerTIF/Online/RAW #7c7419d3-b726-4d07-91d6-772ac194f9a6
srm.cern.ch	47168	134	125.2GB	cff, txt, details	CLOSED	/TrackerTIF/Online/RAW #02101af8-0168-4ac8-a504-dc27fab05e3f
srm.cern.ch	1698	6	5.6GB	cff, txt, details	CLOSED	/TrackerTIF/Online/RAW #1ab1b1ae-4c33-43f4-a576-2d070d9e8377
srm.cern.ch	36008	103	95.6GB	cff, txt, details	CLOSED	/TrackerTIF/Online/RAW #f68a6888-7e6a-4dfd-8887-2c8a2653a6e5
srm.cern.ch	921	1	18.6MB	cff, txt, details	CLOSED	/TrackerTIF/Online/RAW #29da2865-5878-4fb2-b9d1-fccbd8e112c9
srm.cern.ch	500	2	1.5GB	cff, txt, details	CLOSED	/TrackerTIF/Online/RAW #e22f2d51-6c9d-4242-b528-b986d344ba20
srm.cern.ch	32792	94	87.1GB	cff, txt, details	CLOSED	/TrackerTIF/Online/RAW

Navigator - Finder - Config - Analysis - RSS - Sites - Runs - Help - Contact
View

```
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.0.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.1.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.10.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.100.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.101.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.102.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.103.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.104.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.105.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.106.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.107.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.108.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.109.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.11.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.110.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.111.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.112.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.113.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.114.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.115.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.116.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.117.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.118.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.119.dat
/store/data/TrackerTIF/000/010/258/tif.00010258.A.testStorageManager_0.12.dat
```

Tracker runs in DBS-2

Runs included in the processed dataset: **/TrackerTIF/Online/RAW**

Dataset:
/TrackerTIF/Online/RAW
contains 20 run(s)

Run	Type	Events	Lumi sec.	Total L	Store	StartOfRun	EndOfRun	dataset	# Files	Size	Created by	Creation time	Modified by	Modification time	LFNs
10348	data	500	1	0	0	0	0	/TrackerTIF /Online /RAW	2	1.5GB	Nicola De Filippis	18 Jun 2007 21:26:08 GMT		18 Jun 2007 21:26:26 GMT	txt details
10336	data	1698	1	0	0	0	0	/TrackerTIF /Online /RAW	6	3.7GB	Nicola De Filippis	18 Jun 2007 21:26:47 GMT		18 Jun 2007 21:28:08 GMT	txt details
10330	data	283	1	0	0	100000000	0	/TrackerTIF /Online /RAW	1	957.2MB	Nicola De Filippis	17 Jun 2007 20:05:07 GMT		18 Jun 2007 21:15:34 GMT	txt details
10271	data	22780	1	0	0	100000000	0	/TrackerTIF /Online /RAW	65	1.6GB	Nicola De Filippis	17 Jun 2007 18:30:23 GMT		18 Jun 2007 21:09:45 GMT	txt details
10264	data	15760	1	0	0	0	0	/TrackerTIF /Online /RAW	45	1.7GB	Nicola De Filippis	18 Jun 2007 21:29:13 GMT		18 Jun 2007 21:40:02 GMT	txt details
10258	data	47168	1	0	0	0	0	/TrackerTIF /Online /RAW	134	957.1MB	Nicola De Filippis	18 Jun 2007 21:40:28 GMT		18 Jun 2007 22:22:38 GMT	txt details
10254	data	15171	1	0	0	0	0	/TrackerTIF /Online /RAW	44	1.0GB	Nicola De Filippis	18 Jun 2007 22:28:11 GMT		18 Jun 2007 22:40:53 GMT	txt details
10252	data	32792	1	0	0	0	0	/TrackerTIF /Online /RAW	94	1.1GB	Nicola De Filippis	18 Jun 2007 22:41:20 GMT		18 Jun 2007 23:15:41 GMT	txt details
10250	data	32042	1	0	0	0	0	/TrackerTIF /Online /RAW	92	984.2MB	Nicola De Filippis	18 Jun 2007 23:16:05 GMT		18 Jun 2007 23:44:37 GMT	txt details
10248	data	921	1	0	0	0	0	/TrackerTIF /Online /RAW	1	18.6MB	Nicola De Filippis	18 Jun 2007 23:44:57 GMT		18 Jun 2007 23:45:06 GMT	txt details
10238	data	30870	1	0	0	0	0	/TrackerTIF /Online /RAW	88	1.6GB	Nicola De Filippis	18 Jun 2007 23:45:35 GMT		19 Jun 2007 00:19:24 GMT	txt details

Access to **single run and range of runs** in processed dataset and analysis dataset via CRAB is supported.

Summary/Conclusions

- Tracker data processing was the first experience with real data which used official CMS tools in a distributed environment ⇒ a successfull and complete exercise
- It was an example of integration between the detector and the computing communities
- Tracker example is the prototype for the Tier-0
- Tracker data description is the first example of real data handling in DBS-2 -> A lot of feedback given to and received by the Tier-0, the Phedex, the DBS and the CRAB teams.
- Tier-0 team is supporting Tracker processing in the framework of Global Data Taking effort -> to be ready for Global Run in September/October

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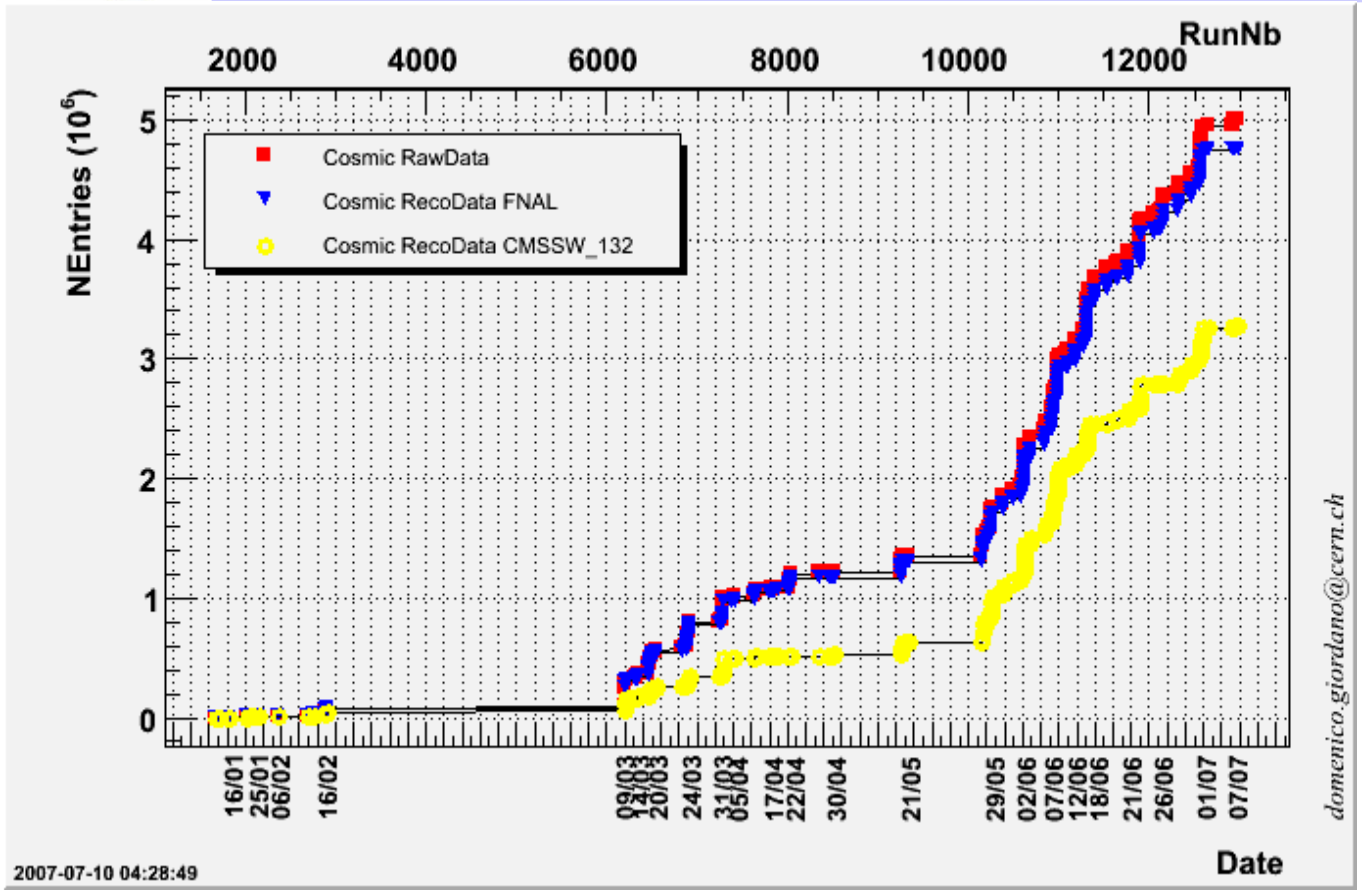
Backup slides

Statistics of reconstruction



Run	nRaw	nRECO_132	nRECO_FNAL
12669	0	0	0
12668	3	0	0
12656	5519	0	0
12603	46380	0	0
11331	30000	25086	29997
11325	30282	26070	30277
11324	30617	26405	30614
11323	30040	13192	30038
11322	30828	16788	30826
11321	30660	27501	30657
11320	30896	0	30895
11319	30440	0	30436
11316	30200	16511	30200
11274	18960	0	18958
11273	30040	0	30038
11272	30060	3159	30059
11184	21220	18252	21219
11182	31623	23901	31619
11181	30720	26157	30720
11179	6420	5367	6419
11096	37600	30560	37598

- Registration & injection on-line -> Transfer to Fermilab quasi on-line - **1hour**
- Reconstruction quasi-online at Fermilab
- Standard reconstruction went slowly w.r.t FNAL and with less resources
- The GRID infrastructure was efficient

Issues about the standard reconstruction

First pilot processing executed with CMSSW_1_3_0_pre6 in April:

- While the reconstruction was going on smoothly the CMSSW_1_3_0_pre6 was removed from CERN (according to the policy of removal of releases) -> not possible to continue the reconstruction at CERN
- Reconstruction moved completely at Bari but after some days the disk was full because of Spring07 MC and RECO -> cleanup of disk
- A lot of CPUs were available at Pisa but the disk was full because of Spring 07 MC

2nd round: processing with CMSSW_1_3_2 at CERN and Bari:

- But problems with the overload of castor at CERN -> delay
- CERN resources shared with Production teams during CSA07 processing -> queues full of jobs -> processing stopped and restarted more times in order to drain CERN queues -> delay
- high level expertise needed to understand problems -> lack of manpower when the scale of processing increased (thousands of runs) -> No time to train shifter and organize shift **!**

Plans for Tracker in Global Run (1)

- Tracker will be in Global Run
  - First with FED patterns starting from summer
  - Starting from **October** the Tracker will be able to take real data (ped., noise, cosmics)

- How much data do you expect to collect? e.g.
  - What is the desired number of events? To be defined
  - What is the trigger rate? 9 Hz expected for cosmic rate in Tracker
  - How long do you plan to run? to be defined, since October onwards
  - How many detectors participate? from the 15 % to the 100 %
  - What is the raw event size for your subsystem? Up to 100 Kb in Zero Suppressed mode (50 times large in Virgin mode)

- What central T0 processing do you need?
  - Conversion to Root/EDM format? YES
  - Reconstruction? YES but also at remote Tiers for re-processing
  - Event selection / skimming? YES for alignment purpores

Plans for Tracker in Global Run (2)

- Where do you need event data distributed?
  - List of T1 / T2 centres in addition to CERN: all tracker nodes
  - What latency requirements do you have on the transfers? order of 1 hour

- What non-event data do you need exported? All via frontier, under discussion with the database team
  - OMDS database → ORCON → ORCOFF + some part of information in DCS
  - What latency requirement? order of 1 hour

- What bookkeeping do you need? Official via DBS/DLS
  - List of published runs, datasets and locations ? YES
  - Data quality information? YES
  - Monitoring of processing and transfer status? YES