Collimator Data Access Tool for Commissioning

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Acknowledgments

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Outline

1 Basics of Collimation Data Acquisition

2 Signals Extracted from the Database

3 Available scripts and technical details

4 Conclusion and Future plans

Basics of Collimation Data Acquisition

- Using a Java API (Application Programming Interface) to extract data from the Measurement and Logging Databases (LHC logging System)
- Applying Java methods and classes of the LHC-Logging Service, which are also the core of TIMBER (logging-data-extractor domain API)
- Data are extracted regularly from the measurement database to a local machine and stored on a RAID1 Disk
- Data are provided as:
  1. Daily data (one file per collimator per day) - available the next day at 2am
  2. 10mins time intervals (extraction interval) - available immediately
  3. a 25 hours loop memory (one file per collimator with the data of the last 25 hours) - available immediately

Basics of Collimation Data Acquisition

- Accessibility of the stored data:
  - on local machines via samba (smb://macbe12138.cern.ch/Collimation)
  - in the LHC control room:
    - Copy the 25 hours loop memory to a folder on the trusted machines (via smb - shell script available)
    - Run the data extraction method on a machine in the control room (discouraged to minimize database access)

Signals Extracted from the Database

- One *.txt file per collimator
- Matrix structure (ordered by time stamp - 1 Hertz)
- Positions and Limits for each collimator and each sensor (GD, GU, LD, LU, RD, RU) i.e.
  - *:MEAS_LIMIT_DUMP_*
  - *:MEAS_LIMIT_WARN_*
  - *:MEAS_LVDT_*
  - *:MEAS_MOTOR_*
  - *:MEAS_RESOLVER_*
- Epoch time stamp
- Signal names same as in Database (e.g. TCP.6L3.B1:MEAS_LIMIT_DUMP_OUTER_LD)
- Files named by collimator: Design names are currently exchanged by display names (see CollimatorList.txt)

Example File

Timestamp (Epoche)	TCP.D6L7.B1:MEAS_LIMIT_DUMP_INNER_GD						TCP.D6L7.B1:MEAS_LIMIT_DUMP_INNER_GU						TCP.D6L7.B1:MEAS_LIMIT_DUMP_INNER_LD
1252221301557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221302557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221303558	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221304559	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221305557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221306557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221307557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221308557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221309557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221310557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221311557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221312557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221313557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221314557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221315557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221316557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221317557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221318557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221319557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5
1252221320557	.356	.344	-5.669	-5.689	5.543	5.59	58.9	58.895	29.401	29.391	-29.399	-29.404	.546	.534	-5.569	-5.5

Header Example (TCP.IP3.B1.1.H)

Timestamp (Epoche)
TCP.6L3.B1:MEAS_LIMIT_DUMP_INNER_GU
TCP.6L3.B1:MEAS_LIMIT_DUMP_INNER_LU
TCP.6L3.B1:MEAS_LIMIT_DUMP_INNER_RU
TCP.6L3.B1:MEAS_LIMIT_DUMP_OUTER_GU
TCP.6L3.B1:MEAS_LIMIT_DUMP_OUTER_LU
TCP.6L3.B1:MEAS_LIMIT_DUMP_OUTER_RU
TCP.6L3.B1:MEAS_LIMIT_WARN_INNER_GU
TCP.6L3.B1:MEAS_LIMIT_WARN_INNER_LU
TCP.6L3.B1:MEAS_LIMIT_WARN_INNER_RU
TCP.6L3.B1:MEAS_LIMIT_WARN_OUTER_GU
TCP.6L3.B1:MEAS_LIMIT_WARN_OUTER_LU
TCP.6L3.B1:MEAS_LIMIT_WARN_OUTER_RU
TCP.6L3.B1:MEAS_LVDT_GU
TCP.6L3.B1:MEAS_LVDT_LU
TCP.6L3.B1:MEAS_LVDT_RU
TCP.6L3.B1:MEAS_MOTOR_LU
TCP.6L3.B1:MEAS_MOTOR_RU
TCP.6L3.B1:MEAS_RESOLVER_LU
TCP.6L3.B1:MEAS_RESOLVER_RU

Header Example (TCP.IP3.B1.1.H)

TCP.6L3.B1:MEAS_LIMIT_DUMP_INNER_GD
TCP.6L3.B1:MEAS_LIMIT_DUMP_INNER_LD
TCP.6L3.B1:MEAS_LIMIT_DUMP_INNER_RD
TCP.6L3.B1:MEAS_LIMIT_DUMP_OUTER_GD
TCP.6L3.B1:MEAS_LIMIT_DUMP_OUTER_LD
TCP.6L3.B1:MEAS_LIMIT_DUMP_OUTER_RD
TCP.6L3.B1:MEAS_LIMIT_WARN_INNER_GD
TCP.6L3.B1:MEAS_LIMIT_WARN_INNER_LD
TCP.6L3.B1:MEAS_LIMIT_WARN_INNER_RD
TCP.6L3.B1:MEAS_LIMIT_WARN_OUTER_GD
TCP.6L3.B1:MEAS_LIMIT_WARN_OUTER_LD
TCP.6L3.B1:MEAS_LIMIT_WARN_OUTER_RD
TCP.6L3.B1:MEAS_LVDT_GD
TCP.6L3.B1:MEAS_LVDT_LD
TCP.6L3.B1:MEAS_LVDT_RD
TCP.6L3.B1:MEAS_MOTOR_LD
TCP.6L3.B1:MEAS_MOTOR_RD
TCP.6L3.B1:MEAS_RESOLVER_LD
TCP.6L3.B1:MEAS_RESOLVER_RD

Available scripts

Scripts, which are regularily started with launchctl (see also crontab) on macbe12138:

- **DataReadWithLoopMemory_V001.sh**:
  - runs every 10min, extracting the data from t-15min to t-5min
  - needs *DataListExtractionLoopMemory10min_V001.jar* and *CollimatorList.txt* in the folder ./Collimation/LHC_collimator_data/bin
  - puts Stdout to *DataReadCollimation.out* and Stderr to *DataReadCollimation.err*
- **combine_files_yesterday.sh**:
  - runs every day at 2am, combining the extracted data from the last day
  - needs *CombineFilesFastAutoDataYesterday.jar* and *CollimatorList.txt* in the folder ./Collimation/LHC_collimator_data/bin
  - puts Stdout to *CombineFilesYesterday.out* and Stderr to *CombineFilesYesterday.err*

Available scripts

Scripts to run locally:

- **DataListExtraction_V004.jar**:
  - runable jar file (java -jar <YourJarFile>)
  - extracts data from measurement database
  - Input: Start/end time and date, folder for storing the data
  - needs *CollimatorList.txt* in the current folder
- **CombineFilesFast_V002.jar**:
  - runable jar file
  - combines extracted data
  - Input: Source and output folder
  - needs *CollimatorList.txt* in the current folder
- **get_last25h.sh**:
  - copies the /Data_last25h folder from macbe12138 into the current folder
  - needs to be executed within the general network or from a trusted machine (e.g. cs-ccr-dev1)

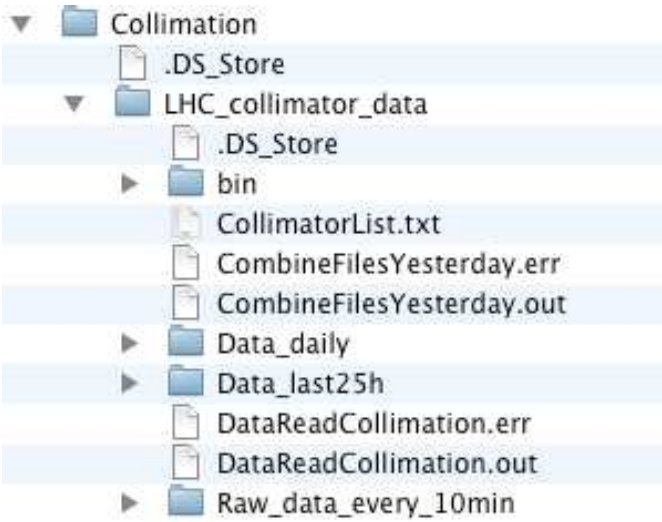
Available scripts

Scripts to run in CCC (stored in: /user/lhcop/COLL/scripts/daniel/):

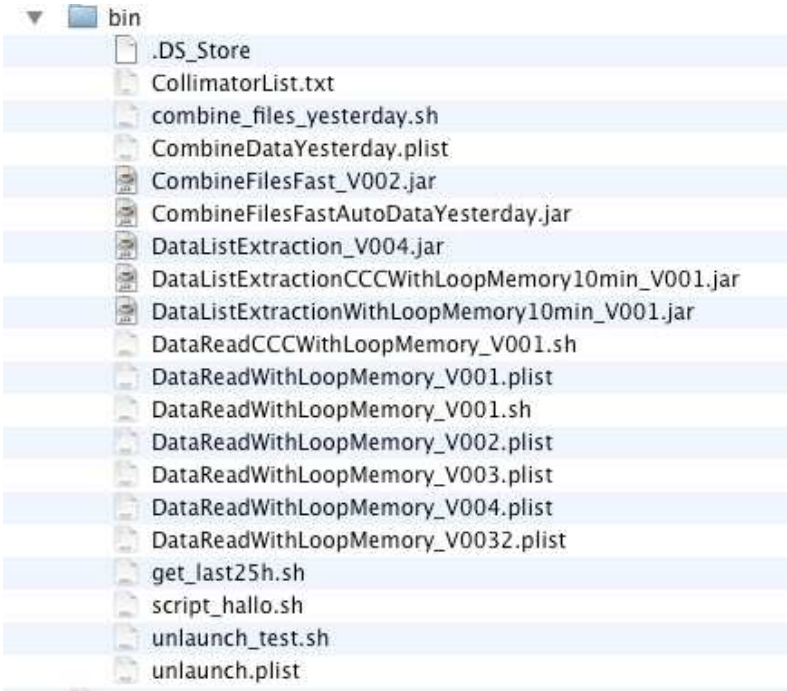
- **DataReadCCCWithLoopMemory_V001.sh**:
  - creates the folders ./Coll_data/ and there ./Data_last25h and ./Raw_Data_every_10min
  - extracts data for t-15min to t-5min every 10mins
  - needs *DataListExtractionCCCWithLoopMemory10min_V001.jar* and *CollimatorList.txt* in the current folder
- **get_last25h.sh**:
  - copies the /Data_last25h folder from macbe12138 into the current folder
  - needs to be executed from a trusted machine (e.g. cs-ccr-dev1)

Folder structure on smb-server

Folder structure on smb-server
(smb://macbe12138/Collimation)

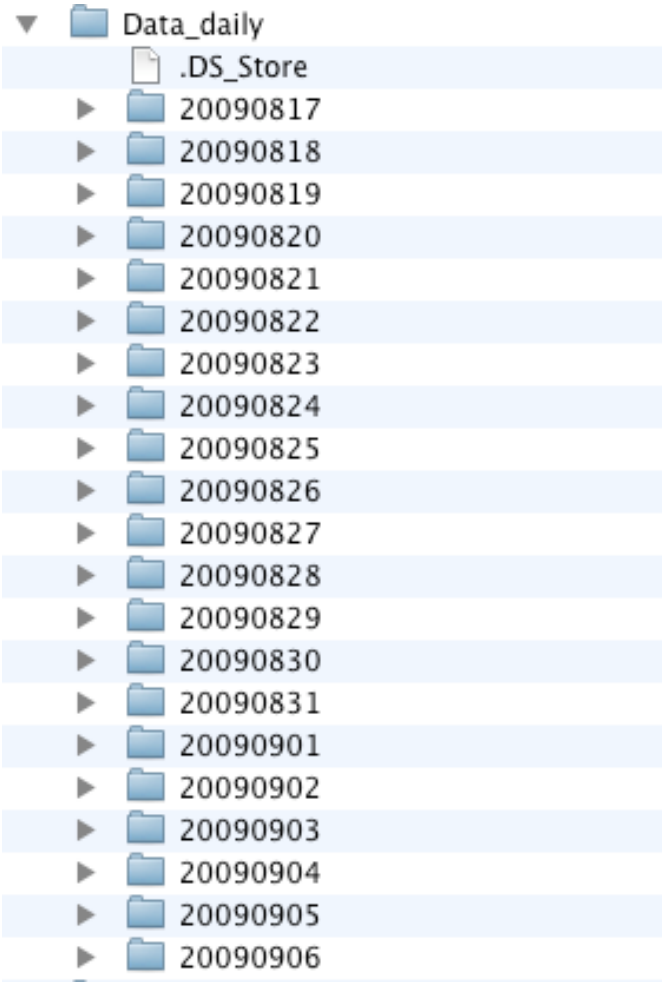


Files in ./LHC_collimator_data/bin

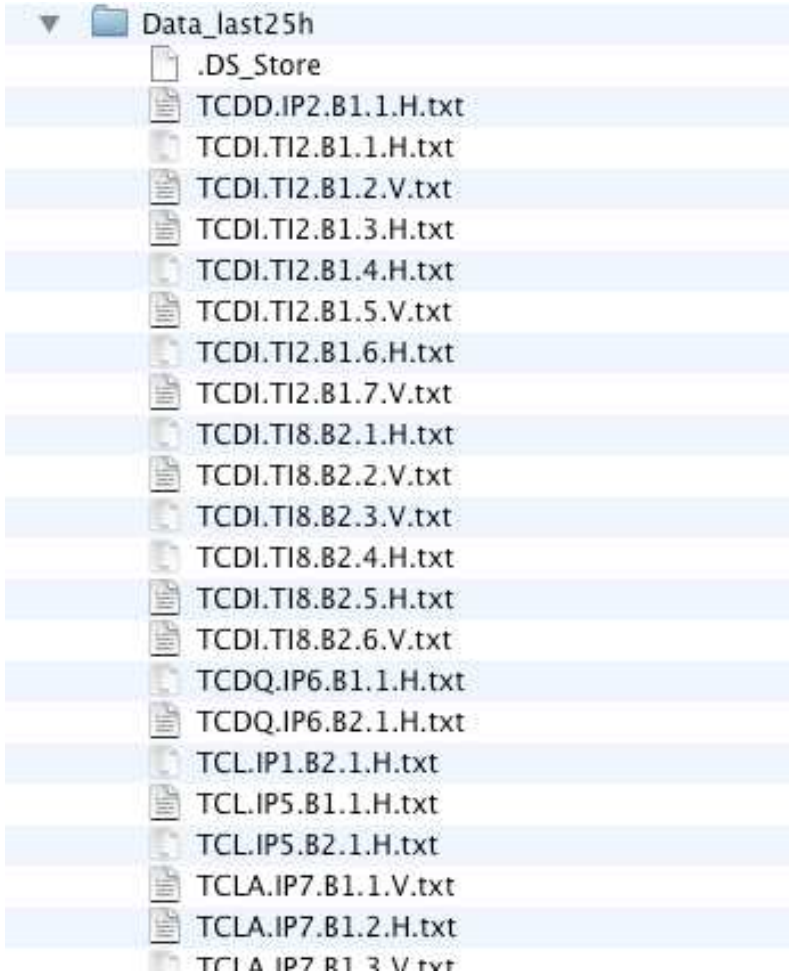


Folder structure on smb-server

Files in
./LHC_collimator_data/Data_daily

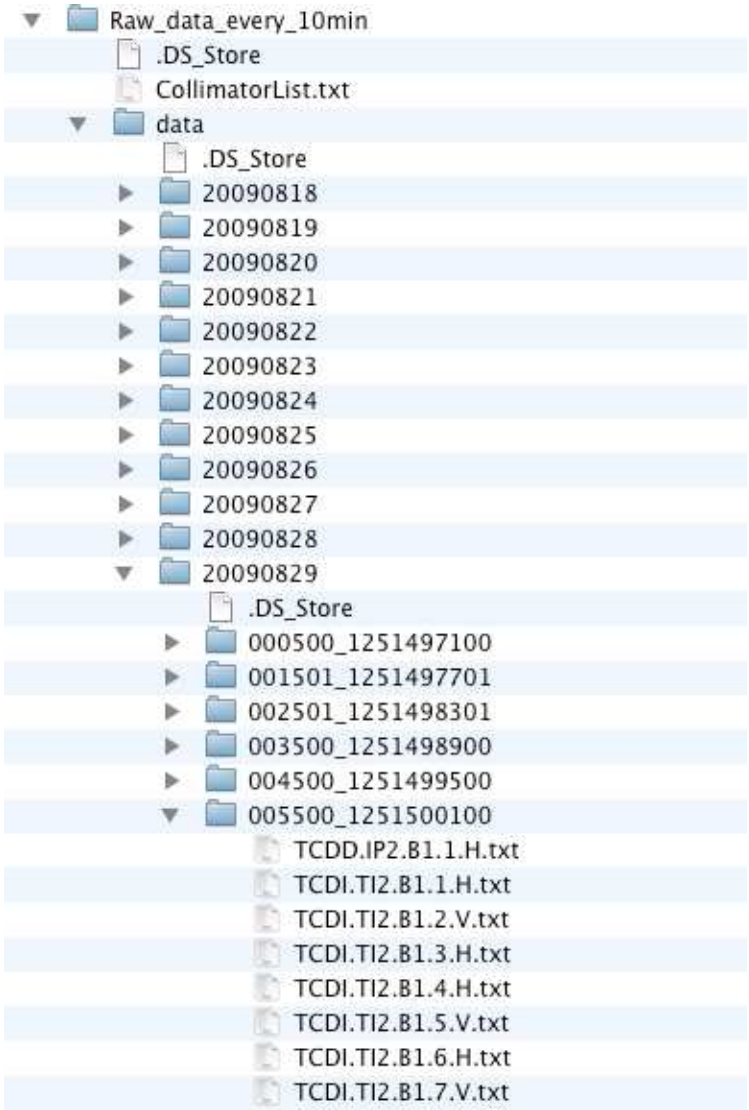


Files in
./LHC_collimator_data/Data_last25h



Folder structure on smb-server

Files in
./LHC_collimator_data/Raw_data_every_10min



Folder structure on technical network

Accessible from CCC or trusted machines (e.g. cs-ccr-dev1)

- scripts: /user/lhcop/COLL/scripts/daniel/
- extracted Data: /user/slops/data/LHC_DATA/OP_DATA/LHCCollimators with subfolders ./DataExtraction/Coll_data

Conclusion

- Measured positions of collimators are regularity extracted from the measurement Database and stored into a smb-server. Consider this as a central service.
- Data can be accessed via smb and are available to analyse the behaviour of the collimators.
- Java methods are available to extract data from the Database for single time intervals on local machines (not standard use)
- Data extraction in operation since 18th of August

Future plans for improvement

- Extract and store on the smb-server also:
  - collimator statuses
  - BLM and BCT data
  - temperature data
- Reprocess the additional data to a matrix structure (ordered by time stamp with interpolation)
- Accessibility of the data via web-server