

ATLAS Dataset Definition

Software Integration Working Group

Preamble

Dataset (DS) is a set of data produced (taken) under the same logical conditions. It is a minimal portion of data movable across the GRID by ATLAS Distributed Data Management (DDM) system and is expected to consist of uniform files suitable for further processing with the same application in the transformation chain.

All datasets share a common set of attributes. In addition, specialized datasets for particular data types (MC, DAQ data, etc) will have attributes specific to their type. The DS attributes form the DS *metadata* which serves two basic purposes :

- to enable data searches using global metadata catalogues or/and databases (DB)
- to associate the DS with other (existing) databases, like production DB and DDM DB. (Remark : DDM is particularly important because our DS is, essentially, a DDM dataset plus metadata).

This implies that the metadata should not duplicate but be largely complementary to the existing DBs describing data properties. A useful redundancy can be tolerated, provided it improves significantly the system performance (eg, the query speed).

This document describes the naming conventions and outlines the DS metadata structure, describing it as a set of inter-related tables. (Remark: physical implementation may differ from this logical description!).

The access to DS metadata is provided via services and APIs. For example, the association between dataset metadata and DDM dataset is done via DDM standard interface using the dataset name and DDM VUID.

1 Dataset name

Dataset name has a predefined number of fields which all should be present and non-empty. The fields can be of arbitrary length, but the total name length must not exceed 80 characters. Only [a-z,A-Z,0-9,_] characters are allowed in a dataset name. Internally, no distinction is made between lowercase and uppercase letters in the DS name. A field name cannot start with underscore. Dataset *NNNNNN* field is unique within the project.

Project.NNNNNN.PhRef.ProductionStep.Format.Version

Project	- ATLAS project (rome, dc2, etc)
NNNNNN	- dataset number in <i>project</i> (6 digits with leading zeroes)
PhRef	- short (!!) physics reference
ProductionStep	- production step (see <i>t_production_step</i> table)
Format	- data format (see <i>t_data_format</i> table)
Version	- dataset version (character string, preferably started with letter 'v')

- Remarks :

- Meta-Data Database browser will provide case insensitive search for all dataset name fields.
- dataset name can be used as a prefix to form output file names, without omitting or changing fields order. It isn't mandatory for files names to have a dataset name as a prefix.
- input dataset name propagates to job names without changing fields order.

2 Datasets, sub-Datasets and DataBlocks

The above dataset naming convention has been implemented in Nov 2005 and in use for 4 months of MC production and subdetectors commissioning. New requirements are forcing us to introduce a new definition of a 'sub-dataset', corresponding to a DQ2 Datablock.

The requirements are mainly due to the following reasons :

- because of large amount of requested events the data production is often done in more than one geographical place and/or GRID flavour and in several production periods to cope with dataset "extension requests". It is necessary to have a way to distinguish between data produced in more than one place, though the data have the same meta-information;
- to have more performant and user-friendly data distribution it was found useful to split MC data to smaller chunks (DQ2 Datablocks)

"subDataset" (corresponding to a DQ2 Datablock) is a set of data produced by one MC task following a single production request on the same GRID flavour and stored on the same storage element (SE).

Subdataset names are formed from the dataset name with an addition of a suffix '*_tidNNNN*', where '*NNNN*' - is the ID of MC production task which generated those events.

Subdatasets are registered as datablocks in the ATLAS DDM system DQ2. At the same time the top-level dataset is defined. The top-level dataset includes files of all subdatasets that have the same metadata information.

3 Dataset tables

All tables can conceptually be divided into the following groups :

- dataset tables
- type specific tables (f.e. *daq*, *mc*, *commissioning*, etc)
- supporting tables (f.e. list of data formats, sw releases, etc)

t_dataset_prim	- primary dataset catalog
t_dataset_desc	- dataset description table
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t_dataset_daq	- dataset specific table for DAQ
t_tile_commissioning_dataset	- dataset specific table for Tile Commissioning
t_ProductionDatasets_exec	- dataset specific table for MC production
t_ProductionDatasets_summary	- dataset specific table for MC production
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t_data_format	- predefined data formats
t_dataset_status	- dataset production (processing) status
t_production_step	- data production (processing) steps
t_project	- ATLAS projects
t_sw_release	- ATLAS software releases
t_sw_transformation	- ATLAS software transformations

3.1 t_dataset_prim

Primary dataset catalogue, to establish a mapping between production dataset ID space and DDM VUID.

id	- dataset unique ID
name	- dataset name according convention
vuid	- ddm dataset unique id
ddm_instance	- ddm instance

3.2 t_dataset_desc

Dataset description contains dataset description attributes common to all datasets.

id	- from t_dataset_prim
project	- from t_project
nnnnnn	- as in dataset name
phref	- as in dataset name
ProductionStep	- from t_production_step
Format	- from t_data_format
version	- as in dataset name
status	- dataset production status (from t_dataset_status)
transformation	- SW this dataset is originating from
release	- SW release
description	- detailed dataset description
owner	- dataset owner (responsible)
user_group	- group ACL is defined by the owner (<i>READ</i> access is granted to all ATLAS members)
spectable	- the name of table with dataset specific information
uptime	- record update time
timestamp	- record insert time

4 Type-Specific Tables

4.1 t_dataset_daq

Specific information for raw data originating from DAQ

id	- dataset id, from t_dataset_prim
begin_time	- data-taking start-time (for the entire dataset)
end_time	- data-taking stop-time
setup	- a reference to the detector setup configuration
trigger	- a reference to the trigger configuration
runtype	- reference to run type description

we assume that trigger configuration, detector setup, run type, etc tables are the part of *online and/or conditions* databases.

4.2 t_tile_commissioning_dataset

Specific information for Tile commissioning data

id	- dataset id, from t_dataset_prim
name	- dataset name
vuid	- DQ2 dataset unique ID
comment	- comments
timestamp	- record insert/update time

trigger configuration, detector setup, run type, etc tables are the part of *Tile commissioning* database.

5 Specific information for MC production datasets

5.1 t_ProductionDatasets_summary

name	- dataset name
task_pid	- ID of the first task
vuid	- DDM dataset unique ID
project	- project
dsn	- dataset number within the project
phref	- short physics description
prodstep	- production step <i>simul, recon, etc</i>
format	- format of produced files <i>AOD, ESD, etc</i>
version	- dataset version <i>derived from SW version</i>
files	- total files in the dataset
events	- total events in the dataset
timestamp	- record insert/update time

5.2 t_ProductionDatasets_exec

name	- dataset name
vuid	- DDM dataset unique ID
task_id	- ID of the task produced the dataset
task_pid	- ID of the first task
files	- total files in the dataset
events	- total events in the dataset
grid_exec	- GRID flavour <i>LCG, NorduGrid, etc</i>
status	- dataset status <i>done, pending, etc</i>
timestamp	- record insert/update time

6 Supporting Tables

Supporting tables contain as expandable list of predefined attributes. The list of supporting tables is incomplete, more tables can be added in future.

6.1 t_data_format

data format table (other formats can be added in the future)

format	- data format (see Annex A)
description	- format description

6.2 t_dataset_status

Dataset production (processing) status, for more details (including state diagram see <https://twiki.cern.ch/twiki/pub/A>)

status	- status (defined, running, completed, validated, aborted, failed)
description	- description

6.3 t_production_step

Production steps table (more production steps can be added in the future)

step - step (evgen, evtxt, daq, digit, lumiNN, mixing, reco, simul)
description - step description

6.4 t_project

List of projects (dc2, rome, dc3, mc11, etc) and DAQ running periods, f.e. 2008A. The following convention was proposed for MC simulation : mcXX - is used for MC testing projects, cscXX - is used for MC production projects.

id - project ID
project - project name
description - project description
begin - start date
end - end date
timestamp - record insert/update time

6.5 t_sw_release

List of SW releases.

name - release name
type - release type (production, development, special (f.e. trigger))
vbegin - validity time (begin)
vend - validity time (end)
timestamp - record insert time

6.6 t_sw_transformation

List of SW transformations. (Remark : t_sw_transformation table can be splitted in the future between DDM and Meta-Data databases. F.e. all information related to the physical file (i.e. file path, MD5SUM, etc) can be moved to DDM database).

name - transformation name (corresponds to the file name)
path - full path for the file used to fill the record
content - transformation content
MD5SUM - file MD5SUM
ftime - file time (as shown by "ls -l")
vbegin - validity time (begin)
vend - validity time (end)
parameters - list of parameters specific for the current transformation
(string syntax : "parX : valueX; parY; valueY;")
owner - name of author (responsible)
timestamp - record insert/update time

7 Annex A : File Data Types

AOD	Output of reconstruction
BYTESTREAM	Output of RDO : Bytestream conversion
CBNT	
EVGEN	Output of event generation, HepMC event record.
EVIDS	EventDataset, List of event IDO's
ESD	Output of reconstruction
HISTO	Histograms
HITS	Output of (g4) simulation (and maybe pile_up)
NTUP	Ntuples
RDO	Output of digitization
TAG	Output of reconstruction

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