

Data Preparation Related Tools

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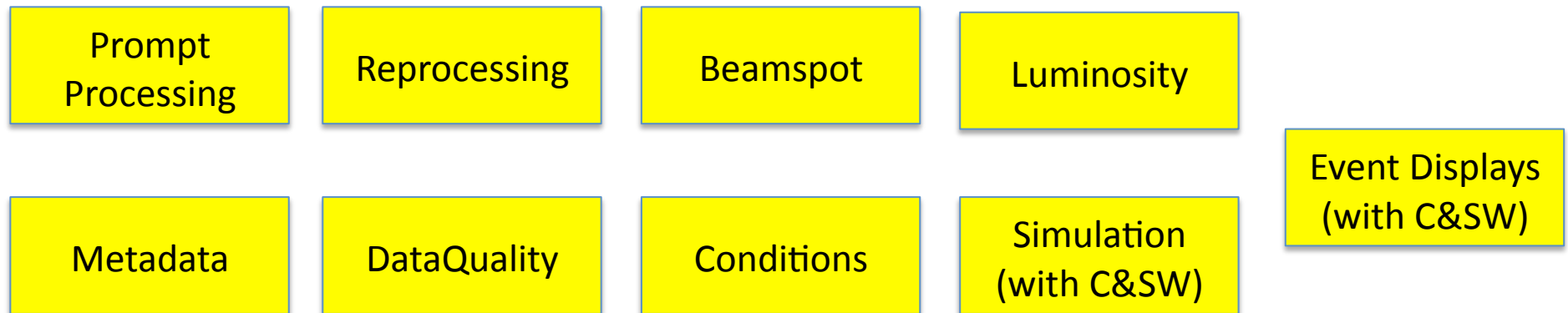
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Lawrence Berkeley National Laboratory*

Outline

- Introduction
- Data Periods and Physics Containers
- AtlRunQuery and DataSummary
- GoodRunList, LumiCalc and AMI
 - See also talks by E. Gallas and S. Albrang
- Summary

Data Preparation

- <https://twiki.cern.ch/twiki/bin/viewauth/Atlas/DataPreparation>
- Coordinators: Jamie Boyd and BH



- General email list for information: atlas-data-preparation@cern.ch
 - Open subscriptio (~500 people are subscribed)
- Help mailing list: atlas-data-preparation-help@cern.ch
 - Contains all the responsables (~20 people) and should always give an answer

Data Periods and Physics Containers

- DataPeriods:

<https://twiki.cern.ch/twiki/bin/view/AtlasProtected/DataPeriods>

- Major period indicated by letter (e.g. period “data10_7TeV.periodF”)
 - Minor sub-periods have number: F1, F2,...
 - Constraint: $F=F1+F2$
 - Otherwise periods do not overlap in content, i.e. the same run is *never* included in F and G (or in F1 and F2) but always in F and F1
- Creation of periods takes into account varying detector conditions, conference schedules etc.
 - Decided by hand (DP and DQ conveners with input from Run Coordination and Systems)

- Physics Containers:

<https://twiki.cern.ch/twiki/bin/view/AtlasProtected/PhysicsContainers>

- One physics container per dataset and per period, e.g.
data10_7TeV.periodF.physics_Egamma.ESD.PhysCont.t0pro04_v01
- Purely created for convenience of users
- The content of a PhysicsContainer corresponds to a given version of the reconstruction software
- Only contain runs that are potentially useful for physics analyses
- Also displayed in AMI
- Usually the starting point of analysis nowadays

DataPeriods

Period	Subperiod	Run Range	Comment	Luminosity (nb ⁻¹)	GRL
A	n.a.	152166-153200	<ul style="list-style-type: none"> unsqueezed stable beam data (beta*=10m): typical beam spot width in x and y is 50-60 microns. 	0.4	DetStatus-v03-repro04-01
B	B1-B2	153565-155160	<ul style="list-style-type: none"> first squeezed stable beams (beta*=2m): typical beam spot width in x and y is 30-40 microns. this period is further subdivided into 2 sub-periods: B1-B2 	9	DetStatus-v03-repro04-01
C	C1	155228-155697	<ul style="list-style-type: none"> very similar to period B but higher luminosity due to more bunches in machine 	9.5	DetStatus-v03-pass1-analysis-2010C
	C2	156682	<ul style="list-style-type: none"> different configuration for L1Calo in eta region near crack at 1.45: previously L1Calo was sampling only from the Endcap while now it is sampling from the barrel in this difficult region. See explanation by Trigger Coordination for details. 		
• • •					
H	H1	166466-166850	<ul style="list-style-type: none"> 233 colliding bunches in ATLAS the CSC problem that affected the last two runs in periodG6 got fixed run 166850 was the run where a Van-der-Meer scan was done at the CMS, LHCb and ALICE experiments and ATLAS ran with a rather special trigger menu. The luminosity of this run is only 7.5 nb⁻¹ and a large bandwidth was given to a special high-multiplicity trigger. 	6500	DetStatus-v03-pass1-analysis-2010H
	H2	166856-166964	<ul style="list-style-type: none"> new RPC timing calibration, see this elog entry 	2800	not yet
I	I1	167575-?	<ul style="list-style-type: none"> 295 colliding bunches in ATLAS the RPC window was unstretched in the L1 trigger, i.e. now only one BC contributes to L1 decisions 	>1000	not yet

Which Data to use with which MC

- <https://twiki.cern.ch/twiki/bin/view/AtlasProtected/DataMCForAnalysis>

Name	Datasets	Release	AMI tag for data	Physics Container	AMI tag for MC
May2010 reprocessing ("repro04")	As April2010, and adding 2010 7 TeV data up to run 155160	15.6.9.8	r1297 (runs 141748-154817) and r1299 (runs 154822-155160), change of DB release only between the two 'r' tags	repro04_v01	ESD (if requested): r1302 (default setup) r1303 (particle ID and cal. hits in ESD for Jet/Etmiss samples) r1304 (GEO-10-01-00 - extra material - sample reconstruction) r1305 (samples without the EM constant term for e/gamma group) r1307 (GEO-10-00-00, no track slimming, for MB) r1336 (GEO-10-00-00, MC_lumi1E31_simpleL1Calib_physics_prescale for some Exotics samples) r1312 (GEO-10-02-00 in digi and GEO-10-00-00 in reco)

RunQuery and DataSummary

- AtlRunQuery (<http://atlas-runquery.cern.ch/>)
 - A lot of different kinds of information about a small subset of runs
 - Start/end, bunch scheme, trigger info, luminosity, stream rates, dataset sizes, DataQuality information, pileup,...
 - Takes a very long time when e.g. using all 2010 collision runs (or times out)
- Atlas-DataSummary (<http://atlas-datasummary.cern.ch>)
 - Static information plotting many variables useful for understanding conditions in single run
 - Luminosity, backgrounds, beam currents, bunch scheme, data-taking efficiency...
- Neither is (or should be) used directly for physics analysis but both are useful to see what went on in particular run
 - Mostly used by experts to understand features of given run

AtIRunQuery

by A. Hoecker and B. Stelzer
(slides taken from J. Walder)

Accessing the Run Query Tool

- The Run Query Tool is written in python,
 - Can be access in two main ways:
 - Simple (yet powerful web interface)
 - <http://atlas-runquery.cern.ch/>
 - Allows interactive search queries

ATLAS Run Queries

Contact

Help

[Current run](#) [Data Summary](#) [Trigger Configuration Query](#) [AMI Data Search](#) [DDM Dashboard](#) [Tier-0 Monitoring](#) [DQ Monitoring](#) [Data Preparation](#) [Operations](#)

- Command line python (need to setup recent Athena release).
 - `AtlRunQuery.py '<arguments>'`
 - Enter the same search criteria as in the web interface.

Web based queries

<http://atlas-runquery.cern.ch/>

Help

Query Box

ATLAS Run Queries

Contact

Help

Current run Data Summary Trigger Configuration Query AMI Data Search DDM Dashboard Tier-0 Monitoring DQ Monitoring Data Preparation Operations

Run Search – Insert Your Query:

find run last 10 and ready / show all

Show Runs

[Default query condition] [Type 'f...' / show all' to see full info (except for DQ and trigger)]

Examples (query format inspired by SPES)

Tab bar of query types

Run/events Time Detectors Streams Magnets Data quality Trigger DAQ Datasets Beamspot LAr Lumi LHC Xtras

find run 90270-90350 and events 100000+ / show run and events

Select runs in given **run number range** and min. **number of events**, and **show** runs and number of events for selected runs.

f r 90270-90350 and ev 100k+ / sh r and ev

Allowed **abbreviations** – same query as above; note that the *show* part could be dropped since same as default.

f r 90270+ and ev 100k-

Select all runs with run number ≥ 90270 and $< 100k$ events.

f r 90270,90275,90380 and ev 100k-200k

Select any of the given run numbers if number of events in given range.

f r last 10 / show all / nodef

Select **last 10 runs**; same in short: **f r l 10 / sh al / nodef**.

f r data10_7TeV.periodC / sh ready

Select runs belonging to a given **run period** (giving only "periodC" would use "data10_7TeV" as default)

f r periodA-periodC,periodD / sh ready

Select runs belonging to the given **range of run periods** (only main letters a considered, so periodA-periodD, means use periods A,B,C,D, but not C1, C2, ...)

(More formatting help)

Example queries

Query Structure

Run Search – Insert Your Query:

find run last 10 and ready / show all

[Default query condition] [Type '...' / show all' to see full

- Query box designed to be familiar to Spire's method of text input
- Query is separated into a matching part and display part
- 'find' / 'display'



- Query words can be shorted when unambiguous.
- Eg. find run and events -> f r and ev

Example Queries – Physics data

- Find runs where stablebeams have been set
 - find run last 10 and lhc stablebeams t / show all

Detailed links



Run	Links	#LB	Start and end time (CEST)	#Events	Ready for physics	LHC and online luminosity information			
						LHC Fill	Stable beams	Beam energy and intensities	Online del. Luminosity [ATLAS_PREFERRED]
166964 <small>(in calib loop)</small>	DS, NS, BS, AMI, DQ, ELOG, DCS:SoR/ EoR	487 <small>(117 s)</small>	Sun Oct 17 2010 18:15:17 – Mon Oct 18 10:06:32	1,220,426 <small>(21.4 Hz)</small>	LB 1-318: 0 LB 319-333: 1 LB 334-487: 0	LB 1-156: 1429 LB 157-370: 1430 LB 371-487: 1431	LB 1-310: FALSE LB 311-336: TRUE LB 337-487: FALSE	 Maximum intensities: Beam 1: 342 e11 protons Beam 2: 337 e11 protons Maximum beam energy: 3500 GeV	 Entire run: 365.7 nb ⁻¹ Stable beams: 320.2 nb ⁻¹ Peak lumi: 1.5e+02 e30 cm ⁻² s ⁻¹ Peak $\langle\mu\rangle$: 3.21 Approx. lifetime: 14 h
166927 <small>Period: H, H2 (in calib loop)</small>	DS, NS, BS, AMI, DQ, ELOG, DCS:SoR/ EoR	131 <small>(112 s)</small>	Sun Oct 17 2010 06:11:56 – 10:17:36	2,850,495 <small>(193.4 Hz)</small>	LB 1- 6: 0 LB 7-104: 1 LB 105-131: 0	1427	LB 1-109: TRUE LB 110-131: FALSE	 Maximum intensities: Beam 1: 237 e11 protons Beam 2: 235 e11 protons Maximum beam energy: 3500 GeV	 Entire run: 625.5 nb ⁻¹ Stable beams: 625.5 nb ⁻¹ Peak lumi: 57 e30 cm ⁻² s ⁻¹ Peak $\langle\mu\rangle$: 1.23 Approx. lifetime: 23 h
166925 <small>Period: H, H2</small>	DS, RS, BS, AMI, DQ, NEMO, ELOG, DCS:SoR/ EoR	35 <small>(114 s)</small>	Sun Oct 17 2010 04:15:31 – 05:22:15	765,755 <small>(191.3 Hz)</small>	LB 1- 4: 0 LB 5-35: 1	1427	TRUE	 Maximum intensities: Beam 1: 241 e11 protons Beam 2: 241 e11 protons Maximum beam energy: 3500 GeV	 Entire run: 201.2 nb ⁻¹ Stable beams: 201.2 nb ⁻¹ Peak lumi: 62 e30 cm ⁻² s ⁻¹ Peak $\langle\mu\rangle$: 1.33 Approx. lifetime: 22 h

- For physics, require “Ready for Physics” flag
 - find run last 10 and ready / show all

Displaying Data Quality

- find run last 5 and ready / **show dq**

Good Lumi Blocks

Run	Links	#LB	Start and endtime (CEST)	#Events	PIXB (SHIFTOFL)	PIX0 (SHIFTOFL)	PIXEA (SHIFTOFL)	PIXE (SHIFTOFL)	SCTB (SHIFTOFL)	SCTEA (SHIFTOFL)	SCTEC (SHIFTOFL)
166964 <small>(in calib loop)</small>	DS, RS, BS, AMI, DQ, ELOG, DCS:SoR/EoR	487 <small>(117 s)</small>	Sun Oct 17 2010 18:15:17 – Mon Oct 18, 10:06:32	1,220,426 <small>(21.4 Hz)</small>	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
166927 <small>Period: H, H2 (in calib loop)</small>	DS, RS, BS, AMI, DQ, ELOG, DCS:SoR/EoR	131 <small>(112 s)</small>	Sun Oct 17 2010 06:11:56 – 10:17:36	2,850,495 <small>(193.4 Hz)</small>	G <small>LB 1-6: R LB 105-131: R</small>	G <small>LB 1-6: R LB 105-131: R</small>	G <small>LB 1-6: R LB 105-131: R</small>	G <small>LB 1-6: R LB 105-131: R</small>	G <small>LB 106-131: R</small>	G <small>LB 106-131: R</small>	G <small>LB 106-131: R</small>

Bad Lumi Blocks

- If you require the pixel detector to be in the run
 - find run 166927 and det pix / show dq
 - And if you want periods with 'good' pixel data quality (say yellow or green).
 - find run 166927 and dq pix y+ / show dq
 - Other systems pix, sct, csc, lar

Other Queries

Query: *find run 90270-90350 and events 100000+ / show ...*

- | | |
|---|--|
| f r 89465-93000 and duration 2m+ | runs that had a duration of at least two minutes |
| f r 90270+ and ev 100k- | runs with run number \geq 90270 and $<$ 100k events |
| f r 90100-90150 and det any sct | runs with at least one SCT in and show all participating detectors |
| f r 90270-90350 and st *IDCos* 10k+ and st *RPC* | runs where sum of *IDCos* streams has more than 10000 events and one *RPC* stream is enabled |
| f r 90270-90350 and mag s and not mag t | runs with solenoid on and toroid off |
| f r 90270-91350 and dq lar g | runs where all LAr-EM are "green" |
| f r 90270-90350 and dq em y+ and dq pixb y+ | runs where LAr-EM and Tile DQ flags are at least "Y" and Pixel-B is "G" |
| f r 90270-90350 and dq any pix n.a. | runs where at least one Pix quality flag is unset |
| f t 10.9.2008-13.9.2008 and ptag data08_1beam* | runs with single-beam project tag, between 10 th and 13 th Sep 08 |
| f r 91890-92070 and tr EF_e5* | runs with triggers matching pattern EF_e5* [not case sensitive] |

Result Caching

- Some searches require queries across many systems and runs, first query may take some time and place demands on the server.
- Each query can now be cached.
 - Send the cached query in email links etc..

Run Search – Insert Your Query: *cached result*

Show Runs

[Default query condition] [Type 'f ... / show all' to see full info (except for DQ and trigger)]

↔ Cached link

http://atlas-runquery.cern.ch/query.py?q=arq_101018192855pznq

- Cache will remain in database for as long as it is 'popular'

Some less well-known favorites of mine

- `find run XXX / show lhc all`
 - Detailed bunch structure
- `find run XXX / show da`
 - Details of all datasets
- `pileup 1.5E32 71.5 295`
 - Pileup for $L=1.5E32 \text{ cm}^{-2}\text{s}^{-1}$, $xsec=71.5 \text{ mb}$, 295 colliding bunches
 - Result is 3.2 for this particular query
- `find run XXX / show bs`
 - Shows beamspot positions and width as stored in COOL versus the luminosity block number

GoodRunList Maker, LumiCalc, AMI

- GoodRunList: <https://atlasdqm.cern.ch/grl/>
 - Critical for all physics and performance analyses
 - Should only be made with above webpage
 - AtlRunQuery can also make them but this is not supported by the DQ group (integrity cannot be guaranteed)
- Luminosity Calculation: <https://atlas-datasummary.cern.ch/lumicalc/>
 - Inputs are GRL and trigger
 - Should be used for any luminosity calculation
- AMI
 - Primary source of datasets, e.g. only reliable source of the number of events in AOD for given dataset
 - Should be used by physics analyses to cross-check events in ntuple
 - Provides a lot more of course (see talk by S. Albrand)

GoodRunList

By M. Baak, P. Onyisi
(slides from J. Walder)

What are Good Runs Lists?

- For physics measurements, must be confident that the data we use satisfies our quality constraints.
- Number of ways data may be classed as 'bad':
 - LHC not in stable-beam (or ready for physics) mode.
 - Magnets Off or ramping
 - Sub-detectors switched off
 - Too many noisy cells.
- Provides granularity down to the luminosity block level (~2min).
- There needs to be a way to telling your analysis which sets of data to exclude:
 - The Good Runs List (GRL)
- In it's simplest form, the GRL is an xml file which specifies sets of 'good' luminosity blocks, over which your data should run.
- Can also contain blacklists, to explicitly exclude some sections (may be useful in using exclusive sets of data).
- By creating the xml file and adding it to Athena's job options, Luminosity information can be kept intact and correctly calculated.

Data Quality Flags



- Traffic light system used as indicator of quality of flag:

- DQ traffic light system explained:

- Black (-1): disabled Subdetector is disabled Disabled
 - Grey (0): undefined Very short runs, or problems Undefined
 - Red: (1) bad Not good for physics Bad
 - Yellow (2): flawed Use with caution. Decided upon later. Flawed
 - Green (3): good Good for physics use. Good

- Order: black < grey < red < yellow < green

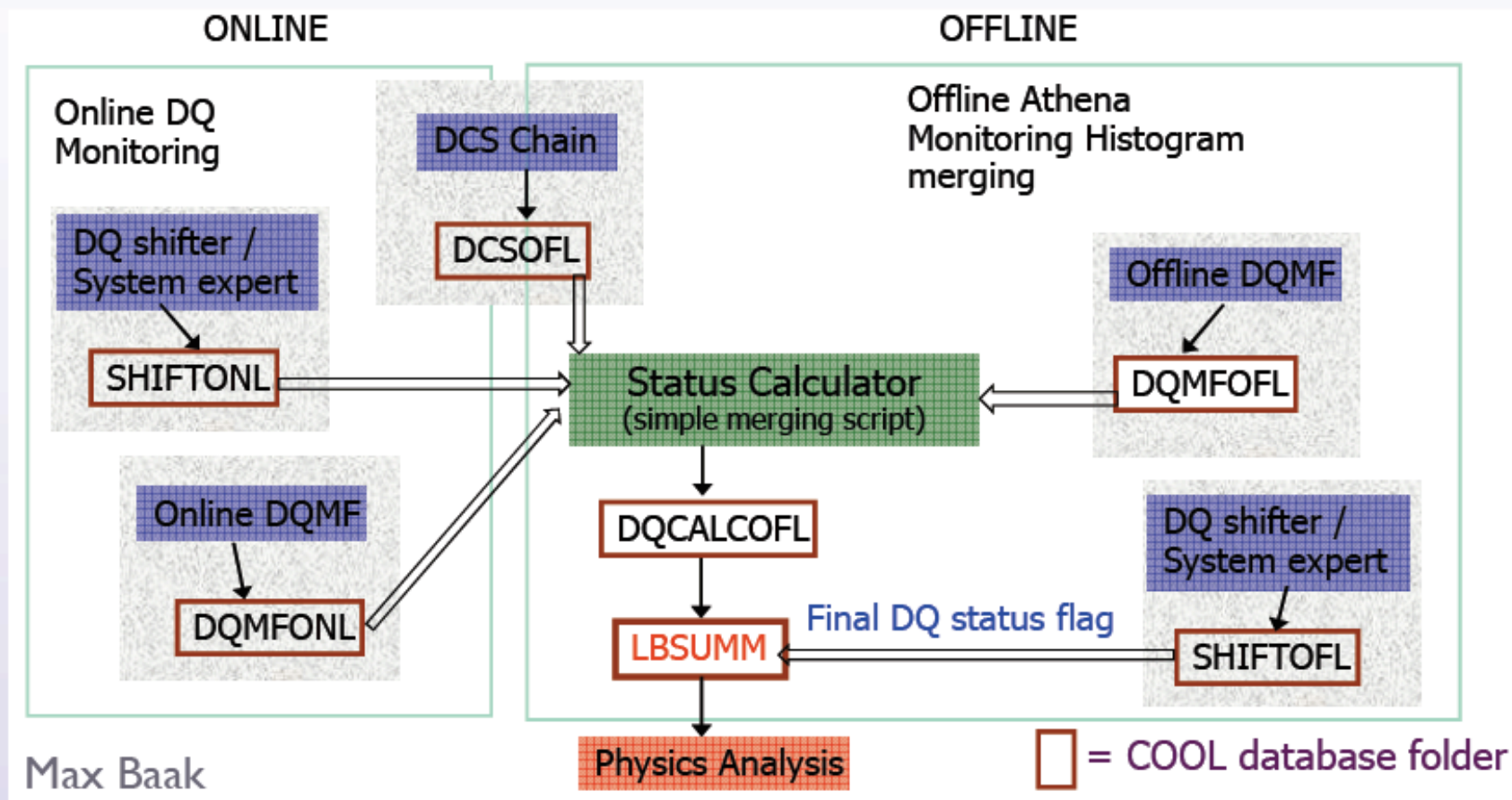
Max Baak, CERN

- Over 100+ flags exist:

- Sub-detectors (pixel, SCT)
 - Trigger (LI dead time)
 - Combined performance (eg. electrons, jets, ...)
 - Global flags.

PIXB (SHIFTOFL)	PIX0 (SHIFTOFL)	PIXEA (SHIFTOFL)	PIXEC (SHIFTOFL)	SCTB (SHIFTOFL)	SCTEA (SHIFTOFL)	SCTEC (SHIFTOFL)	TRTB (SHIFTOFL)	TRTEA (SHIFTOFL)	TRTEC (SHIFTOFL)
G	G	G	G	G	G	G	G	G	G
LB 1-126: R LB 626-626: R LB 627-632: R	LB 1-126: R LB 626-626: R LB 627-632: R	LB 1-126: R LB 526-626: R LB 627-632: R	LB 1-126: R LB 626-626: R LB 627-632: R	LB 1-113: R LB 627-632: R	LB 1-113: R LB 627-632: R	LB 1-113: R LB 627-632: R			

Setting of DQ Flags

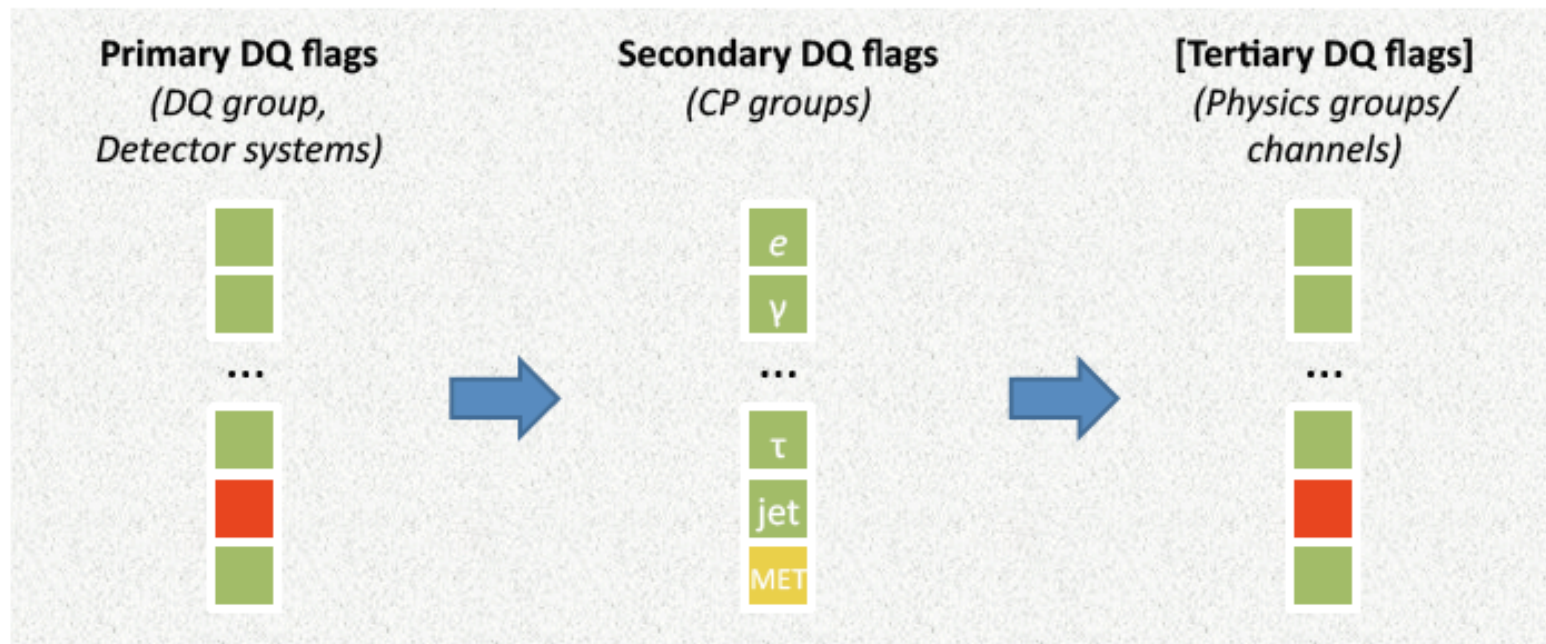


- Data Quality (DQ) flags are set mainly by a team of shifters.
 - Ultimately aim for automated flagging of data quality, where possible.

Data Quality Flags (cont.)

- A DQ hierarchy is in the process of being constructed,

- DQ flags hierarchy consists of three levels:



- Yellow and grey flags indicate that work (eg. calibration) is still ongoing. **Eventually no yellow or grey flags.**

- Yellow flags allowed. Usage depends on physics analysis.
- In process of being finalized.

- **No yellow flags for physics analysis!**
- (Tertiary flags not yet defined.)

Example GRL

- Common run/LB xml format agreed-upon for good run list file.

- Design by TAG grp

- Simple and transparent structure

- Ranges of LBs

- Also contains versioning and metadata info

- Name, version nr.
- Search query used to create xml file.
- Streams, trigger names of interest (work in progress)

```

<?xml version="1.0" ?>
<!DOCTYPE LumiRangeCollection
SYSTEM 'http://atlas-runquery.cern.ch/LumiRangeCollection.dtd'>
<!-- Good-runs-list created by AtlRunQuery.py on 2010-07-07 14:34:52.653539 -->
<LumiRangeCollection>
  <NamedLumiRange>
    <Name>muon_7TeV</Name>
    <Version>2.1</Version>
    <Metadata Name="query">find run 158045-158392 and partition ATLAS and db DATA and
    lhc stablebeams T and st physics_MinBias and ptag data10_7TeV and
    dq ATGL LBSUMM#DetStatus-v03-pass1-analysis-20100 g
    and dq atltor LBSUMM#DetStatus-v03-pass1-analysis-20100 g
    and dq atlsol LBSUMM#DetStatus-v03-pass1-analysis-20100 g
    and dq pix LBSUMM#DetStatus-v03-pass1-analysis-20100 g
    and dq sct LBSUMM#DetStatus-v03-pass1-analysis-20100 g
    and dq trtb,trte LBSUMM#DetStatus-v03-pass1-analysis-20100 y+
    and dq mdt LBSUMM#DetStatus-v03-pass1-analysis-20100 g
    and dq rpc LBSUMM#DetStatus-v03-pass1-analysis-20100 g
    and dq tgc LBSUMM#DetStatus-v03-pass1-analysis-20100 g
    and dq csc LBSUMM#DetStatus-v03-pass1-analysis-20100 g </Metadata>
    <Metadata Name="RunList">158392,158299,158269</Metadata>
    <Metadata Name="RQTSVNVersion">CoolRunQuery-unknown</Metadata>
    <Metadata Name="StreamListInfo">
      <Stream Name="physics_CosmicCalo" TotalNumOfEvents="1906748" NumOfSelectedEvents="745591"/>
      <Stream Name="physics_L1Calo" TotalNumOfEvents="11572490" NumOfSelectedEvents="7871572"/>
      <Stream Name="physics_MinBias" TotalNumOfEvents="2788076" NumOfSelectedEvents="1201539"/>
      <Stream Name="physics_MuonswBeam" TotalNumOfEvents="3629031" NumOfSelectedEvents="2817397"/>
      <Stream Name="physics_RNDM" TotalNumOfEvents="729444" NumOfSelectedEvents="272074"/>
      <Stream Name="physics_ZeroBias" TotalNumOfEvents="102922" NumOfSelectedEvents="65628"/>
    </Metadata>
    <LumiBlockCollection>
      <Run>158392</Run>
      <LBRange Start="218" End="340"/>
      <LBRange Start="358" End="358"/>
      <LBRange Start="367" End="447"/>
    </LumiBlockCollection>
    <LumiBlockCollection>
      <Run>158299</Run>
      <LBRange Start="378" End="434"/>
    </LumiBlockCollection>
    <LumiBlockCollection>
      <Run>158269</Run>
      <LBRange Start="3" End="81"/>
    </LumiBlockCollection>
  </NamedLumiRange>
</LumiRangeCollection>

```

GRL name

DQ criteria

Event count

Passed LumiBlocks in each run

Generating a Good Run List

- The simplest way is to use the GRL generator page:
<https://atlasdqm.cern.ch/grl/>
 - Web-based interface, can download the xml file.
- It is also possible to use the Run Query Tool (web page, or command line) to create an xml file,
 - However for physics analysis you should use 'official' lists.
- Ultimately it is the physics/performance groups that will generate the definition of the correct GRL for their analyses.
- For the moment, and with first data it is a good time to learn about data quality.
- Good runs lists are very closely linked to the luminosity calculation tools.
- More advanced techniques exist, but we won't exercise these at this tutorial.
 - A very good, full tutorial is available from:
 - <https://twiki.cern.ch/twiki/bin/viewauth/Atlas/GoodRunsListsTutorial>
 - Includes how to use GRLs within ROOT (i.e. outside of Athena).

GRL generator web page

- <https://atlasdqm.cern.ch/grl/> : Simplest way to access 'official' GRLs.

Configuration: muons, minbias, etc...

Configuration file: [\(Click to download\)](#)

Project tag/data period: ← Data period

DQ folder: If in doubt, leave as LBSUMM

COOL tag: ← Cool Tag version

← Download the xml file

- Helpful table to correctly match the various options is also on the page:

Data	Project tag / data period	COOL tag	Input datasets to use
7 TeV, runs 152166-155160	data10_7TeV periods A,B	DetStatus-v03-repro04-01	May reprocessing (repro04_v01)
7 TeV, runs 155228-156682	data10_7TeV period C	DetStatus-v03-pass1-analysis-2010C	Tier-0 processing (t0pro04_v01)
7 TeV, runs 158045-159113	data10_7TeV periods D1-5	DetStatus-v03-pass1-analysis-2010D -or- DetStatus-v03-pass1-analysis-2010D-RPClose	Tier-0 processing (t0pro04_v01)
7 TeV, runs 159179+	data10_7TeV period D6	DetStatus-v03-pass1 (not for final results!)	Tier-0 processing (t0pro04_v01)
900 GeV, 2009 data	data09_900GeV AllYear	DetStatus-v03-repro04-01	May reprocessing (repro04_v01)

- Once downloaded, you would copy the xml to the Athena run area.

Using a GRL in root



Selection of good lumiblocks in Root

(Note: for this example you need [GoodRunsLists-00-00-66](#) or greater.)

A Root code example of how to draw observables from a tree, only showing those events that pass the good run list criteria.

First start root and load `$TestArea/DataQuality/GoodRunsLists/i686-slc4-gcc34-opt/libGoodRunsListsLib.so`

```
root [0] gSystem->Load("../i686-slc4-gcc34-opt/libGoodRunsListsLib.so");
root [1] DQ::SetXMLFile("testgrl.xml");
```

where testgrl.xml is a user-provided good run list of interest.

```
root [2] TFile* file = TFile::Open("jetetmiss_example.root");
```

... which is just an arbitrary example ntuple ...

```
root [3] JetMETD3PD->Draw("MET_Topo_sumet")
root [4] JetMETD3PD->Draw("MET_Topo_sumet", "DQ::PassRunLB(RunNumber, lbn)")
```

where the second draw option only shows MET_Topo_sumet for runs and lumiblocks in the good run list. Note that the variables [RunNumber](#) and lbn are assumed to be defined in the [JetMETD3PD](#) tree.

- We recommend applying the GRL at final analysis stage (i.e. not during making of ntuple)
 - GRL can change (due to mistakes or improved DQ understanding by systems/CP groups)
 - The fraction of Not-good data is rather small (no real saving in CPU)

Luminosity determination

- <https://atlas-datasummary.cern.ch/lumicalc/>
- The luminosity of the data you analysis depends on both the Trigger that you are using,
- and the 'amount' of data processed.
 - This 'amount' is affected by the GoodRunsLists, and needs to be used as part of the calculation.
- Fortunately, a simple web-page exists to perform the calculation for you.
 - You need to have:
 - A GoodRunsList xml file (we'll use the one from the previous example).
 - The trigger used for your analysis. Pick your favourite trigger,
 - Or, for example select EF_MU0

https://atlas-datasummary.cern.ch/lumicalc/

ATLAS Luminosity Calculator

https://atlas-datasummary.cern.ch/lumicalc/

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tutorial (27-30 July 2010) GRL generator tutorial (19-21 October 2010) CoolLumiCalcTutorial < Atlas < ... ATLAS Luminosity Calculator

ATLAS Luminosity Calculator [Contact](#) [Help](#)

GRL Calculator Data Summary Run Query Run Summary Data Preparation

This form provides a restricted interface to the luminosity calculator iLumiCalc.exe. A Good Run List appropriate for your processed data sample is required as an input.

Useful Links

- [Good Runs List TWiki](#)
- [LumiCalc Tutorial](#)
- [Offline Luminosity Tags](#)
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LumiCalc News

- **16 September** - The **None** specifier works again. Several bugs were found in the handling of HLT prescales, so it is highly recommended to re-run any luminosity calculations involving triggers which may have been disabled or prescaled.

Luminosity Calculator

GRL XML File:	<input type="button" value="Choose File"/> data10_7TeV.perio...01_muon_7TeV.xml	GRL XML file which defines the data sample of interest.
Luminosity Tag:	OfiLumi-7TeV-002 (preferred, VdM scan calibrations) ▼	Tag which defines the specific version of the luminosity measurement. Only use --online for diagnostic checks.
Live Fraction Trigger:	L1_MBTS_2	This trigger is only used to compute the L1 live fraction. Any high rate L1 trigger can be used, but L1_MBTS_2 is currently preferred.
Physics Trigger:	<input type="checkbox"/> LI_MUO	This trigger is used to compute the prescale correction. It is possible to use a L1 trigger, but if that trigger is prescaled at the HLT, you will get the wrong result! Specify None to assume a prescale of 1 for all luminosity blocks.
Other Options:	<input type="text"/>	Add any additional options here. Use --verbose to get more detailed output. Use --help to find other possibilities.

Remember, this process can take considerable time (minutes) for large data samples. Pushing the button again will only make things worse. Please be patient!

Output

- Output page provides equivalent command-line statement (requires athena)
- Also the total (and per-run) luminosity for the given GRL period.

- Luminosity DB tag: OfiLumi-7TeV-002
- Live fraction trigger: L1_MBTS_2
- Physics trigger: L1_MU0
- GRL file: data10_7TeV.periodB.153565-155160_LBSUMM_DetStatus-v03-repro04-01_muon_7TeV.xml was uploaded successfully to /tmp/lumifiles/81268c

Specification complete!

Environment

LumiBlockComps-00-02-05

Command Details

```
iLumiCalc.exe --lumitag=OfiLumi-7TeV-002 --livetrigger=L1_MBTS_2 --trigger=L1_MU0 --xml=/tmp/lumifiles/81268c/data10_7TeV.periodB.153565-155160_LBSUMM_DetSta01_muon_7TeV.xml
```

Command complete - CPU time: 0.0 s, Clock time: 19.4 s

Total Luminosity: 8.79698 nb⁻¹

Run Number	Number of Good LBs	Number of Bad LBs	Luminosity Delivered (nb ⁻¹)	Luminosity Livefraction Corrected (nb ⁻¹)	Luminosity Prescale Corrected (nb ⁻¹)	Lumi-Weighted Live Fraction (percent)	Lumi-Weighted Prescale
153565 (ARQ, Prescales)	696	0	0.665156	0.664095	0.664095	99.84	1.0
153599 (ARQ, Prescales)	107	0	0.0593819	0.0593123	0.0593123	99.88	1.0
154810 (ARQ, Prescales)	63	0	0.155331	0.152803	0.152803	98.37	1.0
154813 (ARQ, Prescales)	180	0	0.302937	0.299541	0.299541	98.88	1.0
154815 (ARQ, Prescales)	32	0	0.0676402	0.0624522	0.0624522	92.06	1.0
154817 (ARQ, Prescales)	279	0	0.53776	0.533888	0.533888	99.28	1.0
154822 (ARQ, Prescales)	189	0	0.428662	0.427019	0.427019	99.62	1.0
155073 (ARQ, Prescales)	326	0	1.19135	1.17645	1.17645	98.75	1.0
155112 (ARQ, Prescales)	409	0	3.6389	3.57969	3.57969	98.37	1.0
155116 (ARQ, Prescales)	86	0	0.522896	0.51253	0.51253	98.02	1.0
155160 (ARQ, Prescales)	264	0	1.33498	1.32921	1.32921	99.57	1.0
Total	2721	0	8.9052	8.79698	8.79698	98.78	29 1.0

Summary

- Find out which data exist and their approximate luminosity: **DataPeriods twiki**
- Find the corresponding physics containers: **AMI**
 - **Submit job** on physics containers
- Find out corresponding MC:
<https://twiki.cern.ch/twiki/bin/view/AtlasProtected/DataMCForAnalysis>
 - Again find corresponding dataset in **AMI** and **submit job**
- Create a **GoodRunList** depending on your analysis
- Calculate **luminosity** depending on GRL and your preferred trigger
- Analyze data and corresponding MC