



JetMET POG DQM

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Goals



Identify bad data

as defined from the JetMET perspective

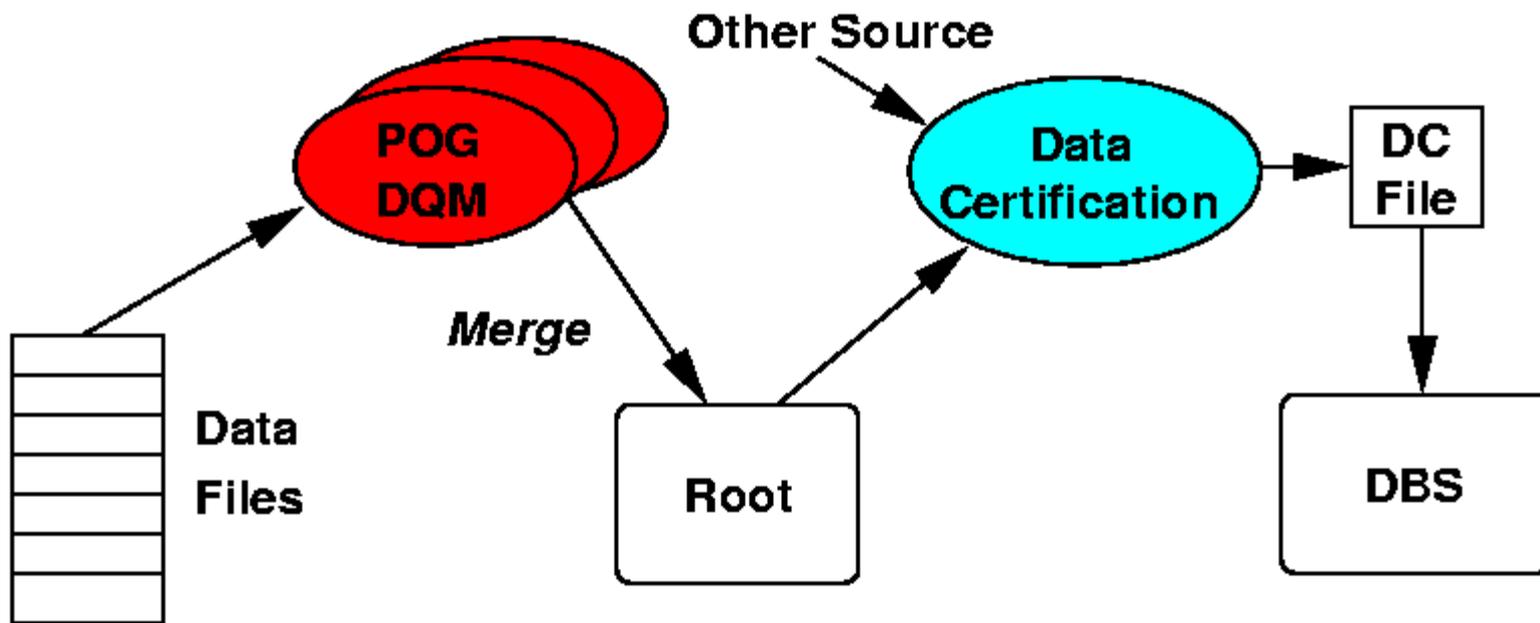
Monitor Jet and MET related triggers

Monitor Jet and MET reconstructed variables

Provide quality information for detector regions

Barrel, EndCap, Forward, HO?

Identify data *within* a run that is bad



- ***Multiple copies of POG DQM read multiple files***
- ***Output is merged into a single root file***
- ***Data Certification uses merged root file***
- ***Result of Data Certification is written to DC File***
- ***DC File read by script which writes results to DBS***



Constraints



May not have enough statistics to determine the data quality per Luminosity Section

One DQM process may not see data from contiguous Luminosity Sections

We need to carry forward the information/LS to the merged root file

Data in root files have to be a fixed size...
Cannot save ntuples



Determining the Quality



Need to specify quantities we want to monitor

Jet, MET, Trigger, Rates,...

Need to specify the definition of the variables

Input sample, bin width, bin boundaries

Need to specify the definition of “good”

mean, sigma, KS test,...



Input and Granularity



Need to use a well defined data path:

**Monitor low and high pT triggers
J20, J110**

**Want to provide quality information for the different
detector regions:**

Barrel	$\eta < 1.3$
EndCap	$1.3 < \eta < 3.0$
Forward	$\eta > 3.0$

Monitor Jet Variables

JetMET_Jet_XXX_Pt_YYY_Val

JetMET_Jet_XXX_Eta_YYY_Val

JetMET_Jet_XXX_Phi_YYY_Val

JetMET_Jet_XXX_Constituents_YYY_Val

JetMET_Jet_XXX_HOverE_YYY_Val

Where *XXX = Barrel, EndCap, Forward*
YYY = Low (J20), High (J110)

Monitor Jet Triggers

JetMET_Jet_J20_Val

JetMET_Jet_J110_Val

Monitor MET Quantities

JetMET_MET_XXX_**Mex**_Val

JetMET_MET_XXX_**Mey**_Val

JetMET_MET_XXX_**Phi**_Val

JetMET_MET_XXX_**SET**_Val

Where XXX = Barrel, EndCap, Forward, HO?

Monitor MET Triggers...



The Data Certification algorithm will use the contents of the merged root file as input

Can also combine information from other sources

DCS – readout voltage settings...

We can also monitor offline quantities that are not being monitored by the online DQM

***Calibrations
Event vertex
Algorithm***

The quality flags that are saved in DBS are calculated from intermediate values

We do not store the intermediate values...

Intermediate Values can be defined by

Comparison to a reference histogram

JetMET_Jet_XXX_Pt_YYY_Val

Mean and Sigma of current distribution

JetMET_MET_XXX_Mex_Val

Intermediate values are combined to make the final decision

Look at the Low and High p_T triggers

```

if ( ( JetMET_Jet_XXX_Pt_Low_Val > 950 )           &&
      ( JetMET_Jet_XXX_Pt_High_Val > 950 )         &&
      ( JetMET_Jet_XXX_Eta_Low_Val > 950 )         &&
      ( JetMET_Jet_XXX_Eta_High_Val > 950 )        &&
      ( JetMET_Jet_XXX_Phi_Low_Val > 950 )         &&
      ( JetMET_Jet_XXX_Phi_High_Val > 950 )        &&
      ( JetMET_Jet_XXX_Constituents_Low_Val > 950 ) &&
      ( JetMET_Jet_XXX_Constituents_High_Val > 950 ) &&
      ( JetMET_Jet_XXX_HOverE_Low_Val > 950 )      &&
      ( JetMET_Jet_XXX_HOverE_High_Val > 950 ) )

```

JetMET_Jet_XXX = 1

Layer 1

JetMET_Global

Layer 2

JetMET_Jet

JetMET_MET

Layer 3

JetMET_Jet_Barrel

JetMET_Jet_EndCap

JetMET_Jet_Forward

JetMET_Jet_J20

JetMET_Jet_J110

JetMET_MET_Barrel

JetMET_MET_EndCap

JetMET_MET_Forward

JetMET_MET_HO

**The results of Data Certification (Quality Flags)
are saved in the Data Base**

Quality Flags calculated from intermediate values



Determining the Quality



Each variable needs to be well defined...

JetMET_Jet

```
if ( (JetMET_Jet_Barrel == 1) &&  
      (JetMET_Jet_EndCap == 1) &&  
      (JetMET_Jet_Forward == 1) ) JetMET_Jet = 1
```

JetMET_Jet_XXX

Quality flag for jets in the XXX (Barrel, EndCap, Forward) region

```
if ( (JetMET_Jet_XXX_Pt_Val > 950 ) &&  
      (JetMET_Jet_XXX_Eta_Val > 950 )  
      (JetMET_Jet_XXX_Phi_Val > 950 )  
      (JetMET_Jet_XXX_Constituents_Val > 950 )  
      (JetMET_Jet_XXX_HOverE_Val > 950 ) ) JetMET_Jet_Barrel = 1
```

JetMET_Jet_XXX_Pt_Val

Result of KS test between current data and reference distributions for the Barrel, EndCap, and Forward region.

JetMET_Jet_XXX_Eta_Val

Result of KS test between current data and reference distributions for the Barrel, EndCap, and Forward region.

JetMET_Jet_XXX_Phi_Val

Result of KS test between current data and reference distributions for the Barrel, EndCap, and Forward region.

JetMET_Jet_XXX_Constituents_Val

Result of KS test between current data and reference distributions for the Barrel, EndCap, and Forward region.

JetMET_Jet_XXX_HOverE_Val

Result of KS test between current data and reference distributions for the Barrel, EndCap, and Forward region.

JetMET_Jet_J20

Monitor the performance of the J20 trigger path. Result of KS test between current data and reference distributions.

```
if ( (JetMET_Jet_J20_Pt_Val > 950 ) &&  
      (JetMET_Jet_J20_Eta_Val > 950 ) ) JetMET_Jet_J20 = 1
```



Quality Monitoring Tools



Some tools already exist to compare histograms to a reference set

See discussion in HyperNews

Should try this out to see if it can suit our needs

Output of Data Certification is written to the DC File
Python script reads file and writes results to DBS

File format:

Run	LumiSection	TagName	TagValue
1	0	JetMET_Global	1
1	0	JetMET_Jet	1
1	0	JetMET_Jet_Barrel	1

- *One line per variable*
- *Default starting conditions (LumiSection=0) are written out so we can establish the initial conditions*
- *Variables that change from the initial conditions are included only when there is a change in the condition*



Phases



Phase 1: Commissioning

Semi-Automated reporting
Looser quality requirements
Good/Bad for entire run
Can run off of the merged root file

Phase 2: Stable Running

Automated reporting
Tighter quality requirements
Good/Bad for Luminosity Sections



Functional description

<http://ncdf76.fnal.gov/~chlebana/CMS/DQM/JetMET/>

Hypernews

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DQM Workshop (Sept 4)

Discussion on POG Monitoring

We should present a complete working example...

Run over data from global run and produce a DC File

We need to:

Specify quantities to monitor and trigger path

Specify definition of variables

Update DQM code to provide intermediate vals

Define Data Certification Algorithm

Define scheme to monitor data in Luminosity Section *(or multiple Luminosity Sections)*

Produce Data Certification File