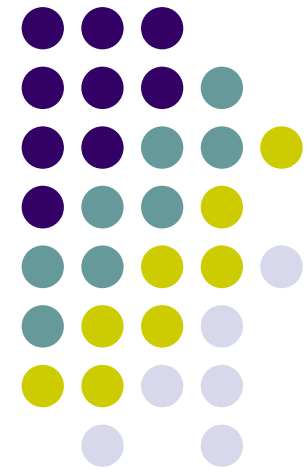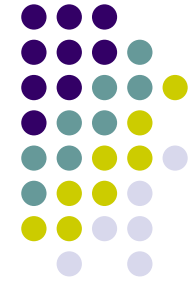# ATLAS Data Quality Monitoring Framework:
DQM Database Editor GUI

Ben Safdi

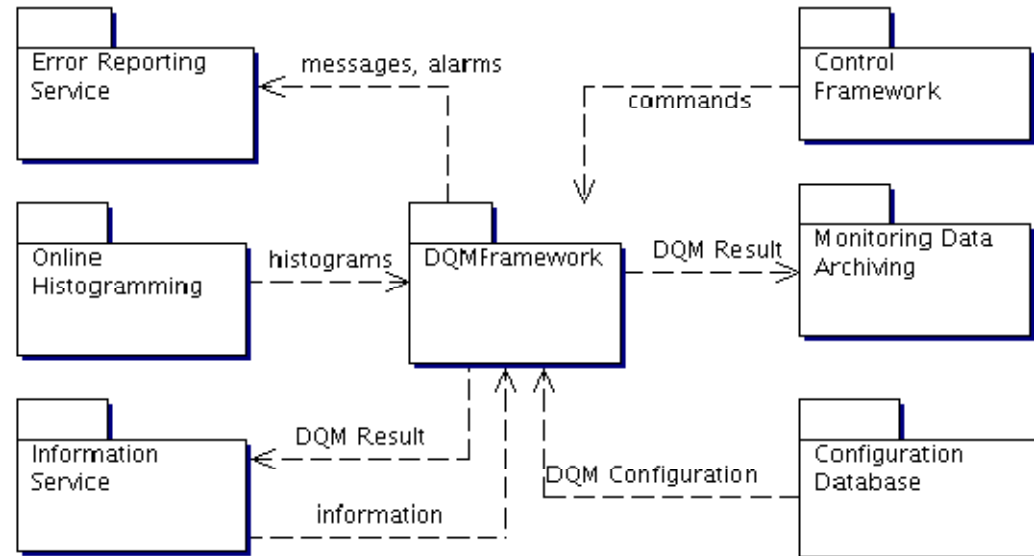The University of Colorado at Boulder

Supervisor: Dr. S. Kolos

Data Quality Monitoring Framework (DQMF)

- Online framework for performing data quality assessment.

- Analyses monitoring data through user defined algorithms during run.

- Relays a summary of the results to shift personnel and stores to conditions database.

DQMFramework: Structure

- Main Idea:
  - Read in histograms and values.
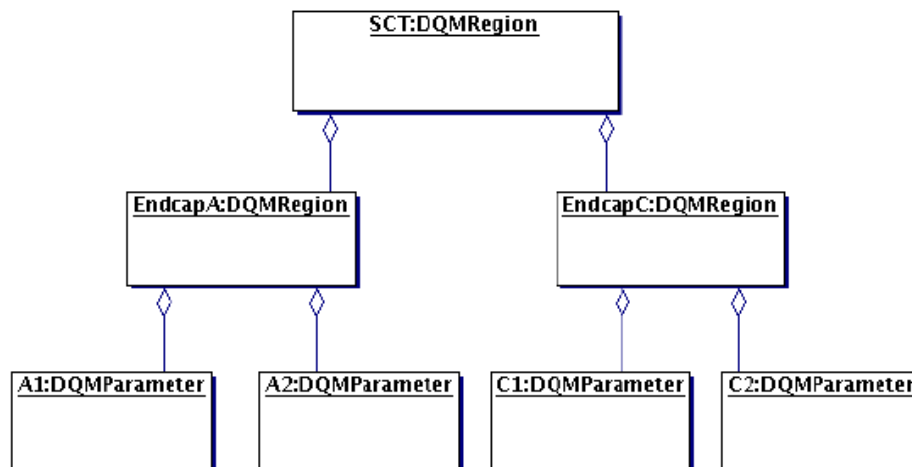 - Run algorithms.
  - Publish results.

DQMFramework: Algorithms and Results

- What are the algorithms? … examples
  - If input is a number:
    - Is the number above / below threshold?
  - If input is a histogram:
    - Do all bins have at least one entry?
      - No reference.
    - No more than n empty bins in bin range.
      - Reference: maximum number of empty bins.
      - Parameters: bin range.
- What Is the Output?
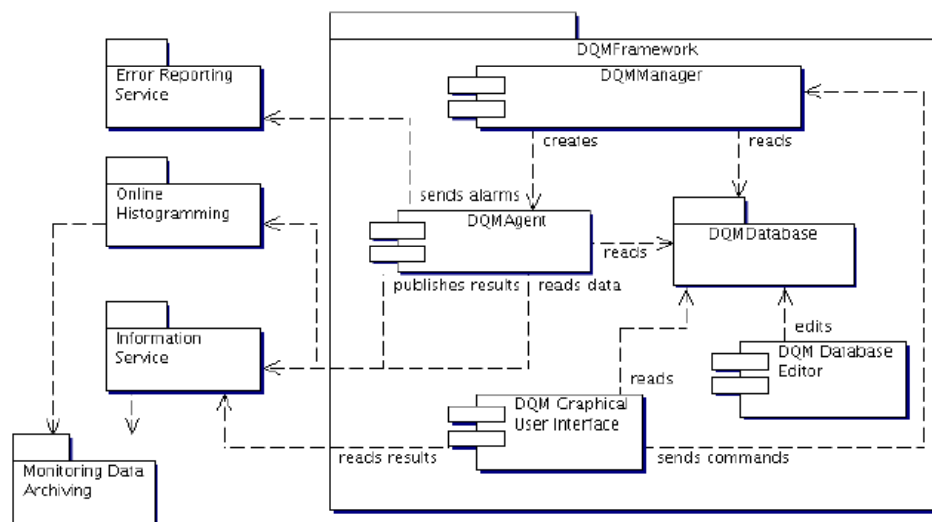 - OK: green
  - Warning: yellow
  - Alarm: red

DQMF Database Hierarchy

- DQM regions contain hierarchy.
- DQM parameters associated with single algorithms.
  - Parameters specify **input source**, **references**, **thresholds**, **algorithm parameters** …

DQM Database Editor GUI

- I constructed the DQM database editor graphical user interface.
  - Purpose: Create DQM parameters and regions.
    - Choose Algorithm.
    - Specify configuration parameters.
    - Edit thresholds and algorithm values.

DQM Database Editor GUI: Startup and Passive Elements

- Reads in DQM hierarchy from database.
  - Displays in JTree.
- Runs Consistency check.
  - Checks database for…
    - Regions/Parameters with wrong threshold names.
    - Regions/Parameters without input data sources.
    - Region/Parameters without actions.
- For a selected parameter or region…
  - Displays configuration parameters, threshold values, and algorithm values in a table.

DQM Database Editor GUI: Startup and Passive Elements

- **Configuration Parameters**
  - Algorithm (dqm_config.dal.DQAlgorithm)
  - Weight (Double)
  - Input data source (String)
  - References (String[])
  - Name (String)
  - Action(String)
- **Threshold Parameters**
  - Red and Green Threshold names (String)
  - Red and Green Threshold Values (Double)
- **Algorithm Parameters**
  - Value Name (String)
  - Values (Double[])

DQM Database Editor GUI: Startup and Passive Elements

DQM Database Editor GUI: Edit

- All fields except for algorithm are directly editable on the screen.

- File->Save saves all changes to the database.

Configuration parameters

Name	Value
weight	0.3
algorithm	Simple_gaus_Fit
input source	Histogramming.dummy.h1
references	/home/alina/larmon_cosmics.8037.hist.root:CaloClusterVecMon/ROI/ROIDistRegion0
Action	

Threshold Parameters

Red Names	Red Values	Green Na...	Green Valu...
Constant	0.0	Constant	0.0
Sigma	0.0	Sigma	0.0
Mean	0.0	Mean	0.0

Algorithm Parameters

Name	Value

DQM Database Editor GUI: Edit

- Edit menu allows for more advanced options.

  - Change Algorithm.

  - Delete selected region or parameter.

  - Add new threshold parameter.

  - Add algorithm parameter.

  - Delete threshold/algorithm parameter.

  - Reset to default algorithm and threshold parameters.

DQM Database Editor GUI: Edit

DQM Database Editor GUI: Edit

- ## Change Algorithm

  - Loads a list of available algorithms from database.
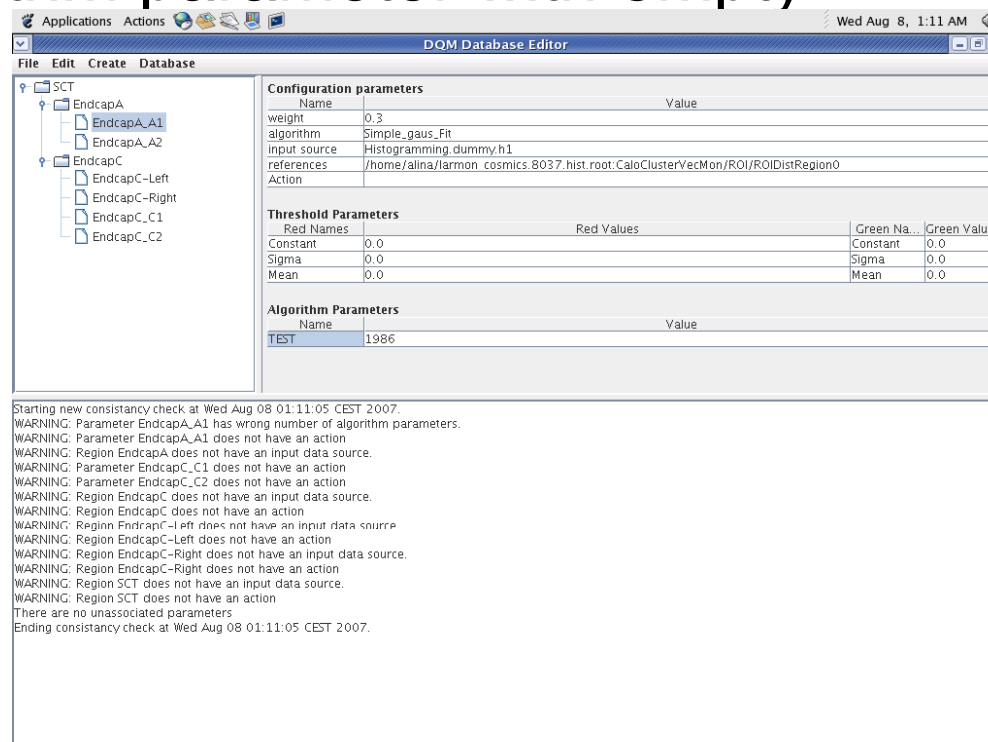 - After selection automatically updates threshold and algorithm parameters.
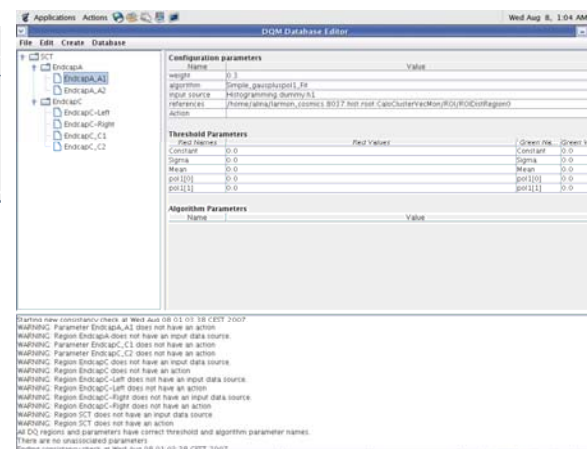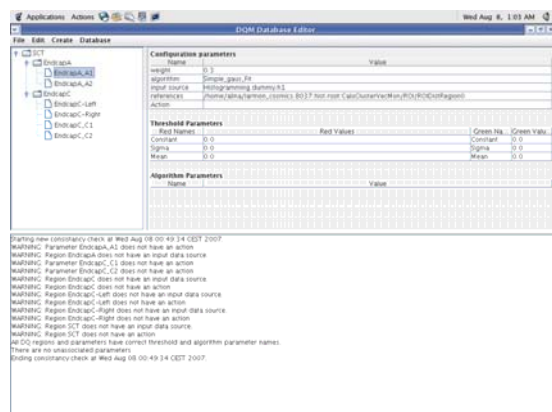
DQM Database Editor GUI: Edit

- ## Add Algorithm Parameter:
  - ### Creates new algorithm parameter with empty name and value.
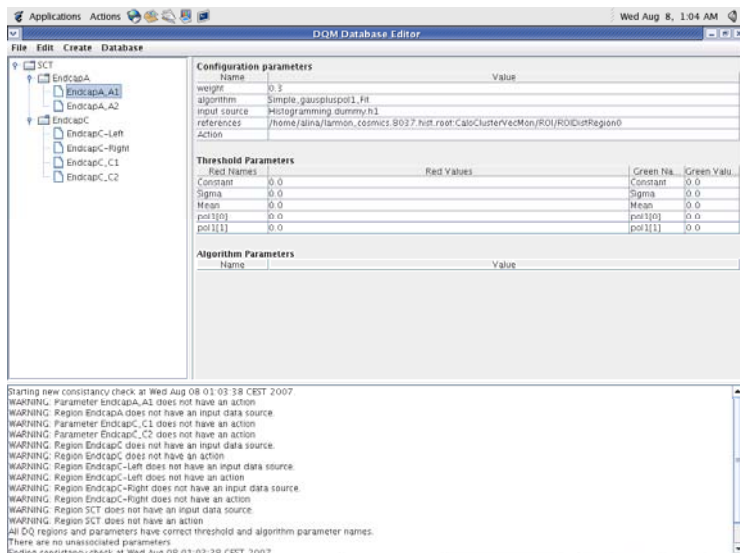
Safdi

DQM Database Editor GUI: Consistency Checker

- Now, running Database->consistency checker will tell us that EndcapA_A1 has the wrong number of algorithm parameters.

```
Starting new consistency check at Wed Aug 08 01:16:02 CEST 2007.
WARNING: Parameter EndcapA_A1 has wrong number of algorithm parameters.
WARNING: Parameter EndcapA_A1 does not have an action
WARNING: Region EndcapA does not have an input data source.
WARNING: Parameter EndcapC_C1 does not have an action
```

- Consistency checker also looks for wrong threshold / algorithm parameter names.

DQM Database Editor GUI: Create

- Editor can create both regions and parameters.

  - Must specify algorithm and configuration parameters.

- Editor can create multiple parameters at the same time.

  - For this feature threshold and algorithm parameter values can also be specified ahead of time.

DQM Database Editor GUI: Create

- Make a new Region.

DQM Database Editor GUI: Create

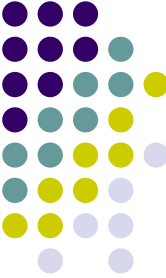- New region Create_Demonstration and new parameter Create_Parameter are now displayed.
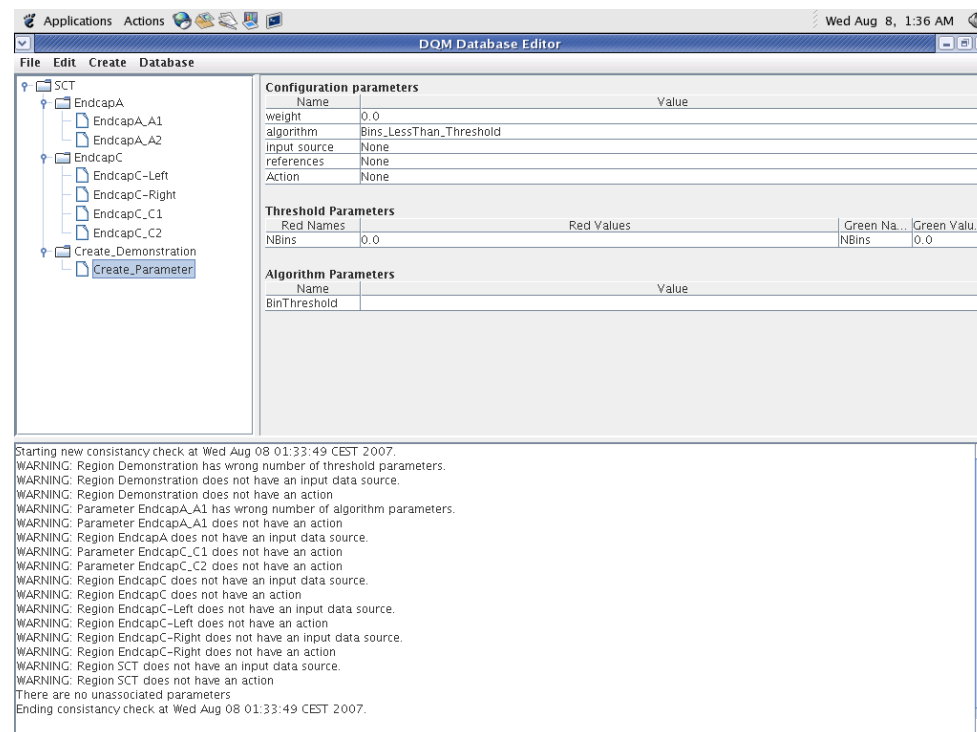
DQM Database Editor GUI: Create

- Create Multiple Parameters:
  - Allows for the creation of multiple parameters with same features except for slightly different names and input data sources.
    - First Algorithm must be chosen from list.
    - Beginning and ending strings for data sources and names must be specified.
    - Total number of parameters and beginning index must be specified.
    - Then, names and data sources are created in the form "beginng_String" + Index + "ending_String"
    - Optionally, thresholds can be specified before creation.

DQM Database Editor GUI: Create

DQM Database Editor GUI: Create

DQMF Review

- DQMF runs **algorithms** on online data to ensure the quality of the detectors and the run.

- Algorithms produce results in the form: green = OK, Yellow = warning, Red = danger.

- DQ **Regions** and **Parameters** are a way of organizing the algorithms, their data sources, and their settings.

  - Regions contain Parameters.

DQM Database Editor GUI: Review

- The editor allows for viewing, editing, and creating DQ regions and parameters.
  - Displays configuration parameters (such as input data source), thresholds (when red, yellow, or green), and algorithm parameters (other necessary values).
- All quantities and settings can be changed.
- New regions and parameters can be created.
- Multiple parameters of similar form can be created at the same time.

DQM Database Editor GUI: Critique

- ## Successes
  - My editor fulfills all of the necessary requirements for a database editor.
  - It catches all exceptions and is user friendly.

- ## Missing attributes
  - Moving parameters and regions around within the database hierarchy is tedious.
    - Were there more time, I would have liked to implement such a method.

DQM Database Editor GUI: Programming

- All Programming done in Java.

My Project: Lessons learned

- I gained insight into…
  - The methods for monitoring data from large detectors.
  - The ways in which massive quantities of information are organized in databases.
  - The methods for editing and reading information to and from the DAL (DQMF) database.
- Programming Knowledge:
  - I learned JAVA.
  - I learned how to creates GUI's.

My Travels…

- Corsica (before CERN for 12 days)
- England (before CERN for 5 days)
- Chamonix (1st weekend)
- Interlaken (2nd weekend)
- Bern (3rd weekend)
- Romanch Switzerland (4th weekend)
- Paris (5th weekend)
- Hospital / Montreux (6th weekend)
- Sardegna (and briefly hospital) (7th weekend)

Thank You

- Thanks to Dr. Kolos, the NSF, Prof Jean Krisch, Prof Homer Neal, Dr. Steven Goldfarb, University of Michigan, and CERN.