Data Quality Monitoring for High Energy Physics (DQM4HEP) Version 03-02-00

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1. Overview and packaging
2. Architecture
3. User interfaces overview
4. Conclusion and plans

Overview and packaging

DQM4HEP : an online monitoring system for data quality

Key points

- Event distributed system : server/client paradigm
- Set of interfaces for data analysis, adapted to DQM purpose
- Histogram distributed system
- Visualization interface (Qt GUI)
- Large scale process management
- IO support for any data type (opt. LCIO)
- Full size detector (ILD) to single prototype (CALICE) design
- ELog interface

Set of interfaces inspired from CMS DQM system (monitor elements, collectors).

Application flow inspired from ALICE DQM system, AMORE (cycles).

Overview and packaging

DQM4HEP packages

One location : `https://github.com/DQM4HEP`

The main package : DQM4HEP

Installation package for sub-packages (CMake).

Sub-packages :

- **dim** : Distributed Information Management (Delphi). Manage client/server communications
- **dimjc** : DIM Job Control (L. Mirabito). Remote process management using dim.
- **jsoncpp** : Json I/O for dimjc
- **streamlog** : logging library (used in ILCSOFT)
- **DQMCore** : Core part of the DQM system. Client/server interfaces, analysis, IO, run control interface, plugin management ...
- **DQMViz** : Qt visualization interfaces. Job control gui client, monitoring gui client, run control server gui (standalone).
- **LCIO** : Linear Collider IO. Build support for LCIO streamer

Overview and packaging

Installation

Installation mode

Designed to be built **standalone** or using **ILCSOFT**.
Basic install requires ROOT.
Full install with DQMViz requires Qt and ROOT **compiled with *–enable-qt* option**.

Standalone mode :

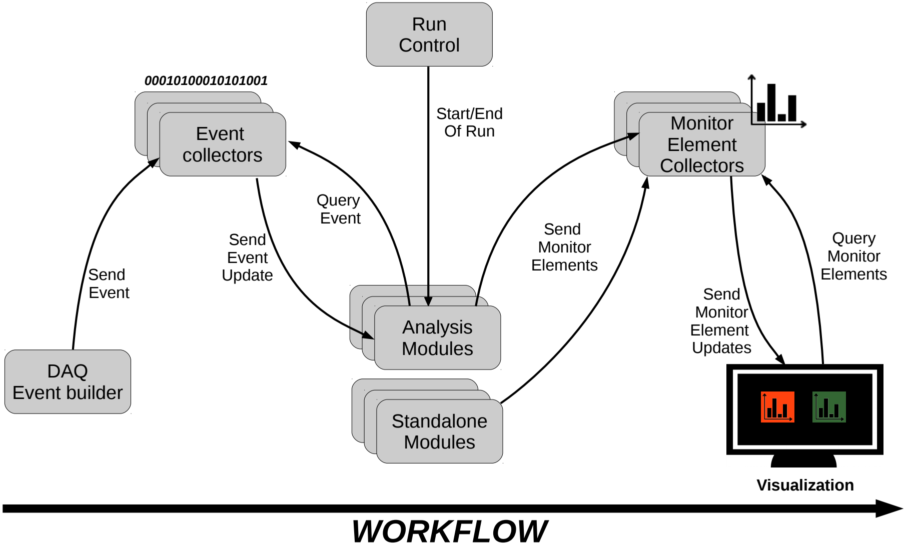
- Basic install : dim, dimjc, jsoncpp, streamlog, DQMCore
- Full install : + DQMViz, LCIO

ILCSOFT mode :

- Basic install : dim, dimjc, jsoncpp, DQMCore
- Full install : + DQMViz

Architecture

Global workflow



Architecture

Event collectors, client/server

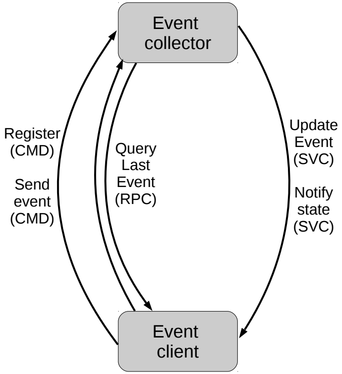
Event collector (`DQMEventCollector`) and
Event client (`DQMEventClient`)
linked via DIM (TCP/IP).

Receiver interface with 2 modes :

- on update
- on query

Sender interface with one unique command to send an event to the collector server

Use `dqm4hep_start_event_collector` to start a collector server.



Architecture

Module applications - analysis module

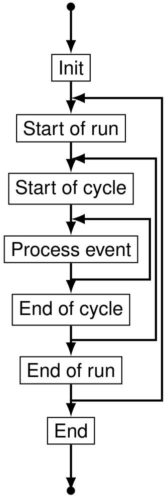
Purpose

- Receive events from a collector server and process them
- Produce monitor elements (histograms, scalars, generic TObject)
- Follow the run control signals (SOR, EOR)

- **Init** : Initialize the application : load dlls, declare services, etc ... Wait for a SOR
- **Start of run** : start cycles loop, open archive
- **Start of cycle** : start a cycle of '*process event*'
- **Process event** : Process incoming event, fill monitor elements, etc ...
- **End of cycle** : send subscribed monitor elements, update archive (opt).
- **End of run** : Wait for SOR, close archive (opt).
- **End** : Clean and exit module.

To implement online DQM analysis, user must implement the `DQMAnalysisModule` interface. A shared library must be build and loaded in the application using the plugin system (see next slides).

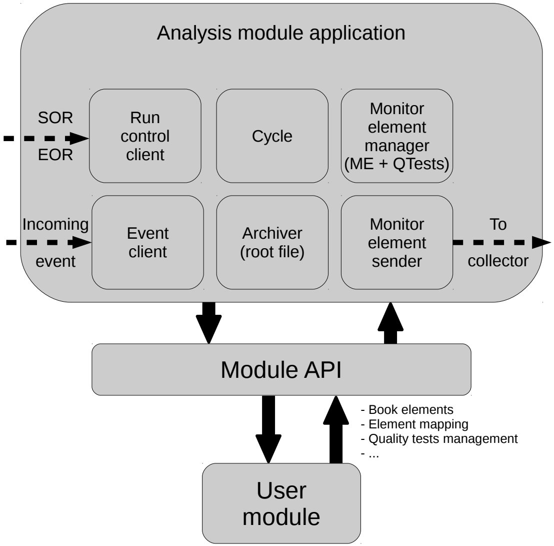
Use `dqm4hep_start_analysis_module` to start an analysis module.



Analysis module application flow

Architecture

Module API



Architecture

Module applications - standalone module

Purpose

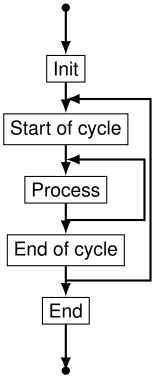
- No event reception
- No run signals
- Produce monitor elements (histograms, scalars, generic TObject)

- **Init** : Load dlls, init the module.
- **Start of cycle** : start a timer cycle of n seconds
- **Process** : call back function.
- **End of cycle** : collect monitor elements and send
- **End** : The application has received a signal to exit and the process ends.

To implement online standalone analysis, user must implement the `DQMStandaloneModule` interface. A shared library must be build and loaded in the application using the plugin system (see next slides).

Designed for *slow control - like* data processing.

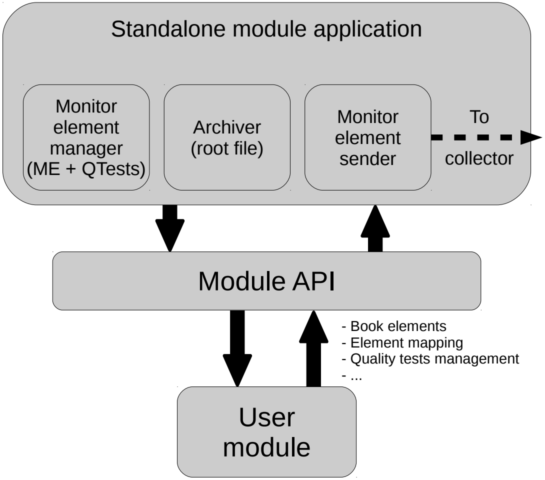
Use `dqm4hep_start_standalone_module` to start a standalone module.



Standalone module application flow

Architecture

Module API



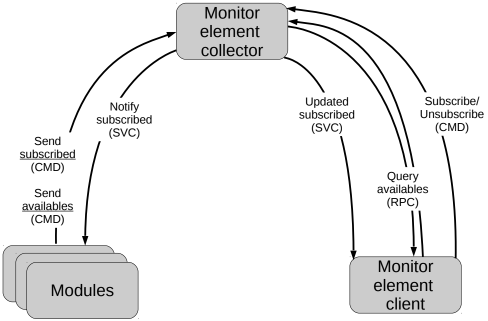
Architecture

Monitor element collector, client/server

Collect monitor elements from different modules.

Publish/subscribe paradigm with client side.

Collector stores the available list of elements (names) from the different modules and the elements that the clients have subscribed.



Client interface works on both update and query modes.

Use `dqm4hep_start_monitor_element_collector` monitor element collector.

User interfaces overview

Plugin system

The core part of the system provides a plugin system, massively used by the framework to handle user classes.

The `DQMPluginManager` singleton class manages the plug-ins provided by the system and the users. Plugins can be loaded at any time by loading shared libraries.

Example :

```
// single library loading
DQMPluginManager::instance()->loadLibrary("libMyClass.so");
// multiple libraries loading
StringVector libraries = { "libMyClass.so" , "libAnotherClass.so" }
DQMPluginManager::instance()->loadLibraries(libraries);
// using DQM4HEP_PLUGIN_DLL env var with ':' separation
// assuming export DQM4HEP_PLUGIN_DLL=./lib/libSuperClass.so:./lib/libDirtyClass.so
DQMPluginManager::instance()->loadLibraries();
```

In principle **any** user class can be plugged in the framework and retrieved inside applications.

User interfaces overview

Plugin system

User Example :

```
// MyClass.h
class MyClass
{
  public:
    MyClass(); // Default constructor mandatory !!
  private:
    int     m_attribute;
};
// MyClass.cc
DQM_PLUGIN_DECL( MyClass , "MyClass" ) // plug the class in the system

MyClass::MyClass() : m_attribute(0) {}
// ...
```

To get an instance of your class, use the plugin manager :

```
// ...
MyClass *pClass = DQMPluginManager::instance()->createPluginClass<MyClass>("MyClass");
// ...
```

For example, this functionality is used internally to get :

- user module implementations
- event streamers
- run control clients

User interfaces overview

Streaming interface

The framework has no dependency on the type of data transferred over the network !

For example, the streamer for LCIO is implemented and provided as a plug-in in the software. The type of data that is transferred over the network can be user defined.
Users have to implements the `DQMEventStreamer` interface :

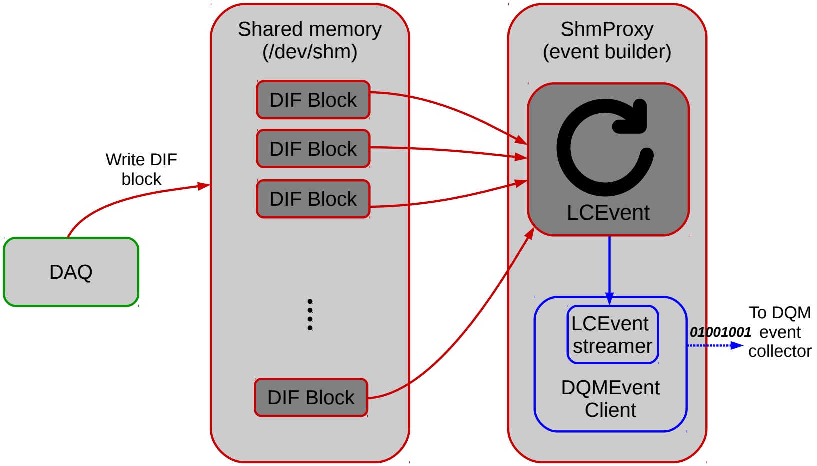
```
class DQMEventStreamer : public DQMStreamer<DQMEvent>
{
public:
  // ...
  virtual StatusCode serialize(const DQMEvent *const pEvent, DQMDataStream *const pDataStream) = 0;
  virtual StatusCode deserialize(DQMEvent *&pEvent, DQMDataStream *const pDataStream) = 0;
  virtual StatusCode serialize(const DQMEvent *const pEvent, const std::string &subEventIdentifier,
        DQMDataStream *const pDataStream) = 0;
};
```

and plug the streamer class using the plugin mechanism. The `DQMDataStream` class provides functions to read and write raw buffers.

For an experiment with a simple event structure, it can be useful to define a raw event streamer and propagate the event through the DQM system without taking care about the network interface.

User interfaces overview

Example : SDHCAL DAQ interface



DAQ

User specific

DQM framework

User interfaces overview
Module API

Data processing performed in **modules** (standalone or analysis).
Modules **book** monitor elements, **fill** them and **publish** them to a single collector.

A monitor element is a wrapper around a ROOT TObject with some additional attributes :
→ Type, name, path (i.e "/Efficiency/Layer2/"), collector name, quality flag, reset policy, title, description, run number, quality test results.

The `DQMModuleApi` class provide a static interface to perform operations within the application :

- Monitor elements management (book, delete, reset, from xml)
- Directory structure management (mkdir, cd, ls, rmdir, pwd)
- Quality test management (register, add, remove, run, from xml)

Quality tests can be run on a particular monitor element to test the quality of the processed data (chi2, Kolmogorov, user defined).

Note that **QTest results are sent to the collector together with the monitor element** !

User interfaces overview

Analysis module - Example

```
// ExampleModule.h
class ExampleModule : public DQMAnalysisModule
{
public:
  ExampleModule();  // requiered by plugin system
  ~ExampleModule();

  StatusCode initModule();
  StatusCode readSettings(const TiXmlHandle &
        xmlHandle);
  StatusCode startOfRun(DQMRun *const pRun);
  StatusCode startOfCycle();
  StatusCode processEvent(DQMEvent *const pEvent);
  StatusCode endOfCycle();
  StatusCode endOfRun(DQMRun *const pRun);
  StatusCode endModule();

private:
  DQMMonitorElement    *m_pNHitElement;
};
```

```
// ExampleModule.cc
#include "ExampleModule.h"
// declare plugin in the system
DQM_PLUGIN_DECL( ExampleModule, "ExampleModule" )
// create and enter dir. Book histogram
StatusCode ExampleModule::initModule()
{
  DQMModuleApi::mkdir(this, "/Histograms");
  DQMModuleApi::cd(this, "/Histograms");
  DQMModuleApi::bookIntHistogram1D(this,
        m_pNHitElement, "NHit",
    "Number␣of␣hits", 1200, 0, 1199);
  return STATUS_CODE_SUCCESS;
}
// get lcio event and fill your histogram !
StatusCode ExampleModule::processEvent(DQMEvent *
      const pEvent)
{
  EVENT::LCEvent *pLCEvent =
    pEvent->getEvent<EVENT::LCEvent>();
  if(!pLCEvent)
    return STATUS_CODE_FAILURE;
  m_pNHitElement->get<TH1I>()->Fill(NHit);
  return STATUS_CODE_SUCCESS;
}
```

User interfaces overview

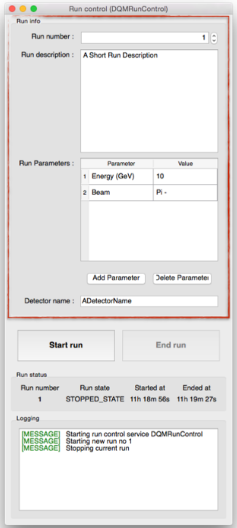
Gui visualisation

Gui interfaces for DQM client developed :

- Run control, job control, online monitoring
- Written with Qt4 framework
- Easily configurable with json and xml.

User interfaces overview

Run Control GUI



	Parameter	Value
1	Energy (GeV)	10
2	Beam	Pi -

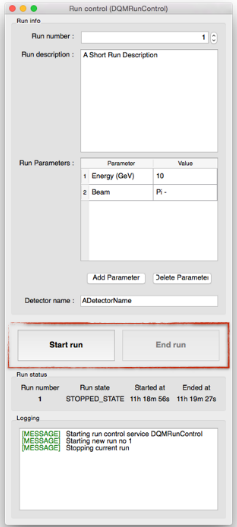
Run number	Run state	Started at	Ended at
1	STOPPED_STATE	11h 18m 56s	11h 19m 27s

```
[MESSAGE] Starting run control service DQMRunControl
[MESSAGE] Starting new run no 1
[MESSAGE] Stopping current run
```

- Parametrisation of run with run number, detector name, run description and parameters

User interfaces overview

Run Control GUI



	Parameter	Value
1	Energy (GeV)	10
2	Beam	Pi -

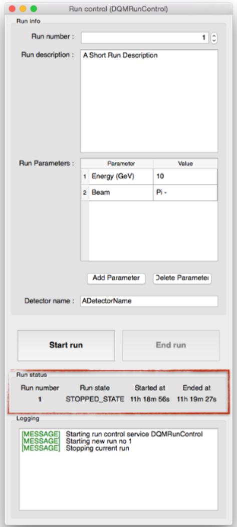
Run number	Run state	Started at	Ended at
1	STOPPED_STATE	11h 18m 56s	11h 19m 27s

```
[MESSAGE] Starting run control service DQMRunControl
[MESSAGE] Starting new run no 1
[MESSAGE] Stopping current run
```

- Parametrisation of run with run number, detector name, run description and parameters
- Send SOR and EOR signals

User interfaces overview

Run Control GUI



Run number: 1

Run description: A Short Run Description

	Parameter	Value
1	Energy (GeV)	10
2	Beam	Pi -

Detector name: ADetectorName

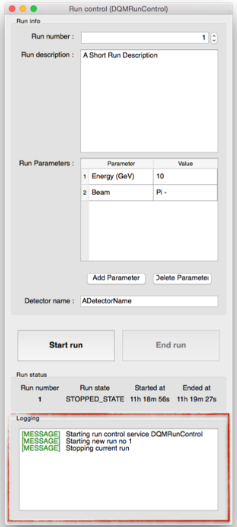
Run number	Run state	Started at	Ended at
1	STOPPED_STATE	11h 18m 56s	11h 19m 27s

```
[MESSAGE]  Starting run control service DQMRunControl
[MESSAGE]  Starting new run no 1
[MESSAGE]  Stopping current run
```

- Parametrisation of run with run number, detector name, run description and parameters
- Send SOR and EOR signals
- Control run status (State, Started/Stopped time)

User interfaces overview

Run Control GUI


Run control (DQMRunControl)

Run info

Run number : 1

Run description : A Short Run Description

Run Parameters :

	Parameter	Value
1	Energy (GeV)	10
2	Beam	Pi -

Detector name : ADetectorName

Run status

Run number	Run state	Started at	Ended at
1	STOPPED_STATE	11h 18m 56s	11h 19m 27s

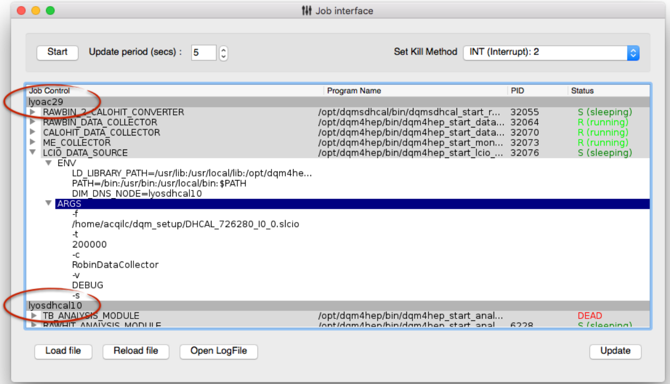
Logging

```
[MESSAGE]  Starting run control service DQMRunControl
[MESSAGE]  Starting new run no 1
[MESSAGE]  Stopping current run
```

- Parametrisation of run with run number, detector name, run description and parameters
- Send SOR and EOR signals
- Control run status (State, Started/Stopped time)
- Every action is logged for easy information overview

User interfaces overview

Job Control GUI

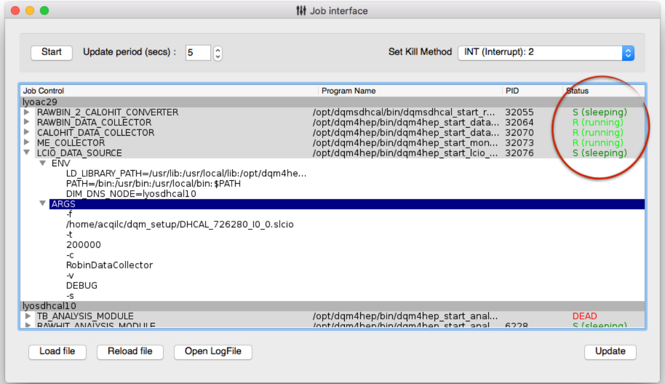


Job Control	Program Name	PID	Status
lyoac29			
RAWBIN_2_CALOHIT_CONVERTER	/opt/dqmsdhcal/bin/dqmsdhcal_start_r...	32055	S (sleeping)
RAWBIN_DATA_COLLECTOR	/opt/dqm4hep/bin/dqm4hep_start_data...	32064	R (running)
CALOHIT_DATA_COLLECTOR	/opt/dqm4hep/bin/dqm4hep_start_data...	32070	R (running)
ME_COLLECTOR	/opt/dqm4hep/bin/dqm4hep_start_mon...	32073	R (running)
LCIO_DATA_SOURCE	/opt/dqm4hep/bin/dqm4hep_start_lcio_...	32076	S (sleeping)
ENV			
LD_LIBRARY_PATH=/usr/lib:/usr/local/lib:/opt/dqm4he...			
PATH=/bin:/usr/bin:/usr/local/bin:$PATH			
DIM_DNS_NODE=lyosdhcal10			
ARGS			
-f			
/home/acqilc/dqm_setup/DHCAL_726280_I0_0.slcio			
-t			
200000			
-c			
RobinDataCollector			
-v			
DEBUG			
-s			
lyosdhcal10			
TB_ANALYSIS_MODULE	/opt/dqm4hep/bin/dqm4hep_start_anal...		DEAD
RAWHIT_ANALYSIS_MODULE	/opt/dqm4hep/bin/dqm4hep_start_anal...	6228	S (sleeping)

- Load and display a list of applications (Collectors, Modules, etc.) available on different hosts

User interfaces overview

Job Control GUI

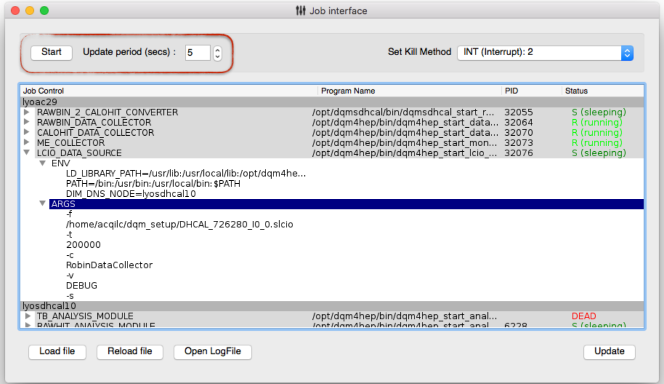


```
Job Control                                 Program Name                              PID     Status
lyoac29
▶ RAWBIN_2_CALOHIT_CONVERTER                /opt/dqmsdhcal/bin/dqmsdhcal_start_r...    32055   S (sleeping)
▶ RAWBIN_DATA_COLLECTOR                     /opt/dqm4hep/bin/dqm4hep_start_data...     32064   R (running)
▶ CALOHIT_DATA_COLLECTOR                    /opt/dqm4hep/bin/dqm4hep_start_data...     32070   R (running)
▶ ME_COLLECTOR                              /opt/dqm4hep/bin/dqm4hep_start_mon...      32073   R (running)
▼ LCIO_DATA_SOURCE                          /opt/dqm4hep/bin/dqm4hep_start_lcio_...    32076   S (sleeping)
    ▼ ENV
        LD_LIBRARY_PATH=/usr/lib:/usr/local/lib:/opt/dqm4he...
        PATH=/bin:/usr/bin:/usr/local/bin:$PATH
        DIM_DNS_NODE=lyosdhcal10
    ▼ ARGS
        -f
        /home/acqilc/dqm_setup/DHCAL_726280_I0_0.slcio
        -t
        200000
        -c
        RobinDataCollector
        -v
        DEBUG
        -s
lyosdhcal10
▶ TB_ANALYSIS_MODULE                        /opt/dqm4hep/bin/dqm4hep_start_anal...             DEAD
▶ RAWHIT_ANALYSIS_MODULE                    /opt/dqm4hep/bin/dqm4hep_start_anal...     6228    S (sleeping)
```

- Load and display a list of applications (Collectors, Modules, etc.) available on different hosts
- Displays informations(Name, Host, PID, Status, etc.) about applications

User interfaces overview

Job Control GUI



Update period (secs) : 5

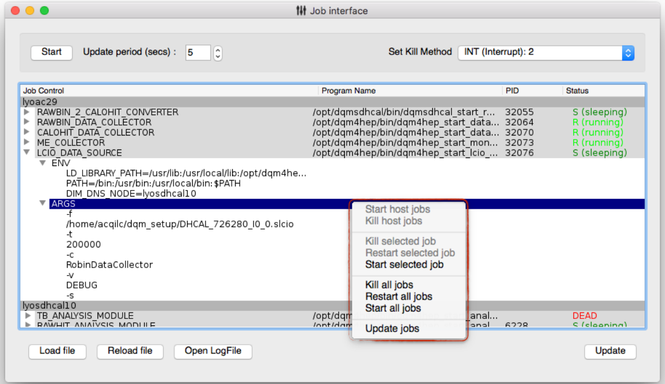
Set Kill Method: INT (Interrupt): 2

```
Job Control                  Program Name                                PID     Status
lyoac29
▶ RAWBIN_2_CALOHIT_CONVERTER  /opt/dqmsdhcal/bin/dqmsdhcal_start_r...    32055   S (sleeping)
▶ RAWBIN_DATA_COLLECTOR       /opt/dqm4hep/bin/dqm4hep_start_data...     32064   R (running)
▶ CALOHIT_DATA_COLLECTOR      /opt/dqm4hep/bin/dqm4hep_start_data...     32070   R (running)
▶ ME_COLLECTOR                /opt/dqm4hep/bin/dqm4hep_start_mon...      32073   R (running)
▼ LCIO_DATA_SOURCE            /opt/dqm4hep/bin/dqm4hep_start_lcio_...    32076   S (sleeping)
  ▼ ENV
      LD_LIBRARY_PATH=/usr/lib:/usr/local/lib:/opt/dqm4he...
      PATH=/bin:/usr/bin:/usr/local/bin:$PATH
      DIM_DNS_NODE=lyosdhcal10
  ▼ ARGS
      -f
      /home/acqilc/dqm_setup/DHCAL_726280_I0_0.slcio
      -t
      200000
      -c
      RobinDataCollector
      -v
      DEBUG
      -s
lyosdhcal10
▶ TB_ANALYSIS_MODULE          /opt/dqm4hep/bin/dqm4hep_start_anal...             DEAD
▶ RAWHIT_ANALYSIS_MODULE      /opt/dqm4hep/bin/dqm4hep_start_anal...     6228    S (sleeping)
```

- Load and display a list of applications (Collectors, Modules, etc.) available on different hosts
- Displays informations(Name, Host, PID, Status, etc.) about applications
- Infos can be updated in "real time"

User interfaces overview

Job Control GUI



```
Job Control                                   Program Name                             PID     Status
lyoac29
▶ RAWBIN_2_CALOHIT_CONVERTER                 /opt/dqmsdhcal/bin/dqmsdhcal_start_r...   32055   S (sleeping)
▶ RAWBIN_DATA_COLLECTOR                      /opt/dqm4hep/bin/dqm4hep_start_data...   32064   R (running)
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        PATH=/bin:/usr/bin:/usr/local/bin:$PATH
        DIM_DNS_NODE=lyosdhcal10
    ▼ ARGS
        -f
        /home/acqilc/dqm_setup/DHCAL_726280_I0_0.slcio
        -t
        200000
        -c
        RobinDataCollector
        -v
        DEBUG
        -s
lyosdhcal10
▶ TB_ANALYSIS_MODULE                         /opt/dqm                         anal...          DEAD
▶ RAWHIT_ANALYSIS_MODULE                     /opt/dqm                         anal...  6228    S (sleeping)
```
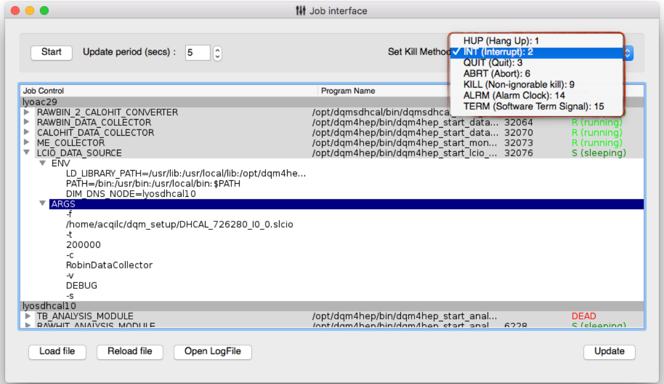

- Load and display a list of applications (Collectors, Modules, etc.) available on different hosts
- Displays informations(Name, Host, PID, Status, etc.) about applications
- Infos can be updated in "real time"
- Manage Applications (Start/Kill/Restart) with contextual menu

User interfaces overview

Job Control GUI



```
Job Control                      Program Name
lyoac29
▶ RAWBIN_2_CALOHIT_CONVERTER     /opt/dqmsdhcal/bin/dqmsdhca
▶ RAWBIN_DATA_COLLECTOR          /opt/dqm4hep/bin/dqm4hep_start_data...  32064  R (running)
▶ CALOHIT_DATA_COLLECTOR         /opt/dqm4hep/bin/dqm4hep_start_data...  32070  R (running)
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  ▼ ENV
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  ▼ ARGS
      -f
      /home/acqilc/dqm_setup/DHCAL_726280_I0_0.slcio
      -t
      200000
      -c
      RobinDataCollector
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      DEBUG
      -s
lyosdhcal10
▶ TB_ANALYSIS_MODULE             /opt/dqm4hep/bin/dqm4hep_start_anal...         DEAD
▶ RAWHIT_ANALYSIS_MODULE         /opt/dqm4hep/bin/dqm4hep_start_anal...  6228   S (sleeping)
```
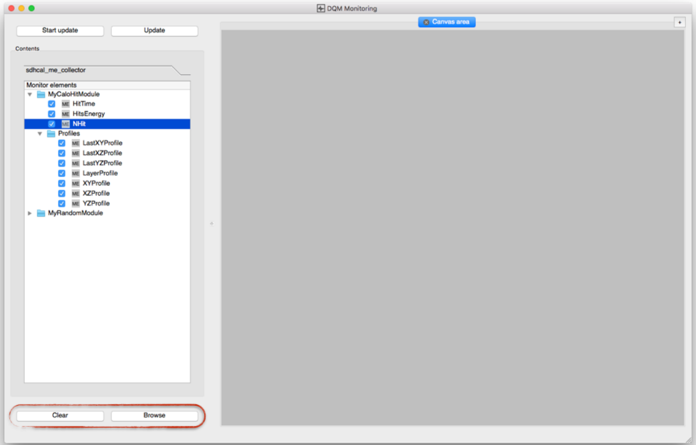

- Load and display a list of applications (Collectors, Modules, etc.) available on different hosts
- Displays informations(Name, Host, PID, Status, etc.) about applications
- Infos can be updated in "real time"
- Manage Applications (Start/Kill/Restart) with contextual menu
- Kill method can be adjusted

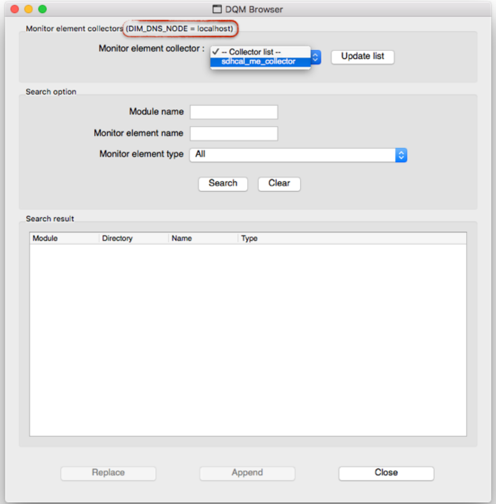
User interfaces overview

Monitoring Gui + Browser



User interfaces overview

Monitoring Gui + Browser


DQM Browser

Monitor element collectors (DIM_DNS_NODE = localhost)

Monitor element collector : ✓ -- Collector list -- / sdhcal_me_collector

Search option

Module name

Monitor element name

Monitor element type: All

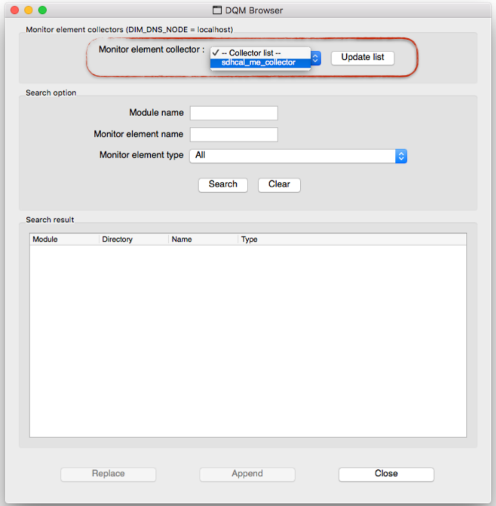
Search result

Module	Directory	Name	Type

- Browser to build histograms selections to display

User interfaces overview

Monitoring Gui + Browser


DQM Browser

Monitor element collectors (DIM_DNS_NODE = localhost)

Monitor element collector : ✓ -- Collector list -- / sdhcal_me_collector

Search option

Module name:

Monitor element name:

Monitor element type: All

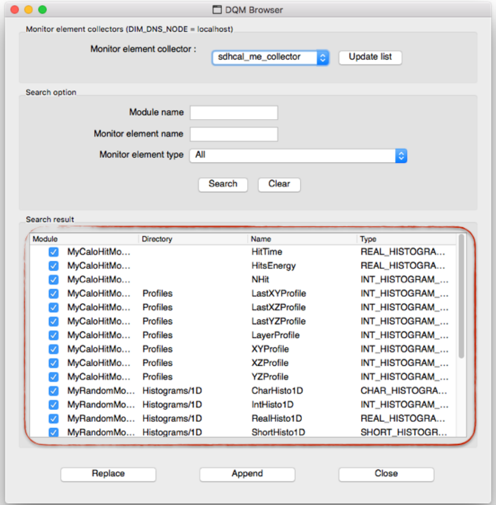
Search result

Module	Directory	Name	Type

- Browser to build histograms selections to display

User interfaces overview

Monitoring Gui + Browser



DQM Browser

Monitor element collectors (DIM_DNS_NODE = localhost)

Monitor element collector : sdhcal_me_collector

Update list

Search option

Module name

Monitor element name

Monitor element type: All

Search Clear

Search result

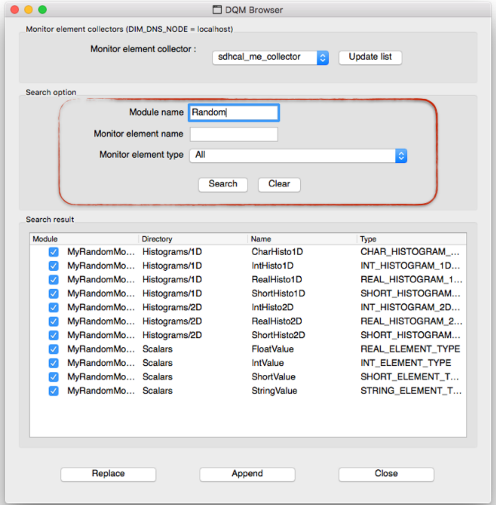
	Module	Directory	Name	Type
✓	MyCaloHitMo...		HitTime	REAL_HISTOGRA...
✓	MyCaloHitMo...		HitsEnergy	REAL_HISTOGRA...
✓	MyCaloHitMo...		NHit	INT_HISTOGRAM_...
✓	MyCaloHitMo...	Profiles	LastXYProfile	INT_HISTOGRAM_...
✓	MyCaloHitMo...	Profiles	LastXZProfile	INT_HISTOGRAM_...
✓	MyCaloHitMo...	Profiles	LastYZProfile	INT_HISTOGRAM_...
✓	MyCaloHitMo...	Profiles	LayerProfile	INT_HISTOGRAM_...
✓	MyCaloHitMo...	Profiles	XYProfile	INT_HISTOGRAM_...
✓	MyCaloHitMo...	Profiles	XZProfile	INT_HISTOGRAM_...
✓	MyCaloHitMo...	Profiles	YZProfile	INT_HISTOGRAM_...
✓	MyRandomMo...	Histograms/1D	CharHisto1D	CHAR_HISTOGRA...
✓	MyRandomMo...	Histograms/1D	IntHisto1D	INT_HISTOGRAM_...
✓	MyRandomMo...	Histograms/1D	RealHisto1D	REAL_HISTOGRA...
✓	MyRandomMo...	Histograms/1D	ShortHisto1D	SHORT_HISTOGR...

Replace Append Close

- Browser to build histograms selections to display

User interfaces overview

Monitoring Gui + Browser



Monitor element collectors (DIM_DNS_NODE = localhost)

Monitor element collector : sdhcal_me_collector

Search option

Module name: Random

Monitor element name:

Monitor element type: All

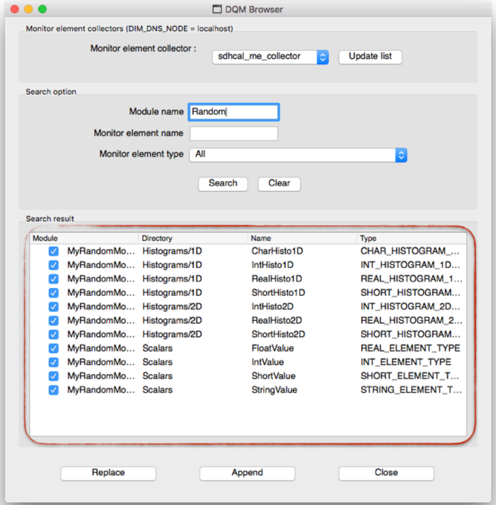
Search result

	Module	Directory	Name	Type
✓	MyRandomMo...	Histograms/1D	CharHisto1D	CHAR_HISTOGRAM_...
✓	MyRandomMo...	Histograms/1D	IntHisto1D	INT_HISTOGRAM_1D...
✓	MyRandomMo...	Histograms/1D	RealHisto1D	REAL_HISTOGRAM_1...
✓	MyRandomMo...	Histograms/1D	ShortHisto1D	SHORT_HISTOGRAM...
✓	MyRandomMo...	Histograms/2D	IntHisto2D	INT_HISTOGRAM_2D...
✓	MyRandomMo...	Histograms/2D	RealHisto2D	REAL_HISTOGRAM_2...
✓	MyRandomMo...	Histograms/2D	ShortHisto2D	SHORT_HISTOGRAM...
✓	MyRandomMo...	Scalars	FloatValue	REAL_ELEMENT_TYPE
✓	MyRandomMo...	Scalars	IntValue	INT_ELEMENT_TYPE
✓	MyRandomMo...	Scalars	ShortValue	SHORT_ELEMENT_T...
✓	MyRandomMo...	Scalars	StringValue	STRING_ELEMENT_T...

- Browser to build histograms selections to display
- Search Function to refine selection

User interfaces overview

Monitoring Gui + Browser



Monitor element collectors (DIM_DNS_NODE = localhost)

Monitor element collector : sdhcal_me_collector

Search option

Module name: Random

Monitor element name:

Monitor element type: All

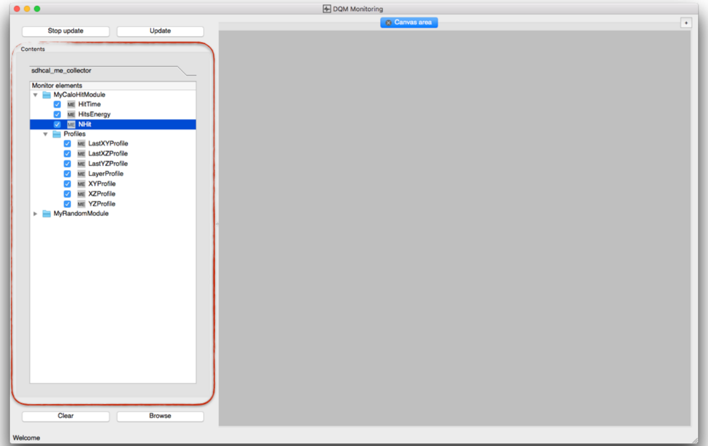
Search result

Module	Directory	Name	Type
✓ MyRandomMo...	Histograms/1D	CharHisto1D	CHAR_HISTOGRAM_...
✓ MyRandomMo...	Histograms/1D	IntHisto1D	INT_HISTOGRAM_1D...
✓ MyRandomMo...	Histograms/1D	RealHisto1D	REAL_HISTOGRAM_1...
✓ MyRandomMo...	Histograms/1D	ShortHisto1D	SHORT_HISTOGRAM...
✓ MyRandomMo...	Histograms/2D	IntHisto2D	INT_HISTOGRAM_2D...
✓ MyRandomMo...	Histograms/2D	RealHisto2D	REAL_HISTOGRAM_2...
✓ MyRandomMo...	Histograms/2D	ShortHisto2D	SHORT_HISTOGRAM...
✓ MyRandomMo...	Scalars	FloatValue	REAL_ELEMENT_TYPE
✓ MyRandomMo...	Scalars	IntValue	INT_ELEMENT_TYPE
✓ MyRandomMo...	Scalars	ShortValue	SHORT_ELEMENT_T...
✓ MyRandomMo...	Scalars	StringValue	STRING_ELEMENT_T...

- Browser to build histograms selections to display
- Search Function to refine selection

User interfaces overview

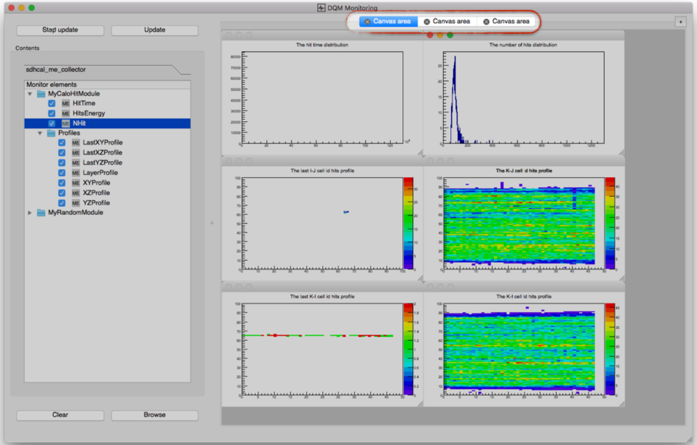
Monitoring Gui + Browser



- List of histograms added from Browser

User interfaces overview

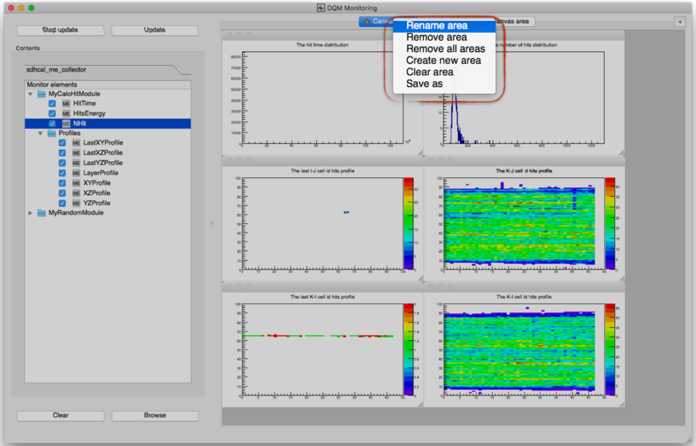
Monitoring Gui + Browser



- Multiple canvas area available

User interfaces overview

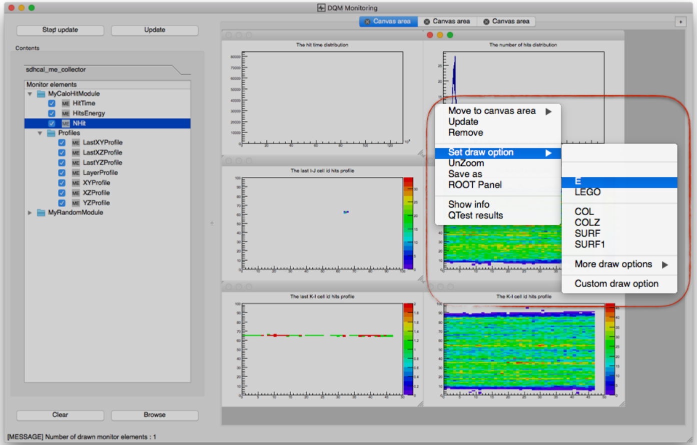
Monitoring Gui + Browser



- Multiple canvas area available

User interfaces overview

Monitoring Gui + Browser

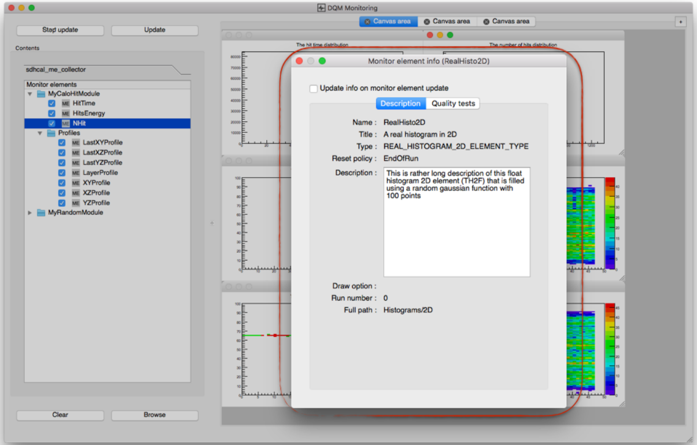


[MESSAGE] Number of drawn monitor elements : 1

- Multiple canvas area available
- Real ROOT histograms (Can be fitted, zoomed, etc.)

User interfaces overview

Monitoring Gui + Browser



sdhcal_me_collector

Monitor elements
- MyCaloHitModule
  - ME HitTime
  - ME HitsEnergy
  - ME NHit
  - Profiles
    - ME LastXYProfile
    - ME LastXZProfile
    - ME LastYZProfile
    - ME LayerProfile
    - ME XYProfile
    - ME XZProfile
    - ME YZProfile
- MyRandomModule

Monitor element info (RealHisto2D)

☐ Update info on monitor element update

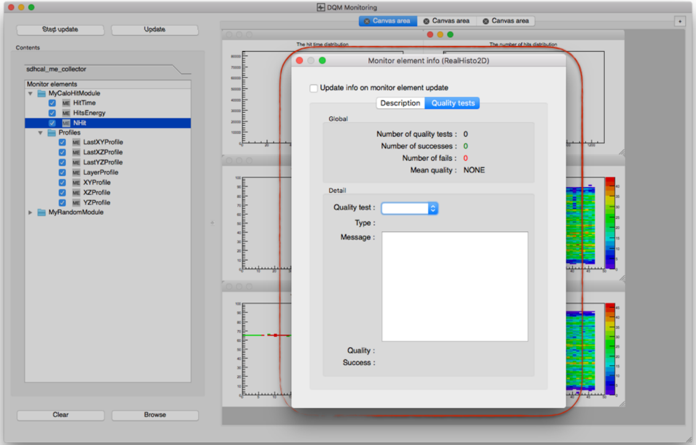
Description | Quality tests

Name :	RealHisto2D
Title :	A real histogram in 2D
Type :	REAL_HISTOGRAM_2D_ELEMENT_TYPE
Reset policy :	EndOfRun
Description :	This is rather long description of this float histogram 2D element (TH2F) that is filled using a random gaussian function with 100 points
Draw option :	
Run number :	0
Full path :	Histograms/2D

- Multiple canvas area available
- Real ROOT histograms (Can be fitted, zoomed, etc.)
- Histograms descriptions and Quality

User interfaces overview

Monitoring Gui + Browser



Monitor element info (RealHisto2D)

Update info on monitor element update

Description | Quality tests

Global

Number of quality tests : 0
Number of successes : 0
Number of fails : 0
Mean quality : NONE

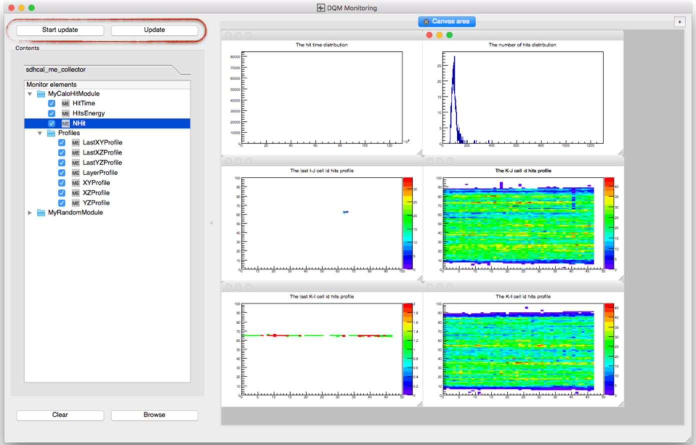
Detail

Quality test :
Type :
Message :
Quality :
Success :

- Multiple canvas area available
- Real ROOT histograms (Can be fitted, zoomed, etc.)
- Histograms descriptions and Quality

User interfaces overview

Monitoring Gui + Browser



- Multiple canvas area available
- Real ROOT histograms (Can be fitted, zoomed, etc.)
- Auto Update

Conclusion and plans

Conclusions and plans

Conclusion and plans

- Network decouples/links different part of the system.
- Plugins (modules, data streaming) to configure and run the system
- Tools for data feed in the system from the DAQ (event client interface)
- GUIs to control/monitor the system
- Tests are OK but performance tests : timing, statistics, compression (network, streaming)
- ILCSOFT release ?

Plans for SDHCAL

- Full implementation of SDHCAL DQM :
  - Gas system, HV, LV, T/P
  - Global detector (efficiency, multiplicity, nHit 1-2-3, rate)
  - Particle ID (counting, selection)
  - Particle specific modules (pion, electron, muons)
  - Particle flow (performance)
- Combined ECAL test-beam : combined DQM ?