

Software week

Hlt monitoring

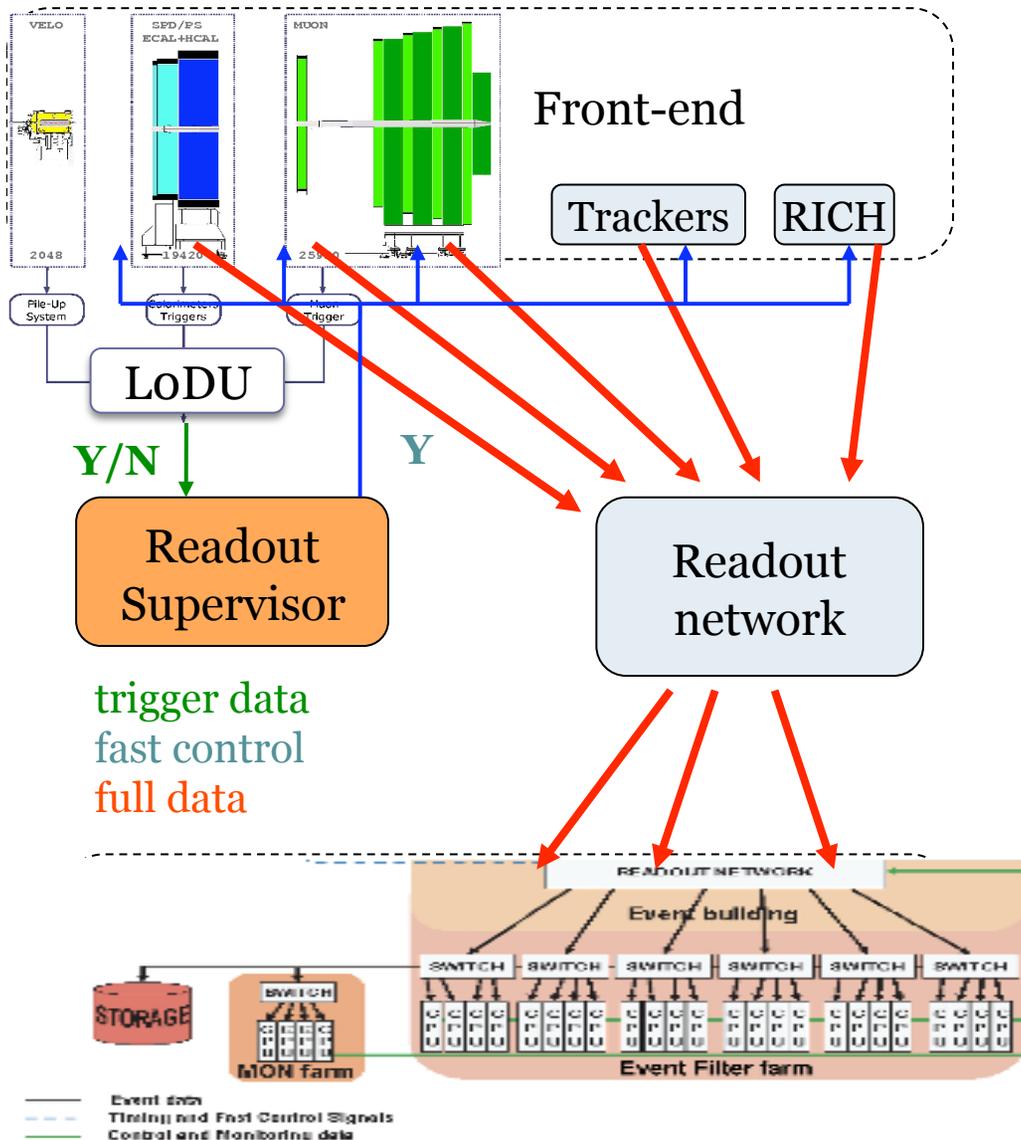
Kim Vervink
on behalf of Leandro De Paula,
Jose A. Hernando and Frederic Teubert

17th of June 2009

Outlook

- Introduction: dataflow
- Hlt monitoring for the shifter
 - EFF
 - PVSS
- Hlt monitoring for the expert
 - EFF
 - Monitoring Farm
- Disaster plan
- TCK presenter
- Summary

Data flow: from collision to tape



LoDU:

- collects the information from pile-up, calo and muon detector & makes 1 decision
- passes it on to the Readout Supervisor

Readout supervisor:

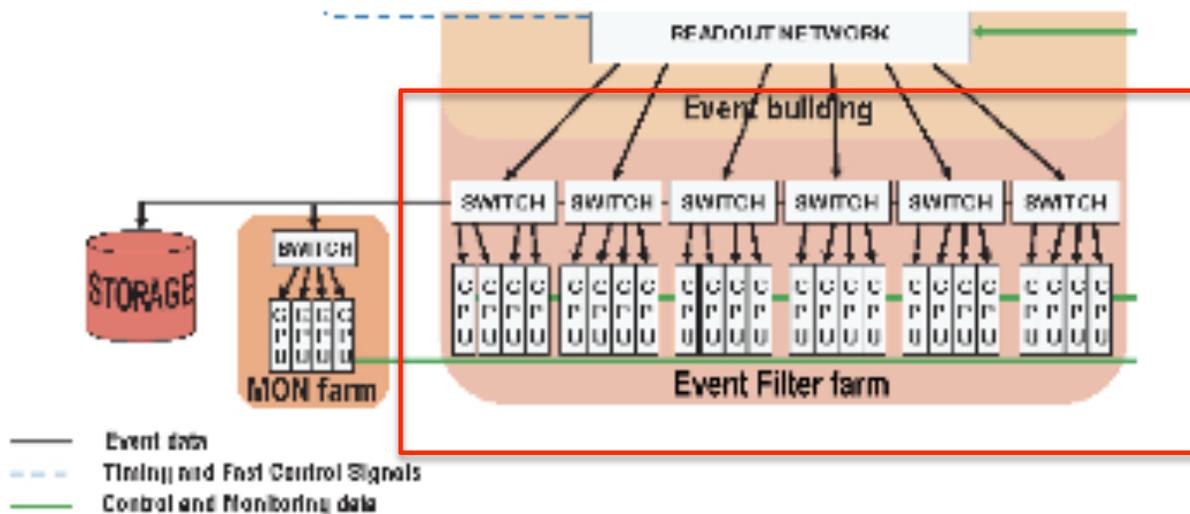
- interface between LO-trigger system and readout chain.
- Demands total readout of the detector upon YES decision from Lo
- Controls the data flow from the Front-end electronics to the Event Filter Farm (ex. which CPU processes which event)
- Appends to the event data a time stamp and source of the trigger Lo

Also called **ODIN**:

(pronounced /*ˈɒdɪn*/ from Old Norse *Óðinn*), is considered the chief god in Norse paganism



Data flow: from collision to tape - EFF



Event Filter Farm

Computing farm where the HLT runs.

- receives the LO accepted data
- filters it and writes the accepted event to storage

-8 cores/node

-20-40 nodes/subfarm

-50 subfarms

→ added together by HLTAoxox_Adder_1 → HltAox

→ added together by HLTAox_Adder_1 → Hltox

→ added together by Partxx_Adder_1 → MONAox

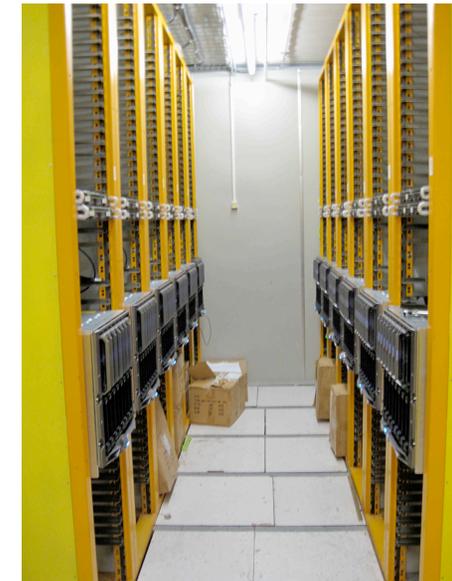
--> to start with a few hundred cores

--> within 2 months the complete system(~10000 cores) can be installed

Pictures from the pit

8 cores/node

Nodes and subfarms.



Part of the EFF
and monitoring farm

Hlt Monitoring

Hlt monitoring

What is the task of the Hlt monitoring group:

- monitor what happens in the EFF:
 - does the Hlt algorithm behaves as expected, is the output rate stable, how long does it take to process an event , do we get any error messages...
- monitor variables we cut on so we can study the reason for higher rates...
- trigger efficiencies

We can also offer further monitoring:

- rates of the LO alleys
- which ODIN trigger type was selected
- are the farms all up?
- show which TCK is being used
- ...

What is not part of the online monitoring?

- in depth studies of MC verification and fine tuning of Hlt,
→ this should be done offline.

Overview

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	Shifter	Expert
Event Filter Farm	Overview Small number of plots Fast	More detailed information Fast
PVSS	Overview of rates and time	In more detail
Monitoring Farm	-	More time available Distributions of variables, Efficiencies, offline...

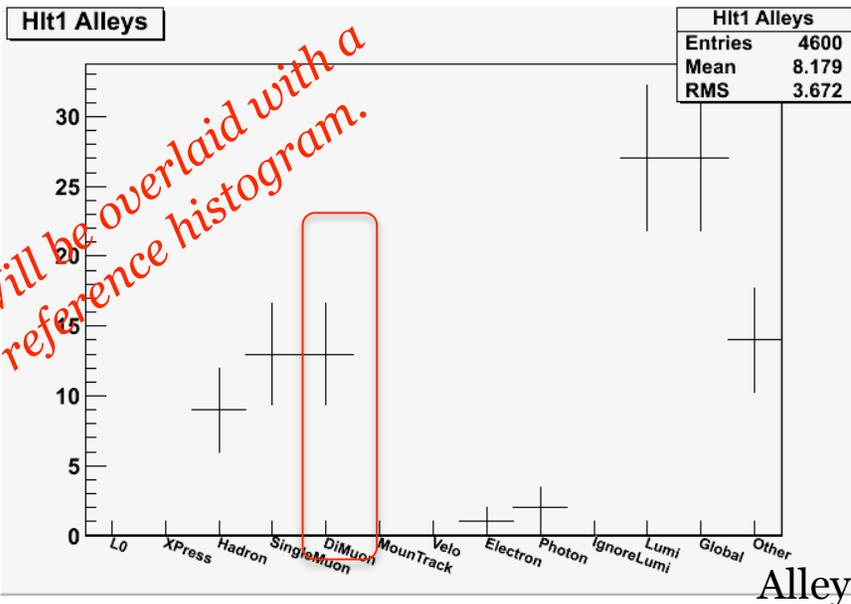
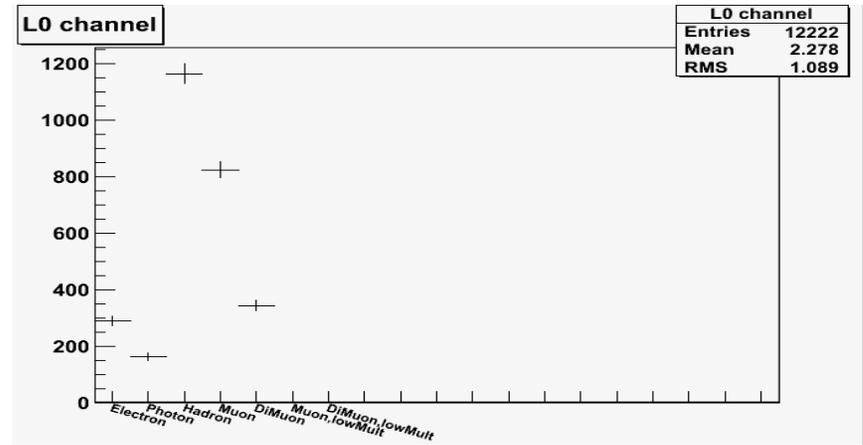
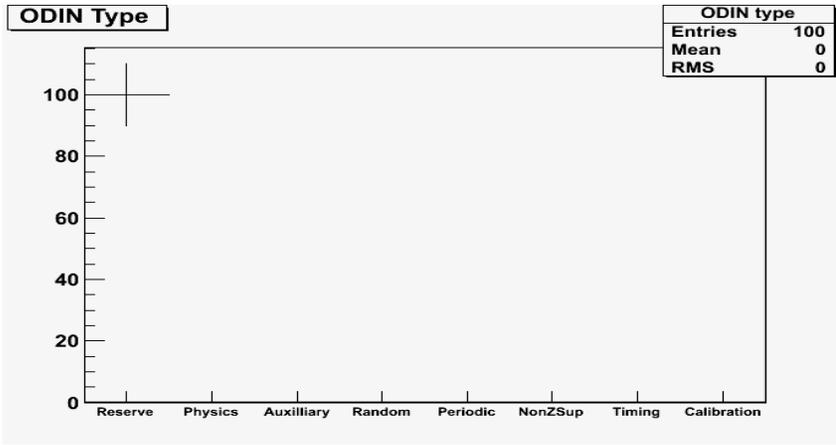
Hlt monitoring done by the **shifter**

- Needs to get a “general picture” fast of what is happening “live”
- only a handful of histograms to verify
- 2 presenter - pages

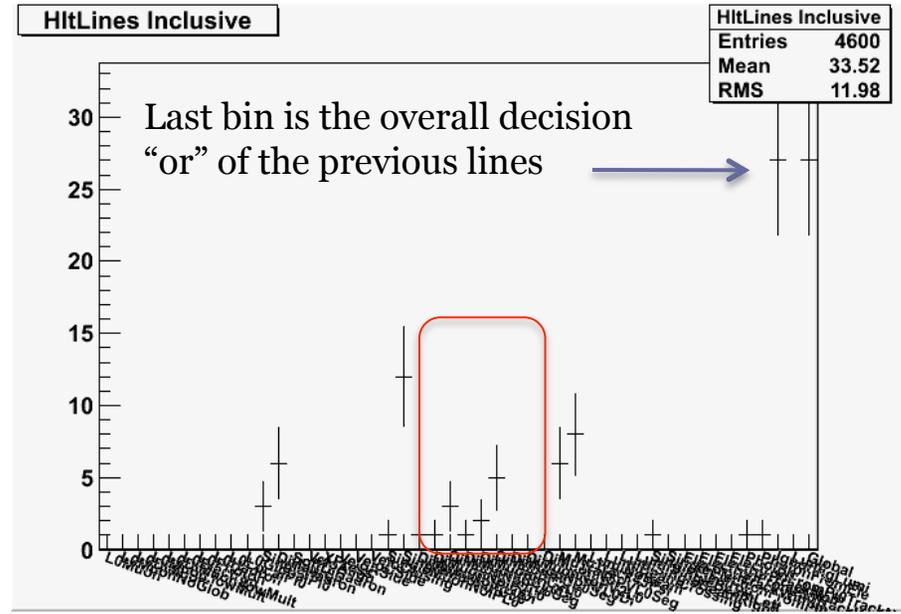
1. output rate of Hlt alleys
2. error messages
3. overall timing
4. readout supervisor settings
5. LO rates

All provided
from the
monitoring
of the EFF

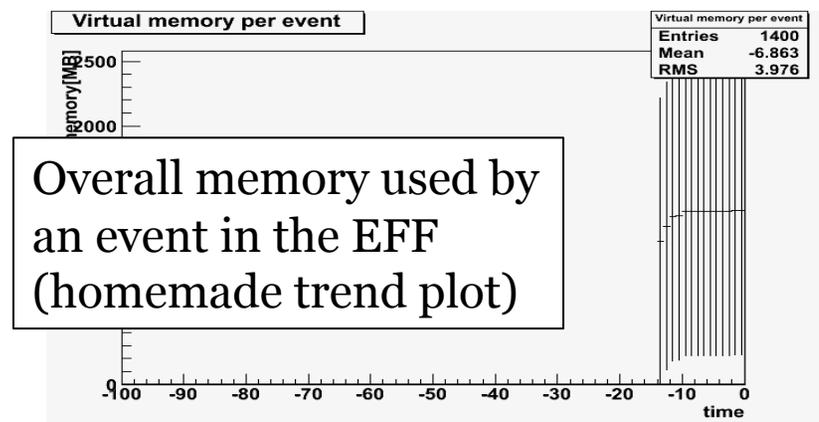
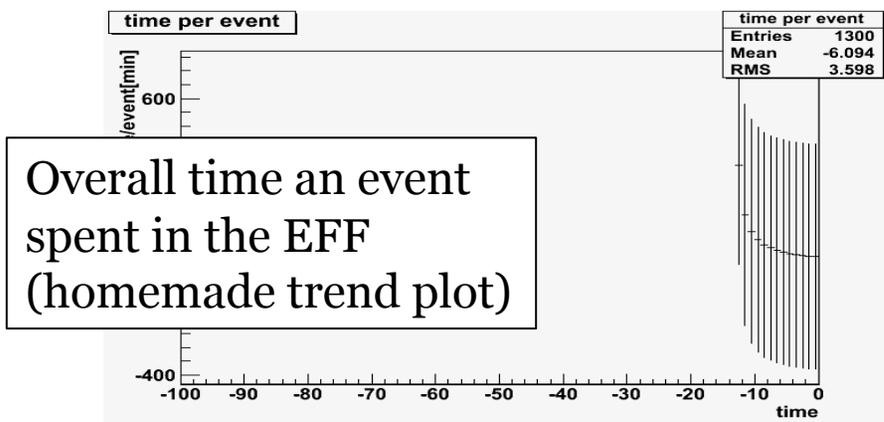
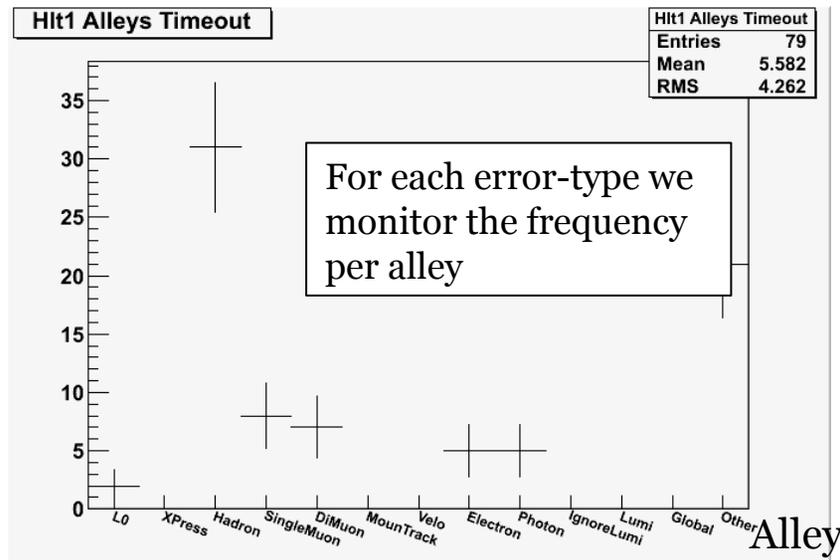
Shifter pages: rates of Hlt alleys and lines, L0 and RS setting



Will be overlaid with a reference histogram.



Shifter pages: errors, time and memory



Trendplots provided by PVSS

- Overall rate
- Overall time per event
- Rate per line
 - Average over x-amount of data is plotted on the trendplot.
- Implemented offline.
- Pages to be build online.

What does the **expert-shifter** need to know?

More detailed information to investigate the problem signaled by the shifter

- Basic information from the EFF for each Hlt line and the algorithms it contains.
- ex. the average time an event stays in a line.
- ex. the retention rate after each cut in a line.
- ...

All provided from the monitoring of the EFF

- + Fancier stuff from the monitoring farm

Expert pages (EFF)

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Database Page Browser

HISTDB

- BruneiOnline
- Calorimeters
- HLT
 - Global
 - HLT1 Lines
 - DiMuonIPC2
 - DiMuonIPCL
 - DiMuonIPCL**
 - DiMuonNoIP:
 - DiMuonNoIP
 - DiMuonNoP\
 - DiMuonNoP\
 - ElectronFrom
 - ElectronFrom
 - ElectronTrack
 - ElectronTrack
 - Global
 - IgnoringLumi
 - Incident
 - LODiMuon
 - LODiMuon

48 lines -> 48 pages

LHCb Online Presenter

File Edit View Tools

FEST preset file

2009-05-29 18:05:12

HIT1DiMuonIPCL0Seg rejection stage

rejected events $\times 10^4$

Entries 2140310
Mean 2.666
RMS 4.428

Variable plotted

Name of the line

HIT1DiMuonIPCL0Seg error

entries $\times 10^4$

Entries 2140310
Mean 0.001801
RMS 0.05998

HIT1DiMuonIPCL0Seg log(wall time/ms)

events 10^6

Entries 2140310
Mean -1.496
RMS 0.2634

time (ms)

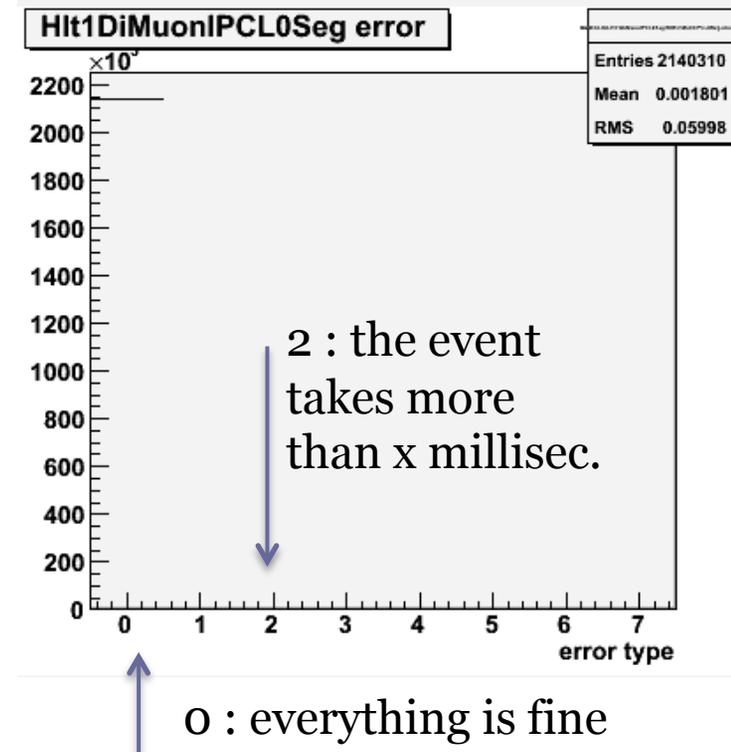
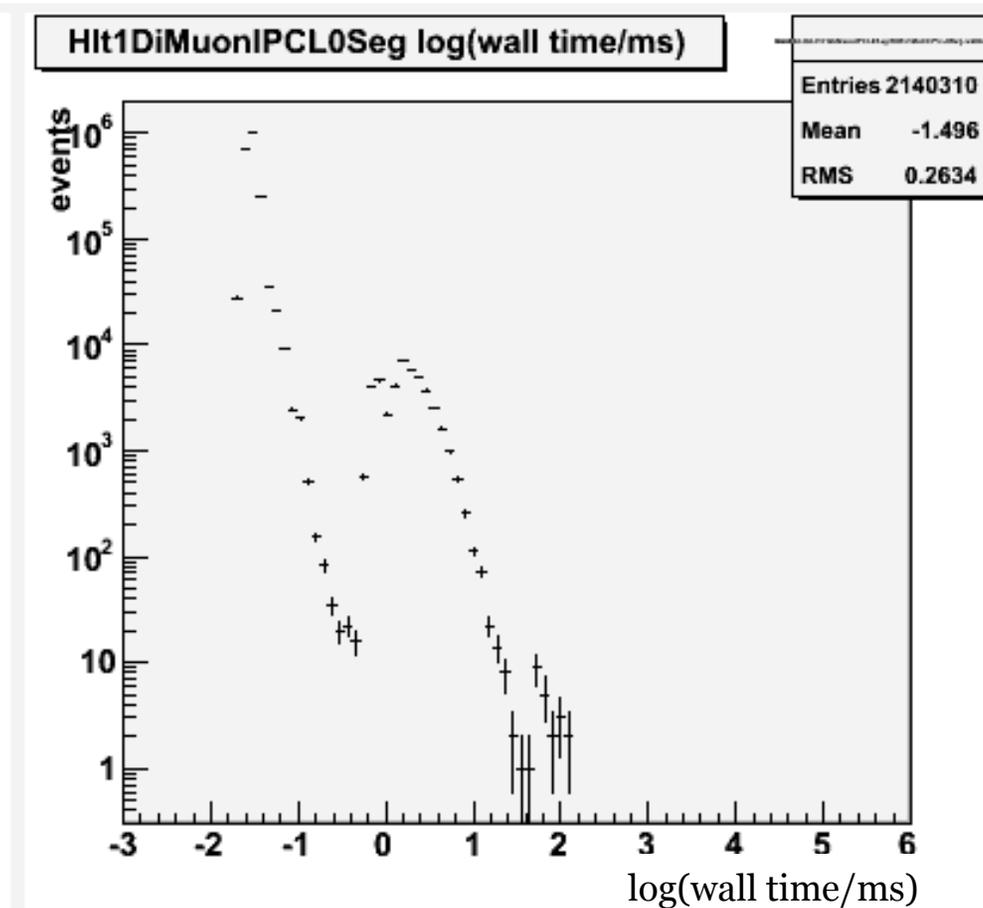
Histograms in Alarm

Analysis Task

HISTDB

Page Comments

Expert pages (EFF) - time per line and error



Information stored in the error bit only 2 types implemented so far

The sequence of cuts in the Hlt1DiMuonIPCL0Seq – line

The principle of the **monitoring farm**

- We have the time to display all the **variables we cut on** in the trigger
 1. Input in LO trigger
 2. Input in Hlt1 (later idem for Hlt2)
 3. Output of Hlt1
 4. Trigger efficiency (TISTOS)
 5. Hlt Efficiency vs. (offline) variable

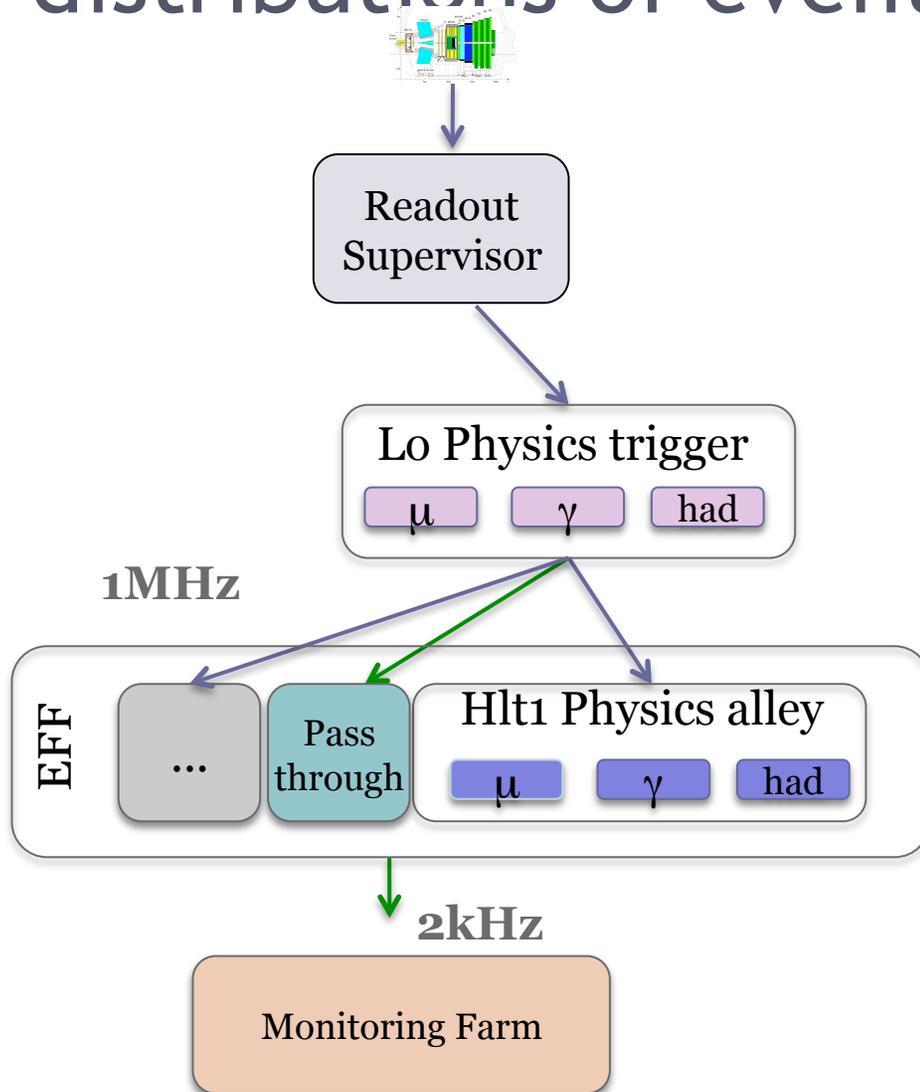
- To explore if there are temporary changes.
Do distributions of physical variables change w.r.t previous run, beginning of the beam fill (**temporary changes**)?

- Different monitoring tasks can **run in parallel** on a separate data set

How can we monitor distributions when the data in the monitoring farm are Hlt accepted data?

Monitoring the distributions of events entering the Hlt1

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Pass

Hlt1 alley which merely exist of a prescaler but no cuts.

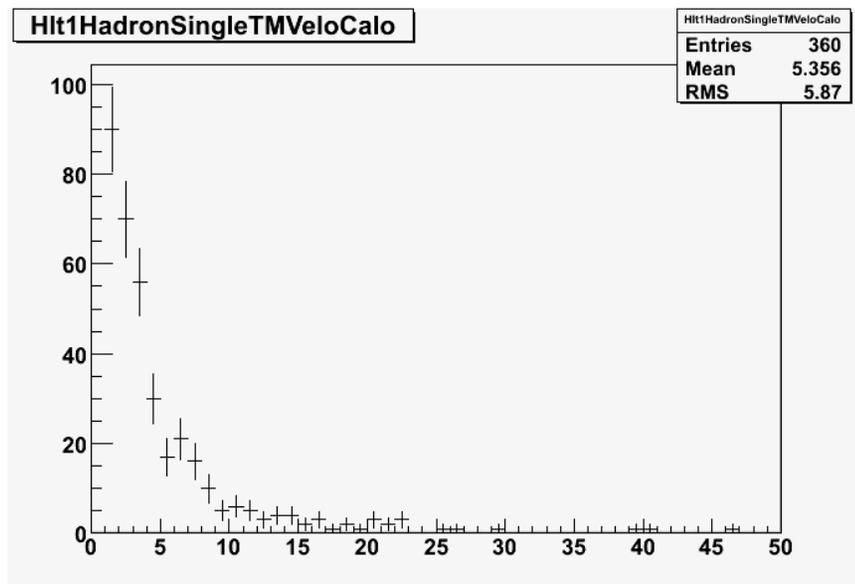
In the Moni-farm:

-rerun the Hlt 1
-run also brunel if you want to compare to offline

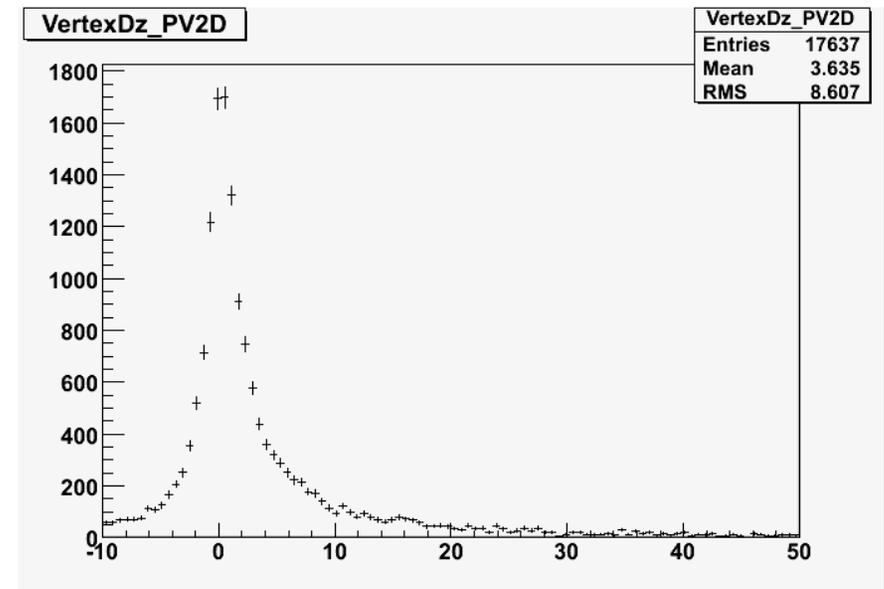
- show the distribution of the variable we cut on in Hlt1.
- show LO-TOS efficiency w.r.t offline variable.
- use previous run(s) as a reference.

Histograms for monitoring Hlt1

Hlt1 Hadron Single TM Velo Calo



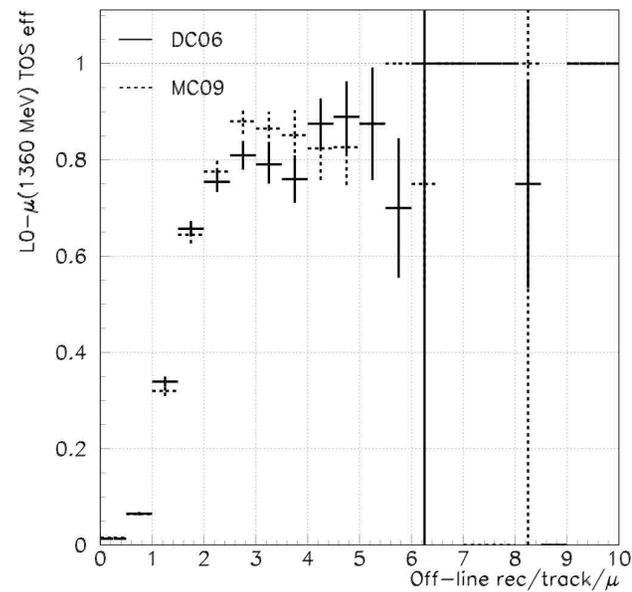
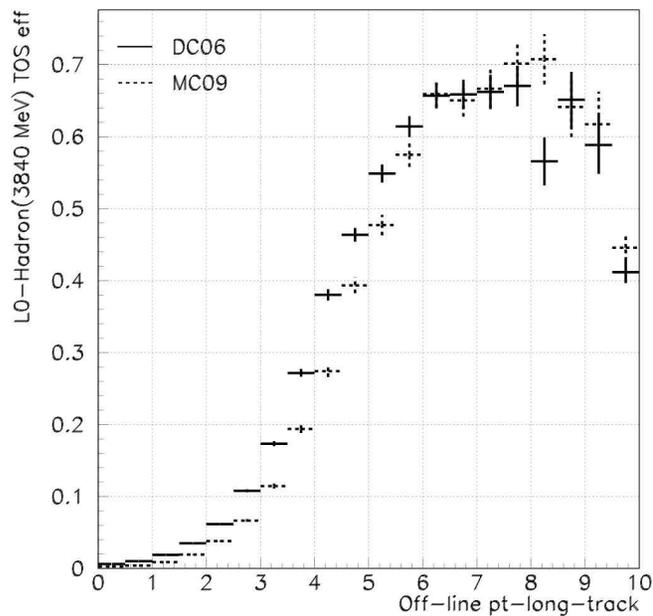
Hlt1 Mu Track Vertex Dz PV2D



- distributions we cut on in Hlt1.
- available offline.
- we are now setting up the system on the Monitoring farm.

Histograms of the L0 TOS efficiency

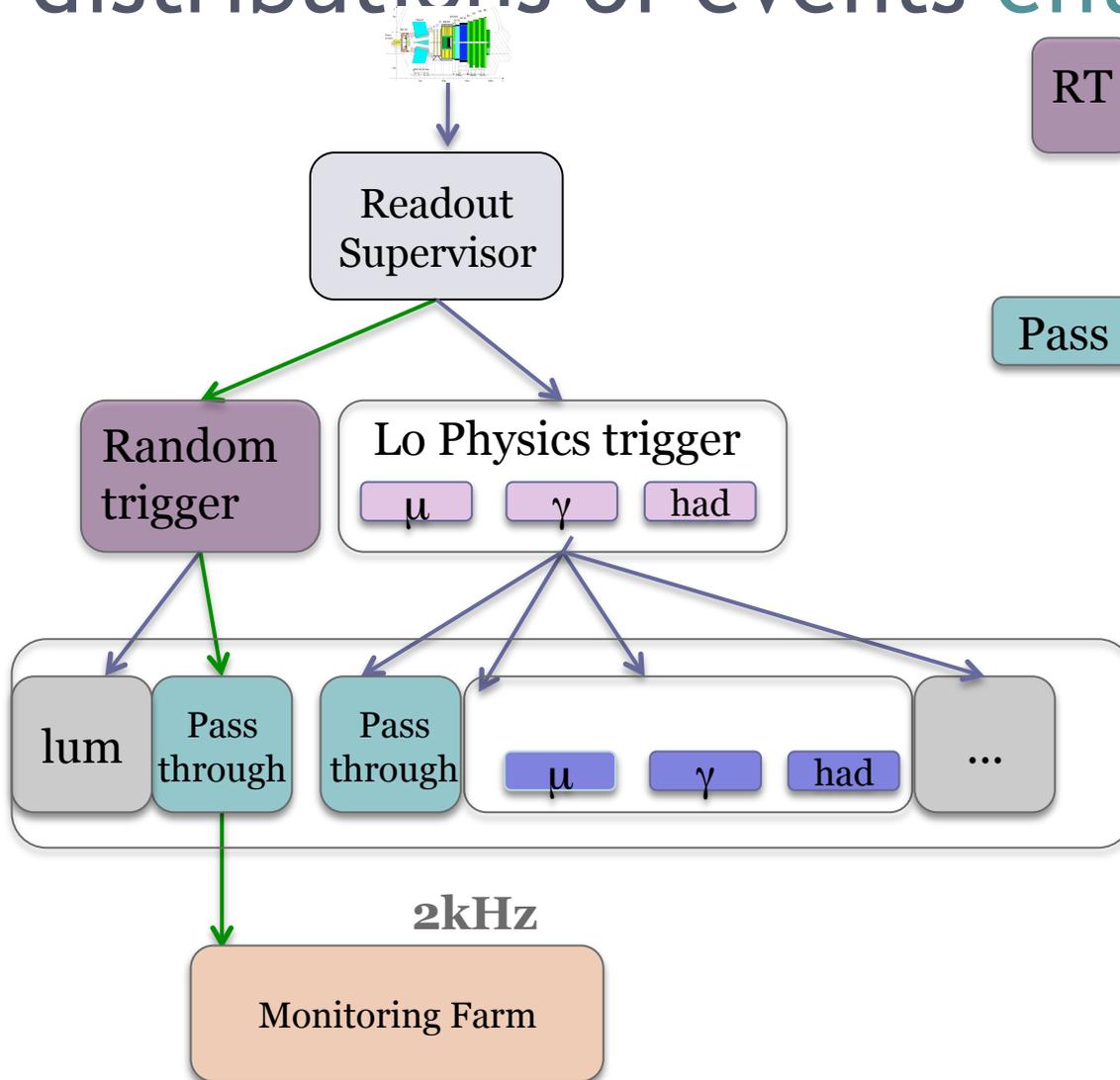
ex. TOS efficiency versus (offline) P_T



- Turn into trendplots of threshold, efficiencies and resolution
- We are now setting up the system on the Monitoring farm

Data used to monitor the distributions of events entering the L0

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RT

Readout Supervisor can set L0 to be a random trigger (designed for lumi), No cuts are present.

Pass

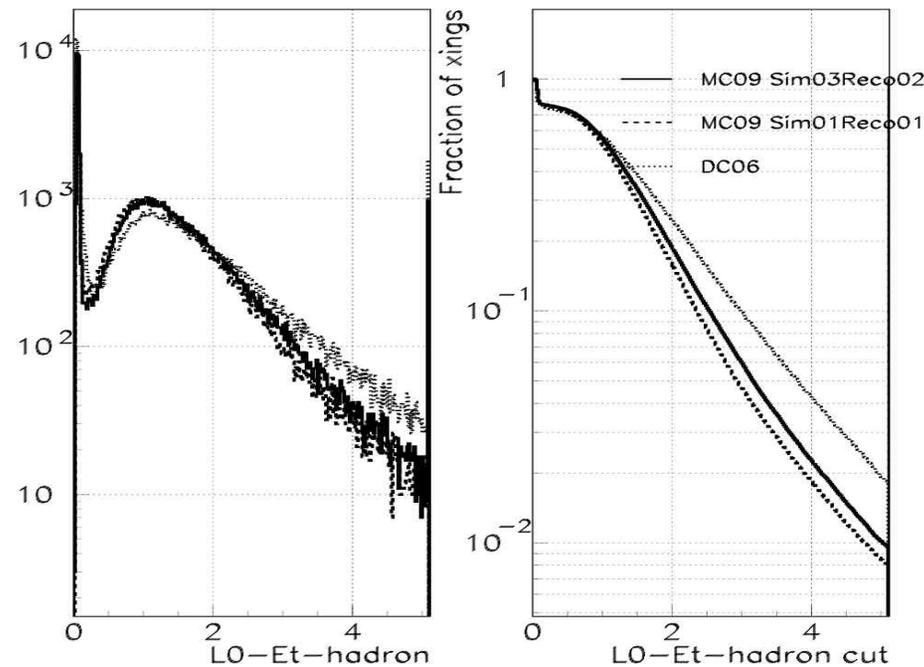
Hlt1 alley which merely exist of a prescaler but no cuts.

In the Moni-farm:

- Here we rerun the L0 with all the histograms turned on.

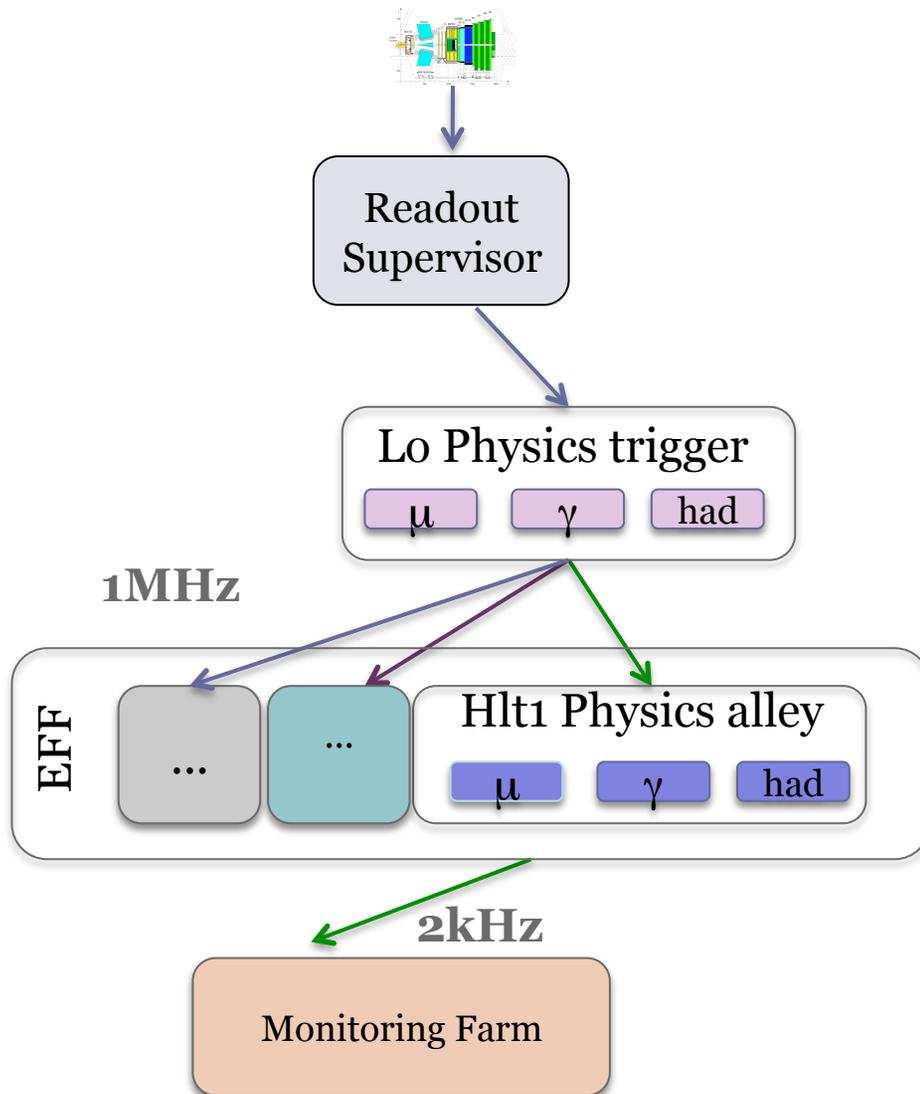
-Plot all the distributions before and after the cut is applied.

Histograms for monitoring L0 variables



- We are now setting up the system on the Monitoring farm

Data used to monitor the Hlt1 trigger efficiency



In the Moni-farm:

- Monitor the online Hlt1 variables after the cuts (seems trivial)
- Hlt1 TOS efficiency vs. offline/online variable

What about Hlt2?

- Hlt2 runs now in the pit.
- Monitoring will follow the same strategy as Hlt1.
 - Overall plots and trendplots for the expert shifter.
 - Detailed plots for the expert.
- Hlt2 line responsible need to implement the variables. they cut on, so we can monitor them in the moni-farm. (see examples from Hlt1)
- When Hlt2 becomes a bit more stable offline we can start monitoring it online.

What do we do when the monitoring shows that there is a **problem**?

*For example rates go too much up or down,
many error messages, timing takes forever...*

The shifter

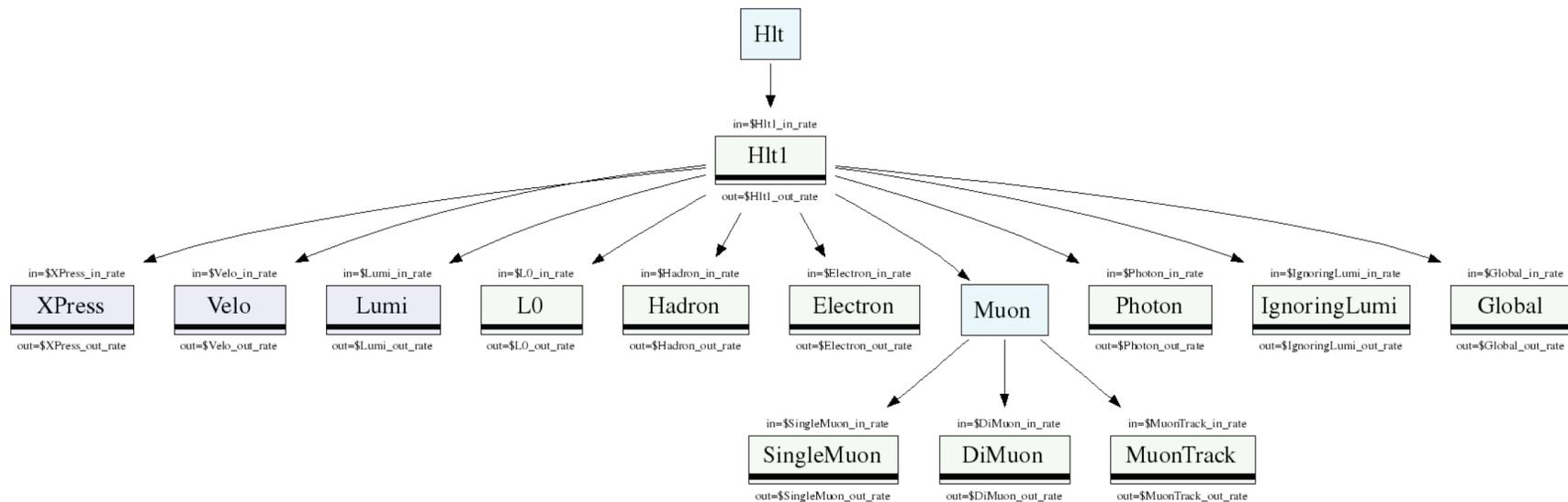
- in case of **an anticipated “problem”**:
 - a few different trigger settings (+ guidelines) will be made (TCK)
 - **switch to a different TCK.** (new TCK implies new run)
- in case of an **unexpected problem** → inform the expert shifter.

The expert shifter

- **Localize the problem:** which line gives too much rate or takes too long?
 - look in **the expert plots from the EFF**
- In case of **unexpected rates**:
 - look at **the plots from the monitoring farm** if there is a variable has a different distribution than anticipated
 - **make a new TCK** with a new overall prescaler, or new prescaler for a certain line or new cut value
- When the problem can't be understood directly:
 - look at the information **offline** and apply a new TCK to control the rate.

Extra feature for the expert

- **TCK presenter project**: webpage with visualization of the TCK.



- **Every box is clickable** and leads you to a new page with the **details inside** (the lines, or the cuts in a line)
- In and output **rates** will be included too
- Will also be available offline
- Summer student project (*Klaus Neumann*) : more information at the end of the summer ☺

Summary

- Hlt1 monitoring on the EFF for the shifter and the expert shifter is in place in the pit.
 - The shifter only needs to look at a handful of histograms
 - More histograms are available for the expert shifter
- Trendplots for timing and rates will be available through PVSS
- Histograms for the monitoring farm are ready offline, work is being done on getting it to work on the monitoring farm
 - We will monitor the distributions of the variables we cut on in LO and Hlt
 - As well as the TOS efficiencies
- Once the Hlt2 strategy and monitoring is finalized offline we need to put the monitoring in place online

Pictures from the pit

LoDU



Readout Supervisor

