EMC data quality monitoring software

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Contents

- Introduction to DQ monitoring plots
- The modules that make these plots:
  - EmcOepDiag, EmcOepMon, EmcOepRaw
  - EmcOprQAHist, EmcOprTrickleHist, EmcOprDamageHist
- The applications you can use to run these modules:
  - EmcMyReadXtc
  - ElfUserXtcApp, EmcOprReadXtc
  - Moose, BetaMiniQAAApp

Everything in this talk is documented at
linked from ‘EMC commissioner’s bible’:
OEP monitoring plots

- Looked at by DQM shifter, EMC expert shifter
- Made by fast monitoring application in IR2
  - DQM shifter sees histograms updated in real-time in JAS window
  - Cron job runs kumac over hbook files for completed runs, produces ps files used by EMC expert shifter
  - hbook files are at: /nfs/bbr-srv02/u4/FastMon/Outputs/LiveFastMon
  - ps files are at:
- Histograms made by module EmcOepDiag
- Module is run after EmcTCToDigi
  - Access to Raw digi quantities only
OEP monitoring plots

Summary: LiveFastMon-0050601

Hit Maps: $\phi$ vs. $\theta$ Index

Digi Multiplicity

Run quality: good
OPR monitoring plots

- Looked at by EMC Data Quality Expert (Haiwen)
- PR has two stages of processing:
  - PC (Prompt Calibration) runs on a fraction of events to calculate calibration constants
  - ER (Event reconstruction) runs on all events, writes out Kan files
- Elf (full reconstruction application) is run over XTC files
- EmcOprMonSequence contains EmcOprQAHist, EmcOprLERtrickle, EmcOprHERtrickle
- Run after:
  - tracking sequences,
    - Access to TrkRecoTrks
  - EmcRecoSequence,
    - Access to Default (sparsified+calibrated) digis, EmcClusters, EmcBumps
  - EmcPidSequence
    - Access to EmcCands
OPR monitoring plots
Other useful modules

- In EmcOepMon package:
  - EmcOepDiag (reproduce OEP monitoring plots)
  - EmcOepRaw (ntuple of raw quantities)
  - EmcOepMon (lots of stuff including waveforms)

- In EmcOprMon package:
  - EmcOprQA Hist, EmcOprTrickleHist (reproduce OPR plots)
  - EmcOprDamageHist
    - Look at various quantities, e.g. digi energy spectrum, digi times, $\gamma\gamma$ masses, in specific regions of the calorimeter defined by tcl parms region1phiMin etc.
    - Also looks at same quantities in events with TC damage (not fully implemented yet)
Running over xtc files

- If the hbook file containing plots you want to look at doesn’t already exist, is possible to run over XTC file yourself

- **Step 1: stage xtc file.**
  
  `tcstage 00[run_number]-001`

  - xtc file will be staged from tape to disk

  `/nfs/babar/tcfiles/babar-00[run_number]-001.xtc`

  where it will stay for ~1 week.

- **Step 2: run application.**

  `[App_name] -f [xtc_filename] -n [num_events] -s [events_to_skip] [tcl_file]`

  - Note 1: the ‘-s’ option doesn’t work for applications that inherit from `OepFPlaybackMain`, i.e. `EmcMyReadXtc`

  - Note 2: the ‘-n’ option includes skipped events, so if you want to run over events 100-120, do ‘-n 120 –s 100’
Running EmcMyReadXtc

- Easiest way to run:
  - EmcOepDiag EmcOepRaw EmcOepMon
- Checkout EmcOepMon package
  
gmake EmcOepMon.EmcMyReadXtc
- For EmcOepDiag, EmcOepRaw:
  - in EmcMyReadXtc.tcl, comment out line
    mod disable [module]
- For EmcOepMon, also need to instantiate module in EmcMyReadXtc.cc
  - Use other modules as example
- Run from workdir with the command:
  EmcMyReadXtc –n [num_EVTs] –f [xtc file] ../../../EmcOepMon/EmcMyReadXtc.tcl
Running ElfUserXtcApp

- ElfUserXtcApp built as part of release – don’t even need to checkout a package
  - Just need tcl snippet, e.g.

```tcl
# runElf.tcl
# put this file in workdir
set ElfConfigPatchSet "Run2"
set ElfHistoFileName "testElf.hbook"
sourceFoundFile PARENT/Elf/ElfProduction.tcl
```

- Run from workdir with the command:

Running EmcOprReadXtc

- Cut-down version of Elf
  - Just runs TrkStandaloneSequence, EmcRecoSequence, EmcPidSequence, EmcOprMonSequence
- Quickest way to reproduce EMC OPR monitoring plots, or run EmcOprDamageHist
- By default, does not run Digi and BG filters (these remove most events in Elf before the monitoring sequences)
- Checkout recent tag of EmcOpr (e.g. V00-03-02)
  gmake EmcOpr.EmcOprReadXtc

- Uncomment line mod disable EmcOprDamageHist from EmcOprReadXtc.tcl if required
- Run from workdir with command:
  EmcOprReadXtc -n [numevts] -s [skipevts] -f [xtc] ../EmcOpr/EmcOprReadXtc.tcl


Moose, BetaMiniQAApp

- EmcOprMonSequence is run by default when you run Moose
  - Moose output hbook file should have directories EMCOPRQAHIST, EMCOPRLERTRICKLE, EMCOPRHERTRICKLE
- Can also run EmcOprMonSequence on CM2 mini using BetaMiniQAApp
  - Also built as part of release – don’t even need to checkout BetaMiniQA package:
    setenv MyJobName [some name]
    setenv MyHbookFile [hbook filename]
    setenv MyInputCollection [collection name]
    BetaMiniQAApp PARENT/BetaMiniQA/runDQG.tcl
  - Note: in “cache” mode, some plots will look different, as not all digis are available
Conclusions

- Running over XTC files is easy and fun!
- Modifying code in monitoring modules to make new plots is fairly easy and fairly fun
- Looking at page after page of plots (i.e. being an EMC expert shifter) is very easy, not all that fun, but please do it anyway😊