Muon Trigger Emulator

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CMS trigger emulator meeting
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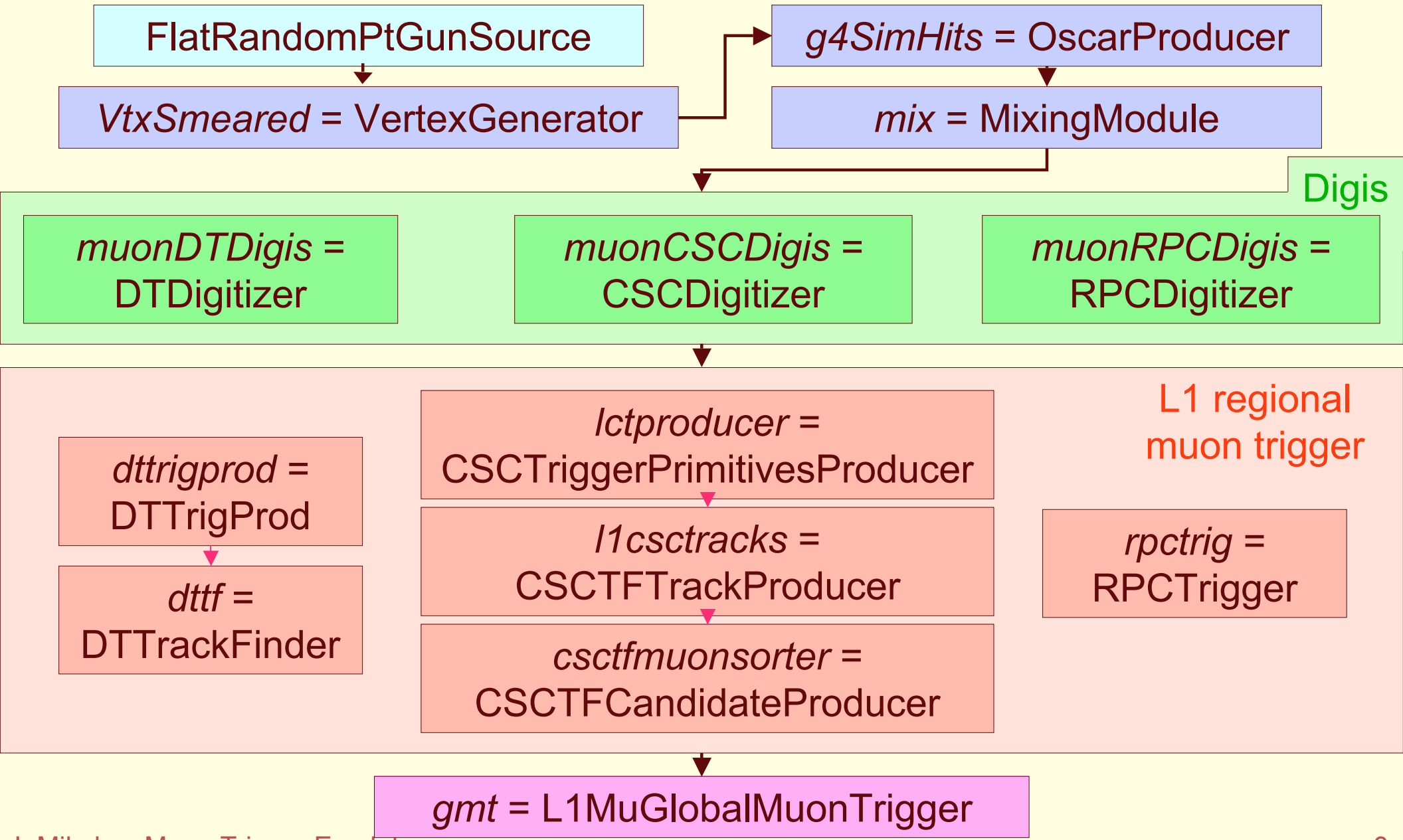
Performance of muon trigger emulators

- In the meeting of August 30th an extensive report was given on performance of the muon part of the L1 emulator
- The analysis was done:
  - using CMSSW 0.9.1 + compiled DTTrigger, DTTrackFinder and GlobalMuonTrigger
  - runing the full CMSSW path from source to GMT
  - generating 100k single muons with pT 2-100GeV
  - comparing performance to ORCA 8.13.0
- Here I will not repeat details of that analysis - please refer to that talk - only progress on open issues

Scheme of the CMSSW path from source to GMT



Progress on open issues

- **TOF offset (DT)**
  - in DT digis the TOF offset has to be set to 0 instead of default 500ns.
  - **Discussion between DTDigi (Nicola) and DTTrigger (Stefano) on BTI synchronisation is going on.**
- **Phi measurement/ghosts (DT)**
  - Phi coordinate of DTTF candidates is offset by 30deg.
  - **Discussion between DTTrigger (Stefano) and DTTF (Jorge) on how to index the sectors is going on.**
- **Central eta measurement (DT,RPC)**
  - The eta coordinate in the central wheel has wrong sign.
  - **Apparently connected to a bug in the ORCA geometry which was fixed in the code. Now the geometry is right but the fix is still present (c.f. Jorge)…**

Progress on open issues (cont.)

- **pT measurement (CSC)**
  - PT resolution from CSCTF bad.
  - **Work is going on to improve this (c.f. Darin).**
- **Charge measurement (CSC,RPC)**
  - Charge valid bit from CSCTF and RPC not set.
  - **Need to understand better the charge measurement (lower priority for now).**
- **DT-CSC data exchange**
  - **Present in the HW and was present in ORCA. Will be progressively implemented also in CMSSW**
- **Databases and online-offline configuration/condition transfer**
  - **Werner promised to start to look into this using some simple/trivial database example**
- **Unpacking of raw data and comparison emulator - hardware with real data.**
  - **Unpacking code is being added as soon as readout HW available and working.**

Mini-Tutorial on L1Mu from 1.1.0.pre1

```
prompt> project CMSSW
prompt> scramv1 project CMSSW CMSSW_1_1_0_pre1
prompt> cd CMSSW_1_1_0_pre1/src
prompt> eval `scramv1 run -csh`
prompt> cvs co -r V00-00-01 L1Trigger/DTTrackFinder
prompt> cd L1Trigger/DTTrackFinder
prompt> scramv1 b
prompt> cd [somedir]
prompt> wget http://cern.ch/cms-gmtgt-afs/GMT/cmssw/gen2gmt.cfg
prompt> setenv DTTF_DATA_PATH
   $CMSSW_BASE/src/L1Trigger/DTTrackFinder/parameters/
prompt> cmsRun gen2gmt.cfg
```

DTTF has to be checked out and compiled

for the moment needs to specify LUTs path as env

L1 related parts of gen2gmt.cfg

DTDigi part

```
include "Geometry/DTGeometry/data/dtGeometry.cfi"
include "SimMuon/DTDigitizer/data/muonDTDigis.cfi"
replace muonDTDigis.pset = {
                    double offset = 0
                    int32 TOFCorrection = 2
                   }
```

changed TOF offset

```
# dt trigger
 module dttrigprod = DTTrigProd{}
 module dttf = DTTrackFinder { }

 # csc trigger primitives
 #=======================
 include "L1Trigger/CSCTriggerPrimitives/data/CSCTriggerPrimitivesProducer.cfi"

 # csc trackfinder
 #================
 include "L1Trigger/CSCTrackFinder/data/CSCTrackFinder.cfi"
```

L1 related parts of gen2gmt.cfg

```
# rpc trigger
#================
#include "L1Trigger/RPCTrigger/data/RPCTrigger.cfi"
module L1RPCMuCand = RPCTrigger {
      string RPCPatternsDir = 'L1Trigger/RPCTrigger/data/Eff90PPT12/'
      untracked int32 RPCTriggerDebug = 0
}

# GMT
#================
include "L1Trigger/GlobalMuonTrigger/data/gmt.cfi"
replace gmt.BX_min = -1
replace gmt.BX_max = 1
replace gmt.BX_min_readout = -1
replace gmt.BX_max_readout = 1

sequence dttrig = {dttrigprod, dttf}
sequence csctrig = {lctproducer, csc_tf_cands}
sequence l1mutrig = { dttrig & csctrig & L1RPCMuCand }
path p1 = { VtxSmeared, g4SimHits, mix, doDigi, l1mutrig, gmt}
```

sequences for DT and CSC Triggers

sequence for the L1Mu Regional Trigger

The GMT Product

- **The L1MuGlobalMuonTrigger module produces L1MuGMTReadoutCollection**
- **This product contains all input, intermediate (barrel, forward) and output GMT candidates with all their parameters in a predefined bx-window**
- **An example of accessing and reading this product is: L1Trigger/GlobalMuonTrigger/test/L1MuGMTDump.cc which is an EDAnalyzer in the release and can be run by adding**

```
module gmttest = L1MuGMTDump {}
```

to the .cfg file with gmttest at the end of the path

- **A root tree can be produced with another EDAnalyzer: L1Trigger/GlobalMuonTrigger/test/L1MuGMTTree.cc also in the release and run by adding**

```
module gmttree = L1MuGMTTree {
   untracked string OutputFile = "gmttree.root"
}
```

to the .cfg file with gmttree at the end of the path