L0 Event Model

The L0 Event Model is made of four components, as is the hardware.

L0Calo :

Inputs are extracted from the Raw Buffer, and are the 8 bit transverse energy (ECAL, HCAL) and the trigger bits for PRS and SPD. These are described in L0CaloAdc and L0PrsSpdHit. The result of the processing is L0CaloCandidate which is available in two containers, one with all non-zero candidates, and one with the highest candidate of each type. If required, the L0Calo emulator also fills a container with L0ProcessorData to be used as input to the L0DU emulator.

L0Muon :

In the simulation, the L0Muon emulator uses MuonDigit objects (directly in the TES or extracted from the raw buffer).

The result of L0Muon processing (obtained by the decoding of L0Muon banks or by running the L0Muon emulator) is stored as :

- L0MuonCandidate : muon candidates found by the L0Muon. L0MuonCandidates are available in several containers, typically :
  - `LHCb::L0MuonCandidateLocation::Ctrl` (or `::Default`) : final candidates selected by the controller boards and sent to the L0DU
  - `LHCb::L0MuonCandidateLocation::CtrlBCSU` : intermediate candidates selected by the Best Candidate Selection Unit (BCSU) received by the controller boards
  - `LHCb::L0MuonCandidateLocation::BCSU` : intermediate candidates selected by the BCSU and sent by to the controller boards (should be identical to previous)
  - `LHCb::L0MuonCandidateLocation::PU` : intermediate candidates found by the Processing Units (PU), i.e. all candidates seen by the L0Muon.
  - Note that these locations are modified depending on the RootInTES (prepend /Prev1 ... /Next1) and context (append the context string) properties. This allows for example to have the containers filled both by the decoding and the emulators.
- L0MuonData : input data (MuonTileID) received by the L0Muon
- L0MuonError : error detected by the hardware during the processing or by the decoding software.
- L0MuonInfo

In addition, the L0Muon emulator can produce (depending on the job options) :

- the L0Muon banks
- L0ProcessorData : final candidates sent to the decision unit. Generic object used as input to the L0DU emulator.

PileUpSystem

L0DU :

Inputs are L0ProcessorData from the three other systems. An EDMS document is in preparation to specify the exact bit assignment, see EDMS 528259. The output is basically the decision, in L0DUReport. The PUS information is added in the L1 Buffer, and it is foreseen to add information in the Raw Buffer, but this is not currently done. A tentative desciption is available in LHCb Note 2003-065.

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