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The Database Driven ATLAS Trigger Configuration System

This contribution describes the trigger selection configuration system of the ATLAS low- and high-level trigger (HLT) and the upgrades it received in preparation for LHC Run 2.

The ATLAS trigger configuration system is responsible for applying the physics selection parameters for the online data taking at both trigger levels and the proper connection of the trigger lines across those levels. Here the low-level trigger consists of the already existing central trigger (CT) and the new Level-1 Topological trigger (L1Topo), which has been added for Run 2. In detail the tasks of the configuration system during the online data taking are

- Application of the selection criteria, e.g. energy cuts, minimum multiplicities, trigger object correlation, at the three trigger components L1Topo, CT, and HLT
- On-the-fly, e.g. rate-dependent, generation and application of prescale factors to the CT and HLT to adjust the trigger rates to the data taking conditions, such as falling luminosity or rate spikes in the detector readout
- Recording of the complete trigger configuration for any given point in time, for later use by data analysts

The core of the trigger configuration system is an oracle database (TriggerDB), with a dedicated schema to reflect the L1Topo, CT, and HLT configuration needs. A java-based UI serves as the front-end to the TriggerDB for the trigger experts to store new and modify existing trigger configurations. C++-based database reader software exists for the trigger clients to retrieve configurations from the database. Web interfaces exist to display the information to a large group of ATLAS members.

With the vast amount of upgrades of the CT and HLT during the last two years, and the addition of the L1Topo, substantial changes to the database and software were necessary, which will be presented. Technical problems, such as the low-latency distribution of the configuration across the HLT computing farm and the synchronous application to the data will be addressed. Also the propagation of the trigger configuration database from the data-taking side to various ATLAS data reconstruction sites will be discussed, including a short description how the same trigger configuration mechanism is being used for ATLAS Monte Carlo simulation. New features such an automated luminosity tracking and prescale application system, which optimizes the ATLAS data taking efficiency, will also be shown.

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