CHEP'07

VICTORIA, BC

Contribution ID: **143**   Type: **oral presentation**

The ATLAS High Level Trigger Steering

Monday 3 September 2007 16:50 (15 minutes)

The High Level Trigger (HLT) of the ATLAS experiment at the Large Hadron Collider receives events which pass the LVL1 trigger at ˜75 kHz and has to reduce the rate to ˜200 Hz while retaining the most interesting physics. It is a software trigger and performs the reduction in two stages: the LVL2 trigger should take ˜10 ms and the Event Filter (EF) ˜1 s.

At the heart of the HLT is the Steering software. To minimise processing time and data transfers it implements the novel event selection strategies of seeded, step-wise reconstruction and early rejection. The HLT is seeded by regions of interest identified at LVL1. These and the static configuration determine which algorithms are run to reconstruct event data and test the validity of trigger signatures. The decision to reject the event or continue is based on the valid signatures, taking into account pre-scale and pass-through. After the EF, event classification tags are assigned for streaming purposes.

Several powerful new features for commissioning and operation have been added: comprehensive monitoring is now built in to the framework; for validation and debugging, reconstructed data can be written out; the steering is integrated with the new configuration (presented separately), and topological and global triggers have been added.

This paper will present details of the final design and its implementation, the principles behind it, and the requirements and constraints it is subject to. The experience gained from technical runs with realistic trigger menus will be described.

Summary

The final version of the software for first LHC collisions will be presented. There have been major changes, significant experience and a new design drawn up and implemented since the CHEP '06 paper.

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Session Classification: Online computing

Track Classification: Online Computing