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ConfDB: a database backend and GUI program for the management and development of CMS High Level Trigger

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The CMS experiment has been designed with a 2-level trigger system: the Level 1 Trigger, implemented using FPGA and custom ASIC technology, and the High Level Trigger (HLT), implemented running a streamlined version of the CMS offline reconstruction software on a cluster of commercial rack-mounted computers, comprising thousands of CPUs.

The CMS software is written mostly in C++, using Python as its configuration language through an embedded CPython interpreter. The configuration of each process is made up of hundreds of "modules", organised in "sequences" and "paths". As an example, the latest HLT configurations used for 2011 data taking comprised over 2200 different modules, organized in more than 400 independent trigger paths.
To manage the complexity of each HLT configuration, and the number of different configurations used to cope with the changing LHC luminosity and specific detector conditions, all configurations used for data taking are stored in a database ("ConfDB") and developed with a dedicated GUI program.
A configuration can be converted back to python format through the GUI itself, or with command-line tools which interact with the database backend through a web server.
In addition, an experimental Jython interface is under development, to allow loading a python configuration directly into the GUI and in the database.

We will describe how the CMS python configuration language is used to steer the High Level Trigger, and detail the ConfDB GUI used to edit such configurations, with special emphasis on the features introduced specifically for trigger development.

Author: BOCCI, Andrea (CERN)

Presenter: BOCCI, Andrea (CERN)

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