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The LHCb Online System

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LHCb is one of the four experiments currently under construction at Cern's LHC
accelerator. It is a single arm spectrometer designed to study CP violation the
B-meson system with high precision. This paper will describe the LHCb online system,
which consists of three sub-systems:
- The Timing and Fast Control (TFC) system, responsible for distributing the clock
and trigger decisions together with beam-synchronous commands. The system is based on
the Cern's RD-12 TTC and LHCb specific infrastructure
- The Data Acquisition (DAQ) system which performs the transfer of the physics data
from the front-end electronics to the storage via a large CPU farm housing
sophisticated trigger software. The DAQ system is based on GbEthernet throughout from
the Front-End Electronics to storage. The scale of the system (56 GB/s bandwidth) is
very much comparable with the big LHC experiments, even though the number of detector
channels and the event size is significantly smaller due to high readout rate of 1 MHz.
- An integrated Experiment Control System (ECS) responsible for controlling and
monitoring the operational state of the entire experimental setup, i.e. the detector
hardware as well as all the electronics of the TFC and the DAQ system.

The design of the system is guided by simplicity, i.e. identifying components with
simple functionalities and connecting them together via simple protocols. The
implementation decisions were based on the ideas of using COTS components and links
wherever possible and commodity hardware where appropriate. In this paper we will
present the design of the system and the status of its implementation and deployment.

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