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The ATLAS Data acquisition and High-Level Trigger: concept, design and status.

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The Trigger and Data Acquisition system (TDAQ) of the ATLAS experiment at the CERN Large Hadron Collider is based on a multi-level selection process and a hierarchical acquisition tree. The system, consisting of a combination of custom electronics and commercial products from the computing and telecommunication industry, is required to provide an online selection power of 105 and a total throughput in the range of Terabit/sec.

The concept and design of the ATLAS TDAQ have been developed to take maximum advantage of the physics nature of very high-energy hadron interactions. The trigger system is implemented to provide a background rejection of one to two orders of magnitude before the events are fully reconstructed. The Region-of-Interest (RoI) mechanism is used to minimise the amount of data needed to calculate the trigger decisions thus reducing the overall network data traffic considerably. The final system will consist of a few thousands processors, interconnected by multi-layer Gbit Ethernet networks. The selection and data acquisition software has been designed in-house, based on industrial technologies (such as CORBA, CLIPS and Oracle). Software releases are produced on a regular basis and exploited on a number of test beds as well as for detector data taking in test labs and test beams.

This paper introduces the basic system requirements and concepts. describes the architecture and design of the system and reports on the actual status of construction. It serves as introduction to the functionally and performance measurements made on large-scale test systems (LST) and on the TDAQ Pre-series installation, reported in separate papers at this conference.

Primary author: Dr MAPELLI, Livio (CERN)

Presenter: Dr GORINI, Benedetto (CERN)

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