THE INTEGRATED GRAPHICAL USER INTERFACE OF THE TRIGGER AND DATA ACQUISITION SYSTEM OF ATLAS EXPERIMENT AT THE LARGE HADRON COLLIDER

Content:
The ATLAS experiment at the Large Hadron Collider at CERN relies on a complex and highly distributed Trigger and Data Acquisition system to gather and select particle collision data at unprecedented energy and rates. The main interaction point between the operator in charge of the data taking and the Trigger and Data Acquisition (TDAQ) system is the Integrated Graphical User Interface (IGUI), which is one of the components of the ATLAS online software.

The tasks of the IGUI can be coarsely grouped into 3 categories: system status monitoring, control and configuration:

- Status monitoring implies the presentation of the global status of the TDAQ system and of the ATLAS run, as well as the visualization of errors and other messages generated by the system;
- Control includes the functionality to interact with the TDAQ Run Control and Expert System;
- Configuration implies the possibility to give a representation and modify some parameters of the TDAQ system configuration.

This paper describes the IGUI design and implementation. Particular emphasis will be given to the design choices taken to address the main performance and functionality requirements:

- Scalability – The IGUI shall scale with the complexity and size of the TDAQ system (at the moment 10000 applications – in the final configuration 50000 sw processes);
- Responsiveness – The IGUI shall be responsive despite the large amount and sources of information (basically all the contents shown by the GUI reside on remote
services and are updated mostly via a call-back mechanism with a peak rate of about 30 kHz);

- Customizability – The IGUI shall allow for configurable extensions of its functionality (to achieve this a plug-in like mechanism is used);
- User friendliness – The IGUI shall organize and represent the system information in an intuitive way and guide the operator through his main tasks (expandable trees, dynamic enabling/disabling of buttons, blinking alerts, pop-ups, etc)

In this paper we will also highlight some of the technical solutions adopted to meet all these requirements, in particular the exploitation of the latest concurrent technologies available in Java (e.g., lock-less thread safe algorithms).

Finally we will conclude with an assessment of the present component and with an outlook on possible improvements for the future.

**Primary authors** : Dr. AVOLIO, Giuseppe (Univeristy of California, Irvine, USA)

**Co-authors** : Dr. CAPRINI, Mihai (National Institute of Physics and Nuclear Engineering, Bucharest, Romania) ; Dr. LEHMANN MIOTTO, Giovanna (CERN)

**Presenter** : Dr. AVOLIO, Giuseppe (Univeristy of California, Irvine, USA)

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