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Visualization of historical data for the ATLAS detector controls

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The ATLAS experiment is one of four detectors located on the Large Hardon Collider (LHC) based at CERN. Its detector control system (DCS) stores the slow control data acquired within the back-end of distributed WinCC OA applications. The data can be retrieved for future analysis, debugging and detector development in an Oracle relational database.

The ATLAS DCS Data Viewer (DDV) is a client-server application providing access to the historical data outside the experiment network. The server builds optimized SQL queries, retrieves the data from the database and serves it to the clients via HTTP connections. The server also implements protection methods to prevent malicious use of the database.

The client is an AJAX-type web application based on the Google Web Toolkit (GWT) which gives users the possibility to access the data with ease. The DCS metadata can be selected using a column-tree navigation or a search engine supporting regular expressions. The data is visualised by a selection of output modules such as a java script value-over time plot or a lazy loading table widget. Additional plugins give the users the possibility to retrieve data in ROOT format or as ASCII file. Control system alarms can be visualized in a dedicated table. Python mock-up scripts can be generated by the client, allowing the user to query the pythonic DDV server directly, such that the users can embed the scripts into more complex analysis programs. Users can store searches and output configurations as XML on the server to share with others by URL or embed in HTML.

In a recent major release of DDV, the code was migrated to use the Vaadin Java Web framework for the user interface implementation, greatly improving aspects such as browsers and platform independence. The update has helped with reducing development and maintenance timescales. In addition, the tool now supports and visualizes metadata evolution which allows users to access the data consistently over decades. It is able to trace changes of hardware mappings or changes resulting from back-end software migration/restructuring. Furthermore, users can use DDV to review database insert rates e.g. to spot elements causing excessive database storage consumption. The client now also provides each user a usage history which is stored on the server allowing quick access to previously used configurations. Finally, the application has been generalised to be compatible with any other WinCC OA based RDB archive which allowed it to be set up for other control systems of the CERN accelerator infrastructure without any additional development.

Tertiary Keyword (Optional)

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