World-wide online monitoring interface of the ATLAS experiment

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1. The ATLAS Online Monitoring System

The Atlas experiment

ATLAS is one of the four major experiments on the Large Hadron Collider accelerator at CERN.

The ATLAS Trigger/DAQ System

The ATLAS Data Acquisition (DAQ) system transports event data from the 1600 detector read-out links to the mass storage.

The ATLAS Online Monitoring System

The Online Monitoring system is responsible for real-time checking of the full spectrum of operational conditions of the ATLAS data taking, including physics events analysis and data quality assessment. Online Monitoring system is operating in highly-distributed multi-partition computing environment.

The Web Monitoring interface

The efficiency of the experiment can be improved allowing system experts not present on site to follow the ATLAS operations in real-time, spotting potential problems which otherwise may remain unattended for a non-negligible time. Taking into account the wide geographical spread of the ATLAS collaboration, the solution of this problem is to have all monitoring information with minimal access latency available world-wide.

We have designed the interface which defines a standard approach for retrieving arbitrary monitoring information from the ATLAS private network from a Web Browser via HTTP.

2. Web Monitoring Framework Architecture

The Flow of Data

The Web Monitoring interface is implemented by a number of homogenous servers written in Python using **REST** technology. The servers are stateless, which facilitates information caching and load-balancing. The latency to access an item is determined by the HTTP access, typically in the order of 100 ms if one is outside of CERN.

The API

Web Monitoring Interface provides generic **RESTful API** to the Monitoring Services. Each monitoring resource has a unique URL associated with it, e.g. the following is URL of the object in the Information Service:

<https://atlasop.cern.ch/info/current/ATLAS/is/RunParams.RunParams>

A GET request with such URL returns the value of the respective IS object in XML format. This design allows users to present the information they are interested in their preferable form. It is used to construct complex WEB based GUIs using CSS, JavaScript, Java applets or standalone Java applications.

The Framework

The Web Monitoring server is implemented as a framework which can load and maintain an arbitrary number of specific data handling modules. When the server receives a request it parses it, finds an appropriate data module and passes parameters of the request to that module. Any module is supposed to return some relevant data either in JSON or XML format, which framework sends back to the client of the original request.

<https://atlasop.cern.ch/info/current/ATLAS + is + RunParams.RunParams>

Web Monitoring Base URL

Plugin ID

Resource ID

3 Data Plugins for Run 1

Information Service module

For displaying an arbitrary piece of information from IS the **DIV** tags have been used where IS resources URLs have been put to the **ID** of those elements. When such HTML page is loaded in a browser, the dedicated JS script iterates through the **DIV** elements and sends HTTP GET requests to the server using elements **IDs** as URLs and extracts the necessary information from the XML data which is returned.

Log Files module

The screenshot shows the generic Web interface for browsing arbitrary log files on the ATLAS experiment computers. The module, which supports this interface, can return a list of log files for a particular machine. The screenshot shows the result of this request for the pc-tdq-mon-70 machine. By clicking on any file name from the first colon, one will see the content of the chosen file.