

# Usage and Development of Web Services at MAX IV

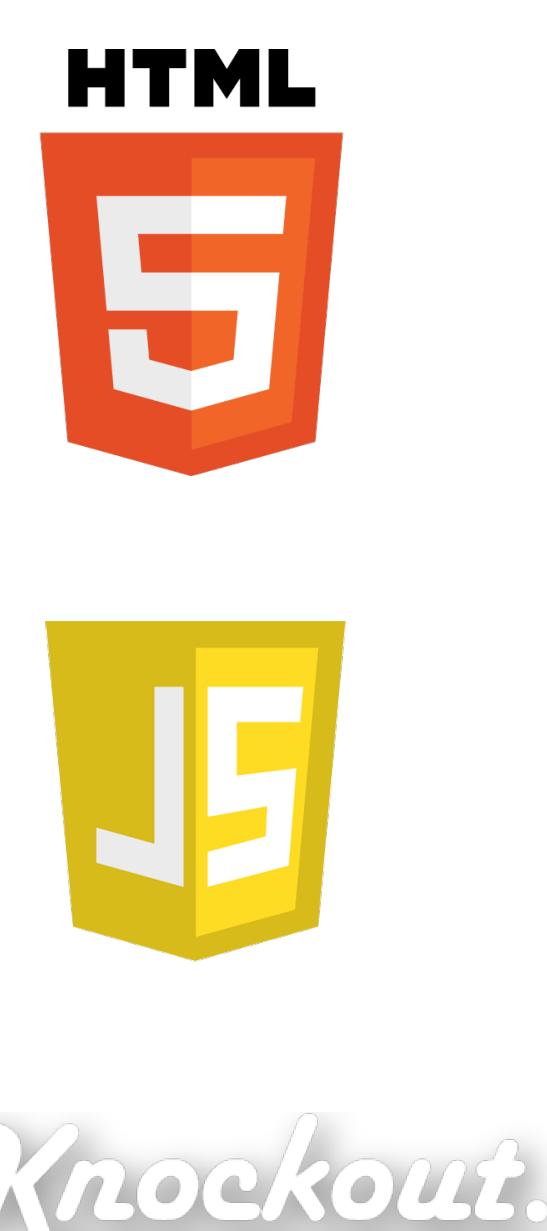
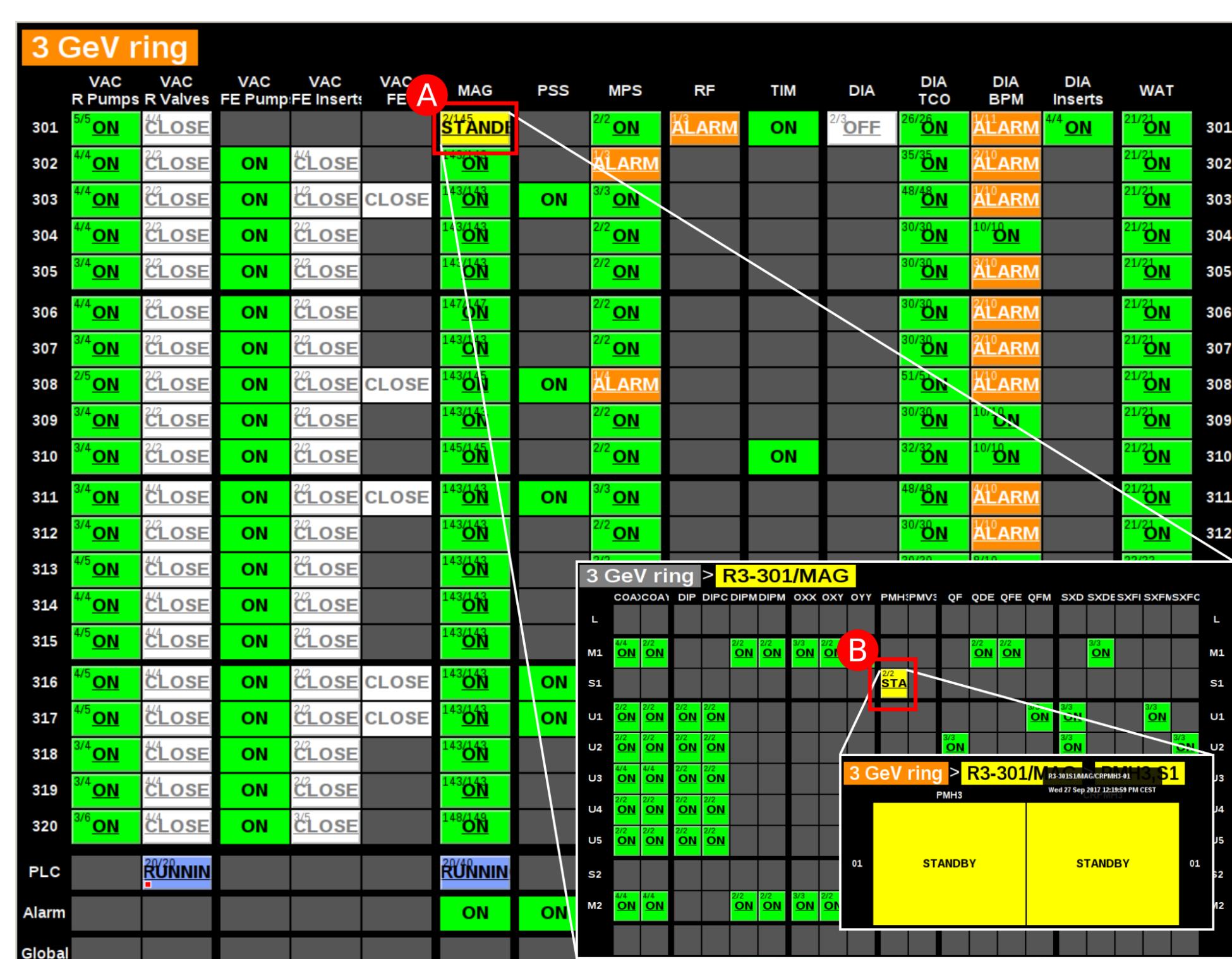


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## Monitoring and Status

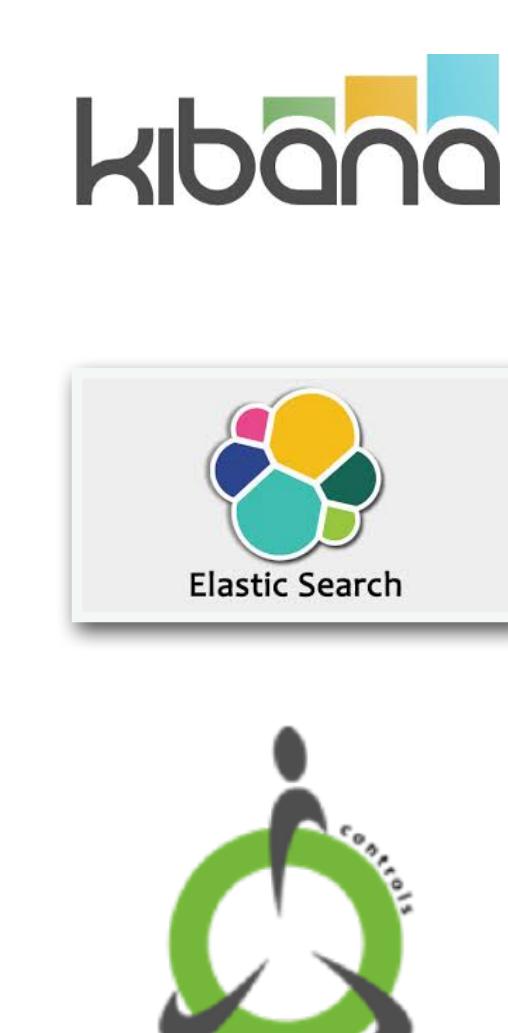
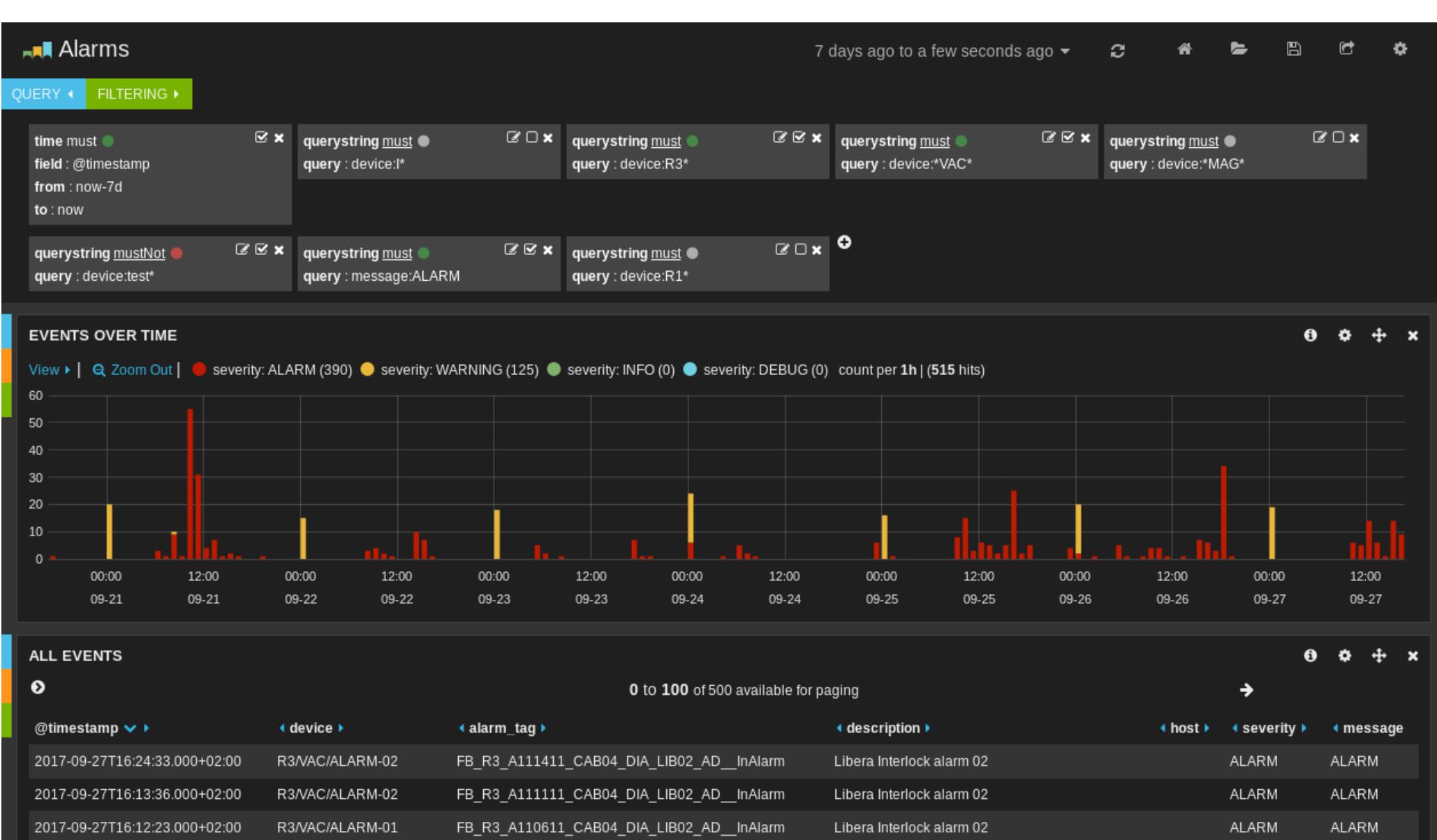
### State Grid

The state grid is mainly implemented as a HTML5 application using JavaScript. It is backed by a specifically developed TANGO device that collects the current state from a configured set of devices via event subscriptions and makes this information available as an attribute.



### Logging

A Tango device server has been developed to be used as a logger for the control system. It uses Elasticsearch as a back-end and Kibana 3 as front-end.



### Machine Status

Based on Server Send Events, this application is updating its content based on events generated in the system. Tango events are generated by the control system and forwarded as HTTP POST to a reverse proxy that them again to a web server located in a DMZ. This web server send Server Send Events to the clients in order to update them.

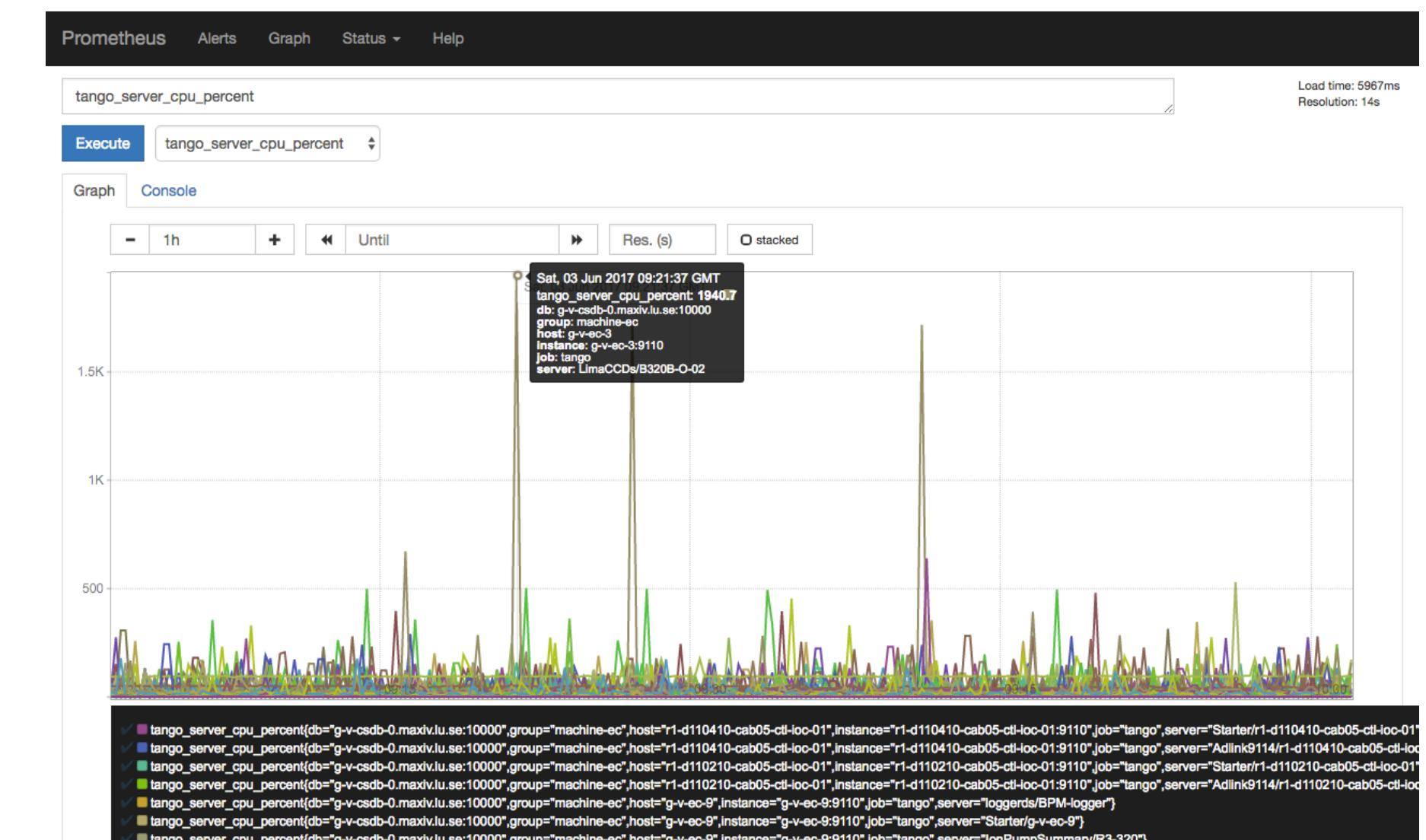


### Monitor and Alerts

Apart from the usual system metrics (CPU, memory, network, etc) for each server in the system, we have also developed an "exporter" that monitors TANGO servers.

Prometheus can be configured to send out alerts if some arbitrary conditions are fulfilled, based on recent data.

Grafana is used to display the data reported by prometheus.

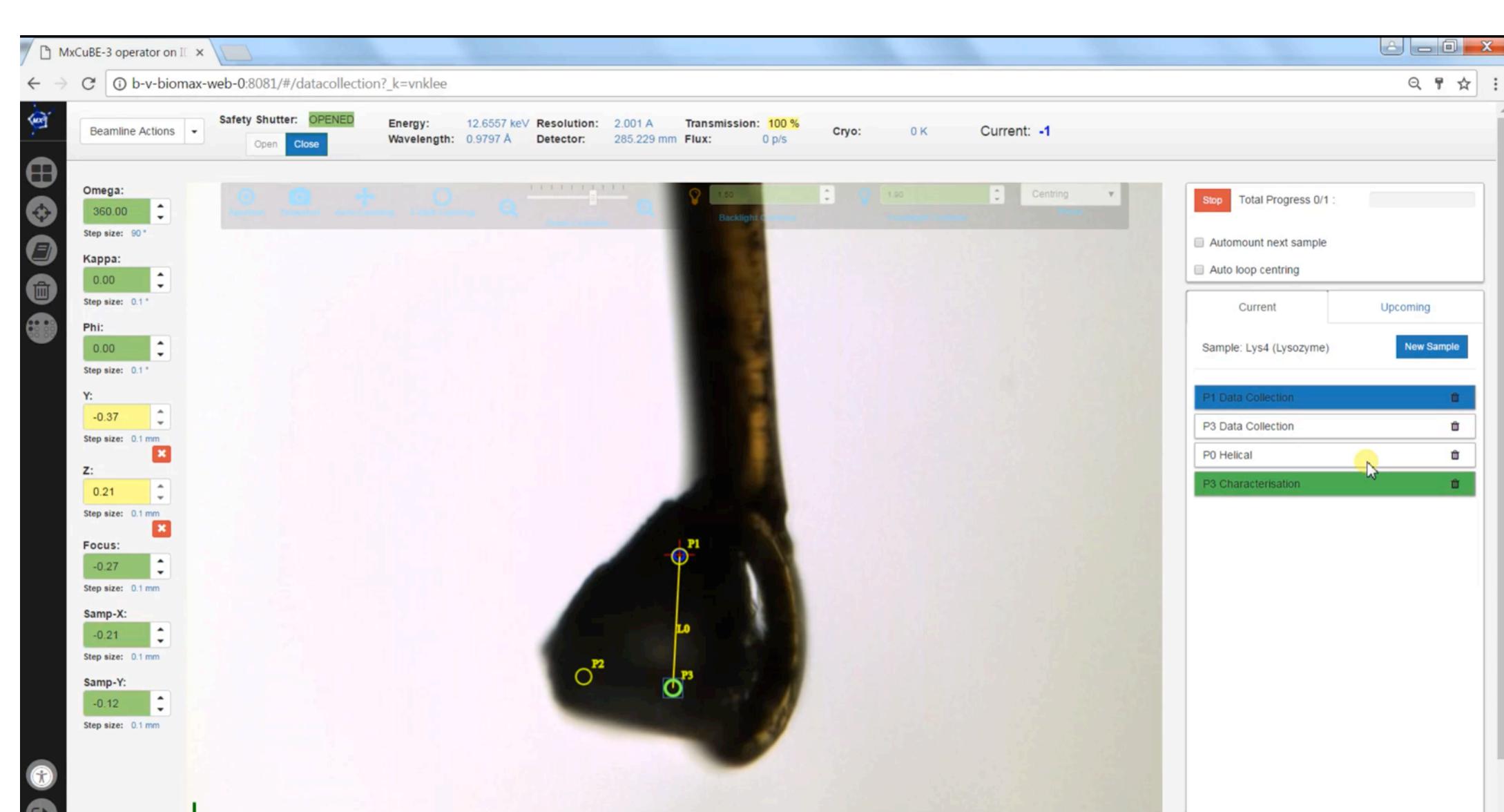


## Beamline Control and Acquisition

### MxCUBE 3

Single page application developed in collaboration between ESRF and MAXIV. Its main purpose is to automate routines in an MX Beamline.

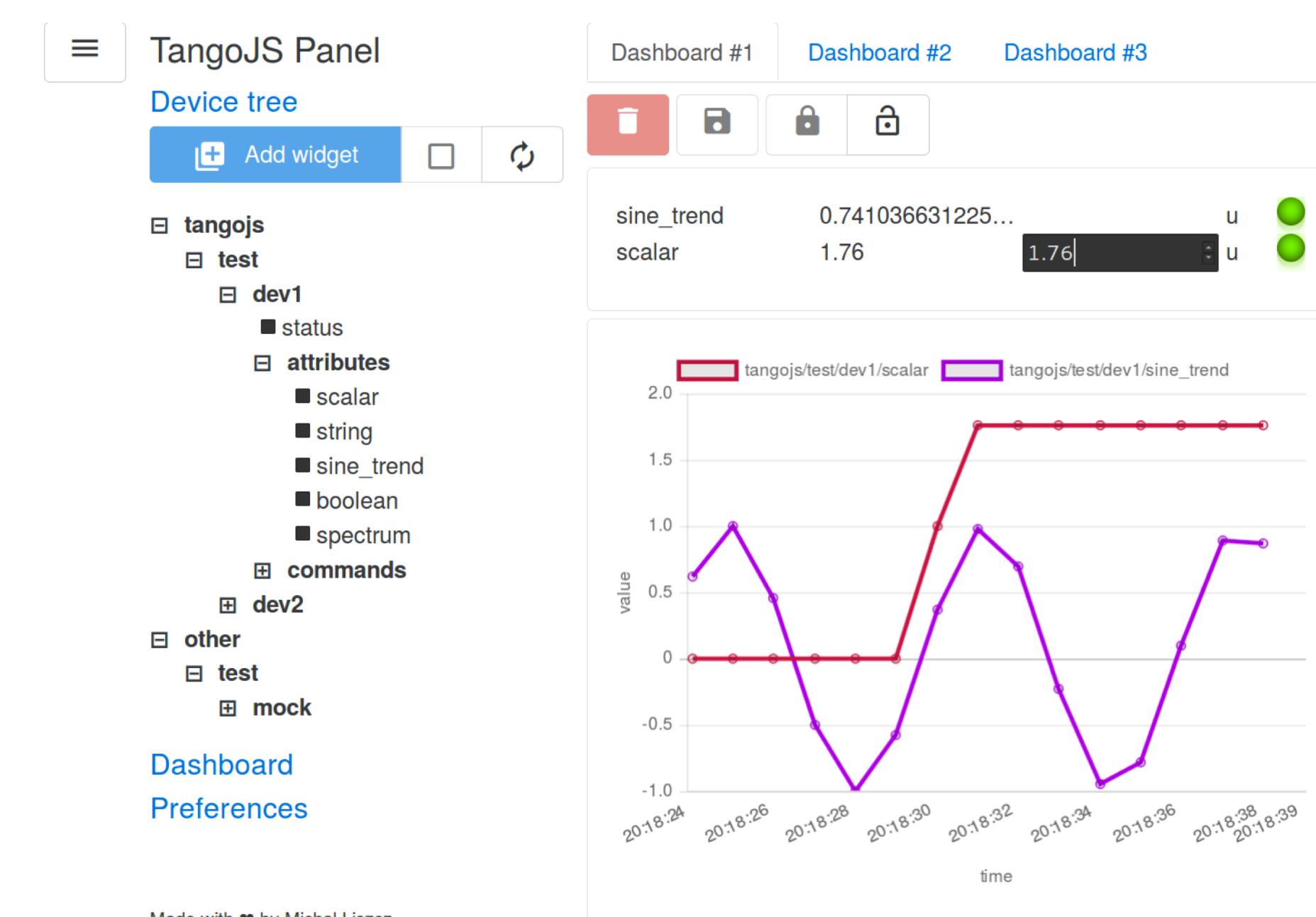
It's using Flask as a back-end and a React and Redux for the front-end.



### TangoJS

TangoJS is a complete solution for creating TANGO clients in a web application.

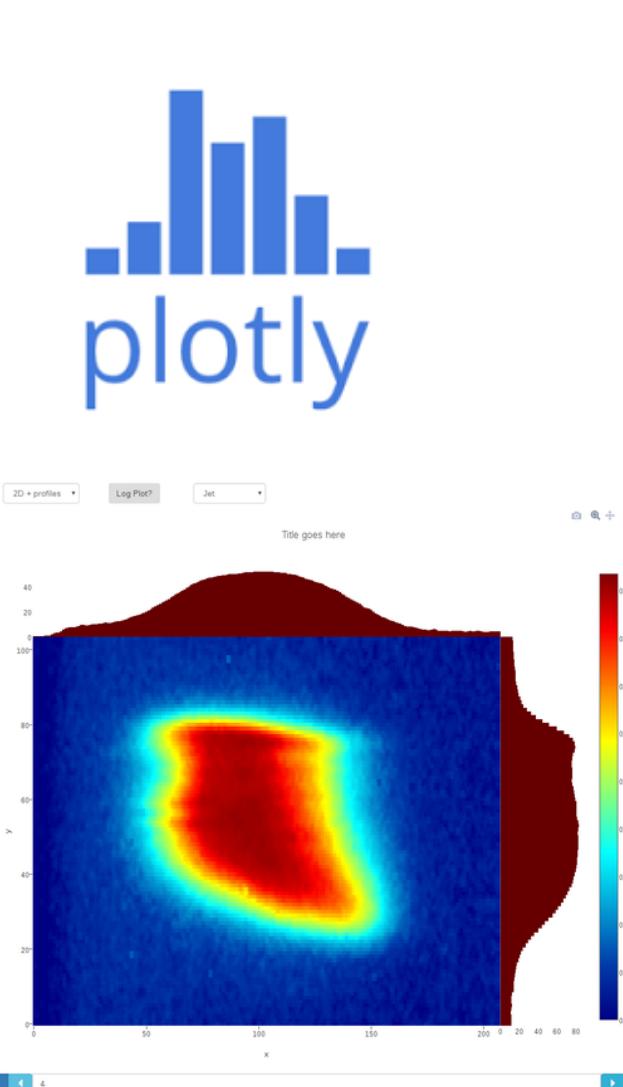
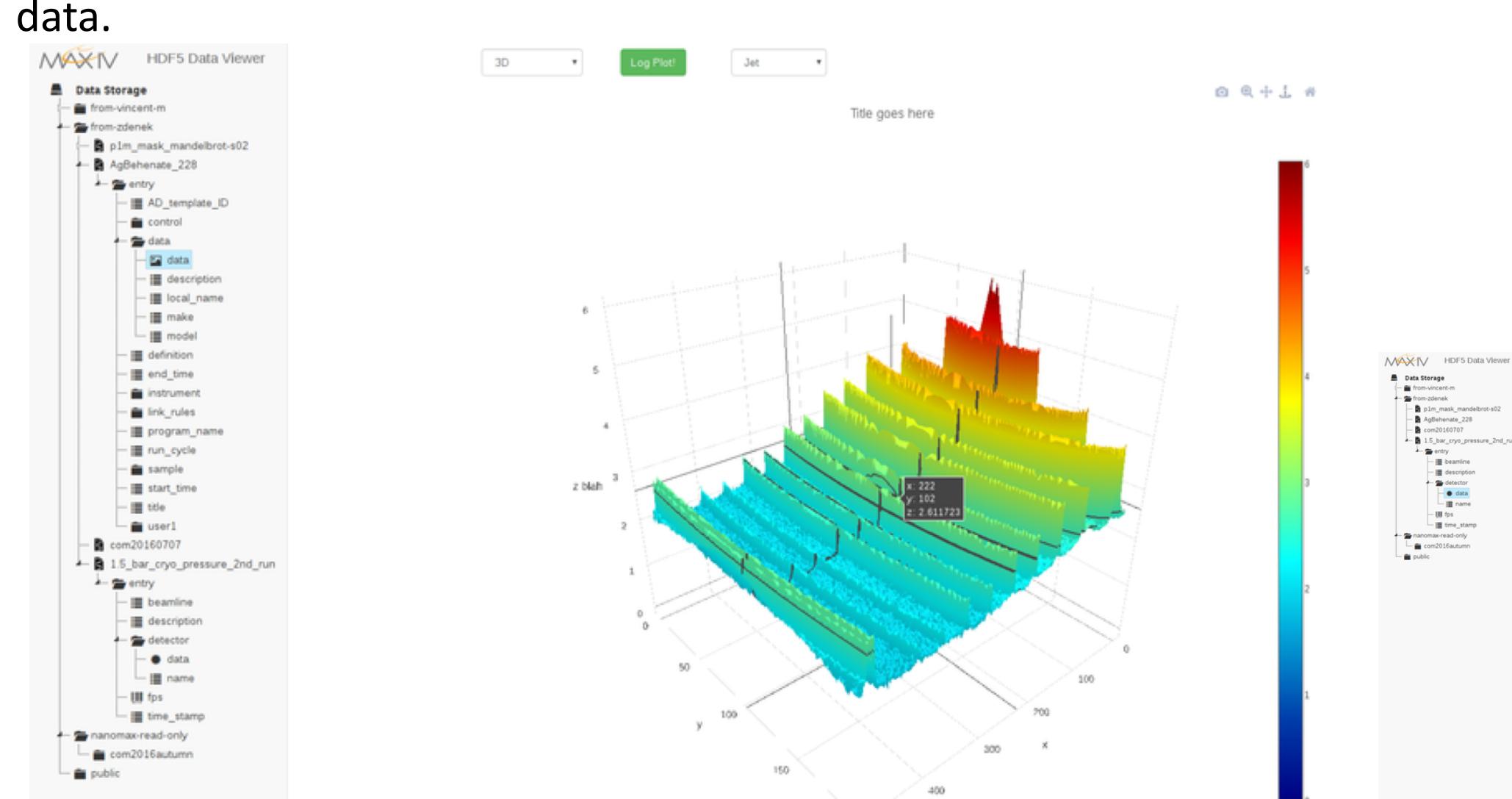
Built with Node.js, TangoJS is available in npm, making easier its integrations into any Node.js project.



## Data Access

### HDF5 Viewer

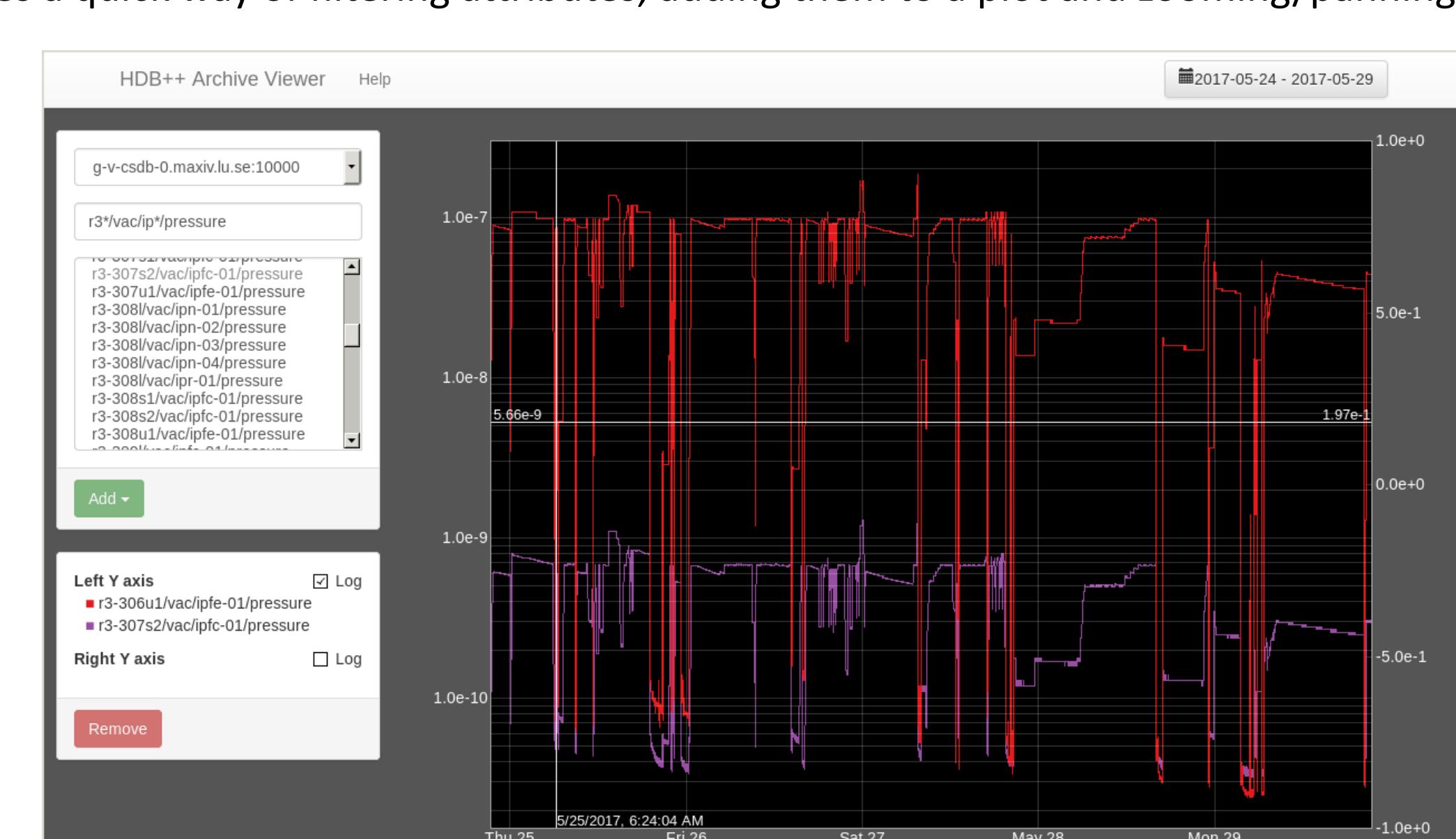
Based on a REST API web service, this application provides a quick inspection of the data taken, without the need to download or install any software, and allows in an easy way, the remote access and analysis of that data.



### HDB++ Viewer

This web interface provides a quick way of filtering attributes, adding them to a plot and zooming/panning the plot using the mouse.

There is also a date picker for more exact setting of time period. When the settings are changed, the front-end requests a new plot image via HTTP, and draws it.



## MAX IV Laboratory

MAX IV Laboratory has operated successfully for more than 30 years and is currently commissioning the new MAX IV synchrotron facility in Lund. Fully developed it will receive more than 2 000 scientists annually, from Sweden and the rest of the world. They will do research in areas such as materials science, structural biology, chemistry,

geology, physics and nanotechnology. MAX IV is the largest and most ambitious Swedish investment in national research infrastructure. It is the brightest source of x-rays worldwide and was inaugurated June 2016. MAX IV Laboratory is hosted by Lund University.