Grafana for WinCC OA based SCADA systems at CERN

CERN openlab summer student Lightning talk session

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The Problem

• The WinCC OA archiving solutions deployed at CERN, the RDB Archiver and its replacement the Next Generation Archiver (NGA), archive to Oracle databases.

• For visualising/monitoring the data, Grafana is a multi-platform open source analytics and interactive visualization web application for different data sources.

• Grafana(Open Source version) doesn’t support Oracle Database as data source
The Solution

• Grafana Enterprise? Not necessarily!

• Use a third party plugin, which connects any arbitrary backend to Grafana.

• We built a flask backend that connects to Oracle Database and provides access to the data stored in Database.
More Problems

• How should users define what Datapoint elements (DPEs) they want to retrieve?

• Oracle queries are sometimes slow. How to address this bottleneck?
But first.. What are Datapoint elements (DPEs)?

- DPEs represent the control signals, and a signal is an individual measurement for which changes are being archived.

- A example of a signal would be the current measured at a particular power junction.
More Solutions

• How should users define what DPEs they want to retrieve?
  - Use Grafana variables. Users provide schema and filter to retrieve intended DPEs.

• Oracle queries are slow. How to address this bottleneck?
  - Use in-memory caching or in-memory database for fast retrieval of DPEs.
Some screen captures!

Plotting Signal
Some screen captures!

Plotting Multiple Signals at once
### Some screen captures!

**Browse Alarms**

![Screen Capture of Alarms Table]

<table>
<thead>
<tr>
<th>Abbr.</th>
<th>Time</th>
<th>DPE</th>
<th>Alias</th>
<th>Text</th>
<th>Priority</th>
<th>Direction</th>
<th>Value</th>
<th>Ack.</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>2017-12-20 10:15:17</td>
<td>pSEN_1:psen-PSEN-PSEN_Managers-PSEN_Tag-derived_analog-14.delay-61.P</td>
<td>P</td>
<td>Bad</td>
<td>61</td>
<td>WENT</td>
<td>0</td>
<td>Yes</td>
</tr>
<tr>
<td>P</td>
<td>2017-12-07 10:34:03</td>
<td>pSEN_1:psen-PSEN-PSEN_Managers-PSEN_Tag-derived_analog-14.delay-61.P</td>
<td>P</td>
<td>Bad</td>
<td>61</td>
<td>WENT</td>
<td>0</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Deployment

• Openshift and Openstack
  - Reviewed deployment architecture for production systems with Openshift and Openstack along with required security standards.
  - Deployed the Datasource in Openshift along with automating the process of redeployments using CI/CD pipelines.
QUESTIONS?

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