Phoebus Alarm System
Micro Services for Logging and Management.
A good alarm system is one which helps users take correct actions.

- Identify the problems & the corrective actions
- Manageable alarm rate <150/day
- Help locating useful information
- Notify subject matter expert
- Determine patterns & trends
Alarm Server
Current Alarms: Acknowledged? Transient? Annunciated?

PV Updates (Channel Access, ...)

Tomcat
-Reports

JMS
Alarm Updates
Ack '; Config Updates

Alarm Cfg & State
RDB

Alarm Client GUI

Message RDB

JMS 2 RDB
JMS 2 Speech

LOG
TALK
ALARM_SERVER
ALARM_CLIENT

LOG Messages
Annunciations

PV Updates (Channel Access, ...)

IOCsg

BEAST
Alarm Logger Service
Alarm Message Logger

Motivation
To create a archive of all alarm state changes and associated actions

• Discover alarm patterns and trends
• Generate Statistical reports on alarms
• Debug the alarm system
Alarm Message Logger

The alarm message logger subscribes to all
• Configuration changes
   adding/removing or enabling/disabling
• State changes
   e.g. alarm state changes from OK to MAJOR
• Commands
   e.g. user actions to Acknowledge an alarm

All the above changes and commands are logged into a dedicated elastic index
Architecture

- Elasticsearch is a distributed, RESTful search and analytics engine.

- An analytics and visualization platform called Kibana

Build and Run

git https://github.com/shroffk/phoebus.git

cd services/alarm-config-logger

mvn exec:java
kibana client

A Timeseries view of phoebeus alarm server messages.

Filtered:
pvname
node/system
alarm serverity
kibana client
kibana client
CS-Studio/Phoebus client
Alarm Data Management

• The server can be configured to create a new index every day, week, month, or year

# The units of the indices date span: Days (D), Weeks(W), Months(M), Years(Y).
date_span_units=M

# The value of the indices date span.
# An integer value to be combined with the units. For example, if months were selected and the value set
to 2, each index would span 2 months.
date_span_value=1

• Searches can be performed across multiple indexes

http://localhost:9493/xf23id_opr_alarms_config_*/_search

• Elastic Curator
  An Index Lifecycle Management tool which manages the cleanup and deletion of cold indices
Alarm Configuration Service

Log all the configuration changes made to the alarm server configuration

Build and Run

git https://github.com/shroffk/phoebus.git

cd services/alarm-config-logger

mvn exec:java
Alarm Configuration Tree
# Configuration History

<table>
<thead>
<tr>
<th>Id</th>
<th>Message</th>
<th>Author</th>
<th>Authored Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>8367a50</td>
<td>Alarm config update /XF23ID_OPR/23-ID/Beam Monitor</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>167c5cc</td>
<td>Alarm config update /XF23ID_OPR/23-ID/Beam Monitor</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>ad473db</td>
<td>Alarm config update /XF23ID_OPR/23-ID-A/Vacuum</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>116f791</td>
<td>Alarm config update /XF23ID_OPR/23-ID-A/Utilities</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>398112e</td>
<td>Alarm config update /XF23ID_OPR/23-ID-A</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>aeb1775</td>
<td>Alarm config update /XF23ID_OPR/23-ID-2/Vacuum</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>ce96729</td>
<td>Alarm config update /XF23ID_OPR/23-ID-2/Utilities</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>db94929</td>
<td>Alarm config update /XF23ID_OPR/23-ID-2</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>e00bd93</td>
<td>Alarm config update /XF23ID_OPR/23-ID-1/Vacuum</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>705ed07</td>
<td>Alarm config update /XF23ID_OPR/23-ID-1/Utilities</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>b8e97da</td>
<td>Alarm config update /XF23ID_OPR/23-ID-1</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>03a090f</td>
<td>Alarm config update /XF23ID_OPR/23-ID/Control System/UPS</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>6936805</td>
<td>Alarm config update /XF23ID_OPR/23-ID/Control System/Smoke Detectors</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>aaebo60</td>
<td>Alarm config update /XF23ID_OPR/23-ID/Control System/Rack Temp Monitoring</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>176daa1</td>
<td>Alarm config update /XF23ID_OPR/23-ID/Control System/PDU</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>e497446</td>
<td>Alarm config update /XF23ID_OPR/23-ID/Control System/Leak Detection</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
<tr>
<td>h5n475</td>
<td>Alarm config update /XF23ID_OPR/23-ID/Control System/Computer Systems</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
</tr>
</tbody>
</table>
Configuration events

Repository: XF23D_OPR

<table>
<thead>
<tr>
<th>Id</th>
<th>Message</th>
<th>Author</th>
<th>Authored Date</th>
<th>Commit</th>
</tr>
</thead>
<tbody>
<tr>
<td>017b02</td>
<td>Alarm config update /XF23D_OPR/23-ID/Control System</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
<td>Kunal S</td>
</tr>
<tr>
<td>017b02</td>
<td>Alarm config update /XF23D_OPR/23-ID/Control System</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
<td>Kunal S</td>
</tr>
<tr>
<td>357b08</td>
<td>Alarm config update /XF23D_OPR/23-ID/Control System/Vacuum</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
<td>Kunal S</td>
</tr>
<tr>
<td>560b90</td>
<td>Alarm config update /XF23D_OPR/23-ID/Control System/Vacuum/XF_23ID1-VA/Dif_LockLck-CCG</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
<td>Kunal S</td>
</tr>
<tr>
<td>2eaa434</td>
<td>Alarm config update /XF23D_OPR/23-ID/Control System/Vacuum/XF_23ID1-VA/Dif_LockLck-CCG</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
<td>Kunal S</td>
</tr>
<tr>
<td>73d0764</td>
<td>Alarm config update /XF23D_OPR/23-ID/Control System/Vacuum/XF_23ID1-VA/Dif_LockLck-CCG</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
<td>Kunal S</td>
</tr>
<tr>
<td>65ce90</td>
<td>Alarm config update /XF23D_OPR/23-ID/Control System/Vacuum/XF_23ID1-VA/Dif_LockLck-CCG</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
<td>Kunal S</td>
</tr>
<tr>
<td>7af7d6</td>
<td>Alarm config update /XF23D_OPR/23-ID/Control System/Vacuum/XF_23ID1-VA/Dif_LockLck-CCG</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
<td>Kunal S</td>
</tr>
<tr>
<td>984ef0a</td>
<td>Alarm config update /XF23D_OPR/23-ID/Control System/Vacuum/XF_23ID1-VA/Dif_LockLck-CCG</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
<td>Kunal S</td>
</tr>
<tr>
<td>e900eb4</td>
<td>Alarm config update /XF23D_OPR/23-ID/Control System/Vacuum/XF_23ID1-VA/Dif_LockLck-CCG</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
<td>Kunal S</td>
</tr>
<tr>
<td>eadbe4</td>
<td>Alarm config update /XF23D_OPR/23-ID/Control System/Vacuum/XF_23ID1-VA/Dif_LockLck-CCG</td>
<td>Kunal Shroff</td>
<td>5 days ago</td>
<td>Kunal S</td>
</tr>
</tbody>
</table>

```json
{  "23-ID/Control System/Vacuum/XF_23ID1-VA/Dif_LockLck-CCG": 0,  "Kunal Shroff": 5 days ago,  "23-ID/Control System/Vacuum/XF_23ID1-VA/Dif_LockLck-CCG": 5 days ago}
```

```json
{  "23-ID/Control System/Vacuum/alarm_config.json": 0,  "Kunal Shroff": 5 days ago,  "23-ID/Control System/Vacuum/XF_23ID1-VA/Dif_LockLck-CCG": 5 days ago}
```
Restore Scripts

Each alarm configuration change results in the creation or an update to the config.xml file.

The config.xml can be directly imported into the alarm server to restore it to the alarm configuration to that instant.
Questions