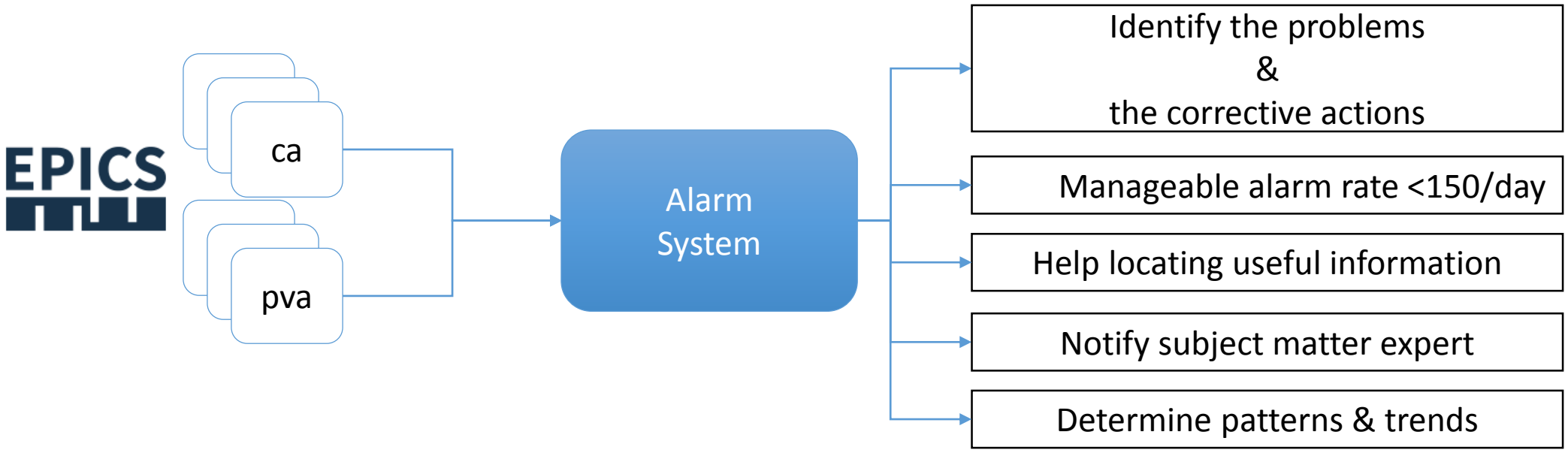
Phoebus Alarm System

Micro Services for Logging and Management.

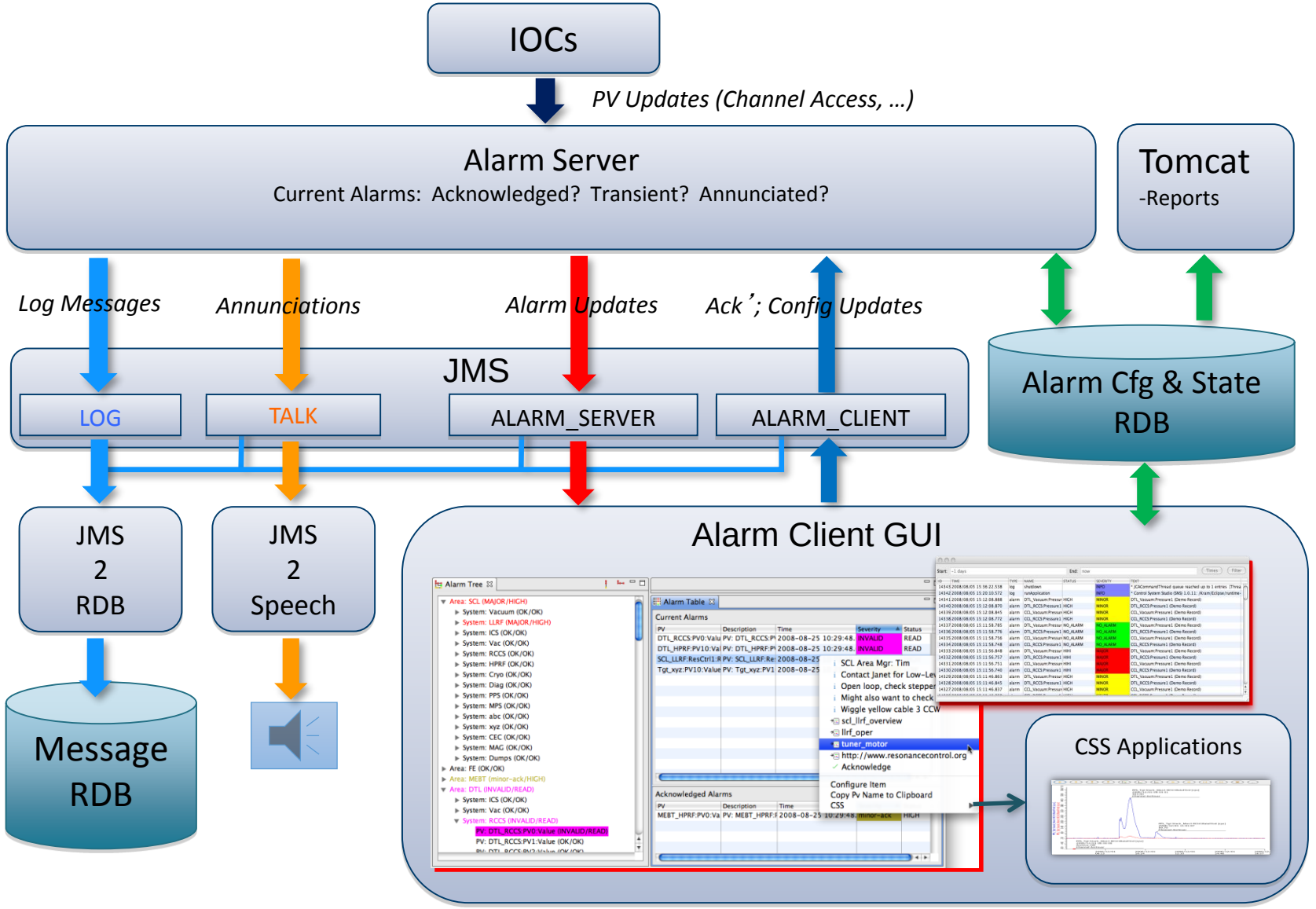
Alarm Philosophy

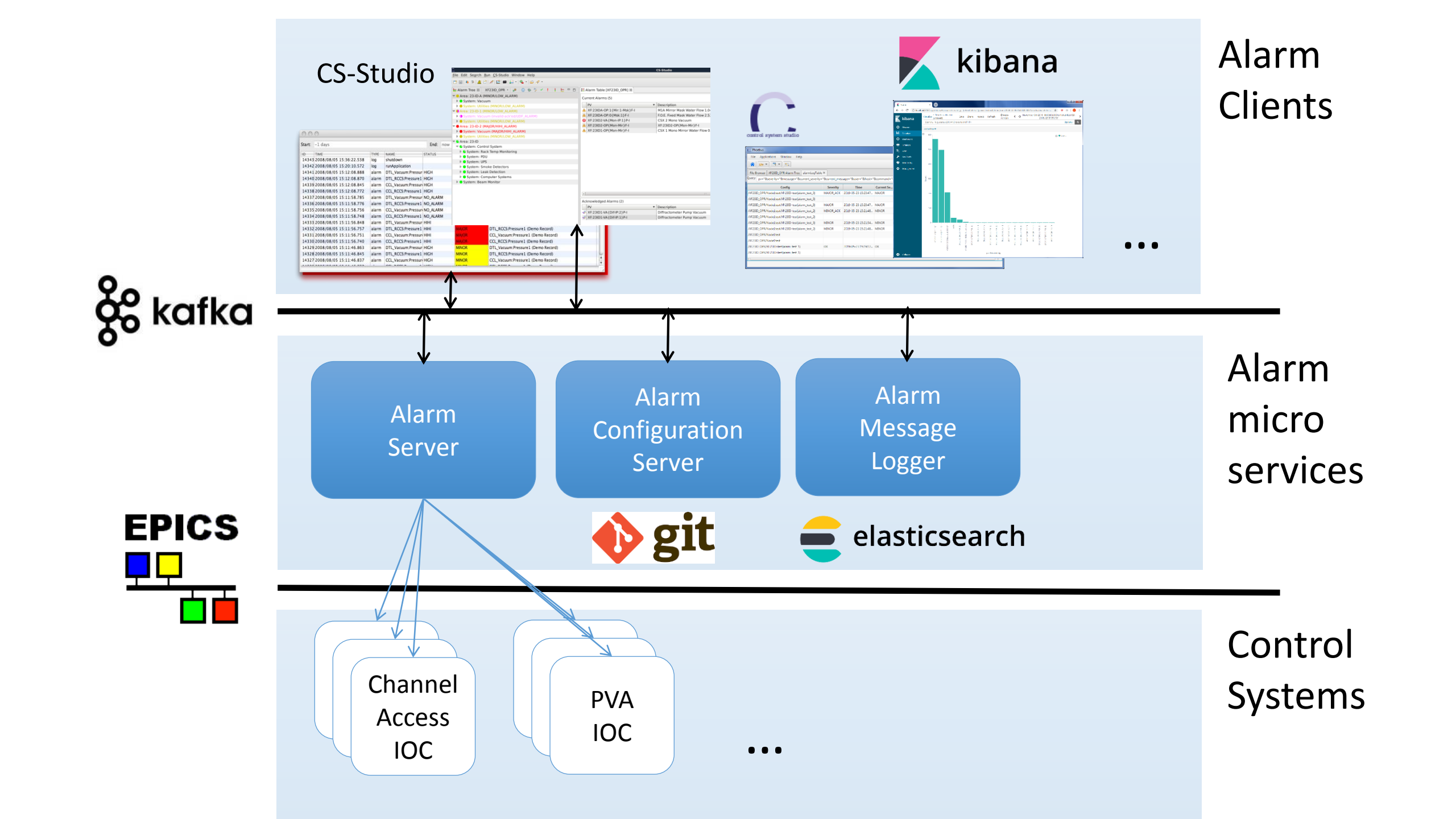
B. Hollifield, E. Habibi,
"Alarm Management:
Seven Effective Methods for Optimum Performance", ISA, 2007

A good alarm system is one which helps users take correct actions



BEAST


IOCs
PV Updates (Channel Access, …)
Alarm Server
Current Alarms: Acknowledged? Transient? Annunciated?
Tomcat
-Reports
Log Messages
Annunciations
Alarm Updates
Ack'; Config Updates
JMS
LOG
TALK
ALARM_SERVER
ALARM_CLIENT
Alarm Cfg & State RDB
JMS 2 RDB
JMS 2 Speech
Alarm Client GUI
Message RDB
CSS Applications


CS-Studio
kibana
Alarm Clients
...
kafka
Alarm Server
Alarm Configuration Server
Alarm Message Logger
Alarm micro services
git
elasticsearch
EPICS
Channel Access IOC
PVA IOC
...
Control Systems

Alarm Logger Service

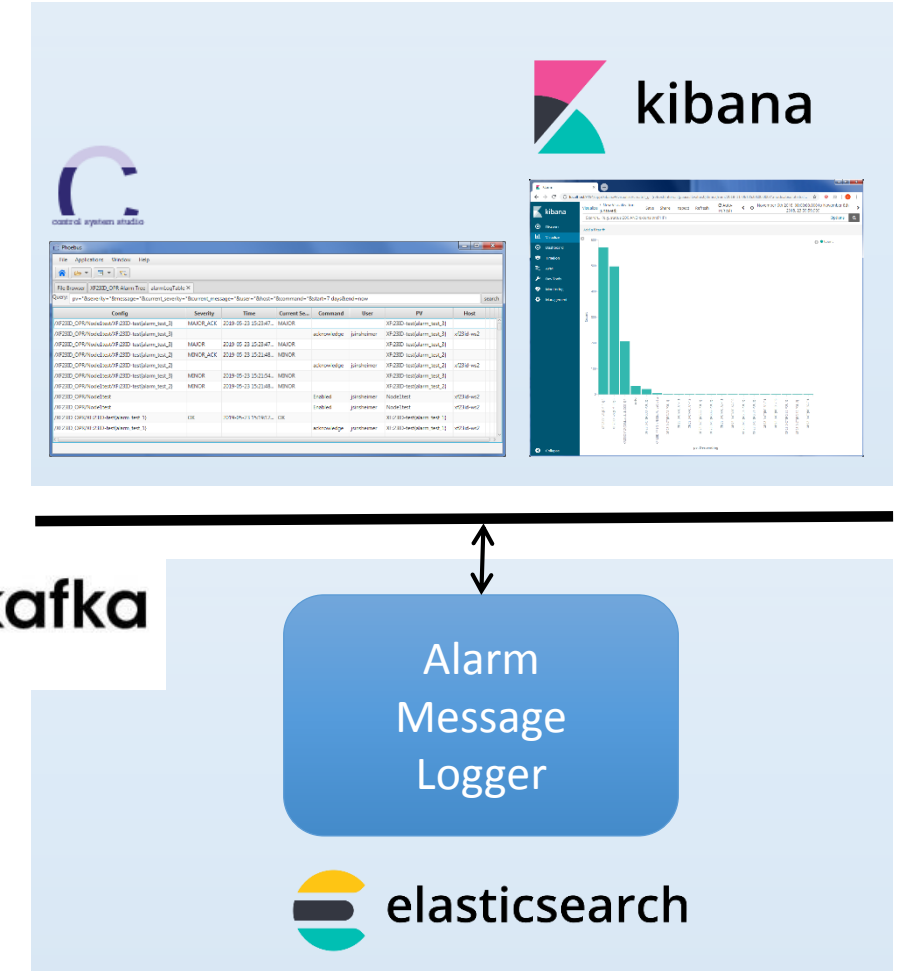
control system studio

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

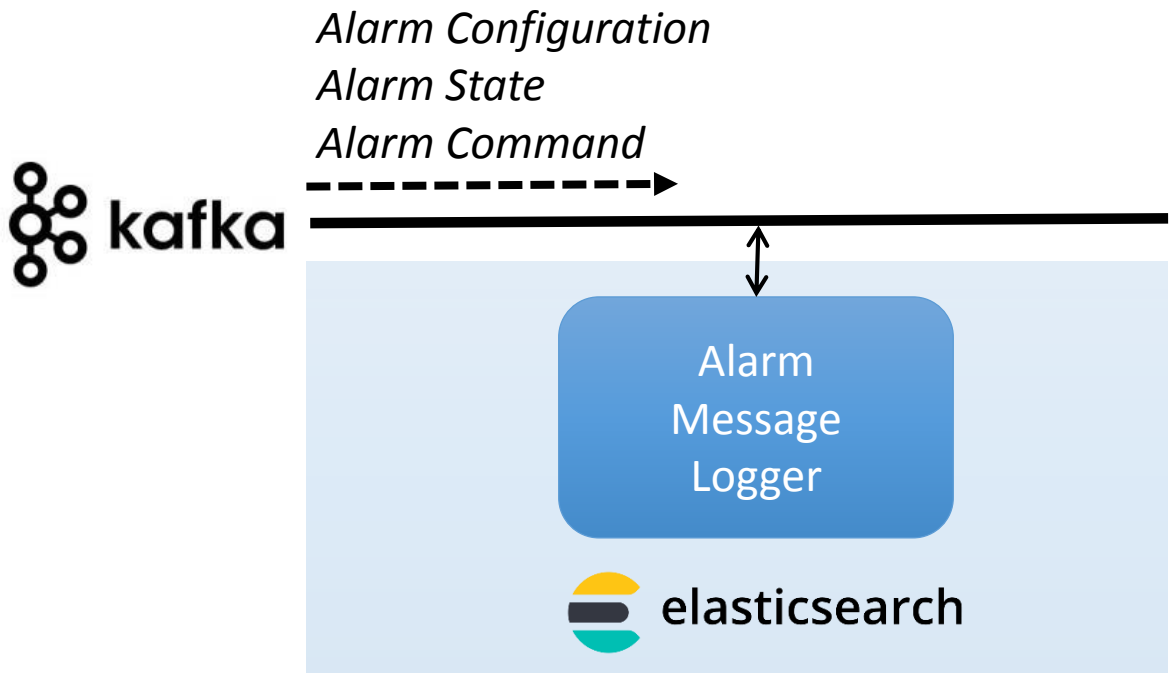


Alarm Message Logger

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



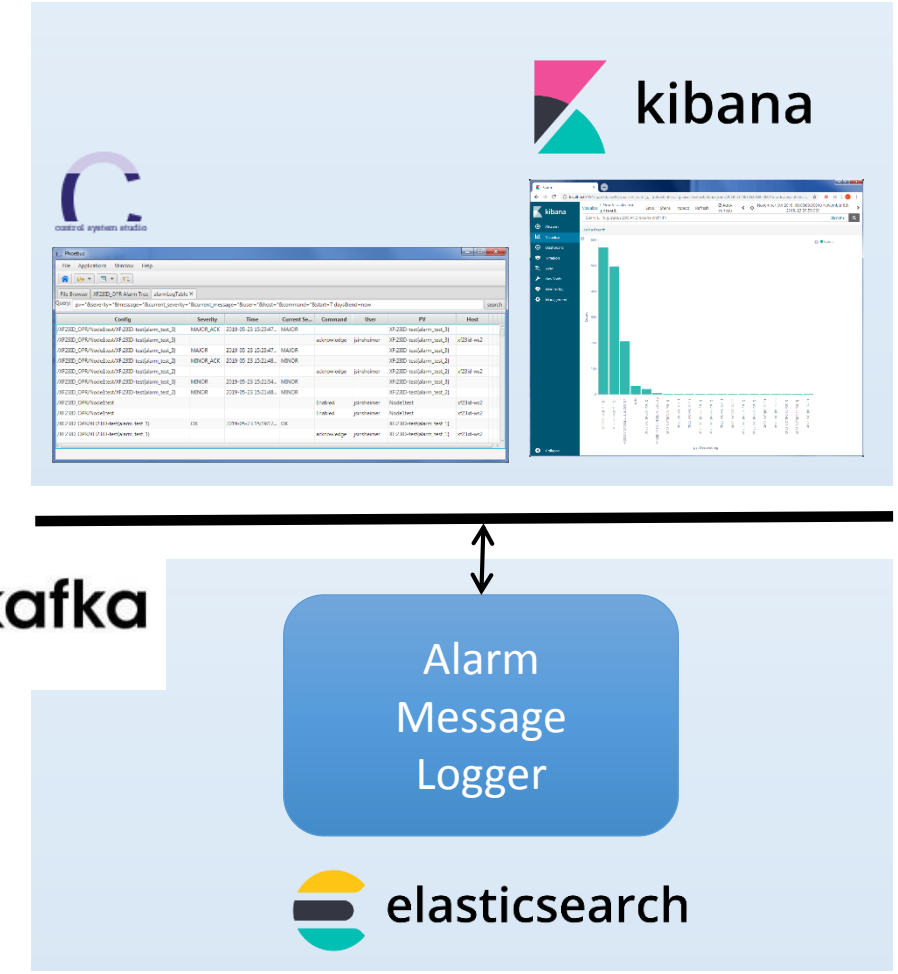
Architecture

elasticsearch

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

kibana

- 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

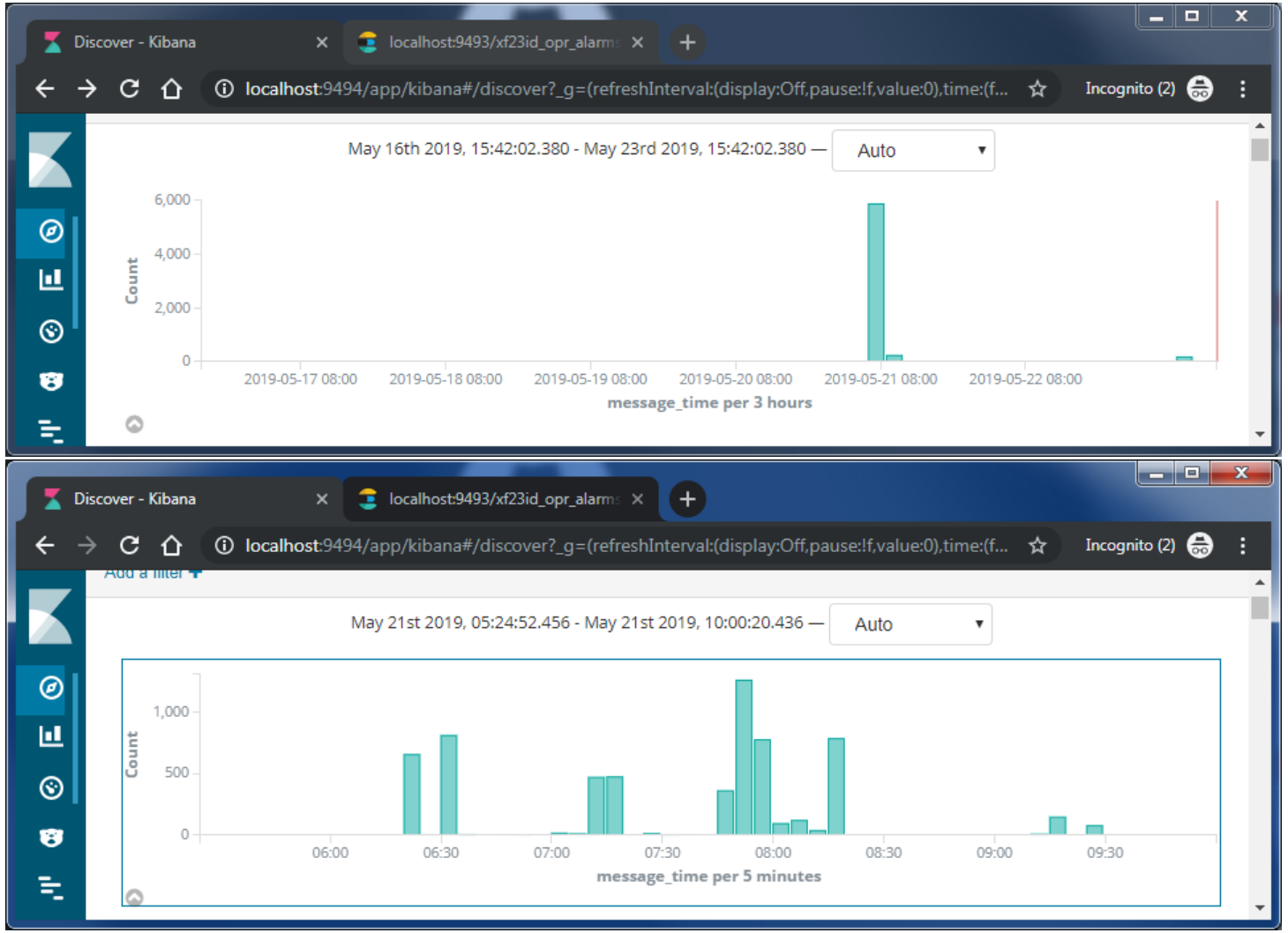
A Timeseries view of phoebus alarm server messages.

Filtered:

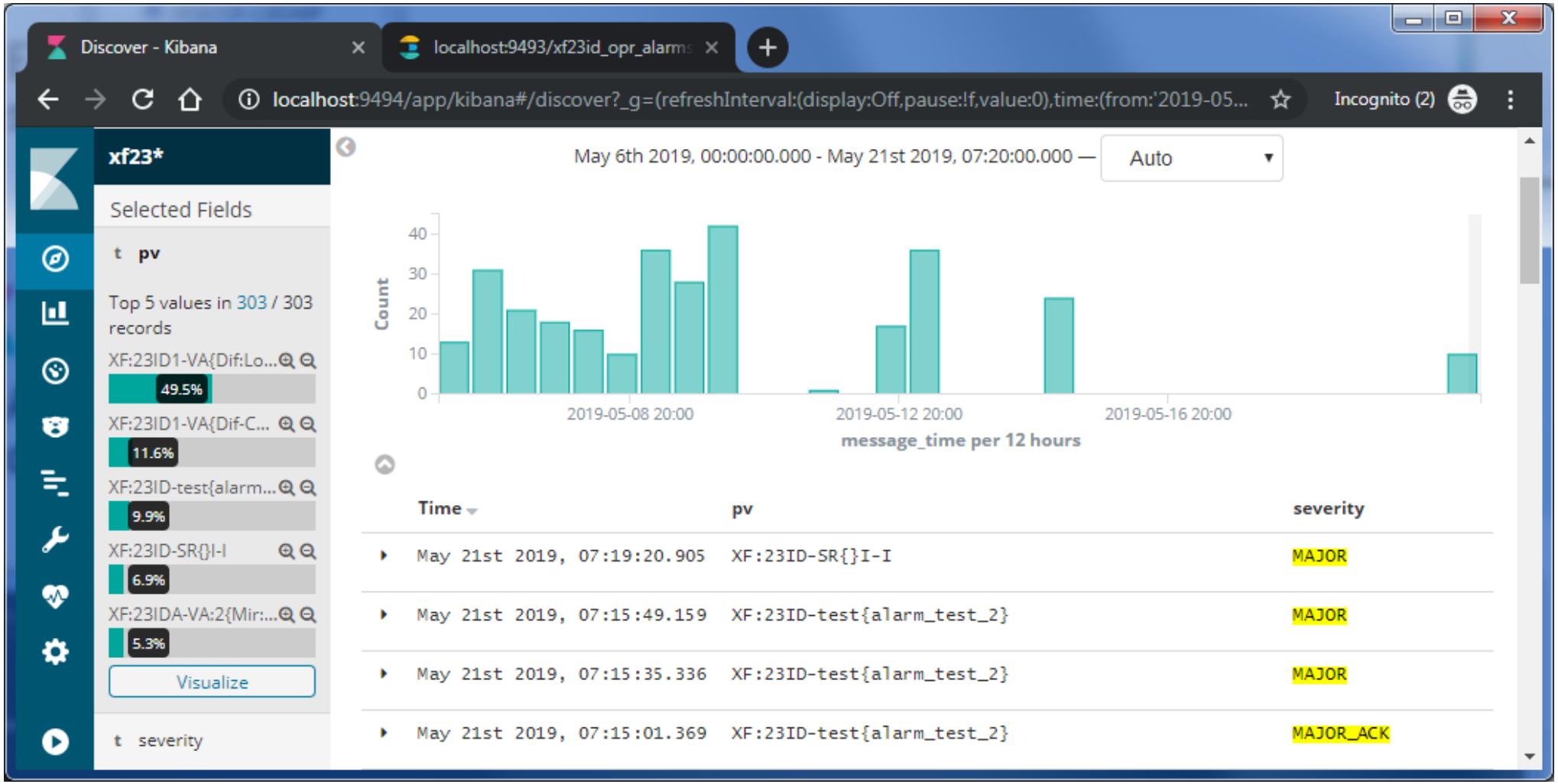
pvname

node/system

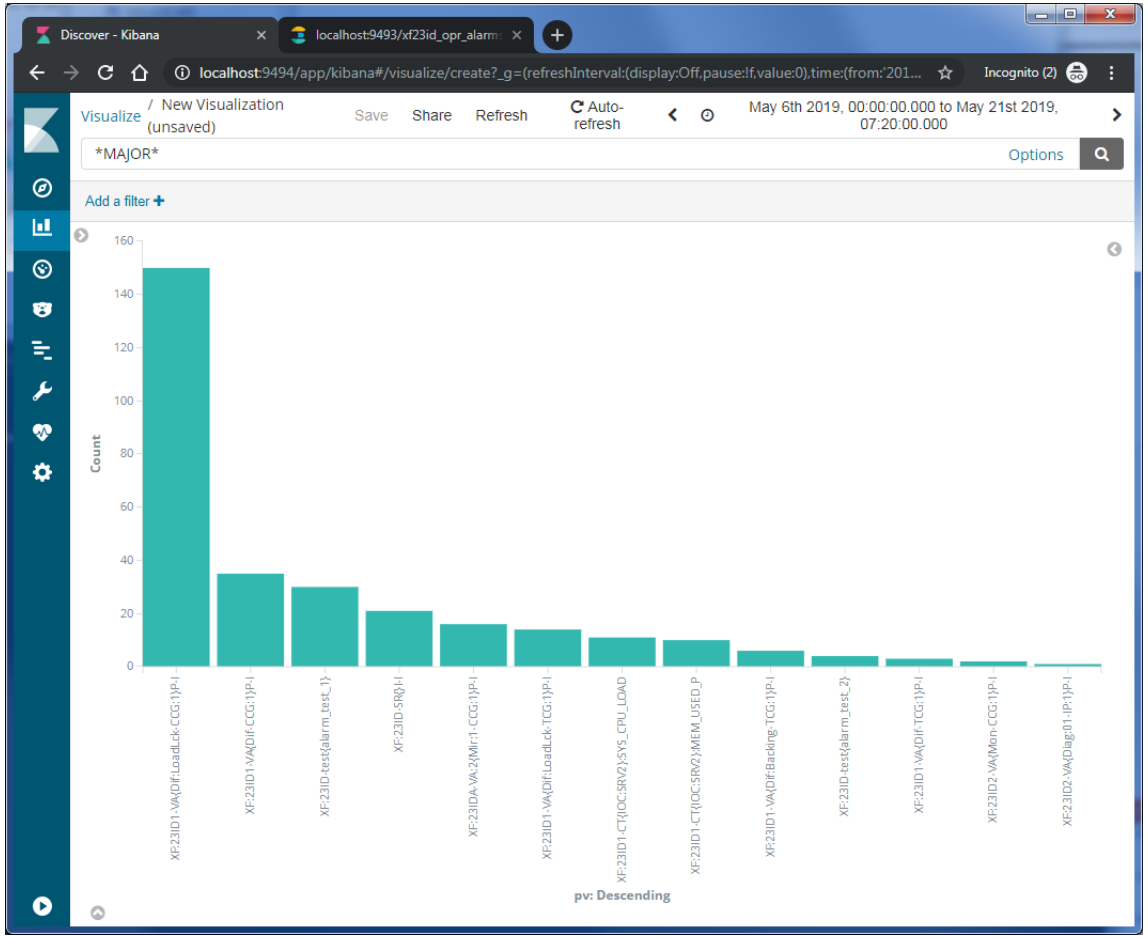
alarm serverity

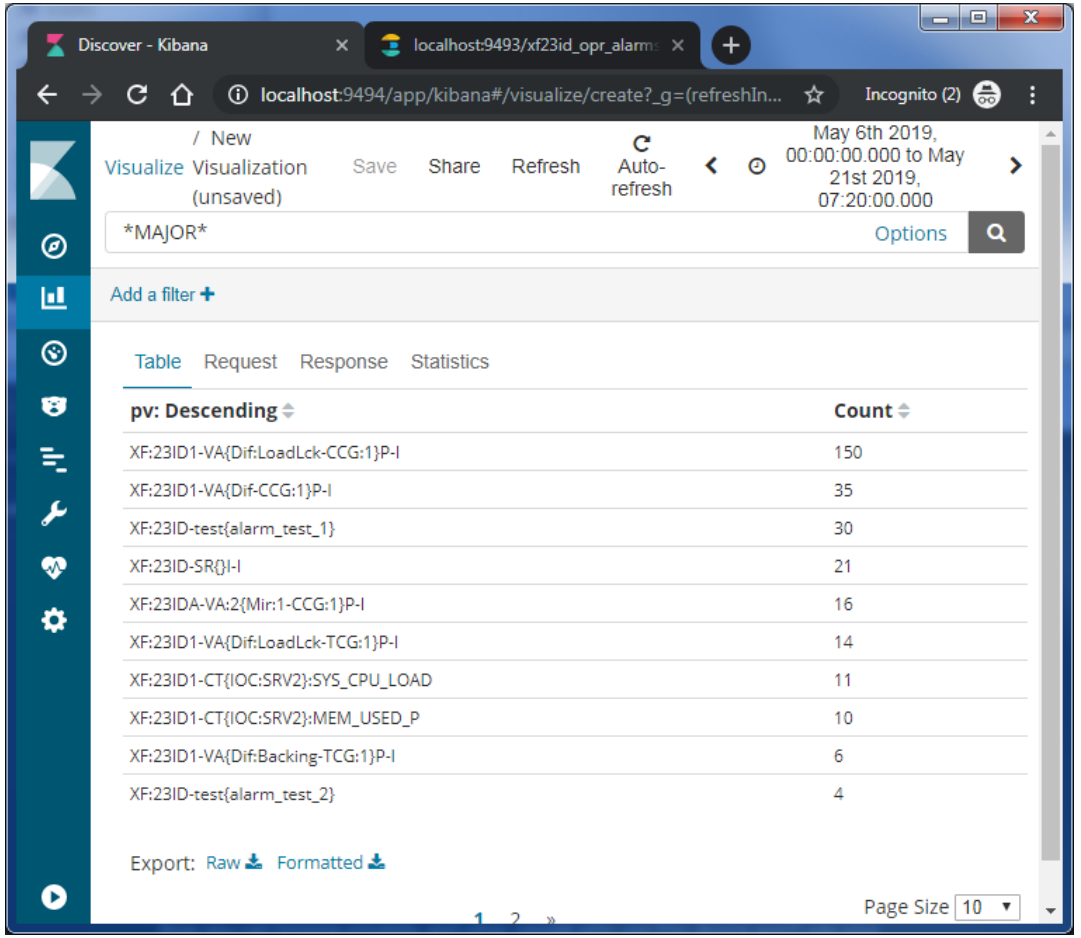


kibana client



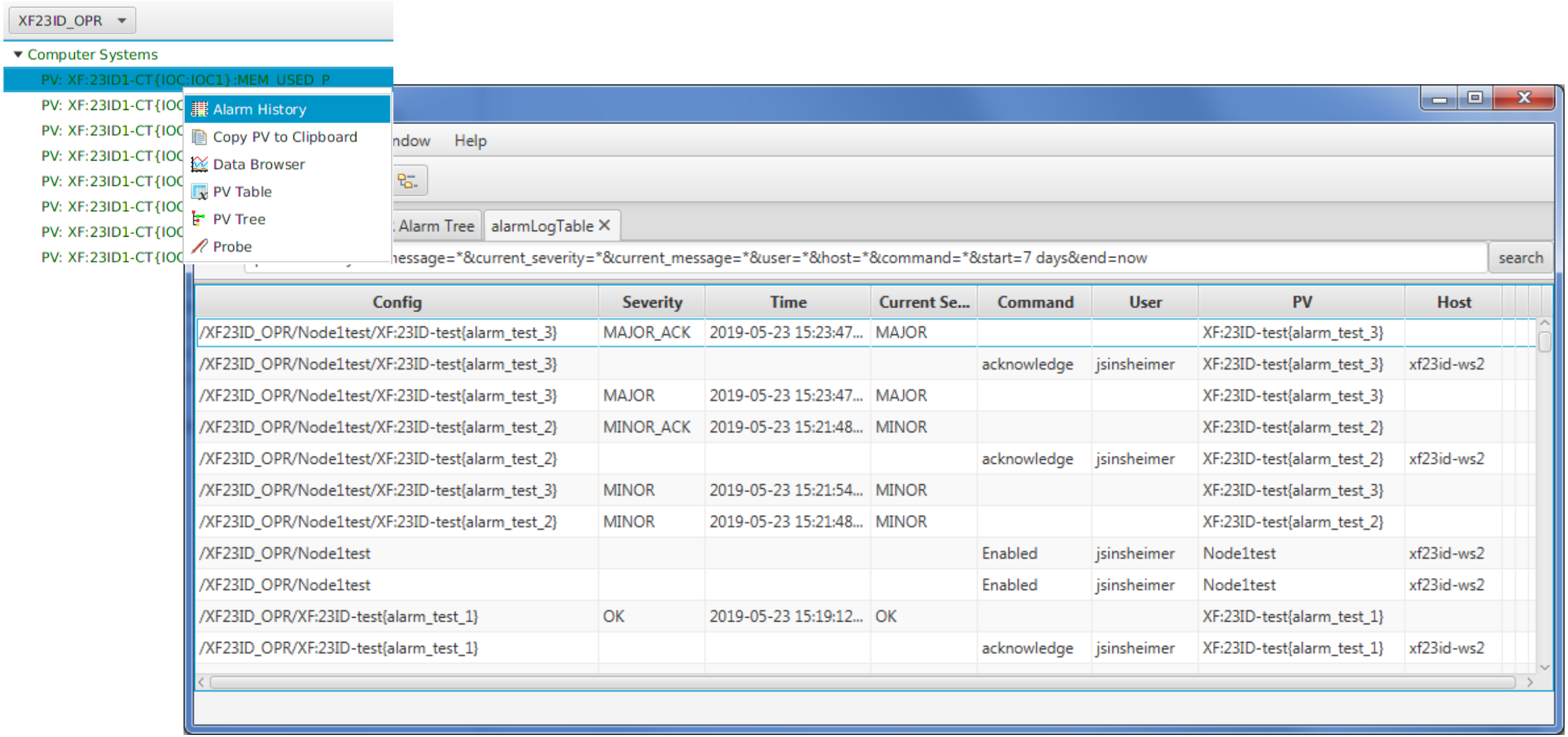
kibana client





pv: Descending	Count
XF:23ID1-VA{Dif:LoadLck-CCG:1}P-I	150
XF:23ID1-VA{Dif-CCG:1}P-I	35
XF:23ID-test{alarm_test_1}	30
XF:23ID-SR{}I-I	21
XF:23IDA-VA:2{Mir:1-CCG:1}P-I	16
XF:23ID1-VA{Dif:LoadLck-TCG:1}P-I	14
XF:23ID1-CT{IOC:SRV2}:SYS_CPU_LOAD	11
XF:23ID1-CT{IOC:SRV2}:MEM_USED_P	10
XF:23ID1-VA{Dif:Backing-TCG:1}P-I	6
XF:23ID-test{alarm_test_2}	4

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

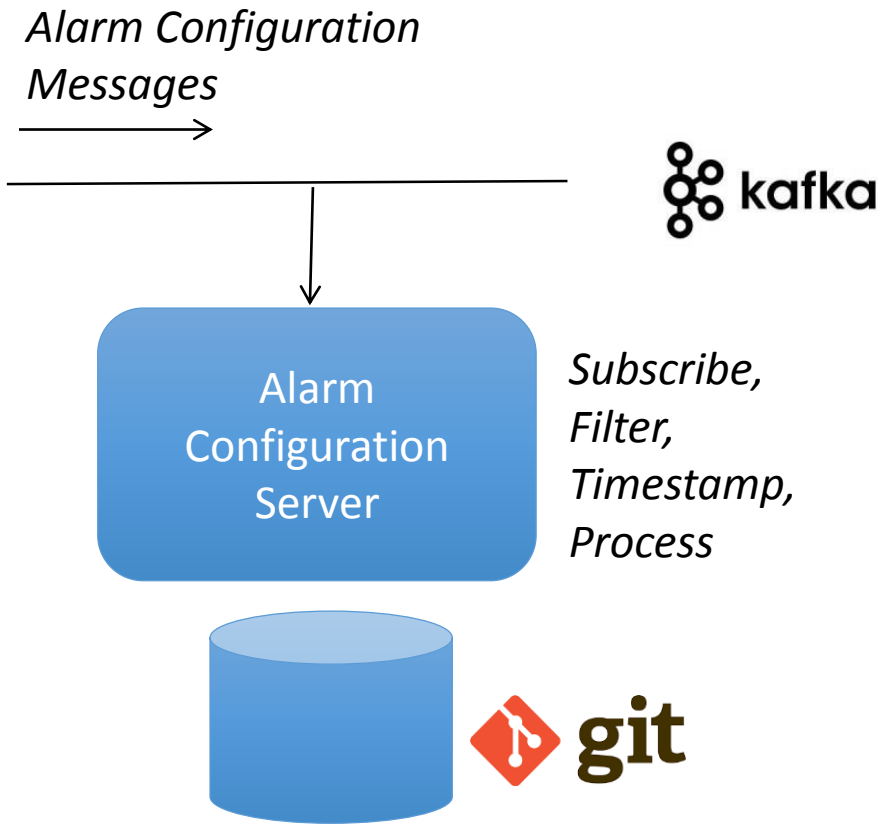
```
http://localhost:9493/xf23id_opr_alarms_config_*/_search
```

- Elastic Curator
  An Index Lifecycle Management tool which manages the cleanup and deletion of cold indices

Alarm Configuration Service

Alarm Configuration Service

Log all the configuration changes made to the alarm server configuration



Build and Run

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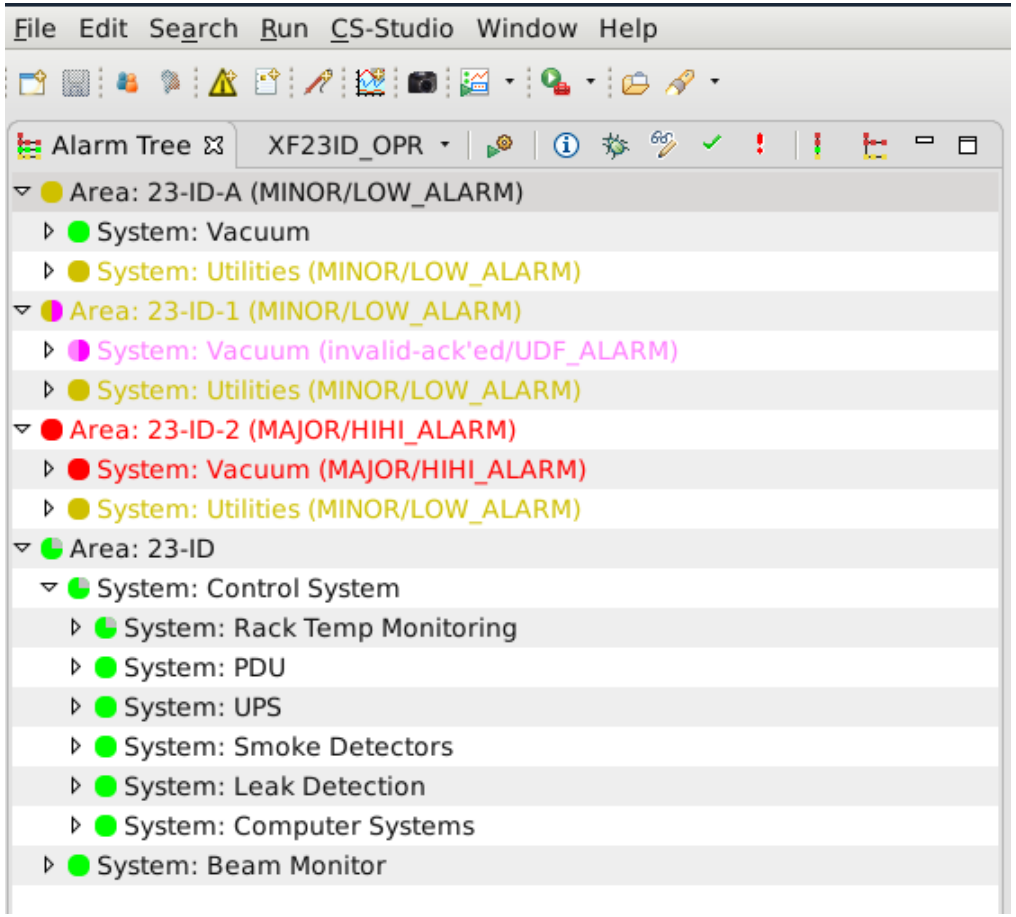
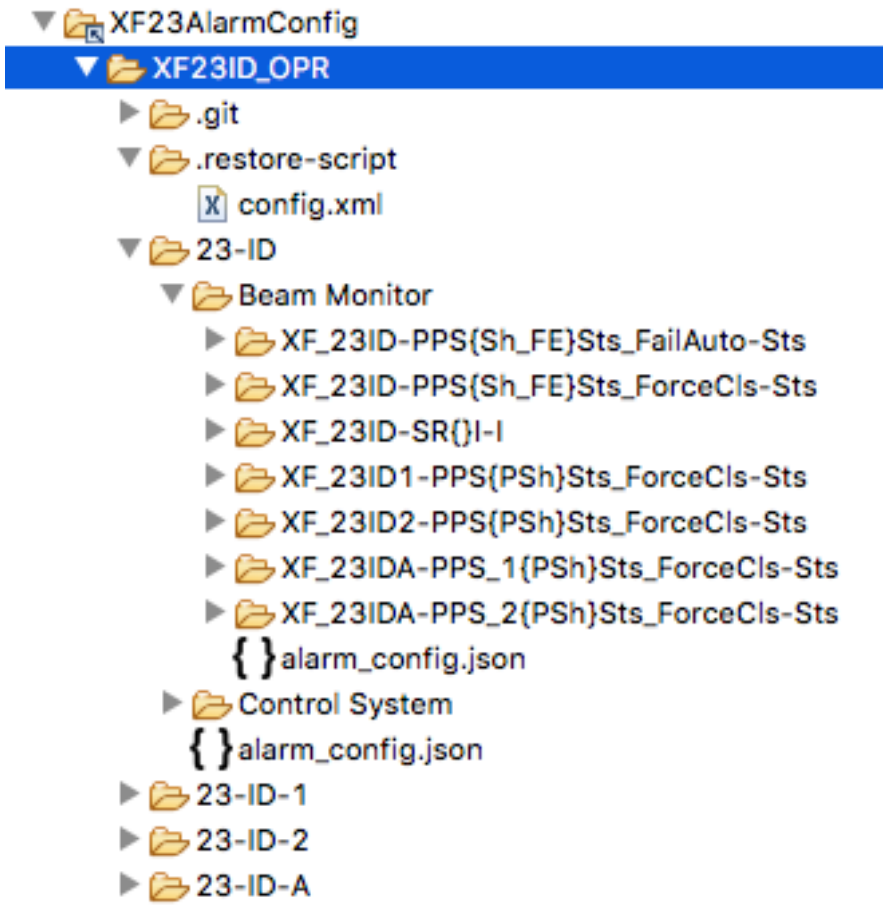
Alarm Configuration Tree





Configuration History

Id	Message	Author	Authored Date
8367a50	Alarm config update /XF23ID_OPR/23-ID/Beam Monitor	Kunal Shroff	5 days ago
167c5cc	Alarm config update /XF23ID_OPR/23-ID/Beam Monitor	Kunal Shroff	5 days ago
ad473db	Alarm config update /XF23ID_OPR/23-ID-A/Vacuum	Kunal Shroff	5 days ago
116f791	Alarm config update /XF23ID_OPR/23-ID-A/Utilities	Kunal Shroff	5 days ago
398112e	Alarm config update /XF23ID_OPR/23-ID-A	Kunal Shroff	5 days ago
aeb1775	Alarm config update /XF23ID_OPR/23-ID-2/Vacuum	Kunal Shroff	5 days ago
ce96729	Alarm config update /XF23ID_OPR/23-ID-2/Utilities	Kunal Shroff	5 days ago
db94929	Alarm config update /XF23ID_OPR/23-ID-2	Kunal Shroff	5 days ago
e00bd93	Alarm config update /XF23ID_OPR/23-ID-1/Vacuum	Kunal Shroff	5 days ago
705ed07	Alarm config update /XF23ID_OPR/23-ID-1/Utilities	Kunal Shroff	5 days ago
b8e97da	Alarm config update /XF23ID_OPR/23-ID-1	Kunal Shroff	5 days ago
03a090f	Alarm config update /XF23ID_OPR/23-ID/Control System/UPS	Kunal Shroff	5 days ago
6936805	Alarm config update /XF23ID_OPR/23-ID/Control System/Smoke Detectors	Kunal Shroff	5 days ago
aaeb060	Alarm config update /XF23ID_OPR/23-ID/Control System/Rack Temp Monitoring	Kunal Shroff	5 days ago
176daa1	Alarm config update /XF23ID_OPR/23-ID/Control System/PDU	Kunal Shroff	5 days ago
e497446	Alarm config update /XF23ID_OPR/23-ID/Control System/Leak Detection	Kunal Shroff	5 days ago

Configuration events

Repository: XF23ID_OPR

Id	Message	Author	Authored Date	Commi
0137b02	master HEAD Alarm config update /XF23ID_OPR/23-ID/Control System	Kunal Shroff	5 days ago	Kunal S
8971901	Alarm config update /XF23ID_OPR/23-ID/Control System/Vacuum	Kunal Shroff	5 days ago	Kunal S
3578b08	Alarm config update /XF23ID_OPR/23-ID/Control System/Vacuum	Kunal Shroff	5 days ago	Kunal S
57ed173	Alarm config update /XF23ID_OPR/23-ID/Control System/Vacuum/XF_23ID1-VA{Dif_L	Kunal Shroff	5 days ago	Kunal S
5a6bc90	Alarm config update /XF23ID_OPR/23-ID/Control System/Vacuum/XF_23ID1-VA{Dif_L	Kunal Shroff	5 days ago	Kunal S
2caa434	Alarm config update /XF23ID_OPR/23-ID/Control System/Vacuum/XF_23ID1-VA{Dif_L	Kunal Shroff	5 days ago	Kunal S
73d076a	Alarm config update /XF23ID_OPR/23-ID/Control System/Vacuum/XF_23ID1-VA{Dif_L	Kunal Shroff	5 days ago	Kunal S
301d6df	Alarm config update /XF23ID_OPR/23-ID/Control System/Vacuum	Kunal Shroff	5 days ago	Kunal S
55cce99	Alarm config update /XF23ID_OPR/23-ID/Control System/Vacuum	Kunal Shroff	5 days ago	Kunal S
7afc7d6	Alarm config update /XF23ID_OPR/23-ID/Control System/Vacuum	Kunal Shroff	5 days ago	Kunal S
964ef0a	Alarm config update /XF23ID_OPR/23-ID/Control System/Vacuum	Kunal Shroff	5 days ago	Kunal S
e9ebeb4	Alarm config update /XF23ID_OPR/23-ID-1/Vacuum/XF_23ID1-VA{Dif_LoadLck-TCG_	Kunal Shroff	5 days ago	Kunal S
ead4b54	Alarm config update /XF23ID_OPR/23-ID-1/Vacuum/XF_23ID1-VA{Dif_LoadLck-CCG_	Kunal Shroff	5 days ago	Kunal S

```
index 0000000..4101b8c
--- /dev/null
+++ "b/23-ID/Control System/Vacuum/XF_23ID1-VA\173Dif_LoadLck-CCG_
@@ -0,0 +1,5 @@
+{
+  "user" : "Kunal Shroff",
+  "host" : "KunalShroff-PC",
+  "description" : "XF:23ID1-VA{Dif:LoadLck-CCG:1}P-2"
+}
```

23-ID/Control System/Vacuum/XF_23ID1-VA{Dif_Loa

	Author	Authored Date
ol System	Kunal Shroff	5 days ago
ı	Kunal Shroff	5 days ago
ı	Kunal Shroff	5 days ago
ı/XF_23ID1-VA{Dif_L	Kunal Shroff	5 days ago
ı/XF_23ID1-VA{Dif_L	Kunal Shroff	5 days ago
ı/XF_23ID1-VA{Dif_L	Kunal Shroff	5 days ago
ı/XF_23ID1-VA{Dif_L	Kunal Shroff	5 days ago
ı	Kunal Shroff	5 days ago
ı	Kunal Shroff	5 days ago
ı	Kunal Shroff	5 days ago
ı	Kunal Shroff	5 days ago
A{Dif_LoadLck-TCG_	Kunal Shroff	5 days ago
A{Dif_LoadLck-CCG_	Kunal Shroff	5 days ago

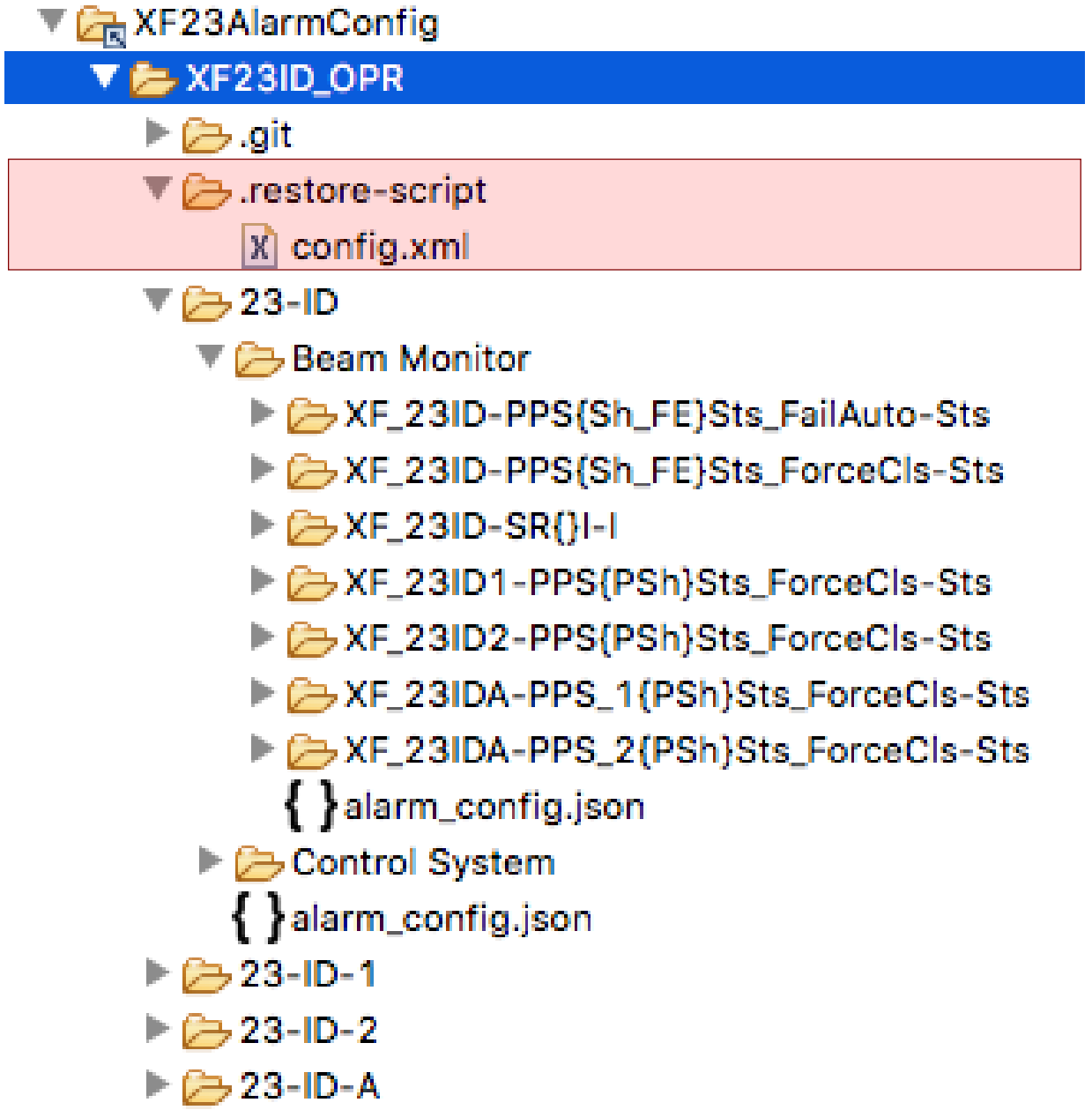
```
index 9acaef9..0000000
--- a/23-ID/Control System/Vacuum/alarm_config.json
+++ /dev/null
@@ -1,5 +0,0 @@
-{
-  "user" : "Kunal Shroff",
```

23-ID/Control System/Vacuum/alarm_config.json
23-ID/Control System/Vacuum/XF_23ID1-VA{Dif_LoadLck-CCG_
23-ID/Control System/Vacuum/XF_23ID1-VA{Dif_LoadLck-CCG_

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