Alarm notification system for P̄ANDA prototypes

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Reminder: DCS layout in Bochum

- Forward endcap calorimeter prototype "Proto192"

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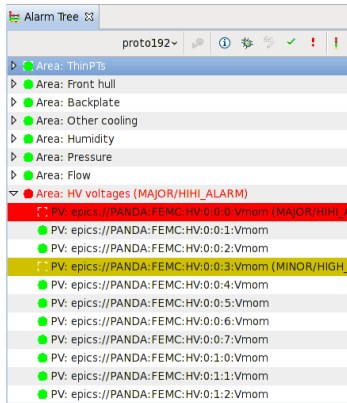
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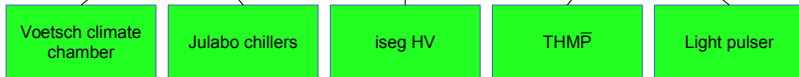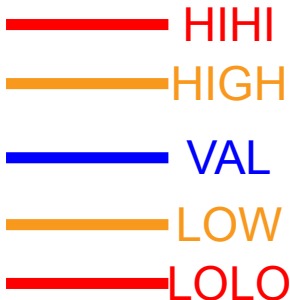
EPICS Alarm Handling

- Upper and lower boundaries for each numeric value
- Violation changes status of parameter
- No notification or action possible with EPICS alone

HIHI

HIGH

VAL

LOW

LOLO

BEAST: CSS Alarm Server

- Stand-alone application (not connected to CSS GUI)
- Based on Java and Eclipse Rich Client Platform (RCP)
- Subscribes to all EPICS process variables in its database
- Notifies its clients when alarm status changes
- User interface integrated into CSS GUI
  - Convenient display of detector (alarm) status
  - Acknowledge alarms if problem is taken care of
- Communication to clients via Java Message Service (JMS)
- Message broker for JMS (e.g. Apache ActiveMQ) required
- Native client libraries for many programming languages available (inter alia C, C++, Java, Perl, .net)
$\implies$ Write your own clients for specific tasks

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Usage Scenario

- DCS for $\overline{\text{P}}$ANDA prototypes also prototype for $\overline{\text{P}}$ANDA DCS
- Solution not only developed for $\overline{\text{P}}$ANDA control room, but needed now
    - Daily work with the prototype
    - Test beam setups
- Problem with daily work: No "shift crew"
- Long running experiments (e.g. cosmic runs)
- Lot of time wasted when devices (e.g. power supplies) fail unnoticed

Design Considerations

- Main principle: Draw attention to the problem
- For prototypes: Include the possibility that nobody is at the institute (e.g. nights, weekends)

$\implies$ "Three-strikes system"
1. Laboratory notifications
2. Desktop notifications
3. E-mail notifications

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Laboratory Notifications
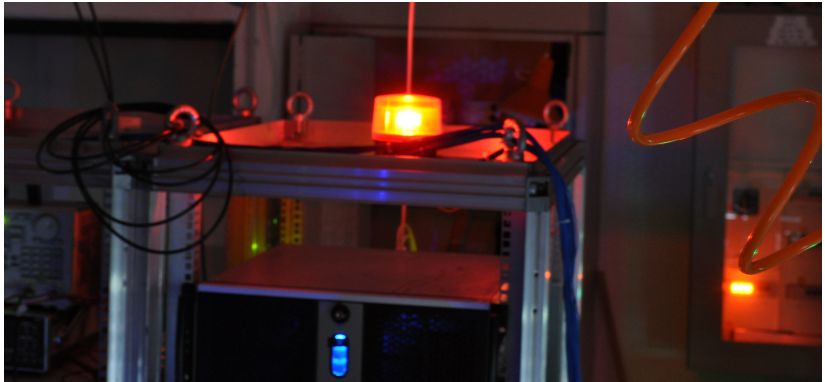
- Red flash light on top of the rack
- Started within seconds after an alarm fired
- Notify staff in the lab (may have caused the alarm)

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Desktop Notifications

⚠ **Proto192 Alarm**   ✕

Alarm on this/these PV(s):

PANDA:FEMC:EXAMPLE:VAL1:DEMO
PANDA:FEMC:EXAMPLE:VAL2:DEMO
PANDA:FEMC:EXAMPLE:VAL3:DEMO
PANDA:FEMC:EXAMPLE:VAL4:DEMO

- Small C++/Qt-based application running on office PCs
- No dependency on Eclipse RCP or CSS
- Communication with alarm server via network (JMS)
- Displays notification when alarm occurs
- Configurable delay, typically several minutes
- Beamtime version: Opto-acoustic alarm by playing a video in a frame-less window (cannot be "clicked away")

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E-mail Notifications

[Ep1epicsalarm] Proto192 Alarm

Von:	Proto192 Alarm System <ep1epicsalarm@ep1.ruhr-uni-bochum.de>
An:	Proto192 Alarm Mailing List <ep1epicsalarm@ep1.ruhr-uni-bochum.de>
Datum:	Dienstag 18:36:44

Hello,

the following PV(s) triggered an alarm:

PANDA:FEMC:VME1:C1:FanSpeed
PANDA:FEMC:VME1:C2:FanSpeed
PANDA:FEMC:VME1:C3:FanSpeed
PANDA:FEMC:VME1:LV:C3:Vmom

Please remember to acknowledge the alarms if you go solving the problem.

Your Proto192 Alarm Service

- E-mail to mailing list
- Everyone is informed, even if not at the institute
- Delay also configurable, current value at EP1: 10 minutes
- E-mail shows names of all PVs that currently have a problem
- Acknowledged alarms are not listed
- Internal spam protection: Every alarm reported only once

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Source Code Repository

- Source code licensed under GNU General Public License v3
- Repository publicly available on GitHub:
  https://github.com/ttrubep1/AlarmNotifications
- Read access for everyone, source code can be obtained via a
  simple git clone --recursive
- Accounts on GitHub are free of charge if working only on
  free/open source software
- You can fork the repsository and work on your own version
- Sophisticated collaboration features (e.g. wiki, issue tracker,
  pull requests)

Binary Packages

- Open Build Service (OBS, http://openbuildservice.org) tool to create packages for many distributions from one source
- Interface inspired by svn and git
- Packages for AlarmNotifications currently available for
    - openSUSE 13.1, 13.2, Tumbleweed
    - Scientific Linux 6 and 7
    - Fedora 19 and 20
- Support for Debian-based distros planned, but they have another build system (DEB instead of RPM)
- Homepage:
  http://ep1.rub.de/~tobias/alarmnotifications/

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Excursus: EPICS packages and VM appliances

- EPICS, Asyn, StreamDevice, Sequencer, IOC and drivers also packaged using OBS
- Reduce maintenance effort
- Standardize software distribution
- Primarily built for use at EP1, but you can use/fork/clone them, of course: https://build.opensuse.org/project/show/home:ttrubep1:pandadcs
- EP1 has been asked to provide EPICS "turnkey solution" to another $\overline{P}$ANDA group
$\implies$ Create a virtual machine appliance from basic Linux, OBS EPICS packages, and some configuration files

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- EPICS- and CSS-based alarm notification system for day to day work with $\overline{P}$ANDA prototypes
- System installed in Bochum since July 2014
$\implies$ It works! ☺

- Alarm daemon and desktop applet have modular design
- Dependencies only on C++, Qt and ActiveMQ for C++
- Software available to other $\overline{P}$ANDA groups
- If you have a question, write me an e-mail:
  tobias@ep1.ruhr-uni-bochum.de

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The End

Thank you
for your
attention!