

AlarmHandler

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What's new

- Deployed in Elettra and Fermi control systems. All legacy alarms migrated to the new system
- alarm-manager device developed
- new GUI developed
- Bugs fixed
- Moved to Elettra gitlab:
<https://gitlab.elettra.eu/cs/ds/alarm-handler>
- Moved to cmake build system
- Added build and functional tests in gitlab CI pipeline

Deployment in Elettra and Fermi

- Migration from legacy alarm system
 - 2 legacy alarm devices in Elettra and 1 in Fermi
 - Legacy alarm names: domain/family/member/name
 - alarm-handler alarms are attributes, device name is part of alarm name
- Ex. ***ecpsbsa2-1/power_supply/psb1_b/fault*** converted to
device=***alarm/booster/power_supply***, alarm=***psb1_b_fault***

ELETTRA

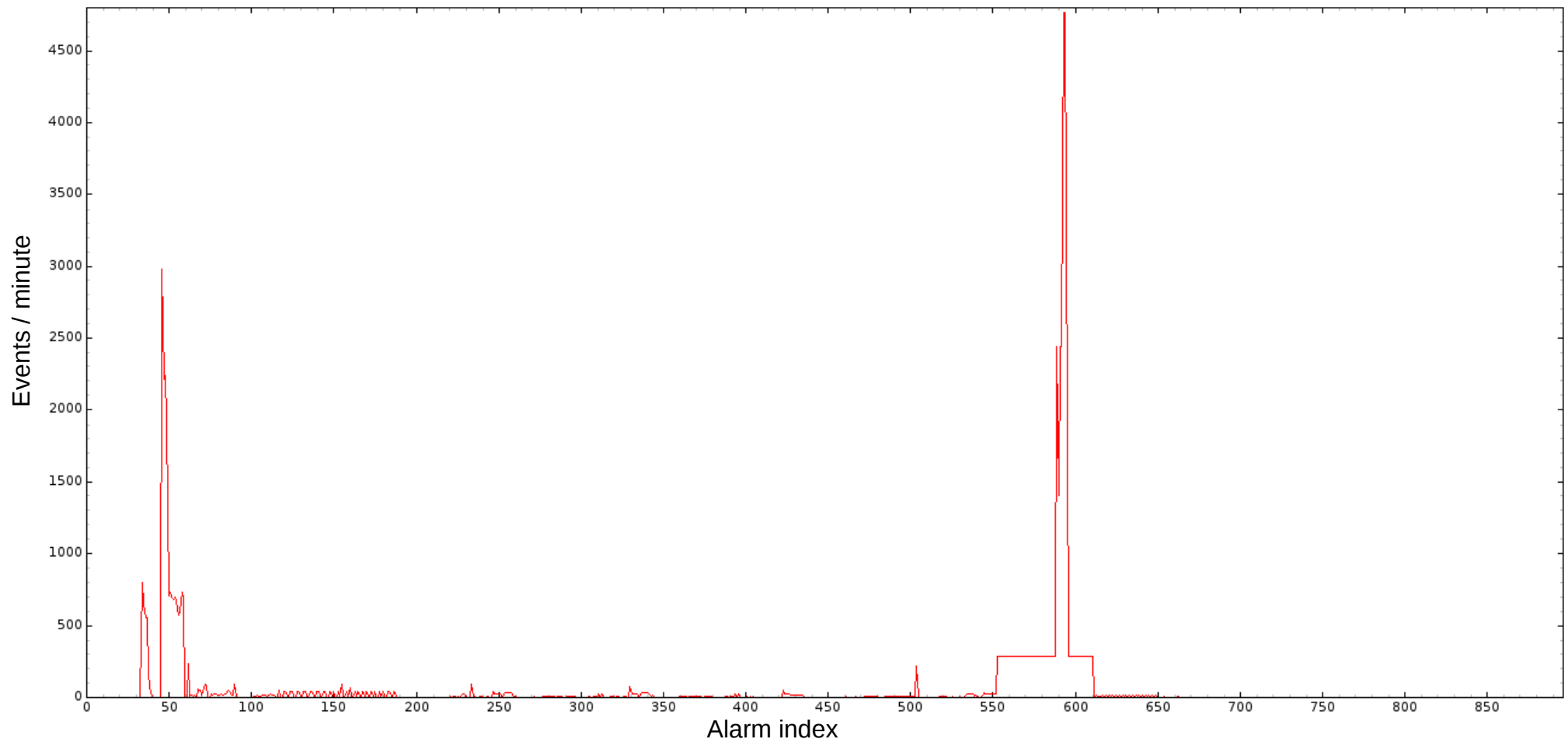
- **26** alarm-handler devices
- **1224** alarm rules managed by Control Room GUI
- **7** alarm rules sending only email notifications

FERMI

- **22** alarm-handler devices
- **897** alarm rules managed by Control Room GUI
- **415** alarm rules sending only email notifications

Deployment in Elettra and Fermi

- Fermi: around 60000 formula evaluated per minute
- Elettra: around 23000 formula evaluated per minute





alarms are configured in attribute properties

- One property per alarm property
- Can be modified offline
- ReLoadAll command (or restart/init of the device) to be reloaded
- Online loading/modification through Load/Modify commands

Jive 7.21 [srv-tango-srf-01:20000] (su pc-scalamera)

File Edit Tools Filter

Server: /alarm-handler-srv/mod/AlarmHandler/alarm/mod/0/Attribute properties/hv_kg01_fault

Property name	Value
enabled	1
formula	{kg01/mod/hv/voltageset > 5 && kg01/mod/hv/voltage < 1}
group	gr_ctrl
message	FAULT Mod 1: VoltageSet > 5 and Voltage < 1
off_command	
off_delay	0
on_command	
on_delay	120
priority	high
shlvd_time	-1
tag	hv_kg01_fault

Server Device Class Alias Att. Alias Property

feedback infra interlock laser mod AlarmHandler alarm/mod/0 Properties Polling Event Attribute config Pipe config Attribute properties hv_kg01_fault hv_kg02_fault hv_kg03_fault

AlarmManager

Purpose:

- Collect state/statistics from several AlarmHandlers
- Simplify configuration:
 - Allows to browse and configure alarm properties as attributes
 - Makes it possible to move an alarm from one handler device to another
 - Makes it possible to configure archiving in HDB++

AtkPanel 5.4 : alarm/manager/fermi (su pc-scalamera)

File View Preferences Help

alarm/manager/fermi

alarm/manager/fermi

At least one alarm present

tag	pt100_kg01.01_temperature
formula	(kg01/climate/pt100_kg01.01/Temperature > 32.0)
message	Allarme T rack LLRF KG01, aprire porte rack e contattare reperibile S-Band
priority	high
group	gr_climate
shlvd_time	-1
on_delay	0
off_delay	0
on_command	
off_command	
enabled	<input checked="" type="checkbox"/>
handler	tango://srv-tango-srf-01.fcs.elettra.trieste.it:20000/alarm/fermi/climate
url	
default_archiver	<input checked="" type="checkbox"/>
archiver	archiving/hdb++archiver/alarm
strategy	ALWAYS

Scalar alarmList alarmFrequency handlerStatus

AlarmHandler

Alarm-ng GUI

- QT interface based on Cumbia libraries
- Takes the list of alarm-handler devices from Tango free properties
- Displays active alarms, disabled alarms, alarm history
- Displays detailed information (configuration, current attribute values and statistics) of active alarms
- Notifies and displays communication errors toward alarm-handlers as alarms

AlarmHandler

Alarm-ng GUI

Alarm [ng]

Alarm [0] Disabled Alarms [6] History Test

Date/Time	Alarm	Status	Ack	Level	Sil. min.	Device	Message
Fri Aug 27 15:28:28 2021	3hc_cold_box_valve	ALARM	ACK	high	-1	alarm/sr/3hc	3HC: cold box valve aperture < 5.
Fri Aug 27 15:28:28 2021	3hc_lcv705_closed	ALARM	ACK	high	-1	alarm/sr/3hc	3HC: valvola LCV705 chiusa.
Fri Aug 27 15:28:28 2021	hel3hc_s11_turb1_fault	ALARM	ACK	high	-1	alarm/sr/3hc	helial 3hc: helial turbine fault.
Fri Aug 27 15:28:28 2021	hel3hc_s11_turb2_fault	ALARM	ACK	high	-1	alarm/sr/3hc	helial 3hc: helial turbine fault.
Fri Aug 27 15:27:59 2021	pscew_s4_ps_fault	ALARM	ACK	low	-1	alarm/sr/power_supply	alimentatore bobine correzione
Fri Sep 3 09:50:42 2021	topup_fault	NORMAL	NACK	lowest	-1	alarm/sr/feedback	FAULT TopUP
Fri Sep 3 03:16:40 2021	topup_rf_ramp_disable	NORMAL	NACK	lowest	0	alarm/sr/feedback	TopUp ON but RF ramp disabled

tag 3hc_cold_box_valve
state ACKED
message "3HC: cold box valve aperture < 5."
url
formula (sr/devmapper/3hc/lcv705 < 5)
values sr/devmapper/3hc/lcv705: 0
quality ATTR_VALID
enabled 1
shelved 0
ack 1
audible 0
counter 157
freq_counter 45
on_delay 0
off_delay 0
priority high
shlvd_time -1
shlvd_end -1
group gr_3hc

3HC: cold box valve aperture < 5.

Info Stop Beep Acknowledge All

Different colors
for different priorities

Collects alarms from
many handler
devices

Detailed information
and current attribute
values

AlarmHandler

Alarm-ng GUI

Alarm [ng]

Alarm [0] Disabled Alarms [4] History Test

Date/Time	Alarm	Status	Ack	Level	Sil. min.	Device	Message
Fri Sep 3 10:36:16 2021	vgsrg_pfe_f01.01_alarm	ALARM	ACK	high	0	alarm/fermi/vacuum	Pressione troppo alta su I0 monit...
Thu Sep 2 15:04:33 2021	linkstabilizer_kgsp.01_fault	ALARM	ACK	high	-1	alarm/fermi/timing	Mod Spare: LinkStabilizer FAULT
Thu Sep 2 15:04:26 2021	fvlv_mbd_fel01.01_closed	ALARM	ACK	high	-1	alarm/fermi/vacuum	FAST VALVE is not open
Thu Sep 2 15:04:26 2021	fvlv_mbd_fel02.01_closed	ALARM	ACK	high	-1	alarm/fermi/vacuum	FAST VALVE is not open
Thu Sep 2 15:04:09 2021	pstrmcw_fel01.02_fault	ALARM	ACK	high	-1	alarm/fermi/power_supply	PS fault
Thu Sep 2 15:03:52 2021	pdu_rc_kg03_01_temperature	ERROR	ACK	high	0	alarm/fermi/pdu	Event exception for'kg/pdu/pdu-r...
Fri Sep 3 15:56:26 2021	mscr_f_alarm	NORMAL	NACK	medium	-1	alarm/fermi/diagnostics	Maximum number of camera rea...

tag	pdu_rc_kg03_01_temperature
state	ERROR
message	"Temperature out of range"
url	
formula	((kg/pdu/pdu-rc-kg03-01/temperature < 20.0 kg/pdu/pdu-rc-kg03-01/temperature > 29.0) && kg/pdu/pdu-rc-kg03-01/temperature>0 && 0)
values	Desc: "Event exception for'kg/pdu/pdu-rc-kg03-01/temperature' error=cannot extract, no data in DeviceAttribute object " Origin: "FORCED_EVAL" Reason: "FORMULA_ERROR"
quality	ATTR_INVALID
enabled	1
shelved	0
ack	1
audible	0
counter	0
freq_counter	0
on_delay	600
off_delay	0
priority	high
shlvd_time	60
shlvd_end	0
group	gr_climate
on_command	
off_command	

FAST VALVE is not open

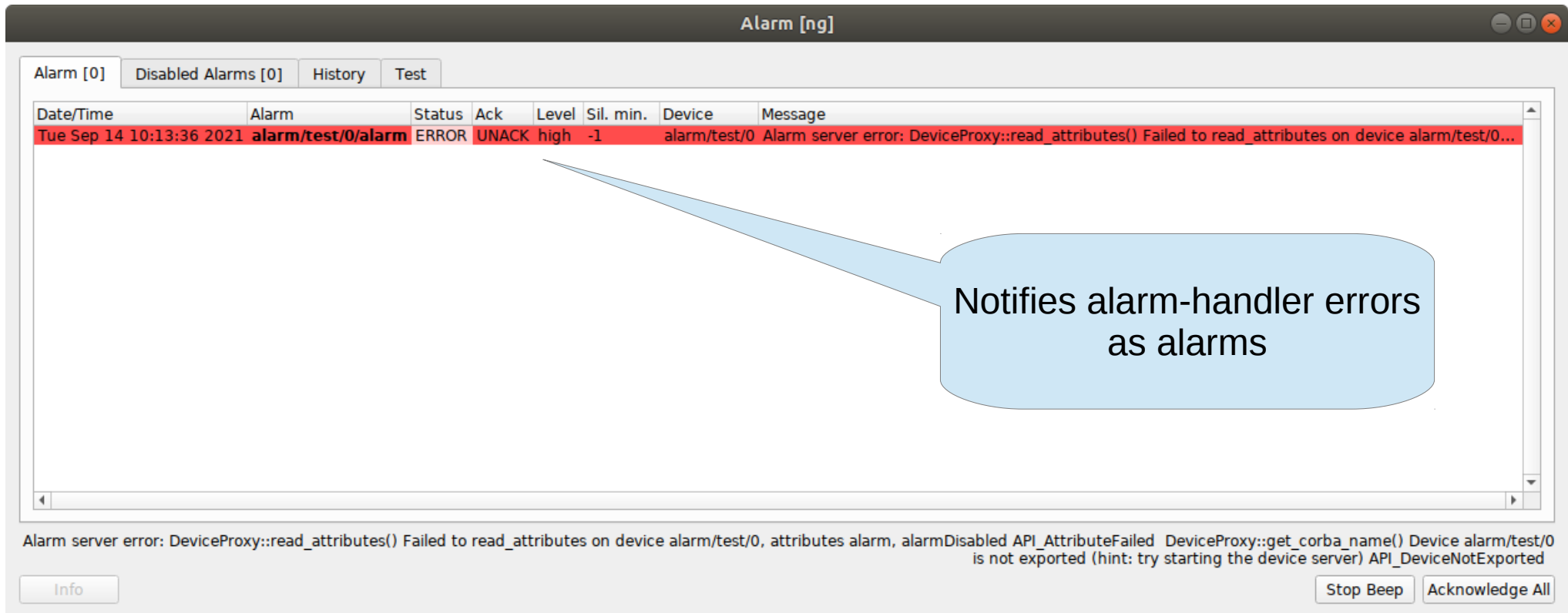
Info Stop Beep Acknowledge All

Notifies Tango Errors as alarms

Tango Exception displayed in the values field

AlarmHandler

Alarm-ng GUI



The screenshot shows the Alarm-ng GUI window titled "Alarm [ng]". It has tabs for "Alarm [0]", "Disabled Alarms [0]", "History", and "Test". The "Alarm [0]" tab is active, displaying a table with the following data:

Date/Time	Alarm	Status	Ack	Level	Sil. min.	Device	Message
Tue Sep 14 10:13:36 2021	alarm/test/0/alarm	ERROR	UNACK	high	-1	alarm/test/0	Alarm server error: DeviceProxy::read_attributes() Failed to read_attributes on device alarm/test/0...

A blue callout bubble points to the error message in the table, containing the text: "Notifies alarm-handler errors as alarms".

At the bottom of the window, there is a detailed error message: "Alarm server error: DeviceProxy::read_attributes() Failed to read_attributes on device alarm/test/0, attributes alarm, alarmDisabled API_AttributeFailed DeviceProxy::get_corba_name() Device alarm/test/0 is not exported (hint: try starting the device server) API_DeviceNotExported". Below this message are three buttons: "Info", "Stop Beep", and "Acknowledge All".

AlarmHandler

Alarm-ng GUI

Alarm [ng]

Alarm [0] Disabled Alarms [3] History Test

Date/Time	Alarm	Status	Ack	Level	Sil. min.	Device	Message
Fri Jul 16 11:44:37 2021	softintlk_p1_stateflags_1	OOSRV	NACK	medium	-1	alarm/booster/preinj	Situazione anomala sul modul...
Fri Jul 16 11:44:37 2021	softintlk_p2_stateflags_1	OOSRV	NACK	medium	-1	alarm/booster/preinj	Situazione anomala sul modul...
Mon Aug 30 09:40:59 2021	psb_bts_alarm	OOSRV	NACK	low	-1	alarm/booster/power_supply	PS alarm.

OutOfService and Shelved alarms in Disabled tab

tag: softintlk_p1_stateflags_1
 state: ERROR
 message: "Situazione anomala sul modulatore 1: trigger thyatron assente e HV alta. Se permane l'anomalia fra 15 minuti verra' sp...
 url: http://elog/topic.asp?TOPIC_ID:5847
 formula: (p/mod/softintlk_p1/stateflags[1] == 1)
 Desc: "Event exception for 'p/mod/softintlk_p1/stateflags' error=The polling (necessary to send events) for the attribute...
 values: Origin: "p/mod/softintlk_p1/stateflags"
 Reason: "Event_ERROR"
 quality: ATTR_INVALID
 enabled: 0
 shelved: 0
 ack: 0
 audible: 0
 counter: 0
 freq_counter: 0
 on_delay: 0
 off_delay: 0
 priority: medium
 shld_time: -1
 shld_end: -1
 group: gr_preinj
 on_command
 off_command

Info Stop Beep Acknowledge All

AlarmHandler

Alarm-ng GUI

Alarm [ng]

Alarm [0] Disabled Alarms [6] History Test

Date/Time	Alarm	Status
2021-09-03 09:50:42.008	[tom] alarm/sr/feedback/topup_fault	RETURNED NORMAL
2021-09-03 09:44:33.509	[tom] alarm/sr/feedback/topup_fault	ALARM UNACK
2021-09-03 03:16:40.942	[tom] alarm/sr/feedback/topup_rf_ramp_disable	RETURNED NORMAL
2021-09-02 05:32:31.009	[tom] alarm/sr/feedback/topup_fault	RETURNED NORMAL
2021-09-02 05:26:22.009	[tom] alarm/sr/feedback/topup_fault	ALARM UNACK
2021-08-31 18:37:49.141	[tom] alarm/sr/feedback/sdo_fault	NORMAL
2021-08-31 18:35:11.676	[tom] alarm/sr/interlock/diodebpm_s3_verinterlockrisk	NORMAL
2021-08-31 18:35:06.844	[tom] alarm/sr/feedback/gof_status_gofnoton	NORMAL
2021-08-31 18:33:12.103	[tom] alarm/sr/feedback/gof_status_gofnoton	ALARM ACKED
2021-08-31 18:33:12.102	[tom] alarm/sr/feedback/topup_rf_trigger_absent	NORMAL
2021-08-31 17:10:39.129	[tom] alarm/sr/feedback/gof_status_gofnoton	ALARM UNACK
2021-08-31 17:04:10.428	[tom] alarm/sr/feedback/topup_rf_trigger_absent	RETURNED NORMAL
2021-08-31 17:04:07.641	[tom] alarm/sr/feedback/topup_rf_trigger_absent	ALARM UNACK
2021-08-31 17:02:13.266	[tom] alarm/sr/rf/cavity_s9.1_low_vlt	NORMAL
2021-08-31 17:01:27.531	[tom] alarm/sr/interlock/diodebpm_s2_verinterlockrisk	NORMAL
2021-08-31 16:58:44.427	[tom] alarm/sr/rf/cavity_s09.01_vlt	NORMAL
2021-08-31 16:52:13.028	[tom] alarm/sr/rf/cavity_s09.01_vlt	ALARM ACKED
2021-08-31 16:52:13.028	[tom] alarm/sr/rf/cavity_s9.1_low_vlt	ALARM ACKED
2021-08-31 16:52:13.028	[tom] alarm/sr/rf/g021_txa_s09_v_grid	NORMAL
2021-08-31 16:52:13.028	[tom] alarm/sr/rf/g021_txb_s09_v_grid	NORMAL
2021-08-31 16:52:13.028	[tom] alarm/sr/rf/alarm_txa_s9_tube	NORMAL
2021-08-31 16:52:13.027	[tom] alarm/sr/rf/alarm_txb_s9_tube	NORMAL

Configure History Parameters

Last Week

From: 9/3/21 4:03 PM To: 9/3/21 4:03 PM Update

Filter

Name Clear Status ☐ ALARM

FAULT TopUP

Info

History is queried from HDB++

AlarmHandler

Gitlab CI

Docker images from SKA

Build stage:
Build alarm handler and
test device using CMake

Test stage:

- runs Tango DB
- configures devices with Dsconfig
- runs devices
- performs tests with PyTango scripts

```
image:
  name: nexus.engageska-portugal.pt/ska-docker/tango-dsconfig

stages:
  - build
  - test

build_job:
  stage: build
  script:
    - mkdir build && cd build
    - cmake -DBUILD_TESTS=ON ..
    - make
  artifacts:
    paths:
      - build/alarm-handler-srv
      - build/bin/testdevice-srv
    expire_in: 1 week

test_load_job:
  stage: test
  script:
    - sleep 10
    - /usr/local/bin/DataBasesd 2 -ORBEndPoint giop:tcp::10000 &
    - sleep 10
    - exit_code=2
    - json2tango -w -a -u ./test/ah_config.json || exit_code=$?
    - if [ ${exit_code} -ne 2 ]; then echo "Tango DB configuration failed!" ; else echo "Tango DB configuration successful!" ; fi
    - ./build/alarm-handler-srv 01 &
    - ./build/bin/testdevice-srv 01 &
    - sleep 5
    - python ./test/load-alarm-conf.py --device=alarm/handler/01 --load="tag=test0;formula=(a
    - sleep 1
    - python ./test/check-alarm-conf.py --device=alarm/handler/01 --alarm="tag=test0;formula=
  needs: ["build_job"]
  services:
    - name: nexus.engageska-portugal.pt/ska-docker/tango-db
      alias: tangodb
```

Gitlab CI considerations

- Gitlab runner installed in Docker and Docker executor used
- At the moment the only possible link between stages are artifacts (build results)
- No memory between stages (Docker restarted)
- Tango DB not persistent, unless mounting external volumes
- Need to prepare complete setup at each test stage
- There are requests from the gitlab community to run different stages in the same docker if the same image is used
 - but discussions ongoing since almost 4 years (issues #17497, #118599, ...) :-)
- Publish our own dockers to avoid building with missing dependencies at each test
 - desiderata

AlarmHandler

What's next

- GUI: right click launches specific GUIs for the attributes in the formula, if it exists, otherwise it launches ATKPanel
- GUI: develop a GUI for alarm-manager
- Alarm-manager: add to HDB++ every attribute in the formula when loading new alarm
- PANIC: to have alarm-handler in PANIC, some issues to be solved, to display PyAlarm with alarm-ng GUI some work needed (full support of alarmSummary attribute, etc.)

Questions ?