

AMS – Alarm Management System

and

CSS – Control System Studio Update

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DESY / MKS-2

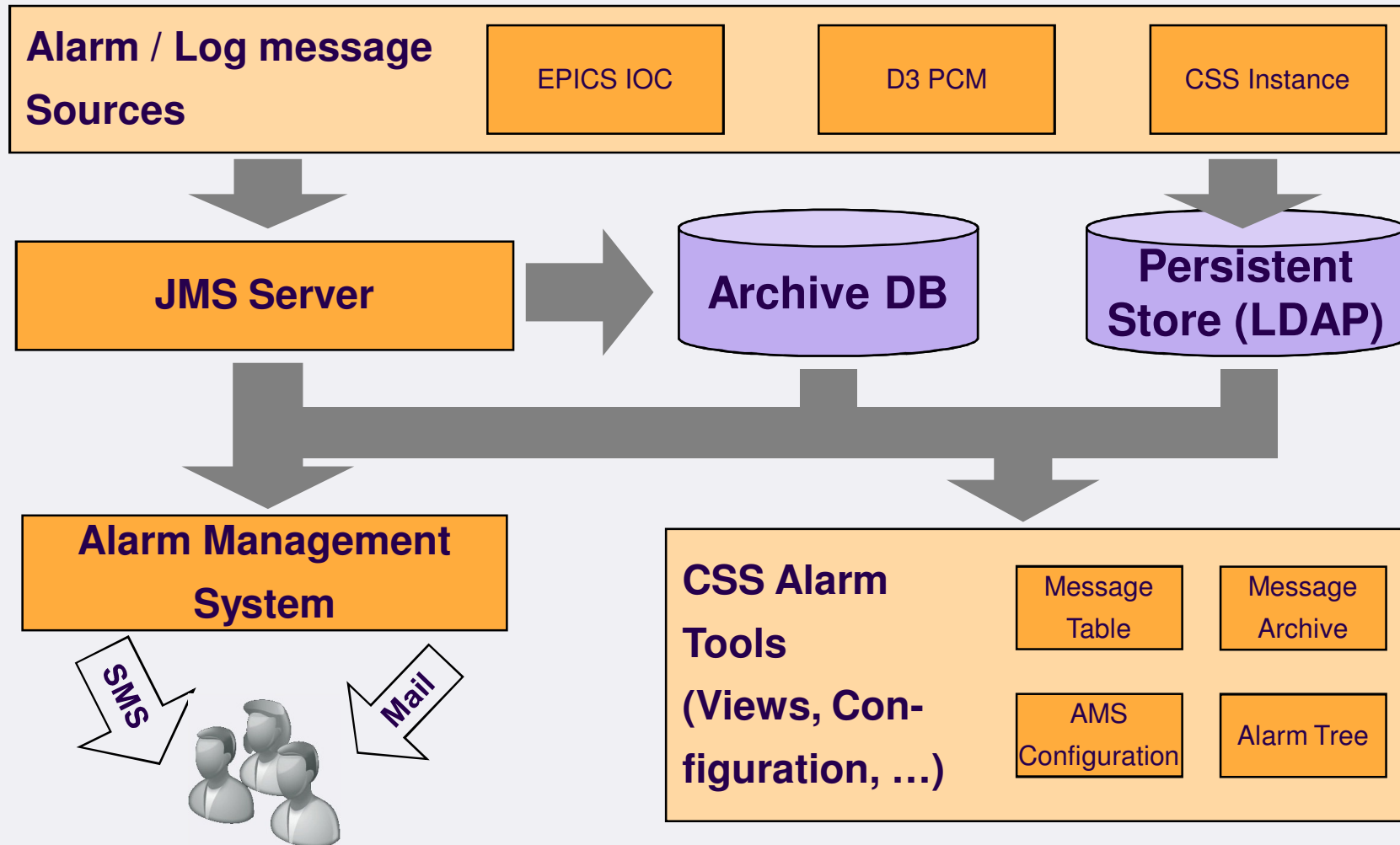
Overview

- Requirements of the alarm system
- Structure of alarm system
- Technical overview
- Interconnection server and persistent store
- Filter configuration in the alarm management system
- CSS Alarm Applications
- CSS Update

Requirements

- Several sources for alarm/log messages (EPICS, D3, CSS, ...)
- Dedicated alarm messages should be forwarded to different destinations (SMS, e-mail, voice mail, ...)
- Rules and actions to configure special behavior for alarm messages
- Persistent store holds current status of all process variables
- Archive all alarm/log messages
- Operating system independent applications to view messages and configure alarm system

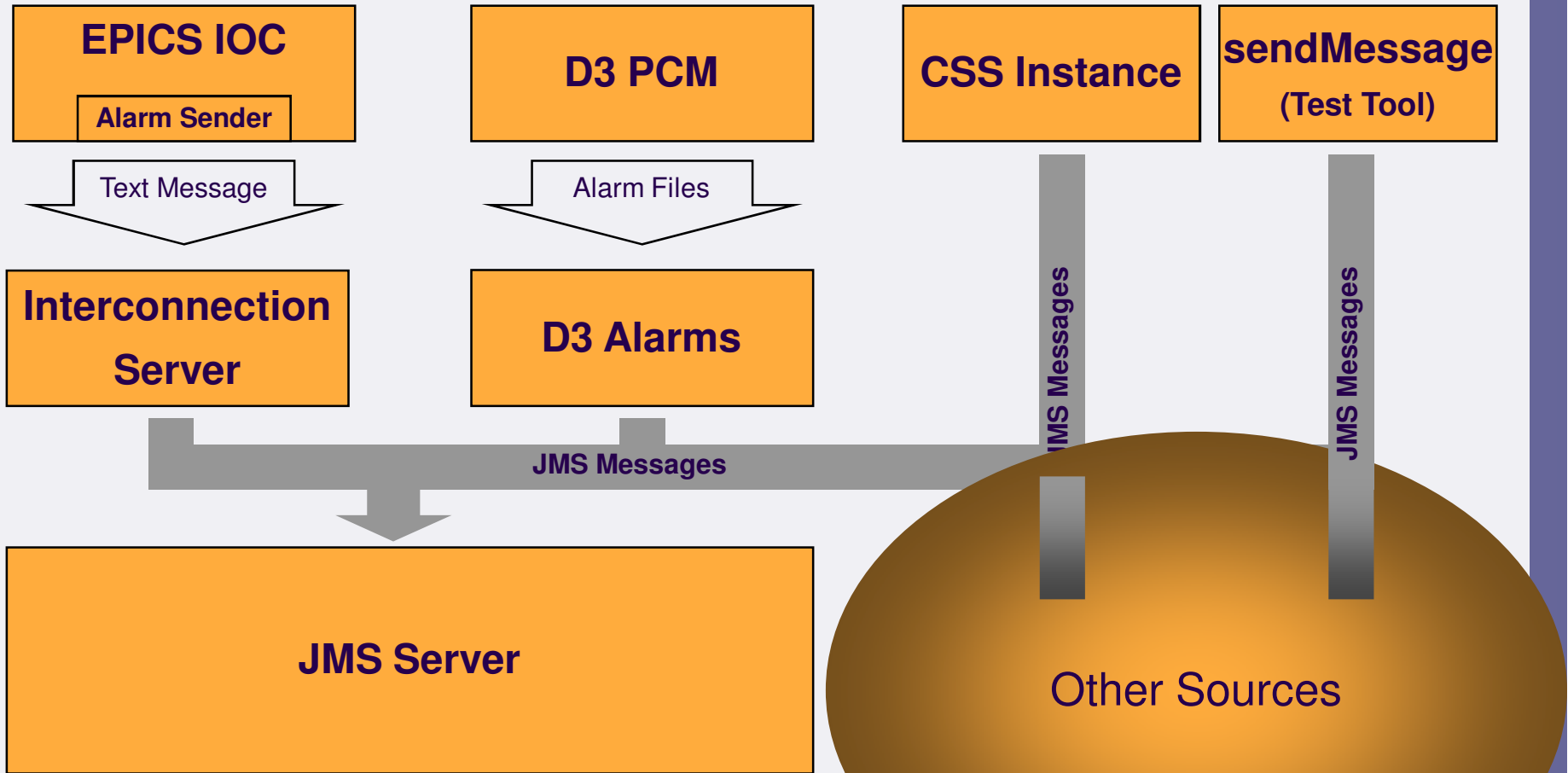
Structure of alarm system



Technical Overview

- Implementation in Java → Operating System independent
- Alarm applications with UI part are integrated in Control System Studio (CSS)
- Common APIs for JMS -, LDAP – Server and Database → no special implementation is required
- JMS Messages (Key, Value) for all communication between components → alarm messages are just a special kind of message
- Redundancy for JMS communication and Alarm Management System

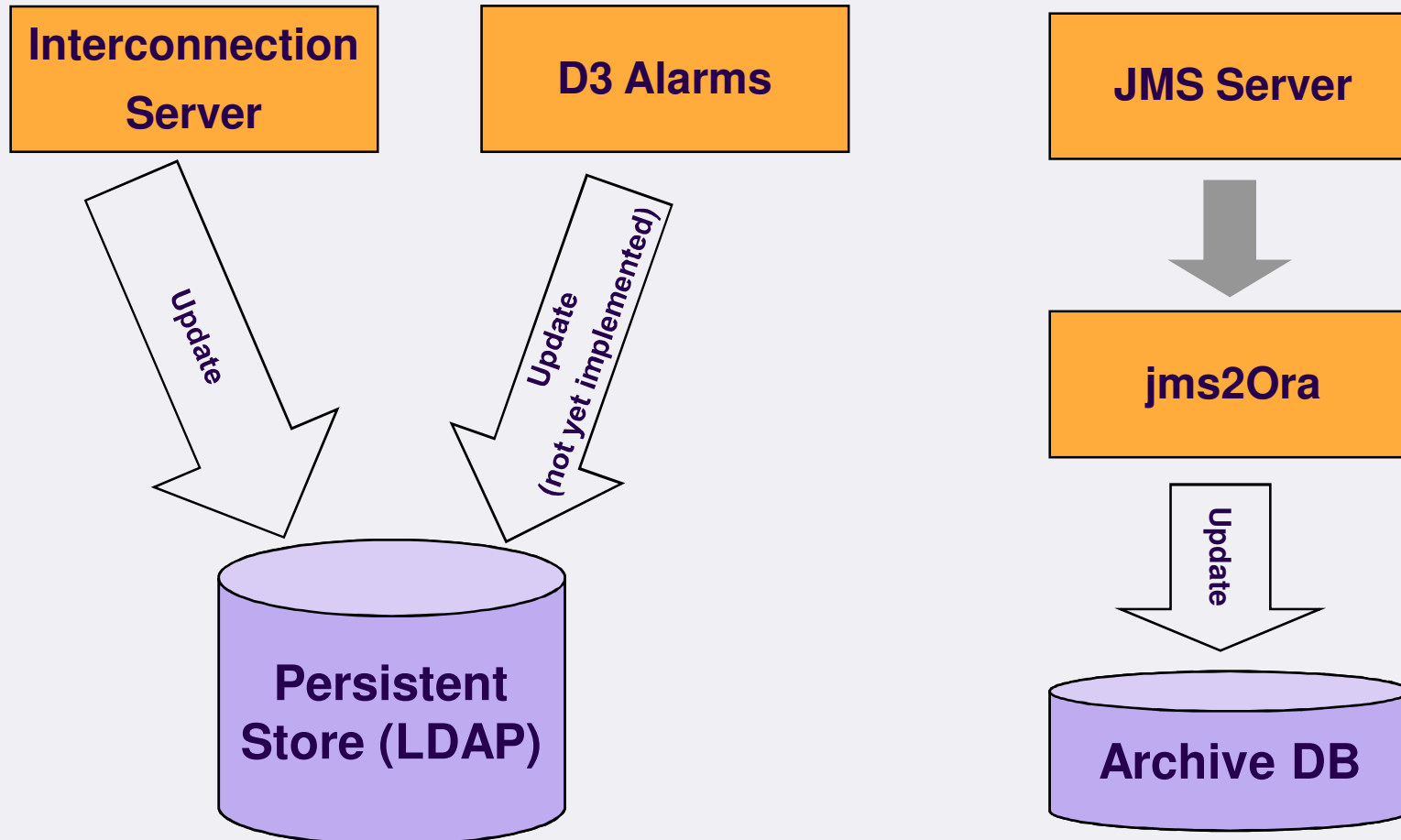
Message sources



Message sources II

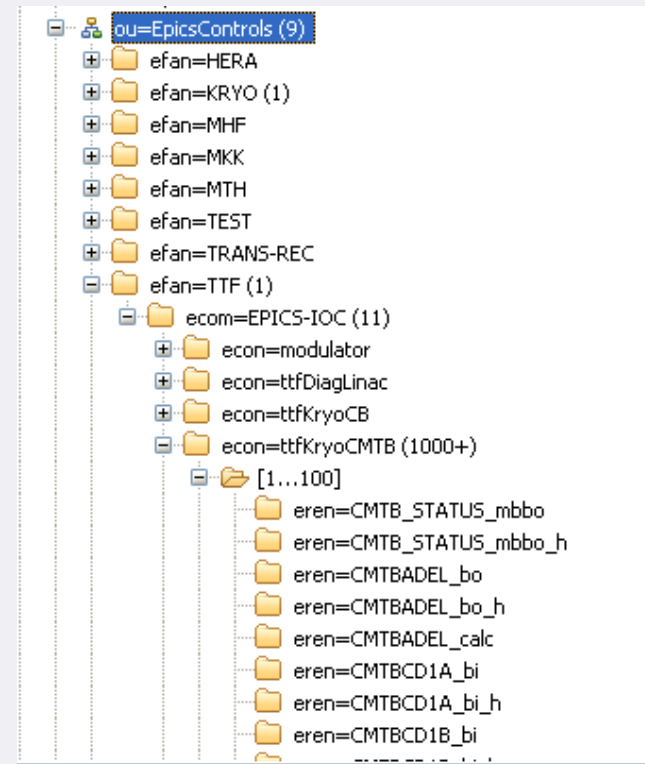
- EPICS IOC and D3 PCM send alarm messages in a special format
- Interconnection Server (EPICS) and D3 Alarms (D3) translates alarm messages in JMS format
- Interconnection Server and D3 Alarms are headless CSS applications (XMPP management)
- CSS uses log4j and sends log messages in JMS format
- JMS Server at DESY is Apache ActiveMQ

Persistent store and archive

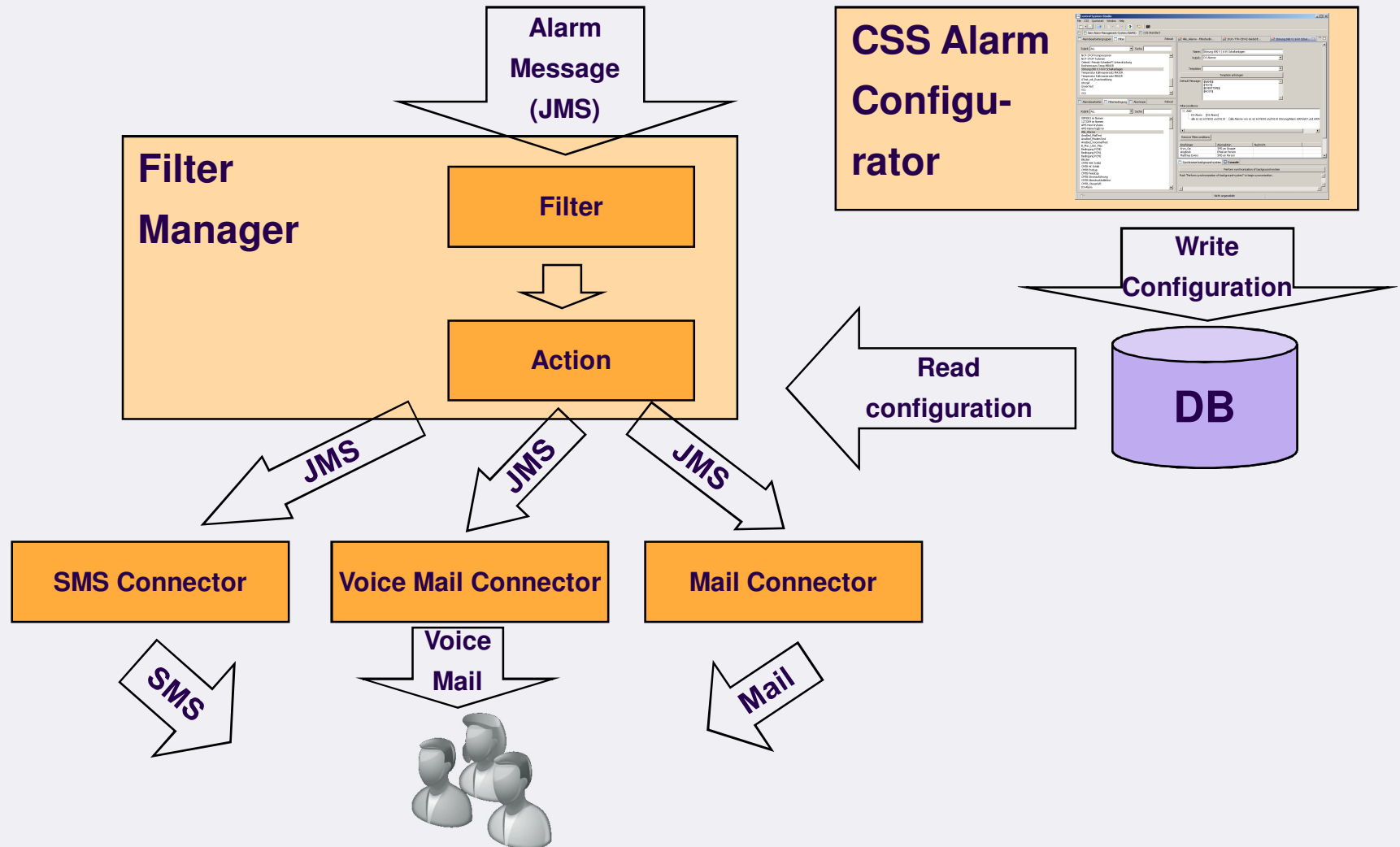


Persistent store and archive II

- Persistent Store (LDAP) holds structured list of all records
- Records are ordered by facility name, component and controller
- Alarm status of a record:
 - epicsAlarmAcknTimeStamp
 - epicsAlarmSeverity
 - epicsAlarmStatus
 - epicsAlarmTimeStamp
- Jms2Ora is a CSS headless applications
- JDBC for DB connection → Jms2Ora can use any DB implementation



Alarm Management System (AMS)



Logical elements of AMS

Operators:

- Receives alarm messages via mail, sms, ...
- PIN Code to acknowledge alarm messages

Groups:

- Operators responsible for specific facilities
- Defines priority who should be informed first, second, ...
- Maximum delay for acknowledgment

Action:

- What should be happen with an alarm message?

Logical elements of AMS

Filter:

- Checks if the filter matches
- Creates a new message with the relevant information of the alarm message
- Forwards the message to an action

Filter condition:

- A Filter is a combination of filter conditions
- Filter conditions can be connected with AND and OR
- Available condition types are:
Compare strings, Check current PV, Time based condition, ...

Filterconditions

- AND
 - OR
 - CMTB 40K Schild [wichtige von 40K Schild]
 - CMTB 4K Schild [CMTB 4K Schild]
 - CMTB Endcap [CMTB Modul]
 - CMTB_Steuerluft [CMTB Steuerluft]

Empfänger	Alarmaktion	Nachricht
Kryo_Op	SMS an Gruppe	

AMS Configurator in CSS

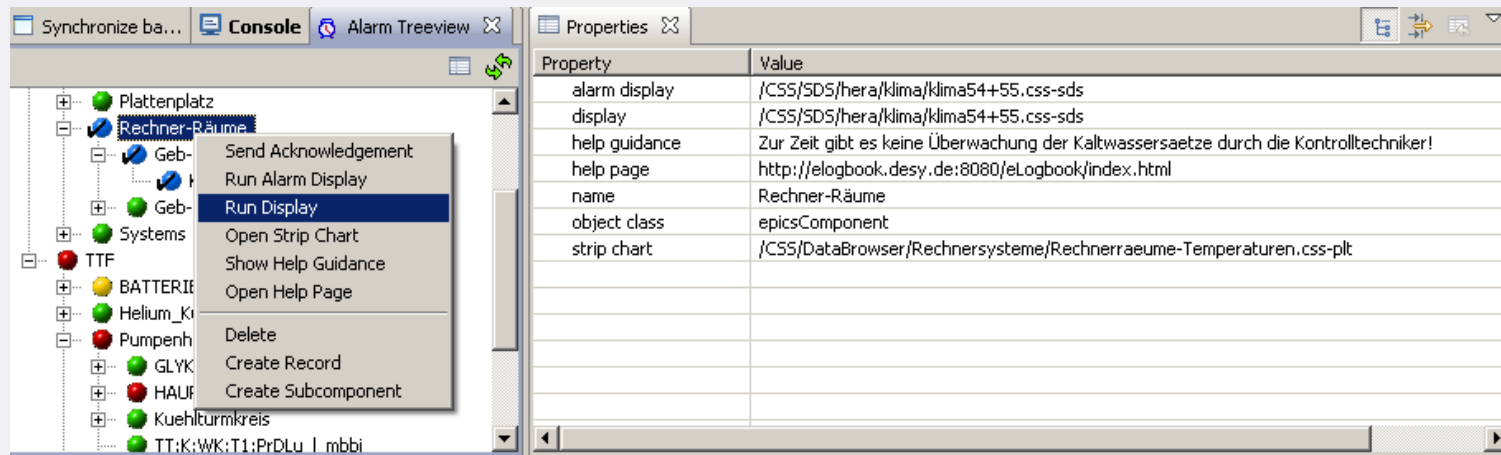
The screenshot displays the Control System Studio (CSS) interface for configuring an Alarm Management System (AMS). The main window is titled "New Alarm-Management-System (NAMS) CSS Standard".

Key components visible include:

- Alarmbearbeitergruppen (Alarm Operator Groups):** A list of groups such as AMSAdmin, C1, CTA_Rechner, Halle 3, Kryo_Op, MKS_2, and MKS_2_Rufbereitschaft.
- Filterbedingung (Filter Condition):** A section for defining filter conditions, currently showing a tree structure with "AND" and "OR" operators, including conditions like "CMTB 40K Schild", "CMTB 4K Schild", "CMTB Endcap", "CMTB Steuerluft", and "UTest_Bedingung".
- Alarmbearbeiter (Alarm Operator):** A list of operators with columns for "Aktiv" (Active) and "Hinweise vom Alarmbearbeiter" (Hints from Alarm Operator). The list includes names like Schichtleiter Handy, Lothar Kleiner, Torsten Pätzold, Julius Zejac, Josua Rudolph, Hermann Herzog, Michael Stephan, Wolfgang Schroth, Tobias Schnauz, and Matthias Ewers.
- Console:** A message indicating "Perform synchronization of background-system".

The status bar at the bottom indicates the user is logged in as "jhatje@DESY.DE".

CSS alarm applications (Alarm Treeview)



- Shows the current status of the persistent store (LDAP)
- Delete and create records and subcomponents by context menu
- Changes are stored in the LDAP server
- Alarm status is propagated to root component
- Property view to view and edit tree items

CSS alarm applications (Alarm Table)

Message properties, color and text for severities are configurable

Log View

- Shows all types of messages in a chronological

Alarm View

- Shows alarm messages
- Ordered by: 1. severity and 2. time

Archive View

- Shows messages stored in archive DB
- Time period and search criteria

JMS Alarm viewer

Acknowledge MINOR Running Since: 01.08.08 10:32

A.	COUNT	TYPE	EVENTTIME	
<input type="checkbox"/>	167	event	2008-08-01 14:45:50.395	alarmTe
<input type="checkbox"/>	1	event	2008-08-01 11:04:58.673	krykWeath
<input type="checkbox"/>	0	event	2008-08-01 11:04:58.673	krykWeat
<input type="checkbox"/>	0	event	2008-08-01 14:28:24.167	MTF
<input type="checkbox"/>	0	event	2008-08-01 14:28:25.181	MTFI
<input type="checkbox"/>	166	event	2008-08-01 14:44:50.395	alarmTe
<input type="checkbox"/>	1	event	2008-08-01 13:22:17.904	TV2

Properties JMS Log archive viewer

Period: Day 3 Days Week User Expert from: 2008-10-06 15:04:00.0 to: 2008-10-07 15:04:00.0 Result cc: 2

Start- und Endzeit

Absolute Startzeit: Relative Startzeit: Absolute Endzeit: Relative Endzeit:

Mo Di Mi Do Fr Sa So

29 30 1 2 3 4 5

6 7 8 9 10 11 12

13 14 15 16 17 18 19

20 21 22 23 24 25 26

27 28 29 30 31 1 2

3 4 5 6 7 8 9

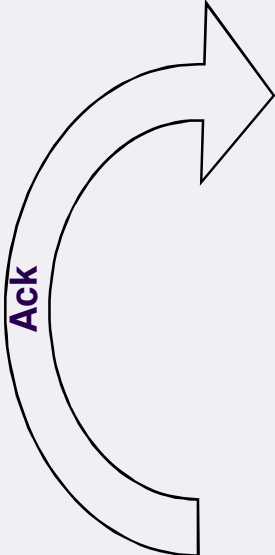
Zeit: 15:04

Jetzt: 00:00 12:00

Startzeit: 2008/10/06 15:04:00.000 Endzeit: 2008/10/07 15:04:00.000

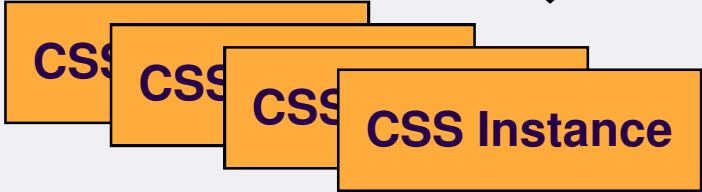
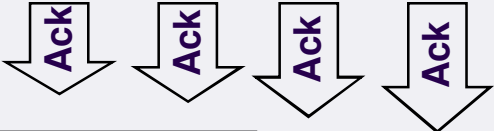
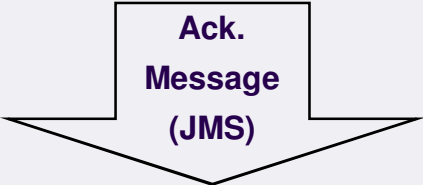
OK Cancel

Acknowledgement



CSS Instance
Acknowledge
Alarm message

A.	COORD	TYPE	EVENTTIME	
167		event	2008-08-01 14:45:50.395	alarmTe
1		event	2008-08-01 11:04:58.673	krykWeath
0		event	2008-08-01 11:04:58.673	krykWeath
0		event	2008-08-01 14:28:24.167	MTFI
0		event	2008-08-01 14:28:25.181	MTFI
166		event	2008-08-01 14:44:50.395	alarmTe
1		event	2008-08-01 13:22:17.904	TV2



Summary

The Alarm System has run through a major refactoring stage.

The new Filter Manager provides an extendible set of filters; including time based filters and condition based filters with online data through the control system independent Data Access Layer.

The modular design is key to run major components redundantly (JMS server and InterconnectionServer run on a Sun Cluster)

The message based communication only specifies a limited set of mandatory Tags. Other Tag/Value pairs may be added on demand.

There's no EPICS specific application besides the alarmSender on the IOC.

The Alarm System is ready to be shared.

CSS Update I

Interval: ●

Start snooping | Stop snooping

Remote snooping results from: krynfsa
There were 3837 requests for 383 different PVs.
Max frequency: 2.8Hz
Average frequency: 0.242Hz

Id	Hostname	PV	Frequency
1	kryksunh.desy.de:32895	DISK:SunH/local_ai.DESC	2.8 Hz
2	kryksuna.desy.de:41460	XMTSTTF1140_ai_SEVR	1.6 Hz
3	kryksuna.desy.de:41460	XMTSTTF1140_ai	1.6 Hz
4	kryksunb.desy.de:37315	XMTSTF1140_ai.DESC	1.4 Hz
5	kryksunb.desy.de:37315	XMTSTF1140_ai	1.4 Hz
6	kryksunb.desy.de:32983	TVCSPL_ai	1.4 Hz
7	mikxsunb.desy.de:43836	L2:K:WK:L1:T2_R_norm_mbbi	1.4 Hz
8	mikxsunb.desy.de:43836	L2:K:WK:L1:T1_R_norm_mbbi	1.4 Hz
9	kryksunb.desy.de:39896	FEL218KQ_sub	1.4 Hz
10	kryksuna.desy.de:32911	DISK:SunH/local_ai.DESC	1.4 Hz
11	kryksuna.desy.de:33017	DISK:SunH/local_ai.DESC	1.4 Hz
12	kryksunh.desy.de:32895	DISK:SunH/local_ai	1.4 Hz
13	kryksuna.desy.de:33017	DISK:SunH/local_ai	1.4 Hz
14	kryksuna.desy.de:32911	DISK:SunH/local_ai	1.4 Hz
15	kryksunb.desy.de:40062	13MFG:Statuswort1_1_mbbid.B6.DESC	1.4 Hz
16	kryksunb.desy.de:40062	13MFG:Statuswort1_1_mbbid.B5.DESC	1.4 Hz
17	kryksunb.desy.de:40062	13MFG:Statuswort1_1_mbbid.B4.DESC	1.4 Hz
18	kryksunb.desy.de:40062	13MFG:Statuswort1_1_mbbid.B2.DESC	1.4 Hz
19	kryksunb.desy.de:37906	TVCSPL_ai	1.366 Hz
20	kryksunb.desy.de:39978	KOD11_mbbid.B9.DESC	1.366 Hz
21	kryksunb.desy.de:39978	KOD11_mbbid.B8.DESC	1.366 Hz
22	kryksunh.desy.de:44340	DISK:SunH/local_ai.DESC	1.366 Hz
23	kryksunh.desy.de:44340	DISK:SunH/local_ai	1.366 Hz
24	epicsWME29.desy.de:1030	L2:K:WK:L1:B5_ai.VAL	1.2 Hz
25	epicsWME29.desy.de:1030	L2:K:WK:L1:B4_ai.VAL	1.2 Hz
26	epicsWME60.desy.de:1030	AL:KV:A1:UL3L1TA1_veff_sub.INDX	1.2 Hz
27	epicsWME60.desy.de:1030	AL:KV:A1:UL2L3TA1_veff_sub.INDX	1.2 Hz
28	epicsWME60.desy.de:1030	AL:KV:A1:UL1L2TA1_veff_sub.INDX	1.2 Hz
29	epicsWME60.desy.de:1030	AL:KV:A1:UL3L1TA1_cb	1.2 Hz
30	epicsWME02.desy.de:1029	CTA:Ti624_lim.VAL	1.1 Hz
31	epicsWME02.desy.de:1029	CTA:MW305_SW_bo.VAL	1.1 Hz
32	epicsWME02.desy.de:1029	32_72727273	1.1 Hz
33	epicsPC03.desy.de:1031	XMTSWC2110_ai_h	0.733 Hz
34	epicsPC03.desy.de:1031	XMTSWC1130_ai_h	0.733 Hz
35	epicsPC03.desy.de:1031	XMTSWC1121_ai_h	0.733 Hz

CA Snooper

- Monitors the Channel Access traffic
- CA Snooper Server is a CSS headless application
- CA Snooper UI gets information via XMPP protocol from the server

Record Property

- Shows all fields of a record
- Field value for configuration DB, RMI server and IOC

Record Property

Record: Crate1:fanSpeed3_ai

Field Name	RDB (Oracle)	Value
STAT	NO_ALARM	TIMEOUT
SEVR	NO_ALARM	INVALID
NSTA	NO_ALARM	NO_ALARM
NSEV	NO_ALARM	NO_ALARM
ACKS	NO_ALARM	INVALID
ACKT	NO	YES
DISS	NO_ALARM	NO_ALARM
LCNT	0	1
PACT	0	1
PUTF	0	0
RPRO	0	0

CSS Update II

SDS

- New Strip Chart -, Thumb wheel -, 16 binary bit widget
- Connection Overview for status of all PVs
- Previous display name is displayed as a link on current display

Channel	Connection State	Latest Value
EpicsDemo1	CONNECTED	96
EpicsDemo1	CONNECTED	96.0
EpicsDemo1.SEVR	CONNECTED	2
Trainloc:Alarm:RAMPA calc	CONNECTED	175.0
Trainloc:Alarm:RAMPA calc.HIGH	CONNECTED	60.0
Trainloc:Alarm:RAMPA calc.HIHI	CONNECTED	120.0
Trainloc:Alarm:RAMPA calc.HOPR	CONNECTED	100.0
Trainloc:Alarm:RAMPA calc.LOLO	CONNECTED	0.0
Trainloc:Alarm:RAMPA calc.LOPR	CONNECTED	0.0
Trainloc:Alarm:RAMPA calc.LOW	CONNECTED	0.0
Trainloc:Alarm:RAMPB calc	CONNECTED	12.0
Trainloc:Alarm:RAMPB calc.HIGH	CONNECTED	7.0
Trainloc:Alarm:RAMPB calc.HIHI	CONNECTED	11.0
Trainloc:Alarm:RAMPB calc.HOPR	CONNECTED	100.0
Trainloc:Alarm:RAMPB calc.LOPR	CONNECTED	0.0
Trainloc:Alarm:RAMPB calc.LOW	CONNECTED	0.0
Trainloc:alive	CONNECTED	6
location	CONNECTED	
mv SINF0:QualifiedHostname	CONNECTED	krvk@cl.desy.de
mv SINF0:UserId	CONNECTED	hricks
userName	CONNECTED	

PV	Wert	Benutzer
CMTBSF1V60_ai.LOLO	0.0	claus@DESY.DE
ttfKryoCMTB:alive	8	claus@DESY.DE
CMTBSF1V60_ai.HIHI	0.0	claus@DESY.DE
CMTBSF1V60_ai.HYST	0.01	claus@DESY.DE

Save Value

- Store current settings of control system via RMI service from any CSS instance

Current State

The Alarm System is in operation since one year

The new version is in test and will run in production this month

A new CSS-Beta is now available.

After collecting final feedback on this version CSS-1.1 will be released.

The CSS-Synoptic Display will go into production this autumn during commissioning of a cryogenic plant which has been converted from a commercial system (D/3) into EPICS.

CSS will slowly replace all of the dm2k screens and take over

Thank You