



EPICS CSS Studio

(24 hour experience)

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Outline



- Reporting on my 24h experience with EPICS CSS.
- I'll give my conclusions at the beginning and support them with the rest of my talk.
- Talk includes:
 - an overview of main CSS applications;
 - installation and configuration instructions;
 - screenshots of running applications;
 - and development & support estimates



Conclusions (p1)



- EPICS CSS studio provides a flexible and scalable **development** framework that is certainly capable of supporting large scale DCS projects.
- The “out-of-the-box” product delivers a usable set of monitoring and alarming features primarily oriented at detector experts.
 - It allows browsing IOC data types, raw values and their histories, alarm states.
 - A minimal effort is required to develop simple OPI pages to display PVs.
 - Alarm tree and alarm table views show PV alarm states and manipulate their configurations in a database.
 - Oracle, MySQL and PostgreSQL database vendors are supported.
 - PV Archiver records PV data that can be viewed by the DataBrowser view.
- The choice of the Eclipse development platform is reasonable.

Key features of Eclipse:

 - plugin oriented MVC architecture,
 - runs in a headless (“no GUI”) mode,
 - abundance of third party plugins and libraries,
 - cross platform.



Conclusions (p2)



- CSS Applications have to be rebuilt from source and have site specific settings provided either within the package itself (preferred option) or in the Eclipse plugin customization file.
 - While digging setting names from the source is a viable method, it is not my preferred one.
 - Need to adjust package dependencies; the provided default ones are not always working.
 - Java NaN values were not handled by the source properly, had to make changes.
 - Have not found PV Archive and PV Alarmer configuration formats; had to reverse engineer them from the source.
 - User authentication requires LDAP, so I disabled password validation for now.
- Several CSS Applications were built for specific sites and therefore are not usable without migrating the source code.
- To run comfortably CSS GUI Applications require 1.3GB allocated to the JVM.
- DDS is not supported, CSS uses JMS instead. Using both is redundant.



Conclusions (p3)



- Nova specific alarm logic has to be implemented in IOCs and possibly in a CSS plugin.
- Alarm tree and/or table views can not be inserted onto an OPI page.
 - It would be certainly nice to have a system/component wide indicator.
- Apart from tweaking private Eclipse metadata, I have not found a way to save and restore CSS window layout.
 - Users have to be trained in how to open certain views (mdi windows).
- Had a positive experience with the CSS team. Received quick responses to my emails with clear and reasonable suggestions.



CSS Overview



- Control System Studio (**CSS**) is a family of control system applications implemented as Eclipse plugins.
 - Eclipse offers graphical UI elements and also defines their behavior.
 - The Eclipse “Plugin” and “Extension Point” mechanisms aid in the organization and deployment of software modules.
- The CSS plugins define control-system data types for front-end computers, PV names, and live or archived data samples.
- System integrators can choose applications packaged into a site specific distribution.
- The CSS development effort is lead by Kay Kasemir, ORNL, Oak Ridge.
 - my talk frequently cites his publications and web pages (see works cited);



CSS Applications



A list of CSS applications I've experimented with:

- **OPI Builder** is an operator interface display and builder.
- **BEAST** is an alarm system for control rooms.
- **RDB Archiver** is an Epics Channel Archiver. It has support for Oracle, MySQL & Postgress databases.
- **Data Browser** plots live or archived data samples; exports the data to files.
- **PV Tree** displays a hierarchical view of EPICS record input links with current values and alarm states.
- **PV Probe** displays the current value of a PV.
- **JMS2RDB** logs JMS messages posted to a user specified topic into a database.
- **Annunciator** plays various sound messages upon alarm conditions.
- **JMS Monitor** displays messages posted to a user specified topic.
- **Message History** displays log messages from a database.
- **BOY** contains various OPI examples.
- **Send E-mail** captures an OPI screenshot and emails it.



Software Dependencies



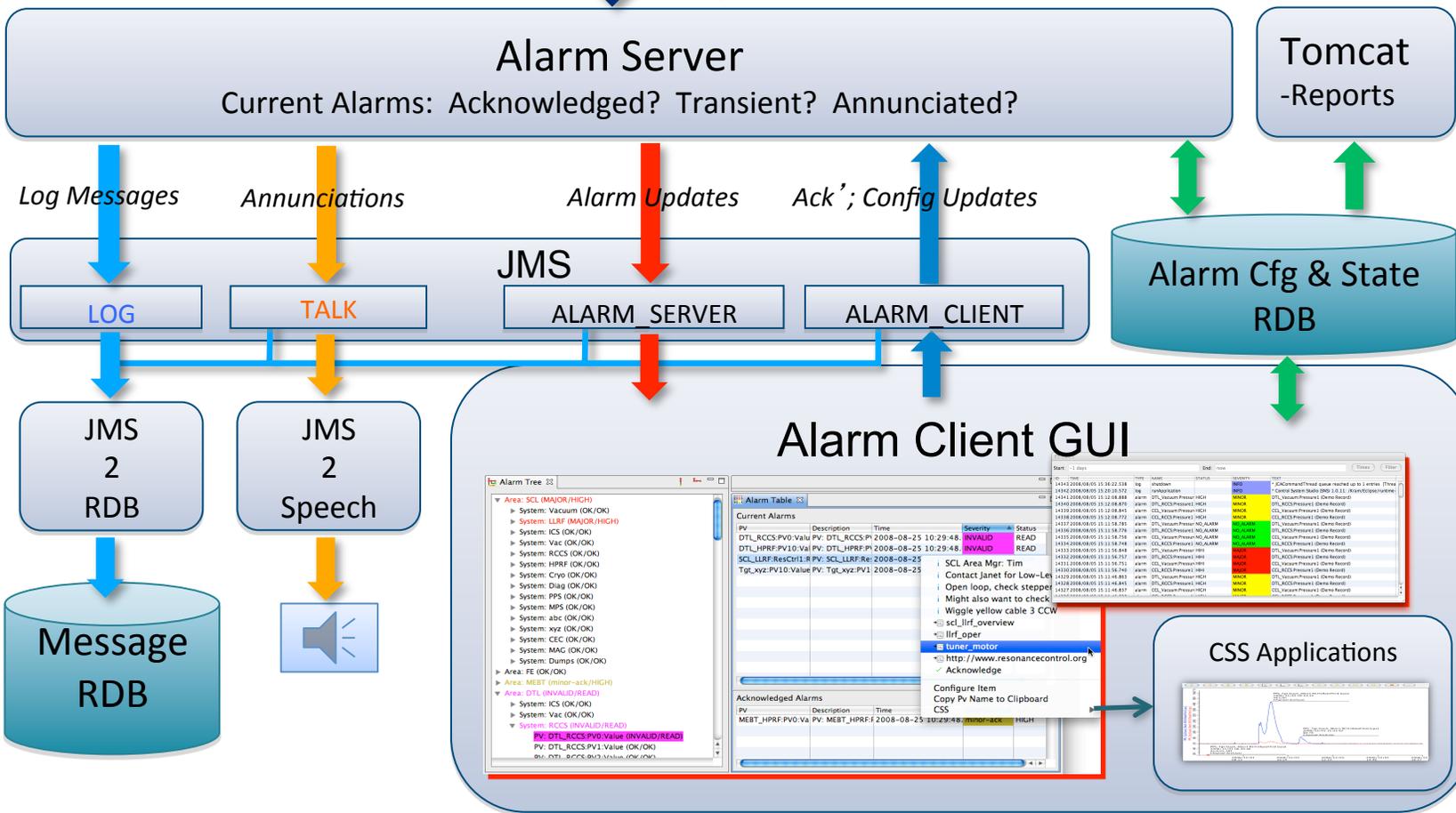
- A relational database with logging, archiving and alarming schemas.
 - Mysql, Oracle, or Postgress (??)
- Apache ActiveMQ -- open source messaging server.
- Eclipse -- a development environment.
- Apache Tomcat -- runs web reports (not tested).
- Mercurial SCM client.



Technical View

IOCs

PV Updates (Channel Access, ...)



Source: Xihui Chen, Katia Danilova, Kay Kasemir
SNS/ORNL



- I'll go over main software components shown on the Technical View and briefly explain how to configure and run them.
 - MySQL
 - Apache MQ
 - CSS Applications
 - Alarm Server
 - Archive Engine
 - JMS RDB Server



MySQL setup



1. UPS

```
setup libzip v0_9_3 -f Linux64bit+2.6-2.5 -q GCC_4_5_1
setup mysql v5_5_13 -f Linux64bit+2.6-2.5 -q GCC_4_5_1
setup mysql_client v5_1_56 -f Linux64bit+2.6-2.5 -q gcc45
```

2. MySQL

Create database: `mysql_install_db --user=lukhanin --ldata=/mnt/disk1/work/epicsTestDB001/`

Start database: `mysqld_safe --defaults-file=~/.my.cnf &`
`mysqladmin --defaults-file=~/.my.cnf -u root password 'mypass '`
`mysqladmin --defaults-file=~/.my.cnf -u root -h localhost password 'mypass '`
`mysqladmin --defaults-file=~/.my.cnf -u root -h 127.0.0.1 password 'mypass '`

Connect: `mysql --host=127.0.0.1 --port=3906 --user=root --password=mypass`

Deploy schemas:

```
source ${CSS_SOURCE}/org.csstudio.alarm.beast/dbd/ALARM_MYSQL.sql1;
source ${CSS_SOURCE}/org.csstudio.archive.rdb/dbd/mysql_schema.txt;
source ${CSS_SOURCE}/org.csstudio.sns.jms2rdb/dbd/MySQL-Log-DDL.sql;
```

Create users:

```
GRANT ALL ON alarm.* TO alarm@localhost IDENTIFIED BY '$alarm';
GRANT INSERT, SELECT, UPDATE ON alarm.* TO alarm@%' IDENTIFIED BY '$alarm';
GRANT ALL ON log.* TO log@localhost IDENTIFIED BY '$log';
GRANT INSERT, SELECT, UPDATE ON log.* TO log@%' IDENTIFIED BY '$log';
GRANT ALL ON archive.* TO archive@localhost IDENTIFIED BY '$archive';
GRANT INSERT, SELECT, UPDATE ON archive.* TO archive@%' IDENTIFIED BY '$archive';
flush privileges;
```



```
cat ~/my.cnf |grep -v "#"
```



```
[client]
port = 3906
socket = /tmp/mysqlpics001.sock
[mysqld]
port = 3906
bind-address = 127.0.0.1
socket = /tmp/mysqlpics001.sock
default-storage-engine = INNODB
datadir=/data/epicsTestDB001
key_buffer = 256M
max_allowed_packet = 1M
table_cache = 256
sort_buffer_size = 1M
read_buffer_size = 1M
read_rnd_buffer_size = 4M
myisam_sort_buffer_size = 64M
thread_cache_size = 8
query_cache_size= 16M
thread_concurrency = 8
server-id = 1
innodb_data_home_dir = /data/epicsTestDB001
innodb_data_file_path = ibdata1:10M:autoextend
innodb_log_group_home_dir = /data/epicsTestDB001
innodb_buffer_pool_size = 256M
```

```
innodb_additional_mem_pool_size = 20M
innodb_log_file_size = 64M
innodb_log_buffer_size = 8M
innodb_flush_log_at_trx_commit = 1
innodb_lock_wait_timeout = 50
innodb_file_per_table
[mysqldump]
quick
max_allowed_packet = 16M
[mysql]
no-auto-rehash
[isamchk]
key_buffer = 128M
sort_buffer_size = 128M
read_buffer = 2M
write_buffer = 2M
[myisamchk]
key_buffer = 128M
sort_buffer_size = 128M
read_buffer = 2M
write_buffer = 2M
[mysqlhotcopy]
interactive-timeout
```



Apache ActiveMQ setup



- UPS

```
setup apache_activeMQ v5_5_0 -f Linux64bit+2.6-2.5
```

```
export ACTIVEMQ_BASE=/data/epicsActiveMQ001; mkdir -p $ACTIVEMQ_BASE/conf/;
```

- Copy a config file into the \$ACTIVEMQ_BASE/conf/:

```
cp ups/apache_activeMQ/v5_5_0/Linux64bit+2.6-2.5-/conf/* $ACTIVEMQ_BASE/conf/
```

- Update ports and hostnames in \$ACTIVEMQ_BASE/conf/activemq.xml

-default values tcp://127.0.0.1:61616

- Update update usernames and passwords in

```
$ACTIVEMQ_BASE/conf.credentials.properties (i use default values)
```

- Start MQ

```
activemq start
```

Getting Started Guide:

- <http://activemq.apache.org/getting-started.html#GettingStarted-StartingActiveMQ>



CSS Applications setup



- UPS
 - setup epics_applications v3_0_0 -f Linux64bit+2.6-2.5
- Copy configuration files into the `$EPICS_PRODUCTS_HOME/config/`:

```
cp ups/epics_applications /v3_0_0/Linux64bit+2.6-2.5-/config/* \  
$EPICS_PRODUCTS_HOME/config/
```
- Update configuration files so they have the same settings as for mysql and apachemq, e.g. passwords, ports, hostnames, and etc.
 - There are two types of settings used by eclipse plugins:
 - 1) settings shared among all plugins and
 - 2) plugin specific settings.
 - Default settings are packaged inside individual plugins and can be overridden in `plugin_customization.ini` files.
 - Have not found a good documentation source explaining what all possible settings are. (had to dig some of them from the source code)



Running Alarm Server



- Start with: startAlarmServer.sh &
- URL: http://localhost:8161/admin/topics.jsp

Topics

Name ↑	Number Of Consumers	Messages Enqueued	Messages Dequeued	Operations
Annunciator_CLIENT	2	2252	4506	Send To Delete
Annunciator_SERVER	2	55509	81702	Send To Delete
Annunciator_TALK	0	2	0	Send To Delete
GLOBAL_SERVER	0	0	0	Send To Delete
LOG	1	16	1	Send To Delete
TALK	1	0	0	Send To Delete



Alarm Server Configuration Tool



- Configuration is stored in the XML format
- runAlarmConfigTool.sh is a configuration management tool.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<config name="Annunciator">
  <component name="NovaNDOS">
    <component name="dcm-3-01-02">
      <component name="dcm-3-01-02:0">
        <guidance>
          <title>FEB dcm-3-01-02:0 alarm</title>
          <details>Do Something</details>
        </guidance>

        <pv name="dcm-3-01-02:0_dc">
          <description>dcm-3-01-02:0_dc</description>
          <latching>>true</latching>
          <guidance>
            <title>Info</title>
            <details>Do Something</details>
          </guidance>
        </pv>
      </component>
    </component>
  </component>
</config>
```



Running JMS2RDB Server



- Start with: startJMS2RDBServer.sh &
- URL <http://localhost:4913/main>

JMS-to-RDB Tool

JMS to RDB Sender 3.0.0.201107131151

Message Count: 0

Last Error

[-Main-](#) [-Versions-](#)

2011/07/21 14:41:32 (Use web browser's Reload to refresh this page)



Running Archive Engine



- Start with: startArchiveEngine.sh &
- URL <http://localhost:4812/main>
Archive Engine

Summary	
Version	3.0.0
Description	NovaNDOS
HTTP Server	uboonedaq01.fnal.gov:4812
State	RUNNING
Start Time	2011/07/15 11:27:02
Uptime	6.14 days
Workspace	/home/lukhanin/work/products/ ~/eclipse-runtime/ArchiveEngine/
Groups	1
Channels	468
Batch Size	500 samples
Write Period	30 sec
Write State	OK
Last Written	2011/07/21 14:43:53
Write Count	224 samples
Write Duration	0.0 sec
SQL Timeout	30.00 min



Archive Engine Configuration Tool



- Configuration is stored in the XML format
- runArchiveConfigTool.sh is a configuration management tool.

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<!-- Created by EngineConfigImport (Export), 2011/07/21 15:09:46.656000000 -->
<engineconfig>
  <group>
    <name>dcm-3-01-02</name>
    <channel><name>dcm-3-01-02:0_dc</name><period>10.0</period><scan/></channel>
    <channel><name>dcm-3-01-02:0_enable</name><period>10.0</period><scan/></channel>
    <channel><name>dcm-3-01-02:0_febtemp</name><period>10.0</period><scan/></channel>
    <channel><name>dcm-3-01-02:0_hvadjust_cold</name><period>10.0</period><scan/></channel>
    <channel><name>dcm-3-01-02:0_hvadjust_warm</name><period>10.0</period><scan/></channel>
    <channel><name>dcm-3-01-02:0_setpoint</name><period>10.0</period><scan/></channel>
    <channel><name>dcm-3-01-02:0_tecc</name><period>10.0</period><scan/></channel>
  </group>
</engineconfig>
```



Alarm Tree



- Alarm tree gives a hierarchical display of all alarms and their states disabled, inactive, new, and acknowledged.

-Has a context sensitive menu for alarm management.

-The “info” menu selection gives preconfigured troubleshooting instructions.

-Has option to show only PVs in the alarmed state.

The screenshot shows the 'Alarm Tree' window with a toolbar at the top containing an 'Annunciator' dropdown and several icons. The tree structure is as follows:

- Area: NovaNDOS (INVALID/UDF_ALARM)
 - System: dcm-3-01-02 (INVALID/UDF_ALARM)
 - System: dcm-3-01-02:0 (MAJOR/LOLO_ALARM)
 - System: dcm-3-01-02:1 (MAJOR/LOLO_ALARM)
 - PV: dcm-3-01-02:1_dc
 - PV: dcm-3-01-02:1_febtemp
 - PV: dcm-3-01-02:1_tecc (MAJOR/LOLO_ALARM, MAJOR/LOLO_ALARM)
 - System: dcm-3-01-02:2 (MAJOR/LOLO_ALARM)
 - PV: dcm-3-01-02:2_dc
 - PV: dcm-3-01-02:2_febtemp
 - PV: dcm-3-01-02:2_tecc (MAJOR/LOLO_ALARM, MAJOR/LOLO_ALARM)

A context menu is open over the 'PV: dcm-3-01-02:2_tecc' item, showing the following options:

- 110:02:38
- Info
- Logbook...
- Acknowledge
- Configure Item
- Rename Item
- Duplicate PV
- Move item
- Remove selected Items
- Alarm Perspective



Alarm Table

Alarm table has similar functionality to the alarm tree.

- Can be sorted by any column.
- Multiple alarms can be acknowledged, or unack'ed.

Console | Global Alarm Table | Message History | JMS Monitor | System Monitor | Therapist

Select

Description	Alarm Time	Current Seve	Current Statu	Alarm Severi	Alarm Stat
dcm-3-01-02:3_tecc	2011/07/16 22:51:17	INVALID	UDF_ALARM	INVALID	UDF_ALAR
dcm-3-01-02:9_tecc	2011/07/18 08:14:22	MAJOR	LOLO_ALARM	MAJOR	LOLO_ALA
dcm-3-01-02:8_tecc	2011/07/19 01:59:26	MAJOR	HIHI_ALARM	MAJOR	HIHI_ALAR
dcm-3-01-02:7_tecc	2011/07/18 00:26:19	MAJOR	HIHI_ALARM	MAJOR	HIHI_ALAR
dcm-3-01-02:6_tecc	2011/07/16 22:51:17	MAJOR	SOFT_ALARM	MAJOR	LOLO_ALA
dcm-3-01-02:63_tecc	2011/07/16 22:51:17	MAJOR	LOLO_ALARM	MAJOR	LOLO_ALA
dcm-3-01-02:62_tecc	2011/07/18 12:01:13	MINOR	HIGH_ALARM	MAJOR	LOLO_ALA
dcm-3-01-02:60_tecc	2011/07/18 05:15:42	MAJOR	HIHI_ALARM	MAJOR	HIHI_ALAR
dcm-3-01-02:5_tecc	2011/07/18 13:15:25	MINOR	HIHI_ALARM	MAJOR	HIHI_ALAR
dcm-3-01-02:59_tecc	2011/07/18 08:41:30	MAJOR	LOLO_ALARM	MAJOR	LOLO_ALA
dcm-3-01-02:58_tecc	2011/07/18 08:41:30	MAJOR	LOLO_ALARM	MAJOR	LOLO_ALA
dcm-3-01-02:57_tecc	2011/07/18 08:41:30	MAJOR	LOLO_ALARM	MAJOR	LOLO_ALA
dcm-3-01-02:61_tecc	2011/07/18 08:41:30	MAJOR	LOLO_ALARM	major-ack'ed	HIHI_ALA

87:41:30
FEB dcm-3-01-02:59 alarm
Info
Logbook...
Acknowledge
Configure Item
Alarm Perspective
Process Variable

Acknowledged alarms



Alarm Configuration



- Alarm configuration window can be accessed by doing a right mouse click on any Alarm PV in either Alarm Tree or Alarm Table and selecting “Configure Item”.
 - Supports simplistic filtering, e.g dcm-3-01-02:2_enable=1.
 - Can be configured to execute a custom shell script.
 - Has annunciate option.

Alarm Item Configuration

Item: /Annunciator/NovaNDOS/dcm-3-01-02/dcm-3-01-02:2/dcm-3-01-02:2_tecc

Configure guidance, related displays, ...

Description: dcm-3-01-02:2_tecc

Alarm Delay [seconds]: 0

Alarm Count [within delay]: 0

Behavior: Enabled Latch Annunciate

Enabling Filter:

Guidance:

Title	Detail
Info	Do Something
<Add>	<Add>

Displays:

Title	Command
<Add>	<Add>

Commands:

Title	Command
<Add>	<Add>



Alarm Server Behavior



- ✓ Latch highest severity, or non-latching
- ✓ Alarm filter
 - Alarm only if severity persists some minimum time
 - .. or alarm happens $\geq N$ times within period
- ✦ Annunciation
- ✦ Optional formula-based alarm enablement:
 - Enable if “(pv_x > 5 && pv_y < 7) || pv_z==1”
 - ... but the development team prefers if that logic is moved into IOC
- ✧ When acknowledging MAJOR alarm, subsequent MINOR alarms not annunciated

Source: Xihui Chen, Katia Danilova, Kay Kasemir
SNS/ORNL



CSS OPI Display



dcm-3-01-02

ECC Temperature Monitoring

Scan Interval (click to set):

TECC Temperature for every FEB

20.21 C	-18.52 C	NO-TEC	INACTIVE	-5.48 C	-7.22 C	-80.04 C	13.60 C	1.18 C	-29.28 C	51.39 C	-12.94 C	-10.83 C	-17.44 C
0	1	2	3	4	5	6	7	8	9	10	11	12	13
13.32 C	12.63 C	6.27 C	2.79 C	-42.36 C	11.69 C	-24.21 C	NO-TEC	-8.17 C	-46.37 C	-3.70 C	-8.36 C	2.79 C	NO-TEC
16	17	18	19	20	21	22	23	24	25	26	27	28	29
20.42 C	-40.56 C	0.51 C	NO-TEC	-20.42 C	0.29 C	-50.21 C	-18.31 C	-18.31 C	28.67 C	68.59 C	-11.98 C	-55.16 C	-35.94 C
32	33	34	35	36	37	38	39	40	41	42	43	44	45
46.69 C	-21.95 C	-48.92 C	-17.08 C	-30.82 C	-3.90 C	-8.36 C	NO-TEC	24.14 C	-1.23 C	-19.57 C	13.93 C	10.47 C	-26.57 C
48	49	50	51	52	53	54	55	56	57	58	59	60	61

C Cooling is active; reading is okay.

C Cooling is active; reading is in minor alarm.

C **Cooling is active; reading is in major alarm.**

C Cooling is inactive.

INACTIVE FEB is inactive.



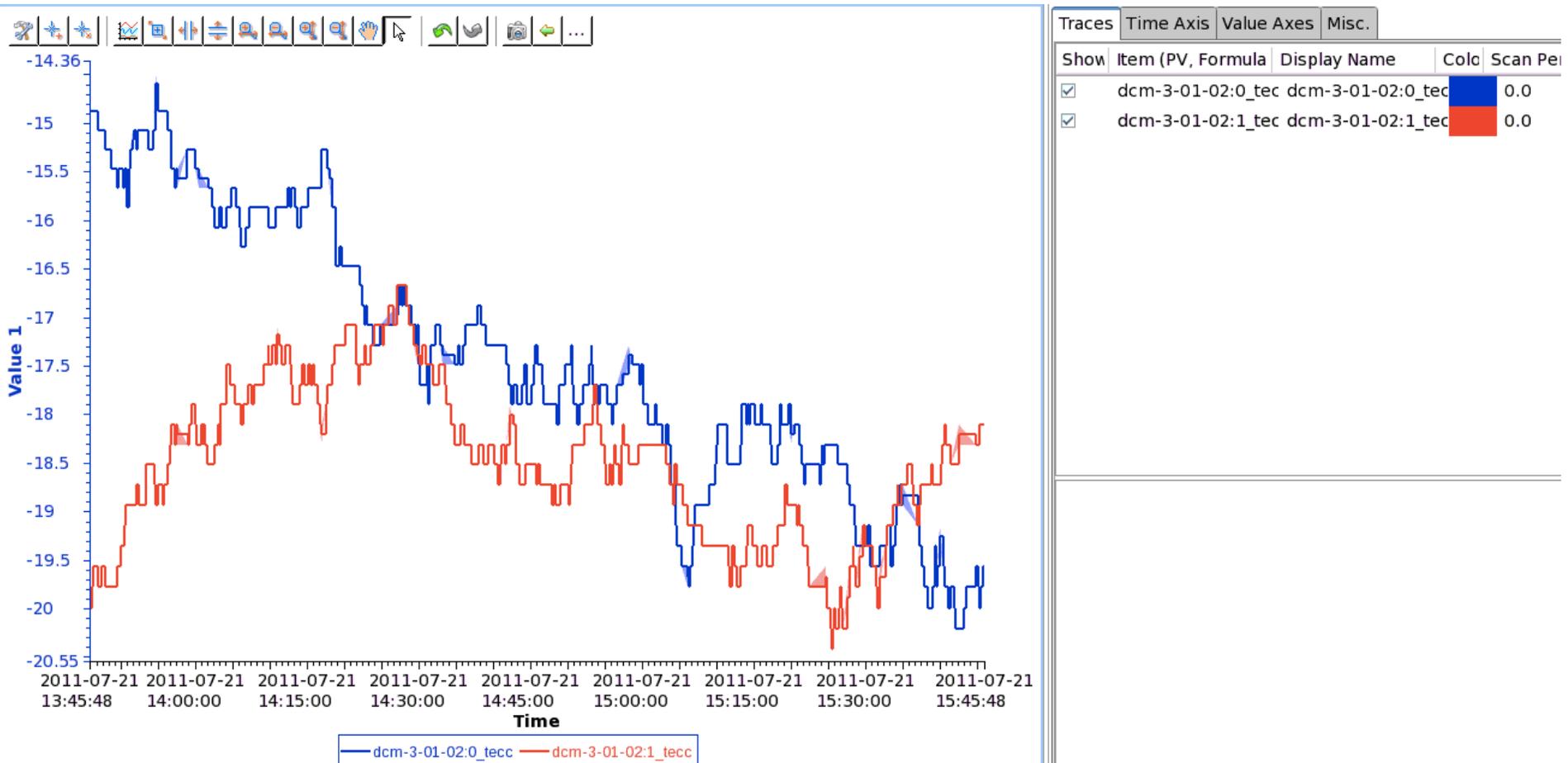
Data Browser

Data Browser plots live or archived data samples and exports the data to files.

-Screenshot shows data read from a local MySQL database.

-Can be inserted into an OPI Display page.

-The “macro” support feature was added within **2hours** upon my request!





EPICS PV Tree



PV Tree displays a hierarchical view of EPICS record input links with current values and alarm states.

-It is a primarily debugging / development tool.

The screenshot shows the EPICS PV Tree interface. At the top, there are four tabs: "EPICS PV Tree" (selected), "Alarm Tree", "Message History", and "Console". Below the tabs, there is a search bar with the text "PV: dcm-3-01-02:0_dc_". The main area displays a hierarchical tree structure:

- ▼ PV 'dcm-3-01-02:0_dc_' (compress) = 2630.0, 2630.0, 2630.0, 2630.0, 2630.0, 2630.0, 2630.0, 2630.0, 2630.0, 2630.0, 2630.0, 2630.0
- ▼ INP 'dcm-3-01-02:0_dc' (ai) = 2600.0
 - INP '@0 DC'



JMS Monitor



JMS Monitor is yet another debugging tool that displays messages posted to a user specified topic.

Alarm Table Console Global Alarm Table Message History **JMS Monitor** System Monitor Therapist

URL: @ failover:(tcp://localhost:61616)

Topic:

Server: localhost/127.0.0.1:61616

Date	Type	Content
2011-07-19 18:45:3	alarm	JMS Source=topic://Annunciator_SERVER, HOST=uboonedaq01.fnal.gov, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, USER=lukhanin, TEXT=I
2011-07-19 18:45:3	alarm	JMS Source=topic://Annunciator_SERVER, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, NAME=dcm-3-01-02:26_tecc, SEVERITY=MAJOR, STAT
2011-07-19 18:45:4	alarm	JMS Source=topic://Annunciator_SERVER, HOST=uboonedaq01.fnal.gov, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, USER=lukhanin, TEXT=I
2011-07-19 18:45:5	alarm	JMS Source=topic://Annunciator_SERVER, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, NAME=dcm-3-01-02:40_tecc, SEVERITY=MAJOR, STAT
2011-07-19 18:46:0	alarm	JMS Source=topic://Annunciator_SERVER, HOST=uboonedaq01.fnal.gov, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, USER=lukhanin, TEXT=I
2011-07-19 18:46:0	alarm	JMS Source=topic://Annunciator_SERVER, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, NAME=dcm-3-01-02:27_tecc, SEVERITY=MAJOR, STAT
2011-07-19 18:46:1	alarm	JMS Source=topic://Annunciator_SERVER, HOST=uboonedaq01.fnal.gov, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, USER=lukhanin, TEXT=I
2011-07-19 18:46:2	alarm	JMS Source=topic://Annunciator_SERVER, HOST=uboonedaq01.fnal.gov, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, USER=lukhanin, TEXT=I
2011-07-19 18:46:3	alarm	JMS Source=topic://Annunciator_SERVER, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, NAME=dcm-3-01-02:56_tecc, SEVERITY=MAJOR, STAT
2011-07-19 18:46:4	alarm	JMS Source=topic://Annunciator_SERVER, HOST=uboonedaq01.fnal.gov, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, USER=lukhanin, TEXT=I
2011-07-19 18:46:4	alarm	JMS Source=topic://Annunciator_SERVER, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, NAME=dcm-3-01-02:27_tecc, SEVERITY=MAJOR, STAT
2011-07-19 18:46:4	alarm	JMS Source=topic://Annunciator_SERVER, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, NAME=dcm-3-01-02:40_tecc, SEVERITY=MAJOR, STAT
2011-07-19 18:46:5	alarm	JMS Source=topic://Annunciator_SERVER, HOST=uboonedaq01.fnal.gov, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, USER=lukhanin, TEXT=I
2011-07-19 18:47:0	alarm	JMS Source=topic://Annunciator_SERVER, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, NAME=dcm-3-01-02:40_tecc, SEVERITY=MAJOR, STAT
2011-07-19 18:47:1	alarm	JMS Source=topic://Annunciator_SERVER, HOST=uboonedaq01.fnal.gov, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, USER=lukhanin, TEXT=I
2011-07-19 18:47:1	alarm	JMS Source=topic://Annunciator_SERVER, CONFIG=Annunciator, APPLICATION-ID=AlarmServer, NAME=dcm-3-01-02:27_tecc, SEVERITY=MAJOR, STAT



PV Table



PV Table can save and restore PV values and seems to resemble a configuration database.

ata Browser SNS Control System Studio

Sel	Name	Time	Value	Saved	Readback	RB Value	Saved RB
<input checked="" type="checkbox"/>	dcm-3-01-02:0_tecc	2011/07/21 15:50:57	-19.15	-18.31263			
<input checked="" type="checkbox"/>	dcm-3-01-02:4_tecc	2011/07/21 15:51:02	-6.25	-13.32219			



Alarm logic



- Kay's suggestion is to create "good" alarm trigger PVs on the IOC side. In general, it requires the alarm logic to go between a raw signal and "good" alarm, which includes
 - smoothing of the raw signal;
 - varying alarm limits based on detector state;
 - and manual or automated alarm disabling.
- Alarm logic should reduce the rate of alarms to an operator manageable rate (< 100/day).
 - Operators need to respond to each alarm.
 - Alarms need to provide clear guidance.
 - Need to consider system impact if no action was taken.
 - Requires thought, communication, documentation.



Alarm logic (cont'd)



- Another recommendation is to avoid multiple alarm levels, e.g. HIGH & HIHI; or LOW & LOLO.
 - In most cases, HIGH & HIHI only double the alarm traffic.
 - Having both alarms implies that the first one is ignored and becomes worthless.
 - Considering response time for each alarm level is important.
 - Is it enough time to respond between minor and major alarm levels?
 - Do they require significantly different operator actions?



Impact/Consequence grid



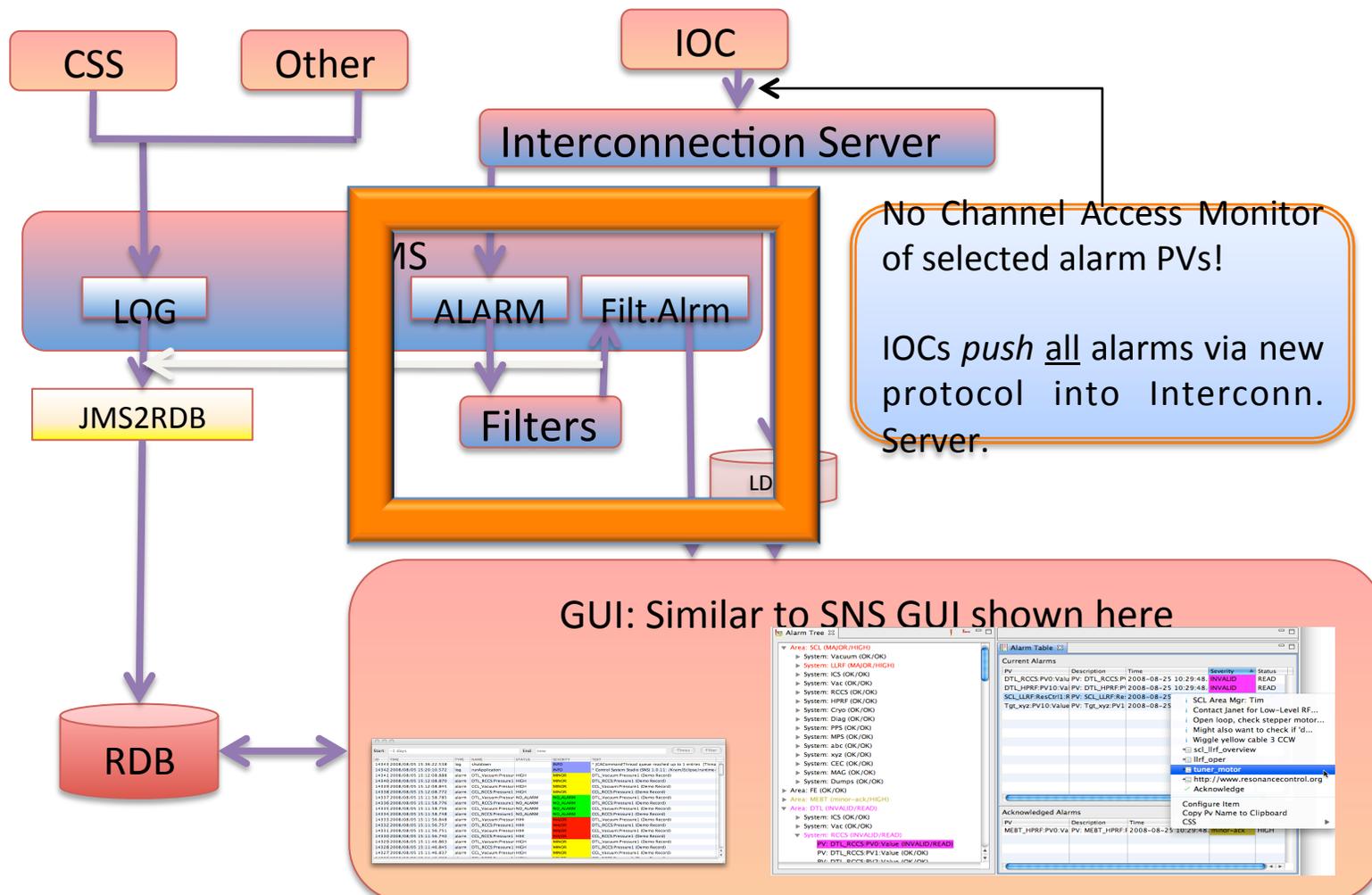
Category	So What	Minor Consequence	Major Consequence
Personnel Safety		PPS independent from EPICS?	
Environment, Public		Can EPICS cause contained spill of mercury?	Uncontained spill??
Cost: Beam Production, Downtime, Beam Quality	No effect Beam off < 1 sec?	Beam off <10 min <\$10000	Beam off >10min >\$10000

- Mostly: How long will beam be off?

Source: Xihui Chen, Katia Danilova, Kay Kasemir
SNS/ORNL



DESY Alarm System



Source: Xihui Chen, Katia Danilova, Kay Kasemir
SNS/ORNL



Development and support estimates



- .1/y FTE for packaging, integration and functional testing of new features.
- .3/y FTE for implementing Nova specific alarm logic and a custom DDS to IOC bridge, or perhaps even replace JMS with DDS.
- I am not aware of any long term support agreements between Nova/FNAL and ORNL.



DEMO & Q/A



Works cited



CSS documentation pages

<http://sourceforge.net/apps/trac/cs-studio>

<http://sourceforge.net/apps/trac/cs-studio/wiki/Applications>

Eclipse homepage

<http://www.eclipse.org>

CSS Publications

<http://accelconf.web.cern.ch/AccelConf/ica07/PAPERS/ROPB02.PDF>

<http://accelconf.web.cern.ch/AccelConf/ica07/PAPERS/MOPB03.PDF>