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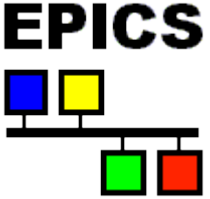

and Conlog

Michael Thomas

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What is it?

"EPICS is a set of software tools and applications which provide a software infrastructure for use in building distributed control systems to operate devices such as Particle Accelerators, Large Experiments and major Telescopes."

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Glossary

- **E**xperimental **P**hysics and **I**ndustrial **C**ontrol **S**ystem
- **I**nput/**O**utput **C**ontroller
- **C**hannel **A**ccess
- **P**rocess **V**ariable
- **M**otif **E**ditor and **D**isplay **M**anager
- **CON**figuration **LOG**ger

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IOC

- The IOC provides a uniform network-enabled interface to the underlying hardware
- Epics provides drivers for many common types of hardware: serial ports, modbus, etc.
- Epics provides an API for developing custom hardware drivers (eg frontend computer)

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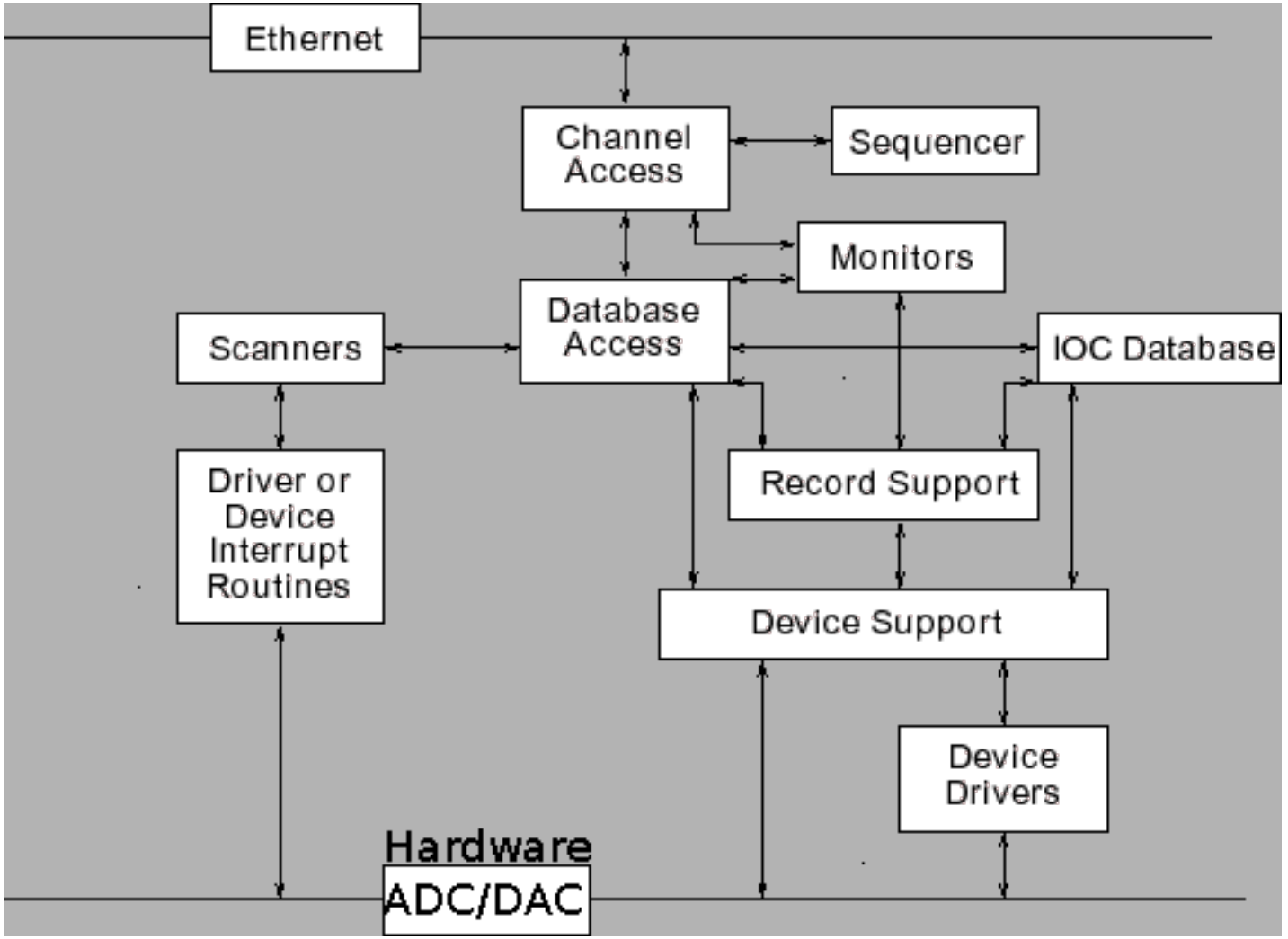
Anatomy of an IOC



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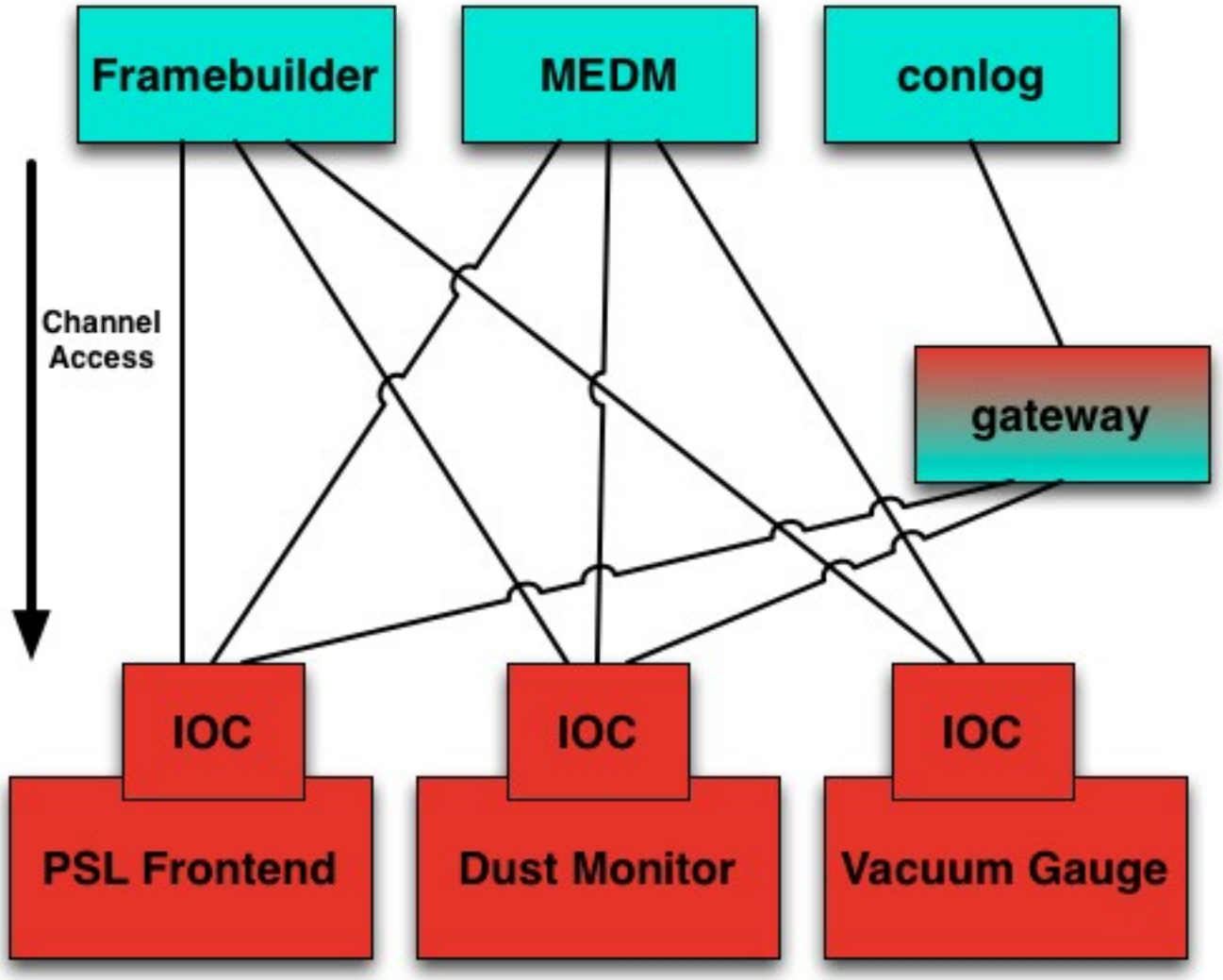
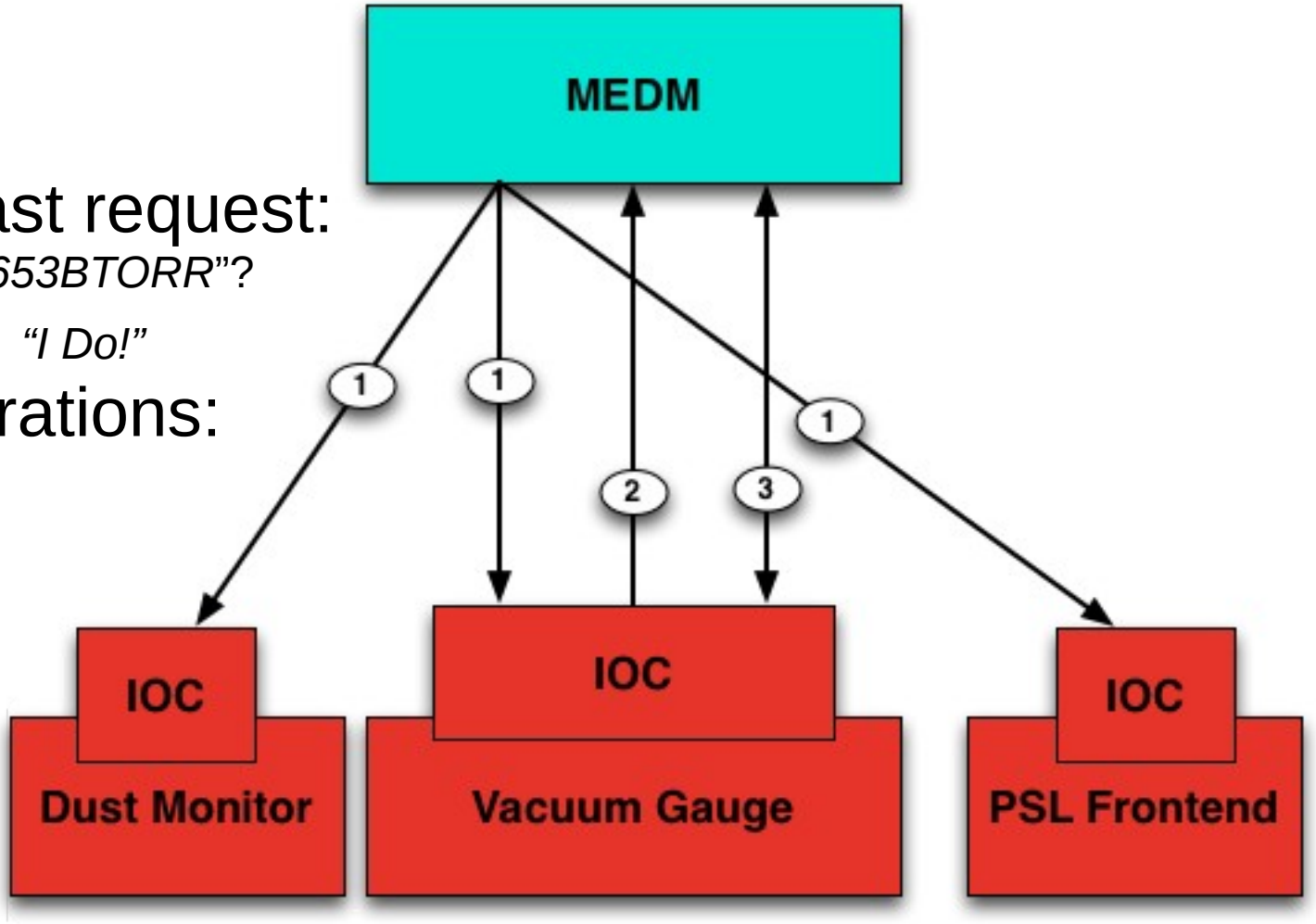
Clients



Servers

Channel Access

1. Clients broadcast request:
   "*Who has LVE-MX:X1_653BTORR*"?
2. IOC Responds: *"I Do!"*
3. Read/write operations:
   "Gimme value!"
   "Set this value!"



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Gateways

- Provide way to traverse multiple network segments
- Provide additional access control
- Reduce the number of connections to an IOC

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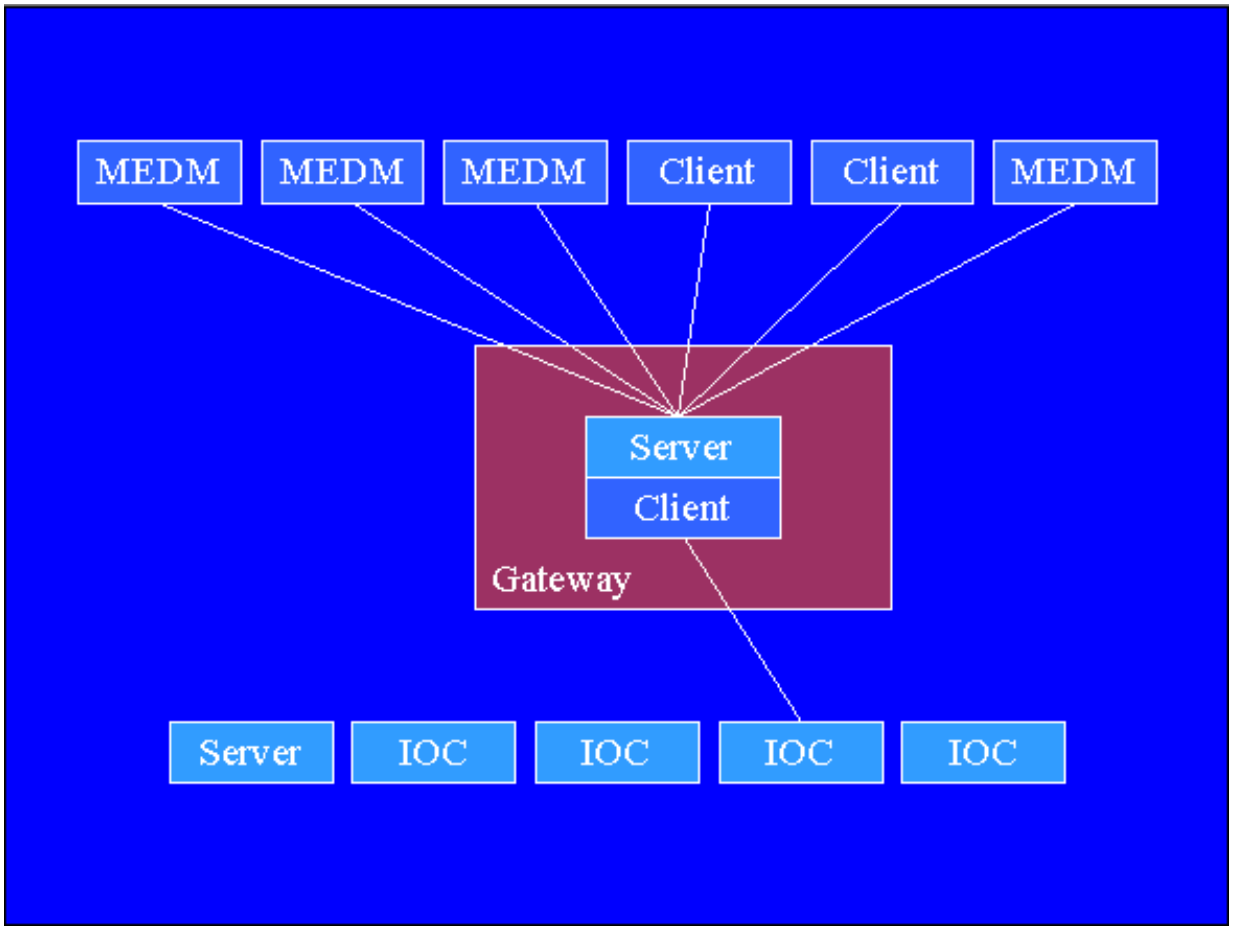
Gateway



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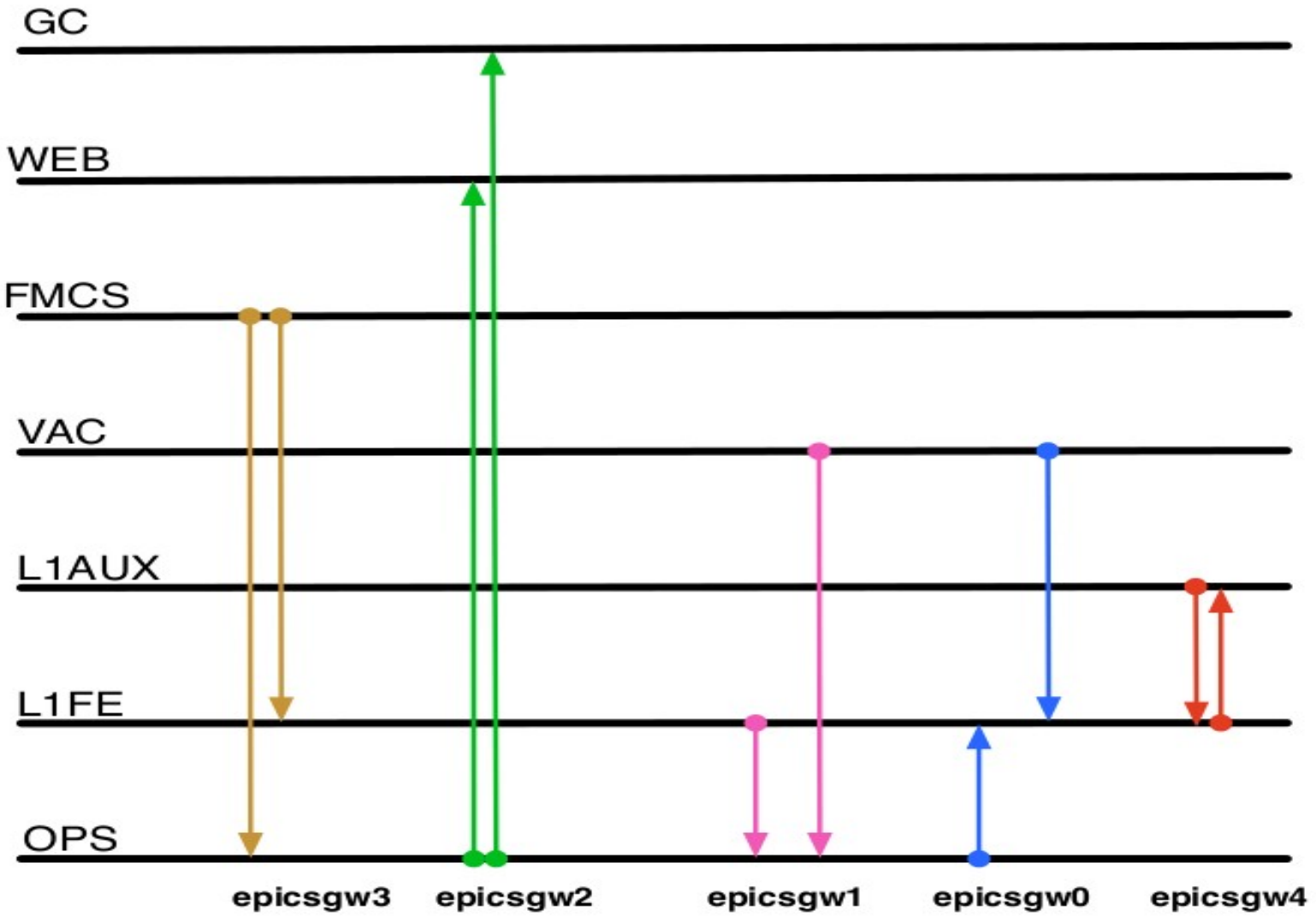
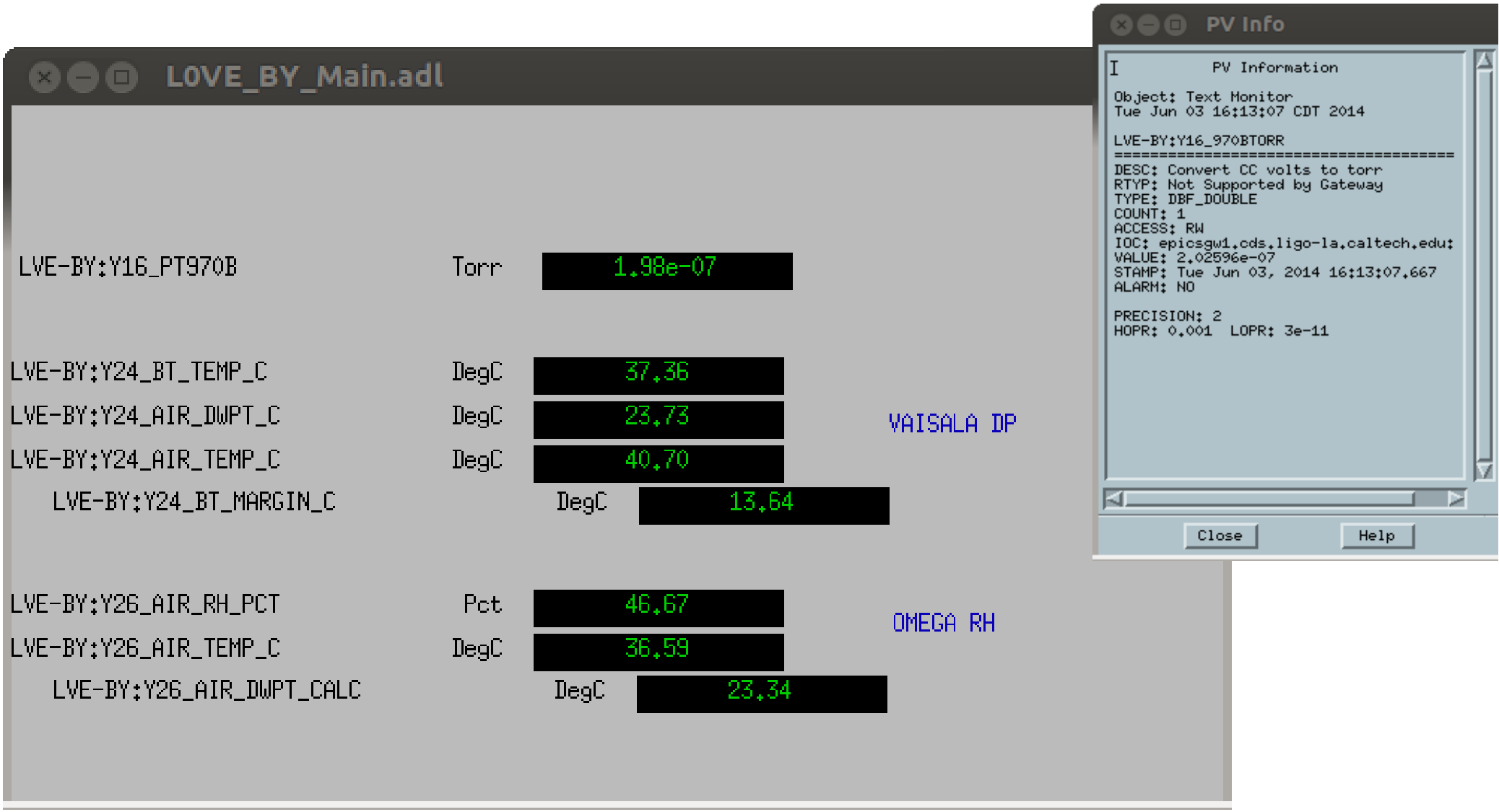
Gateways @ LLO



Clients - MEDM



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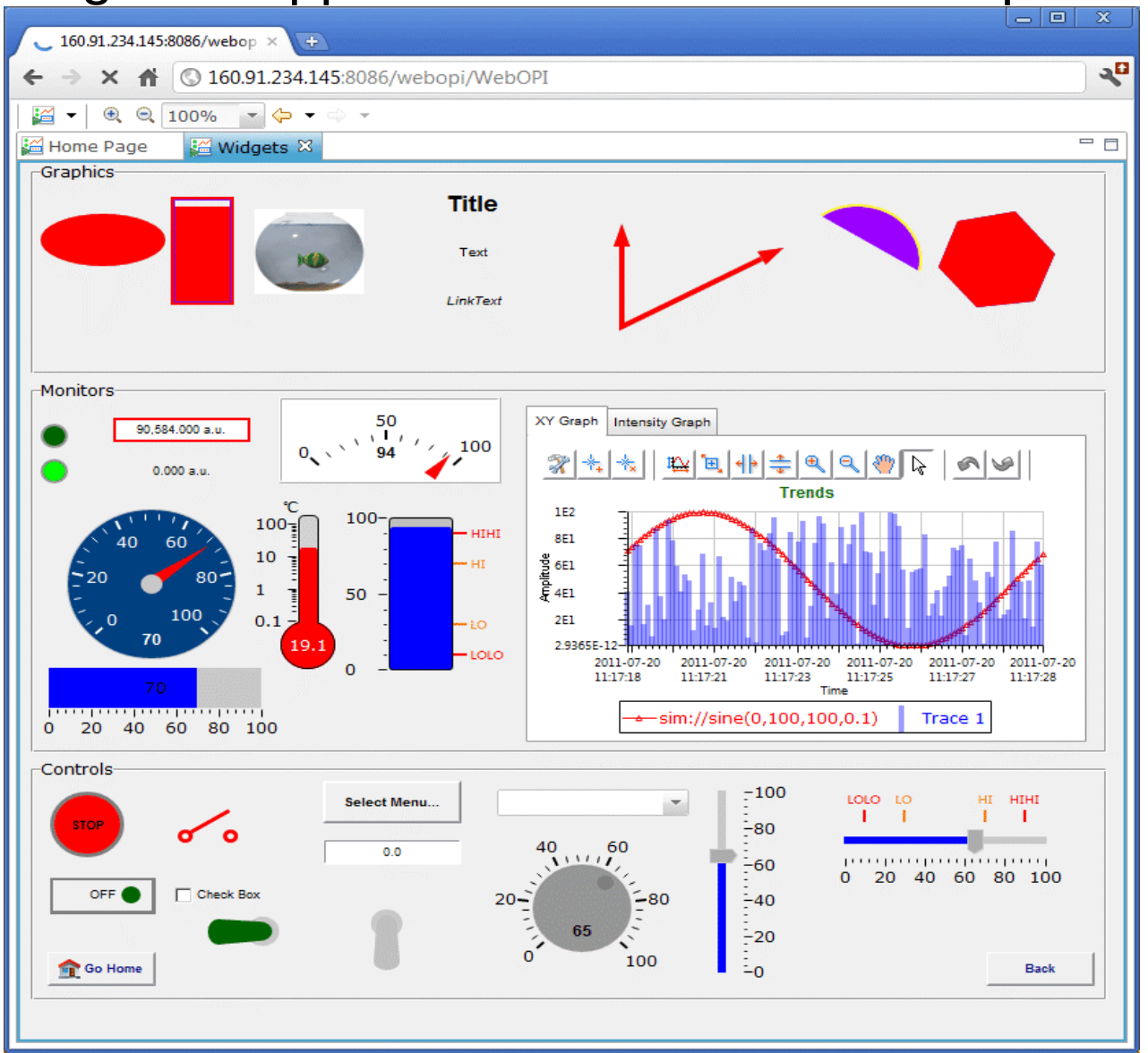
Sample ADL

```
"text update" {
        object {
                x=248
                y=70
                width=117
                height=18
        }
        monitor {
                chan="LVE-BY:Y16_970BTORR"
                clr=0
                bclr=14
        }
        clrmod="alarm"
        align="horiz. centered"
        format="exponential"
        limits {
        }
}
```

Clients - CSS/BOY

- http://sourceforge.net/apps/trac/cs-studio/wiki/webopi



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Clients - CLI

- caget
- caput
- ezcaread
- ezcawrite
- cainfo
- cdsutils

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Clients - pyEpics

```
#!/usr/bin/python

import epics

def onConnectionChange(pvName=None, conn=None, **kw):
    sys.stdout.write('%s: PV connection status changed: %s %s\n' %
(datetime.datetime.today(), pvName,  repr(conn)))

def onValueChange(pvname=None, value=None, host=None, timestamp=None, **kws):
    sys.stdout.write('%s: PV value changed: %s (%s)  %s @ %s\n' %
( datetime.datetime.today(), pvname, host, repr(value),
datetime.datetime.fromtimestamp(timestamp)))

myPV = epics.PV('L0:VIDEO-REQUEST_MONITOR',
        connection_callback=onConnectionChange,
        callback=onValueChange)

while True:
    myPV.get()
    time.sleep(0.1)
```

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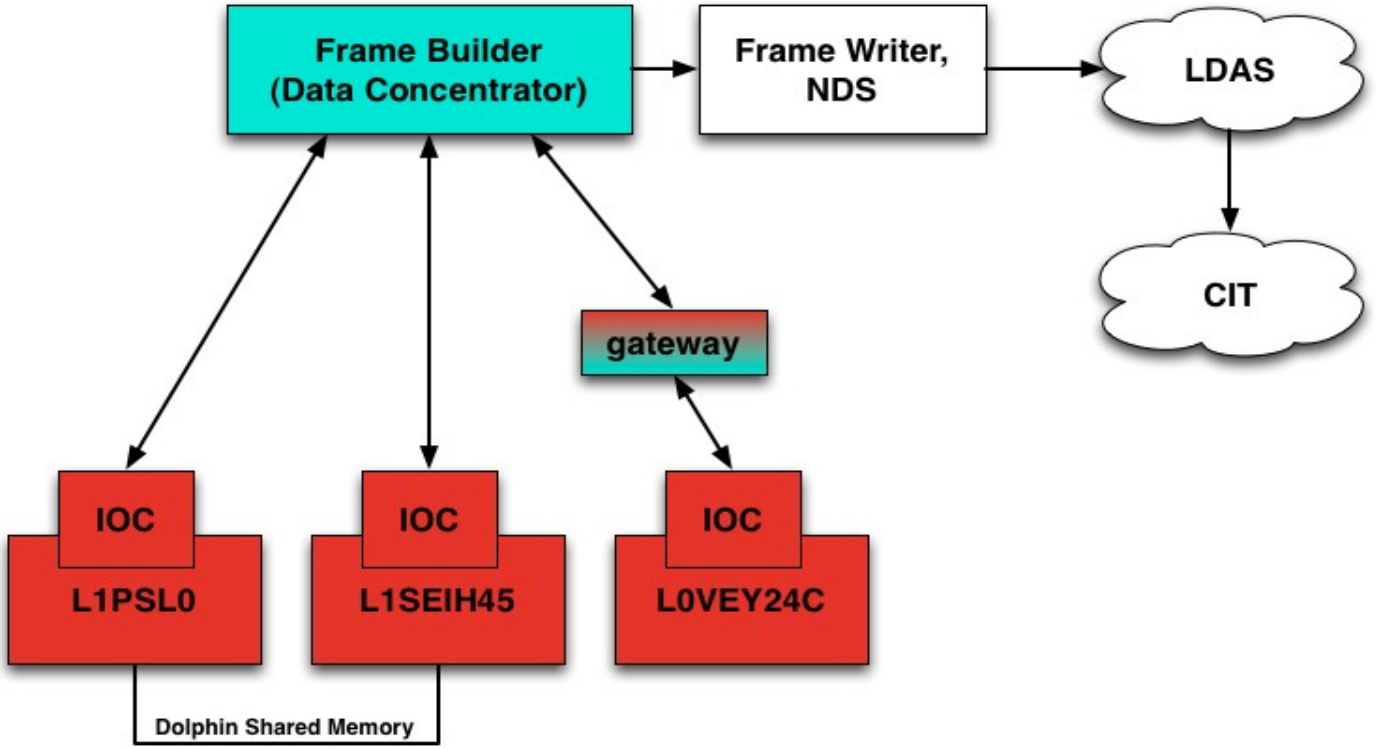
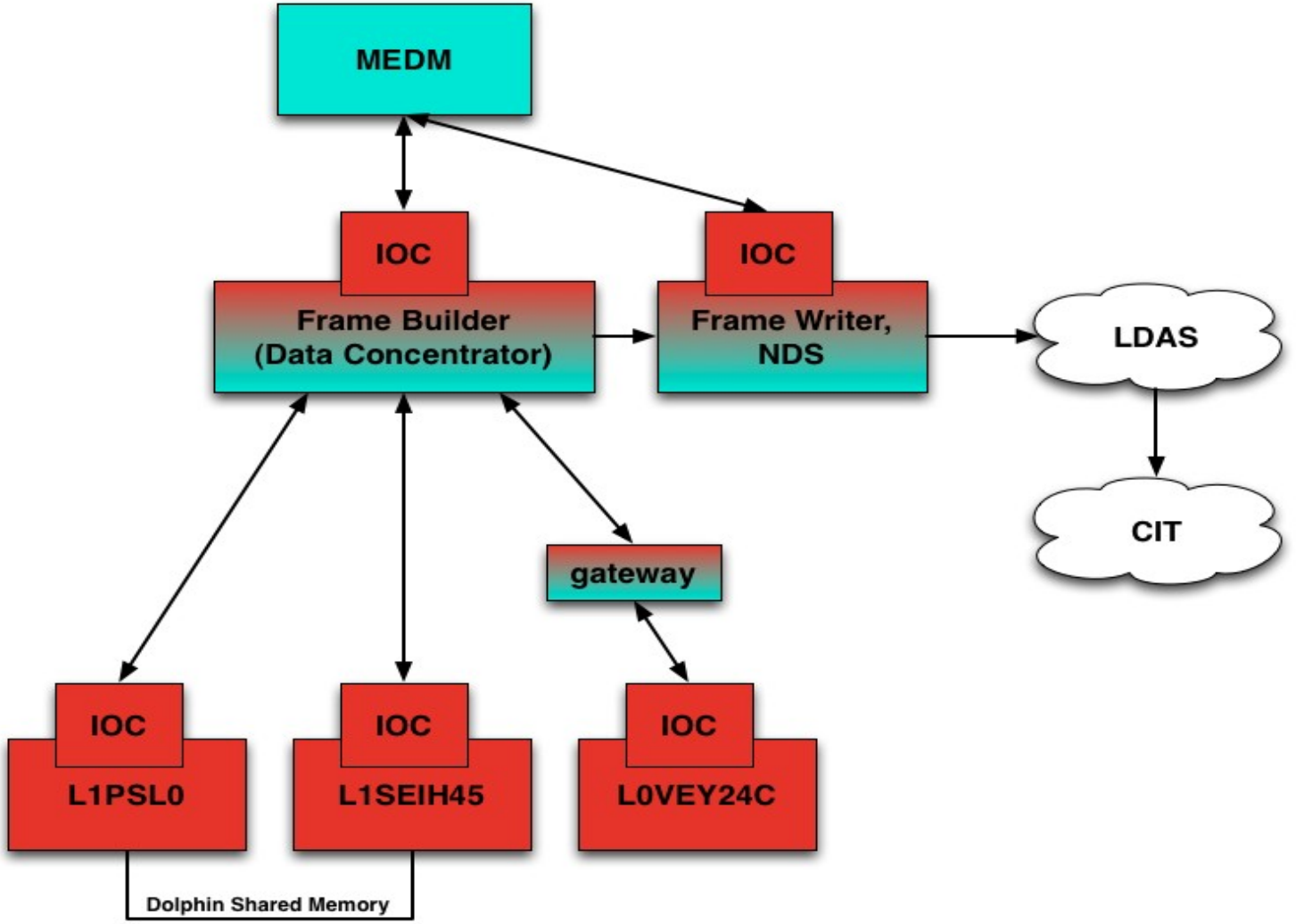
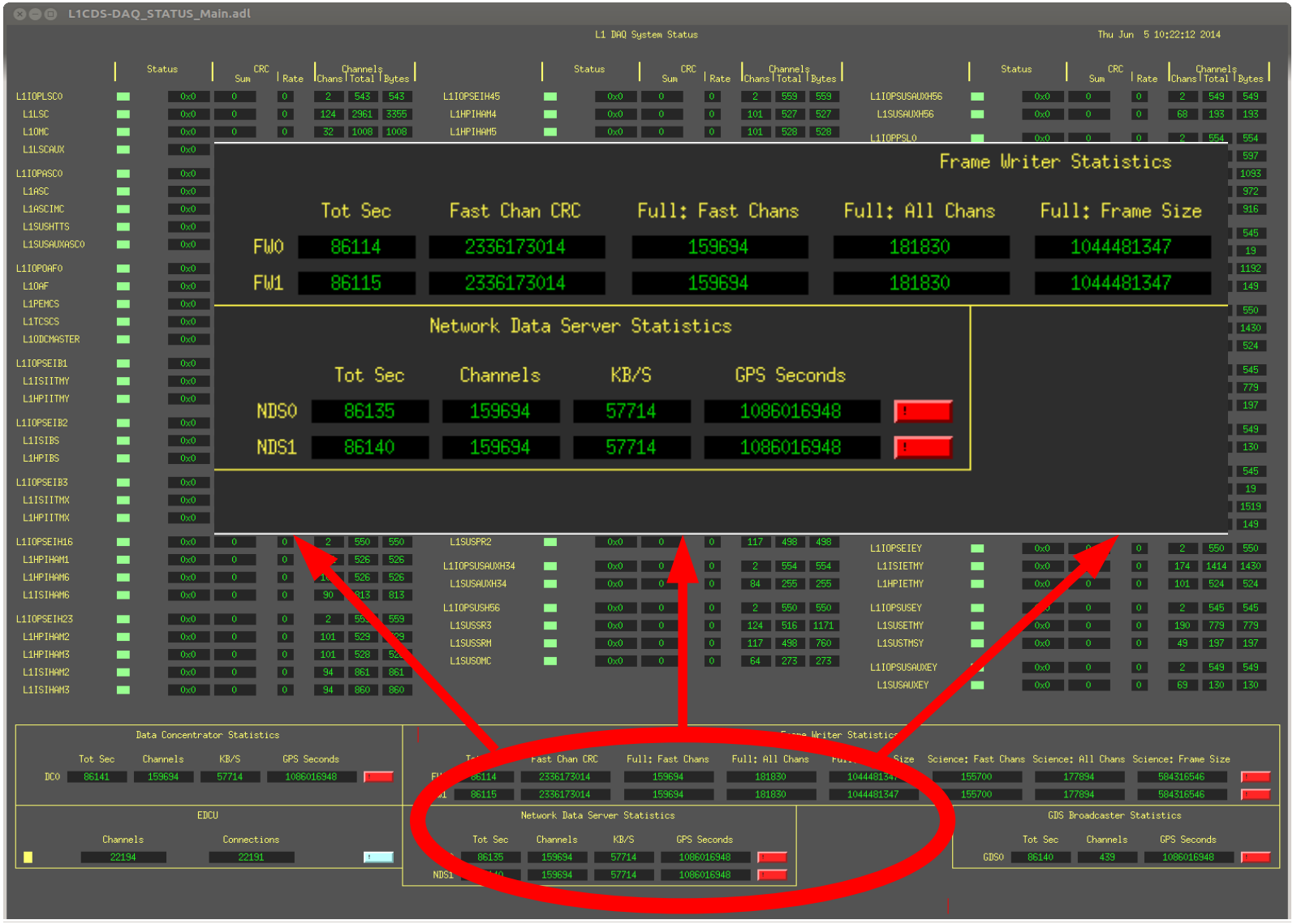
Client - DAQ



Client - DAQ


MEDM
IOC
Frame Builder
(Data Concentrator)
IOC
Frame Writer,
NDS
LDAS
CIT
gateway
IOC
L1PSL0
IOC
L1SEIH45
IOC
L0VEY24C
Dolphin Shared Memory


L1CDS-DAQ_STATUS_Main.adl
L1 DAQ System Status
Thu Jun 5 10:22:12 2014
Frame Writer Statistics
Tot Sec
Fast Chan CRC
Full: Fast Chans
Full: All Chans
Full: Frame Size
FW0 86114 2336173014 159694 181830 1044481347
FW1 86115 2336173014 159694 181830 1044481347
Network Data Server Statistics
Tot Sec
Channels
KB/S
GPS Seconds
NDS0 86135 159694 57714 1086016948
NDS1 86140 159694 57714 1086016948
Data Concentrator Statistics
Tot Sec
Channels
KB/S
GPS Seconds
DC0 86141 159694 57714 1086016948
EDCU
Channels
Connections
22194 22191
Network Data Server Statistics
Tot Sec
Channels
KB/S
GPS Seconds
GDS Broadcaster Statistics
Tot Sec
Channels
GPS Seconds
GDS0 86140 439 1086016948

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Clients - conlog

- Configuration Logger
- Records all changes of configuration (ie not readback) channels
- Faster than reading frame files
- https://llocds.ligo-la.caltech.edu:8443/conlog/index.php

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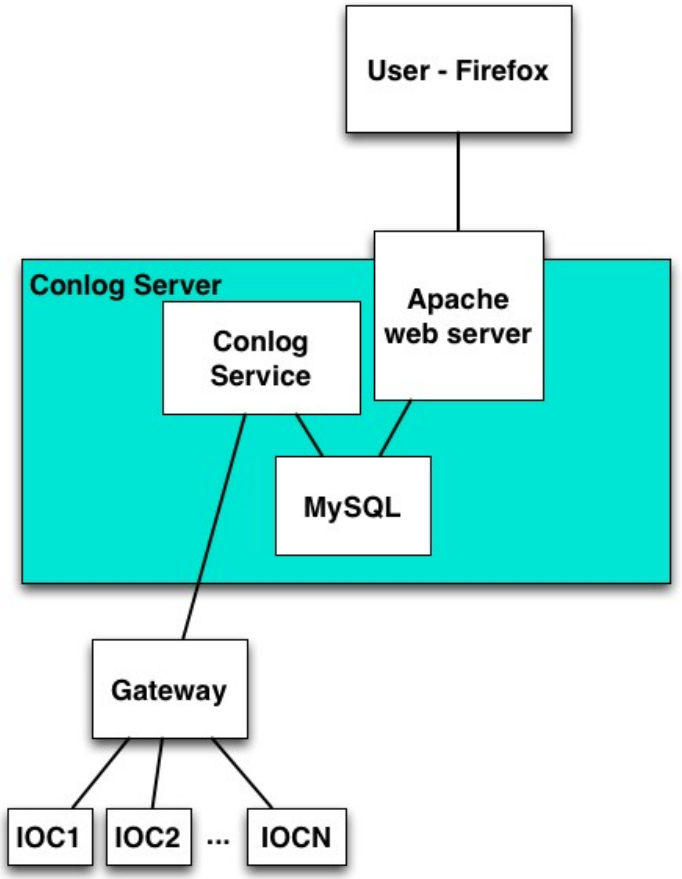
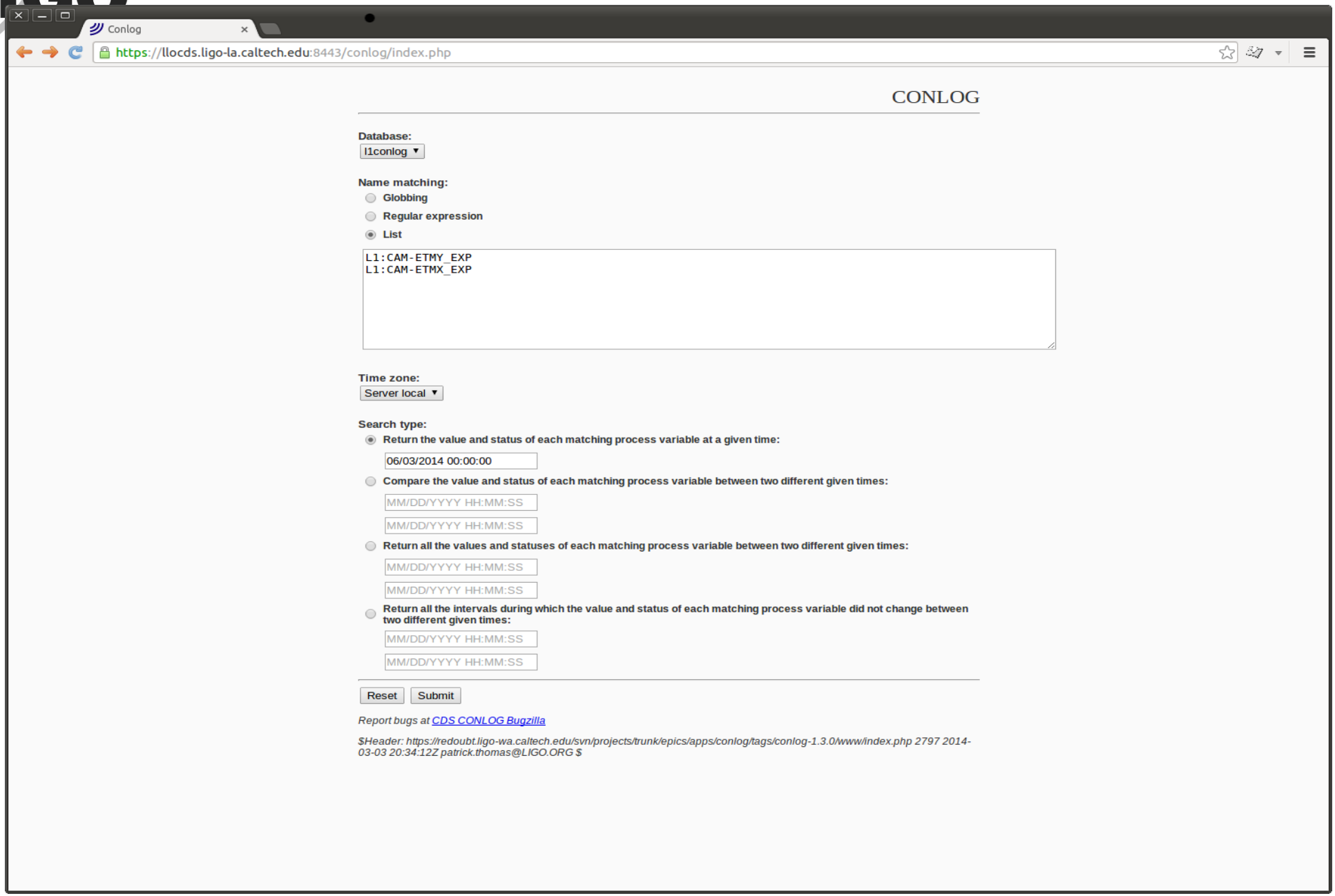
Conlog Architecture




Conlog
https://llocds.ligo-la.caltech.edu:8443/conlog/index.php
CONLOG
Database:
l1conlog
Name matching:
Globbing
Regular expression
List
L1:CAM-ETMY_EXP
L1:CAM-ETMX_EXP
Time zone:
Server local
Search type:
Return the value and status of each matching process variable at a given time:
06/03/2014 00:00:00
Compare the value and status of each matching process variable between two different given times:
MM/DD/YYYY HH:MM:SS
MM/DD/YYYY HH:MM:SS
Return all the values and statuses of each matching process variable between two different given times:
MM/DD/YYYY HH:MM:SS
MM/DD/YYYY HH:MM:SS
Return all the intervals during which the value and status of each matching process variable did not change between two different given times:
MM/DD/YYYY HH:MM:SS
MM/DD/YYYY HH:MM:SS
Reset
Submit
Report bugs at CDS CONLOG Bugzilla
$Header: https://redoubt.ligo-wa.caltech.edu/svn/projects/trunk/epics/apps/conlog/tags/conlog-1.3.0/www/index.php 2797 2014-03-03 20:34:12Z patrick.thomas@LIGO.ORG $

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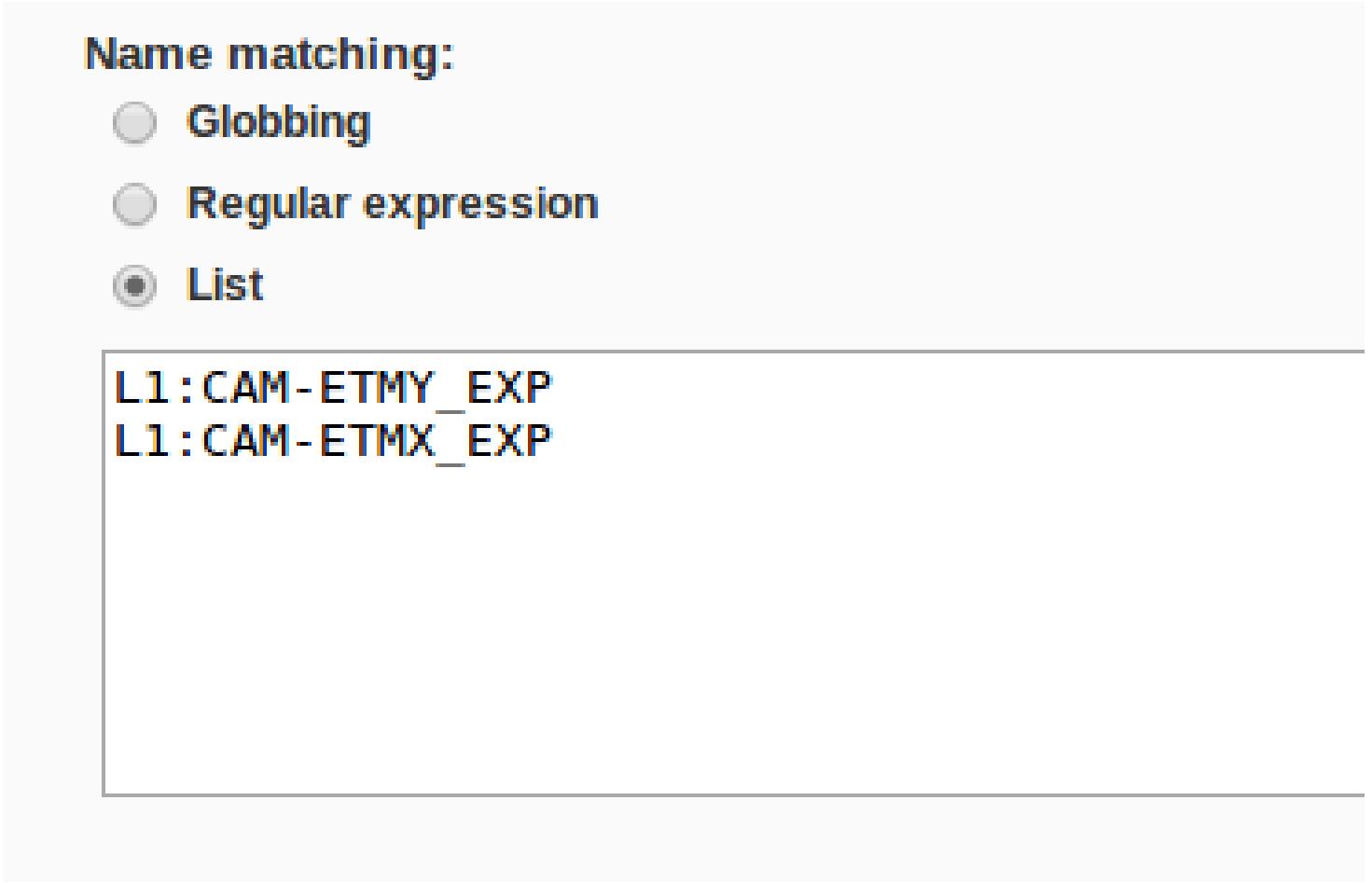
List Channels



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Select times

Search type:

- (•) **Return the value and status of each matching process variable at a given time:**
  - 06/03/2014 00:00:00
- ( ) **Compare the value and status of each matching process variable between two different given times:**
  - MM/DD/YYYY HH:MM:SS
  - MM/DD/YYYY HH:MM:SS
- ( ) **Return all the values and statuses of each matching process variable between two different given times:**
  - MM/DD/YYYY HH:MM:SS
  - MM/DD/YYYY HH:MM:SS
- ( ) **Return all the intervals during which the value and status of each matching process variable did not change between two different given times:**
  - MM/DD/YYYY HH:MM:SS
  - MM/DD/YYYY HH:MM:SS

Results

Jun 03 2014 00:00:00 CDT

Name	Time	Event	Value	Alarm Status	Alarm Severity	Error
L1:CAM-ETMX_EXP	May 29 2014 06:37:21 CDT	update	100000	NO_ALARM	NO_ALARM	
L1:CAM-ETMY_EXP	May 29 2014 10:32:55 CDT	update	100000	NO_ALARM	NO_ALARM	

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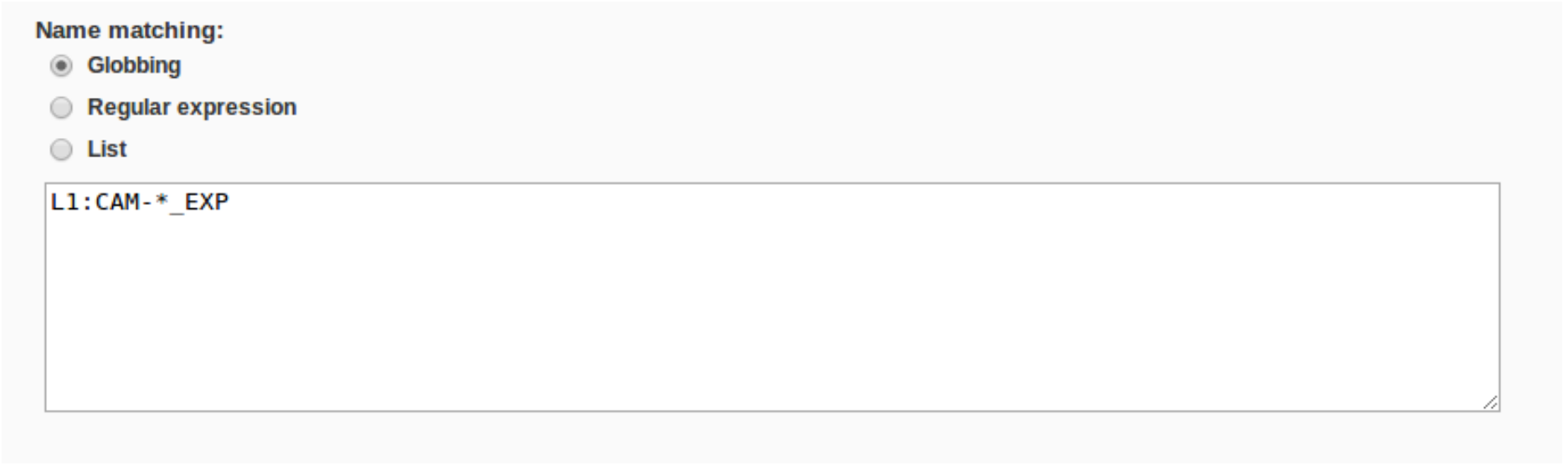
Glob patterns



Results

Jun 03 2014 00:00:00 CDT

Name	Time	Event	Value	Alarm Status	Alarm Severity	Error
L1:CAM-AS_EXP	Jun 02 2014 23:46:00 CDT	update	1816.9	NO_ALARM	NO_ALARM	
L1:CAM-BS_EXP	May 29 2014 06:37:21 CDT	update	1e+06	NO_ALARM	NO_ALARM	
L1:CAM-ETMX_EXP	May 29 2014 06:37:21 CDT	update	100000	NO_ALARM	NO_ALARM	
L1:CAM-ETMY_EXP	May 29 2014 10:32:55 CDT	update	100000	NO_ALARM	NO_ALARM	
L1:CAM-IM4_TRANS_EXP	May 29 2014 06:37:21 CDT	update	0	NO_ALARM	NO_ALARM	
L1:CAM-ITMX_EXP	May 31 2014 20:47:27 CDT	update	81690.1	NO_ALARM	NO_ALARM	
L1:CAM-ITMY_EXP	May 31 2014 01:08:31 CDT	update	30281.7	NO_ALARM	NO_ALARM	
L1:CAM-MC1_EXP	May 29 2014 06:37:21 CDT	update	100000	NO_ALARM	NO_ALARM	
L1:CAM-MC1_LAV_EXP	May 29 2014 06:37:21 CDT	update	50000	NO_ALARM	NO_ALARM	
L1:CAM-MC2_EXP	Jun 02 2014 12:42:31 CDT	update	1000	NO_ALARM	NO_ALARM	
L1:CAM-MC2_LAV_EXP	May 29 2014 06:37:21 CDT	update	35211.3	NO_ALARM	NO_ALARM	
L1:CAM-MC3_EXP	Jun 01 2014 13:07:11 CDT	update	500	NO_ALARM	NO_ALARM	
L1:CAM-MC_REFL_EXP	May 29 2014 06:37:21 CDT	update	16000	NO_ALARM	NO_ALARM	
L1:CAM-MC_TRANS_EXP	May 29 2014 06:37:21 CDT	update	13380	NO_ALARM	NO_ALARM	
L1:CAM-OMC_REFL_EXP	May 29 2014 06:37:21 CDT	update	0	NO_ALARM	NO_ALARM	
L1:CAM-OMC_TRANS_EXP	May 31 2014 01:49:01 CDT	update	9859.2	NO_ALARM	NO_ALARM	
L1:CAM-PR2_EXP	May 29 2014 06:37:21 CDT	update	9971.8	NO_ALARM	NO_ALARM	
L1:CAM-PR3_EXP	May 29 2014 06:37:21 CDT	update	1e+06	NO_ALARM	NO_ALARM	
L1:CAM-PRM_EXP	May 29 2014 06:37:21 CDT	update	100000	NO_ALARM	NO_ALARM	
L1:CAM-PRM_REFL_180_EXP	May 29 2014 06:37:21 CDT	update	3000	NO_ALARM	NO_ALARM	
L1:CAM-PRM_REFL_90_EXP	May 29 2014 06:37:21 CDT	update	43662	NO_ALARM	NO_ALARM	
L1:CAM-PSL_EXP	May 29 2014 06:37:21 CDT	update	0	NO_ALARM	NO_ALARM	
L1:CAM-SPARE1_EXP	May 29 2014 06:37:21 CDT	update	200	NO_ALARM	NO_ALARM	
L1:CAM-TEMP1_EXP	May 29 2014 06:37:21 CDT	update	0	NO_ALARM	NO_ALARM	
L1:CAM-TEMP2_EXP	May 29 2014 06:37:21 CDT	update	0	NO_ALARM	NO_ALARM	