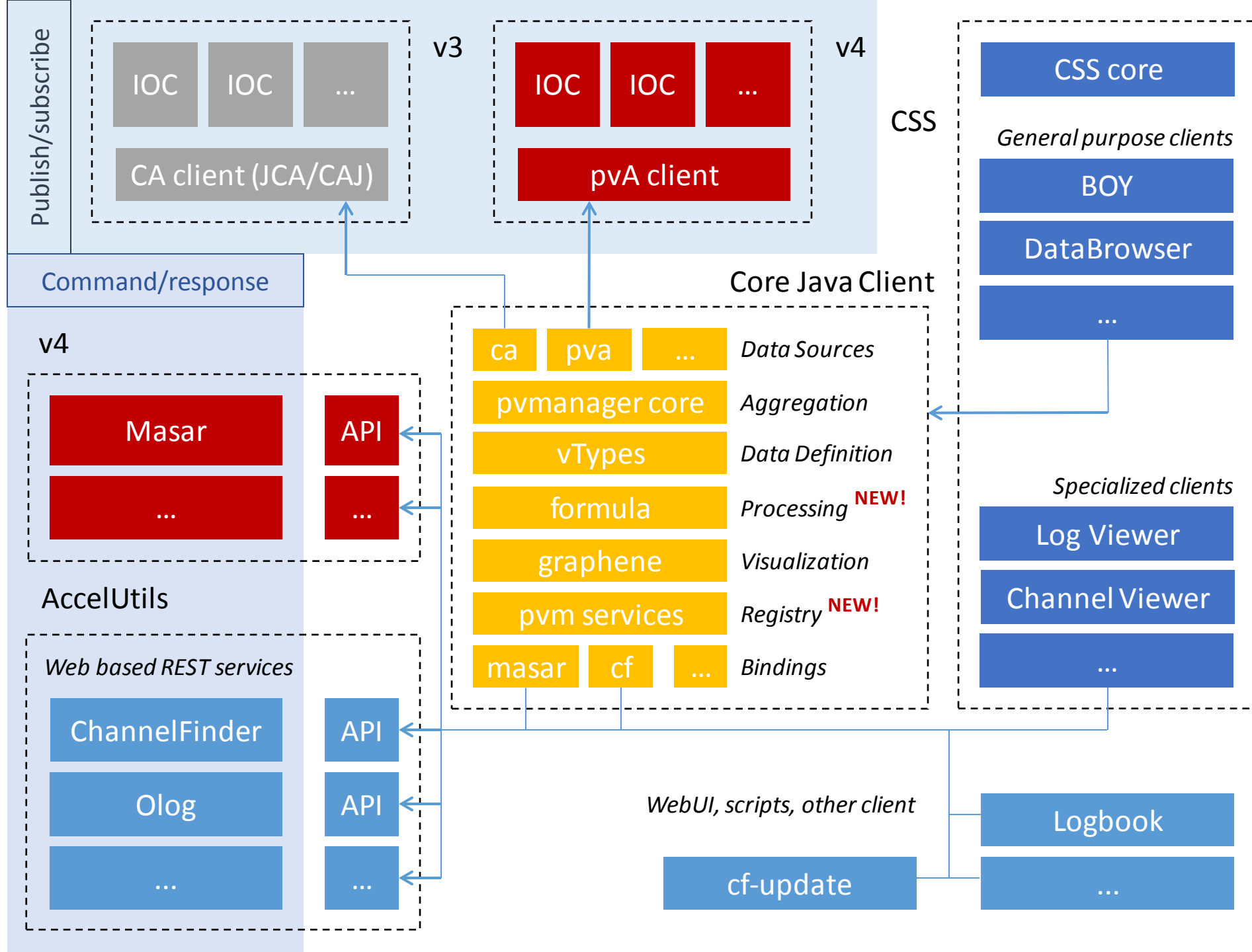
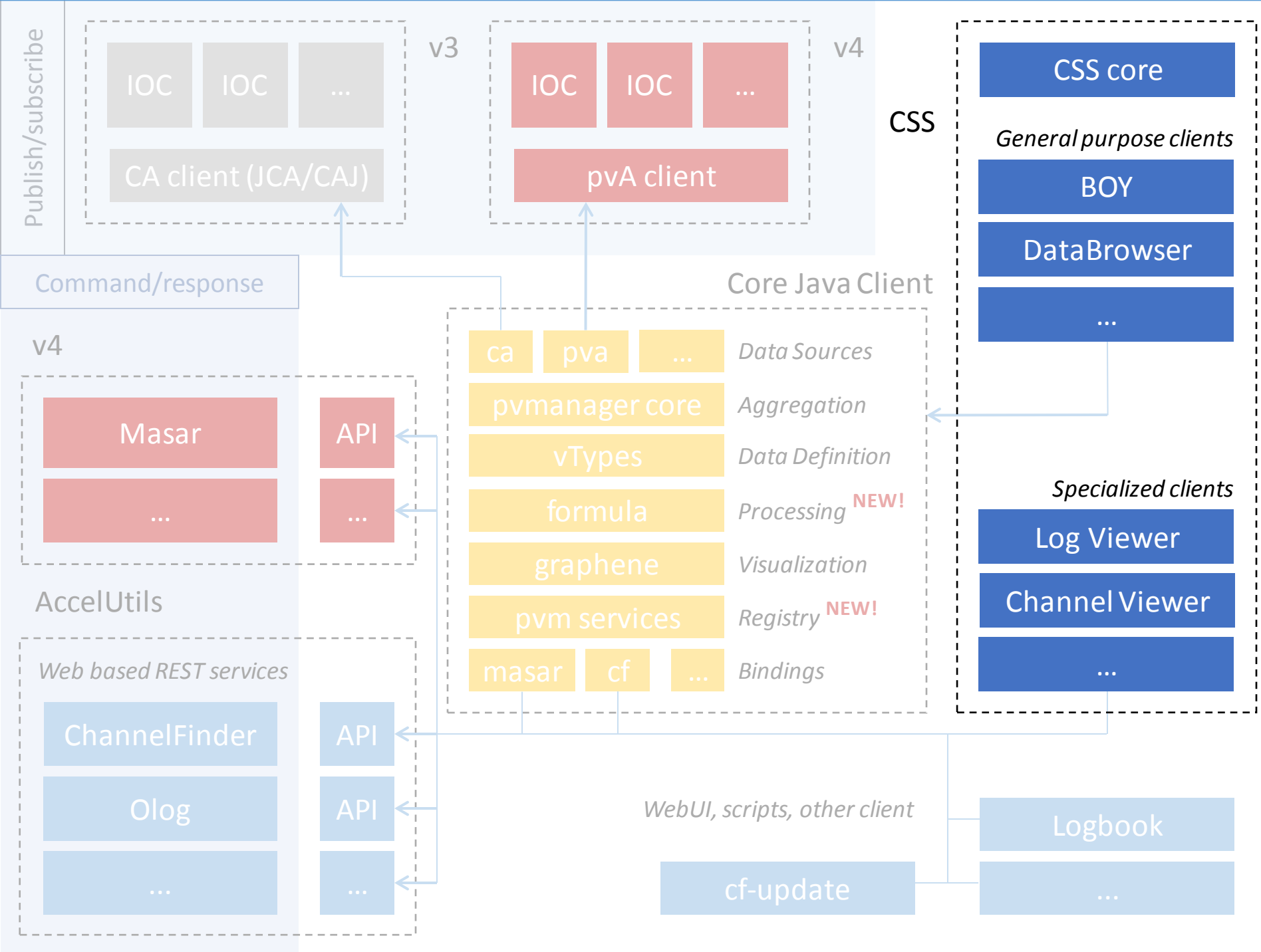


Tools and Services at NSLSII

Kunal Shroff, Tasha Summers, Smith Reid, Gabriele Carcassi, Michael
Davidsaver (NSLSII)
Ralph Lange (ITER)
Samuel Dallstream (UMich)
Michael Skinner (Marist College)





CS-Studio

- An Integrated platform for controls and physics applications
 - Over 2 dozen releases
 - In production 3.1.6, 3.2.15a, and 3.3.10a

CS-Studio Applications

- BOY
- BEAST
- LogViewer
- DataBrowser
- Pretune
- ShiftViewer

BOY: Best OPI Yet

- Approximately 5000 opi screens
- All hosted in a mercurial repository
- NFS mounted onto all machines in the controls network

BOY Screens

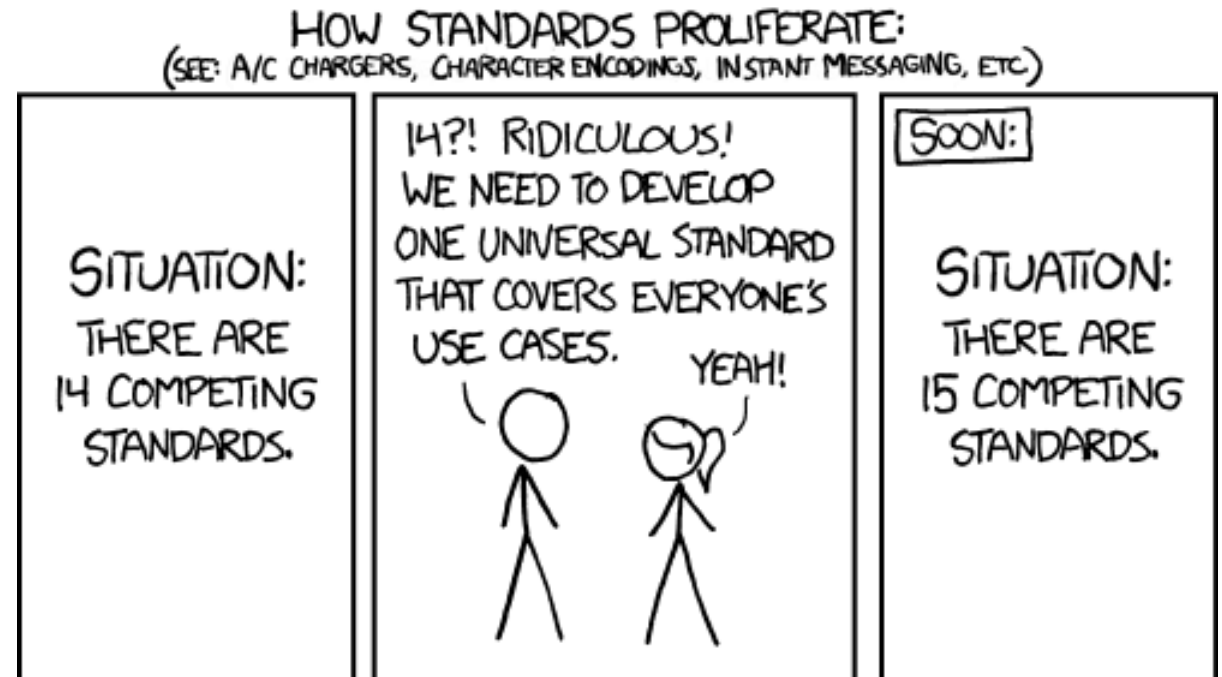
- Engineering :
 - Developed by the controls engineers / the developers of the device IOC
 - Designed for device control
- Physics:
 - Do the real useful stuff..
 - Created from a list of required interfaces and discussed in AP group meetings
 - Lots of rules, calls to external python scripts
 - Task oriented screens
- Operator:
 - Combine/Summarize a lot of information

~~Issues~~

Interesting Experiences

BOY Screen standards:

- A perfect standards are hard to define
- Following standards adds overhead



Source: <http://xkcd.com/927/>

Absence of BOY Screen standards:

Storage Ring Main Dipole

Common Parameter for Dipole SP PSC

PS Init	Clock	PS Mode	Firmware
IDLE	Internal Clock	Asyn Smoo...	1.2
PSC Reset	PSC Disable	RampRate	Temp
Sys Normal	PSC Enable	4.000000	25.4
PSI Pol Init	PSI Pol Read	PSC Fiber	PSC IP
Unipolar	Unipolar	Good	1

Common for Dipole PS1 Readback PSC

PS Init	Clock	Firmware	
IDLE	Internal Clock	1.2	
PSC Reset	PSC Disable	Temp	
Sys Normal	PSC Enable	24.8	
PSI Pol Init	PSI Pol Read	PSC Fiber	PSC IP
Bipolar	Bipolar	Good	2

Common for Dipole PS2 Readback PSC

PS Init	Clock	Firmware	
IDLE	Internal Clock	1.2	
PSC Reset	PSC Disable	Temp	
Sys Normal	PSC Enable	24.2	
PSI Pol Init	PSI Pol Read	PSC Fiber	PSC IP
Bipolar	Bipolar	Good	3

PS1 Readings From PLC

I:AC A	I:AC B	I:AC C	I:DC
-0.1	-0.05	0	-0.188
V:AC A	V:AC B	V:AC C	V:DC
0.029	0.042	-0.12	0.06
I:CapDis1	I:CapDis2	I:ClampDio	V:CapBank
0.029	0.042	0.088	1
FuseFltLo	FuseFltHi	V:LPEdIff	PS1 State
0x7FFFFFFF	0x7FFFFFFF	0	2
Flt:Sum	Flt:T-limit	NoFlt:T-Sw	
0x0	0x0	0x7FFFFFFF	

PS2 Readings From PLC

I:AC A	I:AC B	I:AC C	I:DC
-0.05	-0.05	-0.05	-0.062
V:AC A	V:AC B	V:AC C	V:DC
0.06	-0.06	-0.06	0.06
I:CapDis1	I:CapDis2	I:ClampDio	V:CapBank
0.045	0.07	0.041	1
FuseFltLo	FuseFltHi	V:LPEdIff	PS1 State
0x7FFFFFFF	0x7FFFFFFF	0.04	2
Flt:Sum	Flt:T-limit	NoFlt:T-Sw	
0x0	0x0		

Pentant 1 Power Supply Status

Ring Alarm Status (Green=OK, Red=Alarm)
Center: On/Off Status (Light Green=On, Dark Green=Off)

Cell	Magnet	Ch	Setpoint (A)	DMM DCCT1 (A)	DMM DCCT2 (A)	DMM DAC (A)	Loopback (A)	DCCT1 (A)	DCCT2 (A)	Error (V)	Ctrl Volt (V)	Vout Raw (V)	Gnd Curr (A)	History
SR-C23	OLIA	1	0 AMP	-0.002	-0.002	0.001	0.005 AMP	0.005 AMP	-0 AMP	-0.029 Volt	0.003 Volt	0.003 Volt	0.005 Volt	History
SR-C23	OL2A	1	0 AMP	-0.004	-0.002	0.001	0.005 AMP	0.005 AMP	-0 AMP	-0.045 Volt	0.003 Volt	0.003 Volt	0.008 Volt	History
SR-C23	OL3A	1	0 AMP	-0.003	-0.002	0.001	0 AMP	-0 AMP	-0.005 AMP	-0.066 Volt	0.003 Volt	0.003 Volt	0.006 Volt	History
SR-C23	OL4A	1	0 AMP	-0.002	-0.001	0	0.005 AMP	0.005 AMP	-0 AMP	-0.064 Volt	0.003 Volt	0.003 Volt	0.006 Volt	History
SR-C23	OM2A	1	0 AMP	-0.006	-0.003	0	0 AMP	0.006 AMP	-0.006 AMP	-0.147 Volt	0.004 Volt	0.002 Volt	0.008 Volt	History
SR-C23	OM1B	1	0 AMP	-0.001	-0.002	0.001	0.005 AMP	0.005 AMP	-0.005 AMP	0.036 Volt	0.002 Volt	0.003 Volt	0.006 Volt	History
SR-C23	OM2B	1	0 AMP	0.004	-0.002	-0	0.014 AMP	0 AMP	0.01 AMP	-0.079 Volt	0.025 Volt	0.027 Volt	0.006 Volt	History
SR-C23	OH1B	1	0 AMP	-0.002	-0.003	-0	0 AMP	0.005 AMP	-0.005 AMP	-0.05 Volt	0.003 Volt	0.079 Volt	0.006 Volt	History
SR-C23	OH2B	1	0 AMP	-0.001	-0.006	0	0 AMP	0.005 AMP	-0.005 AMP	-0.052 Volt	0.004 Volt	0.003 Volt	0.006 Volt	History
SR-C23	OH3B	1	0 AMP	-0.004	0.002	0.001	0 AMP	-0 AMP	-0.005 AMP	-0.041 Volt	0.002 Volt	0.003 Volt	0.005 Volt	History
SR-C23	CL1A	1	0 AMP	-0	-0	-0.004	-0.004 AMP	-0.001 AMP	-0 AMP	-0.789 Volt	-0.005 Volt	0.003 Volt	0.003 Volt	History
SR-C23	CL2A	1	0 AMP	0	-0	-0.002	-0.003 AMP	0.001 AMP	-0 AMP	-0.45 Volt	-1.252 Volt	0.103 Volt	0.016 Volt	History
SR-C23	CM1A	1	0 AMP	-0.001	-0.001	-0.002	-0.001 AMP	0.001 AMP	-0 AMP	-0.407 Volt	-0.001 Volt	0.141 Volt	0.002 Volt	History
SR-C23	CM1B	1	0 AMP	0.001	0	-0.006	-0.005 AMP	-0 AMP	-0 AMP	-1.047 Volt	-0.008 Volt	0.004 Volt	0.001 Volt	History
SR-C23	CH1B	1	0 AMP	0.002	0.001	-0.003	-0.002 AMP	-0.002 AMP	-0.002 AMP	-0.203 Volt	0 Volt	0.128 Volt	0.003 Volt	History
SR-C23	CH2B	1	0 AMP	0	-0	-0.001	-0.001 AMP	0.001 AMP	-0 AMP	-0.161 Volt	0.001 Volt	0.121 Volt	0.002 Volt	History
SR-C23	CL1A	2	0 AMP	0.002	0.001	-0.001	0 AMP	-0.002 AMP	-0.001 AMP	0.11 Volt	0.004 Volt	0.022 Volt	0.002 Volt	History
SR-C23	CL2A	2	0 AMP	0.001	0.001	-0	0.001 AMP	-0.001 AMP	0.044 Volt	0.003 Volt	0.112 Volt	0.003 Volt	History	
SR-C23	CM1A	2	0 AMP	-0	0	-0.003	-0.003 AMP	0.001 AMP	-0 AMP	-0.628 Volt	-0.005 Volt	0.128 Volt	0.002 Volt	History
SR-C23	CM1B	2	0 AMP	-0.001	0.001	-0.004	-0.003 AMP	-0.001 AMP	-0.001 AMP	-0.457 Volt	-0.003 Volt	0.103 Volt	0.002 Volt	History
SR-C23	CH1B	2	0 AMP	0	0.001	-0.001	0.001 AMP	-0 AMP	-0.001 AMP	-0.021 Volt	0.002 Volt	0.145 Volt	0.003 Volt	History
SR-C23	CH2B	2	0 AMP	-0	-0	-0.001	0 AMP	0.001 AMP	-0.001 AMP	-0.203 Volt	-0 Volt	0.098 Volt	0.002 Volt	History
SR-C23	FL2A	1	0 AMP	-0	-0	-0	-0 AMP	-0 AMP	-0 AMP	-0.739 Volt	-0.005 Volt	-0.015 Volt	0.026 Volt	History
SR-C23	FM1A	1	0 AMP	0	-0	-0	0 AMP	-0 AMP	-0 AMP	-0.22 Volt	0 Volt	0.002 Volt	-0.121 Volt	History
SR-C23	FL2A	1	0 AMP	0	-0	-0	-0 AMP	-0 AMP	-0 AMP	-0.126 Volt	0.001 Volt	0.002 Volt	-0.118 Volt	History
SR-C23	FL2A	2	0 AMP	0	-0	-0	-0 AMP	-0 AMP	-0 AMP	-0.241 Volt	-0.001 Volt	-0.048 Volt	-0.027 Volt	History
SR-C23	FM1A	2	0 AMP	0	0	-0	0 AMP	-0 AMP	-0 AMP	-0.049 Volt	0.002 Volt	0.002 Volt	-0.149 Volt	History
SR-C23	FM1A	2	0 AMP	0	0	-0	0 AMP	-0 AMP	-0 AMP	0 Volt	0.002 Volt	0.001 Volt	-0.157 Volt	History
SR-C23	BT1A	1	0 AMP	-0	-0	0	0 AMP	0.001 AMP	-0 AMP	-0.002 Volt	0.003 Volt	0.165 Volt	0.002 Volt	History
SR-C23	BT1A	2	0 AMP	-0	-0	0	0 AMP	0.001 AMP	-0 AMP	-0.166 Volt	0.001 Volt	0.111 Volt	0.002 Volt	History
SR-C23	SOX1A	1	0 AMP	0	0.002	-0.001	0.001 AMP	0.001 AMP	-0.001 AMP	-0.117 Volt	0.004 Volt	0.147 Volt	0.003 Volt	History

BNL Low Level RF Controller

Storage ring CFC E

NO freq: 499681300.000 #z

Controller

Start here: Manual start

Auto start (incl. closing the loop)

Process

Update scan rate

RF Abort

RESET

FF waveform generator

FF Dutycycle: Cont.

Cavity undervoltage:

Drive

FWD P

RFL P

Cavity

Raw scopes channels

Calculated waveforms A

USB Trigger Ins: Endpoints & Signals

Ref phase trend plot

TripStack

USB Port

Wire in Readback Vals

Wire & Trigger Outcs

Tuner

Circular buffer

Zoom selector: 6

S/N: 3b0000002b18

Buid: e5de9

Decode

Desired value: 90

OROC: 10.0 deg

PROC

Desired value: 0.050

OROC: 0.050

PROC

Desired value: 1910.0 kV

OROC: 1910.0 kV

PROC

ORANGE RING BPM STATUS

NT3	C8	C9	C10	C11	C12	C13	C14
8-7	10-7	11-7					
8-8	10-8	11-8					
8-1	9-1	10-1	11-1	12-1	13-1	14-1	
8-2	9-2	10-2	11-2	12-2	13-2	14-2	
8-3	9-3	10-3	11-3	12-3	13-3	14-3	
8-4	9-4	10-4	11-4	12-4	13-4	14-4	
8-5	9-5	10-5	11-5	12-5	13-5	14-5	
8-6	9-6	10-6	11-6	12-6	13-6	14-6	

PENTANT 4

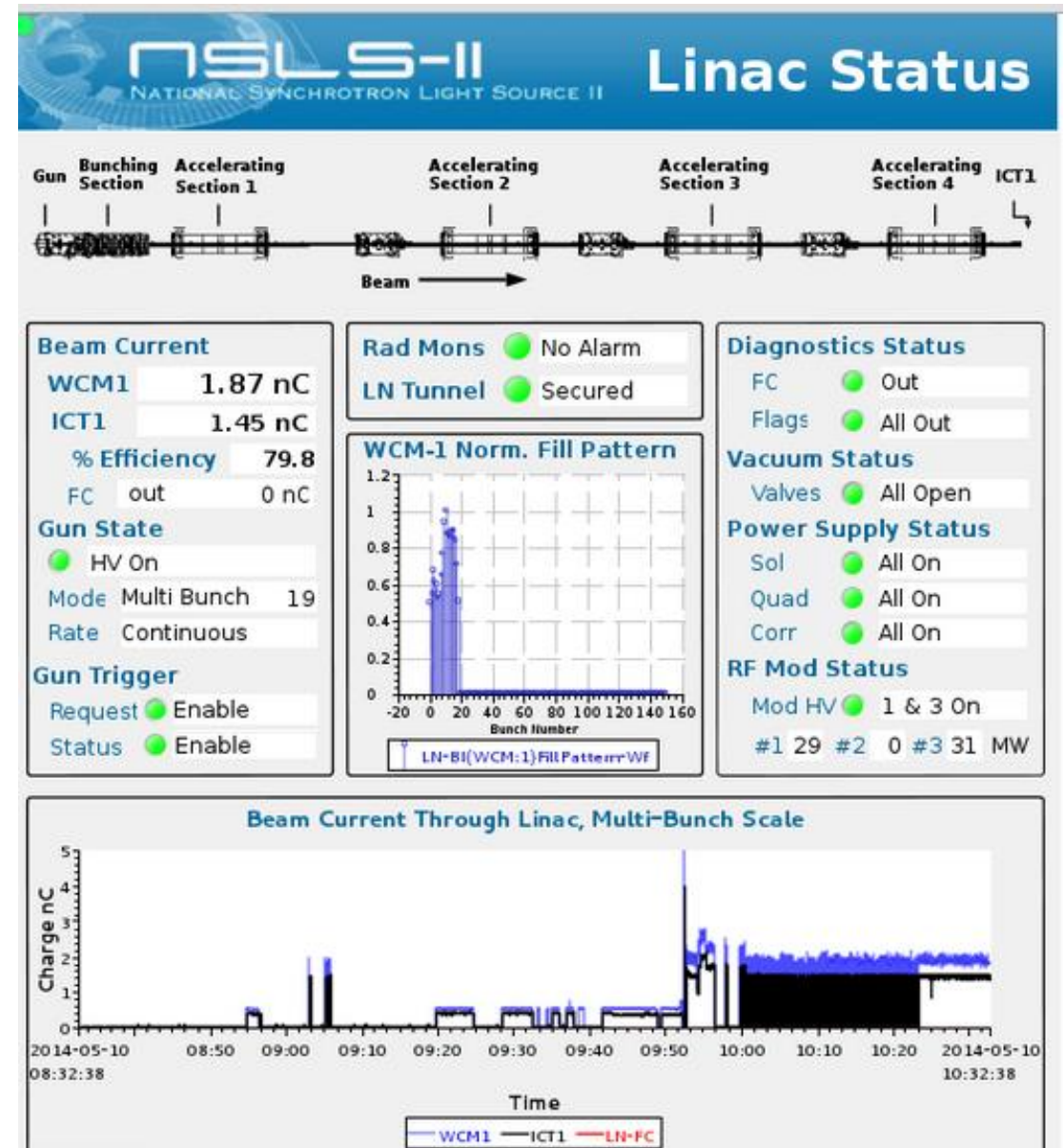
C24	C25	C26	C27	C28
20-2	21-2	22-2	23-2	24-2
20-3	21-3	22-3	23-3	24-3
20-4	21-4	22-4	23-4	24-4
20-5	21-5	22-5	23-5	24-5

PENTANT 1

C24	C25	C26	C27	C28
20-2	21-2	22-2	23-2	24-2
20-3	21-3	22-3	23-3	24-3
20-4	21-4	22-4	23-4	24-4
20-5	21-5	22-5	23-5	24-5

Solution*

- Guidelines are easier than standards
- Good examples more effective than good standards



* contingent on cooperation between physicist, engineers and operators

Good and Bad Practices:

- PV naming convention + Macros
+ Linking containers
 - Reusable pieces
 - Easily modified

NSLS-II
National Synchrotron Light Source II

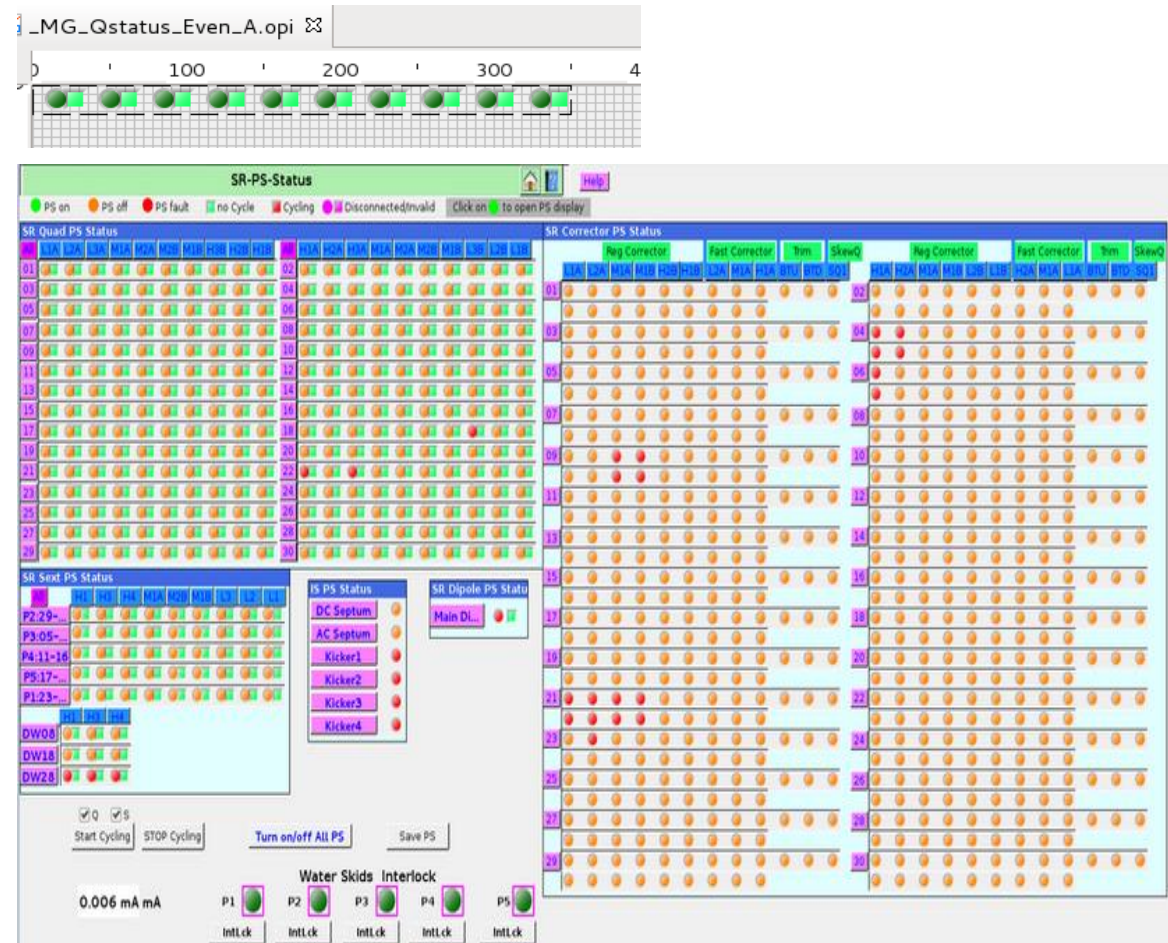
Pentant 1 Power Supply Status

Ring: Alarm Status (Green=Ok, Red=Alarm)
Center: On/Off Status (Light Green=On, Dark Green=Off)

Cell	Magnet	Ch	Setpoint (A)	DMM DCCT1 (A)	DMM DCCT2 (A)	DMM DAC (A)	Loopback (A)	DCCT1 (A)	DCCT2 (A)	Error (V)	Ctrl Volt (V)	Vout Raw (V)	Gnd Curr (A)	History
SR-C23	QL2A	1	0 AMP	-0.002	-0	0.001	0.005 AMP	0.005 AMP	-0 AMP	-0.039 Volt	0.003 Volt	0.003 Volt	0.005 Volt	History
SR-C23	QL2A	1	0 AMP	-0.004	-0.002	0.001	0.005 AMP	0.005 AMP	-0 AMP	-0.045 Volt	0.003 Volt	0.003 Volt	0.008 Volt	History
SR-C23	QL3A	1	0 AMP	-0.003	-0.002	0.001	0 AMP	-0 AMP	-0.005 AMP	-0.066 Volt	0.003 Volt	0.003 Volt	0.006 Volt	History
SR-C23	QM1A	1	0 AMP	-0.002	-0.001	0	0.005 AMP	0.005 AMP	-0 AMP	-0.064 Volt	0.003 Volt	0.003 Volt	0.006 Volt	History
SR-C23	QM2A	1	0 AMP	-0.006	-0.003	0	0 AMP	0.006 AMP	-0.006 AMP	-0.147 Volt	0.004 Volt	0.002 Volt	0.008 Volt	History
SR-C23	QM1B	1	0 AMP	0.001	-0.002	0.001	0 AMP	0.005 AMP	-0.005 AMP	0.036 Volt	0.002 Volt	0.003 Volt	0.006 Volt	History
SR-C23	QM2B	1	0 AMP	-0.004	-0.002	-0	0.014 AMP	0 AMP	0.01 AMP	-0.079 Volt	0.025 Volt	0.027 Volt	0.006 Volt	History
SR-C23	QH1B	1	0 AMP	-0.002	-0.003	-0	0 AMP	0.005 AMP	-0 AMP	-0.05 Volt	0.003 Volt	0.079 Volt	0.006 Volt	History
SR-C23	QH2B	1	0 AMP	-0.001	-0.006	0	0 AMP	0.005 AMP	-0.005 AMP	-0.052 Volt	0.004 Volt	0.003 Volt	0.006 Volt	History
SR-C23	QH3B	1	0 AMP	-0.004	0.002	0.001	0 AMP	-0 AMP	-0.005 AMP	-0.041 Volt	0.002 Volt	0.003 Volt	0.005 Volt	History
SR-C23	CL1A	1	0 AMP	-0	-0	-0.004	-0.004 AMP	-0.001 AMP	-0 AMP	-0.789 Volt	-0.005 Volt	0.003 Volt	0.003 Volt	History
SR-C23	CL2A	1	0 AMP	0	-0	-0.002	-0.001 AMP	0.001 AMP	-0 AMP	-0.45 Volt	-1.252 Volt	0.103 Volt	0.016 Volt	History
SR-C23	CM1A	1	0 AMP	-0.001	-0.001	-0.002	-0.001 AMP	0.001 AMP	-0 AMP	-0.407 Volt	-0.001 Volt	0.141 Volt	0.002 Volt	History
SR-C23	CM1B	1	0 AMP	0.001	0	-0.006	-0.005 AMP	-0 AMP	-0 AMP	-1.047 Volt	-0.008 Volt	0.004 Volt	0.001 Volt	History
SR-C23	CH1B	1	0 AMP	0.002	0.001	-0.003	-0.002 AMP	-0.002 AMP	-0.002 AMP	-0.203 Volt	0 Volt	0.128 Volt	0.003 Volt	History
SR-C23	CH2B	1	0 AMP	0	-0	-0.001	-0.001 AMP	0.001 AMP	-0 AMP	-0.161 Volt	0.001 Volt	0.121 Volt	0.002 Volt	History
SR-C23	CL1A	2	0 AMP	0.002	0.001	-0.001	0 AMP	-0.002 AMP	-0.001 AMP	0.11 Volt	0.004 Volt	0.032 Volt	0.002 Volt	History
SR-C23	CL2A	2	0 AMP	0.001	0.001	-0	0 AMP	-0 AMP	-0.001 AMP	0.044 Volt	0.003 Volt	0.112 Volt	0.003 Volt	History
SR-C23	CM1A	2	0 AMP	-0	0	-0.003	-0.003 AMP	0.001 AMP	-0 AMP	-0.698 Volt	-0.005 Volt	0.128 Volt	0.002 Volt	History
SR-C23	CM1B	2	0 AMP	0.001	0.001	-0.004	-0.003 AMP	-0.001 AMP	-0.001 AMP	-0.497 Volt	-0.003 Volt	0.103 Volt	0.002 Volt	History
SR-C23	CH1B	2	0 AMP	0	0.001	-0.001	0.001 AMP	-0 AMP	-0.001 AMP	-0.021 Volt	0.002 Volt	0.145 Volt	0.003 Volt	History
SR-C23	CH2B	2	0 AMP	-0	-0	-0.001	0 AMP	0.001 AMP	-0.001 AMP	-0.269 Volt	-0 Volt	0.098 Volt	0.002 Volt	History
SR-C23	FL2A	1	0 AMP	-0	0	-0	-0 AMP	-0 AMP	-0 AMP	-0.739 Volt	-0.005 Volt	-0.019 Volt	0.026 Volt	History
SR-C23	FM1A	1	0 AMP	0	-0	-0	0 AMP	-0 AMP	-0 AMP	-0.22 Volt	0 Volt	0.002 Volt	-0.131 Volt	History
SR-C23	FH1A	1	0 AMP	0	-0	-0	-0 AMP	-0 AMP	-0 AMP	-0.136 Volt	0.001 Volt	0.003 Volt	-0.118 Volt	History
SR-C23	FL2A	2	0 AMP	-0	-0	-0	-0 AMP	-0 AMP	-0 AMP	-0.341 Volt	-0.001 Volt	-0.048 Volt	0.027 Volt	History
SR-C23	FM1A	2	0 AMP	0	0	-0	0 AMP	-0 AMP	-0 AMP	-0.049 Volt	0.002 Volt	0.002 Volt	-0.149 Volt	History
SR-C23	FH1A	2	0 AMP	0	0	-0	0 AMP	-0 AMP	-0 AMP	0 Volt	0.002 Volt	0.001 Volt	-0.157 Volt	History
SR-C23	BT1A	1	0 AMP	-0	-0	0	0 AMP	0.001 AMP	-0 AMP	-0.007 Volt	0.003 Volt	0.165 Volt	0.002 Volt	History
SR-C23	BT1A	2	0 AMP	-0	0	-0	0 AMP	0.001 AMP	-0 AMP	-0.166 Volt	0.001 Volt	0.111 Volt	0.002 Volt	History
SR-C23	SQKM1A	1	0 AMP	0	0.002	-0.001	0 AMP	0.001 AMP	-0.001 AMP	-0.17 Volt	0.004 Volt	0.147 Volt	0.003 Volt	History
SR-C24	QH1A	1	0 AMP	-0.004	0.003	-0	0.005 AMP	0.011 AMP	-0.005 AMP	-0.083 Volt	0.003 Volt	0.003 Volt	0.003 Volt	History
SR-C24	QH2A	1	0 AMP	-0.003	0.001	0.002	0 AMP	0.005 AMP	-0.005 AMP	-0.063 Volt	0.002 Volt	0.003 Volt	0.006 Volt	History

Good and Bad Practices:

- PV naming convention + Macros + Linking containers + Rules
 - 2000 + pvs with over 800 rules
- Solution:
 - Multistate LED + formulas



Good and Bad Practices:

- Avoid Scripts/Rules unless absolutely necessary
 - Should this be implemented in an IOC?
 - Is there a PvManager formula I can use?
 - Can I use rules? (Have I allocated a large enough PermGen space)
 - Use a script

Data Connection Layer:

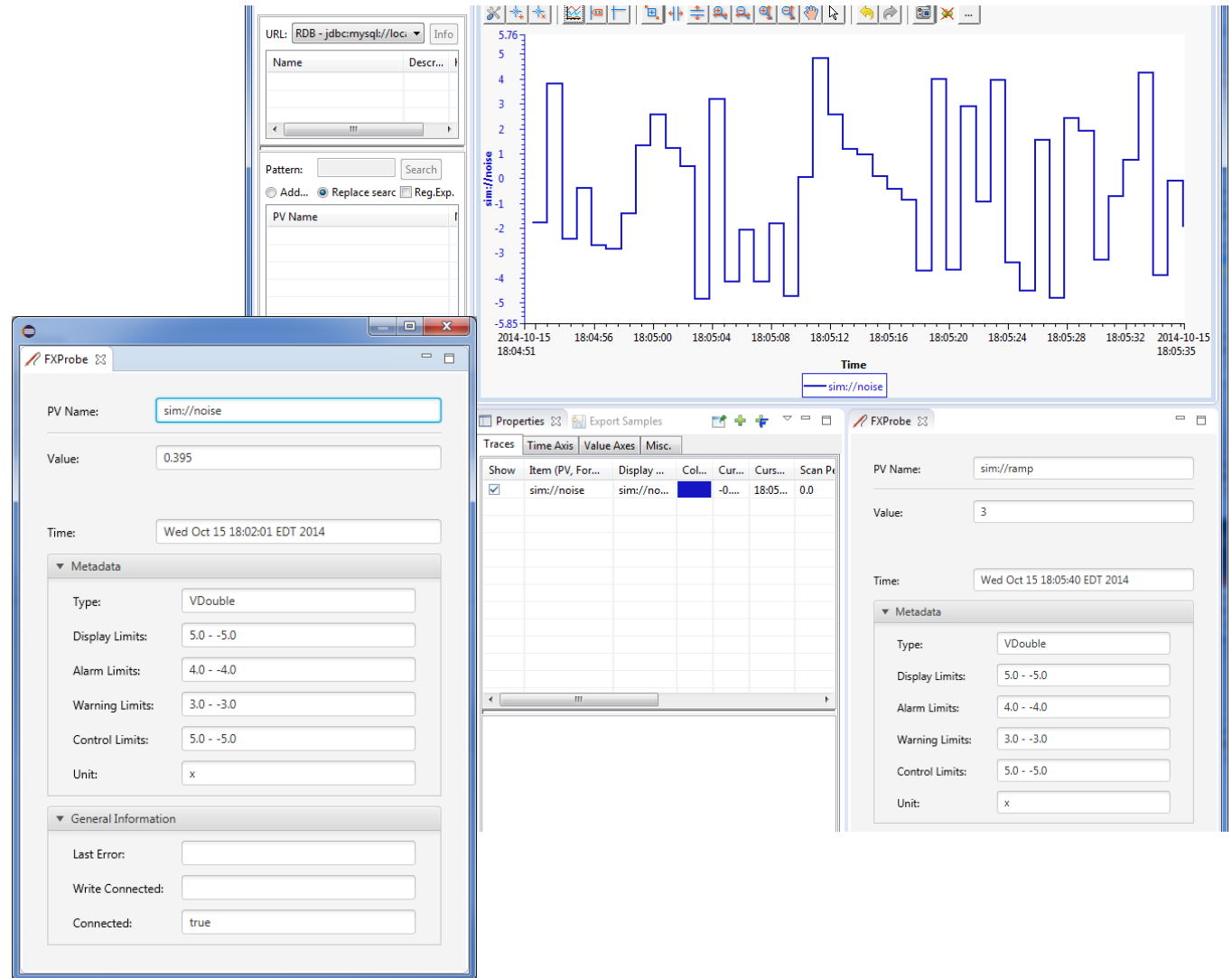
- 3.1.x
 - Use PVManager to address threading issues, source rate throttling
- 3.2.x
 - PVManager with formula functions to provide an alternative to rules and scripts
 - Graphene prototype for displaying large waveforms
- 3.3.x
 - Passive scanning: switch from active polling of the queue to notification model
 - More graphene plots

SWT:

- A limited widget set
 - Using native widget results in the lowest common denominator
 - Poor performance on Linux machines
- JavaFX to the rescue
 - Part of jdk 8
 - Richer and easier to use widget set
 - TreeTable, Table with embedded controls
 - JavaFX and SWT share the UI thread
 - Can be easily embedded into SWT/Jface composites/views

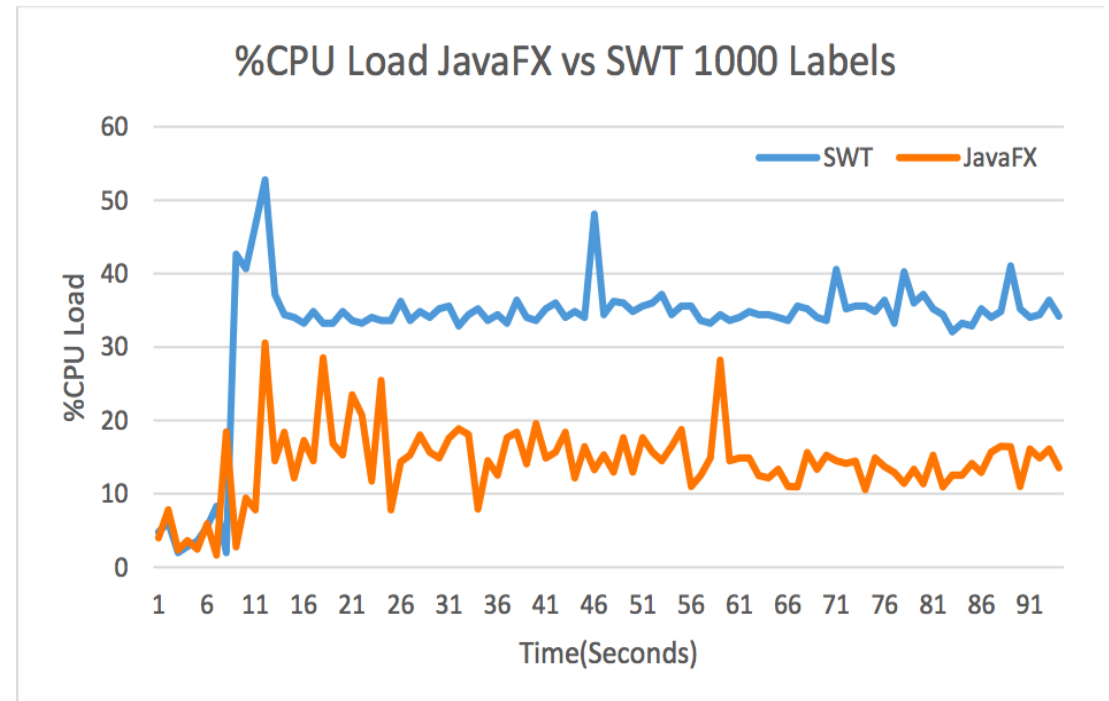
JavaFX in eclipse

- Share the same UI thread
- Relatively easy to embed
 - Require e(fx)clipse



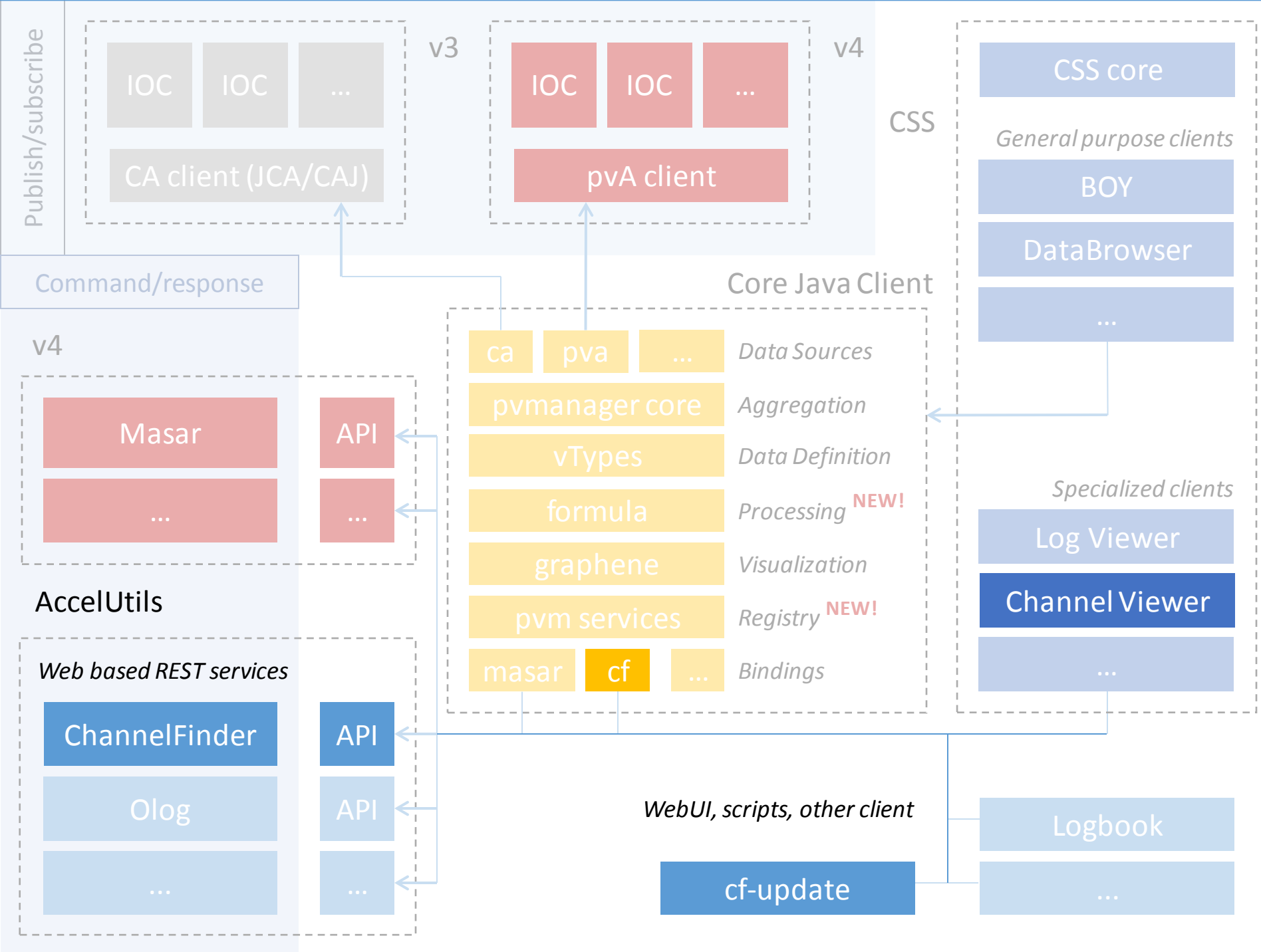
JavaFX preliminary comparisons

- 1000 label widgets updating at 1Hz



SWT Average = 32.834% (starting at t = 16) = 34.978%

JavaFX Average = 14.232% (starting at t = 16) = 15.140%



Motivation and Objectives

- A flat name space restricts seriously:
 - Clients need to know all channel names beforehand
 - Portable generic clients must be simple
 - Apps need full configuration or framework supplied service
- Develop a Directory Service
 - Generic
 - No dependency on installation and local conventions
 - Simple and fast (enough)
 - Use standards wherever possible
 - Provides "query-by-functionality"

Directory Data

- Set of **Channels** (unique names)
- Each Channel has an arbitrary number of **Properties** (name/value pairs) and **Tags** (names)
- Each Channel, Property, or Tag has an **Owner** (group) to allow basic access control
- All names and values are strings

Directory Data example

```
<channel name="V:1-SR-BI:SUPER{BPM:4}SA:X" owner="cf-update">
<properties>
  <property name="elemName" value="bpm:4" owner="cf-update"/>
  <property name="elemIndex" value="400" owner="cf-update"/>
  <property name="elemPosition" value="5.208" owner="cf-update"/>
  <property name="pvStatus" value="Active" owner="cf-update"/>
</properties>
<tags>
  <tag name="aphla.sys.SR" owner="operator"/>
</tags>
```

Query Example

- *SR:*C01**

All pvs from storage ring cell 1

- *SR:*C01*&elemName=bpm:4**

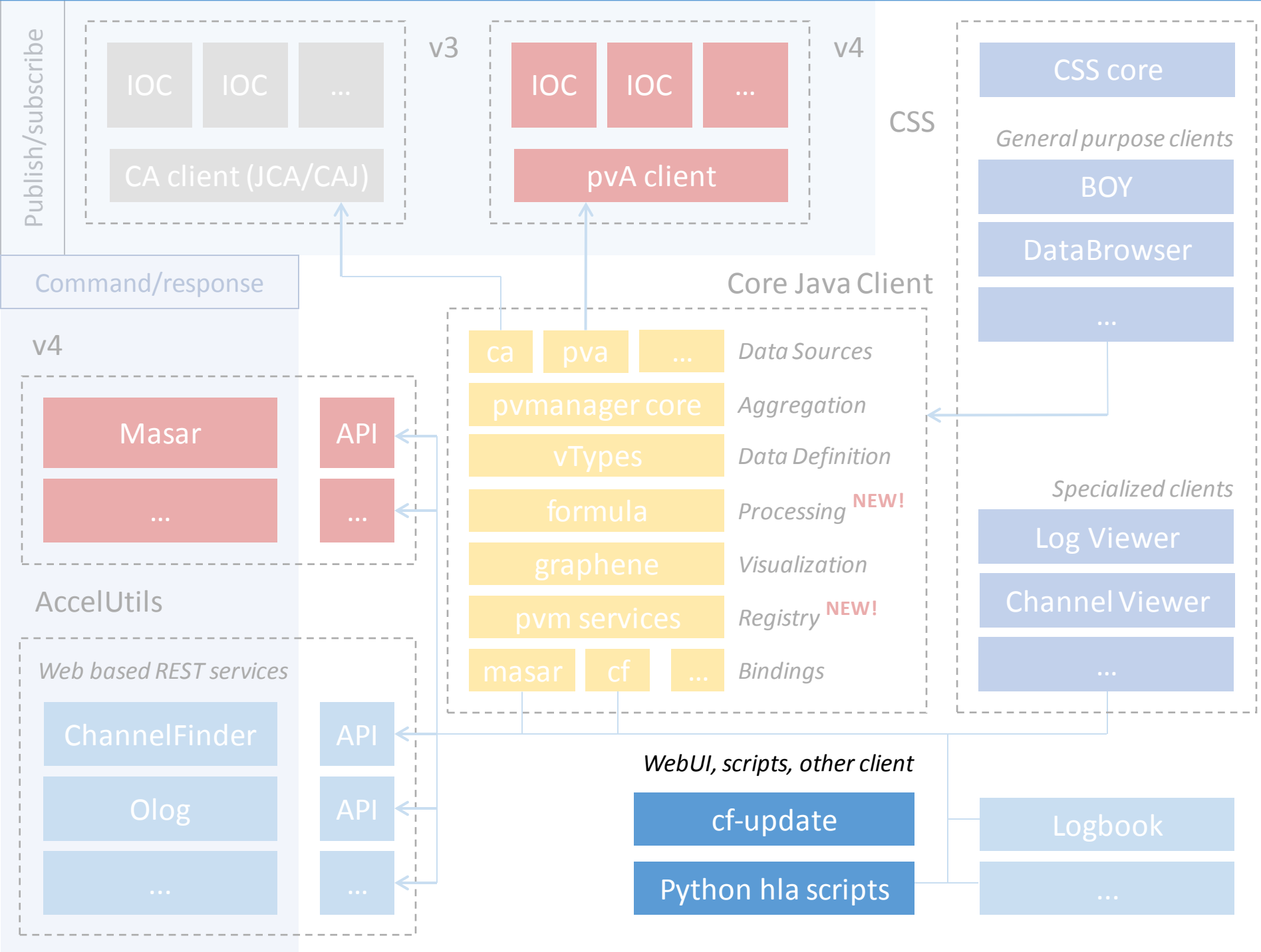
All pvs from storage ring cell 1 belonging to element bpm:4

- *SR:*C01*&elemName=bpm:4*&pvStatus=active*

All pvs from storage ring cell 1 belonging to element bpm:4 and with pvStatus active

- *SR:*C01*&elemName=bpm:4&tag=aphla.sys.SR*

All pvs from storage ring cell 1 belonging to element bpm:4 with tag aphla.sys.SR



Populating ChannelFinder

- cf-update
 - Adds new channels
 - Manages existing channels
 - Orphaned channels
 - Moved channels
- Python scripts
- cf-properties (under development)

Example st.cmd

```
dbLoadRecords("gauss.db","P=ktest")
```

```
epicsEnvSet("EPICS_HOSTNAME", "dev32new")
```

```
epicsEnvSet("EPICS_IOCNAME", "gauss")
```

```
ioclnit()
```

```
# pipe the output of the dbl command to a file
```

```
# the file name should follow the convention 'myHostName.myIOCName.dbl'
```

```
# write the file to a well know directory on which the cfmonitor deamon is running
```

```
dbl > $(CF_UPDATE_DIR)/$(EPICS_HOSTNAME).$(EPICS_IOCNAME).dbl
```

Under the Hood

- The cf_monitor daemon monitors \$(CF_UPDATE_DIR) directory and invokes an update task when
 - A new *.dbl file is created in the dir
 - An existing *.dbl file is modified
- The update task handles
 - Uses the filename to obtain the hostName, iocName property values
 - New channels – creates new channels with hostName, iocName, pvStatus and time properties
 - Orphaned channels – pvStatus property is updated
 - Moved channels – ensures that the hostName, iocName properties are update when channels are moved
 - Unchanged channels
- In all cases existing properties(excluding hostName, iocName, pvStatus, time) and tags are left unaffected

device FM1G4C02A

Channel Name	SR:C02- MG:G04A{HFCor:FM1} Fld-I	SR:C02- MG:G04A{HFCor:FM1} Fld-SP	SR:C02- MG:G04A{HFCor:FM1} Fld-I	SR:C02- MG:G04A{HFCor:FM1} Fld-SP
handle	READBACK	SETPOINT	READBACK	SETPOINT
elemName	FXM1G4C02A		FYM1G4C02A	
elemType	HFCOR		VFCOR	
elemField	x		y	
devName	FM1G4C02A			
sEnd	65.5222			
cell	C02			
girder	G4			
symmetry	A			
length	0.044			
ordinal	263		264	
tags	eget	eput	eget	eput
	x		y	
	sys.SR			

ChannelViewer

Control System Studio (NLSII)

File Edit CSS Window Help

OPI Editor Alarm Data Browser CSS perspective

Channel Viewer

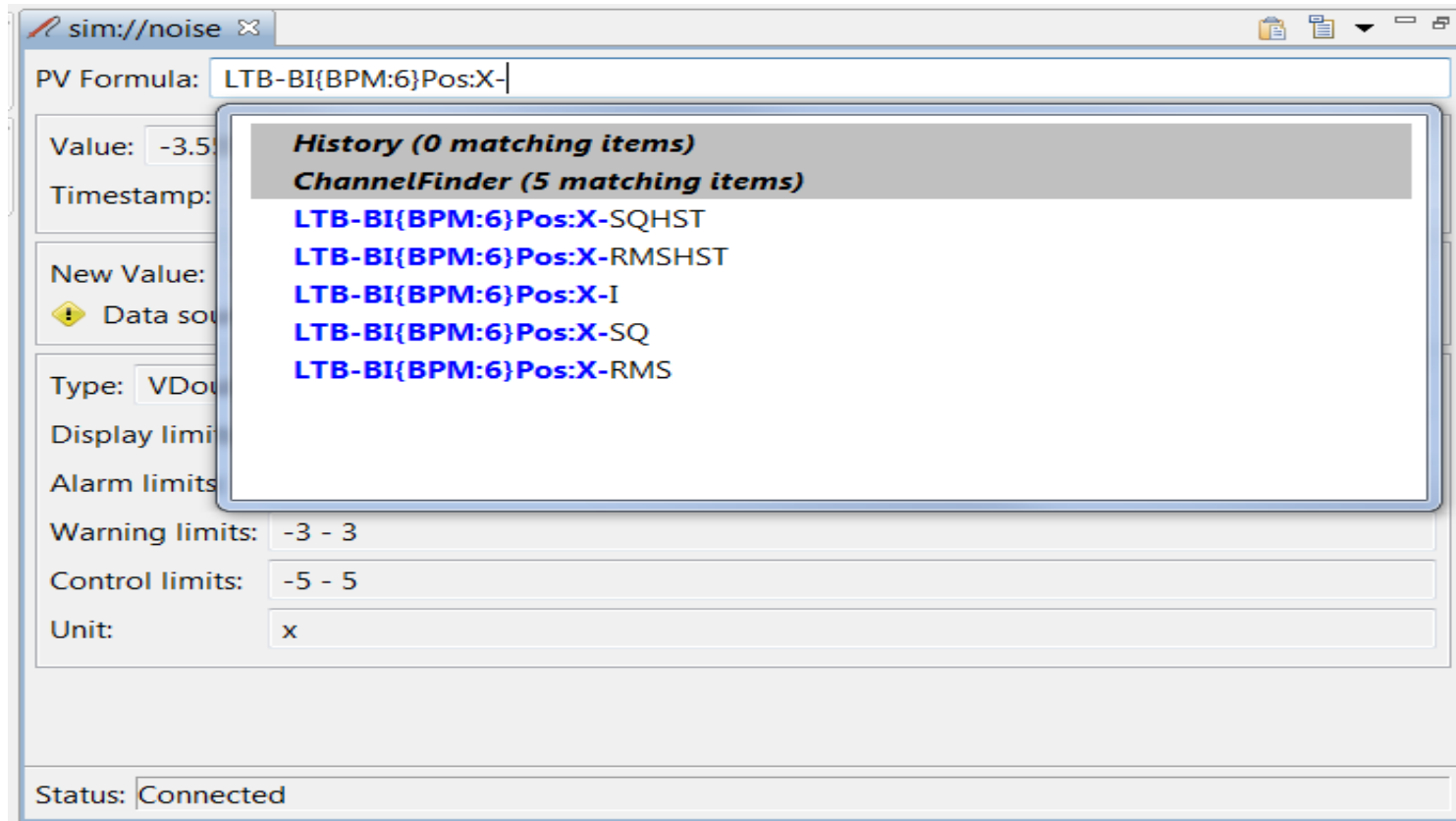
Query: * cell=C01 girder=G2 elemType=SEXT,QUAD

Channel Name	cell	girder	elemType	elemName	elemPosition	elemField	elemIndex	system	elem
V:1-SR:C01-MG:G2{QL2:134}Fld:SP	C01	G2	QUAD	ql2g2c01a	31.6966	k1	134	V:1-SR	0.448
V:1-SR:C01-MG:G2{QL3:145}Fld:I	C01	G2	QUAD	ql3g2c01a	32.8997	k1	145	V:1-SR	0.275
V:1-SR:C01-MG:G2{QL2:134}Fld:I	C01	G2	QUAD	ql2g2c01a	31.6966	k1	134	V:1-SR	0.448
V:1-SR:C01-MG:G2{QL3:145}Fld:SP	C01	G2	QUAD	ql3g2c01a	32.8997	k1	145	V:1-SR	0.275
V:1-SR:C01-MG:G2{QL1:125}Fld:SP	C01	G2	QUAD	ql1g2c01a	30.3301	k1	125	V:1-SR	0.275
V:1-SR:C01-MG:G2{QL1:125}Fld:I	C01	G2	QUAD	ql1g2c01a	30.3301	k1	125	V:1-SR	0.275
V:1-SR:C01-MG:G2{SL3:141}Fld:SP	C01	G2	SEXT	sl3g2c01a	32.4622				0.2
V:1-SR:C01-MG:G2{SL1:121}Fld:SP	C01	G2	SEXT	sl1g2c01a	29.8986				0.2
V:1-SR:C01-MG:G2{SL3:141}Fld:I	C01	G2	SEXT	sl3g2c01a	32.4622				0.2
V:1-SR:C01-MG:G2{SL2:132}Fld:I	C01	G2	SEXT	sl2g2c01a	30.9986	k2	132	V:1-SR	0.2
V:1-SR:C01-MG:G2{SL2:132}Fld:SP	C01	G2	SEXT	sl2g2c01a	30.9986	k2	132	V:1-SR	0.2
V:1-SR:C01-MG:G2{SL1:121}Fld:I	C01	G2	SEXT	sl1g2c01a	29.8986	k2	121	V:1-SR	0.2

Channel Viewer Context Menu:

- Channel
- Process Variable
- Configure...
- Copy PV name to clip-board
- EPICS PV Tree
- Probe
- PV Table
- OPI Probe
- Data Browser

Auto-complete



PVManager Formula

- =cf(“* elemType=HFCOR handle=SETPOINT tags=sys.SR”)

Queries ChannelFinder and returns a VTable consisting of all of channels for the setpoint pvs for all horizontal fast correctors in the storage ring

Even more

Interesting Experiences

ChannelFinder data

- Over 180k channels
- Over 1.2 million instances of channel + tag/property
- Service response (Query + Parsing) in the order of seconds

MongoDB

- Embedded (denormalized) data model
 - Ideal for one-to-many relationships between entities.
- provides better performance for read operations, as well as the ability to request and retrieve related data in a single database operation.
- Embedded data models make it possible to update related data in a single atomic write operation.

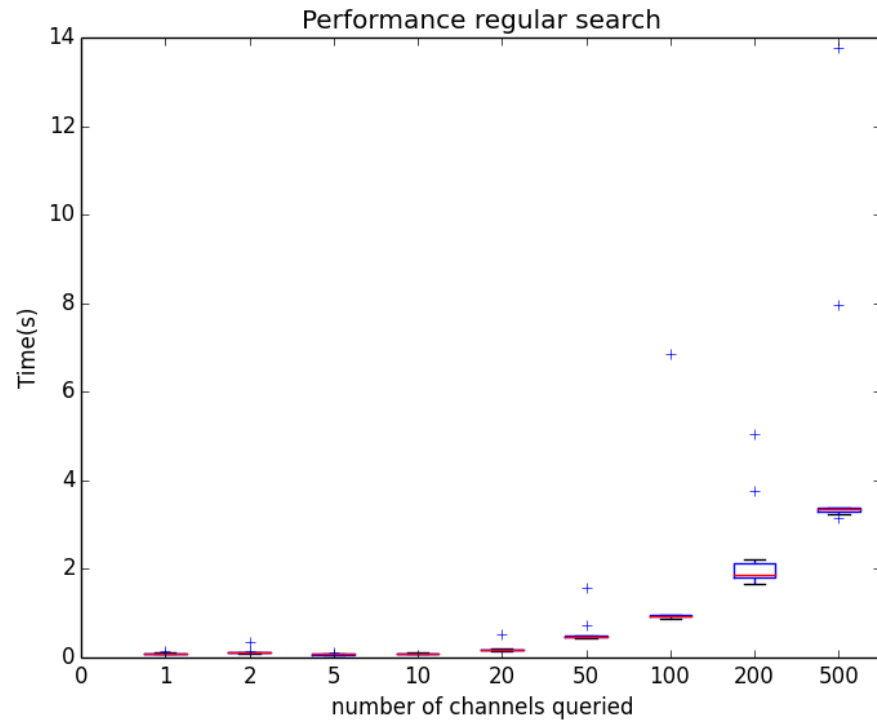
```
// channels
{
  name: "channel name"
  owner: "channel owner"
  properties: [{name: "property name",
  owner: "property owner",
  value: "property value",
  _id: properties._id},.....]
  tags: [tags._id,.....]
}
// tags
{
  name: "Tag name",
  owner: "Tag owner",
  _id: ID
}
// properties
{
  name: "Property name",
  owner: "Property owner",
  _id: ID
}
```

Performance Environment

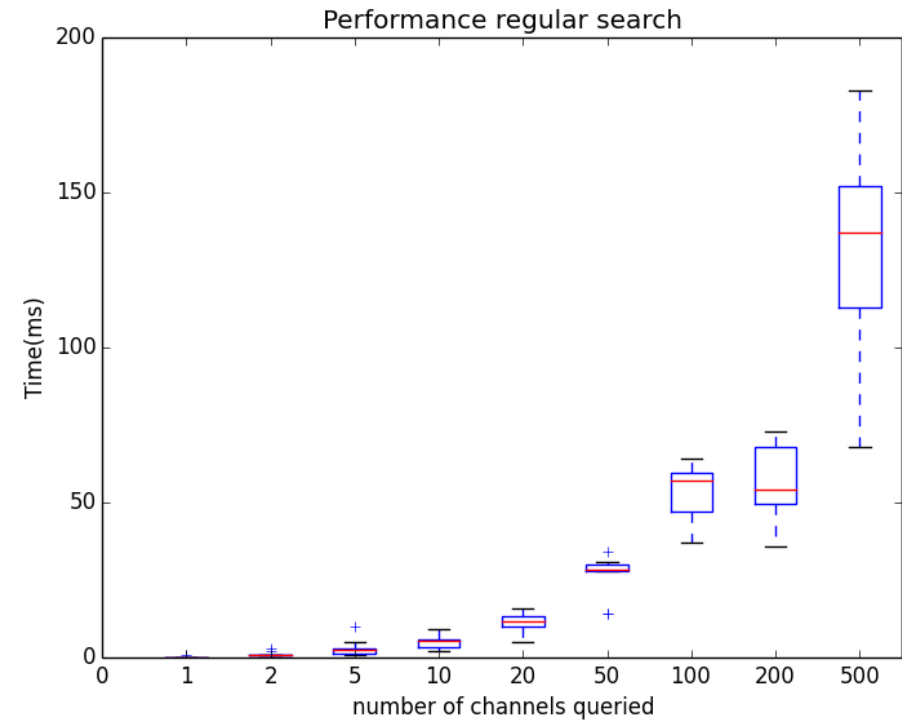
- Database
 - 150k channels
 - 15 million channel-properties/channel-tags
- Queries
 - Search based on channel names and property values

Mysql Vs MongoDB

Mysql



MongoDB



Questions?

Links:

Control System Studio

- <http://controlsystemstudio.org/>

ChannelFinder

- <http://channelfinder.sourceforge.net/>
- <https://github.com/ChannelFinder/ChannelFinderService>

Performance Tests

- <https://github.com/shroffk/cf-mongo-java-test>
- <https://github.com/mskinner5278/cf-mongo-test>

JavaFx

- <https://github.com/sjdallst/FXvsSWTProfiling>
- <http://www.eclipse.org/efxclipse>