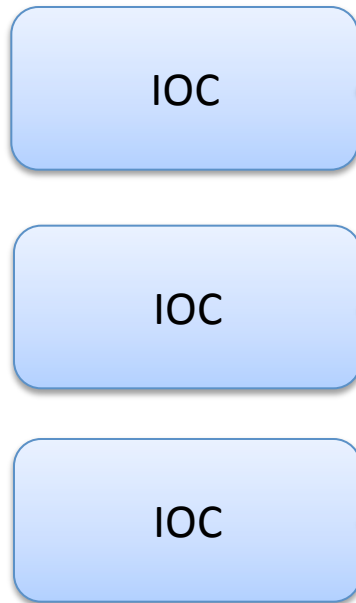


Control System Studio: An Integrated Toolset

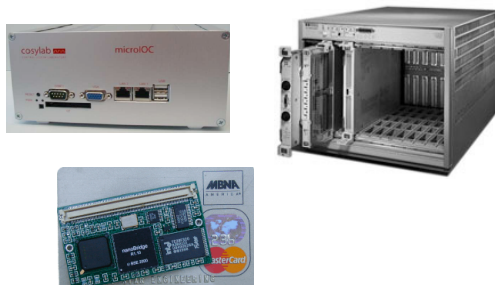
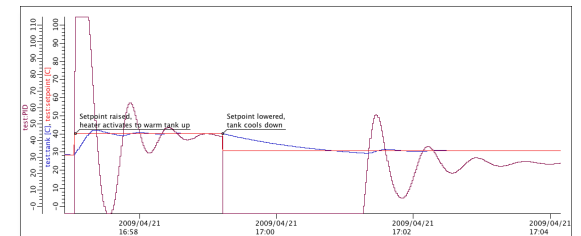
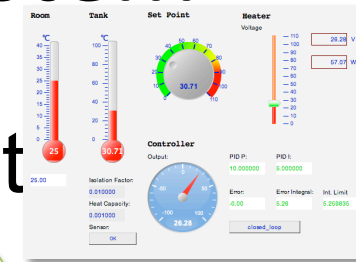
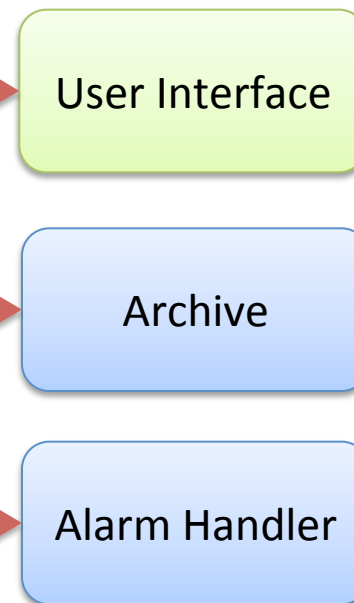
Kay Kasemir,
ORNL/SNS

EPICS: Distributed System

Servers



Client



Over the years



Since ~1990:

```
record(ai, "my_record")
{
    field(DTYP, "MyDevice")
    field(INP , "@channel2")
    field(SCAN, "1 second")
    ...
}
```

1. edd/dm 198x

2. medm 199x

3. edm 200x

4. CS-Studio 201x

Also:

tcl/tk/ca, python/qt/ca, ..

More supported platforms:

vxWorks, RTEMS, Linux, OS X, Windows, ..
68000, Intel, PPC, Arm, ..

Limited upward-compatibility.

Control System (CS) Studio

User Interface tools

- Display editor & runtime
- Strip Chart
- Channel Access utilities

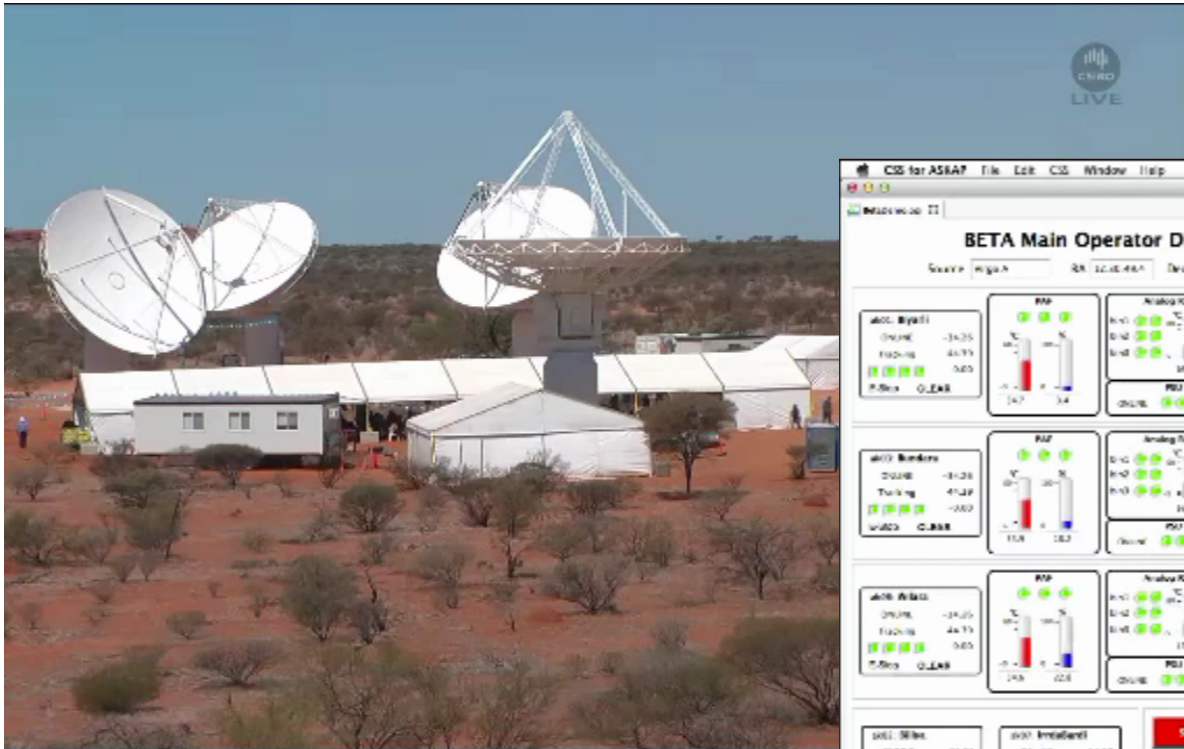
Also

- Archive system
- Alarm Handler
- Site-Specific support for logbook, IOC and channel information, ..

.. combined into an integrated, site-specific user-interface tool for Windows, Linux, OS X

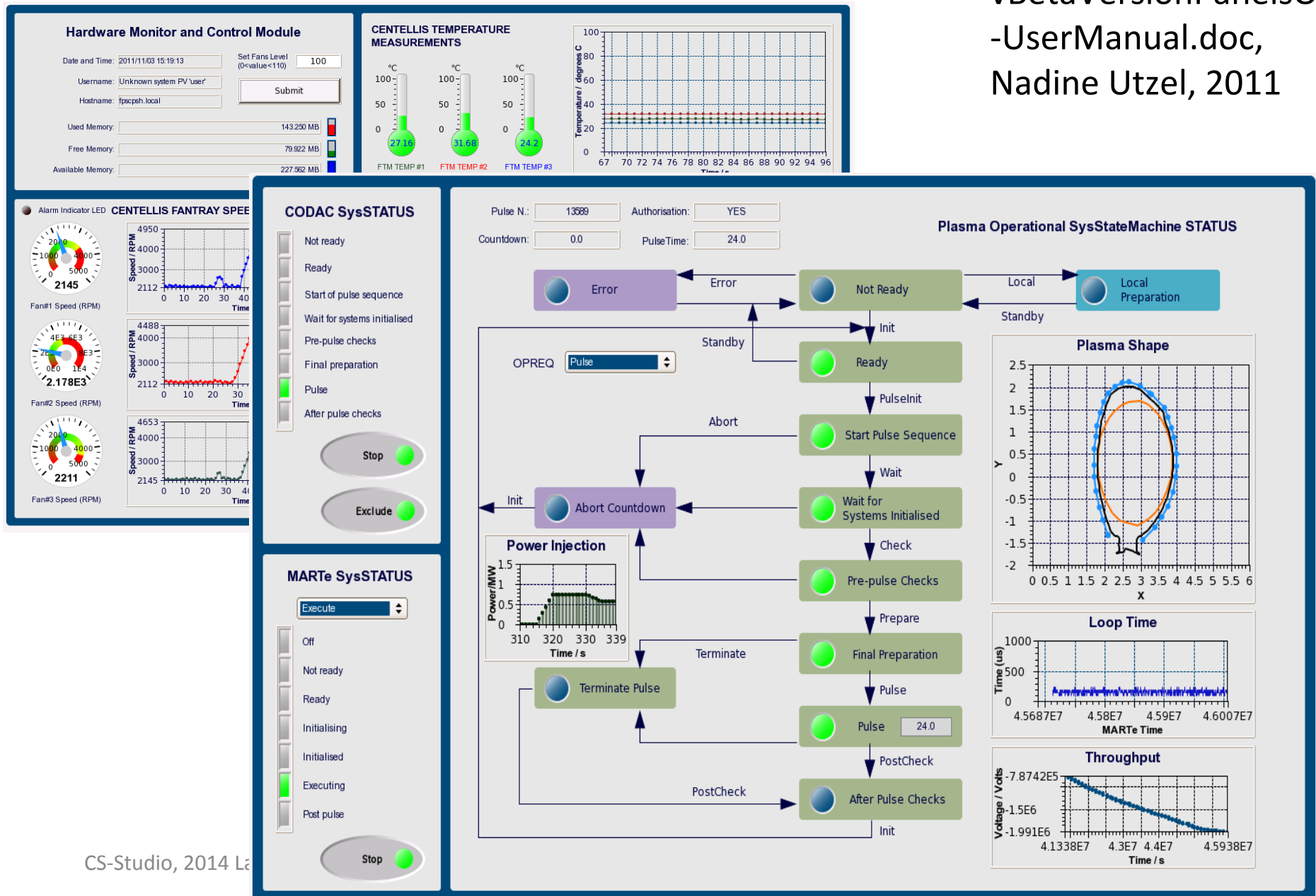
What does CS-Studio look like?

The image displays the ASHA7 radio telescope facility, featuring large white parabolic antennas mounted on a red desert landscape. In the background, a screenshot of the BETA Main Operator Display is visible, showing various system parameters and status indicators. The display includes sections for 'ASHA7 Main Operator Display', 'ASHA7 System', and 'ASHA7 Status', with data points such as 'ASHA7 System', 'ASHA7 Status', and 'ASHA7 System'.

[illegible]

ITER

ITER-FPSC-
vBetaVersionPanelsOPI
-UserManual.doc,
Nadine Utzel, 2011



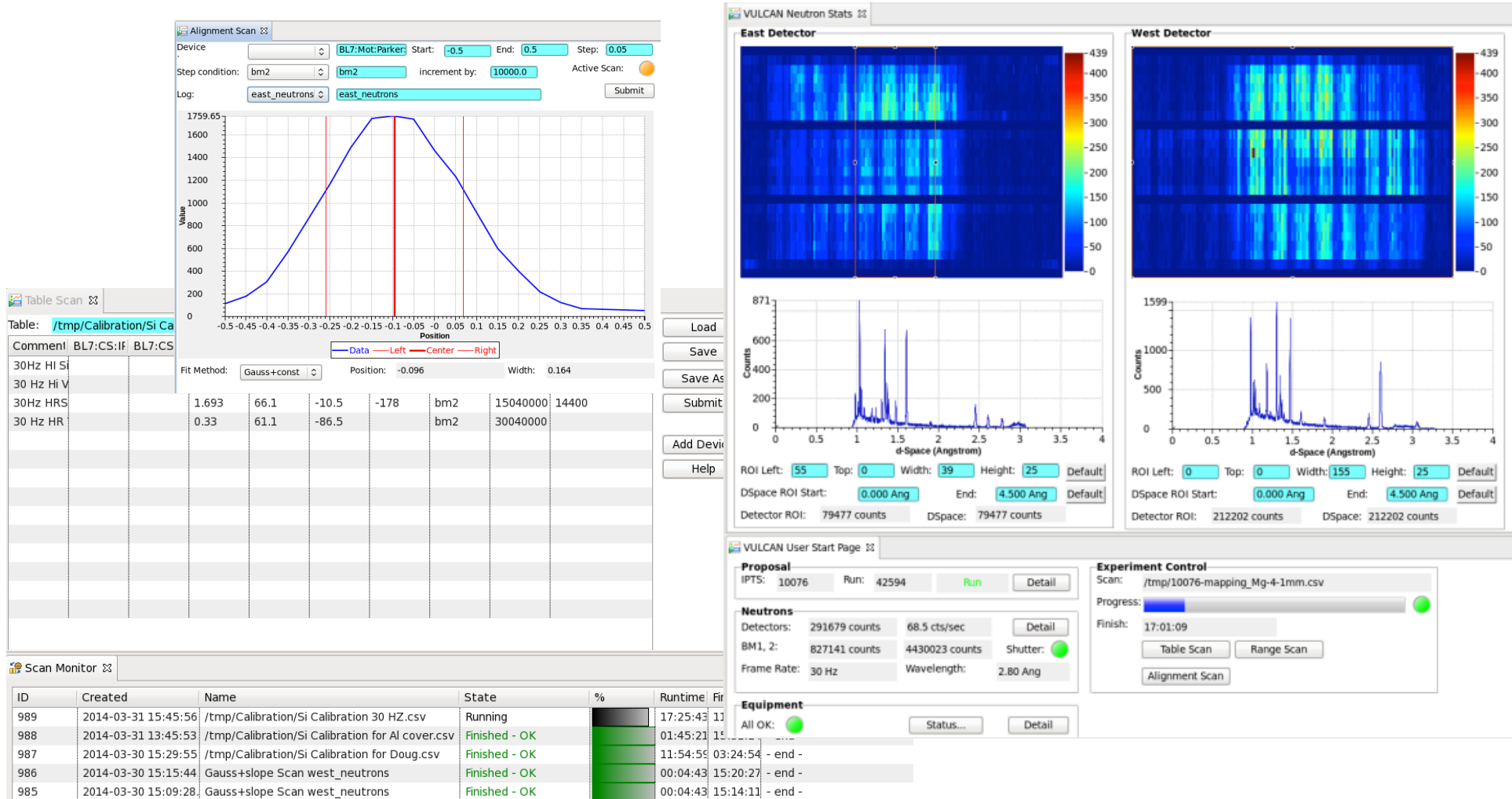
ORNL 'CG-1D' Beam Line

The screenshot displays the EPICS/CSS control interface for the ORNL 'CG-1D' Beam Line. The interface is divided into several sections:

- Navigator:** A file tree on the left showing the directory structure, including files like `20130108_Turbine_CT_0180_000.000.0000.fits`.
- Camera Control:** A central panel with a live image of a turbine component. It includes controls for Exposure Time (180.000), Binning (1), ADC Speed (1.00 MHz), Shutter Mode (Auto), and Camera State (Idle). There are also buttons for Start, Stop, Full Control (Simulated), Full Control (Andor), File I/O Configure, and General Camera.
- Cooling:** A section with a Cooler status (On) and Temperature (-60.000, -59.777). The status is 'Stabilized at set pc'.
- Advanced:** A section with buttons for Full Control (Simulated), Full Control (Andor), File I/O Configure, and General Camera.
- File Path:** A section showing the File Path, File Name, Next File #, Last File Name, and Andor Message.
- Motors:** A table on the right showing the status of various motors. The table has columns for Motor, Readback, Position, Left/Move/Right, and Limits. The motors listed are Lift Table, Short Axis, Long Axis, Large Rotation T., Detector Table, Small Rotation T., Camera Vert., and Robofocus. The Robofocus motor is currently at 50, with a Motor Guide showing a diagram of the beam line.
- CT Scan:** A section with a Configuration table showing Start, End, Step, Device, Exposure, Delay, and Simulate? options. The Status section shows the Angle (90.0 deg), Camera (Idle), and Last file (J130109_Turbine_CT_0180_181.350_0279.f).
- Console:** A section at the bottom showing a log of scan activities. The log includes columns for ID, Created, Name, State, %, Runtime, Finish, Command, and Error. The log shows two completed scans: 'Rotation Scan: Turbine_CT' and 'Rotation Scan: Turbine_CT_test'.

Neutron Tomography, EPICS/CSS since Jan. 2013

ORNL SNS 'VULCAN' Beam Line

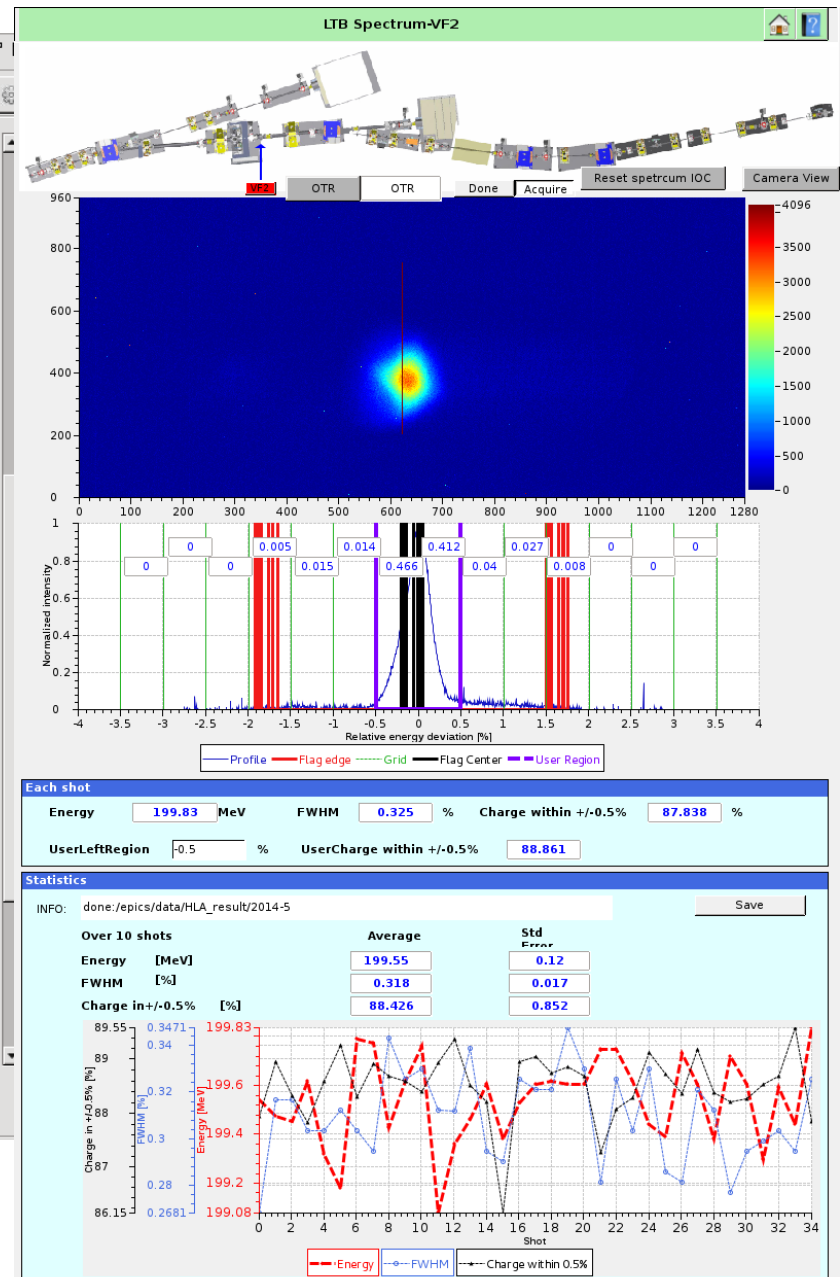


Engineering Diffractometer, EPICS/CSS since March 2014

BNL NSLS2

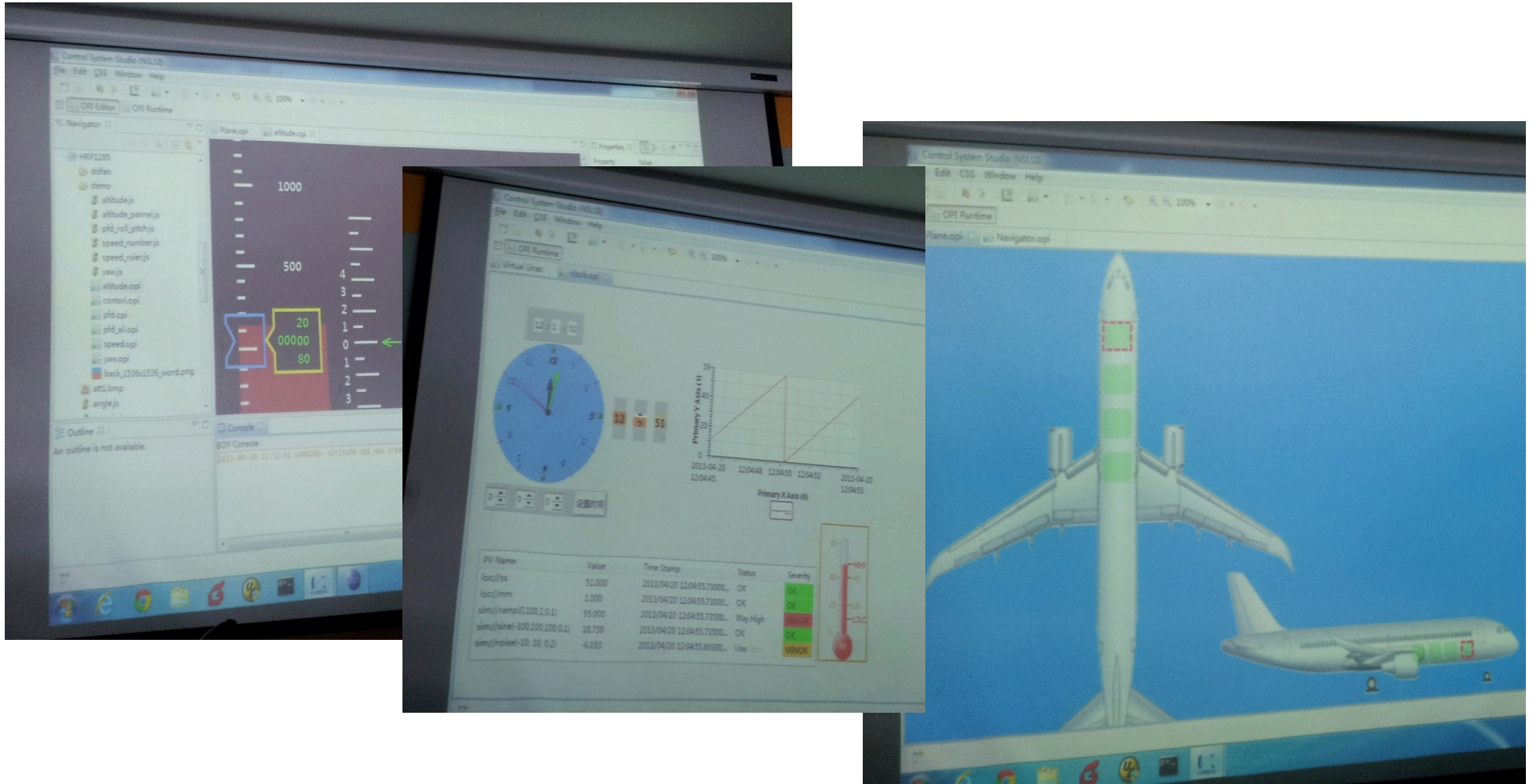
Date	Description	Owner	Logbooks	Tags	A.
5/12/14 7:40 AM modified at: 5/13/14 11:32 AM	Systems are now shut down for SR, BTS, Booster, LBT, and Linac. Klystrons 1 and 3 were left on and in standby.	zeitler modified by: zitvogel	Operations		0
5/12/14 7:32 AM modified at: 5/13/14 11:32 AM	Pentant 3 would not open using normal access request, RCT had to hit emergency access button. At the time the SR RF was set to AUX state, the main dipole was off, BTS B2 was off, and BTS shutter was closed.	zeitler modified by: zitvogel	Operations		0
5/12/14 7:21 AM modified at: 5/13/14 11:32 AM	Linac is Off. Cathode is off. klystrons in standby.	rfiller modified by: zitvogel	Operations		1
5/12/14 7:19 AM modified at: 5/13/14 11:32 AM	Vertical Emittance Measurement epsy: 85.6 +/-3.8 nm betay=14.2 +/-0.63 m alphay=-1.67 +/-0.07	rfiller modified by: zitvogel	Operations		1
5/12/14 7:09 AM modified at: 5/13/14 11:32 AM	Horizontal Emittance Scan: epsx: 81 +/-5nm betax: 14.3 +/-0.6m alphax:-1.81 +/-0.08	rfiller modified by: zitvogel	Operations		1
5/12/14 7:00 AM modified at: 5/13/14 11:32 AM	Linac Status Page.	rfiller modified by: zitvogel	Operations		1
5/12/14 7:00 AM modified at: 5/13/14 11:32 AM	Starting to shut down the Storage ring and booster while Ray finishes some measurements on the Linac.	zeitler modified by: zitvogel	Operations		0
5/12/14 7:00 AM modified at: 5/13/14 11:32 AM	There are the 72 bunches in all their glory. Saved the waveform to a text file.	rfiller modified by: zitvogel	Operations		1
5/12/14 6:55 AM modified at: 5/13/14 11:32 AM	72 bunches in the booster! That is what the linac is making. GREAT! We have established that the linac can inject its bunch train into the booster.	rfiller modified by: zitvogel	Operations		1
5/12/14 6:52 AM	successfully restore machine with the snapshot #1164 and Conifg LTB_BR_BTS_20140421	rfiller	Machine Physics Operations	MASAR	0
5/12/14 6:52 AM	Succeed to save a snapshot #1165 to MASAR database using Conifg LN-LTB-All-20131219 with description: 200 MeV, 9.0nC at ICT1, 150 ns 0.3% energy spread. Comment: Saving best Beam Loading Compensation with 9nC at ICT1, 150 ns	rfiller	Machine Physics Operations	MASAR	0
5/12/14 6:50 AM modified at: 5/13/14 11:32 AM	This is the best beam loading compensation to date with a 150 ns pulse. 9nC at ICT1. 7.4 nC at FCT1.	rfiller modified by: zitvogel	Operations		1
5/12/14 6:23 AM modified at: 5/13/14 11:32 AM	Booster extraction kicker 1 pulse is still erratic.	zeitler modified by: zitvogel	Operations		1

Previous page 1 Next page



Kunal Shroff, May 2014

Airplane Simulator/Test



Somewhere ...

What is CS-Studio?

CS-Studio Components

Common Use

- BOY Display Builder
- Data Browser
- Probe
- PV Table
- EPICS PV Tree
- Channel Access
- PV Autocomplete from History

Selected Use

- Alarm System
- Channel Archiver, RDB Archiver, Archive Appliance
- ChannelFinder
- Olog, SNS ELog
- DDS, EPICS V4 PVA
- Autocomplete from Channel Finder, SNS PV database, Archive
- SNS MPS Bypass Table
- Therapist

Integration: Alarm...

Context-Menu

Complete Alarm Perspective:
Tree view, Table of current alarms

Alarm Area Panel

Alarm Tree

Alarm Table

PV	Description	Alarm Time	Current Sev	Current Sta	Alarm Sev	Alarm Statu	Alarm Value
BL1B:Vac:VacOK	major-ack'ed alarm: Beam Line 1 B Vacuum	2014/03/06 07:40:376	MAJOR	LOLO_ALAR	major-ack'ed	LOLO_ALAR	0.0

Integration: Alarm...

The screenshot displays the CS-Studio interface for the BL1B_Nomad Vacuum system. The main window shows a schematic diagram of the vacuum system, including components like the Collimator, Guides (1, 2, 3), Secondary Shutter, Sample Isolation Chamber, and Nomad Detector Tank. Various pressure points are indicated, such as Pressure 1.6E-2, Pressure 2.6E-2, Pressure 2.1E-12, Pressure 4.6E4, Pressure 8.2E2, Pressure 4.7E4, Pressure 7.6E2, and Pressure 7.6E2. The interface also includes an Alarm Tree on the left, listing areas like IH, BL-1B NOMAD, BL-3 SNAP, BL-7 VULCAN, BL-11A POWGEN, BL-14B HYSPEC, BL16B VISION, and IPPS. The Alarm Table at the bottom shows current and acknowledged alarms, with a blue arrow pointing to the 'What to do' section.

Alarm Tree

- Area: IH
- Area: BL-1B NOMAD (major-ack)
- Area: BL-3 SNAP
- Area: BL-7 VULCAN
 - PV: BL7:Det:All:Stat
 - PV: BL7:CS:Stat:SkfChoppers
- Area: BL-11A POWGEN
- Area: BL-14B HYSPEC
- Area: BL16B VISION
- Area: IPPS

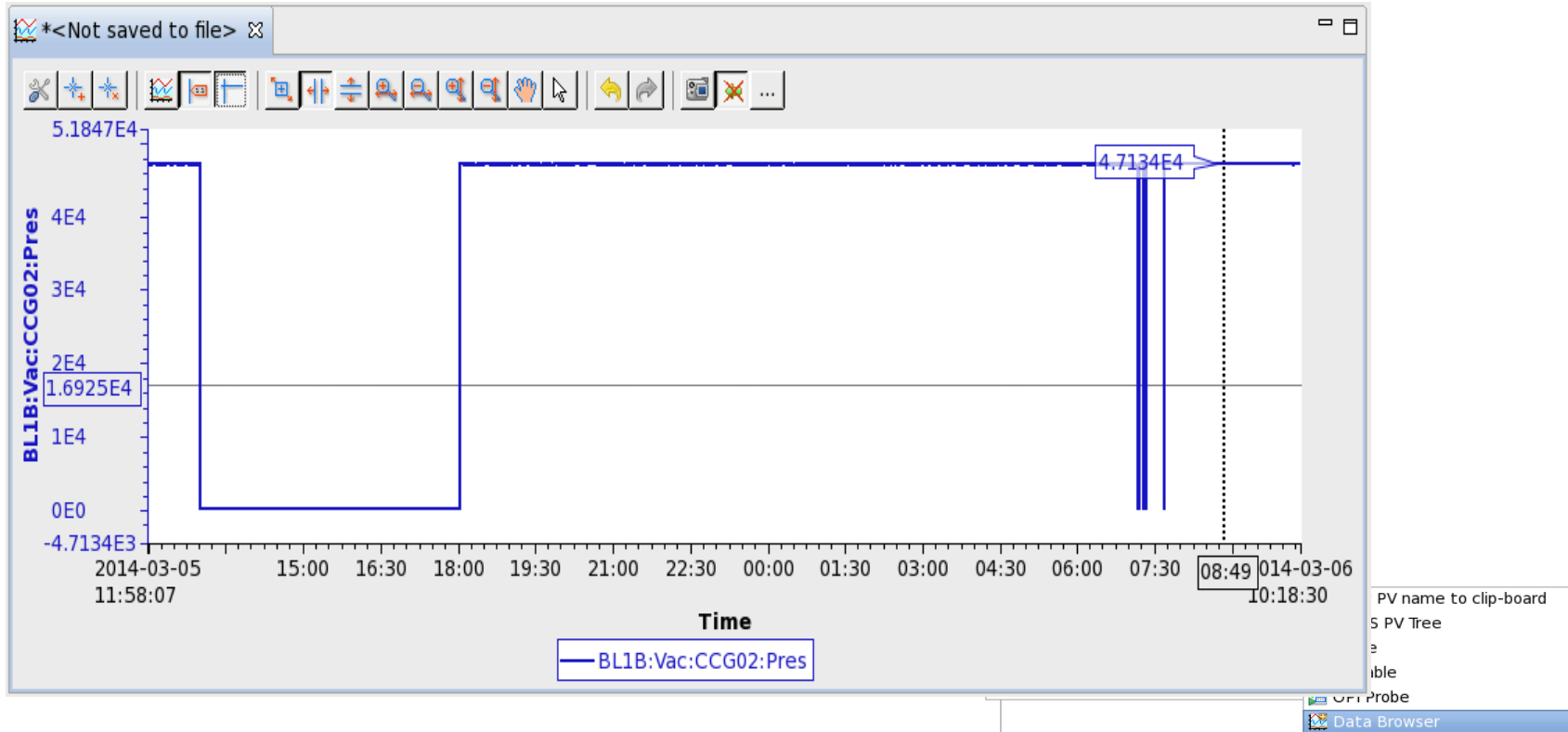
Alarm Table

PV	Description	Alarm Time	Current Sev	Current Sta	Alarm Sev	Alarm Statu	Alarm Value
BL1B:Vac:VacOK	major-ack'd alarm: Beam Line 1 B Vacuum	2014/03/0					

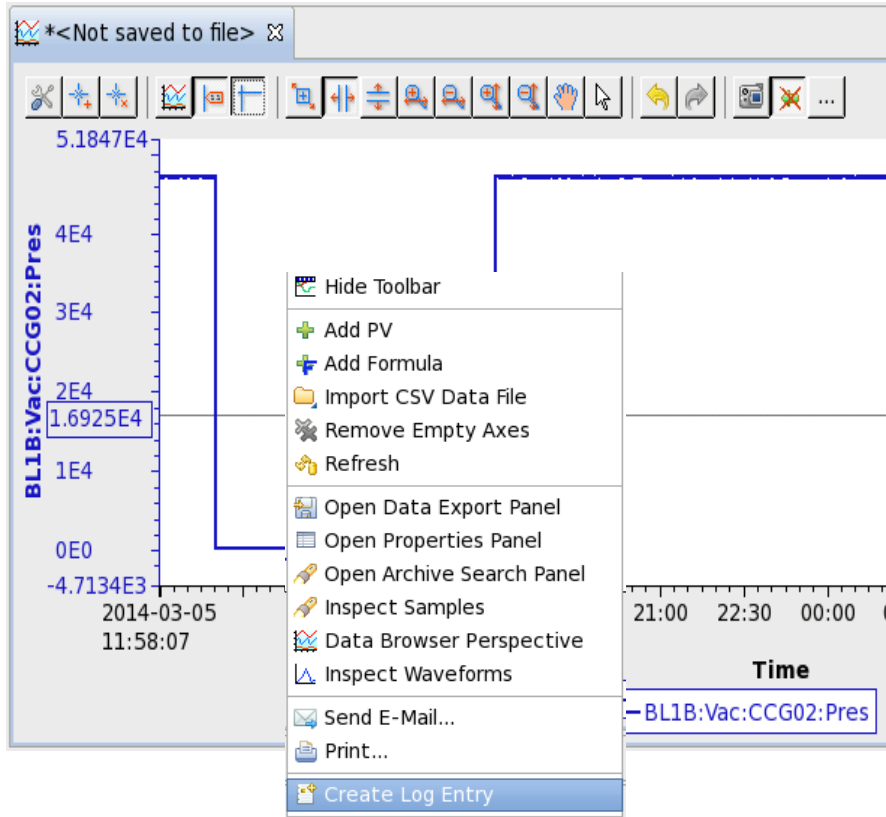
What to do

- NOMAD Overview
- Vacuum Display

Integration: Alarm...



Integration: Alarm...



The "Create Log Entry" dialog box is shown, featuring the following fields and options:

- User Name:** Fred
- Password:**
- Date:** Apr 4, 2014
- Level:** [Dropdown menu]
- Description:** Received vacuum alarm on beam line. Looks like the reading dropped to zero. The same happened a few times before. We assumed that just as before the sensor was disconnected, so we checked the XY123 controller box. Upon inspection, we noticed that ...
- Logbooks:** Operations
- Tags:** [Empty field]
- Hide details** (button)
- Images:** [Thumbnail image of the plot]
- Files:** [Empty field]
- Properties:** [Empty field]
- Remove** (button with red X icon)
- Add Image** (button)
- Screenshot** (button)
- CSS Window** (button)
- Cancel** (button)
- Submit** (button)

CS-Studio

is a collection of components.

Many of them. Confusing to get started as a developer/integrator.

To end user:

One tool, integrated Workflow

- Alarm display
- BOY Displays (Channel Access)
- Data Browser (with RDB Archive)
- Logbook (SNS Elog)

Result:

The instrument returned to normal automatic operation at 01:05:00.	
Operations	RFQ Recovery from SCL 19a Trip
2014-04-03 10:40	During the 30-second beam recovery from SCL 19a, the RFQ resonance error decreased quickly. In order to save the RFQ from opening loop, I dropped the field down by one click. After the resonance error became stable, I restored the field back to .340.
	Note: The BEAST alarm for RFQ resonance error came in and this is what alerted us that there was a problem. The alarm annunciated in time for us to do something instead of it being too late.
	- 2014_04_03_103941.jpg -
Operations	LEBT channel C dropping out Charles Bates