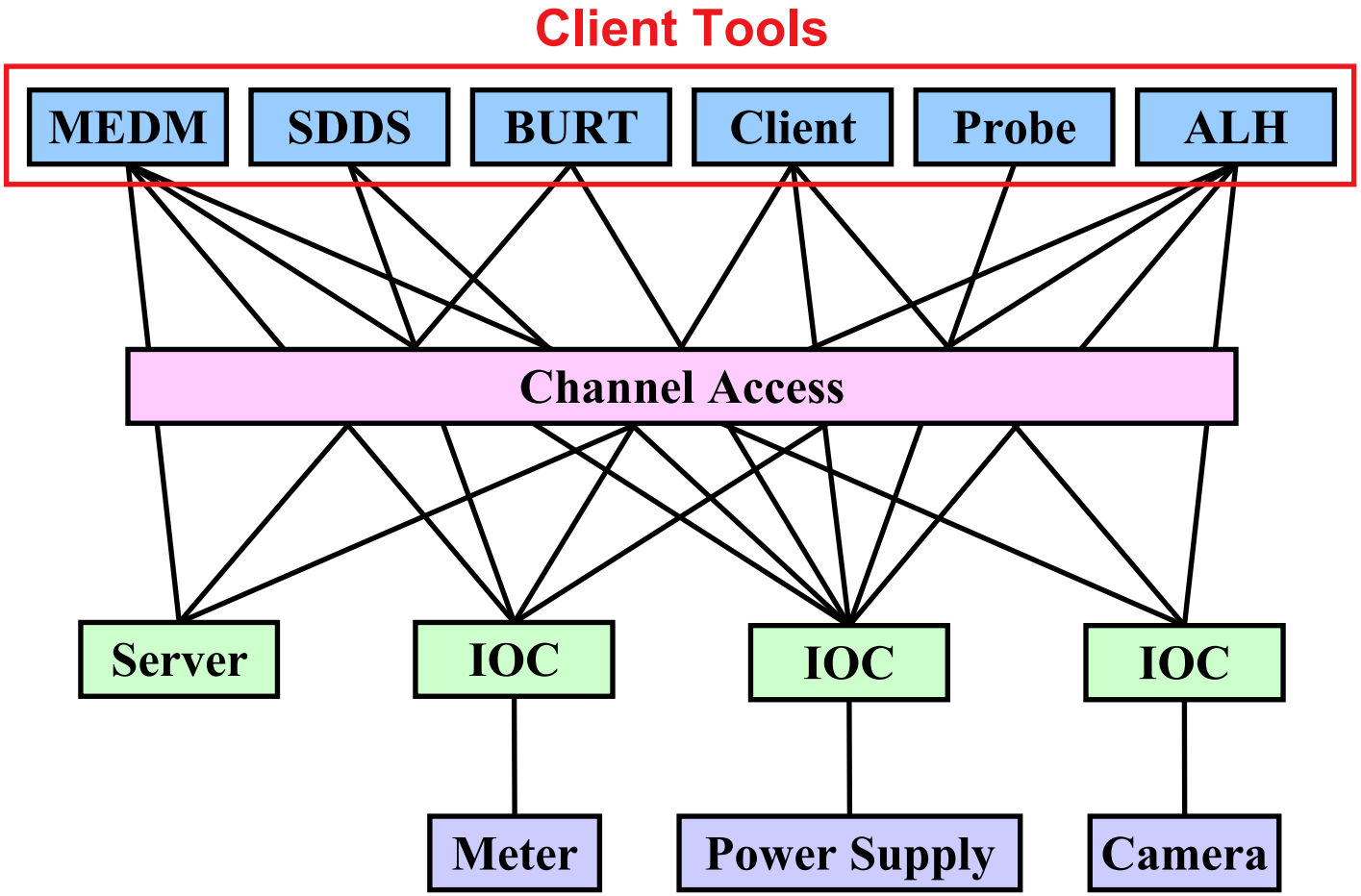
Channel Access and Client Tools

Author: Kenneth Evans, Jr., August 2004
Modified: Kay Kasemir, October 2006
Andrew Johnson, January 2007 & 2011

EPICS Overview



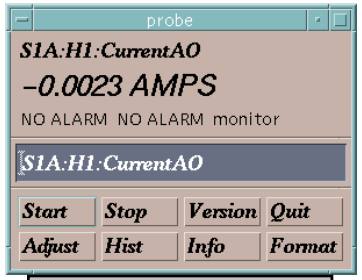
Channel Access

- The EPICS “software bus”
- Used to read and write values to/from Process Variables
- To many people, Channel Access *is* EPICS
  - Especially those that have no IOC experience
  - “Integrate X into EPICS” often means “Be able to control X via CA”
- CA is not defined by a protocol specification
  - Jeff Hill (LANL) maintains the CA client and server libraries
  - A single expert maintainer for both ensures very robust control systems

What is a Process Variable (PV)

- "A named item of data, with associated optional attributes"
  - Data is an Integer, Floating point number, enumeration value or string, or an array of any of those types
  - Attributes include timestamp, alarm status/severity, precision, engineering units string, list of enumeration strings, operator/control/alarm limits

Channel Access in One Slide



Channel Access Client

"connection request" or "search request"

"get" or "caGet"

"put" or "caPut"

"set a monitor"

Who has a PV named "S1A:H1:CurrentAO"?

What is its value?

Change its value to 30.5

Notify me when the value changes

CA Client

CA Server

Channel Access Server

Process Variables:

S1A:H1:CurrentAO

S1:P1:x

S1:P1:y

S1:G1:vacuum

I do.

25.5 AMPS

OK, it is now 30.5

It is now 20.5 AMPS

It is now 10.5 AMPS

It is now -0.0023 AMPS

"put complete"

or

30.5 is too high. It is now set to the maximum value of 27.5.

or

You are not authorized to change this value

"post an event" or "post a monitor"

Tools Described in This Presentation

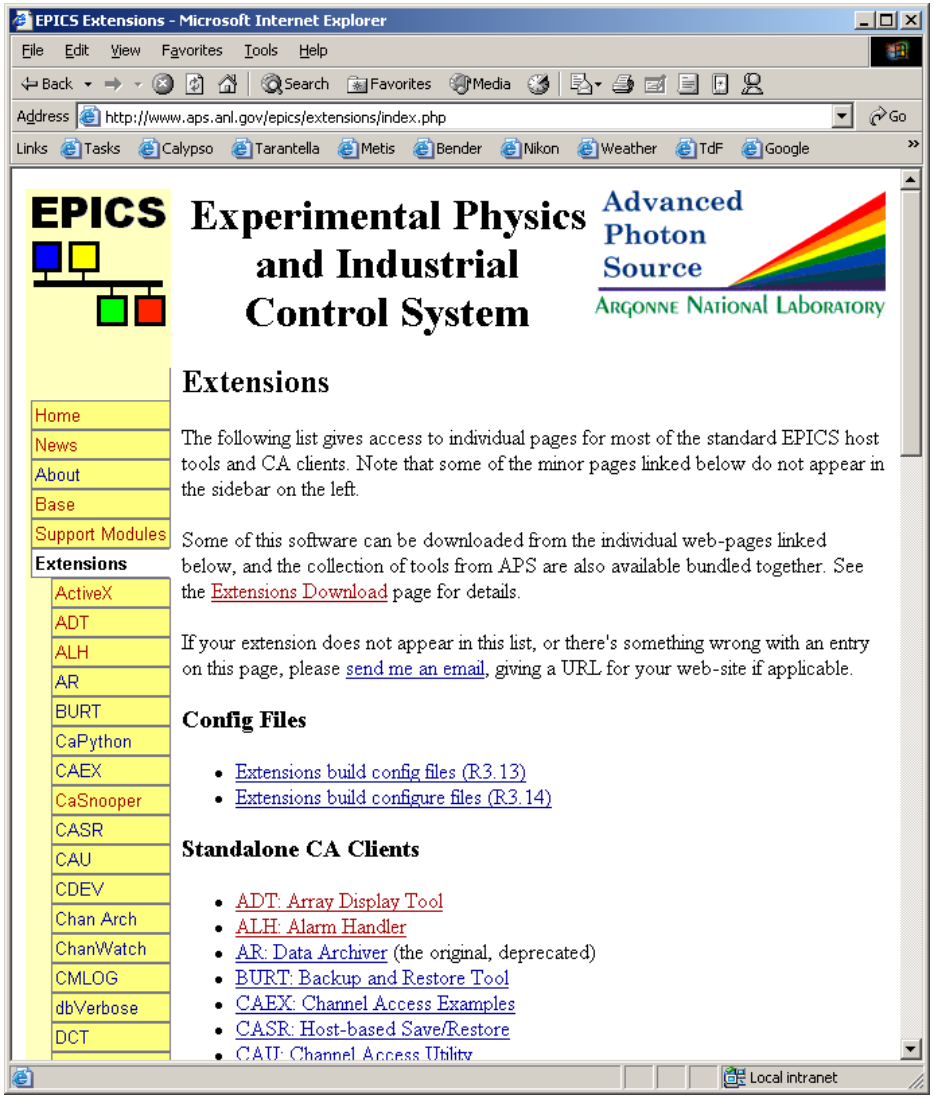
- Base command-line tools
  - caget, caput, camonitor, cainfo
- Probe
- StripTool
- ALH
- MEDM

More Information

- There is a wealth of information in the EPICS web pages
  - http://www.aps.anl.gov/epics/index.php
- Each of the Extensions covered here has its own page there for
  - Documentation
  - Source code for the latest releases
- There are *many* other tools described there too

- Extensions executables are typically located at
  - …epics/extensions/bin/<*platform*>/<*executable*>
    - **`/usr/local/epics/extensions/bin/solaris-sparc/…`**
  - Platforms are **`solaris-sparc`**, **`linux-x86`**, **`linux-x86_64`**, **`win32-x86`**, etc.
- The Base command line tools are typically at
  - …epics/base/bin/<*platform*>/<*executable*>
    - **`/usr/local/iocapps/R3.14.11/base/3-14-11-asd1/bin/linux-x86_64/…`**

EPICS Extensions Web Page



Command-Line Tools

- There used to be several versions of these tools
- We will discuss the ones that now come with EPICS Base
- The tools we will cover are:
  - caget
    - *Gets the value of one or more process variables*
  - caput
    - *Sets the value of one process variable*
  - camonitor
    - *Monitors the value changes of one or more process variables*
  - cainfo
    - *Gets information about one or more process variables*
- All accept –h to display usage and options

- NOTE: The programs with these names found in your default Unix search path are different (older).

Caget Example

- Get the values of two process variables

```
caget S35DCCT:currentCC S:SRlifeTimeHrsCC
```

- Returns

```
S35DCCT:currentCC     102.037
S:SRlifeTimeHrsCC     7.46514
```

Caput Example

- Set the value of a process variable

```
caput Xorbit:S1A:H1:CurrentAO 1.2
```

- Returns

```
Old : Xorbit:S1A:H1:CurrentAO    0
New : Xorbit:S1A:H1:CurrentAO    1.2
```

Camonitor Example

- Monitor two process variables

```
camonitor evans:calc evans:bo01
```

- Returns

```
evans:calc    2004-08-05 17:23:04.623245 1
evans:bo01    2004-08-05 17:23:04.623245 On
evans:calc    2004-08-05 17:23:05.123245 2
evans:bo01    2004-08-05 17:23:05.123245 Off
evans:calc    2004-08-05 17:23:05.623245 3
evans:calc    2004-08-05 17:23:06.123245 4
evans:calc    2004-08-05 17:23:06.623233 5
evans:calc    2004-08-05 17:23:07.123183 6
```

- Use Ctrl-C to stop monitoring

Cainfo Example

- Get information about a process variable

```
cainfo S35DCCT:currentCC
```

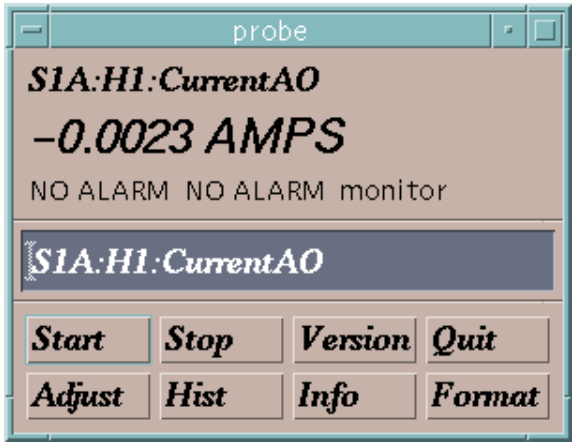
- Returns

```
State:      connected
Host:       ctlapps41188:5064
Access:     read, no write
Data type: DBR_DOUBLE (native: DBF_DOUBLE)
Element count: 1
```

- Some additional information can be found using Probe

Probe

- Simple way to get information about a single process variable
- Combines the features of caget, caput, camonitor, and cainfo in a graphical interface
- Very useful in diagnosing problems

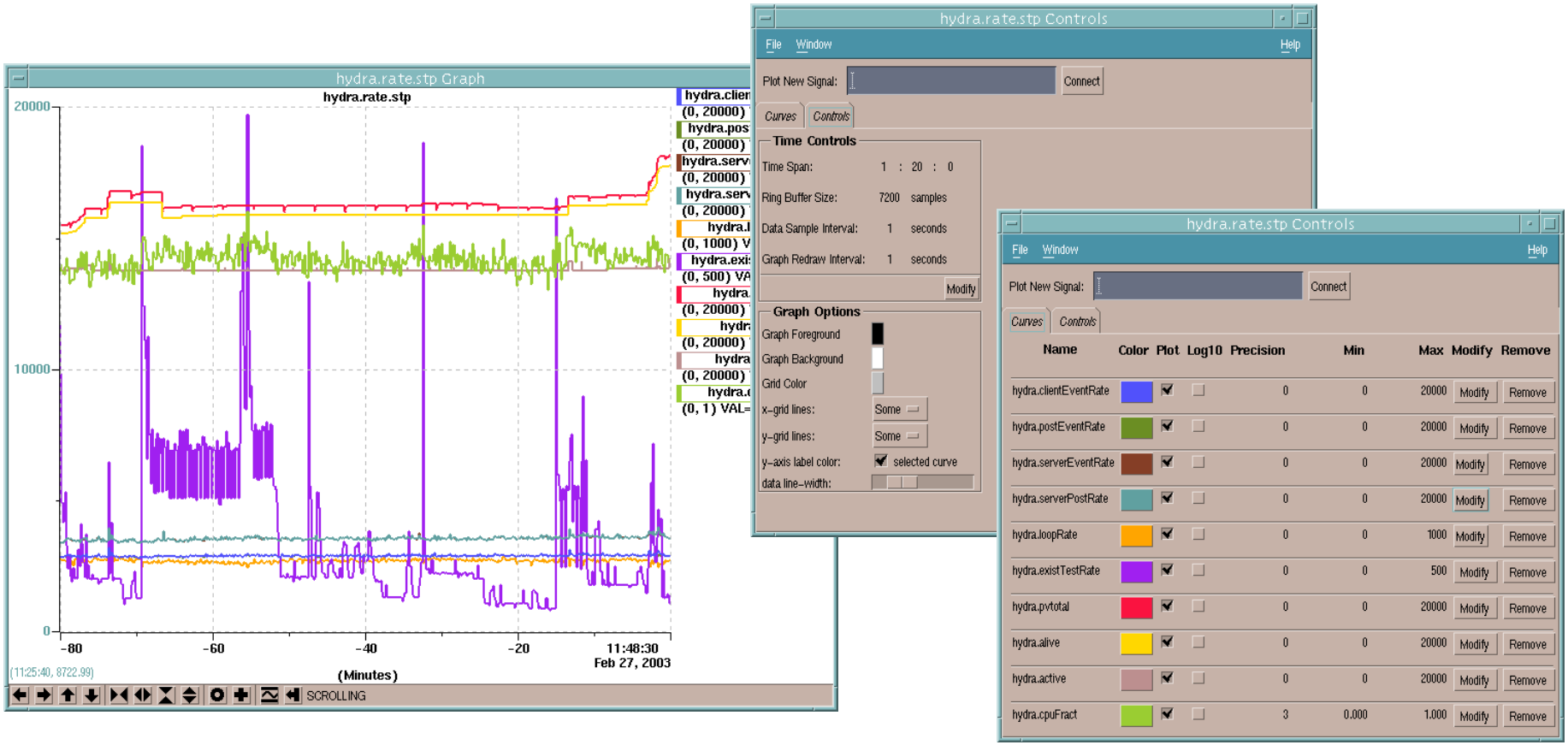


Probe Demo

Flash Demonstration of Probe

StripTool

- Plots process variables in real time on a strip chart
- Widely used



StripTool Demo

Flash Demonstration of StripTool

ALH

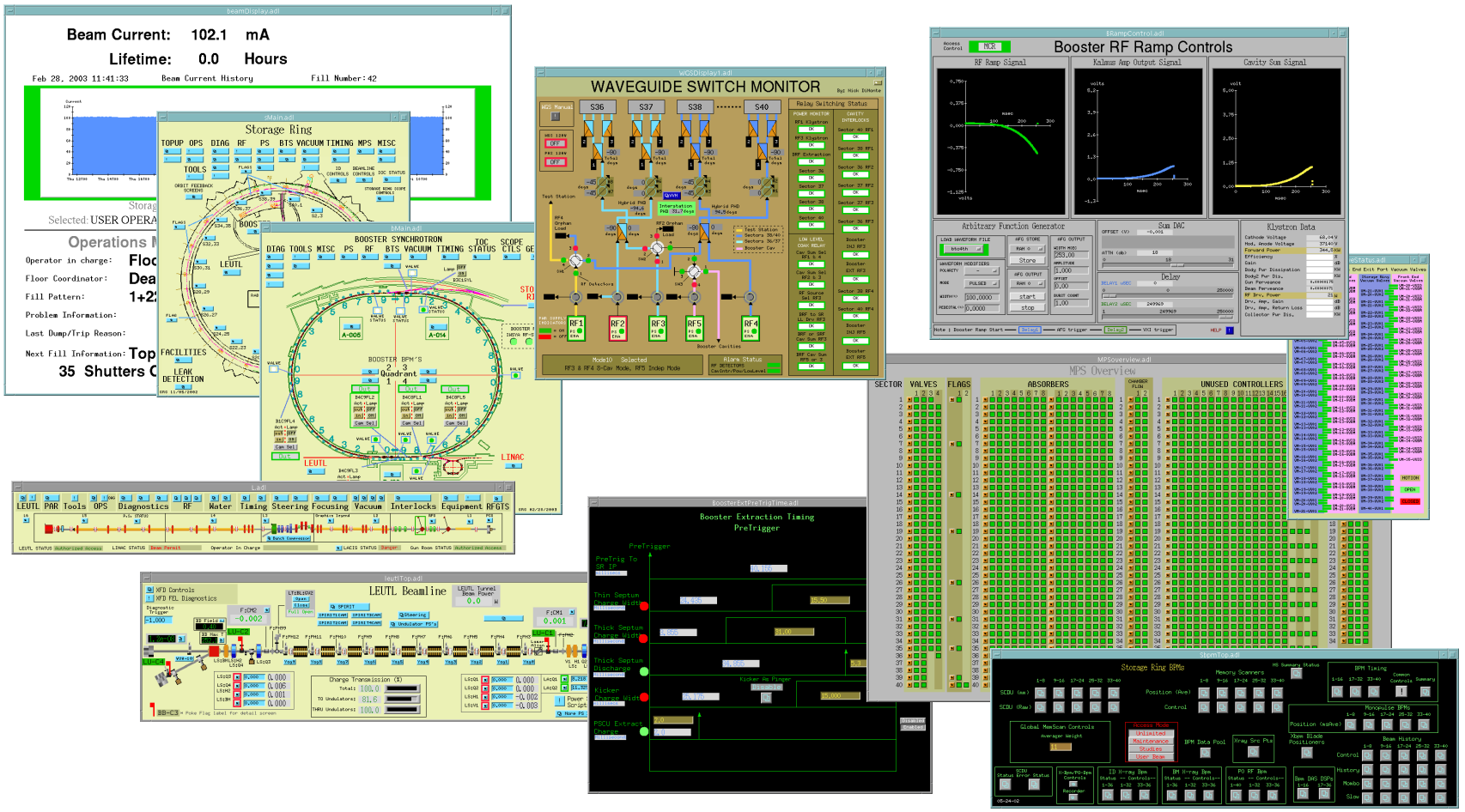
- Stands for Alarm Handler
- Important GUI application in the APS Control Room
- Brings alarms to the operators' attention
  - It dings and flashes
- Can be configured to require the operator to acknowledge alarms
- Provides a hierarchical display
  - Allows managing alarms in overview or in detail
- Provides guidance for handling specific alarms
- Logs alarms and displays alarm history

- The APS Operators configure the Alarm Handler

MEDM

- Stands for Motif Editor and Display Manager
- The principal human interface to the APS control system
- Used worldwide at many facilities
- Creates and runs control screens

MEDM Screens



- And thousands of others

MEDM

- MEDM is very reliable at both design and run-time
- However it is very hard to extend
  - Uses the Motif X11 toolkit
  - Not written in Object-Oriented style
  - Ken Evans retired last year
- We will now only fix major bugs found in MEDM
  - Eventually it may prove impossible to build on new Linux versions
- Not a good choice for a new control system
  - There are several alternatives available
  - John Hammonds will talk about CSS and BOY on Thursday