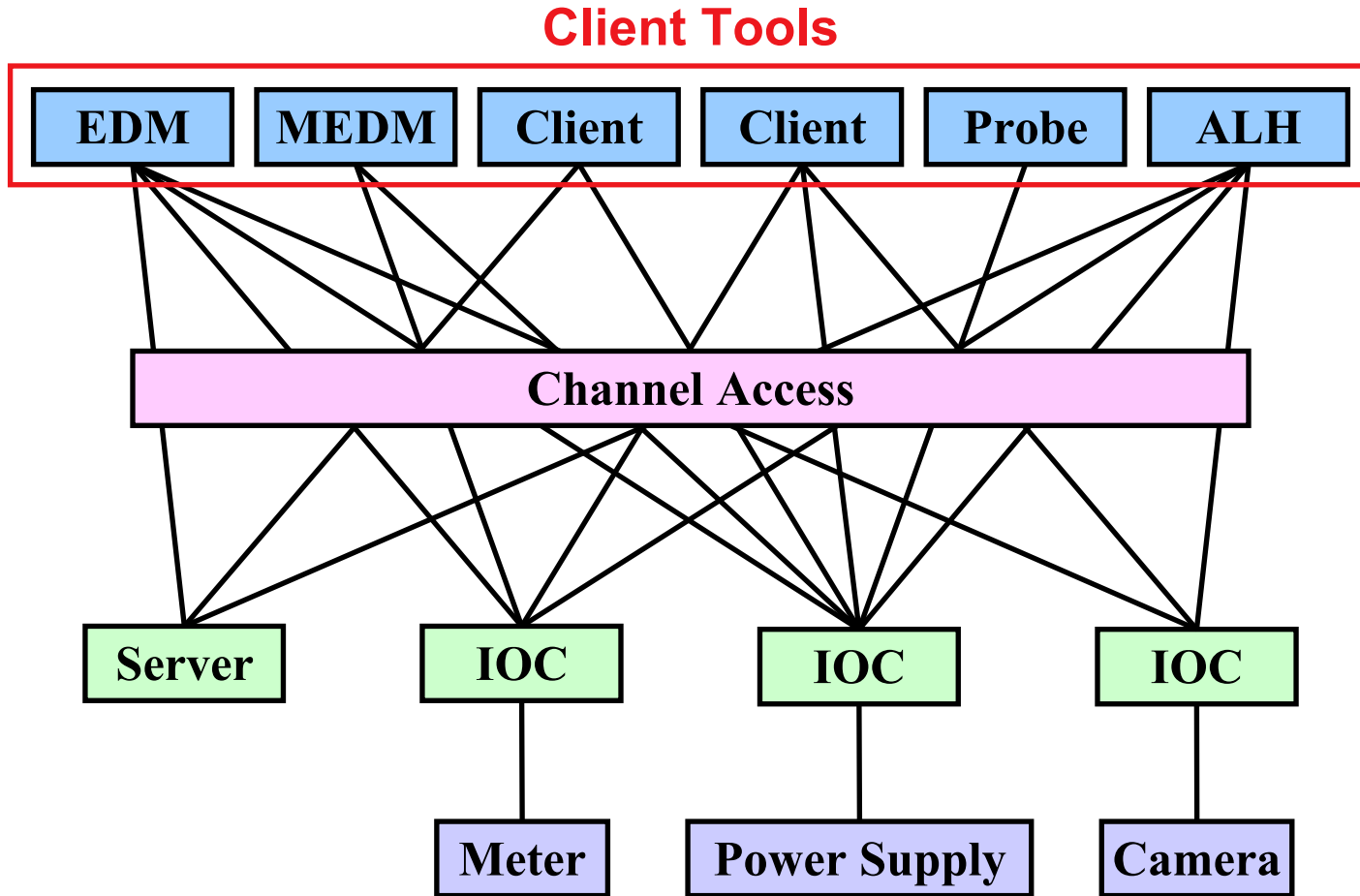


Channel Access and Client Tools

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

EPICS Overview



Channel Access

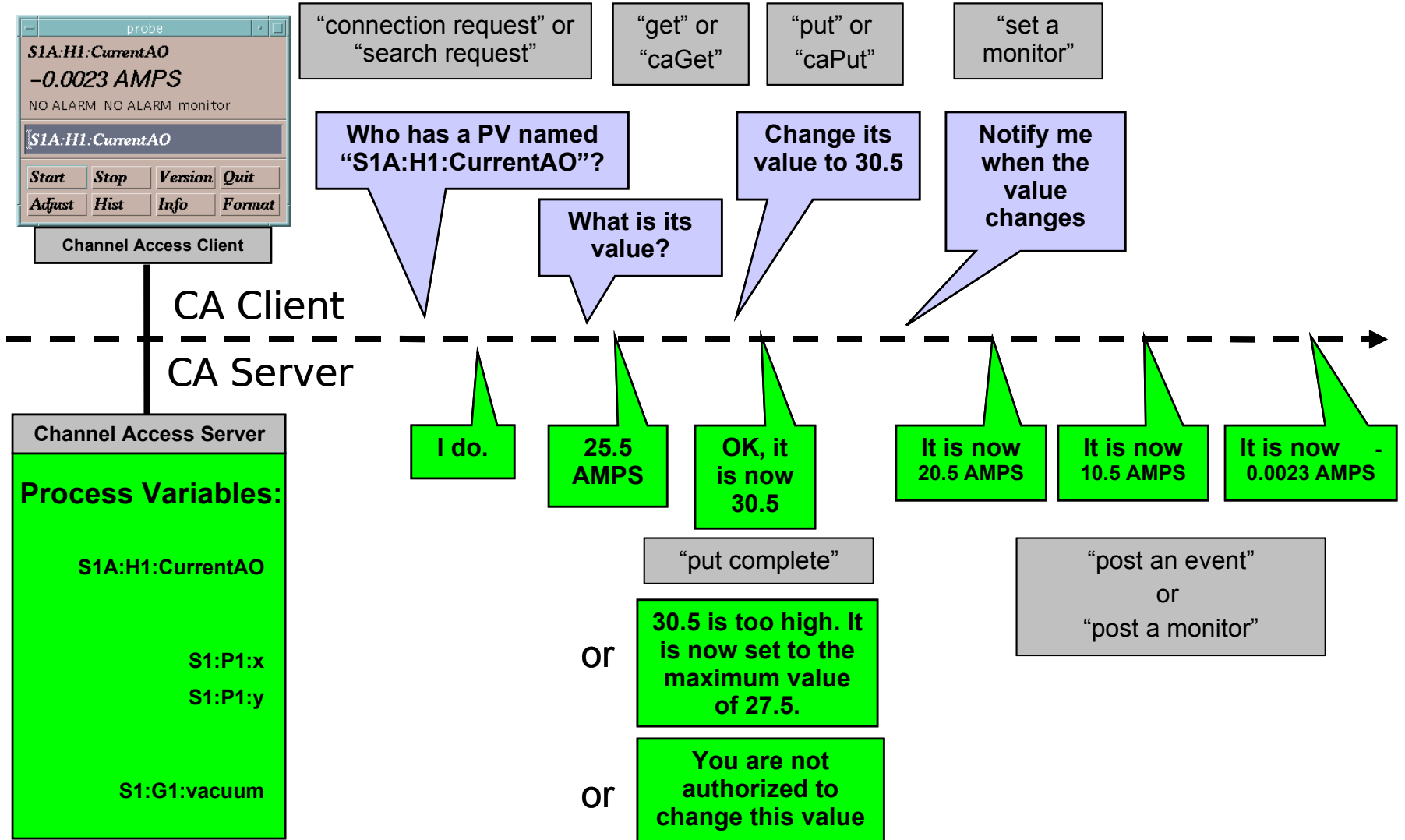
- The EPICS “software bus”
- Used to read and write values to/from Process Variables
- To many people, Channel Access *is* EPICS
 - Especially those that have no IOC experience
 - “Integrate X into EPICS” often means “Be able to control X via CA”
- CA is not defined by a protocol specification
 - Jeff 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



Tools Covered in This Presentation

- Command-Line Tools
 - caget, caput, camonitor, cainfo
- Probe
- StripTool
- MEDM
- ALH



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 with much additional information
 - Including tar files of the latest releases
- There are many other tools described there as well

- The Extensions **executables** are typically located at
 - ...epics/extensions/bin/<platform>/<executable>
 - e.g. /opt/epics/extensions/bin/solaris-sparc/edm
 - Platforms are solaris-sparc, linux-x86, win32-x86, etc.
- The Base command line tools are typically at
 - ...epics/base/bin/<platform>/<executable>

EPICS Extensions Web Page

EPICS Experimental Physics and Industrial Control System
Advanced Photon Source
ARGONNE NATIONAL LABORATORY

Extensions

The following list gives access to individual pages for most of the standard EPICS host tools and CA clients. Note that some of the minor pages linked below do not appear in the sidebar on the left.

Some of this software can be downloaded from the individual web-pages linked below, and the collection of tools from APS are also available bundled together. See the [Extensions Download](#) page for details.

If your extension does not appear in this list, or there's something wrong with an entry on this page, please [send me an email](#), giving a URL for your web-site if applicable.

Config Files

- [Extensions build config files \(R3.13\)](#)
- [Extensions build configure files \(R3.14\)](#)

Standalone CA Clients

- [ADT: Array Display Tool](#)
- [ALH: Alarm Handler](#)
- [AR: Data Archiver](#) (the original, deprecated)
- [BURT: Backup and Restore Tool](#)
- [CAEX: Channel Access Examples](#)
- [CASR: Host-based Save/Restore](#)
- [CAU: Channel Access Utility](#)

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

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
```

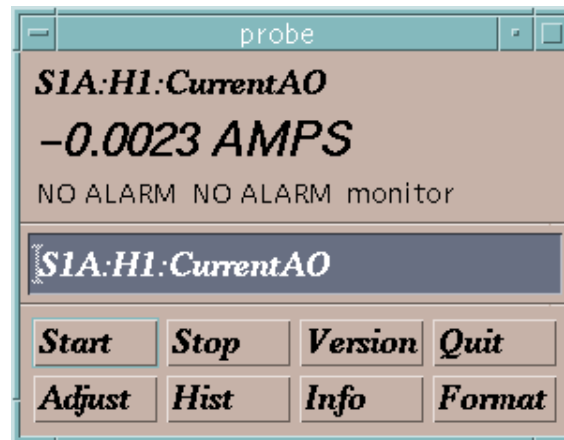
```
Data type: DBR_DOUBLE (native: DBF_DOUBLE)
```

```
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



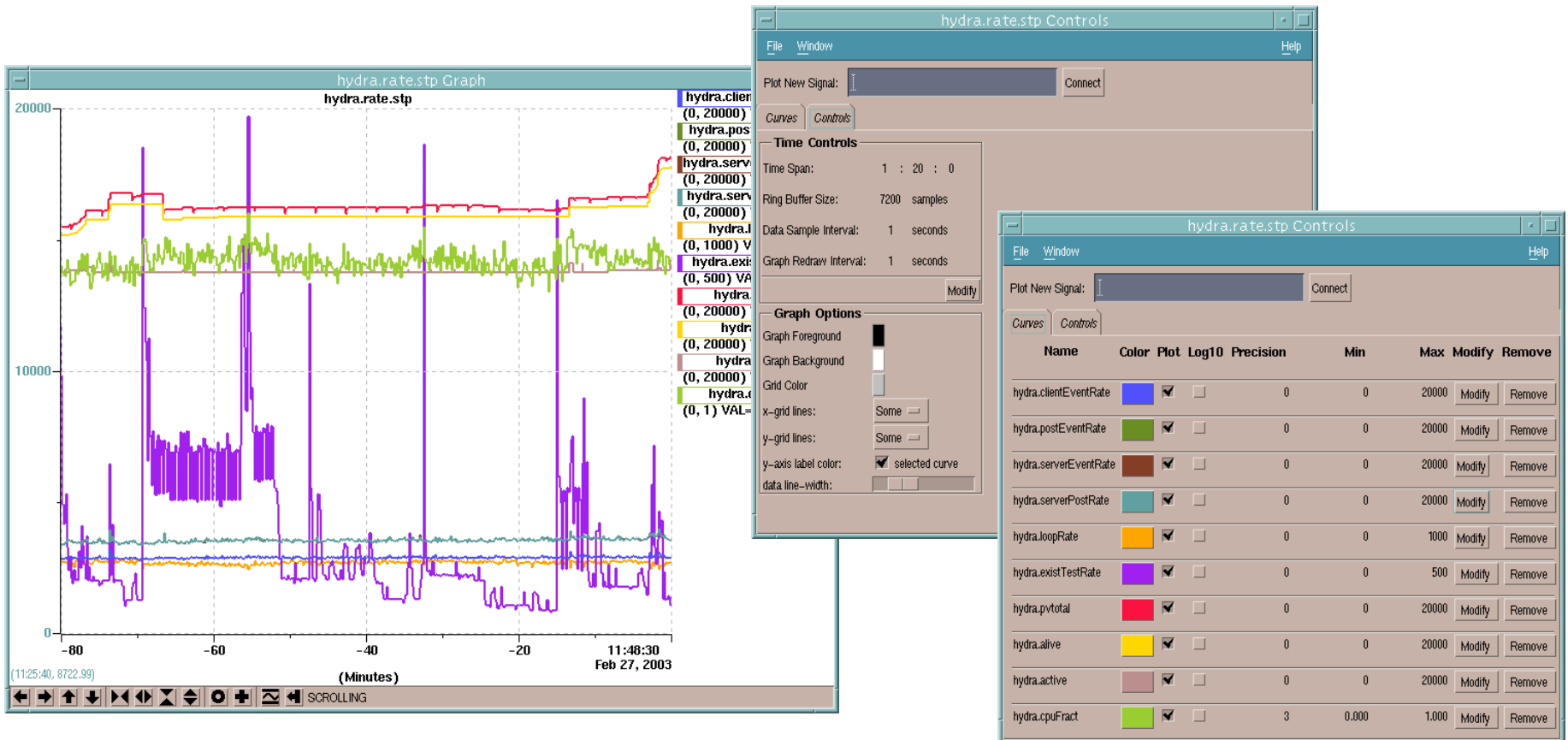
Probe Demo

Macromedia Flash Demonstration of Probe



StripTool

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



StripTool Demo

Macromedia Flash Demonstration of StripTool



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

The image displays a collection of MEDM control screens for a particle accelerator system. Key screens include:

- Beam Current Monitor:** Shows a beam current of 102.1 mA and a lifetime of 0.0 hours. It includes a graph of beam current history and a circular diagram of the accelerator layout.
- WAVEGUIDE SWITCH MONITOR:** Displays the status of waveguide switches (S36, S37, S38, S40) and relay switching status. It features a schematic diagram of the switch network.
- Booster RF Ramp Controls:** Shows RF ramp signals, Kalman Amp output signals, and cavity gun signals. It includes an arbitrary function generator and a Sun DAC control panel.
- MPS Overview:** A large table showing the status of various components, including absorbers and unused controllers, organized by sector and valve flags.
- LEUTL Beamline:** Displays detailed control parameters for the LEUTL beamline, including transmission, power levels, and various diagnostic tools.
- Booster Extraction Timing:** Shows pre-trigger and trigger signals for the booster extraction system.
- Storage Ring BPMs:** Displays beam position monitor (BPM) data for the storage ring, including position and timing information.

- And thousands of others

MEDM

- MEDM is very reliable at both design and run-time
- However it is very hard to extend
 - Not written in Object-Oriented style
 - Maintainer has recently moved to other responsibilities
- APS will only fix major bugs found in MEDM now
- Not a good choice for a new control system
 - Use EDM instead (upcoming lecture)

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



ALH

- ALH will be covered more fully in another lecture