UT-BATTELLE

EPICS Channel Access Overview

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Channel Access: The EPICS Network Protocol

- Read and write Process Variables over the network.
- To many, CA is EPICS.
  - Especially to users of systems that have no IOC database.
  - "Integrate into EPICS" can mean: Talk CA on the network.

History

- CA was not defined via a protocol specification.
- Jeff Hill (LANL) provides CA server and client libraries in C/C++.
  - Odd, but resulted in very stable implementation, avoiding conflicts caused by differing interpretations of the protocol by different persons.
- Cosylab recently has reverse-engineered the protocol specification, and implemented a pure Java version.
  - Which is great for the future of CA.
  - … but for now suffers from interpretation issues, possibly crashing CA servers on IOCs.

What is a Process Variable?

- Good question!
  - Need to revisit.
- "A named piece of data with attributes".
- Consider this record:

```
record(calc, "t1:calcExample")
{
        field(DESC, "Sawtooth Ramp")
        field(SCAN, "1 second")
        field(CALC, "(A<10)?(A+1):0")
        field(INPA, "t1:calcExample.VAL")
}
```

  - Fine print:
    Your soft IOC will have a "t1:calcExample" with a slightly more complicated "CALC=(A<B)?(A+C):D", because it uses variables B and C instead of fixed values 10 and 0. Plus it defaults to B=9, not 10 as used in this example.

What is a PV, given that record?

- "t1:calcExample"
  - PV for the current value of the record.
  - Number 0…10, changes each second.
- "t1:calcExample.DESC"
  - PV for the DESC (description) field of the record.
  - String "Sawtooth Ramp", static.
- "t1:calcExample.VAL"
  - Same as "t1:calcExample".
- Pretty much every field of a record can be a PV:
  - "{record name}.{field name}"
  - ".VAL" is implied when the field is left off.

'caget', 'caput' Experiments

- 'caget' command-line tool comes with EPICS base:

```
> caget t1:calcExample
t1:calcExample                  6
> caget t1:calcExample.VAL
t1:calcExample.VAL              9
> caget t1:calcExample.DESC
t1:calcExample.DESC             Sawtooth Ramp
```

- 'caput' allows writing:

```
> caput t1:calcExample.DESC "Howdy"
Old : t1:calcExample.DESC               Sawtooth Ramp
New : t1:calcExample.DESC               Howdy
```

'camonitor'

- 'camonitor' *monitors* value changes:

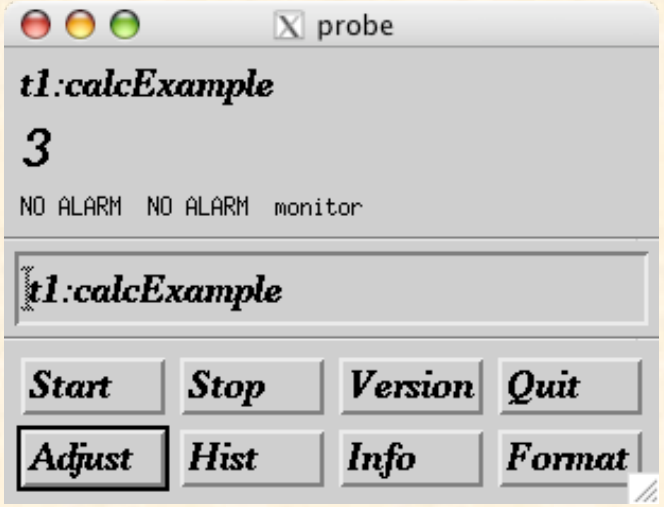
```
> camonitor t1:calcExample
t1:calcExample                 2006-10-06 13:26:03.332756 6
t1:calcExample                 2006-10-06 13:26:04.332809 7
t1:calcExample                 2006-10-06 13:26:05.332866 8
t1:calcExample                 2006-10-06 13:26:06.332928 9
t1:calcExample                 2006-10-06 13:26:07.332981 10
t1:calcExample                 2006-10-06 13:26:08.333034 0
t1:calcExample                 2006-10-06 13:26:09.333097 1
t1:calcExample                 2006-10-06 13:26:10.333143 2
… plus one more each second…
… press Ctrl-C to stop …


> camonitor t1:calcExample.DESC
t1:calcExample.DESC            2006-10-06 13:29:12.442257 Howdy
… and then nothing …
```

- Idea called *publish* and *subscribe*.

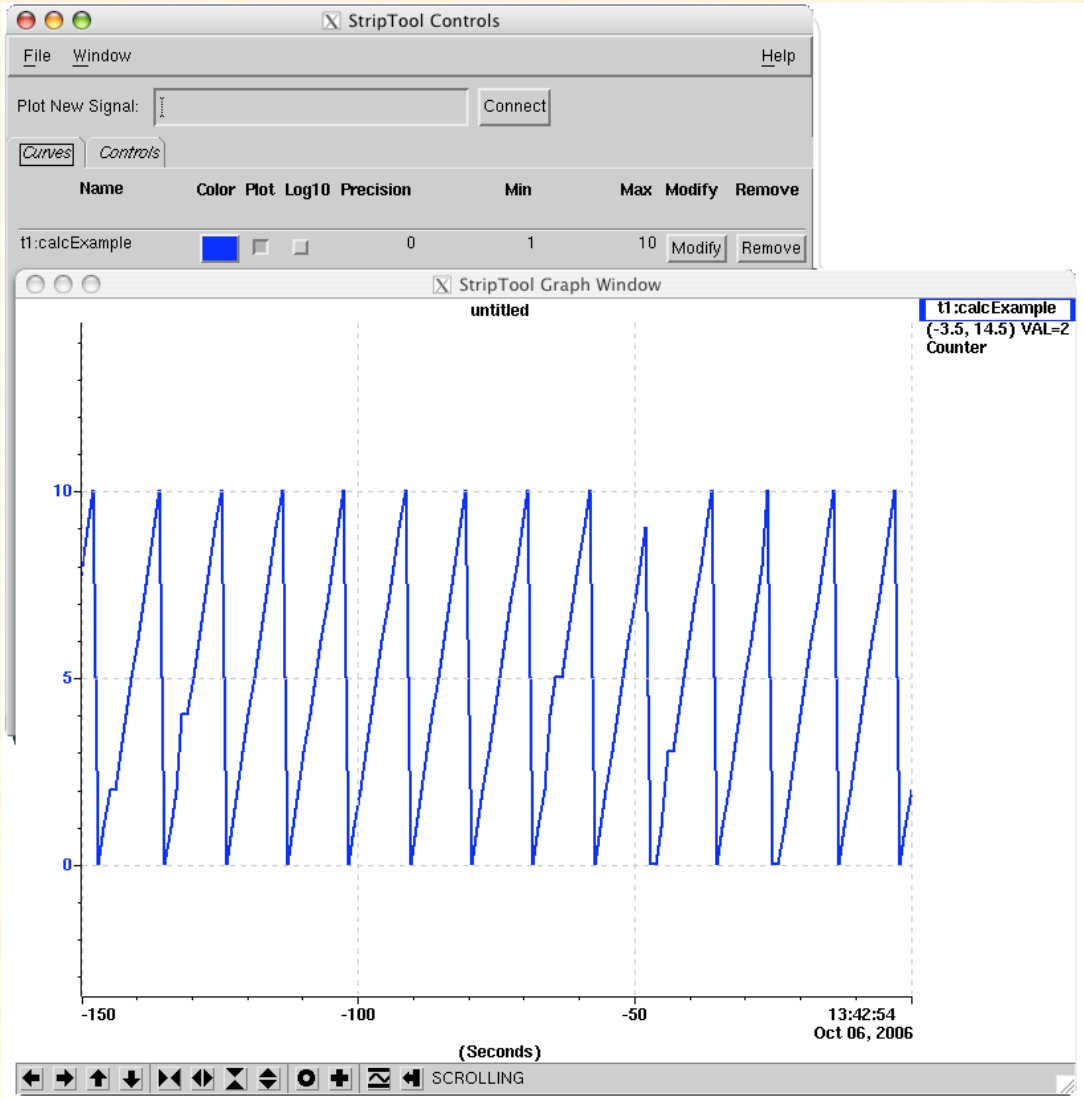
probe

- Graphical tool similar to caget/put.
  - Run
    ```
    probe &
    ```
  - Enter PV name
  - Press 'start' to subscribe,
  - … 'stop' to unsubscribe.
  - Press 'adjust' to write/put.



StripTool

- Plots value over time.
  - Run `StripTool &`
  - Enter PV name
  - Maybe adjust the min/max value range or color.
- Based on (configurable) sampling, defaulting to once per second.
  - Note occasional hickup when data also changes at 1Hz, but isn't synchronized with the sampling.
  - Fix: Configure StripTool to sample every 0.5 secs.



Intermediate Summary

- CA is the EPICS network protocol.
- CA can get/monitor/put PVs
  - read, listen, write
- PV can be
  - "{record name}"
  - "{record name}.{field name}"
- Useful Tools:
  - caget, caput, camonitor, (and cainfo)
  - probe, StripTool

… to be continued…

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