OAK RIDGE National Laboratory

CA/PVA Channel vs. IOC Record vs. other CA/PVA server

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What is a Process Variable (Channel)?

Good question!

"A named piece of data with properties"

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What is a PV (Channel)?

- Whenever there's a CA/PVA server out there which decides to respond to a search request, that's a PV!
- IOC responds to "{record}.{field}" searches if
  - {record} names a record on this IOC,
  - {field} is an accessible field of that record (using VAL if no .{field} given),
  - or it's the pseudo-field "RTYP" (record type).

➔ Every field of every record is a PV!

When you implement your own server based on the CAS/PVA library (C++, python, …),
you decide when to respond!

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Channel Properties

- For CA, DBR_... request types are fixed:
  - DBR_DOUBLE, DBR_SHORT, ...: Just value.
  - DBR_STS_...: Value with status and severity.
  - DBR_TIME_...:Value with status, severity and time stamp.
  - DBR_CTRL_...:Value, status, severity, units, limits, … but NOT time
  - Not available:
    - Custom combinations like value with units.
  - See `caget –h`

- For PVA, "Normative Types" offer same info as all DBR_... types combined
  - See separate PVA presentation

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Records & Fields vs. Channels & Properties

- A CA/PVA client asks for a channel with properties
- The implementer of the server decides how to answer.
  - The IOC maps the fields of a record to the properties of a channel.
  - Details are ultimately in the IOC source code

How do records & fields map to channels & properties?

Analog Record (ai, calc, …)

Fields

- VAL
- DESC
- EGU
- PREC
- LOPR, HOPR
- LOLO, LOW, HIGH, HIHI
- TIME

Channel

DBR_CTRL_DOUBLE

- **value**
- **status/severity**
- **time stamp***
- **units**
- **precision**
- **display limits**
- **warn limits**
- **alarm limits**
- **ctrl limits**

* Actually, DBR_CTRL does not include time stamp. But DBR_TIME would.

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")
        field(PREC, "2")
        field(EGU,  "steps")
        field(LOPR, "0")
        field(HOPR, "10")
        field(HIGH, "8")
        field(HIHI, "9")
}
```

t1:calcExample as *DBR_CTRL_DOUBLE*

- value = VAL
- status/severity = STAT/SEVR
- units = EGU
- precision = PREC
- display limits = LOPR/HOPR
- warn limits = LOW/HIGH
- alarm limits = LOLO/HIHI
- ctrl limits = LOPR/HOPR

Makes sense!

t1:calcExample as *DBR_TIME_DOUBLE*

- value = VAL
- status/severity = STAT/SEVR
- time stamp = TIME

Makes sense!

t1:calcExample.DESC as *DBR_TIME_STRING*

- value = DESC
- status/severity = STAT/SEVR
- time stamp = TIME

Alarm, time don't apply to DESC!

t1:calcExample.SCAN as *DBR_CTRL_ENUM*

- value = SCAN
- status/severity = STAT/SEVR
- labels = ["Passive", .., "10 second", .., ".1 second"]

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Consider a ‘news’ website…

- People create web pages with news
- http:// serves them
  - Doesn’t mean you can list all the people, or get the color of their socks
  - People might change
  - Some pages are created by programs, *they don’t wear socks!*

- Records on IOCs provide data
- CA/PVA serves it
  - Doesn’t mean you can list all records
  - IOCs might change
  - Some channels are provided by python, LabVIEW, …, there are no records!

Keep in mind

- The protocol http:// is different from the people who create web sites
- The CA/PV protocol is different from the IOCs and records

This 'decoupling' has proven essential but is often forgotten !

Key Points

- Channel != Record
  - IOC maps fields of records to properties of channel
  - This separation allowed development of generic clients (displays, alarm tools, archives) independent from IOCs
- There is a growing number of non-IOC CA/PVA servers
  - Mostly python
  - They provide channels “x” with value, units, precision, alarms, time.. but that doesn’t mean you can read/write “x.EGU”, “x.PREC”, …
    There is no record!
- PVAccess allows custom data types
  - But to remain compatible, try to support the Normative Types