OAK RIDGE National Laboratory

Put- and Get-callback (aka completion) Support, 'Busy' Record

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Basic Automation Example

1. Move motor to some position

Has the motor reached the position?

2. Open shutter

How quickly does the shutter open?

3. Take data for 5 seconds

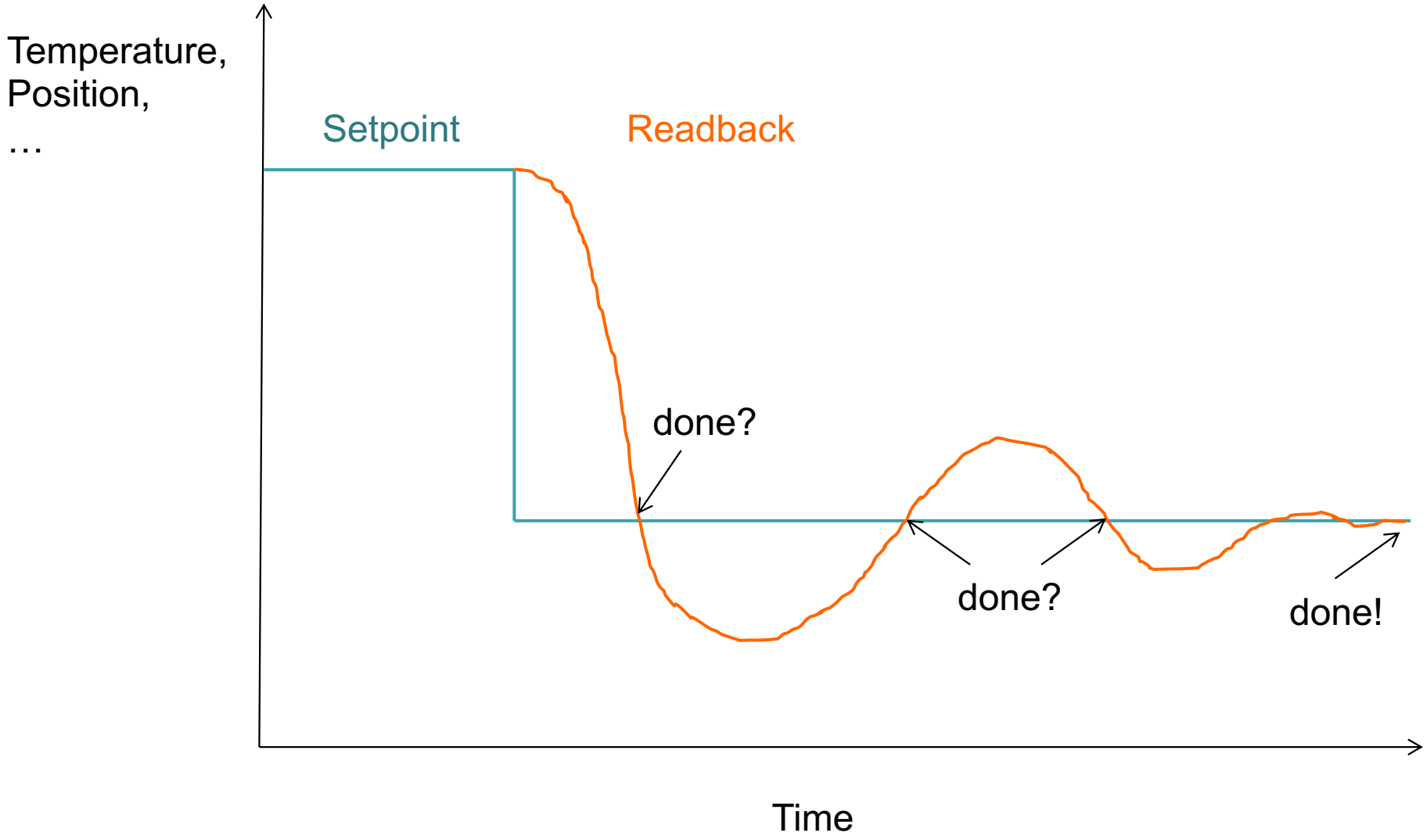
4. Close shutter

What not to do

1. Ask motor to move to position X
2. Wait until motor encoder reports X±0.1mm
3. Ask shutter to open
4. Wait 4 seconds - Fred said that's how long it'll take
5. Take data for 5 seconds
6. Close shutter

Not reliable!

Based on readback, are we there, yet?



IOC has to tell us when it's done!

1. Use CA "put-callback"
2. Record completes callback when it is "done"

Requires record with support for "completion" aka "put-callback"

✓ Motor record: When reaching desired position

? Other record: Check device support manual

! Plain database: Use BUSY record

Does “SomeRecord” support put-callback?

- Hard to tell from outside
  - No? “put-callback” will return right away like a plain “put”
  - Yes? “put-callback” will return when record is done, which could be after 0.01 sec (fast shutter) or hours (cryostat cooling down)…
- Device support manual tells you that put-callback is supported?
  - Good!
    Motor record, some temperature controller device support, …
- BUSY record allows you to create record logic that supports put-callback

Internals: EPICS record PACT field

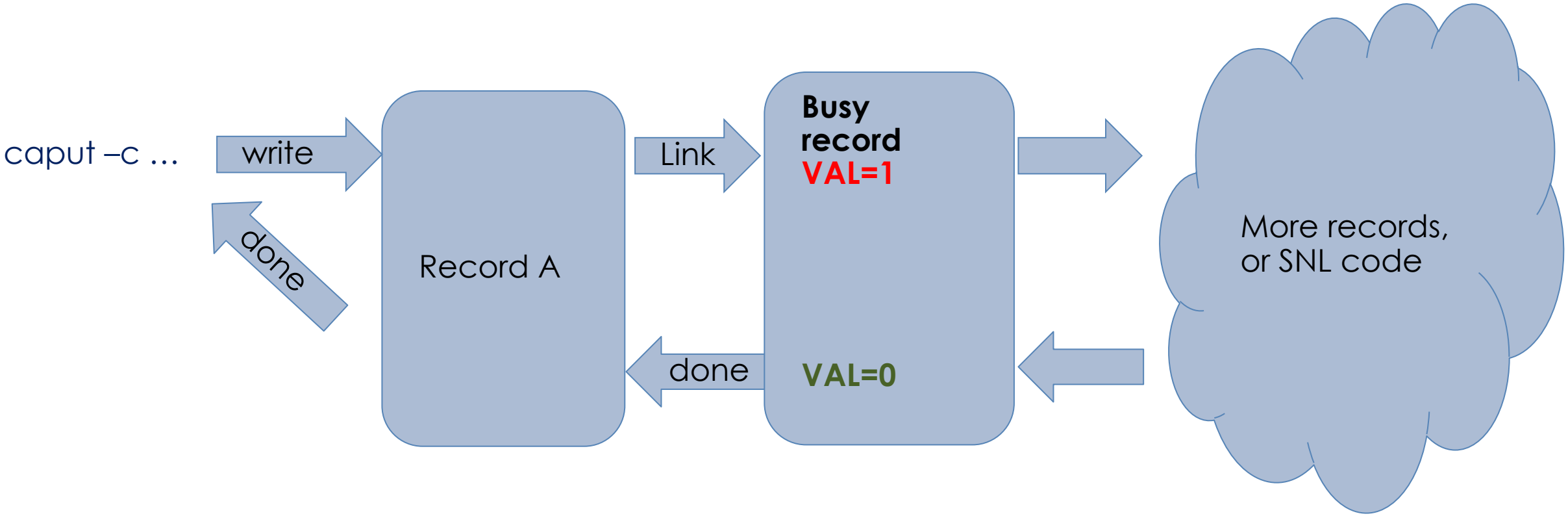
- PACT is binary flag that is 1 (ON) when record is processing
- CA put-callback is mechanism to use PACT information…
- …and not return until PACT is 0 (OFF)

caput -c -w *timeout PV* *value*

caput –c –w 20 SomeMotorRecord 5.7

BUSY Record to support Put-Callback

- VAL = 1 "Busy", VAL=0 "Done"
- Blocks processing (PACT=1) while busy



Typical Use

1. Writing to some record, which has FLNK or OUT links to a busy record, sets busy.VAL = 1
2. This causes writer to that first record to block in put-callback
3. Something else resets busy.VAL = 0
   a) Other database logic
   b) Sequencer code
   c) asyn device support
   d) …
4. Put-callback completes

Monitor, active Get, Get-Callback

- Typical client should use 'monitor' to efficiently receive the most recent value
  - PyEPICS `caget()` does this by default
- But consider this:
  - We monitor "SomePV", last received value was 10
  - `caput(SomePV,11)`

  We should *real soon* receive an update with value 11,
  but until then PyEPICS `caget("SomePV")` will return 10

  → Sometimes you need to force an active, round-trip "caget",
  not rely on the next monitor.
  In PyEPICS: `caget("SomePV", use_monitor=False)`
- There is also "get callback" that will cause record to process, wait for completion, then return the current value

Put-Callback
(and sometimes round-trip get or get-callback)

.. Is essential for robust automation

Check if your device support offers callback/completion

If not, use BUSY record to create database logic that supports put-callback