

PAUL SCHERRER INSTITUT



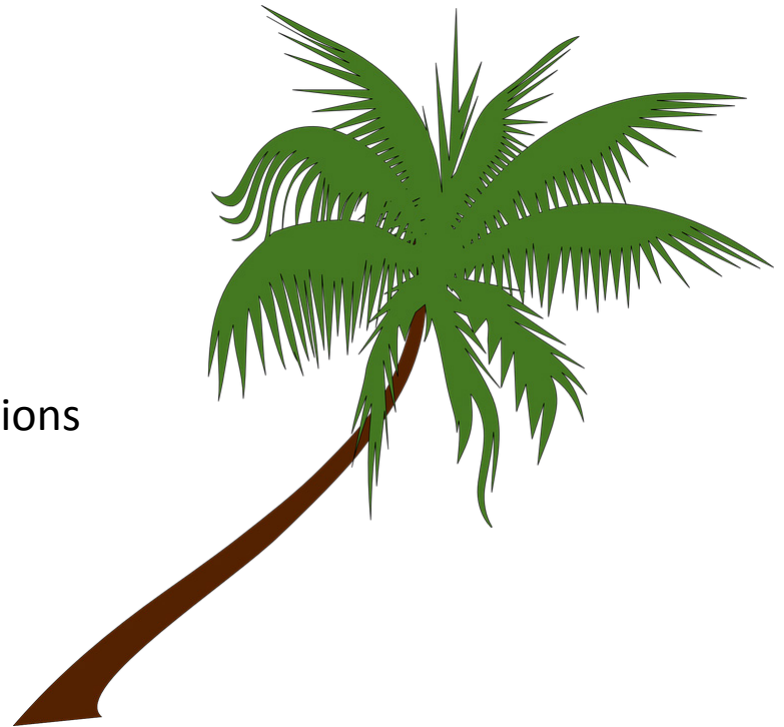
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IOC Utilities at PSI

EPICS Collaboration Meeting at ICALEPCS 2017

Goal: Make Life Easier

- Simplify tedious work
 - Adding new scan rate
 - Adding breakpoint tables
 - Setting EPICS_CA_MAX_ARRAY_BYTES
- Help debugging with reverse lookup functions
 - Listing all aliases of a record
 - Listing all links pointing to a record
 - Listing all CA connections to a record
- Accessing info fields
 - List matching infos of all records
 - Iterator API function to traverse matching infos
 - Read infos with Channel Access



Adding New Scan Rate

- Edit menuScan.dbd the right way and rebuild

```

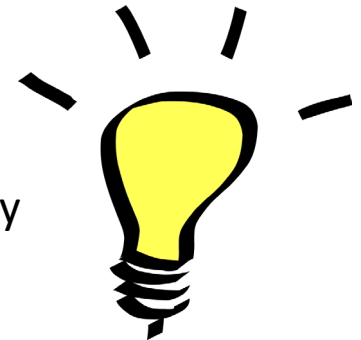
menu(menuScan) {
    choice(menuScanPassive,"Passive")
    choice(menuScanEvent,"Event")
    choice(menuScanI_0_Intr,"I/O Intr")
    # Periodic scans follow, ordered from slowest to fastest
    choice(menuScan10_second,"10 second")
    choice(menuScan5_second,"5 second")
    choice(menuScan2_second,"2 second")
    choice(menuScan1_second,"1 second")
    choice(menuScan_5_second,".5 second")
    choice(menuScan_3_second,".3 second")
    choice(menuScan_2_second,".2 second")
    choice(menuScan_1_second,".1 second")
}

```

Basically arbitrary
name

Defines new scan rate.
Up to R3.15: unit must
be "second"

- Or simply execute **addScan** command in startup script:
 - addScan .3
 - Automatically calls sysClkRateSet() on vxWorks if necessary



Adding Breakpoint Tables

- Include bpt*.dbd, edit menuConvert.dbd and then rebuild

```

menu(menuConvert) {
    choice(menuConvertNO_CONVERSION, "NO CONVERSION")
    choice(menuConvertSLOPE, "SLOPE")
    choice(menuConvertLINEAR, "LINEAR")
    choice(menuConverttypeKdegF, "typeKdegF")
    choice(menuConverttypeKdegC, "typeKdegC")
    choice(menuConverttypeJdegF, "typeJdegF")
    choice(menuConverttypeJdegC, "typeJdegC")
    choice(menuConverttypeEdegF, "typeEdegF(ixe only)")
    choice(menuConverttypeEdegC, "typeEdegC(ixe only)")
    choice(menuConvertmyConv, "myConv")
    choice(menuConvertmyOtherConv, "myOtherConv")
}
  
```

Basically arbitrary
name

Must match name
of breaktable in
bpt*.dbd file

- Or simply load bpt*.dbd files and update menuConvert in startup script

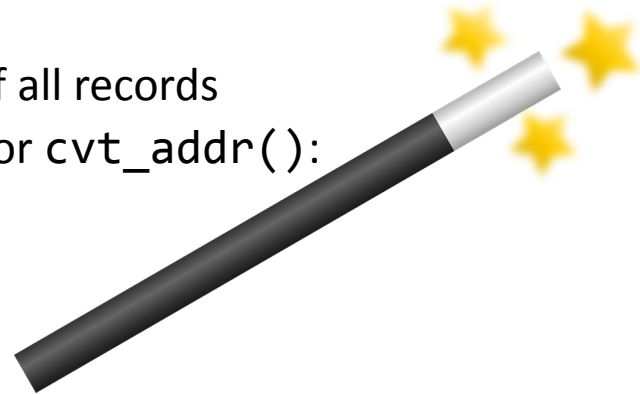

```

dbLoadDatabase bptMyConv.dbd
dbLoadDatabase bptMyOtherConv.dbd
updateMenuConvert
      
```



Setting EPICS_CA_MAX_ARRAY_BYTES

- EPICS_CA_MAX_ARRAY_BYTES on IOC too small: array PVs inaccessible
 - (Not needed any more with R3.16)
- Check size of all array fields of all records
 - Keep in mind CA type promotion (e.g. ULONG → DOUBLE)
 - Add overhead for status, severity, time stamp, ...
 - Find maximum
- Add to startup script:
`epicsEnvSet EPICS_CA_MAX_ARRAY_BYTES,...`
- Or simply calculate it automatically
 - Init hook checks potential array fields of all records
 - Two SynApps records needed patch for `cvt_addr()`:
sCalcout record and table record
 - Sets EPICS_CA_MAX_ARRAY_BYTES
if current value (or default) is too small

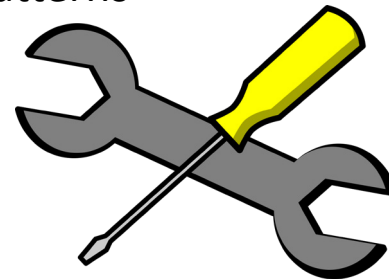


Listing All Aliases of a Record

- Translating alias name to record name is easy
 - Remote: `caget aliasname.NAME`
 - On IOC shell: `dbla aliasname`
 - Works with patterns: `dbla *XYZ`
- Finding all **aliases of a record** is difficult
 - Call `dbla` without parameter, then search the list

- Or modify `dbla` to accept **alias or record** name patterns

```
> dbla recordname  
alias1 -> recordname  
alias2 -> recordname  
alias2 -> recordname
```



Listing All Links Pointing to a Record

- Finding link targets of a record is not too difficult
 - On IOC shell: `dbpr record,4` then search the output for links
 - Or get known link field: `dbgf record.OUT`
- Finding all links with a given **target record** is very difficult
 - Analyze record database offline and search for links



- Or use new IOC shell function: `dbll record-pattern`
 - > `dbll *:X`
 - A.DOL --> DEV1:X
 - B.INPA --> DEV2:X.VAL MS CP
 - C.OUT --> DEV3:X.RVAL PP
- Filter for target field
 - > `dbll *:X.VAL`
 - A.DOL --> DEV1:X
 - B.INPA --> DEV2:X.VAL MS CP

Listing All CA Connections to a Record

- It is possible to get all CA connections to an IOC
 - On IOC shell: `casr 2`
- Good luck searching the output for a **specific record!**



- Or use new IOC shell function: `cal record-pattern`
 - > `cal MYRECORD`
 - `zimoch@pc1234:47643 --> MYRECORD.VAL`
 - `zimoch@pc1234:47643 --> MYRECORD.EGU`
 - `archive_user@archive_host:83542 --> MYRECORD.VAL`

Accessing Info Fields

- Records can have info fields

```
record (ai, "REC1") {  
    info(autosaveFields_pass0, "LOLO LOW LLSV LSV")  
}
```

- But info fields are not easily accessible

- Use new IOC shell function: `dbli info-pattern [pattern ...]`

```
> dbli autosaveFields*
```

```
REC1.autosaveFields_pass0 "LOLO LOW LLSV LSV"
```

```
REC2.autosaveFields_pass1 "VAL"
```



Accessing Info Fields (cont.)

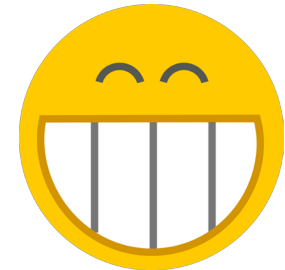
- New iterator API function: `dbNextMatchingInfo`

```
char* patternlist[] = {"autosaveFields*", NULL};
dbInitEntry(pdbbase, &dbentry);
while(dbNextMatchingInfo(&dbentry, patternlist) == 0)
{
    printf("%s.%s \"%s\"\n", dbGetRecordName(&dbentry),
        dbGetInfoName(&dbentry), dbGetInfoString(&dbentry));
}
dbFinishEntry(&dbentry);
```

NULL terminated
array of pattern
strings

- Goody: Use Channel Access to read info fields

```
$ caget REC1.autosaveFields_pass0
REC1.autosaveFields_pass0      LOLO LOW LLSV LSV
```



How to get it?

- Package with utility functions (everything except Channel Access patch)
<http://epics.web.psi.ch/software/iocUtils.tgz>
- Patch for Channel Access to info fields
 - for EPICS 3.15 and 3.16
<http://epics.web.psi.ch/software/caInfoFields-R3-15.patch>
 - for EPICS 3.14
<http://epics.web.psi.ch/software/caInfoFields-R3-14.patch>

I will try to get these changes into EPICS base.