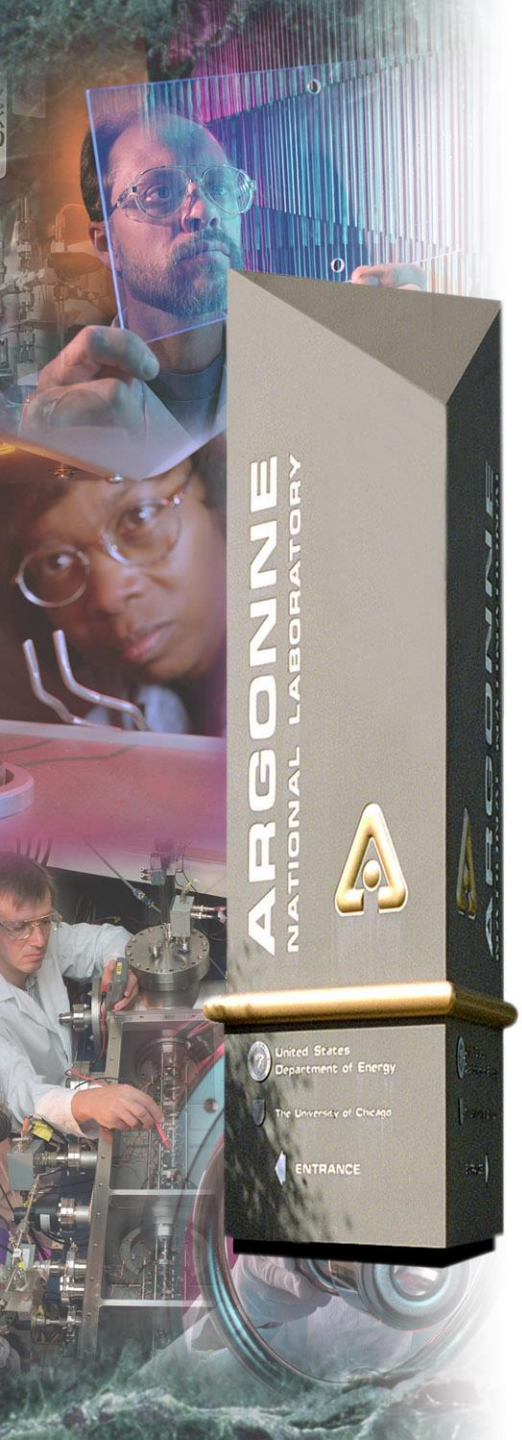

The synApps calc module

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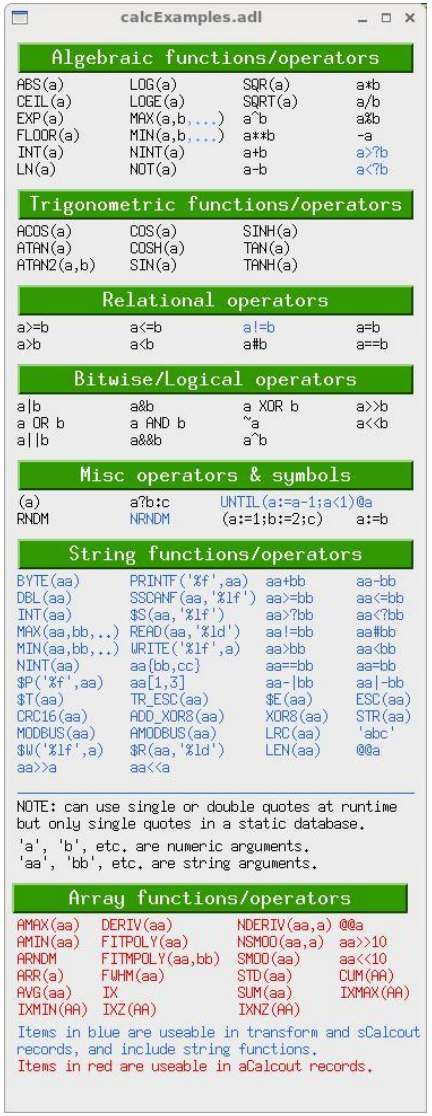
calc overview

Support for evaluating expressions entered at run time

- **EPICS record types:**
  - **acalcout** – like *calcout*, but also supports array expressions; user can specify wait-for-completion.
  - **scalcout** – like *calcout*, but also supports string expressions; user can specify wait-for-completion.
  - **swait** – like *calcout*, but uses recDynLink (no “PP MS” link attributes), and waits for completion.
  - **transform** – like 16 *calcout* records that share a PV data pool
  - **sseq** – like *seq*, in base, but can get and put strings; user can specify wait-for-completion.
- **Other code:**
  - interpolation routines for *aSub* record
  - averaging routines for *sub* record
  - *sseq*-record editor

calc databases and display files

- **Databases, display files for run-time programming**
  - userCalc, userCalcout
  - userStringCalc
  - userArrayCalc
  - userTransform
  - userStringSeq
  - userAve
  - interpolation
- **Examples of ALL calc expressions can be found in synApps calc*Example displays**

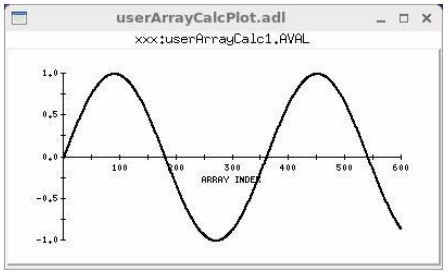


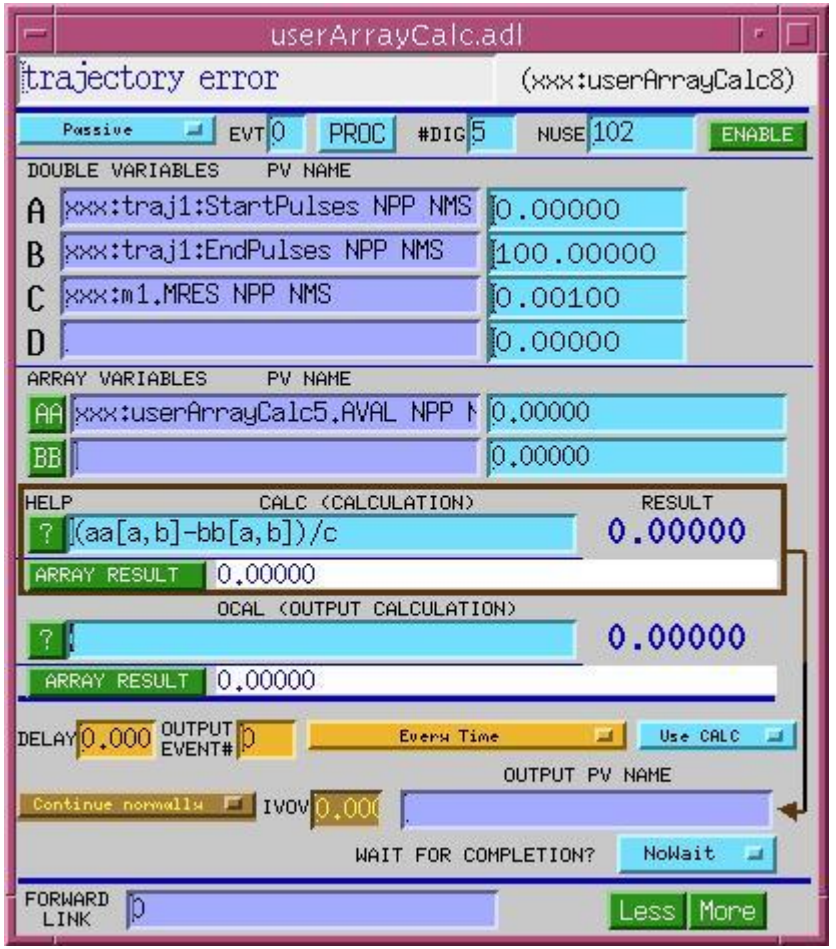
Array-calc (acalcout) record

- **Calcout record plus:**
- **Array fields AA…LL**
- **Array result AVAL**
- **Additional output option “Never”**
- **Can wait for completion**
- **Array expressions:**

  Assume aa=(1,2,3,4,5)

  - aa[2,4] -> (2,3,4)
  - ix -> (0,1,2,3,…)
  - sin(ix*d2r) ->

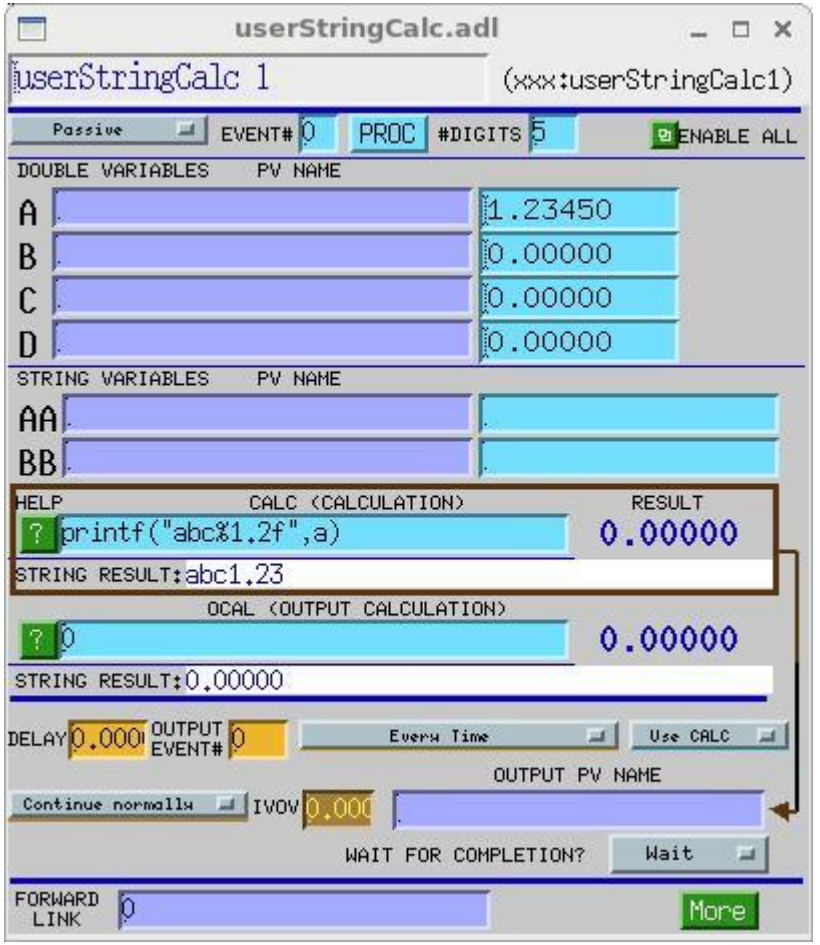




String-calc (scalcout) record

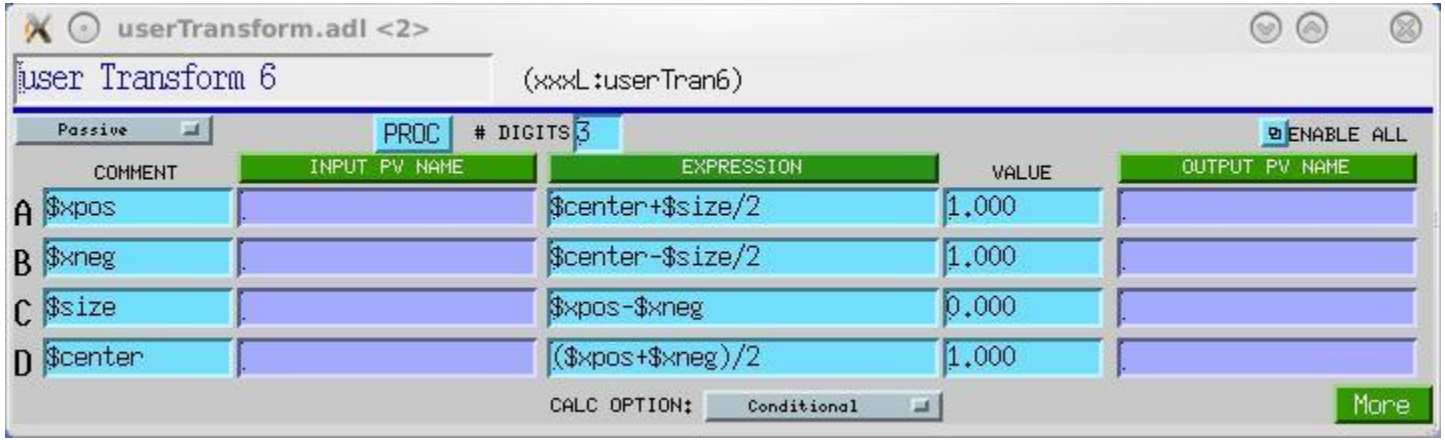
- Calcout record plus:
- String fields AA…LL
- String result SVAL
- Additional output option “Never”
- Can wait for completion
- String expressions:

Expression	Result
printf("abc%1.2f", a)	“abc1.23”
"abcdef"[2,4]	“cde”
“m1.VAL”{“.VAL”,”.EGU”}	“m1.EGU”



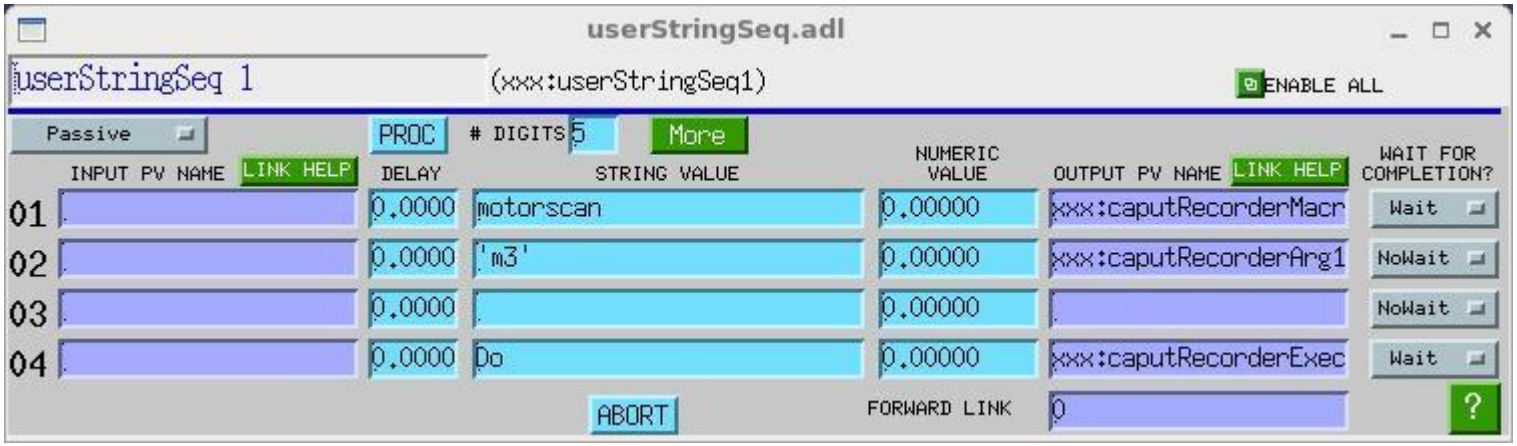
Transform record

- **Like 16 calcout records, sharing a pool of input variables**
- **Original use was for coordinate transformations**
- **Conditional expression evaluation:**
  - If field A was written to, don't execute expression CLCA
  - Each expression uses results of previous expression
- **Example: equations for slit**



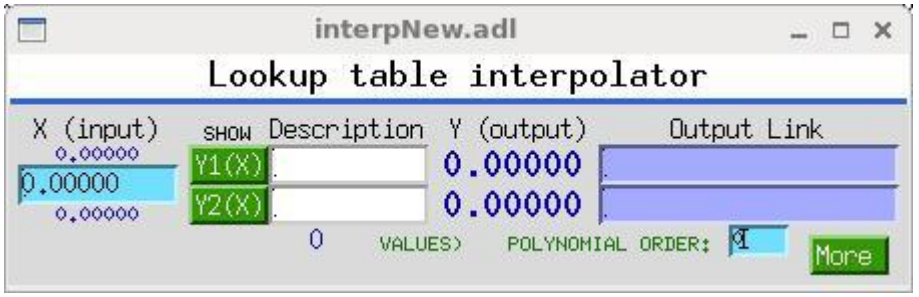
Sseq (String-Sequence) record

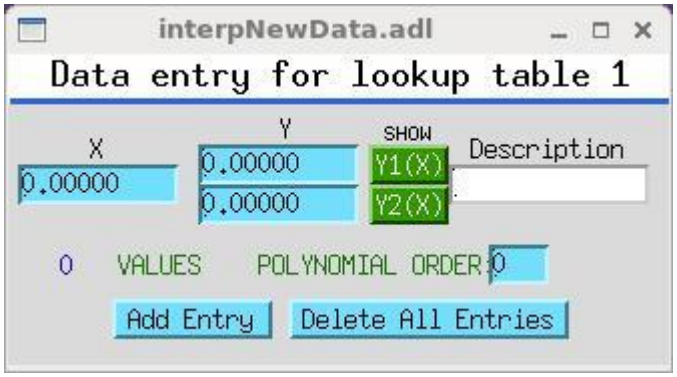
- Like seq record, but can read/write strings or numbers
- Can wait for completion (MUST use CA link)
- Example: driving caputRecorder playback from EPICS:

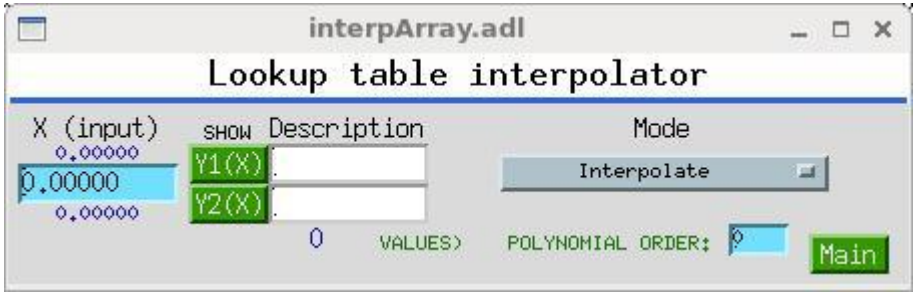


Interp database

- Lagrange nth-order interpolation
- One input, two outputs
- Can load interpolation table, or build it point by point
- Array mode: accept input array, output interpolated array







userAve data averaging

- **Continuous or one-shot**
- **“Acquire” calls back when specified average has completed**
- **Algorithms:**
  - AVERAGE
    - *Straight average*
  - FIT-LINE
    - *Fit to a line, return estimate of current value from line fit*
  - AUTO
    - *Vary smoothly between AVERAGE and FIT-LINE, using correlation coefficient*