synApps Update

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EPICS Collaboration Meeting
Tokai, Japan
12/8/04

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A U.S. Department of Energy
Office of Science Laboratory
Operated by The University of Chicago
synApps

- synApps is a distribution of EPICS modules
- synApps is designed to provide a compatible collection of software that can be used to run 80% of a beamline
- synApps provides generic tools that have proven themselves useful in the development of custom support
- synApps consists of software from many people and institutions
What’s in synApps

- Custom EPICS records
- Custom EPICS device-support modules
- Other custom infrastructure (e.g., autosave, recDynLink, saveData)
- Custom EPICS databases, MEDM displays
- Matched to a version of EPICS base
- 540 files
- ~200k lines of source code
Basic record/device support

- Motor
- Scaler
- Multichannel analyzer
- Multichannel scaler
- Serial (RS-232)
- GPIB
- ADC’s
- DAC’s

- Encoders
- Optical table
- String calc, sequence
- Complex expressions
- Enhanced PID
- Scan
- Scan parameter
- Generic VME
Layered devices, techniques

- Optical tables
- Slits
- Mirrors
- Monochromators
- Piezo controller
- Digital Multimeter
- Current preamplifier
- Interpolation
- N-step measurement
- Serial I/O block
- GPIB I/O block
- Autocollimator
- Temperature controller
- X-ray microscope
- Insertion device
- Filter/shutter

• Databases, SNL programs, …
Other support

- Autosave (save parameters through reboot)
- saveData (store scan data to disk)
- Clients to display scan/MCA data
- Programs to handle MDA, NeXus data files
- recDynLink (adds notify-when-done link)
  - used by sscan, swait records
What’s not in synApps

- To build you will also need*…
  - EPICS base R3.14.6 Base, of course
  - allenBradley2-1 If you intend to connect with Allen Bradley PLC's
  - ipac2-7a Required for IndustryPack support
  - Asyn4-0 Required by mca, dac128V, ip, ip330, motor, quadEM
  - seq2-0-8 For SNL programs in synApps
  - vxStats1-7-2a vxWorks statistics
  - genSub1-6 The genSub record

* Required for synApps 5.1
What’s new

- Latest versions (5.x) work with base 3.14.x
- Increased modularisation
  - Previously 10 modules
  - Now 18 modules
- New web page
- Released under the EPICS open license
- MPF replaced with asyn
And...

- Documentation
  - Some now exists!!!
  - Every module has documentation
- MEDM screens
  - Improved
  - Extensive help screens now available
## Modules

<table>
<thead>
<tr>
<th>Module</th>
<th>Description</th>
<th>Contact</th>
</tr>
</thead>
<tbody>
<tr>
<td>autosave</td>
<td>Support for saving PV values through an ioc reboot</td>
<td>Tim Mooney</td>
</tr>
<tr>
<td>calc</td>
<td>Device for run-time expression evaluation, and other calculations</td>
<td>Tim Mooney</td>
</tr>
<tr>
<td>camac</td>
<td>camac driver, device support, DXP software</td>
<td>Mark Rivers</td>
</tr>
<tr>
<td>ccd</td>
<td>CCD control</td>
<td>Mark Rivers</td>
</tr>
<tr>
<td>dac128V</td>
<td>Industry Pack digital to analog converter</td>
<td>Mark Rivers</td>
</tr>
<tr>
<td>dxp</td>
<td>DXP digital-signal processing spectroscopy systems</td>
<td>Mark Rivers</td>
</tr>
<tr>
<td>ip</td>
<td>Device support and databases for some serial Industry Pack devices</td>
<td>Tim Mooney</td>
</tr>
<tr>
<td>ip330</td>
<td>Industry Pack analog to digital converter</td>
<td>Mark Rivers</td>
</tr>
<tr>
<td>ipUnidig</td>
<td>Industry Pack digital I/O</td>
<td>Mark Rivers</td>
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<tr>
<td>love</td>
<td>Love serial digital controllers</td>
<td>Tim Mooney</td>
</tr>
<tr>
<td>mca</td>
<td>Multi-channel analyzer support</td>
<td>Mark Rivers</td>
</tr>
<tr>
<td>motor</td>
<td>Motor support</td>
<td>Ron Sluiter</td>
</tr>
<tr>
<td>optics</td>
<td>Support for x-ray optics</td>
<td>Tim Mooney</td>
</tr>
<tr>
<td>quadEM</td>
<td>APS Quad electrometer support</td>
<td>Mark Rivers</td>
</tr>
<tr>
<td>sscan</td>
<td>Support for moving positioners, triggering detectors, acquiring and storing data</td>
<td>Tim Mooney</td>
</tr>
<tr>
<td>std</td>
<td>Miscellaneous support</td>
<td>Tim Mooney</td>
</tr>
<tr>
<td>vme</td>
<td>Device support and databases for some VME devices</td>
<td>Tim Mooney</td>
</tr>
<tr>
<td>xxx</td>
<td>Sample user application, which builds, loads, and runs software from all the other modules listed here.</td>
<td>Tim Mooney</td>
</tr>
</tbody>
</table>
Array Support

- Base 3.14 allows larger array sizes via CA
- MCA arrays
  - Were limited to <= 4000 points
  - Now unlimited
- Scan data arrays
  - Were limited to <= 2000 points
  - Now unlimited (65k points tested)
Scan Support

- **Scan double buffering now works**
  - New scan can start before previous scan has completed uploading
- **Any detector can now be an array detector**
  - Scaler and array detectors can be mixed
- **Array triggering**
Auto Save

- Much more robust
  - Previously it trusted NFS files server
  - Now it assumes server can misbehave
- Can now save arrays
  - Changing array sizes is ok
- Sequenced save
  - A series of backup save files
- Autosave status PVs are available
Strings and Things

• **StringCalc can have device support**
  - Output device type and address changeable at run time

• **Optical table**
  - Previously one point of rotation
  - User can now select between several

• **Serial O/I replaced by Device Command/Reply**
  - Allows build – send – receive – parse sequences

• **Interpolation support**
  - Routines for gensub record
  - Linear and polynomial interpolation
  - 3k point limitation removed
  - Now uses un-copyrighted code
**More Motors**

- Support for many motor drivers added
  - PMAC
  - Piezo
  - Soft motor
  - e.t.c.
ccd module

• Support for area detectors (CCD’s and image plates)
• Supported devices
  - MAR 165 CCD
  - MAR 345 image-plate reader
  - Roper (all WinView-supported CCD’s, including former Princeton and most former Photometrics devices)
  - Bruker SMART CCD
• Can control, at minimum
  - exposure time
  - file name
  - data-acquisition start
  - wait for acquisition to complete
  - much more for most devices
dxp module

- record, device support, databases, and MEDM displays for XIA DXP and Saturn spectroscopy systems
- dxp record for setting DXP parameters
- device support for the mca record
ip330 module

- device support, databases, and MEDM displays for the IP330 ADC IndustryPack module

- 16/32 channel, 16-bit ADC
  - ip330Scan for periodic, averaged reads of ADC channels
  - ip330Sweep, with the MCA record, for using ip330 as a waveform-digitizer
  - ip330PID for using the ip330 in a fast-feedback loop
Clients, Libraries and Visualization Tools

- **IDL:**
  - scanSee
  - dataCatcher
  - mca display
  - ezcaIDL
  - ezcaScan
  - HDF translator/browser
  - Ascii-format plotter
  - ez_fit
  - etc.

- Some python support

- Most IDL tools now available for the IDL Virtual Machine – No license fee to run IDL tools
Summary

• Taking advantage of changes in base to give better array support
• Taking advantage of asyn to simplify device support and st.cmd files
• Improving documentation
• Improving ease of build and os independence
• Improving distribution
• Improving maintainability
• Released under EPICS open license
• Web page  