

## BCDA Activities – April 04

### *Highlights*

Posted SPEC support and EPICS application positions

Interviewed candidates for SPEC support position

Announced the HDFB (HDF file browser) to beamline control and nexus community

### *Specific beamline/XOR support*

#### XOR - 1ID

- Designed, tested, fabricated and implemented on the beamline several channels of buffering so that a motor's step signal could drive multiple (50-ohm terminated) inputs of the Joerger scaler.
- Updated snl code & database for the Federal linear guage readout, maximizing the read rate from the device.
- Wrote and tested motor record device support for the Sigma-Koki linear actuator.

#### XOR - 2

- Consulted with Stefan Vogt on scan-overhead issues for the existing 2xfm x-ray microscope, and for the planned nanoprobe. Gave Stefan some run-time calculations that measure various scan-overhead times.
- Help Yanan Xiao from user2idd to debug a corrupted image file and reconstruct the image file for them by using the toimage program.

#### XOR - 4ID

- Rewrote database for PI E662 piezo controller. Installed and tested in ioc4idb.
- Continued testing and debugging Superconducting magnet controls.
- Started converting ioc4idc1 to synApps\_4\_6.

#### IMMY CAT - Sector 8

- I Station

The following devices have been integrated into ioc8idi1.

32 Stepper motors

Optical Table (X,Y,Z)

XIA Slits (RS232)

4 x Stanford Research Systems SR570 Current Preamplifier (RS232)

Lakeshore 331 Temperature Controller (RS232)

Remaining devices...

XIA Filter (Digital I/O)

MM3000 motor controller

MDrive17 motor controller

Full beamline level MEDM screen has be completed.

### GSCECARS – Sector 13

- Resolved the problem that M. Rivers was having when two SBS IP-Carrier (VIP616) boards were installed in the same ioc. The second carrier board was not jumpered to the correct A32 address. The IPAC driver did not report a problem during initialization of the carrier or the IP-Octal card. A. Johnson will add a check for the wrong A32 address in the next release of IPAC.

### PNC CAT – Sector 20

- Consulted with Dale Brewe (PNC-CAT) on array-mode scans. He's considering various mechanisms for decreasing overhead of scans involving the XIA DXP multi-element data-acquisition system used as a multichannel scaler. (Normally the DXP functions as a multi-element multichannel analyzer, but the software can be configured to implement an array of single-channel analyzers for each detector element. In this case, it can appear to the sscan record as a number of multichannel scalars.) If the sscan record's array-mode implementation were recast as a run-time decision to acquire array-valued PV's at the end of a scan loop, array and scalar PV's could be mixed in the same sscan record, and PNC might recapture a significant amount of scan overhead.

I haven't evaluated all of the implications of this change, or the effort that would be required, but this seems like a good idea, and not too expensive to implement. However, because currently there is only one customer, because it's not clear whether the capability would actually be used, and because it's not clear whether others folks could benefit, development is pending a stronger request.

### Nano CAT - Sector 26

- Researched new controls and data acquisition options
- Participated in planning meetings to lay our strategy for controls for the NanoProbe.
- EPICS integration of NanoProbe prototype

### UNI CAT – Sector 33

- Diagnosed UNI-CAT problems implementing save\_restore v3.3. save\_restore complained that it couldn't find status PV's for a custom save set added by UNI-CAT, because the supplied database, save\_restoreStatus.db, only has PV's for the standard sets auto\_positions and auto\_settings. The next version of save\_restore will support custom save sets names without requiring additions to the database.

### XOR

- Assisted users from X-ray Labs with data visualization.

## **General support**

### Image Server work

- Fixed an annoying bug that would occasionally hang the CCD Image Server when Sector 8 used their Spec acquisition script.
- Modified the code to allow multiple images per file when saving binary files.
- Modified the file save dialog to allow for more and clearer options depending on the file format being saved.
- Created an ROI to allow for IMM's data compression algorithm. The ROI is capable of calculating a per pixel RMS map of the dark current which is then used to discriminate between noise and photon events. This required a number of changes to allow for the floating point format required to hold the RMS value. Also cleaned up the whole ROI hierarchy while I was at it.

### ebrick work

- Got a linux machine set up and working
- Built 3.14.5 and some of the EPICS extensions on Linux
- Built the base ebrick code against base 3.14.5 and booted an ebrick from that build.
- Built the calcApp and sscanApp and motorApp (soft support only) and tested them on standard linux and on the ebrick.
- Modified linuxrc to allow for loading of multiple IOCs on a single ebrick
- Installed GRUB on FLASH disk and booted from FLASH disk
- Started work on building, configuring and installing SSH on ebrick

Interviewed Candidates for Detector Pool position.

BCDA is now recommending the SBS IP-Carrier (VIP626-ET) for new purchases. B. Laird found that the VIP616 was not handling the VME Interrupt Cycle correctly with the IOC processor was PPC based. There is not visible symptom of the problem but delays in interrupt handling happen sporadically. SBS has developed a fix for the existing VIP616's in the field. Details are being worked out.

### Hardware Database Interface

Continue refinement of the Beamline interface to the hardware database.

- Added a filter to the Form Factor list that only displays items of interest to beamlines.
- Added a AND function to the string search field (NAME/DESC.).
- Created a HELP screen for the Search Form.
- Created feature sheets for beamline hardware documentation database.

### Beamline Knowledge Base

- Using the Hardware Database application as a template related a searchable database to hold general knowledge and debugging information acquired by BCDA group members (and M. Rivers). The plan is to make the database search function open to APS Users. This database has a web-based data entry and edit

screen.

Arranged for repair of existing Apple G4 laptop that had been mothballed. IS will configure it for wireless networking in building 401, and the XOR beamlines. This laptop will be used to debug IOC's on the experimental floor.

Reviewed Joerger's plans for a new series of VME boards (mother/daughter system with some similarities to existing IndustryPack standard). Commented and suggested they talk with Mark Rivers and Andrew Johnson.

Finished EPICS 3.13-compatible version of array save\_restore (v3.5), and delivered to ASD controls for deployment on accelerator ioc's. Decided to delay general distribution until ASD has acquired some operational experience with it.

Consulted with Peter Siddons (NSLS) on his development of EPICS support for his intelligent 384-element x-ray detector. The device has 384 sets of three single-channel analyzers, and looks to EPICS sort of like a massive scaler array, so he's basing his code on the scaler and MCA records. The device also requires arrays of setup information (e.g., upper- and lower-level discriminator settings) that would be difficult to maintain without array save\_restore (v4.x).

Ported array save\_restore to EPICS 3.14 (v4.0), but haven't finished testing.

Forwarded NOBUGS 2004 announcement and call for papers to various APS email lists.

Worked on EPICS-training session 'Applications/Special Topics'

Met with Isand held discussions to determine the ways in which gateway servers can be used as a software-distribution mechanism, and alert local system administrators to the implications, for each type of use, of a system failure.

Modified the sscan record and saveData to take advantage of the sscan record's double-buffered arrays, and write data from one scan-loop iteration while the next iteration is running. Because saveData is a channel-access client, the sscan record's lockset must be unlocked while waiting for a handshake from saveData, so that saveData can read the data. In the quick-and-dirty prototype implementation, the sscan record just calls dbScanUnlock() and waits for saveData.

Modified saveData to allocate storage space only for detectors actually in use. The prototype implementation, for the EPICS 3.13 version of saveData, seems to work well, and saves a few MB of ioc memory. I haven't tried hard to make it fail yet.

Installed SynApps\_4\_6 on beams. Built and booted crate from there and from the gateway.

Arranged paperwork for eight UK visitors from DIAMOND to visit APS. They will meet with BCDA and ASD controls staff

Completed web development training. Received certification.

#### TRUECOLOR DEVICE

- Modified catcher and scanSee to support both PseudoColor/TrueColor devices.

#### CAWINGZ

- Modified caWingz to build with EPICS R3.14.5 and Wingz3 release
- Modified caWingz worksheet and performed system test against new EPICS build
- Sent instructions on modification requirements for new caWingz to J. Stevens

#### IDL ITOOL

- Added IDL 6.0 itool features to scanSee, PLOT1D, PLOT2D programs, currently the interactive IDL 6.0 ITOOLS are only available for licensed developer version

#### HDFB

- updated and prepared hdfb release package, wrote hdfb user's guide, prepared test data, performed system test

#### LINUX

- successfully built EPICS R3.13.10 and R3.14.5 on a Linux machine, modified IDL UNIX scripts such that they automatically run for both Solaris/Linux.
- Downloaded EPICS R3.13.10 base, extensions configuration files and Catcher2\_2c9.Tar.gz on the Linux machine prism2bm, successfully built base and extensions on Linux.
- Modified the UNIX scripts for the IDL tools such that they will also run on the Linux machine smoothly.
- Downloaded EPICS R3.14.5 base and Catcher3\_1.Tar.gz on the Linux machine prism2bm, I have successfully built the base and extensions on linux-x86.

Updated user's guide for hdfb, prepared hdfb.sav file for IDLVM 6.0, prepared hdf.zip a collection of hdfb test examples

Prepared invited presentation on "Beamline Automation at the APS" for the BioXHIT workshop at the ESRF.