EPICS User Meeting - Melbourne 2015

Sunday 18 October 2015 - Sunday 18 October 2015

Book of Abstracts

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Accelerator Daily Log Management Subsystems

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At Los Alamos Neutron Science Center (LANSCE), all parameter logs are manually printed and archived by operators. As a result, searching parameter logs to find useful in- formation is difficult and time consuming. To deal with this problem, we introduce a new Integrated Relational Model of Installed Systems (IRMIS), a collaborative effort between several EPICS sites, with an ongoing subsystems to store the parameter logs and data. We start with a real EPICS/IRMIS at LANSCE and present a web application based on IR- MIS of Advanced Photon Source (APS) of Argonne National Laboratory. Particularly, we describe the whole system including the APS crawler, IRMIS modules, the front-end and back-end of applications, full-text search and mobile-friendly pages. We then present the ongoing daily log management subsystems which are built on it. We discuss the database schema for the daily logs and logs' meta-data, and how we populate them into database. We use and change the existing applications and display screens so that we can avoid impacting the current daily logs and save the development efforts. Finally, we conclude with the future work.

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An EPICS Solution for Galil Products that can Provide a Comprehensive, and High Performance Motor and PLC Control System for Use at Synchrotrons

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A new Asyn based model 3 EPICS driver for Galil products has been written. The software connects EPICS to all products in the Galil range, resulting in an easy way to implement beamline and other synchrotron control equipment. High bandwidth updates using UDP is supported enabling high performance analog and digital IO. Standard motor record point to point motion is supported as well as a litany of new features such as auto power on/off, wrong limit protection and more. For high end motor controls, coordinated velocity trajectory motion for up to 8 motors is available whilst output compare can be used to gate external detectors based on motor position. Up to 8 pseudo or virtual motors are also supported. Devices requiring multi-mode coordinated motion are easily implemented using the provided run-time changeable kinematics. The driver is simple and intuitive, whilst being flexible, and providing high performance. This EPICS driver for Galil products is the easy way to meet your demanding requirements.

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CS-Studio Display Builder Upgrade

Kay Kasemir[1]

[1] *SNS*

CS-Studio's 'BOY' may well be the most prominent component of the toolset. It's used in production at many sites, its feature set is quite complete. Still, there is always room for improvement. The display builder project aims for the design and development of an upgrade that is highly compatible, specifically reads existing *.opi files, but with more modular code that removes our dependence on

GEF, SWT, and the UI thread. Initial demonstrations show performance gains of JavaFX over SWT especially Linux, plus a general move of the data pipeline to background threads instead of blocking the user interface thread

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CSS collaboration status

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TBD

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Closing remarks

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EPICS Archiver Appliance in connection with a StrongBox storage gateway

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We run the Epics Archiver Appliance (http://epicsarchiverap.sourceforge.net) at the Fritz-Haber-Institut. The appliance runs right now as a cluster on two server systems.

The servers are connected to different networks to collect all EPICS-PV-data from different experiments distributed in the whole institute.

As long time storage (LTS) a storage gateway (StrongBox) is used to enable storage cost optimization. StrongBox is using tapes (LTO 5 & 6) as archive/long-term storage media. The self-describing LTFS is used. So no properitary software is necessary to access the data on the tapes.

I will introduce the assembly and will give some performance data.

I want to discuss some open issues regarding the retrival and management of the archiver appliance.

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EPICS Development for the ASKAP Design Enhancements Program

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The development of the 2nd generation ASKAP hardware and software introduced several enhancements to the EPICS 3.14 based Telescope Monitoring and Control System. We review the use of database & code generation tools, composite IOCs for creating a control and monitoring point hierarchy and the use of summary records for aggregating health information.

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EPICS Status and Roadmap (video)

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EPICS v3 and v4 status and roadmap

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EPICS V4 evaluation for SNS Neutron Data

Kay Kasemir[1]

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Version 4 of the Experimental Physics and Industrial Control System (EPICS) toolkit allows defining application-specific structured data types (pvData) and offers a network protocol for their efficient exchange (pvAccess). We evaluated V4 for the transport of neutron events from the detectors of the Spallation Neutron Source (SNS) to data acquisition and experiment monitoring systems. This includes the comparison of possible data structures, performance tests, and experience using V4 in production on a beam line.

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EPICS, Linux & NUMA I/O: an example

Euan Troup[1]

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An EPICS soft IOC that running under Linux and doing significant I/O can need system and application tuning for NUMA (Non-Uniform Memory Access) to use the hardware efficiently. I present an example of an IOC that uses 2x10Gb Ethernet for I/O and has been tuned for a current generation Dell server using Intel CPUs. The parameters for tuning the I/O are device interrupt CPU affinity and application CPU affinity. These settings may be generalised to other devices and EPICS applications.

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Interfacing EPICS to the widespread platform management interface IPMI (video)

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The Intelligent Platform Management Interface (IPMI) is a standardized interface to management functionalities of computer systems. The data provided typically includes the readings of monitoring sensors, such as fan speeds, temperatures, power consumption, etc. It is provided not only by servers, but also by uTCA crates that are often used to host an experiment's control and readout system. Therefore, it is well suited to monitor the health of the hardware deployed in HEP experiments. In addition, the crates can be controlled via IPMI with functions such as triggering a reset, or configuring IP parameters. We present the design and functionality of an EPICS module to interface to IPMI that is based on ipmitool. It supports automatic scanning for IPMI sensors and filling the PV metadata (units, meaning of status words in mbbi records) from the IPMI sensor information. Most importantly, the IPMI-provided alarm thresholds are automatically placed in the PV for easy implementation of an alarm system to monitor IPMI hardware.

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Matlab Channel Access

Simon Gregor Ebner[1]

[1] *Paul Scherrer Institute*

For many user as well as beamline and machine scientists Matlab is the tool of choice for data analysis and modelling. To facilitate the interaction of their code with the Epics control system the Controls group of PSI provides and supports a new Matlab Channel Access library. The library has no other dependencies than Matlab itself and can be used on all major operating systems. The usage of the library is as easy as downloading it and to dynamically load it from a Matlab application.

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Modern Java Channel Access - CA

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To simplify and speed up the development of Java Channel Access clients PSI Controls and Cosylab developed a modern pure Java Channel Access library called CA. The library overcomes several shortcomings of the current Java libraries based on out-dated JCA interfaces. It makes fully use of the Java type system, and easily supports synchronous and asynchronous operations for get, put and connect operations. It offers efficient and simple handling of parallel operations without the need to use threads by using modern concepts introduced in Java 8.
This short talk will give you a quick start on how to use this library, present the underlying concepts, and show what can be done with it.

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PVAPY: Python API for EPICS PV ACCESS

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As the number of sites deploying and adopting EPICS Version 4 grows, so does the need to support PV Access from multiple languages. Especially important are the widely used scripting languages that tend to reduce both software development time and the learning curve for new users. In this paper we describe PvaPy, a Python API for the EPICS PV Access protocol and its accompanying structured data API. Rather than implementing the protocol itself in Python, PvaPy wraps the existing EPICS Version 4 C++ libraries using the Boost.Python framework. This approach allows us to benefit from the existing code base and functionality, and to significantly reduce the Python API development effort. PvaPy objects are based on Python dictionaries and provide users with the ability to access even the most complex of PV Data structures in a relatively straightforward way. Its interfaces are easy to use, and include support for advanced EPICS Version 4 features such as implementation of client and server Remote Procedure Calls (RPC).

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Py4Syn - a Python library for beamline control under EPICS

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Py4Syn is an open-source Python-based library for data acquisition, device manipulation, scan routines and other helper functions, created by LNLS staff. It offers high customization level for scans and data output, covering distinct techniques and facilities.

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Support of user focused graphical applications through the epicsQt framework

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With ongoing development of epicsQt, user focused EPICS graphical applications keep getting easier to develop. If you are simply dragging and dropping from the widget set provided with epicsQt, using other widget sets such as caQtDM, building your own widget plugins, or coding entire applications, epicsQt supports the creation of applications that focus on the user. The tools within the epicsQt framework that help develop you a rich application, rather than just present a set of synoptic displays, are presented.

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Using Linux containers for EPICS gateways

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Experimental Physics and Industrial Control System (EPICS) gateways allow the (read-only) access of almost all of the process variables (PVs) available at the Australian Synchrotron from almost any network. An EPICS gateway is both a Channel Access server and a Channel Access client. Users connect to the server side, and the client side connects to Input Output Controllers (IOCs) as well as other gateways. There are three main reasons to use EPICS gateways in an EPICS based controls system: improved performance by having only the gateways connect to PVs, additional access security beyond that of the Channel Access server, and the ability to bridge different subnets (e.g. access accelerator PVs at the beamlines).

In this talk we will review the previous EPICS gateway configuration at the Australian Synchrotron and will explain in detail the new architecture which makes use of dynamically configured Linux containers running on CentOS 7. Finally we will discuss the experiences gained during the system's past 5 months in production.

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Welcome

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aLIGO Guardian: an EPICS-based state machine automation platform

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The Advanced LIGO project has developed a new automation platform to handle the complicated automation needs of their newly upgraded detectors. Written entirely in Python and using EPICS for all communications, the platform, called Guardian, consists of a hierarchy of distributed state-machine automaton processes. Each automaton controls a particular sub-domain of the instrument, with the full hierarchy control the entire detector.

This talk will discuss the concept and implementation of this novel platform, how automation logic is programmed into the system, and how the aLIGO project has deployed it for use in commissioning and automating complex, large-scale interferometric gravitational wave detectors.