CSS - WE DIDN'T INVENT IT, WE MADE IT BETTER

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Abstract

The Spallation Neutron Source (SNS) Project is continuing on its path towards high reliability. To help ensure that this happens, the SNS Controls Group has developed many new applications for use with Control System Studio (CSS). These applications are different in functionality and somewhat in implementation. The ELog integration, PACE, Alarm System GUI, and Data Browser updates are some of the applications that are generic in nature and designed to be implemented regardless of the institution. The Process Variable (PV) Utility, Fields Viewer, and Rack Viewer were designed specifically for use at SNS but allow for additions and use elsewhere. The use of CSS provides a common interface to the users. CSS also provides developers with the ability to build their applications and use the various CSS-data types. End users benefit because the use of the CSS-data types provides a connection between the different applications at run-time. This paper describes the recent applications that have been developed at SNS for use within CSS.

CSS SUMMARY

CSS[1] is based on the Eclipse Rich Client Platform and is the result of a continuing collaborative effort. CSS is an environment that allows the implementation of applications for use with control systems. Because these applications are implemented in one environment, they present a common look and feel to the user. CSS is designed to give facilities the ability to customize the functionality contained within the environment by choosing the various applications or plug-ins that are included. CSS is developed using the Eclipse development environment and is written in Java.

All CSS applications have been designed as extensions that can be used with other CSS plug-ins. CSS uses the PV as an object. This object contribution enables the utilities to appear in context menus when the PV object is selected. And the context menu of any PV in any CSS tool lists all other PV-aware tools.

GENERIC APPLICATIONS

At SNS, we try to develop applications in a manner that makes them generic in nature and available for use by other institutions.

Alarm System GUI

The Alarm System GUI is an important part of the Best Ever Alarm System Toolkit (BEAST[2]), which displays alarms in tree and table view, and provides users the functions to acknowledge or un-acknowledge alarms, access guidance information, open related operator displays or modify the alarm configuration online. The alarms displayed in the GUI are read from the Alarm Server via JMS. The alarm configuration which includes the alarm PVs and related guidance and display links are stored in a relational database.

The Alarm Tree displays the alarm states of all the configured components in a tree-like structure. A dynamically colored icon reflects the alarm state of each tree item. The alarm table provides a tabular view of currently active alarms, separated into sections for current alarms (unacknowledged alarms) and acknowledged alarms.

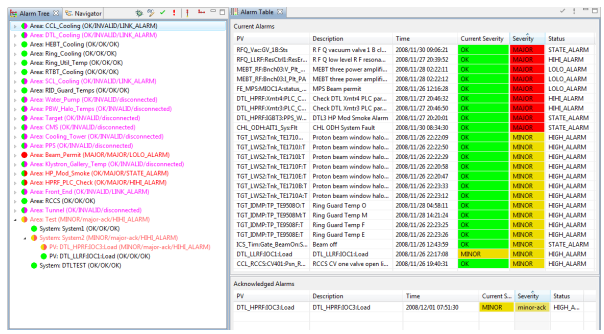

Figure 1: Alarm System GUI.

PACE

This tool is used to adjust critical process variables of the SNS accelerator. Driven by XML configuration files, PACE presents a tabular view of process variables, for example power limit settings for all accelerator cavities. Users can adjust values in the table, either by editing individual cells or by conveniently setting multiple cells to the same value. The tool highlights modified values, and allows users to revert to the original settings. After reviewing the intended changes, users commit the new values by entering a user name, password and comment. PACE then performs the changes and logs the modifications.

Data Browser

The Data Browser is a strip-chart type plotting tool for 'live' as well as historic data. It allows interactive zoom and pan as well as the addition of annotations.

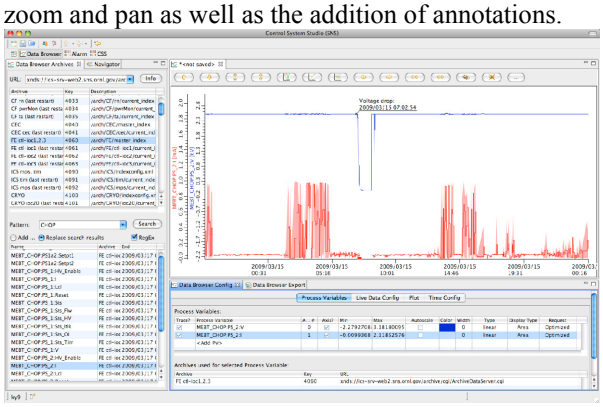

Figure 2: Data Browser.

Elog Integration

We developed a generic CSS library for submitting electronic logbook entries consisting of text and images. A pluggable interface provides the site-specific implementation, for example for the Oracle-based SNS ELog [3]. From alarm tools, operators use it to send commented detail on selected alarms to the logbook. PACE logs its actions; the Data Browser can create screenshots with custom comments provided by the user.

PV and Archive Data Access

All CSS tools developed at the SNS support the EPICS network protocol and the Channel Archiver for historic data [4], but they are not limited to them. Instead, they utilize libraries for 'PV' and 'Archive' access, supporting multiple pluggable implementations and thereby allowing concurrent access to various control systems. This can be especially useful for sites which are transitioning between different control systems and at least temporarily need to access both systems from the same user interface.

SNS SPECIFIC PLUG-INS

Currently, some plug-ins are considered specific to SNS because of their reliance on the SNS relational database. They were, however, developed to be independent from their data source. Interfaces to site-specific plug-ins supply the data, so non-SNS sites can implement plug-ins that supply data acquired from the source that is best for them.

PV Utility

The SNS relational database (RDB) is set up to track the relationship between deployed equipment and the signals that are associated with them. The PV utility is designed to show that relationship to the user.

It has been designed to give users multiple avenues to access this information. Filtering can be performed to find a specific device and then see what signals are produced by that device.

The utility can also take a signal and determine what device is controlling it. This is useful when this information is not intuitive and only can be found using a tracking system like RDB.

Figure 3 shows the utility along with some user input. The user has requested a list of devices that contain ':IOC'. They have selected 'CCL_LLRF:IOC1' and asked to see the process variables associated with this IOC that contain 'Beam'. The percent character is included as wild cards specifically needed for a search of the SNS RDB. The use of percent characters in the process variable text box and not for the List Filter is done as functionality specific to SNS.

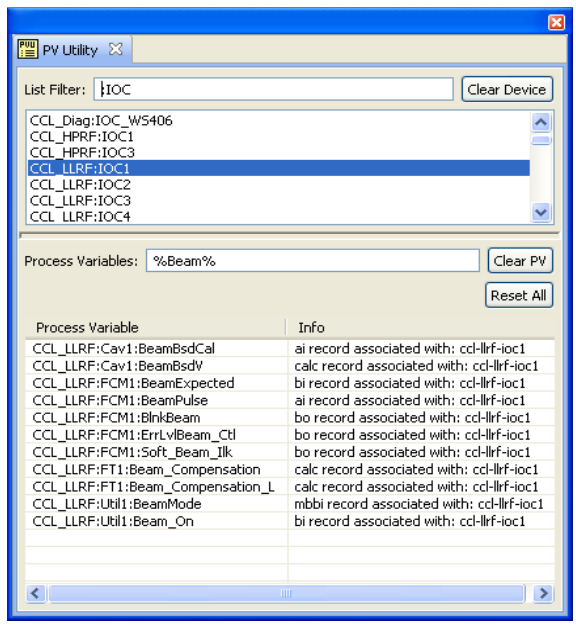

Figure 3: PV Utility.

PV Fields Viewer

The PV Fields Viewer allows users to look at the EPICS fields for a specific PV. The utility displays both the data as loaded from the EPICS database file and the current live value. The utility also includes the ability to filter the results so that comparisons can be made of field values for multiple PVs.

Figure 4 shows the two basic uses. The viewer on top is displaying all field data associated with PV 'FE_Ctl:Util3:RawTSError'. The live DESC value is different from the value originally implemented via the EPICS database file. The live value is highlighted to indicate the difference. The lower viewer has displayed the VAL field values for a filtered list of PVs. This functionality allows users to compare specifics of many different PVs.

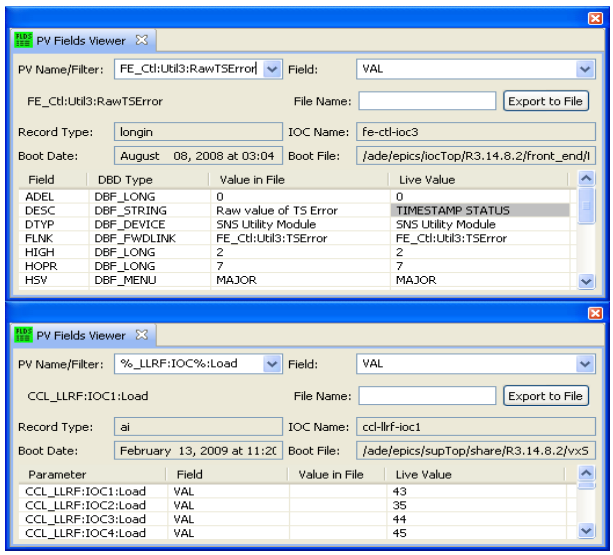

Figure 4: PV Fields Viewer.

Rack View Utility

The RDB is also set up to manage the equipment housed within the SNS rack enclosures. The Rack View utility is a plug-in that allows a user to find a rack and display its contents. The utility gives a standard table list of the contents and also displays a real-time image of the layout.

Users can look directly for a rack by scrolling through the complete list, or a filter is available to reduce the number of racks contained in the rack list. Also, with the relationships in the RDB between process variables and equipment, users can use a device name or a signal name to directly produce the rack profile. The utility also allows users to look at equipment stored in the rear of the rack.

In Figure 5, the user has supplied the signal "MEBT_Diag:BPM01:currentWF" to the utility. The utility has found the IOC that supplies that signal and produced the rack profile for the rack, "FE:Cab_FER11," which holds the IOC.

CONCLUSION AND FUTURE PLANS

The CSS environment provides a common interface and continues to be an ideal place for plug-ins that provides a variety of useful tools for the CSS users.

CSS currently has a good number of tools available and will only be made better with additional plug-in options. Because most of these plug-ins are designed to be non-site specific, other facilities can also use the tools. And SNS can take advantage of the tools developed by other facilities.

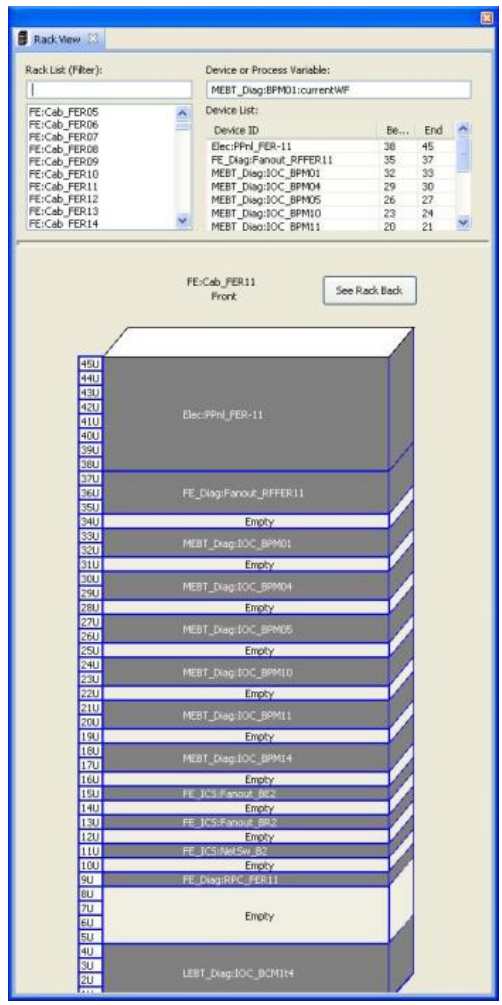

Figure 5: Rack View Utility.

The CSS toolset can be expanded to also include a higher, broader view. A future step at SNS will be to take advantage of the data related to the hardware. With this data, tools will be developed to relate a variety of information including device configuration, cabling, and positioning. The RDB can also allow CSS to link users to documentation associated with PVs and hardware

REFERENCES

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