

VISUAL DCT'S LATEST HITS

J. Bobnar*, M. Sekoranja, I. Verstovsek
Cosylab, Ljubljana, Slovenia

Abstract

Visual DCT (Visual Database Configuration Tool) became the most advanced and popular graphical EPICS database configuration tool for creating, editing and debugging EPICS databases. EPICS is a widely used control system based on a real-time database configured via text files. We will present new features that have been recently added to Visual DCT (support for Channel archiver and, Alarm handler), as well as some features, which have been proposed, but not yet implemented (Spreadsheet view and editor and Substitutions file editor). Visual DCT Channel archiver plug-in allows creating and editing archive files with a simple mouse click, while displaying the whole hierarchical structure of the file. Similar to archiver, the Alarm handler Visual DCT plug-in is designed to edit EPICS Alarm handler configuration files. Spreadsheet view could be useful for designing databases where a lot of data must be entered into the channel fields. An important addition is also the substitution file editor. Nowadays the substitution files can be very hard to maintain due to their lack of transparency as text files. This editor will introduce some nice features which will make editing the substitution files an easy rather than a painful job.

1 OVERVIEW

Visual Database Configuration Tool (Visual DCT) has been designed to create and maintain EPICS record instance (.db) database files. EPICS is a widely spread control system which can be nowadays used to control either a simple system with only a few devices as well as a system as complicated as an accelerator. Such distributed control systems typically comprise tens or even hundreds of computers, networked together to allow communication between them and to provide control and feedback of the various parts of the device from a central control room, or even remotely over the internet. In order to maintain such a complex system, powerful development software is required; VisualDCT's main objective is to offer intuitive development environment to the EPICS database engineer. With its sophisticated graphical design VisualDCT offers an instant intuitive view over the complex database structure and is a great step forward from text-based database editors.

In order for VisualDCT to execute properly a database definition (.dbd) file, which contains the specifications for various record and device types, has to be provided. Once a database definition (.dbd) file has been specified, tools provided by VisualDCT can be used to create and arrange record instance database files.

As the user interacts with various VisualDCT windows, selections, and data entry fields, these interactions are instantly presented on the screen. However, all the actions taken by the user are not instantly applied to a database file; the data is not written to a file until the current file is saved. This enables the user to inspect or revert to the original database if necessary.

As VisualDCT executes, it attempts to trap and display the most common situations that might diminish the integrity of the database.

Beside all the aforementioned features, VisualDCT already provides hierarchy support for configuration files, which will be considered at integration of hierarchy support into EPICS. The application also provides a flattening tool, which is capable of flattening hierarchically build database into a single level database, which is recognized by EPICS.

With all the numerous features that are "just one click away" time and effort can now be focused on the design of the databases instead on using the tools.

In order to run VisualDCT, Java Runtime Environment 2 is required. VisualDCT is completely Java based application and therefore, it is platform independent (no additional settings are needed to run the application on different systems). In addition to that, it is also web start supported, which

* jaka.bobnar@cosylab.com

means that the application can be deployed with a single click over the network. VisualDCT is distributed as a Java ARchive package (.jar file), so there is only one file in the distribution.

2 NEW FEATURES AND DEVELOPMENT

VisualDCT is becoming the most popular database configuration tool in the EPICS community. The ever increasing number of users has a positive effect on the VisualDCT itself as well. Extensive use contributes to the reliability of the tool as users provide bug information and new feature requests. During the last summer VisualDCT was significantly updated. Several new visual features have been introduced as well as additional tools for maintain of the EPICS-based control systems are also being developed. Among the latter there are two plug-ins (Alarm Handler and Channel Archiver plug-ins) which have already been presented. In addition to those, Spreadsheet view and editor and Substitutions file editor have also been proposed. They are currently in the planning phase and will probably be implemented in near future.

All additional tools for VisualDCT are designed as VisualDCT Plug-ins. This means, that there is no need to change or reinstall the core of the application; plug-in only needs to be added to the class path and then it can be launched from the VisualDCT's main window using the provided Plug-in Manager.

ALARM HANDLER CONFIGURATIONS PLUG-IN

Alarm Handler is an application used primarily by accelerator operators and physicists to display and monitor EPICS database alarm states. In other words, it is an interface between the operator and the database. In order to run EPICS Alarm Handler configuration files have to be provided. Configuration files are text based files that contain EPICS channels structured in a hierarchical manner. Alarm Handler files are not easy to maintain when the number of channels in the database is high. In addition, configuration may consists of one file holding all the channels the user wants to observe, or the user may specify a hierarchical structure consisting of many different files, thus achieving a very complicated structure, which is very difficult to maintain. Labs all across the world spend a lot of time and effort developing systems that generate these files for their particular case. A generic tool that would do this once and for all was a very appealing feature.

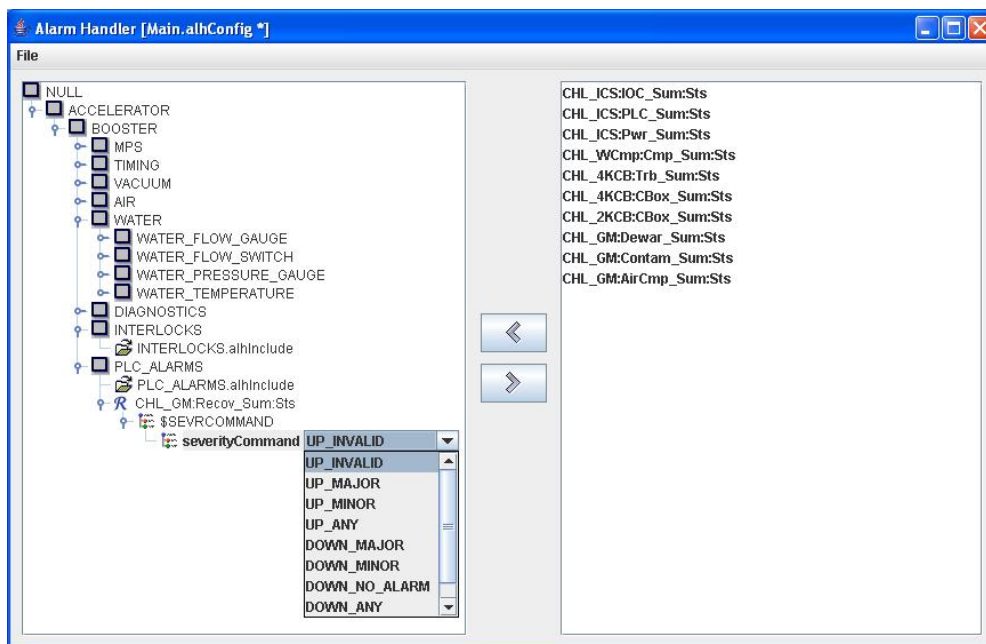


Figure 1: working environment of the Alarm Handler plug-in

Having in mind simple and easy procedure for generating configuration files and trying to import all the benefits of VisualDCT, the idea of Alarm handler configuration plug-in arose. This plug-in offers a straightforward approach for creating configuration files. The main screen of the plug-in is divided into two areas: right part of the window displays a list of all available records, which are obtained from the currently open template file in the VisualDCT, while left part displays a tree, representing the hierarchical structure of the configuration file. The configuration tree consists of different objects (Channels, Groups) and their properties (COMMAND, ALIAS...) that are defined by the EPICS Alarm Handler. The values of all properties can be set by editing the appropriate field in the tree. All the changes that are made to the currently open configuration file are saved to the file after the “save” command of the plug-in has been executed. At that point the plug-in also verifies the consistency of the configuration file with EPICS Alarm Handler demands and reports all errors in the structure. In addition to that, drag and drop support has been included in the plug-in; any tree field can be moved to another location by a simple drag and records can be dragged and dropped from the list to the tree and vice versa, which eliminates all the unnecessary typing in text editors.

CHANNEL ARCHIVER CONFIGURATION PLUG-IN

Channel Archiver is an archiving toolset for EPICS. It is used to archive values that are available via ChannelAccess, the EPICS network protocol. Similar to Alarm Handler, the Channel Archiver also needs configuration file to run properly. The configuration file, which defines the channels that have to be archived, is in XML format and is far less complicated than the configuration file(s) of the Alarm Handler, since there is no sub grouping and there is only one file.

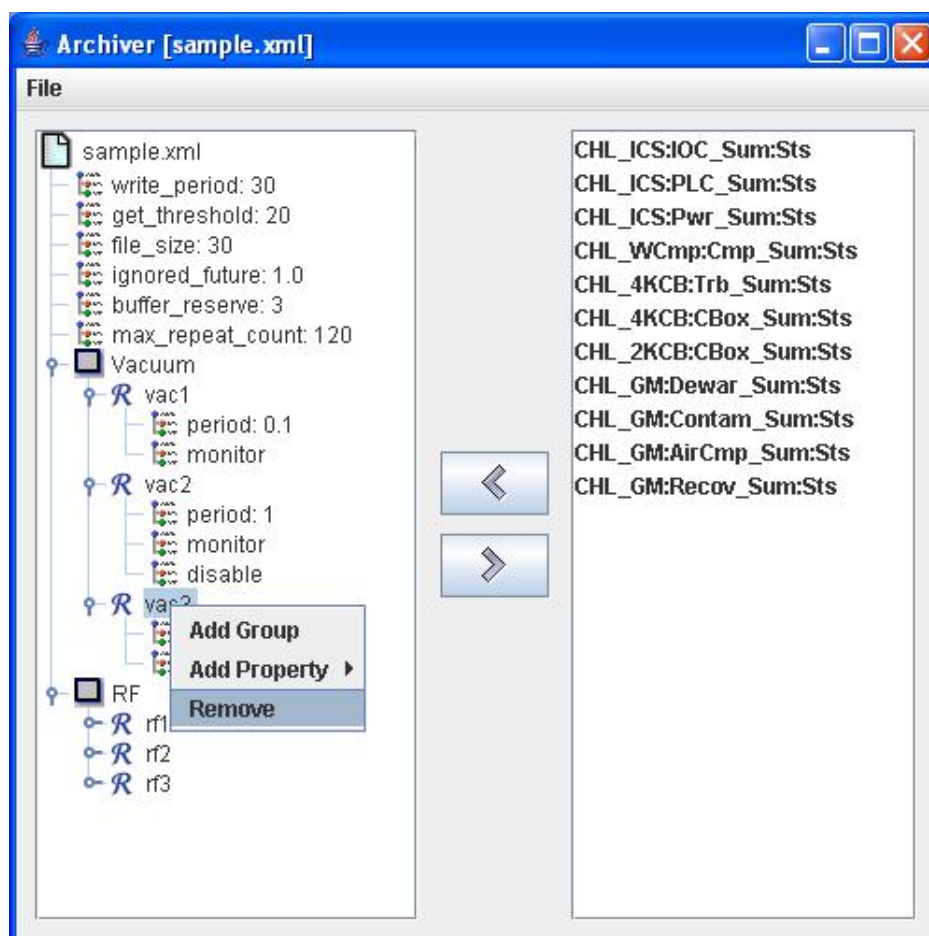


Figure 2: working environment of the Channel Archiver plug-in

From graphical point of view the Channel Archiver is very similar to Alarm Handler. It also consists of two areas: on the right side is the list of available records and on the left side is a tree, which represents the hierarchical structure of the configuration file. Through the popup menu user can easily add or remove different properties of the root, groups or channels, while editing and organizing the tree is the same as in Alarm Handler. Like Alarm Handler plug-in, the Channel Archiver plug-in also supports drag and drop, which makes working with it a real pleasure compared to editing the configuration file in text editors.

Further developments could include the possibility to use substitutions file upon a group of channels. Hence the user would obtain many instances of the device that is represented with the template file. This tool will avoid the extra work that needs to be done to generate archiver configuration files manually.

SPREADSHEET VIEW AND EDITOR

The majority of EPICS databases contain a large number of records. In these cases, the graphical view is not very logical and intuitive and therefore, it is difficult to maintain the databases with ordinary VisualDCT's tools, not to mention ordinary text editors. For example, if there is only one field that has to be changed in each of the records, user must inspect all the records in the database and manually apply the appropriate settings. This usually means a lot of effort. Therefore, Bob Dalesio from SLAC proposed to introduce a new view of records – spreadsheet style. Instead of graphical representation as in ordinary VisualDCT, records will be presented in the table, one record per row. It will be possible to configure the table, which records' fields should be visible. Spreadsheet view will consist of a tabbed pane, where each tab will present a certain record type. All cells in the table will be editable using property inspector functionality. It will even be possible to select all records in a single table and set the table to display only the fields that are common to all records or for example select only all output records. This will enable users to quickly find errors in the database. Ability to compare the database directly to the signal list will also be available.

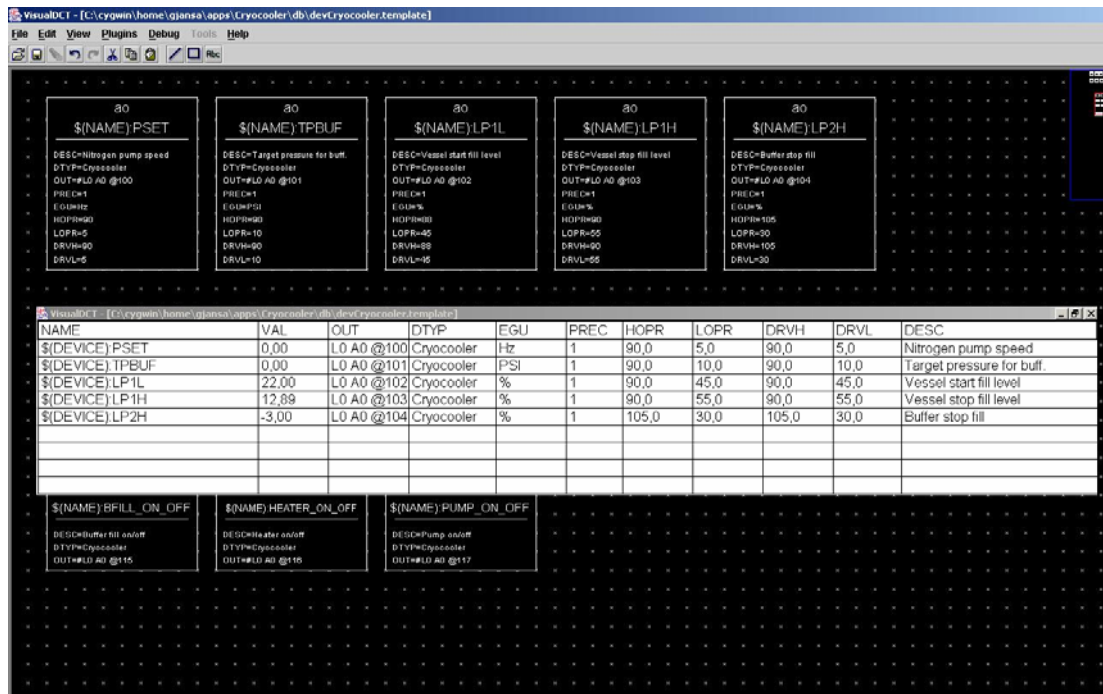


Figure 3: Spreadsheet View and Editor can be useful for large databases

SUBSTITUTIONS FILE EDITOR

The current EPICS database mechanism is very restricted in its capabilities. It requires two input files (.template and .substitutions) that have radically different syntaxes. The template file contains records with macros and the substitutions file holds the definitions for these macros. Substitutions files with huge amount of macros have a tendency to become hard to maintain.

Substitutions file editor, another potential Visual DCT plug-in, could offer syntax checks and a comparison between the number of macros and the number of their substitutes. These features will enable user to focus more on actual values of macro substitutes rather than on the syntax of a substitution file.

3 CONCLUSIONS

Taking into account all aforementioned features, we can justifiably state that Visual DCT add a very powerful database development tool to EPICS. With extensive use of shell scripts and manual editing, it gets very hard to maintain a large control system. So, though EPICS is very scalable, it gets very messy over a period of time and drives a lot of human resources to maintain all the databases.

We believe that VisualDCT can help tremendously in this area. It is very easy to create the databases with it, but the biggest gain occurs later, after a few months or a year, when something needs to be changed.

4 ACKNOWLEDGEMENTS

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