NEW FEATURES IN MEDM*

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Abstract

MEDM, which is derived from Motif Editor and Display Manager, is the primary graphical interface to the EPICS control system. This paper describes new features that have been added to MEDM in the last two years. These features include new editing capabilities, a PV Info dialog box, a means of specifying limits and precision, a new implementation of the Cartesian Plot, new features for several objects, new capability for the Related Display, help, a user-configurable Execute Menu, reconfigured start-up options, and availability for Windows 95/98/NT. Over one hundred bugs have been fixed, and the program is quite stable and in extensive use.

1 INTRODUCTION

MEDM is an X-Windows, Motif program that displays objects, such as meters, sliders, menus, and plots. These objects are used to read and set parameters in a control system. In addition to supervising these objects and interacting with the control system, MEDM is also a drawing package that provides the means of laying them out in screens, also called displays. A significant control system can have thousands of screens, each with as many as hundreds of objects.

MEDM has been developed primarily at the Advanced Photon Source at Argonne National Laboratory starting around 1990. It is arguably the principal graphical interface to EPICS [1] and now works with CDEV [2] and other control systems as well. In the last two years MEDM has been made more robust and a number of features have been added. It is the purpose of this paper to describe some of these new features. Additional information on MEDM, which is an extensive program with many other features than those described here, may be obtained from the MEDM Reference Manual [3].

2 NEW EDITING FEATURES

Since MEDM is used to design the many screens that operators and engineers use to control a system, it is essential that it be a full-fledged, convenient, and robust drawing tool. To that end, many features commonly found in other drawing packages have been added to MEDM. The top-level menu to access these capabilities is shown in Fig. 1. The foremost of these editing features

Figure1: Edit-Mode Menu.

is the ability to Undo and Redo. The basic operations of cut, copy, paste, group, and ungroup were already in MEDM. There are now ways to align, space evenly, center, flip, rotate, and size selected objects or groups of objects. An example of flip and rotate is shown in Fig. 2. There is also now a grid and snap-to-grid option. Additional keystroke combinations have been added to control moving, resizing, and selecting objects. It is now possible to change the colors of all grouped objects simultaneously.

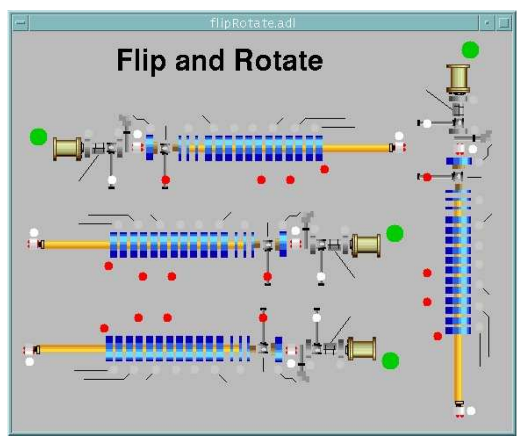

Figure 2: Flip and rotate options. The items shown were designed with the MEDM drawing tools.

3 PV INFO

The PV Info dialog box, shown in Fig. 3, gives extended information about the control parameters (known as process variables in EPICS) associated with an object. This information has proven very useful, particularly in tracking down problems.

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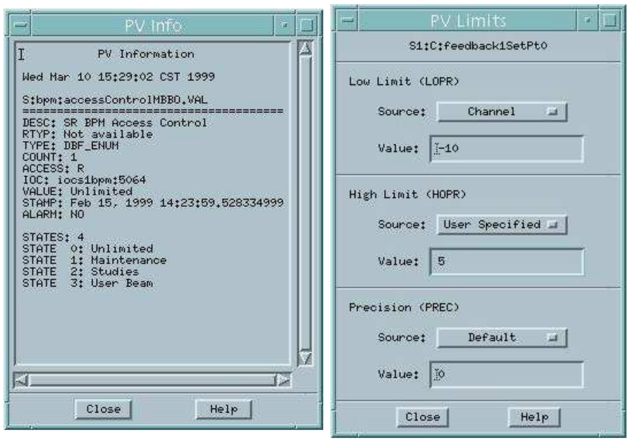

Figure 3: PV Info and PV Limits Dialog boxes.

4 LIMIT AND PRECISION INFORMATION

A shortcoming of MEDM was that the limits of MEDM objects such as the Meter, Slider, Bar, and Scale were set by data stored with the process variable. This meant it could not be different for different users, nor easily adjusted. A similar situation existed with the number of figures after the decimal point, or precision, for text objects. The limits and precision defaults can now be set by the screen designer. The user can choose either to get the values from the process variable as before, use the designer's defaults, or set his own values, perhaps for fine or coarse tuning. The PV Limits dialog box for doing this is shown in Fig. 3.

5 CARTESIAN PLOT

The Cartesian Plot is the most complicated object in MEDM and one of the most useful. An example is shown in Fig. 4. In the past it was implemented with the commercial product XRT/Graph [4]. The Cartesian Plot logic has been rewritten to make it more generic so it may be used with other plot packages. In particular, the public-

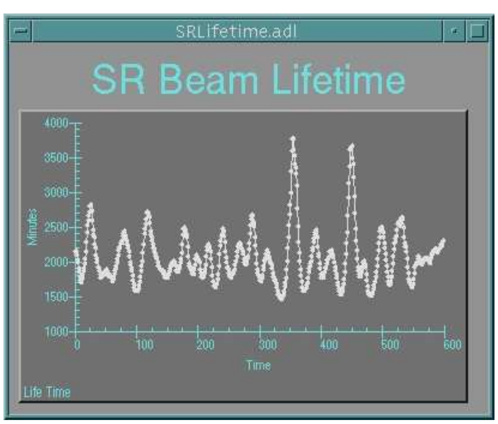

Figure 4: Cartesian Plot using SciPlot.

domain SciPlot [5] widget has been enhanced and adapted to MEDM. It is used for the Windows version of MEDM, where XRT/Graph is not available, and provides a free alternative on other platforms.

6 NEW FEATURES FOR OTHER OBJECTS

All objects have been made to have consistent shadows using the Motif look and feel and to have consistent sizes between EDIT and EXECUTE mode. The Bar object now has a "no-decorations" attribute that allows it to be used to make bar graphs as in Fig. 5.

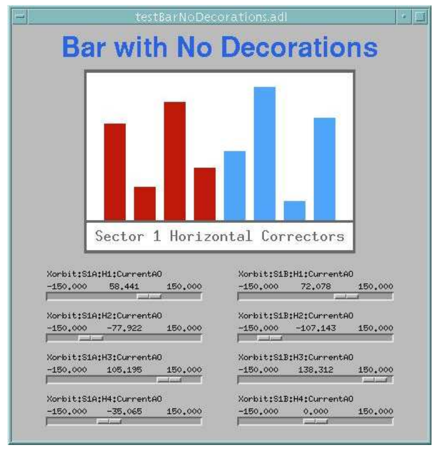

Figure 5: Bar object used to make a bar graph.

7 RELATED DISPLAY

The Related Display, shown in Fig. 6, is an MEDM object used to bring up other screens. Formerly, it presented a menu of choices. Now, if there is only one item, it behaves like a button and just brings up the screen. If there is a single button, the graphics and label text are placed in the center of the label rather than left justified, so the user will be aware the action will happen immediately. Further, the designer can specify whether a new screen replaces the old screen, and the user can also decide

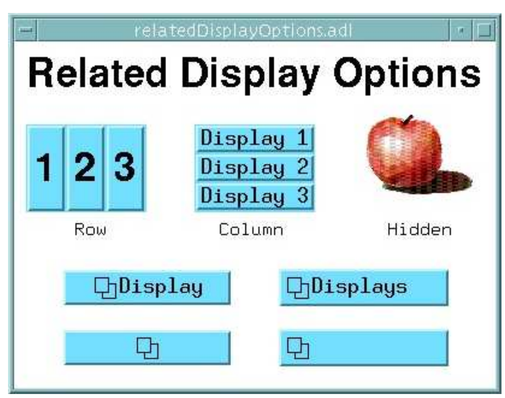

Figure 6: Some Related Display options.

whether to replace any screen or not. This capability allows drill-down screen hierarchies and screens that change to fit the conditions. Screens have also been implemented with "More" and "Less" buttons to display varying amounts of information. The Related Display can be a "hidden button" so that if it is placed under a graphic, clicking on the graphic brings up the new screen. Some of the options are shown in Fig. 6. These capabilities give the designer a chance to be creative.

8 HELP

Formerly there was little or no help available for MEDM. Now there is an extensive reference manual [3] that can be formatted as text for printing or as HTML for the Internet. Both context-sensitive and menu-driven help are implemented through Netscape [6], which can be controlled from MEDM. There is also bubble help that pops up over tool icons.

9 EXECUTE MENU

There is now a configurable menu in EXECUTE mode that appears as part of the popup menu obtained by right clicking on the background of a display. This menu can be used to conveniently call other programs. There are special characters that insert the name of the screen definition file (called ADL file) for the current screen or insert a process variable name from an object into the command to be executed.

For example, the following environment variable:

MEDM_EXEC_LIST=Probe;probe &P &:
ADL File;echo &A:PV Name(s);echo &P

results in the menu shown in Fig. 7. These particular menu items implement (1) calling another program, Probe, for a process variable associated with an object, (2) echoing the name of the ADL file, and (3) echoing the process variable names associated with an object. See the manual [3] for the syntax and other details.

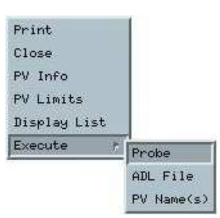

Figure 7: Execute-Mode Menu with customizable Execute Menu. PV Info and PV Limits are also selected via the Execute-Mode Menu.

10 STARTUP OPTIONS

MEDM allows new executions of MEDM to attach to an existing one to provide efficiency and prevent a proliferation of MEDMs. Formerly this was the default; however, the mechanism by which this is done is complicated and often misunderstood, leading to problems with ownership and access permissions in particular. The default is now to not engage this mechanism, making life simpler for the casual user and leaving the more complicated operation to places like control rooms, where knowledgeable people are available and where it is more relevant.

11 WINDOWS 95/98/NT SUPPORT

MEDM now runs on Windows. It is available as a self-extracting, InstallShield [7] executable that also includes other EPICS extensions, such as Probe and Namecapture [1]. The Windows version of MEDM uses the Sciplot [5] widget for its Cartesian Plot. A Windows version is, of course, useful for people who use PCs rather than UNIX. It is also useful for people who connect to the control system via a modem from home or from a laptop. When MEDM is running locally, only the control-system data need to go over the phone line. When connected to a remote workstation, the X-Windows information has to be transmitted as well. The PC version is being used regularly and is stable. It requires Hummingbird Exceed [8] as an X server.

ACKNOWLEDGEMENTS

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REFERENCES

[1] http://www.aps.anl.gov/asd/controls/epics/EpicsDocumentation has extensive information on all parts of EPICS as well as links to both the HTML and Postscript versions of the MEDM Reference Manual.
[2] http://www.jlab.org/cdev.
[3] http://www.aps.anl.gov/asd/controls/epics/EpicsDocumentation/ExtensionsManuals/MEDM/MEDM.html.
[4] XRT/Graph is a product of the KL Group Inc., Toronto, Ontario, Canada.
[5] http://www.ae.utexas.edu/~rwmcm/SciPlot.html.
[6] Netscape is a product of Netscape Communications Corporation, Mountain View, CA.
[7] InstallShield is a product of InstallShield Software Corp., Schaumburg, IL.
[8] Exceed is a product of Hummingbird Communications Ltd., North York, Ontario, Canada.