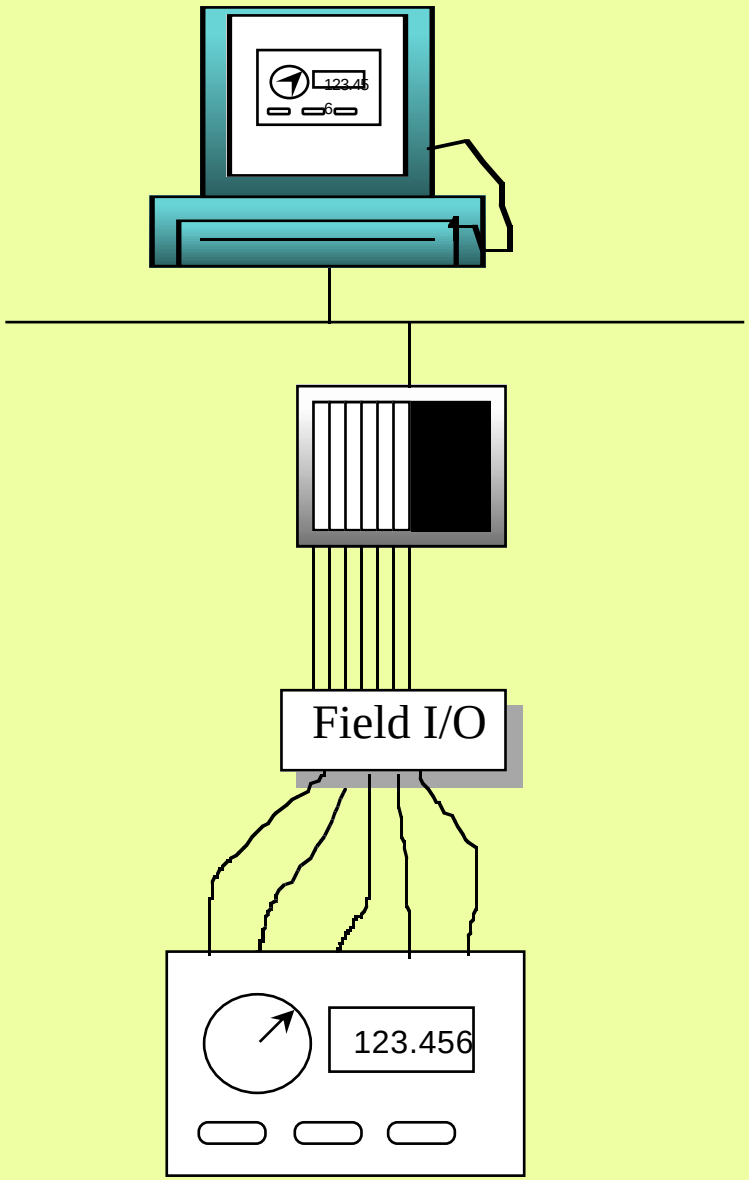
MEDM/ALH/AR

- EPICS CA clients
  - MEDM(Motif Based Editor & Display Manager)
  - ALH(EPICS Alarm Handler)
  - AR(EPICS Archiver)
- MEDM practice

EPICS terminology



Operator Interface (OPI)

On OPI, A device is represented as a set of channels (or records).

CA Client software runs on OPI.

I/O controller (IOC)

Process Database keeps an information of a device as a set of records.

Channnel: Basic unit of Data exchange in EPICS.

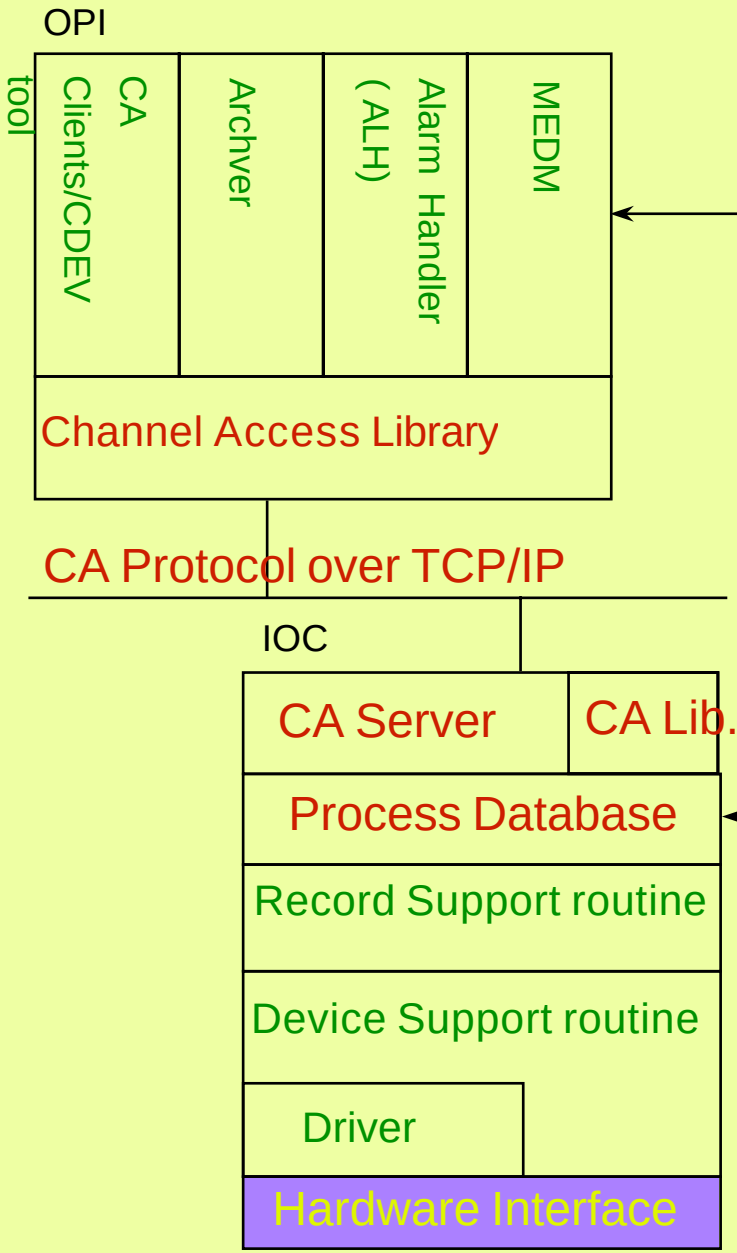
EPICS CA clients

- General Purpose Tools for control system.(OPI tools)
  EDD/DM(EPICS OPI Display Editor/ Display Manager)
  MEDM(Motif based Editor & Display Manager)
  jdm(java based display manager)

  ALH (Alarm Handler)
  AR(EPICS ARchiver)

- Tools to support a development of custom applications
  Tcl/Tk
  CaMath/devMath(EPICS CA in Mathematica)
  java/cdev
  Python/Tk (under development in KEK)
  SAD/Tk (Programmable Modeling Program with GUI object) and more

Software Layers in EPICS



Configuration Data files.
(.req, .alhConfig, .adl, .dl)

EPICS OPI tools and Process database are configuread through the configuration files.

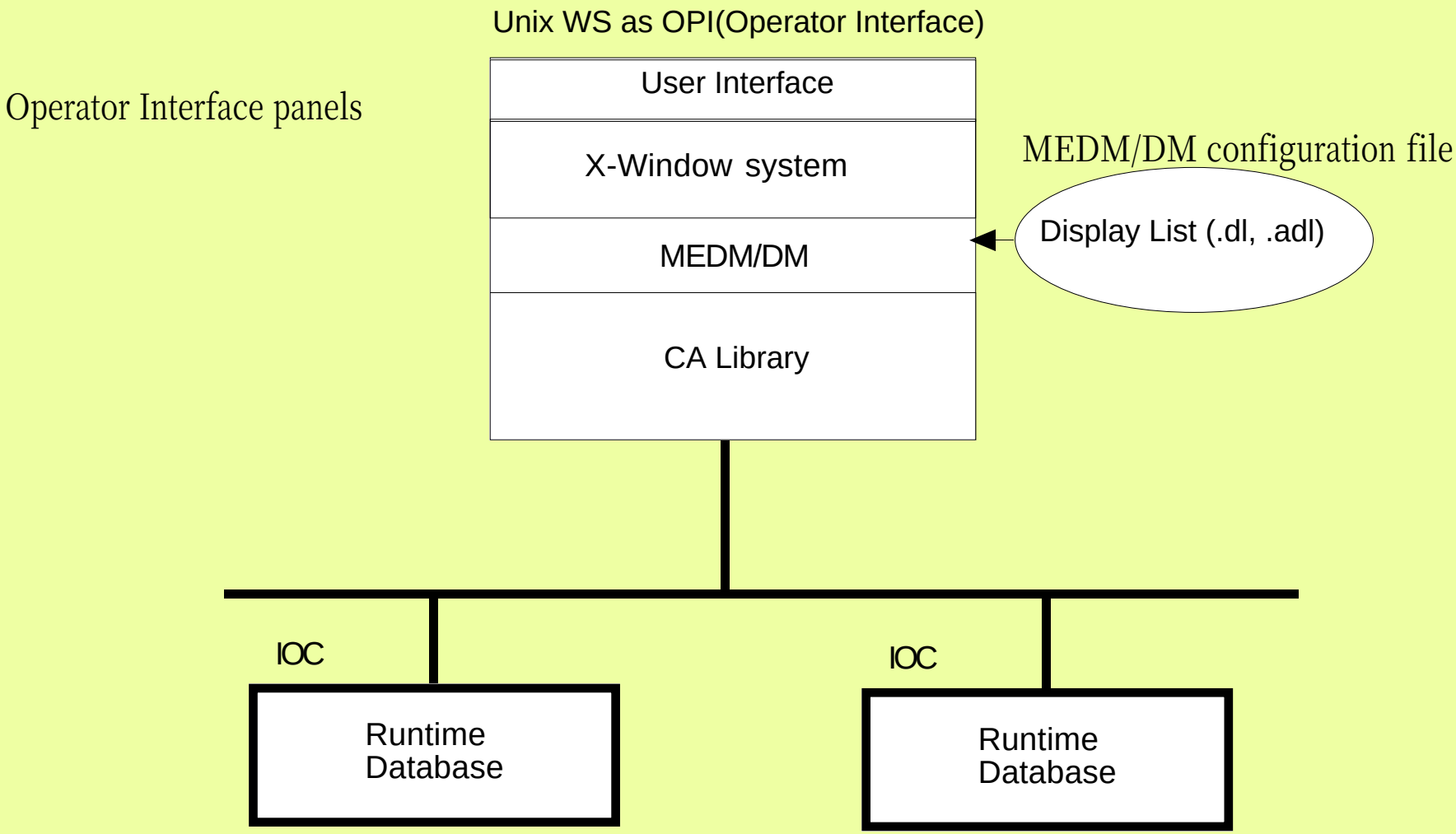
Process Database Configuration files.
(.db files)

Configuration files for EPICS OPI tools

Tool	File Extension	data type
EDD/DM	.dl/.adl	binary/ASCII
MEDM	.adl	ASCII
ALH	.alhConfig	ASCII
AR(AR_cmd)	.req	ASCII

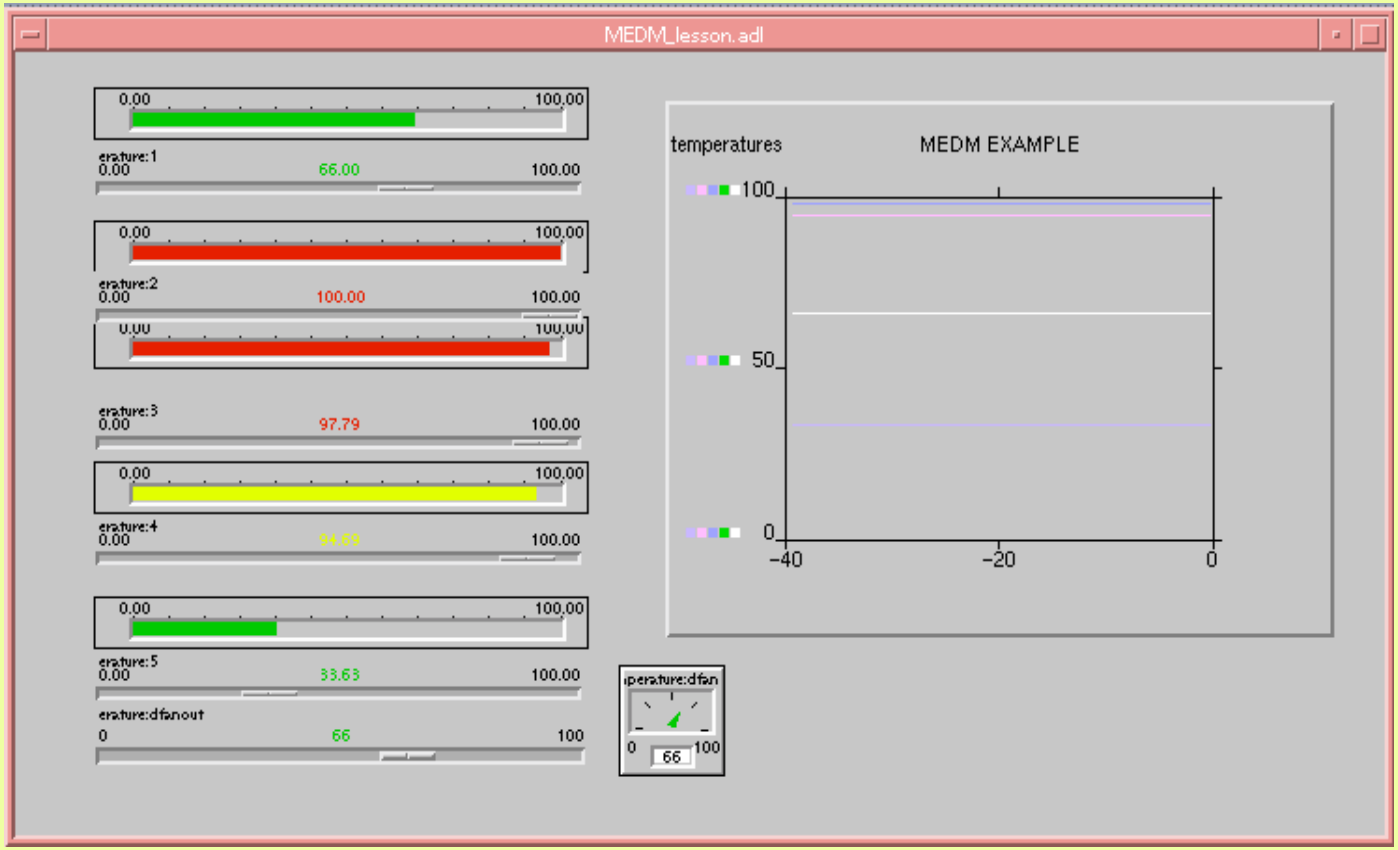
*) File Formats of .adl files for EDD/DM and for MEDM are slightly different. Unification of two formats is in progress.

OPI Overview



OPI Overview

- DM/MEDM are CA client tools to display operator interface panels.
- DM/MEDM are configured by configuration files.
- EDD/MEDM are used to create the configuration files.



MEDM command line syntax

```
% medm [-x | -e] [-local | -cleanup] [other options]
          [-displayFont alias | scalable]
          [-macro "<name>=<value>,<name>=<value>..."]
          [...X based options...] [display file names]
```

parameters:

-displayFont	**select alias for scalable fonts**
-macro	**apply macro substitution**

options:

-x	**startup medm in execute-only ("dm") mode**
-e	**startup medm in edit/execute ("edd/dm") mode (the default)**
-readonly	**run in read only mode (no CA put)**
-local	**don't participate in remote display protocol**
-cleanup	**support remote display protocol, ignore existing instances**
-cmap	**use private color map**
-bigMousePointer	**use big cursors**
-silent	**reduced error messages**
-wmPositionPolicy	**define the WM positioning policy : FRAME or USER**
-verbose	**display verbose error messages**
-debug	**provide debugging information**
-synchro	**run X11 protocol in synchrous mode**
-help	**this message**

X11 resource options:

-display
-displayGeometry

Display filenames: **a list of ascii display list files(*.adl)**

MEDM Environment variables

MEDM_WM_POSITION_POLICY
value = FRAME / USER, to define the WM positioning policy
MEDM_COLOR_RULE
to define the name of color rule file,If the env is not set, then medm reads file ColorRules in current directory.
If there is not such file, it uses default
MEDM_HELP command for Medm_HELP(mwm environment)
PSPRINTER PostScript Printer Name
EPICS_DISPLAY_PATH Path name to find display list files.
MEDM_MAIL_CMD
EPICS_MEDM_DEFAULT_MB3_DISPLAY

MEDM X resources

Default X resource file : Medm.ad
Custom resource setting: ~/.Xdefaults

Release Notes at : http://www-kryo.desy.de/~romsky/

Add-ons for 2.4.4

- MEDM help.
- Replace option for Related Display element. *Made by Fred Vong from ANL.*
- Save edited and non saved displays when MEDM crashes.
- Associated menu for Composite element.
- Check for identical display.
- Reading archive data into StripChart element.
- X Window resource file Medm.ad.
- Fixed bugs in version 2.4.3 from 2.3.0 which was one from what we started.
- Fixed bugs in version 2.4.4 from 2.4.3.

New in the release 2.4.5

- Added an icon for display windows.
- For all monitor elements, except **Cartesian Plot** and **Valuator**, press on mouse button 3 will lead to activate a new display with macro record substitution by PV name from the element. A name of the displ will be read in from system environment EPICS_MEDM_DEFAULT_MB3_DISPLAY.
- Press and just release on **Composite** elements with defined associated menu will activate an action of t first item in the associated menu. This done to make an operator's manipulations swifter.

New in the release 2.4.8

- New resource **Sensitivity PV** was added into every Control element resource list (Valuator, Text Entry, etc.).
- New resource **Display Type** was added into Display element. This made an available to have adl display within modal dialog windows.
- Two Help infos describing mouse/button actions are available. Help button is on a main window menubar. One info is for actions in EDIT mode, another one is for EXECUTE mode.
- Some resources of an element can be viewed in run-time in Properties dialog invoked by Ctrl-MB3.
- Command line option -readonly was added. This made all Control element insensitive for actions of user
- medm -help will show to user all available MEDM options.

New concept of Color Rule

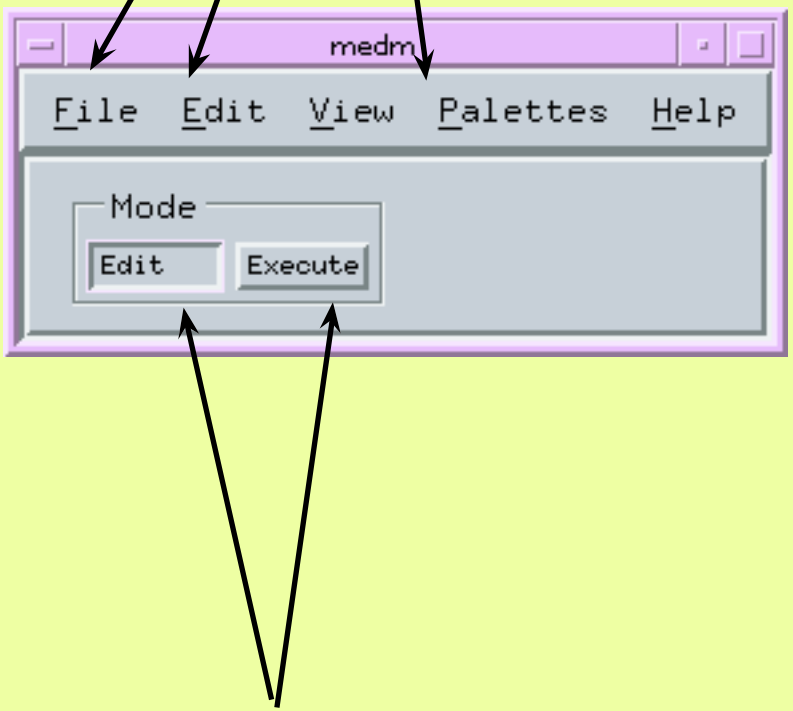
- MEDM in startup time reads ColorRules file and constructs internal list of available color rules. Th file consists of an arbitrary number of color rules. Each color rule can consists of an arbitrary number(not just 16 as it was before) of rule entries(low boundary, high boundary, and color index). The ColorRules file has to keep all color rules been using in adl used files. New environment MEDM_COLOR_RULE keeps a path to this file. If the env is not set, then medm reads file ColorRules in current directory. If there is not such file, MEDM uses default color rules hard coded into the source.

New resources was added to Bar element:

1. Color Mode (static/alarm/discrete)
2. Scale Type (linear/logarithm)
3. Show Bar (on/off)
4. Show Alarm Limits (on/off)
5. Show Scale (on/off)
6. Show Alarm Limits (from channel/local)
7. Low Limit, float point value
8. High Limit, float point value

MEDM Startup Screen

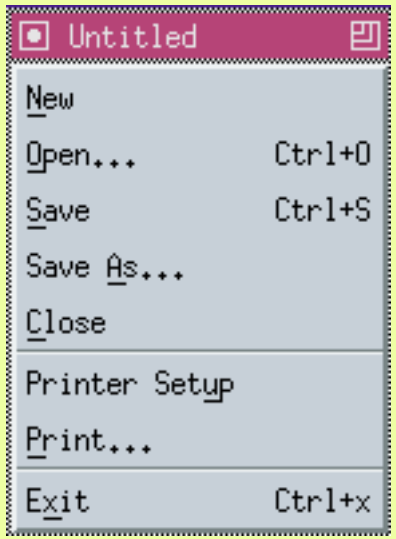
Menus of MEDM



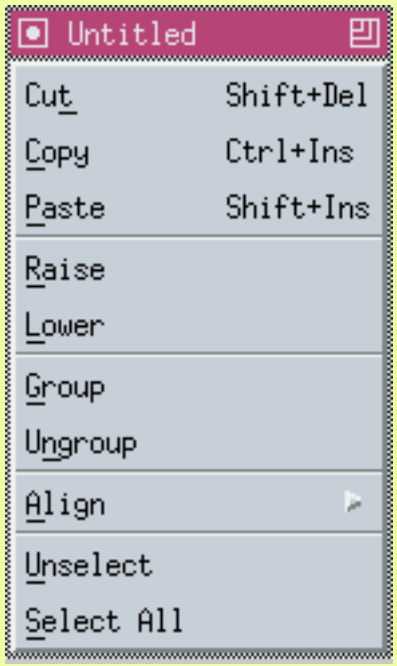
MEDM has two modes, "Edit" and "Execute". You can go and back between two modes with these buttons.

MEDM menus

File Menu

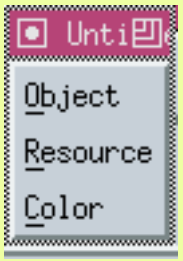


Edit Menu



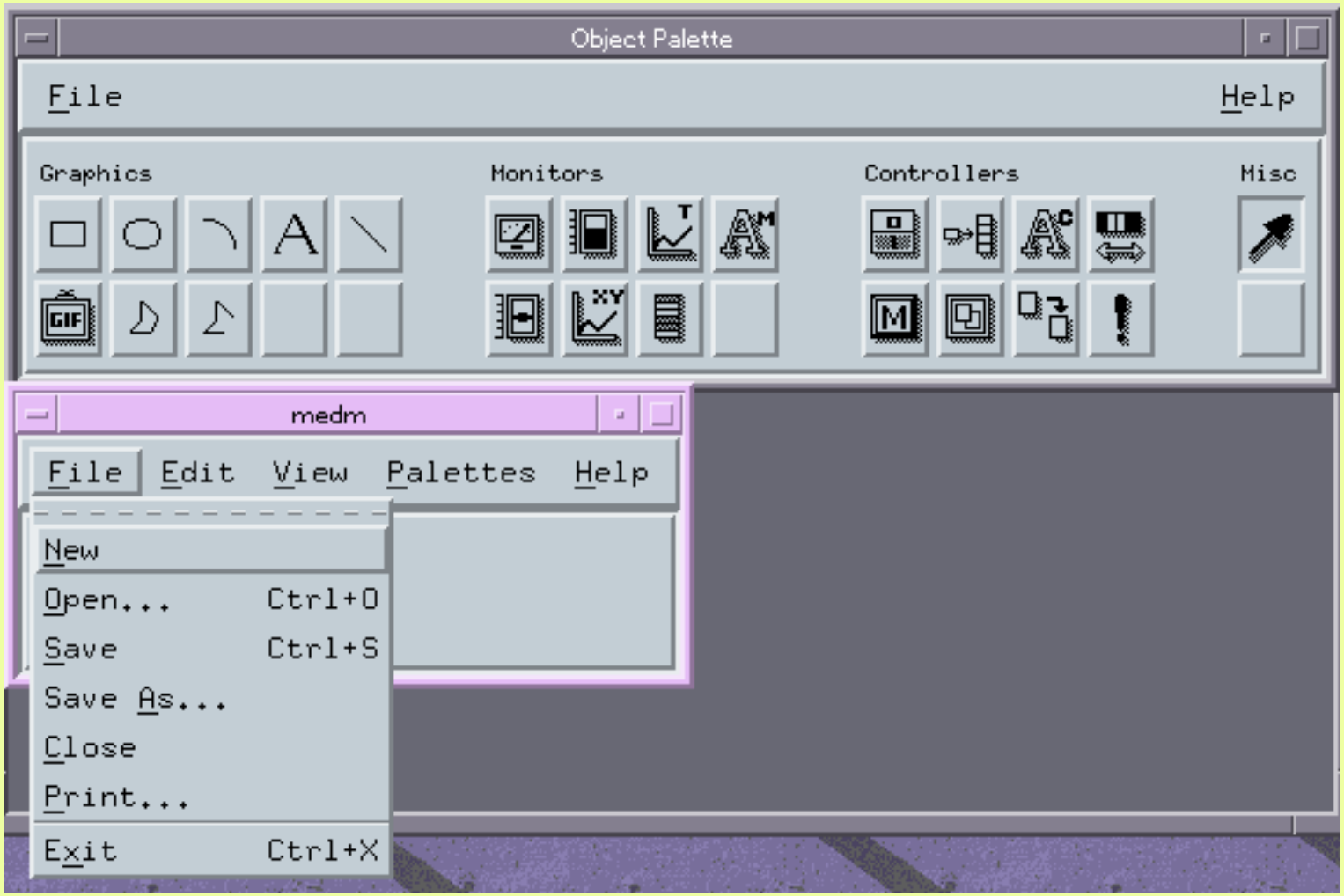
View Menu

Palettes Menu



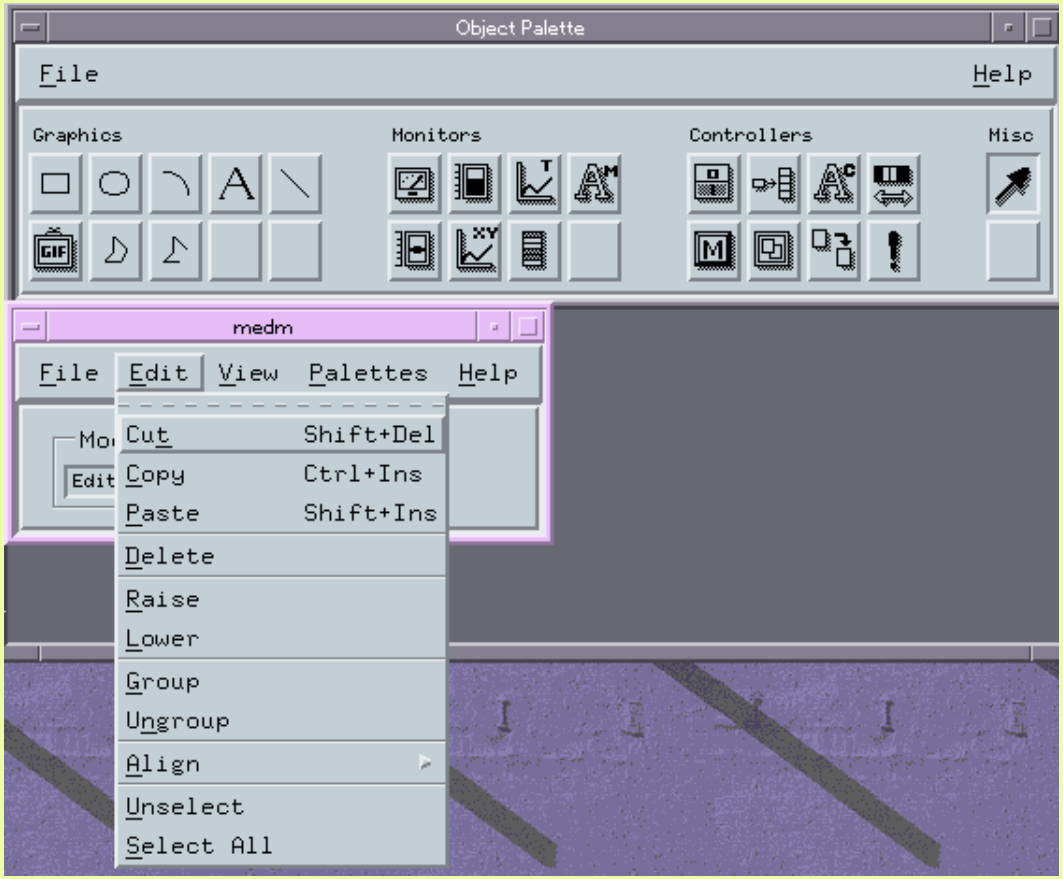
Help Menu

File Menu


Object Palette
File
Help
Graphics
Monitors
Controllers
Misc
medm
File
Edit
View
Palettes
Help
New
Open...
Ctrl+O
Save
Ctrl+S
Save As...
Close
Print...
Exit
Ctrl+X

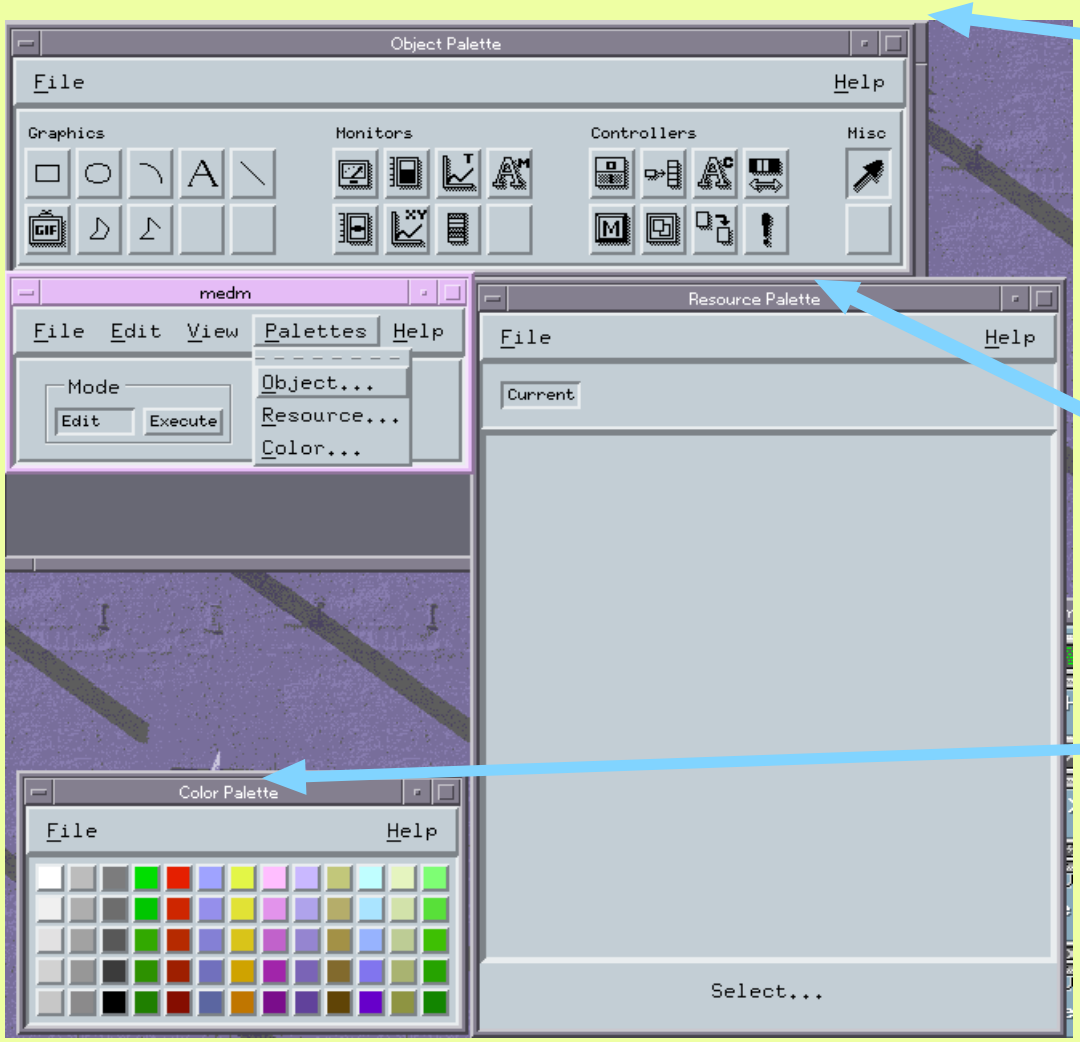
Edit Menu

Edit menu has menu items to edit objects on a display window.



Palettes Menu

MEDM has three palettes.

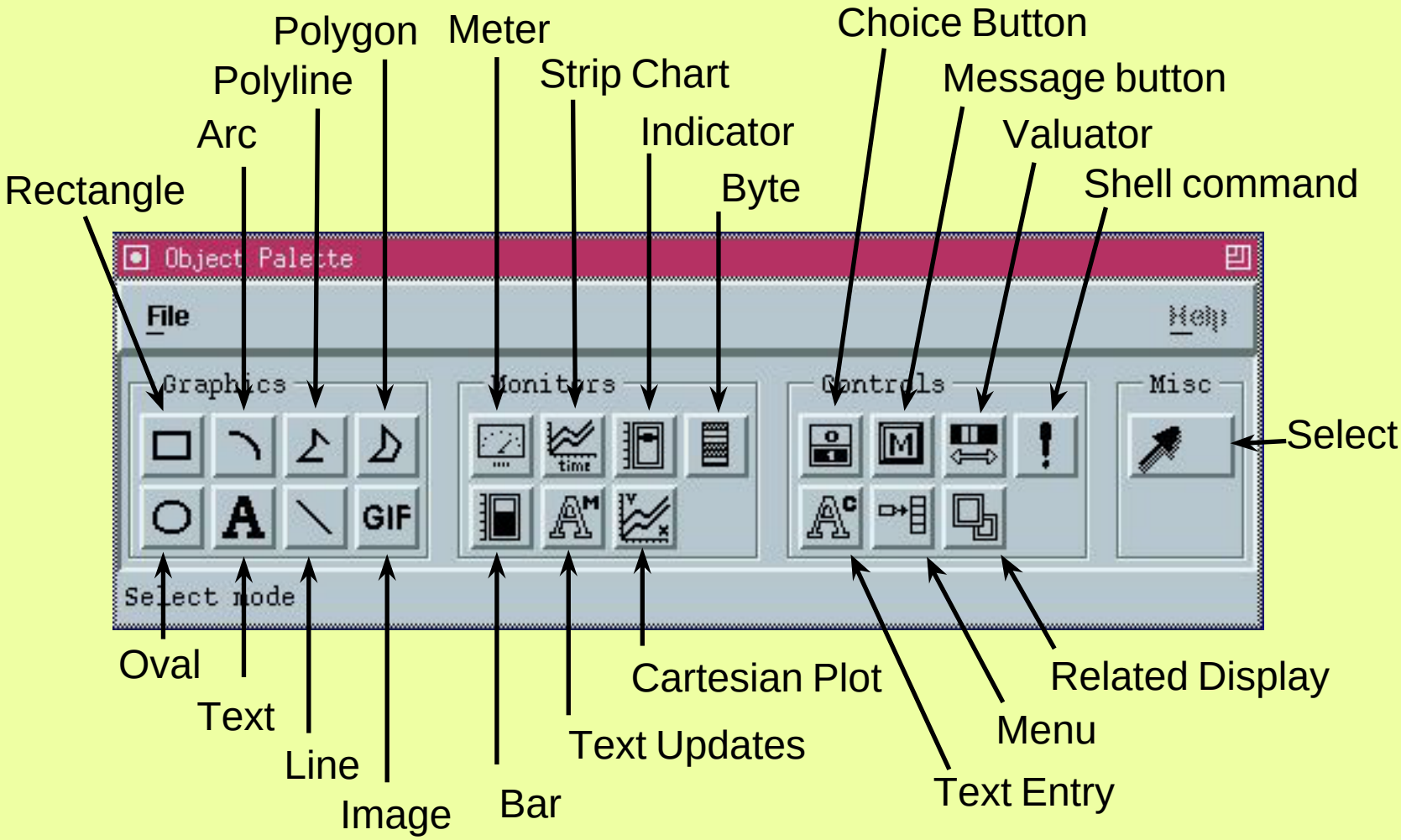


- **Objects Palettes:**
  Objects pallets displays objects used in MEDM. A object belongs to one of three categories, Graphics, monitors and controllers.

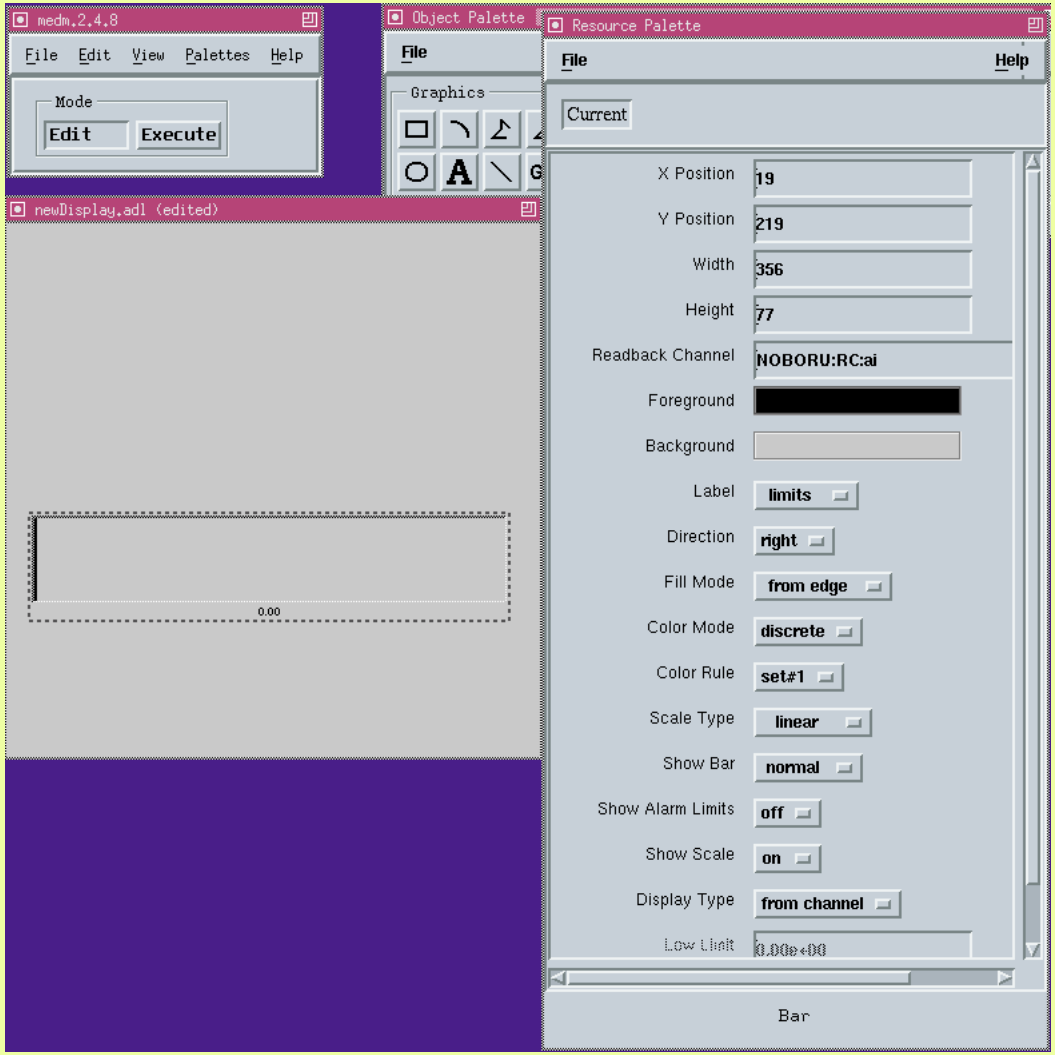
- **Resource Pallet:**
  Resource pallet displays information of a selected object in a display window.

- **Color Pallet:**
  Color pallet is used to change color of objects.

Object Palette



Create a object on a new display window.



1. Choose bar object in the object palette(bar object in the example).

2. Place a cross cursor within the display window.

3. Press a mouse button 1 and drag the mouse to change the size of the object.

4. reelase a mouse button.

5. Fill connected channel name in the resoruce palette.

Mouse operation in MEDM.

MB1: **select** an object (or objects) on the screen and highlight. the resource palette is updated to reflect the selected item's internal data. a drag operat under MB1 selects a group of objects on the screen (including those objects wh bounded by the selection rectangle).

Shift-MB1: **multiple-select**. a set of objects are selected for operations (such as grouping).

MB2: selected object(s) are **move**d while MB2 is depressed and deposited on butt release. if no objects are currently selected, the object under the cursor whe MB2 is depressed in made the current object for moving. to cancel the effect of current move, the cursor may be dragged off the current display window and the button released. this cancels the effect of the move.

Ctrl-MB2: selected object(s) are **resize**d while MB2 is depressed. if no objects ar currently selected, the object under the cursor when MB2 is depressed in made t current object for resizing. to cancel the effect of the current resize, the cursor may be dragged off the current display window and the button released this cancels the effect of the resize. N.B. this mechanism performs ABSOLUTE reseizing, in which all objects are extended in width and height by the magnit of the x and y mouse motion. for PROPORTIONAL reseizing in which selected obje resize consistently, the object must first be grouped.

MB3: **pop up applicable menus**.

MEDM Exercise

1. Startup MEDM.
2. Create a new display in MEDM.
3. Create Title using "Text" graphic object.
4. Create "bar" object on the display.
5. Fill "readback channel " field with a channel name "EPICS:SAMPLE:AI:n". Here <n> is a group number of your group.
6. Change attributes of the "bar" objects to,

   label : limit

   Color Mode: alarm
7. Create "valuator" object which is also connected to "EPICS:SAMPLE:AO:n".
8. Turn a mode of medm to "execution" and see what happen when you operate the valuator.

ALH
(EPICS Alarm Handler)

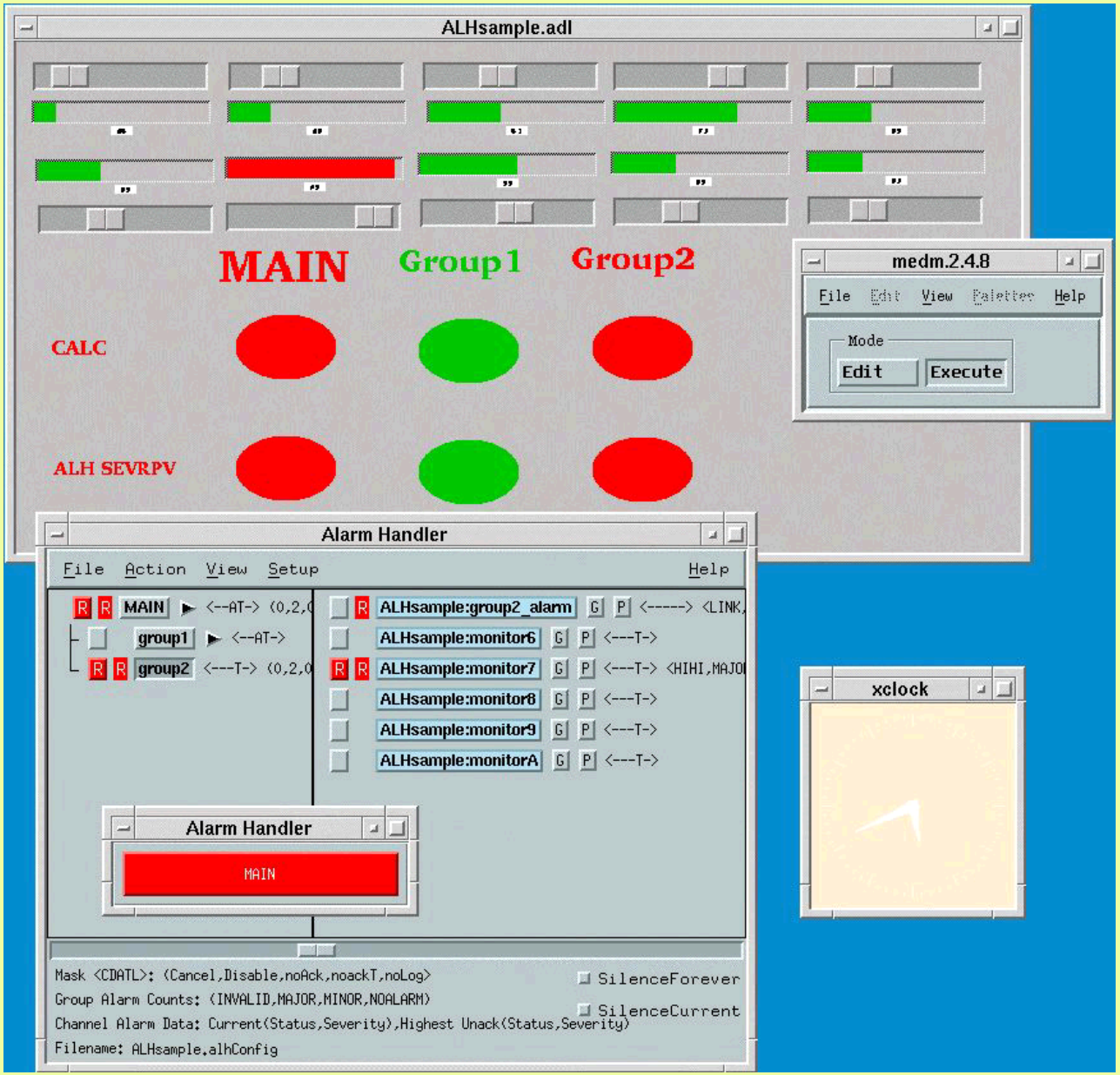
ALH:

- **is an EPICS OPI tool(CA Client)**
- **displays Alarm Status(Severity) of EPICS records specified in the configuration file(.alhConfig).**
- **has a Graphical User Interface based on Motif.**
- **notifies alarm status to the operator by,**
  - **Color,**
  - **Sound(Beep),**
  - **Any Unix command.**
- **writes alarm/operator log into the files.**

ALH sample display

MEDM

ALH

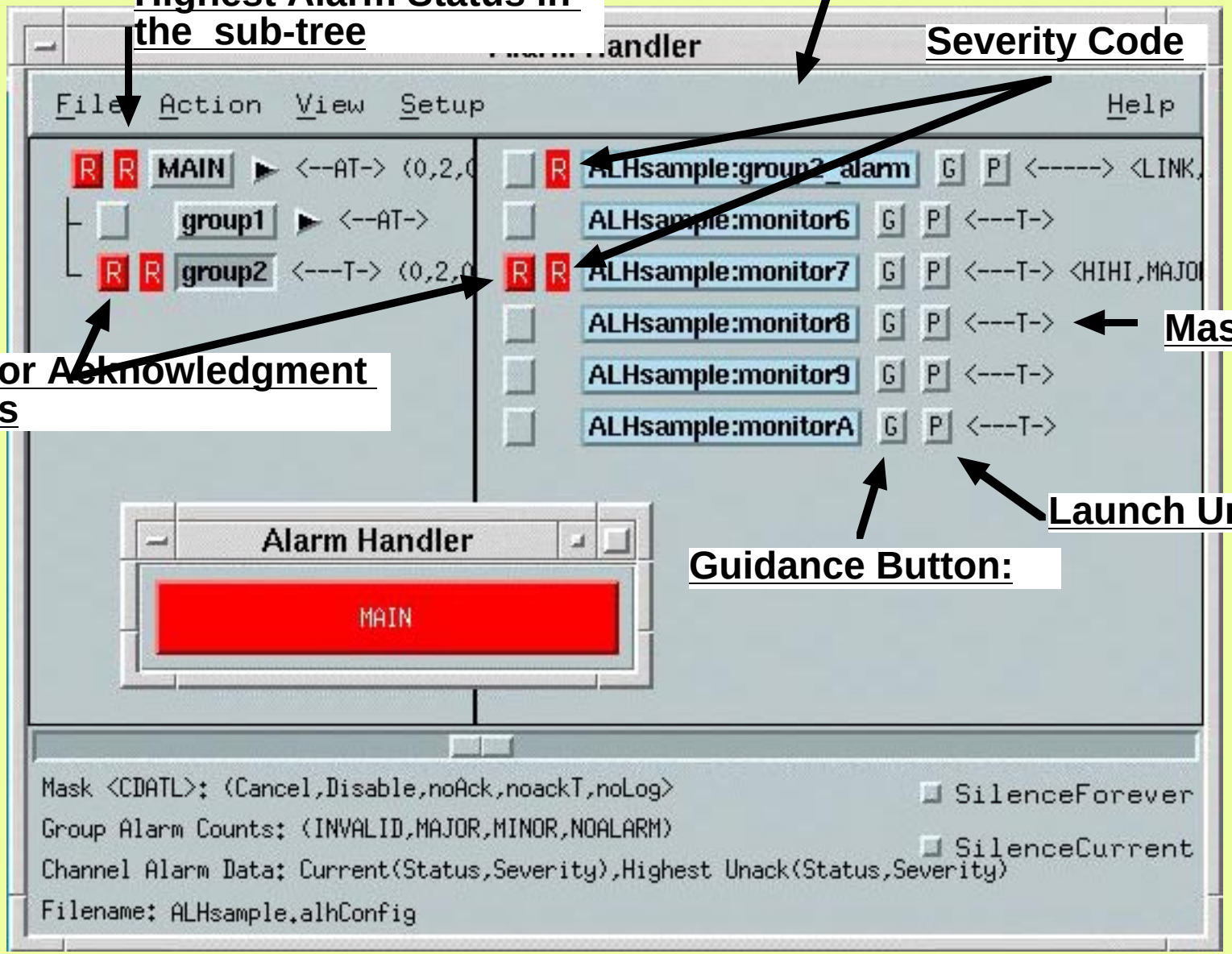


ALH Group Window displays Tree of Alarm Group status.

Channel/Sub group Status

Highest Alarm Status in the sub-tree

Severity Code



Mask

Operator Acknowledgment Buttons

Launch Unix Command

Guidance Button:

MASK

- Add/Cancel Monitors
- Enable/Disable Alarm Events
- Ack/NoAck Alarm Changes
- Ack/NoAck Transient Alarms
- Log/NoLog Alarm

- Force Process Variable to change Mask dynamically.

  $FORCEPV <ForcePVName> <ForceMask> <Force Value> <resetValue>

ALH configuration file

```
GROUP    NULL        MAIN
    $ALIAS  ROOT
    $COMMAND  ShowHelp
    $SEVRPV   ALHsample:status
    $SEVRCOMMAND  UP_MAJOR echo "Help me!" | mail manager
    $GUIDANCE
    Put Your Guidance text here.
    $END
    GROUP    MAIN        group2
        $SEVRPV   ALHsample:group2status
        $SEVRCOMMAND  UP_ANY echo "GROUP2  Alarm up_any"
        CHANNEL  group2  ALHsample:group2_alarm         --A--
        $COMMAND  medm related_display.adl
        CHANNEL  group2  ALHsample:monitor6             ---T-
        CHANNEL  group2  ALHsample:monitor7             ---T-
        CHANNEL  group2  ALHsample:monitor8             ---T-
```

ALH: Communication to the others

- **Put new status into the EPICS Record(Process Variable)**
- **Launch Unix Program**

```
$SERVPV <ServPVName>

    The line starting with $SERVPV is optional. It is
    required only when a user wants to write the severity
    value of the group or channel to a process variable.
```

$SEVRCOMMAND <severtyChangeValue> <any valid Unix command syntax >

The line starting with $SEVRCOMMAND is optional. It is required only when a user wants to start a Unix process when the alarm severity value for a group or channel changes. A single group or channel may have multiple $SEVRCOMMAND lines. This line defines the change in the severity necessary to start the process and defines the process to be started. Valid severity change values are -

UP_INVALID UP_MAJOR UP_MINOR UP_ANY
DOWN_MAJOR DOWN_MINOR DOWN_NO_ALARM DOWN_ANY

$STATCOMMAND <alarmStatusStringValue> <any valid Unix command syntax >

The line starting with $STATCOMMAND is optional and valid only for an alarm channel. It is required only when a user wants to start a Unix process when the alarm status for the channel becomes a specified value. A single channel may have multiple $STATCOMMAND lines. This line defines the status value necessary to start the process and defines the process to be started. Valid alarmStatusString values are defined in the alarmString.h header file. Example alarm status string values are -

NO_ALARM READ WRITE HIHI HIGH READ_ACCESS
LOLO LOW STATE COS COMM WRITE_ACCESS
TIMEOUT HWLIMIT CALC SCAN LINK
SOFT BAD_SUB UDF DISABLE SIMM

$ALARMCOUNTFILTER <inputCount> <seconds>

The line starting with $ALARMCOUNTFILTER is optional. It is required only when a user wants the alarm handler to filter the registration of alarms for an alarm channel. This line defines alarm count and seconds required for alarm registration. To register as an alarm, an alarm channel must remain in alarm state for more than <inputSeconds> seconds OR the alarm channel must enter into an alarm state from a no-alarm state more than <inputCount> times within <inputSeconds> seconds.

```
%alh [-c] [-f filedir] [-l logdir] [-a alarmlogfile]
[-o opmodlogfile] [-m alarmlogmaxrecords] [Xoptions]
[configfile]

options:
   configfile          Alarm configuration filename
   -c                  Alarm Configuration Tool mode
   -f filedir          Directory for all files
   -l logdir           Directory for log files
   -a alarmlogfile     Alarm log filename
   -o opmodlogfile     OpMod log filename
   -m maxrecords       alarm log file max records
   (default 2000)
   -v                  DEBUG mode

Environment Variable:
   ALARMHANDLER        config file directory
```

MEDM: Color Rule File

colorRule <setname1>;
<lower value1> <uppler value1> <index1>;
<lower value2> <uppler value2> <index2>;
.....
colorRule <setname2>;
<lower valueA> <uppler valueA> <indexA>;
<lower valueB> <uppler valueB> <indexB>;
.....