Envision Toolbox Manual

Chapter 9

Xprism

2D/3D Plotting Package

Chapter 9 - Xprism

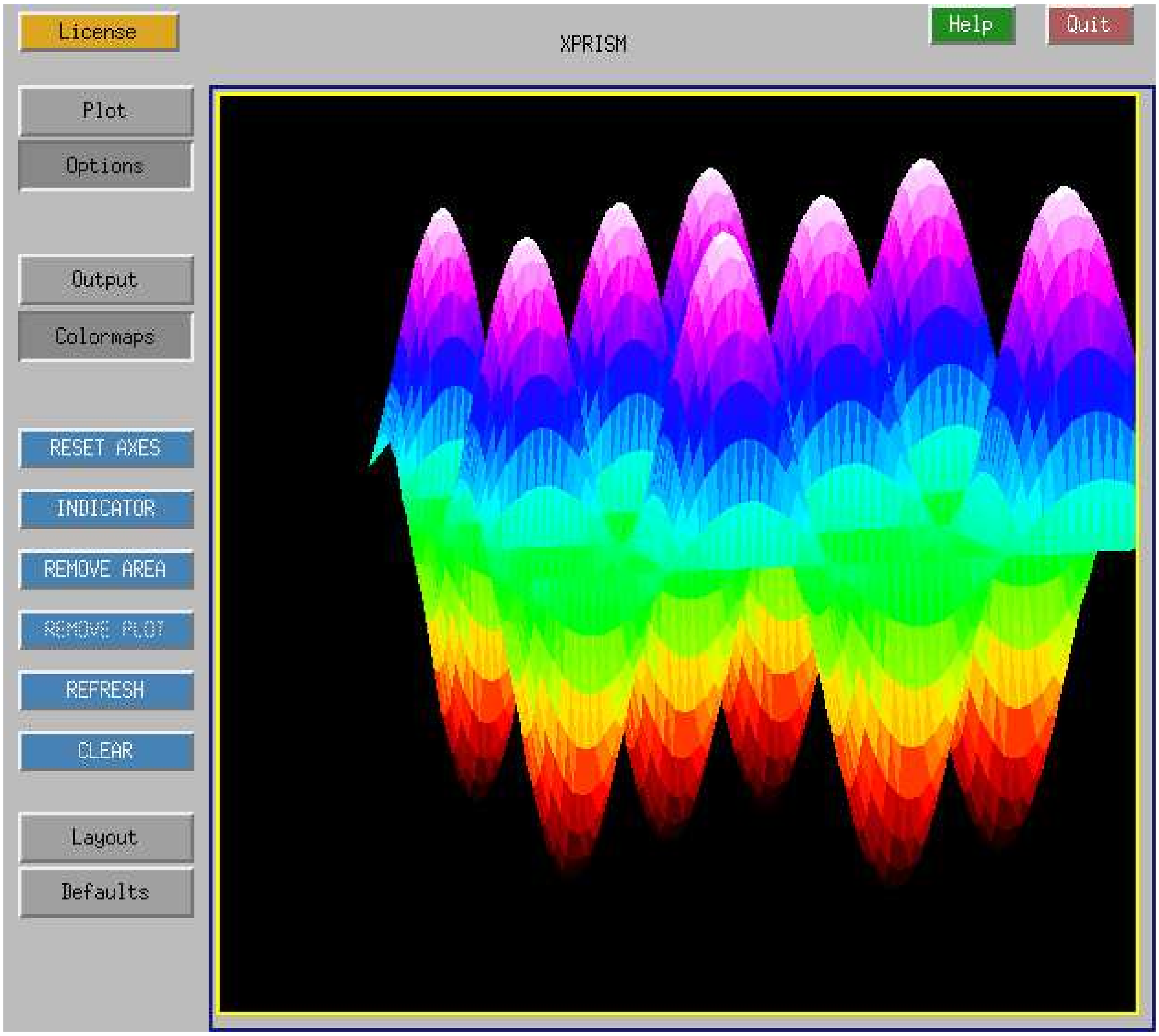


Figure 1: Here, xprism is used to display a 3D shaded plot.

A. Overview

Xprism is a 2D/3D plotting package for use independently or with other parts of Khoros. Multiple plots may be displayed in a single area, and multiple areas may also be used. For 2D plots, plot types include line, discrete, bar, polymarker and linemarker plots. Plot types for 3D plots include line, wireframe, mesh, color mesh, horizon, scatter, impulse, 2D and 3D contour, and shaded plots.

There are a variety of ways to input the plot data. Data objects containing plot information, images, or raw data may be used. Ascii files containing functions or data points are also supported. In addition, 2D and 3D functions may be entered directly from the keyboard.

Fonts, colors, axes, marker types, line types, plot types, and titles can be changed as desired. The perspective with which 3D plots are viewed can be controlled.

The first plot to be input automatically creates a new *area*. This area is considered to be the *selected* area; this is indicated by the yellow border highlighting the area. Next time you input a plot, you must indicate whether its destination is to be the "Selected Area", or a "New Area". If you specify "Selected Area", the second plot will join the first plot in the original area. If you specify a new area, a new area will be created, dividing the plot workspace in two, with the second plot inside. The new area will now be considered to be the selected area, as indicated by the yellow border. If you want to go back to operations concerning the first area, simply click on the first area to select it; the yellow border should now appear on the first area. Remember, before doing any operation, to make sure that the area with which you want to work is selected, and highlighted with the yellow border.

The graphical user interface of xprism consists of a master form containing a number of action buttons and subform buttons, as well as the workspace in which the plots are displayed. Above the ploy workspace are "License", "Help", and "Quit" buttons, from which one may access the license agreement, display online help pages, and quit the program, respectively. To the left of the image workspace are four subform buttons labeled "Files", "Options", "Output", and "Colormaps". Below the subform buttons are a group of action buttons, and beneath those are two more subform buttons. An overview of the subform buttons and action buttons is given below.

Plot
Displays the Plot subform, which is used to create and display plots.

Options
Displays the Options subform, which allows you to access the internal menuforms associated with plots and axes, so that the displayed plots can be customized.

Output
Displays the Output subform, used to write out plots. Currently, the only output supported by xprism is a screen dump. In the future, PostScript output will also be provided.

Colormaps
Displays the Colormaps subform, used to perform autocolor procedures and colormap operations on plots with which such operations make sense (ie, shaded 3D plots, 2D and 3D contour plots only).

RESET WC's
Resets the world coordinates of the area.

INDICATOR
Causes an indicator object to appear on the selected plot, marking the origin (0,0).

REMOVE AREA
Deletes the currently selected area.

REFRESH
Refreshes the currently selected area.

CLEAR
Clears the plot workspace of all areas.

Layout
Displays the Area Layout subform, which allows you to control how new areas are laid out.

Defaults
Displays the Area Defaults subform, which allows you to control defaults used by new areas that are created, including fonts, colors, etc.

B. Restrictions

Xprism is still under development. The following list describes the limitations:

1. The only type of output available is a screen dump. PostScript output is not yet supported.
2. Axes on 3D plots are not available yet.
3. Annotations of plots are not available yet.
4. Plots are always non-proportional, regardless of the setting ("Proportional, Windowed", or "Proportional, Nonwindowed");
5. "Nice Labels" are very buggy. They may or may not work for a particular plot.
6. The function parser may not trap arithmetic errors such as overflows, underflows and divide by zero. These arithmetic errors will cause Xprism to core dump.

C. Command Line Options

Xprism can be executed from within cantata or directly from the command line. The minimum syntax specification to run xprism from the command line is:

```
% xprism
  [-i1]       (infile)  Input plot 1
  [-i2]       (infile)  Input plot 2
  [-i3]       (infile)  Input plot 3
  [-i4]       (infile)  Input plot 4
```

[-i1], [-i2], [-i3], [-i4]
The command line user interface to xprism is currently rather limited. Four input files may be specified; the plot contained in each input file will be plotted in a separate area on startup.

D. Input of Files

As described in the following sections, there are a number of ways to specify the (X, Y) coordinates of a 2D plot, and the (X,Y,Z) coordinates of a 3D plot. Pixel values can also be specified for use with plot types that support use of a color for each data point.

D.1. Color Specification

Along with the coordinates of the data points themselves, a *D* value can also be stored for each point. This value indicates the *color* of the data point, and is used whenever a plot type happens to utilize a variety of colors. For example, 2D colormarker plots and 3D color mesh plots can be drawn such that each point appears in a different color. 3D surface plots such as constant shade, phong shade, and ghouraud shade use the D values to specify the color on the surface of the plot, enabling applications to overlay "imagery" specified by D values over "elevation" specified by Z values. When D values are used, each D value is the *pixel value* associated with the desired color. D values take effect with the following plot types:

1. 2D colormarker plots
2. 2D colorline plots
3. 3D colormesh plots
4. 3D contour plots
5. 3D constant shade plots
6. 3D phong shade plots
7. 3D ghouraud shade plots

D.2. Specifying an Input File

Plots defined by the contents of a file are input and displayed using the "Files" pane of the "Plot" subform. Xprism can plot data from an input file that is in any of the file formats supported by Khoros 2. Of special interest are files containing ascii data points and Khoros 2.0 VIFF files.

Specifying the Plot Destination

Indicate whether the new plot is to be created in a new area or in the currently selected area using the "Where shall I plot?" toggle. If you choose "New Area", a new area will be created to contain the plot. If you choose "Selected Area", be sure that you have selected the area in which the plot is to appear by clicking on it; the selected area will have its border highlighted in yellow. Note that when you add a new plot to the current area by choosing "Selected Area", the world coordinates of the area will be reset to the world coordinate maximums and minimums of the new plot. See Section F for more details.

Plot Dimension

For most input files, this toggle may be left as "Best Guess". Occasionally, however, the "best guess" will be incorrect. If the plot is displayed as 3D when a 2D plot was expected or vice versa, simply delete the plot area. Then, specify "2D" or "3D" directly using this toggle and re-plot the data.

Specifying the Plot Type

Each plot that is created using the "Plot" subform will be displayed in the plot type that is specified for that plot dimension (2D or 3D) on the "Plot Types" subform. Before creating a 2D plot, for example, you may go to the "Plot Types" subform and change the toggle entitled "Plot 2D object as:" toggle to "Bar Graph". This will cause any new 2D plots to be created as bar graphs. Alternatively, the plot type may be changed after the plot is created by using the "Options" subform to bring up the menuform associated with the plot, and changing the plot type using the menuform.

Plotting the File

Specify the file to be plotted using the "Filename" input file selection. To use the file browser to find/select a file, click the mouse in the word "Filename" on the pane; alternatively, you may type the full path to the file into the text parameter box. If you use the file browser, the file will immediately be plotted when you select a file name. If you fill in the filename using the text parameter box, hit <cr> to read the file and create the plot.

D.3. Input of Files Containing Ascii Data Points

Data points may be directly typed into an ascii file using an editor, or a program may generate them. Either C-style comments (/*...*/) or a '#' may be used to designate comments in an ascii file. If the '#' is used, all characters to the end of the line are assumed part of the comment.

2D Data Points

2D Data points may be in integer or floating point values. The file must be in the following form:

```
x y
x y
x y
```

3D Data Points

3D Data points may be in integer or floating point values. The file must be in the following form:

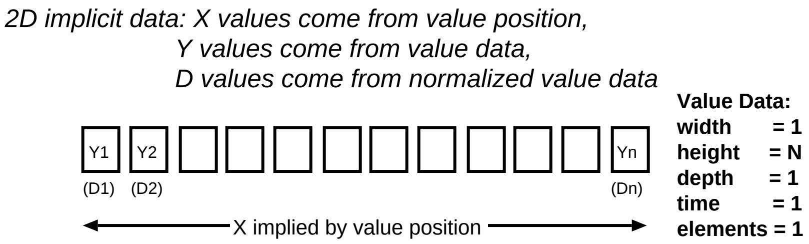
```
x y z
x y z
x y z
```

D.4. Input of Files Containing Data Objects

Xprism can read in any data file supported by Khoros 2.0. Data files may have 2D or 3D data that may be stored *implicitly* or *explicitly*. The size of the data set may be determined by *width*, *height*, or both. In the following descriptions, when either width or height can be used to indicate the size of the data set, height has been used.

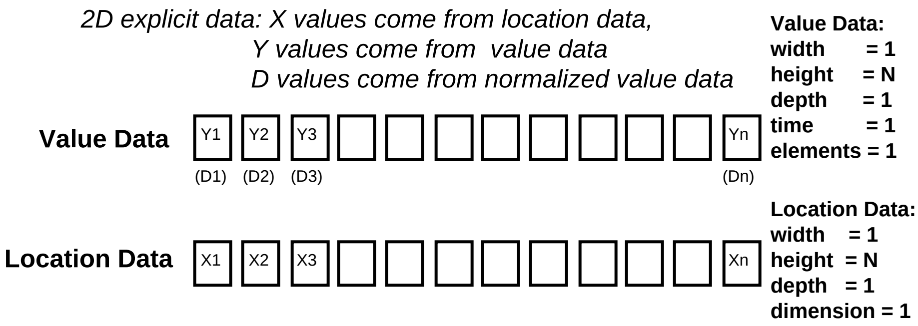
D.4.1. Implicit 2D data

For files containing implicit 2D plot information, the value segment is expected to contain the Y values of the data points. The X coordinates are implied from the position of the Y coordinates in the value segment. Thus, data sets stored in this fashion are restricted to having incremental X values beginning at 0.



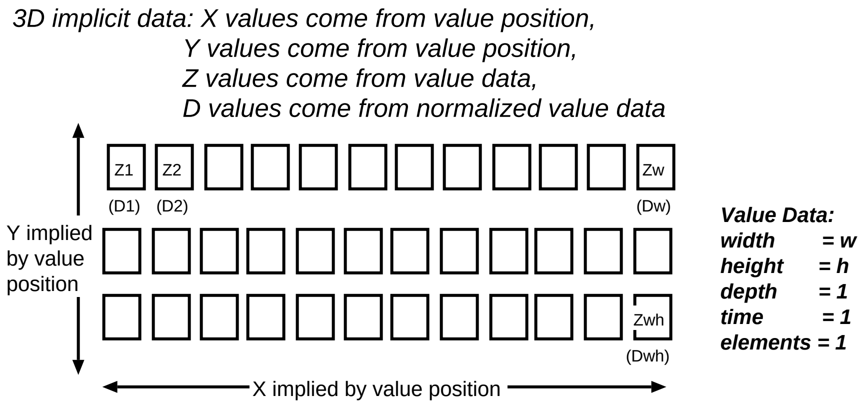
D.4.2. Explicit 2D data

Like implicit 2D data, files containing explicit 2D plot information, also have the Y values stored in the value segment. The location information, however, is explicitly given in the location segment. This makes it possible to specify X coordinates that are not incremental.



D.4.3. Implicit 3D data

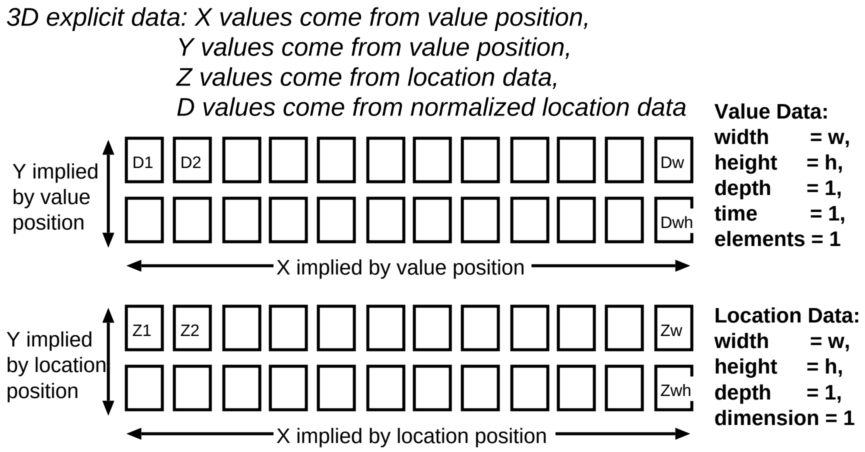
For files containing implicit 3D plot information, the value segment is expected to contain the Z values (elevation) of the data points. The D values (imagery), are obtained by normalizing the Z values. The X and Y values are implied by the size of the data itself. X is considered to be incremental integer values beginning at 0 and ranging to the width of the value segment; Y is considered to be incremental integer values beginning at 0 and ranging to the height of the value segment.



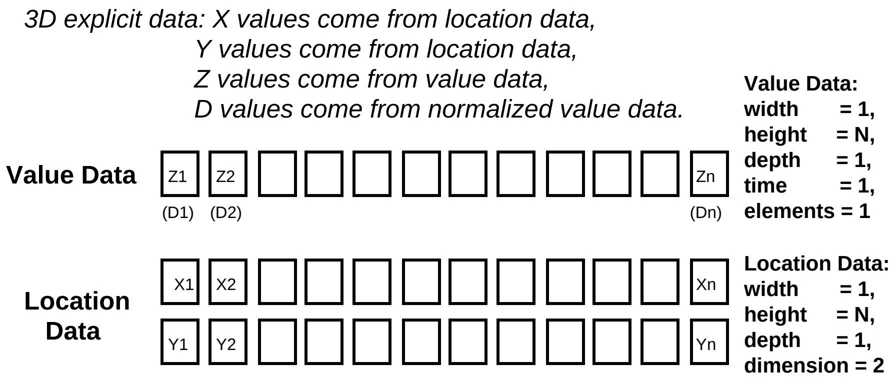
D.4.4. Explicit 3D data

For files containing explicit 3D plot information, the D values (imagery) are obtained by normalizing the values in the value segment. Where X, Y, and Z values are stored is determined by the dimension.

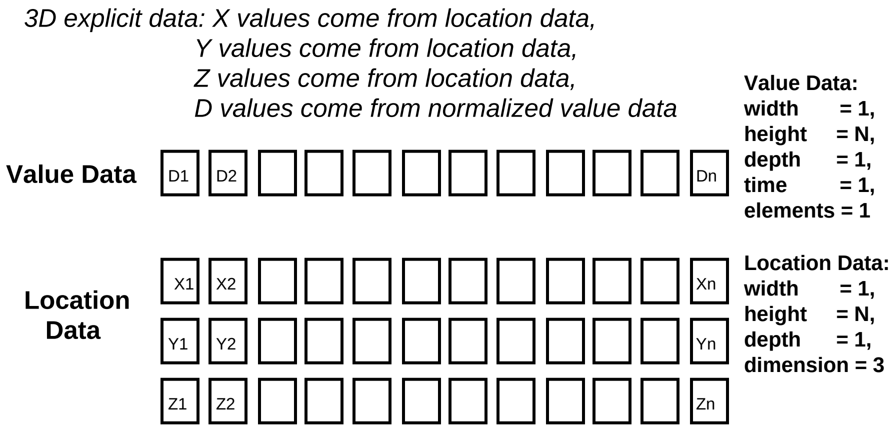
If the *dimension of the data is 1*, Z values are stored in the location segment; X and Y values are determined from the width and the height of the value segment, as in the implicit 3D data case. The most common application of this case is for GIS systems, where the elevation data is stored in the location segment and the D values (the image) are stored in the value segment.



If the *dimension of the data is 2*, X and Y values are stored in the location segment; the Z values are stored in the value segment, and the D values are obtained by normalizing the Z values. Note that there can be no row/column information implied by this storage method; thus, it cannot be used for visualization of line plots, mesh plots, surface plots, or any other plots that require the number of rows to be specified. It is appropriate *only* for 3D scatter plots.



If the *dimension of the data is 3*, X, Y, and Z values are all stored in the location segment. As in the other cases, the D values are still found in the value segment. Like the previous storage method with dimension = 2, there is no row/column information implied by this storage method. Thus, it can only be used with 3D scatter plots.



D.5. Input of Functions

Xprism has a built-in expression parser, so that you may enter 2D or 3D functions directly from the keyboard.

The Function Dimension

Before typing in a function, be sure that the "Function Dimension" selection is set to 2D or 3D, according to the type of function you would like to enter.

Specifying a 2D Function

When the "Function Dimension" selection is set to 2D, the label above the text parameter box will read, "2D Function f(x) =". Enter a 2D function in the text parameter box; all functions are entered in cartesian coordinates. An example of a 2D function is 3*cos(x). Note that when entering a 2D function, the ONLY accepted variable is "x". Attempting to use any variable other than "x" will cause an error message. Next, specify the "X Minimum", "X Maximum" points over which the function will be evaluated, and specify the "# points" to be calculated.

Specifying a 3D Function

When the "Function Dimension" selection is set to 3D, the label above the text parameter box will read, "3D Function f(x,y) =". Enter a 3D function in the text parameter box; all functions are entered in cartesian coordinates. An example of a 2D function is sin(x*y)+x*y. Note that when entering a 3D function, the ONLY accepted variables are "x" and "y". Attempting to use any variables other than "x" or "y" will cause an error message. Next, specify the "X Minimum", "X Maximum" points over which the function will be evaluated in the X direction, and specify the "# points" to be calculated over X. Finally, specify the "Y Minimum", "Y Maximum" points over which the function will be evaluated in the Y direction, and specify the "# points" to be calculated over Y.

Specifying the Plot Destination

Indicate whether the new plot is to be created in a new area or in the currently selected area using the "Where shall I plot?" toggle. If you choose "New Area", a new area will be created to contain the plot. If you choose "Selected Area", be sure that you have selected the area in which the plot is to appear by clicking on it; the selected area will have its border highlighted in yellow. Note that when you add a new plot to the current area by choosing "Selected Area", the world coordinates of the area will be reset to the world coordinate maximums and minimums of the new plot. See Section F for more details.

Specifying the File Type

Set this toggle to "Data Object", unless you are using a raw data file or an ascii file. For raw data, set it to "Raw data". For ascii files, set it to "Ascii".

Specifying the Plot Type

Each plot that is created using the "Plot" subform will be displayed in the plot type that is specified for that plot dimension (2D or 3D) on the "Plot Types" subform. Before creating a 2D plot, for example, you may go to the "Plot Types" subform and change the toggle entitled "Plot 2D object as:" toggle to "Bar Graph". This will cause any new 2D plots to be created as bar graphs. Alternatively, the plot type may be changed after the plot is created by using the "Options" subform to bring up the menuform associated with the plot, and changing the plot type using the menuform.

Plotting the Function

Click on the "PLOT FUNCTION" button to plot the function. Before plotting the function, make sure that the minimum and maximum values and the number of data points for X are filled out correctly. Also be sure that the "Where shall I plot?" toggle is set correctly according to whether you want the plot to appear in a new area or in a selected area. The file will be plotted as indicated and displayed according to the current value of the "plot type" toggle that is set for 2D or 3D functions on the "Plot Types" subform.

Issues to be Aware of When Plotting Functions

When providing a function to xprism, make sure that the maximum and minimum points (the bounds of the plot), are specified correctly in the parameters labeled "X Minimum", "X Maximum" and "# Points", respectively. For 3D plots, the "Y Minimum", "Y Maximum" and "# Points" must also be specified. The defaults are -1 to 1 with a total of 40 points.

The function "minimum", "maximum", and "number of points" fields are string fields. Therefore, for any of these fields a constant such as "pi", or an expression such as tan(0.9923) can be entered. The only restriction is that the expression can not be a function of x or y.

Be sure that the function is defined over the interval specified. If the function provided is not defined vier the given interval, 2 things may occur:

1. The built-in parser will generate an error message

2. Round-off error may cause the parser to compute points that are NOT EXACTLY at the point where the function is UNDEFINED. In this case, xprism2 will go ahead and plot the function to the best of its ability, in spite of the fact that it is undefined over the specified interval. Results may or may not be close to the correct graph of the function.

3. If there is an error that the signal handlers in Xprism2 cannot handle, the package will core dump.

E. Options Subform

The Options subform is used to modify attributes of plot areas, axes, and plots. It may also used to delete areas and plots.

E.1. The Area List

On the left of the Options subform is the Area list. Inside is a list of all the areas that appear in the plot workspace.

Open Menuform

To open the menuform for a plot area, select the desired area and click on "Open Menuform". The menuform containing the attributes of the area object will be displayed. The menuform can be used to control whether or not a title is displayed on the area, the string that is used for the title, whether or not the date is displayed, and the foreground and background colors of the area.

Delete

To delete a plot area, select the unwanted area and click on "Delete". Note that areas may also be deleted by using the "REMOVE AREA" button on the main xprism form.

E.2. The Plot & Axis List

On the right of the Options subform is the Plot & Axis list. Inside is a list of the axis & plots that appear in the currently selected area. First, set the current area by selecting it from the Area list or clicking on the area itself. The Plot & Axis list will be updated to list the contents of that area. Next, select the desired plot or axis from the Plot & Axis list.

Open Menuform

To open the menuform for a plot or an axis, select the desired item and click on "Open Menuform". The menuform containing the attributes of the plot object or axis object will be displayed. The plot menuform can be used to control the plot type, the line type, the marker type, and the plot color. The axis menuform is used to set a wide variety of attributes, including the color whether or not various axis components are displayed, the color of the various axis components, the range over which the plot is labeled, and a large number of other options.

Delete

To delete a plot, select the plot to be deleted from the Plot & Axis list, and click on "Delete". Axes cannot be deleted.

The following sections describe attributes of the area object, the 2D plot object, the 3D plot object, and the axis object. The menuforms for the various objects are used to set the attributes as desired.

E.3. The Area Object

The area object provides an area which contains a coordinated view of other visual objects, such as plots, axes, annotations, and so on. All visual objects in the area visual will have the same world coordinates, viewport, and perspective.

Display Title?

This attribute controls whether or not a title is displayed at the top of the area object. Set to True to display title, False to suppress title.

Title

This attribute sets the string that is used as the title of the area object. It is only used when "Display Title?" is set to True.

Display Date?

This attribute controls whether or not the date is displayed at the bottom of the area object. Set to True to display date, False to suppress date.

Background Color

This stringlist selection lets you set the background color of the area object.

Foreground Color

This stringlist selection lets you set the foreground color of the area object. Note that the foreground color of the area is only used when the foreground color of the objects in the area (ie, axes and plots) are not specified.

E.4. The 2D Plot Object

A 2D plot visual object supports the display of a 2D plot.

Plot Type
This list selection lets you set the plot type of the 2D plot object. Choices include: "2D", "Discrete", "Bar Graph", "Polymarker", "Line Marker" and "Color Marker". 2D is a simple line graph. Discrete displays a set of vertical lines, from each (x,y) point down to the X axis. Bar Graph displays the usual bar graph. Polymarker displays a single marker at each (x,y) location. Line Marker is a combination of 2D and Polymarker, resulting in a "connect the dots" display. Color marker will display each marker of a polymarker plot in a separate color, provided that color information is provided in the plot data.

Line Type
There are seven line types available: "Solid", "Dotted", "Dot Dash", "Short Dash", "Long Dash", "Odd Dash", and "Grid Dotted". The line type is not used with polymarker or color marker plots.

Line Width
This list selection allows you to set the line width used by the 2D plot. It is not used with plot types of polymarker or color marker. Line widths range from "Extra Fine" to "Extra Wide".

Marker Type
This list selection allows you to control the marker type that is used with polymarker, line marker, and colormarker plots. There is a wide variety of marker types that may be used.

Plot Color
This stringlist selection lets you set the foreground color of the 2D plot. It is not used with plot types that are automatically colored according to the "D" values in the plot data, which include color marker and colorline plots.

E.5. The 3D Plot Object

The 3D plot object supports the display of a 3D plot.

Plot Type
This list selection lets you set the plot type that is used by the 3D plot object. Choices include: "Line Plot", "Mesh", "Scatter", "Contour 3D", "Contour 2D", "Impulse", "Phong Shade", "Ghouraud Shade", "Constant Shade", "Horizon", "Color Mesh", and "Wireframe".

Line Type
There are seven line types available: "Solid", "Dotted", "Dot Dash", "Short Dash", "Long Dash", "Odd Dash", and "Grid Dotted". The line type is not used with scatter plots.

Line Width

This list selection allows you to set the line width used by the 3D plot. It is not used with scatter plots. Line widths range from "Extra Fine" to "Extra Wide".

Marker Type

This list selection allows you to control the marker type that is used with polymarker, line marker, and colormarker plots. There is a wide variety of marker types that may be used.

Plot Color

This stringlist selection lets you set the foreground color of the 3D plot, using the color name. It is not used with plot types that are automatically colored according to the "D" values in the plot data, which include color mesh plots, contour plots, constant shade plots, phong shade plots, and ghouraud shade plots.

E.6. The 2D Axis Object

The 2D axis object provides a set of axes for use with 2D plots. The 2D axis object is most effective inside an area object, so that it can control a world coordinate system that is consistent between itself and any plots that also appear inside the area object. The 2D axis object is made up of a number of components such as labels, lines, grid marks, tic marks, numerical labels, and so on; you may control which of these components are displayed. A great amount of flexibility over axis labeling is supported. The 2D axis can also be used to window the data.

The 2D axis menuform is divided into four panes: "Axis Range and Label", "General Axis Attributes", "Precise Axis Attributes", and "Color Axis Attributes".

The "Axis Range and Label" pane allows you to window the data. It also allows you to specify the range for labelling, the number of tic marks, and the interval between tic marks. In the future, it will also allow setting of symmetric axes, nice labels, and proportional plotting.

The "General Axis Attributes" pane allows you to specify which of the various axis components are displayed, such as the box, the zero line, the tic marks, the axes labels, the grid, and so on. It also allows you to specify the labels that are used on the X and Y axes.

The "Precise Axis Attributes" pane lets you specify tic justification, grid line width and line type, and the format that is used to display numerical labels.

The "Color Axis Attributes" pane supports specification of the color used with each of the axis compontens.

E.6.1. Axis Range and Label

The "Range" attributes of the 2D axis object control how the axes are labeled.

Actual Displayed Range

These parameters specify the window over which the axis and plot data is displayed. Enter the X and Y minimums and maximums that define the desired window and click on "Change Range" to initiate the change in window. For example, a particular data might have X values ranging from -100 to 100. To "zoom in" on the data, you might specify the X minimum as -10 and the X maximum as 10. Clicking on "Change Range" will cause only those data points with X values between -10 and 10 to be displayed; the axes will update accordingly.

Currently Labeled Range

These parameters allow you to specify the maximum and minimum values that are labeled on the axis, where these values may differ from the actual world coordinate maximums and minimums of the plot data. Enter the X and Y minimums and maximums that define the desired range for labeling and click on "Change Labels" to initiate the change in the axis labeling. These parameters may be used to "clean up" the axis labels. For example, suppose that a 2D plot has X values which range from 0.21 to 1.0; the minimum X numeric label will read "0.21". However, you may prefer to have the X axis labeled from 0 to 1. To do this, you would specify a value of "0" for the X minimum before clicking on "Change Labels". To restore the labeling to the actual world coordinate maximums and minimums of the plot data, click on "Restore X" and "Restore Y".

Number of Steps

This parameter specifies the number of "steps" or tic marks, from the world coordinate minimum to the world coordinate maximum. For example, if X values range from 0 to 1 and the number of steps is specified as 4 for the X axis, then there will be 4 "steps" from 0 to 1 on the X axis. The "steps" appear as tic marks when tic marks are displayed; in this example, there would be tic marks at intervals of 0.25, 0.5, and 0.75. The last step is shown by the box, if the box is displayed for the X axis; if not, the last step will appear as a tic mark at 1.0. Note that the "Labeled Interval" will change according to the "Number of Steps" that are specified, as one is used to calculate the other.

Labeled Interval

Like "Number of Steps", this parameter allows you to specify the interval that is used to label tic marks on the axis. For example, it might be easier to specify that you prefer an interval of "0.2" rather than a step size of "4.422". Note that the "Number of Steps" will change according to the "Labeled Interval" that is specified, as one is used to calculate the other.

Symmetric

Symmetric axes are not available at this time; these selection should be de-activated. When functional, these attributes will allow you to specify that X and Y axes appear symmetrical about the origin.

Nice Labels

Nice labels are not available at this time; these selections should be de-activated. Without the "nice labels" feature, axis labeling follows these rules:

1. Minimum may or may not be a even multiple of the labeled interval.

2. Maximum may or may not be a even multiple of the labeled interval.

3. Each numeric label may or may not be a even multiple of the labeled interval.

When functional, turning "nice labels" on will cause the labeling of axes to follow these rules:

1. Minimum will be a even multiple of the labeled interval.

2. Maximum will be a even multiple of the labeled interval and will be equal to the minimum + number of steps * label interval.

3. Each tic label will be a even multiple of the labeled interval.

Proportional

Proportional plotting is not available at this time; this selection should be de-activated. With non-proportional plotting (the only option available at this time), the scale in each axis direction is determined by the world coordinate minimums and maximums of the data. Thus, if the X values range from 0 to 1, and the Y values range from 1 to 100, and the physical length of the X and Y axes are the same, then the scale in the X direction (1) is much smaller than the scale in the Y direction (100). When proportional plotting is available, turning this feature on will cause the scale in each axis direction to be the same, causing the range of X values to be proportional to the range of Y values.

E.6.2. General Axis Attributes

The "General Axis Attributes" pane of the 2D Axis menuform allows you to specify whether or not various components of the 2D axis object are displayed. It also allows you to specify the labels that appear on the X and Y axes.

Axis Mode

This attribute specifies the scale with which the X and Y axes will be drawn. The scale may be linear or log.

Show Box

Use these logical selections to dictates whether or not the box will be displayed on the X and Y axes.

Zero Line

These logical selection specify whether or not a line should be drawn to mark the location of zero on the X and Y axes.

Show Axis

These attributes control whether or not the X and Y axes are displayed.

Show Tics

These attributes control whether or not tic marks are displayed on the X and Y axes.

Axis Label
Use these logical selections to specify whether or not the X and Y axes are labeled.

Numeric Label
Use these logical selections to specify whether or not the numbers appear on the X and Y axes.

Grid
This attribute indicates whether or not to draw the X and Y axis grid lines.

X Axis Label
Use this string selection to specify the label that appears on the X axis. Note that "Axis Label" must be set to TRUE for the X axis or the label will not appear.

Y Axis Label
Use this string selection to specify the label that appears on the Y axis. Note that "Axis Label" must be set to TRUE for the Y axis or the label will not appear.

E.6.3. Precise Axis Attributes

The "Precise Axis Attributes" pane of the 2D axis menuform allows you to specify the justification of tic marks and the format in which numeric labels are printed, as well as the line width and line type used to draw the grid.

Tic Justification
Use these list selections to specify how tic marks are justified for the X and Y axes. Tic marks may be justified to be inside the axis, outside the axis, or centered on the axis.

Numeric Label Format
Use these string selections to indicate how X and Y numerical labels are to be formatted. Syntax is identical to that used by *kprintf()*; for example, three decimal places would be specified by "%.3f".

Grid Line Width
These list selections allow you to set the line width used by the grid. Line widths range from "Extra Fine" to "Extra Wide".

Grid Line Type
These list selections allow you to set the line type used by the grid. There are seven line types available: "Solid", "Dotted", "Dot Dash", "Short Dash", "Long Dash", "Odd Dash", and "Grid Dotted".

E.6.4. Axis Color Attributes

The "Color" pane of the 2D axis menuform allows you to specify the colors in which the various components of the 2D axis object appear. For each item, a stringlist selection allows you to choose one of the predefined colors by name. Alternatively, you may type a color name into the text parameter box and hit <cr> to change the color of the item. Valid color names may be found in /usr/lib/X11/rgb.txt.

X Axis Color
The color of the X axis.

Y Axis Color
The color of the Y axis.

X Box Color
The color of the box lines associated with the X axis.

Y Box Color
The color of the box lines associated with the Y axis.

X Grid Color
The color of the major grid lines associated with the X axis.

Y Grid Color
The color of the major grid lines associated with the Y axis.

X Numeric Color
The color of the numerical labels on the X axis.

Y Numeric Color
The color of the numerical labels on the Y axis.

F. Reset WC's

The "Reset WC's" button allows you to reset the world coordinates of the current area to the global maximums and minimums of *all* the plots in the area.

When a new plot is created in the selected area (implying that there are multiple plots in the area), the world coordinate minimums & maximums used by the area are reset to the world coordinate minimums & maximums of the new plot. Suppose the first plot has X values ranging from 10 to 100, and the second plot has X values ranging from 0 to 1. The area will be reset to display world coordinates from 0 to 1 when the second plot is input. This will cause all the points of the first plot to be clipped, as those points lie outside the world coordinates of the second plot; thus, it will appear as though the first plot has "disappeared" when the second plot is input. In order to see the first and second plots relative to each other, it is necessary to click on "Reset WC's". This will cause the world coordinates used by the area object to be reset to the *overall* maximums and minimums, which are 0 to 100 in the example above.

First, select the area for which you want to reset the world coordinates by clicking on it; the selected area will have its border highlighted in yellow. If only one plot exists in the area, then clicking the mouse in the Reset WC's button will have no effect. If more than one plot exists, then the area object will have its world coordinates reset so as to display all plots relative to one another. Note that if the range covered by one plot is much larger than the range covered by another plot, this action may cause the plot with the smaller range to shrink into obscurity.

G. Indicator

The "Indicator" action button will place an indicator on the axes of the selected area to mark the origin. First, select the area in which the indicator is to be displayed by clicking on it; the selected area will be highlighted in yellow. Next, click on the "Indicator" button. An indicator will appear, marking the origin (0,0). Indicators can only be used with 2D plots.

You may move the indicator about the plot by "grabbing" it with the mouse and moving it *slowly* over the plot area while keeping the mouse button down. The plot location marked by the indicator will interactively update as the indicator is moved. A limitation in the current system makes it difficult and sometimes frustrating to move the indicator; moving the indicator slowly and carefully is the key to success.

After moving one indicator, you may create another one by clicking on the "Indicator" button again. Thus, you may create and place as many indicators as desired.

H. Remove Area

The "Remove Area" button is used to remove an area currently displayed in the plot workspace.

I. Refresh

Click on the Refresh button to refresh the selected area in the plot workspace. This may need to be done occasionally, in situations where X Windows fails to refresh the workspace for some reason.

J. Clear

Click on the Clear button to completely clear the plot workspace. All areas and their associated plots will be destroyed, and all memory associated with the plot data will be freed. The effect produced is identical to exiting from xprism and restarting from scratch.

K. Layout

The Layout object gives you control over how its children (areas) are laid out.

Number of Areas Across

To change the number of areas that are laid out horizontally, enter a new number and hit <cr>. Any currently existing areas will be re-laid-out accordingly.

Border Size in Pixels

This number specifies the number of pixels that are used for the border of the area. This is the border that is highlighted in yellow when the area is selected.

Buffer in Pixels

This number specifies the number of pixels that divide each area from its neighbors.

Area Justification

This setting specifies how the *last row* of area(s) is to be laid out, as areas in the last row will have excess space available unless the number of areas can be evenly divided by the number of areas in a row. For example, suppose the setting for "number of areas across" is set to 2, (the default value), and that there are currently three areas displayed. The first two areas will appear in the top row, and the third area will appear in the bottom row, by itself. If the area justification is set to "Center", the third area will appear in the center of the bottom row. If the area justification is set to "Left", the third area will appear to the left, under the first area. If the area justification is set to "Right", the third area will appear to the right, under the second area. If the area justification is set to "Full", the third area will take up the full available area; in other words, it will grow horizontally to take up all the space beneath the first and second areas.

L. Defaults Subform

The Defaults subform is used to control various aspects concerning the way that plots are displayed.

Differentiate New Plots

New plots that are added to an area after the first plot may be differentiated from the other plots in the area by their color, their line type, or both their color and their line type.

Title for New Areas

This logical selection allows you to specify whether or not new areas that are created have a title displayed.

Date for New Areas

This logical selection allows you to specify whether or not new areas that are created have the date displayed.

Area Background Color

The color of the area background may be specified using this stringlist selection.

Area Foreground Color

The color of the area foreground may be specified using this stringlist selection.

Table of Contents