

DataMontage™

Version 2.1

User's Guide

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Stottler Henke Associates, Inc.

951 Mariner's Island Blvd., suite 360
San Mateo, CA 94404

Tel: 650.931.2710
Fax: 650.931.2701
Web: www.stottlerhenke.com
Email: info@stottlerhenke.com

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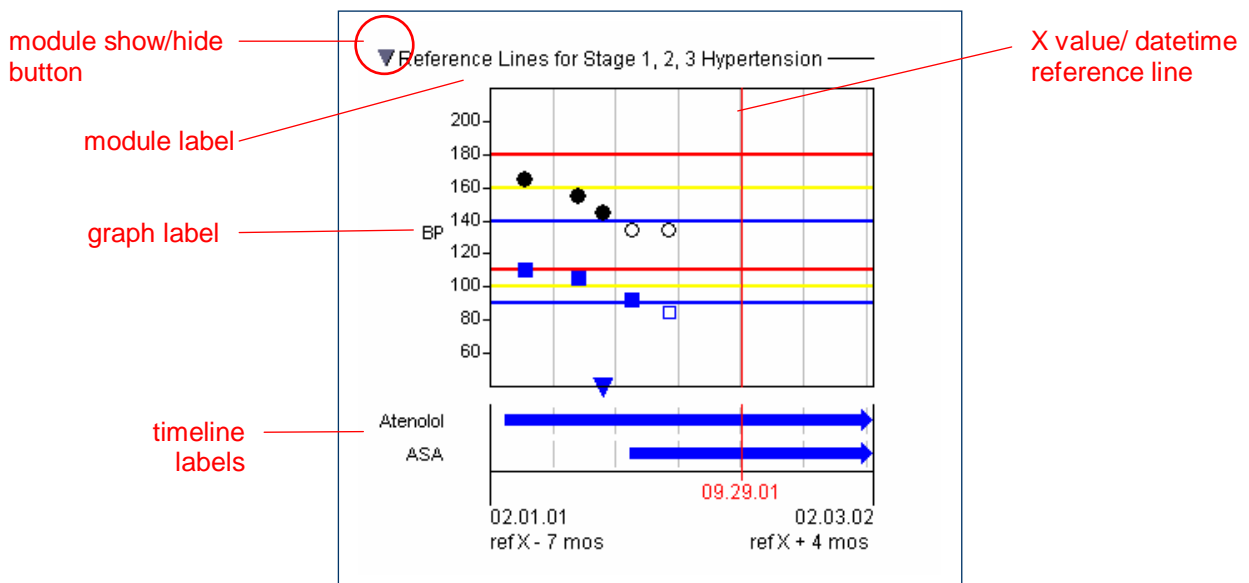
1 Getting Started

1.1 Overview

The DataMontage™ software system is a collection of software applications and libraries that enable you to create, display, and print information-dense collections of timelines, XY graphs, and notes that share a common X or time axis. Each DataMontage *graph container* contains one or more vertically-stacked *modules*, and each module contains one or more XY graphs or timelines. Each XY graph displays data points that represent the value of a quantity measured at a point in time or at a particular floating point X value. Each timeline contains data points and/or intervals. Each data point describe an event or measurement associated with a single point in time or floating point X value, and each interval describes an event or condition that spans a period of time or range of floating point X values.

Within each module, you can stack graphs and timelines vertically or arrange them in rows and columns to see patterns spanning multiple variables. Flexible control over the color, shape, and size of graph and timeline symbols lets you encode multiple attributes and highlight significant data points. Custom icon support lets you draw data points using image icons, text strings, or arbitrary graphics drawn by custom drawing software. Colored lines and regions help you compare data points to reference values, time intervals, and ranges.

In the example below, the container contains one module that contains one graph and two timelines.



DataMontage lets you see additional information associated with each graphical data element using mouse rollovers, popup HTML windows, and navigation to other web pages. Your Java applet, application, or web server application can configure the content and format of DataMontage objects via Java application programming interface (API). Programs written in Java or in other languages can configure DataMontage displays by creating Extensible Markup Language (XML) files. DataMontage also supports custom user interactivity by providing an API that enables menu choices to be added to the context menu. You can define and select custom, pre-defined graph subsets to filter large datasets. For example, you can view subsets of a patient's diagnoses, labs, and medications graphs and timelines related to certain medical problems or clinical specialties. You can also create custom, pre-defined queries and highlight the data points and/or time intervals that satisfy certain selection criteria. For example, a data point query could draw a circle around every data point in any timeline that is related to the currently-selected data point, using a custom comparison function.

You can view interactive graphical displays using the DataMontage Viewer application, the DataMontage applet, or within custom Java software applications or applets that embed the DataMontage software library.

1.2 Configuration Requirements

DataMontage runs on Intel-compatible PCs running the Windows NT and Windows XP operating systems which support the following configuration requirements:

CPU	Intel Pentium-compatible processors
RAM	1 GByte
Free disk	15 Mbytes (this does not include disk space needed for Java runtime system which is installed separately).
Display monitor resolution	1024 x 768 pixels or higher
Display monitor colors	8 bit color or higher
Video memory	2 Mbytes

1.3 Installing DataMontage

Before installing a new version of DataMontage, uninstall any previous versions of DataMontage. If you need to run multiple versions of DataMontage on your computer, copy the entire previous installation folder to another location on your computer's file system before uninstalling a previous version.

To install a new version of the software, run the DataMontage installation program file (e.g., `datamontage_2.1.exe`). By default, the installation program installs the files in the *installation folder* whose default location is `c:\Program Files\Stottler Henke\DataMontage 2.1`.

1.4 Uninstalling DataMontage

To uninstall the DataMontage software, select the *Add or Remove Programs* menu choice from the Windows Control Panel. In the list of programs, select *DataMontage* and press the Change/Remove button.

1.5 Launching the DataMontage Viewer

To invoke the DataMontage Viewer, select *DataMontage/Viewer* from the Windows *Start/All Programs* menu. This action runs DOS command file `runDataMontageViewer.bat` in the DataMontage installation directory. It invokes the Java run-time system and launches the DataMontage Viewer application.

Note: If you are viewing DataMontage graph containers that contain custom user interactions that rely on certain Java classes and methods, edit this command files to include the appropriate Java libraries using the Java `-cp` switch. If you use the SQL query operations feature to populate a graph container with data from a SQL database, edit the command file to include any Java Database Connectivity (JDBC) driver library files needed to access the database. To run procedures that require large amounts of memory, use the Java `-Xms` and `-Xmx` switches to control memory allocation. If you use DataMontage in combination with different Java libraries, you may find it useful to create additional DOS command files with different settings.

1.6 Java

DataMontage 2.1 requires pre-installation of Java Standard Edition or Enterprise Edition version 1.5 or 1.6. You can download the Java software distribution from <http://java.sun.com>.

1.7 3rd Party JAXB Software

DataMontage relies on the following Java Architecture for XML Binding (JAXB) *version 1.0.6* software library files, (<http://java.sun.com/webservices/jaxb/>) which are included in the DataMontage software distribution.

- `jaxb-api.jar`
- `jaxb-impl.jar`
- `jaxb-libs.jar`

- relaxngDatatype.jar
- xsdlib.jar

DataMontage is not compatible with versions of JAXB later than version 1.0.6. If you use DataMontage within a Java applet, make sure that the CODEBASE and ARCHIVE attributes of the applet tag specify these JAR files. If you embed DataMontage.jar within a Java desktop or server application, include these JAR files in the class path when running the application, and include these JAR files in the build path when compiling the application. The JAXB source code and software license can be downloaded from: <https://jaxb.dev.java.net/>.

1.8 Displaying the *About DataMontage* Dialog

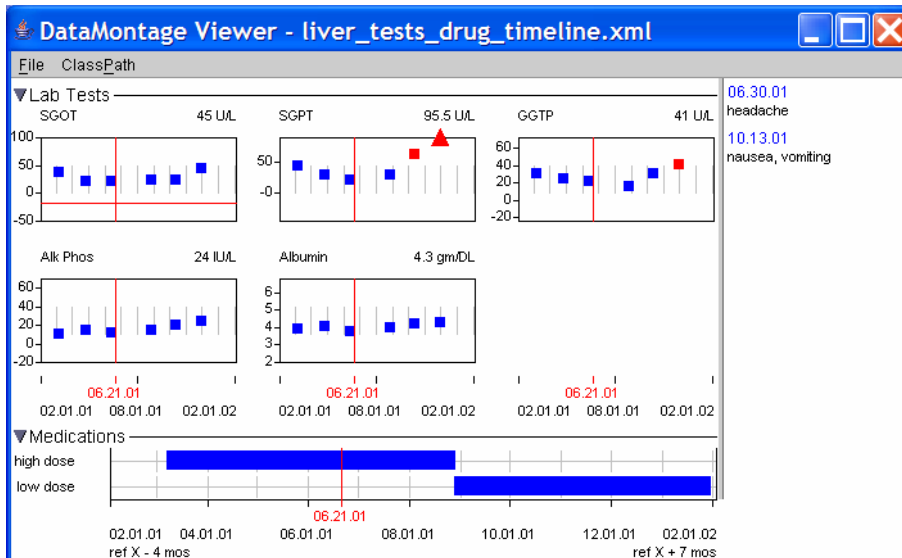
The About dialog shows the version number and creation date of the DataMontage display software. To display the About dialog, click the mouse over the DataMontage display. Then, type control-A by pressing the control key and the A key simultaneously.

2 What's New in Version 2.1

DataMontage version 2.1 provides the following new capabilities for end users:

- **Java 1.6 Support** – DataMontage 2.1 supports versions 1.5 and 1.6 of the Java run-time environment.
- **Pre-defined Graph Queries** – You can define and select custom, pre-defined graph subsets to filter large datasets. For example, you can view subsets of a patient's diagnoses, labs, and medications graphs and timelines related to certain medical problems or clinical specialties.
- **Support for compressed ZIP Files** – The DataMontage 2.1 API provides container-level methods for reading and writing DataMontage configuration files using ZIP file format to reduce disk space usage and delays incurred when transferring DataMontage configuration files over a network. The DataMontage applet and Viewer application can open and read ZIP files containing configuration files.
- **Streamlined GUI for Zoom and Non-Linear Time Scales** – The user interface has been streamlined so you can use the zoom and non-linear time scales feature more easily.

3 DataMontage Viewer



The DataMontage Viewer is a Java application that enables you to display and print an interactive DataMontage graph container whose configuration is stored in a file. You can also populate the graph container with data according to SQL query operations specified in the configuration file. To invoke the viewer, select *Programs/DataMontage/Viewer* from the Windows *Start* menu.

The File menu provides the following menu choices:

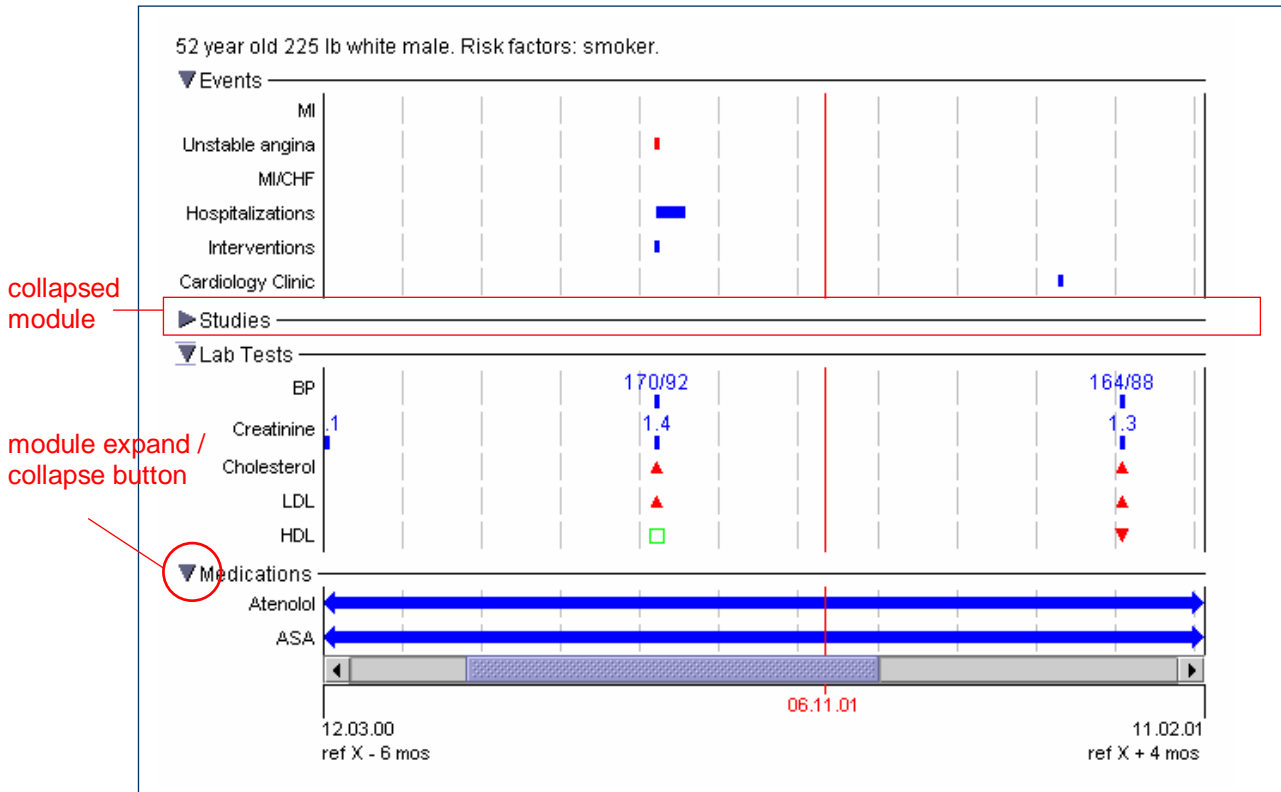
<i>Open</i>	Displays a file selection dialog that prompts you for the DataMontage configuration file to open and display. You can select either a configuration file (with .xml file extension) or a Zip file (with .zip file extension) that contains the XML configuration file. In the latter case, the Zip file and the configuration file must share the same name, with different file extensions. The Viewer determines the preferred height of the graph container, based on the preferred (or default) heights of the container's graphs and timelines.
<i>Close</i>	Closes the currently open DataMontage configuration file.
<i>Save As...</i>	Displays a file selection dialog that prompts you for the file in which to save the DataMontage configuration in XML format. In addition, some changes entered via the DataMontage GUI, such as setting non-linear X axis scales and collapsing/expanding modules, will also be saved to the file. If you use custom popup menu choices to change the content or appearance of the DataMontage container object, those changes will also be saved to the file.
<i>Print</i>	Prints the currently open DataMontage configuration file.
<i>Fetch Data</i>	Applies SQL Query Operations stored in the currently open DataMontage configuration file to populate the DataMontage graph container with data retrieved from the database. Populating the container creates data points, intervals, graphs, timelines, and/or modules from the SQL data. If a database connection has not yet been established, the Viewer prompts you to enter a database login and password to create a connection.
<i>Export to JPEG</i>	Creates an image file in JPEG format from the currently open DataMontage configuration file. The Viewer will prompt you for the name of the destination file and the desired image quality. Higher quality images require more file space.
<i>Properties</i>	Displays attributes of the graph container, such as its height and width.
<i>Exit</i>	Exits the Viewer application.

The ClassPath menu enables you to select operations that are useful if you are using or testing a DataMontage container whose user interaction has been customized using the user interactivity customization API.

<i>Add</i>	Adds a file folder or JAR file to the class path system folder that contain Java class files that implement the customization
<i>List</i>	Lists the folders and JAR files that have been added.

4 Expanding and Collapsing Modules

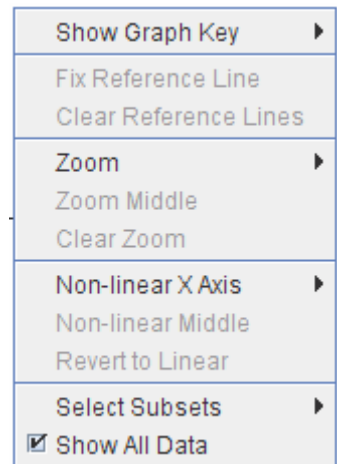
You can collapse a module by pressing the left mouse button over the triangular-shaped show/hide button in the upper left corner, next to the module's label. It is useful to collapse some of the modules in a container if the amount of vertical space required by all modules exceeds the height of the container. You can also collapse modules that lie between two modules that you wish to view next to one another. In the example below, the Studies module has been collapsed so that the Events and Lab Tests modules are closer to each other.



5 Using the Context Menu

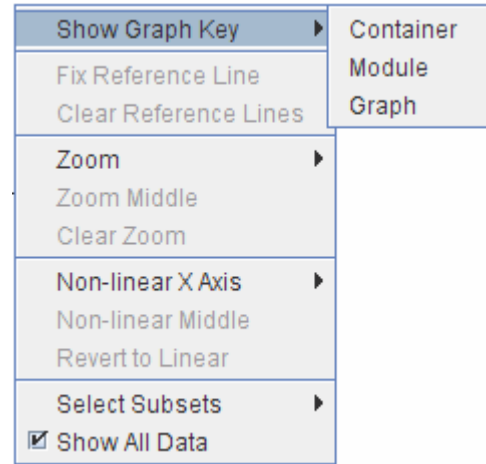
Many DataMontage operations are invoked using a popup, context menu. To invoke this menu, position the mouse cursor over the DataMontage display and press the right mouse button. DataMontage displays the menu shown at right. To select a menu choice, move your mouse cursor over the desired menu choice and then press and release the left mouse button. DataMontage graph containers can also be configured with custom context menu operations. If a particular DataMontage graph container has been configured in this way, additional menu choices will appear at the bottom of the popup menu.

A DataMontage container can optionally be configured to show only some of the popup menu choices described in this document.

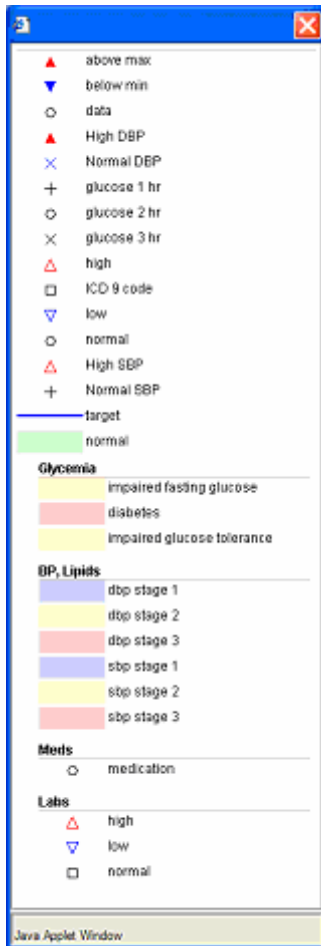


Some of the menu choices display a triangle to the right of their label. When you select one of these choices, DataMontage displays a submenu that offers additional choices. For example, if you select the *Show Graph Key* menu choice, DataMontage displays a submenu that prompts you to select the type of graph key to display, as shown at right.

In this document, “select the xxx/yyy menu choice” means select the xxx choice from the main menu to display its associated submenu and then select yyy from the submenu.



5.1 Show Graph Key



DataMontage displays three types of graph keys. To display a graph key for the entire DataMontage container, select the *Show Graph Key/Container* menu choice. The top of this graph key describes each graphical element (symbol, line, and region group) used across modules in the container. In the example at left, 14 symbol groups (“above max” to “Normal SBP”), the “target” line group, and the “normal” region group apply to any modules in the container.

Below the descriptions of container-wide graphical elements, the graph key describes the graphical elements defined for each module. In the example at left, three region groups are defined for all graphs in the Glycemia module: “impaired fasting glucose”, “diabetes”, and “impaired glucose tolerance”. Below the descriptions of each set of module-wide graphical elements, the graph key describes the graphical elements used by individual graphs or timelines, if any.

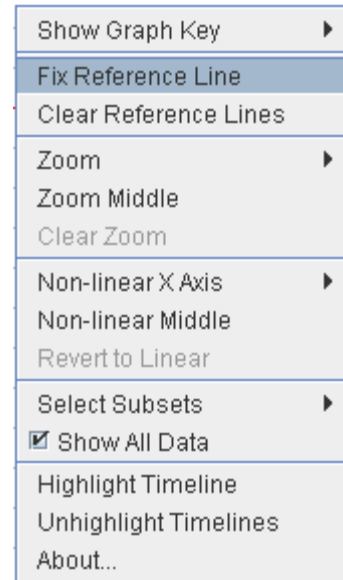
You can also display a graph key for the module or graph/timeline specified by the mouse cursor’s position by selecting the *Show Graph Key/Module* or *Show Graph Key/Graph* menu choices.

5.2 Fix Reference Line

When you press the left mouse button over a graph or timeline, DataMontage displays a red vertical reference line in all graphs and timelines at the datetime or floating point x value specified by the mouse cursor position. In the figure in section 1, a vertical x/datetime reference line is drawn in the graph and in both timelines at the date 09.29.01. After setting an x/datetime reference line, the mouse rollover text shows the difference between the reference line and the datetime or x value indicated by the mouse cursor position.

You can *fix* the current x/datetime reference line so that it remains displayed even after you click on another location in the graph. To fix an x/datetime reference line, press the right mouse button over the graph and select *Fix Reference Line* from the popup menu. This feature is helpful for marking x values or datetimes of interest. You can fix up to four reference lines.

You can fix up to four reference lines. To clear all x value/datetime reference lines, press the right mouse button over the graph and select *Clear Reference Lines* from the menu.

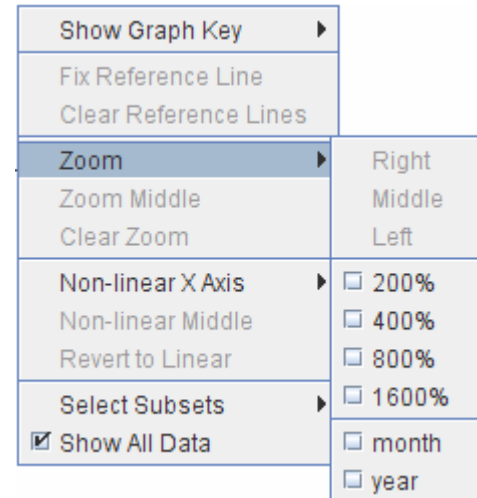


5.3 Zoom

A graph container can be configured to enable zooming and scrolling. You can "zoom in" to get a close-up view of a subset of the data or "zoom out" to see more of the data at a reduced size. When only a subset of the x axis range is displayed by the container, a horizontal croll bar appears at the bottom of the container which you can use to scroll forward and backward through the data.

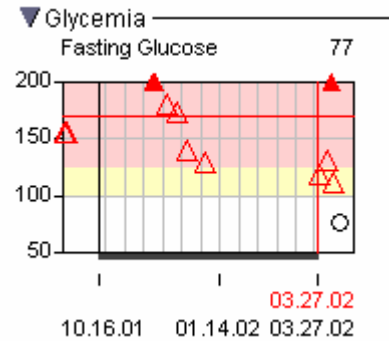
DataMontage provides three ways of specifying the zoom period. First, you can zoom to the time interval specified by the reference timeline and, optionally, the position of the mouse when the context menu was selected via right mouse click. Select *Zoom/Right* to zoom to the time interval to the right of the reference timeline. Select *Zoom/Middle* to zoom to the time interval between the reference timeline and the mouse position. Select *Zoom/Left* to zoom to the time interval to the left of the reference timeline. Selecting *Zoom Middle* from the context menu choice is a shortcut for selecting the *Middle* submenu (*Zoom /Middle*.)

Second, you can zoom by selecting a magnification level such as 200%. Finally, a DataMontage container may be configured with custom, pre-defined zoom periods that can be selected from the Zoom menu. In the example at right, zoom periods have been pre-defined for *1 month* and *1 year*. To restore the display to normal magnification, select *Clear Zoom*.



5.4 Non-Linear X Axis

DataMontage enables you to specify a time interval (or x value interval) of interest and view the data in this interval using most of the width of each graph or timeline. Data outside of this interval are displayed in a compressed format using the remainder of each graph or timeline. This feature provides a closer look at the data that lie within the interval of interest while still showing data outside of this interval in a compressed format. You can control how much of the width of each graph or timeline is allocated to the interval of interest by selecting 50%, 60%, or 75% from the submenu. When DataMontage displays data using a non-linear x axis, a thick line along the x axis highlights the interval of interest. In the example below, the time interval of interest starts on 10.16.01 and ends on 03.27.02. Data before and after this interval are displayed in a compressed format.



DataMontage provides two ways of selecting the time interval to expand. First, you can expand the displays based on the positions of the x/time reference line and, optionally, the mouse position. There are five submenu choices. Submenu choice *Right of 2 intervals* expands the time interval to the right of the x/datetime reference line. Submenu choice *Right of 3* expands the rightmost time interval of the three intervals separated by the x/datetime reference line and mouse position. The left and middle intervals are compressed. *Middle* expands the middle of the three intervals, *Left of 2* expands the interval to the left of the x/datetime reference line, and *Left of 3* expands the leftmost interval of the three intervals separated by the x/datetime reference line and the mouse position.

Show Graph Key	
Fix Reference Line	
Clear Reference Lines	
Zoom	
Zoom Middle	
Clear Zoom	
Non-linear X Axis	Right of 2 Intervals
Non-linear Middle	Right of 3
Revert to Linear	Middle
Select Subsets	Left of 2
<input checked="" type="checkbox"/> Show All Data	Left of 3
	From Zoom Period
	<input type="checkbox"/> 50%
	<input type="checkbox"/> 60%
	<input checked="" type="checkbox"/> 75%

Second, you can select submenu choice *From Zoom Period* to expand the interval that is the current zoom period. To restore the display to a linear time scale, select *Revert to Linear*.

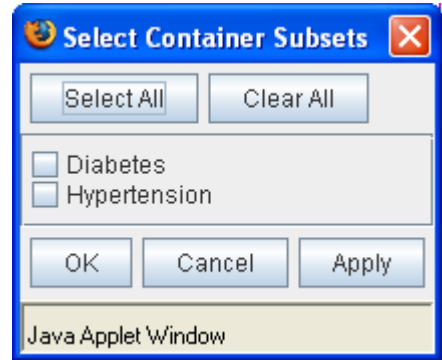
5.5 Select Subsets

A DataMontage container can be configured to provide custom *graph subsets* that let you specify that one or more pre-defined subsets of the graphs and timelines should be displayed and all others should be hidden. This feature lets you explore large datasets by selecting and viewing meaningful subsets. DataMontage provides three ways of selecting a subset of the graphs and timelines for display: container subsets, module subsets, and individual graphs and timelines. To clear the subsets and show all timelines and graphs, select context menu choice *Show All Data*.

Show Graph Key	
Fix Reference Line	
Clear Reference Lines	
Zoom	
Zoom Middle	
Clear Zoom	
Non-linear X Axis	
Non-linear Middle	
Revert to Linear	
Select Subsets	<input type="checkbox"/> Container Subsets
<input checked="" type="checkbox"/> Show All Data	<input type="checkbox"/> Module Subsets
	<input type="checkbox"/> Individual Timelines & Graphs

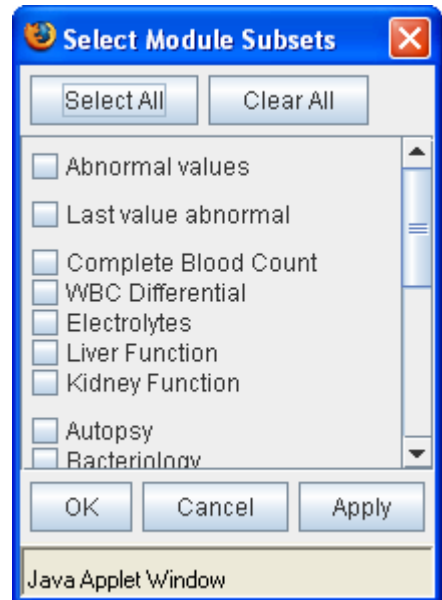
5.5.1 Container Subsets

Custom *container subsets* specify a subset of the graphs and timelines that may appear in any of the modules. For example, if a DataMontage container contains timelines that display a patient's diagnoses, medications, and lab data, organized within three modules, a container subset might show a subset of the timelines that are relevant to patients with a particular medical problem, such as diabetes. To select a container subset, select context menu choice *Select Subsets/Container Subsets*. Then, in the *Select Container Subsets* popup dialog, select each desired subset by checking its check box. DataMontage will display a timeline or graph if it belongs to any of the subsets you select. The figure at right shows an example check list of custom container subsets.



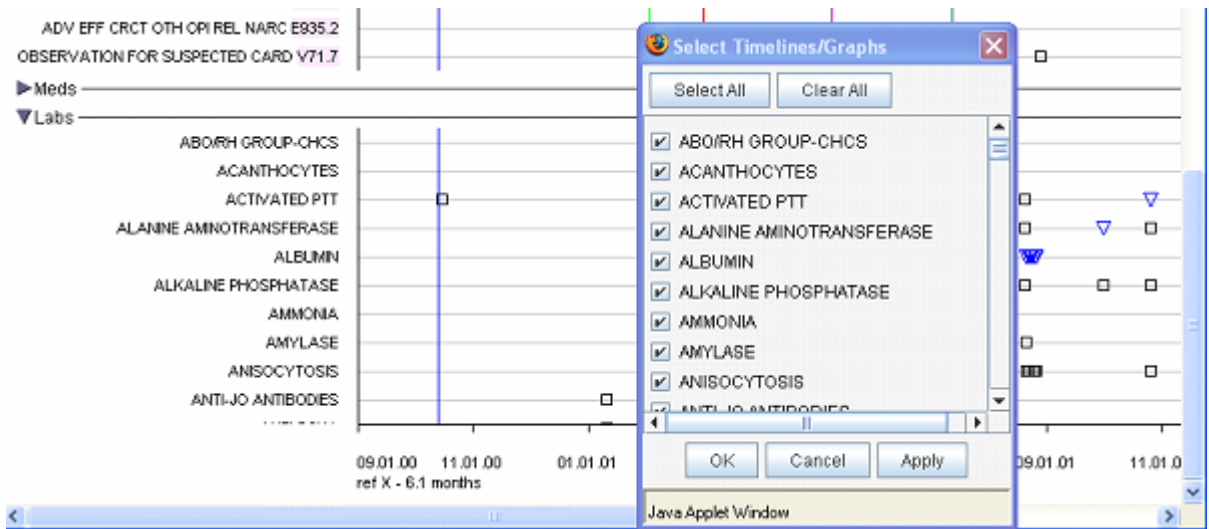
5.5.2 Module Subsets

Module subsets lets you select one or more pre-defined subsets of the graphs and timelines in the module in which you pressed the right mouse button to show the context menu. For example, if your mouse was positioned over a module containing labs data, subsets could be created that let you select timelines that contain abnormally low or high data values or timelines for lab variables that belong to common lab panels such as Complete Blood Count. To select module subsets, select context menu choice *Select Subsets/Module Subsets*. Then, in the *Select Module Subsets* popup dialog, select each desired subset by checking its check box. The figure at right shows an example check list of custom, module subsets.



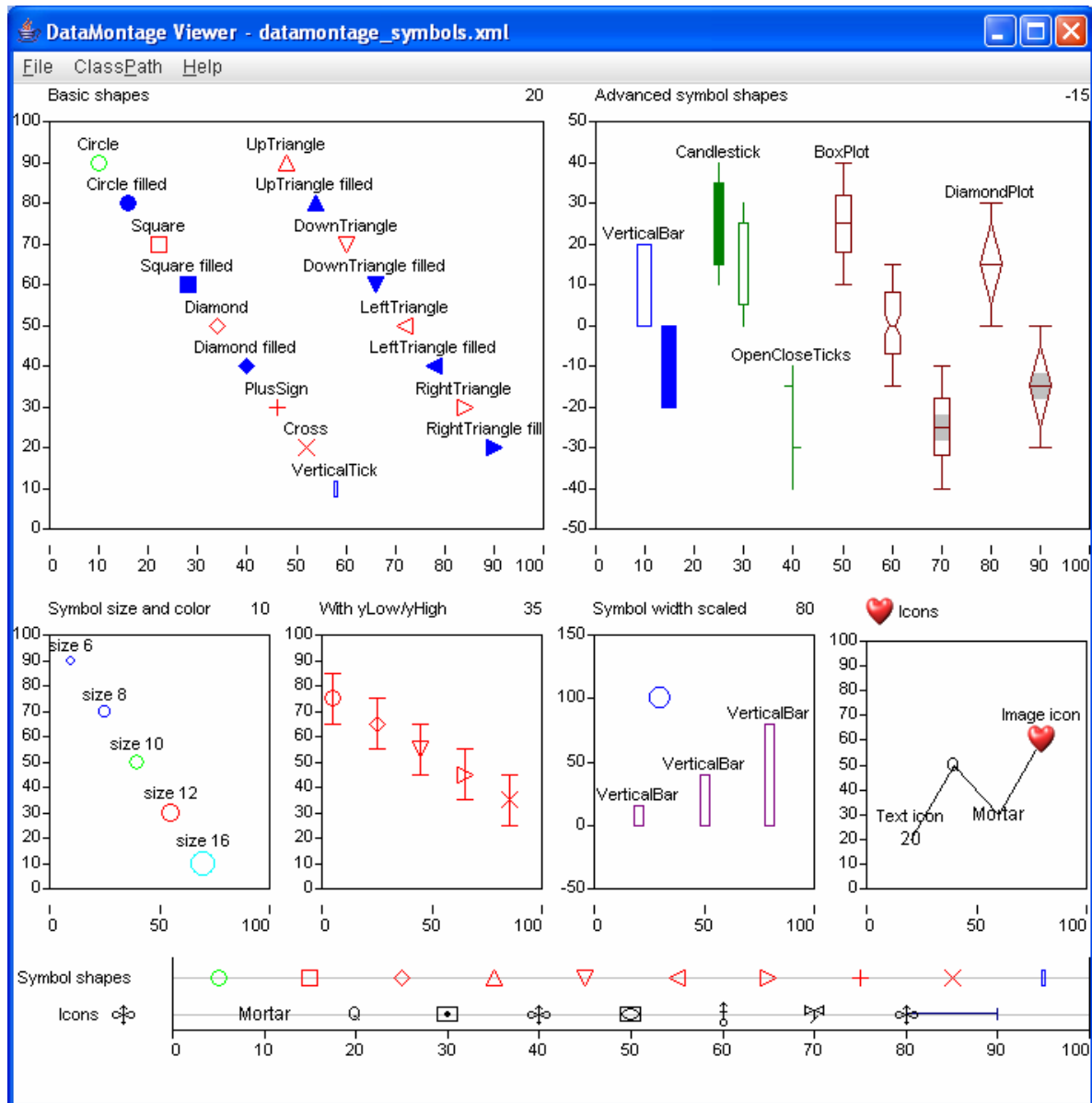
5.5.3 Individual Graphs & Timelines

You can select or deselect individual graphs and timelines in a module for display by selecting context menu choice *Select Subsets/Individual Timelines & Graphs*. DataMontage will display a popup dialog that contains one checkbox for each timeline or graph in the current module, labeled with its name. If no subsets have been selected, all timelines and graphs will initially be checked. If one or more subsets have already been selected, checkboxes corresponding to the timelines and graphs that belong to those subsets will initially be checked.



6 Symbol Groups, Line Groups, and Custom Icons

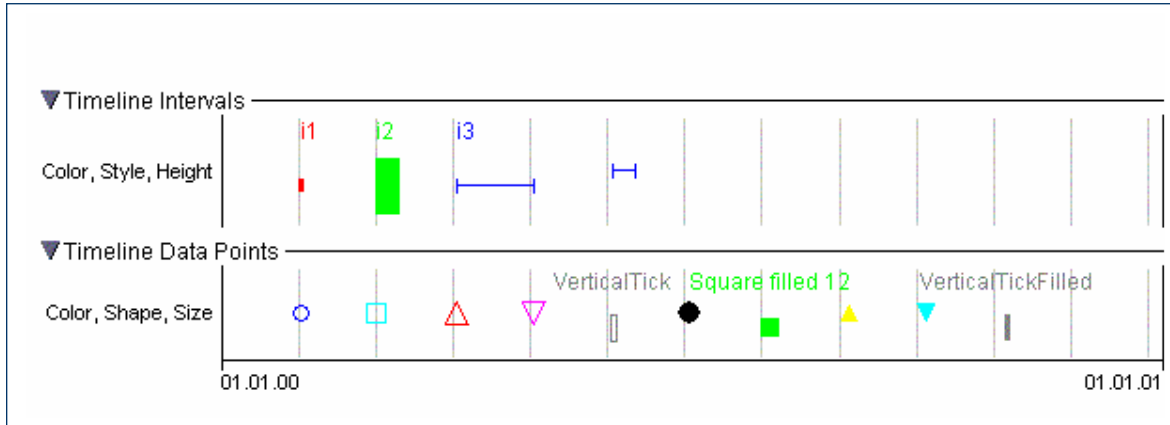
Timelines and xy graphs use symbols to display data points associated with points in time or floating point x values. Each data point can belong to a symbol group that specifies the symbol's shape, size, color, and fill. For example, one symbol group could be used to display values that lie within the normal range. Another symbol group could be used to highlight high values, and a third symbol group could be used to highlight low values. Custom icon support lets you draw data points using image icons, text strings, or arbitrary graphics drawn by custom drawing software. For example, the bottom timeline labelled *Icons* in the figure below shows how icons can display standard Army symbology to show time-stamped events involving different types of military units.



Lines in XY graphs can connect data points that belong to the same variable. Data points connected in this way belong to the same line group which specifies the color and thickness of the connecting line.

7 Timeline Interval Groups

Timelines can display timeline intervals and data points. The color, style, and height of each timeline interval is specified by its timeline interval group. There are two timeline interval styles: Bar (default) and Whisker. The figure below shows red and green timeline intervals that use a Bar style and two blue timeline intervals that use a Whisker style.

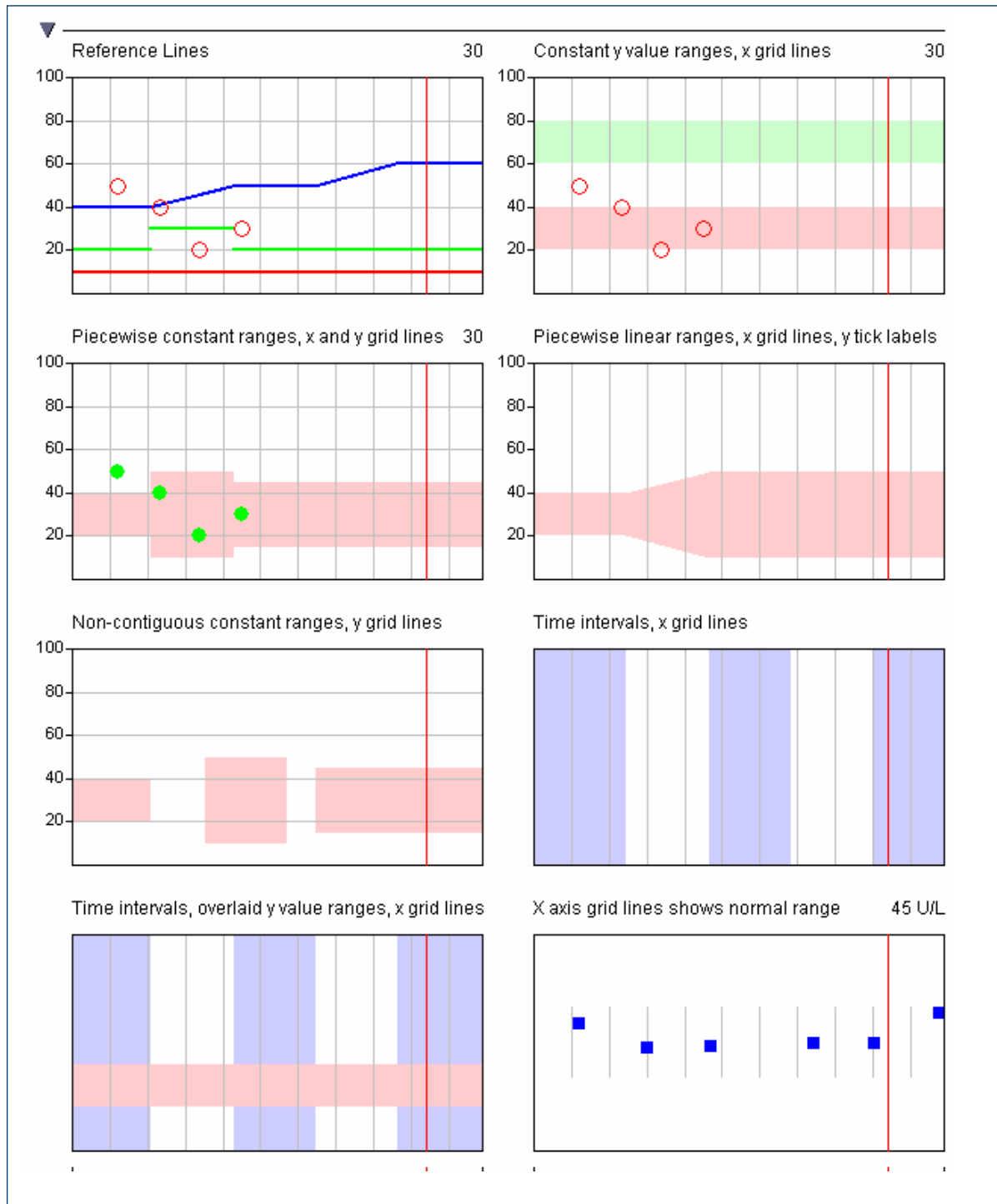


8 Reference Data - Lines, Regions, and Intervals

XY graphs can display *reference value lines* that help you compare data points to y reference values. In the figure in section 1, the red, yellow, and blue reference value lines show constant values and span the range of the graph. Reference value lines can also be straight line segments with zero, positive or negative slope that are bounded by two datetimes or two floating point x values. One or more reference value lines can belong to the same line group and share the same meaning and appearance (color, thickness). Graphs can display piecewise linear approximations to curved reference lines by concatenating multiple reference lines.

XY graphs can display *reference regions* as colored backgrounds that help you compare data points to ranges of x or y values. Reference regions can be bounded horizontally by lower and/or upper x bounds or they can span the entire width of the graph. Regions can also be bounded vertically by lower bound and/or upper y bounds, or they can span the entire height of the graph. The figure at left shows example reference lines and reference regions.

Timelines can display *reference time intervals* as colored backgrounds, bounded by start and end times or lower and upper bounds on x axis values, that help you compare data points to significant time periods or ranges of x values.



9 Rollover Text

As you move the mouse over a timeline, DataMontage displays additional information in a rollover (tool tip) window. The information that is displayed depends upon the type of graph and whether the mouse cursor is over any display objects. The following table describes default rollover information displayed within timelines:

<i>Object below mouse cursor</i>	<i>Information displayed in rollover window</i>
Timeline label	1. Rollover text that describes the timeline as a whole.
None	2. "X =" followed by the date/time indicated by cursor position 3. Difference between the times indicated by the cursor position and the x/datetime reference line, if one has been set.
Time interval	1. "Time Interval" followed by the time interval's label. 2. Start and end time of time interval
Data point	1. "Data Point" followed by the data point's label. 2. X value (time) of the data point 3. Difference between the times indicated by the cursor position and the x/datetime reference line, if one has been set.

The following table describes rollover information default displayed within xy graphs:

<i>Object below mouse cursor</i>	<i>Information displayed in rollover window</i>
Graph label	1. Rollover text that describes the graph as a whole.
None	1. X value (date/time) indicated by cursor position 2. Y value indicated by cursor position 3. Difference between the times indicated by the cursor position and the x/datetime reference line, if one has been set.
Data point	1. "Data Point" followed by the data point's label. 2. X value (time) of the data point 3. Y value of the data point 4. Difference between the times indicated by the cursor position and the x/datetime reference line, if one has been set.
Reference value line	1. "Reference Value Line" followed by label of reference value line's line group 2. X and Y value of the cursor position 3. Difference between the times indicated by the cursor position and the x/datetime reference line, if one has been set.
Reference region	1. "Reference Region" followed by the label of reference region's group 2. X and Y coordinates of the cursor position 3. Difference between the times indicated by the cursor position and the x/datetime reference line, if one has been set.

If your DataMontage container has been configured with custom user interactions, the rollover text you see may differ from the text specified above.

10 Popup Details and Navigation

You can display a web page within popup details window to show details associated with a graph data point, timeline data point, or timeline interval by pressing the left mouse button over the data point or interval.

If you are viewing a DataMontage applet within a web browser, you can navigate to a new web page that has been associated with a display object (such as a graph data point, timeline data point, or timeline interval). First, press the left mouse button over the display object to select it. If a navigation web page has been associated with the display object, the popup menu will contain a menu choice labelled *Navigate*. Select this menu choice to navigate to the web page associated with the display object.

11 Time-Stamped Text Notes

A DataMontage container can show short, text notes. When you click on the display of a note, a time or x value reference line is displayed in all graphs in the container at the x value or datetime associated with the note, as shown below. You can click and drag the divider to allocate space between the note area and the graph area of the container.

