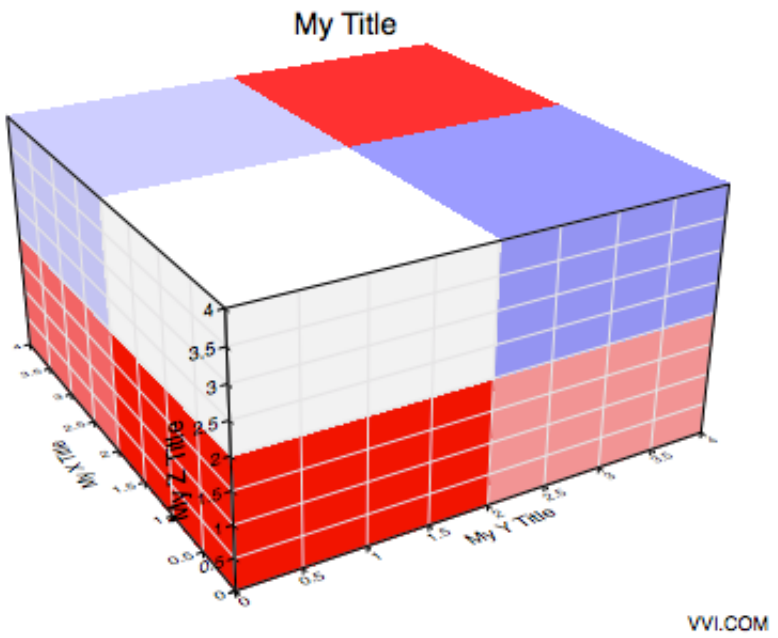
Vvidget™ Server Reference Manual

Revision 2.2.4 (12.4.9)
— April 5, 2016 —
By VVI ®
888-VVI-PLOT
www.vvi.com

Vvidget Server is used in web applications to make, i.e.: serve you up, graphs like that shown below.



Graphs are made from the key-value dictionaries described in this manual. The way to form the dictionary depends on your application. The list below gives some starting points.

If you are programming a ...

- Web interface then the Dictionary section gives examples of forming URLs in addition to describing the input forms.
- Web forms interface then the Forms section shows how to construct HTML FORM blocks for data input. With careful consideration, you can integrate forms with other technology to traverse data visualization with little additional programming.
- Web Application Server (ASP, WebObjects, PHP, etc.) then you need to form URLs using those facilities to make a chart. That represents a level of indirection because you are forming URLs, not images. That way of working is not immediately obvious so it is mentioned explicitly here.
- The Peer Visual Server is also programmable, but that use is out of the context of the Vvidget Server product. For additional information please contact VVI.

For a system overview see Design.

Vvidget Server > Overview

Below is a brief list of overview sections. If you are new to Vvidget Server then you may want to start off by reading the section Getting Started.

Overview

Getting Started	Describes how to get started.
Design	Gives an overall design of the Vvidget Server System.

Vvidget Server > Overview > Getting Started

Here are a few options to get started:

High-Level Overview:

The Design section is a good section to read because it gives a top down view.

Web Applications And HTML Generation:

The Forms section is a good section to see HTML examples.

The Dictionary sections show example URLs and also describe each key value pair of the dictionary represented by the URL.

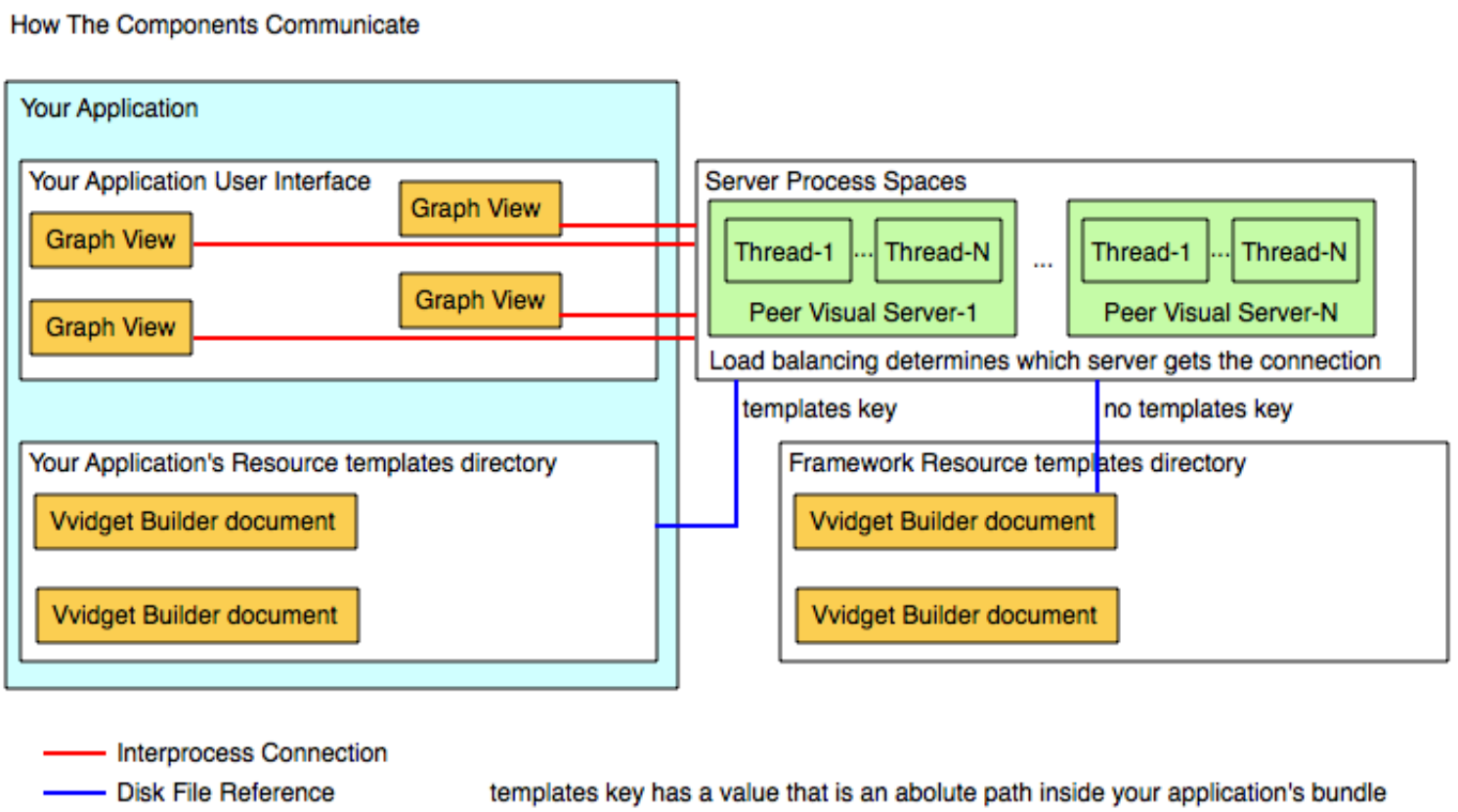
Vvidget Server Reference Manual

Vvidget Server > Overview > Design

Vvidget Server can be used in a desktop application, static HTML, or in a web app server configuration. The designs for each are diagrammed below.

Desktop Application

The system you use while programming with Vvidget Server is diagrammed in the following figure.



The Graph Views in your application sends input to the Peer Visual Server which returns a resulting graph image. The graph layouts (fonts, grid widths, colors and annotation, etc.) are maintained in template directories. You can use the default layouts in which case you do not have to be concerned about templates. However, sooner or later you will probably want to add your own graphics to the graphs in which case you will need to add a templates directory to your application's Resource folder.

You use the graph view's input string constructor to form key value pairs as input to the server. Once all those entries are formed you display your graph view and the communication starts. For example, to form a "data_value" key and value pair use this code:

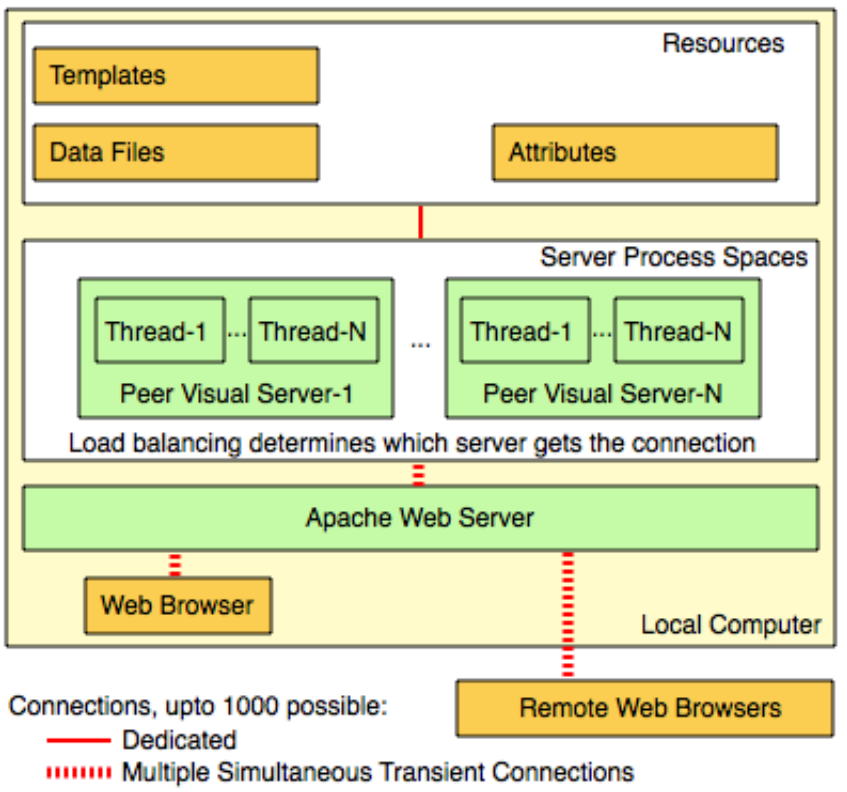
```
VP_Input_String_Constructor *inputStringConstructor;
NSString * dataString;

inputStringConstructor = [myGraphView get_VP_input_string_constructor];
dataString = [myTextView string];
[input_string_constructor VP_append_key:"data_values" string_value:data_string];
```

The key value pairs are described in the Dictionary section.

Static HTML

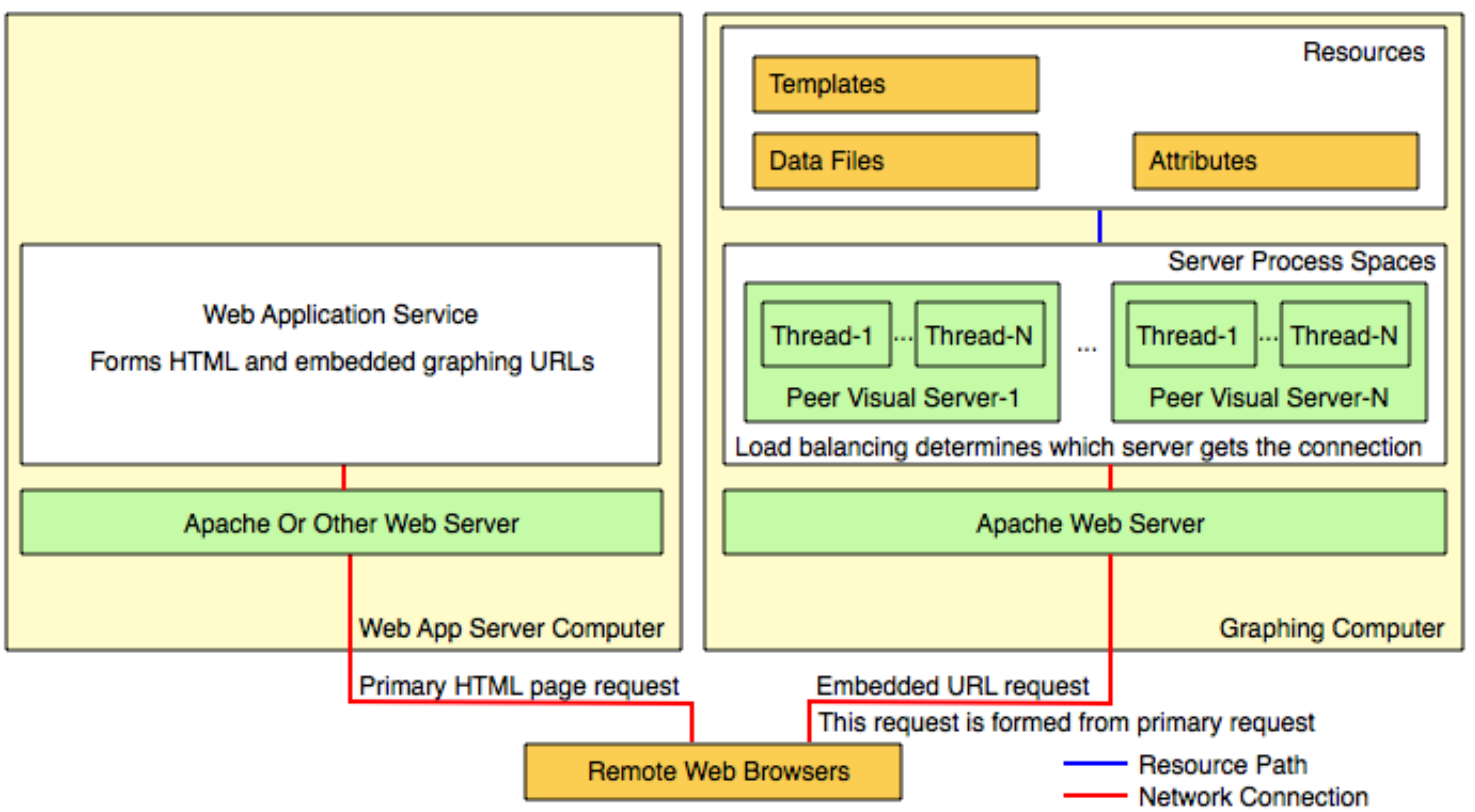
By using static Peer Visual HTML you can provide charts of your data without having to store the chart images. You can also provide PDF forms for print without further conversion. In addition, you can provide forms processing to permit access to your information.

The static html design is diagrammed below. The request to the graphing server comes directly from the web browser after it reads your HTML file in the normal way.



Web Application Server

By utilizing a web application server you can automate the construction of the peer visual URL. In this way you can construct URLs dynamically based on query state information. The Peer Visual server can also be programmed (optional) to respond to custom application service URLs.



Vvidget Server > Examples

As you peruse this user manual make special note of each figure. They are Vvidget Builder documents made with Vvidget Builder, stored on your disk, and then retrieved and imaged in real time when you open the corresponding page in your web browser. So this entire manual is an example of the use of Vvidget Server. The following sections show some other examples.

The following is a brief list and definition of the Examples sections:

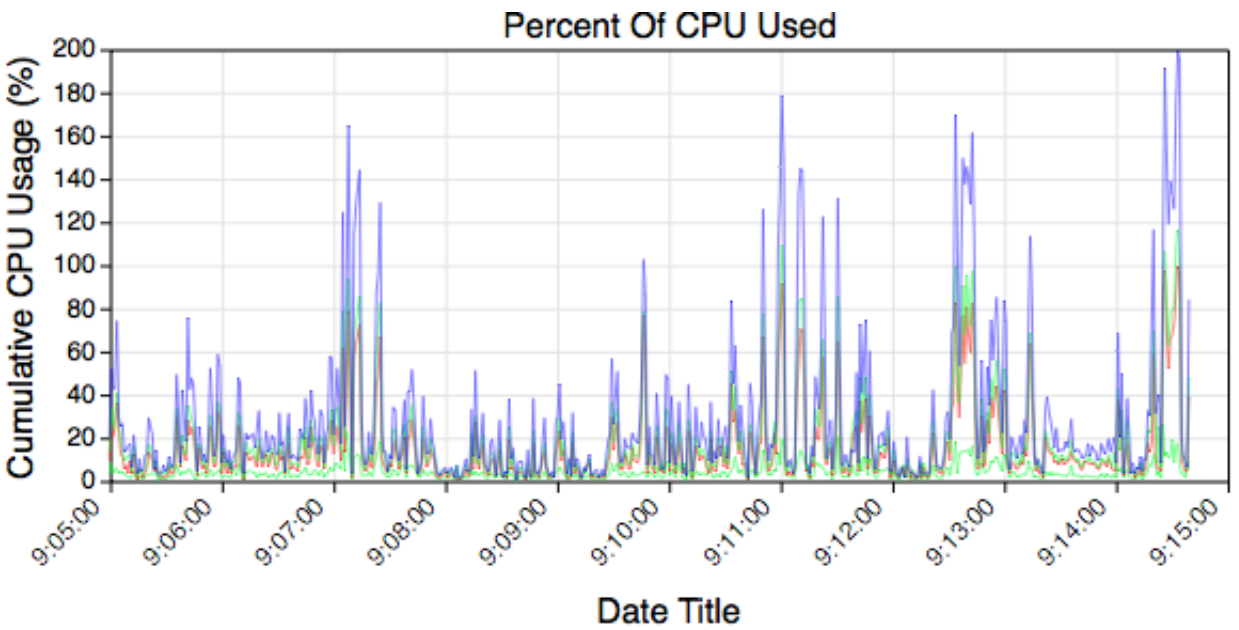
Examples

Dynamic Examples	Gives examples of graphs and visuals that are made from other types of data and may be useful to you.
Other Dynamic Examples	Shows how any Vvidget Builder document can be turned into a high-transaction robust server oriented solution.
System Graphs	Describes built in system graphs.

Vvidget Server Reference Manual

Vvidget Server > Examples > Dynamic Examples

Vvidget Server incorporates real-time, dynamic and high-transaction imaging technology. All figures in this manual are made on demand by Vvidget's imaging server called The Peer Visual Server. That server just made the following graph which shows your last 10 minutes of CPU use on your computer:



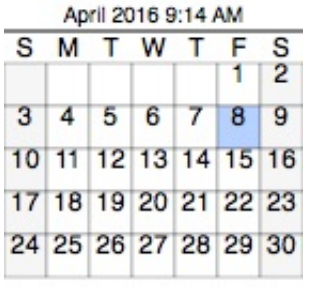
(Refresh your web browser to see the current time)
Click For A Print Version

If you put this HTML in your web page:

```
<IMG SRC="http://host.domain.com/cgi-bin/nph-pvs?1&d&statistics&1&600,300"
WIDTH=600 HEIGHT=300 BORDER=0>
```

Where *host.domain.com* is the DNS name of your computer (such as www.vvi.com), then you can view your computer's CPU usage from anywhere in the world in a web browser.

You can also make calendars of today:



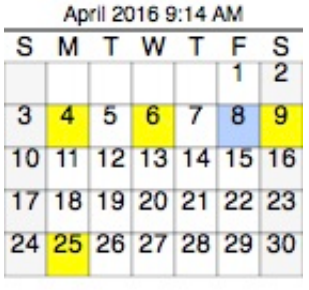
Click For A Print Version

If you put this HTML in your web page:

```
<IMG SRC="http://host.domain.com/cgi-bin/nph-pvs?pvs_version=1&
image_maker=calendar&image_width=140&image_height=150&image_output_type=2&image_contact=d&
start_month=0&start_year=0" WIDTH=140 HEIGHT=150 BORDER=0>
```

Where *host.domain.com* is the DNS name of your computer (such as www.vvi.com), then you can have updated calendars on your web site.

You can also mark dates (highlighted in yellow), such as the dates 4,6,9,25 as in this example:



by adding a `selected_days_of_month` key. For example, the calendar above was made with this URL:

```
<IMG SRC="http://www.vvidget.org/cgi-bin/nph-pvs?pvs_version=1&image_maker=calendar&
image_width=140&image_height=150&image_output_type=2&image_contact=direct&
start_month=0&start_year=0&selected_days_of_month=4,6,9,25" WIDTH=140 HEIGHT=150 BORDER=0>
```

If you use the URL then replace `localhost` with the name of your computer (as usual).

If you want, you can incorporate print calendars into your web site. To make a month for a calendar update the following selections and then click "Make Calendar":

Month: Jan Year: 2016 Output Type: PDF Submit: Make Calendar

You can view the source to this page and see the form that made the calendar and then incorporate that into your own web site.

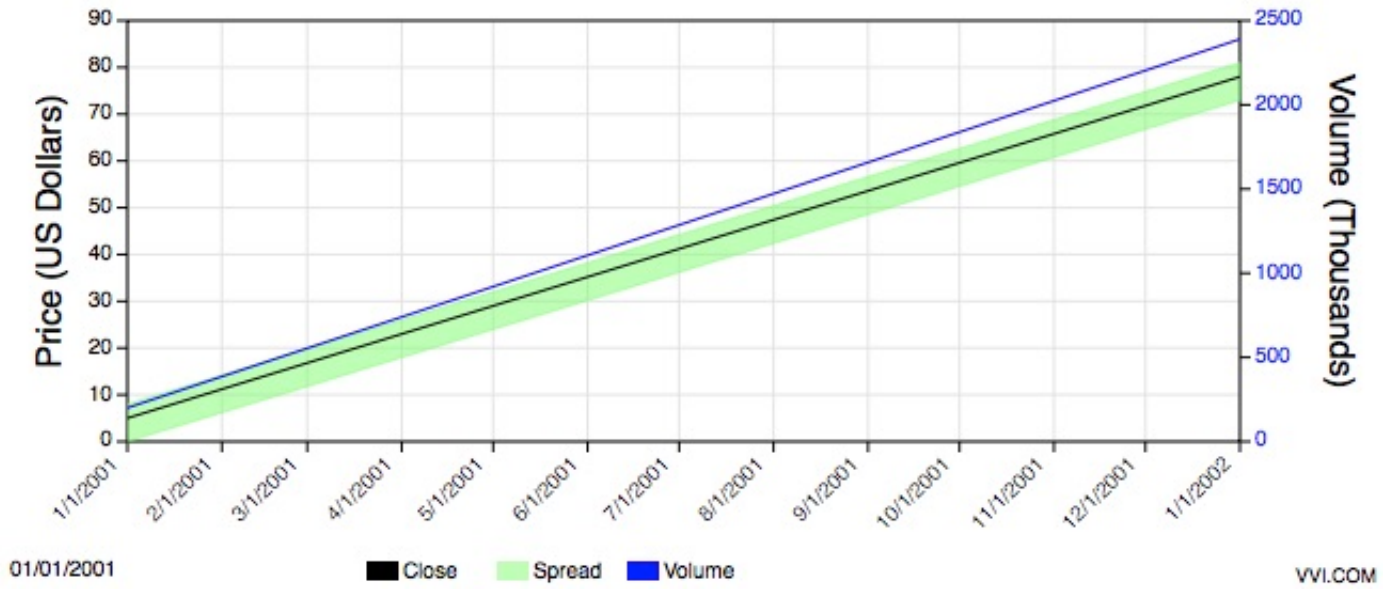
With Vvidget Builder you can make very detailed information documents. Once you master a particular visual type then if you need to replicate it many times you can let the Peer Visual Server (an optional programmable graphing server) make them on demand for you just like the examples above.

You can also use the preconfigured functionality of the Peer Visual Server included in Vvidget Server to make graphs.

Vvidget Server Reference Manual

Vvidget Server > Examples > Other Dynamic Examples

The following stock chart graph is an example graph embedded into the Peer Visual server that comes with Vvidget Server.



It read a Vvidget Builder document and inserted linear point data onto the graph. In an actual use, the data would come from a real-time stock feed or database server with stock prices.

That functionality can be hooked up to a HTML form for query. For example, to make a stock chart of a particular date range update the selections below and then click "Make Chart". It will take a Vvidget Builder document stored on your hard disk and add fake data to it (a sequence of points on a line) to give the final result.

Ticker Or Index: DJIA | Start Date: Jan 1 2016 | End Date: Feb 1 2016 | Output Type: JPEG | Submit: Make Chart

There are many more pre-canned examples of the graphing server features. A much more comprehensive explaination is available with the Peer Visual Server product (optional to Vvidget Server).

The main point to make is that any Vvidget Builder document can be hooked up to a robust high-transaction information visualization server, so if that is your direction then there is plenty of room for growth and your knowledge of constructing Vvidget Builder document scales to large server-oriented problems.

Vvidget Server Reference Manual

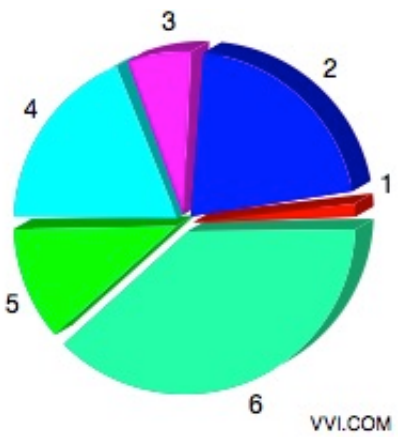
Vvidget Server > Examples > System Graphs

System graphs are non-keyed graphs that are used for system related information as well as backwards compatibility with older string input encoding styles. They are of little value for general programming.

An example of a system graph is this URL:

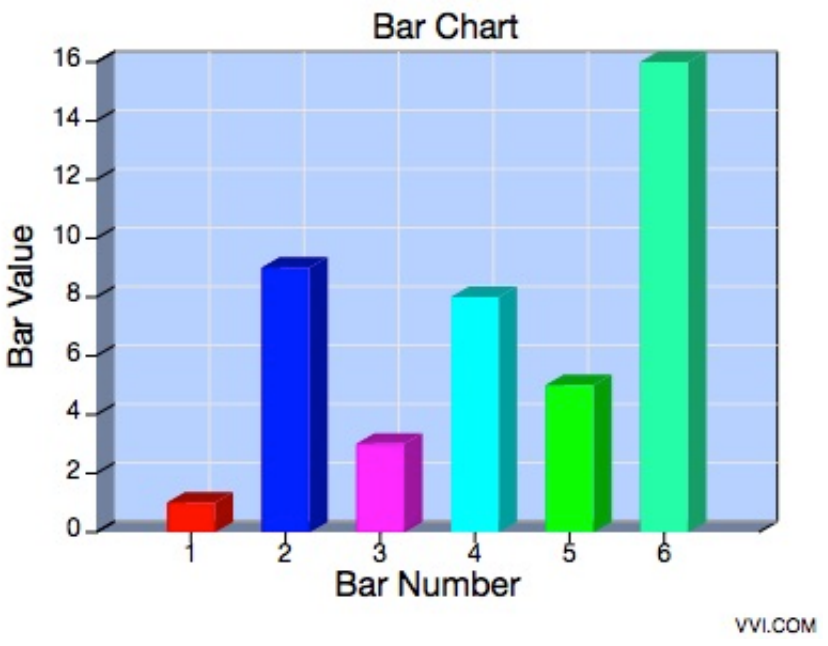
```
http://www.vvidget.org/cgi-bin/nph-pvs?1&EMAIL&pie&2&200,200&1.0,9.0,3.0,8.0,5.0,16.0
```

which makes this pie chart:



The data is the sequence of values `1.0,9.0,3.0,8.0,5.0,16.0`. You can change those values as you wish. You can also make bar charts using this type of URL:

```
http://www.vvidget.org/cgi-bin/nph-pvs?1&EMAIL&column&2&400,300&Bar%20Chart&Bar%20Number&Bar%20Value
&1.0,9.0,3.0,8.0,5.0,16.0
```



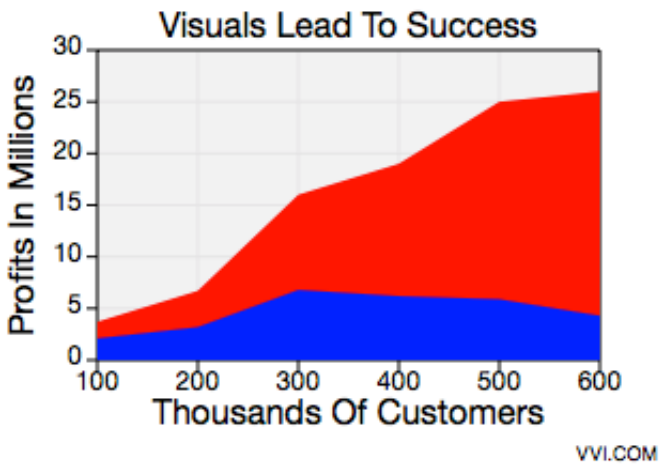
Print versions of the graphs can be made by changing the first "2" to "1005 like this:

```
http://www.vvidget.org/cgi-bin/nph-pvs?1&EMAIL&column&1005&400,300&Bar%20Chart&Bar%20Number&Bar%20Value
&1.0,9.0,3.0,8.0,5.0,16.0
```

Click this link: Print Version to make the print version of the graph.

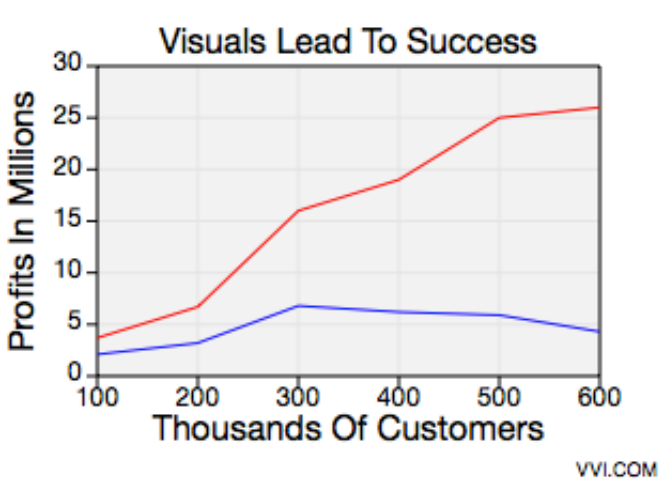
You can also make area and line charts. For instance:

Area charts:




```
http://www.vvidget.org/cgi-bin/nph-pvs?1&demo@vvi.com&area&1&325,225&Visuals%20Lead%20To%20Success
&Thousands%20Of%20Customers&Profits%20In%20Millions&100,200,300,400,500,600
&3.7,6.7,16,19,25,26&100,200,300,400,500,600&2.1,3.2,6.8,6.2,5.9,4.3
```

Line charts:




```
http://www.vvidget.org/cgi-bin/nph-pvs?1&demo@vvi.com&line&1&325,225&Visuals%20Lead%20To%20Success
&Thousands%20Of%20Customers&Profits%20In%20Millions&100,200,300,400,500,600
&3.7,6.7,16,19,25,26&100,200,300,400,500,600&2.1,3.2,6.8,6.2,5.9,4.3
```

An explanation of this chart making functionality is available in the various sections of this chapter.

If you incorporate this functionality into your web site remember to change the "localhost" part of the URL to the address of your own computer (for example, the address of the VVI web server is www.vvi.com).

Vvidget Server > Forms

This section shows how to embed the Dictionary key value pattern into HTML FORM blocks. You can exercise the sections and then look at the HTML file (View Source) to see how it is implemented.

The following is a brief list and definition of the example sections:

Forms	
Overview	Overview of this forms section. Why do you want to learn about forms?
Line Graph	Shows form input for a line graph.
Area Graph	Shows form input for an area graph.
Pie Chart	Shows form input for a pie chart.
Data File Line Graph	Shows how to make a graph using form entries and delegate the data values to a file on the graphing server computer.
Input String File	Shows how to partition the input string dictionary formation to naturally split form v.s. function.
URL Line Graph	Shows how to make a graph using form entries and delegate the data values to a URL query.
Input String URL	Shows how to redirect the input string formation to a URL. If the URL is a CGI then the formation is dynamic. In other words, the peer visual server dictionary and data values become programmable. In addition, URLs can be encoded to redirect to other computers so the query can be a distributed computation.

Vvidget Server > Forms > Overview

This forms section is useful for Web application programming, as well as useful in its own right to show how to implement forms.

Forms is a convenient way to script key value pairs and test and demonstrate them. Once the effect is established the key value encoding can be placed in a Web application or static HTML.

Forms examples such as URL Line Graph are particularly interesting because it shows how to abstract the data query by redirecting it to another web server query. This is particularly useful if your data is not in a flat file format, but rather in a database server for instance. There are many examples of retrieving data from a database server using CGI interfaces. If your query is not at the data point level then the form Input String URL shows the same level of indirection, but at a more abstract level. That example reverses the indirection found when the query is built from a web application server.

Using URLs in the query has another advantage. Namely, the data can reside on a data server computer separate from the graphing server.

Flat file data storage, on the other hand, provide a very good amount of straightforward design and are very easy to implement, understand and maintain. As long as the data is in the correct preconceived format this method is probably the best. Of course, the Peer Visual URL also permits data to be encoded inline in the URL for direct encoding, but if the data sets are large then this is not the best way to encode the URL.

Vvidget Server Reference Manual

Vvidget Server > Forms > Line Graph

To make a line graph first update the entry fields and then click "Make Line Graph". See the HTML source for this example to program your own web page.

Main Title:

Main Title

X Title:

X-Axis Title

Y Title:

Y-Axis Title

Curve 1 Data(Sequence of x y values, or file path):

1 1 2 3 3 10

Curve 2 Data(Sequence of x y values, or file path):

1.2 5 2.2 2 3.2 8

Data Entry Type: Point Data

Output Type: JPEG

Graph subtype: Linear

Submit: Make Line Graph

Vvidget Server Reference Manual

Vvidget Server > Forms > Area Graph

To make an area graph first update the entry fields and then click "Make Area Graph". See the HTML source for this example to program your own web page.

Main Title:

Main Title

X Title:

X-Axis Title

Y Title:

Y-Axis Title

Curve 1 Data(Sequence of x y values, or file path):

1 2 2 5 3 20

Curve 2 Data(Sequence of x y values, or file path):

1 1 2 3 3 10

Data Entry Type: Point Data

Output Type: JPEG

Graph subtype: Linear

Submit: Make Area Graph

Vvidget Server > Forms > Pie Chart

To make a pie chart first update the entry fields and then click "Make Pie Chart". See the HTML source for this example to program your own web page.

Pie Data (Sequence of values, or file path):

1 1 2 3 3 10

Data Entry Type: Scalar Data

Output Type: JPEG

Submit: Make Pie Chart

Vvidget Server > Forms > Data File Line Graph

This example shows how to use data files to limit the data entry. Unlike the other examples, the user is constrained to predetermined data file names. To make a line graph first update the entry fields and then click "Make Line Graph". See the HTML source for this example to program your own web page.

Main Title:

Main Title

X Title:

X-Axis Title

Y Title:

Y-Axis Title

Data Set Name:

Data Sample 1

Output Type:

JPEG

Graph subtype:

Linear

Submit:

Make Line Graph

Vvidget Server > Forms > Input String File

This example shows how to use input string files to abstract the query result. The level of abstraction is determined by the division between the information in this form and the referenced input string file. If desired, all parameters can reside in the input string file on the server file, or only the data can. In this way, you can make data report forms without knowing beforehand what the data represents.

Note that keys that are not processed for the particular chart are simply ignored. Values of keys duplicated in this form and in the input string file are overwritten by the values in the input string file.

Main Title:
Main Title

X Title:
X-Axis Title

Y Title:
Y-Axis Title

Input String Path:
Input String File Sample 1

Output Type:
JPEG

Graph subtype:
Linear

Submit:
Make From Input String File

Vvidget Server > Forms > URL Line Graph

This example shows how to use URLs to limit the data entry. Unlike the other examples, the user is constrained to predetermined URL names. To make a line graph first update the entry fields and then click "Make Line Graph". See the HTML source for this example to program your own web page.

Main Title:
Main Title

X Title:
X-Axis Title

Y Title:
Y-Axis Title

Data Set Name:
Data Sample 1

Output Type:
JPEG

Graph subtype:
Linear

Submit:
Make Line Graph

Vvidget Server > Forms > Input String URL

This example shows how to use an input string URL to abstract the query result. In this way, the Peer Visual URL query can be totally programmed and abstracted. For more information see the Overview.

Note that keys that are not processed for the particular chart are simply ignored. Values of keys duplicated in this form and in the input string URL are overwritten by the values in the input string URL.

Main Title:
Main Title

X Title:
X-Axis Title

Y Title:
Y-Axis Title

CGI Script To Execute (Returns input string):
Script One - A Pie Chart

Output Type:
JPEG

Graph subtype:
Linear

Submit:
Make From Input String URL

Vvidget Server > Dictionary

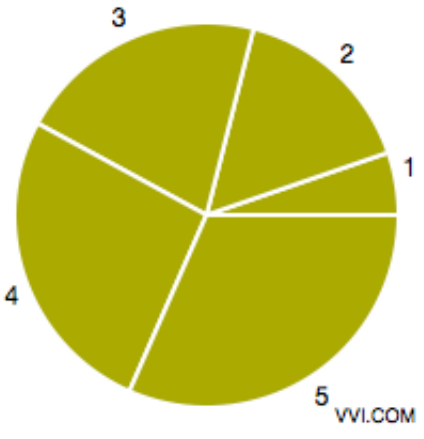
Vvidget Server uses dictionaries to make requests for graphs. The following sections describes dictionaries. You should probably start with the Overview section.

Dictionary	
Overview	A general overview of what happens when you use Dictionary.
Line Graph	Describes line graph attributes.
Area Graph	Describes area graph attributes.
Bar Chart	Describes bar chart attributes.
Column Chart	Describes column chart attributes.
Pie Chart	Describes pie chart attributes.
Point Map Chart	Describes point map chart attributes.
Date Graph	Describes date graph attributes.
Perspective Scatter Chart	Describes Perspective Scatter Chart attributes.
Perspective Surface Chart	Describes Perspective Surface Chart attributes.
Marker	Describes Marker attributes.

Vvidget Server > Dictionary > Overview

Making a graph is a matter of forming a sequence of key value pairs. That sequence is called a dictionary. The dictionary can be serialized or take on a object-oriented API that layers an encoded serialization.

For example, this pie chart:



was made using the Peer Visual Server by sending it this URL:

```
http://www.vvidget.org/cgi-bin/nph-pvs?1&EMAIL&chart&1&200,200&chart_type=5&chart_subtype=0
&chart_format_type=1&data_values=1 3 4 5 6&fill_color=AAAA00
```

Where the URL encodes the key value pairs explicitly in string form separated by the & delimiter.

The rest of this chapter deals with the way to form requests that get sent to the Peer Visual Server and how to incorporate those requests in the various end uses. To see a representative request format see Pie Chart.

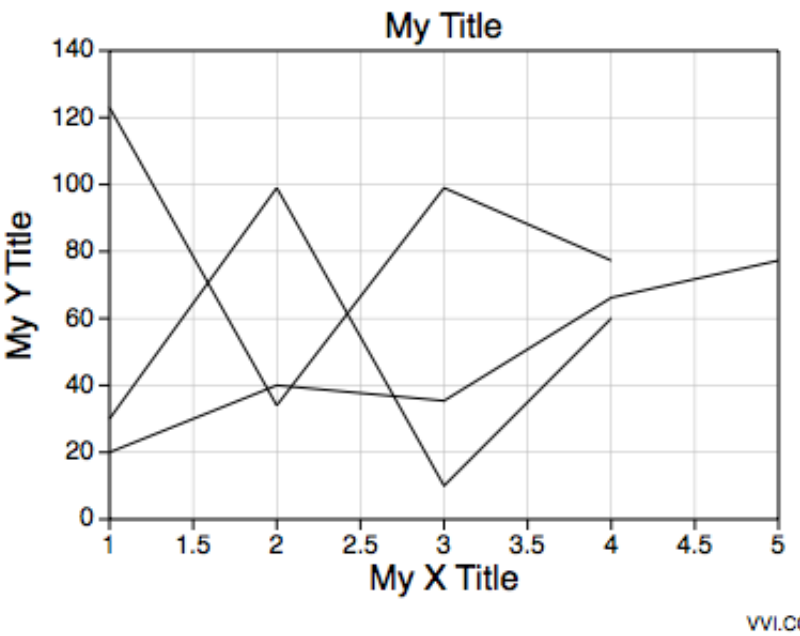
Vvidget Server Reference Manual

Vvidget Server > Dictionary > Line Graph

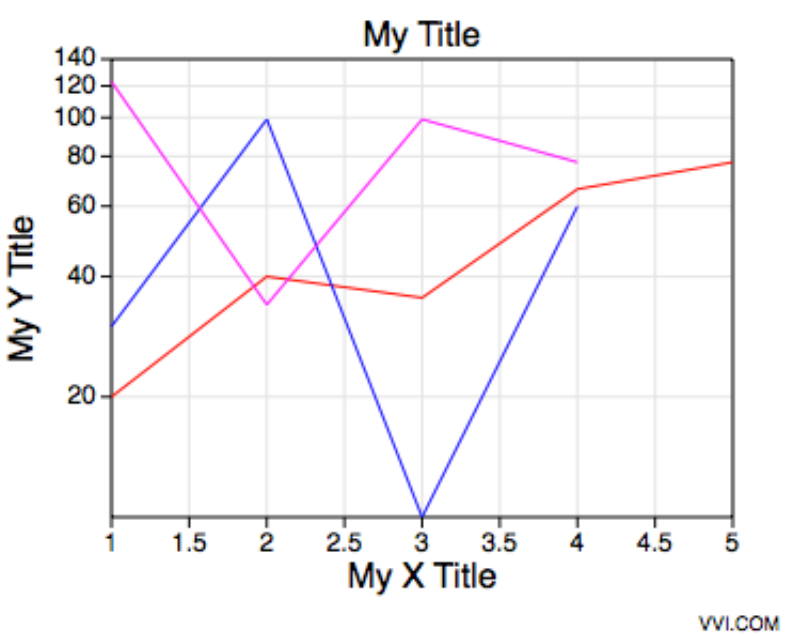
This section explains how to form an input string for a line graph such as these:

Format

Type-1, line_color=000000



Type-1, no line_color



An example input string serialization follows (appropriate for web application):

```
chart_type=1&chart_subtype=0&chart_format_type=2&title=string&x_title=string&y_title=string
&data_1=x1 y1 x2 y2 ... xN yN&data_2=x1 y1 x2 y2 ... xN yN&data_3=x1 y1 x2 y2 ... xN yN
&line_color=RRGGBBAA&templates=string
```

The following table defines the input string key and value pairs:

Chart Specific Entries	
Key	**Value Description**
chart_type[1]	The chart type is always 1 (aliased to *line*), indicating a line graph.
chart_subtype[1]	one of {0, 1, 2, 3} (aliased to {*linear* , *semilog*, *x-log y-linear*, *log-log*}) for {X-Linear, Y-Linear}, {X-Linear, Y-Log}, {X-Log, Y-Linear} or {X-Log, Y-Log} respectively.
chart_format_type[1]	An index from 1 to 2 (aliased to {*default*, *alternate*}) as shown above.
title	The main title of the graph. If this key is not present then the template's title is used.
x_title	The x title of the graph. If this key is not present then the template's x-title is used.
y_title	The y title of the graph. If this key is not present then the template's y-title is used.
data_I	A white space delimited list of values representing the x and y values of points in a sequence for curve index I where I starts at 1. See Data Oriented keys for additional information and keys.
label_I	A string for the I-th x-label value. I starts at 1. **NOTE:** If any label key is present then the data x-values are assumed unitless and an arbitrary unit must be assigned. The x-axis minimum starts at zero and runs to (N-1), where N is the maximum label index. To place a data point at each label x-value the data x-values should be the sequence {0, 1, 2, ..., (N-1)} but you may also choose to skip locations where a label is, etc.
line_color	A hex encoded representation of a RGBA color value for the line color. If this key is not present then the color table template is used.
templates	A custom Templates directory.

If you incorporate this functionality into your web site please consult Web URL.

You can also modify the following Templates:

Template Document Names	
Template	**Description**
PVST_Line_Graph	Forms the static attributes for the X-Linear, Y-Linear graph.
PVST_X_Log_Line_Graph	Forms the static attributes for the X-Log, Y-Linear graph.

PVST_Y_Log_Line_Graph	Forms the static attributes for the X-Linear, Y-Log graph.
PVST_XY_Log_Line_Graph	Forms the static attributes for the X-Log, Y-Log graph.
PVST_2Y_Line_Graph	Forms the static attributes for a two y-axis graph. The y-axis can be of any type (linear, log, etc.) that can be made in a template.
PVST_line_color_table	Forms the line colors for odd format type indices.
PVST_line_color_table_1	Forms the line colors for even format type indices.

The following are vvidget name components in the template that can be used to adjust graphical attributes of the respective parts.

Vvidget Names	
Name	**Description**
PVS_graph	The graph. All graphical attributes of the graph can be altered. When queried upon the graph limits will autoscale.
PVS_graphic_prototype	The optional curve prototype (a Function graphic). All graphical attributes of the curve prototype can be altered and will be used to generate the curves for the graph. When queried upon the curve's data will be updated. This graphic prototype must reside on the graph's (foreground) data layer.
PVS_y1_graphic_prototype	If present, used for left-axis related graphics instead of PVS_graphic_prototype. This is only applicable to 2-y-axis graphs.
PVS_y2_graphic_prototype	If present, used for right-axis related graphics instead of PVS_graphic_prototype. This is only applicable to 2-y-axis graphs.

The following Server Side Attributes define additional non-graphic attributes. A file with this name in the templates directory will alter the parameters that appear in the attribute file.

Server Side Attributes Names	
Name	**Description**
PVST_Line_Graph_attributes	Main server side attributes.

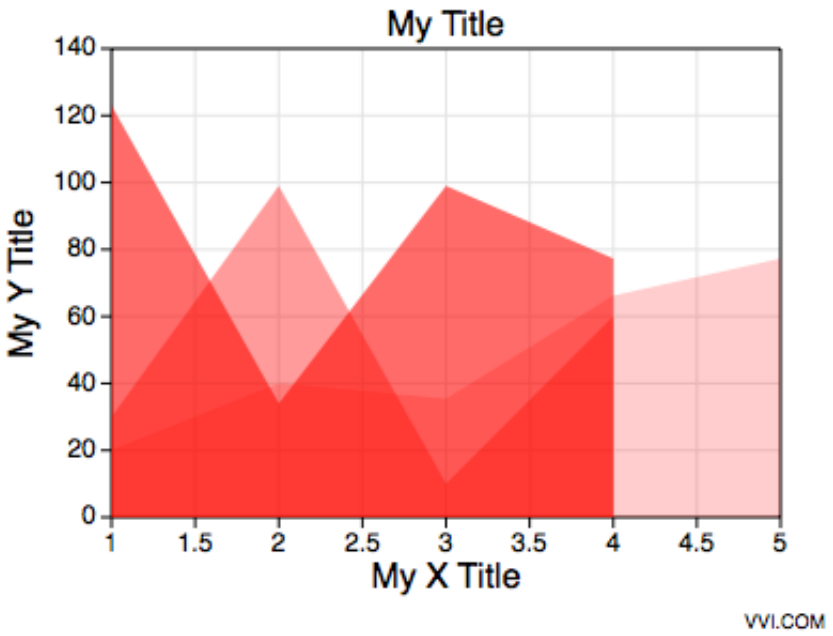
Vvidget Server Reference Manual

Vvidget Server > Dictionary > Area Graph

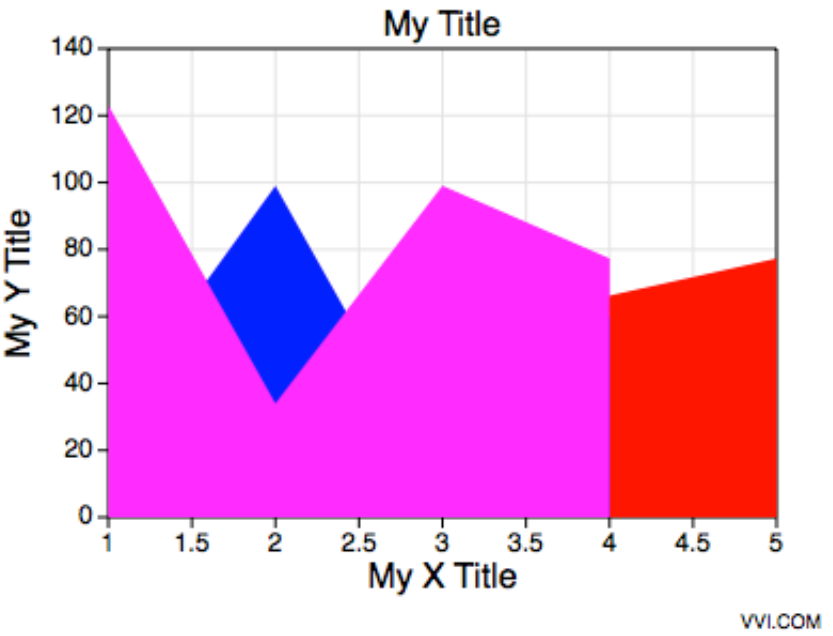
This section explains how to form an input string for an area graph such as these:

Format

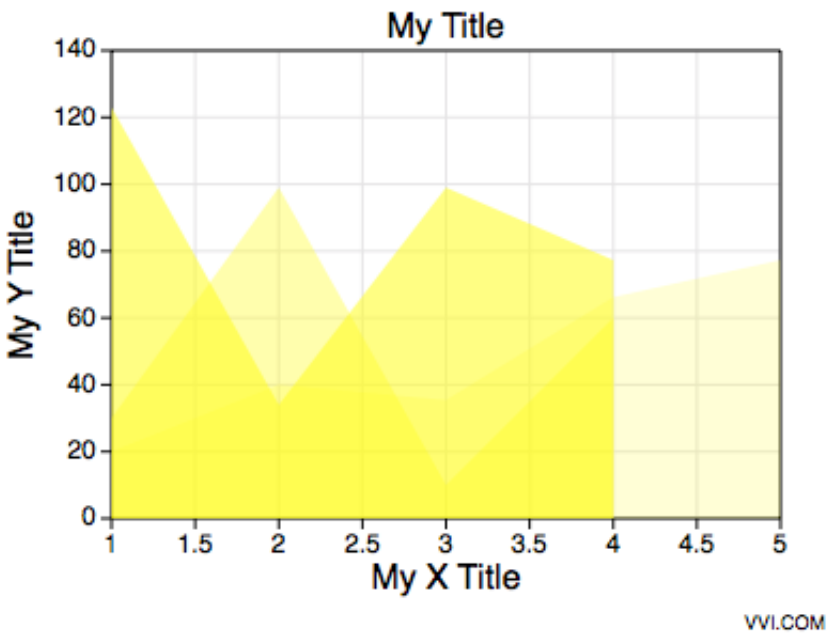
Type-1, area_color=ff0000



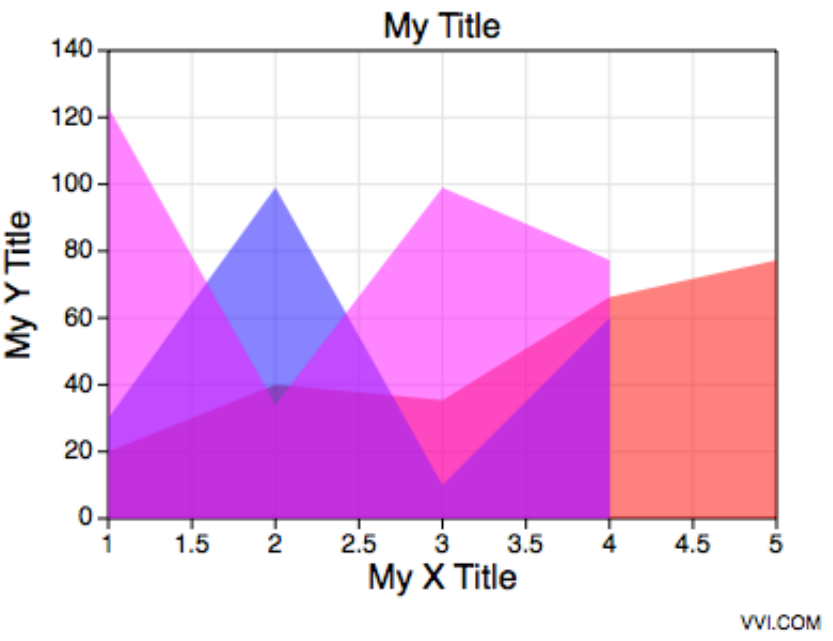
Type-1, no area_color



Type-2, area_color=ffff00



Type-2, no area_color



The input string has this form:

```
chart_type=2&chart_subtype=0&chart_format_type=2&title=string&x_title=string&y_title=string&data_1=x1 y1 x2
y2 ... xN yN&data_2=x1 y1 x2 y2 ... xN yN&data_3=x1 y1 x2 y2 ... xN yN&area_color=RRGGBBAA&templates=string
```

The following table defines the input string key and value pairs:

Chart Specific Entries	
Key	**Value Description**
chart_type[1]	The chart type is always 2 (aliased to *area*), indicating an area graph.
chart_subtype[1]	one of {0, 1, 2, 3} (aliased to {*linear* , *semilog*, *x-log y-linear*, *log-log*}) for {X-Linear, Y-Linear}, {X-Linear, Y-Log}, {X-Log, Y-Linear} or {X-Log, Y-Log} respectively.
chart_format_type[1]	An index from 1 to 2 as shown above (1 is aliased to *default*).
title	The main title of the graph. If this key is not present then the template's title is used.
x_title	The x title of the graph. If this key is not present then the template's x-title is used.
y_title	The y title of the graph. If this key is not present then the template's y-title is used.
data_I	A white space delimited list of values representing the x and y values of points in a sequence for curve index I where I starts at 1. See Data Oriented keys for additional information and keys.

label_I	A string for the I-th x-label value. I starts at 1. **NOTE:** If any label key is present then the data x-values are assumed unitless and an arbitrary unit must be assigned. The x-axis minimum starts at zero and runs to (N-1), where N is the maximum label index. To place a data point at each label x-value the data x-values should be the sequence {0, 1, 2, ..., (N-1)} but you may also choose to skip locations where a label is, etc.
area_color	A hex encoded representation of a RGBA color value for the area fill color. If this key is not present then the color table template is used.
templates	A custom Templates directory.

If you incorporate this functionality into your web site please consult Web URL.

You can also modify the following Templates:

Template Document Names	
Template	**Description**
PVST_Area_Graph	Forms the static attributes for the X-Linear, Y-Linear graph.
PVST_X_Log_Area_Graph	Forms the static attributes for the X-Log, Y-Linear graph.
PVST_Y_Log_Area_Graph	Forms the static attributes for the X-Linear, Y-Log graph.
PVST_XY_Log_Area_Graph	Forms the static attributes for the X-Log, Y-Log graph.
PVST_area_color_table	Forms the area colors for odd format type indices.
PVST_area_color_table_1	Forms the area colors for even format type indices.

This Area graph image maker inherits the Vvidget prototype definitions of the Line Graph image maker.

The following Server Side Attributes define additional non-graphic attributes. A file with this name in the templates directory will alter the parameters that appear in the attribute file.

Server Side Attributes Names	
Name	**Description**
PVST_Area_Graph_attributes	Main server side attributes.

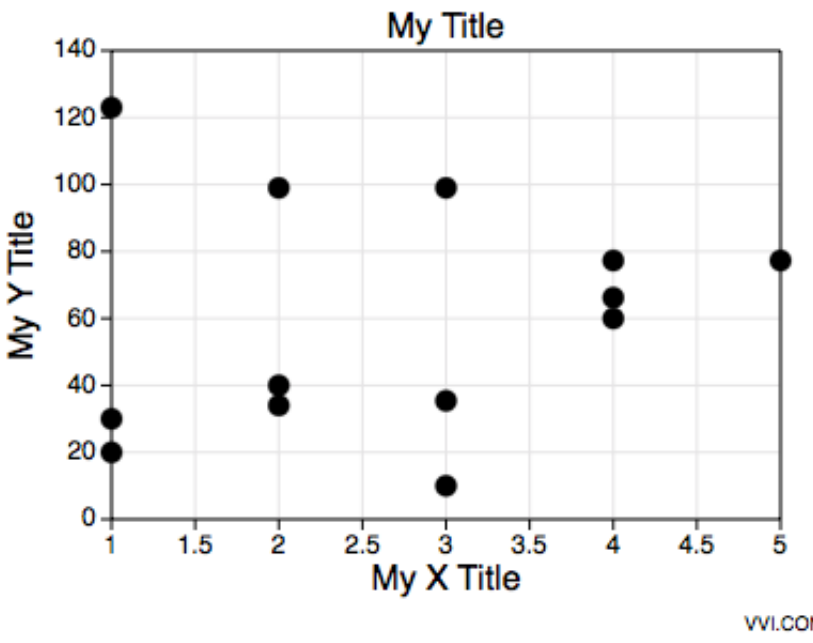
Vvidget Server Reference Manual

Vvidget Server > **Dictionary** > **Scatter Graph**

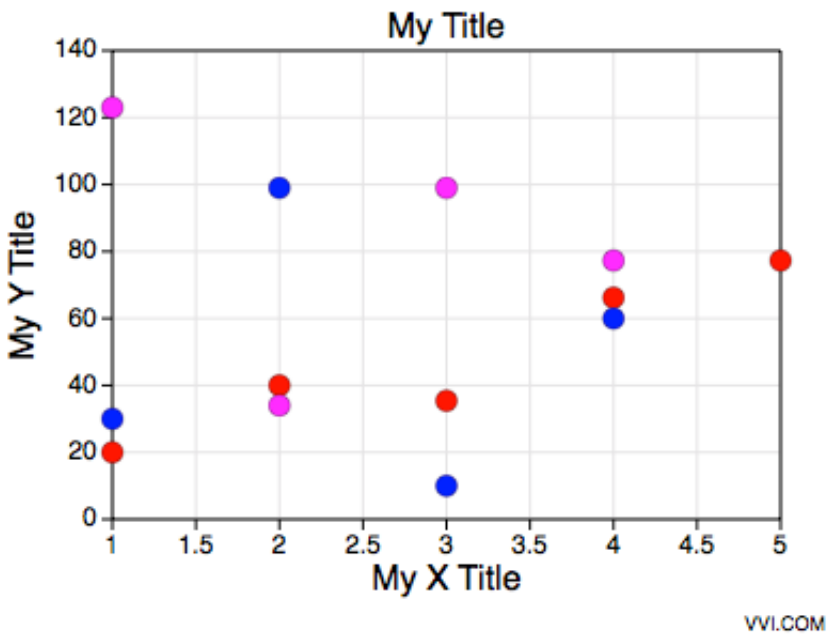
This section explains how to form an input string for a scatter graph such as these:

Format

Type-1, fill_color=000000



Type-1, no fill_color



The input string has this form:

```
chart_type=10&chart_subtype=0&chart_format_type=2&title=string&x_title=string&y_title=string
&data_1=x1 y1 x2 y2 ... xN yN&data_2=x1 y1 x2 y2 ... xN yN&data_3=x1 y1 x2 y2 ... xN yN
&fill_color=RRGGBBAA&templates=string
```

The following table defines the input string key and value pairs:

Chart Specific Entries	
Key	**Value Description**
chart_type[1]	The chart type is always 10 (aliased to *scatter*), indicating a scatter graph.
chart_subtype[1]	one of {0, 1, 2, 3} (aliased to {*linear* , *semilog*, *x-log y-linear*, *log-log*}) for {X-Linear, Y-Linear}, {X-Linear, Y-Log}, {X-Log, Y-Linear} or {X-Log, Y-Log} respectively.
chart_format_type[1]	An index from 1 to 2 (aliased to {*default*, *alternate*}) as shown above.
title	The main title of the graph. If this key is not present then the template's title is used.
x_title	The x title of the graph. If this key is not present then the template's x-title is used.
y_title	The y title of the graph. If this key is not present then the template's y-title is used.
data_I	A white space delimited list of values representing the x and y values of points in a sequence for curve index I where I starts at 1. See Data Oriented keys for additional information and keys.
label_I	A string for the I-th x-label value. I starts at 1. **NOTE:** If any label key is present then the data x-values are assumed unitless and an arbitrary unit must be assigned. The x-axis minimum starts at zero and runs to (N-1), where N is the maximum label index. To place a data point at each label x-value the data x-values should be the sequence {0, 1, 2, ..., (N-1)} but you may also choose to skip locations where a label is, etc.
fill_color	A hex encoded representation of a RGBA color value for the marker fill color. If this key is not present then the color table template is used.
templates	A custom Templates directory.

If you incorporate this functionality into your web site please consult Web URL.

You can also modify the following Templates:

Template Document Names	
Template	**Description**
PVST_Scatter_Graph	Forms the static attributes for the X-Linear, Y-Linear graph.
PVST_X_Log_Scatter_Graph	Forms the static attributes for the X-Log, Y-Linear graph.

PVST_Y_Log_Scatter_Graph	Forms the static attributes for the X-Linear, Y-Log graph.
PVST_XY_Log_Scatter_Graph	Forms the static attributes for the X-Log, Y-Log graph.
PVST_2Y_Scatter_Graph	Forms the static attributes for a two y-axis graph. The y-axis can be of any type (linear, log, etc.) that can be made in a template.
PVST_scatter_color_table	Forms the fill colors for odd format type indices.
PVST_scatter_color_table_1	Forms the fill colors for even format type indices.

The following are vvidget name components in the template that can be used to adjust graphical attributes of the respective parts.

Vvidget Names	
Name	**Description**
PVS_graph	The graph. All graphical attributes of the graph can be altered. When queried upon the graph limits will autoscale.
PVS_graphic_prototype	The optional curve prototype (a Function graphic). All graphical attributes of the curve prototype can be altered and will be used to generate the curves for the graph. When queried upon the curve's data will be updated. This graphic prototype must reside on the graph's (foreground) data layer.
PVS_y1_graphic_prototype	If present, used for left-axis related graphics instead of PVS_graphic_prototype. This is only applicable to 2-y-axis graphs.
PVS_y2_graphic_prototype	If present, used for right-axis related graphics instead of PVS_graphic_prototype. This is only applicable to 2-y-axis graphs.

The following Server Side Attributes define additional non-graphic attributes. A file with this name in the templates directory will alter the parameters that appear in the attribute file.

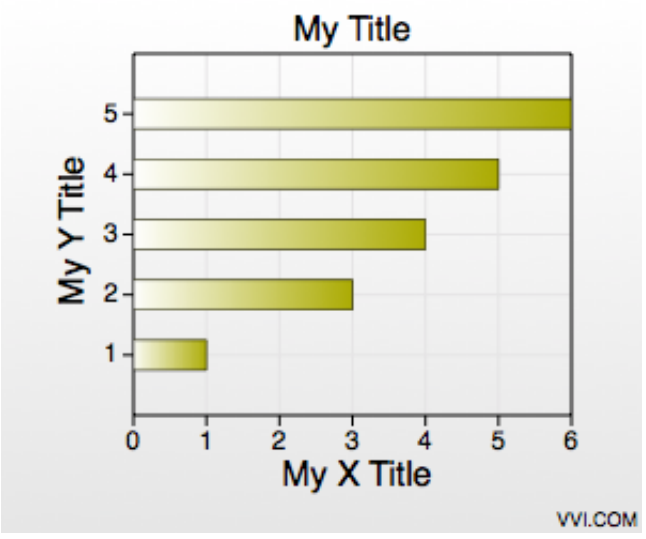
Server Side Attributes Names	
Name	**Description**
PVST_Scatter_Graph_attributes	Main server side attributes.

Vvidget Server > **Dictionary** > **Bar Chart**

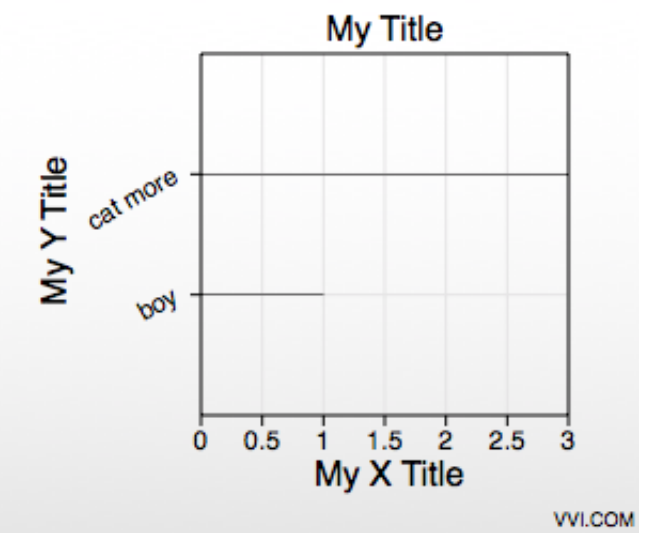
This section explains how to form an input string for a bar chart such as these:

Format Type

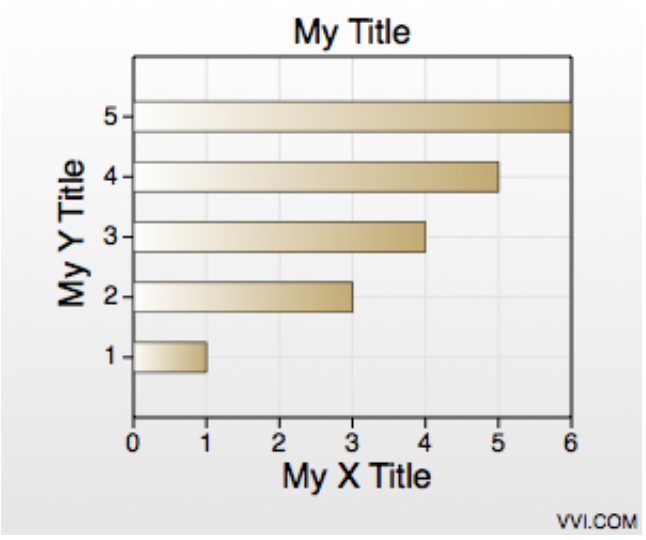
1; fill_color=AAAA00



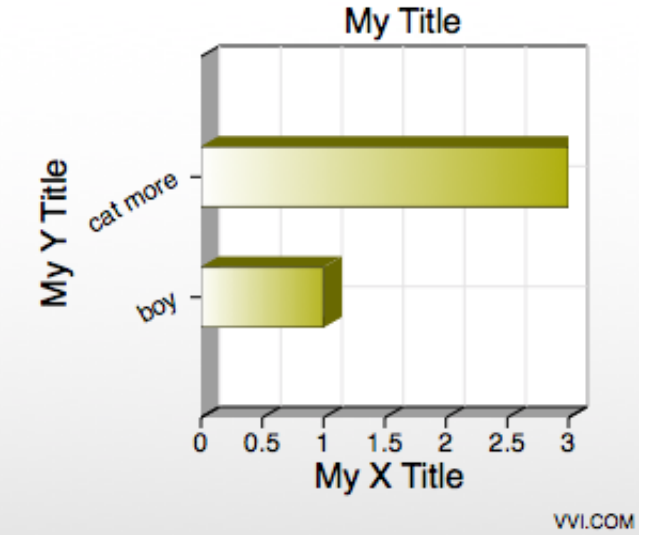
1; With Labels, no fill color



2, no fill color



3



The input string has this form:

```
chart_type=3&chart_subtype=0&chart_format_type=1&data_values=v1 v2 ...
vN&fill_color=RRGGBBAA&label_1=string&label_2=string&templates=string
```

The following table defines the input string key and value pairs:

Chart Specific Entries	
Key	**Value Description**
chart_type[1]	The chart type is always 3 (aliased to *bar*), indicating a bar chart.
chart_subtype[1]	The chart subtype is always 0. (aliased to *default*)
chart_format_type[1]	The chart format type is an index from 1 to 3 (aliased to {*default* , *alternate*, *extruded*}) which produces the varied results of the figures above.
title	The main title of the graph. If this key is not present then the template's title is used.
x_title	The x title of the graph. If this key is not present then the template's x-title is used.
y_title	The y title of the graph. If this key is not present then the template's y-title is used.
data_values	A white space delimited list of values representing the length of the bar. See Data Oriented keys for additional information and keys.
label_I	A string for the I-th label value. I starts at 1.
fill_color	A hex encoded representation of a RGBA color value. This only is in effect for format type 1. If this key is not present then the color table template is used.
fill_color_I	A hex encoded representation of a RGBA color value for the I-th bar. I starts at 1 (example: fill_color_2=FF0000 assigns the 2nd bar to a red fill color). This entry overrides the fill_color and the table color specifications.

templates	A custom Templates directory.

If you incorporate this functionality into your web site please consult Web URL.

You can also modify the following Templates:

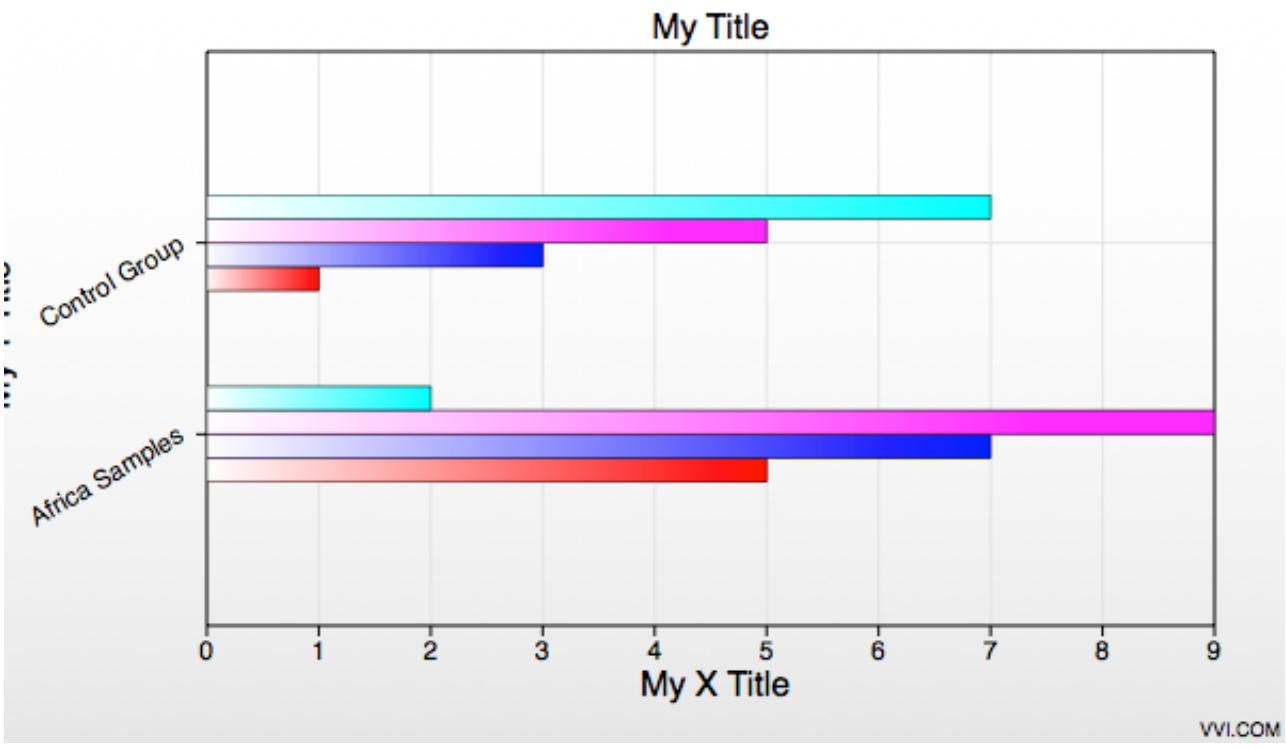
Template Document Names	
Template	**Description**
PVST_Bar_Chart	Forms the static attributes for this chart type when there are no label keys.
PVST_Custom_Label_Bar_Chart	Forms the static attributes for this chart type when there is at least one label key. The left margin is greater to accommodate longer labels.
PVST_bar_color_table	Forms the bar color attributes for odd format type indices.
PVST_bar_color_table_1	Forms the bar color attributes for even format type indices.

The following Server Side Attributes define additional non-graphic attributes. A file with this name in the templates directory will alter the parameters that appear in the attribute file.

Server Side Attributes Names	
Name	**Description**
PVST_Bar_Chart_attributes	Main server side attributes.

Other examples

Group bars can be formed by using the data_I keys instead of the data_values key. Here is an example:

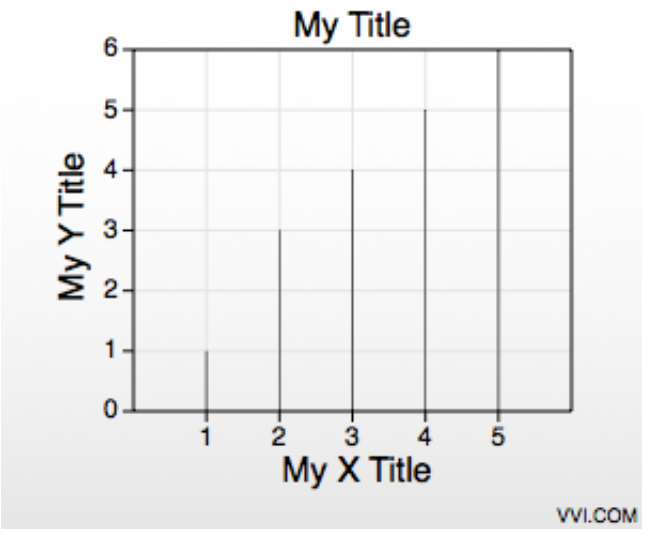


Vvidget Server > **Dictionary** > **Column Chart**

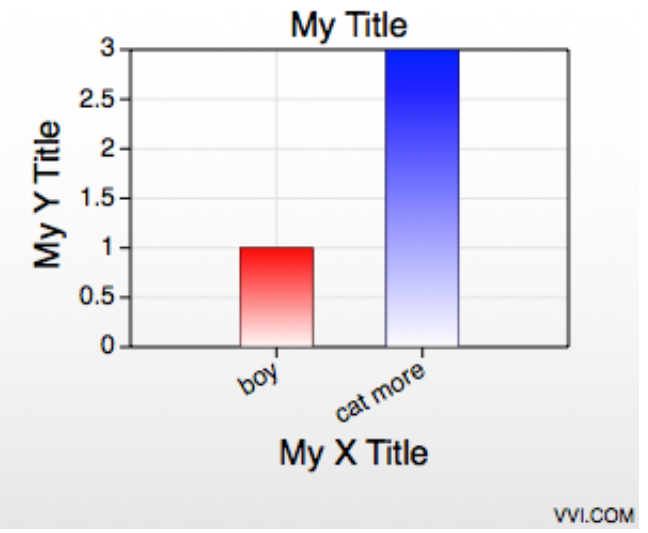
This section explains how to form an input string for a column chart such as these:

Format Type

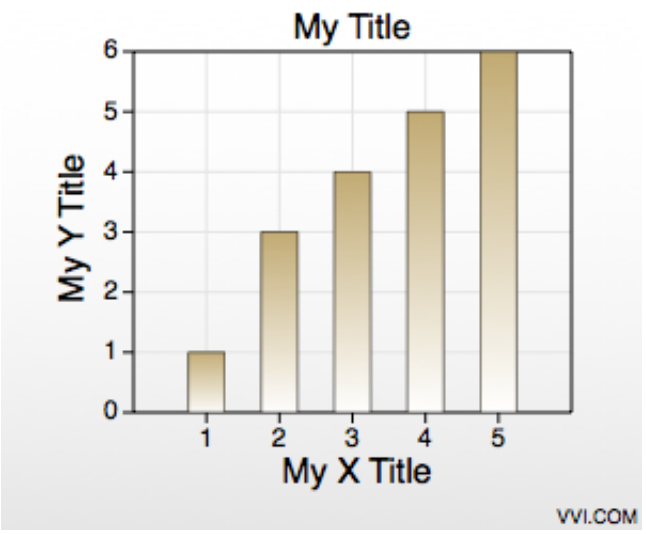
1; fill_color=AAAA00



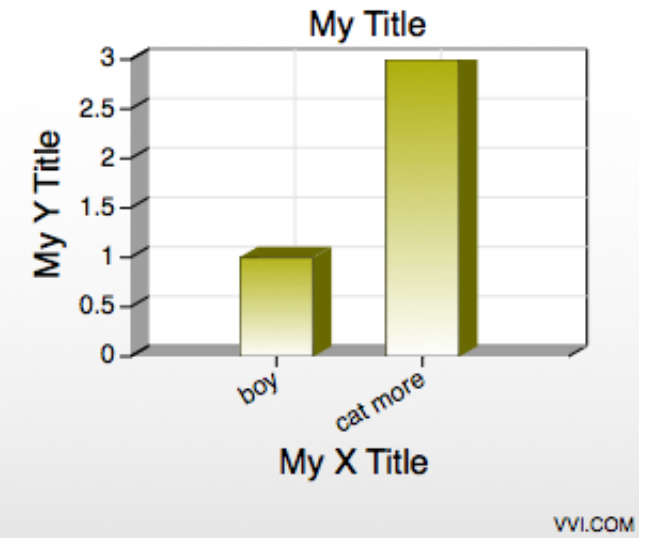
1; With Labels, no fill color



2, no fill color



3



The input string has this form:

```
chart_type=4&chart_subtype=0&chart_format_type=1&data_values=v1 v2 ...
vN&fill_color=RRGGBBAA&label_1=string&label_2=string&templates=string
```

The following table defines the input string key and value pairs:

Chart Specific Entries	
Key	**Value Description**
chart_type[1]	The chart type is always 4 (aliased to *column*), indicating a column chart.
chart_subtype[1]	The chart subtype is always 0. (aliased to *default*)
chart_format_type[1]	The chart format type is an index from 1 to 3 (aliased to {*default* , *alternate*, *extruded*}) which produces the varied results of the figures above.
title	The main title of the graph. If this key is not present then the template's title is used.
x_title	The x title of the graph. If this key is not present then the template's x-title is used.
y_title	The y title of the graph. If this key is not present then the template's y-title is used.
data_values	A white space delimited list of values representing the length of the column. See Data Oriented keys for additional information and keys.
label_I	A string for the I-th label value. I starts at 1.
fill_color	A hex encoded representation of a RGBA color value. This only is in effect for format type 1. If this key is not present then the color table template is used.
fill_color_I	A hex encoded representation of a RGBA color value for the I-th bar. I starts at 1 (example: fill_color_2=FF0000 assigns the 2nd bar to a red fill color). This entry overrides the fill_color and the table color specifications.

templates	A custom Templates directory.

If you incorporate this functionality into your web site please consult Web URL.

You can also modify the following Templates:

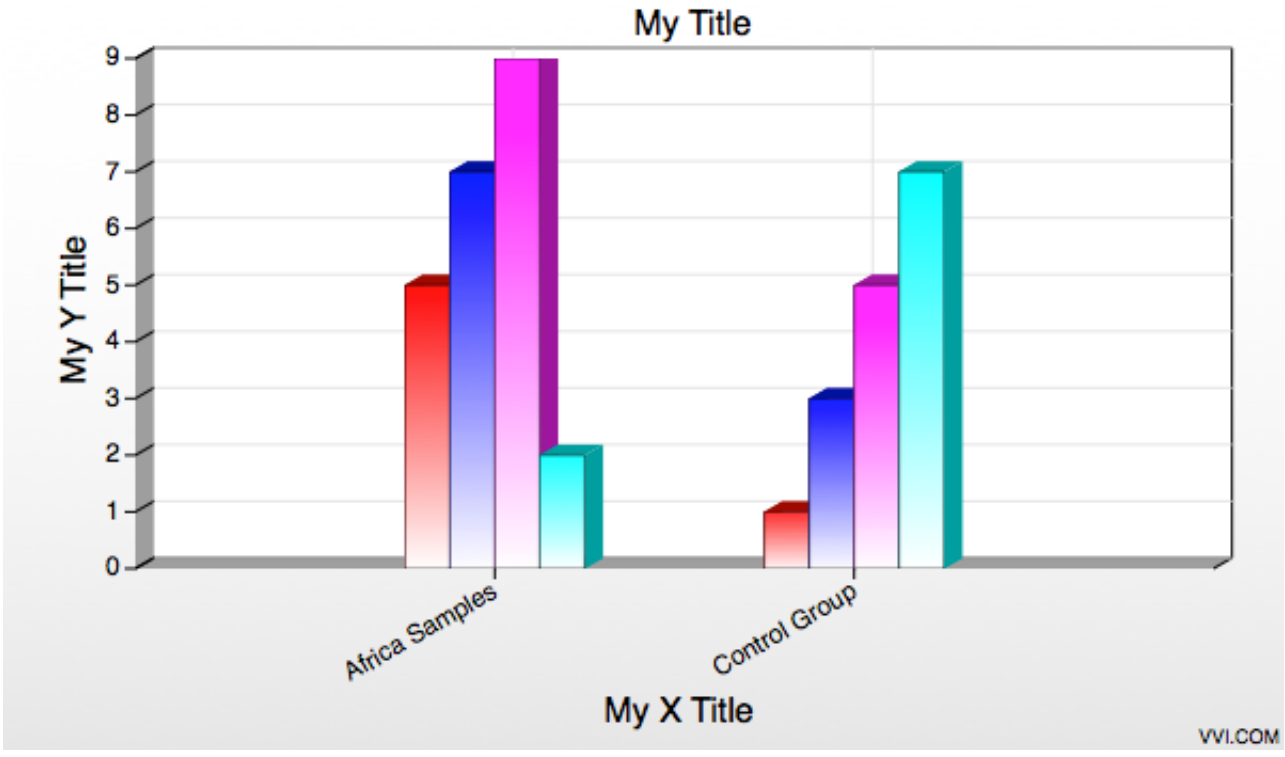
Template Document Names	
Template	**Description**
PVST_Column_Chart	Forms the static attributes for this chart type when there are no label keys.
PVST_Custom_Label_Column_Chart	Forms the static attributes for this chart type when there is at least one label key. The bottom margin is greater to accommodate longer labels.
PVST_column_color_table	Forms the column color attributes for odd format type indices.
PVST_column_color_table_1	Forms the column color attributes for even format type indices.

The following Server Side Attributes define additional non-graphic attributes. A file with this name in the templates directory will alter the parameters that appear in the attribute file.

Server Side Attributes Names	
Name	**Description**
PVST_Column_Chart_attributes	Main server side attributes.

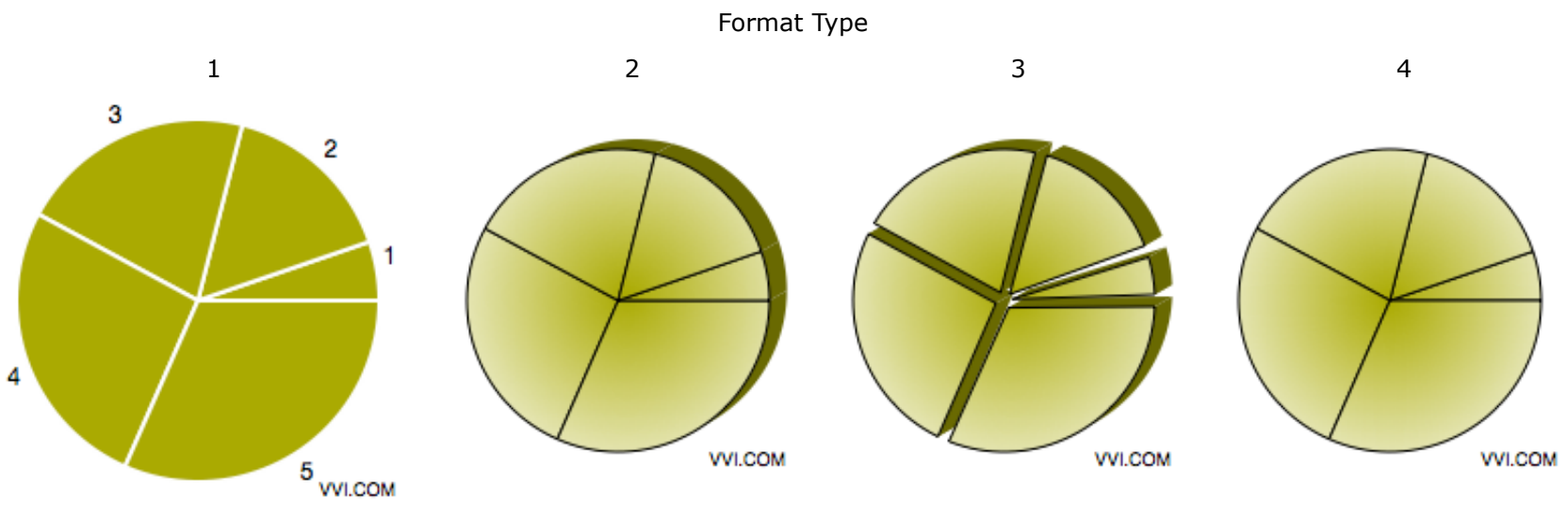
Other examples

Group columns can be formed by using the data_I keys instead of the data_values key. Here is an example:



Vvidget Server > Dictionary > Pie Chart

This section explains how to form an input string for a pie chart such as these:



The input string has this form:

```
chart_type=5&chart_subtype=0&chart_format_type=1&data_values=v1 v2 ...
vN&fill_color=RRGGBBAA&templates=string
```

The following table defines the input string key and value pairs:

Chart Specific Entries	
Key	**Value Description**
chart_type[1]	The chart type is always 5 (aliased to *pie*), indicating a pie chart.
chart_subtype[1]	The chart subtype is always 0. (aliased to *default*)
chart_format_type[1]	The chart format type is an index from 1 to 4 (aliased to {*labeled* , *extruded*, *extruded-exploded*, *default*}) which produces the varied results of the figures above.
data_values	Data values is a white space delimited list of values representing the proportional arc of the wedge. See Data Oriented keys for additional information and keys.
fill_color	A hex encoded representation of a RGBA color value. This only is in effect for format type 1. If this key is not present then the color table template is used.
templates	A custom Templates directory.

If you incorporate this functionality into your web site please consult Web URL.

You can also modify the following Templates:

Template Document Names	
Template	**Description**
PVST_Pie_Chart	Forms the static attributes for this chart type.
PVST_pie_color_table	Forms the data color attributes (wedge fill colors) for odd format type indices.
PVST_pie_color_table_1	Forms the data color attributes (wedge fill colors) for even format type indices.

The following Server Side Attributes define additional non-graphic attributes. A file with this name in the templates directory will alter the parameters that appear in the attribute file.

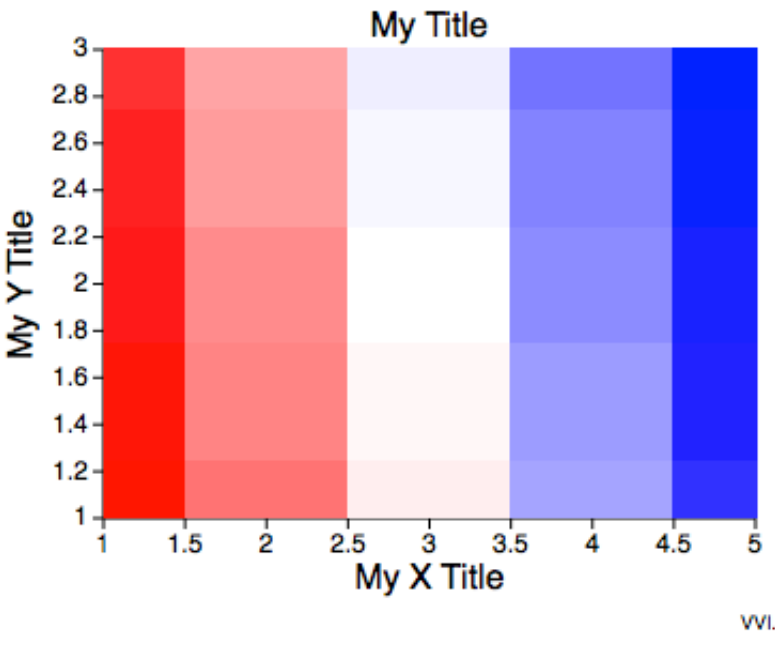
Server Side Attributes Names	
Name	**Description**
PVST_Pie_Chart_attributes	Main server side attributes.

Vvidget Server > **Dictionary** > **Point Map Chart**

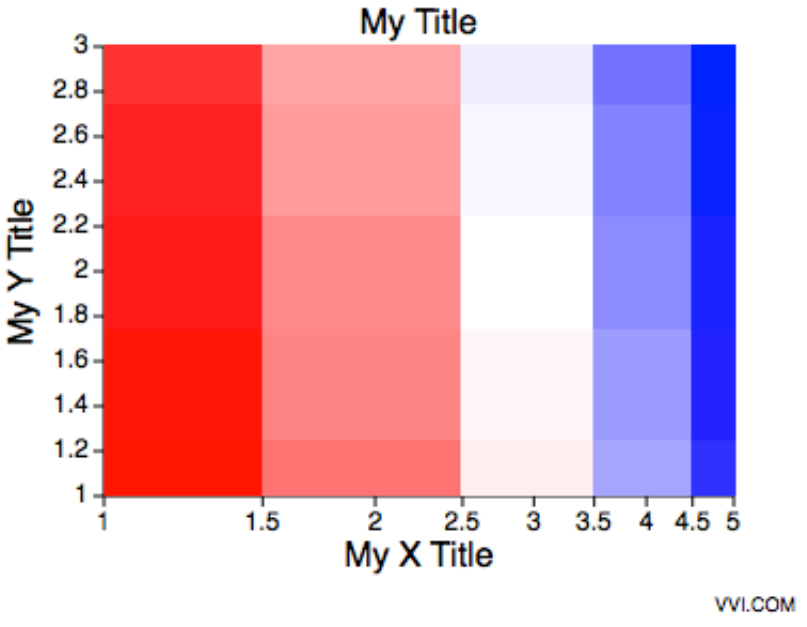
This section explains how to form an input string for a Point Map Chart such as these:

Format

chart_subtype=0 (Rectilinear)



chart_subtype=1 (X-Log)



The input string has this form:

```
chart_type=7&chart_subtype=0&chart_format_type=0&title=string&x_title=string&y_title=string
&grid_x_length=N&grid_x_minimum=x0&grid_x_maximum=x1&grid_y_length=M&grid_y_minimum=y0
&grid_y_maximum=y1&color_map_1_type=CMT1&color_map_2_type=CMT2&color_map_1_length=CML1
&color_map_2_length=CML2&color_map_rgb_11=RRGGBBAA&color_map_rgb_12=RRGGBBAA
&color_map_rgb_21=RRGGBBAA&color_map_rgb_22=RRGGBBAA
&data_values=A01 A02 ... A0N A11 A12 ... A1N ... AM1 AM2 ... AMN
```

The following table defines the input string key and value pairs:

Chart Specific Entries	
Key	**Value Description**
chart_type[1]	The chart type is always 7 (aliased to *point map*), indicating a Point Map Chart.
chart_subtype[1]	one of {0, 1, 2, 3} (aliased to {*linear* , *semilog*, *x-log y-linear*, *log-log*}) for {X-Linear, Y-Linear}, {X-Linear, Y-Log}, {X-Log, Y-Linear} or {X-Log, Y-Log} respectively.
chart_format_type[1]	Always 0 (aliased to *default*).
title	The main title of the graph. If this key is not present then the template's title is used.
x_title	The x title of the graph. If this key is not present then the template's x-title is used.
y_title	The y title of the graph. If this key is not present then the template's y-title is used.
grid_x_length	The number of grid cells in the x-direction.
grid_x_minimum	The minimum x-value of the grid.
grid_x_maximum	The maximum x-value of the grid.
grid_y_length	The number of grid cells in the y-direction.
grid_y_minimum	The minimum y-value of the grid.
grid_y_maximum	The maximum y-value of the grid.
color_map_1_type	The color mapping type (0, 1, 2, 3).
color_map_1_length	Number of colors in map 1.
color_map_rgb_11	Beginning color of the color mapping.
color_map_rgb_12	Ending color of the color mapping.
color_map_2_type	The color mapping type (0, 1, 2, 3).
color_map_2_length	Number of colors in map 2.
color_map_rgb_21	Beginning color of the color mapping.
color_map_rgb_22	Ending color of the color mapping.

templates	A custom Templates directory.
data_values	A white space delimited list of values representing the z-values of the grid matrix. See Data Oriented keys for additional information and keys.

If you incorporate this functionality into your web site please consult Web URL.

You can also modify the following Templates:

Template Document Names	
Template	**Description**
PVST_Line_Graph	Forms the static attributes for the X-Linear, Y-Linear graph.
PVST_X_Log_Line_Graph	Forms the static attributes for the X-Log, Y-Linear graph.
PVST_Y_Log_Line_Graph	Forms the static attributes for the X-Linear, Y-Log graph.
PVST_XY_Log_Line_Graph	Forms the static attributes for the X-Log, Y-Log graph.
PVST_line_color_table	Forms the line colors for odd format type indices.
PVST_line_color_table_1	Forms the line colors for even format type indices.

The following Server Side Attributes define additional non-graphic attributes. A file with this name in the templates directory will alter the parameters that appear in the attribute file.

Server Side Attributes Names	
Name	**Description**
PVST_Point_Map_Chart_attributes	Main server side attributes.

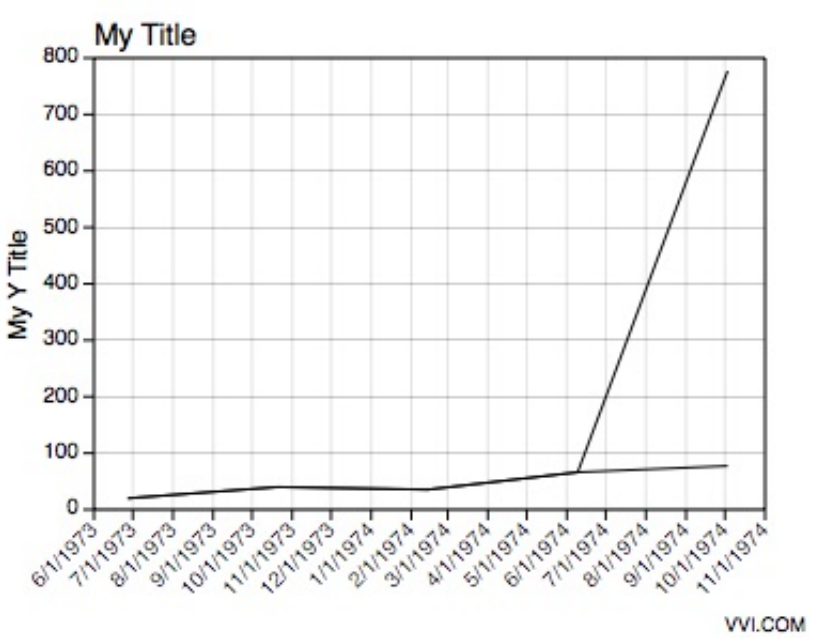
Vvidget Server Reference Manual

Vvidget Server > Dictionary > Date Graph

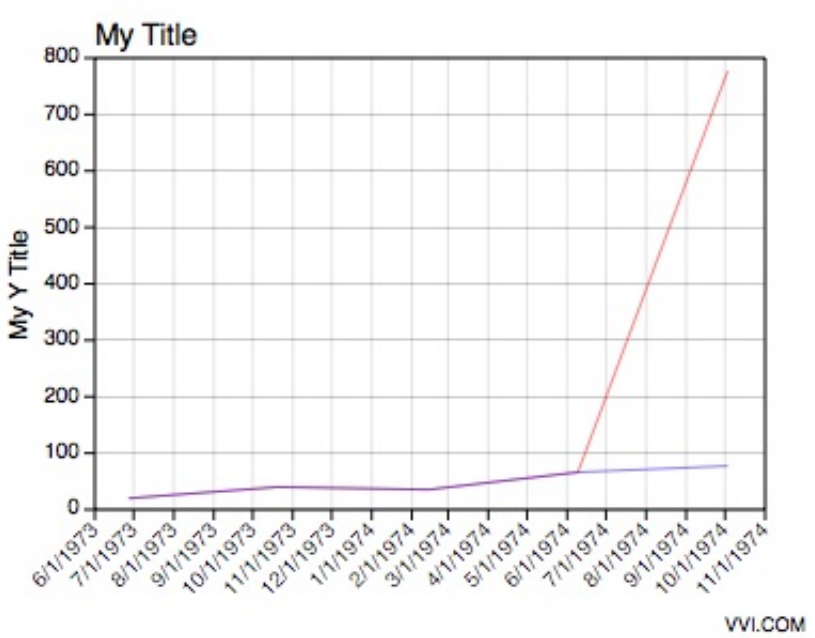
This section explains how to form an input string for a date graph such as these:

Format

Type-1, line_color=000000



Type-1, no line_color



The input string has this form:

```
chart_type=2&chart_subtype=0&chart_format_type=2&title=string&x_title=string&y_title=string&data_1=x1 y1 x2
y2 ... xN yN&data_2=x1 y1 x2 y2 ... xN yN&data_3=x1 y1 x2 y2 ... xN yN&line_color=RRGGBBAA&templates=string
```

A date graph scales from fractional seconds to millennia and formats accordingly. There is some explicit scale information in its display. For example, you cannot interpret seconds whole numbers as MM/DD/YYYY values.

The following table defines the input string key and value pairs:

Chart Specific Entries	
Key	**Value Description**
chart_type[1]	The chart type is always 6 (aliased to *date*), indicating a date graph.
chart_subtype[1]	The chart subtype is always 0 (aliased to *linear*).
chart_format_type[1]	An index from 1 to 2 (aliased to {*default*, *alternate*}) as shown above.
title	The main title of the graph. If this key is not present then the template's title is used.
x_title	The x title of the graph. If this key is not present then the template's x-title is used.
y_title	The y title of the graph. If this key is not present then the template's y-title is used.
data_I	A white space delimited list of values representing the x and y values of points in a sequence for curve index I where I starts at 1. The x values are in units of seconds from 1970 and the y values are unitless. See Data Oriented keys for additional information and keys.
line_color	A hex encoded representation of a RGBA color value for the line color. If this key is not present then the color table template is used.
start_period_seconds	The seconds that corresponds to the left boundary of the PVS_period_graphic. If this key is not present then 28800 (8am) is used. If the value is sunrise then the seconds at sunrise is used.
end_period_seconds	The seconds that corresponds to the right boundary of the PVS_period_graphic. If this key is not present then 18000 (5pm) is used. If the value is sunset then the seconds at sunset is used.
templates	A custom Templates directory.

Note: The main title is aligned to the left and the x-axis title is turned off in the template. If you need different results you must modify the template.

If you incorporate this functionality into your web site please consult Web URL.

You can also modify the following Templates:

Template Document Names

Template	Description
PVST_Date_Chart	Forms the static attributes for this chart type.
PVST_2Y_Date_Graph	Forms the static attributes for a two y-axis graph. The y-axis can be of any type (linear, log, etc.) that can be made in a template.
PVST_date_color_table	Forms the line colors for odd format type indices.
PVST_date_color_table_1	Forms the line colors for even format type indices.

This Date graph image maker inherits the Vvidget prototype definitions of the Line Graph image maker. In addition, the following are vvidget name components in the template that can be used to adjust graphical attributes of the respective parts specific to a date graph.

Vvidget Names	
Name	**Description**
PVS_period_graphic	The optional period graphic prototype (usually a rectangle). If this graphic is present then it will be repeated across the graph. The width of each repetition is defined by the start_period_seconds and end_period_seconds keys. The period is modulo one day. This graphic prototype must reside on the graph's (foreground) data layer.
PVS_start_date_label	The optional start date text graphic (a Label graphic). Is present, the start date of the graph is inserted in the text of this graphic. This date is often useful when the graph only shows a few hours because the labels are formatted in hours:minutes:seconds and there is no absolute date information presented otherwise.

The following Server Side Attributes define additional non-graphic attributes. A file with this name in the templates directory will alter the parameters that appear in the attribute file.

Server Side Attributes Names	
Name	**Description**
PVST_Date_Graph_attributes	Main server side attributes.

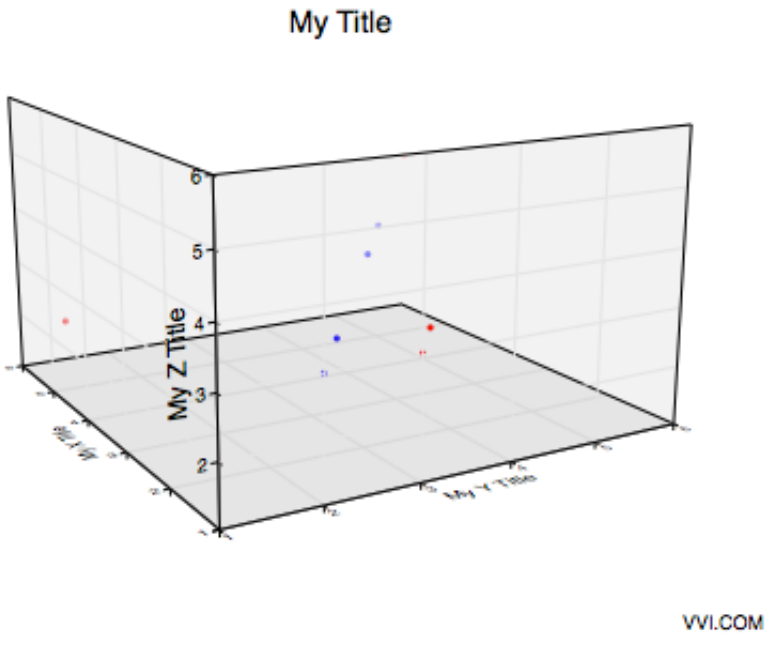
Vvidget Server Reference Manual

Vvidget Server > Dictionary > Perspective Scatter Chart

This section explains how to form an input string for a Perspective Scatter Chart such as these:

Format

chart_subtype=0 (Rectilinear)



The input string has this form:

```
chart_type=9&chart_subtype=0&chart_format_type=0&title=string&x_title=string&y_title=string
&z_title=string&color_map_1_type=CMT1&color_map_2_type=CMT2
&color_map_1_length=CML1&color_map_2_length=CML2&color_map_rgb_11=RRGGBBAA
&color_map_rgb_12=RRGGBBAA&color_map_rgb_21=RRGGBBAA&color_map_rgb_22=RRGGBBAA
&data_values=X1 Y1 Z1 X2 Y2 Z2 ... XN YN ZN
```

The following table defines the input string key and value pairs:

Chart Specific Entries	
Key	**Value Description**
chart_type[1]	The chart type is always 9 (aliased to *3D scatter*), indicating a Perspective Scatter Chart.
chart_subtype[1]	Always 0 (aliased to *linear*).
chart_format_type[1]	Always 0 (aliased to *default*).
title	The main title of the graph. If this key is not present then the template's title is used.
x_title	The x title of the graph. If this key is not present then the template's x-title is used.
y_title	The y title of the graph. If this key is not present then the template's y-title is used.
z_title	The z title of the graph. If this key is not present then the template's z-title is used.
color_map_1_type	The color mapping type (0, 1, 2, 3).
color_map_1_length	Number of colors in map 1.
color_map_rgb_11	Beginning color of the color mapping.
color_map_rgb_12	Ending color of the color mapping.
color_map_2_type	The color mapping type (0, 1, 2, 3).
color_map_2_length	Number of colors in map 2.
color_map_rgb_21	Beginning color of the color mapping.
color_map_rgb_22	Ending color of the color mapping.
templates	A custom Templates directory.
data_values	A white space delimited list of values representing the x y z coordinates of each point. See Data Oriented keys for additional information and keys.

If you incorporate this functionality into your web site please consult Web URL.

You can also modify the following Templates:

Template Document Names	
Template	**Description**
PVST_Perspective_Scatter_Chart	Forms the static attributes for the chart.
PVST_perspective_scatter_color_table	Forms the line colors for odd format type indices.
PVST_perspective_scatter_color_table_1	Forms the line colors for even format type indices.

The following Server Side Attributes define additional non-graphic attributes. A file with this name in the templates directory will alter the parameters that appear in the attribute file.

Server Side Attributes Names	
Name	**Description**
PVST_Perspective_Scatter_Chart_attributes	Main server side attributes.

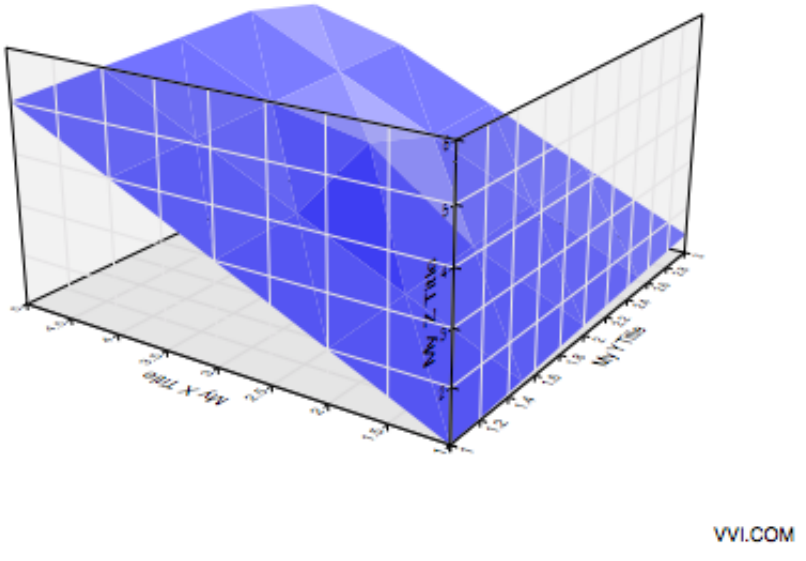
Vvidget Server Reference Manual

Vvidget Server > Dictionary > Perspective Surface Chart

This section explains how to form an input string for a Perspective Surface Chart such as these:

Format

chart_subtype=0 (Rectilinear)



The input string has this form:

```
chart_type=8&chart_subtype=0&chart_format_type=0&title=string&x_title=string&y_title=string
&z_title=string&grid_x_length=N&grid_x_minimum=x0&grid_x_maximum=x1&grid_y_length=M
&grid_y_minimum=y0&grid_y_maximum=y1&color_map_1_type=CMT1&color_map_2_type=CMT2
&color_map_1_length=CML1&color_map_2_length=CML2&color_map_rgb_11=RRGGBBAA
&color_map_rgb_12=RRGGBBAA&color_map_rgb_21=RRGGBBAA&color_map_rgb_22=RRGGBBAA
&data_values=A01 A02 ... A0N A11 A12 ... A1N ... AM1 AM2 ... AMN
```

The following table defines the input string key and value pairs:

Chart Specific Entries	
Key	**Value Description**
chart_type[1]	The chart type is always 8 (aliased to *3D surface*), indicating a Perspective Surface Chart.
chart_subtype[1]	Always 0 (aliased to *linear*).
chart_format_type[1]	Always 0 (aliased to *default*).
title	The main title of the graph. If this key is not present then the template's title is used.
x_title	The x title of the graph. If this key is not present then the template's x-title is used.
y_title	The y title of the graph. If this key is not present then the template's y-title is used.
z_title	The z title of the graph. If this key is not present then the template's z-title is used.
grid_x_length	The number of grid cells in the x-direction.
grid_x_minimum	The minimum x-value of the grid.
grid_x_maximum	The maximum x-value of the grid.
grid_y_length	The number of grid cells in the y-direction.
grid_y_minimum	The minimum y-value of the grid.
grid_y_maximum	The maximum y-value of the grid.
color_map_1_type	The color mapping type (0, 1, 2, 3).
color_map_1_length	Number of colors in map 1.
color_map_rgb_11	Beginning color of the color mapping.
color_map_rgb_12	Ending color of the color mapping.
color_map_2_type	The color mapping type (0, 1, 2, 3).
color_map_2_length	Number of colors in map 2.
color_map_rgb_21	Beginning color of the color mapping.

color_map_rgb_22	Ending color of the color mapping.
templates	A custom Templates directory.
data_values	A white space delimited list of values representing the z-values of the grid matrix. See Data Oriented keys for additional information and keys.

If you incorporate this functionality into your web site please consult Web URL.

You can also modify the following Templates:

Template Document Names	
Template	**Description**
PVST_Perspective_Surface_Chart	Forms the static attributes for the chart.
PVST_perspective_scatter_color_table	Forms the line colors for odd format type indices.
PVST_perspective_scatter_color_table_1	Forms the line colors for even format type indices.

The following Server Side Attributes define additional non-graphic attributes. A file with this name in the templates directory will alter the parameters that appear in the attribute file.

Server Side Attributes Names	
Name	**Description**
PVST_Perspective_Surface_Chart_attributes	Main server side attributes.

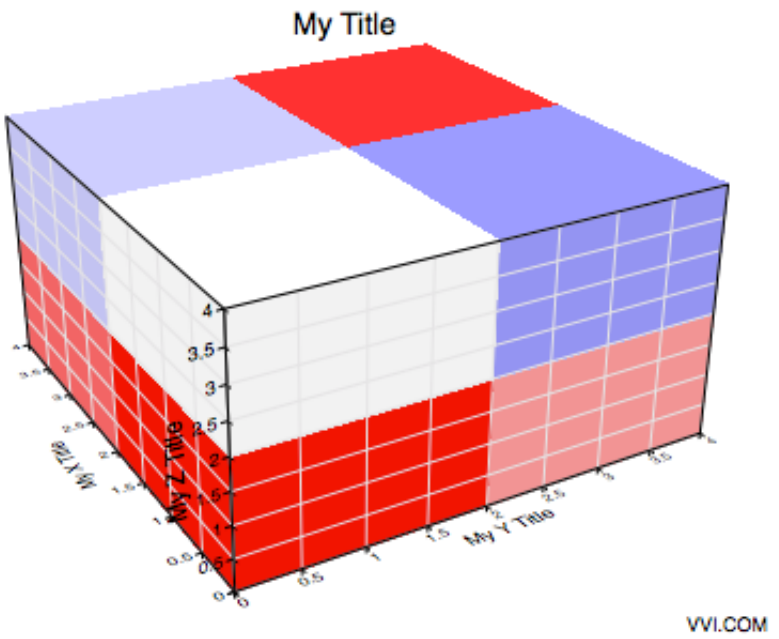
Vvidget Server Reference Manual

Vvidget Server > Dictionary > Perspective Volume Chart

This section explains how to form an input string for a Perspective Volume Chart such as these:

Format

chart_subtype=0 (Rectilinear)



The input string has this form:

```
chart_type=11&chart_subtype=0&chart_format_type=0&title=string&x_title=string&y_title=string
&z_title=string&grid_x_length=NX&grid_x_minimum=x0&grid_x_maximum=x1&grid_y_length=NY
&grid_y_minimum=y0&grid_y_maximum=y1&grid_z_length=NZ
&grid_z_minimum=z0&grid_z_maximum=z1&color_map_1_type=CMT1&color_map_2_type=CMT2
&color_map_1_length=CML1&color_map_2_length=CML2&color_map_rgb_11=RRGGBBAA
&color_map_rgb_12=RRGGBBAA&color_map_rgb_21=RRGGBBAA&color_map_rgb_22=RRGGBBAA
&data_values=A1 A2 ... AN
```

The following table defines the input string key and value pairs:

Chart Specific Entries	
Key	**Value Description**
chart_type[1]	The chart type is always 11 (aliased to *3D volume*), indicating a Perspective Volume Chart.
chart_subtype[1]	Always 0 (aliased to *linear*).
chart_format_type[1]	Always 0 (aliased to *default*).
title	The main title of the graph. If this key is not present then the template's title is used.
x_title	The x title of the graph. If this key is not present then the template's x-title is used.
y_title	The y title of the graph. If this key is not present then the template's y-title is used.
z_title	The z title of the graph. If this key is not present then the template's z-title is used.
grid_x_length	The number of grid cells in the x-direction.
grid_x_minimum	The minimum x-value of the grid.
grid_x_maximum	The maximum x-value of the grid.
grid_y_length	The number of grid cells in the y-direction.
grid_y_minimum	The minimum y-value of the grid.
grid_y_maximum	The maximum y-value of the grid.
grid_z_length	The number of grid cells in the z-direction.
grid_z_minimum	The minimum z-value of the grid.
grid_z_maximum	The maximum z-value of the grid.
color_map_1_type	The color mapping type (0, 1, 2, 3).
color_map_1_length	Number of colors in map 1.
color_map_rgb_11	Beginning color of the color mapping.
color_map_rgb_12	Ending color of the color mapping.

color_map_2_type	The color mapping type (0, 1, 2, 3).
color_map_2_length	Number of colors in map 2.
color_map_rgb_21	Beginning color of the color mapping.
color_map_rgb_22	Ending color of the color mapping.
templates	A custom Templates directory.
data_values	A white space delimited list of values representing the density-values of the grid matrix. A density value is a value between zero and one inclusive. See Data Oriented keys for additional information and keys.

If you incorporate this functionality into your web site please consult Web URL.

You can also modify the following Templates:

Template Document Names	
Template	**Description**
PVST_Perspective_Volume_Chart	Forms the static attributes for the chart.
PVST_perspective_volume_color_table	Forms the line colors for odd format type indices.
PVST_perspective_volume_color_table_1	Forms the line colors for even format type indices.

The following Server Side Attributes define additional non-graphic attributes. A file with this name in the templates directory will alter the parameters that appear in the attribute file.

Server Side Attributes Names	
Name	**Description**
PVST_Perspective_Volume_Chart_attributes	Main server side attributes.

Vvidget Server > Dictionary > Marker

This section explains how to form an input string for a marker such as these:

Markers are provided as a convenience for constructing legends in conjunction with HTML tables.

The input string has this form:

```
marker&1&14,14&0&1&RRGGBBAA&fill_color=RRGGBBAA
```

The following table defines the input string key and value pairs:

Chart Specific Entries	
Key	**Value Description**
fill_color	A hex encoded representation of a RGBA color value used to fill markers of type 1 and 2.

If you incorporate this functionality into your web site please consult Web URL.

Vvidget Server > Common Keys

Common key value pairs are described in this section.

Common Keys

General	Describe keys used mostly by all dictionaries.
Templates	Describes the static input attributes to the dynamic content generated by Dictionaries.
Data Oriented	Describes keys used during processing of other data-oriented keys.
Graph Oriented	Describes keys used for common graph facilities.
Caching	Describes the caching URL and key values of the peer visual server.
Admin	Describes the administrative URL and key values. The administrative URL controls cache delete and logging on the server.

Vvidget Server > Common Keys > General

This section explains keys that are common to all, or at least most, dictionaries.

The following table defines the basic input string key and value pairs.

Nonrecursive Entries

Key	Value Description
pvs_version	1 for the current PVS URL format.
image_maker	Usually the string "chart", but can be other things for a custom peer visual server.
image_width	The width of the image in pixels.
image_height	The height of the image in pixels.
image_output_type	Defines the output type. 1 for PNG, 2 for JPEG, 3 for GIF, 1005 for PDF, 1006 for SVG.
image_contact	An arbitrary string that represents the sender's identification.
string_encoding_type	If 0 then normal character escaped processing is performed on dictionary values. 0 is the default. If 1 then forms based escaped processing is performed where a + is the encoding for a blank. You usually do not have to encode values as web browsers will do it automatically. But, if you are forming a URL for insertion into HTML directly then you should use the escaped encoding for applicable characters.

The following defines recursive keys. These keys redirect the PVS URL encoding to other places which contain new PVS URL encodings.

Recursive Entries

Key	Value Description
input_string_path	Redirects the dictionary processing to a file on the server. Dictionary entries in that file are added to the total input string. Keys in the original query input string that are also in the file are overwritten. This entry can be used for many different things, but especially to store arbitrary information in a data file. See Input String File for an example.
input_string_url	Redirects the dictionary processing to a URL that returns the input string as Content-type: text/plain. Dictionary entries in that returned text are added to the total input string. Keys in the original query input string that are also in the returned text are overwritten. This entry can be used for many different things, but especially to store arbitrary information in a URL. Note that when the URL points to a CGI then the CGI is executed and, hence, the input string becomes programmable and dynamic. See Input String URL for an example.

The following defines redirection keys. Redirection keys are those which forward the PVS URL to another location based on their values, usually a server running on the same or different computer.

Redirection Entries

Key	Value Description
pvs_ip	Redirects (forwards) the URL to the host at the IP address defined by the value associated with this key. See Direct URL for an example.
pvs_channel	Either 0 or 1 for the channel number of the peer visual server running on the localhost or the host pointed to by the pvs_ip value. See Direct URL for an example.

Vvidget Server > Common Keys > Templates

The dynamic graphs (besides the system ones) are generated starting from a template document made with Vvidget Builder. The path to that document is found in the following ways.

If the **templates** key appears in the Peer Visual input string then the template path is obtained from that key's value. If that value is an absolute path (starts with a slash) then that is the path. If that value is a relative path then the path is:

`/Library/Vvidget/Configuration/Peer_Visual_Server/`*`custom_templates`*
where *custom_templates* is the value of the **templates** key. If there is no **templates** key then the path is obtain from one of:

```
/Library/Vvidget/Configuration/Peer_Visual_Server/templates
/Library/Frameworks/Vvidget_PVS.framework/Resources/templates
```

Those directories are searched in the order shown above for the respective template name.

Those templates are Vvidget Builder documents and can be altered like any other document. You can add graphics, change fonts and colors, etc. but one thing you should not do is remove any graphic that exists by default in the template. You must also not change the widget name of graphics in the template.

When you modify the template then the modifications affect all dynamic graphics of that type. For example, you can modify the color table for a Pie Chart in which case all pie charts refering to that templates directory will conform to the new color table scheme. In that way you can set up an application that has a color scheme consistent with your own company's guidelines, for example, and also make many different guideline specifications using different custom templates directories.

The easiest way to make your own templates is to copy the directory:

```
/Library/Frameworks/Vvidget_PVS.framework/Resources/templates
```

To another directory such as one of:

```
<path within your application>/custom_templates
/Library/Vvidget/Configuration/Peer_Visual_Server/custom_templates
```

and modify the templates in the custom templates directory to suit your needs and refer to that directory as the value of the templates key in the Peer Visual input string.

There are two types of templates which are described here:

Base Template: The base template forms the basis of the static graphics. For example, it might contain a graph. You can modify any attribute of the base template; but, if needed, the attributes will be modified in order to satisfy the dynamic attributes of a requests.

Color Table Template: The color table template form the basis of the colors that vary with data index, for example line color or pie wedge color. The color attribute is extracted from the fill color of the rectangles in the color table template.

Vvidget Server > Common Keys > Data Oriented

This section explains keys that are common to data-oriented facilities.

The following table defines the input string key and value pairs for data values. Use only one of these keys, depending on the chart type and data format.

Data Value Specific	
Key	**Data Value Description**
data_I	A key that represents one graphic worth of data. For example, the Ith curve. The format for the value depends on the data_format_type key. The index I runs from 1 to N inclusive where N is the number of curves.
data_values	A key that represents a collection of data, for example multiple curves. The format for the value depends on the data_format_type key.
yM_data_I	This is the same as the key data_I except it associates the data with a particular y-axis. If M is 1 then the y-axis is the left axis, if M is 2 then the y-axis is the right axis. For example, y2_data_3 is the data associated with the third curve on the right hand y-axis. If this key is present then the two-y-axis template is used.
yM_data_values	This is the same as the key data_values except it associates the data with a particular y-axis. If M is 1 then the y-axis is the left axis, if M is 2 then the y-axis is the right axis. For example, y2_data_values is the data associated with the right hand y-axis. If this key is present then the two-y-axis template is used.

The following table defines keys and values for data format and type. Any of these keys can appear in the input string.

Data Format Or Source Specific	
Key	**Value Description**
data_format_type	Defines the format for the values of the data keys. If not present, or if this key has value of 0 then the data format is explained in the relevant chart type section. Otherwise the data format is one of those explained below.
data_reference_type	If 0 then data keys refer to the value of the data. If 1 then the data keys refer to a path on the graphing server's file system. If 2 then the data keys refer to a URL that returns the data as Content-type: text/plain. The contents of the file at that path, or the text returned by the URL, are read and inserted as if the data key referred directly to that contents.
data_subdirectory	Refers to the directory where data files reside on the graphing server.

All data-oriented chart types have data-key name and data-format-key value pairs. The following section defines that relationship.

Scalar-Data Set

Scalar data is a list of values and is organized as a blank space delimited list of numbers, i.e.:

```
V1 V2 ... VN
```

Applies to these chart types:

Data Key	data_format_type Key Value	Chart types that have conforming pairing.
data_values	0	This is the default pairing for Pie, Bar and Column chart types.
data_I	0	The default pairing for Bar and Column chart types where I runs from 1 to the number of labels. The number of values, N, in each group corresponds to the number of bars at that label. The bars are offset and narrowed in proportion to the number in the grouping.

Point-Data Set

Point data is a list of points, either 2D or 3D, and is organized as a blank space delimited list of x y pairs, i.e.:

```
X1 Y1 X2 Y2 ... XN YN
```

Or as x y z triplets for 3D data points:

```
X1 Y1 Z1 X2 Y2 Z2 ... XN YN ZN
```

Applies to these chart types:

Data Key	data_format_type Key Value	Chart types that have conforming pairing.
data_I yM_data_I	0	The 2D form is the default pairing for Line, Area and Date chart types where I runs from 1 to the number of curves.

data_values	0	The 3D form is the default pairing for Perspective Scatter chart type.

Multiple Point-Data Sets

Multiple point data is a list of points, either 2D or 3D, and is organized as tab and return character delimited list of x y pairs, i.e.:

```
X11 Y11 X12 Y12 ... X1N Y1N
...
XM1 YM1 XM2 YM2 ... XMN YMN
```

Where N can be different for each curve.

Applies to these chart types:

Data Key	data_format_type Key Value	Chart types that have conforming pairing.
data_values yM_data_values	0	The 2D form is the default pairing for Line, Area and Date chart types

or for the dimensions embedded into the data stream as scalars that precede the data point as such:

```
NUMBER_OF_CURVES NUMBER_OF_POINTS X11 Y11 X12 Y12 ... X1N Y1N ... NUMBER_OF_POINTS XM1 YM1 XM2 YM2 ... XMN YMN
```

Where N varies to correspond to `NUMBER_OF_POINTS`.

Applies to these chart types:

Data Key	data_format_type Key Value	Chart types that have conforming pairing.
data_values yM_data_values	1	Format type for Line, Area and Date chart types

Matrix-Data Set

Matrix data is a list of white space delimited values, i.e.:

```
A11 A12 ... A1N A21 A22 ... A2N ... AM1 AM2 ... AMN
```

The dimensions and other attributes of the data are defined in other related keys, such as x_grid_length. (i.e.: any tab or return structure is treated as a simple delimiter).

Applies to these chart types:

Data Key	data_format_type Key Value	Chart types that have conforming pairing.
data_values	0	This is the default pairing for the Point Map and Perspective Surface chart type.

Vvidget Server > Common Keys > Graph Oriented

This section explains keys that are common to graph-oriented facilities.

The following table defines the input string key and value pairs for graph titles.

Graph Titles Specific	
Key	**Value Description**
title	The main title of the graph. If this key is not present then the template's title is used.
x_title	The x title of the graph. If this key is not present then the template's x-title is used.
y_title	The y title of the graph. If this key is not present then the template's y-title is used.
z_title	The z title of the graph. If this key is not present then the template's z-title is used. This only applies to 3D graphs.
yM_title	The left and right y-titles of the graph for M of 1 or 2 respectively. If this key is not present then the template's y-title is used.

The following table defines keys and values for axis limits. Any of these keys can appear in the input string. There is a lot going on with limit values and the autoscale feature may get in the way of exact limits. The basic philosophy of the autoscaler is to round to good looking decimals and to maintain uniform tick increments, even at the axis limits. Note that not all graphs and settings use these limits. The Line Graph and Area Graph are two graphs which use these limits, unless x-labels are on in which case these limits do not make sense for the x-axis. For the Bar Chart only the x-limits apply and for the Column Chart only the y-limits apply. None of these limits are applicable to the Pie Chart.

Axes Limit Specific	
Key	**Value Description**
x_minimum	Defines the x-minimum value of the x-axis. If this key is not present then the corresponding limit is autoscaled according to the data limits.
x_maximum	Defines the x-maximum value of the x-axis. If this key is not present then the corresponding limit is autoscaled according to the data limits.
y_minimum	Defines the y-minimum value of the y-axis. If this key is not present then the corresponding limit is autoscaled according to the data limits.
y_maximum	Defines the y-maximum value of the y-axis. If this key is not present then the corresponding limit is autoscaled according to the data limits.

The following table defines the input string key and value pairs for line parameters. These are appropriate for the Line and Date charts.

Line Specific	
Key	**Value Description**
line_color	A hex encoded representation of a RGBA color value for the line color. If this key is not present then the color table template is used.
yM_line_color	Same as line_color, except specific to two-y-axis graphs. Curves associated with the left hand axis are colored with y1_line_color and curves associated with the right hand axis are colored with y2_line_color.

Vvidget Server > Common Keys > Caching

This section explains caching keys, which can be used by any PVS URL. The caching URLs are divided into two steps, a request URL and a response URL. You make a request directly to the Peer Visual Server to cache a response and then you embed a response URL into your web pages.

Request URL

A request URL takes this form:

```
http://localhost:9877/direct?1&EMAIL&chart&1&400,400&chart_type=5&chart_subtype=0&chart_format_type=1
&data_values=1%203%204%205%206&fill_color=AAAA00
&session_name=uhr23845d&request_name=6666&cache_instruction=store
```

Notice how the first part of the URL is to the localhost computer on port 9877 with a URL root of direct. By default, port 9877 is channel 0 and port 9878 is channel 1. Each of those channel and port numbers correspond to a different Peer Visual Server running on your computer. The channel number is important because the cached result will be stored within a particular server and that server must be referenced when retrieving the cache. For additional information on this issue see Direct URL.

The following table defines the keys and values for the request URL:

Request Entries

Key	Value Description
session_name	A key identifying the context of the cache. Usually this is the session id of the web application server making the request to the peer visual server.
request_name	The name of the request in the context of the session. The request_name must be unique within a particular session_name.
cache_instruction	This is always the value "store" meaning the PVS URL response is always stored in the cache when this key and value is present. If the value is not "store" then the response is not cached.

Response URL

Once the request is cached then a response PVS URL must be generated which references the response (result) of the request URL. An example is:

```
http://www.vvidget.org/cgi-bin/nph-pvs?1&EMAIL&cache&pvs_channel=0&session_name=uhr23845d&request_name=6666
```

Notice that the session_name and request_name must be identical to the corresponsing Request URL.

Response Entries

Key	Value Description
pvs_channel	The channel number of the original request to cache. This value is either 0 or 1. If 0 then the cache result is stored on Peer Visual Server on port 9877, if 1 then the cache result is stored on Peer Visual Server on port 9878
session_name	A key identifying the context of the cache. Usually this is the session id of the web application server making the request to the peer visual server.
request_name	The name of the request in the context of the session. The request_name must be unique within a particular session_name.

Synchronizing

The Request and Response URLs synchronize via the channel_number, session_name and request_name. Temporal synchronization is automated, meaning that either URL can be issued before the other. Usually you should issue the Request URL first because then the Peer Visual Server can compute the result of it and by the time some other process (the web browser) issues the Response URL and it is received by the Peer Visual Server the result is already generated. Because of the optimizations in the cache this can lead to a 10,000 fold or more improvement in latency while satisfying requests to the Peer Visual Server.

Hardening The Cache

Notice how the Request URL is transmitted to port 9877 or 9878 and that the Request URL can alter the cache. The Response URL is the public viewable one and it can only retrieve from the cache, not write to it. If you block port 9877 and 9878 in your firewall then no one can muck with your cache.

To learn how to delete the cache see the Admin section.

Vvidget Server > Common Keys > Admin

This section explains the admin URL. The admin URL is used for two purposes: (1) To delete Caching entries and (2) to set logging in the Peer Visual Server. The admin URLs can only take effect with direct URL requests on the channel index corresponsing to the port of the PVS.

Admin Cache URL

An admin cache URL takes this form:

```
http://localhost:9877/direct?1&EMAIL&admin&instruction=cache&operation=delete&session_name=uhr23845d
```

Notice how the first part of the URL is to the localhost computer on port 9877 with a URL root of direct. By default, port 9877 is channel 0 and port 9878 is channel 1. Each of those channel and port numbers correspond to a different Peer Visual Server running on your computer. The channel number is important because the cached result will be stored within a particular server and that server must be referenced when altering the cache. For additional information on this issue see Direct URL.

The following table defines the keys and values for the admin cache URL:

Caching Entries

Key	Value Description
instruction	Always the word cache.
operation	Always the word delete.
session_name	If present, then only the cache corresponding to the session_name is deleted. Issue this type of URL when your session expires on the web application server. If this key is not present then the entire cache is deleted.

Admin Logging URL

This URL will adjust logging within the server so you can see what it is doing. Logging is reported to stderr, usually the Console of the computer the PVS is running on. An example is:

```
http://localhost:9877/direct?1&EMAIL&admin&instruction=report&operation=all
```

Logging Entries

Key	Value Description
instruction	Always the word report or packet_report. Usually you would want to use report. If you use packet_report then each packet status is reported.
operation	One of off, error, summary, all. off: no logging (the default); error: log errors only; summary: log incremental summary usage and errors; all: log everything.

Vvidget Server > Server Side Attributes

Server side attributes are described in this section.

Server Side Attributes

Basics	Basic Attributes.

Vvidget Server > Server Side Attributes > Basics

Server side attributes reside in the template directory of the server request string. They are contained in a file that has a generalized recursive key value encoding of arbitrary complexity. It is most relevant as a starting point to define group attributes for a class of response parameters.

Although it has immediate applicability, its utility for generalization is really embedded in the Peer Visual Server API proper.

Line Graph

A Line Graph has one server side attribute in the file PVST_Line_Graph_attributes.definition. The contents are as follows:

```
{
color_table_is_circular = YES;
}
```

The value of color_table_is_circular is YES if colors loop through the color table, and NO if colors after the last entry in the color table are the constant of the last color value.

Bar or Column Chart

A Bar Chart or Column Chart has one server side attribute in the file PVST_Bar_Chart_attributes.definition or PVST_Column_Chart_attributes.definition respectively. The contents are as follows:

```
{
bar_half_width = 0.25;
}
```

The value of bar_half_width must be between 0.0 and 0.5 and represents the relative width of the bar. 0.0 means no width, 0.5 means the bars touch. Greater than 0.5 the bars overlap, which is probably not a desired effect. The default is 0.25, meaning the space between the bars equals the bar width.

Vvidget Server > Web Programming

This entire manual, including the Forms and Dictionary sections show examples of Web programming. This section details a few miscellaneous issues.

Web Programming

Documents	Describes how to publish Vvidget Builder documents to the web right away.
Web URL	Gives a brief description and example of the Peer Visual Server URL.

Vvidget Server > Web Programming > Documents

Documents made with Vvidget Builder can be immediately viewed on the web. You do not have to first convert them into an image or other representation. The steps to distributing the contents of your documents are as follow:

- Connect your computer to the Internet (see the Vvidget Builder User Manual)
- Make a graph or figure in a Vvidget Builder document window.
- Save that document to your home folder's **Site** directory.
- Include a URL (described below) referencing that document in the HTML of your own web page.

For example, if your user name is **fred** and you make a Vvidget Builder document named **GnomeStudy** with Graphic View width 400 and height 300 and save that document in your home folder's Site folder then its display is accessible to anyone on the Internet using this URL:

```
http://www.mydomain.com/cgi-bin/nph-pvs?1&direct&document&2&400,300&~fred&GnomeStudy
```

Where `www.mydomain.com` is your own Internet address. (The Sharing pane will let you know what your address is. It states something like this: "View this computer's web sites at http://vvih132.vvi.com/ or your personal web site at http://vvih132.vvi.com/~fred/").

To incorporate the display of your document in a web page use this HTML:

```
<IMG SRC="http://www.mydomain.com/cgi-bin/nph-pvs?1&direct&document&2&400,300&~fred&GnomeStudy">
```

You can also place a document in your web server's document directory, in which case it is accessible like this:

```
<IMG SRC="http://www.mydomain.com/cgi-bin/nph-pvs?1&direct&document&2&400,300&GnomeStudy">
```

If you saved the document in the sub-folder `Sites/chapter1/sectionA` in your home folder then the URL would be:

```
<IMG SRC="http://www.mydomain.com/cgi-bin/nph-pvs?
1&direct&document&2&400,300&~fred&chapter1§ionA&GnomeStudy">
```

i.e.: the folder names in the path are separated by ampersands (&) instead of slashes (/).

All the figures for this manual are actually imaged from Vvidget Builder documents in the same way. By doing it that way, their is no chance that (hypothetical) working documents are different than the figures in this document, because there is only one version.

Vvidget Server > Web Programming > Web URL

To use the Peer Visual Server in your web pages you will need to form a string. That string is called the *Peer Visual URL*. You can form that string using any computer, programming tool, web application server, or location in the world. If you want to experiment with a static chart then all you need do is type that string into your web page as you would any other piece of text.

To form the Peer Visual URL first see the specific URL type in any of the chapters in the dictionary section. For example, see the Pie Chart section to form the input string and append it to this following URL root:

```
http://www.vvidget.org/cgi-bin/nph-pvs?pvs_version&contact&chart&output_type&width,height&
```

The following table defines the attribute fields shown in the URL above:

Field Name	Description
localhost	The name of the computer that the request is directed to. Use localhost for requests on your computer, or use a valid computer name for requests to other computers (such as www.vvi.com).
pvs_version	The PVS version number for the format of the PVS-URL. This number is always 1 in the present version.
contact	A string indicating who or from what the request came from.
chart	The chart keyword (do not change this).
width	The width value of the resulting output.
height	The height value of the resulting output.
output_type	The output type. Its value is 1 for PNG, 2 for JPEG and 1005 for PDF output types.

For example, here is an actual Pie Chart Peer Visual URL:

```
http://www.vvidget.org/cgi-bin/nph-pvs?1&EMAIL&chart&2&200,200&chart_type=5
&chart_subtype=0&chart_format_type=1&data_values=1%203%204%205%206&fill_color=AAAA00
```

If you click here then that string will be placed in the Address field of your web browser. Then you can modify it and click the Return key to see a new chart. You may want to copy the Peer-Visual chart URL shown above to a text editor first in order to modify it and then paste it into the Address field of your web browser.

Obviously, if you intend to program a web application you need to form the Peer Visual URL in code using your desired web application programming environment.

Connecting To The Internet

To publish to the web your computer must be connected to the Internet and the "Personal Web Sharing" in the System Preferences Sharing pane must be turned on. In addition, your computer must have a fixed DNS address (an Internet name). The Sharing pane will let you know what your address is. It states something like this: "View this computer's web sites at http://earth.vvi.com/ or your personal web site at http://earth.vvi.com/~fred/". Alternatively, you can use a hosting service that has Vvidget Server installed on their computers.

Static Or Semi-Static Visuals:

If you need a static chart of type supplied by the Peer Visual Server, then make the chart as specified above and then drag the resulting chart image from your web browser to your file system viewer (or use the save feature of your web browser). Rename the resulting file and include that file in your own web site resources as usual.

If your data is semi-static, for example varies once a day, then program your web application server to send a dynamic Peer Visual chart URL once a day and store the returned image on your file system for use by your server's web clients.

Vvidget Server > Web Programming > Direct URL

A normal or indirect Peer Visual Server URL (PVS-URL) directs a request to a web service on the HTTP port (port 80) and that gets redirected to a CGI-BIN and then to the Peer Visual Server. By contrast, the direct-PVS-URL accepts the PVS-URL directly from the requesting entity on the Peer Visual Server's private IP port.

To form the Peer Visual URL first see the specific URL type in any of the chapters in the dictionary section. For example, see the Pie Chart section to form the input string and append it to this following URL root:

```
http://localhost:9877/direct?pvs_version&contact&chart&output_type&width,height&
```

The following table defines the attribute fields shown in the URL above:

Field Name	Description
localhost	The name of the computer that the request is directed to. Use localhost for requests on your computer, or use a valid computer name for requests to other computers (such as www.vvi.com).
9877	The PVS port number. By default, this is port 9877 or 9878, corresponding to channel 0 or 1 respectively. There are two separate Peer Visual Servers running on the computer and this port number indicates which one to use.
direct	A string indicating that the request is direct. The Peer Visual Server processes this string and associates it with special internal processing appropriate to direct URL requests.

For example, here is an actual Pie Chart direct-PVS-URL:

```
http://localhost:9877/direct?1&EMAIL&chart&2&200,200&chart_type=5
&chart_subtype=0&chart_format_type=1&data_values=1%203%204%205%206&fill_color=AAAA00
```

If you click here then that string will be placed in the Address field of your web browser. Then you can modify it and click the Return key to see a new chart. You may want to copy the Peer-Visual chart URL shown above to a text editor first in order to modify it and then paste it into the Address field of your web browser.

When To Use The Direct-PVS-URL

There are 3 specific usages for the Direct-PVS-URL:

- The Caching and Admin keys require a direct PVS URL. They require it for security reasons.
- The Caching direct PVS URL should be used anytime you need to encode a large amount of data in the URL, or if you do not want your keys published publicly.
- If you do not want to run a general web server on your computer then you can make direct connections to the Peer Visual Server, in effect treating the Peer Visual Server as a custom web server which accepts requests on both port 9877 and 9878.

Vvidget Server > Support

The following is a brief list of support sections:

Support

Question Answer	A brief list of question answers on subjects that are not covered elsewhere in this manual, or not obvious to find.
Turn On Figures	If you do not see figures on this page then please see this section. It describes how you must configure your computer to view the figures in this manual.

If you have a question that is not explained in this manual please contact support@vvi.com so that we may answer your question and update this manual as needed.

Vvidget Server > Support > Question Answer

Below are answers to commonly asked questions about Vvidget Builder. If you have a question please mail support@vvi.com.

Question: No Questions?

Answer: Manual newly revised, all previous answers integrated into main body.

Vvidget Server Reference Manual

Vvidget Server > **Support** > **Turn On Figures**

This manual uses your computer's Web Sharing to image figures in this manual. If you do not see figures in this manual then most likely you have not yet turned on your Web Sharing. To do that, launch the **System Preferences** application, select the **Sharing** icon and then turn on Web Sharing as shown in the figure below:

Then launch the Terminal application and type these commands:

```
mkdir -p ~/Library/Vvidget/Configuration/SCS
cd ~/Library/Vvidget/Configuration/SCS
echo "/var/tmp" > common.config
```

and then reboot your computer. If you are using a custom web server, as in a production setting, then do not turn on the default Web Sharing service, instead use these commands:

```
su cd /usr/local/apache2/cgi-bin
rm -f nph-pvs
cp -p /Library/WebServer/CGI-Executables/nph-pvs .
```

Where you need to cd to the proper location of your web server cgi directory, the example cd above is just that: an example; however it could most likely be the valid example for your situation.

If you still do not see the figures then:

- You must install Vvidget User (in addition to this manual) to see the figures. Make sure Vvidget User is installed on your computer. If you have not yet installed it then click this link: http://www.vvidget.org/download. Figures in this manual are imaged using the Vvidget Server included with Vvidget User, which translates a Vvidget Builder document (the figures) into web browser appropriate formats.
- If you use a Web Proxy then in the **System Preferences** application, select the **Network** icon, and in the **Advanced...** > **Proxies** pane in the **Bypass proxy settings for these Hosts & Domains** place the text **localhost**, then click **OK** then **Apply**. The changes are effective immediately so you should be able to refresh your browser to see the figures in this manual.

If, after doing the above, you cannot see figures then please email support@vvi.com with your computer's configuration.

Vvidget Server > Legal

This documentation and the software it describes is governed by a End User License Agreement (EULA) between you and VVimaging, Inc. To read that license click License Agreement. The Intellectual Property contained in this product is further protected by trade-secret, trademark and tradedress properties as describe in Trademarks. This documentation and the software that it describes and all other material distributed with it is © Copyright 1991-2016 by VVimaging, Inc. (VVI) with All Rights Reserved.

The following is a brief list of Legal sections:

Legal	
License Agreement	The Vvidget Builder End User License Agreement.
Trademarks	A list of trademarks used in this manual.

Vvidget Server Reference Manual

Vvidget Server > Legal > End User License Agreement

Below is a copy of the End User License Agreement that you received with your copy of Vvidget Server and was presented to you before installing Vvidget Server.

Vvidget Server™ v12.4.9

END-USER LICENSE AGREEMENT FOR VVI SOFTWARE

IMPORTANT-READ CAREFULLY: This End-User License Agreement ("Agreement") is a legal agreement between you (either an individual or a single entity) and VVimaging Corporation (VVI) for the VVI software product(s) identified above which may include associated software components, media, printed materials, and "online" or electronic documentation ("SOFTWARE PRODUCT"). By installing, copying, or otherwise using the SOFTWARE PRODUCT, you agree to be bound by the terms of this Agreement. If you do not agree to the terms of this Agreement, do not install or use the SOFTWARE PRODUCT. If the SOFTWARE PRODUCT was purchased by you, you may return it unopened to your place of purchase for a full refund.

The enclosed copy of the SOFTWARE PRODUCT is **never sold**. It is licensed by VVI to the original customer for his or her use only under the terms of this license agreement which follows:

- **1. SCOPE OF LICENSE**
  - This Agreement governs the use of the SOFTWARE PRODUCT and user documentation in printed and electronic forms (the "SOFTWARE PRODUCT"). The SOFTWARE PRODUCT also includes, and this Agreement also governs, later releases, IF ANY, of the SOFTWARE PRODUCT which VVI distributes without additional charge to licensees of your release of the SOFTWARE PRODUCT.
- **2. RESTRICTED USE**
  - STUDENT USE: If you licensed the SOFTWARE PRODUCT for student use you represent to VVI that you are a current member of an accredited educational institution's student body. ("Student User"). Student Users are licensed to use the SOFTWARE PRODUCT in accordance with this Agreement, and solely for the purposes directly related to satisfying the requirements of degree-granting programs ("Student Purposes"). Student Use is use of the SOFTWARE PRODUCT by Student Users and for Student Purposes only. Any use of the SOFTWARE PRODUCT for other than Student Use is expressly prohibited.
  - DEMONSTRATION USE: If you licensed the SOFTWARE PRODUCT for demonstration use then you may only use the SOFTWARE PRODUCT for Demonstration Purposes. Demonstration Purposes shall mean use of the SOFTWARE PRODUCT for the sole limited purpose of verify that the SOFTWARE PRODUCT performs in accordance with manufacture's representations as documented in the SOFTWARE PRODUCT online manuals. Demonstration Purposes shall not mean use for commercial, official university, government laboratory purposes, or any use other than Demonstration Purposes.

  THIS LICENSE WILL TERMINATE AUTOMATICALLY if you fail to comply with the terms and conditions set forth above if such terms are applicable to you.
- **3. LICENSEE's RIGHTS**

  YOU MAY:
  - A. Install and use the SOFTWARE PRODUCT on any computer, as long as it is used only on one computer by one user at a time and in a way which is consistent with this Agreement. If several persons use this SOFTWARE PRODUCT at the same time, or if one person uses it on more than one computer, you must pay one license fee for each copy being used as designated in the Purchase Agreement between you and VVI. You may only use this SOFTWARE PRODUCT on a computer network, if authorized under the Purchase Agreement and if you pay one license fee for each computer and terminal connected to the network.
  - B. Copy the SOFTWARE PRODUCT for back-up purposes only. You may make one (1) copy of the SOFTWARE PRODUCT for back-up purposes. All copies must contain the copyright notice contained in the original copy of the SOFTWARE PRODUCT.
  - C. Transfer the SOFTWARE PRODUCT permanently to another person ONLY IF:
    - (a) that person agrees in writing to accept all of the terms and conditions of this Agreement; and
    - (b) you notify VVI in writing that you have transferred your copy of the SOFTWARE PRODUCT; and
    - (c) you cease all use of the SOFTWARE PRODUCT.
  - D. Terminate this license by destroying the original and all copies of the SOFTWARE PRODUCT in whatever form.
- **4. PROHIBITED ACTIVITIES**

  YOU MAY NOT:
  - A. Loan, rent, lease, give, sublicense or otherwise transfer the SOFTWARE PRODUCT (or any copy), in whole or in part, to any other person.
  - B. Copy or translate the User Manual included with the SOFTWARE PRODUCT.
  - C. Copy, alter, translate, decompile, or reverse engineer the SOFTWARE PRODUCT, including but not limited to, modify the SOFTWARE PRODUCT to make it operate on non-compatible hardware.
  - D. Remove, alter or cause not to be displayed, any copyright notices or startup messages contained in the SOFTWARE PRODUCT or documentation.

THIS LICENSE WILL TERMINATE AUTOMATICALLY if you fail to comply with the terms and conditions set forth above.

- **5. OWNERSHIP**
  - SOFTWARE PRODUCT contains software proprietary to VVI. As a licensee, you own the media on which the SOFTWARE PRODUCT is originally or subsequently recorded, but VVI retains title and ownership to the SOFTWARE PRODUCT recorded on the media and all copyright and other intellectual property rights therein. This license is not a sale of the SOFTWARE PRODUCT or any copy.
  - Operations, features and methodologies of graph and data-oriented graphics by user interface oriented creation, manipulation and editing such as by or in relation with, but not exclusive to, a general purpose drawing system, application or software in any combination of the aforementioned is a trademark and tradedress of VVI with all rights reserved in the United States and all international locations.
- **6. WARRANTY**
  - VVI warrants, to you personally, for a period of ninety (90) days from the date of the Purchase Agreement for SOFTWARE PRODUCT subject to this License Agreement (the "Warranty Period"), that the media containing the SOFTWARE PRODUCT shall be free from defects in material and workmanship under normal use. VVI further warrants, for the Warranty Period, that the SOFTWARE PRODUCT shall operate substantially in accordance with the functional specifications in the accompanying documentation if properly used on a machine for which it was designed. If during the Warranty Period a defect in the SOFTWARE PRODUCT or media appears, you may return the SOFTWARE PRODUCT to your place of purchase for either, at the election of VVI, replacement or refund of the amounts paid by you for the license of the SOFTWARE PRODUCT. You agree that the foregoing constitutes your sole and exclusive remedy for breach by VVI of any warranties made under this Agreement.
- **7. DISCLAIMER**
  - Because it is impossible for VVI to know the purposes for which you acquired this SOFTWARE PRODUCT or the uses to which you will put this SOFTWARE PRODUCT, you assume full responsibility for the selection of the SOFTWARE PRODUCT, and for its installation and use and the results of that use.
  - EXCEPT FOR THE LIMITED WARRANTY SET FORTH IN SECTION 6 ABOVE, YOU AGREE THAT THE SOFTWARE PRODUCT IS FURNISHED ON AN "AS-IS" BASIS. NEITHER VVI NOR ANY THIRD PARTY SUPPLIER MAKES ANY WARRANTIES OF ANY KIND, EITHER EXPRESS OR IMPLIED, AS TO ANY MATTER WHATSOEVER, INCLUDING WITHOUT LIMITATION THE CONDITION, MERCHANTABILITY, OR FITNESS FOR ANY PARTICULAR PURPOSE OF THE SOFTWARE PRODUCT. SOME STATES DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES, SO THE ABOVE EXCLUSION MAY NOT APPLY TO YOU. IN THE UNITED KINGDOM THE ABOVE DISCLAIMER OF WARRANTIES DOES NOT AFFECT YOUR STATUTORY RIGHTS AS A CONSUMER. NEITHER VVI NOR ANY THIRD PARTY SUPPLIER WARRANTS THAT THE SOFTWARE PRODUCT WILL MEET YOUR REQUIREMENTS, THAT IT WILL OPERATE IN THE COMBINATIONS WHICH YOU MAY SELECT, OR THAT ITS OPERATION WILL BE UNINTERRUPTED OR ERROR FREE. NEITHER VVI NOR ANY THIRD PARTY SUPPLIER ASSUMES ANY LIABILITY REGARDING USE OF, OR ANY DEFECT IN, THE SOFTWARE PRODUCT.
  - VVI is not responsible for problems caused by changes in the operating characteristics of the hardware or operating system software you are using which are made after the release date of this version of the SOFTWARE PRODUCT, nor for problems in the interaction of the SOFTWARE PRODUCT.
- **8. LIMITATION OF LIABILITY**
  - IN NO EVENT SHALL VVI OR THIRD PARTY SUPPLIERS BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, EVEN IF SUCH PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGE. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.
- **9. EXPORT**
  - You agree not to export or re-export the SOFTWARE PRODUCT, or any portion thereof, without the appropriate United States or foreign government licenses.
- **10. SEVERABILITY**
  - If any portion of this Agreement is held invalid or unenforceable for any reason, such invalidity shall not affect the validity of the remaining provisions of this Agreement, and the parties will substitute for the invalid provisions a valid provision which most closely approximates the intent and economic effect of the valid provision.
- **11. TERMINATION**
  - This Agreement shall be effective until terminated by Licensor. Any failure by you to comply with any of the provisions of this Agreement will be a material breach of this Agreement and entitle VVI to terminate this Agreement immediately. Upon termination, you are to immediately stop all use of the SOFTWARE PRODUCT and to return to VVI or erase all copies of the SOFTWARE PRODUCT in any form (including copies contained in any mass storage device).
- **12. ENTIRE AGREEMENT**
  - This Agreement shall constitute the entire agreement between the parties with respect to the subject matter hereof, and supersedes any prior agreements or understandings between the parties, whether written or oral, with respect hereto. No modification to this Agreement shall be of any force or effect unless made in writing signed by each party.
- **13. APPLICABLE LAW; JURISDICTION; VENUE**
  - This Agreement shall be governed and construed in accordance with the laws of the State of Pennsylvania. The parties agree that Centre County in the State of Pennsylvania shall be the proper venue for any action brought under the Agreement whether in state or federal court. You consent to the personal jurisdiction of such courts.

- **14. U. S. GOVERNMENT END USERS**
    - If the SOFTWARE PRODUCT is acquired by or on behalf of a unit or agency of the United States Government, the following provisions apply. The documentation and Software licensed under this Agreement is provided with RESTRICTED RIGHTS and constitute restricted computer software, under the Federal Acquisition Regulations, as set forth below. The SOFTWARE PRODUCT: (a) is existing computer software and, was developed at private expense, (b) is a trade secret of VVI for all purposes of the Freedom of Information Act, (c) is "commercial computer software" subject to limited utilization as expressly stated in this Agreement or as provided in the contract between the vendor and the government entity, (d) in all respects is proprietary data belonging solely to VVI and (e) is unpublished and all rights are reserved under the copyright laws of the United States.
    - The SOFTWARE PRODUCT is licensed only with "Restricted Rights" and use, reproduction or disclosure is subject to restrictions set forth in Alternate III(g)(3) of the Rights in Data - General Clause at 52.227-14 (June 1987) and subparagraphs (a) through (d) of the Commercial Computer Software - Restricted Rights clause at 52.227-19 (June 1987) of the Federal Acquisition Regulations and their respective successors. For units of the Department of Defense (DoD), this SOFTWARE PRODUCT is licensed only with "Restricted Rights" and use, duplication, or disclosure is subject to restrictions as set forth in subdivision (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at 252.227-7013 (June 1988) of the DoD Supplement to the Federal Acquisition Regulations and its successors.
    - Contractor/manufacturer is VVimaging, Inc., 311 Adams Avenue, State College, Pennsylvania 16803.

EULA - 10.5.8 - 7/19/2009

Vvidget Server Reference Manual

Vvidget Server > Legal > Trademarks And Legal

Manipulating graphs and data graphics and other manipulations unique to Vvidget is a Trademark and Tradedress of VVimaging, Inc (VVI) in the United States and world-wide.

VVI is a registered trademark of VVimaging, Inc (VVI). Peer Visual, Vving, Vvidget, OpenGraph, VVI, VVimaging, SAM, "State Automation", "State AutoMation", and Vvidget with any word combination are trademarks of VVimaging, Inc (VVI) in the United States and world-wide.

The OpenGraph logo, Vvidget logo, Vvidget Builder logo, VVI logo are registered trademarks or trademarks of VVimaging, Inc (VVI).

Apple, Power Macintosh, Macintosh, WebObjects are trademarks or registered trademarks of Apple Computer, Inc. Microsoft and Windows are registered trademarks of Microsoft, Inc. All other trademarks and service marks belong to their respective owners.

VVI has tried to make the information contained in this manual as accurate and reliable as possible. Nevertheless, VVI disclaims any warranty of any kind, whether express or implied, as to any matter whatsoever relating to this information, including without limitation the merchantability or fitness for any particular purpose. VVI will from time to time revise the software described in this manual and reserves the right to make such changes without obligation to notify the purchaser. In no event shall VVI be liable for any indirect, special, incidental, or consequential damages arising out of purchase or use of this manual or the information contained herein.
