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| **GLIMMPSE: Chart Service API** |

Contents

[**GLIMMPSE: Chart Service API** 1](#_Toc293045208)

[1 Introduction 1](#_Toc293045209)

[2 The Chart Service 1](#_Toc293045210)

[3 Scatter Plots 2](#_Toc293045211)

[4 Legend Images 4](#_Toc293045212)

[5 Examples 4](#_Toc293045213)

[5.1 Basic Scatter Plot 4](#_Toc293045214)

[5.2 Basic Legend Image 4](#_Toc293045215)

# Introduction

The GLIMMPSE software system provides a web based user interface to estimate power and sample size for the general linear multivariate model (GLMM) with or without a baseline covariate. The GLIMMPSE system consists of five main components:

* GLIMMPSE.com user interface - a Javascript/GWT front-end user interface
* Power Service - Java web service which processes power/sample size requests
* **Chart Service** - Java web service which produces graphs. For the GLIMMPSE system, this service produces power curves.
* File Service - Java web service providing upload/save functionality for study design information
* JavaStatistics library - low level library containing routines for computing GLMM power
* Web Service Common library – defines the communication layer and provides utility functions for GLIMMPSE web services.

This document describes the API for the Chart Service. It assumes basic familiarity with [HTTP](http://www.w3.org/Protocols/).

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# The Chart Service

The Chart Service component of the GLIMMPSE system is a Java web service which provides scatter plot capabilities for the GLIMMPSE user interface. This service is used to produce power curve images. The service itself is generic, and can be used to create basic scatter plots with multiple data series.

The GLIMMPSE user interface calls this service to allow users to create a scatter plot of their power results, which is displayed on the final results screen. Images can be saved from using the standard right-click “Save Image As” menu item available in most browsers.

The service is implemented using the [Restlet Framework](http://www.restlet.org/). Requests to the file service are received via an [HTTP GET request](http://www.w3.org/Protocols/) from the GLIMMPSE user interface.

The Chart Service was developed and tested for use within the [Apache Tomcat Server (v 6.0)](http://tomcat.apache.org/).

# Scatter Plots

The chart service supports 2D scatter plots with one or more data series. The user may also specify the plot title, axis labels and limits, and may show/hide the plot legend. Scatter plots are returned as JPEG images to the calling application. Chart parameters are passed as arguments in the URL query string. The chart service API is based on the [Google Chart API](http://code.google.com/apis/chart/).

Scatter plots are created with a URI of the form:

GET /chart/scatter?*chartParameters*

Supported parameters are listed in the table below. Parameters values must be URL-encoded.

|  |  |  |
| --- | --- | --- |
| Query Parameter | Description | Example |
| chtt | The main title of the chart | chtt=Power%20Curve |
| chs | The row and column dimension of the resulting JPEG image, separated by “x”. The maximum width and height allowed is 800 pixels. | chs=300x300 |
| chd | The data series information. All data series are preceded by the characters “t:”. The data are specified in alternating blocks of X and Y values:  chd=x1,x2,…,xn|y1,y2,…yn  Each pair of x and y value lists represents an individual data series. | A data set containing two data series:  chd=t:1,2,3|1,2,3|1,2,3|2,4,9 |
| chdl | A pipe separated list of data series labels. The order matches the order of series specified with the chd parameter | chdl=group1|group2 |
| chxl | A pipe-separated list of axis labels. The first entry in the list is the label for the X axis and the second entry is for the Y axis. | chxl= |
| ls | A pipe separated list of line styles for each data series. If there are more data series than line styles specified, then the style will default to a solid line for the additional data series. A line style is specified as three comma-separated integers indicating line width, dash length, and space length in pixels | A dotted line style  ls=1,1,3 |

# Legend Images

The chart service can create a separate image which contains only the chart legend. The input parameters are the same as described for scatter plots, but the URI is as follows:

GET /chart/legend?*chartParameters*

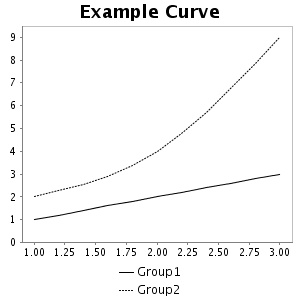
# Examples

## Basic Scatter Plot

The following example builds a scatter plot with a line and a simple quadratic curve. We add “Group1” and “Group 2” as data series labels, and label the axes “X” and “Y”. The GET request to the chart service is:

GET /chart/scatter?chd=t:1,2,3|1,2,3|1,2,3|2,4,9&chtt=Example%20Curve&chdl=Group1|Group2&ls=1,1,1|1,1,3

The resulting image is:

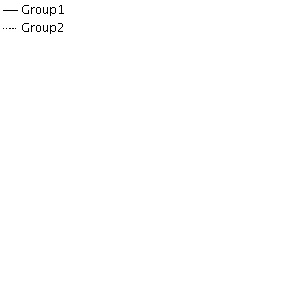


## Basic Legend Image

To produce a legend image for the curve in example 5.1, we use the following request:

GET /chart/legend?chd=t:1,2,3|1,2,3|1,2,3|2,4,9&chtt=Example%20Curve&chdl=Group1|Group2&ls=1,1,1|1,1,3

The resulting image is:



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