Creating Action Sequences

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Contents

Introduction

Action sequences are a unique and powerful feature of the Pentaho BI Platform; they enable BI developers and business users to perform advanced tasks that cannot easily be accomplished through Pentaho's design tools and user interface functions, including interaction with third-party software frameworks. This guide is designed to help experienced BI Platform users learn to create and edit action sequences using the Action Sequence Editor built into Pentaho Design Studio.

Note: This guide is not yet finished. It is being published early because it contains a great deal of useful information, and the extended delay caused by completing the component reference and action sequence examples would unreasonably prevent it from reaching Pentaho Business Analytics Enterprise Edition customers in an acceptable timeframe. Please do let your Pentaho sales or support representative know if there are unfinished or missing sections that you would like to read.

What is an Action Sequence?

An action sequence is an XML document that defines an ordered set of action definitions that together perform a single task; it is the smallest complete task that the Pentaho BI Platform's solution engine can perform. It is useful for sequencing small, linear, success-oriented tasks like reporting and bursting, and has the ability to loop through a result set, call other action sequences, and conditionally execute components.

Action sequences can be created through raw XML (though the DOM for each component can be unique), or through the graphical interface built into Design Studio (though not every function in every component is supported).

What is a Solution?

A collection of action sequences that fit a common theme or purpose is called a **solution**, and each solution is typically in its own directory. By default, all solutions are in subdirectories in the `/pentaho/server/biserver-ee/pentaho-solutions/` directory, which is mirrored in the solution repository database. Mirroring the solutions directory allows the BI Platform to have fine-grained control of user and role access to each file and subdirectory.

Requirements and Recommendations

At its core, an action sequence is an XML file with a **.xaction** extension. Because each component and plugin has its own unique inputs, outputs, and action definitions, it's best not to try to create an action sequence by hand with an XML editor -- you'll quickly get lost. Instead, you should use the Action Sequence Editor built into Pentaho Design Studio.

Design Studio is a standalone tool that facilitates the creation and management of action sequences using a graphical interface, and should be your tool of choice when creating, editing, and publishing action sequences. It doesn't require knowledge or manipulation of the underlying XML, but does offer an XML editor so that you can hand-edit action sequences that you create through the standard user interface. While you do not necessarily need to understand how to code the bare XML for each component in order to create simple action sequences, more complex operations require hand-editing.

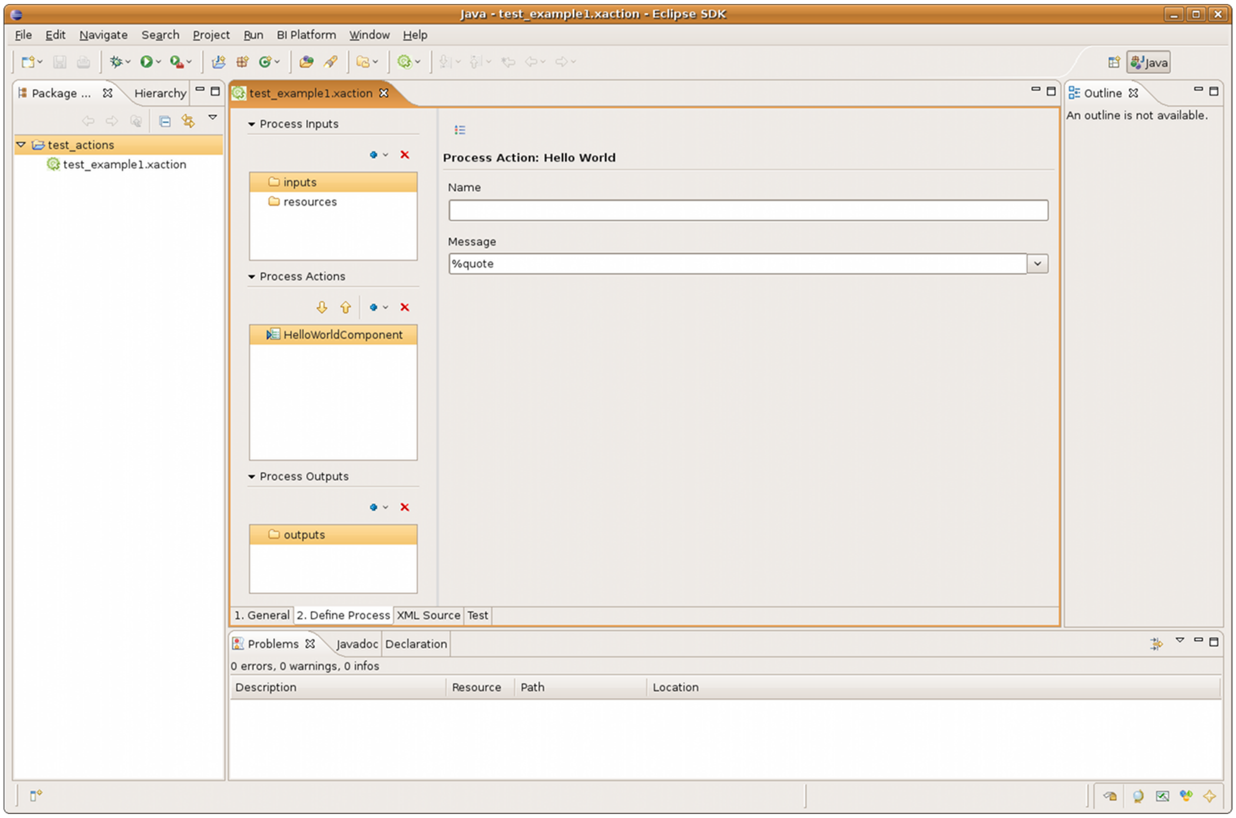
Note: Some BI Platform components -- especially very new ones -- may not be fully or correctly implemented in Design Studio, and will require hand-editing.

Design Studio is included with a standard Pentaho Business Analytics Enterprise Edition workstation deployment. If it is not installed on your system, you can either re-run the Pentaho Business Analytics installation utility, or you can download an individual Design Studio package from the Pentaho Customer Support Portal. If you are on a supported 64-bit operating system, you will have to install the Eclipse integrated development environment for your platform on your own, then download and install the Pentaho Action Sequence Editor Eclipse plugins. Instructions for this process are included in the *Pentaho Archive-Based Installation Guide*, which is available in the Pentaho InfoCenter.

In order to test and publish your action sequences, you will have to either install Design Studio on the same machine as your BI Server, or you will have to install a standalone BI Server instance for action sequence development on your workstation. Once you've developed and tested your new action sequence, you can copy it over to your production server to deploy it.

Using Design Studio

This section explains how to use the basic functionality of the Action Sequence Editor in Pentaho Design Studio.



Initial Design Studio Configuration

When you first launch Design Studio, you must establish a workspace and an Eclipse project before you can begin creating action sequences. Follow the below directions to initialize Design Studio.

1. Start Pentaho Design Studio.

   On Windows, you can start Design Studio through the Start menu in the Pentaho Business Analytics category. On Linux, run the `/pentaho/design-tools/design-studio/PentahoDesignStudio` script.
2. If this is the first time you've run Design Studio, you'll be asked to type in a workspace location. Type in `/pentaho/server/biserver-ee/pentaho-solutions/`, or whatever the location of your solutions directory is.

   This is where Eclipse (the integrated development environment that Design Studio is based on) stores project files. Using the solutions directory for the BI Platform ensures that your xactions will be easily accessible from it.
3. Start a new Eclipse project by going to the **File** menu, then selecting **New**, then clicking **Project** in the sub-menu.

   A New Project selection window will appear.
4. Click the triangle next to **General**, then click the **Project** item under it, then click **Next**.
5. Type **learning_solutions** in the Project Name field, then click **Finish**.

   You will return to the Welcome screen.
6. Click **Workbench** to go to the Eclipse workbench.

   This is the view you will need to be in to perform most Design Studio functions.

Design Studio is now configured with a Pentaho workspace and a project directory for creating and managing new action sequences.

When you are ready to create production-quality action sequences, you should start a new Eclipse project for each new solution.

Using PDI Data Sources in Action Sequences

If you have any action sequences that rely on Pentaho Data Integration (PDI) data sources that are stored in an enterprise repository, you must make a configuration change in order to run them.

Create a `.kettle` directory in the home directory of the user account that runs the BI Server, and copy the **repositories.xml** file from your local PDI configuration directory to the new one you just created on the BI Server machine.

You must also edit the `/pentaho-solutions/system/kettle/settings.xml` file and put in your PDI enterprise repository information.

Once these changes have been made, restart the BI Server. When it comes back up, the **Use Kettle Repository** function in Pentaho Design Studio should properly connect to the DI Server.

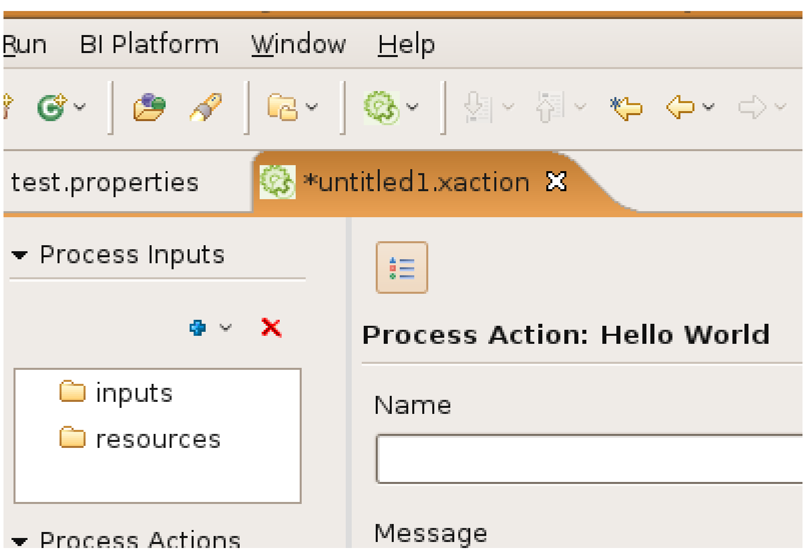
The Design Studio Interface

Design Studio features a modular interface with the following tabs:

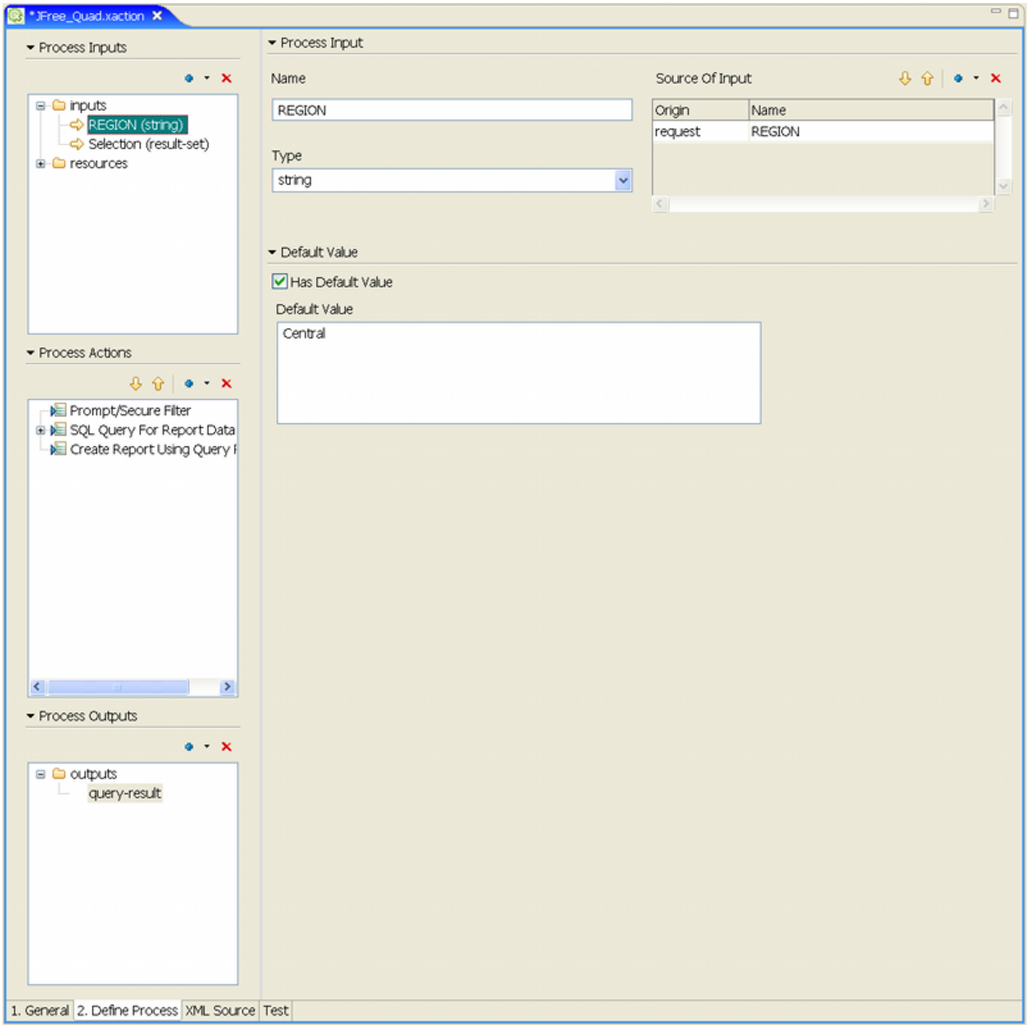
- **General** This tab enables you to define and modify basic values including the logging level, result type, and icon for the action sequence.
- **Define Process** This tab is where you define the process inputs, process actions, and process outputs that go together to make up an action sequence.
- **XML Source** This tab enables you to view the bare action sequence XML.
- **Test** This tab allows you to test the action sequence inside of Design Studio.

Note: The **Test** tab does not work on Linux or Solaris. To test an action sequence, publish it to your test server

Design Studio starts by default in a specialized view that limits its interface options to the actions defined in the template. You can switch to Generic Component Mode, which shows all possible component parameters, by clicking the toggle button to the right of Process Inputs, shown in the graphic below underneath the **untitled1.xaction** tab:



The following example shows the JFree_Quad.xaction in the Define Process tab with some defined process inputs, process actions, and process outputs. The focus is on the REGION process input, so the right pane shows the options for defining this specific input.



Creating Design Studio Templates

Note: This section is not yet complete.

Creating a Solution Directory

Before you begin creating action sequences, it makes sense to create a directory to store them in. In theory, this directory will contain a collection of action sequences that fit a common purpose or theme -- a **solution**, which would make this a **solution directory**. You should create a new directory for every solution you develop.

1. Create a new directory in `/pentaho/server/biserver-ee/pentaho-solutions/`.

   Use underscores instead of spaces in the solution directory name. Ensure that the directory has the appropriate user and group ownership to be writable from the BI Platform.
2. Using an XML-aware text editor (or Design Studio), create a file named **index.xml** in your new solution directory.
3. Copy the following text into the index.xml file, changing the content accordingly:

```
<index>
        <name>Example Solution</name>
        <description>This solution contains examples I created while learning to
 work with action sequences.</description>
        <icon></icon>
        <visible>true</visible>
        <display-type>icons</display-type>
</index>
```

4. Save the file and close the text editor.
5. Log into the Pentaho User Console as an administrator.
6. Refresh the solution repository cache by going to the **Tools** menu, then selecting the **Refresh** submenu, then clicking on **Repository Cache**.

You now have a new solution directory. It will show up in all file dialogues in the Pentaho User Console as well as the Solution Browser in the left pane.

Every time you add or edit an action sequence to your solution directory, you must refresh the repository cache as explained above. Each user currently logged into the Pentaho User Console must also refresh their session cache; this is best done by re-logging into the Pentaho User Console.

Your First Action Sequence

Follow the directions below to create the simplest kind of functional action sequence with Design Studio.

1. In Design Studio, go to the **File** menu, then select **New**, and click on **Other...** in the sub-menu.

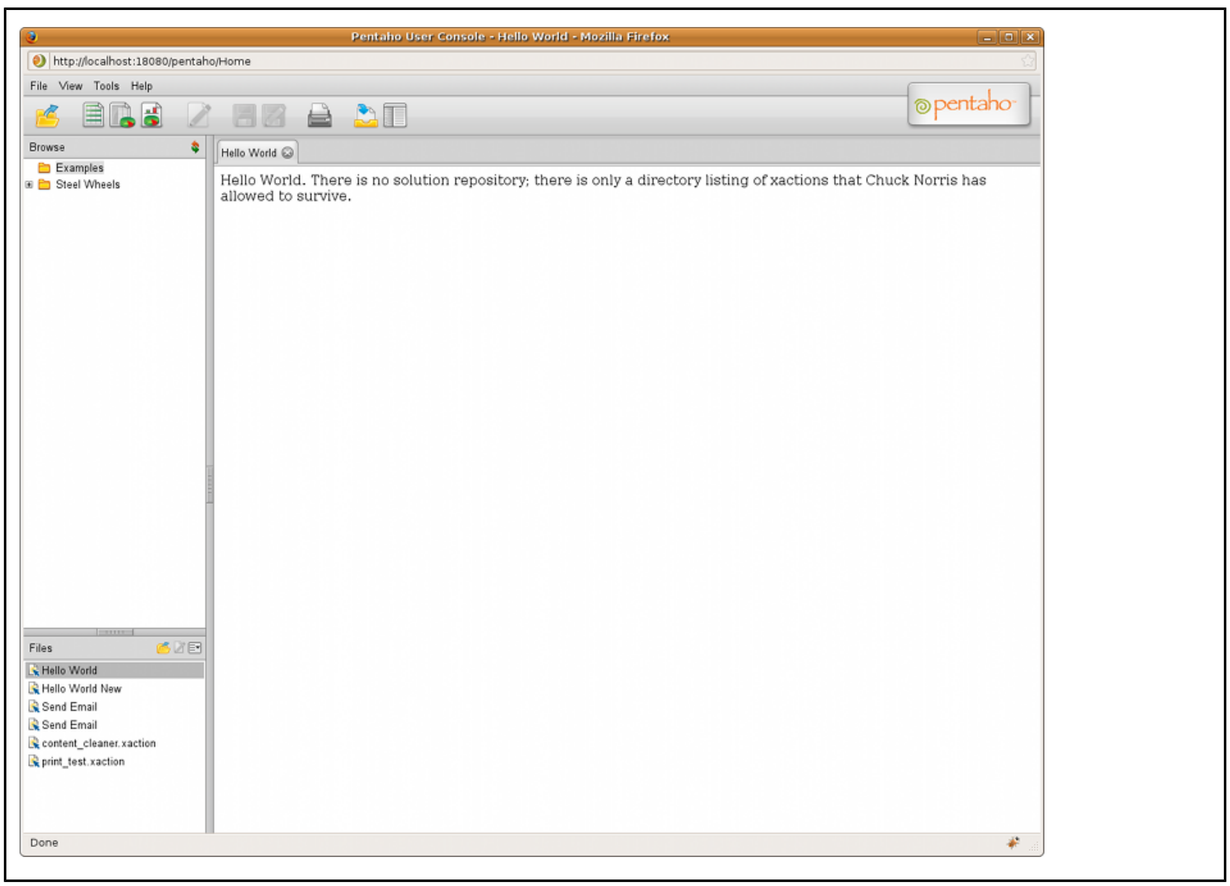
   The **New** window will appear.
2. In the **New** window, click the triangle next to **Pentaho**, select **New Action Sequence Wizard**, then click **Next**.
3. In the **File name** field, type **hello_world.xaction**.
4. Select **Hello World** from the **Template** drop-down box, then click **Finish**.

   The wizard will generate the new file and bring you back to the workbench.
5. Click on **HelloWorldComponent** in the **Process Actions** section on the left.

   The right side of the screen will change to show the options available for this action: **Name** and **Message**. The Name field controls the name of the component in the Process Actions list on the left; it doesn't do anything else of note. The Message field contains the text that will appear on the screen when the action sequence is run. It is pre-populated with **%quote**, which is a token that represents a quote message in a nonexistent properties file. Pentaho used to provide properties files for each example, but they have been removed from the standard Pentaho Business Analytics distribution.
6. Replace the **%quote** with a sufficiently inspiring message.

   Alternatively, you could create a **hello_world.properties** file and populate it with the appropriate messages and tokens, but that has no advantage unless you intend to internationalize this action sequence.
7. Save the file.

You now have a working action sequence that prints a short text message: "Hello, World." plus whatever you typed into the Message field. The first part of the message is determined by a message bundle packaged with the Pentaho Web application archive.



To test the action sequence, use the Test tab if you are on Windows or OS X, or log into the Pentaho User Console and run it from the Solution Browser.

Anatomy of an Action Sequence

In the below example action sequence, an email is generated and sent to either Joe or Suzy, depending on which region the user selects. There are four inputs: **region**, **from**, **subject**, and **message-plain**. The region input type is defined as a **string**, and it has a default value of **Central**. Region may come from one of two sources: **request** or **session**. When the **RuntimeContext** resolves the region input at runtime, it will first look in the request (most likely an HTTP request). If it doesn't find it in the request, it will look in the session (most likely the HTTP session). If it is not available in the session, the **default** value will be used. The order that the sources are specified in the XML document is the order that they will be searched. The default is always used as a last resort.

The other three inputs only specify a default value. This is analogous to hard-coding the parameters to a constant value. Since the output of this action sequence is an email message, no output parameters will be set.

There are two **action-definition** nodes for this sequence. The first invokes the JavascriptRule component and takes a **region** parameter as input; it will create a new parameter called **rule_result** as output. This new parameter will be made available to other action-definition nodes in the sequence.

The JavaScript defined in the **component-definition** will be executed and will set the value of **rule_result** to the appropriate email address, based on the value of **region**.

When the first **action-definition** completes, the second, which defines an interaction with EmailComponent, will execute. EmailComponent requires four action-inputs: **to**, **from**, **subject**, and **message-plain**.

You may have noticed that some of the action-inputs (from, subject and message-plain) are also specified in the inputs section of the action sequence header. The RuntimeContext will take the values from there and pass them to EmailComponent just as it passed region to the JavascriptRule. The source of the action-input is indirectly defined with the **mapping** attribute, which tells the RuntimeContext to use the value from **rule_result** that was generated by the JavascriptRule action and use it as the component's **to** input.

```
<action-sequence>
   <name>Example1.xaction</name>

   <documentation>
    <author>Chuck Norris</author>
    <description>Email to selected user</description>
    <help>There is no help when Chuck Norris emails you</help>
   </documentation>

   <inputs>
      <region type="string">
         <default-value>Central</default-value>
         <sources>
            <request>REGION</request>
            <session>aRegion</session>
         </sources>
      </region>

      <from type="string">
         <default-value>admin@example.com</default-value>
      </from>

      <subject type="string">
         <default-value>Pentaho Example1</default-value>
      </subject>

      <message-plain type="string">
         <default-value>
                This is an email from the Pentaho BI Platform - Example1
         </default-value>
      </message-plain>
   </inputs>

   <outputs/>

   <resources/>

   <actions>
```

```
      <action-definition>
         <action-inputs>
            <region type="string"/>
         </action-inputs>

         <action-outputs>
            <rule_result type="string"/>
         </action-outputs>

         <component-name>JavascriptRule</component-name>
         <component-definition>
            <script>
               <![CDATA[
                  if ( "Central".equals( region ) ) {
                     rule_result = "joe@pentaho.org";
                  }
                  else {
                     rule_result = "suzy@pentaho.org";
                  }
              ]]>
            </script>
         </component-definition>
      </action-definition>

      <action-definition>
         <action-inputs>
            <to type="string" mapping="rule_result"/>
            <from type="string"/>
            <subject type="string"/>
            <message-plain type="string"/>
         </action-inputs>
         <component-name>EmailComponent</component-name>
         <component-definition/>
      </action-definition>

   </actions>
</action-sequence>
```

Output Types

Component-specific action-outputs are defined on an individual basis and can vary; however, global output handlers are static.

The output variable data types are defined in Design Studio, and are reasonably self-explanatory. For the majority of action sequences, you will only be using **string** and **content** (binary file) data types. **All output types can be parameterized by using {curly braces}.**

response

This directs previously generated content to whatever agent made the request (usually a Web browser). If you want to save the content for later use, you should use the **file** output handler (explained below) instead.

1. **content**: The default outputstream type. This streams output to a Web browser (or whatever the component's destination may be) to be displayed. The type of content and how the browser displays it are determined by the MIME type you specify.
2. **redirect**: The Web browser will be redirected to the URL defined by the output. The Web browser will automatically load the content associated with that URL. The redirect content type is useful when you want to use action sequence logic to generate a URL or to set programmatically URL parameters before sending the request to another Web application. It is possible to chain action sequences using the redirect.
3. **header**: This will return a standard HTTP name/value pair that will go into the header of an HTTP response. This is useful for setting error codes in the browser.

These three response types stream different kinds of data to your Web browser.

Below is a typical global output response example; just replace **content** with **redirect** or **header** to define other response types:

```
<outputs>
    <myReport type="string">
        <destinations>
            <response>content</response>
        </destinations>
    </myReport>
</outputs>
```

file

This is direct output to a file. The path to the file is defined through a platform-specific URI. The default location is the BI Server's working directory. If the location you specify does not exist, the BI Platform will attempt to create it. If the file name you specify is already in use, the existing file will be replaced with the new one you are generating.

```
<outputs>
    <myReport type="content">
      <destinations>
        <file>file:invoice_{orderkey}.pdf</file>
      </destinations>
    </myReport>
</outputs>
```

Apache VFS

This directs output to the Apache Commons Virtual Filesystem. Currently, only the FTP destination type is supported.

```
<outputs>
    <content type="content">
      <destinations>
        <vfs-ftp>vfs-ftp://ftp.example.org|bsmith:password@ftp.example.org/
mytest.txt</vfs-ftp>
      </destinations>
    </content>
</outputs>
```

Custom output types

You can define your own output type in the BI Platform by writing an output class, then mapping it to a new output type in the `/pentaho/server/biserver-ee/pentaho-solutions/system/pentahoObjects-spring.xml` configuration file. Once that work is complete, you can use the new output type in an action sequence. This is useful for action sequence output that has to be formatted in a certain way, particularly for use as an input file for other applications.

```
<outputs>
    <myReport type="content">
      <destinations>
        <myOutput>myoutput:custom_app_data_{datestamp}.xmp</myOutput>
      </destinations>
    </myReport>
</outputs>
```

Input Types

Inputs are typically small, dynamic data sources that are available globally for all actions in an action sequence. Each is declared as a variable with a static data type, one or more methods of retrieving the data, and a default value in case no data is retrieved.

Note: If you declare a **default-value** without assigning a value, the user running the action sequence will be prompted for a value, if possible.

There are four potential sources for input values:

1. **runtime**: parameters that are stored in the runtime context, which retains the inputs and outputs from previous instances and makes them available to future executions of the same runtime instance-id.
2. **request**: the name/value pairs specified on a URL.
3. **session**: variables that are stored in the user's session and may contain unique values for each user.
4. **global**: similar to session parameters, except they have the same values for all users. Global scope contains the output of any global startup action sequences or any action sequences that have explicitly output to global.

```
<inputs>
    <region type="string">
        <sources>
            <request>REGION</request>
            <runtime>aRegion</runtime>
        </sources>
        <default-value>Central</default-value>
    </region>
</inputs>
```

In the above example, a single input named **region** is declared as a string. The BI Platform first attempts to get the value from the **REGION** variable in the browser request; if no value is found, the BI Platform looks in the runtime context for an **aRegion** variable; if no value is found there either, the default value of **Central** is assigned.

Resources

Resources define unique input sources that have a specific MIME type and a path. Usually you would use a resource instead of an input when you're referring to large or unusual data sources.

file

The full path to a local file (or a file accessible through a local directory), including the file name.

```
<file>
    <location>/home/pentaho/samples/reporting/myReport.prpt</location>
    <mime-type>text/xml</mime-type>
</file>
```

url

A link to a remote file accessible via HTTP.

```
<url>
    <location>http://www.example.com/logo.png</location>
    <mime-type>image/png</mime-type>
</url>
```

solution-file

A file in the BA Server solution repository; the path is relative to the top-level solution directory (by default this is `/pentaho/server/biserver-ee/pentaho-solutions/`).

```
<solution-file>
    <location>myReport.prpt</location>
    <mime-type>application/zip</mime-type>
</solution-file>
```

string

An inline block of text in CDATA tags, as opposed to an external text file.

```
<string>
    <location><![CDATA[This is a text string.]]></location>
```

```
    <mime-type>text/plain</mime-type>
</string>
```

xml

Inline XML, as opposed to an external XML file.

```
<xml>
    <location><node type="primary">An example</node></location>
    <mime-type>text/xml</mime-type>
</xml>
```

Parameter Data Types

Data type	Definition
content	A large block of data that is generated within a component.
long	A Java long object.
property-map	A property map of Java strings.
property-map-list	A list of property maps of Java strings.
string	The standard Java string.
string-list	A list of Java string objects.

Action Definition Reference

All of the possible BI Platform action definitions -- the entirety of what you can do with an action sequence -- are defined in sufficient detail below. Some components have templates in Design Studio, and some do not. When you can't use a template, you will have to switch to Generic Component Mode, or create the action sequence with raw XML.

Note: All XML tags are case-sensitive. Some are all lowercase, some are all uppercase, and some are camel-cased. Pay close attention to case-sensitivity when working in Generic Component Mode and with raw XML.

ContentRepositoryCleaner

The ContentRepositoryCleaner action removes files and metadata from the Pentaho content repository, which stores generated reports and other BI Platform output. This is particularly useful in two situations: Removing data that is so old that it is no longer valid, and removing orphaned content artifacts created or scheduled by inactive or deleted BI Platform user accounts.

Action Input	Data Type	Definition
days-back	Integer	A static number of days; any content created after this number of days will be removed
aged-date	Date	Any content created before this date will be removed

Action Output	Data Type	Definition
delete-count	Integer	The number of files removed by this action

```
<?xml version="1.0" encoding="UTF-8"?>
<action-sequence>
  <name>clean_repository.xaction</name>
  <title>%title</title>
  <version>1</version>
  <logging-level>debug</logging-level>
  <documentation>
    <author>William E. Seyler</author>
    <description>%description</description>
    <icon>btn_clean.png</icon>
    <help/>
    <result-type>rule</result-type>
  </documentation>

  <inputs>
    <days-back type="string">
      <default-value>180</default-value>
    </days-back>
  </inputs>

  <outputs>
    <delete-count>
      <type>string</type>
    </delete-count>
  </outputs>

  <resources/>

  <actions>
    <action-definition>
      <component-name>org.pentaho.plugin.core.ContentRepositoryCleaner</
component-name>
```

```
      <action-type>rule</action-type>
      <action-inputs>
        <days-back type="string"/>
      </action-inputs>
      <action-outputs>
        <delete-count type="string"/>
      </action-outputs>
      <component-definition/>
    </action-definition>

  </actions>
</action-sequence>
```

EmailComponent

The EmailComponent enables you to send email messages from the BI Platform. Most of the inputs are standard email parameters and need little explanation. The **message-plain** and **message-html** values are meant to be used in an either-or scenario; you would use one or the other, but not both.

Attachments are not defined as inputs, but as resources of type **file** with the **text/plain** mime-type. The attachment resource is then called in the component definition as an **attachment-ref**, shown in the example action sequence below.

Action Input	Data Type	Definition
message-plain	String	The email message body in plain text
message-html	String	The email message body in HTML format
subject	String	The email subject
to	String	The email address of the message recipient. You may specify multiple addresses by using a comma to separate each
cc	String	The email address of a secondary (carbon copy) message recipient. You may specify multiple addresses by using a comma to separate each
bcc	String	The email address of a blind carbon copy message recipient, who will not be able to see the recipients specified in the to, cc, or bcc fields. You may specify multiple addresses by using a comma to separate each
from	String	The email address you want to send the message as. If you do not specify an address, the default value that you specified in the BI Platform configuration will be used (typically this is set through the Pentaho Enterprise Console or Pentaho Administration Console)

```
<?xml version="1.0" encoding="UTF-8"?>
<action-sequence>
  <title>Send Email</title>
  <version>1</version>
```

```
  <logging-level>DEBUG</logging-level>
  <documentation>
    <author>Joe Pentaho</author>
    <description>Sample sequence for sending an email</description>
    <help>%help</help>
    <result-type>rule</result-type>
    <icon>HelloEmail.png</icon>
  </documentation>

  <inputs>
    <to type="string">
      <default-value/>
      <sources>
        <request>to</request>
      </sources>
    </to>
    <from type="string">
      <default-value>joe.pentaho@pentaho.org</default-value>
    </from>
    <subject type="string">
      <default-value>%subject</default-value>
      <sources>
        <request>email-subject</request>
      </sources>
    </subject>
    <message-plain type="string">
      <default-value>%message</default-value>
    </message-plain>
  </inputs>

  <outputs/>

  <resources>
    <attach_resource_1>
      <file>
        <location>/home/bobs/pentaho/server/biserver-ee/pentaho-
solutions/initech/analysis/tps_latest.analysisview.xaction</location>
        <mime-type>text/plain</mime-type>
      </file>
    </attach_resource_1>
  </resources>

  <actions>
    <action-definition>
      <component-name>org.pentaho.component.EmailComponent</component-
name>
      <action-type>The Bobs Consulting</action-type>
      <action-inputs/>
      <action-resources>
        <attach_resource_1 type="resource"/>
      </action-resources>
      <component-definition>
        <attachment-ref name-param="attach_name_1" resource-
param="attach_resource_1"/>
        <attach_name_1><![CDATA[folder2.png]]></attach_name_1>
        <to><![CDATA[admin@example.com,pgibbons@example.com]]></to>
        <cc><![CDATA[wlumburgh@example.com]]></cc>
        <from><![CDATA[bobs_consulting@example.com]]></from>
        <bcc><![CDATA[michael.bolton@example.com]]></bcc>
        <subject><![CDATA[Analysis view of effects of new cover sheets
 for TPS reports]]></subject>
        <message-plain><![CDATA[I'll go ahead and send you the latest
 statistics on TPS report cover sheet changes.]]></message-plain>
      </component-definition>
    </action-definition>

  </actions>
```

```
</action-sequence>
```

PrintComponent

PrintComponent sends a PDF or HTML file to a printer that is accessible from the BI Platform server. If no printer is specified statically, you will be presented with a list of detected printers to select from at runtime. If you want to use the system default printer, set **printer-name** to **PENTAHO_DEFAULT_PRINTER**. The content to print can be specified in one of two ways: By specifying the file as a **print-file** resource or component setting, or by having a previous action in the sequence pipe its output to the **report-output** parameter. Currently, the JFreeComponent, BIRTComponent, and JasperComponent all have the ability to generate content suitable for the **report-output** parameter. If no content to print is specified, the action sequence will fail.

Action Input	Data Type	Definition
print-file	String	The file you want to print, including the path
printer-name	String	A valid printer name recognized by the JRE, blank if you would prefer to show a list of detected printers to the user, and PENTAHO_DEFAULT_PRINTER if you would like to use the default system printer
copies	Integer	The number of copies you'd like to print

```
<?xml version="1.0" encoding="UTF-8"?>
<action-sequence>
  <name>report-to-printer.xaction</name>
  <title>%title</title>
  <version>1</version>
  <documentation>
    <author>Marc Batchelor</author>
    <description><![CDATA[%description]]></description>
    <icon>JFree-quadrant-budget-hsql.png</icon>
    <help>just testing...</help>
    <result-type>report</result-type>
  </documentation>

  <inputs>
    <output-type type="string">
      <default-value>html</default-value>
      <sources>
        <request>type</request>
      </sources>
    </output-type>
    <printer-name type="string">
      <default-value/>
      <sources>
        <request>printer</request>
      </sources>
    </printer-name>
    <default-printer type="string">
      <default-value/>
      <sources>
        <session>printer</session>
      </sources>
    </default-printer>
  </inputs>
```

```
  <outputs>
    <default-printer type="string">
      <destinations>
        <session>printer</session>
      </destinations>
    </default-printer>
  </outputs>

  <resources>
    <!-- use this section to identify any files that the component needs
 to execute the report -->
    <report-definition>
      <solution-file>
        <location>JFreeQuadForRegion.xml</location>
        <mime-type>text/xml</mime-type>
      </solution-file>
    </report-definition>
  </resources>

  <actions>
    <action-definition>
      <component-name>PrintComponent</component-name>
      <action-type>print</action-type>
      <action-inputs>
        <printer-name type="string"/>
        <default-printer type="string"/>
      </action-inputs>
      <action-outputs>
        <printer-name type="string"/>
        <default-printer type="string"/>
      </action-outputs>
      <component-definition>
        <handle-all-prompts>true</handle-all-prompts>
      </component-definition>
    </action-definition>

    <action-definition>
      <component-name>JFreeReportComponent</component-name>
      <action-type>report</action-type>
      <action-inputs>
        <output-type type="string"/>
        <printer-name type="string"/>
      </action-inputs>
      <action-resources>
        <report-definition type="resource"/>
      </action-resources>
      <component-definition>
        <source>sql</source>
        <live>true</live>
        <jndi>SampleData</jndi>
        <query><![CDATA[select   QUADRANT_ACTUALS.REGION,
 QUADRANT_ACTUALS.DEPARTMENT,   QUADRANT_ACTUALS.POSITIONTITLE,
   QUADRANT_ACTUALS.ACTUAL,   QUADRANT_ACTUALS.BUDGET,
 QUADRANT_ACTUALS.VARIANCE  from QUADRANT_ACTUALS order by
 QUADRANT_ACTUALS.REGION, QUADRANT_ACTUALS.DEPARTMENT]]></query>
      </component-definition>
    </action-definition>

  </actions>
</action-sequence>
```

SecureFilterComponent

The SecureFilterComponent has two separate but related functions: It allows you to customize the default prompting mechanism, and can verify that only valid selections are returned.

The action inputs are custom variables that define each selection and its data source, as defined in the selections section of the component definition. Each input may have the following attributes:

Input Attribute	Data Type	Definition
optional	Boolean	Specifies whether the parameter is required or not. If required, the user must fill in the value before continuing
style	String	Defines the style of control that will be presented to the user. Possible values are: text-box, radio, select, list, list-multi, check-multi, check-multi-scroll, check-multi-scroll-2-column, check-multi-scroll-3-column, check-multi-scroll-4-column.
prompt-if-one-value	Boolean	Prompt users even if there is only one choice
title	String	Defines the user-viewable text description
filter	String	If you do not want to filter a particular selection, you can set **filter="none"** as an attribute. If you do not set this, you will have to define a filter inside of the input tags in the selection section.

When defining a filter, the following attributes apply:

Filter Attribute	Data Type	Definition
value-col-name	String	Specifies the name of the input value
display-col-name	String	Specifies the name of the display value

```
<?xml version="1.0" encoding="UTF-8"?>
<action-sequence>
  <name>secure-sample.xaction</name>
  <title>%title</title>
  <version>1</version>
  <logging-level>debug</logging-level>
  <documentation>
    <author>Doug Moran</author>
    <description>%description</description>
    <help>just testing...</help>
    <result-type/>
    <icon>secure-sample.png</icon>
  </documentation>

  <inputs>
    <output-type type="string">
      <default-value>html</default-value>
      <sources>
        <request>type</request>
      </sources>
    </output-type>
    <REGION type="string">
      <default-value/>
      <sources>
        <request>REGION</request>
      </sources>
    </REGION>
```

```
    <REGION_FILTER type="result-set">
      <sources>
        <session>REGION_FILTER</session>
      </sources>
      <default-value/>
    </REGION_FILTER>
    <DEPARTMENT_FILTER type="property-map-list">
      <default-value type="property-map-list">
        <property-map>
          <entry key="Dept">Human Resource</entry>
          <entry key="Display">HR Dudes</entry>
        </property-map>
        <property-map>
          <entry key="Dept">Product Development</entry>
          <entry key="Display">The Smart Guys</entry>
        </property-map>
        <property-map>
          <entry key="Dept">Executive Management</entry>
          <entry key="Display">Overhead</entry>
        </property-map>
      </default-value>
    </DEPARTMENT_FILTER>
    <DEPARTMENT type="string">
      <default-value/>
      <sources>
        <request>DEPARTMENT</request>
      </sources>
    </DEPARTMENT>
    <result type="string">
      <sources>
        <request>result</request>
      </sources>
      <default-value>&lt;HTML&gt;No selections for REGION were found in
 your session. &lt;p/&gt;This means you are not logged in or you do not
 have permission to view this report.&lt;/HTML&gt;</default-value>
    </result>
  </inputs>

  <outputs>
    <result type="content">
      <destinations>
        <response>content</response>
      </destinations>
    </result>
  </outputs>

  <resources>
    <report-definition1>
      <solution-file>
        <location>JFreeQuadForRegion.xml</location>
        <mime-type>text/plain</mime-type>
      </solution-file>
    </report-definition1>
  </resources>

  <actions>
    <actions>
      <condition><![CDATA[REGION_FILTER]]></condition>
      <action-definition>
        <component-name>SecureFilterComponent</component-name>
        <action-type>Prompt For Region and Dept</action-type>
        <action-inputs>
          <REGION type="string"/>
          <REGION_FILTER type="result-set"/>
          <DEPARTMENT type="string"/>
          <DEPARTMENT_FILTER type="property-map-list"/>
        </action-inputs>
        <action-outputs/>
        <component-definition>
```

```
          <selections>
            <!-- for now ignore the column names -->
            <REGION style="radio">
              <filter value-col-name="REGION" display-col-
name="REGION">REGION_FILTER</filter>
              <title>Select the Region</title>
            </REGION>
            <DEPARTMENT style="select">
              <filter value-col-name="Dept" display-col-
name="Display">DEPARTMENT_FILTER</filter>
              <title>Select the Department</title>
            </DEPARTMENT>
          </selections>
          <xsl>CustomReportParameters.xsl</xsl>
          <target>Report_Window</target>
        </component-definition>
      </action-definition>

      <action-definition>
        <component-name>SQLLookupRule</component-name>
        <action-type>Get Data from Relational</action-type>
        <action-inputs>
          <REGION type="string"/>
          <DEPARTMENT type="string"/>
        </action-inputs>
        <action-outputs>
          <query-result type="result-set"/>
        </action-outputs>
        <component-definition>
          <jndi>SampleData</jndi>
          <query><![CDATA[select   QUADRANT_ACTUALS.REGION,
 QUADRANT_ACTUALS.DEPARTMENT,   QUADRANT_ACTUALS.POSITIONTITLE,
   QUADRANT_ACTUALS.ACTUAL,   QUADRANT_ACTUALS.BUDGET,
   QUADRANT_ACTUALS.VARIANCE  from QUADRANT_ACTUALS
 where QUADRANT_ACTUALS.REGION={PREPARE:REGION} and
 QUADRANT_ACTUALS.DEPARTMENT={PREPARE:DEPARTMENT} order by
 QUADRANT_ACTUALS.REGION, QUADRANT_ACTUALS.DEPARTMENT]]></query>
        </component-definition>
      </action-definition>

      <action-definition>
        <component-name>JFreeReportComponent</component-name>
        <action-type>Pentaho Report</action-type>
        <action-inputs>
          <data type="result-set" mapping="query-result"/>
        </action-inputs>
        <action-resources>
          <report-definition type="resource" mapping="report-
definition1"/>
        </action-resources>
        <component-definition>
          <output-type>html</output-type>
        </component-definition>
      </action-definition>

    </actions>

  </actions>
</action-sequence>
```

SubActionComponent

Subactions create content that is used by the parent action. If you need to perform several dependent actions, you would accomplish them individually through SubActionComponents.

Each input may have the following attributes, all of which are required except the **session-proxy**:

Input Attribute	Data Type	Definition
solution	String	The solution containing the xaction to run
path	String	Path within the solution that locates the xaction to run
action	String	The xaction to run
session-proxy	String	String value that contains an arbitrary session name. Defining this will cause the subaction to process in a different session (asynchronously)
query	String	XMLA query to be run
filter	String	If you do not want to filter a particular selection, you can set **filter="none"** as an attribute. If you do not set this, you will have to define a filter inside of the input tags in the selection section

Each output needs to have a specific name that the parent action will reference as the subaction result.

There is a good example in the `/pentaho-solutions/cdf/components/jfreechart.xaction` action sequence, but it's a little too long to print here in its entirety. Below is a relevant excerpt that shows SubActionComponent in use:

```
<actions>
    <condition><![CDATA[QUERY_TYPE == "kettle"]]></condition>
    <action-definition>
        <component-name>SubActionComponent</component-name>
        <action-type>Pentaho BI Process</action-type>
        <action-inputs>
            <PARAMETER1 type="string"/>
            <PARAMETER2 type="string"/>
            <PARAMETER3 type="string"/>
            <PARAMETER4 type="string"/>
            <PARAMETER5 type="string"/>
            <PARAMETER6 type="string"/>
            <PARAMETER7 type="string"/>
            <PARAMETER8 type="string"/>
            <PARAMETER9 type="string"/>
            <TRANSFORMATION type="string"/>
            <DIRECTORY type="string"/>
            <IMPORTSTEP type="string"/>
        </action-inputs>
        <action-outputs>
            <newResults type="result-set"/>
        </action-outputs>
        <component-definition>
            <solution><![CDATA[cdf]]></solution>
            <path><![CDATA[components]]></path>
            <action><![CDATA[kettletransformation.xaction]]></action>
        </component-definition>
    </action-definition>
</actions>
```

TemplateComponent (Message Template)

The TemplateComponent, also called the Message Template Component, pulls in content from external sources (such as HTML, XML, graphics, or text files) and inserts it in specific places in an action sequence. That external content can be parameterized based on user feedback or a previous action's output.

In addition to whatever action inputs you specify, there is one required input for TemplateComponent:

Input Attribute	Data Type	Definition
template	String	The file containing the supported content you want to import

Potential action outputs are:

Output Attribute	Data Type	Definition
mime-type	String	The MIME type of the file you're creating
extension	String	The three-letter file extension of the file you're creating

```
There is presently no example
```

JavascriptRule

This component executes the specified block of JavaScript, typically as a way of interacting with BI Platform functions that are not available through other components. Parameters specified as inputs will be available to the script for use. The JavascriptRule can have one or more outputs. You can also define library elements in the component definition. Each specified library file must exist in the solution directory, and will be prepended to the script that's specified in the component definition. In this way, you can create a library of commonly used JavaScript code, and include it at runtime execution.

Danger: The JavascriptRule component does not contain any limitations or provide any security checks for the JavaScript you specify. Only the technical validity of the JavaScript code is verified. This means that anything you can do with JavaScript will be executed when this action sequence is run. If you are using this component to make any changes to files, databases, or users and permissions -- or anything else that can potentially be destructive and cannot be undone -- you should carefully verify that it won't do any harm before testing and deploying it.

You should only use this component if you're familiar with the BI Platform's capabilities and have a good understanding of what you want to do with this action sequence. Consult the BI Platform Javadoc for further guidance on how to interact with it: *http://javadoc.pentaho.com/bi-platform/4.1/*.

Required Elements	Data Type	Definition
script	String	The JavaScript to be executed. This code block must be enclosed in a <![CDATA[ ]]> tag.

Action Output	Data Type	Definition
rule-result	Object	A list of the values that have been returned by all the functions that have not been assigned to variables.

In the example below, the function **region** is called but not assigned to a variable. It is the only function specified, so upon completion of the component execution, **rule-result** will contain the value **"Central"**.

```
<?xml version="1.0" encoding="UTF-8"?>
<action-definition>
    <component-name>org.pentaho.component.JavascriptRule</component-
name>
    <action-outputs>
        <rule-result type="string"/>
    </action-outputs>
    <action-type>rule</action-type>
    <component-definition>
        <script><![CDATA[
            function region() {
                return "Central";
            }
            region();
        ]]>
        </script>
    </component-definition>
</action-definition>
```

SimpleReportingComponent

This is the preferred method of generating and manipulating reports programmatically in Pentaho Business Analytics. In order to use SimpleReportingComponent, you need to have generated a PRPT report file with Report Designer.

There is only one input for an action sequence involving this component, and it is defined as a resource in the inputs section of the action sequence, not in the component definition. There are two output attributes defined in the global input section as well. Essentially you're going to point to your PRPT file, then define the file name and content type that you want to generate.

An older *JFreeReportComponent* still works, but has an older, unmaintained feature set and exists primarily for backwards compatibility with older versions.

Input Attribute	Data Type	Definition
reportDefinitionPath	String	Path to the PRPT file you are generating a report from. Must be enclosed in a <![CDATA[]]> tag. Alternatively, you can declare a **reportDefinition** in your global resources section.
outputType	String	The generic MIME type of the content you're generating. Possible values are: • text/html • mime-message/text/html • application/pdf • application/vnd.ms-excel • application/rtf • text/csv • text/plain
outputTarget	String	Specifies the MIME type of the output, but allows for more specificity than outputType. Possible values are: • table/html;page-mode=stream

Input Attribute	Data Type	Definition
		• table/html;page-mode=page • table/excel;page-mode=flow • table/csv;page-mode=stream • table/rtf;page-mode=flow • pageable/pdf • pageable/text

There is only one output, defined in either the global outputs section or the SimpleReportingComponent's action-outputs section:

Output Attribute	Data Type	Definition
outputstream	String	The output destination; where the output will be written.

There are many report options, all of which are technically component inputs, and are positioned in the action-inputs section. Most of these options are rarely used because most report functionality is determined when you initially create the report.

Report Attribute	Data Type	Definition
paginate	Boolean	Determines whether the interface turns on the page controller for the report.
report-definition	String	The path (relative to the top-level solution directory), to the PRPT file, including the file name.
useContentRepository	Boolean	Determines whether the output is written to the BA Server content repository.
accepted-page	Integer	The page number that should be shown when in paginated-html-mode.
print	Boolean	Determines whether or not you want to send output to the printer.
printer-name	String	The (optional) name of the printer. Default printer is the operating system's default printer.
content-handler-pattern	String	When exporting to HTML, this is the name of the content handler servlet that sends images and CSS files to the browser.
res-url	String	If the report-definition stream has been given, then this defines the context-url for loading resources with relative paths.

```
<?xml version="1.0" encoding="UTF-8"?>
<action-sequence>
  <version>1</version>
  <logging-level>ERROR</logging-level>
  <documentation>
    <author>Michael D'Amour</author>
    <description>%description</description>
    <help>just testing...</help>
```

```
    <result-type>report</result-type>
    <icon>JFree-quadrant-budget-hsql.png</icon>
  </documentation>

 <inputs>
  <outputType type="string">
   <default-value>text/html</default-value>
   <sources>
    <request>outputType</request>
   </sources>
  </outputType>
        <outputTypeList type="property-map-list">
          <sources>
            <runtime>outputTypeList</runtime>
          </sources>
          <default-value type="property-map-list">
            <property-map>
              <entry key="report-output-desc">PDF</entry>
              <entry key="report-output-type-id">application/pdf</
entry>
            </property-map>
            <property-map>
              <entry key="report-output-desc">Excel</entry>
              <entry key="report-output-type-id">application/vnd.ms-
excel</entry>
            </property-map>
            <property-map>
              <entry key="report-output-desc">Web Page</entry>
              <entry key="report-output-type-id">text/html</entry>
            </property-map>
          </default-value>
        </outputTypeList>

 </inputs>

 <outputs>
      <myReport type="content">
       <destinations>
       <response>content</response>
       </destinations>
      </myReport>
 </outputs>

 <resources>
  <reportDefinition>
   <solution-file>
    <location>incomestatement_external.prpt</location>
    <mime-type>application/zip</mime-type>
   </solution-file>
  </reportDefinition>
 </resources>

  <actions>

    <action-definition>
      <component-name>SecureFilterComponent</component-name>
      <action-type>Prompt for Product Line and Report Format</action-
type>
      <action-inputs>
        <outputTypeList type="property-map-list"/>
        <outputType type="string"/>
      </action-inputs>
      <component-definition>
        <selections>
          <outputType style="radio">
            <title>Select Report Format</title>
            <filter value-col-name="report-output-type-id" display-col-
name="report-output-desc">outputTypeList</filter>
          </outputType>
```

```
        </selections>
      </component-definition>
    </action-definition>

    <action-definition>
      <component-name>SQLLookupRule</component-name>
      <action-type>SQL Query For Report Data</action-type>
      <action-outputs>
        <query-result type="result-set"/>
      </action-outputs>
      <component-definition>
        <jndi>SampleData</jndi>
        <live>true</live>
        <query><![CDATA[SELECT * FROM TRIAL_BALANCE]]></query>
      </component-definition>
    </action-definition>

    <action-definition>
      <component-name>SimpleReportingComponent</component-name>
      <action-type>Generate the report using a solution path to the
 report definition</action-type>
      <component-definition/>
      <action-resources>
        <reportDefinition type="resource"/>
      </action-resources>
      <action-inputs>
        <queryData type="result-set" mapping="query-result"/>
        <outputType type="string"/>
      </action-inputs>
      <action-outputs>
        <outputstream type="content" mapping="myReport"/>
      </action-outputs>
    </action-definition>

  </actions>
</action-sequence>
```

JFreeReportComponent

If you are working with a PRPT report file generated with a current version of Report Designer, use *SimpleReportingComponent* instead

`JFreeReportComponent` is a **deprecated** method for generating and manipulating reports programmatically, though it is the only way of working with old, non-PRPT, action sequence-based reports created with Report Designer or Report Design Wizard prior to version 3.5.0. In order to use `JFreeReportComponent`, you need to have generated an XML report file with Report Designer or Report Design Wizard prior to version 3.5.0.

There is only one input for an action sequence involving this component, and it is defined as a resource. Essentially you're going to point to your simple or extended .xml file. However, there are many other parameters that go in the inputs section beyond that:

Input Attribute	Data Type	Definition
data	String	Specifies the main datasource to use for this report; usually this is **default**. Other datasources may be defined for subreports; their names must match that of the subreport query.
class-location	String	Specifies the data source class location; used in conjunction with report-jar.

Input Attribute	Data Type	Definition
config_parameters	String	Specifies a map or result set that is used to populate the report's configuration properties.
report-definition	String	Dynamically references a report resource definition.
resource-name	String	Specifies the resource name in which to load the report resource definition.
report-location	String	Specifies the report resource definition; used in conjunction with report-jar.
res-url	String	Optional input that may specify the base URL.
printer-name	String	If a printer name is specified, PrintComponent will be invoked to generate the report.
output-type	String	The type of output to be generated from this report. Possible options are: • html • pdf • csv • xml • rtf • xls • swing-preview
yield-rate	Integer	Calls **Thread.yield** at the interval specified.
create_private_report	Boolean	If set to true, clones the report object to guarantee a single use.
report-priority	String	Specifies the thread priority when generating the report. Possible values are: • normal • lower • lowest
content-handler	String	Specific to HTML inputs. Specifies the content handler.
workbook	String	Specific to Excel inputs. Defines the workbook name to be used when generating the XLS file.
report-controller	String	Specific to Swing preview inputs. A reference to the report controller.
parent-dialog	String	Specific to Swing preview inputs. A reference to the parent dialogue.
modal	Boolean	Specific to Swing preview inputs. If the dialogue should be modal, set this to true.

Input Attribute	Data Type	Definition
progress-bar	Boolean	Specific to Swing preview inputs. If a progress bar is to be displayed, set this to true.
progress-dialog	Boolean	Specific to Swing preview inputs. If a progress dialog is to be displayed, set to true.

There is only one output:

Output Attribute	Data Type	Definition
report-output	String	The default name of the outputstream. Any other output defined will be used in place of the report-output as a name.

```
<?xml version="1.0" encoding="UTF-8"?>
<action-sequence>
  <title>%title</title>
  <version>1</version>
  <logging-level>ERROR</logging-level>
  <documentation>
    <author>Angelo Rodriguez</author>
    <description>%description</description>
    <help>just testing...</help>
    <result-type>report</result-type>
    <icon>JFree-quadrant-budget-hsql.png</icon>
  </documentation>

  <inputs/>

  <outputs/>

  <resources>
    <report-definition>
      <solution-file>
        <location>JFreeQuadForRegion.xml</location>
        <mime-type>text/xml</mime-type>
      </solution-file>
    </report-definition>
  </resources>

  <actions>
    <action-definition>
      <component-name>SQLLookupRule</component-name>
      <action-type>SQL Query For Report Data</action-type>
      <action-outputs>
        <query-result type="result-set"/>
      </action-outputs>
      <component-definition>
        <jndi>SampleData</jndi>
        <live>true</live>
        <query><![CDATA[select   QUADRANT_ACTUALS.REGION,
 QUADRANT_ACTUALS.DEPARTMENT,   QUADRANT_ACTUALS.POSITIONTITLE,
   QUADRANT_ACTUALS.ACTUAL,   QUADRANT_ACTUALS.BUDGET,
 QUADRANT_ACTUALS.VARIANCE  from QUADRANT_ACTUALS order by
 QUADRANT_ACTUALS.REGION, QUADRANT_ACTUALS.DEPARTMENT]]></query>
      </component-definition>
    </action-definition>

    <action-definition>
      <component-name>JFreeReportComponent</component-name>
      <action-type>Create Report Using Query Results</action-type>
```

```
      <action-inputs>
        <data type="result-set" mapping="query-result"/>
      </action-inputs>
      <action-resources>
        <report-definition type="resource"/>
      </action-resources>
      <component-definition>
        <output-type>html</output-type>
      </component-definition>
    </action-definition>

  </actions>
</action-sequence>
```

Charting

There are three components related to charting in the Pentaho BI Platform, each of which uses a different chart engine:

1. **ChartComponent**: Uses the JFreeChart engine; this is the default chart engine in the BI Platform.
2. **ChartBeansComponent**: Uses the Pentaho ChartBeans engine; this is the newest chart engine in the BI Platform, and will someday replace JFreeChart.
3. **OpenFlashChartComponent**: Uses the OpenFlashChart engine; this is a small, limited, but visually impressive chart engine.

Each component has its own reference section below.

JFreeChart (ChartComponent)

JFreeChart is the default charting engine in the BI Platform.

Note: This section is not yet complete.

Pentaho ChartBeans (ChartBeansComponent)

ChartBeans is the next-generation chart engine in the BI Platform.

Note: This section is not yet complete.

OpenFlashChart (OpenFlashChartComponent)

OpenFlashChart is for visually appealing, Adobe Flash-based charts.

Introducing the Flash Chart Component

The Open Flash Chart component employs *Open Flash Charts* as its charting engine.

The OpenFlashChartComponent is a BI component that allows you to create a variety of chart types that include:

- *Bar*
- *Line*
- *Bar/Line Combinations*
- *Pie*
- *Area*
- *XY dot*
- *Bubble*

Sample Action Sequence

The action sequence, (simple_chart.xaction), uses the output from a SQL lookup rule (a Relational data source) as the input for a OpenFlashChartComponent which generates a bar chart. See the Chart Reference for an explanation of the chart properties.

```
<?xml version="1.0" encoding="UTF-8"?>
<action-sequence>
  <name>Simple Bar Chart Example</name>
  <title>Simple Bar Chart Example</title>
  <version>1</version>
  <logging-level>DEBUG</logging-level>
  <documentation>
    <author>Jake Cornelius</author>
    <description>This demonstrates generating a simple bar chart types using the
 OpenFlashChartComponent in an action sequence</description>
    <icon/>
    <help/>
    <result-type/>
  </documentation>

  <inputs>
    <chart_width type="string">
      <sources>
        <request>chart_width</request>
      </sources>
      <default-value><![CDATA[650]]></default-value>
    </chart_width>
    <chart_height type="string">
      <sources>
        <request>chart_height</request>
      </sources>
      <default-value><![CDATA[400]]></default-value>
    </chart_height>
  </inputs>

  <outputs>
    <image-tag type="string"/>
  </outputs>

  <resources>
    <!-- use this section to identify any files that the component needs to execute
 the report -->
    <bar>
      <solution-file>
        <location>flash_barchart.xml</location>
        <mime-type>text/xml</mime-type>
      </solution-file>
    </bar>
  </resources>

  <actions>
    <action-definition>
      <component-name>SQLLookupRule</component-name>
      <action-type>Chart Data Query</action-type>
      <action-outputs>
        <query-result type="result-set" mapping="query_result"/>
      </action-outputs>
      <component-definition>
        <jndi><![CDATA[SampleData]]></jndi>
        <live><![CDATA[true]]></live>
        <query><![CDATA[SELECT PRODUCTS.PRODUCTLINE AS LINE,
            SUM(CASE ORDERFACT.YEAR_ID WHEN '2003' THEN (ORDERFACT.TOTALPRICE) ELSE 0
 END) AS "2003",
            SUM(CASE ORDERFACT.YEAR_ID WHEN '2004' THEN (ORDERFACT.TOTALPRICE) ELSE 0
 END) AS "2004",
            SUM(CASE ORDERFACT.YEAR_ID WHEN '2005' THEN (ORDERFACT.TOTALPRICE) ELSE 0
 END) AS "2005"
          FROM
```

```
            PRODUCTS INNER JOIN ORDERFACT ON PRODUCTS.PRODUCTCODE =
 ORDERFACT.PRODUCTCODE
            INNER JOIN CUSTOMER_W_TER ON ORDERFACT.CUSTOMERNUMBER =
 CUSTOMER_W_TER.CUSTOMERNUMBER GROUP BY
            LINE
          ORDER BY
            2 DESC]]></query>
      </component-definition>
    </action-definition>

    <action-definition>
      <component-name>OpenFlashChartComponent</component-name>
      <action-type>Open Flash Chart</action-type>
      <action-inputs>
        <chart-data type="string" mapping="query_result"/>
        <width type="string" mapping="chart_width"/>
        <height type="string" mapping="chart_height"/>
      </action-inputs>
      <action-resources>
        <chart-attributes type="resource" mapping="bar"/>
      </action-resources>
      <action-outputs>
        <image-tag type="string"/>
      </action-outputs>
      <component-definition/>
    </action-definition>

  </actions>
</action-sequence>
```

Optional Inputs

The following are additional properties that you can specify for the chart as inputs, or as part of the component-definition. Many of these properties duplicate properties that you can set inside of the chart definition (chart-attributes string or XML file). When these duplicate properties are set as inputs or as part of the component-definition, they *override* any identical property that exists in the chart-attributes. The hierarchical nature of these properties allows you to dynamically set and override a value, yet also have a default in the chart-attributes.

by-row

Indicates if the chart data is to be aggregated along the row dimensions. Default value = false.

width

Sets the chart width in either pixels or percentages. Default value = 100%.

height

Sets the chart height in either pixes or percentages. Default value = 100%.

ofc_lib_name

Provides the ability to override the default .swf by providing the name of an alternate Open Flash Chart .swf file to use.

Note: You should not change this input unless you are a developer familiar with development of Open Flash Charts and/or Pentaho platform components.

ofc_url

Provides the ability to override the default location of the Open Flash Chart .swf file.

Required Inputs

chart-data

The dataset that you want the chart to render. Often, this is the output of a **SQLLookupRule** action, but can come from a number of source actions.

chart-attributes

This defines where the XML chart definition will be resourced from. It could come from component definition, action sequence input, or action sequence resource.

Note: The XML chart definition specified in chart attributes also supports parameterization of elements. This is accomplished by inserting parameter strings (for example, {INPUT PARAM}) values in the chart XML or input.

Bar Chart

The bar chart plots a set of values as bars for each series in the given dataset.

Dataset Guidelines

This chart expects its data as a **categorical** dataset.

Required Properties

The only property a bar chart requires is the appropriate chart-type

```
<chart-type>BarChart</chart-type>
```

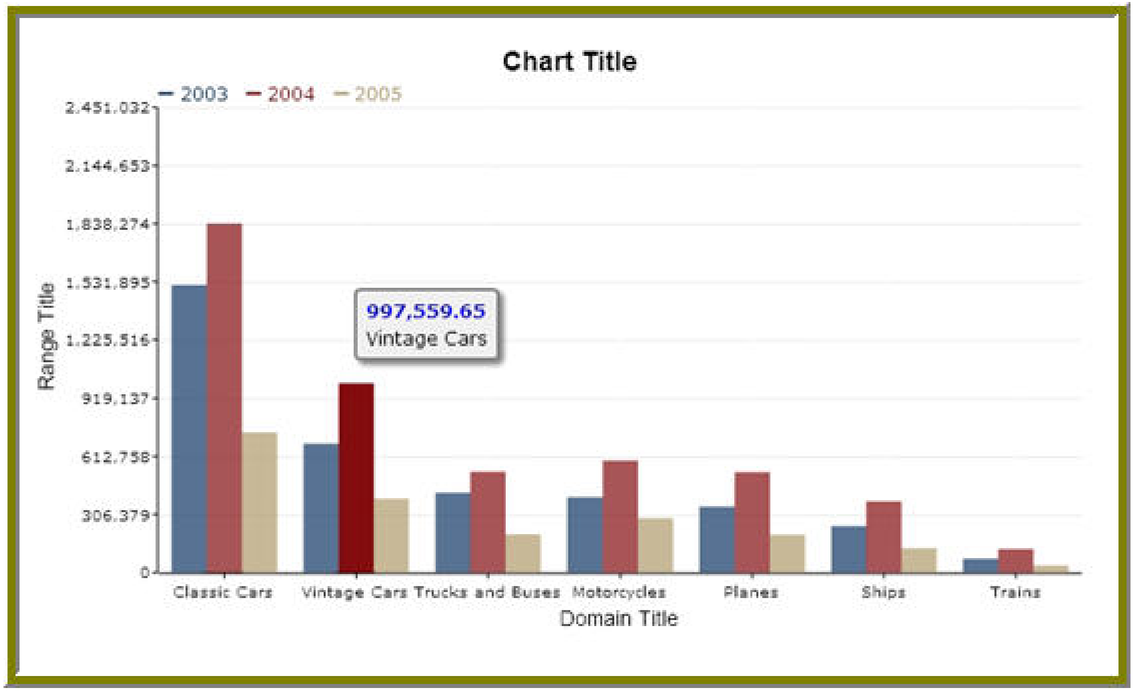
Example

The example below contains the full set of additional supported properties with comments on its purpose and valid values. It is recommended that new users start with this example as a starting place for building their first flash chart. The following chart definition will produce the chart shown directly below it.

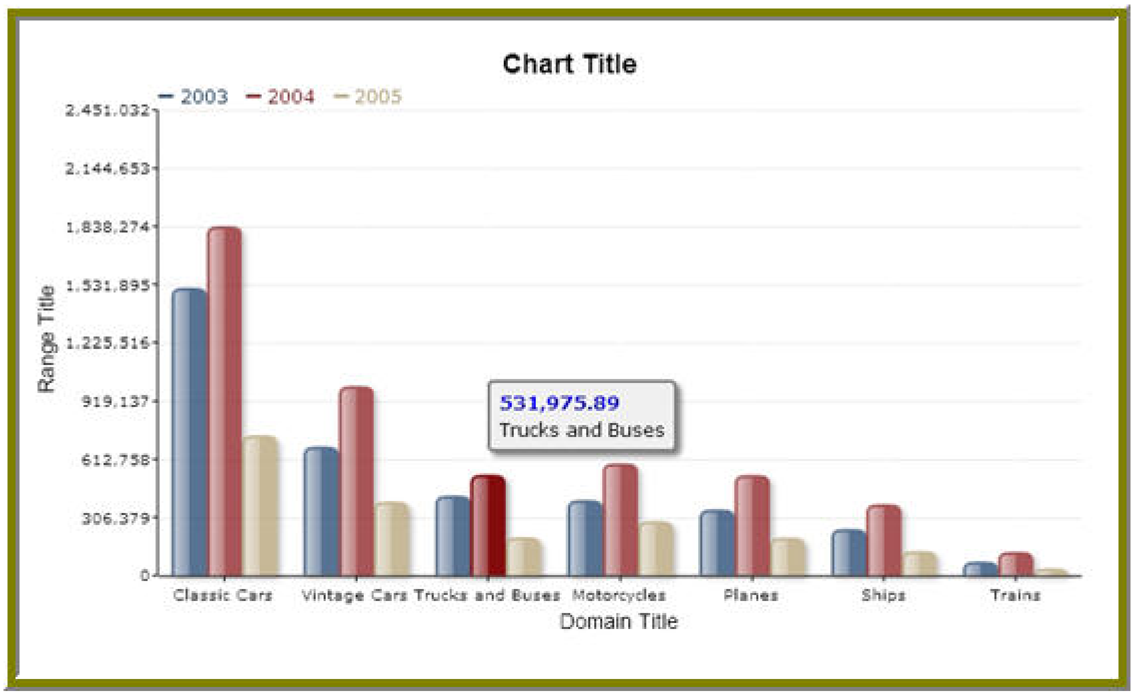
```
<chart>

          <!-- Define the chart type -->
          <chart-type>BarChart</chart-type>

          <!-- Specify the title of the chart -->
          <title>Chart Title</title>
          <title-font>
      <font-family>Arial</font-family>
      <size>18</size>
      <is-bold>true</is-bold>
    </title-font>

  <!-- General Chart Attributes -->
  <orientation>vertical</orientation>  <!-- valid values: vertical, horizontal -->
  <is-stacked>false</is-stacked>  <!-- set to true for a stacked bar -->
  <is-3D>false</is-3D>
  <is-glass>false</is-glass>  <!-- set to true to apply the 'glass' style to bars -->
  <is-sketch>false</is-sketch>  <!-- set to true to apply the 'sketch' style to bars
 -->
    <!-- additional properties specific to sketch charts -->
    <fun-factor>10</fun-factor>  <!-- defines the messiness of bars, 0-2 tame, 3-6
 pretty fun, 7+ lots of fun -->
    <outline-color-palette>  <!-- defines the colors to use for outlines of bars -->
      <color>#FF0000</color>
      <color>#00ff00</color>
    </outline-color-palette>

  <!-- General Chart Formatting Properties -->
  <chart-background type="color">#FFffff</chart-background>
  <plot-background type="color">#ffffff</plot-background>
  <alpha>.70</alpha>  <!-- sets the transparency level of bars -->

  <!-- Define what to display in hover tips -->
  <tooltip>
    #top#
    #bottom#
    #val#
    #x_label#
    #key#
  </tooltip>

  <!--  X-Axis properties (domain)-->
  <domain-title>Domain Title</domain-title>
```

```
  <domain-title-font>
    <font-family>Arial</font-family>
    <size>14</size>
    <is-bold>false</is-bold>
  </domain-title-font>
  <domain-color>#000000</domain-color>  <!-- color of x-axis -->
  <domain-grid-color>#ffffff</domain-grid-color>  <!-- color of vertical grid lines --
>
  <domain-stroke>1</domain-stroke>  <!-- thickness of the x-axis -->

  <!--  Y-Axis properties (range) -->
  <range-title>Range Title</range-title>
  <range-title-font>
    <font-family>Arial</font-family>
    <size>14</size>
    <is-bold>false</is-bold>
  </range-title-font>
  <range-minimum></range-minimum>  <!-- defines minimum starting point for y-axis -->
  <range-maximum></range-maximum>  <!-- defines maximum ending point for y-axis -->
  <range-color>#000000</range-color>  <!-- color of y-axis -->
  <range-grid-color>#eaeaea</range-grid-color>  <!-- color of horizontal grid lines --
>
  <range-stroke>1</range-stroke>  <!-- thickness of y-axis -->
  <range-steps>6</range-steps>  <!-- specify number of ticks, defaults to auto-
calculated number -->

  <!-- Specify the color palette for the chart -->
  <color-palette>
    <color>#0f3765</color>
    <color>#880a0f</color>
    <color>#B09A6B</color>
    <color>#772200</color>
    <color>#C52F0D</color>
    <color>#123D82</color>
    <color>#4A0866</color>
    <color>#445500</color>
    <color>#FFAA00</color>
    <color>#1E8AD3</color>
    <color>#AA6611</color>
    <color>#772200</color>
    <color>#8b2834</color>
    </color-palette>

</chart>
```

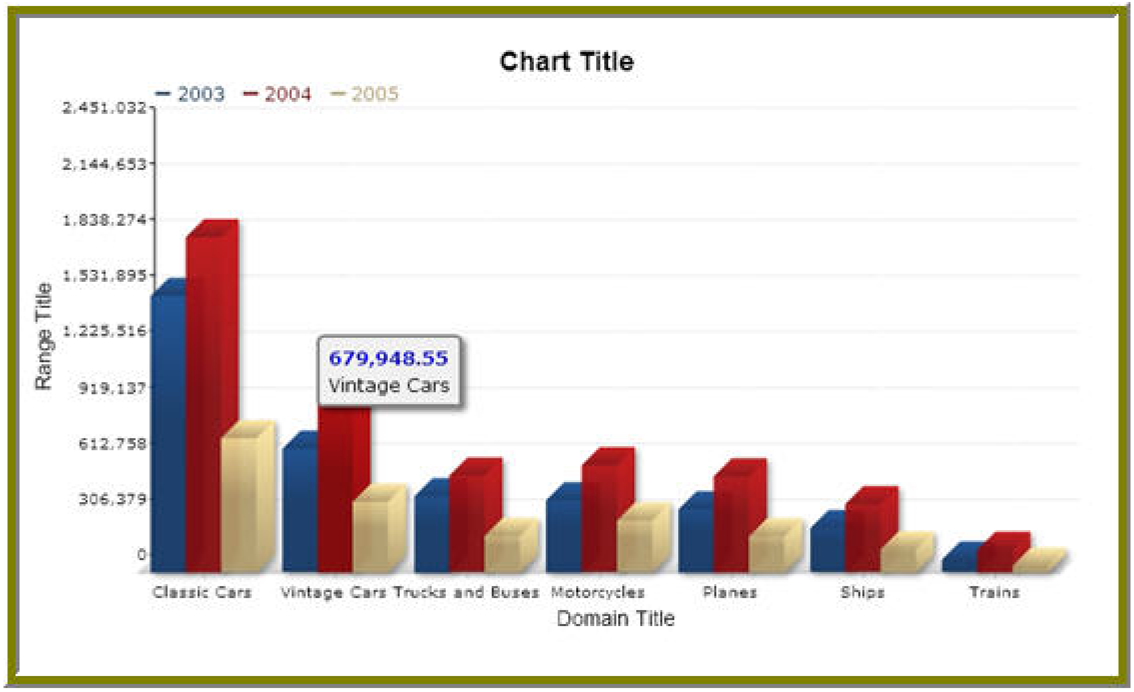
Simple Chart



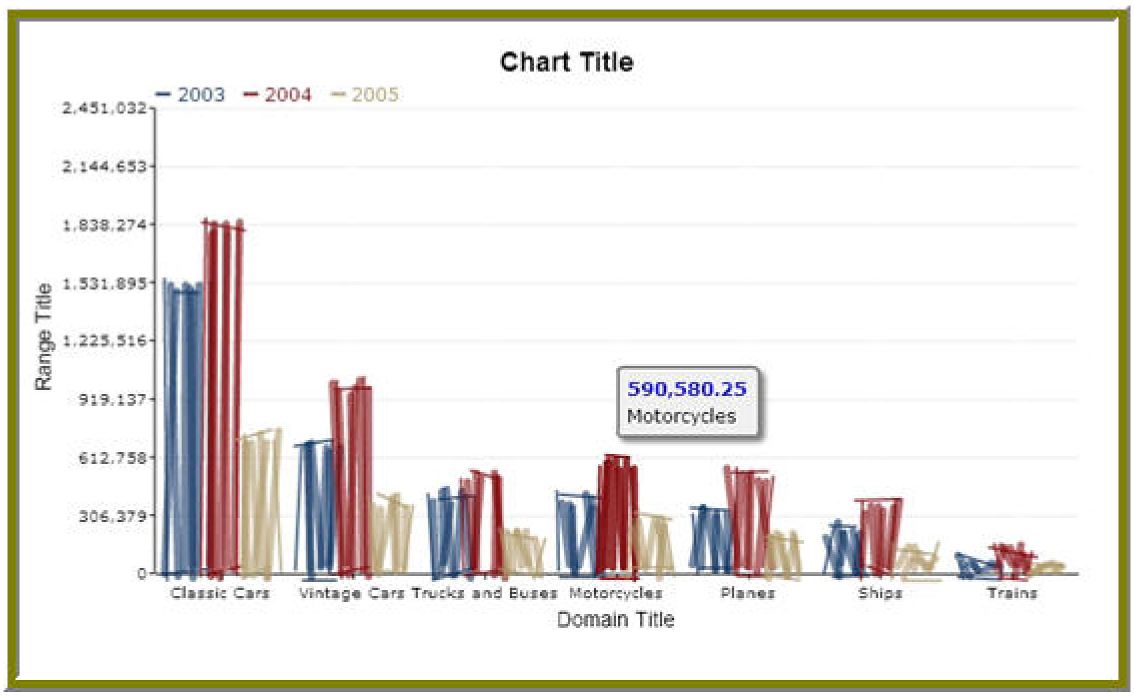
Example with **is-glass** set to **true**



Example with **is-3D** set to **true**



Example with **is-sketch** set to **true** (fun factor = 10)



Line Chart

The line chart plots a set of values on a line for each series in the given dataset.

Dataset Guidelines

This chart expects its data as a **categorical** dataset.

Required Properties

The only property a line chart requires is the appropriate chart-type.

```
<chart-type>LineChart</chart-type>
```

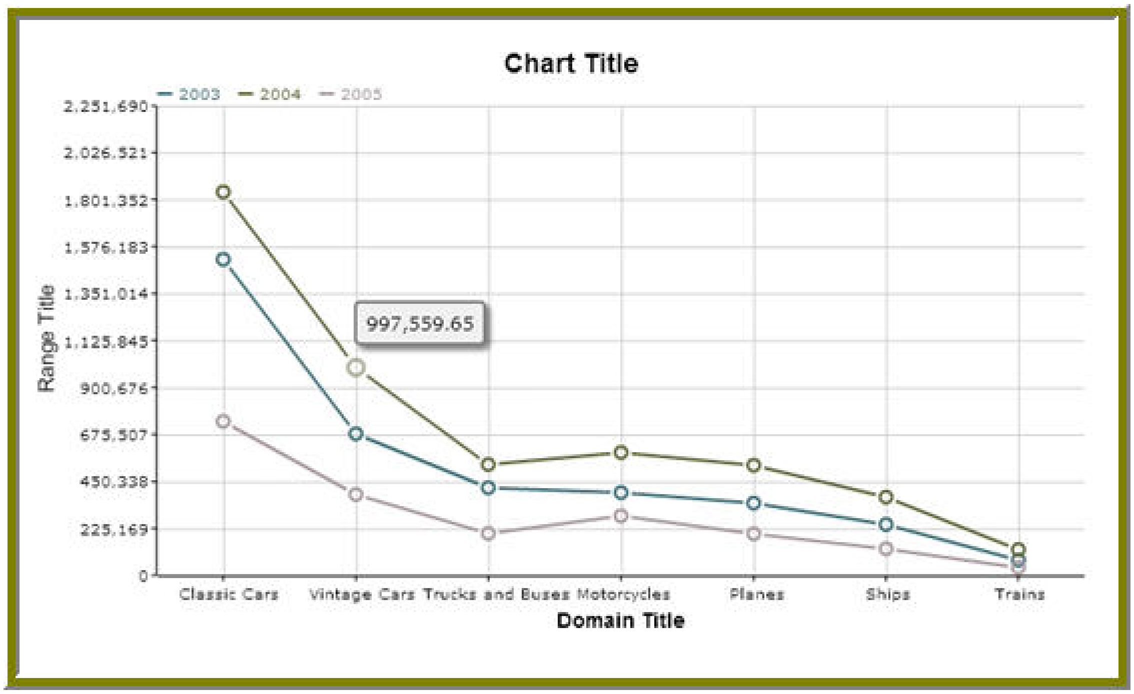
Example

The example below contains the full set of additional supported properties with comments about its purpose and valid values. If you are new to flash charts start here. The following chart definition will produce the chart shown directly below it.

```
<chart>
  <!-- Define the chart type -->
  <chart-type>LineChart</chart-type>

  <!-- Specify the title of the chart -->
  <title>Chart Title</title>
  <title-font>
    <font-family>Arial</font-family>
      <size>18</size>
      <is-bold>true</is-bold>
    </title-font>

  <!--  Line Chart properties -->
  <line-width>2.0</line-width>
  <dot-style>hollow</dot-style> <!-- values: dot, normal, hollow -->
  <dot-width>5</dot-width>

  <!-- General Chart Propeties -->
  <chart-background type="color">#FFFFFF</chart-background>
  <plot-background type="color">#FFFFFF</plot-background>

  <!--  X-Axis properties (domain) -->
  <domain-title>Domain Title</domain-title>
  <domain-title-font>
    <font-family>Arial</font-family>
      <size>14</size>
      <is-bold>true</is-bold>
  </domain-title-font>
  <domain-color>#000000</domain-color>  <!-- color of x-axis -->
  <domain-grid-color>#CCCCCC</domain-grid-color>  <!-- color of vertical grid lines --
>
  <domain-stroke>1</domain-stroke>  <!-- thickness of x-axis -->

  <!--  Y-Axis properties (range) -->
  <range-title>Range Title</range-title>
  <range-title-font>
    <font-family>Arial</font-family>
      <size>14</size>
      <is-bold>true</is-bold>
  </range-title-font>
  <range-minimum></range-minimum>  <!-- defines minimum starting point for y-axis
 range -->
  <range-maximum></range-maximum>  <!-- defines maximum ending point for y-axis range
 -->
  <range-color>#000000</range-color>  <!-- color of y-axis -->
  <range-grid-color>#CCCCCC</range-grid-color>  <!-- color of horizontal grid lines --
>
  <range-stroke>1</range-stroke>  <!-- thickness of y-axis -->
  <range-steps>8</range-steps>  <!-- specify number of ticks, defaults to auto-
calculated number -->

  <!-- Specify the color palette for the chart series-->
  <color-palette>
    <color>#387179</color>
    <color>#626638</color>
    <color>#A8979A</color>
    <color>#B09A6B</color>
    <color>#772200</color>
    <color>#C52F0D</color>
    <color>#123D82</color>
    <color>#4A0866</color>
    <color>#445500</color>
    <color>#FFAA00</color>
```

```
    <color>#1E8AD3</color>
    <color>#AA6611</color>
    <color>#772200</color>
  </color-palette>

</chart>
```

Flash Line Chart



Bar and Line Combination Chart

The bar and line combination chart plots a set of values as bars for each specified series in the given dataset. This chart will also plot specified series as lines, using the right axis as a range axis for the line series, and the left axis as the range axis for the bars.

Dataset Guidelines

This chart expects its data as a **categorical** dataset.

Required Properties

The following properties are required:

- chart-type

```
<chart-type>BarLineChart</chart-type>
```

- bar-series — Add one *series* element per series that should be plotted as bars.

```
<bar-series>
  <series>actual</series>
  <series>budget</series>
  </bar-series>
```

- line-series — Add one *series* element per series that should be plotted as lines.

```
<line-series>
  <series>variance</series>
</line-series>
```

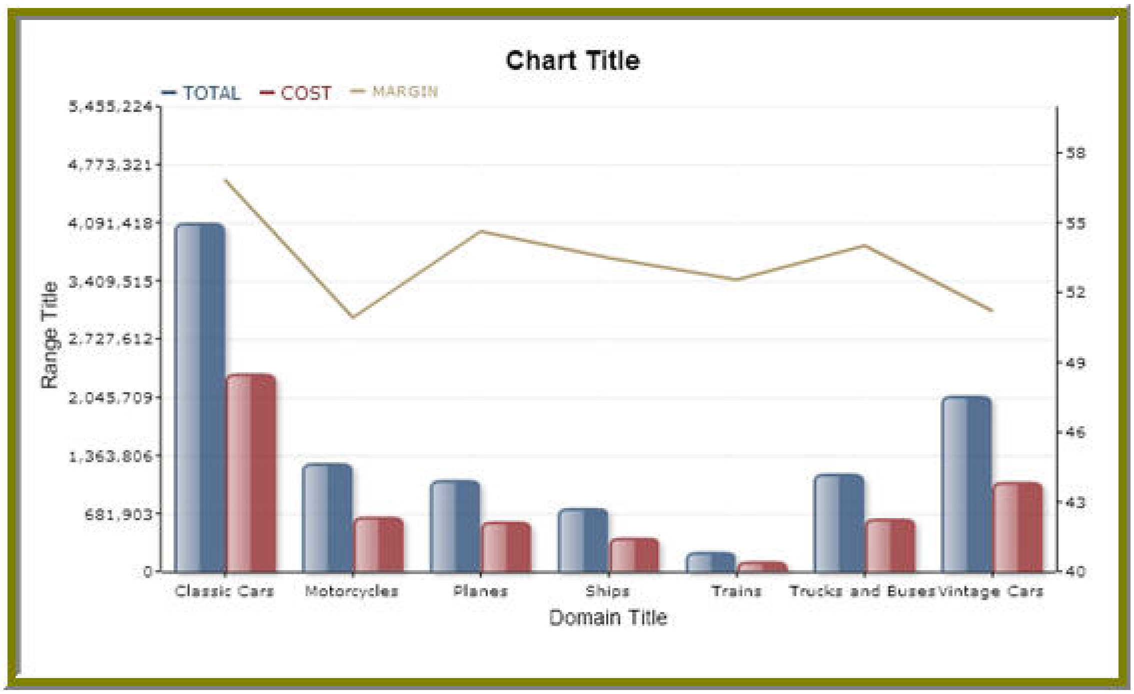
Example

The example below contains the full set of additional supported properties with comments on its purpose and valid values. It is recommended that new users start with this example as a starting place for building your first flash chart. The following chart definition will produce the chart shown directly below it.

```
<chart>

  <!-- Define the chart type -->
  <chart-type>BarLineChart</chart-type>

  <!-- Specify the title of the chart -->
  <title>Chart Title</title>
    <title-font>
      <font-family>Arial</font-family>
      <size>18</size>
      <is-bold>true</is-bold>
    </title-font>

  <!-- Map Series to Chart Type -->
  <bar-series>
    <series>TOTAL</series>
    <series>COST</series>
  </bar-series>
  <line-series>
    <series>MARGIN</series>
  </line-series>

  <!-- General Chart Attributes -->
  <orientation>vertical</orientation>
  <is-stacked>false</is-stacked>
  <is-3D>false</is-3D>
  <height-3d>1</height-3d>
  <is-glass>true</is-glass>
  <is-sketch>false</is-sketch>
    <!-- additional properties specific to sketch charts -->
    <fun-factor>10</fun-factor>
    <outline-color-palette>
      <color>#FF0000</color>
      <color>#00ff00</color>
    </outline-color-palette>

  <!-- General Chart Formatting Propeties -->
  <chart-background type="color">#FFffff</chart-background>
  <plot-background type="color">#ffffff</plot-background>
  <alpha>.70</alpha>

  <!-- Define what to display in hover tips -->
  <!-- <tooltip> -->
    <!-- #top# -->
    <!-- #bottom# -->
    <!-- #val# -->
    <!-- #x_label# -->
    <!-- #key# -->
  <!-- </tooltip> -->

  <!--  X-Axis properties (domain)-->
  <domain-title>Domain Title</domain-title>
  <domain-title-font>
    <font-family>Arial</font-family>
    <size>14</size>
    <is-bold>false</is-bold>
  </domain-title-font>
  <domain-color>#000000</domain-color>
  <domain-grid-color>#ffffff</domain-grid-color>
  <domain-stroke>1</domain-stroke>

  <!--  Y-Axis properties (range) -->
  <range-title>Range Title</range-title>
```

```
  <range-title-font>
    <font-family>Arial</font-family>
    <size>14</size>
    <is-bold>false</is-bold>
  </range-title-font>
  <range-minimum></range-minimum>
  <range-maximum></range-maximum>
  <range-color>#000000</range-color>
  <range-grid-color>#eaeaea</range-grid-color>
  <range-stroke>1</range-stroke>
  <range-steps>6</range-steps>

  <!-- Secondary Y-Axis properties (line-range) -->
  <lines-range-minimum>40</lines-range-minimum>
  <lines-range-maximum>60</lines-range-maximum>
  <lines-range-color>#000000</lines-range-color>
  <lines-range-stroke>1</lines-range-stroke>
  <line-range-steps>6</line-range-steps>

  <!-- Specify the color palette for the chart -->
  <color-palette>
    <color>#0f3765</color>
    <color>#880a0f</color>
    <color>#B09A6B</color>
    <color>#772200</color>
    <color>#C52F0D</color>
    <color>#123D82</color>
    <color>#4A0866</color>
    <color>#445500</color>
    <color>#FFAA00</color>
    <color>#1E8AD3</color>
    <color>#AA6611</color>
    <color>#772200</color>
    <color>#8b2834</color>
  </color-palette>

</chart>
```

Bar/Line Combination Chart



Pie Chart

The pie chart plots a single value per series in a pie shape.

Dataset Guidelines

The pie chart dataset typically contains two columns. The values in the first column are the series names, and the second column contains the data values. If the dataset has multiple rows for each series, the row values will be aggregated, so that each series appears only once in the pie.

The pie chart also supports the by-row property, meaning that the dataset can be row based. In this case, you may have multiple numeric columns in your dataset, whose headers will become the series names, and the data values would aggregate across the rows to formulate the series value.

Below is a sample pie dataset:

Department	Actuals
Sales	11,168,773
Executive Management	6,299,022
Finance	12,224,220
Human Resource	13,075,463
Marketing and Communication	13,910,753
Product Development	10,644,102
Professional Services	76,317,649

Required Properties

The only property a pie chart requires is the appropriate chart-type.

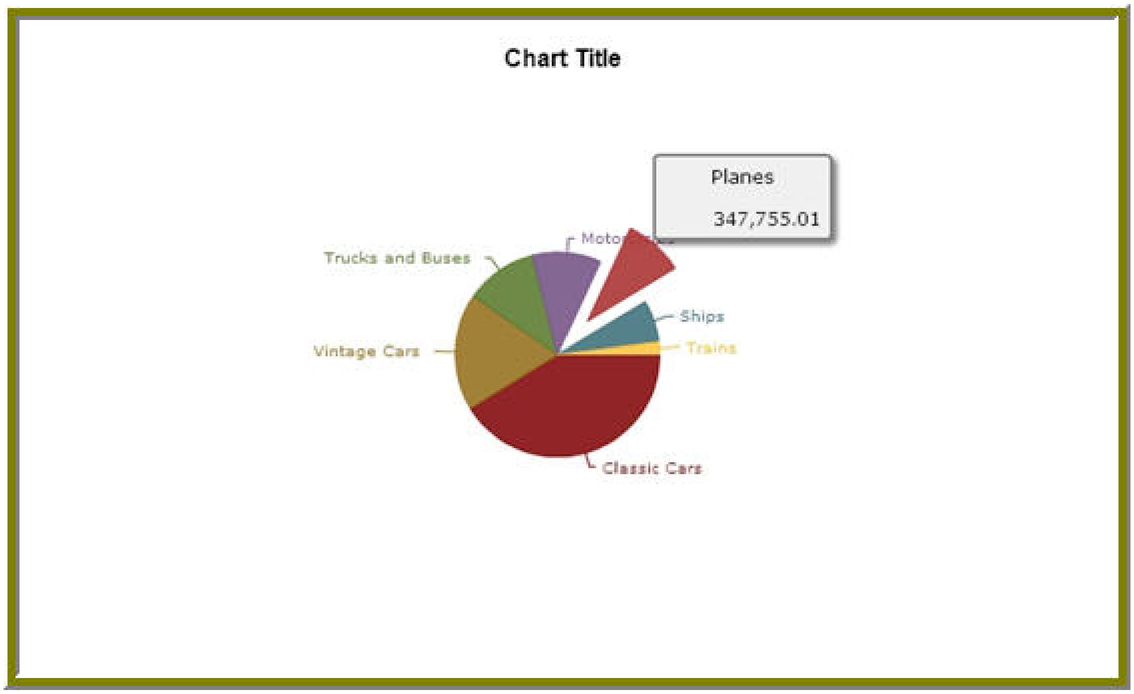
Example

The example below contains the full set of additional supported properties with comments on its purpose and valid values. It is recommended that new users start with this example as a starting place for building their first flash chart. The following chart definition will produce the chart shown directly below it.

```
<chart>

  <!-- Define the chart type -->
  <chart-type>PieChart</chart-type>

  <!-- Define title and title formatting -->
  <title>Chart Title</title>
    <title-font>
      <font-family>Arial</font-family>
      <size>16</size>
      <is-bold>true</is-bold>
    </title-font>

  <!-- General Chart Propeties -->
  <chart-background type="color">#FFFFFF</chart-background>
  <animate>true</animate>  <!-- turns on or off animation of pie -->
  <alpha>.90</alpha>  <!-- sets the transparency of pie slices -->
  <start-angle>0</start-angle>  <!-- sets the angle from which the pie begins
 rendering -->

  <!-- Define what to display in hover tips -->
  <tooltip>
    #label#
    #key#
    #val#
  </tooltip>

  <!-- Specify the color palette for the chart -->
  <color-palette>
    <color>#880a0f</color>
    <color>#0f3765</color>
```

```
    <color>#5d7e33</color>
    <color>#795687</color>
    <color>#AF3335</color>
    <color>#41747e</color>
    <color>#FDC446</color>
    <color>#5d7e33</color>
    <color>#1E8AD3</color>
    <color>#AA6611</color>
    <color>#772200</color>
    </color-palette>

</chart>
```

Pie Chart



Area Chart

The area chart plots a set of values on a line per series, and fills the background of the plot area with the series color for each series in the given dataset. Unlike the ChartComponent (jFreeChart based), the Flash Area chart does not stack the area.

Dataset Guidelines

This chart expects its data as a **categorical** dataset.

Required Properties

The only property an area chart requires is the appropriate chart-type.

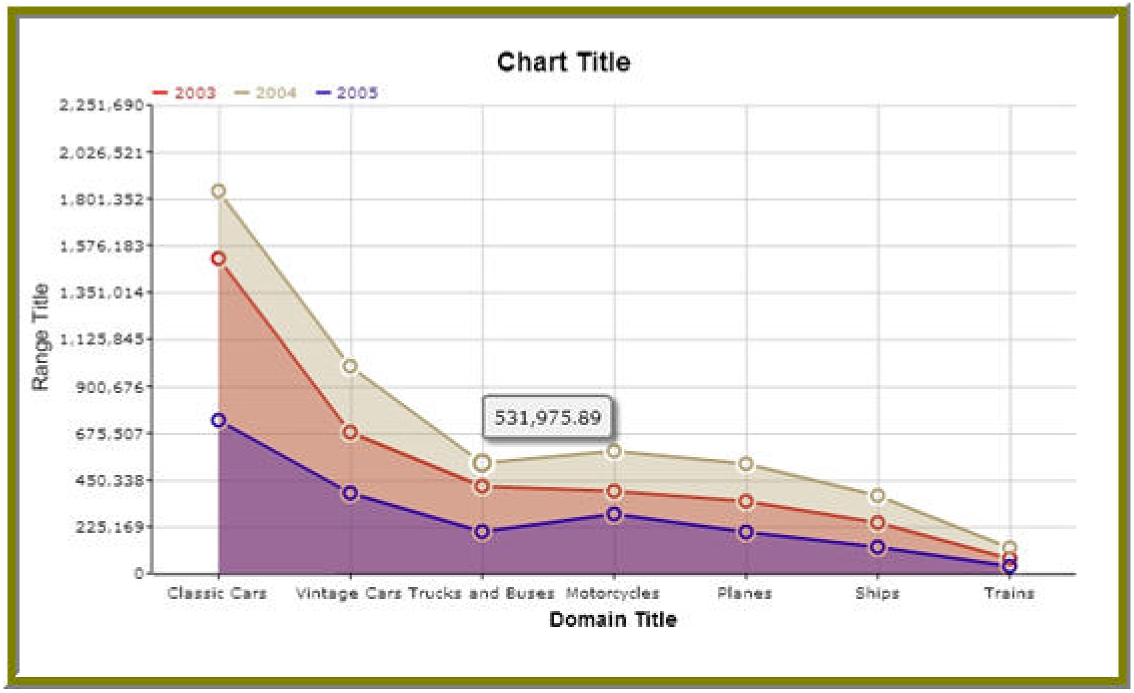
Example

The example below contains the full set of additional supported properties with comments on its purpose and valid values. It is recommended that new users start with this example as a starting place for building their first flash chart. The following chart definition will produce the chart shown directly below it.

```
<chart>
  <!-- Define the chart type -->
  <chart-type>AreaChart</chart-type>

  <!-- Specify the title of the chart -->
  <title>Chart Title</title>
  <title-font>
```

```
    <font-family>Arial</font-family>
    <size>18</size>
    <is-bold>true</is-bold>
  </title-font>

  <!--  Area Chart properties -->
  <line-width>2.0</line-width>
  <dot-style>hollow</dot-style> <!-- values: dot, normal, hollow -->
  <dot-width>5</dot-width>
  <alpha>.95</alpha>

  <!-- General Chart Propeties -->
  <chart-background type="color">#FFFFFF</chart-background>
  <plot-background type="color">#FFFFFF</plot-background>

  <!--  X-Axis properties (domain) -->
  <domain-title>Domain Title</domain-title>
  <domain-title-font>
    <font-family>Arial</font-family>
    <size>14</size>
    <is-bold>true</is-bold>
  </domain-title-font>
  <domain-color>#000000</domain-color>  <!-- color of x-axis -->
  <domain-grid-color>#CCCCCC</domain-grid-color>  <!-- color of vertical grid lines --
>
  <domain-stroke>1</domain-stroke>  <!-- thickness of x-axis -->

  <!--  Y-Axis properties (range) -->
  <range-title>Range Title</range-title>
  <range-title-font>
    <font-family>Arial</font-family>
    <size>14</size>
    <is-bold>true</is-bold>
  </range-title-font>
  <range-minimum></range-minimum>  <!-- defines minimum starting point for y-axis
 range -->
  <range-maximum></range-maximum>  <!-- defines maximum ending point for y-axis range
 -->
  <range-color>#000000</range-color>  <!-- color of y-axis -->
  <range-grid-color>#CCCCCC</range-grid-color>  <!-- color of horizontal grid lines --
>
  <range-stroke>1</range-stroke>  <!-- thickness of y-axis -->
  <range-steps>8</range-steps>  <!-- specify number of ticks, defaults to auto-
calculated number -->

  <!-- Specify the color palette for the chart -->
  <color-palette>
    <color>#DB0000</color>
    <color>#B09A6B</color>
    <color>#2C00A8</color>
    <color>#C52F0D</color>
    <color>#123D82</color>
    <color>#4A0866</color>
    <color>#445500</color>
    <color>#FFAA00</color>
    <color>#1E8AD3</color>
    <color>#AA6611</color>
    <color>#772200</color>
    <color>#0f3765</color>
    <color>#B09A6B</color>
  </color-palette>

</chart>
```

Flash Area Chart



XY Dot Chart

The XY dot chart consists of pairs of values (plotted as points) drawn as marks for each series in the given dataset. This chart will have two numeric axes.

Dataset Guidelines

This chart expects its data as an **XY** dataset.

Required Properties

The following properties are required:

chart-type

```
<chart-type>DotChart</chart-type>
```

dataset-type

```
<dataset-type>XYSeriesCollection</dataset-type>
```

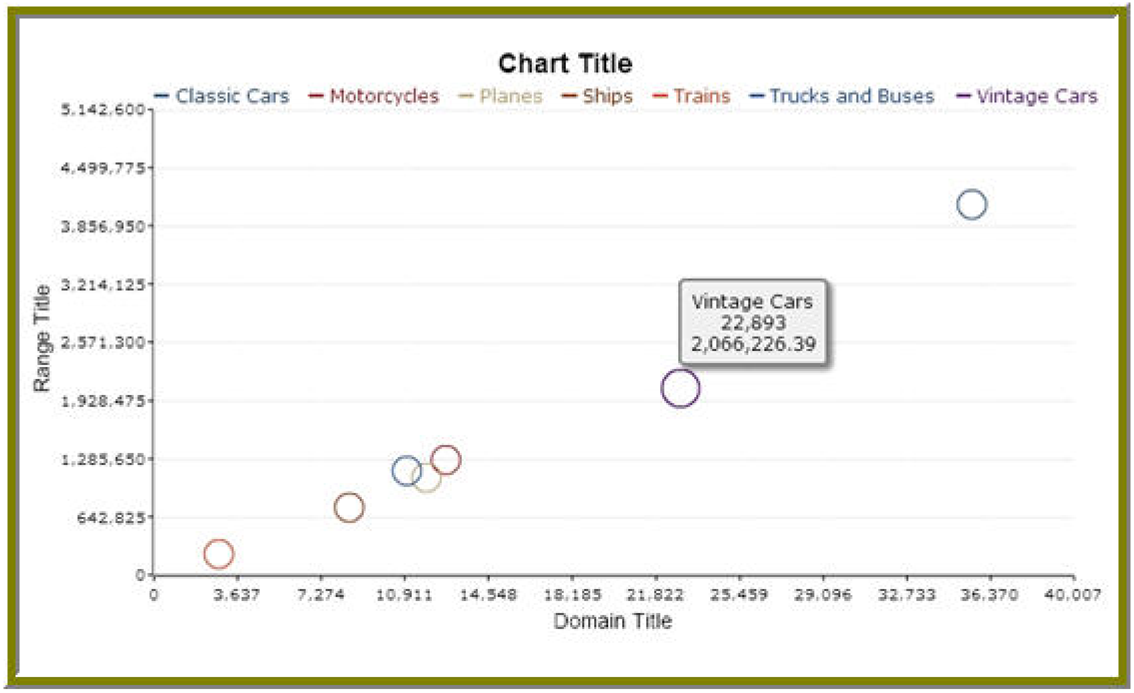
Example

The example below contains the full set of additional supported properties with comments on its purpose and valid values. It is recommended that new users start with this example as a starting place for building their first flash chart. The following chart definition will produce the chart shown directly below it.

```
<chart>

  <!-- Define the chart type -->
  <chart-type>DotChart</chart-type>

  <!-- Specify the title of the chart -->
  <title>Chart Title</title>
    <title-font>
      <font-family>Arial</font-family>
      <size>18</size>
      <is-bold>true</is-bold>
    </title-font>

  <!-- General Chart Attributes -->
  <dataset-type>XYSeriesCollection</dataset-type>
```

```
  <dot-width>10</dot-width>
  <dot-label-content>{0},{1},{2}</dot-label-content> <!-- formatted label, using {0} -
 series name, {1} - x , {2} - y -->

  <!-- General Chart Formatting Propeties -->
  <chart-background type="color">#FFFFFF</chart-background>
  <plot-background type="color">#FFFFFF</plot-background>

  <!--  X-Axis properties (domain)-->
  <domain-title>Domain Title</domain-title>
  <domain-title-font>
    <font-family>Arial</font-family>
    <size>14</size>
    <is-bold>false</is-bold>
  </domain-title-font>
  <domain-minimum></domain-minimum>  <!-- defines the minimum starting point for x-
axis -->
  <domain-maximum></domain-maximum>  <!-- defines the maximum ending point for x-axis
 -->
  <domain-color>#000000</domain-color>  <!-- color of x-axis -->
  <domain-grid-color>#FFFFFF</domain-grid-color>  <!-- color of vertical grid lines --
>
  <domain-stroke>1</domain-stroke>  <!-- thickness of the x-axis -->
  <domain-steps>6</domain-steps>  <!-- specify the number of ticks, defaults to auto-
calculated number -->

  <!--  Y-Axis properties (range) -->
  <range-title>Range Title</range-title>
  <range-title-font>
    <font-family>Arial</font-family>
    <size>14</size>
    <is-bold>false</is-bold>
  </range-title-font>
  <range-minimum></range-minimum>  <!-- defines minimum starting point for y-axis -->
  <range-maximum></range-maximum>  <!-- defines maximum ending point for y-axis -->
  <range-color>#000000</range-color>  <!-- color of y-axis -->
  <range-grid-color>#EAEAEA</range-grid-color>  <!-- color of horizontal grid lines --
>
  <range-stroke>1</range-stroke>  <!-- thickness of y-axis -->
  <range-steps>6</range-steps>  <!-- specify number of ticks, defaults to auto-
calculated number -->

  <!-- Specify the color palette for the chart -->
  <color-palette>
    <color>#0f3765</color>
    <color>#880a0f</color>
    <color>#B09A6B</color>
    <color>#772200</color>
    <color>#C52F0D</color>
    <color>#123D82</color>
    <color>#4A0866</color>
    <color>#445500</color>
    <color>#FFAA00</color>
    <color>#1E8AD3</color>
    <color>#AA6611</color>
    <color>#772200</color>
    <color>#8b2834</color>
  </color-palette>

</chart>
```

XY Dot Chart



Bubble Chart

A bubble chart draws bubbles for each point in a series. The chart expects three values per bubble: the domain (commonly the X-axis) value, the range (commonly the y-axis) value, and a third value (the Z value) that determines the size of the bubble to draw around the point.

The size of the bubble is derived from an algorithm that takes the Z value, divides it by the maximum Z value in the dataset, then multiplies that number by the max-bubble-size property value. See the section on required properties below for more information on the max-bubble-size property.

Dataset Guidelines

This chart expects its data as an **XYZ** dataset.

Required Properties The following properties are required:

- **chart-type**

  ```
  <chart-type>BubbleChart</chart-type>
  ```

- **dataset-type**

  ```
  <dataset-type>XYZSeriesCollection</dataset-type>
  ```

- **max-bubble-size** — the max-bubble-size property is defaulted to zero, so to see your bubbles, you must set this property! The value should be between 1 and 100, as a percentage of smaller to larger.

  ```
  <max-bubble-size>90</max-bubble-size>
  ```

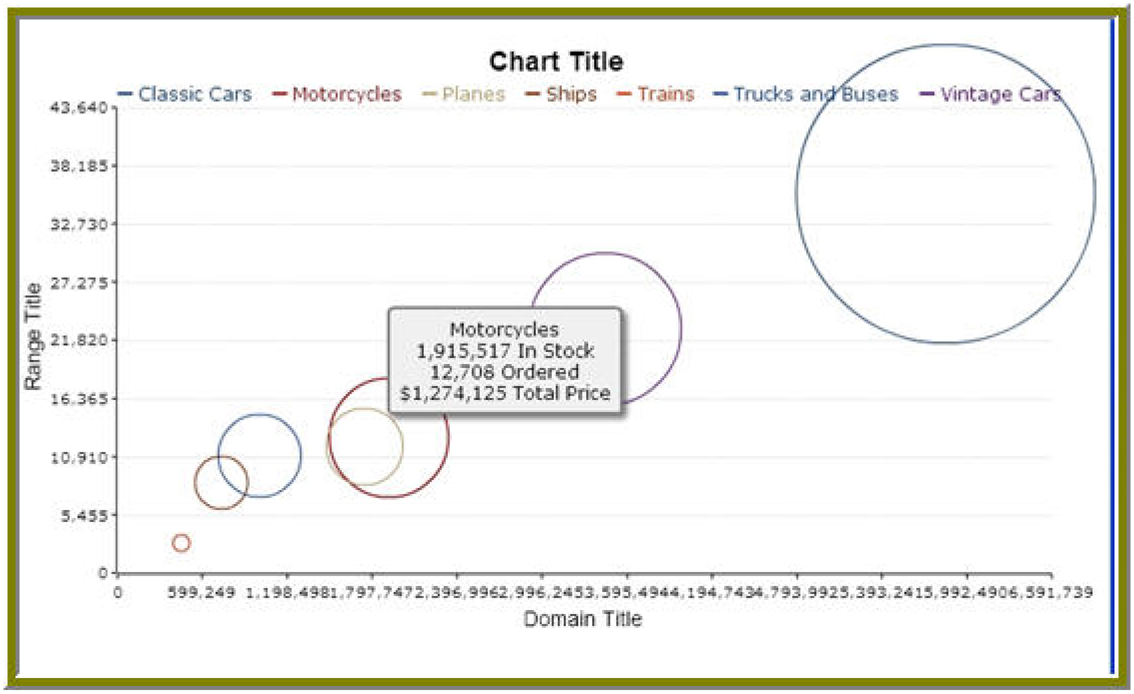
Example

The example below contains the full set of additional supported properties with comments on its purpose and valid values. It is recommended that new users start with this example as a starting place for building your first flash chart. The following chart definition will produce the chart shown directly below it.

```
<chart>

  <!-- Define the chart type -->
  <chart-type>BubbleChart</chart-type>

  <!-- Specify the title of the chart -->
  <title>Chart Title</title>
  <title-font>
```

```
    <font-family>Arial</font-family>
    <size>18</size>
    <is-bold>true</is-bold>
  </title-font>

  <!-- General Chart Attributes -->
  <dataset-type>XYSeriesCollection</dataset-type>
  <!-- formatted label, using {0} - series name, {1} - x , {2} - y, {3} - z -->
  <bubble-label-content>{0},{1},{2},{3}</bubble-label-content>
  <bubble-label-z-format>$#,###</bubble-label-z-format> <!-- formatted using java
 decimal format, ie #,### -->

  <!-- General Chart Formatting Propeties -->
  <chart-background type="color">#FFFFFF</chart-background>
  <plot-background type="color">#FFFFFF</plot-background>

  <!--  X-Axis properties (domain)-->
  <domain-title>Domain Title</domain-title>
  <domain-title-font>
    <font-family>Arial</font-family>
    <size>14</size>
    <is-bold>false</is-bold>
  </domain-title-font>
  <domain-minimum></domain-minimum>  <!-- defines the minimum starting point for x-
axis -->
  <domain-maximum></domain-maximum>  <!-- defines the maximum ending point for x-axis
 -->
  <domain-color>#000000</domain-color>  <!-- color of x-axis -->
  <domain-grid-color>#FFFFFF</domain-grid-color>  <!-- color of vertical grid lines --
>
  <domain-stroke>1</domain-stroke>  <!-- thickness of the x-axis -->
  <domain-steps>6</domain-steps>  <!-- specify the number of ticks, defaults to auto-
calculated number -->

  <!--  Y-Axis properties (range) -->
  <range-title>Range Title</range-title>
  <range-title-font>
    <font-family>Arial</font-family>
    <size>14</size>
    <is-bold>false</is-bold>
  </range-title-font>
  <range-minimum></range-minimum>  <!-- defines minimum starting point for y-axis -->
  <range-maximum></range-maximum>  <!-- defines maximum ending point for y-axis -->
  <range-color>#000000</range-color>  <!-- color of y-axis -->
  <range-grid-color>#EAEAEA</range-grid-color>  <!-- color of horizontal grid lines --
>
  <range-stroke>1</range-stroke>  <!-- thickness of y-axis -->
  <range-steps>6</range-steps>  <!-- specify number of ticks, defaults to auto-
calculated number -->

  <!-- Specify the color palette for the chart -->
  <color-palette>
    <color>#0f3765</color>
    <color>#880a0f</color>
    <color>#B09A6B</color>
    <color>#772200</color>
    <color>#C52F0D</color>
    <color>#123D82</color>
    <color>#4A0866</color>
    <color>#445500</color>
    <color>#FFAA00</color>
    <color>#1E8AD3</color>
    <color>#AA6611</color>
    <color>#772200</color>
    <color>#8b2834</color>
  </color-palette>

</chart>
```

Bubble Chart



Editing Existing Action Sequences

If you used Design Studio to create an action sequence in a previous version of the Pentaho Business Analytics, the same basic rules and practices apply to later releases. While very little has changed with the core set of components, there are some new plugins available to you like the PojoComponent, the result set burst component, and the Flash chart component.

Report Designer publishes reports in the PRPT format, which is an OpenDocument-compliant file archive. Report Designer has been entirely overhauled in an attempt to eliminate the need to hand-edit reports with Design Studio, but in previous versions, there were some functions (such as adding user-interactive parameters) that required hand-editing.

If you have already used Design Studio to customize a published report, it is likely that you will continue to have to follow that process if you want to make changes to the report. Alternatively you could re-create the report in the new Report Designer and republish it to the BI Platform as a PRPT, or you could open the old Report Designer .report file with the new Report Designer, use its new and more powerful feature set to add in the custom changes that you formerly used Design Studio for, and publish it to the BI Platform.

Report Designer does not yet have equivalent functionality to the SecureFilterComponent, so if you need to put strict limits on user parameters, you will have to generate the report by hand with Design Studio.

Internationalization Guidelines

If you need to internationalize your action sequence, you can abstract all of your text content to language-specific message bundles. For each language you want to translate to, create a properties file with the same name as the action sequence, plus the two-letter ISO language code. Optionally, you can also append a two-letter ISO country code if you want to discriminate among different dialects. For instance, using the previously created hello_world.xaction example, you would internationalize it by creating properties files like these:

- **hello_world.properties**: The default version of the message bundle
- **hello_world_fr.properties**: French language version
- **hello_world_de.properties**: German language version
- **hello_world_fr_CA.properties**: French Canadian version of the messages file

It does not matter what the original xaction filename is when it comes to specifying the language and country code. For instance if the original file were called **hello_world_fr_CA.xaction**, the resulting properties file **hello_world_fr_CA.properties** would be the default browser language (usually English), not French Canadian. To specify a French Canadian message bundle, you would create a second file called **hello_world_fr_CA_fr_CA.properties**.

Each string is replaced by a token (indicated by a percent symbol) in the action sequence, and matches up with content in the properties file. Considering this, the original, unmodified hello_world example created from the Design Studio template should make more sense now:

```
<?xml version="1.0" encoding="UTF-8"?>
<action-sequence>
  <title>Hello World</title>
  <version>1</version>
  <logging-level>DEBUG</logging-level>

  <documentation>
    <author>Joe Pentaho</author>
    <description>The most simple Action Sequence</description>
    <help>%help</help>
    <result-type>rule</result-type>
    <icon>HelloWorld.png</icon>
  </documentation>

  <inputs/>

  <outputs/>

  <resources/>

  <actions>
      <action-definition>
        <action-name>Hello World Action</action-name>
        <action-inputs/>
        <action-outputs/>
        <logging-level>DEBUG</logging-level>
        <component-name>org.pentaho.component.HelloWorldComponent</component-name>
        <component-definition>
        <quote>%quote</quote>
        </component-definition>
      </action-definition>
  </actions>
</action-sequence>
```

The **help** and **quote** tags are, by default, abstracted to a properties file. As previously mentioned, Pentaho no longer ships Pentaho Business Analytics with properties files for the sample action sequences. So if you want to see this work, you will have to create a file called **hello_world.properties** in your solution directory (on the same level as hello_world.xaction), and copy the following content to it:

```
help=Hello World demonstrates the most basic action sequence document.  It uses the
 Hello World component.
```

```
quote=Greetings from the Pentaho BI Platform.
```

Based on the above action sequence and properties file, the output of hello_world.xaction will be:

```
Hello World. Greetings from the Pentaho BI Platform.
```

The first part of the message is still pulled in from the global messages.properties file for the BI Platform. This file can also be changed to internationalize the entirety of the Pentaho User Console and Pentaho Enterprise Console, but that task is beyond the scope of this guide.

Action Sequence Error Handling

When an action sequence fails to execute, it will produce a generic error message. You can bring more specificity to the error dialogue by pulling in selected details to construct the HTML error page, as explained below.

Customizing Error Output

To customize your error response page, edit the `/pentaho/server/biserver-ee/pentaho-solutions/system/ui/templates/viewActionErrorTemplate.html` file and modify it accordingly. Any time an action sequence fails, a message formatter is applied that will load the template HTML page and replace all the tokens listed in the next section with the appropriate text. That text may be a label, in which case the source of the text is a message properties file, or the text may be actual data pertinent to the error. See the next section for all the tokens that you can use in your template file.

Note: You are not required to use any tokens at all. The HTML file you use can be as lean or as rich with messages as you wish; you have full control over the content of the error page.

The default error page is shown here:

```
<html><head><title></title><link rel="stylesheet" type="text/css"
 href="/pentaho-style/active/default.css"></head>
<body>
<script language="javascript" type="text/javascript">
<!--
function showHide(shID) {
    if (document.getElementById(shID)) {
        if (document.getElementById(shID+'-show').style.display !=
 'none') {
            document.getElementById(shID+'-show').style.display =
 'none';
            document.getElementById(shID+'-hide').style.display =
 'inline';
            document.getElementById(shID).style.display = 'block';
        }
        else {
            document.getElementById(shID+'-show').style.display =
 'inline';
            document.getElementById(shID+'-hide').style.display =
 'none';
            document.getElementById(shID).style.display = 'none';
        }
    }
}

//-->
</script>

<div id="errorResponse">
<div class="error">

<h1>%ERROR_HEADING%</h1>
<div class="summary">
  <div class="item"><span class="label">%EXCEPTION_MESSAGES_LABEL%</
span><pre>%EXCEPTION_MESSAGES%</pre></div>
  <div class="item"><span class="label">%ACTION_SEQUENCE_LABEL%</span>
%ACTION_SEQUENCE%</div>
  <div class="item"><span class="label">
%ACTION_SEQUENCE_EXECUTION_STACK_LABEL%</span><pre>
%ACTION_SEQUENCE_EXECUTION_STACK%</pre></div>
  <div class="item"><span class="label">%LOOP_INDEX_LABEL%</span>
%LOOP_INDEX%</div>
  <div class="item"><span class="label">%EXCEPTION_TIME_LABEL%</span>
%EXCEPTION_TIME%</div>
```

```
  <div class="item"><span class="label">%EXCEPTION_TYPE_LABEL%</span>
%EXCEPTION_TYPE%</div>
  <div class="item"><span class="label">%SESSION_ID_LABEL%</span>
%SESSION_ID%</div>
  <div class="item"><span class="label">%INSTANCE_ID_LABEL%</span>
%INSTANCE_ID%</div>
  <div class="item"><span class="label">%ACTION_CLASS_LABEL%</span>
%ACTION_CLASS%</div>
  <div class="item"><span class="label">%ACTION_DESC_LABEL%</span>
%ACTION_DESC%</div>
  <!-- <div class="item"><span class="label">%STEP_NUM_LABEL%</span>
%STEP_NUM%</div> -->
</div>

<div id="controls">
<a href="#" id="details-show" class="showLink"
 onclick="showHide('details');return false;">View Details</a>
<a href="#" id="details-hide" class="hideLink"
 onclick="showHide('details');return false;">Hide Details</a>
</div>

<div id="details" class="details"><span class="label">%STACK_TRACE_LABEL
%</span><pre class="stackTrace">%STACK_TRACE%<pre></div>

</div>
</div>

<div class="errorResponseFooter">%SERVER_INFO%</div>

</body>
</html>
```

Error Token Reference

Below is a complete list of all tokens available to action sequence HTML error pages.

Note: The **message bundle key** corresponds to the **MessageFormatter** method that generates the message; this is useful for programmers who want to modify the way action sequences errors are generated and displayed.

Token	Description	Message bundle key
%ERROR_HEADING%	The top heading on the HTML page. For instance, "The Pentaho BI Platform reported an error while running an action sequence."	RESPONSE_ERROR_HEADING
%EXCEPTION_MSG_LABEL%	Label for the primary error. For instance, "Error Message:"	RESPONSE_EXCEPTION_MSG_LABEL
%EXCEPTION_MSG%	Prints the topmost exception message text.	N/A
%EXCEPTION_TIME_LABEL%	Label for the error timestamp. For instance, "Error Time:"	RESPONSE_EXCEPTION_TIME_LABEL
%EXCEPTION_TIME%	The time the root cause exception occurred.	N/A
%EXCEPTION_TYPE_LABEL%	Label for the exception type. For instance, "Error Type:"	RESPONSE_EXCEPTION_TYPE_LABEL
%EXCEPTION_TYPE%	The type of the topmost Java exception.	N/A

Token	Description	Message bundle key
%SESSION_ID_LABEL%	Label for the session ID. For instance, "Session ID:"	RESPONSE_EXCEPTION_SESSION_ID_LA
%SESSION_ID%	The session name of the action sequence's execution.	N/A
%INSTANCE_ID_LABEL%	Label for the instance ID. For example, "Instance ID:"	RESPONSE_EXCEPTION_INSTANCE_ID_L
%INSTANCE_ID%	The unique identifier for the runtime session that executed the action sequence.	N/A
%ACTION_SEQUENCE_LABEL%	Label for the action sequence name. For instance, "Action Sequence:"	RESPONSE_EXCEPTION_ACTION _SEQUENCE_LABEL
%ACTION_SEQUENCE%	The name of the xaction file that failed.	N/A
%ACTION_SEQUENCE_EXECUTION_STACK_LABEL %	Label for the location of the error. For instance, "Execution Stack:"	RESPONSE_EXCEPTION_ACTION_ SEQUENCE_EXECUTION_STACK_LABEL
%ACTION_SEQUENCE_EXECUTION_STACK %	A pointer into the place in the xaction file's DOM where the error occurred.	N/A
%ACTION_CLASS_LABEL%	Label for the component that failed. For instance, "Action Class:"	RESPONSE_EXCEPTION_ACTION_CLASS_
%ACTION_CLASS%	The name of the component or action that failed, as described in the xaction file.	N/A
%ACTION_DESC_LABEL%	Label for the action-type description, if applicable. For instance, "Action Desc:"	RESPONSE_EXCEPTION_ACTION_DESC_
%ACTION_DESC%	If the xaction provides an "action-type" element, that descriptive text goes here.	N/A
%STACK_TRACE_LABEL%	Label for the Java stack trace. For example, "Stack Trace:"	RESPONSE_EXCEPTION_STACK_TRACE_
%STACK_TRACE%	The full Java stack trace text (can be several dozen lines long).	N/A
%EXCEPTION_MESSAGES_LABEL %	Label for exception summaries. For instance, "Possible Causes:"	RESPONSE_EXCEPTION_MESSAGES_LAB
%EXCEPTION_MESSAGES%	An inverted (root cause first) summary of the exceptions that occurred for quicker identification of the root problem.	N/A
%SERVER_INFO%	The version of the BI Platform and other identifying information.	USER_SERVER_VERSION

Basic Action Sequence Tips and Tricks

This section contains commonly used or frequently requested action sequence tips and tricks. Only the basic, common tasks are covered here; the next section contains advanced, highly technical action sequence notes.

Emailing a Report

To email a report, you must match the output of **SimpleReportingComponent** (**reportOutput** in the example below) to the **EmailComponent**'s input. The action sequence shown below will execute an SQL query with a user-defined parameter, then use that to generate a report and email it to the specified email address. The PRPT referenced here is included with the Pentaho sample data, in the `/bi-developers/reporting/unified-file-format/` directory.

```
<?xml version="1.0" encoding="UTF-8"?>
<action-sequence>
  <title>E-mail Inventory Report in Message</title>
  <version>1</version>
  <logging-level>ERROR</logging-level>
  <documentation>
    <author>Kurtis Cruzada</author>
    <description>Send email with report in the Message</description>
    <help/>
    <result-type>report</result-type>
  </documentation>

  <inputs>
    <sendto type="string">
      <sources>
        <request>sendto</request>
      </sources>
      <default-value><![CDATA[joe@pentaho.com]]></default-value>
    </sendto>
    <productline type="string">
      <sources>
        <request>productline</request>
      </sources>
      <default-value>Classic Cars</default-value>
    </productline>
  </inputs>

  <outputs>
    <reportOutput type="content">
      <destinations>
        <contentrepo>reportOutput</contentrepo>
      </destinations>
    </reportOutput>
  </outputs>

  <resources>
    <report-definition>
      <solution-file>
        <location>inventory.prpt</location>
        <mime-type>application/zip</mime-type>
      </solution-file>
    </report-definition>
  </resources>

  <actions>
    <action-definition>
      <component-name>SQLLookupRule</component-name>
      <action-type>Return list of Product Lines</action-type>
      <action-outputs>
        <productline type="string"/>
        <query-result type="result-set" mapping="productLineList"/>
      </action-outputs>
      <component-definition>
```

```
        <jndi>SampleData</jndi>
        <query><![CDATA[select distinct(productline) from PRODUCTS]]></query>
      </component-definition>
    </action-definition>

    <action-definition>
      <component-name>SecureFilterComponent</component-name>
      <action-type>Prompt for Line and Email Address</action-type>
      <action-inputs>
        <sendto type="string"/>
        <productline type="string"/>
        <productLineList type="result-set"/>
      </action-inputs>
      <component-definition>
        <selections>
          <productline style="list-multi">
            <title>Select Product Line</title>
            <filter value-col-name="productline" display-col-
name="productline">productLineList</filter>
          </productline>
          <sendto filter="none" style="text-box">
            <title>Email To</title>
          </sendto>
        </selections>
      </component-definition>
    </action-definition>

    <action-definition>
      <component-name>SQLLookupRule</component-name>
      <action-type>SQL Query For Report Data</action-type>
      <action-inputs>
        <productline type="string"/>
      </action-inputs>
      <action-outputs>
        <query-result type="result-set" mapping="queryData"/>
      </action-outputs>
      <component-definition>
        <jndi>SampleData</jndi>
        <live>true</live>
        <query><![CDATA[SELECT PRODUCTS.PRODUCTLINE, PRODUCTS.PRODUCTVENDOR,
 PRODUCTS.PRODUCTCODE, PRODUCTS.PRODUCTNAME, PRODUCTS.PRODUCTSCALE,
 PRODUCTS.PRODUCTDESCRIPTION, PRODUCTS.QUANTITYINSTOCK, PRODUCTS.BUYPRICE,
 PRODUCTS.MSRP FROM PRODUCTS WHERE PRODUCTS.PRODUCTLINE IN ({PREPARE:productline})
 ORDER BY PRODUCTLINE ASC, PRODUCTVENDOR ASC, PRODUCTCODE ASC]]></query>
      </component-definition>
    </action-definition>

    <action-definition>
      <component-name>SimpleReportingComponent</component-name>
      <action-type>Pentaho Report</action-type>
      <action-inputs>
        <queryData type="result-set"/>
      </action-inputs>
      <action-resources>
        <report-definition type="resource"/>
      </action-resources>
      <action-outputs>
        <outputstream type="content" mapping="reportOutput"/>
      </action-outputs>
      <component-definition>
        <useContentRepository><![CDATA[true]]></useContentRepository>
        <outputType><![CDATA[text/html]]></outputType>
      </component-definition>
    </action-definition>

    <action-definition>
      <component-name>EmailComponent</component-name>
      <action-type>E-Mail HTML</action-type>
      <action-inputs>
```

```
        <to type="string" mapping="sendto"/>
        <message-html type="string" mapping="reportOutput"/>
      </action-inputs>
      <component-definition>
        <message-plain><![CDATA[Please see the report attached.]]></message-plain>
        <subject><![CDATA[Income Statement HTML]]></subject>
      </component-definition>
    </action-definition>

  </actions>
</action-sequence>
```

Advanced Action Sequence Tips and Tricks

The tips and tricks in this section apply to rare or specific cases; they highlight unusual and interesting ways to use action sequences to automate complex tasks.

Using Java Virtual Machine Input Parameters

In an action sequence, you can specify the source of an input parameter as **jvm** and the Pentaho solution engine will resolve the parameter from Java's native **System.getProperty( )** functions. The Pentaho class that retrieves parameters from the Java Virtual Machine properties is **org.pentaho.platform.util.JVMParameterProvider**.

Here's an example action sequence fragment:

```
<java_version type="string">
    <sources>
        <jvm>java.version</jvm>
    </sources>
</java_version>
```

For common JVM properties, refer to *http://docs.oracle.com/javase/1.5.0/docs/api/java/lang/System.html#getProperties%28%29*

Using Action Sequence Variables in Kettle/PDI

If you have variables in an action sequence that you want to access in a Kettle job or transformation, you must map them to command line arguments.

Modifying your ETL process

The first step is to edit your workflow so that accepts command line arguments, as shown in the example KTR below which uses the **Get System Info** step to accomplish this. It then passes the parameters to a script step which sets variables. You would call this KTR as the first part of a job, then go on to other transformations that use the variable values, e.g. use **${END_DATE}** in a SQL step.

```
<?xml version="1.0" encoding="UTF-8"?>
<transformation>
  <info>
    <name>init</name>
    <description/>
    <extended_description/>
    <trans_version/>
    <directory>&#47;</directory>
    <log>
      <read/>
      <write/>
      <input/>
      <output/>
      <update/>
      <rejected/>
      <connection/>
      <table/>
      <step_performance_table/>
      <use_batchid>Y</use_batchid>
      <use_logfield>N</use_logfield>
    </log>
    <maxdate>
      <connection/>
      <table/>
      <field/>
      <offset>0.0</offset>
      <maxdiff>0.0</maxdiff>
    </maxdate>
```

```
    <size_rowset>10000</size_rowset>
    <sleep_time_empty>50</sleep_time_empty>
    <sleep_time_full>50</sleep_time_full>
    <unique_connections>N</unique_connections>
    <feedback_shown>Y</feedback_shown>
    <feedback_size>50000</feedback_size>
    <using_thread_priorities>Y</using_thread_priorities>
    <shared_objects_file/>
    <capture_step_performance>N</capture_step_performance>
    <step_performance_capturing_delay>1000</step_performance_capturing_delay>
    <dependencies>
    </dependencies>
    <partitionschemas>
    </partitionschemas>
    <slaveservers>
    </slaveservers>
    <clusterschemas>
    </clusterschemas>
  <modified_user>-</modified_user>
  <modified_date>2008&#47;10&#47;15 14:28:18.337</modified_date>
  </info>
  <notepads>
    <notepad>
      <note>Get the period start
and end date</note>
      <xloc>16</xloc>
      <yloc>74</yloc>
      <width>103</width>
      <heigth>32</heigth>
    </notepad>
    <notepad>
      <note>Change the format
of the start and end
date.
Store the start date
as a variable</note>
      <xloc>147</xloc>
      <yloc>69</yloc>
      <width>105</width>
      <heigth>65</heigth>
    </notepad>
  </notepads>
  <order>
  <hop> <from>Get System Info</from><to>Process Parameters</to><enabled>Y</enabled> </
hop>  </order>
  <step>
    <name>Get System Info</name>
    <type>SystemInfo</type>
    <description/>
    <distribute>Y</distribute>
    <copies>1</copies>
         <partitioning>
           <method>none</method>
           <schema_name/>
           </partitioning>
    <fields>
      <field>
        <name>start_date_str</name>
        <type>command line argument 1</type>
        </field>
      <field>
        <name>end_date_str</name>
        <type>command line argument 2</type>
        </field>
      </fields>
     <cluster_schema/>
 <remotesteps>   <input>   </input>   <output>   </output> </remotesteps>    <GUI>
      <xloc>43</xloc>
      <yloc>22</yloc>
```

```
      <draw>Y</draw>
      </GUI>
    </step>

  <step>
    <name>Process Parameters</name>
    <type>ScriptValueMod</type>
    <description/>
    <distribute>Y</distribute>
    <copies>1</copies>
         <partitioning>
           <method>none</method>
           <schema_name/>
           </partitioning>
    <compatible>Y</compatible>
    <jsScripts>      <jsScript>        <jsScript_type>0</jsScript_type>
        <jsScript_name>Script 1</jsScript_name>
        <jsScript_script>
&#47;&#47; get the start and end date strings from the previous step
&#47;&#47; these are formatted like &apos;Dec 31, 2008&apos;
var startDateStr = start_date_str.getString();
var endDateStr = end_date_str.getString();

&#47;&#47; convert the start and end date strings into Date objects
var startDate = str2date( startDateStr,&quot;MMM d, yyyy&quot;,&quot;EN&quot;);
var endDate = str2date( endDateStr,&quot;MMM d, yyyy&quot;,&quot;EN&quot;);

&#47;&#47; convert the start and end date objects into strings formatted like
 &apos;2008-12-31&apos;
startDateStr = date2str(startDate,&quot;yyyy-MM-dd&quot;);
endDateStr = date2str(endDate,&quot;yyyy-MM-dd&quot;);

var yearStr = endDateStr.substr( 0, 4 );
var monthStr = endDateStr.substr( 5, 2 );

var quarterStr = &apos;&apos;;
if( monthStr == &apos;03&apos; ) {
 quarterStr = &apos;Qtr 1&apos;;
}
else if( monthStr == &apos;06&apos; ) {
 quarterStr = &apos;Qtr 2&apos;;
}
else if( monthStr == &apos;09&apos; ) {
 quarterStr = &apos;Qtr 3&apos;;
}
else if( monthStr == &apos;12&apos; ) {
 quarterStr = &apos;Qtr 4&apos;;
}

setVariable(&quot;START_DATE&quot;,startDateStr,&quot;r&quot;);
setVariable(&quot;END_DATE&quot;,endDateStr,&quot;r&quot;);
setVariable(&quot;YEAR&quot;,yearStr,&quot;r&quot;);
setVariable(&quot;QUARTER&quot;,quarterStr,&quot;r&quot;);
setVariable(&quot;DATABASE_NAME&quot;,&quot;amrs_demo&quot;,&quot;r&quot;);
</jsScript_script>
      </jsScript>    </jsScripts>    <fields>      <field>        <name>endDateStr</
name>
        <rename>endDateStr</rename>
        <type>String</type>
        <length>10</length>
        <precision>-1</precision>
      </field>      <field>        <name>startDateStr</name>
        <rename>startDateStr</rename>
        <type>String</type>
        <length>10</length>
        <precision>-1</precision>
      </field>    </fields>     <cluster_schema/>
 <remotesteps>   <input>   </input>   <output>   </output> </remotesteps>    <GUI>
      <xloc>170</xloc>
```

```
      <yloc>22</yloc>
      <draw>Y</draw>
      </GUI>
    </step>

  <step_error_handling>
  </step_error_handling>
   <slave-step-copy-partition-distribution>
</slave-step-copy-partition-distribution>
   <slave_transformation>N</slave_transformation>
</transformation>
```

Modifying your action sequence

In the action sequence, you must map the action-inputs to numbered parameters that match what the command line arguments would be, as shown in the snippet below:

```
<action-inputs>
    <start_date/>
    <end_date/>
</action-inputs>
<component-definition>
    <parameter1>start_date</parameter1>
    <parameter2>end_date</parameter2>
</component-definition>
```

Sharing Result Sets in Action Sequences

In an action sequence, it is possible to use an SQLLookupRule to produce a result-set, which can in turn be used as an input for SecureFilterComponenent. That action-input can have a filter that can be shared among multiple action-inputs in SecureFilterComponent. If the action-inputs of a SecureFilterComponent share the same filter, and that filter is a result-set, you will receive a nullPointerException when running the action sequence.

To solve this, modify the SQLLookupRule's component-definition by setting the value of the **<live>** element to **false**, as in this example:

```
    <action-definition>
      <component-name>SQLLookupRule</component-name>
      <action-type>Relational</action-type>
      <action-outputs>
        <query-result type="result-set" mapping="paymentMethodList"/>
      </action-outputs>
      <component-definition>
        <jndi><![CDATA[SampleData]]></jndi>
        <query><![CDATA[select method from paymentMethod]]></query>

<!-- MAKE SURE THIS IS SET TO FALSE OR YOU WILL RECIEVE A NULLPOINTEREXCEPTION -->

        <live><![CDATA[false]]></live>

      </component-definition>
    </action-definition>

   <action-definition>
      <component-name>SecureFilterComponent</component-name>
      <action-type>Prompt/Secure Filter</action-type>
      <action-inputs>
        <PaymentMethodList type="result-set"/>
      </action-inputs>
      <component-definition>
        <selections>
          <CarSales style="list-multi">
            <title>Select payment method for car sales:</title>
            <filter value-col-name="paymentMethod_id" display-col-
name="method">paymentMethodList</filter>
```

```
            </CarSales>
            <BikeSales style="list-multi">
              <title>Select payment method for bike sales:</title>
              <filter value-col-name="paymentMethod_id" display-col-
name="method">paymentMethodList</filter>
            </BikeSales>
          </selections>
        </component-definition>
      </action-definition>
```

Essentially, if you are using a live result set (live = true), then once you use the result-set, and iterate through it, the result-set has been used, and it is no longer available. Hence, the NPE. If you use an in-memory result-set (live = false), the result-set is stored in memory for later use.

Using Security Information In Action Sequences

In addition to providing access to security information within the Web application code, the BI Platform's security system also provides access to security information within action sequences. That security information then can be used in JavaScript rules, presented in reporting prompts, provided as input to SQL lookup rules, etc.

A typical action sequence inputs section is defined like this:

```
<inputs>
  <someInput type="string">
    <sources>
      <request>someInput</request>
    </sources>
  </someInput>
</inputs>
```

In the above example, the input (called **someInput**) can be found by looking at the request (HttpServletRequest, PortletRequest, etc.) for a variable called **someInput**. Then, throughout the rest of the action sequence, specific actions can reference that input. The Pentaho BI Platform extends the inputs to provide a unique type of input: The security input. This input presently supports the following input names:

Input Name	Type	Description
principalName	string	The name of the currently authenticated user.
principalRoles	string-list	The roles that the currently authenticated user is a member of.
principalAuthenticated	string	true if the user is authenticated, false otherwise.
principalAdministrator	string	true if the user is considered a Pentaho Administrator, false otherwise.
systemRoleNames	string-list	All the known roles in the system. Use caution since this list could be quite long.
systemUserNames	string-list	All the users known to the system. Use caution since this list could be quite long.

The following input section will get the list of the user's roles, and make it available to all the actions in the action sequence:

```
<inputs>
  <principalRoles type="string-list">
    <sources>
```

```
        <security>principalRoles</security>
      </sources>
    </principalRoles>
  </inputs>
```

Content Linking in Dashboards

Action sequences used as content in Pentaho Dashboards can broadcast values to other dashboard components in a process called, "Content Linking." To enable the dashboard to accept content links from an action sequence, add the content links to the outputs section.

```
<outputs>
    <!-- is-output-parameter="false" will prevent output from being shown to the user
    and allow it to be used for content link -->
    <territory type="string" is-output-parameter="false">
        <default-value>NA</default-value>
    </territory>
</outputs>
```

The actual firing of content link events from your action sequence content is achieved by calling the following JavaScript:

```
parent.Dashboards.fireChange('PARAM_NAME',parent.encode_prepare('{PARAM_VALUE}'));
```

The ChartComponent supports events when values are selected by a user. You can fire a content link by adding the following to the Chart Definition in the action sequence:

```
 <component-definition>
    <chart-attributes>

    <!-- update content link parameter's value on click -->
        <paramName>PARAM</paramName>
        <url-
template>javascript:parent.Dashboards.fireChange('territory',parent.encode_prepare('{PARAM}'
url-template>

        <url-target>_self</url-target>
        <use-base-url>false</use-base-url>
         ....
    </chart-attributes>
</component-definition>
```

In-Depth Action Sequence Tutorials

This section contains lengthy tutorials that were originally designed as standalone documents.

Creating a Bar Chart Using the Flash Chart Component

This tech tip steps you through the components, tools, and processes for creating a simple chart using the Flash Charting component in the Pentaho BI Platform. To perform this exercise, you must have the following tools:

- A text or XML Editor — used to create and edit the Chart XML definition. Any standard editor such as Notepad will do.
- Pentaho Design Studio — used to create, edit and preview the flash chart action sequence. It is assumed that you have configured your Design Studio installation to point to the Solution Repository of your Pentaho Server, see *Configuring Design Studio*.

While the examples in this tech tip provide step-by-step instructions that walk you through the creation of your first Flash chart, you must have some knowledge and background performing the following tasks:

- Editing XML
- Building Pentaho Action Sequences including using the **Get Data From** and custom components
- Publishing action sequences to a Pentaho BA Server

Overview of the Exercise

In this exercise, you will build a simple Bar Chart to show annual sales by product line using the Steel Wheels sample data that ships with the Pentaho platform. Building your first Flash Chart involves the following steps:

1. Creating a Chart Definition
2. Creating the Action Sequence
3. Viewing Your Chart in the BI Platform

Configuring Design Studio

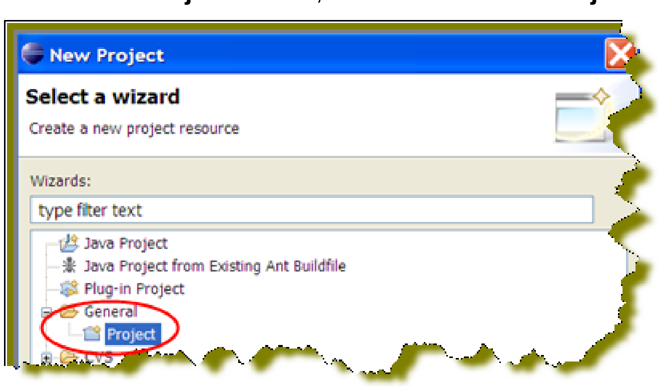
Follow the instructions below to point your Penthao Design Studio installation to point to your Solution Repository.

Note: If you have not already done so, install and run the Pentaho BI Server to ensure that it is functional. Also log on to the Pentaho User Console and try to display one or two reports in `...pentaho-solutions/steel-wheels/reports`.

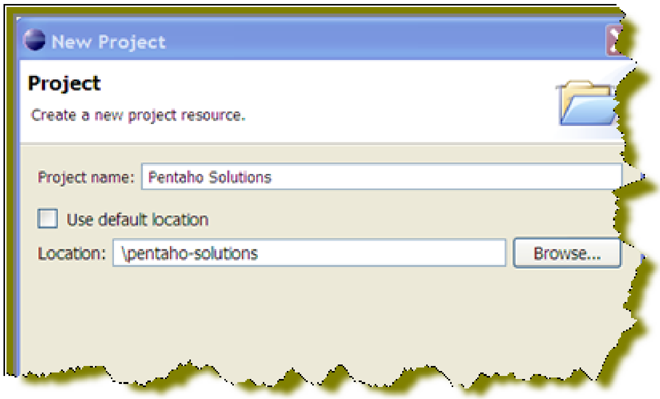
Important: For the purposes of this document, make sure the BI Server and Design Studio are running on the same device.

1. Start the Design Studio and click (Close) to exit the Welcome Page.
2. In the menu bar, click **New** -> **Project**.

3. In the **New Project** wizard, select **General** -> **Project** and click **Next**.



4. Enter **Pentaho Solutions** as the project name and disable **Use default location**.



5. Click **Browse** to located your **pentaho-solutions** directory as shown in the sample image above.
6. Click **Finish**.

Creating the Chart Definition

The chart definition can be defined in an XML document or passed as a string input directly into your action sequence. In this example, you will define the chart using an XML document. The chart definition defines the type of chart you want to create along with properties formatting the chart such as colors, fonts, titles, and axis properties. The quickest approach to building your first chart is to start with an existing Chart Definition template provided in *Using the Flash Chart Component*, under Bar Chart.

Before you begin the exercise, copy and paste that bar chart definition template from *Using the Flash Chart Component*, (under Bar Chart)into a document called **sales_barchart.xml**.

Customizing the Template

Follow the instructions below to customize the template

1. Change the **title** property to `Annual Sales`.
2. Change the **is-glass** property to `true`.
3. Change the **domain-title** property to `Product Line`.
4. Change the **range-title** to `Total Sales ($)`.
5. Save your chart definition document into the Pentaho Solution Repository in the following location: `...\pentaho-solutions\steel-wheels\charts`
   You should now have a Chart Definition document that looks like this:

```
<chart>

  <!-- Define the chart type -->
  <chart-type>BarChart</chart-type>

  <!-- Specify the title of the chart -->
  <title>Annual Sales</title>
    <title-font>
      <font-family>Arial</font-family>
      <size>18</size>
      <is-bold>true</is-bold>
    </title-font>

  <!-- General Chart Attributes -->
  <orientation>vertical</orientation>  <!-- valid values: vertical, horizontal -->
  <is-stacked>false</is-stacked>  <!-- set to true for a stacked bar -->
  <is-3D>false</is-3D>
  <is-glass>true</is-glass>  <!-- set to true to apply the 'glass' style to bars -->
  <is-sketch>false</is-sketch>  <!-- set to true to apply the 'sketch' style to bars
 -->
    <!-- additional properties specific to sketch charts -->
    <fun-factor>10</fun-factor>  <!-- defines the messiness of bars, 0-2 tame, 3-6
 pretty fun, 7+ lots of fun -->
    <outline-color-palette>  <!-- defines the colors to use for outlines of bars -->
```

```
      <color>#000000</color>
      <color>#000000</color>
    </outline-color-palette>

  <!-- General Chart Formatting Properties -->
  <chart-background type="color">#FFFFFF</chart-background>
  <plot-background type="color">#FFFFFF</plot-background>
  <alpha>.70</alpha>  <!-- sets the transparency level of bars -->

  <!-- Define what to display in hover tips -->
  <!-- <tooltip> -->
    <!-- #top# -->
    <!-- #bottom# -->
    <!-- #val# -->
    <!-- #x_label# -->
    <!-- #key# -->
  <!-- </tooltip> -->

  <!--  X-Axis properties (domain)-->
  <domain-title>Product Line</domain-title>
  <domain-title-font>
    <font-family>Arial</font-family>
    <size>14</size>
    <is-bold>false</is-bold>
  </domain-title-font>
  <domain-color>#000000</domain-color>  <!-- color of x-axis -->
  <domain-grid-color>#FFFFFF</domain-grid-color>  <!-- color of vertical grid lines
 -->
  <domain-stroke>1</domain-stroke>  <!-- thickness of the x-axis -->

  <!--  Y-Axis properties (range) -->
  <range-title>Total Sales ($)</range-title>
  <range-title-font>
    <font-family>Arial</font-family>
    <size>14</size>
    <is-bold>false</is-bold>
  </range-title-font>
  <range-minimum></range-minimum>  <!-- defines minimum starting point for y-axis --
>
  <range-maximum></range-maximum>  <!-- defines maximum ending point for y-axis -->
  <range-color>#000000</range-color>  <!-- color of y-axis -->
  <range-grid-color>#EAEAEA</range-grid-color>  <!-- color of horizontal grid lines
 -->
  <range-stroke>1</range-stroke>  <!-- thickness of y-axis -->
  <range-steps>6</range-steps>  <!-- specify number of ticks, defaults to auto-
calculated number -->

  <!-- Specify the color palette for the chart -->
  <color-palette>
    <color>#0f3765</color>
    <color>#880a0f</color>
    <color>#B09A6B</color>
    <color>#772200</color>
    <color>#C52F0D</color>
    <color>#123D82</color>
    <color>#4A0866</color>
    <color>#445500</color>
    <color>#FFAA00</color>
    <color>#1E8AD3</color>
    <color>#AA6611</color>
    <color>#772200</color>
    <color>#8b2834</color>
  </color-palette>

</chart>
```

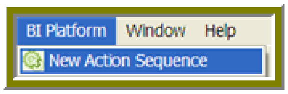
Creating the Action Sequence

An action sequence is a document that defines what platform components you want to use what actions they will perform. In this example, you will be using the Relational Query and Open Flash Chart components.

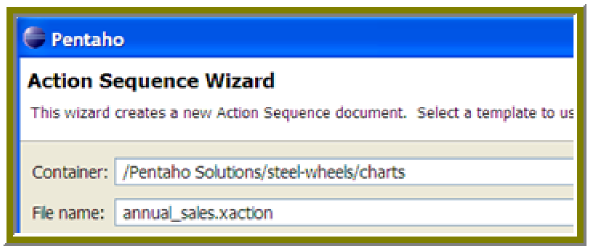
Creating a New Action Sequence

Follow the instructions below to create a new action sequence:

1. In Design Studio, select **BI Platform** -> **New Action Sequence** from the menu.



2. Browse and select `.../pentaho-solutions/steel-wheels/charts` as your container location.



3. Enter **annual_sales.xaction** as your file name
4. Click **Finish**.

Defining General Properties

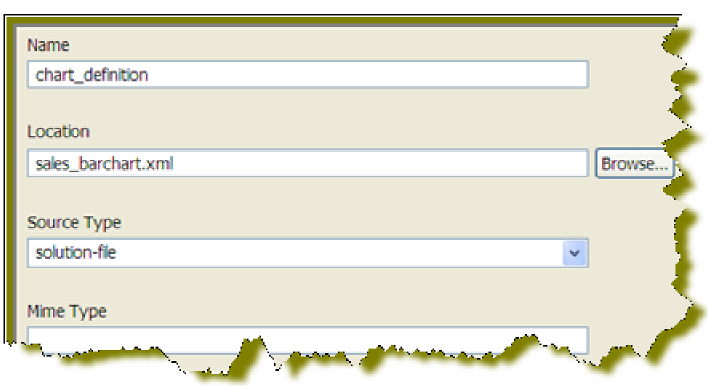
Follow the instructions below to define the General Properties in Design Studio:

1. Type **Annual Sales by Product Line** as the title of your action sequence
2. Specify a custom description for this action sequence. The description will be displayed in the hover tip when mousing over the action sequence in the solution browser of the User Console. (optional)
3. In the lower portion of the General Properties page, click the **2. Define Process** tab.

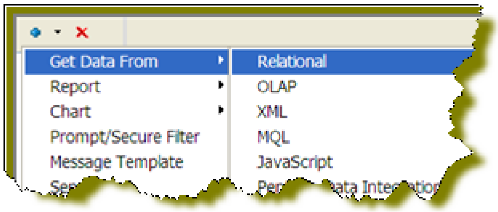
Defining Processes

Follow the instructions below to define the process actions in Design Studio:

1. Under **Process Inputs**, click (Add New Input) to add the **sales_barchart.xml** definition as a resource to the action sequence
2. Type **chart_definition** as the name.
3. Browse to select **sales_barchart.xml** in the Location field.

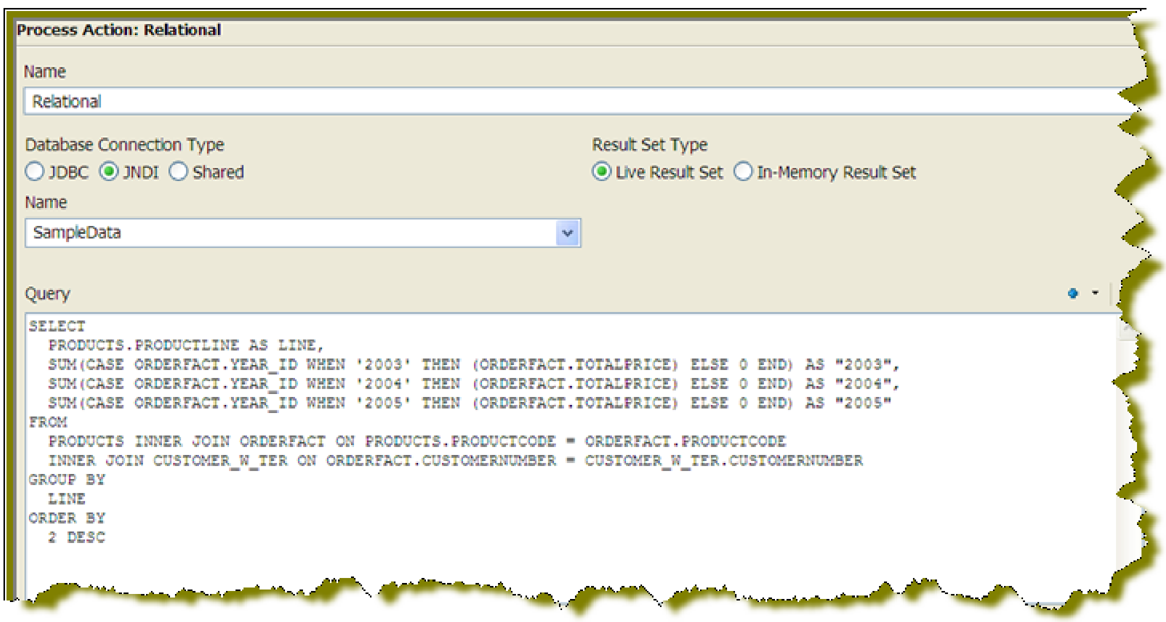


4. Under **Process Action**, click (Add New Action) to add a relational query component. Click **Get Data From** -> **Relational**.



5. Enter **SampleData** as the JNDI data source name.
6. Enter the following SQL in the Query section of the component definition:

```
SELECT
  PRODUCTS.PRODUCTLINE AS LINE,
  SUM(CASE ORDERFACT.YEAR_ID WHEN '2003' THEN (ORDERFACT.TOTALPRICE) ELSE 0 END) AS
 "2003",
  SUM(CASE ORDERFACT.YEAR_ID WHEN '2004' THEN (ORDERFACT.TOTALPRICE) ELSE 0 END) AS
 "2004",
  SUM(CASE ORDERFACT.YEAR_ID WHEN '2005' THEN (ORDERFACT.TOTALPRICE) ELSE 0 END) AS
 "2005"
FROM
  PRODUCTS INNER JOIN ORDERFACT ON PRODUCTS.PRODUCTCODE = ORDERFACT.PRODUCTCODE
  INNER JOIN CUSTOMER_W_TER ON ORDERFACT.CUSTOMERNUMBER =
 CUSTOMER_W_TER.CUSTOMERNUMBER
GROUP BY
  LINE
ORDER BY
  2 DESC
```

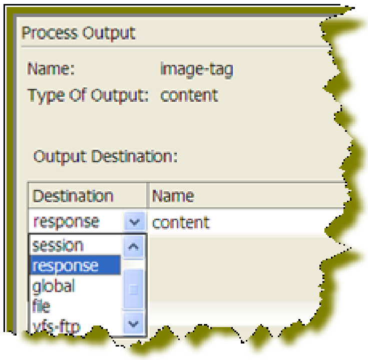


7. Click the **XML Source** tab to add the Open Flash Chart component.
8. After the close tag (</action-definition>) for the query component, insert the following component definition for the Open Flash Chart component.

```
<action-definition>
      <component-name>OpenFlashChartComponent</component-name>
      <action-type>Generate Chart</action-type>
      <action-inputs>
        <chart-data type="string" mapping="query_result"/>
      </action-inputs>
      <action-resources>
        <chart-attributes type="resource" mapping="chart_definition"/>
      </action-resources>
      <action-outputs>
        <image-tag type="content"/>
      </action-outputs>
```

```
      <component-definition/>
    </action-definition>
```

9. Click the **Define Process** tab.
10. Under **Process Outputs**, add the **image-tag** output from the Generate Chart process as an output of the action sequence. Click (Add Output)-> **image-tag**.
11. Double-click **image-tag** (the output you just added under Process Output) section, and select **response** under **Output Destination** on the right.



12. Change the name of the response output to **content**.
13. Save your action sequence.

You action sequence file should look like the sample below:

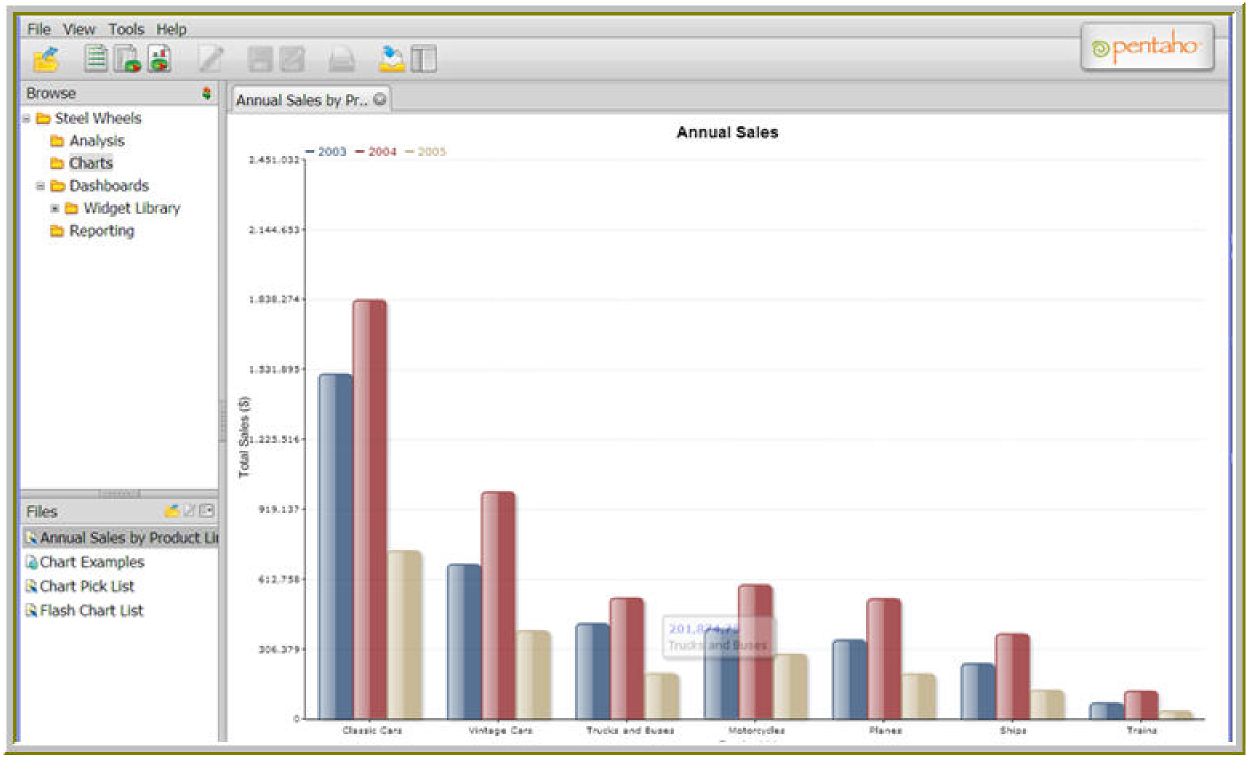
```
<?xml version="1.0" encoding="UTF-8"?>
<action-sequence>
  <title>Annual Sales by Product Line</title>
  <version>1</version>
  <logging-level>ERROR</logging-level>
  <documentation>
    <author>Jake Cornelius</author>
    <description>Empty blank action sequence document</description>
    <help/>
    <result-type/>
    <icon/>
  </documentation>

  <inputs/>

  <outputs>
    <image-tag type="content">
      <destinations>
        <response>content</response>
      </destinations>
    </image-tag>
  </outputs>

  <resources>
    <chart_definition>
      <solution-file>
        <location>sales_barchart.xml</location>
        <mime-type/>
      </solution-file>
    </chart_definition>
  </resources>

  <actions>
    <action-definition>
      <component-name>SQLLookupRule</component-name>
      <action-type>Relational</action-type>
      <action-outputs>
        <query-result type="result-set" mapping="query_result"/>
      </action-outputs>
      <component-definition>
        <jndi><![CDATA[SampleData]]></jndi>
```

```
        <query><![CDATA[SELECT
  PRODUCTS.PRODUCTLINE AS LINE,
  SUM(CASE ORDERFACT.YEAR_ID WHEN '2003' THEN (ORDERFACT.TOTALPRICE) ELSE 0 END) AS
 "2003",
  SUM(CASE ORDERFACT.YEAR_ID WHEN '2004' THEN (ORDERFACT.TOTALPRICE) ELSE 0 END) AS
 "2004",
  SUM(CASE ORDERFACT.YEAR_ID WHEN '2005' THEN (ORDERFACT.TOTALPRICE) ELSE 0 END) AS
 "2005"
FROM
  PRODUCTS INNER JOIN ORDERFACT ON PRODUCTS.PRODUCTCODE = ORDERFACT.PRODUCTCODE
  INNER JOIN CUSTOMER_W_TER ON ORDERFACT.CUSTOMERNUMBER =
 CUSTOMER_W_TER.CUSTOMERNUMBER
GROUP BY
  LINE
ORDER BY
  2 DESC]]></query>
        <live><![CDATA[true]]></live>
      </component-definition>
    </action-definition>

    <action-definition>
      <component-name>OpenFlashChartComponent</component-name>
      <action-type>Generate Chart</action-type>
      <action-inputs>
        <chart-data type="string" mapping="query_result"/>
      </action-inputs>
      <action-resources>
        <chart-attributes type="resource" mapping="chart_definition"/>
      </action-resources>
      <action-outputs>
        <image-tag type="content"/>
      </action-outputs>
      <component-definition/>
    </action-definition>

  </actions>
</action-sequence>
```

Viewing your Chart in the BI Platform

Follow the instructions below to view your chart in the BI Platform.

1. Log on to the Pentaho User Console using the credentials **joe/password**.
2. In the console menu bar, click **Tools** -> **Refresh Repository Cache**.
3. Browse to **Steel Wheels** -> **Charts**
4. Double-click on **Annual Sales by Product Line** to display the chart.



Finding More Information

Congratulations, you have built your first Pentaho flash chart. For detailed information about the Open Flash Chart Component including a list of all supported chart types and sample chart definitions, refer to the Open Flash Chart Component reference.

Troubleshooting

This section contains known problems and solutions relating to the procedures covered in this guide.

Action Sequences That Call PDI Content Won't Run

If you've established an enterprise repository in PDI to store your jobs and transformations, and you attempt to use that stored PDI content in an action sequence on the BA Server, the action sequence will not execute. This is because the BA Server needs specific connection information for the Data Integration (DI) Server in order to retrieve the job or transformation.

Adding PDI Enterprise Repository Content Support to the BA Server

If you are using a Pentaho Data Integration (PDI) enterprise repository (through a Data Integration Server) to store PDI jobs and transformations, and you plan on using those jobs and transformations in action sequences that will be run on the BA Server, you must install some BA Server plugins from the PDI client tool package. This is not a typical scenario, but there is no harm in performing it if you aren't sure of the details.

1. Download a PDI Enterprise Edition 4.4 client tool archive package from the Pentaho Customer Support Portal.

   The package name (available in both tar.gz and zip formats) is: **pdi-ee-client-4.4.0-GA**
2. Unpack the archive to a temporary location.
3. Edit the `/pentaho/server/biserver-ee/pentaho-solutions/system/kettle/settings.xml` file.
4. Change the value of the **<repository.type>** node from **files** to **rdbms**.
5. Enter your enterprise repository connection information in the proper nodes.
6. Enter the location of your local **repositories.xml** file in the **<repositories.xml.file>** node.

   Note: This file is created on your PDI client workstation when you establish a connection to an enterprise repository. Once you have made all of your repository connections on a workstation, copy the **repositories.xml** file to the `~/.kettle/` directory on the BA Server and DI Server machines. If the client tool and servers are all on the same machine, you do not have to copy the file. If you have not yet established any repositories, you will have to revisit this procedure later when your PDI environment is fully configured.
7. Copy the contents of `/data-integration/plugins/` to the `/pentaho/server/biserver-ee/pentaho-solutions/system/kettle/plugins/` directory.

   ```
   cp -r /tmp/data-integration/plugins/* /home/pentaho/pentaho/server/biserver-ee/
   pentaho-solutions/system/kettle/plugins/
   ```
8. Remove the unpacked archive.

   ```
   rm -rf /tmp/data-integration/
   ```

Your BA Server is now configured to run content stored in the DI Server.

Null Pointer Exception When Sharing Result Sets

A null pointer exception error may occur in the Pentaho User Console when you share a relational result set (SQLLookupRule used multiple times) among inputs in a Secure Filter component. The error may be associated with Result Set Type in Pentaho Design Studio. If the **Live Result Set**, is enabled, (this is default behavior), the result set is available one time only; the data for the query is fetched once and cannot be reused. To solve the issue, enable **In-Memory Result Set**; this stores the data in memory so that it can be reused and prevents the error from occurring.