BIRT Chart Interactivity

Functional Specifications

Draft 2: July 26, 2005

Abstract

This document describes the functional specifications of the Chart interactivity features for BIRT 2.0

Document Revisions

Draft	Date	Primary Author(s)	Description of Changes
1	July 21, 2005	David Michonneau	Initial Draft
2	July 26' 2005	David Michonneau	Revised TriggerConditions. Added a new refresh entry in the interactivity menu and actions. Added a new paragraph about the event flow

Contents

1. Introduction

The chart interactivity allows the users to perform different actions on the chart they are viewing.

Each action is mapped to a user gesture, this mapping is called a trigger. These UI gestures can be standard mouse or keyboard events. The Actions can modify the visuals of the chart in different ways, but they can also perform some change at the viewer level, such as redirect to a new page for instance.

Interactivity features depend on the output type, but also on the environment (report/html/birt viewer). The goal is to achieve the best interactivity using SVG inside the HTML BIRT viewer. Other outputs will benefit some interactivity features as well.

2. Use Cases

These use cases are extracted from the Chart interactivity design document of IBM.

2.1 Highlight

A pie chart is displayed in the eclipse workbench. Therefore the chart is rendered in an SWT device. The user has the ability to select a pie slice. When the user select a pie slice the pie slice changes color indicating that it has been selected. Furthermore, property information associated with the pie slice is displayed in the property view.

2.2 Visibility Toggle

A line chart consisting of two datasets is displayed in an html page using the SVG renderer. The user has the ability to select a legend item to toggle the visibility of the associated dataset in the plot area.

2.3 URL redirection

A pie chart is displayed in an html page using the SVG renderer. When the user selects a pie section the browser is redirected to a URL.

2.4 ToolTip

A pie chart is displayed in the eclipse workbench. When the user hovers over a pie section tooltip text is displayed.

3. Triggers

3.1 Overview

Triggers define a mapping between a trigger condition (a UI gesture) and an action. They can be associated with any Chart Block or Serie (see Block.getTriggers() and Series.getTriggers()).

3.2 Trigger Conditions

This table lists all the possible trigger conditions. There are similar to most of the HTML40 intrisic events except that they apply to chart elements and not html elements.

Note that some events such as doubleclick will not work in all renderers/browsers/os. In such case they will simply be ignored.

Name	Description
onclick	Occurs when the pointing device button is clicked over an element
ondblclick	Occurs when the pointing device button is double clicked over an element.
onmousedown	Occurs when the pointing device button is pressed over an element.
onmouseup	Occurs when the pointing device button is released over an element.
onmouseover	Occurs when the pointing device is moved onto an element.
onmousemove	Occurs when the pointing device is moved while it is over an element.
onmouseout	Occurs when the pointing device is moved away from an element.
onfocus	Occurs when an element receives focus either by the pointing device or by tabbing navigation
onblur	Occurs when an element loses focus either by the pointing device or by tabbing navigation
onkeydown	Occurs when a key is pressed down on an element
onkeypress	Occurs when a key is pressed on an element
onkeyup	Occurs when a key is up on an element
onload	Occurs when the chart is loaded in the viewer

Each trigger is associated with any visual component of the chart, called hotspot: that can be a legend item, the chart title, a chart serie, etc… Each hotspot will react to some predefined triggers with one or several actions. Note that this action is not limited to the hotspot it originated.

3.3 Trigger Flow

The trigger flow will follow the W3C DOM specifications event model: http://www.w3.org/TR/2000/REC-DOM-Level-2-Events-20001113/events.html#Events-flow

That is, trigger conditions will be first captured down the target element and then will bubble back up. Any block having registered the same trigger during those two sequences will have the correspond action executed. The TriggerFlow class will define whether it reacts to the capturing or bubbling sequence, the default being the bubbling sequence. It will also allow the propagation sequence to stop in the bubbling phase.

3.3.1 API

A new TriggerFlow class will define three constants:

Capture: the trigger's action will be triggered in the capturing phase

Bubble (default): the trigger's action will be triggered in the bubbling phase

BubbleAndStop: the trigger's action will be triggered in the bubbling phase, and will stop the bubbling flow.

4. Actions

Actions are executed in answer to some trigger events.

4.1 Description

Here are the possible actions:

4.1.1 Show ToolTip

This shows a tooltip on a chart element. It is normally associated with a mouse hover event.

4.1.2 Url Redirect

Only works in an html environment. This redirects the browser to a new url. A possible extension is to redirect the browser to a different page of the report or another report.

4.1.3 Toggle Visibility

This allows to toggle the visibility of one or several series

4.1.4 Invoke Script

This invokes a script inside the viewer. The scripts are written in a language specific to the rendering environment and output type.

4.1.5 Highlight (new)

This highlights a chart element. It is normally associated with a mouse click event.

4.1.6 Zoom (new)

This allows the user to zoom in and out. It is particularly useful for complex charts. The Zoom is done on the whole chart, but can be centered on a particular element.

4.1.7 3D Rotation (new)

This applies to 3D charts and allows a 3D rotation

4.1.8 Refresh (new)

This requests a new chart to be rendered based on the current data. It is a one time refresh, but there is an option to set it as automatic with any time period defined in seconds.

4.2 Support matrix

Not all actions are supported for all outputs and environments. Here is a table summarizing the actions on an output basis.

Output Type/Action	SVG	SWT	Swing	Static image in PDF	Static image in HTML
Url Redirect	✓	✓	✓	✓	✓
Show Tool tip	✓	✓	✓	✓	✓
Toggle Visibility	✓	✓	✓		
Highlight	✓	✓	✓		
Zoom	✓	✓	✓		
3D Rotation	✓	✓	✓		
Refresh	✓	✓	✓		✓
Invoke Script	✓				✓

5. Scripting

When the built-in interactivity features defined by the API are not enough, the user can write his own interactivity script, which is dependent on the output type. This is not to be confused with Chart Scripting which is done at the rendering time.

This release will provide scripting support for SVG (in any svg viewer) and static images (inside a browser)

5.1 SVG Scripting

SVG output supports the ECMAScript language, also known as JavaScript.

An API will be provided to allow the user to manipulate the SVG DOM and access the chart engine on the server.

The capabilities of SVG Scripts allow it to communicate with the chart engine at a specific url through web services. It can also modify the SVG output

5.1.1 SVG JavaScript API

TBD

5.2 Static Images Scripting

It’s possible to write scripts for static images, using JavaScript. An API will be provided to communicate with the chart engine or access other report elements. These scripts can only be used in a javascript-enabled environment.

5.2.1 Static images Script API

TBD

6. Chart Interactivity API

Several classes in the Chart API define the interactivity properties. These properties are then used by each device renderer. Here are the key classes and interfaces to define interactivity at the API level:

6.1 InteractionEvent

The InteractionEvent defines the triggers and action mapping on given hotspots:

public final class **InteractionEvent**
extends PrimitiveRenderEvent
Author:
Actuate Corporation
See Also:
Serialized Form

Field Summary

Fields inherited from class org.eclipse.birt.chart.event.PrimitiveRenderEvent
`DRAW, FILL, iObjIndex`

Constructor Summary

`InteractionEvent``(java.lang.Object source)`

Method Summary

`void`	**`addTrigger`**`(Trigger t)`
`Action`	**`getAction`**`(TriggerCondition tc)`
`PrimitiveRenderEvent`	**`getHotSpot`**`()`
`Trigger[]`	**`getTriggers`**`()`
`void`	**`reuse`**`(java.lang.Object oNewSource)`
`void`	**`setHotSpot`**`(PrimitiveRenderEvent pre)`

6.2 Trigger

public interface **Trigger**

extends org.eclipse.emf.ecore.EObject

A representation of the model object '***Trigger***'. This type defines a Trigger. A trigger defines interactivity for a chart component.

The following features are supported:

- *`Condition`*
- *`Action`*

See Also:

`DataPackage.getTrigger()`

Method Summary

Action	**getAction**() Returns the value of the '***Action***' containment reference.
TriggerCondition	**getCondition**() Returns the value of the '***Condition***' attribute.
boolean	**isSetCondition**() Returns whether the value of the ' *Condition*' attribute is set.
void	**setAction**(Action value) Sets the value of the '*Action*' containment reference.
void	**setCondition**(TriggerCondition value) Sets the value of the '*Condition*' attribute.
Void	**unsetCondition**() Unsets the value of the '*Condition*' attribute.
void	**setFlowReaction**(TriggerFlow flow) Set the trigger flow reaction
TriggerFlow	**getFlowReaction()** Returns the trigger flow reaction

6.3 Action

public interface **Action**
extends org.eclipse.emf.ecore.EObject

A representation of the model object '***Action***'. This type defines an Action. An action is a property defining interactivity for an element. It is associated in a trigger with a trigger condition that defines when the action is to be processed.

The following features are supported:

- *Type*
- *Value*

See Also:
DataPackage.getAction()

Method Summary

ActionType	**getType**() Returns the value of the '***Type***' attribute.
ActionValue	**getValue**() Returns the value of the '***Value***' containment reference.
boolean	**isSetType**() Returns whether the value of the '*Type*' attribute is set.

void	**setType**(ActionType value) Sets the value of the '*Type*' attribute.
void	**setValue**(ActionValue value) Sets the value of the '*Value*' containment reference.
void	**unsetType**() Unsets the value of the '*Type*' attribute.

7. BIRT HTML Viewer Interactivity

7.1 Browser Requirements

Full interactivity will only be available when the user is using a SVG and JavaScript enabled browser. The Chart full interactivity will be available on IE6+ with Adobe SVG Plugin or Firefox 1.1.

7.2 Automatic SVG support detection

The report will automatically show SVG content if the browser supports it, otherwise it will use a static image of the chart, with limited interactivity.

8. Built-in Interactivity

BIRT will provide default built-in interactivity for the Chart, in addition to what the user defines. This section describes what is this default interactivity.

8.1 Top Menu

A menu bar will be displayed over the chart to allow several actions on the chart. Here is a short tree describing the Menu structure:

- Chart Type
  - Bar
    - Side by Side
    - Stack
    - Stack Percent
  - Line
    - Side by Side
    - Stack
    - Stack Percent
  - Area
  - Pie
  - Stock

    - Scatter
- Refresh
    - Refresh Chart Now
    - Automatic Refresh
        - Off
        - 5s
        - 10s
        - 30s
        - 1min
        - 5min
- Zoom
    - Zoom in
    - Zoom out
- Visibility
    - Hide serie on selection (default)
    - Highlight serie on selection

8.1.1 Mockup

TBD

8.2 Chart Types

The top menu will allow to change the type of the chart. It will ask the chart engine to regenerate it.

8.3 3D Rotation

3D Charts can be rotated on any 3D axis by clicking on any part of the chart and holding the mouse button while moving the mouse.

8.4 Refresh

The refresh menu will request an updated chart based on the current data. This can be set as automatic for predefined amounts of time.

8.5 Zoom

The zoom can be accessed through the top menu

8.6 Visibility

There are exclusive choices

8.6.1 Hide serie on selection

Clicking on a legend item or serie will hide/show the corresponding serie

8.6.2 Highlight serie on selection

Clicking on a legend item or serie will highlight the corresponding serie.

9. Chart Builder

The Chart builder will have an additional tab for interactivity settings.

TBD