BIRT Report Object Model – Textual Elements

Functional Specification

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Abstract

The BIRT Text element is a powerful tool for including formatted text within a report. Text can be in HTML or RTF as well as plain text. Text can include embedded expressions.

Document Revisions

Version	Date	Description of Changes
Draft 1	11/29/2004	First BIRT release.
Draft 2	03/01/2005	Several minor corrections Updates on Processing Text-related elements Updated Pseudo selector supports
Draft 3	04/10/2005	Added Page Number Element
Draft4	05/04/2005	Moved section on Html formatting from ROM Style Spec.doc to this document.

Contents

1. Introduction

Reports present information in both graphical (charts) and textual formats. This specification describes the textual options.

Because text is so important within a report, ROM provides four distinct textual elements, each designed to solve a particular reporting problem. These elements are:

- Label: displays a short bit of text and often appears as a table header, as a label of a data value, and so on. The text cannot contain internal formatting.
- Data: displays a single data value from a data set, from an expression, and so on. An optional format string determines how date and numeric values appear when displayed.
- Text: displays longer textual passages. It can contain internal formatting in HTML, and can contain embedded data values. A text element is often used to create report titles, disclaimers, form letters, explanations and similar content.
- Multi-line data: Displays one data value, but that value can contain internal formatting specified using either HTML or Rich Text Format (RTF).

The following table shows the categorization of the four textual report items:

Source of Text	Text Size	
	Short	**Multi-line**
Report Design	Label	Text
Data set	Data	Multi-Line Data

Labels and data items are often used in tables, grids and free-form layouts. Text and multi-line data items are often used to create entire paragraphs within a report.

1.1 Terminology

- Rich Text Format (“RTF”) – A format defined by Microsoft for text markup. RTF is recognized by Microsoft Word and many other applications.
- HTML – As used here, HTML refers to a subset of the HTML 4 specification.
- Cascading Style Sheets (CSS) – CSS works in conjunction with HTML to provide advanced style settings.

1.2 Multi-line Items: Text and Multi-Line Data

While many reports present simple tabular lists of data, others need to display data as part of a document. Typical examples are form letters, promotional messages, contracts, and so on. Often such text is formatted with specific paragraph breaks, fonts, highlights, etc.

BIRT provides two kinds of text elements for this purpose. Both present a block of text. The text can contain formatting. The two text items are:

- Text item: the user provides the text, which can be localized.

- Multi-line data: the text comes from a file, a data set, or an expression.

Both items display formatted text in multiple lines. The key difference between them is the source of the text. Text for the text item is created by the developer as part of the report design, while the text for the multi-line data item is read from a data set.

The text item is often used to create report content such as headers, explanations, and standard paragraphs. The multi-line data is used when the text itself is defined outside the report; perhaps in the form of a standard disclaimer provided by the Legal department, a monthly promotional message provided by Marketing, and a product description stored in the database.

What the two items have in common is the ability to format the text using HTML for the text item, and RTF or HTML for the multi-line data item. Text often has first-line formatting such as the typical first line, subsequent line, and right indent options available in CSS.

Think of the multi-line items as tools for displaying paragraphs of text: the goal is for the block of text to flow smoothly together, perhaps as a series of centered lines, perhaps as indented paragraphs and so on.

When using HTML formatting, hyperlinks can appear within the text using the HTML <a> tag. The hyperlinks work in output formats that support links.

1.2.1 Inserting Data into Text Item

Reports often find the need to insert data into a block of text. For example, a report heading may want to display report parameters within a block of centered text:

Monthly Sales Summary

For Month of January

Run by Charles Babbage

Or, a report may wish to create a form letter:

> Dear Mr. Boole,
>
> Thank you for your interest in our Model 200 Differential Engine. You'll be pleased to know that our sales representative in your area, Ada Lovelace, will contact you shortly.

The Text item (not Multi-line data) provides comprehensive support for this feature. This feature is often called "Mail Merge" in word processing programs.

1.3 Short-text Items: Label and Data

Short-text items are ideal for text displayed in a grid, a table, or in a form-like layout with label & data pairs. The label and data items are meant to be part of a larger structure. Labels display static text. Data items display the value of a column or expression.

The data item displays a simple value that can be a number, date or string. The data item provides options to format that data using a format string. A multi-line data item always displays blocks of text, with optional embedded text formatting in HTML or RTF.

The label item displays a simple bit of text and cannot contain formatting, but the text item can.

Short-text items have no first-line formatting applied. For example, if the report style sheet establishes a quarter-inch indent for the first line in a paragraph, that formatting applies only to multi-line data items, not to the short text items (label and data).

1.4 Localizing Text

BIRT allows the developer to localize text within a Label or Text element. If a report is to appear in only one language, the developer simply enters the text directly into the element. However, if the report is to be translated, then the developer can instead supply a *resource key*. The key allows the text to be *externalized* into a *resource bundle*. The resource bundle provides distinct translations based on the viewer's *locale*. Externalization is the process of moving user-visible strings into a resource bundle. Localization is the process of providing translations of these strings.

Externalization applies only to those elements for which the user enters text: Label and Text items. It does not apply to the items that obtain their values from a data set: Data and Multi-line Data items.

See sections elsewhere in the ROM specs for additional detail on this process.

1.5 Style

A wide range of style options control the appearance of text in a report. BIRT uses the CSS style system to define fonts, font sizes, colors, underlining, and other effects. As you review the four textual items, you'll see that none of them list style properties. Instead, like all BIRT report items, the textual items include all the BIRT style properties automatically. For example, each textual item has a font family, font size, color, background color and other properties. See the *ROM Style Specification* for the list of available style properties.

There are three main ways to control the style properties:

- Using the pre-defined style for each element, the slot in which the element appears, for the entire report and so on.
- Explicitly assigning a shared style name to the item.
- Explicitly setting the value of the style property for the item.

Using an implicit style makes it easy to give the entire report a consistent look with very little work. Use an explicit style for special cases such as when you want to call the user's attention to a specific item. Set individual style properties on an item when that item has unique requirements.

While style settings provide display control at the item level, finer control of text appearance is achieved using HTML and RTF tags (for Multi-line items). For example, if a text item contains HTML string "This is a piece of bold text", the word bold will be displayed in bold face.

1.5.1 First-Line and First-Letter Style

You can control the first line and first letter style of a multi-line textual item. Use this effect to indent lines, apply special formatting to the first letter or line, and so on. For example:

First letter style lets you adjust the appearance of the first letter. First line formatting allows you to display the first line of this paragraph in red color.

BIRT uses the CSS pseudo selectors for specifying the first-line and first-letter effects. See ROM Styles spec for more detail on pseudo styles. The `:first-line` style name suffix selects the first line, and the `:first-letter` suffix selects the fist letter. To achieve the above effect for a Text item, you can define the following styles:

- `text`, the built-in style for text elements, gives the formatting to apply to the paragraph as a whole.
- `text:first-line` gives the formatting to apply to the first line. In this case, the red color.
- `text:first-letter` gives the formatting to apply to the first letter, in this case, a larger font and bold.

You could also use a custom style. For example, if you only want selected text to have the above effect, create styles called `my-text`, `my-text:first-line` and `my-text:fist-letter`. Then, set the style property of your text item to `my-text`. Even though you don't set the text item to use the suffix, BIRT will automatically apply them as needed.

The indentation of a text line is controlled by a regular style property text-indent and does not involve the use of pseudo selectors.

First-line and first-letter formatting applies only to multi-line text items (Text and Multi-line Data), but not to the short text items (Label and Data.) Such a feature is not available in the first release of BIRT.

1.5.2 Link Style

BIRT also allows you to apply special formatting to hyperlinks. BIRT again follows the CSS system and uses the :link, :active, :hover, and :visited suffixes. In HTML, these effects apply only when the web browser supports them. In other formats, the :link format applies, but not the :visited format. You could add to the `my-text` style above to apply link formatting only to items that have that style. Define `my-text:link`, `my-text:visited`, `my-text:hover` and `my-text:active`. Again, you don't set these styles on the element explicitly, BIRT applies them implicitly.

Pseudo link styles are not supported in the first BIRT release.

1.6 Summary of Textual Elements

The following table summarizes the features, capabilities and purposes of the four BIRT textual report items:

	Label	Text	Data	Multi-line Data
Source	Static Text	Static text, but allows embedded expression	Value-Expression	
Localizable		Yes	No	

	Label	Text	Data	Multi-line Data
Multi-/Single-Line	Single[1]	Multi	Single[1]	Multi
Mail Merge	No	Yes	No	No
Purpose	Fixed String	Headers, explanations, standard-paragraphs.	Database column	Long text created outside the current document and stored in DB
Settable at Runtime	No	No	Yes	Yes
Visual Format	No	HTML	No	HTML/RTF
Data Format	String	String	String/Number/Date	String
Visual Format for *value-of*	N/A	HTML	N/A	N/A
Data Format for *value-of*		String/Number/Data		
Content-Type	N/A	Plain/HTML	N/A	Plain/HTML/RTF
Embedded Hyperlink	No	Yes	No	Yes
Action	Yes	No	Yes	No
Help Text				

1. Text string may still wrap if it is too long.

1.7 References

- Cascading Style Sheets, level 1, W3C Recommendation 17 Dec 1996, revised 11 Jan 1999, http://www.w3c.org/TR/CSS1. Provides description of the text formatting model
- Rich Text Format (RTF) Specification, RTF Version 1.7, 8/2001, from Microsoft. Available from the MSDN web site.

2. Short Text Items

As noted above, Label and Data both display short bits of text without internal formatting. Label displays static text, while Data displays information from the data set, from parameters, from an expression, and so on.

3. Multi-line Textual Items

The text item allows the developer to provide the text as part of the report design. The text can be localized. Text can be in HTML or plain text format. HTML text can contain placeholders for data and expressions. The Multi-line Data item, on the other hand, displays text obtained from a data set, from a file, from an expression and so on. The Multi-line Data item allow optional formatting in either HTML or RTF.

3.1 Multi-Line Data Item

Summary

Base element: Report Item

Availability: First release

XML Element Name: `multi-line-data`

Predefined Style Name: `text`

Properties

`value`

An expression that provides the text.

`contentType`

An optional expression that defines the type of text.

Description

The multi-line data item displays blocks of text retrieved from the database, from a file, or from an expression. The text can be plain text, HTML or RTF. The format of the text can be fixed at design time, or can be dynamically selected at run time to match the format of the incoming text.

The user can search text within the multi-line data item.

See Also

Text Item element

Data Item element

Style element, especially the Font and Text properties.

ROM Scripting Specification for information on expressions.

HTML Support section below.

Embedded Expressions section below.

Plain Text Support section below.

RTF Support section below.

3.1.1 `value` Property

Expression that returns the text to display.

Summary

Display Name: Value Expression

ROM Type: Expression

Expression Type: String

JavaScript Type: String

Default value: None

Inherited: Yes

Settable at runtime: Yes

Availability: First release

Description

The value expression provides the text to display. The expression is most often simply a reference to a query column. But, it can also reference a report parameter, a formula, a special value, a file, or other data item.

See Also

`contentType` property

3.1.2 `contentType` Property

The formatting within the text: HTML or plain text.

Summary

Display Name: Content Type

ROM Type: Choice

JavaScript Type: String

Default value: auto

Inherited: Yes

Settable at runtime: No

Availability: First release

Choices

Display Name	Internal Name	Description
Auto	Auto	BIRT will infer the format as explained below.
Plain Text	Plain	Plain text with no formatting.
HTML	Html	Formatting using a subset of HTML tags.
RTF	Rtf	Microsoft Rich Text Format encoding.

Description

The user can explicitly identify the format of the text using the Content Type property. Or, the user can set the property to “auto”, (or omit the property) and BIRT will infer the format from the text itself.

BIRT determines the text format by examining the first few characters of the string. If the first characters are “<HTML>” (in either upper case or lower case), then the string is

assumed to be HTML. If the first characters are “\rtf”, then BIRT assumes that the text is formatted in RTF. Otherwise, the text is plain text. Any white space before these characters is ignored. That is, “<html>” and “ <html>” are both taken to indicate that the text is formatted in HTML.

4. HTML Support

The Text and Multi-line Data items provide comprehensive HTML support. HTML is a rich specification. BIRT supports a subset of features. In the web environment, BIRT may pass the formatting to the web browser for processing, so support is browser-specific. In the commercial product, BIRT itself will process the formatting.

HTML text is identified with the “<HTML>” starting element. This, and other elements, are case insensitive. The HTML text should not contain the <HEAD> HTML section. The <BODY> tag is optional.

Example:

```
{ <HTML>
   { <BODY> } }
         This <i>is</i> an example.
   { { </BODY> }
{ </HTML> }
```

In the above, items in curly-brackets are optional.

If the user sets the Content Type property to HTML, then the user can omit the <HTML> tags:

```
This <i>is</i> an example.
```

4.1 Supported Elements

The following table identifies those HTML 3.2 elements that fit into the context of the Text element. The actual set of supported elements depends on the UI and Presentation Engine in use.

Tag	Description	Priority
<!-- … -->	Comment. Contents of the comment are ignored.	Med.
<A>	Anchor	High
<B>	Bold text.	High
<BODY>	Body element. Ignored.	Low
 	Line break.	High
<CENTER>	Centers text. Deprecated in HTML 4. But, kept for convenience and compatibility with older HTML.	High
<CODE>	Computer code fragment	Low
<DD>	Definition description	Low
<DEL>	Deleted text	Low

Tag	Description	Priority
<DIV>	Generic language/style container	Med
<DL>	Definition list	Low
<DT>	Definition term	Low
<FONT>	Sets font attributes. Deprecated in HTML 4. But, kept for convenience and compatibility with older HTML.	Med
<EM>	Emphasis.	Med
<HEAD>	Ignored except for the STYLE section.	Low
<H*n*>	Heading level	Low
<HTML>	Marks the text as HTML.	High
<I>	Specifies italicized text. Deprecated in HTML 4. But, kept for convenience and compatibility with older HTML.	High
<IMAGE>	BIRT-specific variant of the image tag that allows referring to images in a data source or embedded in the report design.	High
<IMG>	Standard HTML image reference (via a URI)	High
<INS>	Inserted text	Low
<LI>	List item.	Med
<OL>	Ordered list.	Med
<PRE>	Block of fixed-width text. The text truncates if it is wider than the dynamic text control. The text does not wrap.	High
<P>	Paragraph.	High
<SPAN>	Generic language/style container	High
<STRONG>	Strong emphasis	Med
<SUB>	Subscript	Med
<SUP>	Superscript	Med
<TITLE>	Ignored.	Low
<UL>	Unordered list.	Med
<TT>	Teletype or mono-spaced text style	Low
<U>	Underline. Deprecated in HTML 4. But, kept for convenience and compatibility with older HTML.	High
&*sym*	Replaced with the symbol defined in HTML 4 specification, section 24 Character entity references in HTML 4	High

Tag	Description	Priority
&#*D*	where D is a decimal number, refers to the ISO 10646 (Unicode) decimal character number D. As defined in the HTML 4 specification, section 5.3.1: “Numeric character references”.	High
&#x*H* &#X*H*	where H is a hexadecimal number, refers to the ISO 10646 hexadecimal character number H. Hexadecimal numbers in numeric character references are case-insensitive. As defined in the HTML 4 specification, section 5.3.1: “Numeric character references”.	High

4.1.1 HTML 4.0 Compatibility

Early versions of HTML included elements such as <FONT>, <B> (bold), <I> (italic), and <U> (underline) to control formatting. HTML 3.2 and 4.0 deprecated these elements in favor of the more general CSS style support. The following are the equivalent HTML and CSS style settings:

Old-Style HTML	HTML and CSS
<B>	<SPAN style=”font-weight: bold”>
<CENTER>	<DIV style=”text-align: center”>
<FONT	<SPAN
color=”*color*”	style=”color: *color*”
face=”*name*”	style=”font-family: *name*”
size=”*size*”	style=”font-size: *size*”
<I>	<SPAN style=”font-style: italic”>
<U>	<SPAN style=”text-decoration: underline”>

The CSS items are, in general, more powerful and flexible than the old HTML elements. Further, the CSS items can be applied to any element, not just the <SPAN> element shown. However, for quick formatting, the HTML style is concise, easy-to-remember and convenient. This is why BIRT supports the old-style HTML elements.

BIRT formatters may translate the HTML syntax to the HTML/CSS syntax for user agents that do not support the old syntax. Further, the user can use custom style sheets to customize the meaning of the <B>, <I> and <U> elements.

4.2 Formatting

When shown in the browser, the Text and Multi-line Data item are part of the BIRT-created HTML document containment hierarchy. The HTML/CSS style information in effect at the start of the text element is that defined by BIRT’s style inheritance rules. Specifically, in order of priority of a style property is:

- Set on the text item itself.
- Style properties inherited from a base element.
- Style properties inherited from a named style.

See the *ROM Styles Specification* for details. The report can then override these styles using CSS information within the HTML as described below.

4.3 Style Information

The features described below are “nice-to-have” for the text item, but will not be provided in the first release of BIRT. Indeed, the complexity of merging customer-defined and BIRT-defined styles may prevent BIRT from ever fully supporting the feature in this subsection. We leave it here for completeness.

4.3.1 External Style Information

HTML text can define CSS styles. BIRT copies the style information into the each HTML file that BIRT creates. The following rules apply:

- The style element can contain a reference to an external CSS style sheet. This is the preferred solution. If multiple HTML elements refer to the same style sheet, BIRT will ensure that the generated HTML file lists the external file reference only once.
- BIRT concatenates the style definitions from each text element onto the set of styles defined for an HTML page.
- If two elements define conflicting styles, the resulting behavior is undefined. The style used by the browser may be browser-specific, and may be determined by the undefined order that the duplicate styles appear in the generated HTML.
- User-defined styles appear before BIRT-generated styles. If a user style happens to duplicate a BIRT-generated style, the BIRT style will usually win, though actual behavior is undefined.
- BIRT computes the set of styles and file includes from the Static Text attribute of the text element. If a localized value defines different styles, then these styles *will not* appear in the generated HTML.

A typical use case is to create a CSS page to customize, say, a form letter. The text element includes the form letter text, and references the external CSS style sheet.

For example:

```
<HTML>
   <HEAD>
      <STYLE TYPE="text/css">
         @import url(http://style.com/basic);
         p.formLetter { color: blue }
      </STYLE>
   </HEAD>
   <BODY>
   <p class=”formLetter”>Dear Sir, …
   </BODY>
</HTML>
```

The above imports a style sheet, and creates a paragraph style class that is then used inside the HTML content.

4.3.2 In-line Style

Another, simpler, approach is to specify the style information in-line in the HTML:

```
<HTML>
   <p style="color: blue">Dear Sir, …
</HTML>
```

The drawback, of course, is that the style information must be repeated. Still, it is a good solution for short bits of HTML.

4.3.3 Overall Style

To apply a style to the entire HTML section, create a <DIV> that holds the style:

```
<HTML>
   <DIV style="color: blue; font-size: 11">
         Sample text that will appear in 11-point blue text
   </DIV>
</HTML>
```

The above could also be done by defining a style (`div.myStyle`) and referencing it from the `<DIV>` element (`<DIV style="myStyle">`).

4.4 Character Encoding

BIRT designs are in Unicode. All static text is also in Unicode. For this reason, BIRT ignores any HTML character encoding information ("charset=*xxxx*") that appears in the static HTML text.

The character encoding of database data is defined by the database interface. BIRT converts the data to Unicode when reading the data. Therefore, the character encoding information is ignored for expressions as well.

The user is responsible for creating HTML in Unicode. If the user has existing HTML that is to be used with a report, the user must convert that text to Unicode.

4.5 Syntax Rules

The following are syntax rules for HTML in the Text element:

- Even though the HTML is embedded in an XML file, the HTML text itself follows the HTML syntax rules, not the XML rules.
- The HTML must satisfy syntax rules as defined in the HTML 4.0 specification.
- End tags are optional, when marked as such in the HTML 4.0 specification.
- If an end tag is omitted, an implicit end tag is assumed at the end of the HTML text block. For example, the following text:

  ```
  <b>this is bold text
  ```

  Is treated internally as if the HTML were:

  ```
  <b>this is bold text</b>
  ```

- Elements and attribute names are case-insensitive.
,
 and
 are equivalent.

4.5.1 Unsupported Tags and Parameters

HTML tags that are not supported will be treated as white-space. HTML parameters that are not supported will be ignored. For example, the following HTML-tagged text:

```
<table width="100%" border="0" cellspacing="4">
  <tr>
    <td align="center">Call for</td>
  </tr>
  <tr>
    <td align="center">special pricing.</td>
  </tr>
</table>
<p style="color: red;">Offer ends next month!</p>
```

will be rendered like this:

Call for special pricing. Offer ends next month!

because the “table”, “tr” and “td” tags, and the “style” parameter will not be supported.

Unsupported tags will not cause a text chunk break.

4.5.2 Malformed HTML

With the exceptions of the relaxations from the standard described above, malformed HTML (for example, incorrectly nested tags) may not be rendered as the user might expect. However, the dynamic text control will not actually generate an error when it encounters malformed HTML. In other words, the behavior will be the same as that of a Web browser – the dynamic text control will make the best attempt it can to interpret whatever it encounters.

4.6 Embedded and Computed Images

A Text element (but not multi-line data element) with HTML formatting can also refer to an image embedded within the design file, or obtained from a data set. The HTML <IMG> tag already provides the ability to reference an image by URL. The ROM-defined <IMAGE> tag provides access to the other two types of images that the Image item supports.

The <IMAGE> element supports all the attributes of the HTML <IMG> tag except for the “src” element.

To reference an image embedded within the report design, use the “name” attribute:

```
<IMAGE name=”logo”/>
```

To reference an image obtained from an expression, use the “type” attribute with the value of “expr”:

```
<IMAGE type=”expr”>customer.photo</IMAGE>
```

The other valid value for “type” is “embedded”, which is the default.

4.6.1 Runtime Behavior

The behavior of the <IMAGE> tag is as follows, assuming output format is HTML:

- BIRT replaces the ROM-specific syntax with the equivalent HTML syntax:
- The IMAGE tag is replaced with IMG.
- The name="*image*" element is replaced by src="*link*" where *link* is a URL reference to obtain the embedded image.
- The type="expr">*expr*</IMAGE> content is replaced by src="*link*" where *link* is a URL reference to obtain the computed image.

The URLs created are identical to those created by the Image element.

Semantics for other output formats is similar to the HTML behavior.

5. Embedded Expressions

The text item (but not the multi-line data item) formatted with HTML allows the developer to insert expression values within the text. Expression values are results of evaluating expressions enclosed in "value-of" tags. The expression is any valid BIRT expression. Expressions can appear within HTML text, but not plain text.

For example:

```
Constant: <value-of>10</value-of> <br>
Parameter: <value-of>params.MyParam</value-of> <br>
Column: <value-of>row.CustomerName</value-of>
```

The expression can also contain any valid BIRT script or expression as described elsewhere.

5.1 Expression Value

The value-of tag identifies a value to insert into the text for a Text element. The value-of tag contains the expression to evaluate to obtain the data. Value-of tags cannot be inserted into text returned from the value expression property (i.e., it can not be used with data and multi-line data items).

For example:

```
Dear <value-of>
if [Sex] = "M" then "Mr."
else if [Sex] = "F" then "Ms."
</value-of> <value-of>row.firstName</value-of>
<value-of>row.lastName</value-of >,
<p>
<b>Thank you</b> for your purchase of an exciting new
<value-of> row.productName</value-of > on
<value-of> row.purchaseDate</value-of>.
```

The above shows that the value-of tag can encapsulate either a simple value/expression, or a script.

5.2 Expressions that Return HTML

The user can create highly formatted text when the content type is HTML by writing an expression that generates HTML:

```
<value-of format="html">
   String value;
```

```
    if ( row.customer_balance < 0 )
          value = "<span style=\"red\"";
    value += format( row.customer_balance, "(##,###.##") );
    if ( row.customer_balance < 0 )
          value += "</span>";
    value;
</value-of>
```

In this case, the "value-of" element is somewhat like the <script> element in HTML. The difference is that the last value mentioned in the script is the "return" value of the script.

Note that the special "format='html'" attribute is required so that BIRT treats the above text as HTML instead of as a literal string.

HTML created in this way must follow certain rules:

- Cannot include additional "<value-of>" elements.
- Elements started in the value should complete in the value.
- The HTML must include only the subset of HTML supported by the Text element.

5.3 Formatting

The "format" attribute of the "value-of" element provides a BIRT format string appropriate to the type of the value. For example:

```
Your order shipped on
<value-of format="yyyy-mm-dd">row.ShipDate</value-of>. The total
amount was <value-of format="$###,###.##">row.OrderAmount</value-of>.
```

The allowed formatting strings are those described for the Format property in the ROM Styles specification.

If no format attribute is supplied, BIRT will use the formatting that applies to the Text element as a whole using the standard style property search as described in the Styles spec. That is, the rules for the style for a value-of element are the following:

- The format string, if any, that is provided for that value-of element.
- Otherwise, determine the type of the expression (date, number or string). Use the style search algorithm to find the corresponding format string as specified in the style.

This algorithm ensures that value-of expressions use the formatting in effect for the Text element, but can be overridden on a value-by-value basis if needed.

5.3.1 HTML Formatting

In addition, the special format "html" identifies the data item as raw HTML, processed according to the description above. Note that the "html" format is available only in Text items with a content type of HTML. (The content type can be set using the Content Type property, or detected automatically from the text itself.). In addition the BIRT-defined "HTML" format has special meaning for strings. This format treats the string as a literal HTML value to be included in the web page. By default, and with all other formats, BIRT will encode the string value so that it appears correctly in HTML. If the format is "HTML", this escaping is not done, and the value can contain HTML. This is most useful for inserting custom HTML into a <value-of> element in a Text element.

5.3.2 Automatic Formatting

The special format “auto” identifies that BIRT should infer the format based the rules explained below. The “auto” value is a convenience for the GUI: it allows the format attribute to appear in the <value-of> tag, even when it does nothing.

The following:

```
<value-of format=”auto”>row.myColumn</value-of>
```

Is equivalent to:

```
<value-of>row.myColumn</value-of>
```

5.3.3 Default Formats

If the user does not define a format, then BIRT applies a default format according to the following rules:

Type or Value	Default Formatting
Java null or database NULL	Value is an empty string (blank)
String	The string itself. BIRT escapes all special characters in the string.
Number	Standard Java formatting with locale-specific decimal separator.
Date	Locale-specific “General Date” format.

5.4 Values with Externalized Text

Users can externalize their text. The actual text is known only at run time. However, it is necessary for the Factory to obtain any columns required by the expression. To ensure that all columns are available, the developer should provide a default text that includes references to all needed columns.

6. Plain Text Support

Plain text will contain no formatting characters. Plain text cannot contain <value-of> tags for inserted values. (To create plain text with value-of tags, simply set the content type to HTML.)

Plain text can contain control codes. The Text element supports the following control codes:

Control Code	Meaning	HTML Equivalent
Space	Non-breaking space. That is, spaces are preserved in the output. This is in contrast to HTML where consecutive spaces are suppressed.	
CR, LF or CR/LF	Paragraph break	<p>
Tab	Single space	Space
Other	Ignored	

Text itself is encoded in UTF-8 within the design file and in Unicode within the browser. Plain text does now allow character escapes or other formatting.

If the user wishes to show literal HTML or RTF (perhaps for debugging), the user can set the Content Type property to “Plain”. This will force BIRT to treat the text as plain text, even if it starts with an HTML or RTF marker.

For example:

```
<HTML>This looks like HTML, but will show as plain text if Content
Type is set to Plain.</HTML>
```

And:

```
\RTF This looks like RTF, but will show as plain text if Content Type
is set to Plain.
```

7. RTF Support

The Text element will support a subset of the RTF 1.7 standard. For detailed information about RTF syntax, please refer to that standard available on the MSDN subscription site.

The typical use case for RTF support is to retrieve the RTF from a file or data source. The BIRT will probably not provide an RTF editor (at least in early releases.) Hence, the Text element is designed to process an entire RTF file, including header.

RTF must start with “\rtf” as the first few characters.

7.1 Terminology

This section uses the term “tag” to mean what the RTF specification calls a “control word”.

7.2 Character Encoding

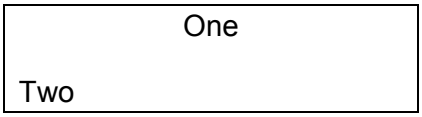
Character encoding information (“\ansi” and “\ansicpg*N*”) is ignored. This is because all characters in the tagged text is converted to UCS-2 automatically as they are read from the data source. The Text element follows the RTF Unicode standards introduced in RTF 1.7.

7.3 Groups

The use of braces ("{ … }") to denote groups is supported. In particular, the use of groups to indicate default paragraph formatting is supported. For example:

```
{\rtf1\qc One\par\pard Two}
```

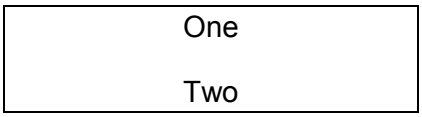
will render as:



because the paragraph break resets the text alignment, but:

```
{\rtf1\qc{One\par\pard Two}}
```

will render as:



because the two paragraphs are grouped within braces, and the text alignment is applied to the whole group.

Braces are often used to provide localized character formatting. For example:

```
{\rtf1\ul One {\plain\i Two} Three}
```

will render as:

7.4 Supported Structural and Definition Tags

The following RTF structural and definition tags are supported:

Tag	Behavior
\rtf	Marks the text as RTF.
*	Extended feature group indicator – the contents of groups identified in this way are ignored.
\blue*N*	Blue value within color table.
\colortbl	Color table.
\deftab*N*	Default tab spacing. *N* is the spacing in twips.
\fonttbl	Font table.
\green*N*	Green value within color table.

Tag	Behavior
\red*N*	Red value within color table.
\rtf*N*	Indicates RTF dynamic text. *N* indicates the major RTF version number. The value of *N* must be “1”.
\uc*N*	Specifies the number of plaintext characters following a “\u*N*” tag.

The unit “twip” refers to a 1/20 of a point, or 1/1440 of an inch.

7.5 Supported Paragraph Formatting Tags

The following RTF paragraph formatting tags are supported:

Tag	Behavior
\fi*N*	First line left indent. *N* indicates the indent in twips. Note that “\fi” is additive with “\li”, and *N* may be negative. For example, “\li1440\fi-720” makes the first line indented 0.5" and remaining lines indented 1.0".
\li*N*	Left indent. *N* indicates the indent in twips.
\pard	Reset all paragraph formatting attributes.
\qc	Centre text.
\ql	Left-align text.
\qr	Right-align text.
\ri*N*	Right indent. *N* indicates the indent in twips.
\sa*N*	Vertical space after the paragraph. *N* indicates the space in twips.
\sb*N*	Vertical space before the paragraph. *N* indicates the space in twips.
\sl*N*	Vertical line spacing. In simple terms, *N* indicates the total line height in twips (but please refer to the RTF specification for a full definition of the behavior of this tag). *Note that the value of N appears to be scaled such that 240 is “single” spacing; the RTF specification does not explain this.*
\slmult*N*	Vertical line spacing multiplier. *N* indicates the multiplication type (but please refer to the RTF specification for a full definition of the behavior of this tag).
\tx*N*	Set tab stop. *N* indicates the tab stop position in twips.

7.6 Supported Character Formatting Tags

The following RTF character formatting tags are supported:

Tag	Behavior
\b	Start bold text.
\b0	End bold text.
\cf*N*	Color number. *N* indicates the color number within the color table.
\f*N*	Font number. *N* indicates the font number within the font table.
\fs*N*	Font size. *N* indicates the font size in half points. Since AFC does not recognize fractional font sizes, half point sizes will be truncated to integers. For example \fs21 indicates font size 10.5pt; this will be truncated to 10pt.
\i	Start italic text.
\i0	End italic text.
\plain	End all character attributes (bold, font, italic, etc.)
\ul	Start underline.
\ul0	End underline.

7.7 Supported Special Characters

The Text element recognizes any Unicode character encoded in the standard RTF form "\u*n*" (*"n"* is the decimal Unicode value of the character).

The Text element recognizes any character encoded in the standard RTF form "\'*xx*", where *"xx"* is the 2-digit hex value of the character. The value] is treated as a Unicode value, regardless of the original document encoding.

In either case, it is possible that the specified character will not exist in the requested font; when this occurs, the "null" symbol ("□", hex value 0x7f) is used. Note that the representation of undefined characters is CSS UA (browser) specific in the web environment, but is controlled by BIRT when printing.

The following RTF special character tags are supported:

Character	Unicode	Tag	Meaning
		\par	Paragraph break.
		\<*LF*>	Paragraph break (<*LF*> is ASCII 10).
		\<*CR*>	Paragraph break (<*CR*> is ASCII 13).
		\line	Line break.
		\tab	Move to next tab stop.

Character	Unicode	Tag	Meaning
		<*TAB*>	Move to next tab stop (<*TAB*> is ASCII 8).
		\emspace	Non-breaking space equal in width to an “m”.
		\enspace	Non-breaking space equal in width to an “n”.
\	\u92	\\	Backslash.
{	\u123	\{	Left curly brace.
}	\u125	\}	Right curly brace.
‘	\u145	\lquote	Left single quote.
’	\u146	\rquote	Right single quote.
“	\u147	\ldblquote	Left double quote.
”	\u148	\rdblquote	Right double quote.
•	\u149	\bullet	Bullet symbol.
–	\u150	\endash	En-dash.
—	\u151	\emdash	Em-dash.
	\u160	\~	Non-breaking space.
		_	Non-breaking hyphen.

7.8 Bulleted and Numbered Lists

Correctly formatted RTF contains simple textual representations of bulleted and numbered lists. The Text element uses these textual representations, and hence does not need to understand the complex RTF tags that describe list formatting rules for editing purposes.

7.9 Matching and Nesting Tags

RTF does not require that tags match. For example, the following RTF is valid, even though there is no start bold tag, nor any finish italic tag:

```
{\rtf1\b0\i italic}
```

It follows from the above that RTF does not require nesting of tags. For example, the following RTF (with overlapped character formats) is valid:

```
{\rtf1\b bold \i bold & italic\b0  italic\i0}
```

7.10 Unsupported Tags

RTF tags that are not supported are silently ignored. The exact behavior will be as described in the RTF standard.

7.11 Relaxations from Standard RTF

The following relaxations from standard RTF are desirable; however it may not be possible to implement any or all of them:

- The outermost braces may be omitted.
- The "\rtf" tag may be omitted.
- The numeric value of the "\rtf" tag may be omitted.
- There will be no requirement for any character set tags to be present. If any character set tags are present, they will be ignored.
- The "\deff" tag will not be required. If it is absent, the default font will be that defined by the dynamic text control's *Font* property.

7.12 Malformed RTF

If the Text element encounters malformed RTF that it is unable to handle, it will fail with an runtime error.

7.13 Compatibility with Other RTF-Aware Applications

While RTF text rendered in the Text element should normally appear similar to the same RTF text rendered by another RTF-aware applications, this will not be guaranteed. Discrepancies between how any particular piece of RTF text is rendered in the Text element and in, for example, WordPad will not automatically be defined to be defects. In particular, rendering of formatting on the Web will be influenced by CSS User Agent (browser) settings and limitations.

7.14 Embedded Expressions

The RTF text can contain embedded expressions as discussed below. Such expressions cannot include RTF formatting. In the rare case in which the user wants to include "<value-of>" as literal text, the user can do so in one of two ways:

- Apply formatting to any of the characters in the string. (BIRT will not recognize the text as a tag if it contains formatting.)
- Use the special form "<&value-of" for the text which BIRT will replace with the literal value "<value-of".

8. Page Number Item

A page number item displays a piece of text that serves as a page number. The text could be a simple number (i.e., "1"), or it could be more complex (i.e., "page 3 of 100"). The text can be externalized, and a page number item can only appear in a Master page.

Page number item is only rendered in output formats that support pagination. In non-paginated output format (such as HTML in BIRT R1), the page number controls are skipped.

8.1 Page Number Item

Summary

Base element: Report Item

Availability: First release

XML Element Name: `page-number`

Predefined Style Name: `pageNumber`

Properties

`text`

The text to display in the page number item. The text can be externalized.

`number-format`

The format to be applied to the page numbers.

Description

A page number item is a piece of text displayed in the page header or footer area. It is similar to a label item except for two differences. First, a page number item can have two special markers embedded: $p and $c. In paginated report output (i.e, PDF), $p (page) is replaced with the current page, and $c (page count) is replaced with the total number of pages.

The text in the label does not normally contain multiple lines. However, if the text provided is too long to fit into the available width, BIRT will automatically break the text into multiple lines. Notice that indentation, line spacing and formatting is needed.

The page number element is a kind of Report Item and inherits the `dataSet` property. However, page number control displays static text and page number, so no data set should be associated with a label.

See Also

Text Item element

8.1.1 `text` Property

The text to display in the Page Number item.

Summary

Display Name: text

ROM Type: Text structure

JavaScript Type: `PropertyStructure` object

Default value: None

Inherited: Yes

Settable at runtime: No

Availability: First release

Description

The text to display in the label, with special markers “$p” and “$c” embedded. The text can be externalized. The following are some examples:

- To display “Page x of y” in a Master page, specify the text property of a page number item as “Page $p of $c”.
- To display literal strings “$p” or “$c”, specify the text property as “$$p” or “$$c”.
- To display “Page $x”, specify the text property as “Page $$$p”.
- $ character not followed by ‘c’ or ‘p’ is displayed literally, i.e., “$foo” is displayed as “$foo”.
- To display $pX (i.e., 4X) for a page number, simply use “$pX” as the value for text property.

See Also

Text structure

8.1.2 `number-format` Property

The format to be applied to the page numbers

Summary

Display Name: Number Format

ROM Type: Choice

JavaScript Type: String

Default value: Arabic Number

Inherited: Yes

Settable at runtime: No

Availability: After First release

Choices

Display Name	Internal Name	Description
Arabic Number	Arabic	Display page numbers as 1, 2, 3, …
Roman Number	Roman	Display page numbers as I, II, III, …
Chinese Number	Chinese	Display page numbers as 一, 二, 三, …

Description

The user can explicitly identify the numbering system to be used when displaying the page number.

9. Processing Text-Related Elements

Text-related elements are processed primarily at presentation time, based on the locale of the user viewing the report. This allows the user to retrieve a localized version of a label or HTML text, and to insert locale-specific text and formatting. For data and multi-line data items, locale-based formatting can be applied to calculate the display strings.

At generation time, database columns that are referenced in data and multi-line items need to be retrieved from database and stored into report document. Since a text item can reference database columns using embedded expressions, text has to be parsed to ensure that all required columns can be serialized to report document.

Default pagination is created at generation time based on label/text retrieved from the default locale.

9.1 Label and Data Item Processing

For label item, generation time processing is not necessary if not for default pagination. At presentation time, locale-specific label is retrieved and displayed.

Values are retrieved from database at generation time for data item. They are formatted based on presentation-time locale and displayed.

9.2 Text and Multi-line Data Item Processing

BIRT processes a text item using rules defined in CSS. Briefly, the process includes:

- Parse the HTML into an abstract parse tree.
- Evaluate each embedded expression in the order they appear in the text. Replace the expression with the formatted result of the expression.
- If the format is HTML, and the format type is HTML, parse the resulting value to produce a revised abstract parse tree.

Multi-line data item is processed similarly except that the third step is never necessary, and the input could also be in RTF format. Based on the parse tree, the following steps are carried out to output both kinds of items to different formats:

- Divide the text into blocks (paragraphs). Blocks are separated by line breaks. Each text element contains at least one block. The HTML <P> element introduces a new block.
- Divide each block into text spans. A span is a block of characters that have the same formatting. A span is introduced by HTML tags such as <B>, <I>, <EM>, <SPAN>, etc. or by the RTF equivalents.
- Flow words onto lines.
- Compute line height. Line height is given by the tallest element within the line such as a large font, and image, etc.
- Compute block height. A block is simply the sum of the lines within the block

In many cases, BIRT does not perform all the above formatting steps itself. When rendering to HTML, the HTML browser (CSS User Agent) might be doing the actual formatting. When rendering to FO, the FO processor might be doing the actual formatting. However, the BIRT report editor (and in particular, the “live” editor) must perform the formatting as part of its overall implementation of a CSS UA.

At generation time, To support default pagination, the steps described here also need to be carried out at generation time, using the default locale.

The reader should consult the CSS specification at http://www.w3c.org/TR/CSS1 for a detailed explanation of the formatting workflow.

The following table summarizes what is performed for each kind of text-related element.

	Generation Time	Presentation Time
Label	Process for default pagination	Retrieve & Display locale-specific string
Data	Retrieve data from database	Display values applying locale-based formatting
Multi-line Data	Process for default pagination	Parsing and display values applying locale-based formatting
Text	Initial parsing to identify all expressions Data retrieval, evaluation of all expressions Second parse for expressions that returns html format Process for default pagination	Retrieve locale-specific text Initial parsing Data retrieval, evaluation of all expressions, locale-based formatting Second parse for expressions that returns html format

9.3 Design File Encoding

The design file treats the contents of the text element as literal text. That is, whatever text is given to the BIRT for the value of the text property of Text element is guaranteed to be preserved when the user saves and reopens the design, even if the HTML is badly formed, or does not adhere to the XML syntax rules.