

# BIRT Report Object Model – Page Setup

Functional Specification

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## Abstract

*Describes BIRT page setup. Page setup consists of Master Page and Page Sequence elements.*

## Document Revisions

Version	Date	Description of Changes
Draft 1	11/29/2004	First BIRT release.

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## 1. Introduction

A developer who wants to print a report can define the master page for the report. Even on the web, the report can be divided into pages and the developer may want control over how the pages appear.

When a report is displayed on the web, it can appear in one of two formats. The first is a simple web page in which the entire report appears as a single web page. The goal is often to display a simple result set (a list of orders, say) in a format that looks like a web page within a larger web application. Such a format works for reports with a limited amount of data.

The second style of web output is to browse through a collection of report pages. This form requires a web viewer to control viewing. Each page is presented as close as possible to how it would appear when printed, while still leveraging the unique features of HTML and CSS.

The master page is not often needed when producing a single web page, but is important when producing a multi-page report for the web or print.

### 1.1 Concepts

The page setup for a report divides into two parts:

- One or more *master pages*, each of which describes the physical layout of a printed page.
- An optional set of *page sequences* that describe how to use the set of master pages.

Note that the first release supports a single master page and does not support the page sequence element.

#### 1.1.1 Page Layout Characteristics

The developer can define the following aspects of a master page:

- The page name. The name lets the user identify this page format in the page sequence and when forcing a section to start on a specific master page.
- The width and height of the page (or, equivalently, a standard page size and orientation.)
- Margins around the outside edges of the page. The page content will appear in the *content area* inside the margins.
- The number of columns in a multi-column report, and the space between columns.
- A style to define page color, style of page decoration, etc.
- The static page content (page decoration). This content includes page header, page footer, watermarks, images, text, or other material that appears on each page.

#### 1.1.2 Flexible Pagination

BIRT supports a wide range of pagination options by adjusting page layout to the needs of each target format.

- Automatically scales or repaginates reports to print the available paper. For example, scales an A4 report down to fit on letter size paper.
- Automatically shifts print orientation to match the required layout. For example, if a report uses normal portrait letter sized pages, but has some pages that are landscape, BIRT automatically tells the printer to rotate the text when printing.
- The user can optionally specify the printer tray for a report. For example, a report may want to print on mailing labels that reside in other than the default printer tray. Provides an option to print selected pages from different trays: for example letterhead for the first page, and blank sheets for the other pages. (The printer tray is, of course, printer dependent. The request would be ignored for output to devices that don't have a printer tray, such as PDF.)
- Supports pages of unlimited size.
- If a report page is significantly larger than the paper, automatically "tiles" the report page onto multiple pieces of paper with clear indication of how the papers relate to display the large report page.

### 1.1.3 Dynamic Pagination

BIRT supports a dynamic pagination model in which the Presentation Engine paginates the report based on a variety of factors such as page size, font metrics, visible data, drill-down, etc. Dynamic pagination is needed for all of the following:

- To adapt to the specific fonts and other graphical restrictions on an output device such as a printer.
- To handle drill-down in which data can be hidden or revealed.

### 1.1.4 Page Sequence

Most reports use a single master page for the entire report. However, some reports require multiple master pages. The following are common scenarios:

- The first page is different from all subsequent pages. For example, the first page might provide room for a preprinted letterhead.
- The left and right pages are different, to allow the report to be printed and bound.

BIRT also allows custom, user-defined page sequences for special purposes.

### 1.1.5 Default Pagination

The web report viewer can display reports as pages. Users can randomly skip around the report. It is too costly to compute the pagination each time a user views the report.

Some reports require a fixed pagination. For example, a statement application may want to ensure that the pagination appears fixed both when printing and viewing.

For these and other reasons, BIRT provides *default pagination*. The Factory creates this pagination as it creates the report. This pagination provides an approximation of how the report will appear when printed on the size of paper specified by the master page. The pagination is approximate because actual printed pagination depends on many factors. The pagination is created for some target device such as a printer, PDF, the web, etc. the default pagination drives the page navigation features in the viewer.

BIRT repaginates the report only if it is printed on a device other than the target device, or if the user invokes view-time actions that change the amount of report content that appears.

### 1.1.6 Single Page Report

Some applications require a report that is displayed on the web as a single web page. Such reports clearly work only when the amount of report data is small.

### 1.1.7 Multi-column Reports

Customers sometimes have the need to create reports with multiple columns. For example, a bank statement may list checks in two or three columns. A printed phone list may display two columns. A dashboard report may show several short reports side-by-side as in a web portal.

BIRT supports multi-column reports.

- Allows the output of a single report to be listed in multiple columns.
- Allows a multiple-column page layout. That is, the report itself is divided into multiple columns. See Word for an example.
- Allows two or more reports to be printed side-by-side similar to the “subpage” feature of e.RD-Pro. For example, to create a sales summary report that shows top-10 largest sales in one column and top-10 riskiest sales in another column. (Note: this is an advanced feature not available in the first release.)

This feature creates “newspaper-style” layouts in which content snakes from one column to another.

Note that multi-column reports are not available in simple HTML and FO output in the open source product because multi-column output is not supported by HTML or FO. Multi-column output is supported only by advanced formatting engines available in the commercial product.

## 1.2 Page Sequence Rules

BIRT follows a set of rules for selecting master pages. At any point in time, BIRT has an active page sequence, and an active master page. The following determine how BIRT selects the initial page sequence:

- If the Page Setup specifies no page sequence, BIRT uses a default page sequence formed by repeating the first master page within the design file.
- If the Page Setup specifies neither a page sequence nor master page, BIRT defines a default master page based on the default page size and margins. The default page size can be based on locale or other configuration setting. The configuration is implementation specific, and may differ between the commercial and open source products.
- If the Page Setup includes one or more page sequences, BIRT chooses the first one as the initial sequence.

The above rules imply that the order of master pages and page sequences is significant.

Next, whenever BIRT needs to start a new page, it determines the next page as follows:

- Inspect the current page sequence and state of the page sequence. Use the page sequence to determine the master page to use to create the new page. This new page becomes the current page.

In addition, report elements can cause changes to the current page or page sequence.

- If an element's Master Page property is blank, then BIRT continues to use the existing page sequence and current page.
- If the element's Master Page is set to the name of a page sequence, and no page break is set on the element, then BIRT continues with the current sequence. (This prevents excessive page breaks due to setting the same value on multiple elements.) The meaning is "switch to the specified sequence if not already using it."
- However, if a page break is set for the above case, then BIRT performs a page break and restarts the sequence to the beginning. (For example, a simple page sequence will restart with a master page.) The meaning is "start the specified sequence whether or not it is already in use."
- If the element's Master Page is set to the name of a page sequence other than the current one, then BIRT performs a page break and starts the new sequence. The new sequence becomes the current sequence. When BIRT starts a new page, it will use the first page from the new sequence.
- If an element's Master Page property is set to the name of a master page that is the same as the current page, and the element does not specify a page break, then BIRT continues to use the current page.
- However, if a page break is requested in the above case, then BIRT forces a page break, and uses the specified master page as the new page, overriding any setting in the current page sequence.
- If an element's Master Page property is set to the name of a master page other than the current page then BIRT forces a page break, and uses the specified master page as the new page, overriding any setting in the current page sequence.
- In the above two cases, the selected master page is used for the current page. When the page becomes full, BIRT selects a new page based on the current page sequence. (Selecting a new master page does not alter the current page sequence.)

### 1.3 Use Cases

The above rules combine to support some common use cases:

- A report uses only one master page and has no header & footer. Use the default master page.
- A report uses only one master page and requires a header and/or footer. Define the master page in the design.
- A report contains two distinct parts, each of which is many pages long. The first page uses master page A, the second uses master page B. Define both master pages, then define a sequence SA for page A, and a sequence SB for page B. Define SA first so the report uses it by default. In the first section for the second part of the report, set the Master Page property to SB to switch sequences.

- A report shows statements for each customer. Each statement is to be printed on stationary with company heading on the first page, but use a blank page for second and subsequent pages. Define two master pages: Continuation and First. Continuation represents the blank page and should appear first in the design. BIRT will use it by default. First is defined to print from a non-default printer tray. In the section for the customer, set the Master Page property to First. Now, BIRT will switch to letterhead for each customer. If a statement takes more than one page, BIRT will revert to blank pages for subsequent pages.
- An alternative way to implement the statement above is to define a simple sequence that includes the first and continuation pages. Call it S. On each customer, force a page break and set the Master Page property to S. This will force the sequence to restart on each customer. The simple sequence will start on the First page, then continue on the Continuation page.

#### 1.4 Release 1 Restrictions

The first BIRT release will support at most one simple master page, and will not support pages sequences. Later releases may add additional support based on user feedback.

	HTML (1 page)	PDF (FO)
Page Size/Margins	N/A	Yes
Multi-Column	No	Yes
Page Header/Footer	Yes	Yes
Page decorations	No	Yes
Auto-Scale	N/A	No
Auto-Orientation	N/A	Yes(?)
Auto Paper-Tray	N/A	N/A
Unlimited page size	Yes	No
Split Large page	N/A	No
Font Adaptation	N/A	Yes, FO's job
Drill-Down	Not 1st release	N/A
Data-driven Security	Not 1st release	N/A
Page Sequence	Not 1st release	Not 1st release
Default Pagination	Not 1st release	N/A
Single-Page Report	Footer+Header	N/A

## 2. Master Pages

BIRT provides two kinds of master pages: a simple master page with just a page header and footer, and a graphic master page that provides full control over page layout. A base master page element provides the properties common to the two master page types.

### 2.1 Master Page Element

Base element for master pages within a report.

#### Summary

Base element: Report Element

Availability: First release

#### Properties

`style`

Name of a shared style applied to this item.

`styleProp`

All properties defined for a style appear as properties on report items also. See the Style element for the list of properties that appear here.

`pageType`

One of the standard page types: Custom, US Letter, US Legal or A4.

`orientation`

The page orientation. Portrait, Landscape or Auto (default).

`width`

The width of a page. (Set only for a custom page size.)

`height`

The height of a page. (Set only for a custom page size.)

`topMargin`

The amount of white space at the top of each page.

`leftMargin`

The amount of white space at the left side of each page.

`rightMargin`

The amount of white space at the right side of each page.

`bottomMargin`

The amount of white space at the bottom of each page.

#### Description

The master page is an abstract element that defines the basic properties of a printed page. The derived elements, Simple and Graphic Master Pages, provide content that appears on the page itself. The simple master page is best for use with simple reports, or reports targeted for the web. Graphic master pages provide a robust set of formatting capabilities and are ideal for sophisticated web layouts or printed reports.



The master page element is a kind of Report Element. Some of the inherited attributes have a special meaning. The Name property provides the name of the master page and is required. The page name must be unique within the design. The name is used to create a page sequence, and to associate master pages with report elements.

Master pages cannot extend another master page, and so the extends property is ignored.

The master page implicitly defines a content area. In a single-column report, the content area is the area inside the margins.

### 2.1.1 style Property

Name of the style applied to this item.

#### ROM Summary

Display Name: Style

ROM Type: Element Reference

JavaScript Type: String

Default value: None

Inherited: Yes

Settable at runtime: Yes

Availability: First release

#### Description

Master pages provide many style properties. The style properties are defined in the *ROM Styles Specification*. An element can inherit its style properties from a parent element, from a named style, or from a style that identifies the context in which the item appears. This property provides the name of the shared style to use.

This item can also set the value of style properties. Properties set on this element “override” those inherited from a parent element or a shared style.

#### See Also

Style element in the *ROM Styles Specification*.

### 2.1.2 pageType Property

The overall page size.

#### Summary

Display Name: Page Type

ROM Type: Choice

JavaScript Type: String

Required.

Settable at runtime: No

Availability: First release

**Choices**

Display Name	Internal Name	Description
US Letter	us-letter	US letter-sized paper: 8.5" × 11".
US Legal	us-legal	US legal-sized paper: 8.5" × 14".
A4	A4	Metric A4 paper size.
Custom	custom	The page size is user-defined.

**Description**

One of the standard page types: Custom, US Letter, US Legal or A4. (Others may be added in the future.)

The default is locale-dependent, usually US Letter for the US locale, A4 for the rest of the world. The default is set when a new page is created in the ERD; a page in the design file must supply a page type.

**See Also**

orientation property

height & width properties

**2.1.3 orientation Property**

The page orientation.

**Summary**

Display Name: Orientation

ROM Type: Choice

JavaScript Type: String

Default value: Auto

Settable at runtime: No

Availability: First release

**Choices**

Display Name	Internal Name	Description
Auto	auto	BIRT chooses the best orientation for the report.
Portrait	portrait	The page is taller than it is wide.
Landscape	landscape	The page is wider than it is tall.

**Description**

The page orientation. Used only if `pageType` is set to one of the standard types; ignored if Type is set to Custom.

**See Also**

`pageType` Property

#### 2.1.4 width Property

The width of a custom-sized page.

##### Summary

Display Name: Width

ROM Type: Dimension

JavaScript Type: String

Required if the page type is Custom.

Settable at runtime: No

Availability: First release

##### Description

The width of a page. (Set only for a custom page size.) The dimension must be in physical units. The dimension cannot use relative units (percent, em, or ex.) The size also cannot be in pixels.

#### 2.1.5 height Property

The height of a custom-sized page.

##### Summary

Display Name: Width

ROM Type: Dimension

JavaScript Type: String

Required if the page type is Custom.

Settable at runtime: No

Availability: First release

##### Description

The height of a page. (Set only for a custom page size.) The dimension must be in physical units. The dimension cannot use relative units (percent, em, or ex.) The size also cannot be in pixels.

#### 2.1.6 topMargin, rightMargin, bottomMargin and leftMargin Properties

##### Summary

Display Name: Top Margin, Right Margin, Bottom Margin and Left Margin

ROM Type: Dimension

JavaScript Type: xx

Default value: None

Inherited: Yes

Required.

Settable at runtime: No

Availability: First release

**Description**

The amount of white space at the margins of each page. Each dimension must be in physical units. The dimension cannot use relative units (percent, em, or ex.) The size also cannot be in pixels.

**2.2 Simple Master Page Element**

The simple master page provides a header and footer that appear on every page.

**Summary**

Base element: Master Page

Availability: First release

XML Element Name: `simple-master-page`

Predefined Style Name: `master-page`

**Properties**

`showHeaderOnFirst`

Whether to show the page header on the first page of the report. Default is true.

`showFooterOnLast`

Whether to show the page footer on the last page of the report. Default is true.

`floatingFooter`

If true, the footer “floats” after the last content on each page. If false, the footer is always at the bottom of the content area. Default is false.

**Contents**

`pageHeader`

Contains an element to display at the top of each page.

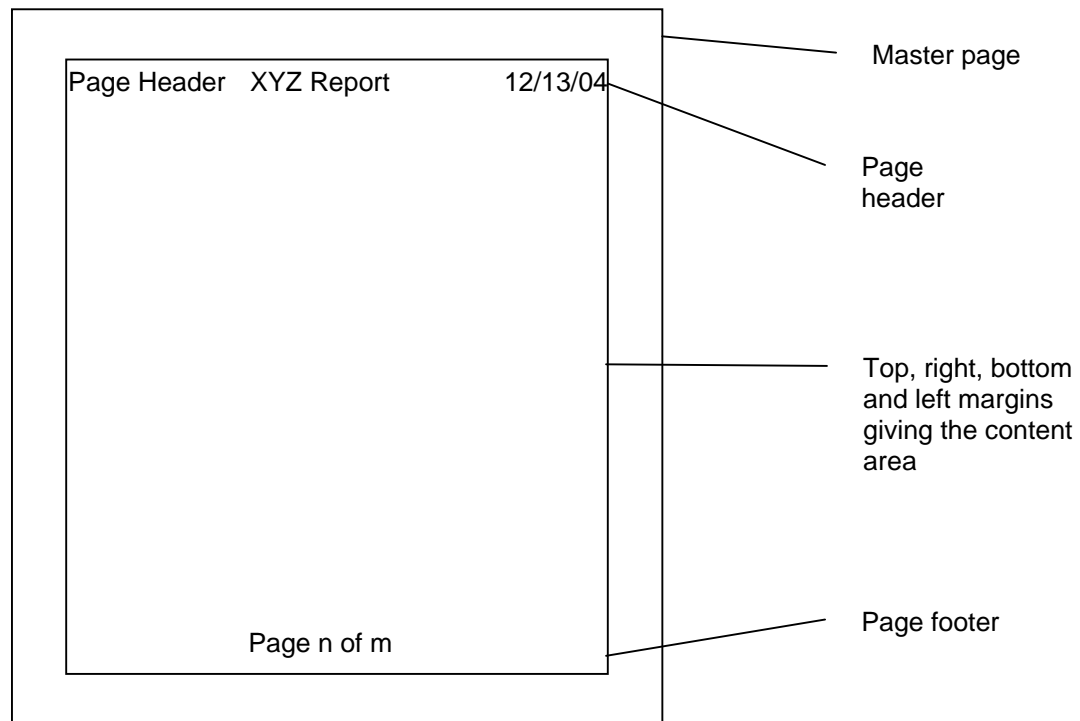
`pageFooter`

Contains an element to display at the bottom of each page.

**Description**

The page margins define the position of the content area on the page. The page header and footer reside within the content area. The page header at the top on each page, and the page footer at the bottom.

The following crude picture gives an idea of the parts of a simple master page:



## Page Header and Footer

The page header and footer can include any element except the following:

- Any element is bound to a data set. The header and footer do not have visibility to any data set.
- A list, table, matrix or other item that is normally driven by a data set.

The header and footer can display data from global variables, from report parameters or other sources. Such expressions are evaluated once early in the report, and the same values will be used on all subsequent pages. The one exception is the page number, which is shown as expected on each page.

## Common Left/Center/Right Layout

A very common construction for a page header or footer is to include a three-cell grid in which the first cell is left-aligned, the second cell is centered and the third is right-aligned. For example:

ABC Corp.                      Sales Summary Report                      Page 1 of 4

Or,

Sales Summary Report                  - 1 -                  Run Date: 12/13/04

---

## Style

Page header and page footer are elements, and each element defines its own style. So, to set the style of the page header or footer, set the style on the page header or footer element itself.

### 2.2.1 showHeaderOnFirst Property

Whether to show the page header on the first page of the report.

#### Summary

Display Name: Show Header on First

ROM Type: Boolean

JavaScript Type: Boolean

Default value: True

Settable at runtime: No

Availability: First release

#### Description

Whether to show the page header on the first page of the report. Default is true.

### 2.2.2 showFooterOnLast Property

Whether to show the page footer on the last page of the report.

#### Summary

Display Name: Show Footer on Last

ROM Type: Boolean

JavaScript Type: Boolean

Default value: True

Settable at runtime: No

Availability: First release

#### Description

Whether to show the page footer on the last page of the report. Default is true.

### 2.2.3 floatingFooter Property

If true, the footer “floats” after the last content on each page.

#### Summary

Display Name: Floating Footer

ROM Type: Boolean

JavaScript Type: Boolean

Default value: False

Settable at runtime: No

Availability: After the first release

#### Description

If true, the footer “floats” after the last content on each page. If false, the footer is always at the bottom of the content area. Default is false.

#### 2.2.4 pageHeader Slot

Element to display at the top of each page.

##### Summary

Cardinality: Single

Element name: `page-header`

Availability: First release

##### Contents

Any report item that is not variable size or is bound to data. The following elements are not allowed: Chart, List, Table, Matrix. The following are allowed: Data, Label, Text, Grid, Image.

##### Description

Contains an element to display at the top of each page.

##### See Also

`showHeaderOnFirst` property

#### 2.2.5 pageFooter Slot

Element to display at the bottom of each page.

##### Summary

Cardinality: Single

Element name: `page-footer`

Availability: First release

##### Contents

Any report item that is not variable size or is bound to data. The following elements are not allowed: Chart, List, Table, Matrix. The following are allowed: Data, Label, Text, Grid, Image.

##### Description

Contains an element to display at the bottom of each page.

##### See Also

`showHeaderOnLast` property

`floatingFooter` property

### 2.3 Graphic Master Page Element

A master page with free-form page decorations.

##### Summary

Base element: Master Page

Availability: After the first release

XML Element Name: `graphic-master-page`

**Properties**

columnCount

The number of columns in the report.

columnSpacing

The amount of space between columns.

**Contents**

The report items that appear on the page itself. Can include page header, page footer, sidebars and other “page decoration.” Report items that can appear on a master page include:

- Label, Data & Text
- Image, Line, Rectangle
- Grid, Container
- Browser control
- Extended control

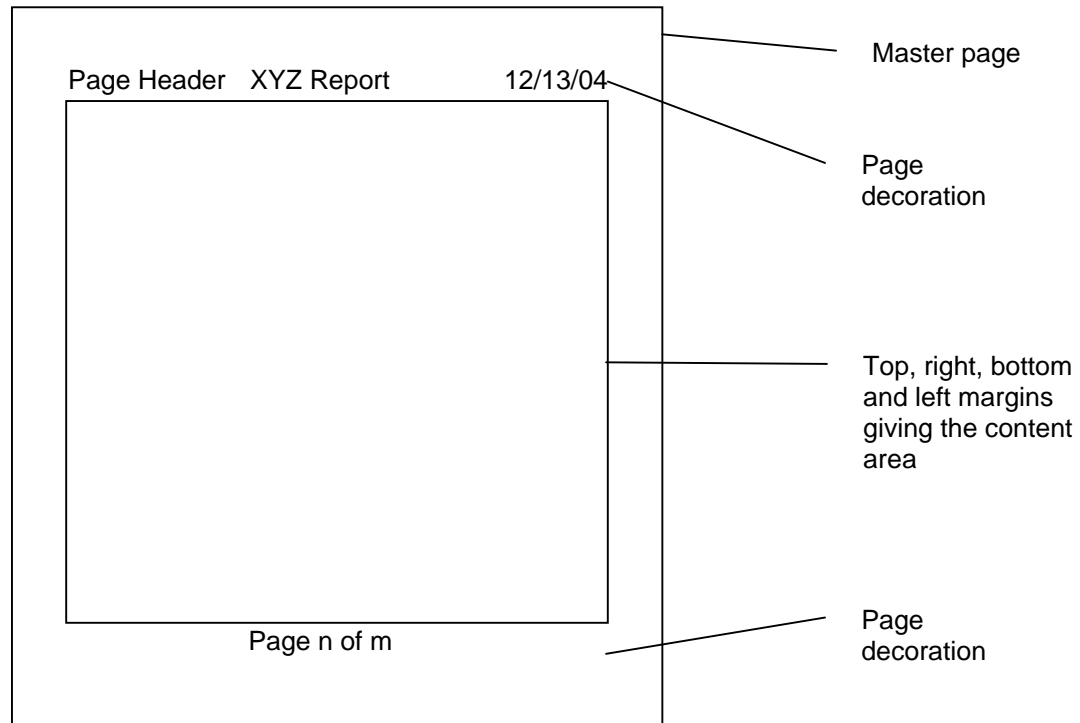
Note that a master page cannot contain data-driven content such as a table, list, matrix or chart.

**Description**

A graphic master page describes a physical page free-form page “decoration”. The decoration can include simple headers and footers, but can also include content within the left and right margins, as well as watermarks under the content area. The page can contain multiple columns. In a multi-column report, the content area is the area inside the margins defined by each column. Note that each page has only one content area, though that content area can be divided into multiple columns. That is, a page has one content area. If a page has multiple columns, the column layout is “overlaid” on top of the content area.

The following crude picture gives an idea of the parts of a graphic master page:





### Graphic Pages in HTML and FO Output

Graphic pages contain free-form content. However, simple HTML output, and FO output do not support arbitrary free-form items on a page. If a graphic master page is used for such formats, BIRT will automatically convert the graphic page to a simple page at run time, following these rules:

- A header area is defined above the content area of the page. Any elements entirely within this header appear in the printed page header.
- A footer area is defined below the content area of the page. Any elements entirely within this footer appear in the printed page footer.
- Any element that appears outside the header or footer areas is ignored for the simple HTML and FO formats.

#### 2.3.1 columnCount Property

##### Summary

Display Name: Number of Columns

ROM Type: Integer

JavaScript Type: Number

Default value: 1

Settable at runtime: No

Availability: First release

**Description**

The number of columns on the page. A multi-column page prints like a phone book or a dictionary: the left column is filled from top to bottom, then the next column, and so on until all columns are full.

**2.3.2 columnSpacing Property****Summary**

Display Name: Column Spacing

ROM Type: Dimension

JavaScript Type: String

Default value: 0

Settable at runtime: No

Availability: First release

**Description**

The amount of space between columns.

### 3. Page Sequences

Page sequences are optional. If a report has more than one master page, the page sequence says how to use the various master pages.

#### 3.1 Page Sequence Structure

The page sequence base element provides properties common to the specific page sequence types.

**Summary**

Availability: After the first release

**Description**

The page sequence defines how the report uses a set of pages. The sequence need not use all the master pages defined above.

A future release may include a custom page sequence. The developer will write scripts to select the page, and can include user-defined properties to specify attributes of the page sequence.

The page sequence element is a kind of Report Element. Some of the inherited attributes have a special meaning. The Name property is required for a page sequence. The name must be unique within the design. The name is used to associate master pages with report elements.

Pages sequences don't support inheritance, and so the Extends property is ignored.

#### 3.2 Alternating Page Sequence Structure

Used for reports that will be printed and need different layouts for the left and right pages.

**Summary**

Availability: After the first release

**Properties**

oddPage

The name of a master page to use as for odd-numbered pages. Required.

evenPage

The name of the master page to use for even-numbered pages. Required.

**Description**

The alternating page sequence is used to create reports that will be printed and need different layouts for the left and right pages.

**3.2.1 oddPage Property**

The name of a master page to use as for odd-numbered pages.

**Summary**

Display Name: Odd Page

ROM Type: Element Reference

JavaScript Type: String

Required.

Settable at runtime: No

Availability: After the first release

**Description**

The name of a master page to use as for odd-numbered pages.

**3.2.2 evenPage Property**

The name of a master page to use as for odd-numbered pages.

**Summary**

Display Name: Even Page

ROM Type: Element Reference

JavaScript Type: String

Required.

Settable at runtime: No

Availability: After the first release

**Description**

The name of a master page to use as for even -numbered pages.

**3.3 Simple Page Sequence Structure**

The simple page sequence allows the user to define a title page followed by any number of body pages. This is used for a report with a cover page.

**Summary**

Availability: After the first release

**Properties**

`titlePage`

The name of a master page to use as the title page. Optional.

`bodyPage`

The name of the master page to use as the repeated body page. Required.

**Description**

The simple page sequence allows the user to define a title page followed by any number of body pages. This is used for a report with a cover page.

**3.3.1 `titlePage` Property**

The name of a master page to use as the title page.

**Summary**

Display Name: Title Page

ROM Type: Element Reference

JavaScript Type: String

Default value: None

Settable at runtime: No

Availability: First release

**Description**

The name of a master page to use as the title page. This page appears once at the beginning of the page sequence.

**3.3.2 `bodyPage` Property**

The name of the master page to use as the repeated body page.

**Summary**

Display Name: Body Page

ROM Type: Element Reference

JavaScript Type: String

Required.

Settable at runtime: No

Availability: First release

**Description**

The name of the master page to use as the repeated body page.