

# BIRT Report Paging Feature Specification (BPS19)

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## Abstract

*This document specifies the BIRT report paging features.*

## Document Revisions

Version	Date	Description of Changes
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## 1. Introduction

This spec summarizes report pagination behaviors in BIRT 2.0. The API for accessing page-based viewing feature is in a different spec (BPS22).

BIRT reports can be viewed in different media such as on the web as HTML, in a fixed format such as PDF, or printed on physical media. To support this, BIRT provides different pagination approaches, each appropriate for different viewing medium:

- **Variable-Size Pagination:** This is typically used when viewing a report as HTML format. In this medium the exact "page" size is variable, based, for example, on the current size of the browser window. BIRT report pages in this medium are based on report structure instead of a fixed physical size.
- **Fixed-Size Pagination:** This is typically used when a report will be output to a fixed medium such as PDF or a printer. In this case, pages are based on physical page sizes such as 8.5" x 11". The physical size of the medium may be different at view time compared to generation time.
- **Default Fixed-Size Pagination:** This is similar to Fixed-Size Pagination, but the page breaks are calculated at report generation time based on specified media size that is provided at report design time. This is not supported in BIRT 2.0.
- **No Pagination.** Some reports may best be viewed without pagination on the web. This is especially the case when the reports are short, and is also the BIRT 1.0 way of working. If the report is printed, however, the user usually still wants to have pagination.

## 2. Pagination Rules & Process

The web-based report viewer supports viewing reports on a page basis, so that users can randomly skip around the report. It is too costly to compute the pagination each time a user views a report page. Instead, BIRT report documents are generated with pre-determined page breaks (default pagination), which is a variable-size pagination and is directly used in HTML rendering and other rendering formats that target a variable-size media. If such a default pagination exists in report document, BIRT supports page-by-page view as well as navigation to a page from TOC.

The default pagination is generated by the Factory based on report design gestures and provides a rough approximation of how the report will appear when printed on the size of paper specified by the master page. An approximate solution is adequate because browser does not have a fixed-size window and allows a lot of flexibility in the amount of content presented in a single page.

BIRT repaginates the report when it is printed on a device that requires fixed-size pagination, i.e., PDF or printer. This means that HTML and PDF outputs do not break a report at the same places.

### 2.1 Hard, Soft and Automatic Page Breaks

Report items that appear at the top level and group bands in a table/list support three properties that affect page breaks behaviors: *page-break-after*, *page-break-before* and

*page-break-inside*. Possible values for the first two properties are *auto*, *always*, *avoid*, *left* and *right* (see the ROM spec, or CSS spec at <http://www.w3.org/TR/CSS21/page.html#page-breaks> for detail). These properties may introduce hard page-breaks in a report. Valid values for the last property include *auto* and *avoid*.

Listing report items (will) have a property *page-break-interval* that determines how many rows of data are put into a page. The property is only observed when the output format does not require fixed-size pagination. Page breaks that are created as a result of this property are deemed “soft”, because they are neglected in Fixed-Size pagination.

Beyond hard and soft page breaks which are explicitly specified in the report design, page breaks may be created when a page fills up. Such page breaks are deemed automatic and are silently inserted when the engine processes a report.

## 2.2 Variable-Size Pagination

Variable-Size pagination is used with HTML format and is based on report structure instead of a fixed page size. Hard and soft page breaks are observed, while automatic page breaks are skipped. Paginations are therefore not allowed to happen in the middle of an image/chart, label/data/text item, or a row in table or grid. Property values *left* and *right* are treated the same as *always*.

If a group has its *collapsible* property set to *true*, none of the hard or soft page breaks within the group are observed.

In default pagination, page sequence rules are observed. Master page definitions are only partially observed. In particular, page header, page footer and background properties are observed. Other properties, such as page size and margins, are skipped.

## 2.3 Fixed-Size Pagination

The following rules summarize the pagination behaviors for Fixed-Size pagination (i.e., PDF format):

1. Page dimensions are determined by page sequence specifications (which includes specifications of master pages) created at the report design time.
2. Hard page breaks are observed when applicable.
3. Soft page breaks are not observed.
4. Automatic page breaks are calculated based on the remaining space on the page, the size of each report item, and whether a page break is allowed in the middle of a report item.

The following guidelines offer more details on the pagination process:

1. The size of a report item is calculated based on the actual content in the report item, and the font (metrics) used in the final output medium (printer or Acrobat reader).
2. Each page, when printed, fits into a physical page with no cutoffs (unless the report is designed to not fit into a standard page).
3. Page dimensions may be reset at print time through print setup dialog.

4. Presentation time scripting that modifies display properties affects pagination. That is, if presentation time scripts changes font size from 10pt to 20pt, the pagination is based on font size being 20pt.
5. Page break in horizontal dimension (i.e., split large page) needs to be considered.

Page breaks in the middle of the following report items are not allowed:

1. Image or chart
2. Label or data. If a page break is desirable, text or multi-line data items should be used.

What this means is that if the remaining space in the current page is not enough for a chart/image/label/data item, a new page may be started. Page breaks are allowed within a list, table or grid. When a label or data item appears in a table cell (which is in a table row), page break could happen before or after the row where the cell exists. The page break, however, does not break a label across two pages.

If a table appears within another table or list, it is allowed to break the inner table.

If the actual page size is too small to fit in even a single non-breakable control, the control is still put on the page and the overflowed content might be cutoff in printout. This is considered as a design error instead of pagination error.

### 2.3.1 Pagination Process

There are at least three cases when multiple report items need to be considered together to determine the location of the next page break. One is during the process of a row in a grid/table. Another is when processing a non-block (i.e., inline) report item.<sup>1</sup> The third case happens when processing an item whose `display` property is set to block, but has `page-break-after` property set to *avoid*. For the first case, all report items in the row need to be processed at once; for the second case, assume we have 5 report items A, B, C, D and E, and B, E are block items, then A and B need to be considered at the same time; so do C, D, and E. For the third case, if again we have 5 block items, and A, B, and C have the `page-break-after` property set to *avoid*, then A, B, C, and D are kept on the same page (with best effort), while E is free to be placed either on the same page or on the next page. Therefore, all report items that need to be considered together belong to the same *pagination group*.

Assume that an overflow list, which is a list of report items that do not finish rendering in the previous page, is kept, the process for generating the current page is summarized as follows:

1. Initialize the available space in the current page by examining the page and margin sizes.
2. Go through all report items in a pagination group, determine the page break characteristics such as whether each item can be broken in the middle, whether the pagination group should be kept on the same page, whether a hard page break is requested. Observe hard page breaks if appropriate.

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<sup>1</sup> A block item would have the `display` property either set to block, or *has page-break-before set to true*.

3. For each report item, check whether it can be broken in the middle. If not, check if its size (or the size of the remaining contents) fits into the current page. If it does, or the control is the first control on this page,<sup>2</sup> flows the content of the control to the page; otherwise, the control belongs to the next page. If it can be broken in the middle, flow the portion of the content that fits in the page.
4. After all report items in the pagination group is processed, determine whether a break needs to happen after this group. A page break could happen for two reasons: (1) there is a hard page break after the group; (2) the group does not fit into the page and needs to flow to next page. For the second case, the overflow list is created.
5. If step 4 yields no page break, start processing the next pagination group.

Each pagination group is considered as a vertically non-breakable control whose height is the vertical span of the group.

### 2.3.2 Horizontal Page Break

If a report page is too wide to fit into the media (i.e., the size set in the master page), the page is broken into several pages horizontally. Horizontal breaks are numbered 1.1, 1.2, 1.3, etc. In future releases, we may support scaling the report (isotropically) to fit into a single page.

## 2.4 Default Fixed-Size Pagination

In enterprise environment, re-paginating a large report each time it is printed may be too costly. The system administrator could choose to create a default Fixed-Size pagination for a report during report generation time based on a pre-defined media specification. This shifts the pagination process from presentation engine to factory engine, and would work well if the report does not need to support view time localization.

Even if view time localization needs to be supported, it is possible to store the size information for report items that are not subject to localization at view time, to save processing time at presentation time.

Support for storing default fixed-size pagination or report item sizing information is not available in BIRT 2.0.

## 3. Viewing behavior

If report document is generated with an option to not create variable-size pagination, the report is displayed as a single page in HTML, same as BIRT 1.0 always does.

By default, `page-break-after`, `page-break-before` and `page-break-inside` take value `auto`, which mean no hard page break is inserted. The `page-break-interval` value is set to 50, so that a long report that displays a table is always broken into multiple pages with 50 detail rows in each page. If a report developer prefers to not have a page-break in web environment, set `page-break-interval` to -1.

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<sup>2</sup> The latter case means that the control does not fit into a single page, and might be truncated.

During interactive viewing, certain operations, such as applying a filter or click-to-sort lead to re-pagination of the report and may be costly. After re-pagination, the first page of the report is displayed. The TOC is refreshed to display the top-most level.

Because a collapsible group is always generated on the same page, collapse/expand does not cause pagination to change.

Additional rendering details can be found in Page-on-Demand Viewing Spec (BPS22) and Report Interactive Viewing Spec (BPS5).

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