AIMMS User's Guide - Creating Printed Reports

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Chapter 14

Creating Printed Reports

This chapter

Besides an attractive graphical end-user interface, paper reports containing the main model results are also an indispensable part of any successful modeling application. This chapter details printed reports. Printed reports are created and designed in a similar fashion to ordinary end-user pages, and can contain the same graphical objects for displaying data. There is, however, additional support for dividing large objects over multiple printed pages.

14.1 Print templates and pages

Printing versus GUI

AIMMS makes a distinction between *end-user* pages that are designed for interactive use by the end-user of your application and *print* pages that are specifically designed for printing on paper. While this may seem puzzling at first, a closer inspection reveals a number of serious drawbacks associated with printing ordinary end-user pages. The most important are:

- usually the screen resolution does not match the size of a sheet of paper,
- in a printed report, you cannot rely on the use of scroll bars on either the page itself or within objects if all the available information does not fit,
- the use of background colors may look nice on the screen, but often severely hinders the readability of printed reports, and
- you may want to add header and footer information or page numbers to printed pages, which are not part of an end-user page.

Printing ordinary end-user pages

Through the **File-Print** menu, AIMMS allows you to print a simple screen dump of the contents of any end-user page that currently is on the screen in your application. The **File-Print** menu will open the **Print Page** dialog box illustrated in Figure 14.1. Using this dialog box you can choose the size, border width and orientation of the screen dump to be produced. Any data that is not visible on the end-user page will also not appear in the screen dump.

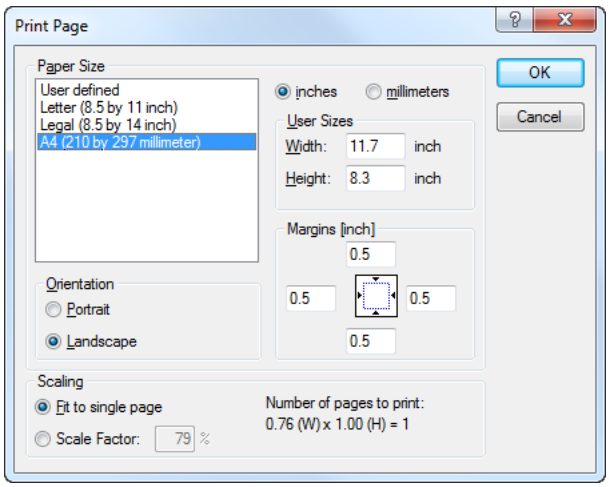

Figure 14.1: **Print Page** dialog box for end-user pages

Print templates and pages

An AIMMS print page, on the other hand, allows you to compose a customized report with data objects that can automatically be resized to print all available object data. Print pages are characterized by the fact that they depend on a special *print template* in the template tree. You can add a print template via the **New-Print Template** item in the **Edit** menu of the **Template Manager**. Print templates can only be placed at the top level of the template tree, i.e. directly below the root, as illustrated in Figure 14.2. All pages below the print template behave as print pages.

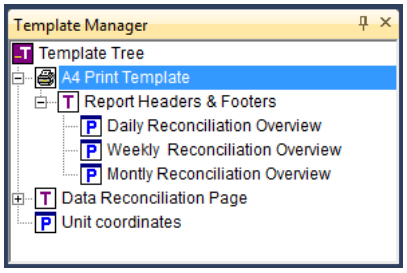

Figure 14.2: Example of a print template

Specifying paper type

Every print template has an associated paper type. The paper type lets you define properties such as paper size, paper orientation, and the width of the surrounding margins. By default, AIMMS will create new print templates with the predefined A4 paper type. You can modify the paper type by opening the print template and selecting **Paper Type** in the **View** menu, which will then open the dialog box displayed in Figure 14.3. With it, you can either select one of the predefined paper types, or define a custom paper type by specifying the

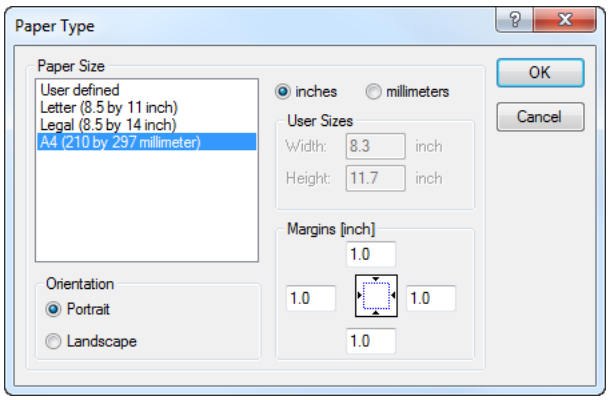

Figure 14.3: **Paper Type** dialog box

paper size, orientation and margins yourself.

Page border

When you open a print page (or print template) in edit mode, AIMMS displays a rectangular box representing the margins corresponding to the current paper type. An example of an empty print page in landscape format containing a margin box is illustrated in Figure 14.4. The margin lines are not displayed

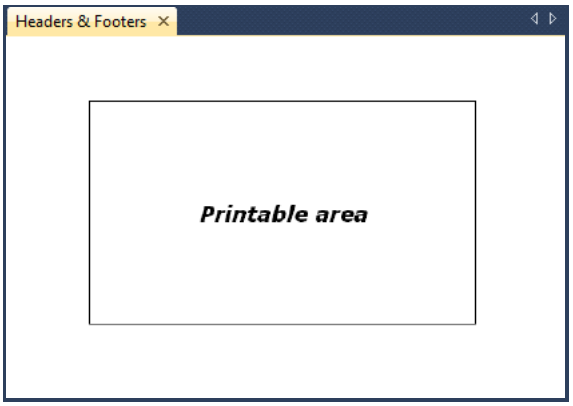

Figure 14.4: An empty print page in landscape format

when the page is previewed or printed. In edit mode, however, the margin lines may help you to position data objects within the printable area.

Printing pages with margins

In general, AIMMS will print all objects on a print page, regardless of their placement with respect to the page margins. However, when you have indicated that a data object should be printed over multiple pages (as discussed in the next section), AIMMS will always restrict itself to printing within the indicated page margins.

Adding objects

You can add data objects and graphical objects to a print page in exactly the same way as you can add such objects to an ordinary end-user page. In fact, objects contained on your end-user pages which you want to be part of a printed report as well, can be copied directly to a print page by means of a simple copy and paste action.

Non-printable objects

You should note, however, that not all objects that are placed on a print page (and are visible on the screen) will be printed on paper. Specifically, AIMMS will omit all controls such as buttons and drop-down lists which are intended for interactive use only. Through such controls you can provide special facilities for your end-users such as allowing them to make last-minute choices prior to printing, activate the actual print job, or navigate to a previous or next print page through navigational controls linked to the page tree (see Section 12.1.2). To prevent interference with printable objects, non-printable controls are best placed in the page margins. Naturally, you can also place such controls on a separate dialog page.

Using additional templates

You can add one or more normal templates below any print template in the template tree, in exactly the same way as for ordinary end-user pages (see also Section 12.2). In this way, you can specify common components such as headers and footers, that are automatically inherited by all dependent print pages.

Displaying the page number

Page numbers can be added to a print page by displaying the predefined AIMMS identifier `CurrentPageNumber` either on the page itself or on any of its page templates. When printing a single page, AIMMS resets `CurrentPageNumber` to 1, and will number consecutively for any additional pages that are created because of a large data object. When printing a report that consists of multiple print pages (see below), AIMMS resets `CurrentPageNumber` to 1 prior to printing the report, and increments it for every printed page.

Printing print pages

AIMMS allows you to print a print page in several manners:

- when the page is opened on the screen, you can print it using the **File-Print** menu,
- you can attach the above action to a page or toolbar button, by adding the **File-Print** menu action to the button, or
- you can print the page from within the model using the `PrintPage` function.

Printing complete reports

In addition to printing single print pages, AIMMS also allows you to print entire reports consisting of multiple print pages. Printing such reports can be initiated only from within your model, through calls to the predefined functions `PrintStartReport`, `PrintPage` and `PrintEndReport`. A multipage report is started by a call to `PrintStartReport`, and finished by a call to `PrintEndReport`. All the

single print pages constituting the report must be printed through consecutive calls to the PrintPage function in between. Such a composite report will be sent to the printer as a single print job, and by default all pages within the report will be numbered consecutively starting from 1. However, if you so desire, AIMMS allows you to modify the value of CurrentPageNumber between two consecutive calls to the PrintPage function. The print functions in AIMMS are discussed in more detail in Section 17.3.2.

14.2 Printing large objects over multiple pages

Printing large data objects

Print pages are explicitly designed to allow the printing of data objects that hold large amounts of data and, therefore, do not fit onto a single page. On a print page you can specify that such large objects should be split over as many pages as are needed to display all the underlying data, respecting the specified page margins. In addition, AIMMS allows you, in a flexible manner, to further restrict printing to those parts of the print page that are not already occupied by fixed page components such as headers and footers.

Required steps

In order to enable multipage printing, only two simple steps are required. More specifically, you should

- modify the print properties of both the fixed page components and the large data objects contained on the page to specify their desired printing behavior, and
- create a simple subdivision of the print page by means of the resize split lines (see also Chapter **??**) to specify how objects should be fixed to particular page positions, or resized as necessary.

The remainder of this section discusses both steps in more detail, and illustrates them on the basis of a realistic example.

Specify printing occurrence

For every object on a print page or template you can define when and how the object should be printed. Through the **Misc** tab of the object **Properties** dialog box (as displayed in Figure 14.5) you can specify that an object must be

- printed on every printed page (such as headers or footers),
- printed on only the first page or the last page,
- printed on all pages except for the first or the last page (ideal for indicating whether the report is continued or not),
- spread over as many pages as required to display all its associated data, or
- omitted from the printed output.

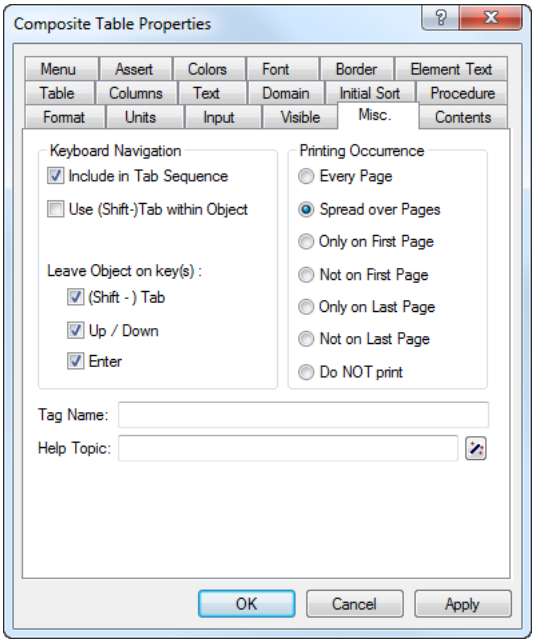

Figure 14.5: The **Misc** properties tab

Usage

Using these choices, you have the capability of having a single print page printed over multiple pages where each page component behaves as desired. For instance, headers and footers can be printed on every page or, perhaps, on all pages but the first. A report title needs only be displayed on the first page. Data objects which are expected to become large can be split over multiple pages.

Multiple page printing

By default, all objects will be printed the same size as they have been placed onto the print page during its creation. Thus, without further action, a large table is split over multiple pages based on the original table size. As you will see below, objects can be stretched to fill the entire print page by using AIMMS' resizability features.

Resizing page objects

Two types of split lines are useful when creating a resizable template for a printed report. *Fixed distance* split lines can be used to specify those areas of a page that contain components such as headers and footers which should keep their original shape and position. *Adjustable distance* split lines can be used to indicate that the objects contained in the relevant page area must be adapted to fill the maximum space within that area.

Spreading over multiple pages

Whenever a data object does not fit in an adjustable area, AIMMS will first extend the data object to the border of the adjustable area. This border may

be either the page margin, or a fixed distance split line that has been placed on the page. When AIMMS runs into the border of an adjustable area, further printing of the data will continue on a new page. On the final page, AIMMS will reserve just enough space to contain the remaining data.

Multiple splits

By creating multiple adjustable areas just below or alongside each other, you have the opportunity to place multiple data objects of varying size within a single report, with each object in its own resizable area. Once AIMMS has finished printing the object contained in the first resizable area, it will start printing the next object directly adjacent to the first, in either a left- to-right or top-to-bottom fashion, depending on your selected layout.

Use of templates

If you are creating multiple reports with more or less the same layout of headers and footers, you should preferably use template pages to define such fixed page components, together with their appropriate printing occurrence (e.g. first page only) and resizability properties for multiple page printing. If you use such templates wisely, creating a specific print page boils down to nothing more than adding one or more data objects to the data area of the page (i.e. the page area not occupied by a header and/or footer), and defining the appropriate print and resizability properties.

Example

The print page, and its corresponding configuration of split lines contained in Figure 14.6 illustrate AIMMS' capabilities of printing large data objects over multiple pages. In this page, the header and footer components are enclosed

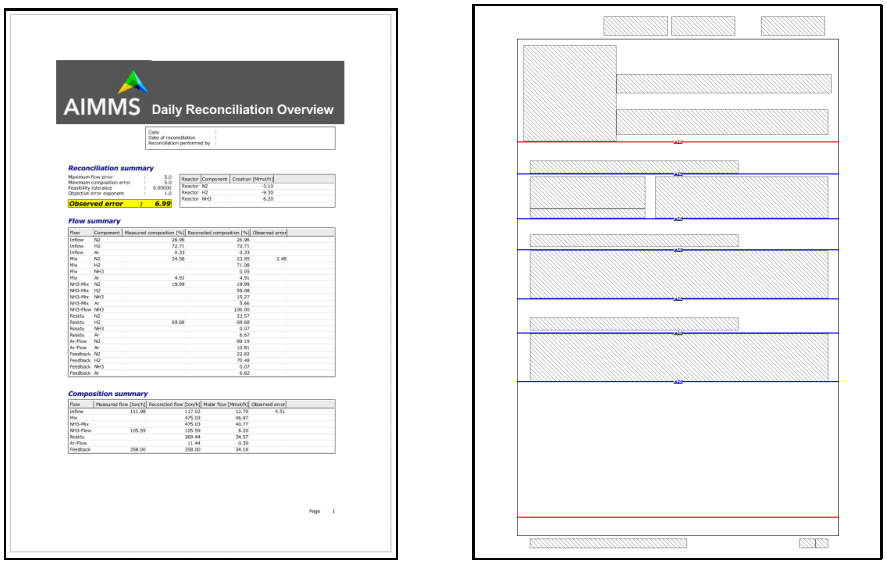

Figure 14.6: Print page with in edit and resize edit mode

in areas which have a fixed size from the top and bottom margin, respectively,

and are printed on every page of the report. The middle part of the page contains a number of data objects, each enclosed in an adjustable area from the top down. As a result, AIMMS will split each object subsequently over as many pages as are necessary.