

Cincom

VisualSmalltalk Enterprise™

Report Writer User's Guide

P46-0204-00



Copyright © 1999–2000 Cincom Systems, Inc. All rights reserved.

Copyright © 1999–2000 Seagull Systems, Inc. All rights reserved.

This product contains copyrighted third-party software.

Part Number: P46-0204-00

Software Release 3.2

This document is subject to change without notice.

RESTRICTED RIGHTS LEGEND:

Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013.

Trademark acknowledgments:

CINCOM, CINCOM SYSTEMS, and the Cincom logo are registered trademarks of Cincom Systems, Inc. Visual Smalltalk is a trademark of Cincom Systems, Inc., its subsidiaries, or successors and are registered in the United States and other countries. Microsoft Windows is a registered trademark of Microsoft, Inc. Win32 is a trademark of Microsoft, Inc. OS/2 is a registered trademark of IBM Corporation. Other product names mentioned herein are used for identification purposes only, and may be trademarks of their respective companies.

The following copyright notices apply to software that accompanies this documentation:

Visual Smalltalk is furnished under a license and may not be used, copied, disclosed, and/or distributed except in accordance with the terms of said license. No class names, hierarchies, or protocols may be copied for implementation in other systems.

This manual set and online system documentation copyright © 1999–2000 by Cincom Systems, Inc. All rights reserved. No part of it may be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form without prior written consent from Cincom.

Cincom Systems, Inc.

55 Merchant Street

Cincinnati, Ohio 45246

Phone: (513) 612-2300

Fax: (513) 612-2000

World Wide Web: <http://www.cincom.com>

Table of Contents

Chapter 1	INTRODUCTION	7
	Using PARTS Report Writer	8
	Tutorial	8
Chapter 2	CONCEPTUAL OVERVIEW	9
	Categories of Report Writer Parts	9
	Report Content Parts	9
	Report Structure Parts	10
	Report Medium Parts	12
	Report Execution	13
	Order of Execution	13
	Record Frames and Execution Order	13
	Group Frames and Execution Order	13
	Report Layout	14
	Horizontal Positioning	14
	Vertical Positioning	16
	Report Writer Parts as Nested Parts	20
Chapter 3	TUTORIAL	21
	Before You Begin	22
	Task 1: Display the Database	23
	Task 2: Building a Report	28
	Task 3: Add the Report to the Tutorial Application	34
	Task 4: Fine-Tune the Report Format	37
	Task 5: Print a Report	41
Chapter 4	PART REFERENCE	45
	COLUMN SUMMARY	46
	Operation	46
	Events	47
	Messages	48
	Property Edit	49
	GROUP FRAME	52
	Operation	52
	Events	54
	Messages	54
	Property Edit	55

HARD PAGE BREAK	56
Events	56
Messages	56
Property Edit	56
PAGE HEADERS AND FOOTERS	57
Events	57
Messages	57
Property Edit	58
Remarks	58
RECORD FRAME	59
Operation	60
Events	60
Messages	61
Property Edit	61
REPORT COLUMN	62
Events	62
Messages	62
Property Edit	63
REPORT DISPLAY PANE	65
Operation	65
Events	65
Messages	65
Properties	66
REPORT FRAME	67
Operation	67
Events	67
Messages	68
Property Edit	68
REPORT HORIZONTAL LINE	70
Operation	70
Events	70
Messages	70
Properties	70
REPORT PRINTER	72
Operation	72
Events	72
Messages	72
Properties	72

REPORT TEXT PART	73
Operation	73
Events	73
Messages	73
Property Edit	74
Remarks	76

Appendix A	PARENT/CHILD RELATIONSHIPS	77
-------------------	-----------------------------------	-----------

Introduction

Welcome to Cincom's **PARTS Report Writer**, a catalog of 12 parts which allow you to format, print and display data from a PARTS Workbench application. This manual covers both the Win32 and OS/2 versions.

The Report Writer divides the textual elements of a report into individual parts that you place in a frame representing the paper on which you will print your report. You design the report's layout by positioning parts such as headers, footers and columns inside the frame.

The source of data for your report will typically be data accessor parts—some of which will automatically provide data in a format suitable for the Report Writer. If the data source does not already provide the data in this format, you can convert it to the proper format with scripts. In general, the Report Writer can accept the data coming from any source as long as it is provided within a specific type of data structure. The format for data is discussed in the part reference for the record frame.

The Report Writer includes the following formatting options:

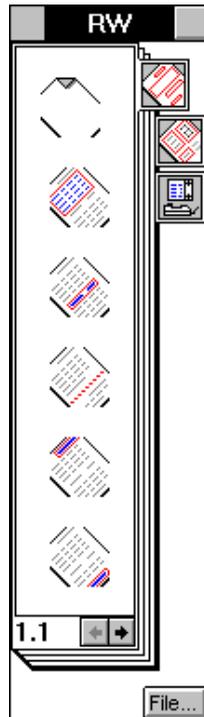
- group records based on the values of specified fields
- create group summaries that perform a predefined or custom function over the range of values for a field in a group of records
- create report summaries that perform a predefined or custom function over the range of values for a field in the whole report
- create a report header and footer
- create a page header and footer
- individually control the font and color for each element in the report
- customize the report further, using Report Writer events and messages

Using PARTS Report Writer

The PARTS Report Writer is delivered with its own Catalog called RW.CAT. This file and the Report Writer parts are installed in the RW\SYSTEM subdirectory of your PARTS Workbench installation directory.

To access the Report Writer parts:

- 1 Launch PARTS Workbench.
- 2 Choose View/Open catalog....
An Open File dialog will be displayed.
- 3 Using the Open File dialog, select RW.CAT and click OK.



Tutorial

The tutorial application presented in chapter 3 and the sample applications in the RW/Samples subdirectory are not compatible with Windows NT because they use the Btrieve accessor.

Conceptual Overview

This chapter discusses the Report Writer parts and how they work including the following topics:

- the different categories of Report Writer parts including Report Content parts, Report Structure parts, and Report Medium parts
- the relationship between Report Writer parts on the Workbench and the text on a printed page
- the execution order of a Report Writer assembly
- Report Writer parts as nested parts

Categories of Report Writer Parts

There are three categories of Report Writer parts: Report Content parts, Report Structure parts and Report Medium parts.

Report Content Parts

The contents of these parts become the text of your report. They hold either static values or field names. You can assign static values when you build the report layout or at runtime with a message. Field names are automatically replaced by the value of the specified record field or a value derived from it as the Report Writer iterates over a series of records.

Report Content parts must be placed inside of Report Structure parts; they cannot be placed directly on the Workbench or inside of any other parts.

Column Summary

The column summary is placed inside a group summary which is in turn placed inside a record frame. You assign a field name and a function to it.

For each record that the record frame iterates over, the column summary retrieves the value of the specified field and calculates an application-builder specified function (such as Sum or Average) for the following values:

- the values of the assigned field in all the records that have been read so far for the group
- the values of the assigned field in all of the records that have been read so far for the entire report

Hard Page Break

The hard page break is placed inside report frames, record frames and group frames. It forces the report to send a form feed to the printer causing the portion of the report that follows it to continue printing on a new page. The hard page break spans the width of the part in which it is placed, so there is no other part on the same line as the hard page break.

Report Column

The report column is placed inside a record frame. You assign a field name to each report column. Every time the record frame that contains the report column iterates over a record, the value of the report column is updated with the current value of its assigned field.

Report Horizontal Line

The report horizontal line allows you to place a horizontal line in your report. You can place it anywhere you can place a report text part (i.e. report frame, record frame, group frame, page header and page footer).

Report Text Part

A report text part prints any string and can be placed in report frames, record frames, group frames, page headers and page footers.

Report Structure Parts

Report Structure parts hold Report Content parts and other Report Structure parts (subject to certain restrictions). They define the layout of your report by controlling where and when information is printed.

Group Frame

A group frame is placed inside a record frame. You use it to separate records into groups and to print information after each group. You can place more than one group frame in a record frame with each group frame reporting different information for different groups of records. There are two ways to define a group.

The first way to define a group is to assign one or more fields to the group frame. When the value of any assigned field changes relative to the previous value, the group frame automatically reports and its contents are printed.

The second way to define a group is to assign one or more fields to the group frame and then override the group frames default behavior using links and a script. Your script analyzes each record and forces the group frame to report when your custom grouping criteria are met.

A group frame with a column summary in it can perform either a built in or a custom function on selected numeric fields and report results for the group and/or for the entire report. For example, a report can be broken into groups followed by the group average. Using the same group frame, you can also include the average of all the values at the end of the report.

Page Header

Page headers can only hold report text parts and report horizontal line parts. You can use the automatic functions of the report text part to display the current date, time or page number in a page header or footer.

Report headers are created with report text parts.

Page Footer

Page footers can only hold report text parts and report horizontal line parts. You can use the automatic functions of the report text part to display the current date, time or page number in a page header or footer.

Report footers are created with report text parts.

Record Frame

A record frame is placed inside of a report frame and contains the template for printing a record. Each record is printed according to this template which can contain multiple lines. The template is a collection of Report Writer parts.

At runtime, a record frame iterates over each record in the source data, updating its template and printing the results. As it iterates, the report columns, group frames and column summaries inside the record frame perform an action for each iteration:

- **Report Column**
Each report column prints the value of its assigned field.
- **Group Frame**
Each group frame evaluates the record for the beginning of a new group.
- **Column Summary (in a Group Frame)**
Each column summary calculates its function for the values of the assigned field in all the records that have been read so far for the group and in all of the records that have been read so far for the entire report.

The order in which the records are printed is determined by their order in the data; the record frame part does not do any sorting by itself.

Report Frame

The report frame is a nonvisual part that provides a framework for assembling other Report Writer parts. All other Report Writer parts (except for the report display pane and the report printer) must be nested either directly or indirectly inside a report frame.

You can think of the report frame as paper on which your report is printed. It is the same width as a piece of paper but not the same height.

The position of a Report Content part relative to the left of the report frame is an exact representation of where its contents will appear relative to the left and right sides of the printed page. If you place a report text part two inches from the left side of the report frame, its contents will be printed two inches from the left side of the paper.

The vertical position of a Report Content part in a report frame reflects either its actual location on the page or its position on the page relative to other Report Content parts.

Report Medium Parts

Report Medium parts are used to display your report on different mediums including your display or a printer.

Report Display Pane

The report display pane is a visual part that allows you to display a report on the screen. It can be placed inside any window, dialog window or notebook page.

Report Printer

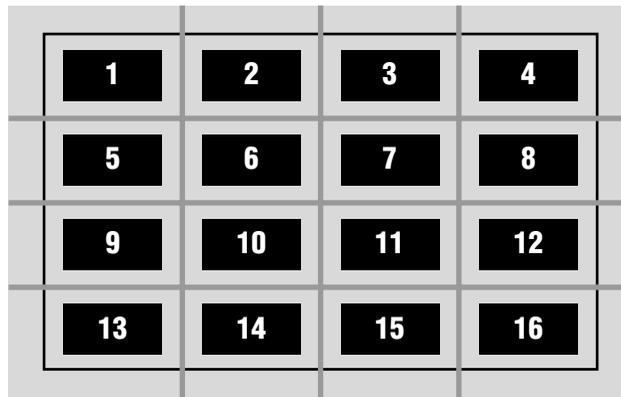
The report printer is a specialized printer part for printing formatted reports generated by PARTS Report Writer.

Report Execution

In order to understand what your report will look like, it is important to understand how a report assembly is executed.

Order of Execution

PARTS Report Writer is a one-pass report generator. When you generate a report, execution begins at the top left of the report frame and proceeds left to right and top to bottom.



This same execution order applies when the Report Writer encounters any other Report Structure part, such as a record frame. The entire contents of the part are printed in the specified order before proceeding to the next part at the same level.

Record Frames and Execution Order

When the Report Writer encounters a record frame, it passes over every record in the source data before passing control to the next part at the same level.

Group Frames and Execution Order

The group frame, which is placed inside of a record frame, is special because it is executed conditionally. Each group frame is associated with one or more record fields. The group frame's contents are only printed when one of two conditions is met:

- the value of one or more of its assigned fields is different than it was in the previous record
- the **report** message is sent to it

Even if neither of these two conditions is met and no printing occurs, Report Writer still passes over the contents of the group frame. If the group frame contains a column summary, the column summary's function is executed so that when the contents of the group frame are printed, the column summary will provide the correct result.

Report Layout

When you lay out a report, you are concerned with the horizontal (left to right) position and the vertical (top to bottom) position of various textual elements on the page. This section explains the mechanics (rather than the aesthetics) of laying out your report.

In this section, we use the terms Report Content part and Report Structure part to group the Report Writer parts by function. Report Content parts contain information that is printed in your report. Report Structure parts affect the appearance or structure of your report. These are categories of parts—not specific parts. The categories are explained in the section, *Categories of Report Writer Parts*, earlier in this chapter.

Horizontal Positioning

Report Structure parts and Report Content parts have fundamentally different behavior in terms of horizontal positioning.

Report Structure Parts and Horizontal Positioning

When you build a report in the Workbench, the report frame is your paper. Each report has a single report frame containing all the other Report Writer parts (except report display panes and report printers). When you place a Report Structure part inside a report frame, either directly or nested within another Report Structure part, it automatically makes itself the same width as the report frame. You can change the height of a Report Structure part but not its width. As a result, you cannot put any other part next to a Report Structure part.

Report Content Parts and Horizontal Positioning

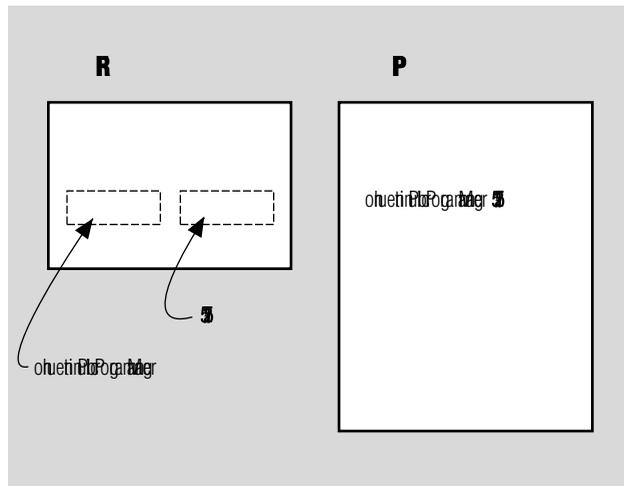
Single Part

You can change the width and height of a Report Content part (except for the hard page break). The horizontal position of a Report Content part relative to a report frame corresponds exactly to the position of its text on the printed page. If you place a report text part one inch from the left side of the report frame (using the report frame's built-in rulers), its contents will be printed one inch from the left side of the paper.

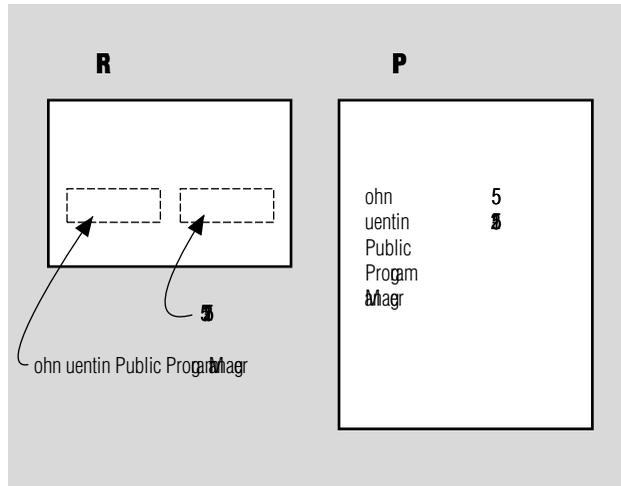
Word Wrap

Unlike Report Structure parts, you can place Report Content parts next to each other. If the text of each side-by-side part fits within the width you have specified for the part, the text will appear exactly as you have specified regardless of the word wrap setting. If the text of one (or both) of the side-by-side parts does not fit within the width that you have specified, one of two things will happen.

1. If word-wrap is turned off, the text will fill as much of the line as necessary overwriting the text of the other part if necessary. The text will overflow differently depending on the part's alignment setting (see the part reference section for details). No matter how much text there is, the part will not use more than one line.



2. If the word-wrap property of the Report Content part is turned on, the Report Writer will generate side-by-side columns of text.

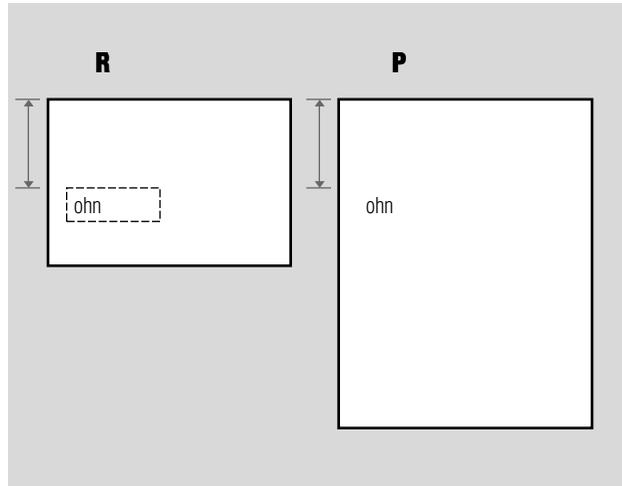


Vertical Positioning

Vertical positioning is a little more complicated than horizontal positioning because, although you can define the exact width of the paper and the textual elements, you can't usually specify the length of your report. There are some situations in which you can specify the exact vertical starting position of an element on the page:

- report header (report text part placed as the topmost element in a report frame)
- page header (measured from top of report frame)
- page footer (measured from bottom of report frame)
- first text element following a hard page break.

For example, if the topmost part inside the report frame is a report text part, the distance between the top of the report frame and the top of the report text part will be the same as the distance from the top of the printed page to the top of the line of text.



An actual report, however, will generally contain elements such as record frames whose contents are variable. When placing one of these parts in your report, you will be concerned with the vertical position of parts relative to each other rather than the vertical position of parts relative to the page. The vertical distance between parts in the Workbench determines how much vertical space will appear between text elements of the printed report.

Report Structure Parts and Vertical Positioning

Blank space in a Report Structure part (or between Report Structure parts) appears as blank space in the printed report.

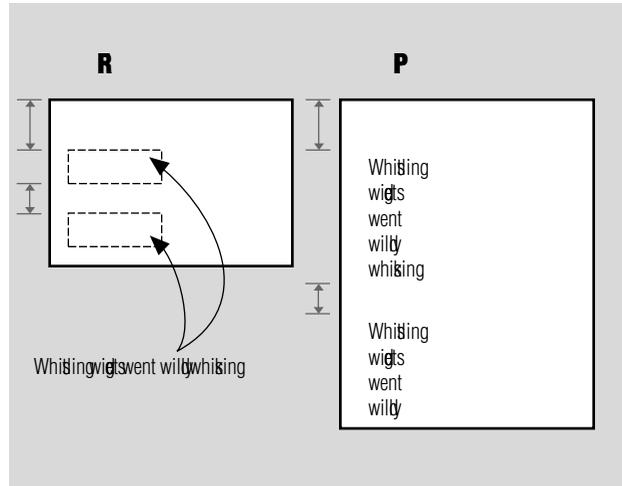
Blank space in and between Report Structure parts is measured in the following way:

- measure from the bottom of one part to the top of the next part at the same level (i.e. both parts share the same parent part)
- measure from the top of the containing part down to the top of the contained part
- measure from the bottom of the contained part down to the bottom of the containing part

Report Content Parts and Vertical Positioning

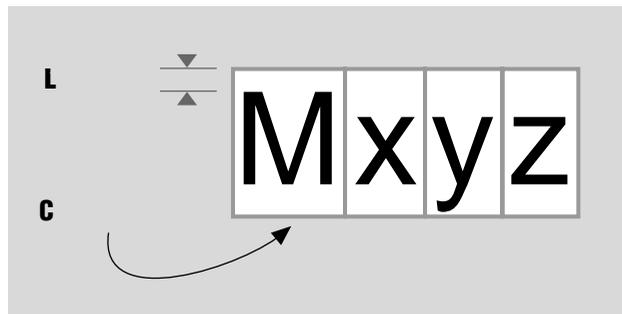
Blank space preceding and between report text parts is measured using a method similar to measuring blank space associated with Report Structure parts:

- measure from the bottom of the preceding part down to the top of the Report Content part



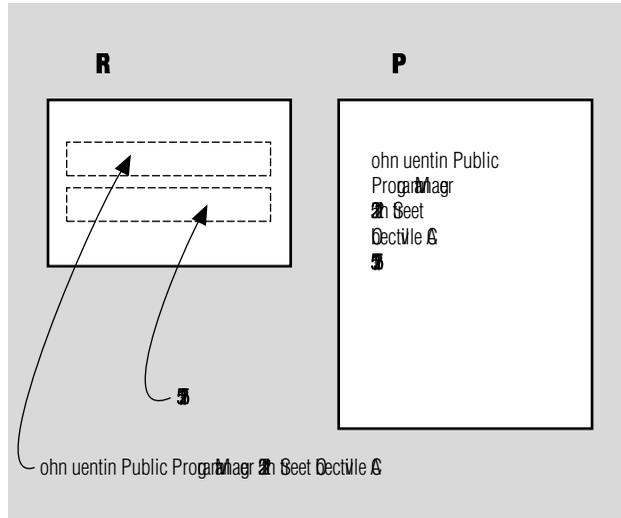
Position of Text within A Part

The top of a Report Content part represents the top of the character box for the specified font. The character box represents the amount of space, including surrounding blank space, occupied by a character.



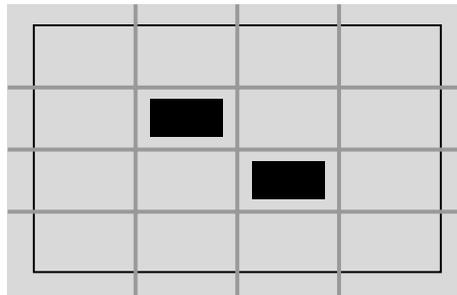
Word Wrap

There are two situations in which word wrap (or the absence of word wrap) affects the vertical position of Report Content parts. The first case is when the parts are stacked, one above the other. If word wrap is turned off, the Report Writer generates a single line of text for each part regardless of the contents. If word wrap is turned on and there is more than one line of text in the upper part, the entire contents of upper part will be printed followed by the contents of the lower part.

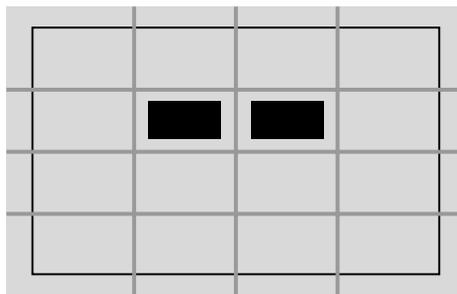


The second situation in which word wrap can affect vertical positioning is the creation of columns. If you visualize a Report Structure part overlaid with a grid, you have one of two basic choices (with many variations) when creating columns:

- you can lay parts down in separate rows



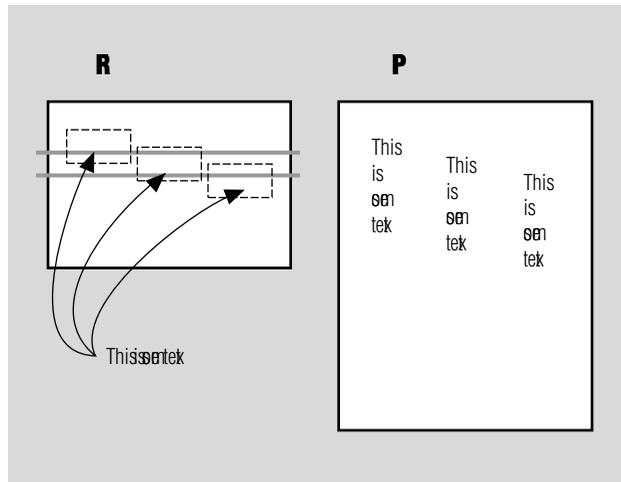
- you can lay parts down in the same row



If you lay the parts down in separate rows, the parts do not overlap in the horizontal dimension. The entire contents of the uppermost box will be printed before the contents of the lower box.

If you lay the parts down in the same row, the contents of the two parts would be printed as side-by-side columns. The parts do not need to be exactly aligned; they only have to overlap a single, imaginary, horizontal line. The text of the uppermost box will begin printing first. When the top of the next part is reached, the contents of both parts will print side by side.

You can create a contiguous group of parts which produce staggered overlapping columns of text. Each part in the group must overlap the part immediately to its left and to its right. The parts to the left and right do not need to overlap each other; they only need to overlap the parts immediately next to them (see the illustration below).



Report Writer Parts as Nested Parts

You can create report templates by building a nested part which contains a complete sub-assembly of Report Writer parts. A complete sub-assembly must contain a report frame part and can be reused with any of the three nested part reuse options:

- Packaged part (linked)
- Packaged part (embedded)
- Ensemble of parts.

You cannot put any other Report Writer part except for a report frame directly in the Workbench.

Tutorial

In this tutorial, you will create a salary report based on an employee database. The report groups employees by department, prints total salaries for each department at the end of the department listing and prints total salaries for all departments at the end of the report. You can view the report on your display and you can print it.

NOTE: The tutorial and sample applications are not compatible with Windows NT because they use the Btrieve accessor.

You begin with a partially completed Employee Database application from which you can retrieve, add, edit and delete individual records. This application includes two nested parts:

- **QueryDB**
This part includes the main application interface. It includes controls to query and display the database, print a report, turn to a page in the report, and a button to invoke the Database Maintenance window. Only the last function, invoking the Database Maintenance window, works; you will enable the other functions in the course of the tutorial.
- **EmployeeDB**
This part includes the database accessor (for a Btrieve database) as well as the database maintenance window. This part can access individual records.

The tutorial is divided into five tasks.

1. **Display the Database**
You will modify the EmployeeDB part so that it can supply the employee database in a data structure compatible with a table pane or a report. In this step, you will display the data in a table pane.
2. **Build a Report**
You will build a salary report that includes each employee record, salary subtotals by department and total salary for all departments. You will test the report with a simplified database application included with the tutorial.

3. **Add the Report to the Tutorial Application**
You will add the report to the tutorial application and replace the table pane with a report display pane. This part allows you to preview a report on-screen before sending it to the printer.
4. **Fine-tune the Report Format**
You will add headers and footers to the report. In addition, you will modify the fonts and text justification used in the report.
5. **Print a Report**
You will add a report printer to your application. This part allows you to print your formatted report.

Before You Begin

You must add the Report Writer tutorial directory to the PARTS Workbench search path before beginning the tutorial. This is necessary so that PARTS Workbench is able to find the nested parts that are used in the tutorial application.

To update the PARTS Workbench search path, perform the following steps:

- 1 In the Workbench, choose File/Settings....
The PARTS Settings window is displayed.
- 2 Click the Add... button.
A Select Directory dialog is displayed.
- 3 Choose the drive and subdirectory containing the tutorial files and click OK.
By default, the tutorial files are installed in the RW\TUTORIAL subdirectory of your PARTS Workbench installation directory. The new directory is inserted at the beginning of your search path; you can resequence your search path by clicking on the Sequence... button.
- 4 In the Settings window, click OK.

Task 1: Display the Database

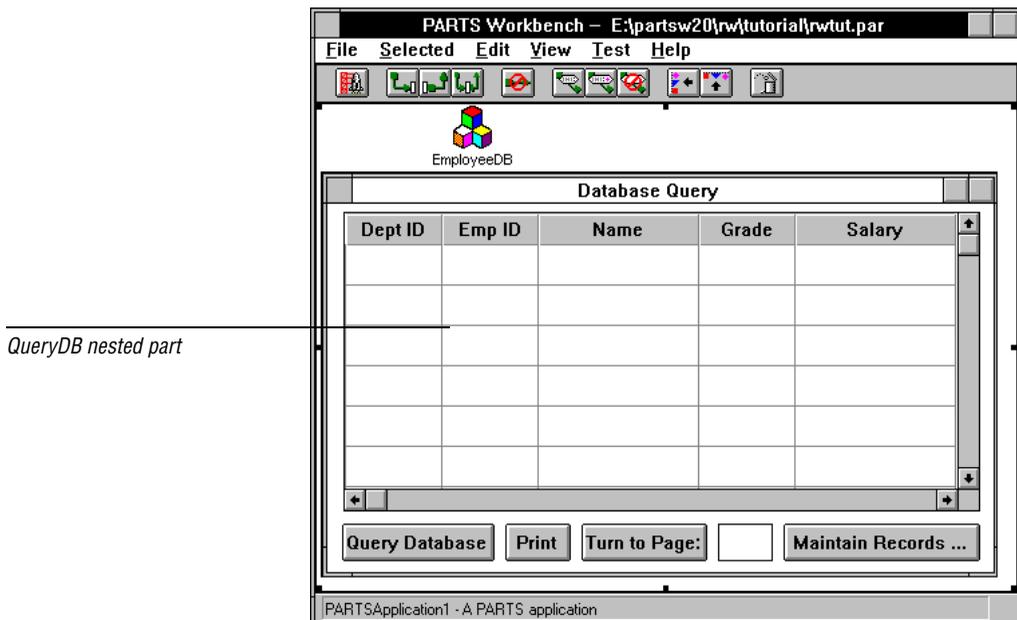
The application includes two nested parts at this stage: QueryDB and EmployeeDB (QueryDB is expanded so that you can see the main database query window which it contains). In Task 1, you enable the Query Database button by performing the following steps:

- inspect the QueryDB nested part
- export a message from the EmployeeDB Btrieve accessor to the EmployeeDB nested part's external interface
- test the application

To inspect the QueryDB nested part, perform the following steps:

- 1 In the Workbench, open the tutorial application RWTUT.PAR.

By default, this file is installed in the RW\TUTORIAL subdirectory.



- 2 Open the QueryDB nested part by <Alt> Clicking on it.

The QueryDB nested part appears in the RWTUT.PAR Workbench as the Database Query window. You can verify its name by shrinking the part or by opening its properties dialog.

The Database Query window contains a table pane which it initially uses to display the contents of the employee database.

- 3 Select the Query Database button.
- 4 Choose Selected/Show outgoing links.
- 5 Choose View/Show labels.

One of the displayed links connects the Query Database button's **clicked** event to the QueryDB part's internal **query** message. A result link supplies the result of the **query** message as an argument to the table pane's **setValue:** message.

- 6 Close the QueryDB Workbench.

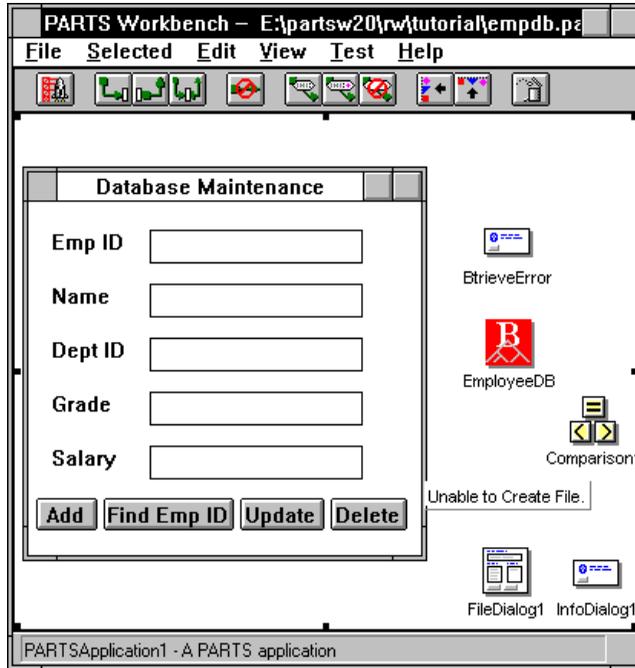
If you are prompted to save changes, you should click on the No button.

The EmployeeDB part contains the Database Maintenance window, a Btrieve accessor and additional parts for handling various Btrieve errors.

The Database Maintenance window allows you to work with individual records. For displaying or printing the database, however, you need a convenient way to retrieve the entire database as a unit. This can be done by adding a new message to the EmployeeDB Btrieve accessor. This message has been added for you. In the following procedure, you will export the message so that parts outside the EmployeeDB part can use it.

To export a message from the EmployeeDB Btrieve accessor to the EmployeeDB nested part's external interface, perform the following steps:

- 7 Open the EmployeeDB nested part.
- 8 Double-click on the EmployeeDB Btrieve accessor.



Its properties dialog is displayed. Notice that the database fields have already been defined. EmployeeID is defined as a unique key and is used by the application to retrieve and store records.

- 9 Click on the Interface... button.

The Interface window is displayed with the Message radio button selected.

- 10 Select the GetEmployeeTable message.

The following script is displayed in the lower pane:

```
GetEmployeeTable
| status table row |
self open.
table := OrderedCollection new.
self useDeptIDAsKey.
status := self getFirst.
[status = 0] whileTrue: [
  row := Dictionary new.
  row
  at: 'EmployeeID' put: self EmployeeID
```

```
        asInteger;  
        at: 'Name' put: self Name;  
        at: 'Salary' put: self Salary;  
        at: 'DeptID' put: self DeptID asInteger;  
        at: 'Grade' put: self Grade asInteger.  
    table add: row.  
    status := self getNext].  
    self close.  
    ^table
```

GetEmployeeTable performs the following tasks:

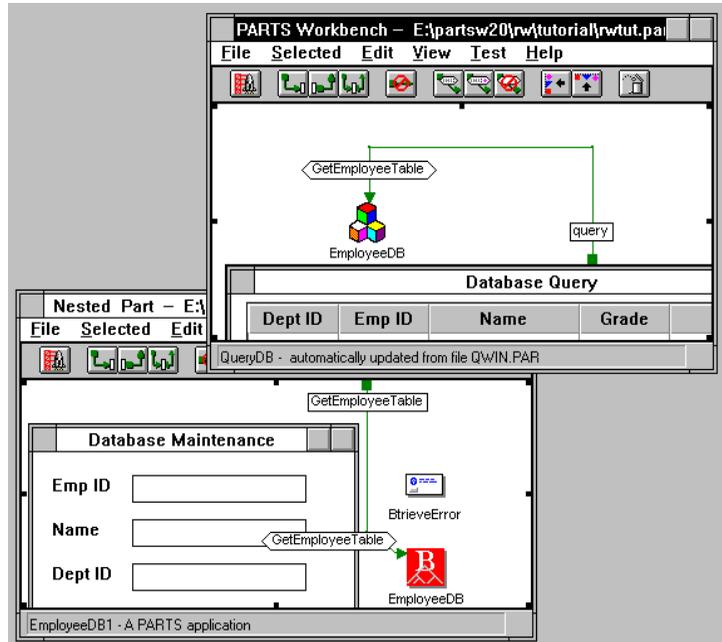
- opens the database
- stores the contents of the database in an OrderedCollection of Dictionaries using one Dictionary for each record
- closes the database
- returns the OrderedCollection

You can use this data structure as an argument to the table pane's **setValue:** message or as an argument to a Report Writer record frame's **setValue:** message (discussed in the next task).

- 11 Click the Export button and close the Interface window.

Exporting the message creates a new external message of the same name for the EmployeeDB nested part. This gives other parts in the Employee Database application access to the new message. The new external message automatically generates a corresponding internal event which is linked to the Btrieve accessor's GetEmployeeTable message.

- 12 In the properties dialog, click on the Cancel button.



The Interface window is independent of the properties dialog. Therefore, pressing the cancel button has no effect on the changes you just made in the Interface window. Clicking on the Cancel button voids any accidental changes you may have made to the part's properties.

- 13 In the EmployeeDB Workbench, choose File/Close.

A dialog is displayed warning you that the application has been changed and asking you if you want to save these changes.

- 14 Click the Yes button.
- 15 In the RWTUT.PAR Workbench, link the QueryDB part's external query event to the EmployeeDB part's GetEmployeeTable message.
- 16 Choose File/Save... to save your work.

To test the application, perform the following steps:

- 17 Launch the application.
- 18 Click on the Query Database button.

The table pane displays the contents of the database.

NOTE: The EmployeeDB nested part expects to find the EMPLOYEE.DAT file in the RW\TUTORIAL subdirectory of your PARTS Workbench directory. If it cannot find the file there, it will attempt to create a new file of the same name.

Task 2:

Building a Report

In the previous task, you exported an EmployeeDB Btrieve accessor message that returns the contents of the database as a single data structure. The Employee Database application uses this data structure to display the contents of the database in a table pane. The table pane provides a convenient way to test the script and display your data, but it only provides limited formatting options. To overcome this limitation, you will create a formatted report.

In this task, you will do the following:

- build a salary report
- extend the salary report's external interface so it can be used as a nested part
- test the completed report assembly

To build a salary report for the employee database, perform the following steps:

- 1 Open a new Workbench.

The report is added to the Employee Database application as a nested part.

- 2 Open the application's properties dialog.

Double-click on the Workbench background.

- 3 Change the application's name to SalaryReport and click OK.

- 4 Open the Report Writer Catalog.

Choose View/Open catalog.... The Report Writer parts are stored in RW.CAT located in the RW/SYSTEM subdirectory of your PARTS Workbench installation directory.

- 5 Drag a report frame onto the Workbench.

The report frame represents the paper on which your report is printed. All other Report Writer parts, except for report display panes and report printers, must be placed inside of a report frame.

NOTE: The rulers' units of measure (inches or centimeters) are displayed as logical units on your screen. You may notice that a logical unit (an inch for example) displayed on your screen is actually longer or shorter than an actual inch depending on your display. When you print, one logical inch corresponds to one actual inch in your printed report.

- Open the report frame's properties dialog and change the width, left margin and right margin properties.

Change the width to 6.5 inches (16.5 cm). Change the left and right margins to 0.5 inches (1.5 cm).

ReportFrame1 Properties

Part name:

Document Name:

All measurements in inches

Width:

Left Margin:

Right Margin:

Top Margin:

Bottom Margin:

- When you have finished adjusting the report frame's width and margins, click OK to close the properties dialog.

Resize the Workbench if necessary. You can adjust the width of the report frame using the resize handles or the properties dialog.

- Select the report frame and drag a resize handle to make the report frame approximately three inches (7.5 cm) high.
- Drag a page header into the record frame.

Position it so that the top is approximately 0.5 inches (0.5 cm) from the top of the report frame. The page header's width automatically matches the report frame's width and you cannot change it with the resize handles. You will use the page header to provide column headings for the report.

TIP: You may prefer using the screen shots as visual guides when placing Report Writer parts for this tutorial rather than matching the measurements provided in the steps.

- From the second page of the Report Writer catalog, drag a report text part into the page header.

If necessary, adjust the height of the page header so you can see the text in the report text part. Don't, however, make it taller than necessary. Extra space will appear in your report as blank space after each page header.

- Change the contents of the report text part to "DeptID".

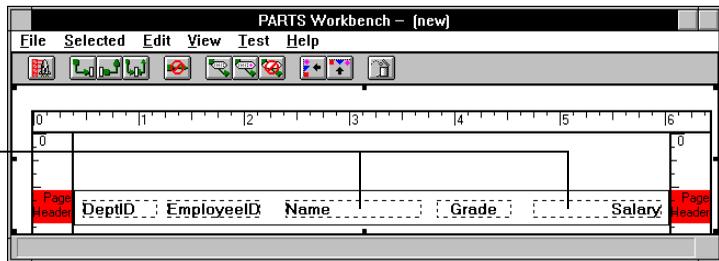
You can change the contents of a report text part by direct-editing it or through its properties dialog.

- Resize the report text part using the resizing handles so it is just slightly wider than the text it contains.

- Repeat steps 10-12 to create the additional fields shown in the illustration below.

Use the illustration below as a guide to positioning the headings. Use the Edit menu's Align and Distribute commands to easily arrange the parts. In addition to the <shift> click method of group selection, don't forget the <Alt> drag method.

Name and Salary should be about 1.5 in (3.5 cm) wide



- From the first page of the Report Writer catalog, drag a record frame into the report frame and position it immediately below the page header.

Like the page header, you can adjust the record frame's height but not its width. The record frame is the template used for printing each record in your database. You define the template by placing parts inside the record frame.

- Resize the record frame so it is about 1.5 inches (3.5 cm) tall.

- 16** From the second page of the Report Writer catalog, drag a report column into the record frame and position it about 0.25 inches (0.5 cm) below the top of the record frame.

Each report column is associated with a field in the database.

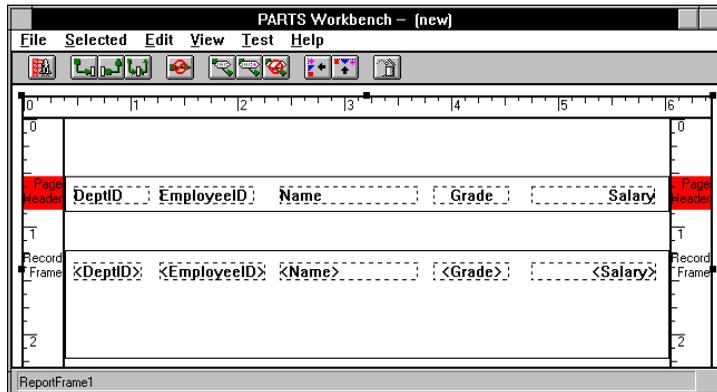
- 17** Change the report column's field name to "DeptID".

The field name must match the database field name exactly. You can view the database field names by opening the properties dialog for the Btrieve accessor part located in the EmployeeDB part.

- 18** Place the report column directly below the corresponding report text part in the page header and resize it using the mouse so that it is approximately the same width as the corresponding report text part.

- 19** Repeat steps 16 - 18, to create the other report columns shown in the illustration below.

The illustration shows the record frame after all the report columns have been added, positioned and sized.

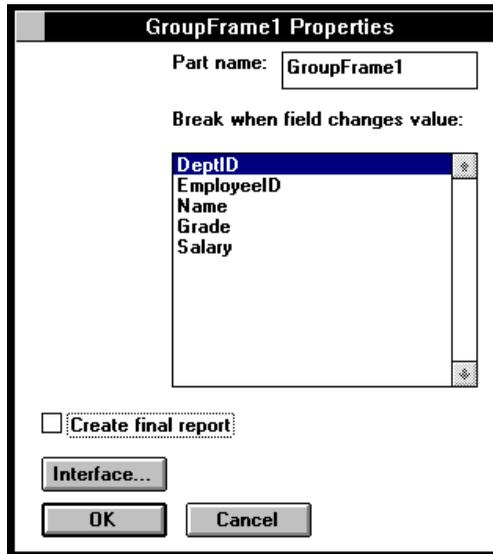


- 20** From the first page of the Report Writer Catalog, drag a group frame into the bottom of the record frame.

You will use the group frame to subtotal salaries after each department and to total salaries for all departments at the end of the report.

- 21** Resize the group frame so that the top is about 0.5 inches (1.5 cm) below the report column parts and even with the bottom of the record frame.

- 22 Open the group frame's properties dialog.

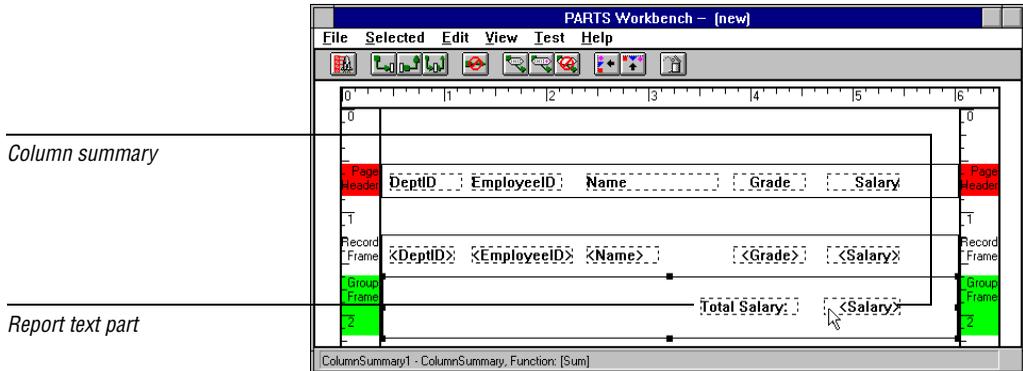


- 23 Choose DeptID from the list of fields and click OK.

The contents of the group frame are inserted in the report every time the value of the DeptID field changes.

- 24 From the second page of the Report Writer catalog, drag a column summary into the group pane and position it about 0.5 inches (1.5 cm) below the Salary report column.
- 25 <Alt> click on the column summary to change its contents to "Salary".
- 26 Drag a report text part into the group frame and position it on the same line and to the left of the column summary part.
- 27 Change the contents of the report text part to "Total Salary:".

When you complete this step the report should look something like the illustration below.



In order to use the report as a nested part you must extend the SalaryReport part's interface by providing external messages which give other parts in the Employee Database application access to the report functions.

To extend the SalaryReport part's external interface, perform the following steps:

- 28** Select the application (the Workbench background) and press <Ctrl> I.

An External Interface window is displayed with the Messages radio button selected.

- 29** Click the New... button.

A prompter dialog requests the new external message name.

- 30** Enter "value" and press Enter.

The **value** message returns a data structure suitable for displaying with the report display pane.

- 31** Click the New... button again.

- 32** Enter "initializeReport:" and press Enter.

The **initializeReport:** message is used to initialize the record frame with the contents of the database.

- 33** Close the External Interface window.

- 34** Create a link from the Salary Report part's internal value event to the record frame's report message.

- 35** Create a link from the application's internal initializeReport: event to the record frame's setValue: message.

You must initialize the report with the **initializeReport:** message before you send it the **value** message.

- 36** Choose File/Save to save your work.

Name the file “SLRYRPT.PAR”.

This file is installed in the RW\TUTORIAL directory includes the file TESTRPT.PAR. This application simply allows you to test your report. It includes SLRYRPT.PAR as a linked nested part. When you open a Workbench on the application, it is automatically updated with the version of SLRYRPT which you just saved.

To test the application, perform the following steps:

37 Open TESTRPT.PAR.

If PARTS notifies you that SLRYRPT.PAR is missing, make sure that you have saved the part with the exact name specified in step 36 and that you saved the file in the same directory as TESTRPT.PAR.

38 Launch the application.

The Report Window is opened and your report is displayed in the report display pane. You can use the scroll bars to view the rest of the report.

39 When you are finished, quit the application.

Task 3: **Add the Report to the Tutorial Application**

Now that you have built your report, you add it to the employee database application. In this task, you do the following:

- add the SalaryReport part containing the report assembly to the Employee Database application
- replace the table pane with a report display pane
- add the ability to turn to a specific page in the report
- test the application

To add the SalaryReport part to the Employee Database application, perform the following steps:

1 Open RWTUT.PAR.

This is the file you saved at the end of Task 1.

2 Choose Edit/Import part....

An Import Part dialog is displayed.

3 Use the Import Part dialog to locate and select SLRYRPT.PAR and then click OK.

The cursor changes into a nested part icon.

- 4 Click next to the EmployeeDB icon.

The SalaryReport nested part is displayed in its expanded form with the report frame and its contents visible. It may be partially hidden by the QueryDB part; you can bring it to the front by clicking on it.

- 5 Open the Salary Report nested part's properties dialog.
- 6 Change the name to SalaryReport and click the OK button.
- 7 Choose Selected/Shrink.

This reduces visual clutter by shrinking the part into an icon.

Next, you need to link the SalaryReport part's two external messages. The first of the two external messages initializes the report with the properly formatted contents of the database.

- 8 Create a link from QueryDB part's query event to the SalaryReport part's initializeReport: message.

The link is red to indicate that an argument is required.

- 9 Create an argument link from the initializeReport: message's argument connection to the EmployeeDB part's GetEmployeeTable message.

The second of the two external messages retrieves data from the SalaryReport nested part to display in the QueryDB nested part's Database Query window.

- 10 Create a link from the QueryDB part's query event to the SalaryReport nested part's value message.

Now that you have added the report, you must modify the QueryDB nested part so that it can display the report.

To substitute a report display pane for the table pane in the QueryDB part, perform the following steps:

- 11 Open the QueryDB nested part.

Remember that this part is represented in the Employee Database application by the Query Database window.

- 12 Resize the table pane to a small square.

You are going to add a report display pane and then transfer the link currently connected to the table pane to the report display pane.

- 13 With the table pane selected, choose Selected/Show links.

There is one incoming result link connected to the table pane's **setValue:** message.

- 14 From the third page of the Report Writer catalog, drag a report display pane into the Database Query Window.
- 15 Click with button 2 on the setValue: message connection of the result link connected to the table pane.

The link pop-up menu is displayed.

- 16 Choose Change destination.

A rubber band line now follows the cursor.

- 17 Click on the report display pane.

The link is transferred to the report display pane.

- 18 Delete the table pane.
- 19 Resize the report display pane to fill the window above the buttons.

To enable the Turn to Page: feature:

- 20 Create a link from the Turn to Page: button's clicked event to the report display pane's turnToPage: message.

The link is red indicating that an argument is required.

- 21 Create a link from the turnToPage: message argument connection to the integer entry field's value message.

- 22 Close the QueryDB Workbench.

Click on Yes when prompted to save changes.

- 23 Choose File/Save to save your work.

To test the application, perform the following steps:

- 24 Launch the Employee Database application and click on the Query Database button.

A report based on the contents of the employee database is displayed. You will add more advanced formatting to the report in the next task.

- 25 When you are finished, quit the application.

Report Window				
1	1	Richard	1	10,000
1	6	Michael	1	15,000
1	3	Maria	2	20,000
1	7	Nasrin	2	15,000

Task 4: Fine-Tune the Report Format

So far, the salary report's formatting is rather basic. In this task, you do the following

- add a page footer that includes automatic page numbering
- add a report header
- add a report footer
- change font characteristics for individual Report Writer parts
- change font characteristics for groups of Report Writer parts
- change text alignment for individual Report Writer parts
- test the application.

To add a page footer with automatic page numbering to your report, perform the following steps:

- 1 In the RWTUT.PAR Workbench, open the SalaryReport nested part.
- 2 From the first page of the Report Writer catalog, drag a page footer into the report frame and position it about 1/2 inch (1.5 cm) below the record frame.
- 3 Drag a report text part into the page footer and position it at the left edge.
- 4 Change the contents of the report text part to "Page #".
- 5 Drag a second report text part into the page footer and position it to the right of the first.
- 6 Open the second report text part's properties dialog.
- 7 Choose Page Number from the Automatic function list pane and click OK.

You can also change the contents if you wish, however, you will only see the result in the workbench. Automatic functions override any text the report text part may contain.

To add a report header to the report, perform the following steps:

- 8** Drag a report text part into the report frame and position it above the page header.

A report header is not a special part; it is a report text part placed before the first page header.

- 9** Resize the report text part so that it spans the width of the report frame from margin to margin.
- 10** Change the contents of the Report Text Part to “Employee Salary Report.”

Adjust the height of the report text part if necessary to view the text properly.

To add a report footer to the report, perform the following steps:

- 11** Drag a report text part into the report frame and position it above the page footer.

A report footer is not a special part; it is a report text part placed before the first page footer.

- 12** Resize the report text part so that it spans the width of the report frame from margin to margin.
- 13** Change the contents of the Report Text Part to “End Employee Salary Report.”

Adjust the height of the report text part if necessary to view the text properly.

Your choice of font, font style and font size has a major impact on the readability of your report. Different parts of your report can have different font attributes depending on their purpose. The tables below offer suggested settings for various parts in the Salary Report. The procedures which follow describe how to change the font attributes of a single part and how to change the font attributes of a group of parts

Table 3-1: Windows Fonts.

Part	Font	Style	Size
Report Header	MS Sans Serif	Regular	18
Report Text Parts in Page Header	MS Sans Serif	Bold	10
Report Columns	MS Sans Serif	Regular	10
Report Text Part in Group Frame	MS Sans Serif	Bold	10
Column Summary	MS Sans Serif	Bold	10
Report Footer	MS Sans Serif	Regular	18
Report Text Parts in Page Footer	MS Sans Serif	Bold	10

Table 3-2: OS/2 Fonts.

Part	Font	Style	Size
Report Header	Helvetica	Regular	18
Report Text Parts in Page Header	Helvetica	Bold	10
Report Columns	Helvetica	Regular	10
Report Text Part in Group Frame	Helvetica	Bold	10
Column Summary	Helvetica	Bold	10
Report Footer	Helvetica	Regular	18
Report Text Parts in Page Footer	Helvetica	Bold	10

To adjust the font characteristics of a single Report Writer part, perform the following steps:

14 Open the part's properties dialog for the part (a report text part for instance).

15 Click the Font... button.

A Font dialog is displayed. Use this dialog to select font, font style, and font size. The Sample box at the bottom of the dialog displays sample text using the currently selected attributes. Text below the sample box gives information about the selected font.

16 Click OK when done.

To adjust the font characteristics of a group of Report Writer parts, perform the following steps:

- 17** <Shift> click or <Alt> drag (marquee select) to select multiple parts.

Remember that multiple selections must have the same parent: all the report text parts in the page header, for example. You cannot, however, select a report text part in a page header and a report text part in a record frame at the same time.

- 18** Choose Selected/Edit properties....

A Color and Font Properties dialog is displayed. You must use the Selected menu's Edit properties command to invoke this dialog.

- 19** Click the Font... button.

A Font dialog is displayed. Use this dialog to select font, font style, and font size. The Sample box at the bottom of the dialog displays sample text using the currently selected attributes. Text below the sample box gives information about the selected font.

- 20** Click OK when done.

- 21** In the Color and Font Properties dialog, click OK.

You will also find it useful to change the alignment of text in parts of your reports. Change the alignment of the following parts to Center:

- Report Header
- Report Footer
- DeptID report column
- EmployeeID report column
- Grade report column

To change the text alignment, perform the following steps:

- 22** Open the part's properties dialog (a report text part for example).

- 23** Choose the appropriate radio button from the Justification group pane and click OK.

- 24** Close the SalaryReport part and click Yes when prompted to save changes.

- 25** Choose File/Save to save your work.

To test the application, perform the following steps:

- 26** Launch the Employee Database application

- 27** Click on the Query Database button.

The report now reflects the formatting changes that you have made.

DeptID	EmployeeID	Name	Grade	Salary
1	1	Richard	1	10,000
6	6	Micheel	1	15,000
3	3	Maria	2	20,000
7	7	Nasrin	2	15,000
8	8	Wilson	2	15,000

Task 5: Print a Report

In this final task, you add the ability to print a hard copy of the salary report. The QueryDB part already has a Print button wired to the external **printReport** message which has been added to the part's external interface. You enable this print function by doing the following:

- modify the SalaryReport part by adding a new external **printReport** message and a report printer
- test the application

The following procedures assume that you have already opened a Workbench on the RWTUT.PAR application from the previous task.

To modify the SalaryReport nested part:

- 1 Open the SalaryReport nested part.
- 2 Select the Workbench background.
- 3 Press <Ctrl> I.

An External Interface window is displayed. Select the Message radio button if it is not already selected.

- 4 Click New....

A dialog prompting for the new external message name is displayed.

- 5 Enter “printReport:” and click OK.

The new message name is added to the list of messages in the External Interface window.

- 6 Close the External Interface window.

- 7 From the third page of the Report Writer catalog, drag a report printer onto the SalaryReport nested part’s Workbench background.

- 8 Create a link from the SalaryReport nested part’s internal printReport: event to the record frame’s setValue: message.

This link initializes the report with the contents of the database. The record frame must be initialized before you can print the report.

- 9 Create a link from the SalaryReport nested part’s internal printReport: event to the report printer’s printReport: message.

When the internal **printReport:** event is triggered, the link to the **setValue:** message fires first followed by the link to the **printReport:** message. You can verify the firing sequence by selecting the Workbench background and choosing Selected/Sequence....

When you create the link, PARTS Workbench supplies a default argument link from the nested part’s internal **printReport:** event to the report printer’s **printReport:** message. This link would send the contents of the database directly to the report printer which is not what you want.

- 10 Double-click twice on the link you created in the previous step.

Double-clicking once displays the link labels; double-clicking a second time displays the argument link.

- 11 Select the argument link’s pop-up menu.

You can do this by clicking on a control point with mouse button 2.

- 12 Choose Delete link.

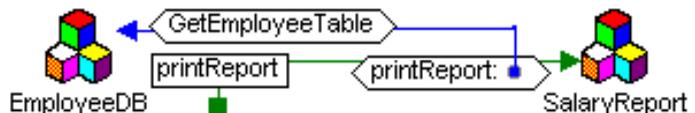
- 13 Create a new argument link from the report printer's printReport: message argument connection to the report frame's report message.



- 14 Choose File/Save to save your changes.
- 15 Close the SalaryReport nested part.
- 16 Create a link from the QueryDB nested part's external printReport event to the SalaryReport part's external printReport: message.

The is red to indicate that an argument link is required.

- 17 Create an argument link from the printReport: message's argument connection to the EmployeeDB part's external GetEmployeeTable message.



To finish the task, perform the following steps:

- 18 Choose File/Save to save your work.
- 19 Launch the employee database application.
- 20 Click the Query Database button.

This application requires you to view the contents of the database before printing. You can easily modify the application to remove this requirement by removing the link which initially disables the Print button when the Database Query window is opened.

- 21 Click the Print button.
A Print dialog is displayed.
- 22 Choose the desired print options including your choice of printer and click OK.

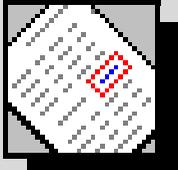
A progress dialog with a Cancel button is displayed. If you used the measurements specified by the tutorial, the report prints on the left side of the page. This is because the report frame's width (and therefore the paper's width) was set to 6.5 inches—less than the 8.5 inch width of a standard piece of paper.

Part Reference

This chapter describes the events, messages and properties available in the Report Writer parts. The Report Writer includes 12 parts:

- column summary
- group frame
- hard page break
- page footer
- page header
- record frame
- report column
- report display pane
- report frame
- report horizontal line part
- report printer
- report text part

For a detailed description of how this reference is organized, refer to *PARTS Workbench Part Reference*.



Column Summary

The column summary is placed inside a group summary which is in turn placed inside a record frame. You assign a field name and a function to it.

For each record that the record frame iterates over, the column summary retrieves the value of the specified field and calculates an application-builder specified function (such as Sum or Average) for the following values:

- the values of the assigned field in all the records that have been read so far for the group
- the values of the assigned field in all of the records that have been read so far for the entire report

Operation

The column summary functions use the value of the same field in each record as input. You specify the field name in the column summary's properties dialog. Each time the record frame containing the column summary reports a record, the column summary retrieves the value of the field and calculates its function. The column summary stores two values:

- the group summary value stores the result of the function calculated using the field values from the current group
- the running summary value stores the result of the function calculated using all of the field values from the first record to the current record

When the group frame containing the column summary reports after a group, the column summary part reports its current group summary value.

The column summary only reports the running summary value if the group frame's Create final report property is checked. When the last record is iterated over, the group frame reports once for the group (if group reporting is enabled). At this time the column summary reports the current group summary value. The group frame reports a second time for the final report. At this time, the column summary reports the running summary value.



The column summary's built-in functions are:

- Sum
- Average
- Minimum
- Maximum
- Count
- Variance (population n)
- Variance (population n - 1)
- Standard Deviation (population n)
- Standard Deviation (population n - 1)

You can also choose None which allows you to shut off the column summary's built in functions and substitute a script that performs your own custom function.

Each time the column summary accesses a record, it triggers the **aboutToEvaluate:** event. To add a custom function, you add a script triggered by the **aboutToEvaluate:** event which calculates your custom function. Your script can then use the column summary's **setValue:** message to post the result back to the column summary.

NOTE: Column summaries are independent of column parts. For example, your report might contain a column summary for the Salary field but not a column part for the Salary field. This would allow you to include the sum of all salaries in your report without including each individual salary. If your report does contain both a column summary and a column part for the same field, changing the value of the column part with a **setValue:** message has no effect on the column summary.

Events

aboutToEvaluate: *value*

Triggered each time the record frame part reports a row. *value* is the value of the field (in the current row) assigned to the column summary part. You can link this event to a script in order to implement a custom function. If you use a custom function, you should also select None from the list of functions in the column summary's properties dialog.

Triggered By: —

aboutToGroupReport: *value*

Triggered immediately before the part is to write its report for the current group. *value* is the result of calculating the specified function over all the values in the group. You can



change the value by using the **setGroupValue:** message linked from this event.

Triggered By: —

aboutToFinalReport: *value*

Triggered immediately before the part is to write its final report. *value* is the result of calculating the specified function over all the values in the report. You can change the value by using the **setRunningValue:** message linked from this event.

Triggered By: —

Messages

groupValue

Returns the column summary's group summary value.

Returns: the group summary value

Triggers: —

runningValue

Returns the column summary's running summary value.

Returns: the running summary value

Triggers: —

setGroupValue: *aValue*

Sets the column summary's group summary value. Has three primary uses: 1) Initialize the starting value for fields which use automatic functions such as sum, etc. 2) Set the value to the result of a custom function. 3) Set the value to something other than the result reported for a standard function by the **aboutToGroupReport:** event .

Returns: —

Triggers: —

setRunningValue: *aValue*

Sets the column summary's running summary value. Has three primary uses: 1) Initialize the starting value for fields which use automatic functions such as sum, etc. 2) Set the value to the result of a custom function. 3) Set the value to something other than the result reported for a standard function by the **aboutToFinalReport:** event.



Property Edit

The properties dialog for the column summary part is shown below. Each of the part-specific controls is described in the following paragraphs. See the *PARTS Workbench User's Guide* for descriptions of common properties.

Label reflects system settings

ColumnSummary1 Properties

Part name:

Field name:

All measurements in inches

Width:

Position:

Decimal digits:

Wordwrap

Automatic Function

- Sum
- Average
- Count
- Minimum
- Maximum
- Var (population n)
- Var (population n - 1)

Alignment

Left

Center

Right

Forecolor... Backcolor... Font...

Interface...

OK Cancel

Field Name

The name of the record field to access.

Width

Specified in the system settings measurement units (inches or centimeters). The width can also be changed by sizing the part in the Workbench.

Position

The position is the distance from the left edge of the group frame. The unit of measurement for specifying distance is based on your system settings. If your system settings specify English, the unit of



measurement is inches; if your system settings specify Metric, the unit of measurement is centimeters. You can also change the position by dragging the column summary in the Workbench.

Decimal Digits

The number of digits to the right of the decimal separator. The decimal separator is taken from the system settings both when launching from the Workbench and when launching as a stand-alone application. If the current value of the part is not a number, this property is ignored.

Word Wrap

A check box. If it is unchecked, whatever text does not fit in the width provided overflows adjacent fields according to the following rules:

- if the text is left aligned, the end of the text grows to the right, overwriting fields to the right of the part
- if the text is right aligned, the beginning of the text grows to the left, overwriting fields to the left of the part
- if the text is centered, the ends of the text grow to the left and to the right, overwriting fields on both sides

If Word wrap is checked, the text is wrapped to multiple lines to fit. Therefore, in each record, different fields may require different numbers of lines to print. The next record starts after the field with the largest number of lines.

Automatic Function

Choose a function for the column summary part to perform.

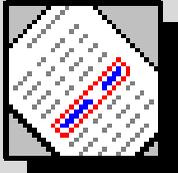
- **Average**
Returns the average of the field values.
- **Count**
Returns the number of records with a field value other than null.
- **Maximum**
Returns the largest field value.
- **Minimum**
Returns the smallest field value.
- **Standard Deviation (population n)**
Returns the standard deviation of the field values with the population parameter as n.



- **Standard Deviation (population n - 1)**
Returns the standard deviation of the field values with the population parameter as $n - 1$.
- **Sum**
Returns the sum of the field values.
- **Variance (population n)**
Returns the variance of the field values with population parameter as n .
- **Variance (population n - 1)**
Returns the variance of the field values with population parameter as $n - 1$.
- **None**
Does not perform a function. Use None when you want to supply your own custom function in a script. See the **aboutToEvaluate:** event for more information on using custom functions.

Alignment

Three radio buttons; left, right and center; that allow you to set text alignment within the part. You can use Right aligned to decimal-align columns of numbers. This works because the Decimal digits property guarantees that all numbers are displayed with the same number of digits after the decimal place.



Group Frame

A group frame is placed inside a record frame. You use it to separate records into groups and to print information after each group. You can place more than one group frame in a record frame with each group frame reporting different information for different groups of records. You can also use a group frame with column summary to print something at the end of the entire report.

Operation

There are two ways to define a group.

The first way to define a group is to assign one or more fields to the group frame by selecting them from the properties-dialog list pane labeled Break when field changes. The group frame automatically reports a group break when either of the two following conditions is met:

- the value of any assigned field changes relative to the previous value
- the end of the data is reached

The group frame's contents are printed immediately after the last record in the group.

The second way to define a group is to assign one or more fields to the group frame and then override the group frames default behavior using links and a script. Your script analyzes each record and forces the group frame to report when your custom grouping criteria are met. The basic procedure for overriding the group frames default behavior is as follows:

- 1** Link the aboutToExamine: event to a script which analyzes the record for grouping criteria.

The event value of the aboutToExamine event is a record.

- 2** Link the script to the report message.

If a record begins a new group, the script forces a group break by sending the report message to the group frame.



Scripts are discussed in the *PARTS Workbench Script Language Guide*.

A group frame with a column summary in it can perform either a built in or a custom function on selected numeric fields and report results for the group, the group summary value, and/or for the entire report, the running summary value.

For example, a report can be broken into groups followed by the group average. Using the same group frame, you can also include the average of all the values after the last record is printed. See the column summary part reference for more information.

To print the group frame's contents after each group only, perform the following steps:

- 1 Drag a group summary into a record frame to which the report columns have been added.
- 2 Open the group frame's properties dialog.

The list pane, Break when field changes, contains a list of all the fields referenced by the report column parts in the record frame.

- 3 Select one or more fields and click the OK button.

If the group frame includes a column summary, the column summary will report its group summary value.

If no fields are selected the contents of the group frame are never printed unless the Create final report property is checked. If it is, the contents of the group frame are printed once after the last record is printed.

To print the group frame's contents after the last record only, perform the following steps:

- 1 Drag a group summary into a record frame to which the report columns have been added.
- 2 Open the group frame's properties dialog.

Do not select any fields from the Break when field changes value list pane.

- 3 Click on the check box for the Create final report property.

When you generate the report, the contents of the group frame are printed after the last record in the report only.

If the group frame includes a column summary, the column summary will report its running summary value.



To print the group frame's contents at the end of each group and after the last record, perform the following steps:

- 1 Drag a group summary into a record frame to which the report columns have been added.
- 2 Open the group frame's properties dialog.

Do not select any fields from the Break when field changes value list pane.

- 3 Select one or more fields and click the OK button.

If the group frame includes a column summary, the column summary will report its group summary value at the end of each group.

- 4 Click on the check box for the Create final report property.

After the last record is printed, the contents of the group frame are printed once for the final group and then once more for the final report.

Events

aboutToReport

Triggered immediately before the group frame begins to report.

Triggered By: —

aboutToExamine: aRecord

Triggered every time a containing record frame finishes reporting a record. You can create a link from this event, and by examining the argument perhaps send the message report to the group frame to make it end the current group and produce a report.

Triggered By: —

Messages

report

This message causes a group break to be reported. This could be used to trigger group break conditions which are not automatically provided. Whenever this message is sent, reporting actually happens after the current record finishes processing. The **aboutToExamine:** event can be used to send this message before the reporting of a record is started.

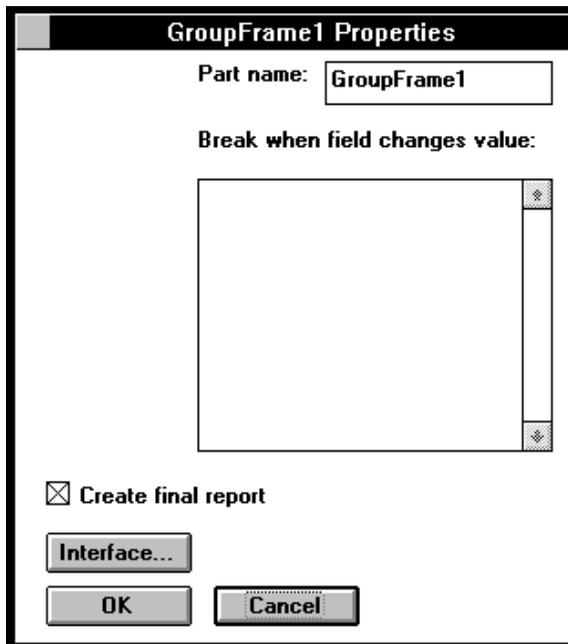
Returns: —

Triggers: —



Property Edit

The properties dialog for the group frame part is shown below. Each of the part-specific controls is described in the following paragraphs. See the *PARTS Workbench User's Guide* for descriptions of common properties.



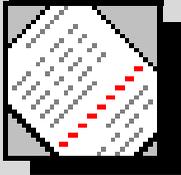
Break When Field Changes Value

A multiple selection list box listing all the fields in the record frame. If any of the selected fields are different in the current record compared to the last record, a group break is reported.

If you only want to create one report at the end of the table, do not select any of the multiple choices, check the Create final report check box.

Create Final Report

Print a report at the end of the table, where all the summary fields cover the whole table.



Hard Page Break

The hard page break is placed inside report frames, record frames and group frames. It forces the report to send a form feed to the printer causing the portion of the report that follows it to continue printing on a new page. The hard page break spans the width of the part in which it is placed, so there is no other part on the same line as the hard page break.

Events

aboutToReport: *anInteger*

anInteger is the page number before the page break.

Triggered immediately before the hard page break begins to report.

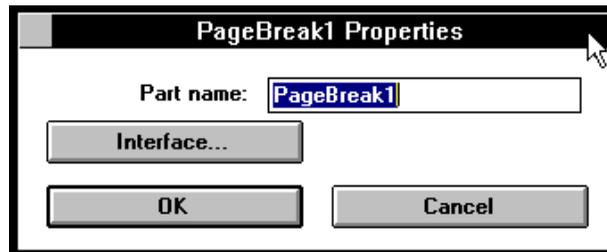
Triggered By: —

Messages

The hard page break does not have any messages.

Property Edit

The hard page break does not have any part-specific properties.





Page Headers and Footers

Page headers and page footers must be placed inside a report frame. These parts span the width of the page. Although their width cannot be adjusted, their height can be adjusted.

Page headers and footers can only hold report text parts and report horizontal lines. The word wrap property is disabled for report text parts nested inside a page header or footer insuring that headers and footers have a constant height. You can use the automatic functions of the report text part to display the current date, time or page number in a page header or footer.

The distance between the top of the printed page and its header will be either:

- the same as the distance between the top of the report frame and the top of the page header if there are no intervening parts, or
- measuring from the part immediately above the page header, the distance from the bottom of that part to the top of the page header.

The distance between the bottom of the printed page and its footer is the same as the distance between the bottom of the report frame and the page footer.

Events

aboutToReport: *anInteger*

anInteger is the current page number.

Triggered By: —

Messages

Page headers and footers do not have any messages.



Property Edit

The properties dialog for a page header is shown below. The page footer properties dialog is identical. Each of the part-specific controls is described in the following paragraphs. See the *PARTS Workbench User's Guide* for descriptions of common properties.



Report on first page

When this option is checked the page header or footer appears on the first page of the report. If you want to create a unique report header, see the Remarks section below.

Remarks

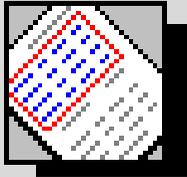
You can create a separate report header or report footer with report text parts.

To create a report header:

Place a report text part before the first page header in your report.

To create a report footer:

Place a report text part before the first page footer in your report.



Record Frame

A record frame is placed inside of a report frame and contains the template for printing a record. Each record is printed according to this template which can contain multiple lines.

The template is a collection of the following types of Report Writer parts:

- group frame
- hard page break
- report column
- report horizontal line
- report text part

In addition, the group frame can hold the following parts:

- column summary
- hard page break
- report horizontal line
- report text part

The order in which the records are printed is determined by their order in the data; the record frame part does not do any sorting by itself.

At runtime, a record frame iterates over each record in the source data. As it iterates, the report columns, group frames and column summaries inside the record frame perform some action for each iteration:

- **Report Column**
Each report column prints the value of its assigned field.
- **Group Frame**
Each group frame evaluates the record for the beginning of a new group.
- **Column Summary (in a Group Frame)**
Each column summary calculates its function for the values of the assigned field in all the records that have been read so far for the group and in all of the records that have been read so far for the entire report.



Operation

At runtime, you must initialize the record frame with the database records on which you plan to base your report. You can do this before the report is executed or you can suspend execution of the report after it has begun but before the record frame executes and initialize the record frame while the report's execution is suspended.

You suspend execution of a report by linking the **aboutToReport** event to a result-link chain. The event isn't completed and therefore execution of the report can't continue until the last message in the result-link chain is executed. One of the messages in the chain should be the record frame's **setValue:** message.

aSourceOfRecords

The argument of the **setValue:** message is *aSourceOfRecords*. These are the records that the record frame reports.

You can get *aSourceOfRecords* from:

- by sending a **value:** message to a table pane with its properties set to access columns by name and rows by index
- sending a message that returns *aSourceOfRecords* to a database accessor part
- a PARTStalk script or a Smalltalk/V method which returns *aSourceOfRecords*

aSourceOfRecords must respond to **do:** *aOneArgumentBlock*. The arguments passed in *aOneArgumentBlock* are the individual records. Each one of these records must respond to **at:** *aString ifAbsent:* [*aZeroArgumentBlock*]. An example *aSourceOfRecords* would be an OrderedCollection of Dictionaries.

Your options are not limited to an OrderedCollection of Dictionaries; *aSourceOfRecords* can also have a stream-like behavior. That is the records are not actually retrieved when the **setValue:** message is sent to the record frame. Instead, the implementation of the **do:** method can retrieve the records one at a time during the iteration.

Events

aboutToReport: *aSourceOfRecords*

Triggered before the record frame starts reporting. *value* is whatever was last set using **setValue:**.

Triggered By: —

**aboutToReportRecord:** *aRecord*

Triggered before reporting the next record.

Triggered By: —

Messages

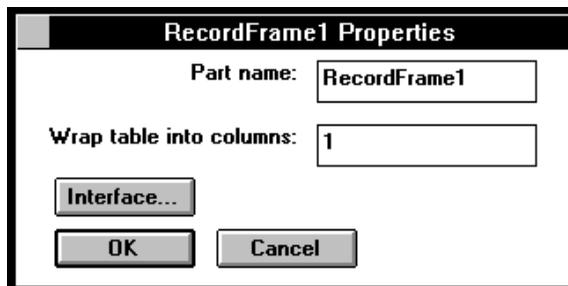
setValue: *aSourceOfRecords*

Returns: —

Triggers: —

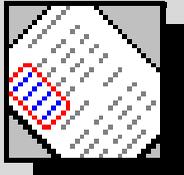
Property Edit

The properties dialog for the record frame part is shown below. Each of the part-specific controls is described in the following paragraphs. See the *PARTS Workbench User's Guide* for descriptions of common properties.



Wrap Table into Columns

An integer n , splits the page into n columns. Each record is printed within the width of each column. When one column is filled up, the report continues to the next column. This is useful for printing mailing labels.



Report Column

The report column is placed inside a record frame. You assign a field name to each report column. Every time the record frame that contains the report column iterates over a record, the value of the report column is updated with the current value of its assigned field.

Events

aboutToReport: *value*

Triggered before the report is to be prepared. *value* is the value of the assigned record field which is about to be formatted and printed. If you want to override the default conversion-to-string of numbers, dates, etc., you can link this event to a script or part which performs your own custom formatting. Return the formatted data to the report column as an argument to the **setValue:** message.

Triggered By: —

Messages

value

Returns the current value of the report column.

setValue: *aString*

Sets the current value of the report column. Has three primary uses: 1) Initialize the starting value for fields which use automatic functions such as sum, etc. 2) Set the value to the result of a custom function. 3) Set the value to something other than the result reported for a standard function by the **aboutToReport:** event.

Returns: —

Triggers: —



Property Edit

The properties dialog for the report column part is shown below. Each of the part-specific controls is described in the following paragraphs. See the *PARTS Workbench User's Guide* for descriptions of common properties.

Label reflects system settings

ReportColumn1 Properties

Part name:

Field name:

All measurements in inches

Width:

Position:

Decimal digits:

Wordwrap

Do Not Repeat

Alignment

Left

Center

Right

Forecolor... Backcolor... Font...

Interface...

OK Cancel

Field name

The field name. If the data is coming from SQL Library, then this must be one of the column names in the query.

Width

Specified in the system settings measurement units (inches or centimeters). The width can also be changed by sizing the part in the Workbench.



Position

The position is the distance from the left edge of the group frame. The unit of measurement for specifying distance is based on your system settings. If your system settings specify English, the unit of measurement is inches; if your system settings specify Metric, the unit of measurement is centimeters. You can also change the position by dragging the report column in the Workbench.

Decimal Digits

The number of digits to the right of the decimal separator. The decimal separator is taken from the system settings both when launching from the Workbench and when launching as a stand-alone application. If the current value of the part is not a number, this property is ignored.

Word Wrap

A check box. If it is unchecked, whatever text does not fit in the width provided overflows adjacent fields according to the following rules:

- if the text is left aligned, the end of the text grows to the right, overwriting fields to the right of the part
- if the text is right aligned, the beginning of the text grows to the left, overwriting fields to the left of the part
- if the text is centered, the ends of the text grow to the left and to the right, overwriting fields on both sides

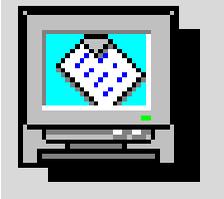
If Word wrap is checked, the text is wrapped to multiple lines to fit. Therefore, in each record, different fields may require different numbers of lines to print. The next record starts after the field with the largest number of lines.

Do Not Repeat

When this property is checked, the report column reports the value of the field only when it changes. As an example, if you were printing a report on salesman by region, you would probably not want to print the value of the region for every salesman in the same group. Checking this property for the “region” field causes it to print only once at the beginning of each group.

Alignment

Three radio buttons; left, right and center; that allow you to set text alignment within the part. You can use Right aligned to decimal-align columns of numbers. This works because the Decimal digits property guarantees that all numbers are displayed with the same number of digits after the decimal place.



Report Display Pane

This visual part displays your formatted report on the screen. It can be placed inside any window or dialog window or notebook page.

Operation

You display a report by sending the **displayReport:** message to the report printer with a report as an argument. You can obtain a report by creating an argument link from the **displayReport:** message's argument connection to a report frame's **report** message.

Events

rightClicked

Occurs when the user clicks the report display pane with button 2.

Triggered By: **the user**

tabbed

Occurs when the user presses the tab key while the report display pane has the input focus. You can connect this event to the **setFocus** message of another part to set the tab order.

Triggered By: **the user**

Messages

clear

Clears the report display pane.

Triggers: —

Returns: —



displayReport: *aReport*

Displays the contents of *aReport* in the report display pane. *aReport* is the result of sending the **report** message to a report frame.

Triggers: —

Returns: —

turnToPage: *aNumber*

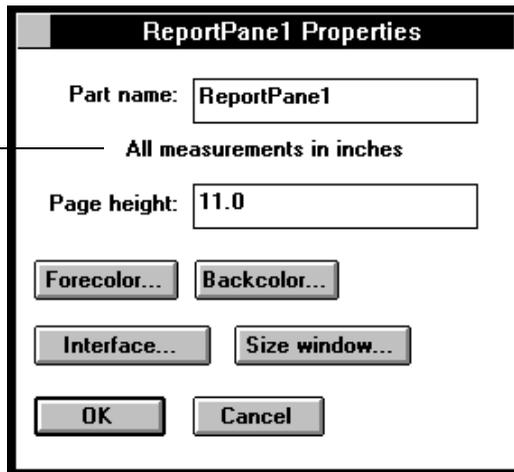
Displays the page of the report specified by *aNumber*.

Triggers: —

Returns: —

Properties

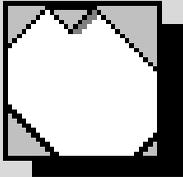
The properties dialog for the report display pane part is shown below. Each of the part-specific controls is described in the following paragraphs. See the *PARTS Workbench User's Guide* for descriptions of common properties.



Label reflects system settings

Page height

Specifies the height of a page in either inches or centimeters, as specified in the system settings.



Report Frame

The report frame is a nonvisual part that provides a framework for assembling other Report Writer parts. All other Report Writer parts (except for the report display pane and the report printer) must be nested either directly or indirectly inside a report frame.

You can think of the report frame as paper on which your report is printed. It is the same width as a piece of paper but not the same height.

The position of a Report Content part relative to the left of the report frame is an exact representation of where its contents will appear relative to the left and right sides of the printed page. If you place a report text part two inches from the left side of the report frame, its contents will be printed two inches from the left side of the paper.

The vertical position of a Report Content part in a report frame reflects either its actual location on the page or its position on the page relative to other Report Content parts.

See Chapter 2, *Conceptual Overview* for more information on vertical and horizontal spacing of Report Writer parts.

Operation

Printing or displaying a report involves three steps:

1. Initialize the record frame nested inside the report frame.
2. Send the report message to the report frame.
3. Send the result of the report message to the displayReport: message of a report display pane or the printReport: message of a report printer.

Events

aboutToReport

Triggered right before the report is to be generated. This event can be used to set the values of the various fields in the report.

Triggered By: —



reportCanceled: *aString*

Triggered when the report is interrupted: if the user cancels printing for example. *aString* is an explanation of the cancellation.

reportFinished

Triggered after the report has been successfully generated.

Triggered By: —

Messages

report

Returns a report which can be supplied as an argument to a Report Medium part (report printer or report display pane).

Returns: **a Report**

Triggers: —

setDocumentName: *aString*

Sets the name of the print job. The name is used on the banner sheet, and in the print queue.

Returns: —

Triggers: —

Property Edit

The properties dialog for the report frame part is shown below. Each of the part-specific controls is described in the following paragraphs. See the *PARTS Workbench User's Guide* for descriptions of common properties.



*Label reflects
system settings*

ReportFrame1 Properties

Part name:

Document Name:

All measurements in inches

Width:

Left Margin:

Right Margin:

Top Margin:

Bottom Margin:

Page Width

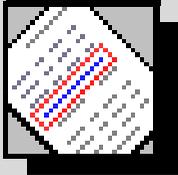
Specified in the system settings measurement units (inches or centimeters). The page width can also be changed by changing the width of the part in the Workbench.

Default document name

This appears in the printer manager's print queue.

Left, right, top and bottom margins

Specified in the system settings measurement units (inches or centimeters)



Report Horizontal Line

This part allows you to place a horizontal line in your report. You can place it anywhere you can place a report text part (i.e. report frame, record frame, group frame, page header and page footer).

Operation

You can adjust its height, width and location via direct manipulation or through the properties dialog. The forecolor property affects the line's single pixel border. Backcolor affects the line's interior color.

Events

The report horizontal line has no events.

Messages

The report horizontal line has no messages.

Properties

The properties dialog for the report horizontal line is shown below. Each of the part-specific controls is described in the following paragraphs. See the *PARTS Workbench User's Guide* for descriptions of common properties.



*Label reflects
system settings*

ReportHorizontalLine1 Properties

Part name:

All measurements in inches

Position:

Width:

Height:

Position

The position is the distance from the left edge of the group frame. The unit of measurement for specifying distance is based on your system settings. If your system settings specify English, the unit of measurement is inches; if your system settings specify Metric, the unit of measurement is centimeters. You can also change the position by dragging the report horizontal line in the Workbench.

Width

Specified in the system settings measurement units (inches or centimeters). The width can also be changed by sizing the part in the Workbench.

Height

Specified in the system settings measurement units (inches or centimeters). The height can also be changed by sizing the part in the Workbench.



Report Printer

This is a specialized printer part designed to print formatted reports generated by PARTS Report Writer.

Operation

You print a report by sending the **printReport:** message to the report printer with a report as an argument. You can obtain a report by creating an argument link from the **printReport:** message's argument connection to the **report** message of a report frame.

Events

The report printer has no events.

Messages

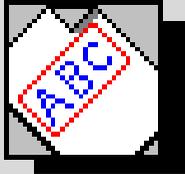
printReport: *aReport*

First opens a print dialog which allows the user to set various characteristics such as the specific printer, the paper orientation, the number of copies, and the collation settings (Windows only). If the user clicks the OK button, the print job begins. *aReport* is the result of sending the message **report** to a report frame.

Properties

The report printer does not have any part specific properties.





Report Text Part

A report text part prints any string and can be placed in report frames, record frames, group frames, page headers and page footers.

Operation

The contents of the report text part can be initialized in the Workbench via direct-editing or the properties dialog, or can be set at runtime via a link.

You can also set an attribute in the properties dialog so that the contents of the report text part is automatically set to the current date, time or page number.

If the value in the report text is a String, the value is printed as is. If it is a number, it is converted to a string with a set number of digits beyond the decimal as specified in the properties dialog.

The decimal separator, date format and time format are based on the current system settings both when launching from the Workbench and when launching as a stand-alone application.

Events

aboutToReport: *value*

Triggered before the report is to be prepared. *value* is the object which is about to be formatted and printed. If you want to override the default conversion-to-string of the page number, date, or time, you can link this event to a script or part which performs your own custom formatting. Return the formatted data to the report text part as an argument to the **setValue:** message.

Triggered By: —

Messages

setValue: *aString*

Sets the current value of the report text part. It can be used to set the value which is going to be reported if it is linked from the **aboutToReport:** event.



value

Returns the contents of the report text part.

Returns: **a Value**

Triggers: —

Property Edit

The properties dialog for the report text part is shown below. Each of the part-specific controls is described in the following paragraphs. See the *PARTS Workbench User's Guide* for descriptions of common properties.

Label reflects system settings

ReportText1 Properties

Part name: ReportText1

Contents: Report Text

All measurements in inches

Width: 1.10

Position: 0.57

Decimal digits: 0

Wordwrap

Automatic Function

- Date
- Time
- Page Number
- None**

Alignment

- Left
- Center
- Right

Forecolor... Backcolor... Font...

Interface...

OK Cancel

Contents

The string that will be printed.



Width

Specified in the system settings measurement units (inches or centimeters). The width can also be changed by sizing the part in the Workbench.

Position

The position is the distance from the left edge of the group frame. The unit of measurement for specifying distance is based on your system settings. If your system settings specify English, the unit of measurement is inches; if your system settings specify Metric, the unit of measurement is centimeters. You can also change the position by dragging the report text part in the Workbench.

Decimal Digits

The number of digits to the right of the decimal separator. The decimal separator is taken from the system settings both when launching from the Workbench and when launching as a stand-alone application. If the current value of the part is not a number, this property is ignored.

Word Wrap

A check box. If it is unchecked, whatever text does not fit in the width provided overflows adjacent fields according to the following rules:

- if the text is left aligned, the end of the text grows to the right, overwriting fields to the right of the part
- if the text is right aligned, the beginning of the text grows to the left, overwriting fields to the left of the part
- if the text is centered, the ends of the text grow to the left and to the right, overwriting fields on both sides

If Word wrap is checked, the text is wrapped to multiple lines to fit. Therefore, in each record, different fields may require different numbers of lines to print. The next record starts after the field with the largest number of lines.

Alignment

Three radio buttons; left, right and center; that allow you to set text alignment within the part. You can use Right aligned to decimal-align columns of numbers. This works because the Decimal digits property guarantees that all numbers are displayed with the same number of digits after the decimal place.



Remarks

You can use a report text part to create a report header or a report footer.

To create a report header:

Place a report text part before the first page header in your report.

To create a report footer:

Place a report text part before the first page footer in your report.

A

Parent/Child Relationships

The following tables summarize the parent/child relationships of the Report Writer parts.

Children of Frame Parts

report frame

Triggers: hard page break
page header
page footer
record frame
report horizontal line
report text part

record frame

Triggers: group frame
hard page break
report column
report horizontal line
report text part

group frame

Triggers: column summary
hard page break
report horizontal line
report text part

page header & page footer

Triggers: report horizontal line
report text part

Parents of Report Writer Parts

report horizontal line

Triggered By: group frame
page header
page footer
record frame
report frame

report text part

Triggered By: group frame
page header
page footer
record frame
report frame

hard page break

Triggered By: report frame
record frame
group frame

column summary

Triggered By: group

group frame

Triggered By: record frame

page header & page footer

Triggered By: report frame

record frame

Triggered By: report frame

report column

Triggered By: record frame

report frame

Triggered By: application

Index

A

- aboutToEvaluateý value 47
- aboutToExamineý aRecord 54
- aboutToFinalReportý value 48
- aboutToGroupReportý value 47
- aboutToReport 54, 67
- aboutToReportRecordý row 61
- aboutToReportý anInteger 57
- aboutToReportý value 62, 73
- aboutToReportýanInteger 56
- average 50

C

- character box 18
- clear 65
- column summary
 - custom functions 47
 - decimal digits 50
 - functions 46
 - position 49
 - properties 49
 - relationship to column parts 47
 - width 49
 - word wrap 50
- columns 19
- count 50
- custom functions 47

D

- decimal digits
 - column summary 50
 - report column 64
 - report text part 75
- displayReportý aReport 66

E

- extensions
 - CAT 8

F

- fields
 - in column summary 13, 46
 - in report column 10, 62
- font
 - characteristics, single part 39

functions

- average 50
- column summary, about 46
- count 50
- maximum 50
- minimum 50
- none 51
- standard deviation (population n - 1) 51
- standard deviation (population n) 50
- sum 51
- variance (population n - 1) 51
- variance (population n) 51

G

- group frame
 - about 10, 52
 - conditional execution 13
 - create final report 55
 - execution order 13
 - field to break on 55
 - properties 55
- group summary value 46
- groupValue 48

H

- hard page break
 - properties 56
- height
 - report horizontal line 71
- horizontal positioning 14

L

- layout
 - about 14
 - columns 19
 - horizontal positioning 14
 - record 11, 59
 - unit of measurement 49
 - vertical positioning 16

M

- maximum 50
- minimum 50

N

- nested parts 20
- none 51
- numbers
 - column summary 50
 - report column 64
 - report text part 75

P

- page 12, 67
- page footer
 - about 11, 57
 - properties 58
 - report footer 58
 - report on first page 58
 - word wrap 57
- page header
 - about 11, 57
 - properties 58
 - report header 58
 - report on first page 58
 - word wrap 57
- position
 - column summary 49
 - report column 64
 - report horizontal line 71
 - report text part 75
 - unit of measurement 49
- printing
 - hardcopy 72
 - to screen 65
- printReportý aReport 72
- properties
 - column summary 49
 - group frame 55
 - hard page break 56
 - page footer 58
 - page header 58
 - record frame 61
 - report column 63
 - report display pane 66
 - report frame 68
 - report horizontal line 70
 - report printer 72
 - report text part 74

R

- record frame
 - about 11, 59
 - properties 61
 - wrap table into columns 61
- report 54, 68

- report column
 - about 10, 62
 - decimal digits 64
 - position 64
 - properties 63
 - width 63
 - word wrap 64
- Report Content parts
 - about 9
 - horizontal positioning 15
 - vertical position of text within a part 18
 - vertical positioning 18
 - word wrap 15, 18
- report display pane 65
 - about 12
 - page height 66
 - properties 66
- report footer 58
- report frame
 - about 12, 67
 - default document name 69
 - left, right, top and bottom margins 69
 - page width 69
 - properties 68
 - see also Report Structure parts 12, 67
- report header 58
- report horizontal line
 - about 10, 70
 - height 71
 - position 71
 - properties 70
 - width 71
- report printer
 - about 13, 72
 - properties 72
- Report Structure parts 10
 - horizontal positioning 14
 - see also page footer 57
 - vertical positioning 17
- report text part
 - about 10, 73
 - automatic functions 73
 - current date 73
 - current page 73
 - current time 73
 - decimal digits 75
 - position 75
 - properties 74
 - width 75
 - word wrap 75
- Report Writer parts
 - as nested parts 20
- reportCanceledý aString 68
- reportFinished 68

- reports
 - current date function 73
 - current page function 73
 - current time function 73
 - execution, order of 13
 - layout 14
 - one-pass generation 13
 - printing 72
 - printing to screen 65
- rightClicked 65
- running summary value 46
- runningValue 48
- RW.CAT 8
- RW.CAT, screen shot 8
- S**
- scripts
 - custom functions 47
 - GetEmployeeTable 25
- setName aString 68
- setGroupValue aValue 48
- setRunningValue aValue 48
- setValue aString 62, 73
- standard deviation (population n - 1) 51
- standard deviation (population n) 50
- sum 51
- T**
- tabbed 65
- text
 - alignment 40
 - alignment in column summary 51
 - alignment in report column 64
 - alignment in report text part 75
 - character box 18
 - vertical position within a part 18
- turnToPage aNumber 66
- tutorial
 - about 21
 - add a page footer 37
 - add a report footer 38
 - add a report header 38
 - build salary report 28
 - enable Turn to Page\
 - feature** 36
 - export a message 24
 - font characteristics, multiple parts 40
 - font characteristics, single part 39
 - import nested part 34
 - inspect QueryDB nested part 23
 - script, GetEmployeeTable 25
 - substitute report display pane for table pane 35
 - text alignment 40
 - update PARTS Workbench search path 22
- U**
- unit of measurement 49
- V**
- value 62, 74
- variance (population n - 1) 51
- variance (population n) 51
- vertical positioning, about 18
- visual parts
 - report display pane 65
- W**
- width
 - column summary 49
 - report column 63
 - report horizontal line 71
 - report text part 75
- word wrap
 - column summary 50
 - columns 19
 - effect on horizontal position of text 15
 - effect on vertical position of text 18
 - report column 64
 - report text part 75

