Chapter 11
Sorting and Grouping Data

Introduction

This chapter explains how to use the Sort and Group commands to sort and group data in R&R reports. With the Sort command, you can select up to 8 sort fields to determine the order in which data will be presented in a report. With the Group command, you can select up to 8 group fields to group data into categories.

The explanation of sorting and grouping in this chapter is presented in the following sections:

- ❑ Sorting Data
- ❑ Grouping Data
- ❑ Techniques for Sorting and Grouping

The first two sections of the chapter explain how to use the Sort and Group dialog boxes. The final section explains the relationship between sorting and master indexes and presents techniques for sorting and grouping with total and calculated fields.

Sorting Data

Before you select one or more sort fields, the order of your report data is determined either by the order of records in the master table or by the master index (if one has been specified). Selecting sort fields gives you complete control over the order in which data will be presented in an R&R report. The sort order you establish overrides the database or master index order.

If you select one sort field, the order of data in that field determines the report's record order. You can select additional sort fields to establish a sorting hierarchy; the number of the sort fields determines the hierarchy. The first sort field determines the highest level sort; the eighth sort field determines the lowest level sort.

For example, if you select STATE as the first sort field, CITY as the second, and COMPANY as the third, R&R sorts data first by state, then by city within each state, then by company within each city.

Selecting Sort Fields

The Database $\Rightarrow$ Sort Order command enables you to select up to 8 fields for sorting the composite records in your report. When you select a sort field, the order in which R&R arranges report records is determined by the data in the specified sort field.

For example, suppose the composite record structure includes a DESCRIPTN field. If you select DESCRIPTN as a sort field, the report data will be sorted alphabetically by the value found in the DESCRIPTN field of each composite record.

To specify sort fields:

1. Select Database $\Rightarrow$ Sort Order (or the Sort button) to display the Sort Order dialog (see Figure 11.1).
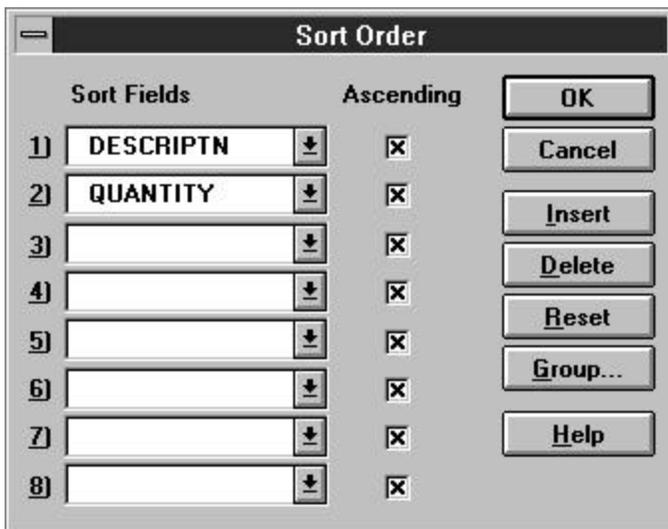
Figure 11.1 Sort Order Dialog Box

2. Open the list box for the first sort field slot. This menu displays all data fields (except memo fields) from the tables used in the report, as well as certain R&R calculated and total fields.

3. Select a field from this menu to establish the first level of sorting.

4. Select other sort fields as necessary to specify additional sort levels. If the slot where you want to add a sort level is empty, simply open the list box and select a field.

To insert a sort level between two existing sort fields, first highlight the field that's in the slot where you want to insert; then select Insert. The current sort field and those below it will be pushed down one level. The list box for the inserted slot will automatically be opened; select the sort field you want to insert at that level. Then select OK.

5. Select OK to save the new sort order.

By default, data for the field you select will be arranged in ascending order. Ascending order is alphabetical for character fields, false before true for logical fields, from most negative to most positive for numeric fields, and chronological for date fields. Descending order is the opposite of ascending order. To change to descending order, turn off the "Ascending" setting in the Sort Order column next to the selected field.

Removing or Resetting Sort Field Selections

To remove a sort field selection:

1. Select Database ⇒ Sort Order (or the Sort button).

    The Sort Order dialog box appears.

2. Highlight the sort level you want to remove; then select Delete.

    The highlighted sort selection is removed and all the levels below it are moved up.

3. Select OK to save the new sort order.

To clear *all* sort field selections, select Reset. You can then specify new sort fields or simply select OK without specifying fields.

Grouping Data

The Database ⇒ Group Order command enables you to select up to 8 fields for grouping the composite records in your report. By selecting group fields, you can organize the records in your report in up to 8 hierarchical categories. Each category can have an associated Group Header and/or Footer to identify it or to provide summary information about the records in that group.

The number of the group field determines the grouping hierarchy in your report. The first group field selection specifies the most general (most

inclusive) grouping level; the eighth group selection specifies the most specific (least inclusive) grouping level.

For example, you might want to group records in a sales report by region, state, city, and product. The report excerpt in Figure 11.2 uses these group fields to report sales at four levels of detail:

> 1 REGION (1st level)
> 2 STATE (2nd level)
> 3 CITY (3rd level)
> 4 PRODUCT (4th level)

```
              Quarterly Sales Report

             Region: Northwestern

  State      City         Product          Sales
  Alaska     Anchorage    PC Com            $999
                          PC Database       $4,470
                          PC Spreadsheet    $1,490
                                            ------
         Total Sales for Anchorage          $6,959

             Fairbanks    PC Database       $7,450
                          PC Publisher      $1,245
                          PC Spreadsheet    $1,490
                                            ------
         Total Sales for Fairbanks          $10,185

                    Alaska Sales            $17,144
                          .
                          .
                          .
      NORTHWESTERN REGION SALES             $45,859
```

Figure 11.2 Grouped Report

Note that if you do not select group fields for a report, R&R will group records according to the sort fields.

Combining Sorting and Grouping

Because your group fields are often the same as your sort fields, the sort fields you initially select automatically become your group fields. However, you can change the default group fields as necessary. In fact, you can

combine sort and group field selections to achieve considerable flexibility in organizing your report.

For example, suppose you have a database containing transactions that you want to order by date. In addition, you want to report subtotals by month. You can achieve this result by sorting the composite records by date and then grouping by month.

Note that grouping achieves the desired effect only when records are sorted in the appropriate order. In the example above, grouping by month works only if the records are in date order.

Selecting Group Fields

When you select sort fields, R&R automatically makes those fields your group fields. Using the Group Order dialog box, you can change the existing group field selections, insert or remove group fields, and specify options that control how grouped data will be presented in your report.

To add a group level to a report:

1. Select Database ⇒ Group Order, the Group button, or the Group button in the Sort dialog box to display the Group Order dialog box (see Figure 11.3).

2. If the slot in which you want to select a field for grouping is blank, select the field name from the drop-down list for that slot.

    To insert a group level above a level for which you have already selected a field, highlight the existing group level; then select the Insert button. The highlighted group level and all the levels below it are moved down, leaving a blank slot. Select a field name from the drop-down list for the blank slot.
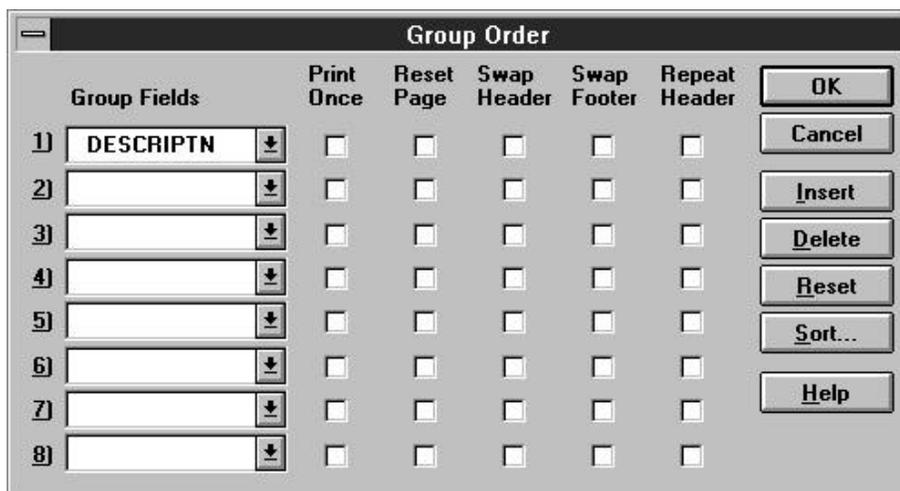
Figure 11.3 Group Order Dialog Box

3. Select OK to save the new group order.

You can specify up to 8 grouping levels on the Group Order dialog box. Once you have specified multiple group fields, you can insert or remove selections; R&R automatically adjusts the remaining group field selections.

Removing or Resetting Group Field Selections

To remove a group field selection:

1. Select Database ⟹ Group Order.

    The Group Order dialog box appears.

2. Highlight the group level you want to remove, then select Delete.

    The highlighted group level is removed and all the levels below it are moved up.

3. Select OK to save the new group order.

To clear *all* group field selections, select Reset. You can then select new group fields or simply select OK without selecting fields.

Changing Group Options

The Group Order dialog box contains the following additional options for group field selections:

❑ Print Once   ❑ Swap Footer
❑ Reset Page   ❑ Repeat Header
❑ Swap Header

By default, each of these options is Off. To turn an option On for a particular group level, click the box in the appropriate column. The following sections explain each of the group options.

Print Once

This option enables you to suppress printing of repeating data on Record lines. For example, if you are grouping a report by STATE, and the STATE field has been inserted in the Record band of the report, the same state name will print for each record in a group. By turning on Print Once, you can suppress this repetition and print the state name once only.

By default, data from a selected group field will print on every line that includes that field. To specify that the data from a group field print only once per group, turn on the Print Once option for that group level.

In the report excerpt illustrated in Figure 11.4, Print Once is Off for the customer name group field.

```
Customer Name      Item          Quantity          Amount

Joyce Adams        101             18              162.00
Joyce Adams        103             12               60.00
Joyce Adams        108             36              144.00

                                 Subtotal          366.00

Greg Anderson      102             18              177.00
Greg Anderson      104             64              192.00
```

Figure 11.4 Report with Print Once Turned Off

Figure 11.5 shows the same report with Print Once turned On.

```
Customer Name      Item          Quantity          Amount

Joyce Adams        101             18              162.00
                   103             12               60.00
                   108             36              144.00

                                 Subtotal          366.00
```

```
Greg Anderson      102            18               177.00
                   104            64               192.00
```

Figure 11.5 Report with Print Once Turned On

Reset Page

Using the Reset Page setting, you can reset the page number to 1 and start a new page for each group. For example, if you are printing a series of invoices grouped by order number and each invoice contains several pages of items ordered, you can start numbering the first page of each invoice at Page 1.

By default, R&R numbers report pages consecutively. To have R&R reset the page number to 1 after the last record of each group, turn on Reset Page for that group level; as a result, each group will automatically begin on a new page.

Swap Header

When you create a report layout that contains Group Headers, you can use the Swap Header option to print the Group Header instead of the Page Header on pages where the group changes. The Group Header created for swapping must be the same number of lines as the Page Header, since it will substitute for the Page Header on some pages. Group Header and Page Header lines should also have the same line height.

By default, R&R prints a Group Header before the first record for each group and places the Page Header at the top of each page. To print the Group Header instead of the Page Header at the top of the first page containing records for a new group, turn on Swap Header for that group level; as a result, each group will automatically begin on a new page.

For example, use the Swap Header option to print sales information grouped by region, with the region name at the top of each page on which a new region begins. By turning Swap Header on, you tell R&R to print the Group Header at the top of the first page of the group (each group will begin on a new page) and then print the Page Header at the top of each subsequent page in the group.

Swap Footer

When you create a report layout that includes Group Footers, you can use the Swap Footer option to print a Group Footer instead of the Page Footer

on each page containing the last record in a group. The Group Footer created for swapping must be the same number of lines as the Page Footer, since it will substitute for the Page Footer on some pages. Group Footer and Page Footer lines should also have the same line height.

This feature is especially useful when you are reporting on pre-printed, multi-page forms, such as invoice forms. For example, you would use this option when printing invoices that group many pages of items by order number.

In this case, for each invoice, each page but the last will contain a Page Footer that includes a page total. However, the last page of each invoice will contain the Group Footer with the total for the entire invoice.

When the Swap Footer option is off, R&R prints the Group Footer after the last record for each group and places the Page Footer at the bottom of each page. To print the Group Footer instead of the Page Footer at the bottom of the last page containing records for each group, turn on Swap Footer for that group level; as a result, each group will automatically begin on a new page.

Repeat Header

This option allows you to reprint a Group Header at the top of the page when a group continues across several pages. When this option is on, each time R&R starts a new page, it prints a Page Header, if any, and then repeats the Group Header before printing more data within the group. When this option is off, R&R prints the Group Header only once at the beginning of each group. You can use this option to reprint column headings contained in a Group Header when the data within the columns continues across pages.

Using Group Headers and Footers

R&R determines where to place Group Headers and Footers in your report based on the group fields you define. For example, if REGION is the first group field, the first-level Group Header prints before the first record for each new region; the first-level Group Footer prints after the last record for each region. In the same way, the second group field controls the placement of second-level Headers and Footers.

Each Group Header and Footer must have a corresponding group field at the same level. Without a controlling group field, R&R does not print or display Group Header and Footer lines.

The line type indicators on the R&R window show the connection between group fields and their corresponding Group Header and Footer bands. When you create a Group Header or Footer band, the line type indicator shows the Header or Footer level, followed by the group field name.
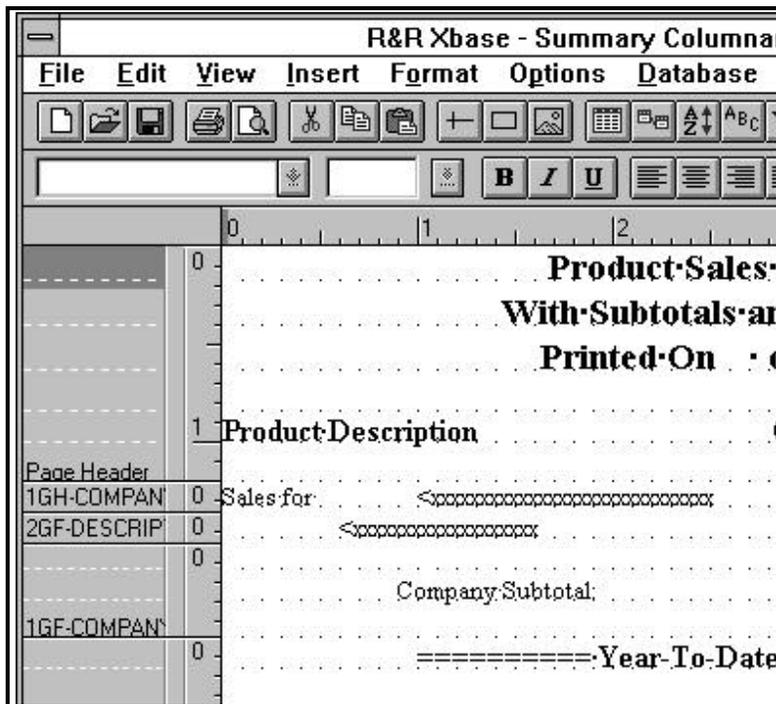
Figure 11.6 Group Field Line Indicators

For example, in the portion of the report layout shown in Figure 11.6, the 1GH_COMPANY and 1GF_COMPANY that display to the left of the Group Header and Footer bands indicate that the first-level group field COMPANY controls those Header and Footer lines. The Group Header lines print each time the value in the COMPANY field changes; the Group Footer lines print at the end of each group.

Using Group Footers enables you to include summary information (such as Company Subtotal figures) at each level of this report.

Techniques for Sorting and Grouping

You can use various techniques to obtain further control over the order of
report records. For example, you can:

❑ Use a master index instead of selecting sort fields;

❑ Sort and group on total fields;

❑ Sort and group on calculated fields.

These techniques are explained in the following sections.

Sorting with Master Indexes

You can often speed up report generation by using a master index instead
of a sort field to order records for a report. A master index determines the
order in which R&R reads the records in the master table, often eliminating
the need for any sorting. For information on using a master index, see the
explanation of Database ⇒ Master Table in Chapter 7, "Selecting Data
Files."

Sorting and Grouping with Total Fields

R&R allows you to sort and group on total fields, as long as the fields have
been designated as pre-processed.

For example, suppose you want to create an orders report that shows total
orders by state and within state, by customer. You want to list states in
order of decreasing number of orders, and within each state group, you
want to list customers in order of decreasing number of orders.

You might create this report as follows:

1. Create the report using STATE and CUSTID as your initial sort and
   group fields, so that you can create the group totals you want.

2. Create a total field called STATECNT that is a count of the
   ORDERNO field that resets on the STATE group field. This field will
   count the number of orders for each state. On the Total Field dialog,
   select Options and select "Pre-processed" as the Processing type.

3. Create a total field called CUSTCNT that is a count of the ORDERNO
   field that resets on the CUSTID group field. This field will count the
   number of orders for each customer. On the Total Field dialog, select
   Options and select "Pre-processed" as the Processing type.

4. Replace the STATE sort field with the pre-processed STATECNT total field.

5. Replace the CUSTID sort field with the pre-processed CUSTCNT total field.

Note that although your list of sort fields will be STATECNT, CUSTCNT, R&R will sort your report as if the sort fields were STATECNT, STATE, CUSTCNT, CUSTID. The STATE and CUSTID fields are implicitly included (even though they do not appear in the list of sort fields) to break ties between states that have the same number of orders and between customers that have the same number of orders.

As a general rule, when a pre-processed total field (or calculated field using a pre-processed total) is selected as sort field *n*, R&R inserts an implicit sort field between sort level *n* and *n*+1. The implicit sort field is the group field on which the total resets. If your sort field list includes several contiguous pre-processed totals that reset on the same group field, R&R inserts the implicit sort field once, after the last of the contiguous totals.

Sorting and Grouping with Calculated Fields

R&R allows you to sort and group on most calculated fields. For example, you could sort and group an orders report by month, by creating a calculated field with the expression MONTH(ORD_DATE). Using this expression as the first sort and group field in your report would enable you to sort by month, as well as create Group Headers and Footers for each month's records.

Although you can group on such fields, you *cannot* use as a sort field any calculated field that:

❑ Uses the PAGENO, RECNO, or PREVIOUS functions;
❑ Is self-referencing;
❑ Is running-total-related.

You can also sort and group on many total-related calculated fields, as long as the total fields used in the calculated field expressions have been designated as pre-processed. For example, you could sort and group a customer report by customer category, using a calculated field that assigned customers to a category based on the total dollar volume of their orders. You might create such a report as follows:

1. Create the report using CUSTID as the first sort and group field.

2. Create a total field called CUST_TOT that is a sum of the ORD_AMT field reset on the CUSTID group field. This field will sum the order amounts for each customer.

3. Use the Options setting on the New/Edit Total Fields dialog to make CUST_TOT a pre-processed total.

4. Create a calculated field called CATEGORY that assigns customers to one of three categories ("High Volume," "Moderate Volume," "Low Volume") based on the value in the CUST_TOT pre-processed total field.

    The field might have the following expression:

    ```
    IIF(CUST_TOT>50,000,"High Volume",
    IIF(CUST_TOT >= 10,000,"Moderate Volume",
    "Low Volume"))
    ```

5. Use the Sort command to replace the CUSTID sort field with the CATEGORY field. If you want to sort by customer total within this category, you could add CUST_TOT as the second level sort field.

6. Use the Group command to insert the CATEGORY field as the first group field, pushing the CUSTID field down one level.

7. Use Calculations ⇒ Total Field to edit the CUST_TOT total field so that it will continue to reset on CUSTID, which is now the *second* group field.

Although you can group on calculated fields whose expressions include *both* a pre-processed total field and a database field, you cannot select such fields as sort fields. This restriction is a result of the type of processing that produces pre-processed totals.

Sorting in Multiple-Scan Reports

When you select sort fields for multiple-scan reports (reports that scan more than one table from the same controlling table), note that fields not supplied with data by the current scan will be empty. Empty fields of this type will sort last, whether you select ascending or descending order. See Chapter 17, "Creating Multiple-Scan Reports," for more information on sorting multiple-scan reports.