ibi™ WebFOCUS®

Reporting Language Primer Guide

Version 8.2.0.5 and later | November 2024

Contents

Creating Basic Output Requests

This guide provides a foundation of the basic concepts to write reports. You use the reporting language to create all the output requests in this guide. You describe the reports that you want to produce by writing report requests. For more information on reporting features and syntax described in this guide, see the technical content for your product.

Each request contains a set of English language instructions called commands that are interpreted and implemented. The result of the request is a report or a chart. The charting syntax is similar to the reporting syntax. A chart can present the same kinds of information as a tabular report, in a wide variety of two-dimensional and three-dimensional chart types.

Creating Basic Reports

In this topic, you create elementary reports using basic building blocks common to even the most complex report requests. You learn to use:

- The TABLE FILE command. TABLE starts the reporting request. FILE identifies the data source to use in reports.
- The PRINT, LIST, SUM, and COUNT display commands to specify how to process data in a report, individually or grouped.
- Field names to identify the data to retrieve from a data source.
- The AS keyword to change column titles that are automatically provided.
- The END command to complete a report request and break the connection to the data source you named in the TABLE command. To write another request, you start with the TABLE command.
- Any text editor to create and change files called FOCEXECs. A FOCEXEC is a set of commands, in this case, reporting commands, that you can save and execute at any time. You can also edit FOCEXECs.

Types of Output Requests

You can create the following types of output requests using the reporting language syntax:

- **Tabular Report.** It displays information in rows and columns. This is the basic report type, incorporating the fundamental reporting concepts. Most of the other report formats build on these concepts. You can drill down or roll up data hierarchies, pivot fields from columns to rows or from rows to columns, and separate information by filtering or querying data sources based on specified criteria or thresholds. You can display these reports in many different formats, including HTML, Excel®, PowerPoint®, and PDF.
- **Drill-Down Report.** It enables you to create links from report data (including headings and footings), as well as graphic images (such as a company logo or product image), to other reports, procedures, URLs, or JavaScript® functions.
- **Drill-Through Report.** It enables you to create a PDF document that contains a summary report plus detail reports, where the detail reports contain all the detail data for designated fields in the summary report. Clicking a Drill-Through hyperlink navigates internally in the PDF file and no additional reports are run. Drill-Through reports are static. You can save the PDF file to disk or distribute it using ReportCaster. When opened with Acrobat® Reader, it retains its full drill-through functionality.
- **Accordion Report.** It provides an interactive interface to data aggregated at multiple levels by presenting the sort fields within an expandable tree. By default, the report will present the highest dimension or sort field (BY value) and the aggregated measures associated with each value. You can use the tree control to open or close each dimension and view the associated aggregated values. Clicking the plus sign (+) next to a sort field value opens new rows that display the next lower-level sort field values and subtotals. The lowest level sort field, when expanded, displays the aggregated data values. Accordion reports can also be created to be opened by column, instead of by row.
- **Active Technologies Report.** It is designed for offline analysis. When using an active report, you can interact with data, using analysis options similar to those found in an Excel workbook. Since no connection to a server is required to view the data or use the analysis options, you can save and use the report anywhere. Analysis options include filtering, sorting, charting, and much more.
- **Excel Compound and Table of Contents Report.** It provides a way to generate multiple worksheet reports using the XLSX output format. By default, each of the

component reports from the compound report is placed in a new Excel worksheet. A Table of Contents report generates a multiple worksheet report where a separate worksheet is generated for each value of the first sort field (BY) in the report.

- **Free-Form Report.** It presents detailed information about a single record in a form-like context that is often used with letters and forms. If your goal is to present a detailed picture of one record per report page, you can use free-form reports to position headers, footers, free text, and fields precisely on a page. You can customize your headers and footers by including fields as display variables, and incorporate prefix operators in your headers and footers to perform calculations on the aggregated values of a single field.
- **Financial Report.** It is specifically designed to handle the task of creating, calculating, and presenting financially oriented data, such as balance sheets, consolidations, and budgets. You design the content of the report on a row-by-row basis using a field, called a FOR field, that identifies each row, such as an account field. This organization provides a number of advantages, including easily defined inter-row and inter-column calculations, formatting on a cell-by-cell basis, and saving individual rows and row titles in extract files.
- **Precision Report.** It provides an additional set of tools that make it easy to control the precise placement of objects and data in the report output. With a precision report, you can quickly create a layout that is perfectly aligned for a preprinted form, such as a Bill of Sale or a tax form, and that automatically breaks out one record per report page. You can convert an existing report into a precision report or you can create a new precision report.
- **Chart Request.** It presents the same kinds of information as tabular reports, but in a wide variety of two-dimensional and three-dimensional chart types. Charts allow you to present information graphically, using such visual cues as color, size, and position to convey relationships between measures (numeric fields to be aggregated) and dimensions (categories) and to identify trends and outliers. Using the GRAPH command, you can easily transform almost any type of data into an effective chart that you can customize to suit your needs. You can link your chart to other resources, or feature conditional styling to highlight specific data in your chart. You may select from a multitude of chart styles, which include the standard chart formats, bar, line, pie, and scatter, as well as many variations on these types.

Before You Begin

The reporting language is powerful and is available on several platforms.

Note:

- The ibi™ WebFOCUS® reporting language on the Windows platform was used to create the sample output shown in this guide. If you are not using Windows, your screen and keyboard may differ slightly. The concepts of the reports, however, are the same.
- The default StyleSheet (Warm), which uses the IBIDefault font Arial for many languages, was used for the output in the examples that we show in this guide. You can change the style sheet and font in any request. For more information, see Introducing Formatting and Style Sheets.
- The syntax and images in the examples were edited to include only those portions of information that highlight the components discussed. For example, for readability purposes and consolidation of syntax, the following StyleSheet code was removed from the examples:

```
ON TABLE SET STYLE *

       TYPE=REPORT, INCLUDE=Warm.sty, $

       TYPE=DATA, BORDER=OFF, TOPGAP=.03, BOTTOMGAP=.03, $

ENDSTYLE
```

guide

- The WebFOCUS®, ibi™ WebFOCUS® App Studio, or ibi™ FOCUS® product.
- The sample data sources that are included with the product.
- A text editor.

Contact your system administrator if any of the above conditions does not exist.

Sending Instructions to the Server

Once you are in the product, you can create and issue report requests using the embedded text editor that is available in the product, or any text editor that has an option to save the file as text only.

When you use a text editor, the product does not process instructions as you enter them. Instead, you can save the entire request and run it at a different time. This saved request is called a FOCEXEC.

All language commands must be typed in uppercase text.

Identifying Data for Use in Reports

The data you use to create a report is organized into units called fields. Fields are stored in a data source. Each field has a value. For instance, a field named LAST_NAME stores the last name of an employee. LAST_NAME is the field, but each of the last names stored is a field value.

Fields are distinguished based on their functions in a request. Fields that are used for sorting and categorizing data are called dimensions. They are usually, but not always, alphanumeric fields. Fields that are used in summations and other calculations are called measures. They are usually numeric fields. Some numeric fields are not meant to be summed and are, therefore, not considered measures. For example a bank code would be considered a dimension because it would probably be used for sorting and selecting records.

A Master File describes the structure and contents of a data source. The Master File consists of statements, called declarations, that name each part of the file and describe its characteristics.

The following is the EMPLOYEE Master File for your reference.

```
FILENAME=EMPLOYEE, SUFFIX=FOC

 SEGNAME=EMPINFO,  SEGTYPE=S1

  FIELDNAME=EMP_ID,        ALIAS=EID,    FORMAT=A9,          $

  FIELDNAME=LAST_NAME,     ALIAS=LN,     FORMAT=A15,         $

  FIELDNAME=FIRST_NAME,    ALIAS=FN,     FORMAT=A10,         $

  FIELDNAME=HIRE_DATE,     ALIAS=HDT,    FORMAT=I6YMD,       $

  FIELDNAME=DEPARTMENT,    ALIAS=DPT,    FORMAT=A10,         $
  FIELDNAME=CURR_SAL,      ALIAS=CSAL,   FORMAT=D12.2M,       $
  FIELDNAME=CURR_JOBCODE,  ALIAS=CJC,    FORMAT=A3,           $
  FIELDNAME=ED_HRS,        ALIAS=OJT,    FORMAT=F6.2,         $
 SEGNAME=FUNDTRAN,  SEGTYPE=U,   PARENT=EMPINFO
  FIELDNAME=BANK_NAME,     ALIAS=BN,     FORMAT=A20,          $
  FIELDNAME=BANK_CODE,     ALIAS=BC,     FORMAT=I6S,          $
  FIELDNAME=BANK_ACCT,     ALIAS=BA,     FORMAT=I9S,          $
  FIELDNAME=EFFECT_DATE,   ALIAS=EDATE,  FORMAT=I6YMD,        $
 SEGNAME=PAYINFO,   SEGTYPE=SH1, PARENT=EMPINFO
  FIELDNAME=DAT_INC,       ALIAS=DI,     FORMAT=I6YMD,        $
  FIELDNAME=PCT_INC,       ALIAS=PI,     FORMAT=F6.2,         $
  FIELDNAME=SALARY,        ALIAS=SAL,    FORMAT=D12.2M,       $
  FIELDNAME=JOBCODE,       ALIAS=JBC,    FORMAT=A3,           $
 SEGNAME=ADDRESS,   SEGTYPE=S1,  PARENT=EMPINFO
  FIELDNAME=TYPE,          ALIAS=AT,     FORMAT=A4,           $
  FIELDNAME=ADDRESS_LN1,   ALIAS=LN1,    FORMAT=A20,          $
  FIELDNAME=ADDRESS_LN2,   ALIAS=LN2,    FORMAT=A20,          $
  FIELDNAME=ADDRESS_LN3,   ALIAS=LN3,    FORMAT=A20,          $
  FIELDNAME=ACCTNUMBER,    ALIAS=ANO,    FORMAT=I9L,          $
 SEGNAME=SALINFO,   SEGTYPE=SH1, PARENT=EMPINFO
  FIELDNAME=PAY_DATE,      ALIAS=PD,     FORMAT=I6YMD,        $
  FIELDNAME=GROSS,         ALIAS=MO_PAY, FORMAT=D12.2M,       $
 SEGNAME=DEDUCT,    SEGTYPE=S1,  PARENT=SALINFO
```

```
   FIELDNAME=DED_CODE,      ALIAS=DC,     FORMAT=A4,          $
   FIELDNAME=DED_AMT,       ALIAS=DA,     FORMAT=D12.2M,      $
  SEGNAME=JOBSEG,    SEGTYPE=KU,  PARENT=PAYINFO, CRFILE=JOBFILE,
   CRKEY=JOBCODE,$
  SEGNAME=SECSEG,    SEGTYPE=KLU, PARENT=JOBSEG,   CRFILE=JOBFILE, $
  SEGNAME=SKILLSEG,  SEGTYPE=KL,  PARENT=JOBSEG,   CRFILE=JOBFILE, $
  SEGNAME=ATTNDSEG,  SEGTYPE=KM,  PARENT=EMPINFO,  CRFILE=EDUCFILE,
   CRKEY=EMP_ID,$
  SEGNAME=COURSEG,   SEGTYPE=KLU, PARENT=ATTNDSEG, CRFILE=EDUCFILE,$
```

In order to retrieve field values for use in a report, you first identify the data source in which they are stored. You identify and access a data source using the command:

```
TABLE FILE
```

followed by the name of the data source that contains the fields you want to use. The word TABLE indicates that you want to write a report request and invokes the reporting language.

For example, in this guide, you will use the sample EMPLOYEE data source supplied with every release of the product. The reports you produce may differ from the ones you see in this guide. Although the data source names are the same, different releases of the product may include different sets of data.

To start a request and access the EMPLOYEE data source, issue the command:

```
TABLE FILE EMPLOYEE
```

The EMPLOYEE data source contains information about employees, such as names, addresses, salary, and deductions. This information is useful for creating reports on individuals or groups of employees. You start with simple requests that display employee identification numbers, names, and salaries. You gradually include more commands in your requests to produce more complex reports.

Note: TABLEF is a variation of the TABLE command that provides a fast method of retrieving data that is already stored in the order required for printing and requires no additional sorting. Using TABLEF, records are retrieved in the logical sequence from the data source. TABLEF is limited in functionality in comparison to TABLE.

Now that you have issued the TABLE FILE EMPLOYEE command, you include instructions that retrieve information for inclusion in reports. Before you begin, you might want to display a list of fields stored in the EMPLOYEE data source.

Issue the following commands from a text editor:

```
?F

END
```

Depending on your platform, the list of fields may include asterisks, instead of blanks, to separate different groups of related fields.

```
FILENAME=EMPLOYEE

 EMPINFO.EMP_ID              LAST_NAME     FIRST_NAME    HIRE_DATE

 DEPARTMENT    CURR_SAL      CURR_JOBCODE  ED_HRS

 BANK_NAME     BANK_CODE     BANK_ACCT     EFFECT_DATE

 DAT_INC       PCT_INC       SALARY        PAYINFO.JOBCODE

 TYPE          ADDRESS_LN1   ADDRESS_LN2   ADDRESS_LN3   ACCTNUMBER

 PAY_DATE      GROSS

 DED_CODE      DED_AMT

 JOBSEG.JOBCODE              JOB_DESC

 SEC_CLEAR

 SKILLS        SKILL_DESC

 DATE_ATTEND   ATTNDSEG.EMP_ID

 COURSE_CODE   COURSE_NAME
```

Note: All references to field names in this guide assume that field names are unique within the data source structure. If field names are NOT unique, field names can be qualified as follows:

```
FILENAME.fieldname
```

```
SEGNAME.fieldname
```

```
FILENAME.SEGNAME.fieldname
```

In the above field list, the EMP_ID and JOBCODE fields are qualified to indicate which field name instance is being referenced.

Presenting Data Values: Verbs

You can present data in the reporting language using a choice of four display commands, commonly called verbs. You can use one or more verbs in a single request. Using multiple verbs in a single request is explained in Advanced Features. Each verb, PRINT, LIST, SUM, and COUNT, displays data in a unique way.

The following display commands display each record:

- PRINT displays individual data.
- LIST displays individual data in a numbered list.

The following display commands process multiple records:

- SUM returns a single value, typically the sum total.
- COUNT counts and displays the number of data occurrences.

Displaying Field Values: PRINT

The PRINT command displays all the values for each field you specify. The values retrieved for each field appear in a column. The PRINT command, by default, uses the field name or the value for the TITLE attribute in the Master File to name each column. The columns automatically display in the same order you request them when you use PRINT.

To create a report request that displays employee identification numbers (EMP_ID field), last names (LAST_NAME field), and salaries (CURR_SAL field), issue the following request:

```
TABLE FILE EMPLOYEE

PRINT EMP_ID LAST_NAME CURR_SAL
```

To complete the request and run it, issue the following command on a line by itself:

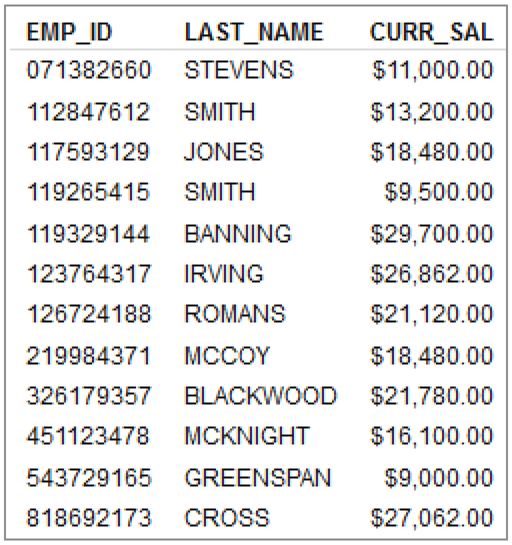
```
END
```

You must always type the END command on its own line. When you use END to complete a request, you are indicating that you are finished using the data source you identified in the request, in this case, EMPLOYEE. Therefore, in order to start another request, you must identify the data source again using the TABLE FILE command.

To see statistics after running a request, such as the number of records retrieved and how many lines appear on the report, you can use the Message Viewer or Session Viewer, depending on the product you are using. This output is not displayed for every example in this guide. The information is shown below:

```
NUMBER OF RECORDS IN TABLE=        12  LINES=      12
```

Run the request. The output is:



EMP_ID	LAST_NAME	CURR_SAL
071382660	STEVENS	$11,000.00
112847612	SMITH	$13,200.00
117593129	JONES	$18,480.00
119265415	SMITH	$9,500.00
119329144	BANNING	$29,700.00
123764317	IRVING	$26,862.00
126724188	ROMANS	$21,120.00
219984371	MCCOY	$18,480.00
326179357	BLACKWOOD	$21,780.00
451123478	MCKNIGHT	$16,100.00
543729165	GREENSPAN	$9,000.00
818692173	CROSS	$27,062.00

The report you produce shows field values displayed in columns from left to right in the same order in which you specified them in your request. Each column uses the field name or the value for the TITLE attribute in the Master File as its title. You can also specify edit options, such as date formats, floating dollar signs, commas, and zero suppression. Notice that alphanumeric data is left-justified and numeric data is right-justified.

Alphanumeric data consists of characters and/or digits that cannot be used in calculations. For example, the EMP_ID field consists of only numbers, yet the numbers are not the type you use in calculations. Therefore, the data stored in EMP_ID is alphanumeric.

Numeric data, which include decimal and integer values, contain numbers for use in calculations. Field formats identify the type of data a field stores. You see that there is no apparent order to the values in this report. You learn how to organize, or sort values in Sorting Records.

Correcting Errors

When you run a request, error messages display when you make mistakes. Mistakes can be typos or using the wrong command format. To see an example of an error message, type the same request you just entered. But this time, include a typo by typing PRINTE, instead of PRINT.

The following message displays:

```
ERROR AT OR NEAR LINE      2  IN PROCEDURE procedure_name

(FOC002) A WORD IS NOT RECOGNIZED: PRINTE
```

Correct the word PRINT to fix the typo.

Listing Field Values: LIST

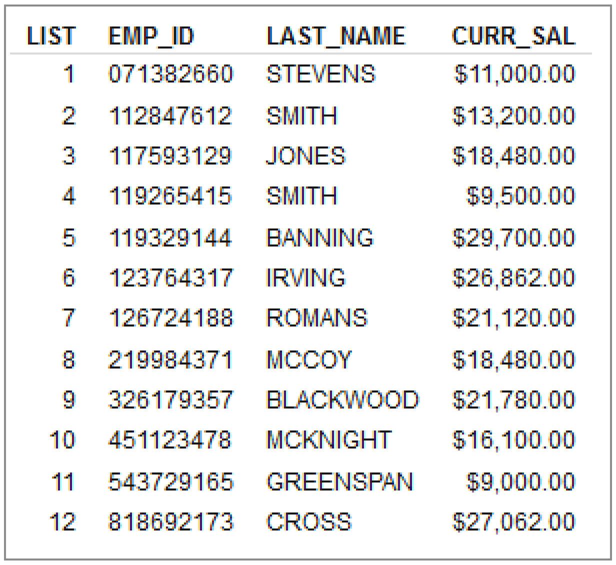
If you want to display the values for the field or fields you request in a numbered list, use LIST instead of PRINT. The LIST command numbers each row of data.

Issue the previous request, but use LIST instead of PRINT.

```
TABLE FILE EMPLOYEE
```

```
LIST EMP_ID LAST_NAME CURR_SAL

END
```

Run the request. The output is:



```
LIST  EMP_ID     LAST_NAME    CURR_SAL
   1  071382660  STEVENS     $11,000.00
   2  112847612  SMITH       $13,200.00
   3  117593129  JONES       $18,480.00
   4  119265415  SMITH        $9,500.00
   5  119329144  BANNING     $29,700.00
   6  123764317  IRVING      $26,862.00
   7  126724188  ROMANS      $21,120.00
   8  219984371  MCCOY       $18,480.00
   9  326179357  BLACKWOOD   $21,780.00
  10  451123478  MCKNIGHT    $16,100.00
  11  543729165  GREENSPAN    $9,000.00
  12  818692173  CROSS       $27,062.00
```

Notice that there is an additional column titled LIST, which includes a number for each row in the report. The contents and order of the columns remain the same. The only difference is that the LIST numbered each row for you.

Adding Field Values: SUM

The SUM command adds the values of numeric fields. Because SUM acts on multiple records, it is known as an aggregating verb. If you use SUM with an alphanumeric field, only the last value retrieved for that field is displayed, by default. A command you can use interchangeably with SUM is WRITE. SUM is used in our examples.

Unlike PRINT and LIST, which display individual field values, SUM uses the values to create new information.

Issue the following request:

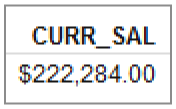
```
TABLE FILE EMPLOYEE

SUM CURR_SAL
```

```
END
```

Look at the statistics for this report. Even though there are 12 records, only one line of information is produced:

```
NUMBER OF RECORDS IN TABLE=       12  LINES=      1
```

Run the request. The output is:



```
  CURR_SAL
$222,284.00
```

SUM adds the values for CURR_SAL and produces one line of aggregated data, not individual values. This is why 12 records were retrieved, but only one line of data is displayed.

Counting Field Values: COUNT

The COUNT command, like SUM, is an aggregating verb. It uses data you select to create new information. The difference is that COUNT tells you the number of occurrences of values that exist for a field, instead of calculating the summed value. The values counted do not have to be unique. By default, the result of COUNT is limited to five (5) digits.

COUNT has the same effect on both alphanumeric and numeric fields. You can see how COUNT differs from SUM when you compare the following request and report to the ones you produced using SUM.

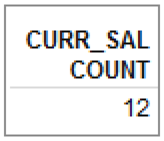
Issue the following request:

```
TABLE FILE EMPLOYEE

COUNT CURR_SAL

END
```

Once again, the statistics indicate that the number of records exceeds the number of lines in the report.

```
NUMBER OF RECORDS IN TABLE=        12  LINES=      1
```

Run the request. The output is:



CURR_SAL COUNT
12

You have just completed several requests that show you the differences among the four verb commands available to you. Although the sample requests in this guide use one verb command at a time, you can use up to 64 verbs in a single request. A brief description of a multi-verb request in included in Advanced Features.

Manipulating Display Fields With Display Options

Display options may be used to edit formats. These options only affect how the data in the field is printed or appears on the screen, not how it is stored in your data source.

The following table describes the display options that you can use to edit the display of numeric formats. For more information on display options for alphanumeric, currency, date and time fields, see the *Describing Data With WebFOCUS Language* manual for your product.

Edit Option	Meaning	Effect
`-`	Minus sign	It displays a minus sign to the right of negative numeric data.
`%`	Percent sign	It displays a percent sign (%), along with numeric data. It does not calculate the percent.
`p`	Percentage	It converts a number to a percentage by multiplying it by 100, and displays it followed by a percent sign (%).

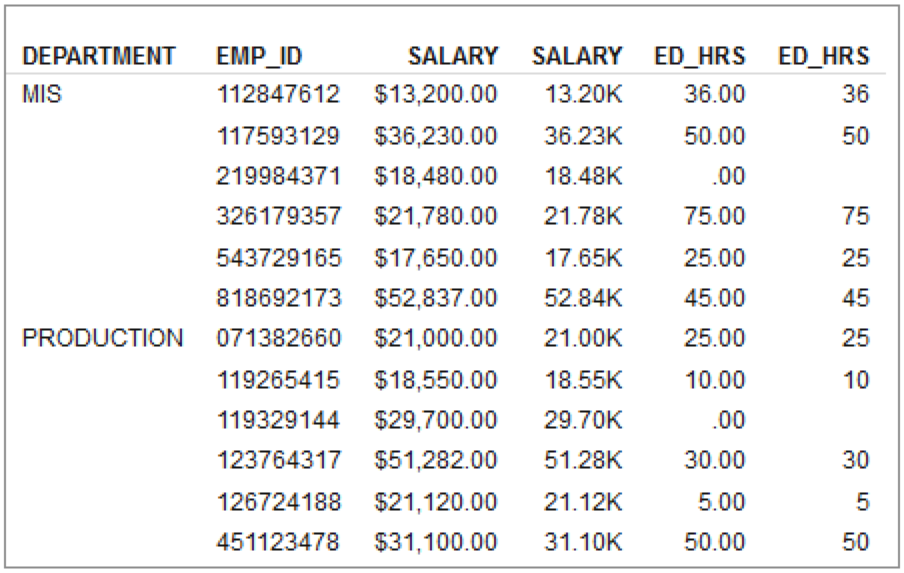
Edit Option	Meaning	Effect
A	Negative suppression	It displays the absolute value of the number, but does not affect the stored value.
a	Automatic abbreviation	It calculates the appropriate abbreviation (K, M, B, or T) to use for displaying the number based on the magnitude of the number. This option uses the appropriate abbreviation for the specific value on the current row and, therefore, each row may have a different abbreviation. For example, 1234567890 is displayed as 1.23B, while 1234567890000 displays as 1.23T.
b	Billions abbreviation	It displays numeric values in terms of billions. For example, 1234567890 displays as 1.23B.
B	Bracket negative	It encloses negative numbers in parentheses.
c	Comma suppress	It suppresses the display of commas. It is used with numeric format options M and N (floating and non-floating dollar sign) and data format D (floating-point double-precision).
C	Comma edit	It inserts a comma after every third significant digit, or a period instead of a comma if continental decimal notation is in use.
E	Scientific notation	It displays only significant digits.

Edit Option	Meaning	Effect
`k`	Thousands abbreviation	It displays numeric values in terms of thousands. For example, 12345 displays as 12.35K.
`L`	Leading zeroes	It adds leading zeroes.
`m`	Millions abbreviation	It displays numeric values in terms of millions. For example, 1234567 displays as 1.23M.
`M`	Floating currency symbol ($ for US code page)	It places a floating currency symbol to the left of the highest significant digit. The default currency symbol depends on the code page.
`N`	Fixed currency symbol ($ for US code page)	It places a currency symbol to the left of the field. The symbol appears only on the first detail line of each page.
`R`	Credit (CR) negative	It places CR after negative numbers.
`S`	Zero suppress	If the data value is zero, it prints a blank in its place.
`t`	Trillions abbreviation	It displays numeric values in terms of trillions. For example, 1234567890000 is displayed as 1.23T.

The following request uses the numeric abbreviation option *k* on the SALARY field, displaying two decimal places. The request also changes the ED_HRS field to an integer format and suppresses values equal to zero (0).

```
TABLE FILE EMPLOYEE

SUM SALARY SALARY/D6.2k ED_HRS ED_HRS/I2S

BY DEPARTMENT

BY EMP_ID

END
```

Run the request. The output is:



```
DEPARTMENT  EMP_ID          SALARY   SALARY   ED_HRS  ED_HRS
MIS         112847612   $13,200.00   13.20K    36.00      36
            117593129   $36,230.00   36.23K    50.00      50
            219984371   $18,480.00   18.48K      .00
            326179357   $21,780.00   21.78K    75.00      75
            543729165   $17,650.00   17.65K    25.00      25
            818692173   $52,837.00   52.84K    45.00      45
PRODUCTION  071382660   $21,000.00   21.00K    25.00      25
            119265415   $18,550.00   18.55K    10.00      10
            119329144   $29,700.00   29.70K      .00
            123764317   $51,282.00   51.28K    30.00      30
            126724188   $21,120.00   21.12K     5.00       5
            451123478   $31,100.00   31.10K    50.00      50
```

Manipulating Display Fields With Prefix Operators

You can use prefix operators to perform calculations directly on the values of aggregated fields. Each prefix operator is applied to a single field, and affects only that field.

The syntax is:

```
{SUM|COUNT} prefix.fieldname
```

The following table lists prefix operators and describes the function of each.

Prefix	Function
`ASQ.`	It computes the average sum of squares for standard deviation in statistical analysis.
`AVE.`	It computes the average value of the field.
`AVE.DST.`	It averages the distinct values within a field.
`CNT.`	It counts the number of occurrences of the field, even if used with the SUM verb. The data type of the result is always an integer.
`CNT.DST.`	It counts the number of distinct values within a field.
`CT.`	It produces a cumulative total of the field. This operator can be used only in subfoots.
`DST.`	It determines the total number of distinct values in a single pass of a data source.
`FST.`	It generates the first physical instance of the field and can be used with numeric or text fields.
`LST.`	It generates the last physical instance of the field and can be used with numeric or text fields.
`MAX.`	It generates the maximum value of the field.
`MDE.`	It computes the mode of the field values.

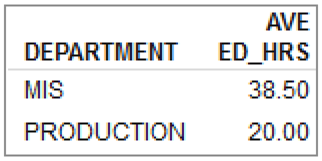
Prefix	Function
`MDN.`	It computes the median of the field values.
`MIN.`	It generates the minimum value of the field.
`PCT.`	It computes a field percentage based on the total value for the field. The PCT operator can be used with detail, as well as summary fields.
`PCT.CNT.`	It computes a field percentage based on the number of instances found. The format of the result is always F6.2.
`RNK.`	It ranks the instances of a BY sort field in the request. It can be used in PRINT commands, COMPUTE commands, and IF or WHERE TOTAL tests.
`ROLL.`	It recalculates values on summary lines using the aggregated values from lower-level summary lines.
`RPCT.`	It computes a field percentage based on the total values for the field across a row.
`ST.`	It produces a subtotal value of the field at a sort break in the report. This operator can be used only in subfoots.
`SUM.`	It sums the field values, even if used with the COUNT verb.
`SUM.DST.`	It sums the distinct values within a field.
`TOT.`	It totals the field values for use in a heading (includes footings, subheads, and subfoots).

AVE. Prefix Operator

To calculate the average number of education hours spent in each department, issue the following request:

```
TABLE FILE EMPLOYEE

SUM AVE.ED_HRS BY DEPARTMENT

END
```

Run the request. The output is:



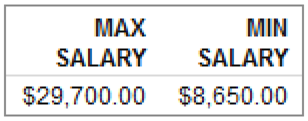
```
                    AVE
DEPARTMENT       ED_HRS
MIS               38.50
PRODUCTION        20.00
```

MAX. and MIN. Prefix Operators

To calculate the maximum and minimum values of SALARY, issue the following request:

```
TABLE FILE EMPLOYEE

SUM MAX.SALARY AND MIN.SALARY

END
```

Run the request. The output is:



```
       MAX         MIN
    SALARY      SALARY
$29,700.00   $8,650.00
```

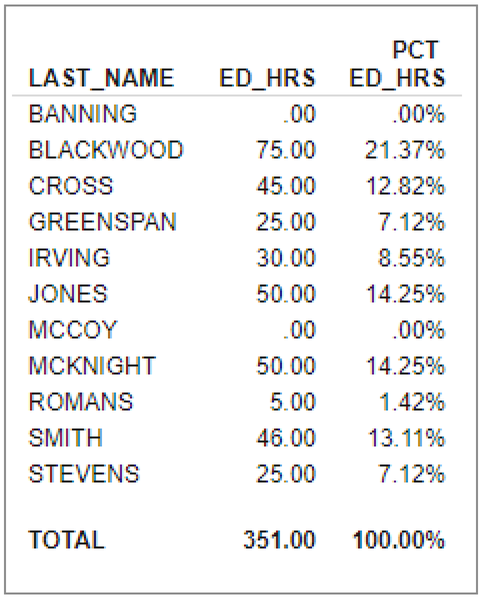
PCT. Prefix Operator

To calculate the percentage that a field makes up of the column total value. For example, to calculate each employee's share of education hours, issue the following request:

```
TABLE FILE EMPLOYEE

SUM ED_HRS PCT.ED_HRS BY LAST_NAME

ON TABLE COLUMN-TOTAL
```

```
END
```

Run the request. The output is:



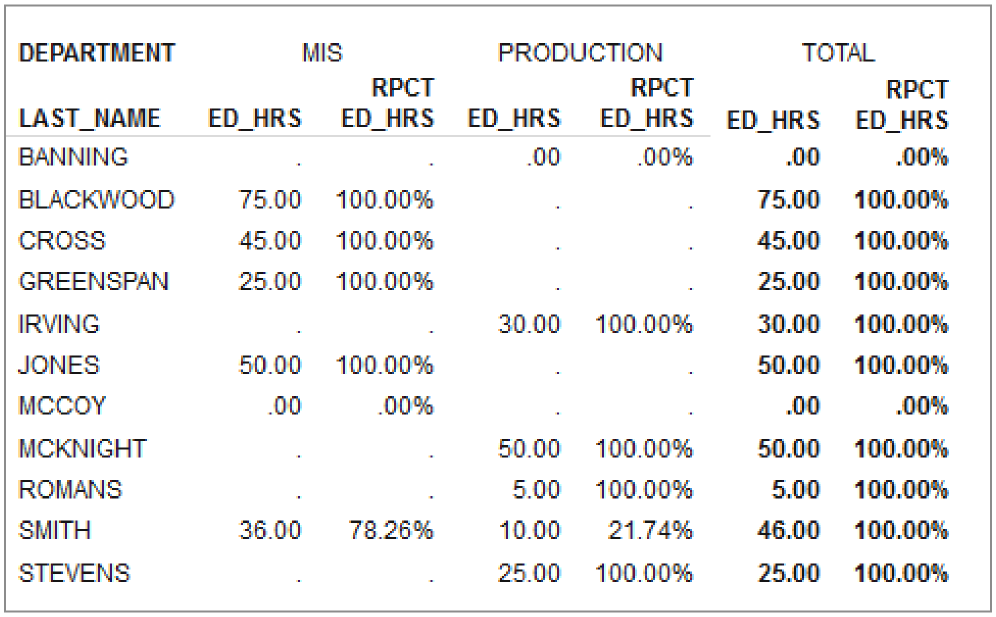
```
                             PCT
LAST_NAME     ED_HRS      ED_HRS
BANNING          .00        .00%
BLACKWOOD      75.00      21.37%
CROSS          45.00      12.82%
GREENSPAN      25.00       7.12%
IRVING         30.00       8.55%
JONES          50.00      14.25%
MCCOY            .00        .00%
MCKNIGHT       50.00      14.25%
ROMANS          5.00       1.42%
SMITH          46.00      13.11%
STEVENS        25.00       7.12%

TOTAL         351.00     100.00%
```

RCPT. Prefix Operator

To calculate the total education hours (ED_HRS column) and the percentage that the total makes up in relation to the sum of all education hours (RPCT.ED_HRS) for each employee within the department, issue the following request:

```
TABLE FILE EMPLOYEE

SUM ED_HRS RPCT.ED_HRS ROW-TOTAL BY LAST_NAME

ACROSS DEPARTMENT

END
```

Run the request. The output is:



DEPARTMENT	MIS		PRODUCTION		TOTAL	
LAST_NAME	ED_HRS	RPCT ED_HRS	ED_HRS	RPCT ED_HRS	ED_HRS	RPCT ED_HRS
BANNING	.	.	.00	.00%	**.00**	**.00%**
BLACKWOOD	75.00	100.00%	.	.	**75.00**	**100.00%**
CROSS	45.00	100.00%	.	.	**45.00**	**100.00%**
GREENSPAN	25.00	100.00%	.	.	**25.00**	**100.00%**
IRVING	.	.	30.00	100.00%	**30.00**	**100.00%**
JONES	50.00	100.00%	.	.	**50.00**	**100.00%**
MCCOY	.00	.00%	.	.	**.00**	**.00%**
MCKNIGHT	.	.	50.00	100.00%	**50.00**	**100.00%**
ROMANS	.	.	5.00	100.00%	**5.00**	**100.00%**
SMITH	36.00	78.26%	10.00	21.74%	**46.00**	**100.00%**
STEVENS	.	.	25.00	100.00%	**25.00**	**100.00%**

SUM and COUNT in the Same Request

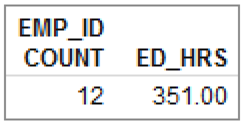
To count the occurrences of EMP_ID and sum the value of ED_HRS, issue either of the following requests:

```
TABLE FILE EMPLOYEE

SUM CNT.EMP_ID AND ED_HRS

END
```

or

```
TABLE FILE EMPLOYEE

COUNT EMP_ID AND SUM.ED_HRS

END
```

Run the request. The output is:



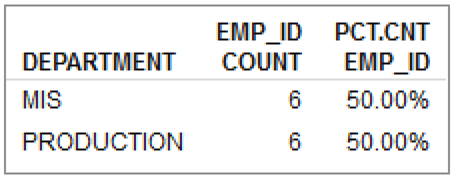
EMP_ID COUNT	ED_HRS
12	351.00

PCT.CNT. Prefix Operator

To count the occurrences of EMP_ID and the relative percentage of the values in the EMP_ ID field for each department, issue the following request:

```
TABLE FILE EMPLOYEE

SUM CNT.EMP_ID PCT.CNT.EMP_ID

BY DEPARTMENT

END
```

Run the request. The output is:



DEPARTMENT	EMP_ID COUNT	PCT.CNT EMP_ID
MIS	6	50.00%
PRODUCTION	6	50.00%

CNT.DST. Prefix Operator

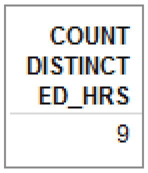
To count the number of unique ED_HRS values, issue either of the following requests:

```
TABLE FILE EMPLOYEE

SUM CNT.DST.ED_HRS

END
```

or

```
TABLE FILE EMPLOYEE

COUNT DST.ED_HRS

END
```

Run the request. The output is:



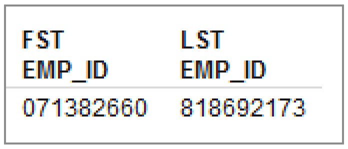
COUNT DISTINCT ED_HRS
9

FST. and LST. Prefix Operators

To retrieve the first and last logical record in the EMP_ID field, issue the following request:

```
TABLE FILE EMPLOYEE

SUM FST.EMP_ID LST.EMP_ID

END
```

Run the request. The output is:



```
FST         LST
EMP_ID      EMP_ID
071382660   818692173
```

Manipulating Display Field Values in a Sort Group

You can use the WITHIN phrase to manipulate display field values as they are aggregated within a sort group. This technique can be used with a prefix operator to perform calculations on a specific aggregate field within a subset of all data.

The WITHIN phrase requires a BY phrase and/or an ACROSS phrase. A maximum of two WITHIN phrases can be used for each display field. If one WITHIN phrase is used, it must act on a BY phrase. If two WITHIN phrases are used, the first must act on a BY phrase and the second on an ACROSS phrase.

You can also use WITHIN TABLE, which allows you to return the original value within a request command. The WITHIN TABLE command can also be used when an ACROSS phrase is needed without a BY phrase. Otherwise, a single WITHIN phrase requires a BY phrase.

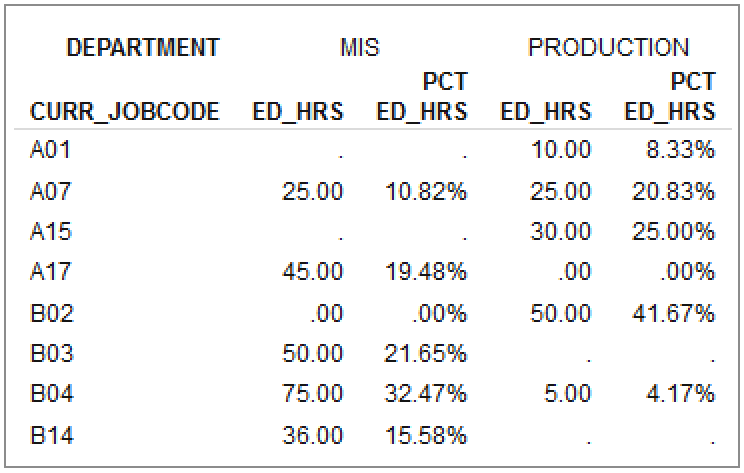
The basic format of the WITHIN command is:

```
field WITHIN {by_field|TABLE} [WITHIN across_field]
```

To display the gross salary and the percent of gross salary by job code within each department, issue the following request:

```
TABLE FILE EMPLOYEE

SUM ED_HRS PCT.ED_HRS WITHIN TABLE WITHIN DEPARTMENT

BY CURR_JOBCODE

ACROSS DEPARTMENT

END
```

Run the request. The output is:



DEPARTMENT	MIS		PRODUCTION	
CURR_JOBCODE	ED_HRS	PCT ED_HRS	ED_HRS	PCT ED_HRS
A01	.	.	10.00	8.33%
A07	25.00	10.82%	25.00	20.83%
A15	.	.	30.00	25.00%
A17	45.00	19.48%	.00	.00%
B02	.00	.00%	50.00	41.67%
B03	50.00	21.65%	.	.
B04	75.00	32.47%	5.00	4.17%
B14	36.00	15.58%	.	.

Note: Prefix operators, except for CNT. (I5) and PCT.CNT. (F6.2) use the format of the referenced field.

Naming Columns: Field Names and AS

In order to include data in a report, you need to identify which fields you want to retrieve from the data source. You identify which fields you want to include using the appropriate field names.

Fields have different formats. Two types of formats we use in our examples are alphanumeric and numeric.

Alphanumeric fields contain characters and/or digits. Even if the field contains only digits, it cannot be used in calculations. For example, social security numbers or zip codes are not used in mathematical calculations.

Numeric fields, which include decimal and integer formats, contain numbers for use in calculations.

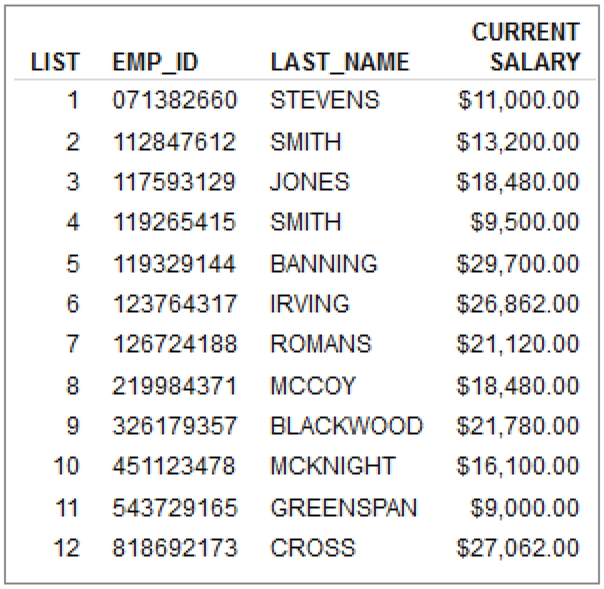
Each field name or TITLE attribute in the Master File serves as a title for the column it produces and sets the width for that column. If the length of a particular field value is greater than the field name, the column is automatically sized to be as wide as the field length.

When you write a report request, you can include a keyword called AS that changes the default column title. Since field names are used as titles for columns, type AS next to the field name for which you want to provide a new column title. Then, type the new title after AS and enclose it in single quotation marks ('). If you want more than a one-line title, use a comma (,) to indicate where each new line begins. You can include up to 16 lines in your column titles.

To produce a two-line title, issue the following request:

```
TABLE FILE EMPLOYEE

LIST EMP_ID LAST_NAME CURR_SAL AS 'CURRENT,SALARY'

END
```

Run the request. The output is:



LIST	EMP_ID	LAST_NAME	CURRENT SALARY
1	071382660	STEVENS	$11,000.00
2	112847612	SMITH	$13,200.00
3	117593129	JONES	$18,480.00
4	119265415	SMITH	$9,500.00
5	119329144	BANNING	$29,700.00
6	123764317	IRVING	$26,862.00
7	126724188	ROMANS	$21,120.00
8	219984371	MCCOY	$18,480.00
9	326179357	BLACKWOOD	$21,780.00
10	451123478	MCKNIGHT	$16,100.00
11	543729165	GREENSPAN	$9,000.00
12	818692173	CROSS	$27,062.00

Notice the new column title in this report. Each time you want to change a title, simply include another AS keyword after the appropriate field name.

Creating a Stored Request

A request stored in a file is called a FOCEXEC. A FOCEXEC stores the request commands as straight text. No formatting or other codes, such as those created by many word processors, can be included in it. When you execute the FOCEXEC, the commands are read from the file, line by line.

You can create a FOCEXEC by using the embedded text editor or any text editor that has an option to save the file as text only. The file extension for a FOCEXEC is .fex.

Note: If you are using the WebFOCUS® App Studio GUI tools to create a request, you can view and edit the underlying syntax using the Text Editor tab. For more information, see the *ibi™ WebFOCUS® App Studio User's Manual*.

Sorting Records

In the first chapter, you learned how to write simple report requests that print, add up, or count records from your data source. You can add details to a report by sorting the records that are retrieved by using the data from another field, called a sort field.

Sorting reorganizes the records in a report in the order of the values found in the sort field. For example, you can put names into alphabetic order or add up salaries by department.

Sorting the Rows of a Report Down the Page

The simplest report requests either print or add up all the records in the data source. The report has one line for each record retrieved or one line displaying the total for each numeric field.

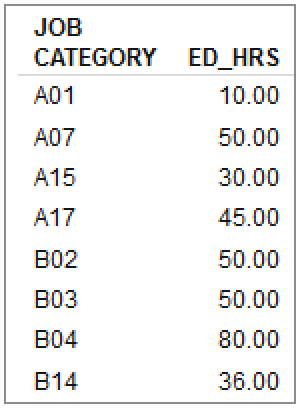
You can reorganize the way the records are printed by sorting them using the data found in another field. To do this, you type the keyword BY followed by the name of the field you want to sort, the sort field.

For example, issue a report request that adds up the hours spent in the classroom for each job category in the data source. Classroom hours are stored in the field ED_HRS. Job categories are stored in the field CURR_JOBCODE. Use AS to rename the column title the sort field CURR_JOBCODE creates.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM ED_HRS

BY CURR_JOBCODE AS 'JOB,CATEGORY'

END
```

Run the request. The output is:



JOB CATEGORY	ED_HRS
A01	10.00
A07	50.00
A15	30.00
A17	45.00
B02	50.00
B03	50.00
B04	80.00
B14	36.00

If you execute this request without using BY, a single number displays, which represents the total number of classroom hours for the entire data source. However, the report now shows the total number of classroom hours logged in each job category. You could just as easily analyze the numbers by department or by employee.

Notice how sorting affects the output of the request. A total for each job category retrieved from the data source is produced. The sort order is low to high, by default.

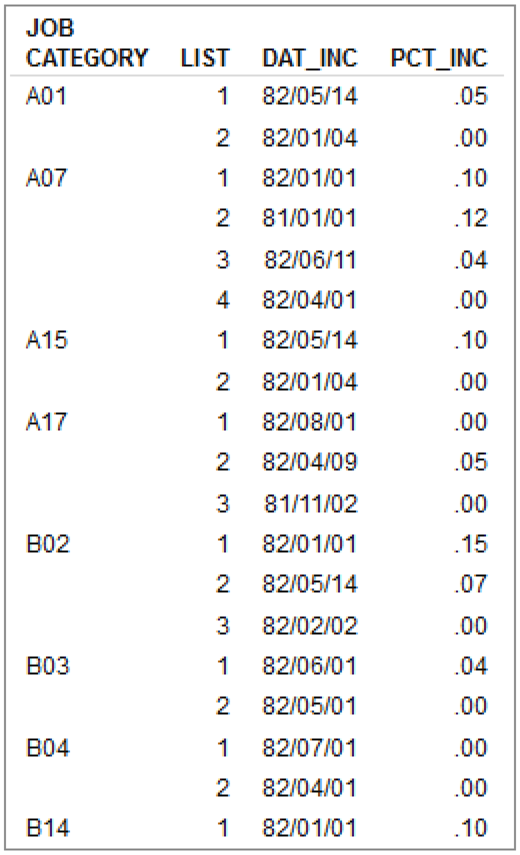
Now use the verb LIST with a sort phrase. When you list records, they are printed next to their corresponding sort field value and the list counter is set to one (1) each time the value for the first sort field specified in the request changes.

For example, issue a report request that lists the date and percent of salary increases associated with each job category in the data source. The increase date is stored in the field DAT_INC and the percentage increase is stored in the field PCT_INC.

Issue the following request:

```
TABLE FILE EMPLOYEE

LIST DAT_INC PCT_INC

BY CURR_JOBCODE AS 'JOB,CATEGORY'

END
```

Run the request. The output is:



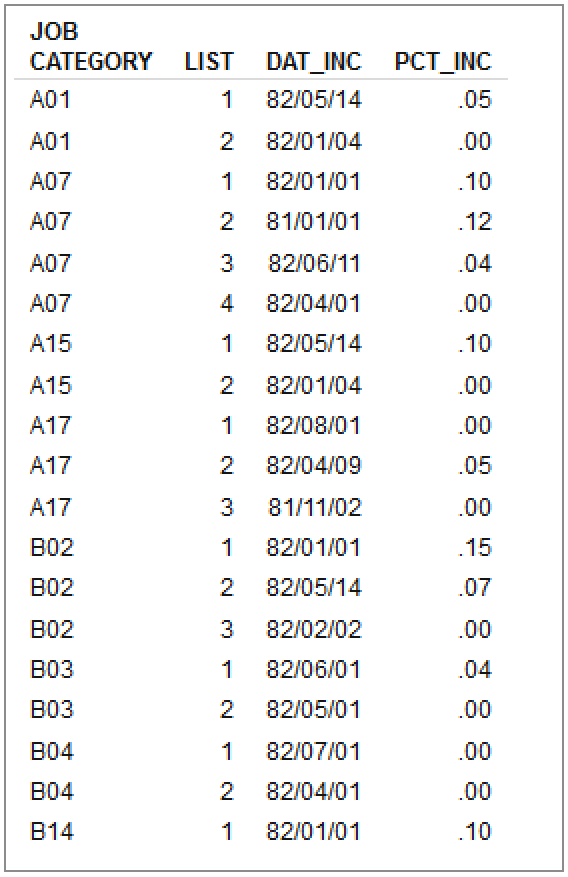
JOB CATEGORY	LIST	DAT_INC	PCT_INC
A01	1	82/05/14	.05
	2	82/01/04	.00
A07	1	82/01/01	.10
	2	81/01/01	.12
	3	82/06/11	.04
	4	82/04/01	.00
A15	1	82/05/14	.10
	2	82/01/04	.00
A17	1	82/08/01	.00
	2	82/04/09	.05
	3	81/11/02	.00
B02	1	82/01/01	.15
	2	82/05/14	.07
	3	82/02/02	.00
B03	1	82/06/01	.04
	2	82/05/01	.00
B04	1	82/07/01	.00
	2	82/04/01	.00
B14	1	82/01/01	.10

Note: By default, a sort field value displays only on the first row or column of the set of detail rows or columns generated for that sort field value. If you want the sort field values to display for every row, issue the SET BYDISPLAY = ON or ON TABLE SET BYDISPLAY ON command in your request.

Issue the following request:

```
TABLE FILE EMPLOYEE

LIST DAT_INC PCT_INC

BY CURR_JOBCODE AS 'JOB,CATEGORY'

ON TABLE SET BYDISPLAY ON

END
```

Run the request. The output is:



JOB CATEGORY	LIST	DAT_INC	PCT_INC
A01	1	82/05/14	.05
A01	2	82/01/04	.00
A07	1	82/01/01	.10
A07	2	81/01/01	.12
A07	3	82/06/11	.04
A07	4	82/04/01	.00
A15	1	82/05/14	.10
A15	2	82/01/04	.00
A17	1	82/08/01	.00
A17	2	82/04/09	.05
A17	3	81/11/02	.00
B02	1	82/01/01	.15
B02	2	82/05/14	.07
B02	3	82/02/02	.00
B03	1	82/06/01	.04
B03	2	82/05/01	.00
B04	1	82/07/01	.00
B04	2	82/04/01	.00
B14	1	82/01/01	.10

Sorting on Several Fields

You can show more details by sorting on additional fields. You name each field with its own sort phrase. A report can have up to 128 sort phrases.

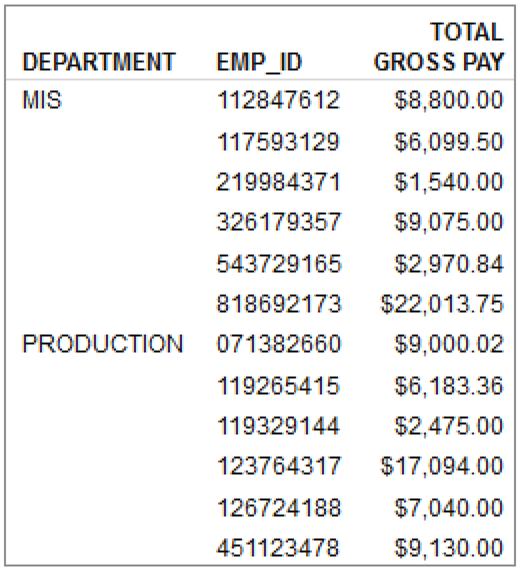
For example, issue a report request that summarizes the gross salary payments for the employees in each department. This data is stored in the fields GROSS, DEPARTMENT, and EMP_ID.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM GROSS AS 'TOTAL,GROSS PAY'

BY DEPARTMENT

BY EMP_ID
```

```
END
```

Run the request. The output is:



```
                                    TOTAL
DEPARTMENT    EMP_ID           GROSS PAY
MIS           112847612        $8,800.00
              117593129        $6,099.50
              219984371        $1,540.00
              326179357        $9,075.00
              543729165        $2,970.84
              818692173       $22,013.75
PRODUCTION    071382660        $9,000.02
              119265415        $6,183.36
              119329144        $2,475.00
              123764317       $17,094.00
              126724188        $7,040.00
              451123478        $9,130.00
```

When you name several fields as sort fields, the first sort field named in the request appears on the left-hand side of the report. In this case it is the DEPARTMENT field. This field is called the highest order or primary sort field. The next sort field named appears to its right and is called a low order or secondary sort field. In this case it is the EMP_ID field. Sort fields appear on the report from left to right in the same order they are specified in the request. Note that the GROSS PAY values include dollar sign ($) and comma (,) edit options.

Sorting Information Across the Page

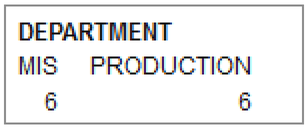
Just as you can sort data down the page, you can sort data across the page using the keyword ACROSS.

When you use ACROSS, you produce a column for each unique value in the sort field. For example, if you have a field named QUARTER that contains the values FIRST, SECOND, THIRD, and FOURTH, then using ACROSS QUARTER produces four columns.

To count the number of employees in each department, issue the following request:

```
TABLE FILE EMPLOYEE

COUNT EMP_ID

ACROSS DEPARTMENT

END
```

Run the request. The output is:



```
DEPARTMENT
MIS   PRODUCTION
  6            6
```

Notice the column titles in this report. In Creating Basic Output Requests, you learned that the field named by a verb command is used as a column title. This is not the case for this report. You do not see a column title for the field EMP_ID anywhere. This happens when you use ACROSS in a request that uses only one field after the verb. In this example, the single field is EMP_ID.

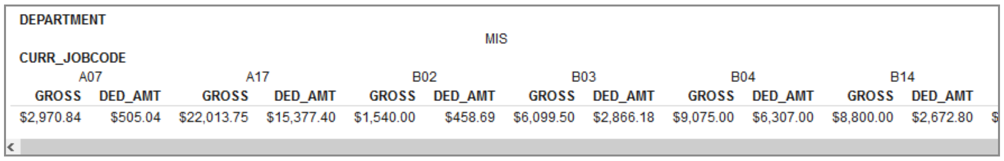
As with BY, you can enter more than one ACROSS in a report request. You can include up to 128.

Also, when the verb in a report request names more than one field, each of the fields is repeated for each value in the ACROSS phrase.

To sum the gross salary and deductions for each of the job categories in each department, issue the following request:

```
TABLE FILE EMPLOYEE

SUM GROSS DED_AMT

ACROSS DEPARTMENT

ACROSS CURR_JOBCODE

END
```

Run the request. The output is:



DEPARTMENT											
MIS											
CURR_JOBCODE											
A07		A17		B02		B03		B04		B14	
GROSS	DED_AMT	GROSS	DED_AMT	GROSS	DED_AMT	GROSS	DED_AMT	GROSS	DED_AMT	GROSS	DED_AMT
$2,970.84	$505.04	$22,013.75	$15,377.40	$1,540.00	$458.69	$6,099.50	$2,866.18	$9,075.00	$6,307.00	$8,800.00	$2,672.80

This report produces several screens to display the report. Only the first screen is shown here.

If there are many values in the field you specify with ACROSS, or if you use several fields with ACROSS, the report can become quite unwieldy.

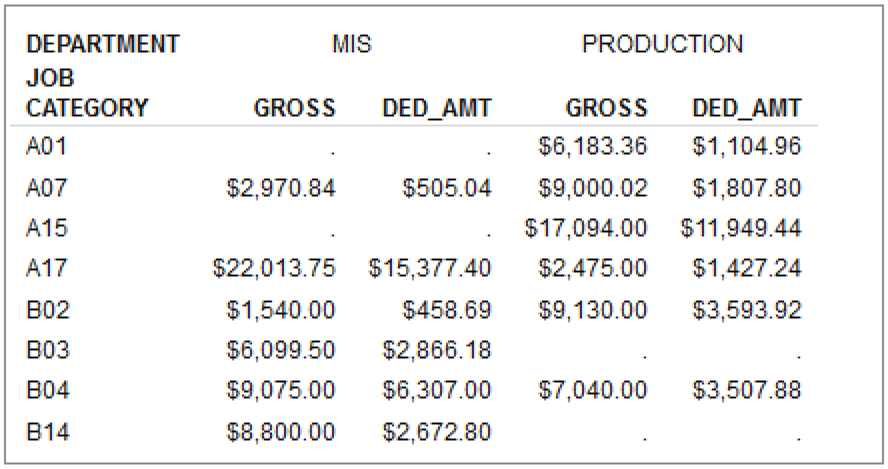
Creating a Matrix Using BY With ACROSS

You can combine both BY and ACROSS to produce a matrix report. A matrix report displays values in rows and columns. For example, issue the previous report request, but this time, sort CURR_JOBCODE using BY instead of ACROSS, and change the column title that the field CURR_JOBCODE produces.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM GROSS DED_AMT

ACROSS DEPARTMENT

BY CURR_JOBCODE AS 'JOB,CATEGORY'

END
```

Run the request. The output is:



DEPARTMENT	MIS		PRODUCTION	
JOB CATEGORY	GROSS	DED_AMT	GROSS	DED_AMT
A01	.	.	$6,183.36	$1,104.96
A07	$2,970.84	$505.04	$9,000.02	$1,807.80
A15	.	.	$17,094.00	$11,949.44
A17	$22,013.75	$15,377.40	$2,475.00	$1,427.24
B02	$1,540.00	$458.69	$9,130.00	$3,593.92
B03	$6,099.50	$2,866.18	.	.
B04	$9,075.00	$6,307.00	$7,040.00	$3,507.88
B14	$8,800.00	$2,672.80	.	.

The report is now much more compact. It is easier to compare the numbers for the same job category in different departments.

Notice that some positions in the report are marked with a period (.). The period is called the NODATA character. It appears in a report when there is no data available in the field for that position in the report. In this report, it means that no one with that job code works in the particular department. For example, there are no employees with job code A15 working in the MIS department.

The period (.) is the default NODATA character. You can change it to another character, or to a set of characters such as 'NA'.

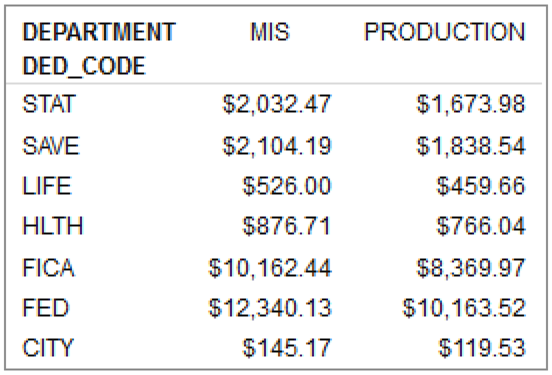
Changing the Order of the Sorting

By default, sorting is from the lowest to the highest value. You can reverse this order by adding the keyword HIGHEST to the sort phrase.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM DED_AMT

BY HIGHEST DED_CODE

ACROSS DEPARTMENT

END
```

Run the request. The output is:



```
DEPARTMENT        MIS      PRODUCTION
DED_CODE
STAT        $2,032.47      $1,673.98
SAVE        $2,104.19      $1,838.54
LIFE          $526.00        $459.66
HLTH          $876.71        $766.04
FICA       $10,162.44      $8,369.97
FED        $12,340.13     $10,163.52
CITY          $145.17        $119.53
```

The DED_CODE field stores alphanumeric data, which normally displays in a low-to-high order (alphabetically, A to Z is low to high). This makes the first record CITY and the last record STAT. By adding HIGHEST to the sort phrase, you reverse the order of sorting.

Ranking Sort Field Values

When you sort report rows using the BY phrase, you can indicate the numeric rank of each row. Ranking sort field values is frequently combined with restricting sort field values by rank.

Note that it is possible for several report rows to have the same rank if they have identical sort field values.

The default column title for RANKED BY is RANK. You can change the title using an AS phrase. The RANK field has format I7. Therefore, the RANK column in a report can be up to seven (7) digits.

You can rank aggregated values using the syntax RANKED BY TOTAL.

The format of the RANKED command is:

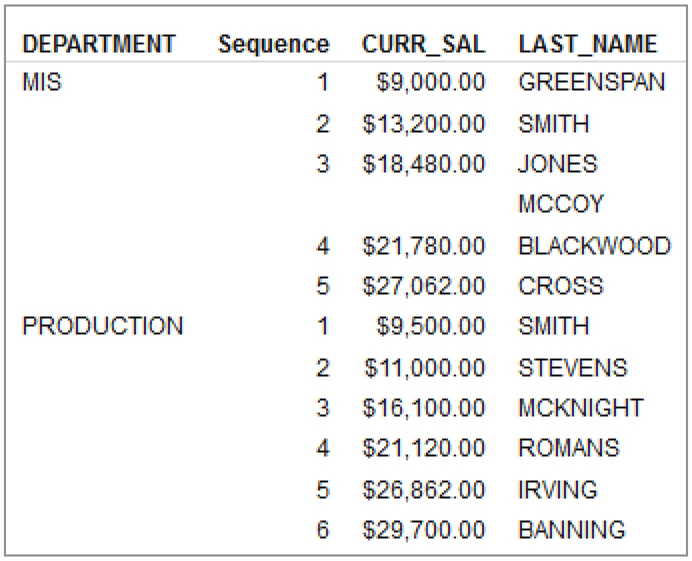
```
RANKED [AS 'name'] BY {HIGHEST|LOWEST|TOP|BOTTOM} [n] sort_field

[AS 'text']
```

TOP is a synonym for HIGHEST and BOTTOM is a synonym for LOWEST.

To display a list of employee names in salary order, indicating the rank of each employee by salary, issue the following request. Note that employees Jones and McCoy have the same rank since their current salary is the same.

```
TABLE FILE EMPLOYEE

PRINT LAST_NAME

BY DEPARTMENT

RANKED AS 'Sequence' BY CURR_SAL

END
```

Run the request. The output is:

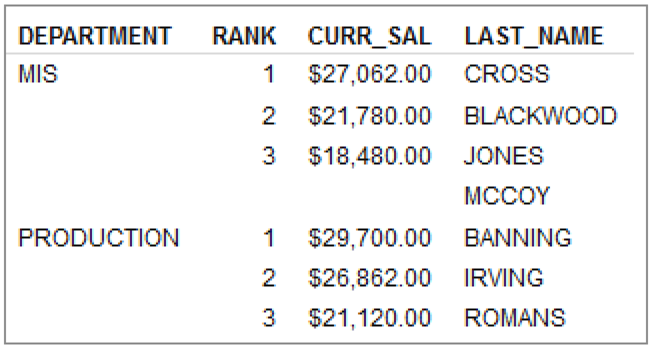


DEPARTMENT	Sequence	CURR_SAL	LAST_NAME
MIS	1	$9,000.00	GREENSPAN
	2	$13,200.00	SMITH
	3	$18,480.00	JONES
			MCCOY
	4	$21,780.00	BLACKWOOD
	5	$27,062.00	CROSS
PRODUCTION	1	$9,500.00	SMITH
	2	$11,000.00	STEVENS
	3	$16,100.00	MCKNIGHT
	4	$21,120.00	ROMANS
	5	$26,862.00	IRVING
	6	$29,700.00	BANNING

To rank sort field values while restricting the sort field values by rank, issue the following request:

```
TABLE FILE EMPLOYEE

PRINT LAST_NAME

BY DEPARTMENT

RANKED BY HIGHEST 3 CURR_SAL

END
```

Run the request. The output is:



DEPARTMENT	RANK	CURR_SAL	LAST_NAME
MIS	1	$27,062.00	CROSS
	2	$21,780.00	BLACKWOOD
	3	$18,480.00	JONES
			MCCOY
PRODUCTION	1	$29,700.00	BANNING
	2	$26,862.00	IRVING
	3	$21,120.00	ROMANS

Notice that the rank resets based on the outer BY field, DEPARTMENT.

Limiting Sort Field Values

In a sort phrase, you can restrict the number of sort values displayed. With the PLUS OTHERS phrase, you can aggregate all other values to a separate group and display this group as an additional report row.

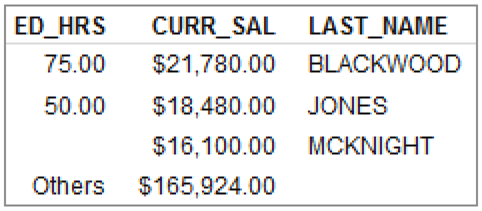
The format of the PLUS OTHERS phrase is as follows:

```
[RANKED] BY {HIGHEST|LOWEST} nsort_field [AS 'text']

[PLUS OTHERS AS 'othertext']
```

To display the top two ED_HRS values and aggregate the values that are not included in a row, which is labeled Others, issue the following request:

```
TABLE FILE EMPLOYEE

PRINT CURR_SAL LAST_NAME

BY HIGHEST 2 ED_HRS

PLUS OTHERS AS 'Others'

END
```

Run the request. The output is:



ED_HRS	CURR_SAL	LAST_NAME
75.00	$21,780.00	BLACKWOOD
50.00	$18,480.00	JONES
	$16,100.00	MCKNIGHT
Others	$165,924.00	

Hiding a Field

You have an option to use, but not display, a field.

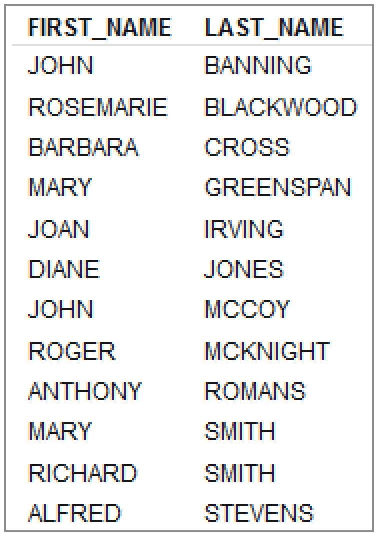
A common use for this is when you want to list or print records from a data source, and you want them to appear in alphabetical order. You print the field and sort it by itself, but you hide the sort field.

To hide a field that you want to sort, you add the keyword NOPRINT right after the field you are sorting. For example, if you want to print the employee names in alphabetic order, and you print FIRST_NAME and sort it by LAST_NAME, the field LAST_NAME appears as the first field on the report and FIRST_NAME as the second. However, see what happens when you enter a request using NOPRINT.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT FIRST_NAME LAST_NAME

BY LAST_NAME NOPRINT

END
```

Run the request. The output is:



FIRST_NAME	LAST_NAME
JOHN	BANNING
ROSEMARIE	BLACKWOOD
BARBARA	CROSS
MARY	GREENSPAN
JOAN	IRVING
DIANE	JONES
JOHN	MCCOY
ROGER	MCKNIGHT
ANTHONY	ROMANS
MARY	SMITH
RICHARD	SMITH
ALFRED	STEVENS

This report prints the employee names organized alphabetically by last name, and the first name appears before the last name as you would expect to see it. If you omit NOPRINT, you produce three columns in the report in this order: LAST_NAME, FIRST_NAME, LAST_NAME.

Clustering Numeric Data Into Groups

You can group the records in a report into ranges by adding the following phrase to a sort phrase. The sort field must be numeric. The keyword TOP is optional.

```
IN-GROUPS-OF value [TOP value]
```

In an IN-GROUPS-OF phrase, the first value defines the ranges within which the records will be grouped. The optional word TOP sets an upper limit within which all records with greater values than that amount are grouped.

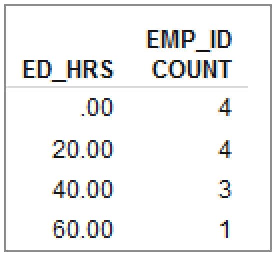
For example, suppose you want a count of the number of employees who have taken classes, grouped for every twenty hours spent in the classroom. The number of hours of classroom time is stored in the field ED_HRS.

Issue the following request:

```
TABLE FILE EMPLOYEE

COUNT EMP_ID
```

```
BY ED_HRS IN-GROUPS-OF 20

END
```

Run the request. The output is:



```
         EMP_ID
ED_HRS    COUNT
    .00       4
  20.00       4
  40.00       3
  60.00       1
```

The report shows that four (4) employees have fewer than 20 hours of classroom time, while one (1) has taken 60 hours or more.

Selecting Records

Now that you know how to retrieve and sort records, the next step in creating a report is to selectively retrieve records. Selecting data (screening) enables you to retrieve a subset of data in the data source.

Describing Screening Conditions

So far, you have written report requests that retrieve all records available in the EMPLOYEE data source for the fields you specify. Using the WHERE keyword, you can limit the records retrieved by specifying conditions a record must meet in order to be retrieved.

You use WHERE to begin a conditional statement. You create a condition by comparing a field or calculation to a test value, another field, or a calculation you supply. You can include several conditions in a single request.

You create a conditional statement using the following format:

```
WHERE fieldrelational_operator {test_value|field|calculation}[;]
```

In the above structure, if you supply a test value, it is the value to which each record is compared. If you supply a field, it can be alphanumeric or numeric as long as the data type is the same as the field name to the left of the relational operator. If you supply a calculation, it can be a mathematical formula or alphanumeric manipulation.

The relational operator enables you to determine the type of comparison between the field and any of the components to the right of the operator. When the value is retrieved from the data source, it checks each value to see if it meets the condition you specified. Only values that satisfy the condition or conditions are included in the report. To retrieve values that do not satisfy conditions, use the NOT operator in front of the expression.

When you include WHERE in your request to describe screening conditions, remember the following rules:

- Make sure the field or fields you are screening and the test values or fields to which you are comparing them to, are the same data type. That is, they must both be either numeric or alphanumeric.

- Enclose all literal test values that are alphanumeric in single quotation marks ('). The literal test value is the string of characters searched for in each record.

Note: You can include screening conditions in a procedure, Master File, or filter file.

Relational Operators

The following table includes a partial list of relational operators and the types of comparisons they perform.

Relational Operator	Type of Comparison
GT	Greater than.
LT	Less than.
EQ	Equals.
NE	Not equal.
GE	Greater than or equal to.
LE	Less than or equal to.
LIKE	Selects values containing test character strings.

For instance, if you want to retrieve records that are greater than the specified test value, field, or calculation, you use the GT (greater than) operator. If you want to retrieve only records that are less than the specified component, you use the LT (less than) operator.

Logical Operators

Another type of operator you use in conditional statements is the logical operator. There are two logical operators, AND and OR. You use these logical operators to connect more than one condition. If you want each and every condition satisfied before a record is retrieved, you connect them using AND. If you want at least one of the conditions to be met for a record to be retrieved, you connect the conditions using OR.

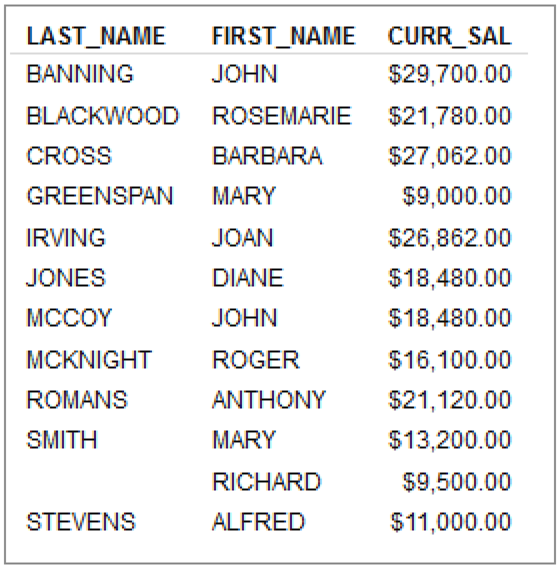
Screening Numeric Data

Fields can have either alphanumeric or numeric formats. Using the relational operators, along with WHERE, you can screen data of both types in the same request.

Start with a request that has no screening conditions. To display each employee salary in the EMPLOYEE data source, issue the following request:

```
TABLE FILE EMPLOYEE

PRINT CURR_SAL

BY LAST_NAME BY FIRST_NAME

END
```

Run the request. The output is:



```
LAST_NAME   FIRST_NAME    CURR_SAL
BANNING     JOHN        $29,700.00
BLACKWOOD   ROSEMARIE   $21,780.00
CROSS       BARBARA     $27,062.00
GREENSPAN   MARY         $9,000.00
IRVING      JOAN        $26,862.00
JONES       DIANE       $18,480.00
MCCOY       JOHN        $18,480.00
MCKNIGHT    ROGER       $16,100.00
ROMANS      ANTHONY     $21,120.00
SMITH       MARY        $13,200.00
            RICHARD      $9,500.00
STEVENS     ALFRED      $11,000.00
```

The salary for every employee is retrieved.

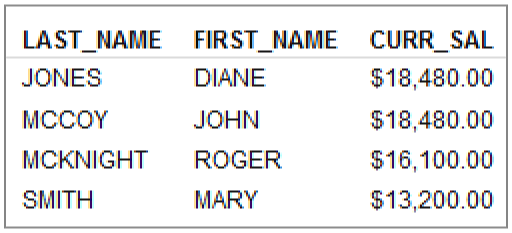
Suppose now that you want to see only employees whose salaries fall within a range. To retrieve employees whose salaries satisfy this condition, add a WHERE condition to the previous request.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT CURR_SAL

BY LAST_NAME BY FIRST_NAME

WHERE CURR_SAL GT 11000 AND CURR_SAL LT 20000;

END
```

Notice that you left out the dollar signs ($) and commas (,) in each salary figure in the request. These are format edit options, which are not stored in the data source. Therefore, do not include either in your requests.

Run the request. The output is:



LAST_NAME	FIRST_NAME	CURR_SAL
JONES	DIANE	$18,480.00
MCCOY	JOHN	$18,480.00
MCKNIGHT	ROGER	$16,100.00
SMITH	MARY	$13,200.00

This time four (4) records are retrieved, each of which meets the screening conditions you included in the request. Notice that the name, Alfred Stevens, does not appear in this report since his current salary is $11,000.

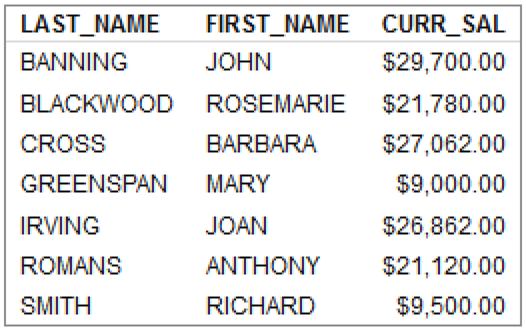
Now, suppose you want to display employees earning less than a minimum or more than a maximum amount. In our last example, you saw how the AND relationship worked. In this next example, you explicitly change the AND relationship using the OR logical operator. As a result, any record that satisfies one OR another of the conditions is retrieved.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT CURR_SAL
```

```
BY LAST_NAME BY FIRST_NAME

WHERE CURR_SAL LT 11000 OR CURR_SAL GT 20000;

END
```

Run the request. The output is:



LAST_NAME	FIRST_NAME	CURR_SAL
BANNING	JOHN	$29,700.00
BLACKWOOD	ROSEMARIE	$21,780.00
CROSS	BARBARA	$27,062.00
GREENSPAN	MARY	$9,000.00
IRVING	JOAN	$26,862.00
ROMANS	ANTHONY	$21,120.00
SMITH	RICHARD	$9,500.00

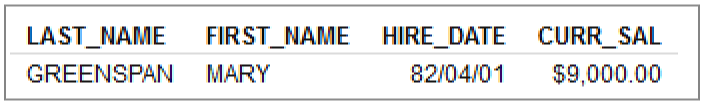
Notice that there are some salaries in this report that meet the first condition (LT 11000) and others that meet the second condition (GT 20000). If you used the AND logical operator, your report would contain no data because no salary record could be less than $11,000 and greater than $20,000 at the same time.

You do not always use a field as a basis of comparison. Rather, you can use a calculation using WHERE. For instance, a company is giving employees a 10 percent increase. You want to find out which employees, even after the increase, are still making less than $10,000 a year. The field you use is CURR_SAL. The calculation is CURR_SAL increased by 10 percent (CURR_SAL * 1.1). The parentheses are optional, but are used for clarity.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT LAST_NAME FIRST_NAME HIRE_DATE CURR_SAL

WHERE (CURR_SAL * 1.1) LT 10000;

END
```

Run the request. The output is:



LAST_NAME	FIRST_NAME	HIRE_DATE	CURR_SAL
GREENSPAN	MARY	82/04/01	$9,000.00

You see from this report that only Mary Greenspan is earning less than $10,000.

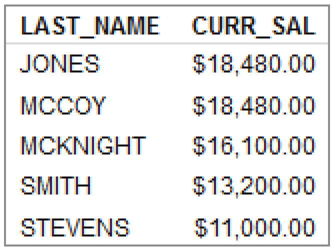
Defining Ranges

You have actually already included a range in a report request by creating the report that displayed four (4) records for salaries greater than $11,000 and less than $20,000. A range sets a lower and upper limit. Here is another way to specify a range. Notice that using a range is another way to specify the AND relationship.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT CURR_SAL

BY LAST_NAME

WHERE CURR_SAL FROM 11000 TO 20000;

END
```

Run the request. The output is:



LAST_NAME	CURR_SAL
JONES	$18,480.00
MCCOY	$18,480.00
MCKNIGHT	$16,100.00
SMITH	$13,200.00
STEVENS	$11,000.00

There is a subtle difference between using FROM ... TO to specify a range and using GT and LT. To see the difference, compare this report to the earlier one that displays salaries greater than $11,000 and less than $20,000.

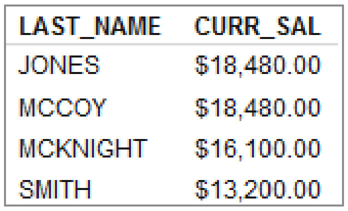
This report displays an employee named Stevens who earns $11,000. In the previous report, Stevens is omitted. This is because the GT and LT operators exclude the test values, while FROM ... TO operator includes them.

Remember, the test values are those values to which each record is compared.

In this scenario, to exclude the test values of 11000 and 20000 from your report, issue the following request:

```
TABLE FILE EMPLOYEE

PRINT CURR_SAL

BY LAST_NAME

WHERE CURR_SAL FROM 11000.01 TO 19999.99;

END
```

Run the request. The output is:



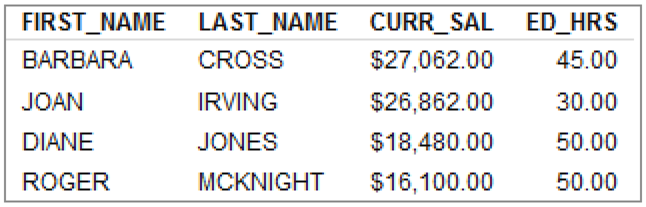
LAST_NAME	CURR_SAL
JONES	$18,480.00
MCCOY	$18,480.00
MCKNIGHT	$16,100.00
SMITH	$13,200.00

Combining Ranges and WHERE Conditions

You can combine range limitations with other WHERE conditions. Suppose you are interested in retrieving information about employees with a certain salary level and a certain number of training hours. To retrieve this information, issue the following request:

```
TABLE FILE EMPLOYEE

PRINT FIRST_NAME LAST_NAME CURR_SAL ED_HRS

BY LAST_NAME NOPRINT

WHERE CURR_SAL GT 15000 AND ED_HRS FROM 10 TO 50;

END
```

Run the request. The output is:



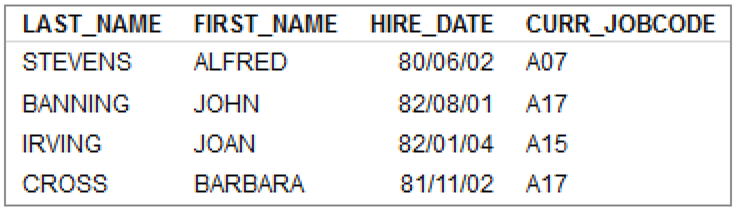
FIRST_NAME	LAST_NAME	CURR_SAL	ED_HRS
BARBARA	CROSS	$27,062.00	45.00
JOAN	IRVING	$26,862.00	30.00
DIANE	JONES	$18,480.00	50.00
ROGER	MCKNIGHT	$16,100.00	50.00

Here is another example using WHERE to combine more than one condition to narrow down records. In many companies, employees must be with the company for a specified length of time, or attain a certain title to qualify for additional vacation time. In the following example, you retrieve employees who satisfy at least one of these two requirements, that they started work before 1981, or that their job code (A15, A16, or A17) indicates a managerial position.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT LAST_NAME FIRST_NAME HIRE_DATE CURR_JOBCODE

WHERE HIRE_DATE LT '810101' OR CURR_JOBCODE EQ 'A15' OR 'A16' OR 'A17';

END
```

Run the request. The output is:



LAST_NAME	FIRST_NAME	HIRE_DATE	CURR_JOBCODE
STEVENS	ALFRED	80/06/02	A07
BANNING	JOHN	82/08/01	A17
IRVING	JOAN	82/01/04	A15
CROSS	BARBARA	81/11/02	A17

Screening Aggregated Values

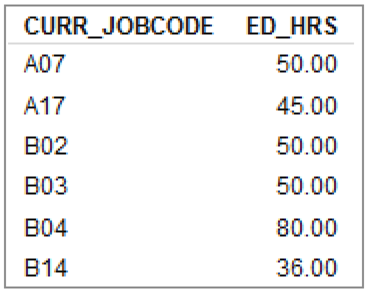
So far you have used WHERE to screen individual values. Before any value is retrieved, it is evaluated to make sure it satisfies the condition or conditions in the WHERE statement. But, you may recall from Creating Basic Output Requests, that the SUM and COUNT verb commands produce summary information rather than individual values. This process is called aggregation and requires use of the WHERE TOTAL condition.

The WHERE TOTAL condition screens aggregated values produced by SUM or COUNT. Instead of evaluating data before it is retrieved, WHERE TOTAL works on data after it has been retrieved and processed. Whenever you want to screen the results of an aggregation, you must use WHERE TOTAL.

To determine which job codes exceed a minimum training requirement of 35 hours, issue the following request:

```
TABLE FILE EMPLOYEE

SUM ED_HRS BY CURR_JOBCODE

WHERE TOTAL ED_HRS GT 35;

END
```

Run the request. The output is:



CURR_JOBCODE	ED_HRS
A07	50.00
A17	45.00
B02	50.00
B03	50.00
B04	80.00
B14	36.00

Screening Alphanumeric Data

In the previous sections, you selected fields with numeric data. Here, you screen fields that contain alphanumeric data. An alphanumeric field can contain characters, numbers not used in calculations, or a combination of the two.

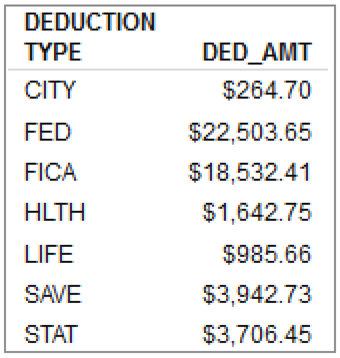
In this section, you use some relational operators that you used with numeric data, as well as three (3) relational operators used only with alphanumeric data: CONTAINS, OMITS, and LIKE.

As you know, every employee has certain deductions taken from each paycheck. To display the total deductions for each type, sorted by the deduction code, issue the following request:

```
TABLE FILE EMPLOYEE

SUM DED_AMT
```

```
BY DED_CODE AS 'DEDUCTION,TYPE'

END
```

Run the request. The output is:



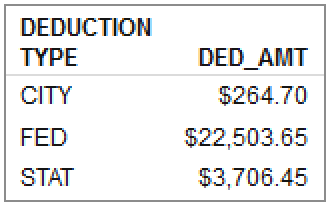
DEDUCTION TYPE	DED_AMT
CITY	$264.70
FED	$22,503.65
FICA	$18,532.41
HLTH	$1,642.75
LIFE	$985.66
SAVE	$3,942.73
STAT	$3,706.45

All records from the file are retrieved.

Now, suppose you want to see the total amount withheld for Federal, State, and City taxes. Issue the following request:

```
TABLE FILE EMPLOYEE

SUM DED_AMT

BY DED_CODE AS 'DEDUCTION,TYPE'

WHERE DED_CODE EQ 'FED' OR 'STAT' OR 'CITY';

END
```

Run the request. The output is:



DEDUCTION TYPE	DED_AMT
CITY	$264.70
FED	$22,503.65
STAT	$3,706.45

You have seen that you can screen aggregated values. In this example, you also see that you can screen sort fields (DED_CODE).

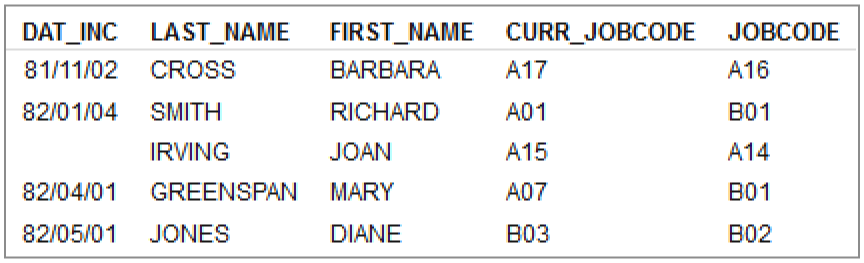
Notice that there are now only three (3) deduction types in your report, and that the summed amounts for each of them are the same as those produced in the first report. The screening condition caused only Federal, State, and City deductions to be retrieved.

You can tailor a request to retrieve different types of information about employees. In the following request, you find out which employees have changed job titles within the company. You do this by comparing their current job code to another field called JOBCODE.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT LAST_NAME FIRST_NAME CURR_JOBCODE JOBCODE

BY DAT_INC

WHERE CURR_JOBCODE NE JOBCODE;

END
```

Run the request. The output is:



DAT_INC	LAST_NAME	FIRST_NAME	CURR_JOBCODE	JOBCODE
81/11/02	CROSS	BARBARA	A17	A16
82/01/04	SMITH	RICHARD	A01	B01
	IRVING	JOAN	A15	A14
82/04/01	GREENSPAN	MARY	A07	B01
82/05/01	JONES	DIANE	B03	B02

Screening Alphanumeric Content

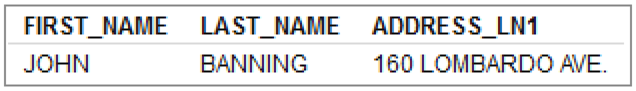
There are three (3) relational operators designed to screen only alphanumeric data. These are CONTAINS, OMITS, and LIKE (NOT LIKE is the opposite of LIKE).

CONTAINS is useful when an alphanumeric field may have the same string of characters appearing in differing places in multiple records. For example, suppose you are interested in seeing which employees live on Lombardo Avenue.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT ADDRESS_LN1

BY FIRST_NAME BY LAST_NAME

WHERE ADDRESS_LN1 CONTAINS 'LOMBARDO';

END
```

Run the request. The output is:



```
FIRST_NAME   LAST_NAME   ADDRESS_LN1
JOHN         BANNING     160 LOMBARDO AVE.
```

The literal LOMBARDO is the string of characters searched for in each record. This example retrieves all the records in which that string appears, regardless of where in the ADDRESS_ LN1 field the value appears.

Of course, this example would also retrieve records, if there were any, for employees who live on Lombardo Street, or Lombardo Boulevard. To limit the records to those living on Lombardo Avenue, you would use the following request. Since we know there is only one record containing "Lombardo", do not issue this request:

```
TABLE FILE EMPLOYEE

PRINT ADDRESS_LN1

BY FIRST_NAME BY LAST_NAME

WHERE ADDRESS_LN1 CONTAINS 'LOMBARDO' AND ADDRESS_LN1 CONTAINS 'AVE';

END
```

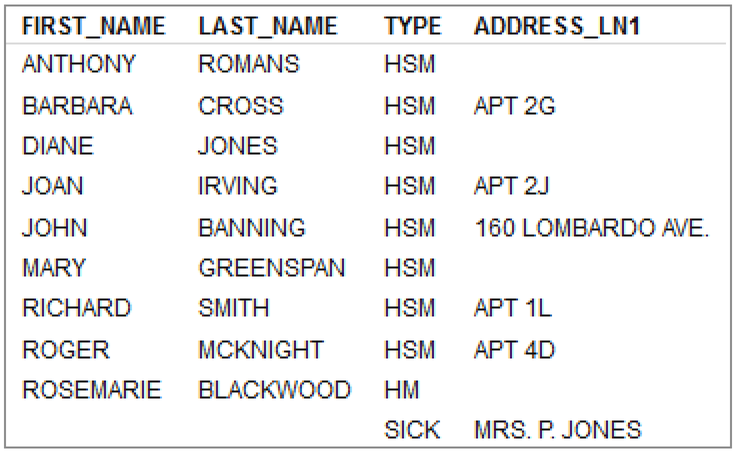
By using two conditions connected by AND, you avoid problems related to the positions of the words "Lombardo" and "Avenue" relative to each other (for instance, "LombardoAve" or "Lombardo Avenue"), and problems related to abbreviations of the word "Avenue".

OMITS is the opposite of CONTAINS. You exclude records that contain the character string you specify. In this next request, the field TYPE, which defines the type of addresses available for employees, is used to exclude employee bank addresses.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT ADDRESS_LN1 BY FIRST_NAME BY LAST_NAME BY TYPE

WHERE TYPE OMITS 'BANK';

END
```

Run the request. The output is:



```
FIRST_NAME  LAST_NAME   TYPE  ADDRESS_LN1
ANTHONY     ROMANS      HSM
BARBARA     CROSS       HSM   APT 2G
DIANE       JONES       HSM
JOAN        IRVING      HSM   APT 2J
JOHN        BANNING     HSM   160 LOMBARDO AVE.
MARY        GREENSPAN   HSM
RICHARD     SMITH       HSM   APT 1L
ROGER       MCKNIGHT    HSM   APT 4D
ROSEMARIE   BLACKWOOD   HM
                        SICK  MRS. P. JONES
```

Screening Masked Fields: LIKE

Another type of screening that uses only alphanumeric data is the type that uses a mask to identify data. A mask is an alphanumeric pattern you supply that is used to compare to characters in a data field value. The relational operator you use to screen a masked field is LIKE.

The format of a screening condition using LIKE is:

```
WHERE field LIKE 'mask';
```

The field in the above structure is the field in which the mask appears. The mask is an alphanumeric string of characters enclosed in single quotation marks ('). To retrieve records that do not contain the specified mask, use NOT LIKE. When you use a mask, you use two masking characters:

- The percent sign (%) to indicate any number of characters, which may be zero (0).

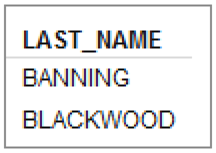
- The underscore (_) to indicate a single character in a specific position.

Here is a simple example of how you might use the percent sign (%) in a mask. Assume you want to retrieve every employee whose last name begins with a certain letter, B for instance. Although each last name may be different, you can still retrieve each one because the percent sign (%) matches any arbitrary sequence of characters that occurs starting in the position you place it.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT LAST_NAME

WHERE LAST_NAME LIKE 'B%';

END
```

Run the request. The output is:



```
LAST_NAME
BANNING
BLACKWOOD
```

You use the underscore (_) to specify a position in the record and to indicate that any character in that position is acceptable. As a contrast, when you use CONTAINS, you specify a string that can occur anywhere in a record.

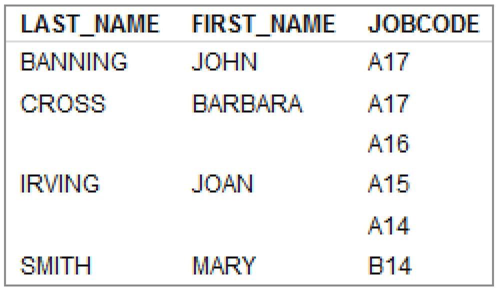
The following example shows how you can retrieve all employees who are managers. Each employee is assigned a three-character job code. The second character in this code indicates whether or not a job is on the management level. If the second character is 1, it is, otherwise, it is not. In this following example, you use the underscore (_) to retrieve only job codes whose second character is 1, with any character in the first and third position.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT JOBCODE

BY LAST_NAME BY FIRST_NAME

WHERE JOBCODE LIKE '_1_';
```

```
END
```

Run the request. The output is:



LAST_NAME	FIRST_NAME	JOBCODE
BANNING	JOHN	A17
CROSS	BARBARA	A17
		A16
IRVING	JOAN	A15
		A14
SMITH	MARY	B14

Only employees whose job codes match the mask you provided are retrieved.

Limiting Records Retrieved: RECORDLIMIT

If you are working with a large data source and want to test report requests to see if they work, use RECORDLIMIT. Instead of processing hundreds or thousands of records to test your design, you could see results just as effectively by processing and displaying a few.

RECORDLIMIT retrieves the number of records that meet test conditions specified in a request. For instance, if five (5) employees live in New Jersey and you want to retrieve only those records, you would use a RECORDLIMIT of five (5). As soon as the fifth record is retrieved, the searching of the data source stops.

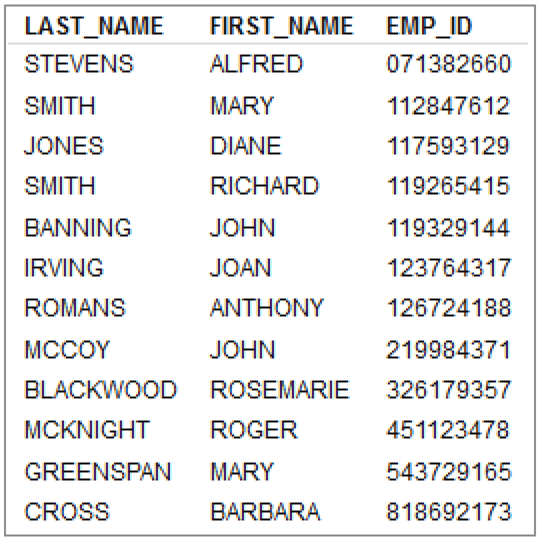
To see how RECORDLIMIT works, first issue the following request without using RECORDLIMIT:

```
TABLE FILE EMPLOYEE

PRINT LAST_NAME FIRST_NAME EMP_ID

END
```

Notice that the statistics display the following:

```
NUMBER OF RECORDS IN TABLE=      12  LINES=      12
```

Run the request. The output is:



LAST_NAME	FIRST_NAME	EMP_ID
STEVENS	ALFRED	071382660
SMITH	MARY	112847612
JONES	DIANE	117593129
SMITH	RICHARD	119265415
BANNING	JOHN	119329144
IRVING	JOAN	123764317
ROMANS	ANTHONY	126724188
MCCOY	JOHN	219984371
BLACKWOOD	ROSEMARIE	326179357
MCKNIGHT	ROGER	451123478
GREENSPAN	MARY	543729165
CROSS	BARBARA	818692173

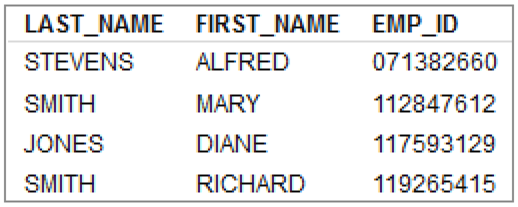
To limit the records to four (4), issue the following request:

```
TABLE FILE EMPLOYEE

PRINT LAST_NAME FIRST_NAME EMP_ID

WHERE RECORDLIMIT EQ 4;

END
```

The statistics reflect the number specified in the RECORDLIMIT command:

```
NUMBER OF RECORDS IN TABLE=      4  LINES=      4
```

Run the request. The output is:



LAST_NAME	FIRST_NAME	EMP_ID
STEVENS	ALFRED	071382660
SMITH	MARY	112847612
JONES	DIANE	117593129
SMITH	RICHARD	119265415

You can see the difference in the statistics. The structure of your report does not change so you can evaluate it as effectively and save time using fewer records.

Using Temporary Fields

Sometimes the information that you want to use is not stored in the data source, but you can calculate it from the data that is. For example, you might want to use employee salaries and deductions to calculate their net take-home pay. If you can compute the data you want, then you can create a temporary field to calculate and display it.

There are two ways to create a temporary field. You can define it in the report request using the COMPUTE command (calculated value), or you can declare it before you write the report request using a DEFINE command (virtual field).

The main difference between fields created with COMPUTE and fields created with DEFINE is that DEFINE creates the fields before you start the report request and COMPUTE creates the fields after records have been retrieved. Once the DEFINE command has been executed, the temporary fields look just like real fields from the data source. You can use them to sort the report, select records, or use them in other temporary field definitions.

Creating a Temporary Field Using the COMPUTE Command

The simplest way to calculate a temporary field is to define it in a report request using the COMPUTE command. The temporary fields you create using the COMPUTE command are not real fields in the data source. They only exist for the request in which you create them.

The basic format of a COMPUTE command is:

```
COMPUTE field/format=expression;
```

In this structure, **field** represents the name you give the temporary field you are creating. You define the field format with a slash (/) and the desired format, which describes the type and length of data in a field. By default, the numeric format D12.2 is assigned to temporary fields, but it is good coding practice to always provide a format. On the right side of the equation, **expression** is a formula you specify that indicates how to calculate values for the new field.

When you write a COMPUTE command, keep the following rules in mind:

- The COMPUTE command cannot start a report request. It must follow a verb command.
- Any fields that are used, but not referenced prior to the COMPUTE, are treated as NOPRINT verb objects.

To illustrate how you create a new field from existing data, calculate the difference between gross pay and the amount taken out in deductions for each employee and store it in a new field called DIFF.

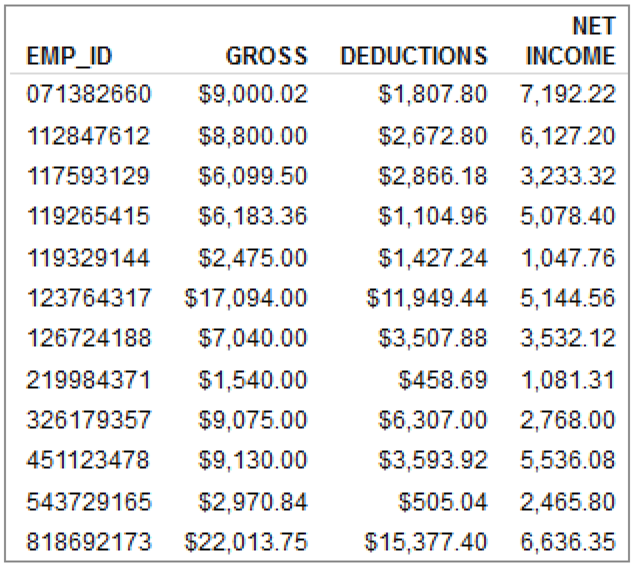
The data you use is stored in the fields GROSS and DED_AMT. The formula for calculating the new field value is simply:

```
DIFF = GROSS - DED_AMT;
```

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM GROSS AND DED_AMT AS 'DEDUCTIONS'

COMPUTE DIFF/D12.2=GROSS - DED_AMT; AS 'NET,INCOME'

BY EMP_ID

END
```

Run the request. The output is:



EMP_ID	GROSS	DEDUCTIONS	NET INCOME
071382660	$9,000.02	$1,807.80	7,192.22
112847612	$8,800.00	$2,672.80	6,127.20
117593129	$6,099.50	$2,866.18	3,233.32
119265415	$6,183.36	$1,104.96	5,078.40
119329144	$2,475.00	$1,427.24	1,047.76
123764317	$17,094.00	$11,949.44	5,144.56
126724188	$7,040.00	$3,507.88	3,532.12
219984371	$1,540.00	$458.69	1,081.31
326179357	$9,075.00	$6,307.00	2,768.00
451123478	$9,130.00	$3,593.92	5,536.08
543729165	$2,970.84	$505.04	2,465.80
818692173	$22,013.75	$15,377.40	6,636.35

You have just used a simple expression to create a new field in a report. You can write many kinds of expressions, depending on the kind of temporary field you want to create.

Combining Two Alphanumeric Fields Into a New Field

In the previous section, you created a new numeric field by performing a simple calculation on two numeric fields in the data source. You can also create new alphanumeric fields.

For example, you can combine the data in two or more alphanumeric fields into a new field. This is called concatenation. There are two forms of concatenation, weak and strong. You use weak concatenation when you want to include trailing blanks in the field value to which you are concatenating. Trailing blanks occur when a field value is shorter than the field length. The blanks occur at the end of the value, trailing behind it. When you want to eliminate blanks at the end of the value, you use strong concatenation.

You use a solid bar (|) or a broken vertical bar (¦) to indicate concatenation. A single bar means weak concatenation, where the entire field value, including blanks, is used. A double bar (| |) means strong concatenation, where blanks at the end of the first data value are discarded. It is good coding practice to include a space before and after the concatenation bar.

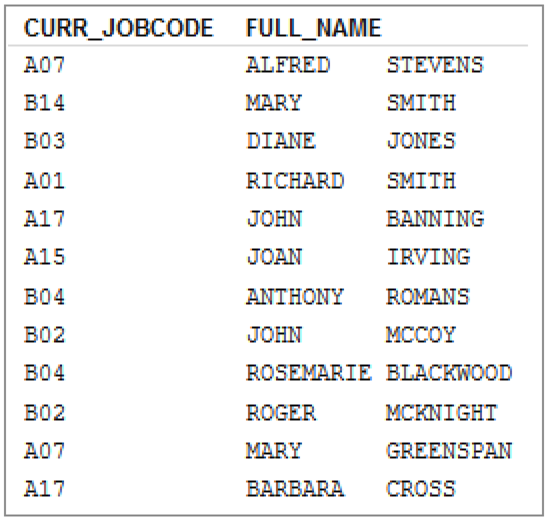
To show how this works, first combine the fields FIRST_NAME and LAST_NAME into one field called FULL_NAME, using weak concatenation. You use a format of A30 to account for the alphanumeric nature of the data (first names and last names) and to allow enough space in the field to fit the two names. The browser automatically removes extra blank spaces, so you must add the SET SHOWBLANKS = ON command to the request to retain the blanks. Also, since the default font is proportional, the spaces and characters are not all the same size. If you want to see the characters all aligned, you need to use a monospaced font, such as Courier.

Issue the following request:

```
SET SHOWBLANKS=ON

TABLE FILE EMPLOYEE

PRINT CURR_JOBCODE AND
```

```
COMPUTE FULL_NAME/A30= FIRST_NAME | LAST_NAME;

END
```

Run the request. The output is:



```
CURR_JOBCODE  FULL_NAME
A07           ALFRED    STEVENS
B14           MARY      SMITH
B03           DIANE     JONES
A01           RICHARD   SMITH
A17           JOHN      BANNING
A15           JOAN      IRVING
B04           ANTHONY   ROMANS
B02           JOHN      MCCOY
B04           ROSEMARIE BLACKWOOD
B02           ROGER     MCKNIGHT
A07           MARY      GREENSPAN
A17           BARBARA   CROSS
```

The names retrieved from the FIRST_NAME and LAST_NAME fields have been combined into the field FULL_NAME. Notice two things about the temporary field definition:

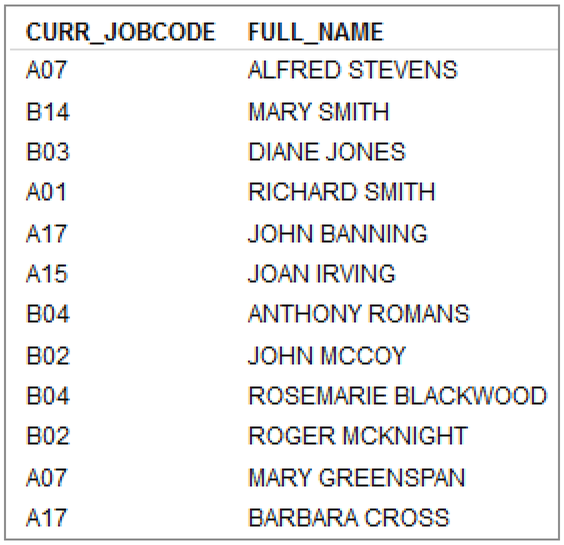
1. The characters */A30* declare that FULL_NAME is an alphanumeric field 30 characters long. Remember that the default is a numeric format for temporary fields. Because the fields used in this expression are alphanumeric, FULL_NAME must also be defined as an alphanumeric field. A length of 30 characters provides room for the combined values from both FIRST_NAME and LAST_NAME.
2. FIRST_NAME is 10 characters long. For names that are shorter than this, blank spaces fill the rest of the field. Using the single vertical bar (|) keeps these spaces in FULL_NAME.

If you want only one blank space between the first names and last names, you cannot use the double vertical bar (| |) because strong concatenation discards all trailing blanks. The two (2) names will simply be stuck together. Instead, you first append a blank to the start of LAST_NAME using weak concatenation. Then you concatenate the result to FIRST_NAME, using strong concatenation to discard the trailing blanks from the end of that field. Use parentheses ( ) around the blank space and LAST_NAME to perform this concatenation first, then concatenate FULL_NAME to the result.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT CURR_JOBCODE

COMPUTE FULL_NAME/A30=FIRST_NAME || (' '| LAST_NAME);

END
```

Run the request. The output is:



```
CURR_JOBCODE   FULL_NAME
A07            ALFRED STEVENS
B14            MARY SMITH
B03            DIANE JONES
A01            RICHARD SMITH
A17            JOHN BANNING
A15            JOAN IRVING
B04            ANTHONY ROMANS
B02            JOHN MCCOY
B04            ROSEMARIE BLACKWOOD
B02            ROGER MCKNIGHT
A07            MARY GREENSPAN
A17            BARBARA CROSS
```

The field FULL_NAME now appears as you want it to, with one blank space between the names. The parentheses around the blank space and LAST_NAME perform this concatenation first, then concatenate FULL_NAME to the result.

In this example, the field FULL_NAME appears to the right of the field CURR_JOBCODE, because you can only write the COMPUTE command after you have specified the verbs and field names for the request. Since you used COMPUTE, you cannot put FULL_NAME before the PRINT command or use it to sort the report.

Using Temporary Fields With DEFINE

If you want to use a temporary field in a report request for a session, as if it were a real field in the data source, you create it using the DEFINE command before writing the report request.

The basic format of a DEFINE command is:

```
DEFINE FILE filenamefield/format=expression;

.

.

.

END
```

Filename represents the name of the data source you are using. **Field** is the name you give the temporary field you are creating. You define the field format with a slash (/) and the desired format. On the right side of the equation, **expression** represents a formula you specify that indicates how to calculate values for the new field. You complete the DEFINE command with the command END. A DEFINE command alone does not produce any display on your screen.

To illustrate the difference between creating temporary fields using DEFINE and COMPUTE, you now create FULL_NAME using DEFINE.

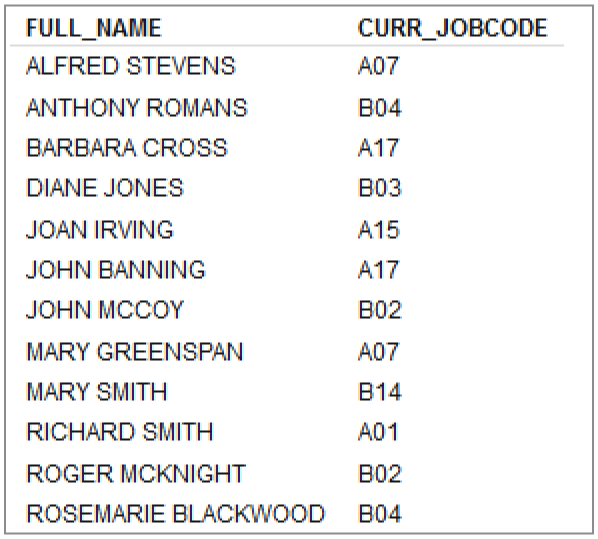
Issue the following DEFINE command:

```
DEFINE FILE EMPLOYEE

FULL_NAME/A30=FIRST_NAME || (' '| LAST_NAME);

END
```

Now, issue the following request:

```
TABLE FILE EMPLOYEE

PRINT CURR_JOBCODE

BY FULL_NAME

END
```

Run the request. The output is:



FULL_NAME	CURR_JOBCODE
ALFRED STEVENS	A07
ANTHONY ROMANS	B04
BARBARA CROSS	A17
DIANE JONES	B03
JOAN IRVING	A15
JOHN BANNING	A17
JOHN MCCOY	B02
MARY GREENSPAN	A07
MARY SMITH	B14
RICHARD SMITH	A01
ROGER MCKNIGHT	B02
ROSEMARIE BLACKWOOD	B04

Unlike a temporary field created by a COMPUTE command, you can sort the field FULL_ NAME and it continues to exist after the report is finished.

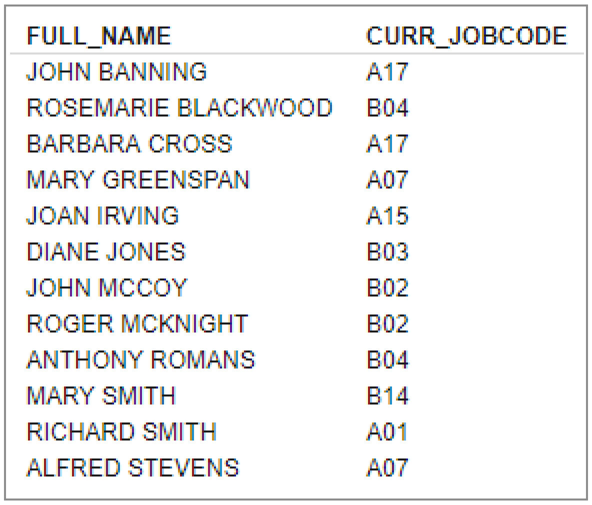
Note that the report output is sorted by FULL_NAME, which has the first name concatenated to the last name.

If you want to sort by last name and then the first name, but not show those values, you can use NOPRINT to suppress their display.

Issue the following request:

```
DEFINE FILE EMPLOYEE

FULL_NAME/A30=FIRST_NAME || (' '| LAST_NAME);

END



TABLE FILE EMPLOYEE

PRINT FULL_NAME CURR_JOBCODE

BY LAST_NAME NOPRINT

BY FIRST_NAME NOPRINT

END
```

Run the request. The output is:



FULL_NAME	CURR_JOBCODE
JOHN BANNING	A17
ROSEMARIE BLACKWOOD	B04
BARBARA CROSS	A17
MARY GREENSPAN	A07
JOAN IRVING	A15
DIANE JONES	B03
JOHN MCCOY	B02
ROGER MCKNIGHT	B02
ANTHONY ROMANS	B04
MARY SMITH	B14
RICHARD SMITH	A01
ALFRED STEVENS	A07

Adding More Temporary Fields

When you issue a new DEFINE, it erases existing temporary fields, unless you start the DEFINE command as follows:

```
DEFINE FILE filename ADD
```

ADD prevents existing temporary fields from being erased and lets you add new ones. Right now, FULL_NAME is the only temporary field that exists. In the next example, you will add another.

Extracting Part of the Text From an Alphanumeric Field

When data is in an alphanumeric field, you can extract some of the characters from the data or change the way the characters are presented. For example, you might want to pick out the first character of the job code and use it as the job category.

You can use the EDIT function to do this. Using EDIT, you can:

- Change the way an alphanumeric field displays.
- Extract part of a field.

- Change an alphanumeric field to an integer field or an integer field to an alphanumeric field.

To change an alphanumeric field to an integer field, the basic format is:

```
field_alpha/An=EDIT(field_numeric);
```

To use the EDIT function to extract characters, the basic format is:

```
field/An= EDIT(fieldname,'mask');
```

Field is the name you give the temporary field. You must use **A** to declare that the temporary field is alphanumeric. The **n** represents an integer you supply that defines the field length.

Fieldname is the name of the field in the data source, and **mask** represents a series of characters you supply that act as a filter for the data found in the field. Enclose your masks within single quotation marks (').

The mask works like this:

- If a character in the mask is a "9", then the character in the same position in a data value is passed to the new field.
- If a character in the mask is a "$", then the character in the same position in a data value is discarded.
- Any other character is simply inserted in the field and the other characters are moved over one position to the right.

For example, CURR_JOBCODE contains a three-character job code consisting of a letter and two numbers. In the next example, you use EDIT to discard the letter and extract the two numbers. You use them in a field called JOB_LEVEL.

Issue the following DEFINE command:

```
DEFINE FILE EMPLOYEE ADD

JOB_LEVEL/A2=EDIT(CURR_JOBCODE, '$99');

END
```

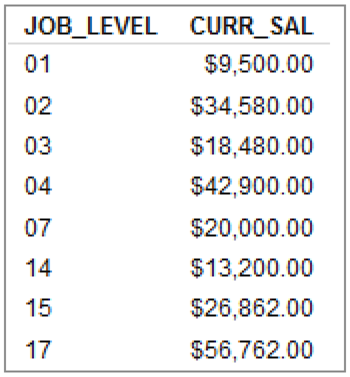
Although you see nothing on your screen when you execute this or any DEFINE command, this is what it does once you execute a report request.

The $ in the first position in the mask discards the letter from each data value retrieved from CURR_JOBCODE. The nines (9) in the next two positions pass the two numbers retrieved from each value in CURR_JOBCODE to the temporary field JOB_LEVEL.

Now, issue the following request:

```
TABLE FILE EMPLOYEE

SUM CURR_SAL BY JOB_LEVEL

END
```

Run the request. The output is:



```
JOB_LEVEL    CURR_SAL
01          $9,500.00
02         $34,580.00
03         $18,480.00
04         $42,900.00
07         $20,000.00
14         $13,200.00
15         $26,862.00
17         $56,762.00
```

This example illustrates the basics of the EDIT function.

Decoding the Characters in an Alphanumeric Field

You can also decode or translate characters stored in a field. For example, job codes could be decoded into job titles.

You can use the DECODE command to do this. DECODE enables you to replace values retrieved from a field with its decoded value.

The basic format of the DECODE command is:

```
field/format= DECODE fieldname (value result value result...

ELSE default);
```

In this structure, **field** is the name you give the temporary field. You supply the format, which must match the format of the results. For instance, if you supply an alphanumeric format for the field, the results of the DECODE must also be alphanumeric. Likewise, if you supply a numeric format, the results must be numeric also.

The **fieldname** is the name of the field in the data source you want to translate, and **value** is a data value found in the data source that you specify. The **result** represents the value you want written to the temporary field when its matching value is found in the data source. The result does not have to be unique. Several values retrieved from the data source can all be translated into the same result.

The keyword ELSE is optional and goes into effect if no values in the data source match the values you list. It is good coding practice to always include an ELSE value. **default** represents a value you specify to be written to the temporary field. If you do not supply a default value, the previous value is maintained.

In the next example, you use DECODE to translate deduction codes into one of three (3) categories: BENEFITS, SAVINGS, or TAXES. The deduction codes are found in the field DED_ CODE. You use a temporary field named D_TYPE for the translated values.

Issue the following DEFINE command:

```
DEFINE FILE EMPLOYEE ADD

D_TYPE/A10=DECODE DED_CODE (HLTH BENEFITS LIFE BENEFITS

SAVE SAVINGS ELSE TAXES);

END
```

DED_CODE contains seven (7) possible values: FICA, FED, STAT, CITY, HLTH, LIFE, and SAVE. If the value retrieved from DED_CODE is either HLTH or LIFE, D_TYPE will contain the value BENEFITS. If the value is SAVE, D_TYPE will contain the value SAVINGS. Since the remaining values can only be one of the tax deductions, the default for D_TYPE is TAXES.

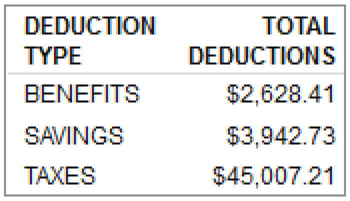
Notice also that the expression for D_TYPE spans two lines. The expression can be written on more than one line. A semicolon (;) ends the expression.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM DED_AMT AS 'TOTAL,DEDUCTIONS'
```

```
BY D_TYPE AS 'DEDUCTION,TYPE'

END
```

Run the request. The output is:



```
DEDUCTION          TOTAL
TYPE          DEDUCTIONS
BENEFITS       $2,628.41
SAVINGS        $3,942.73
TAXES         $45,007.21
```

Creating Subtotals and Grand Totals

In the previous chapters, you learned how to control the detailed information on a report by sorting and selecting records and by calculating new values that do not exist in the data source from records in the data source. To help you and others interpret the detailed information on a report, you can summarize the numeric information using subtotals and grand totals. You can also display totals on a conditional basis using WHEN.

As a reminder, some of the reports you generate in the Primer extend over several pages. To focus your attention on the salient points in each exercise, a subset of the sample output is shown. In addition, the border line for subtotals and grand totals were removed from the Warm StyleSheet.

Creating Column and Row Totals

The exercises in this topic demonstrate how to add column totals and row totals to your reports, using the following commands:

- COLUMN-TOTAL
- ROW-TOTAL

You can add these commands either to the verb phrase in a report request or to the ON TABLE phrase, as shown in some of the following examples. You can also use the optional keyword AND to connect more than one command in a single request. The AND is included in some examples for clarity and omitted in others for brevity.

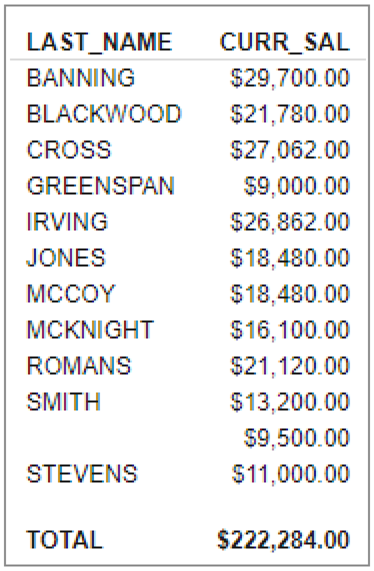
Creating a Column Total

To total the current salaries of all employees, issue the following request:

```
TABLE FILE EMPLOYEE

PRINT CURR_SAL AND COLUMN–TOTAL
```

```
BY LAST_NAME

END
```

Run the request. The output is:



```
LAST_NAME      CURR_SAL
BANNING      $29,700.00
BLACKWOOD    $21,780.00
CROSS        $27,062.00
GREENSPAN     $9,000.00
IRVING       $26,862.00
JONES        $18,480.00
MCCOY        $18,480.00
MCKNIGHT     $16,100.00
ROMANS       $21,120.00
SMITH        $13,200.00
              $9,500.00
STEVENS      $11,000.00

TOTAL       $222,284.00
```

This report contains one column of numeric data. However, if it had contained another numeric field, for example, gross pay for each employee, that column would also be totaled. By default, COLUMN-TOTAL calculates values for all columns of numeric data.

Suppose that your next report has more than one column of numeric data, but that only one contains data that you want to summarize. To provide you with maximum control over the data you present, you can restrict totaling to that one column simply by naming the field you wish to total in the ON TABLE phrase.

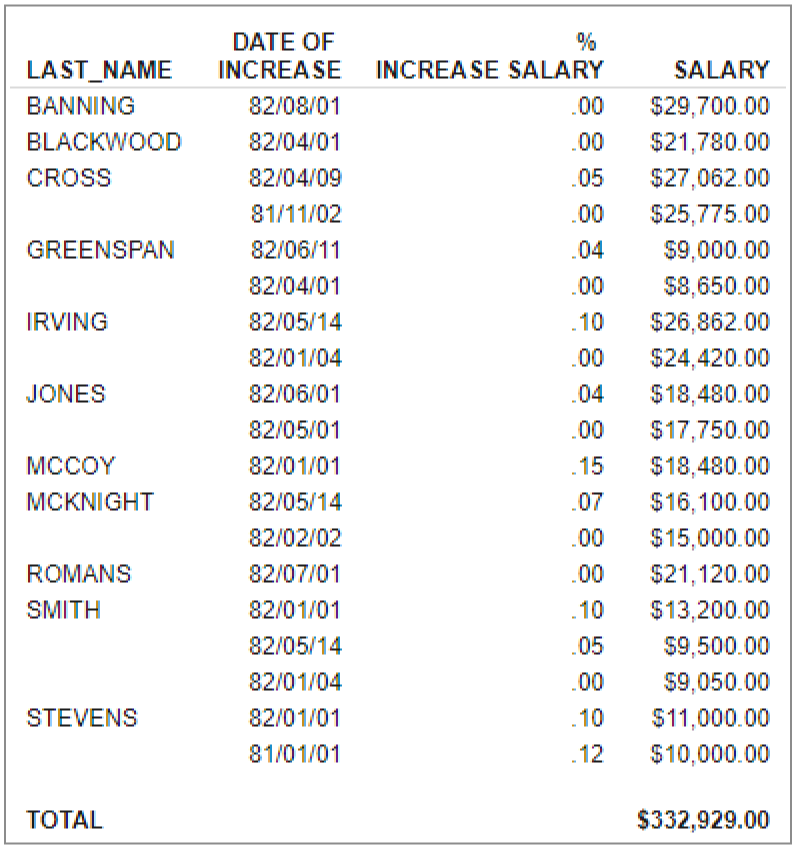
Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT DAT_INC AS 'DATE OF,INCREASE'

PCT_INC AS '%,INCREASE SALARY'

SALARY

BY LAST_NAME

ON TABLE COLUMN-TOTAL SALARY
```

```
END
```

Notice that this request identifies two columns of numeric data, PCT_INC and SALARY, yet it only asks to total employee salaries, since adding their percentages of increase would not provide meaningful information.

Run the request. The output is:



```
              DATE OF                   %
LAST_NAME     INCREASE   INCREASE SALARY        SALARY
BANNING       82/08/01               .00    $29,700.00
BLACKWOOD     82/04/01               .00    $21,780.00
CROSS         82/04/09               .05    $27,062.00
              81/11/02               .00    $25,775.00
GREENSPAN     82/06/11               .04     $9,000.00
              82/04/01               .00     $8,650.00
IRVING        82/05/14               .10    $26,862.00
              82/01/04               .00    $24,420.00
JONES         82/06/01               .04    $18,480.00
              82/05/01               .00    $17,750.00
MCCOY         82/01/01               .15    $18,480.00
MCKNIGHT      82/05/14               .07    $16,100.00
              82/02/02               .00    $15,000.00
ROMANS        82/07/01               .00    $21,120.00
SMITH         82/01/01               .10    $13,200.00
              82/05/14               .05     $9,500.00
              82/01/04               .00     $9,050.00
STEVENS       82/01/01               .10    $11,000.00
              81/01/01               .12    $10,000.00

TOTAL                                      $332,929.00
```

As requested, the report displays a single column total at the bottom of the SALARY column.

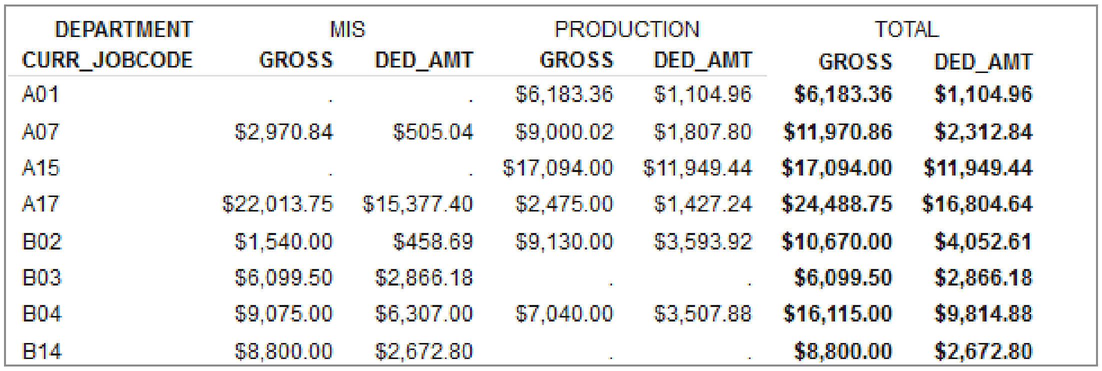
Creating a Row Total

Similarly, you can create row totals by including the command ROW-TOTAL in your report request.

To create a report with totals at the end of each row, issue the following request:

```
TABLE FILE EMPLOYEE

SUM GROSS DED_AMT

ACROSS DEPARTMENT

BY CURR_JOBCODE

ON TABLE ROW-TOTAL

END
```

Run the request. The output is:



DEPARTMENT	MIS		PRODUCTION		TOTAL	
CURR_JOBCODE	GROSS	DED_AMT	GROSS	DED_AMT	GROSS	DED_AMT
A01	.	.	$6,183.36	$1,104.96	**$6,183.36**	**$1,104.96**
A07	$2,970.84	$505.04	$9,000.02	$1,807.80	**$11,970.86**	**$2,312.84**
A15	.	.	$17,094.00	$11,949.44	**$17,094.00**	**$11,949.44**
A17	$22,013.75	$15,377.40	$2,475.00	$1,427.24	**$24,488.75**	**$16,804.64**
B02	$1,540.00	$458.69	$9,130.00	$3,593.92	**$10,670.00**	**$4,052.61**
B03	$6,099.50	$2,866.18	.	.	**$6,099.50**	**$2,866.18**
B04	$9,075.00	$6,307.00	$7,040.00	$3,507.88	**$16,115.00**	**$9,814.88**
B14	$8,800.00	$2,672.80	.	.	**$8,800.00**	**$2,672.80**

Notice that if you use more than one (1) verb object, the output displays a row total for each of the fields, in this case, GROSS and DED_AMT.

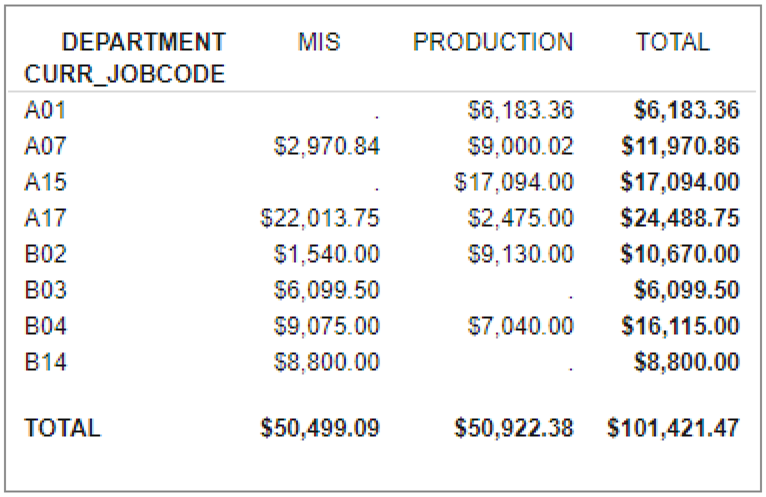
Creating Column and Row Totals

You can add column totals and row totals to a report by including both commands in your request. To calculate the subtotal the gross salary for each department, as well as for each job code, issue the previous request as follows:

```
TABLE FILE EMPLOYEE

SUM GROSS

ACROSS DEPARTMENT

BY CURR_JOBCODE
```

```
ON TABLE ROW-TOTAL AND COLUMN-TOTAL

END
```

Run the request. The output is:



DEPARTMENT CURR_JOBCODE	MIS	PRODUCTION	TOTAL
A01	.	$6,183.36	**$6,183.36**
A07	$2,970.84	$9,000.02	**$11,970.86**
A15	.	$17,094.00	**$17,094.00**
A17	$22,013.75	$2,475.00	**$24,488.75**
B02	$1,540.00	$9,130.00	**$10,670.00**
B03	$6,099.50	.	**$6,099.50**
B04	$9,075.00	$7,040.00	**$16,115.00**
B14	$8,800.00	.	**$8,800.00**
TOTAL	**$50,499.09**	**$50,922.38**	**$101,421.47**

Once again, you could produce the same results by including the totaling commands in the verb phrase and omitting the ON TABLE phrase, as follows:

```
SUM GROSS AND ROW-TOTAL AND COLUMN-TOTAL
```

Adding Section Totals and Grand Totals to Reports

Frequently, reports contain detailed information that is broken down into subsections for which simple column and row totals do not provide adequate summaries. In these instances, it is more useful to look at subtotals for particular sections and a grand total at the end of the report.

You can add the following commands to your report requests to create section subtotals and grand totals:

- SUBTOTAL
- SUB-TOTAL

- RECOMPUTE
- SUMMARIZE
- Use SUBTOTAL or SUB-TOTAL when you only need to add up columns of numbers each time the named sort field changes values. SUBTOTAL shows the column totals each time the named sort field changes values. SUB-TOTAL shows the column totals each time the named sort field and any higher level sort fields change values.
- Use RECOMPUTE or SUMMARIZE when you need to add up columns of numbers *and* recalculate temporary fields, such as ratios, using subtotals. RECOMPUTE shows the column totals each time the named sort field changes values. SUMMARIZE shows the column totals each time the named sort field and any higher-level sort fields change values.

By completing the exercises in this section, you learn when and how to use each of these commands. Following that, we provide a reference chart that summarizes the function or functions of each subtotaling command.

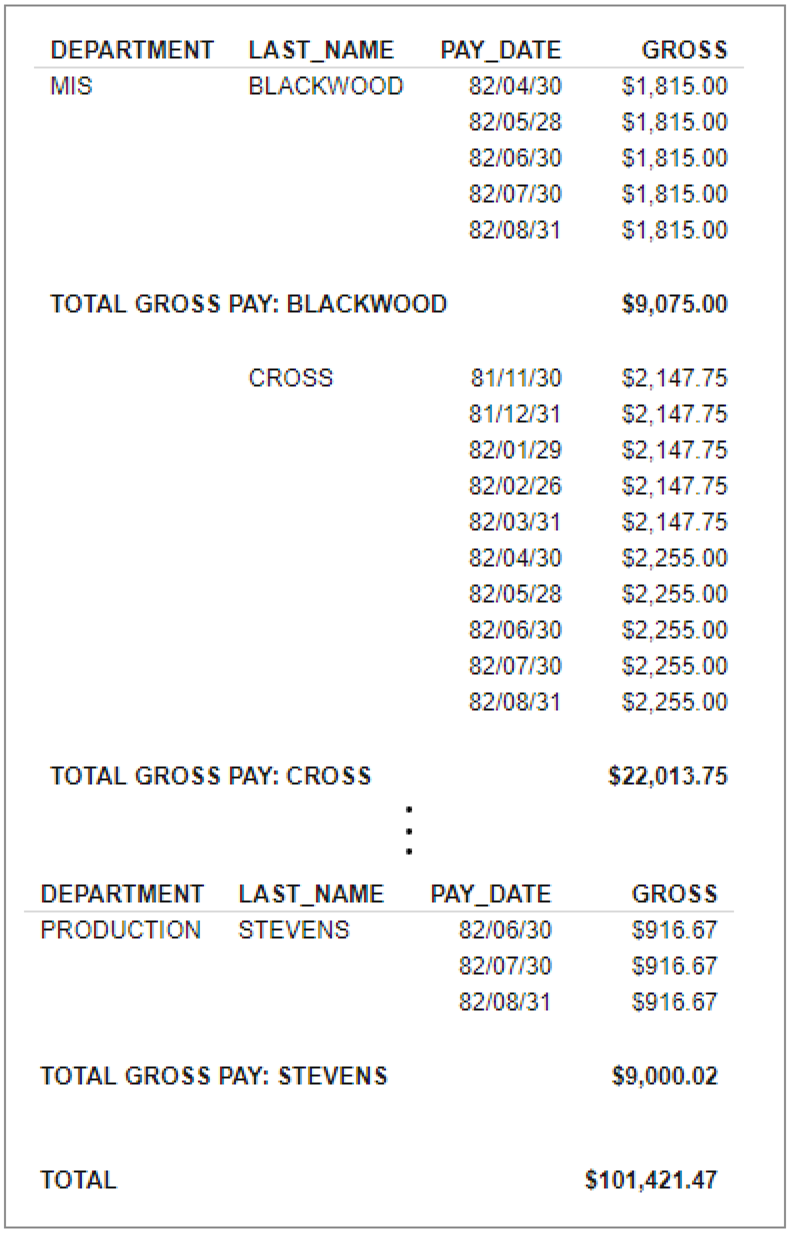
Producing Section Totals for a Specified Sort Field: SUBTOTAL

The SUBTOTAL command enables you to produce a subtotal each time the sort field you specify in a request changes. For example, if you sort by LAST_NAME, you will see a subtotal following the data for each employee.

To produce section totals and a grand total for a specified sort field, issue the following request:

```
TABLE FILE EMPLOYEE

SUM GROSS

BY DEPARTMENT BY LAST_NAME BY PAY_DATE

ON LAST_NAME SUBTOTAL AS 'TOTAL GROSS PAY:'

END
```

Run the request. The output is:



```
DEPARTMENT   LAST_NAME    PAY_DATE        GROSS
MIS          BLACKWOOD    82/04/30    $1,815.00
                          82/05/28    $1,815.00
                          82/06/30    $1,815.00
                          82/07/30    $1,815.00
                          82/08/31    $1,815.00

TOTAL GROSS PAY: BLACKWOOD            $9,075.00

             CROSS        81/11/30    $2,147.75
                          81/12/31    $2,147.75
                          82/01/29    $2,147.75
                          82/02/26    $2,147.75
                          82/03/31    $2,147.75
                          82/04/30    $2,255.00
                          82/05/28    $2,255.00
                          82/06/30    $2,255.00
                          82/07/30    $2,255.00
                          82/08/31    $2,255.00

TOTAL GROSS PAY: CROSS               $22,013.75
                      .
                      .
                      .
DEPARTMENT   LAST_NAME    PAY_DATE        GROSS
PRODUCTION   STEVENS      82/06/30      $916.67
                          82/07/30      $916.67
                          82/08/31      $916.67

TOTAL GROSS PAY: STEVENS              $9,000.02


TOTAL                               $101,421.47
```

Notice that the request contains three sort fields, but the report only subtotals on the sort field you specifically request. That is, it displays a section total for each named employee and a grand total at the end of the report. The AS phrase in the request makes the subtotal line more readable by changing the default subtotal heading: *TOTAL. Therefore, instead of seeing

```
*TOTAL BLACKWOOD
```

on the report, you see the more descriptive phrase:

```
TOTAL GROSS PAY: BLACKWOOD
```

Suppressing a Single-Line Summary: MULTILINES

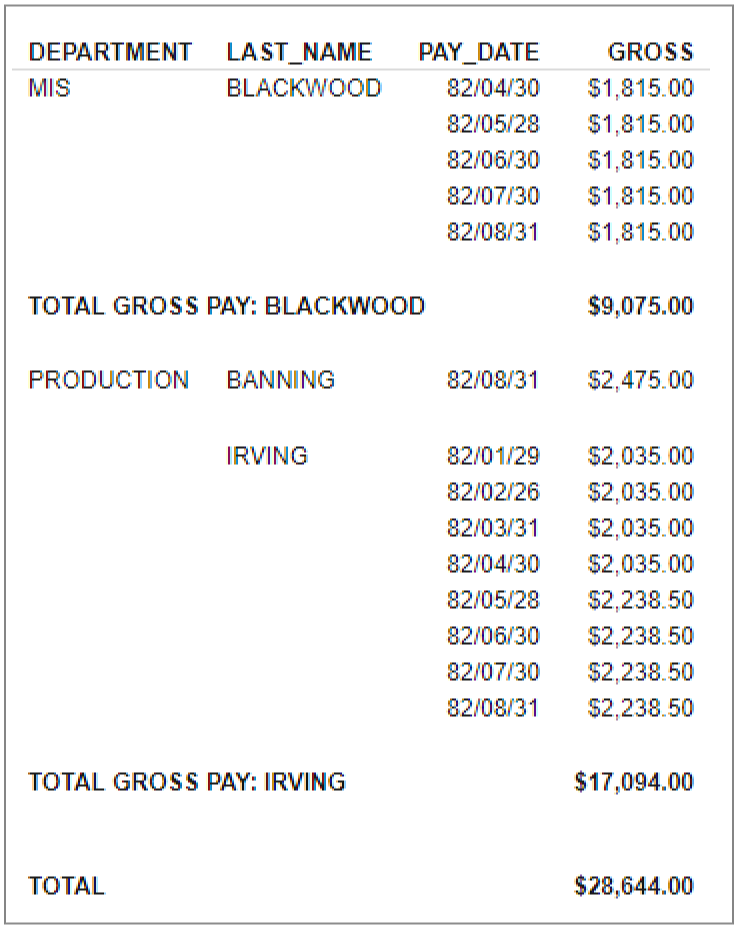
If an employee, for example BANNING, has only one pay date, the subtotal line duplicates the single-line total. To avoid such redundancy, you may suppress this subtotal line on your report using the MULTILINES command.

Issue the previous request with the following variation:

```
TABLE FILE EMPLOYEE

SUM GROSS

BY DEPARTMENT BY LAST_NAME BY PAY_DATE

IF LAST_NAME EQ BANNING OR BLACKWOOD OR IRVING

ON LAST_NAME SUBTOTAL MULTILINES AS ' TOTAL GROSS PAY: '

END
```

This command indicates to subtotal only when the specified sort field has multiple records.

Run the request. The output is:



```
DEPARTMENT   LAST_NAME    PAY_DATE        GROSS
MIS          BLACKWOOD    82/04/30    $1,815.00
                          82/05/28    $1,815.00
                          82/06/30    $1,815.00
                          82/07/30    $1,815.00
                          82/08/31    $1,815.00

TOTAL GROSS PAY: BLACKWOOD            $9,075.00

PRODUCTION   BANNING      82/08/31    $2,475.00

             IRVING       82/01/29    $2,035.00
                          82/02/26    $2,035.00
                          82/03/31    $2,035.00
                          82/04/30    $2,035.00
                          82/05/28    $2,238.50
                          82/06/30    $2,238.50
                          82/07/30    $2,238.50
                          82/08/31    $2,238.50

TOTAL GROSS PAY: IRVING              $17,094.00


TOTAL                                $28,644.00
```

Notice that a single line for BANNING displays, in addition to displaying subtotals for IRVING and all other employees with multiple lines of data.

You can use the MULTILINES command with all of the subtotaling commands in this section.

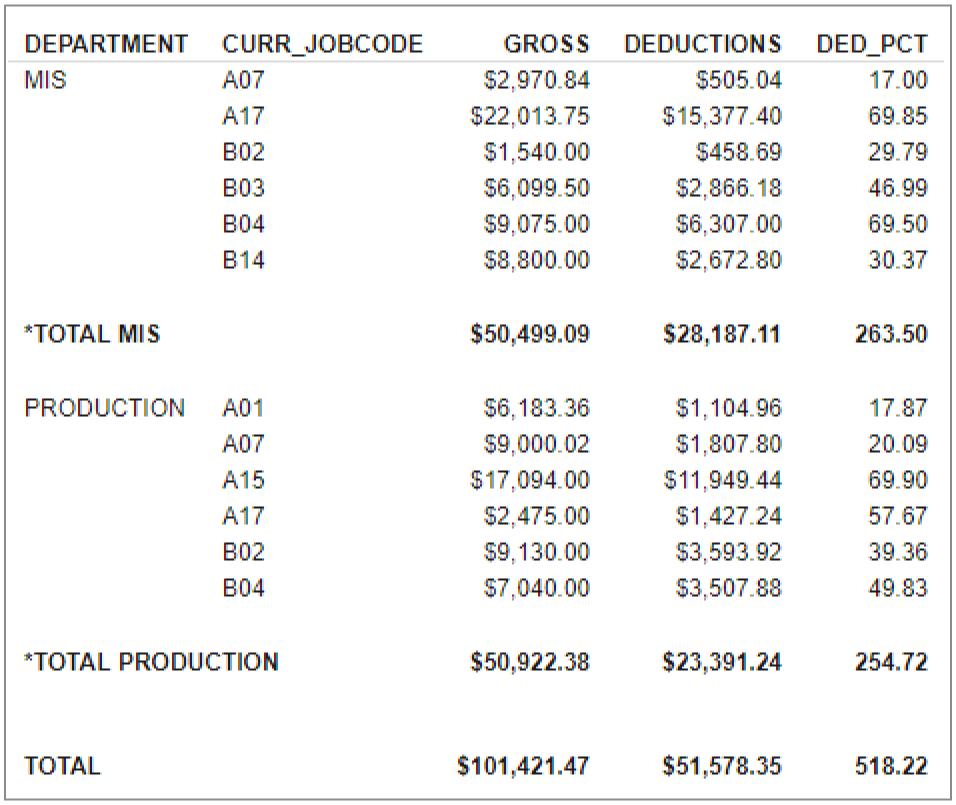
Producing Section Totals for a Specified Sort Field: RECOMPUTE

In this exercise, you again produce section subtotals for a specified sort field, but this time the report request contains a COMPUTE command. In order to demonstrate the effect of RECOMPUTE, you first type the request incorrectly, using the SUBTOTAL command. After examining the results, you change the command to RECOMPUTE and rerun the report.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM GROSS DED_AMT AS 'DEDUCTIONS'

AND COMPUTE DED_PCT=(DED_AMT/GROSS)*100;

BY DEPARTMENT BY CURR_JOBCODE

ON DEPARTMENT SUBTOTAL

END
```

Run the request. The output is:



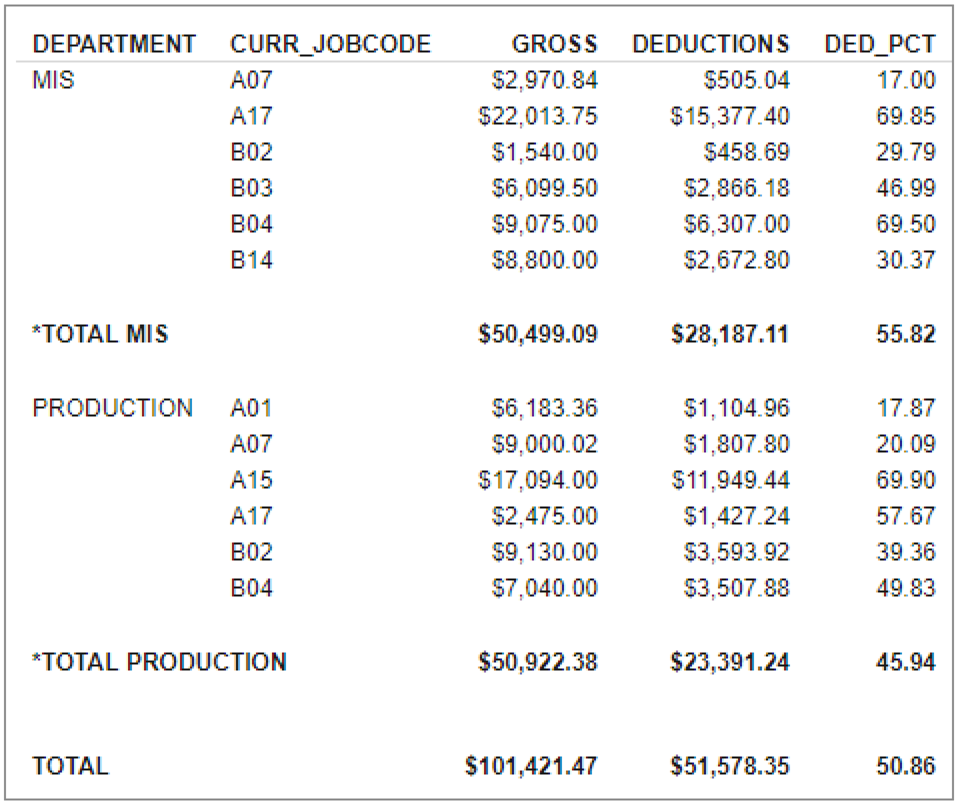
```
DEPARTMENT   CURR_JOBCODE        GROSS    DEDUCTIONS   DED_PCT
MIS          A07             $2,970.84       $505.04     17.00
             A17            $22,013.75    $15,377.40     69.85
             B02             $1,540.00       $458.69     29.79
             B03             $6,099.50     $2,866.18     46.99
             B04             $9,075.00     $6,307.00     69.50
             B14             $8,800.00     $2,672.80     30.37

*TOTAL MIS                  $50,499.09    $28,187.11    263.50

PRODUCTION   A01             $6,183.36     $1,104.96     17.87
             A07             $9,000.02     $1,807.80     20.09
             A15            $17,094.00    $11,949.44     69.90
             A17             $2,475.00     $1,427.24     57.67
             B02             $9,130.00     $3,593.92     39.36
             B04             $7,040.00     $3,507.88     49.83

*TOTAL PRODUCTION           $50,922.38    $23,391.24    254.72


TOTAL                      $101,421.47    $51,578.35    518.22
```

Notice that gross pay and deductions are properly totaled. However, the numbers in the DED_PCT column are added, producing results that you might not expect to see. This happens because the SUBTOTAL command adds up numeric values, which is fine for data like salaries and gross pay. However, computed values, such as ratios, cannot be added together to produce meaningful results. Such values need to be recalculated, not just added.

Issue the previous request, substituting RECOMPUTE for SUBTOTAL, as follows:

```
TABLE FILE EMPLOYEE

SUM GROSS DED_AMT AS 'DEDUCTIONS'

AND COMPUTE DED_PCT=(DED_AMT/GROSS)*100;

BY DEPARTMENT BY CURR_JOBCODE

ON DEPARTMENT RECOMPUTE

END
```

Run the request. The output is:



```
DEPARTMENT  CURR_JOBCODE        GROSS   DEDUCTIONS  DED_PCT
MIS         A07             $2,970.84      $505.04    17.00
            A17            $22,013.75   $15,377.40    69.85
            B02             $1,540.00      $458.69    29.79
            B03             $6,099.50    $2,866.18    46.99
            B04             $9,075.00    $6,307.00    69.50
            B14             $8,800.00    $2,672.80    30.37

*TOTAL MIS                 $50,499.09   $28,187.11    55.82

PRODUCTION  A01             $6,183.36    $1,104.96    17.87
            A07             $9,000.02    $1,807.80    20.09
            A15            $17,094.00   $11,949.44    69.90
            A17             $2,475.00    $1,427.24    57.67
            B02             $9,130.00    $3,593.92    39.36
            B04             $7,040.00    $3,507.88    49.83

*TOTAL PRODUCTION          $50,922.38   $23,391.24    45.94


TOTAL                     $101,421.47   $51,578.35    50.86
```

This time, in addition to showing totals for gross pay and deductions, the deduction percentage is recalculated based on the subtotals for each department, using the COMPUTE command in the request. For example, to determine that the total DED_PCT for the MIS department is 55.82, the computation is:

```
$28,187.25/$50,499.12*100
```

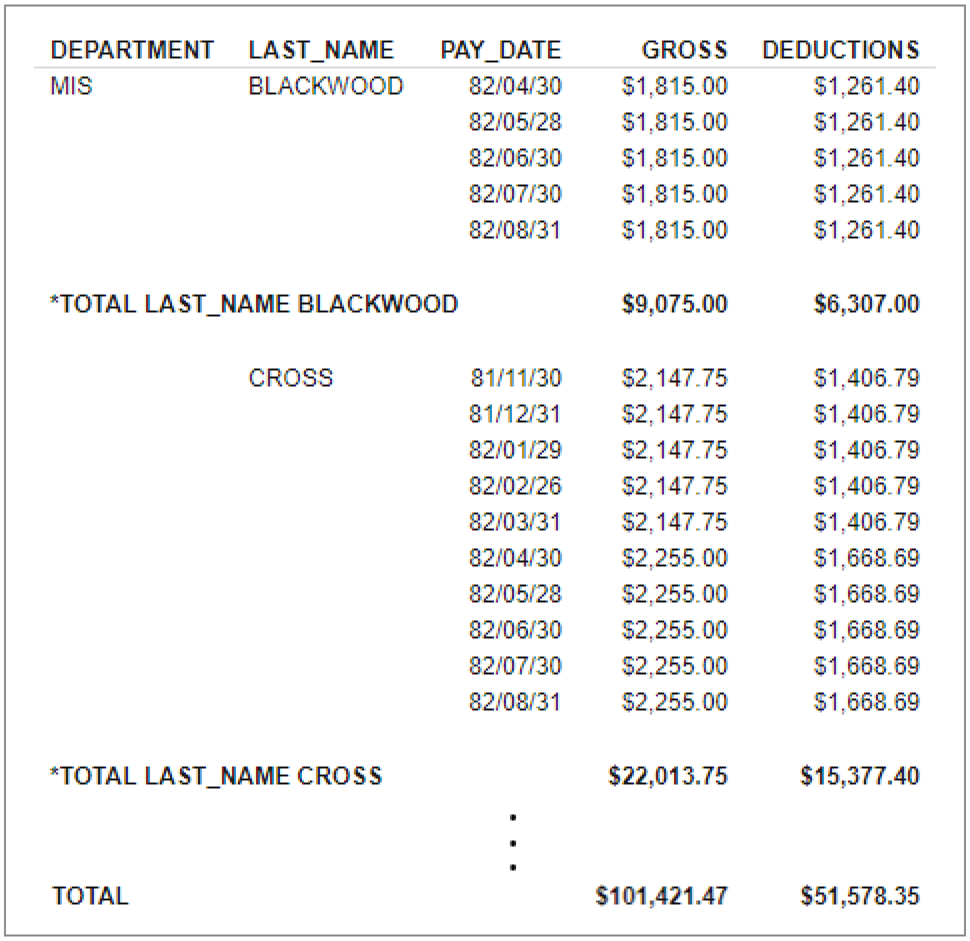
Producing Section Totals for More Than One Sort Field: SUB-TOTAL

Sometimes it is useful to display subtotals for more than one sort field, for example, for each employee in a department, and then for the department as a whole. You can do this easily using the SUB-TOTAL command. Once again, to demonstrate the effect of SUB-TOTAL, by comparison, you first type the request using SUBTOTAL. After reviewing the report, you change the command to SUB-TOTAL and examine the results.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM GROSS DED_AMT AS 'DEDUCTIONS'

BY DEPARTMENT BY LAST_NAME BY PAY_DATE

ON LAST_NAME SUBTOTAL

END
```

Run the request. The output is:



```
DEPARTMENT   LAST_NAME    PAY_DATE       GROSS    DEDUCTIONS
MIS          BLACKWOOD    82/04/30   $1,815.00     $1,261.40
                          82/05/28   $1,815.00     $1,261.40
                          82/06/30   $1,815.00     $1,261.40
                          82/07/30   $1,815.00     $1,261.40
                          82/08/31   $1,815.00     $1,261.40

*TOTAL LAST_NAME BLACKWOOD           $9,075.00     $6,307.00

             CROSS        81/11/30   $2,147.75     $1,406.79
                          81/12/31   $2,147.75     $1,406.79
                          82/01/29   $2,147.75     $1,406.79
                          82/02/26   $2,147.75     $1,406.79
                          82/03/31   $2,147.75     $1,406.79
                          82/04/30   $2,255.00     $1,668.69
                          82/05/28   $2,255.00     $1,668.69
                          82/06/30   $2,255.00     $1,668.69
                          82/07/30   $2,255.00     $1,668.69
                          82/08/31   $2,255.00     $1,668.69

*TOTAL LAST_NAME CROSS              $22,013.75    $15,377.40
                             .
                             .
                             .
TOTAL                              $101,421.47    $51,578.35
```

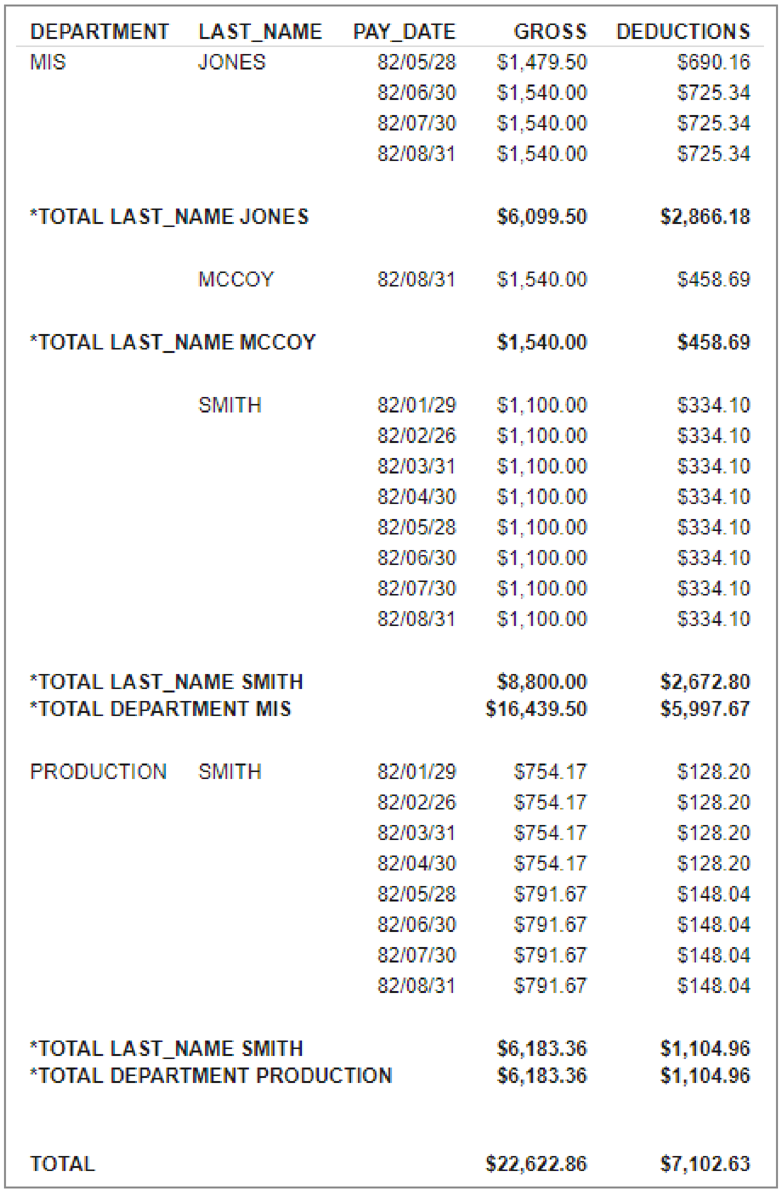
Notice that the report displays a subtotal for each employee name, but it does *not* display a subtotal for all employees in the department.

Issue the following request, substituting SUB-TOTAL for SUBTOTAL, as follows:

```
TABLE FILE EMPLOYEE

SUM GROSS DED_AMT AS 'DEDUCTIONS'

BY DEPARTMENT BY LAST_NAME BY PAY_DATE

IF LAST_NAME EQ JONES OR MCCOY OR SMITH

ON LAST_NAME SUB-TOTAL

END
```

The SUB-TOTAL command includes multiple levels of section totals in a report. Section totals for the sort field you explicitly request (in this case, LAST_NAME), as well as section totals for any sort fields that *precede* the specified field in the request (in this case, DEPARTMENT). These are also known as higher-level sort fields.

Run the request. The output is:



```
DEPARTMENT   LAST_NAME   PAY_DATE       GROSS   DEDUCTIONS
MIS          JONES       82/05/28   $1,479.50      $690.16
                         82/06/30   $1,540.00      $725.34
                         82/07/30   $1,540.00      $725.34
                         82/08/31   $1,540.00      $725.34

*TOTAL LAST_NAME JONES              $6,099.50    $2,866.18

             MCCOY       82/08/31   $1,540.00      $458.69

*TOTAL LAST_NAME MCCOY              $1,540.00      $458.69

             SMITH       82/01/29   $1,100.00      $334.10
                         82/02/26   $1,100.00      $334.10
                         82/03/31   $1,100.00      $334.10
                         82/04/30   $1,100.00      $334.10
                         82/05/28   $1,100.00      $334.10
                         82/06/30   $1,100.00      $334.10
                         82/07/30   $1,100.00      $334.10
                         82/08/31   $1,100.00      $334.10

*TOTAL LAST_NAME SMITH              $8,800.00    $2,672.80
*TOTAL DEPARTMENT MIS              $16,439.50    $5,997.67

PRODUCTION   SMITH       82/01/29     $754.17      $128.20
                         82/02/26     $754.17      $128.20
                         82/03/31     $754.17      $128.20
                         82/04/30     $754.17      $128.20
                         82/05/28     $791.67      $148.04
                         82/06/30     $791.67      $148.04
                         82/07/30     $791.67      $148.04
                         82/08/31     $791.67      $148.04

*TOTAL LAST_NAME SMITH              $6,183.36    $1,104.96
*TOTAL DEPARTMENT PRODUCTION        $6,183.36    $1,104.96


TOTAL                              $22,622.86    $7,102.63
```

Notice that the report now shows a subtotal for each employee and a separate subtotal line for the department. To take full advantage of this capability, it is important to think about the order of sort fields as you type them in a request. Of course, the final line of the report still displays the grand total for all departments.

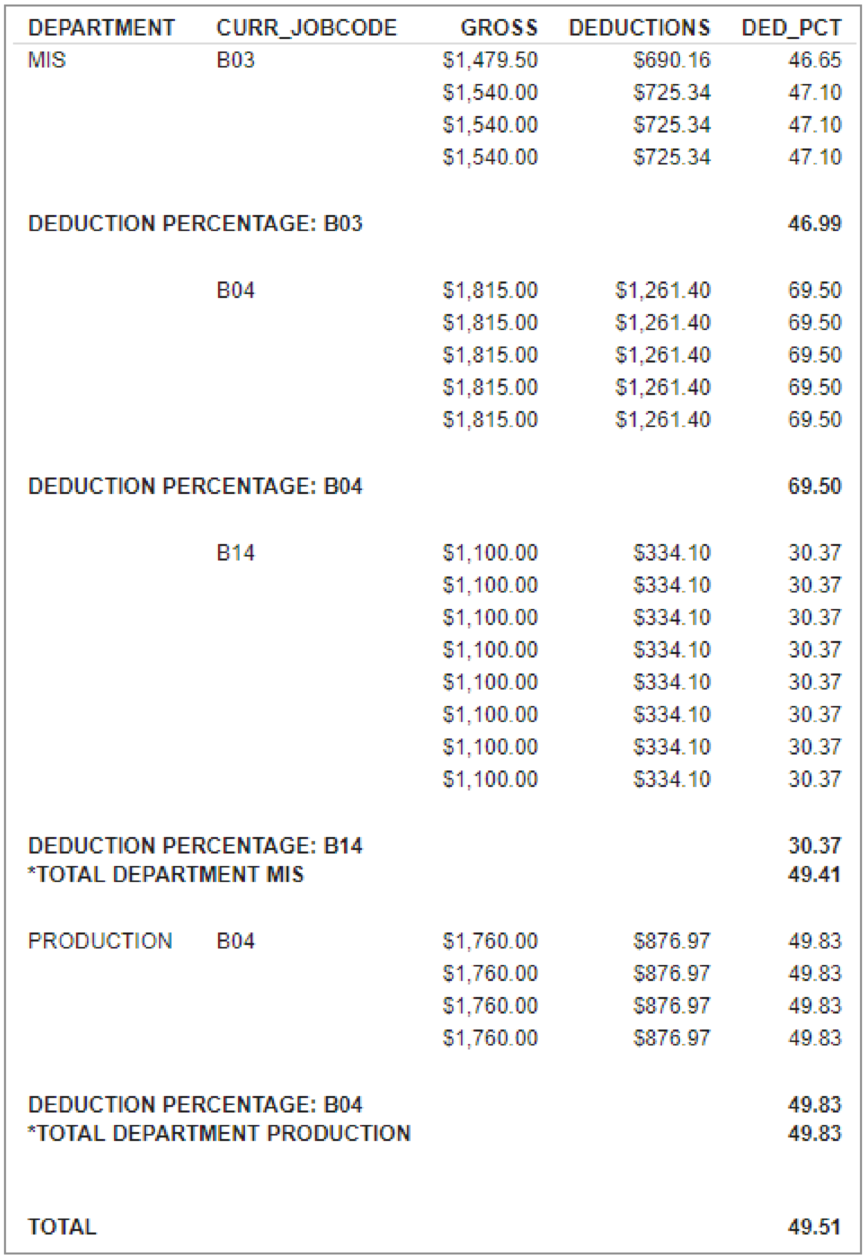
Producing Section Totals for More Than One Sort Field: SUMMARIZE

Once again, you produce a report with multiple section totals, however, this time you also compute and subtotal deduction percentages.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM GROSS DED_AMT AS 'DEDUCTIONS'

AND COMPUTE DED_PCT=(DED_AMT/GROSS)*100;

BY DEPARTMENT BY CURR_JOBCODE BY PAY_DATE NOPRINT

IF CURR_JOBCODE EQ B03 OR B04 OR B14

ON CURR_JOBCODE SUMMARIZE DED_PCT AS 'DEDUCTION PERCENTAGE: '

END
```

Run the request. The output is:



```
DEPARTMENT    CURR_JOBCODE        GROSS    DEDUCTIONS    DED_PCT
MIS           B03             $1,479.50       $690.16      46.65
                              $1,540.00       $725.34      47.10
                              $1,540.00       $725.34      47.10
                              $1,540.00       $725.34      47.10

DEDUCTION PERCENTAGE: B03                                  46.99

              B04             $1,815.00     $1,261.40      69.50
                              $1,815.00     $1,261.40      69.50
                              $1,815.00     $1,261.40      69.50
                              $1,815.00     $1,261.40      69.50
                              $1,815.00     $1,261.40      69.50

DEDUCTION PERCENTAGE: B04                                  69.50

              B14             $1,100.00       $334.10      30.37
                              $1,100.00       $334.10      30.37
                              $1,100.00       $334.10      30.37
                              $1,100.00       $334.10      30.37
                              $1,100.00       $334.10      30.37
                              $1,100.00       $334.10      30.37
                              $1,100.00       $334.10      30.37
                              $1,100.00       $334.10      30.37

DEDUCTION PERCENTAGE: B14                                  30.37
*TOTAL DEPARTMENT MIS                                      49.41

PRODUCTION    B04             $1,760.00       $876.97      49.83
                              $1,760.00       $876.97      49.83
                              $1,760.00       $876.97      49.83
                              $1,760.00       $876.97      49.83

DEDUCTION PERCENTAGE: B04                                  49.83
*TOTAL DEPARTMENT PRODUCTION                               49.83


TOTAL                                                      49.51
```

The SUMMARIZE command recalculates a combined deduction percentage for each job code, as well as a combined percentage for all job codes within each department, using the formula you specify in a request. Notice, however, that the following line in the request that produces this report restricts summary information to the computed field DED_PCT:

```
ON CURR_JOBCODE SUMMARIZE DED_PCT AS ' DEDUCTION PERCENTAGE: '
```

Therefore, you do not see subtotals in the GROSS or DEDUCTIONS columns. Nevertheless, these values are added internally and the resulting subtotals are used to compute a combined deduction percentage for each job code and for all job codes within each department.

Before moving on, look again at the line of the request that produced the previous report:

```
BY DEPARTMENT BY CURR_JOBCODE BY PAY_DATE NOPRINT
```

Notice that it includes the NOPRINT command, which you learned to use in Chapter 2, *Sorting Records*. In this instance, NOPRINT indicates that the PAY_DATE sort field column will not be displayed on the report. This column would make the report too wide to fit on a single screen. By removing the PAY_DATE column, we are able to show all of the essential data on one screen.

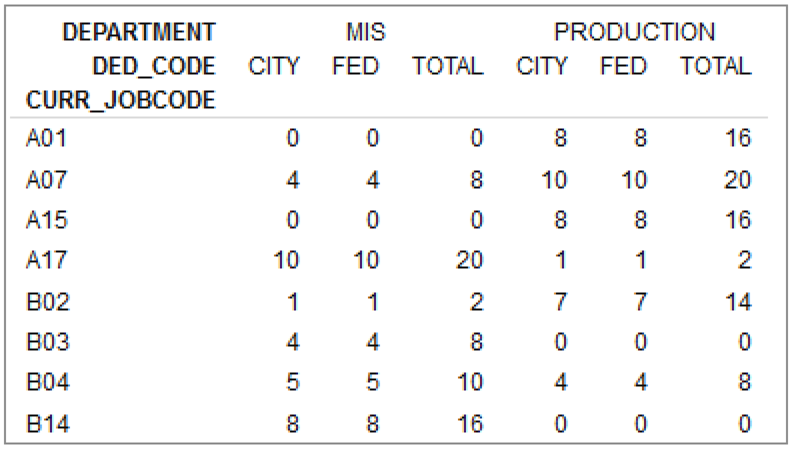
Producing Row Totals for ACROSS Sort Field Values

You can produce row totals for horizontal (ACROSS) sort field values. Row totals for horizontal sort fields, referenced by ACROSS-TOTAL, are different from standard row totals because only horizontal sort field values, within each ACROSS, are included in the total. Integer, single precision floating point, double precision floating point, packed, and long packed fields can all be totaled.

To produce an ACROSS total for the count of CITY and FED deduction codes with each department, issue the following request:

```
TABLE FILE EMPLOYEE

SUM CNT.EMP_ID

BY CURR_JOBCODE

ACROSS DEPARTMENT

ACROSS DED_CODE ACROSS-TOTAL

WHERE DED_CODE EQ 'CITY' OR 'FED'

END
```

Run the request. The output is:



DEPARTMENT	MIS			PRODUCTION		
DED_CODE	CITY	FED	TOTAL	CITY	FED	TOTAL
CURR_JOBCODE						
A01	0	0	0	8	8	16
A07	4	4	8	10	10	20
A15	0	0	0	8	8	16
A17	10	10	20	1	1	2
B02	1	1	2	7	7	14
B03	4	4	8	0	0	0
B04	5	5	10	4	4	8
B14	8	8	16	0	0	0

Summary Chart for Producing Section Totals

The following chart summarizes the four (4) situations illustrated by the exercises you have completed in this section:

	By a specified sort field	**By a specified sort field and all previous (higher) sort fields**
To add up all numeric columns	Use SUBTOTAL	Use SUB-TOTAL
To add numeric columns and then recalculate computed fields based on the numeric subtotals	Use RECOMPUTE	Use SUMMARIZE

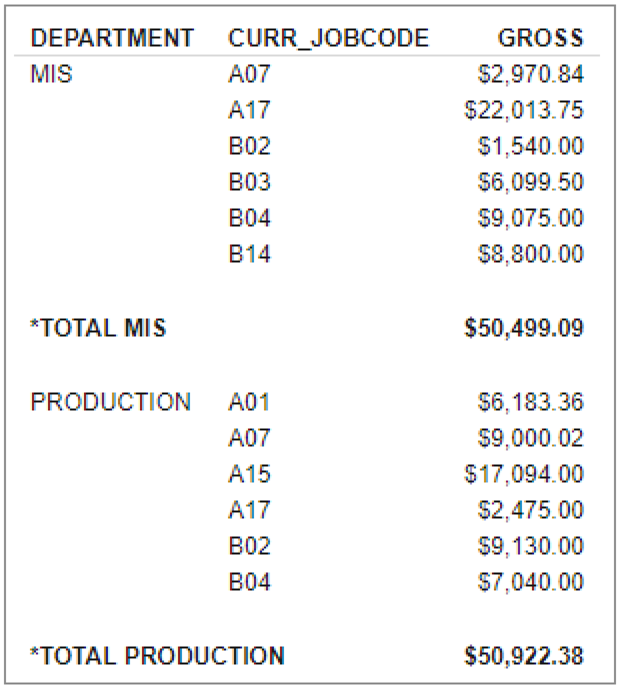
Suppressing Grand Totals: NOTOTAL

You have already learned how to suppress the display of redundant subtotals using the MULTILINES command. To further enhance your control of totaling on reports, you can also suppress grand totals using the NOTOTAL command.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM GROSS

BY DEPARTMENT BY CURR_JOBCODE

ON DEPARTMENT SUBTOTAL

ON TABLE NOTOTAL

END
```

Run the request. The output is:



```
DEPARTMENT   CURR_JOBCODE        GROSS
MIS          A07             $2,970.84
             A17            $22,013.75
             B02             $1,540.00
             B03             $6,099.50
             B04             $9,075.00
             B14             $8,800.00

*TOTAL MIS                  $50,499.09

PRODUCTION   A01             $6,183.36
             A07             $9,000.02
             A15            $17,094.00
             A17             $2,475.00
             B02             $9,130.00
             B04             $7,040.00

*TOTAL PRODUCTION           $50,922.38
```

Notice that unlike all of the other reports in this chapter, this one does not display a grand total.

Displaying Subtotals Conditionally: WHEN

Another way to control when subtotals appear in your report is to specify a condition that must be satisfied in order for the subtotal to be displayed. You accomplish this using WHEN.

WHEN enables you to specify under which conditions subtotals appear. Do not confuse this with WHERE. Although the concept is similar to screening, there is an important distinction. When you use WHERE, you determine what data is included in a report. When you use WHEN, you determine when a subtotal is displayed based on the data in the report. You can use multiple WHEN phrases on the same sort field in a request.

You use WHEN in conjunction with each of the following commands explained in this chapter:

- SUBTOTAL
- SUB-TOTAL
- RECOMPUTE
- SUMMARIZE

First, you use one of the above commands in a report, then you follow it with WHEN. For instance, assume you have a report that contains the following line:

```
ON DEPARTMENT SUBTOTAL
```

To control when the subtotal appears in the report, you add a line like the following:

```
WHEN DEPARTMENT EQ 'MIS'
```

Regardless of which of the above commands you choose to use with WHEN, the format of WHEN is the same. The format is:

```
WHEN fieldnamecalculation
```

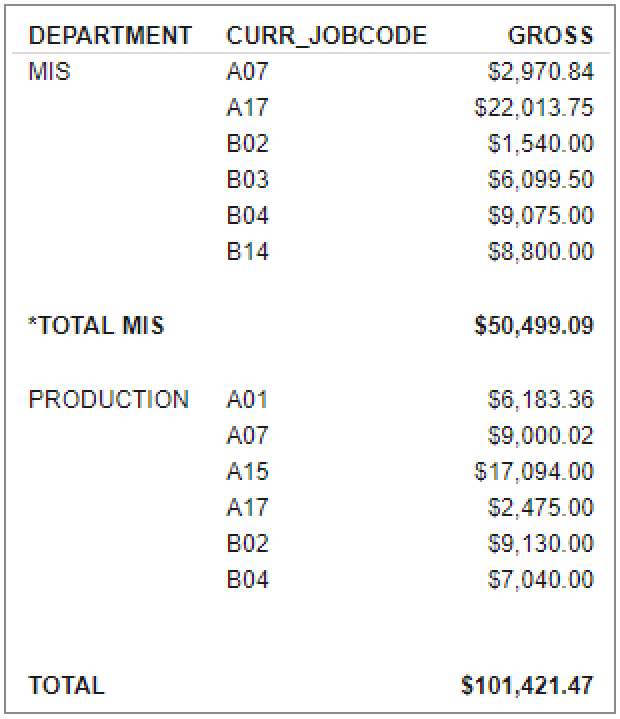
WHEN signals the beginning of a condition. The field name is the same one used with the preceding subtotaling command of your choice. The calculation can be a simple or complex equation, using either alphanumeric or numeric fields.

To produce a departmental subtotal only for the MIS department, issue the following request:

```
TABLE FILE EMPLOYEE

SUM GROSS

BY DEPARTMENT BY CURR_JOBCODE
```

```
ON DEPARTMENT SUBTOTAL

WHEN DEPARTMENT EQ 'MIS'

END
```

Run the request. The output is:



```
DEPARTMENT   CURR_JOBCODE        GROSS
MIS          A07             $2,970.84
             A17            $22,013.75
             B02             $1,540.00
             B03             $6,099.50
             B04             $9,075.00
             B14             $8,800.00

*TOTAL MIS                  $50,499.09

PRODUCTION   A01             $6,183.36
             A07             $9,000.02
             A15            $17,094.00
             A17             $2,475.00
             B02             $9,130.00
             B04             $7,040.00


TOTAL                      $101,421.47
```

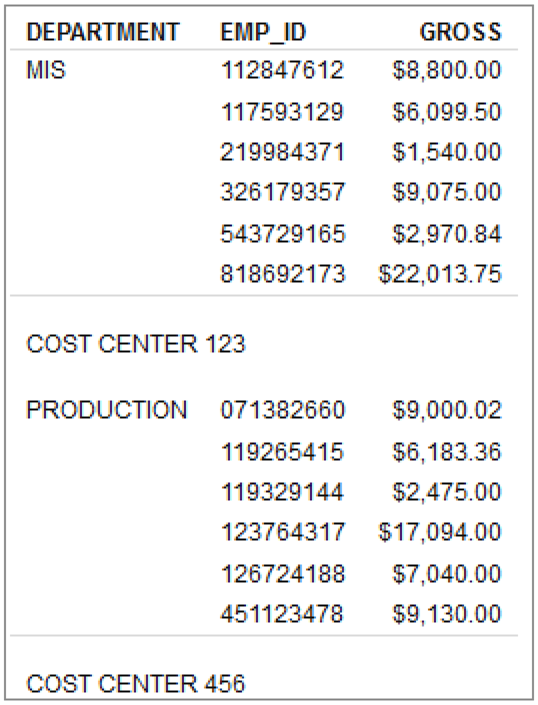
As a result of the WHEN condition, a subtotal is displayed for the MIS department, but not the Production department.

To display different subfoot text, depending on the department value, issue the following request:

```
TABLE FILE EMPLOYEE

SUM GROSS

BY DEPARTMENT

BY EMP_ID

ON DEPARTMENT SUBFOOT
```

```
" "

"COST CENTER 123"

" "

WHEN DEPARTMENT EQ 'MIS'

SUBFOOT

" "

"COST CENTER 456"

" "

WHEN DEPARTMENT EQ 'PRODUCTION'

END
```

Run the request. The output is:



```
DEPARTMENT   EMP_ID          GROSS
MIS          112847612   $8,800.00
             117593129   $6,099.50
             219984371   $1,540.00
             326179357   $9,075.00
             543729165   $2,970.84
             818692173  $22,013.75

COST CENTER 123

PRODUCTION   071382660   $9,000.02
             119265415   $6,183.36
             119329144   $2,475.00
             123764317  $17,094.00
             126724188   $7,040.00
             451123478   $9,130.00

COST CENTER 456
```

Calculating Values Based on Subtotals: RECAP

You can also compute a new value based on subtotals using RECAP.

The format of the RECAP command is:

```
{ON|BY} fieldname1 RECAP fieldname2[/format]=calculation;
```

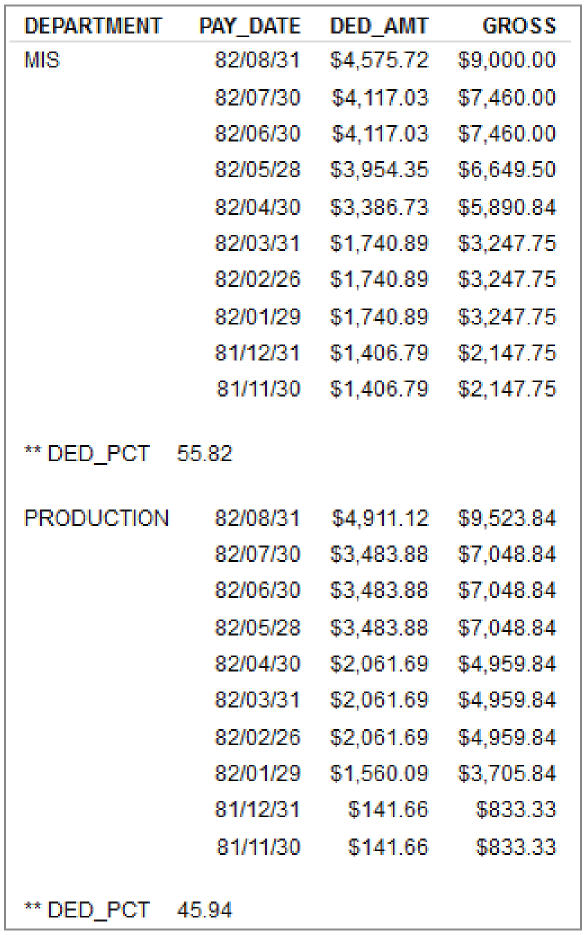
In the above structure, *fieldname1* must be a BY field. Each time the BY field changes in the report, recapped information appears. RECAP indicates that a new field is going to be created for subtotal purposes. *Fieldname2* is the new field and equals the calculation you provide. The */format* is optional, but if you use it, it must be numeric. You use this to change the default format of D12.2 to indicate the new field format.

For example, you could calculate the percentage of salary deductions applied to gross salary for each department, using RECAP.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM DED_AMT GROSS

BY DEPARTMENT BY HIGHEST PAY_DATE

ON DEPARTMENT RECAP DED_PCT/D6.2=(DED_AMT/GROSS)*100;

END
```

Run the request. The output is:



```
DEPARTMENT    PAY_DATE   DED_AMT      GROSS
MIS           82/08/31   $4,575.72  $9,000.00
              82/07/30   $4,117.03  $7,460.00
              82/06/30   $4,117.03  $7,460.00
              82/05/28   $3,954.35  $6,649.50
              82/04/30   $3,386.73  $5,890.84
              82/03/31   $1,740.89  $3,247.75
              82/02/26   $1,740.89  $3,247.75
              82/01/29   $1,740.89  $3,247.75
              81/12/31   $1,406.79  $2,147.75
              81/11/30   $1,406.79  $2,147.75

** DED_PCT    55.82

PRODUCTION    82/08/31   $4,911.12  $9,523.84
              82/07/30   $3,483.88  $7,048.84
              82/06/30   $3,483.88  $7,048.84
              82/05/28   $3,483.88  $7,048.84
              82/04/30   $2,061.69  $4,959.84
              82/03/31   $2,061.69  $4,959.84
              82/02/26   $2,061.69  $4,959.84
              82/01/29   $1,560.09  $3,705.84
              81/12/31     $141.66    $833.33
              81/11/30     $141.66    $833.33

** DED_PCT    45.94
```

Notice that for each department a new field and its calculated value appears. Using RECAP enables you to produce subtotals based on a calculation you provide.

Formatting Reports

In the previous chapters, you learned how to use reporting commands to identify, sort, and select a subset of records. You also learned how to create temporary fields and perform calculations, and include subtotals and totals for rows and columns, in a report.

In this chapter, you learn how to:

- Insert headings and footings into a report.
- Change the layout of a report to enhance its readability.
- Set conditions that control when headings, footings, and layout adjustments take place.

Headings and Footings: Types You Can Use

You can create the following types of headings and footings for a report. Each type is defined by where it appears in the report. These types are:

- Page headings and footings.
- Section headings and footings.
- Report headings and footings.

Page headings and page footings appear on every page of a report. You can create them using the HEADING and FOOTING commands, respectively.

Section headings and section footings appear above and below each section of a report. A section is created each time a specified sort field changes. You can create section headings and footings using the SUBHEAD and SUBFOOT commands, respectively, along with a sort field of your choice.

Report headings and report footings appear only on the first and last pages of a report. You can also produce report headings and footings by using the SUBHEAD and SUBFOOT commands, respectively. The difference here is that you do not use these commands with a sort field.

You can use one or many of these headings and footings in a report. You decide which approach is best for improving the clarity and impact of a report. In the following sections, you will learn how to issue report requests that combine headings and footings with formatting enhancements, sometimes on a conditional basis, to change the appearance of reports in various ways.

Including a Page Heading in a Report: HEADING

To clarify the purpose or contents of a report, you can insert explanatory text into the report using the HEADING command.

You can also determine the placement of the heading but, by default, a page heading is left-justified and positioned at the top of each page of a report.

Before you issue a report request, here are some basic guidelines for using HEADING:

- Enclose the text you want to use as the page heading in double quotation marks (") on the line following the HEADING command. The double quotation mark (") is reserved for marking the beginning and ending of the heading text. You cannot use it within the text of the heading.
- Type CENTER after HEADING on the same line to center the heading over a report.

In the first request, you center a page heading over a report. To create some distance between the heading and the report, include a blank line between the two.

To insert a blank line after a page heading, enclose a blank in double quotation marks (") on the line below the heading text, as follows:

```
" "
```

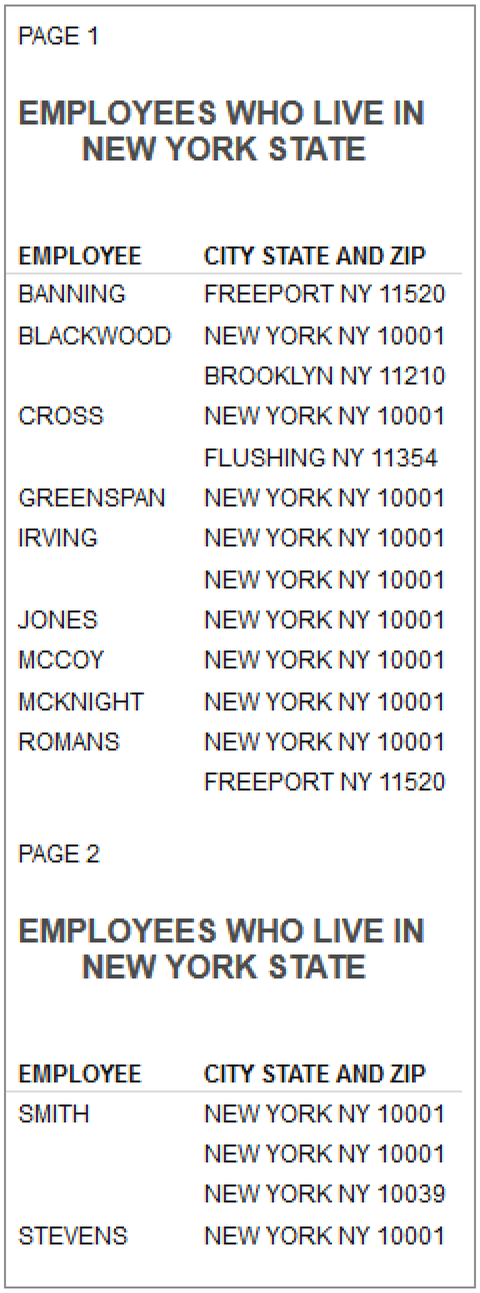
If you want to insert more than one blank line between the heading and the report, repeat the blank within quotation marks on a new line. You can also use the </*n* spot marker to specify the number of lines to skip.

Issue the following request:

```
SET LINES=21

TABLE FILE EMPLOYEE
```

```
HEADING CENTER

"EMPLOYEES WHO LIVE IN"

"NEW YORK STATE"

" "

PRINT ADDRESS_LN3 AS 'CITY STATE AND ZIP'

BY LAST_NAME AS 'EMPLOYEE'

WHERE ADDRESS_LN3 CONTAINS 'NY';

END
```

Run the request. The output is:



```
PAGE 1

EMPLOYEES WHO LIVE IN
   NEW YORK STATE


EMPLOYEE       CITY STATE AND ZIP
BANNING        FREEPORT NY 11520
BLACKWOOD      NEW YORK NY 10001
               BROOKLYN NY 11210
CROSS          NEW YORK NY 10001
               FLUSHING NY 11354
GREENSPAN      NEW YORK NY 10001
IRVING         NEW YORK NY 10001
               NEW YORK NY 10001
JONES          NEW YORK NY 10001
MCCOY          NEW YORK NY 10001
MCKNIGHT       NEW YORK NY 10001
ROMANS         NEW YORK NY 10001
               FREEPORT NY 11520

PAGE 2

EMPLOYEES WHO LIVE IN
   NEW YORK STATE


EMPLOYEE       CITY STATE AND ZIP
SMITH          NEW YORK NY 10001
               NEW YORK NY 10001
               NEW YORK NY 10039
STEVENS        NEW YORK NY 10001
```

Notice that the page number is displayed automatically in the top-left corner of each page of the report. You will see in the remaining requests and reports, you can change the position of a page number and the numbering sequence.

Now, look at the heading you produced using HEADING CENTER. It appears on both pages of the report in the same location. Notice too, that a blank line is inserted between the heading and the report on both pages.

Including a Page Footing in a Report: FOOTING

The counterpart of a page heading is the page footing. You can include a footing in your report by using the FOOTING command. Footings, like headings, appear on each page of the report. The footing, by default, is left-justified and positioned two (2) lines below the last line of output in the report, even if the output is not at the end of the page.

FOOTING is similar to HEADING in the way it works. Here are some simple rules for using FOOTING in your requests:

- Type FOOTING on its own line near the end of the request. This keeps the request ordered in a way that logically reflects the report.
- Enclose the text you want to use as the page footing in double quotation marks (") on the line following the FOOTING command. The double quotation mark (") is reserved for marking the beginning and ending of the footing text. You cannot use it within the text of the footing.
- Type CENTER after FOOTING on the same line to center the footing under a report.
- Type BOTTOM after FOOTING to position the footing text at the bottom of each page (as opposed to two lines below the last line of text in a report).

Now, you can enhance the report you just produced by adding a centered footing.

In this report, you can also change the default location of each page number. To do this, use a system variable, called TABPAGENO, as part of a page, section, or report heading or footing. A system variable represents the values that are supplied automatically, in this case, the page number. Referencing TABPAGENO automatically turns off the default page number location. If you want the heading or the footing text made up solely of the page number, type the following on the line after HEADING or FOOTING:

```
"<TABPAGENO"
```

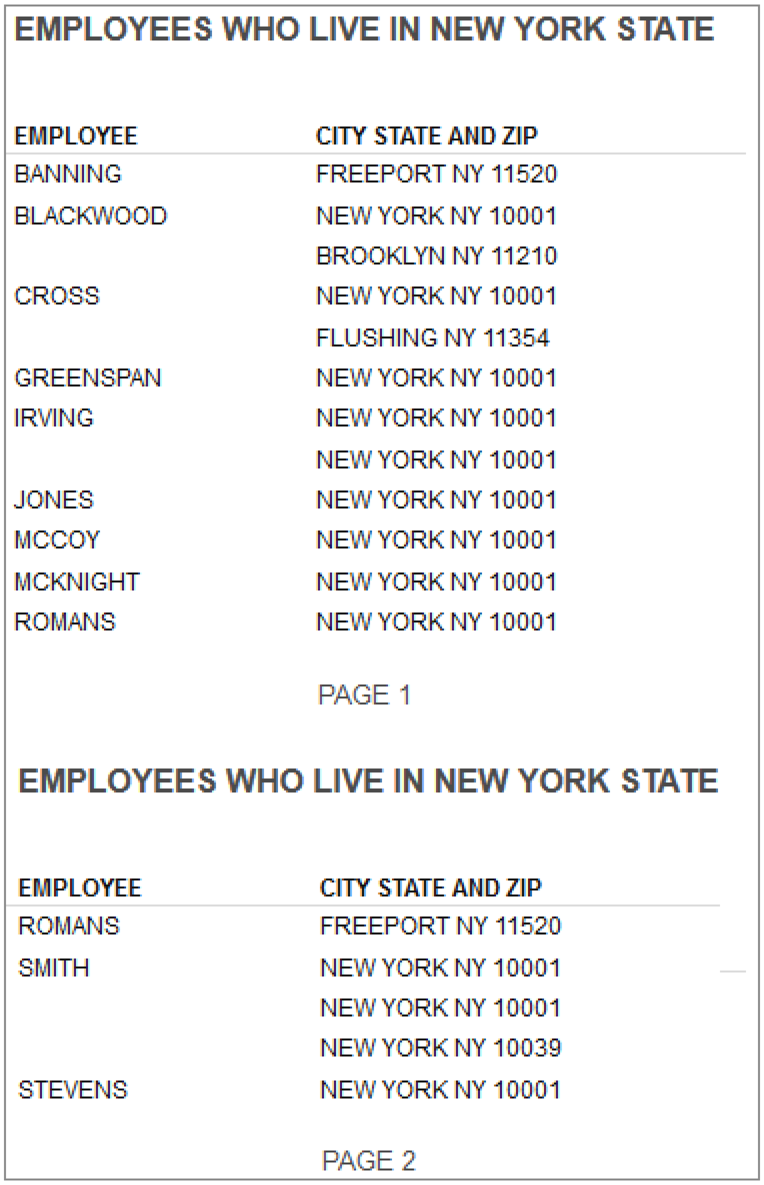
The caret or less than symbol (<) signals that the next item in a heading or footing object is a system variable, such as TABPAGENO, or a field name. You can also include prior RECAP values in a heading or footing.

Issue the following request:

```
SET LINES=21

TABLE FILE EMPLOYEE
```

```
HEADING CENTER

"EMPLOYEES WHO LIVE IN NEW YORK STATE"

" "

PRINT ADDRESS_LN3 AS 'CITY STATE AND ZIP'

BY LAST_NAME AS 'EMPLOYEE'

WHERE ADDRESS_LN3 CONTAINS 'NY';

FOOTING CENTER

"PAGE <TABPAGENO"

END
```

Run the request. The output is:



```
EMPLOYEES WHO LIVE IN NEW YORK STATE

EMPLOYEE          CITY STATE AND ZIP
BANNING           FREEPORT NY 11520
BLACKWOOD         NEW YORK NY 10001
                  BROOKLYN NY 11210
CROSS             NEW YORK NY 10001
                  FLUSHING NY 11354
GREENSPAN         NEW YORK NY 10001
IRVING            NEW YORK NY 10001
                  NEW YORK NY 10001
JONES             NEW YORK NY 10001
MCCOY             NEW YORK NY 10001
MCKNIGHT          NEW YORK NY 10001
ROMANS            NEW YORK NY 10001

                  PAGE 1

EMPLOYEES WHO LIVE IN NEW YORK STATE

EMPLOYEE          CITY STATE AND ZIP
ROMANS            FREEPORT NY 11520
SMITH             NEW YORK NY 10001
                  NEW YORK NY 10001
                  NEW YORK NY 10039
STEVENS           NEW YORK NY 10001

                  PAGE 2
```

Notice the difference between this report and the first one you generated. This report has a centered footing which consists of only the page number. Each page has the correct page number even though you do not supply the numbers in the request. These numbers are provided by the TABPAGENO system variable. The new location of the page numbers is achieved by using TABPAGENO in conjunction with FOOTING CENTER. As you progress through this chapter, you learn that you can increase control of a report format by using different combinations of commands.

Including a Section Heading in a Report: SUBHEAD

In addition to page headings and footings, you can include section headings and footings in a report. You can use the SUBHEAD command in conjunction with a sort field you specify to produce section headings. Remember from Sorting Records, that sort fields are fields that immediately follow BY or ACROSS in a request. The section heading repeats each time the value of the specified sort field changes. You can use the ON TABLE PAGE_BREAK AND SUBHEAD command to produce a heading that appears only once at the beginning of the report and on its own page.

The format of the SUBHEAD command is:

```
ON {sort_field|TABLE} [PAGE-BREAK AND] SUBHEAD

"text"
```

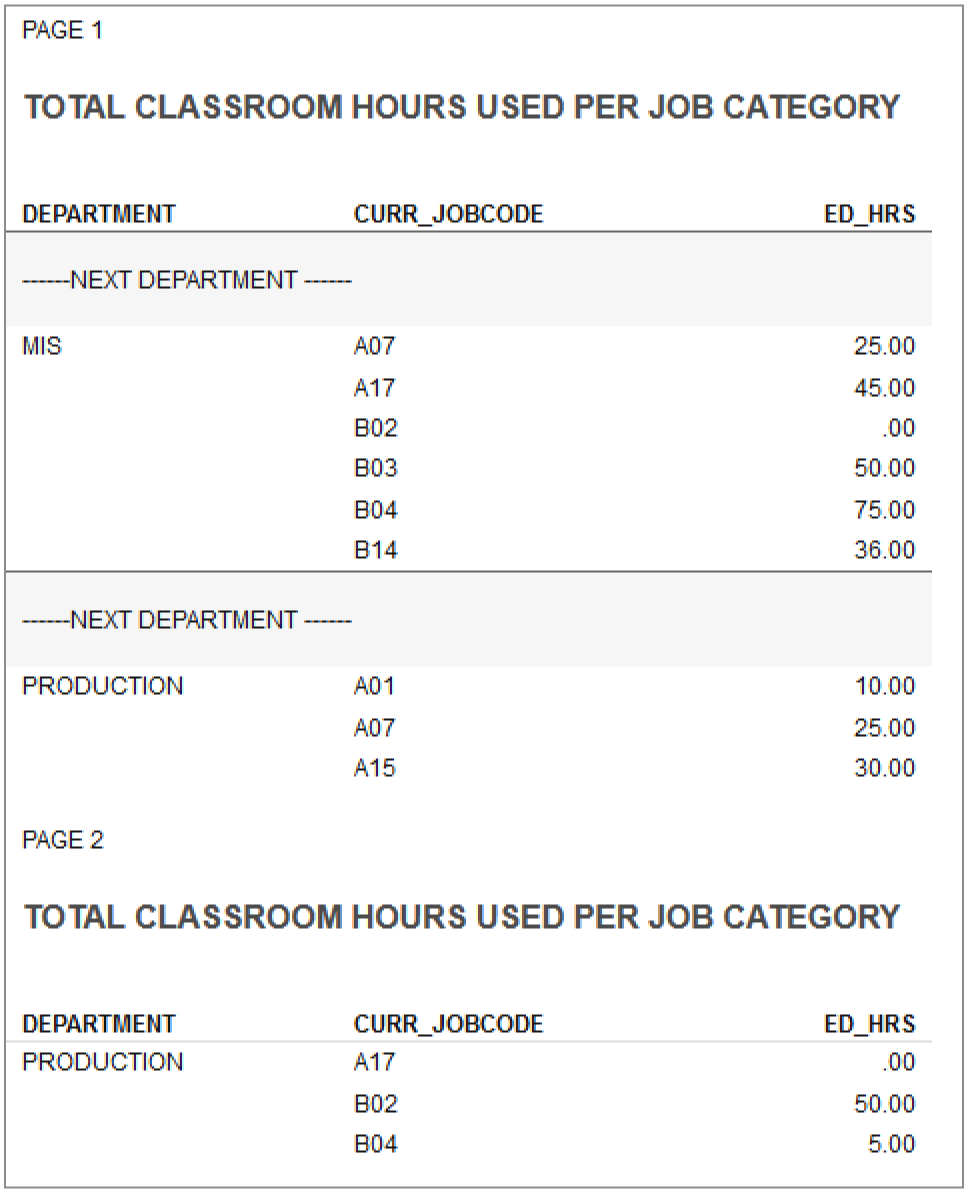
You provide the text for the section heading.

To include a SUBHEAD and HEADING CENTER command, issue the following request:

```
SET LINES=22

TABLE FILE EMPLOYEE

HEADING CENTER

"TOTAL CLASSROOM HOURS USED PER JOB CATEGORY"

" "

SUM ED_HRS

BY DEPARTMENT

BY CURR_JOBCODE

ON DEPARTMENT SUBHEAD

" "

"------NEXT DEPARTMENT ------"
```

```
" "
RUN
```

Run the request. The output is:



```
PAGE 1

TOTAL CLASSROOM HOURS USED PER JOB CATEGORY


DEPARTMENT          CURR_JOBCODE              ED_HRS

------NEXT DEPARTMENT ------

MIS                 A07                        25.00
                    A17                        45.00
                    B02                          .00
                    B03                        50.00
                    B04                        75.00
                    B14                        36.00

------NEXT DEPARTMENT ------

PRODUCTION          A01                        10.00
                    A07                        25.00
                    A15                        30.00

PAGE 2

TOTAL CLASSROOM HOURS USED PER JOB CATEGORY


DEPARTMENT          CURR_JOBCODE              ED_HRS
PRODUCTION          A17                          .00
                    B02                        50.00
                    B04                         5.00
```

This report spans two pages. Notice that the section heading for the Production department is not displayed again on page 2. This is because a section heading appears only once before each sort field. The page heading, however, does appear on both pages. Compare the request to the report and you see the correlation between the blank lines in the report and the " " in the request.

You can force each department to begin on a new page, using PAGE-BREAK. For more information on using PAGE-BREAK see Creating a New Page: PAGE-BREAK. In Conditionally Displaying Section Headings and Footings: WHEN, you learn how to conditionally display section headings using WHEN.

Including a Section Footing in a Report: SUBFOOT

In the previous section, you learned how to include a heading before each new section of a report. Now you learn how to include a footing at the end of a section, just before a new sort field value and section begins. The command you use to achieve this is SUBFOOT.

You can use SUBFOOT, in conjunction with a sort field you specify, to produce section footings. These footings are displayed each time the specified sort field value changes. You can use the ON TABLE PAGE-BREAK AND SUBFOOT command to produce a footing that appears only once at the end of the report and on a trailing page.

The format of the SUBFOOT command is:

```
ON {sort_field|TABLE} [PAGE-BREAK AND] SUBFOOT

"text"
```

You can provide the text for the section footing.

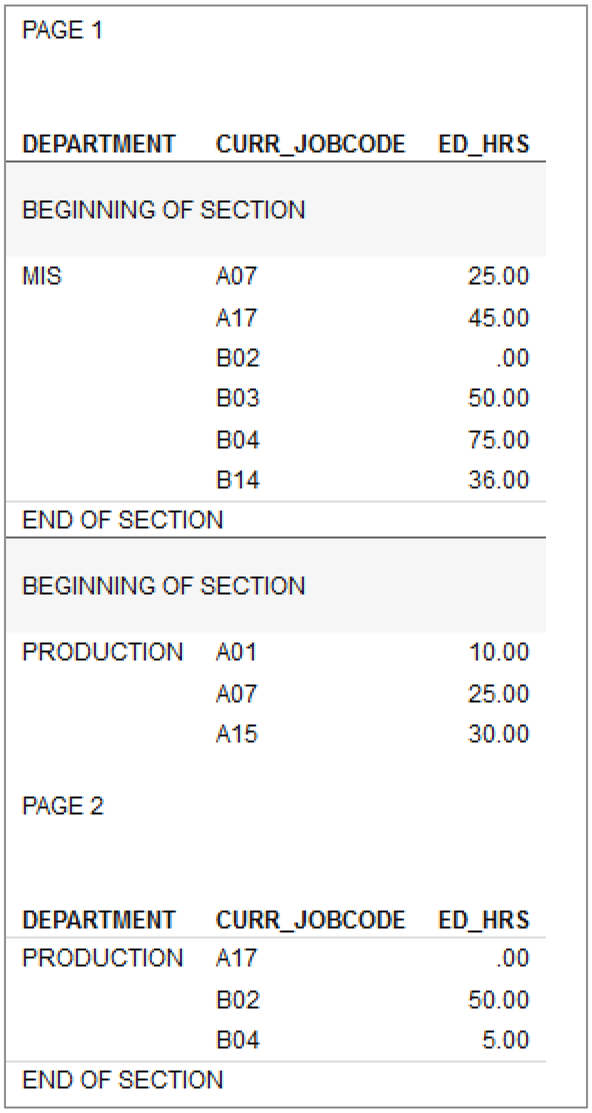
Here is an example that demonstrates the difference between a section heading and a section footing.

Issue the following request:

```
SET LINES=21

TABLE FILE EMPLOYEE

SUM ED_HRS

BY DEPARTMENT

BY CURR_JOBCODE

ON DEPARTMENT SUBHEAD
```

```
" "
"BEGINNING OF SECTION"
" "
ON DEPARTMENT SUBFOOT
"END OF SECTION"
END
```

Run the request. The output is:



```
PAGE 1


DEPARTMENT   CURR_JOBCODE   ED_HRS

BEGINNING OF SECTION

MIS          A07             25.00
             A17             45.00
             B02               .00
             B03             50.00
             B04             75.00
             B14             36.00
END OF SECTION

BEGINNING OF SECTION

PRODUCTION   A01             10.00
             A07             25.00
             A15             30.00

PAGE 2


DEPARTMENT   CURR_JOBCODE   ED_HRS
PRODUCTION   A17               .00
             B02             50.00
             B04              5.00
END OF SECTION
```

Conditionally Displaying Section Headings and Footings: WHEN

You may recall from Creating Subtotals and Grand Totals, that you were able to display total and subtotal summary lines on a conditional basis, using WHEN. You can also use WHEN to control when section headings and footings are displayed.

You include WHEN to display section headings and footings only when the condition or conditions you specify are satisfied. You can include multiple WHEN conditions in a request.

The format for using WHEN with SUBFOOT is:

```
ON sort field SUBFOOT

"text"

WHEN expression
```

You can include in the expression the same sort field from the ON command in the first line and the condition that the sort field must satisfy. Only when the condition is met, the section footing for that sort field will be included.

In addition to SUBFOOT, you could use SUBHEAD, or a number of other commands not reviewed in this guide. For a complete list of commands you can use with WHEN, see the *User's Manual* for your product.

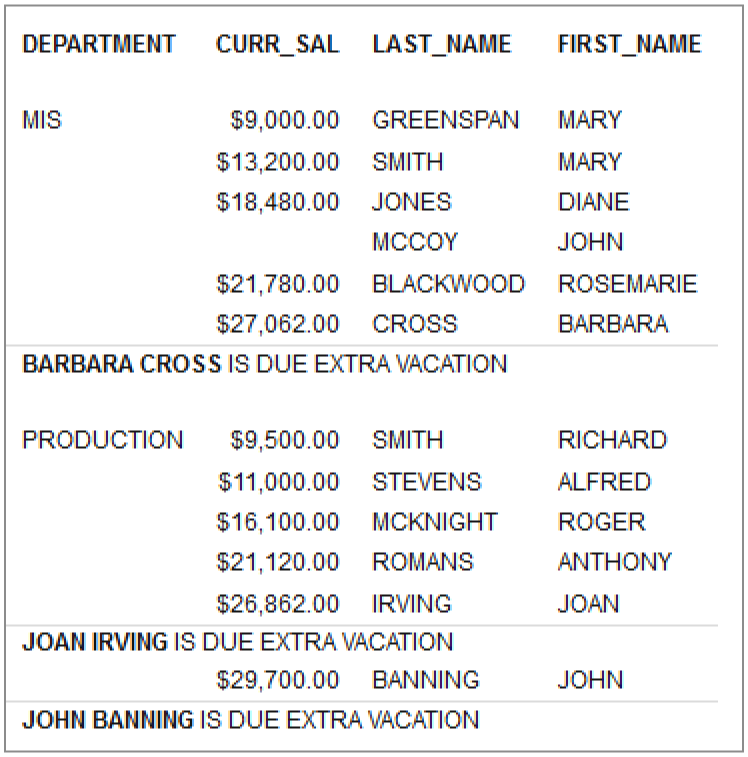
Here is a scenario in which using WHEN is very helpful. Your company provides three (3) weeks of vacation for employees with a minimum base salary of $25,000. You produce a report that shows employee salaries in every department. To draw attention to those employees eligible for the additional vacation, you include a section footing that is only displayed for employees who have a salary of at least $25,000.

You can include an additional level of detail by using FIRST_NAME and LAST_NAME fields as variables. Earlier you used a system variable, TABPAGENO, to automatically include the correct page number, even though it changed. Here, you include a field name variable so that the appropriate first and last names of employees are displayed in the footing. The caret or less than symbol (<) signals that the next item in a heading object is a field name.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT LAST_NAME FIRST_NAME

BY DEPARTMENT BY CURR_SAL

ON CURR_SAL SUBFOOT

"<FIRST_NAME <LAST_NAME IS DUE EXTRA VACATION"

WHEN CURR_SAL GT 25000

ON DEPARTMENT SKIP-LINE

END
```

Run the request. The output is:



```
DEPARTMENT   CURR_SAL     LAST_NAME   FIRST_NAME

MIS           $9,000.00   GREENSPAN   MARY
             $13,200.00   SMITH       MARY
             $18,480.00   JONES       DIANE
                          MCCOY       JOHN
             $21,780.00   BLACKWOOD   ROSEMARIE
             $27,062.00   CROSS       BARBARA
BARBARA CROSS IS DUE EXTRA VACATION

PRODUCTION    $9,500.00   SMITH       RICHARD
             $11,000.00   STEVENS     ALFRED
             $16,100.00   MCKNIGHT    ROGER
             $21,120.00   ROMANS      ANTHONY
             $26,862.00   IRVING      JOAN
JOAN IRVING IS DUE EXTRA VACATION
             $29,700.00   BANNING     JOHN
JOHN BANNING IS DUE EXTRA VACATION
```

Note: In order to display a caret symbol (<) in a heading object, use two consecutive caret symbols (<<).

Adding Blank Lines Between Sorted Records: SKIP-LINE

To make a report easier to read, you can insert blank lines between every line of the report, or between every section. You can achieve both effects using the SKIP-LINE command.

The format of the SKIP-LINE command is:

```
ON fieldname SKIP-LINE
```

or

```
verb_command fieldname SKIP-LINE
```

SKIP-LINE does not have to be used with a sort field. When you do use it with a sort field, you insert a blank line between each section of a report. Remember, a section is defined by the sort field each time it changes.

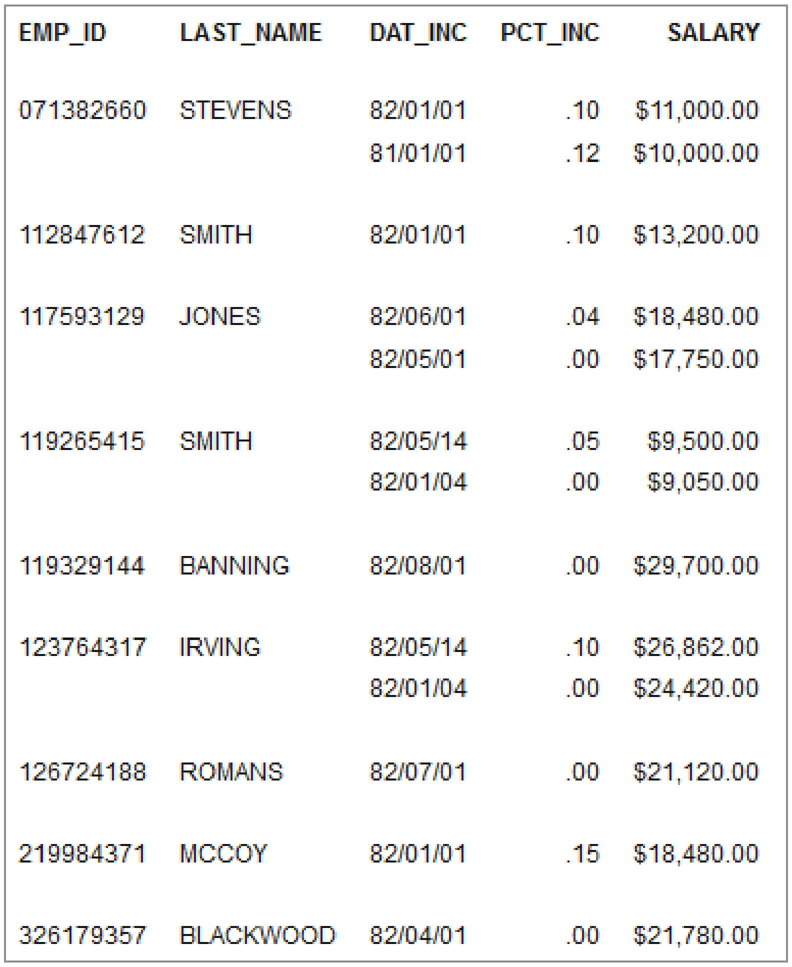
When you use SKIP-LINE with a field that follows a verb command, you insert a blank line between each line of the report, in effect double spacing the report.

You can only use one SKIP-LINE in each report request. You do not have to type it on its own line. Instead, you include it after the field name or sort field for which you want to insert a blank line.

To insert a blank line between each section of the report, issue the following request:

```
TABLE FILE EMPLOYEE

PRINT DAT_INC PCT_INC SALARY

BY EMP_ID BY LAST_NAME

ON EMP_ID SKIP-LINE

END
```

Run the request. The output is:



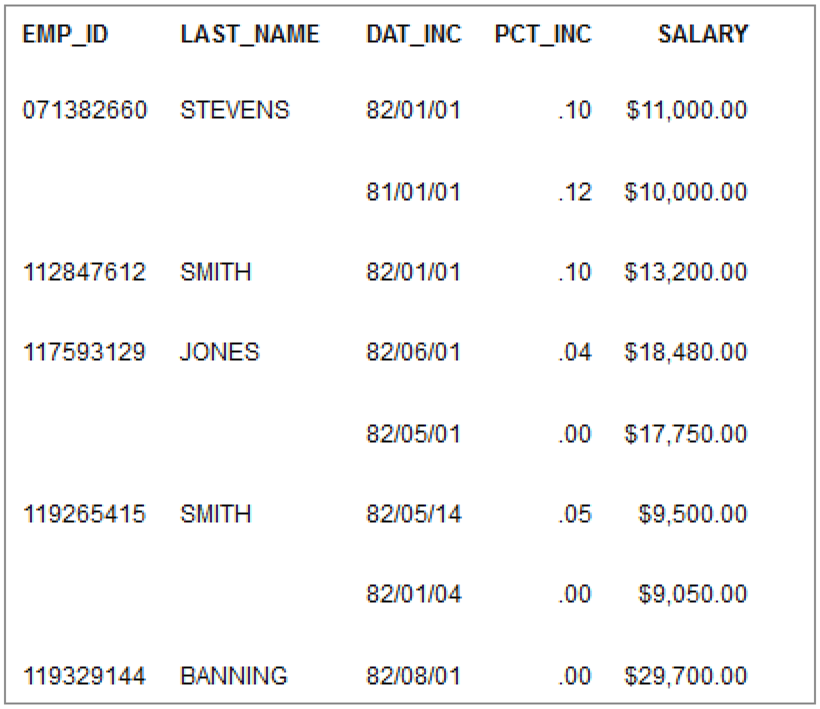
```
EMP_ID      LAST_NAME   DAT_INC   PCT_INC      SALARY

071382660   STEVENS     82/01/01      .10  $11,000.00
                        81/01/01      .12  $10,000.00

112847612   SMITH       82/01/01      .10  $13,200.00

117593129   JONES       82/06/01      .04  $18,480.00
                        82/05/01      .00  $17,750.00

119265415   SMITH       82/05/14      .05   $9,500.00
                        82/01/04      .00   $9,050.00

119329144   BANNING     82/08/01      .00  $29,700.00

123764317   IRVING      82/05/14      .10  $26,862.00
                        82/01/04      .00  $24,420.00

126724188   ROMANS      82/07/01      .00  $21,120.00

219984371   MCCOY       82/01/01      .15  $18,480.00

326179357   BLACKWOOD   82/04/01      .00  $21,780.00
```

To see how using SKIP-LINE on a non-sort field changes the preceding report, use SKIP-LINE after the field SALARY, which is not a sort field.

Issue the following request:

```
TABLE FILE EMPLOYEE

PRINT DAT_INC PCT_INC SALARY SKIP-LINE

BY EMP_ID BY LAST_NAME

END
```

Run the request. The output is:



EMP_ID	LAST_NAME	DAT_INC	PCT_INC	SALARY
071382660	STEVENS	82/01/01	.10	$11,000.00
		81/01/01	.12	$10,000.00
112847612	SMITH	82/01/01	.10	$13,200.00
117593129	JONES	82/06/01	.04	$18,480.00
		82/05/01	.00	$17,750.00
119265415	SMITH	82/05/14	.05	$9,500.00
		82/01/04	.00	$9,050.00
119329144	BANNING	82/08/01	.00	$29,700.00

Notice that this time the report has a blank line between each line of the report.

Separating Sorted Records With an Underline: UNDER-LINE

Another formatting technique you can use to delineate sections of a report is to insert an underline after each section. You can accomplish this using the UNDER-LINE command. You can use UNDER-LINE only in connection with a sort field. Each underline goes across the entire page.

The format of the UNDER-LINE command is:

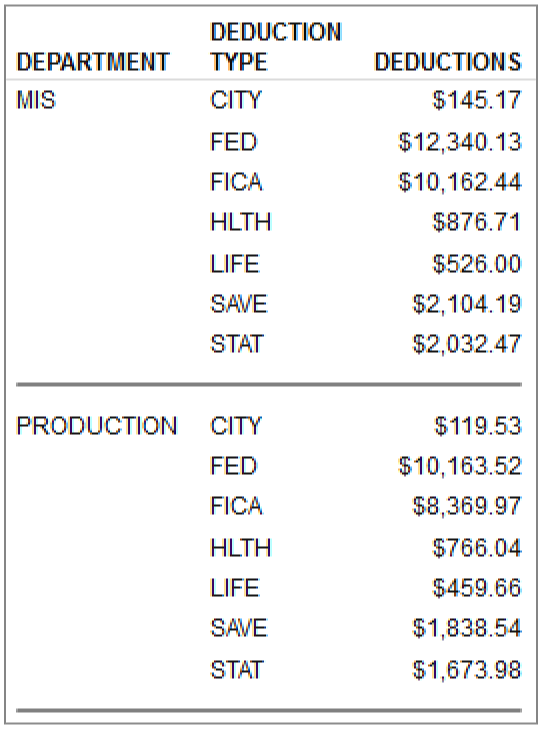
```
ON sort_field UNDER-LINE
```

To see how an underline separates report sections, issue the following request:

```
TABLE FILE EMPLOYEE

SUM DED_AMT AS 'DEDUCTIONS'
```

```
BY DEPARTMENT BY DED_CODE AS 'DEDUCTION,TYPE'

ON DEPARTMENT UNDER-LINE

END
```

Run the request. The output is:



DEPARTMENT	DEDUCTION TYPE	DEDUCTIONS
MIS	CITY	$145.17
	FED	$12,340.13
	FICA	$10,162.44
	HLTH	$876.71
	LIFE	$526.00
	SAVE	$2,104.19
	STAT	$2,032.47
PRODUCTION	CITY	$119.53
	FED	$10,163.52
	FICA	$8,369.97
	HLTH	$766.04
	LIFE	$459.66
	SAVE	$1,838.54
	STAT	$1,673.98

Creating a New Page: PAGE-BREAK

The PAGE-BREAK command enables you to control when a new page is created. You must use PAGE-BREAK with a sort field.

The format of the PAGE-BREAK command is:

```
ON sort_field PAGE-BREAK
```

PAGE-BREAK creates a new page to be started each time the specified sort field value changes. Place the PAGE-BREAK command after the sort field on which you want to break the page. This ensures that each section of the report remains separate from any other section.

To use PAGE-BREAK with commands that produce headings or footings, type PAGE-BREAK first, then on the same line, type the command of your choice.

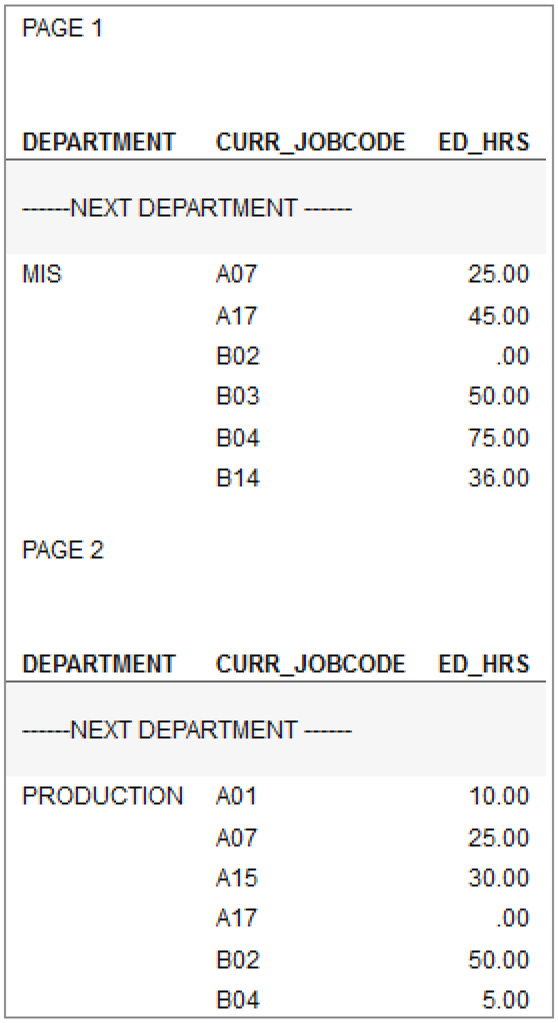
You can use PAGE-BREAK to prevent information that should be grouped together from being fragmented over more than one page. This situation occurred in Including a Section Heading in a Report: SUBHEAD, when information for the Production department was displayed on two different pages.

You can solve that problem now using PAGE-BREAK. The page heading has been omitted from this request. Otherwise, it is the same request you issued in Including a Section Heading in a Report: SUBHEAD.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM ED_HRS

BY DEPARTMENT

BY CURR_JOBCODE

ON DEPARTMENT PAGE-BREAK SUBHEAD

" "

"------NEXT DEPARTMENT ------"

" "

END
```

Run the request. The output is:



```
PAGE 1


DEPARTMENT   CURR_JOBCODE   ED_HRS

------NEXT DEPARTMENT ------

MIS          A07             25.00
             A17             45.00
             B02               .00
             B03             50.00
             B04             75.00
             B14             36.00

PAGE 2


DEPARTMENT   CURR_JOBCODE   ED_HRS

------NEXT DEPARTMENT ------

PRODUCTION   A01             10.00
             A07             25.00
             A15             30.00
             A17               .00
             B02             50.00
             B04              5.00
```

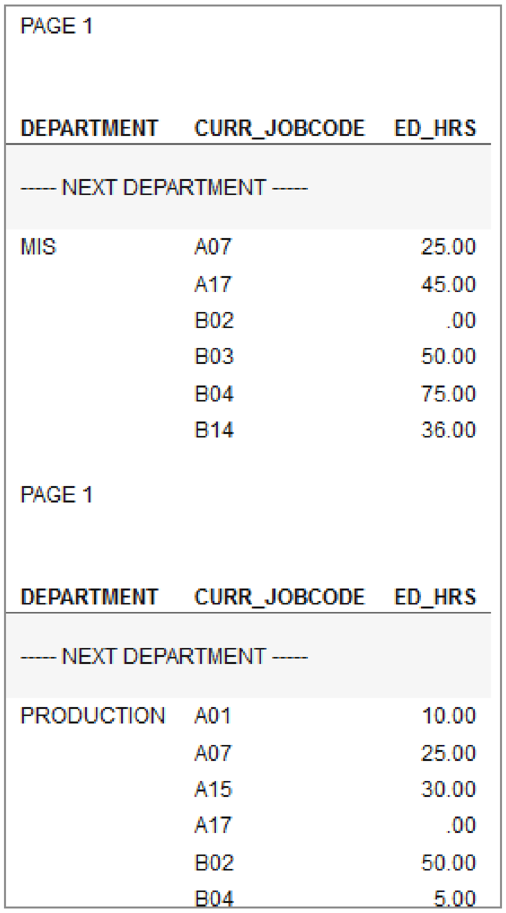
Compare this report to its earlier version. The information for the Production department no longer shares a page with information from the MIS department.

You now know that, by default, each page is numbered consecutively from the number one (1). You can change the numbering sequence and print the first page within a sort field as Page 1 using the REPAGE command. To display the preceding report so that the first page for each new sort value is numbered 1, add the REPAGE command as follows.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM ED_HRS

BY DEPARTMENT
BY CURR_JOBCODE

ON DEPARTMENT PAGE-BREAK REPAGE SUBHEAD

" "

"----- NEXT DEPARTMENT -----"

" "

END
```

Run the request. The output is:



```
PAGE 1


DEPARTMENT    CURR_JOBCODE    ED_HRS

----- NEXT DEPARTMENT -----

MIS           A07              25.00
              A17              45.00
              B02                .00
              B03              50.00
              B04              75.00
              B14              36.00

PAGE 1


DEPARTMENT    CURR_JOBCODE    ED_HRS

----- NEXT DEPARTMENT -----

PRODUCTION    A01              10.00
              A07              25.00
              A15              30.00
              A17                .00
              B02              50.00
              B04               5.00
```

Introducing Formatting and Style Sheets

To create an effective report, you need to account for:

- **Content.** The data in your report.
- **Formatting.** How to present that content to a reader in a way that achieves maximum impact.

There are many formatting options that you can use to give your report a professional appearance and affect how people read and interpret it. For example, you can control:

- The appearance of the data, which you can change to emphasize important values.
- The headings, footings, and other text with which you "frame" the data to give it context.
- The layout of the report on the page or screen, which you can adjust for different display environments and for audiences with different vision needs.

The following topics provide an overview of formatting and style sheets.

What Kinds of Formatting Can I Do?

There are many kinds of formatting that you can apply to a report:

- **The appearance of the report data,** such as its font, size, style (italic, bold, or underlined), color (of the foreground and the background), position, and justification. You can also draw boxes or lines around the data. You can use these properties to emphasize critical values and to draw attention to important data relationships.

  You can also select which character to use to mark decimal position, using either a period (.) or a comma (,), to match the convention of the country in which the report will be read. You can even choose which character to use to represent a null value and missing data.
- **Providing context for data by "framing" it**, for example, with headings, footings, subtotals, recaps, and customized column titles. You can include fields and images within headings and footings. As with data, you can specify a heading, footing,

subtotal, subhead, subfoot, recap, and column title font, size, style, color, position, and justification, as well as enclose it within boxes or lines. You can use these framing devices to explain the context of the data and to engage the interest of the reader.

- **Laying out the report** on the screen or printed page. You can choose the report margins, where to place headings and footings, where to place background images (watermarks), and how to arrange the report columns (adjusting the space around and between columns, adjusting column width and column order, and even stacking one column above another to reduce report width). You can visually distinguish between different columns, rows, or sort groups by using colors and lines. If you wish, you can draw borders around parts of a report or around the entire report.

  You can lay out the report to optimize it for different display environments such as screens of different sizes and resolutions, and printed pages of different sizes. You can create multiple report panes on a single page to print labels. You can even combine several reports into a single file to display or print them as a group.

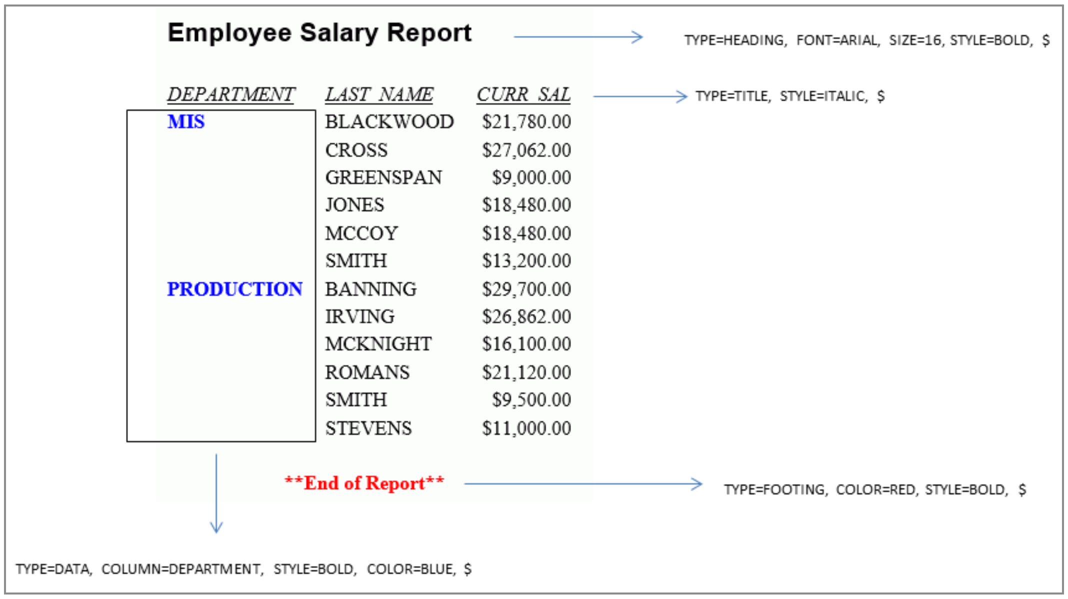
- **Conditionally formatting** a report based on the report data. You specify a condition that, at run time, is automatically evaluated for each instance of the report component you specify, such as each value of a sort column. The formatting option is applied to each instance of the report component for which the condition is true. For example, in a sales report, you can draw attention to sales staff who exceeded their quota by making their names bold and using a different color.
- **Choosing a display format, such as HTML (the default),** PDF (Adobe Acrobat Portable Document Format), Excel, or PostScript, to suit the viewing and processing needs of the readers.

General StyleSheet Syntax

A StyleSheet, identified by the ON TABLE SET STYLE command in a report request, consists of declarations that identify the report components you wish to format and the formatting you wish to apply. A declaration usually begins with the TYPE attribute and is followed by the *attribute=value* pairs you assign to the report component, for example, COLUMN, COLOR, or FONT. You can also include comments that provide context for your StyleSheet. Comments do not affect StyleSheet behavior.

Each StyleSheet declaration specifies a series of attributes in the format:

```
attribute=value, [attribute=value, ...] $
```



Employee Salary Report

DEPARTMENT	*LAST NAME*	*CURR SAL*
MIS	BLACKWOOD	$21,780.00
	CROSS	$27,062.00
	GREENSPAN	$9,000.00
	JONES	$18,480.00
	MCCOY	$18,480.00
	SMITH	$13,200.00
PRODUCTION	BANNING	$29,700.00
	IRVING	$26,862.00
	MCKNIGHT	$16,100.00
	ROMANS	$21,120.00
	SMITH	$9,500.00
	STEVENS	$11,000.00

****End of Report****

```
TYPE=HEADING, FONT=ARIAL, SIZE=16, STYLE=BOLD, $
TYPE=TITLE, STYLE=ITALIC, $
TYPE=FOOTING, COLOR=RED, STYLE=BOLD, $
TYPE=DATA, COLUMN=DEPARTMENT, STYLE=BOLD, COLOR=BLUE, $
```

Creating an ibi WebFOCUS StyleSheet Within a Report Request

You can create a StyleSheet within a report request. This enables you to create and maintain the formatting for your report directly in the report request. This type of StyleSheet is known as an inline StyleSheet.

The format for creating a StyleSheet within a report request is:

```
ON TABLE SET STYLE[SHEET] *

declaration

[declaration]

.

.

.

[ENDSTYLE]
```

StyleSheet declarations usually specify the report component you want to format and the formatting you want to apply. ENDSTYLE indicates the end of an inline StyleSheet.

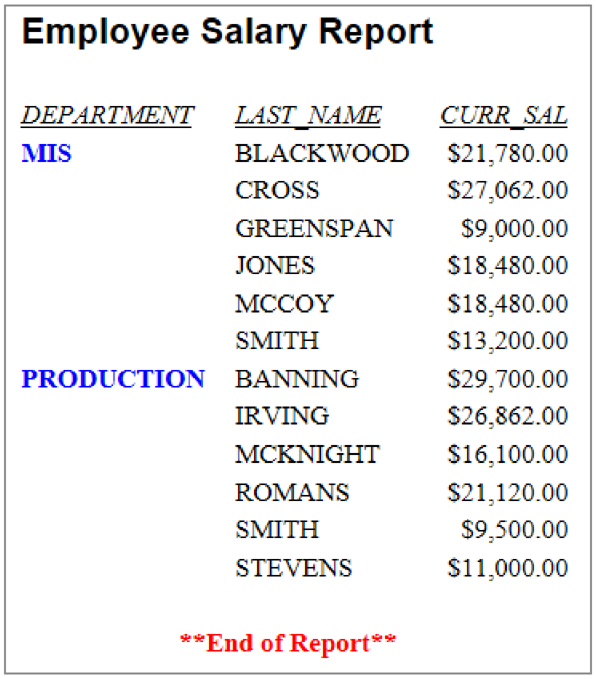
The format to apply an external StyleSheet file within your report request is:

```
ON TABLE SET STYLE[SHEET] stylesheet
```

Issue the following request, which illustrates an inline StyleSheet. The StyleSheet declarations are highlighted in the request.

```
TABLE FILE EMPLOYEE

SUM CURR_SAL BY DEPARTMENT BY LAST_NAME

HEADING

"Employee Salary Report"

" "

FOOTING CENTER

"**End of Report**"

ON TABLE SET PAGE-NUM OFF

ON TABLE SET STYLE *TYPE=REPORT, GRID=OFF, $TYPE=HEADING, FONT=ARIAL,
SIZE=16, STYLE=BOLD, $TYPE=TITLE, STYLE=ITALIC, $TYPE=DATA,
COLUMN=DEPARTMENT, STYLE=BOLD, COLOR=BLUE, $TYPE=FOOTING, COLOR=RED,
STYLE=BOLD, $ENDSTYLE

END
```

Run the request. The output is:



Employee Salary Report

DEPARTMENT	*LAST_NAME*	*CURR_SAL*
MIS	BLACKWOOD	$21,780.00
	CROSS	$27,062.00
	GREENSPAN	$9,000.00
	JONES	$18,480.00
	MCCOY	$18,480.00
	SMITH	$13,200.00
PRODUCTION	BANNING	$29,700.00
	IRVING	$26,862.00
	MCKNIGHT	$16,100.00
	ROMANS	$21,120.00
	SMITH	$9,500.00
	STEVENS	$11,000.00

****End of Report****

Aligning a Heading or Footing Element Across Columns

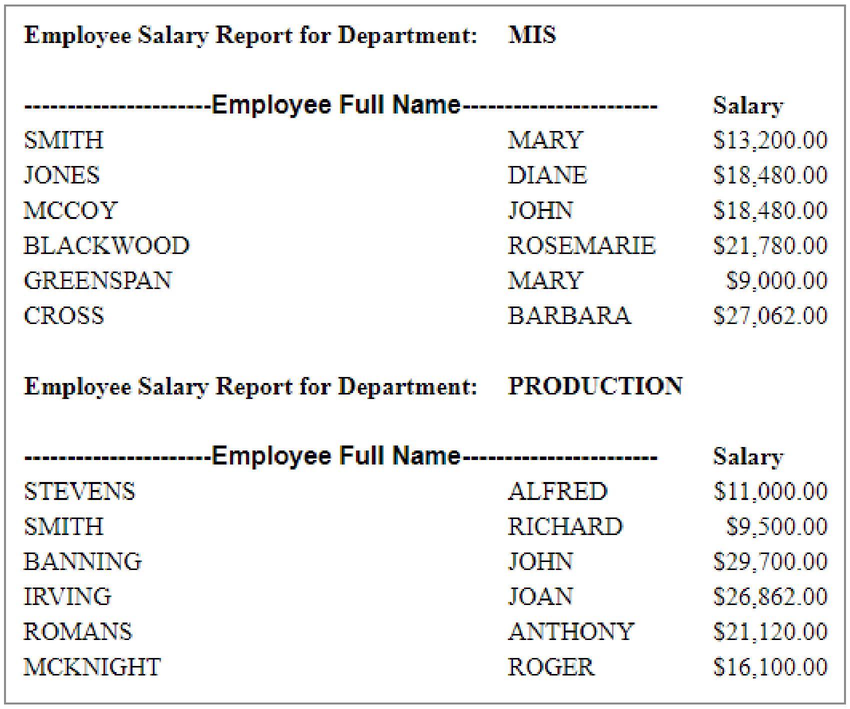
By default, every heading, subheading, footing, or subfooting element (ITEM) is placed in the first available column. However, using the COLSPAN StyleSheet attribute, along with the HEADALIGN attribute, you can position an item to span multiple columns.

Issue the following request. In this request, the COLSPAN attribute for the first item on the fourth line of the SUBHEAD spans the first two columns, LAST_NAME and FIRST_NAME.

```
TABLE FILE EMPLOYEE

PRINT LAST_NAME AS ' ' FIRST_NAME AS ' ' CURR_SAL AS ' '

BY DEPARTMENT NOPRINT SUBHEAD

" "

"Employee Salary Report for Department: <DEPARTMENT "

" "

"----------------------Employee Full Name----------------------- <+1
```

```
Salary "

ON TABLE SET STYLE *

TYPE=REPORT, GRID=OFF, $

TYPE=SUBHEAD, HEADALIGN=BODY, STYLE=BOLD, $TYPE=SUBHEAD, LINE=4, ITEM=1,
COLSPAN=2, FONT=ARIAL,
$

ENDSTYLE

END
```

Run the request. The output is:



```
Employee Salary Report for Department:   MIS

---------------------Employee Full Name----------------------    Salary
SMITH                                     MARY                $13,200.00
JONES                                     DIANE               $18,480.00
MCCOY                                     JOHN                $18,480.00
BLACKWOOD                                 ROSEMARIE           $21,780.00
GREENSPAN                                 MARY                 $9,000.00
CROSS                                     BARBARA             $27,062.00

Employee Salary Report for Department:   PRODUCTION

---------------------Employee Full Name----------------------    Salary
STEVENS                                   ALFRED              $11,000.00
SMITH                                     RICHARD              $9,500.00
BANNING                                   JOHN                $29,700.00
IRVING                                    JOAN                $26,862.00
ROMANS                                    ANTHONY             $21,120.00
MCKNIGHT                                  ROGER               $16,100.00
```

Creating and Applying a StyleSheet File

You can create a StyleSheet as a separate file and apply it to as many reports as you wish. A StyleSheet file contains only declarations and optional comments. Unlike an inline StyleSheet, a StyleSheet file does not contain the ON TABLE SET STYLESHEET and

ENDSTYLE commands. You can apply a StyleSheet file to a report using the SET STYLESHEET command.

You should name a StyleSheet file *filename*.sty, where the *filename* can include letters, numbers, and underscores (_), and otherwise must be valid for the operating environments on which it resides.

As an alternative to creating a new StyleSheet file, you can use one of the sample StyleSheet files provided with the product as a template.

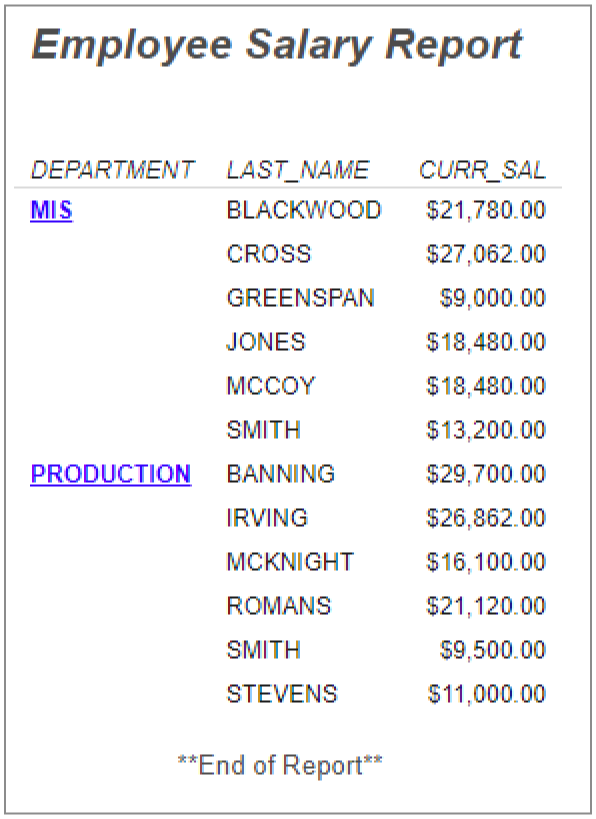
The format to include a StyleSheet file in another StyleSheet is:

```
INCLUDE=stylesheet,$
```

To use one of the distributed StyleSheets in the inline report (INCLUDE) and override the heading and department styles (TYPE=HEADING, TYPE=DATA), issue the following request:

```
TABLE FILE EMPLOYEE

SUM CURR_SAL BY DEPARTMENT BY LAST_NAME

HEADING

"Employee Salary Report"

" "

FOOTING CENTER

"**End of Report**"

ON TABLE SET PAGE-NUM OFF

ON TABLE SET STYLE *

INCLUDE=IBFS:/FILE/IBI_HTML/ibi_themes/Warm.sty,$TYPE=DATA,
COLUMN=DEPARTMENT, STYLE=BOLD + UNDERLINE, COLOR=BLUE, $TYPE=HEADING,
FONT=ARIAL, SIZE=16, STYLE=BOLD + ITALIC,
$

TYPE=TITLE, STYLE=ITALIC, $

ENDSTYLE

END
```

Run the request. The output is:



Employee Salary Report

DEPARTMENT	LAST_NAME	CURR_SAL
MIS	BLACKWOOD	$21,780.00
	CROSS	$27,062.00
	GREENSPAN	$9,000.00
	JONES	$18,480.00
	MCCOY	$18,480.00
	SMITH	$13,200.00
PRODUCTION	BANNING	$29,700.00
	IRVING	$26,862.00
	MCKNIGHT	$16,100.00
	ROMANS	$21,120.00
	SMITH	$9,500.00
	STEVENS	$11,000.00

End of Report

Conditionally Formatting a StyleSheet

You can conditionally format report components, display a graphic, and include links in your report based on the values in your report. Using conditional styling, you can:

- Draw attention to particular items in the report.
- Emphasize differences between significant values.
- Customize the resources to which an end user navigates from different parts of the report.

To conditionally format reports, add the WHEN attribute to a StyleSheet declaration. The WHEN attribute specifies a condition that is evaluated for each instance of a report component (that is, for each cell of a tabular report column, each element in a chart, or each free-form report page). The StyleSheet declaration is applied to each instance that satisfies the condition, and is ignored by each instance that fails to satisfy the condition.

To conditionally format reports, using the WHEN attribute, the format is:

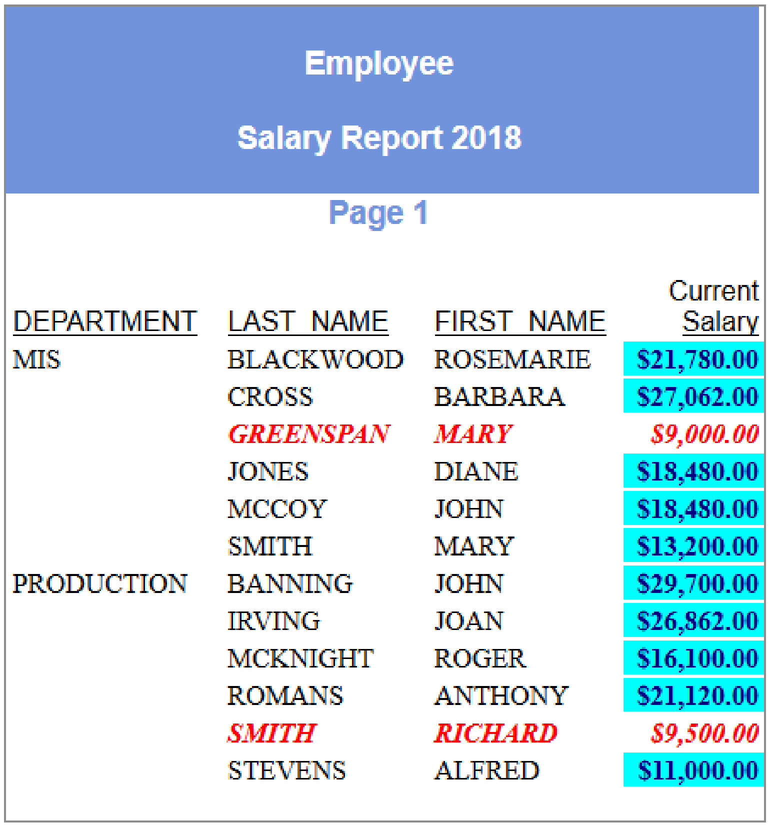
```
TYPE=type, [subtype,] attributes, WHEN=field1 relation_operator

{field2|value},$
```

Issue the following request:

```
TABLE FILE EMPLOYEE

HEADING

" "

"Employee"

" "

"Salary Report 2018"

" "

"Page <TABPAGENO"

" "

SUM CURR_SAL AS 'Current,Salary'

BY DEPARTMENT BY LAST_NAME BY FIRST_NAME

ON TABLE SET STYLESHEET *

TYPE=REPORT, GRID=OFF, UNITS=INCHES, $

TYPE=DATA, FONT='TIMES', $

TYPE=DATA, COLOR=RED, STYLE=BOLD + ITALIC,

WHEN=CURR_SAL LT 10000, $

TYPE=DATA, COLUMN=CURR_SAL, BACKCOLOR=AQUA, COLOR=NAVY, STYLE=BOLD,

WHEN=CURR_SAL GT 10000, $

TYPE=TITLE, FONT='HELVETICA', $

TYPE=HEADING, FONT='HELVETICA', STYLE=BOLD, SIZE=14, JUSTIFY=CENTER,

COLOR=WHITE, BACKCOLOR=DARK TURQUOISE, $
```

```
TYPE=HEADING, LINE=6, BACKCOLOR=WHITE, COLOR=DARK TURQUOISE, $

TYPE=HEADING, LINE=7, BACKCOLOR=WHITE, $

ENDSTYLE

END
```

Run the request. The output is:



Employee

Salary Report 2018

Page 1

DEPARTMENT	LAST_NAME	FIRST_NAME	Current Salary
MIS	BLACKWOOD	ROSEMARIE	**$21,780.00**
	CROSS	BARBARA	**$27,062.00**
	GREENSPAN	*MARY*	*$9,000.00*
	JONES	DIANE	**$18,480.00**
	MCCOY	JOHN	**$18,480.00**
	SMITH	MARY	**$13,200.00**
PRODUCTION	BANNING	JOHN	**$29,700.00**
	IRVING	JOAN	**$26,862.00**
	MCKNIGHT	ROGER	**$16,100.00**
	ROMANS	ANTHONY	**$21,120.00**
	SMITH	*RICHARD*	*$9,500.00*
	STEVENS	ALFRED	**$11,000.00**

Notice that employees with salaries less than $10,000 are red and italic and employees with salaries greater than $10,000 are navy and bold, with a dark turquoise background.

Merging Data Sources

You can gather data for your reports by joining data sources using the JOIN command, merging the contents of data structures using the MATCH command, or concatenating data sources using the MORE phrase, and reporting from the combined data.

- The JOIN command creates a new parent-child structure from multiple data sources.
- The MATCH command creates new data records by combining records from two or more data sources, based on common sort values.
- The MORE command appends output from multiple data sources.

Including Data From More Than One File: JOIN

Creating Basic Output Requests illustrated how to access data from a data source. The JOIN command enables you to report from two or more data sources, as if they were one. Although the two data sources remain physically separate, it will seem as if you are working with one data source. When two data sources are joined, one is called the host file, the other is called the cross-referenced file. Each time a record is retrieved from the host file, the corresponding fields in the cross-referenced file are identified, if they are referenced in the report request. The records in the cross-referenced file containing the corresponding values are then retrieved. You can establish a *joined* structure in several ways. Each way requires specific conditions.

Issuing a JOIN Command

The format for a simple JOIN command is:

```
JOIN field IN host TO [ALL] field IN crfile AS joinname
```

The fields from the host file and cross-referenced file (crfile) must have the same format. The JOIN command requires a real field as the target (cross-referenced field). ALL retrieves multiple matching records from the cross-referenced file. Without ALL, only a single value is retrieved. The AS phrase is a name to identify the Join.

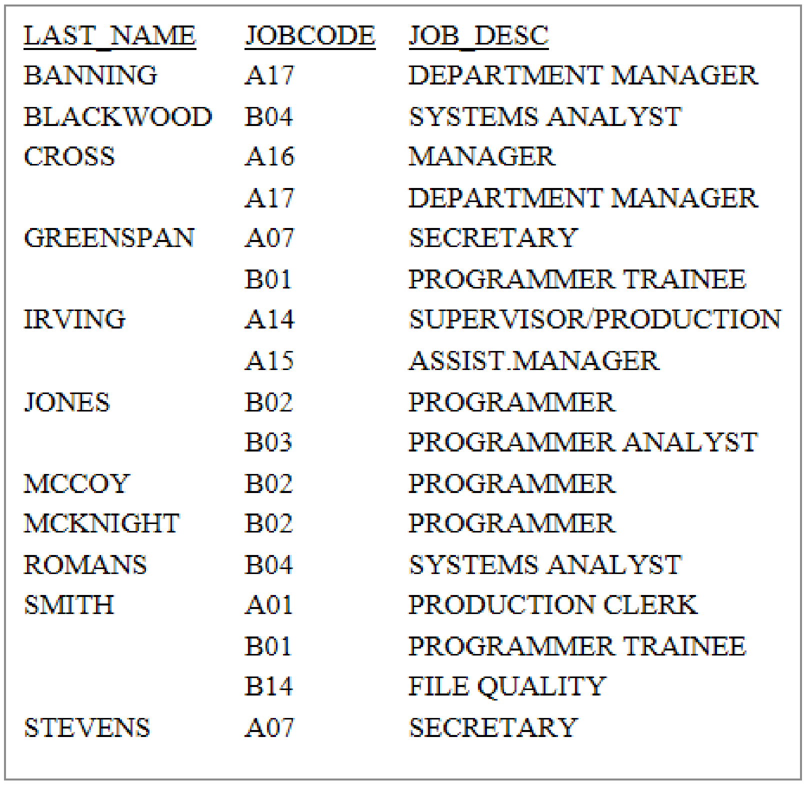
For example, both the EMPLOYEE data source and the JOBFILE data source contain a JOBCODE field. The JOBFILE data source contains a description for each of the job codes (JOB_DESC field). To join the EMPLOYEE data source to the JOBFILE data source, issue the following JOIN command:

```
JOIN JOBCODE IN EMPLOYEE TO JOBCODE IN JOBFILE AS JJOIN
```

To retrieve the job description for each of the job codes for each employee, issue the following request:

```
TABLE FILE EMPLOYEE

BY LAST_NAME BY JOBCODE BY JOB_DESC

END
```

Run the request. The output is:



```
LAST_NAME   JOBCODE  JOB_DESC
BANNING     A17      DEPARTMENT MANAGER
BLACKWOOD   B04      SYSTEMS ANALYST
CROSS       A16      MANAGER
            A17      DEPARTMENT MANAGER
GREENSPAN   A07      SECRETARY
            B01      PROGRAMMER TRAINEE
IRVING      A14      SUPERVISOR/PRODUCTION
            A15      ASSIST.MANAGER
JONES       B02      PROGRAMMER
            B03      PROGRAMMER ANALYST
MCCOY       B02      PROGRAMMER
MCKNIGHT    B02      PROGRAMMER
ROMANS      B04      SYSTEMS ANALYST
SMITH       A01      PRODUCTION CLERK
            B01      PROGRAMMER TRAINEE
            B14      FILE QUALITY
STEVENS     A07      SECRETARY
```

Note: Joining two separate structures may result in duplication of field names. To identify which field name is being referenced in a request, qualify it as FILENAME.*fieldname*, SEGNAME.*fieldname* or FILENAME.SEGNAME.*fieldname*, to uniquely identify which field name instance is to be used. Without qualification, any field name reference will find the FIRST matching field name within the structure, which may not be what was intended.

Merging Data: MATCH

You can merge two or more data sources, and specify which records to merge and which to eliminate, using the MATCH command. The command creates a new data source (a HOLD file), into which it merges fields from the selected records. You can report from the new data source and use it as you would use any other HOLD file. HOLD files are discussed in Advanced Features.

You can select the records to be merged into the new data source by specifying sort fields in the MATCH command. Specify one set of sort fields, using the BY phrase, for the first data source, and a second set of sort fields for the second data source. The MATCH command compares all sort fields that have been specified in common for both data sources, and then merges all records from the first data source whose sort values match those in the second data source into the new HOLD file. You can specify up to 128 sort sets. This includes the number of common sort fields.

In addition to merging data source records that share values, you can merge records based on other relationships. For example, you can merge all records in each data source whose sort values are not matched in the other data source. Yet another type of merge combines all records from the first data source with any matching records from the second data source.

You can merge up to 16 sets of data in one Match request.

The syntax of the MATCH command is similar to that of the TABLE command:

```
MATCH FILE file1

.

.
```

```
.
RUN
FILE file2
.
.
.
[AFTER MATCH merge_phrase]
RUN
FILE file3
.
.
.
[AFTER MATCH merge_phrase]
END
```

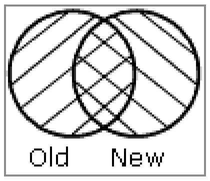
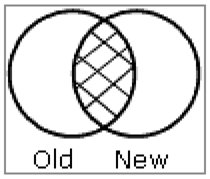
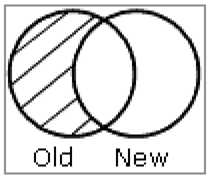
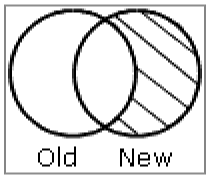
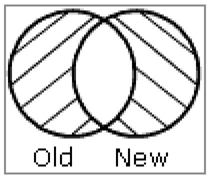
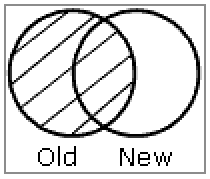
The merge phrase specifies how the retrieved records from the files are to be compared.

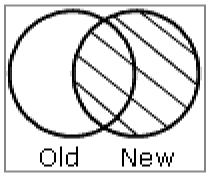
Note that a RUN command must follow each AFTER MATCH command, except for the last one. The END command must follow the final AFTER MATCH command.

MATCH generates a HOLD file. You can print the contents of the HOLD file using the PRINT command with the wildcard character (*).

Specify Merge Phrases

The results of each merge phrase are graphically represented using Venn diagrams. In the diagrams, the left circle represents the old data source, the right circle represents the new data source, and the shaded areas represent the data that is written to the HOLD file.

AFTER MATCH Command	Description
	OLD-OR-NEW specifies that all records from both the old data source and the new data source appear in the HOLD file. This is the default, if the AFTER MATCH line is omitted.
	OLD-AND-NEW specifies that records that appear in both the old and new data sources appear in the HOLD file. This is the intersection of the sets.
	OLD-NOT-NEW specifies that records that appear only in the old data source appear in the HOLD file.
	NEW-NOT-OLD specifies that records that appear only in the new data source appear in the HOLD file.
	OLD-NOR-NEW specifies that only records that are in the old data source but not in the new data source, or in the new data source but not in the old, appear in the HOLD file. This is the complete set of non-matching records from both data sources.
	OLD specifies that all records from the old data source, and any matching records from the new data source, are merged into the HOLD file.

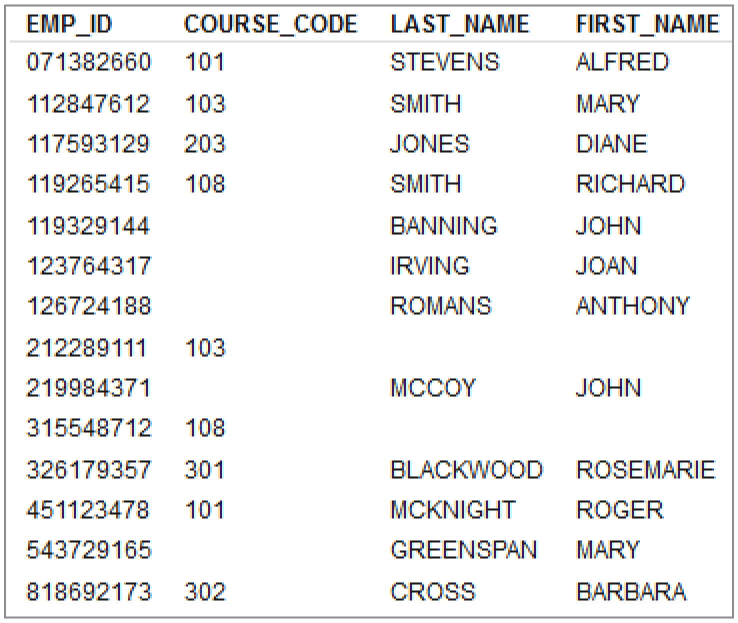
AFTER MATCH Command	Description
	NEW specifies that all records from the new data source, and any matching records from the old data source, are merged into the HOLD file.

In the following request, the high-order sort field is the same for both files.

```
MATCH FILE EDUCFILE

SUM COURSE_CODE

BY EMP_ID

RUN

FILE EMPLOYEE

SUM FIRST_NAME

BY EMP_ID BY LAST_NAME

AFTER MATCH HOLD OLD-OR-NEW

END

-*****************************

-*  PRINT CONTENTS OF HOLD FILE

-*****************************

TABLE FILE HOLD

PRINT *

END
```

The merge phrase used in this example was OLD-OR-NEW. This means that records from both the first (old) data source plus the records from the second (new) data source appear in the HOLD file.

Run the request. The output is:



EMP_ID	COURSE_CODE	LAST_NAME	FIRST_NAME
071382660	101	STEVENS	ALFRED
112847612	103	SMITH	MARY
117593129	203	JONES	DIANE
119265415	108	SMITH	RICHARD
119329144		BANNING	JOHN
123764317		IRVING	JOAN
126724188		ROMANS	ANTHONY
212289111	103		
219984371		MCCOY	JOHN
315548712	108		
326179357	301	BLACKWOOD	ROSEMARIE
451123478	101	MCKNIGHT	ROGER
543729165		GREENSPAN	MARY
818692173	302	CROSS	BARBARA

MATCH Processing With Common High-Order Sort Fields

When you construct your MATCH so that the first sort (BY) fields (called the common high-order sort fields) used for both data sources are the same in name and format, the match compares the values of the common high-order sort fields.

At least one pair of sort fields is required. Field formats must be the same. In some cases, you can redefine a field format using the DEFINE command. If the field names differ, use the AS phrase to rename the second sort field to match the first.

When you are merging files with common sort fields, the following assumptions are made:

- If one set of sort fields is a subset of the other, a one-to-many relationship is assumed.
- If neither set of sort fields is a subset of the other, a one-to-one relationship is assumed. At most, one matching record is retrieved.

Merging With a Common High-Order Sort Field

This request combines data from the EMPLOYEE and EMPDATA data sources. The sort fields are EID and PIN.

```
MATCH FILE EMPLOYEE

PRINT LN FN DPT

BY EID

RUN

FILE EMPDATA

PRINT LN FN DEPT

BY PIN AS 'EID'

AFTER MATCH HOLD OLD-OR-NEW

END


TABLE FILE HOLD

PRINT *

END
```

Merging Without a Common High-Order Sort Field

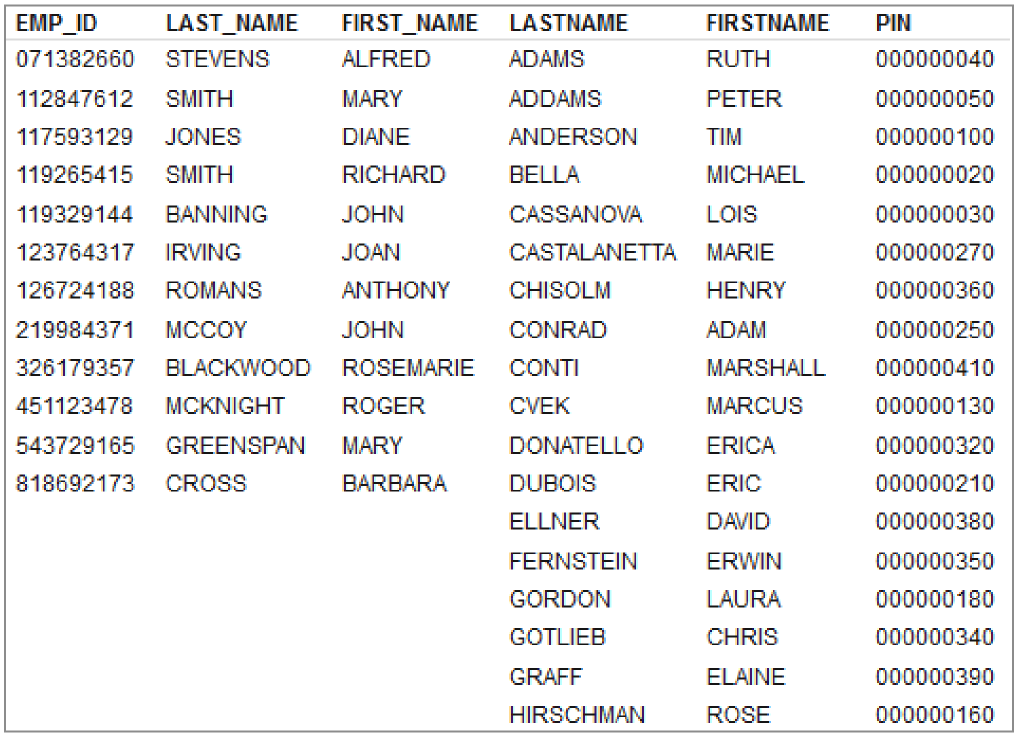
If there are no common high-order sort fields, a match is performed on a record-by-record basis. The following request matches the data and produces the HOLD file:

```
MATCH FILE EMPLOYEE

PRINT LAST_NAME AND FIRST_NAME

BY EMP_ID

RUN
```

```
FILE EMPDATA

PRINT PIN

BY LASTNAMEBY FIRSTNAME

AFTER MATCH HOLD OLD-OR-NEW

END


TABLE FILE HOLD

PRINT *

END
```

The retrieved records from the two data sources are written to the HOLD file. No values are compared.

Run the request. The output is:



```
EMP_ID     LAST_NAME  FIRST_NAME LASTNAME     FIRSTNAME  PIN
071382660  STEVENS    ALFRED     ADAMS        RUTH       000000040
112847612  SMITH      MARY       ADDAMS       PETER      000000050
117593129  JONES      DIANE      ANDERSON     TIM        000000100
119265415  SMITH      RICHARD    BELLA        MICHAEL    000000020
119329144  BANNING    JOHN       CASSANOVA    LOIS       000000030
123764317  IRVING     JOAN       CASTALANETTA MARIE      000000270
126724188  ROMANS     ANTHONY    CHISOLM      HENRY      000000360
219984371  MCCOY      JOHN       CONRAD       ADAM       000000250
326179357  BLACKWOOD  ROSEMARIE  CONTI        MARSHALL   000000410
451123478  MCKNIGHT   ROGER      CVEK         MARCUS     000000130
543729165  GREENSPAN  MARY       DONATELLO    ERICA      000000320
818692173  CROSS      BARBARA    DUBOIS       ERIC       000000210
                                 ELLNER       DAVID      000000380
                                 FERNSTEIN    ERWIN      000000350
                                 GORDON       LAURA      000000180
                                 GOTLIEB      CHRIS      000000340
                                 GRAFF        ELAINE     000000390
                                 HIRSCHMAN    ROSE       000000160
```

Concatenating Data: MORE

With universal concatenation, you can retrieve data from data sources, which are unlike, in a single request. All data, regardless of source, appears to come from a single file. The MORE phrase can concatenate all types of data sources (such as, FOCUS®, Db2, and Oracle), provided they share corresponding field names with the same format. You can use DEFINE fields, if necessary, to make the fields match.

To use MORE, you must divide your request into:

- One main request that retrieves the first data source, sorting criteria, and output format for all data.
- Subrequests that define the data sources to be concatenated to the data of the main request. The fields printed and sorted by the main request must exist in each concatenated data source, but are not mentioned.
- You can add WHERE and IF selection tests in any request.

During retrieval, data is gathered from each data source in turn, then all data is sorted and the output formatted as specified in the main request.

Concatenating Data Sources

The MORE phrase, which is accessible within the TABLE and MATCH commands, specifies how to concatenate data from sources with dissimilar Master Files.

The format of the MATCH command is:

```
{TABLE|MATCH}  FILE file1
main request

MORE

FILE file2

  subrequest

MORE

FILE file3

  subrequest
```

```
MORE
    .
    .
    .
END
```

Field Name and Format Matching

All fields referenced in the main request must either exist with the same names and formats in all the concatenated files, or be remapped to those names and formats using virtual fields. Referenced fields include those used in COMPUTE commands, headings, aggregation phrases, sort phrases, and the PRINT, LIST, SUM, COUNT, and WRITE commands.

A successful format match means that:

Usage Format Type	Correspondence
A	Format type and length must be equal.
I, F, D	Format type must be the same.
P	Format type and scale must be equal.
DATE (new)	Format information (type, length, components, and order) must always correspond.
DATE (old)	Edit options must be the same.
DATE -TIME	Format information (type, length, components, and order) must always correspond.

Note: Text (TX) fields and CLOB fields (if supported) cannot be concatenated.

The following annotated example concatenates data from the EMPDATA and SALHIST data sources.

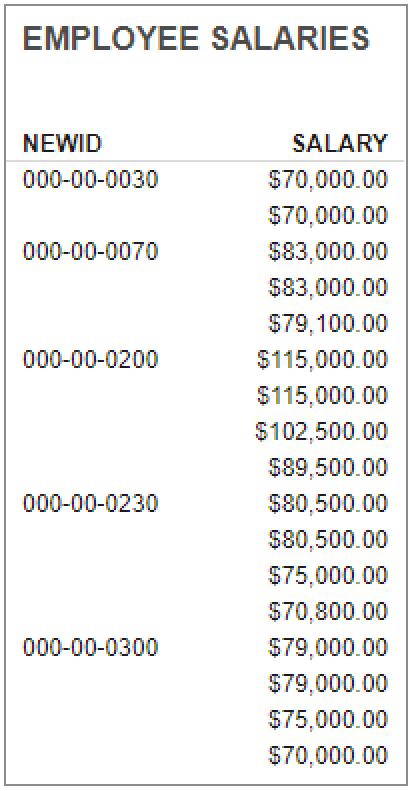
```
   DEFINE FILE EMPDATA
1. NEWID/A11=EDIT (ID,'999-99-9999');
   END


   DEFINE FILE SALHIST
2. NEWID/A11=EDIT (ID,'999-99-9999');
   CSAL/D12.2M=OLDSALARY;
   END


3. TABLE FILE EMPDATA
   HEADING
   "EMPLOYEE SALARIES"
   " "
   PRINT CSAL
   BY NEWID
4. WHERE CSAL GT 65000
5. MORE
   FILE SALHIST
6. WHERE OLDSALARY GT 65000
   END
```

1. Defines NEWID in the EMPDATA data source with the same name and format as the sort field referenced in the main request.
2. Defines NEWID in the SALHIST data source with the same name and format as the

sort field referenced in the main request.

3. The main request. This contains all the formatting for the resulting report and names the first file to be concatenated. It also contains all printing and sorting information. The fields printed and the sort fields must exist as real or DEFINE fields in each file.
4. The WHERE criterion in the main request applies only to the EMPDATA data source.
5. The MORE phrase concatenates the SALHIST data source to the EMPDATA data source.
6. This WHERE criterion applies only to the SALHIST data source. Notice that it references a field that is not defined in the EMPDATA data source.

Run the request. The output is:



```
EMPLOYEE SALARIES


NEWID                SALARY
000-00-0030      $70,000.00
                 $70,000.00
000-00-0070      $83,000.00
                 $83,000.00
                 $79,100.00
000-00-0200     $115,000.00
                $115,000.00
                $102,500.00
                 $89,500.00
000-00-0230      $80,500.00
                 $80,500.00
                 $75,000.00
                 $70,800.00
000-00-0300      $79,000.00
                 $79,000.00
                 $75,000.00
                 $70,000.00
```

Advanced Features

The reporting language has several features that enable you to accomplish more complex tasks than discussed so far. The following topics introduce useful functions for more advanced users. Although we do not teach you how to use them here, we think you should know they exist. You may find that having mastered the basics of reporting, you will be ready to try using these features on your own.

You can read detailed explanations of how these features work in the *User's Manual* for your product.

Using Multiple Verb Commands in Requests

Although each of the sample requests in this Primer uses one verb command at a time, you can use up to sixteen different commands in a single request, to get multiple levels of aggregation.

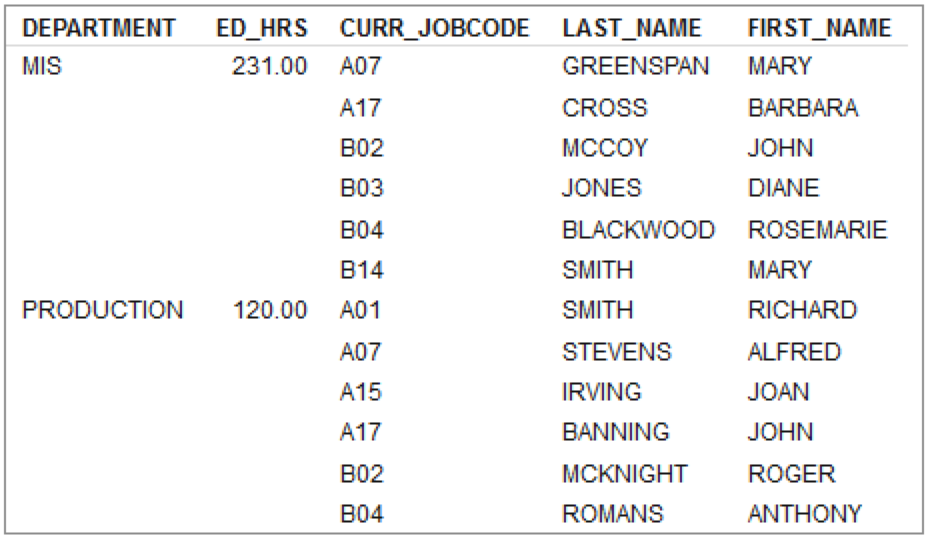
In a multi-verb request, LIST or PRINT must be the last command in the request. Other preceding display commands must be aggregating commands. An easy way to remember this is that before you display fields (PRINT, LIST), you need to decide what you want to do to them (SUM, COUNT).

Also, when you use a sort phrase with a verb, the verb phrases following it must repeat the same sorting phrase using the same order. In this example, the first sorting phrase (BY DEPARTMENT) is repeated before a new sort phrase (BY CURR_JOBCODE) is added.

Issue the following request:

```
TABLE FILE EMPLOYEE

SUM ED_HRS BY DEPARTMENT

PRINT LAST_NAME FIRST_NAME BY DEPARTMENT BY CURR_JOBCODE

END
```

Run the request. The output is:

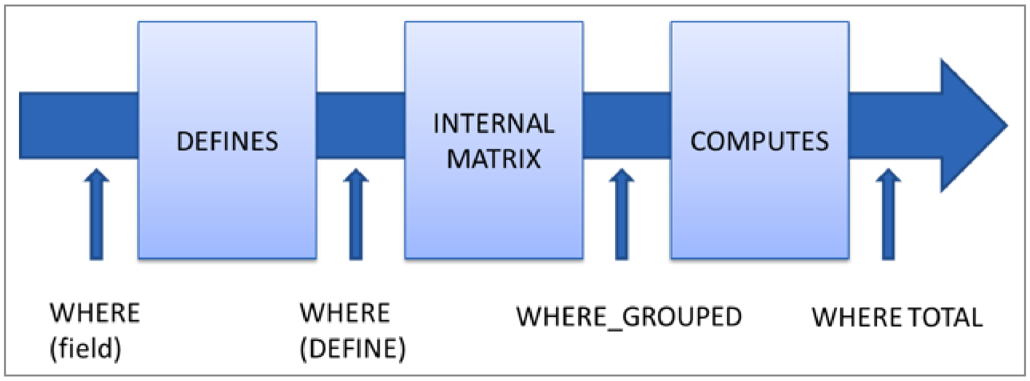


DEPARTMENT	ED_HRS	CURR_JOBCODE	LAST_NAME	FIRST_NAME
MIS	231.00	A07	GREENSPAN	MARY
		A17	CROSS	BARBARA
		B02	MCCOY	JOHN
		B03	JONES	DIANE
		B04	BLACKWOOD	ROSEMARIE
		B14	SMITH	MARY
PRODUCTION	120.00	A01	SMITH	RICHARD
		A07	STEVENS	ALFRED
		A15	IRVING	JOAN
		A17	BANNING	JOHN
		B02	MCKNIGHT	ROGER
		B04	ROMANS	ANTHONY

Note: ED_HRS aggregates to the DEPARTMENT level. LAST_NAME and FIRST_NAME are based on CURR_JOBCODE within DEPARTMENT.

Applying Selection Criteria

The ability to select records can occur at four different times during the processing of a request, as shown in the following image.



The primary difference among these possibilities is:

- Before the internal matrix when you are reading individual records.
- After the internal matrix when you are working with aggregated values, such as sums, counts, averages, maximums, minimums, and so on.

Where the selection occurs can make a significant difference in the output, the performance of the request, or both.

- If you need to do your selection at the record level, you can select on a real field or select on a virtual field (DEFINE). If you are working with a large number of records, selecting on real fields may help speed the processing.
- If you want to select on aggregated values, you can select before COMPUTE fields are evaluated or after they are evaluated.

Applying Selection Criteria to the Internal Matrix

After records are retrieved, selected, sorted, and aggregated, the aggregated values are stored in an internal area called an internal matrix. WHERE TOTAL tests are applied to the rows of the internal matrix after COMPUTE calculations are processed. WHERE_GROUPED tests are applied to the internal matrix values prior to COMPUTE calculations. The processing then continues with COMPUTE calculations, and then WHERE TOTAL tests. This allows you to control the evaluation, and is particularly useful in recursive calculations.

The syntax is:

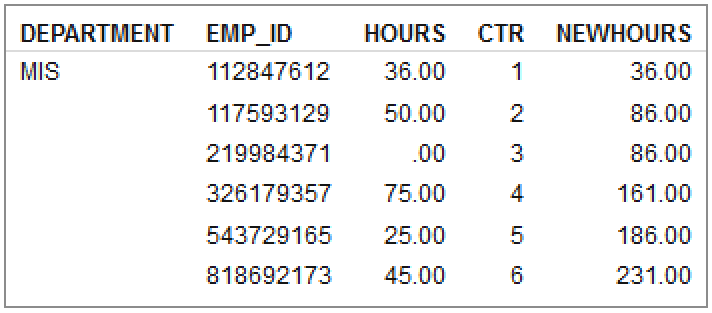
```
WHERE_GROUPED expression
```

The following request has two COMPUTE commands. The first COMPUTE checks to see if the department value has changed, incrementing a counter if it has. This allows you to sequence the records in the matrix. The second COMPUTE creates a rolling total of the education hours within the department.

```
TABLE FILE EMPLOYEE

SUM ED_HRS AS HOURS

COMPUTE CTR/I3 = IF DEPARTMENT EQ LST.DEPARTMENT THEN CTR+1 ELSE 1;

COMPUTE NEWHOURS = IF DEPARTMENT EQ LST.DEPARTMENT THEN NEWHOURS+ED_HRS
ELSE ED_HRS;

BY DEPARTMENT

BY EMP_ID

WHERE DEPARTMENT EQ 'MIS'
```

```
END
```

Run the request. The output is:

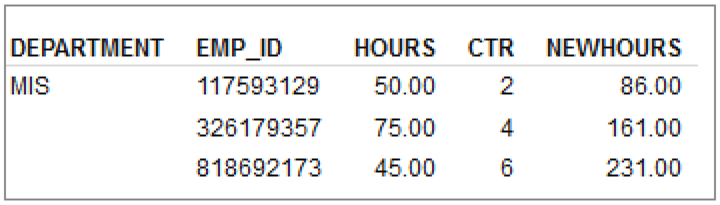


DEPARTMENT	EMP_ID	HOURS	CTR	NEWHOURS
MIS	112847612	36.00	1	36.00
	117593129	50.00	2	86.00
	219984371	.00	3	86.00
	326179357	75.00	4	161.00
	543729165	25.00	5	186.00
	818692173	45.00	6	231.00

The following version of the request adds a WHERE TOTAL test to select only those employee IDs where education hours exceeds 36.00 hours.

```
TABLE FILE EMPLOYEE

SUM ED_HRS AS HOURS

COMPUTE CTR/I3 = IF DEPARTMENT EQ LST.DEPARTMENT THEN CTR+1 ELSE 1;

COMPUTE NEWHOURS = IF DEPARTMENT EQ LST.DEPARTMENT THEN NEWHOURS+ED_HRS
ELSE ED_HRS;

BY DEPARTMENT

BY EMP_ID

WHERE DEPARTMENT EQ 'MIS'

WHERE TOTAL ED_HRS GT 36.00

END
```

Run the request. The output is:



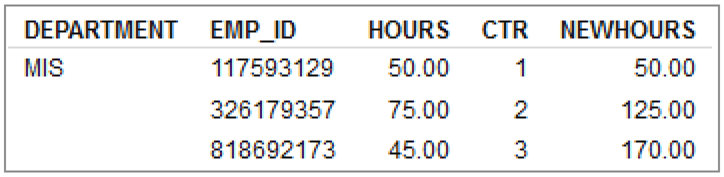
DEPARTMENT	EMP_ID	HOURS	CTR	NEWHOURS
MIS	117593129	50.00	2	86.00
	326179357	75.00	4	161.00
	818692173	45.00	6	231.00

The COMPUTE calculations for CTR and NEWHOURS were processed prior to eliminating the rows in which TOTAL ED_HRS were 36.00 or less, so their values are the same as in the original output. This does not correctly reflect the sequence of records and the rolling total of the values that are actually displayed on the output. To do this, you need to select the appropriate employee IDs (ED_HRS GT 36.00) before the COMPUTE expressions are evaluated. This requires WHERE_GROUPED.

The following version of the request replaces the WHERE TOTAL test with a WHERE_ GROUPED test.

```
TABLE FILE EMPLOYEE

SUM ED_HRS AS HOURS

COMPUTE CTR/I3 = IF DEPARTMENT EQ LST.DEPARTMENT THEN CTR+1 ELSE 1;

COMPUTE NEWHOURS = IF DEPARTMENT EQ LST.DEPARTMENT THEN NEWHOURS +ED_HRS
ELSE ED_HRS;

BY DEPARTMENT

BY EMP_ID

WHERE DEPARTMENT EQ 'MIS'

WHERE_GROUPED  ED_HRS GT 36.00

END
```

Run the request. The output is:



```
DEPARTMENT  EMP_ID      HOURS  CTR  NEWHOURS
MIS         117593129   50.00    1     50.00
            326179357   75.00    2    125.00
            818692173   45.00    3    170.00
```

The COMPUTE calculation for NEWHOURS was processed after eliminating the rows in which TOTAL ED-HRS were 36.00 or less, so its values are based on fewer rows than the calculations in the original request. This is verified by the CTR values, which are now in a continuous sequence. The rolling total now reflects the values that are actually displayed on the report output.

Extracting Data Into a File

You can create extract files, in various formats, that contain the data output of your report requests. Depending on the format you use, a Master File for the data may be created. You can use these files for further reporting or import them into other programs, such as word processors or spreadsheets.

The following commands extract and save report output in a variety of file formats:

- **HOLD.** The HOLD command creates a data source containing the output of a report request. By default, the data is stored in binary format, but you can specify a different format, such as HTML, Excel, PDF, or XLSX. For some formats, the HOLD command also creates a corresponding Master File. You can then write other report requests that in turn extract or save data from the HOLD file.
- **SAVE and SAVB.** The SAVE command is identical to a HOLD command, except that it does not create a Master File, and ALPHA is the default format. If you wish to create a SAVE file in BINARY format, use a variation of the SAVE command called SAVB. As with a HOLD file, you can specify a variety of formats suitable for use with other software products.
- **PCHOLD.** The PCHOLD command creates a data source containing the output of a report request, and downloads the HOLD data source and the optional Master File to a client computer or browser. As with a HOLD file, you can specify a variety of file formats.

Extracting Report Output

You create an extract file by adding the proper command to your report request.

The following is the simple format of the extract command:

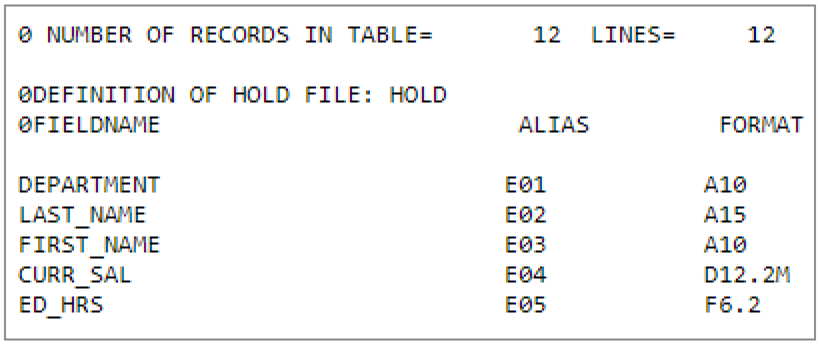
```
ON TABLE {HOLD|SAVE|SAVB|PCHOLD} [AS filename] [FORMAT fmt]
```

To produce a HOLD file, issue the following request:

```
TABLE FILE EMPLOYEE

SUM CURR_SAL ED_HRS
```

```
BY DEPARTMENT

BY LAST_NAME BY FIRST_NAME

ON TABLE HOLD

END
```

The ? HOLD command displays the Master File once the data is extracted. Here is what the Master File for this request looks like:



```
0 NUMBER OF RECORDS IN TABLE=       12  LINES=     12

0DEFINITION OF HOLD FILE: HOLD
0FIELDNAME                          ALIAS         FORMAT

DEPARTMENT                         E01           A10
LAST_NAME                          E02           A15
FIRST_NAME                         E03           A10
CURR_SAL                           E04           D12.2M
ED_HRS                             E05           F6.2
```

Two SET parameters that enable you to control how data is presented in a HOLD Master File are SET ASNAMES (controls the naming of fields) and SET TITLE (controls the naming of column titles). For more information on SET commands, see the *Developing Reporting Applications* manual.

Presenting Data in a Matrix: Financial Modeling Language

The Financial Modeling Language (FML) is an extension of the reporting language. It is particularly suited for use with financial data from which you can produce documents, such as balance sheets or budgets, where rows in addition to columns are interrelated. This means you can perform calculations between rows as well as columns.

The following is a sample FML request along with the asset sheet it produces. Notice that the FML commands are embedded in a standard TABLE request.

This annotated example is similar to a typical report request, except for the addition of the FML keywords. The example produces a simple asset sheet, contrasting the results of two years. The numbers refer to the explanations that follow.

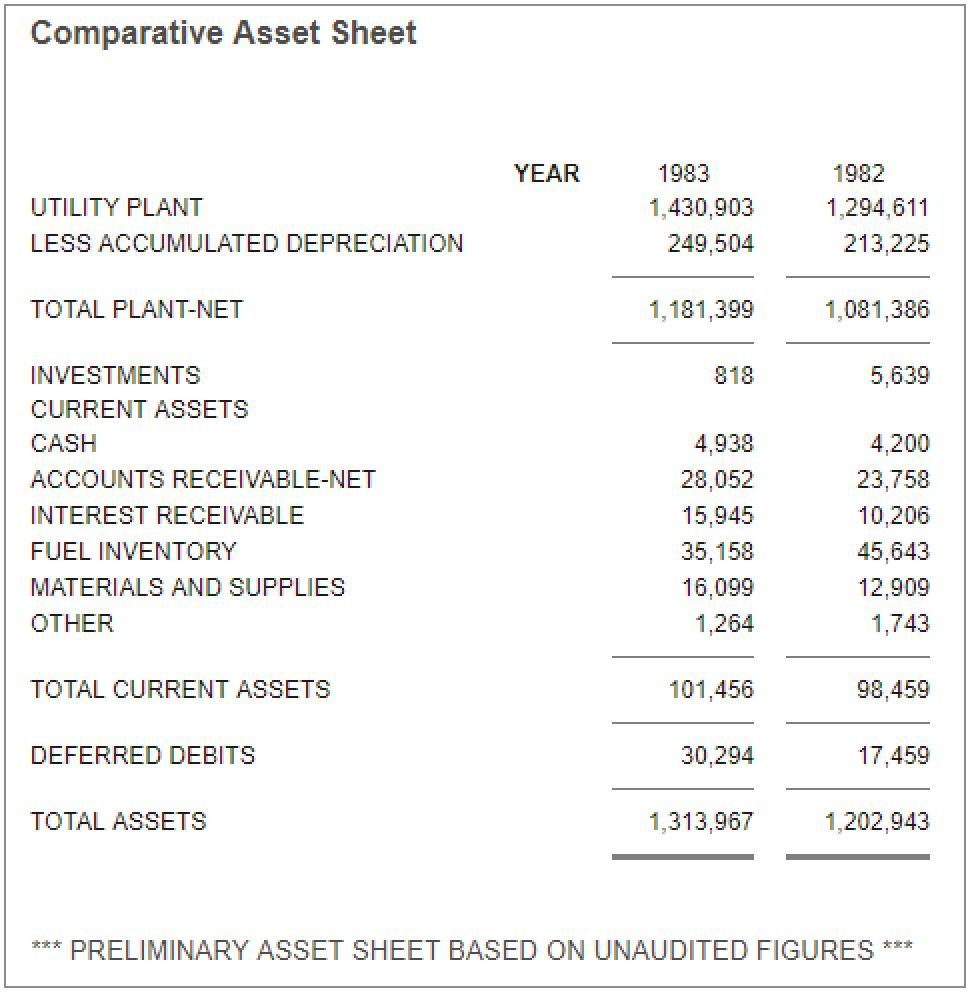
```
TABLE FILE FINANCE

HEADING CENTER

"Comparative Asset Sheet  </2"

SUM AMOUNT ACROSS HIGHEST YEAR

IF 'YEAR' EQ '1983' OR '1982'

1. FOR ACCOUNT

2.     1000             AS 'UTILITY PLANT'                    LABEL
UTP       OVER

2.     1010 TO 1050     AS 'LESS ACCUMULATED DEPRECIATION'    LABEL
UTPAD     OVER

3.     BAR
        OVER

4. RECAP UTPNET=UTP-UTPAD; AS 'TOTAL PLANT-NET'
        OVER

           BAR
        OVER

           2000 TO 3999   AS 'INVESTMENTS'                    LABEL
INV       OVER

           "CURRENT ASSETS"
        OVER

           4000           AS 'CASH'                           LABEL
CASH      OVER

           5000 TO 5999   AS 'ACCOUNTS RECEIVABLE-NET'        LABEL
ACR       OVER

           6000           AS 'INTEREST RECEIVABLE'            LABEL
ACI       OVER

           6500           AS 'FUEL INVENTORY'                 LABEL
FUEL      OVER

           6600           AS 'MATERIALS AND SUPPLIES'         LABEL
MAT       OVER
```

```
           6900           AS 'OTHER'                          LABEL
MISC      OVER

           BAR
        OVER

        RECAP TOTCAS = CASH+ACR+ACI+FUEL+MAT+MISC; AS 'TOTAL CURRENT
ASSETS'     OVER

           BAR
        OVER

           7000           AS 'DEFERRED DEBITS'                LABEL
DEFDB     OVER

           BAR
        OVER

        RECAP TOTAL=UTPNET+INV+TOTCAS+DEFDB; AS 'TOTAL ASSETS'
        OVER

           BAR AS '='

           FOOTING CENTER

           "</2 *** PRELIMINARY ASSET SHEET BASED ON UNAUDITED FIGURES
***"

END
```

Note:

1. FOR and OVER are FML keywords that enable you to easily structure the report on a row-by-row basis.
2. LABEL assigns a variable name to a line item for use in a RECAP calculation.
3. BAR enables you to underline a column of numbers before performing a RECAP calculation.
4. RECAP allows a calculated row to be inserted anywhere in the output.

Run the request. The output is:



Comparative Asset Sheet

	YEAR	1983	1982
UTILITY PLANT		1,430,903	1,294,611
LESS ACCUMULATED DEPRECIATION		249,504	213,225
TOTAL PLANT-NET		1,181,399	1,081,386
INVESTMENTS		818	5,639
CURRENT ASSETS			
CASH		4,938	4,200
ACCOUNTS RECEIVABLE-NET		28,052	23,758
INTEREST RECEIVABLE		15,945	10,206
FUEL INVENTORY		35,158	45,643
MATERIALS AND SUPPLIES		16,099	12,909
OTHER		1,264	1,743
TOTAL CURRENT ASSETS		101,456	98,459
DEFERRED DEBITS		30,294	17,459
TOTAL ASSETS		1,313,967	1,202,943

*** PRELIMINARY ASSET SHEET BASED ON UNAUDITED FIGURES ***

Reporting Dynamically From a Hierarchy

Hierarchical relationships between fields can be defined in a Master File, and automatically displayed using the Financial Modeling Language (FML). The parent and child fields must share data values, and their relationship should be hierarchical. The formats of the parent and child fields must both be either numeric or alphanumeric.

With FML hierarchies, you can define the hierarchical relationship between two fields in the Master File and load this information into memory. The FML request can then dynamically construct the rows that represent this relationship and display them in the report, starting at any point in the hierarchy.

Defining a Hierarchy in a Master File

The CENTGL Master File contains a chart of accounts hierarchy.

- The GL_ACCOUNT_PARENT field is the parent field in the hierarchy (described by PROPERTY=PARENT_OF, REFERENCE=GL_ACCOUNT).
- The GL_ACCOUNT field is the hierarchy field.
- The GL_ACCOUNT_CAPTION field can be used as the descriptive caption for the hierarchy field (described by PROPERTY=CAPTION, REFERENCE=GL_ACCOUNT).

```
FILE=CENTGL ,SUFFIX=FOC

SEGNAME=ACCOUNTS,SEGTYPE=S01

FIELDNAME=GL_ACCOUNT, ALIAS=GLACCT, FORMAT=A7,

TITLE='Ledger,Account', FIELDTYPE=I, $

FIELDNAME=GL_ACCOUNT_PARENT, ALIAS=GLPAR, FORMAT=A7,

TITLE=Parent, PROPERTY=PARENT_OF, REFERENCE=GL_ACCOUNT, $

FIELDNAME=GL_ACCOUNT_TYPE, ALIAS=GLTYPE, FORMAT=A1,

TITLE=Type,$

FIELDNAME=GL_ROLLUP_OP, ALIAS=GLROLL, FORMAT=A1,

TITLE=Op, $

FIELDNAME=GL_ACCOUNT_LEVEL, ALIAS=GLLEVEL, FORMAT=I3,

TITLE=Lev, $

FIELDNAME=GL_ACCOUNT_CAPTION, ALIAS=GLCAP, FORMAT=A30,

TITLE=Caption, PROPERTY=CAPTION, REFERENCE=GL_ACCOUNT, $

FIELDNAME=SYS_ACCOUNT, ALIAS=ALINE, FORMAT=A6,

TITLE='System,Account,Line', MISSING=ON, $
```

The CENTSYSF data source contains detail-level financial data. This is unconsolidated financial data for a fictional corporation, CenturyCorp. It is designed to be separate from the CENTGL database, as if it came from an external accounting system. It uses a different account line system (SYS_ACCOUNT) which can be joined to the SYS_ACCOUNT field in CENTGL. The data uses natural signs (expenses are positive, revenue negative).

```
FILE=CENTSYSF ,SUFFIX=FOC

SEGNAME=RAWDATA ,SEGTYPE=S2

FIELDNAME=SYS_ACCOUNT , ,A6 , FIELDTYPE=I,

TITLE='System,Account,Line', $

FIELDNAME=PERIOD , ,YYM , FIELDTYPE=I, $

FIELDNAME=NAT_AMOUNT , ,D10.0 , TITLE='Month,Actual', $

FIELDNAME=NAT_BUDGET , ,D10.0 , TITLE='Month,Budget', $

FIELDNAME=NAT_YTDAMT , ,D12.0 , TITLE='YTD,Actual', $
```

Displaying an FML Hierarchy

The GET CHILDREN and WITH CHILDREN commands dynamically retrieve and display hierarchical data on the FML report. GET CHILDREN displays only the children, not the parent value referenced in the command. WITH CHILDREN displays the parent and then the children.

The following request displays hierarchical account data for account number 3100.

```
SET NODATA=' '

JOIN SYS_ACCOUNT IN CENTGL TO ALL SYS_ACCOUNT IN CENTSYSF

TABLE FILE CENTGL

HEADING CENTER

"Hierarchical Report of Selling Expenses"

SUM NAT_AMOUNT NAT_YTDAMT

FOR GL_ACCOUNT

3100 WITH CHILDREN ALL AS CAPTION OVER
```

```
9. BAR AS - OVER

10. 3100 ADD ALL AS 'Total Group 1' OVER

11. BAR AS = OVER

12. " " OVER

13. 3100 AS CAPTION OVER

14. 3100 GET CHILDREN ADD AS CAPTION OVER

15. BAR AS - OVER

16. 3100 ADD ALL AS 'Total Group 2' OVER

17. BAR AS =

18. IF PERIOD EQ '2002/03'

19. ON TABLE SET BLANKINDENT ON

20. ON TABLE SET FORMULTIPLE ON

21. ON TABLE SET PAGE NOPAGE

22. ON TABLE NOTOTAL

23. END
```

Note:
8. WITH CHILDREN ALL shows parent and all lower-level children. Caption indicates the field that contains the description that will be on the report based on the account number in the synonym (ELEMENT=CAPTION).

10. ADD ALL consolidates the totals at the parent level.

13. Shows just the parent description by itself, no children or totals.

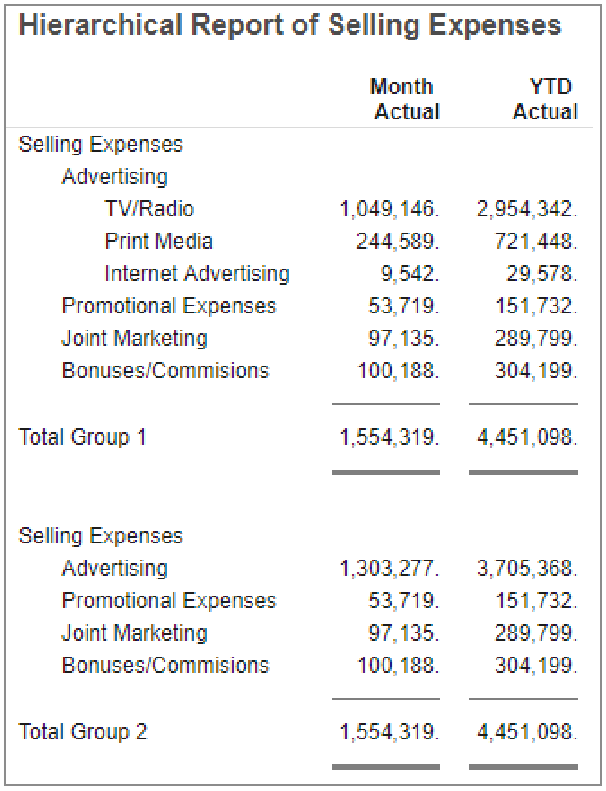
14. GET CHILDREN ADD consolidates totals to the first child level.

16. Consolidates the totals at the parent level. The same as number 10.

19. The SET BLANKINDENT command creates an indent at the next child level.

20. The SET FORMULTIPLE command allows the use of the FOR value in multiple parts of the request.

Run the request. The output is:



```
Hierarchical Report of Selling Expenses

                                  Month         YTD
                                 Actual      Actual
Selling Expenses
    Advertising
        TV/Radio              1,049,146.  2,954,342.
        Print Media             244,589.    721,448.
        Internet Advertising      9,542.     29,578.
    Promotional Expenses         53,719.    151,732.
    Joint Marketing              97,135.    289,799.
    Bonuses/Commisions          100,188.    304,199.
                              ----------  ----------
Total Group 1                 1,554,319.  4,451,098.
                              ==========  ==========

Selling Expenses
    Advertising               1,303,277.  3,705,368.
    Promotional Expenses         53,719.    151,732.
    Joint Marketing              97,135.    289,799.
    Bonuses/Commisions          100,188.    304,199.
                              ----------  ----------
Total Group 2                 1,554,319.  4,451,098.
                              ==========  ==========
```

Customizing Your Environment Using SET Commands

You can use SET commands to override default actions that govern your WebFOCUS, WebFOCUS App Studio, or FOCUS environment. SET command parameters control the content of reports and charts, in addition to system responses to requests and data retrieval characteristics that affect performance. SET commands also help you set up metadata and manipulate information, such as dates.

Issuing SET Commands

You can issue a SET command by coding it directly in a stored procedure or by using the SET tool. If you use the SET tool, a SET command will be generated, in the stored procedure, for the report you are developing.

The format of a SET command is:

```
SET parameter=option
```

You have a choice of different parameters that control different aspects of the product. Each parameter has a set of options, one of which is usually a default setting. You can change the parameters and the options for the parameters.

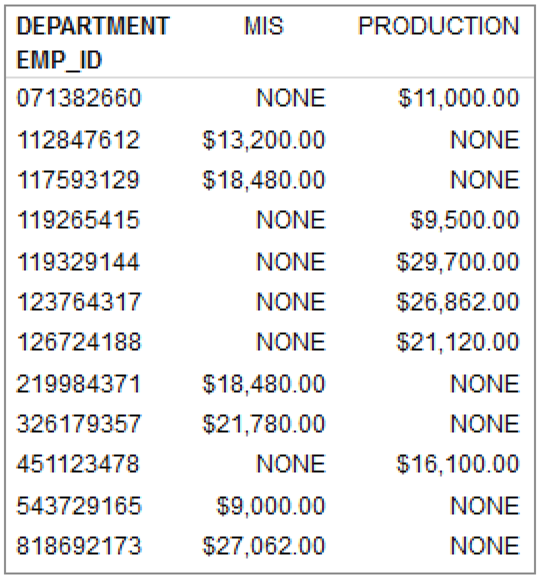
To change the default character for missing data (NODATA) from a period to the word NONE and to suppress default page numbering (PAGE-NUM), issue the following command:

```
SET NODATA=NONE, PAGE-NUM=OFF
```

To see the result, issue the following request:

```
TABLE FILE EMPLOYEE

PRINT CURR_SAL BY EMP_ID

ACROSS DEPARTMENT

END
```

Run the request. The output is:



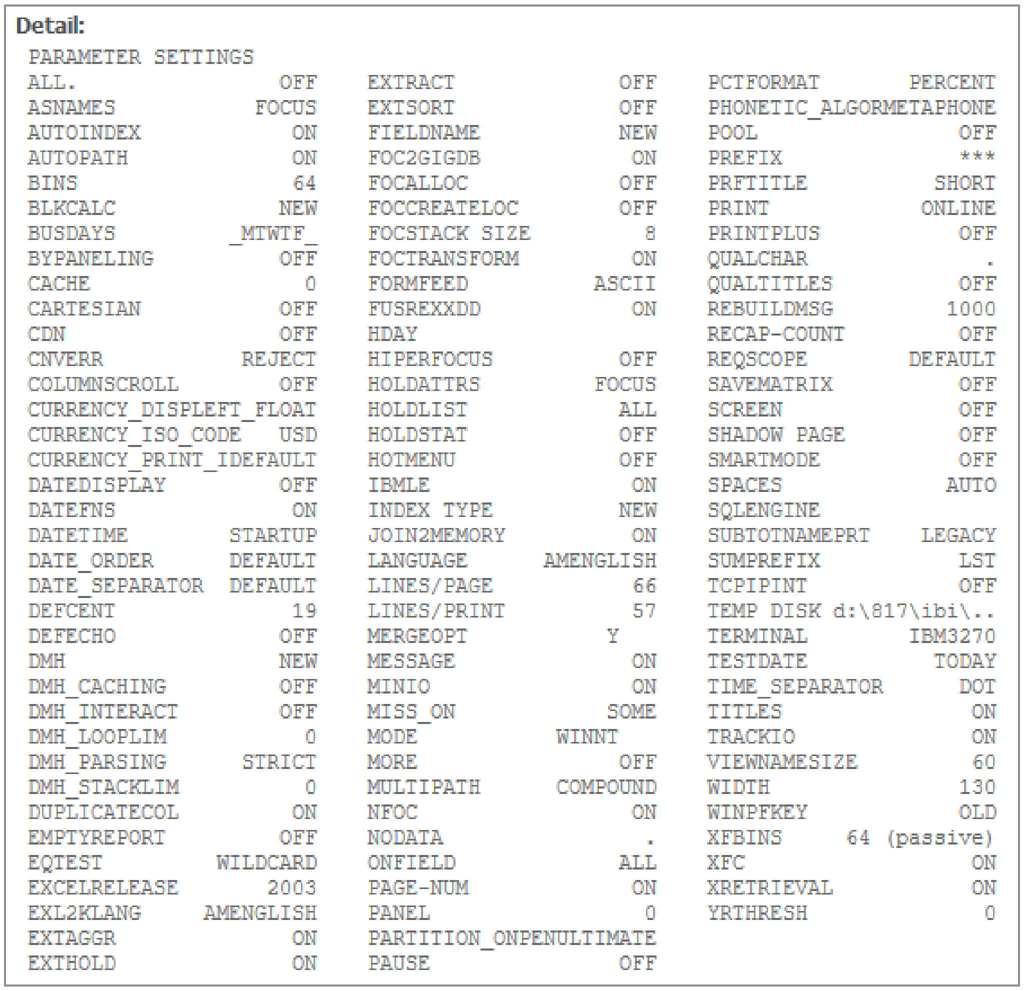
DEPARTMENT	MIS	PRODUCTION
EMP_ID		
071382660	NONE	$11,000.00
112847612	$13,200.00	NONE
117593129	$18,480.00	NONE
119265415	NONE	$9,500.00
119329144	NONE	$29,700.00
123764317	NONE	$26,862.00
126724188	NONE	$21,120.00
219984371	$18,480.00	NONE
326179357	$21,780.00	NONE
451123478	NONE	$16,100.00
543729165	$9,000.00	NONE
818692173	$27,062.00	NONE

In the output, NONE appears when there is no salary information for a specific employee, because that employee does not work in the department that is referenced. There is no page number at the top of the output.

To see a list of most often used SET commands, issue the following request:

```
? SET

END
```

Run the request. The output is:



Detail:

```
PARAMETER SETTINGS
ALL.                 OFF    EXTRACT              OFF    PCTFORMAT        PERCENT
ASNAMES            FOCUS    EXTSORT              OFF    PHONETIC_ALGORMETAPHONE
AUTOINDEX             ON    FIELDNAME            NEW    POOL                 OFF
AUTOPATH              ON    FOC2GIGDB             ON    PREFIX               ***
BINS                  64    FOCALLOC             OFF    PRFTITLE           SHORT
BLKCALC              NEW    FOCCREATELOC         OFF    PRINT             ONLINE
BUSDAYS          _MTWTF_    FOCSTACK SIZE          8    PRINTPLUS            OFF
BYPANELING           OFF    FOCTRANSFORM          ON    QUALCHAR               .
CACHE                  0    FORMFEED           ASCII    QUALTITLES           OFF
CARTESIAN            OFF    FUSREXXDD             ON    REBUILDMSG          1000
CDN                  OFF    HDAY                        RECAP-COUNT          OFF
CNVERR            REJECT    HIPERFOCUS           OFF    REQSCOPE         DEFAULT
COLUMNSCROLL         OFF    HOLDATTRS          FOCUS    SAVEMATRIX           OFF
CURRENCY_DISPLEFT_FLOAT     HOLDLIST             ALL    SCREEN               OFF
CURRENCY_ISO_CODE    USD    HOLDSTAT             OFF    SHADOW PAGE          OFF
CURRENCY_PRINT_IDEFAULT     HOTMENU              OFF    SMARTMODE            OFF
DATEDISPLAY          OFF    IBMLE                 ON    SPACES              AUTO
DATEFNS               ON    INDEX TYPE           NEW    SQLENGINE
DATETIME         STARTUP    JOIN2MEMORY           ON    SUBTOTNAMEPRT     LEGACY
DATE_ORDER       DEFAULT    LANGUAGE       AMENGLISH    SUMPREFIX            LST
DATE_SEPARATOR   DEFAULT    LINES/PAGE            66    TCPIPINT             OFF
DEFCENT               19    LINES/PRINT           57    TEMP DISK d:\817\ibi\..
DEFECHO              OFF    MERGEOPT             Y      TERMINAL         IBM3270
DMH                  NEW    MESSAGE               ON    TESTDATE           TODAY
DMH_CACHING          OFF    MINIO                 ON    TIME_SEPARATOR       DOT
DMH_INTERACT         OFF    MISS_ON             SOME    TITLES                ON
DMH_LOOPLIM            0    MODE             WINNT      TRACKIO               ON
DMH_PARSING       STRICT    MORE                 OFF    VIEWNAMESIZE          60
DMH_STACKLIM           0    MULTIPATH       COMPOUND    WIDTH                130
DUPLICATECOL          ON    NFOC                  ON    WINPFKEY             OLD
EMPTYREPORT          OFF    NODATA                 .    XFBINS     64 (passive)
EQTEST          WILDCARD    ONFIELD              ALL    XFC                   ON
EXCELRELEASE        2003    PAGE-NUM              ON    XRETRIEVAL            ON
EXL2KLANG      AMENGLISH    PANEL                  0    YRTHRESH               0
EXTAGGR               ON    PARTITION_ONPENULTIMATE
EXTHOLD               ON    PAUSE                OFF
```

Note:

- The parameters may be different depending on your platform and release.
- To see a more detailed list of SET commands, issue the following command:

  ```
  ? SET ALL
  ```

A complete list of SET commands and their options is available in the *ibi™ WebFOCUS® Developing Reporting Applications* manual.

Creating a Synonym

When the server accesses a data source, it needs to know how to interpret the data stored there. To obtain the necessary information, your application reads a data source description, also called a synonym. A synonym consists of a Master File (`.mas`) and, for some data sources, an Access File (`.acx`). A Master File describes the structure of a data source, its fields, and the mapping of the data types. An Access File supplements a Master File and includes additional information that completes the description of the data source, for example, the full data source name and location. You need one Master File and, for some data sources, one Access File to describe a data source.

When the server needs to retrieve data from the data source, it needs to know how to interpret the request and how to format an answer set from the response, for example, creating dialect-specific SQL for data retrieval. If you already have a configured adapter, you can connect to a data source to build reports. Whatever your data source, the adapter you are using manages the synonym creation process for you. Synonyms define unique names (or aliases) for each table and view that is accessible from the server. Synonyms are useful because they hide the underlying data source location and identity from client applications. They also provide support for extended metadata features of the server, such as virtual fields and additional security mechanisms.

Once you have generated a synonym from the WebFOCUS start page, which provides an automatic and error-free synonym creation tool, you can report against the synonym. In many instances, the configured adapter and the generated synonym are all you need to access your data and create reports. However, you may wish to enhance the synonym in order to implement particular capabilities that are supported in the WebFOCUS data description language.

The following are the steps to create a synonym:

1. Depending on the product or tool you are using, see the appropriate manual for how to connect to a data source.
2. Select a connection to the data source, for example, Microsoft SQL Server or Db2, and show the objects within the data source.
3. Select one or more tables for synonym creation. If you select more than one table, you can create a cluster synonym or single, separate synonyms.
4. Once you create the synonym, the Synonym Editor opens so that you can enhance the synonym before saving it, if necessary.

Enhancing a Synonym

The following are some of the attributes you might want to add to the synonym to enhance your data access and reporting capabilities:

- Create a business view of the metadata in order to limit the fields available to any retrieval request and to group fields together based on their roles, for example, Measures and Dimensions. Fields can be grouped into a meaningful folder structure. Field names, titles, and descriptions can be customized for each Business View.
- Create a cluster join view by linking available synonyms to create a multi-segment (multi-table) file.
- Create a multi-fact table by using two or more root tables that have only descendants, not parents.
- Define parent and child hierarchies for cube and non-cube data sources.
- Rename field names and add meaningful titles and descriptions, including multi-language variations.
- Add virtual columns (DEFINE fields) and columns for aggregated values (COMPUTE fields).
- Add filters to specify data selection criteria.
- Add group definitions for data sources that support groups (binning).
- Change the format of fields, for example, the size of an alphanumeric field or the format of a date field.

- Define parent and child hierarchies for cube data sources.
- Apply security rules for fields and values to ensure that user access is based on data source security (DBA) specifications.

For information about reporting against single view or cluster views, including multi-fact tables, see the *Creating Reports With WebFOCUS Language* manual.

Data Sources and Master Files

This appendix provides a description of the data sources used in the reporting language examples.

The file that describes a data source is called a Master File. This file provides the names and formats of each field in the data source.

You can display the structure of a data source by issuing the following command:

```
CHECK FILE filename PICTURE
```

EMPLOYEE Data Source

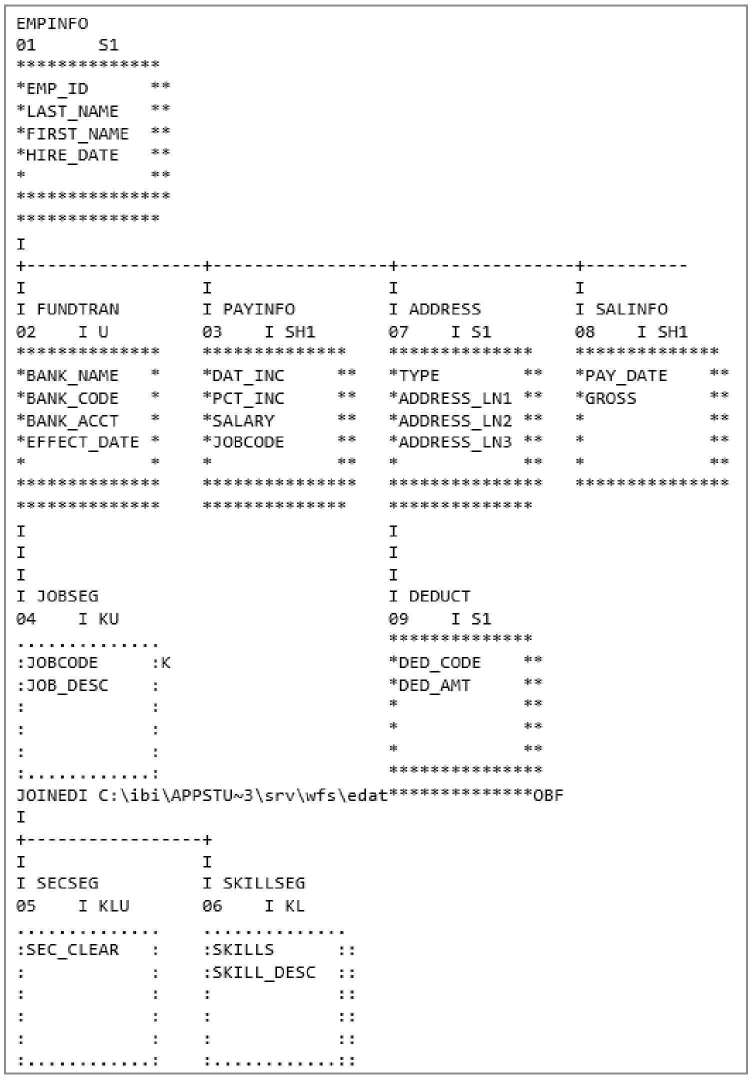
EMPLOYEE contains sample data about company employees.

The following is the EMPLOYEE Master File for your reference.

```
FILENAME=EMPLOYEE, SUFFIX=FOC
 SEGNAME=EMPINFO,  SEGTYPE=S1
  FIELDNAME=EMP_ID,        ALIAS=EID,    FORMAT=A9,          $
  FIELDNAME=LAST_NAME,     ALIAS=LN,     FORMAT=A15,         $
  FIELDNAME=FIRST_NAME,    ALIAS=FN,     FORMAT=A10,         $
  FIELDNAME=HIRE_DATE,     ALIAS=HDT,    FORMAT=I6YMD,       $
  FIELDNAME=DEPARTMENT,    ALIAS=DPT,    FORMAT=A10,         $
  FIELDNAME=CURR_SAL,      ALIAS=CSAL,   FORMAT=D12.2M,      $
  FIELDNAME=CURR_JOBCODE,  ALIAS=CJC,    FORMAT=A3,          $
  FIELDNAME=ED_HRS,        ALIAS=OJT,    FORMAT=F6.2,        $
 SEGNAME=FUNDTRAN,  SEGTYPE=U,   PARENT=EMPINFO
  FIELDNAME=BANK_NAME,     ALIAS=BN,     FORMAT=A20,          $
  FIELDNAME=BANK_CODE,     ALIAS=BC,     FORMAT=I6S,          $
  FIELDNAME=BANK_ACCT,     ALIAS=BA,     FORMAT=I9S,          $
  FIELDNAME=EFFECT_DATE,   ALIAS=EDATE,  FORMAT=I6YMD,        $
 SEGNAME=PAYINFO,   SEGTYPE=SH1, PARENT=EMPINFO
  FIELDNAME=DAT_INC,       ALIAS=DI,     FORMAT=I6YMD,        $
  FIELDNAME=PCT_INC,       ALIAS=PI,     FORMAT=F6.2,         $
  FIELDNAME=SALARY,        ALIAS=SAL,    FORMAT=D12.2M,       $
  FIELDNAME=JOBCODE,       ALIAS=JBC,    FORMAT=A3,           $
 SEGNAME=ADDRESS,   SEGTYPE=S1,  PARENT=EMPINFO
  FIELDNAME=TYPE,          ALIAS=AT,     FORMAT=A4,           $
  FIELDNAME=ADDRESS_LN1,   ALIAS=LN1,    FORMAT=A20,          $
  FIELDNAME=ADDRESS_LN2,   ALIAS=LN2,    FORMAT=A20,          $
  FIELDNAME=ADDRESS_LN3,   ALIAS=LN3,    FORMAT=A20,          $
  FIELDNAME=ACCTNUMBER,    ALIAS=ANO,    FORMAT=I9L,          $
 SEGNAME=SALINFO,   SEGTYPE=SH1, PARENT=EMPINFO
  FIELDNAME=PAY_DATE,      ALIAS=PD,     FORMAT=I6YMD,        $
  FIELDNAME=GROSS,         ALIAS=MO_PAY, FORMAT=D12.2M,       $
 SEGNAME=DEDUCT,    SEGTYPE=S1,  PARENT=SALINFO
  FIELDNAME=DED_CODE,      ALIAS=DC,     FORMAT=A4,           $
  FIELDNAME=DED_AMT,       ALIAS=DA,     FORMAT=D12.2M,       $
 SEGNAME=JOBSEG,    SEGTYPE=KU,  PARENT=PAYINFO, CRFILE=JOBFILE,
  CRKEY=JOBCODE,$
```

```
SEGNAME=SECSEG,    SEGTYPE=KLU, PARENT=JOBSEG,   CRFILE=JOBFILE, $

SEGNAME=SKILLSEG,  SEGTYPE=KL,  PARENT=JOBSEG,   CRFILE=JOBFILE, $

SEGNAME=ATTNDSEG,  SEGTYPE=KM,  PARENT=EMPINFO,  CRFILE=EDUCFILE,

 CRKEY=EMP_ID,$

SEGNAME=COURSEG,   SEGTYPE=KLU, PARENT=ATTNDSEG, CRFILE=EDUCFILE,$
```

The following diagram illustrates the structure of the EMPLOYEE data source.



```
EMPINFO
01      S1
**************
*EMP_ID       **
*LAST_NAME    **
*FIRST_NAME   **
*HIRE_DATE    **
*             **
***************
**************
I
+-----------------+-----------------+-----------------+----------
I                 I                 I                 I
I FUNDTRAN        I PAYINFO         I ADDRESS         I SALINFO
02    I U         03    I SH1       07    I S1        08    I SH1
**************    **************    **************    **************
*BANK_NAME   *    *DAT_INC     **   *TYPE        **   *PAY_DATE    **
*BANK_CODE   *    *PCT_INC     **   *ADDRESS_LN1 **   *GROSS       **
*BANK_ACCT   *    *SALARY      **   *ADDRESS_LN2 **   *            **
*EFFECT_DATE *    *JOBCODE     **   *ADDRESS_LN3 **   *            **
*            *    *            **   *            **   *            **
**************    ***************   ***************   ***************
**************    **************    **************
I                                   I
I                                   I
I                                   I
I JOBSEG                            I DEDUCT
04    I KU                          09    I S1
..............                      **************
:JOBCODE     :K                     *DED_CODE    **
:JOB_DESC    :                      *DED_AMT     **
:            :                      *            **
:            :                      *            **
:            :                      *            **
:............:                      ***************
JOINEDI C:\ibi\APPSTU~3\srv\wfs\edat**************OBF
I
+-----------------+
I                 I
I SECSEG          I SKILLSEG
05    I KLU       06    I KL
..............    ..............
:SEC_CLEAR   :    :SKILLS      ::
:            :    :SKILL_DESC  ::
:            :    :            ::
:            :    :            ::
:            :    :            ::
:............:    :............::
```

JOBFILE Data Source

JOBFILE contains sample data about company job positions.

The following is the JOBFILE Master File for your reference.

```
FILENAME=JOBFILE,  SUFFIX=FOC

 SEGNAME=JOBSEG,   SEGTYPE=S1

  FIELDNAME=JOBCODE,    ALIAS=JC, FORMAT=A3,    INDEX=I,$

  FIELDNAME=JOB_DESC,   ALIAS=JD, FORMAT=A25           ,$

 SEGNAME=SKILLSEG, SEGTYPE=S1,  PARENT=JOBSEG

  FIELDNAME=SKILLS,     ALIAS=,   FORMAT=A4            ,$

  FIELDNAME=SKILL_DESC, ALIAS=SD, FORMAT=A30           ,$

 SEGNAME=SECSEG,   SEGTYPE=U,   PARENT=JOBSEG

  FIELDNAME=SEC_CLEAR,  ALIAS=SC, FORMAT=A6            ,$
```

The following diagram illustrates the structure of the JOBFILE data source.

```
JOBSEG

  01      S1

 **************

 *JOBCODE     **I

 *JOB_DESC    **

 *            **

 *            **

 *            **

 ***************

  **************

```

```
         I
         +------------------+
         I                  I
         I SECSEG           I SKILLSEG
   02    I U         03     I S1
  **************    *************
  *SEC_CLEAR   *    *SKILLS     **
  *            *    *SKILL_DESC **
  *            *    *           **
  *            *    *           **
  *            *    *           **
  **************    **************
                     *************
```

EDUCFILE Data Source

EDUCFILE contains sample data about company in-house courses.

The following is the EDUCFILE Master File for your reference.

```
FILENAME=EDUCFILE, SUFFIX=FOC
 SEGNAME=COURSEG,  SEGTYPE=S1
  FIELDNAME=COURSE_CODE,  ALIAS=CC,   FORMAT=A6,           $
  FIELDNAME=COURSE_NAME,  ALIAS=CD,   FORMAT=A30,          $
 SEGNAME=ATTNDSEG,  SEGTYPE=SH2,  PARENT=COURSEG
  FIELDNAME=DATE_ATTEND,  ALIAS=DA,   FORMAT=I6YMD,        $
  FIELDNAME=EMP_ID,       ALIAS=EID,  FORMAT=A9, INDEX=I,  $
```

The following diagram illustrates the structure of the EDUCFILE data source.

```
COURSEG

  01      S1

 **************

 *COURSE_CODE **

 *COURSE_NAME **

 *            **

 *            **

 *            **

 ***************

  **************

        I

        I

        I

        I ATTNDSEG

  02    I SH2

 **************

 *DATE_ATTEND **

 *EMP_ID      **I

 *            **

 *            **

 *            **
 ***************
  **************
```

EMPDATA Data Source

EMPDATA contains sample data about company employees.

The following is the EMPDATA Master File for your reference.

```
FILENAME=EMPDATA, SUFFIX=FOC
 SEGNAME=EMPDATA, SEGTYPE=S1
  FIELDNAME=PIN,          ALIAS=ID,       FORMAT=A9,  INDEX=I,    $
  FIELDNAME=LASTNAME,     ALIAS=LN,       FORMAT=A15,             $
  FIELDNAME=FIRSTNAME,    ALIAS=FN,       FORMAT=A10,             $
  FIELDNAME=MIDINITIAL,   ALIAS=MI,       FORMAT=A1,              $
  FIELDNAME=DIV,          ALIAS=CDIV,     FORMAT=A4,              $
  FIELDNAME=DEPT,         ALIAS=CDEPT,    FORMAT=A20,             $
  FIELDNAME=JOBCLASS,     ALIAS=CJCLAS,   FORMAT=A8,              $
  FIELDNAME=TITLE,        ALIAS=CFUNC,    FORMAT=A20,             $
  FIELDNAME=SALARY,       ALIAS=CSAL,     FORMAT=D12.2M,          $
  FIELDNAME=HIREDATE,     ALIAS=HDAT,     FORMAT=YMD,             $
$
DEFINE AREA/A13=DECODE DIV (NE 'NORTH EASTERN' SE 'SOUTH EASTERN'
CE 'CENTRAL' WE 'WESTERN' CORP 'CORPORATE' ELSE 'INVALID AREA');$
```

The following diagram illustrates the structure of the EMPDATA data source.

```
EMPDATA
  01      S1
 **************
 *PIN         **I
 *LASTNAME    **
 *FIRSTNAME   **
 *MIDINITIAL  **
 *            **
 ***************
  **************
```

FINANCE Data Source

FINANCE contains sample financial data for balance sheets. Aliases do not exist for the fields in this Master File, and the commas (,) act as placeholders.

The following is the FINANCE Master File for your reference.

```
FILENAME=FINANCE, SUFFIX=FOC,$
 SEGNAME=TOP,     SEGTYPE=S2,$
  FIELDNAME=YEAR   ,  , FORMAT=A4,  $
  FIELDNAME=ACCOUNT,  , FORMAT=A4,  $
  FIELDNAME=AMOUNT ,  , FORMAT=D12C,$
```

The following diagram illustrates the structure of the FINANCE data source.

```
TOP
  01      S2
```

```
**************
*YEAR        **
*ACCOUNT     **
*AMOUNT      **
*            **
*            **
***************
 **************
```

SALHIST Master File

SALHIST contains information about employee salary history.

The following is the SALHIST Master File for your reference.

```
FILENAME=SALHIST,  SUFFIX=FOC
SEGNAME=SLHISTRY,  SEGTYPE=SH2
 FIELDNAME=PIN,        ALIAS=ID,     FORMAT=A9,     INDEX=I,  $
 FIELDNAME=EFFECTDATE, ALIAS=EDAT,   FORMAT=YMD,              $
 FIELDNAME=OLDSALARY,  ALIAS=OSAL,   FORMAT=D12.2,            $
```

The following diagram illustrates the structure of the SALHIST data source.

```
SLHISTRY
  01      SH2
 **************
 *PIN         **I
 *EFFECTDATE  **
 *OLDSALARY   **
 *            **
 *            **
 **************
  *************
```

CENTGL Master File

CENTGL contains a chart of accounts hierarchy.

```
FILE=CENTGL ,SUFFIX=FOC
SEGNAME=ACCOUNTS,SEGTYPE=S01
FIELDNAME=GL_ACCOUNT, ALIAS=GLACCT, FORMAT=A7,
TITLE='Ledger,Account', FIELDTYPE=I, $
FIELDNAME=GL_ACCOUNT_PARENT, ALIAS=GLPAR, FORMAT=A7,
TITLE=Parent, PROPERTY=PARENT_OF, REFERENCE=GL_ACCOUNT, $
FIELDNAME=GL_ACCOUNT_TYPE, ALIAS=GLTYPE, FORMAT=A1,
TITLE=Type,$
FIELDNAME=GL_ROLLUP_OP, ALIAS=GLROLL, FORMAT=A1,
TITLE=Op, $
FIELDNAME=GL_ACCOUNT_LEVEL, ALIAS=GLLEVEL, FORMAT=I3,
TITLE=Lev, $
FIELDNAME=GL_ACCOUNT_CAPTION, ALIAS=GLCAP, FORMAT=A30,
TITLE=Caption, PROPERTY=CAPTION, REFERENCE=GL_ACCOUNT, $

FIELDNAME=SYS_ACCOUNT, ALIAS=ALINE, FORMAT=A6,

TITLE='System,Account,Line', MISSING=ON, $
```

The following diagram illustrates the structure of the CENTGL data source.

```
ACCOUNTS

  01      S1

 **************

 *GL_ACCOUNT  **I

 *GL_ACCOUNT_>**

 *GL_ACCOUNT_>**

 *GL_ROLLUP_OP**

 *            **

 ***************

  **************
```

CENTSYSF Master File

CENTSYSF contains detail-level financial data.

```
FILE=CENTSYSF ,SUFFIX=FOC

SEGNAME=RAWDATA ,SEGTYPE=S2

FIELDNAME=SYS_ACCOUNT , ,A6 , FIELDTYPE=I,

TITLE='System,Account,Line', $

FIELDNAME=PERIOD , ,YYM , FIELDTYPE=I, $
```

```
FIELDNAME=NAT_AMOUNT , ,D10.0 , TITLE='Month,Actual', $

FIELDNAME=NAT_BUDGET , ,D10.0 , TITLE='Month,Budget', $

FIELDNAME=NAT_YTDAMT , ,D12.0 , TITLE='YTD,Actual', $
```

The following diagram illustrates the structure of the CENTSYSF data source.

```
RAWDATA

  01      S2

 **************

 *SYS_ACCOUNT **I

 *PERIOD      **I

 *NAT_ACCOUNT **

 *NAT_BUDGET  **

 *            **

 ***************

  **************
```

Reporting Language Syntax Summary

This appendix provides you with a syntax summary of reporting language commands.

Reporting Language Summary

The syntax of a TABLE request is:

```
DEFINE FILE filename [CLEAR|ADD]

tempfield [/format]

  [{DEFCENT|DFC} {cc|19} {YRTHRESH|YRT} {[-]yy|0}]

  [MISSING {ON|OFF} [NEEDS] {SOME|ALL} [DATA]]

  [(GEOGRAPHIC_ROLE = georole)] [WITH realfield]

  [TITLE 'line1[,line2 ...']]

  [DESCRIPTION 'description'] = expression;

tempfield [/format] REDEFINES qualifier.fieldname = expression;

.

.

.

END

TABLE FILE filename

HEADING [CENTER]

"text"

{display_command} [SEG.] field [/R|/L|/C] [/format]
```

```
{display_command} [prefixop.] [field] [/R|/L|/C] [/format]

  [NOPRINT|AS 'title1,...,title5'] [AND|OVER] [obj2...obj1024]

      [WITHIN field] [IN [+]n]

COMPUTE field [/format] [(GEOGRAPHIC_ROLE = georole)] =

        expression; [AS 'title,...,title5'] [IN [+]n]

[AND] ROW-TOTAL [/R|/L|/C] [/format] [AS 'name']

[AND] COLUMN-TOTAL [/R|/L|/C] [AS 'name']

ACROSS [HIGHEST] sortfieldn [IN-GROUPS-OF qty]

   [NOPRINT] AS 'title1,...,title5']

BY [HIGHEST] sortfieldn [IN-GROUPS-OF qty]

   [NOPRINT] AS 'title1,...,title5']

BY [HIGHEST|LOWEST{n}] TOTAL [prefix_operator] {field|code_value}

RANKED [AS 'name'] BY {TOP|HIGHEST|LOWEST} [n] field

       [PLUS OTHERS AS 'othertext']

       [IN-GROUPS-OF qty [TILES [TOP m]] [AS 'heading']]

       [NOPRINT|AS 'title1,...,title5']
```

```
{BY|ACROSS} sortfield IN-RANGES-OF value [TOP limit]

ON sfld option1 [AND] option2 [WHEN expression;...]

ON sfld RECAP fld1 [/fmt] = FORECAST (fld2, intvl, npredct,

  '{MOVAVE|EXPAVE}',npnt);
```

```
ON sfld RECAP fld1[/fmt] = FORECAST(fld2, interval, npredict,
'DOUBLEXP',

   npoint1, npoint2);
```

```
ON sfld RECAP fld1[/fmt] = FORECAST(fld2, interval, npredict,
'SEASONAL',

   nperiod, npoint1, npoint2, npoint3);
```

```
ON sfld RECAP fld1 [/fmt] = FORECAST (fld2, intvl, npredct, 'REGRESS');
```

```
ON {sortfield|TABLE} RECAP y[/fmt] = REGRESS(n, x1, [x2, [x3,]] z);

ON sfld RECAP fld1 [/fmt] = FORECAST (infield, interval, npredict,

  'DOUBLEXP',npoint, npoint2);

ON sfld RECAP fld1 [/fmt] = FORECAST (infield, interval, npredict,

  'SEASONAL', nperiod, npoint, npoint2, npoint3);{BY|ON} fieldname

SUBHEAD

  [NEWPAGE]

"text"
```

```
{BY|ON} fieldname SUBFOOT [WITHIN] [MULTILINES] [NEWPAGE]

"text" [<prefop.fieldname ... ]" [WHEN expression;]
```

```
WHERE [TOTAL] expression

WHERE {RECORDLIMIT|READLIMIT} EQ n

IF [TOTAL] field relation value [OR value...]

WHERE_GROUPED expression

ON TABLE SET parameter value

ON TABLE HOLD [VIA program][AS name] [FORMAT format] [DATASET dataset]

              [MISSING {ON|OFF}] [PERSISTENCE {STAGE|PERMANENT}]

ON TABLE {PCHOLD|SAVE|SAVB} [AS name] [FORMAT format]  [MISSING
{ON|OFF}]
```

```
ON TABLE NOTOTAL

ON TABLE COLUMN-TOTAL [/R|/L|/C] [AS 'name'] fieldname

ON TABLE {ROW-TOTAL|ACROSS-TOTAL}[/R|/L|/C][format] [AS 'name']
fieldname

{BY|ON} sfld [AS 'text1']   {SUBTOTAL|SUB-TOTAL|SUMMARIZE|RECOMPUTE}

  [MULTILINES] [pref.] [field1 [pref.] field2 ...] [AS 'text2']

  [WHEN expression;]

{ACROSS|ON} sfld [AS 'text1'] {SUBTOTAL|SUB-TOTAL|SUMMARIZE|RECOMPUTE}

   [AS 'text2'] [COLUMNS c1 [AND c2 ...]]

ON  TABLE {SUBTOTAL|SUB-TOTAL|SUMMARIZE|RECOMPUTE}

  [pref.] [field1 [pref.] field2 ...] [AS 'text2']

FOOTING [CENTER] [BOTTOM]

"text"

MORE

FILE file2

   [IF field relation value [OR value...]|WHERE expression]

END
```

Glossary

This glossary includes definitions of reporting language terminology and general computer terminology used in this guide.

?F

It is a query command that displays the names of fields in an identified data source.

? DEFINE

It is a query command that displays a list of fields created with the DEFINE command.

? HOLD

It is a query command that displays the fields in a HOLD file Master File.

? JOIN

It is a query command that lists the Joins currently in effect.

? *n*

It is a query command that displays the meaning of a specified error message. You replace the *n* with the error message number in question.

? REL

It is a query command that displays the release in use.

? SET

It is a query command that displays SET parameters and option settings.

Accordion Report

It provides an interactive interface to data that is aggregated at multiple levels by presenting the sort fields within an expandable tree. By default, the report will present the highest dimension or sort field (BY value) and the aggregated measures associated with each value. You can use the tree control to open or close each dimension and view the associated aggregated values.

ACROSS

A keyword that starts a sort phrase. ACROSS uses the order of values in the first highest-order sort field to control the order of records. Each unique sort field value produces a column across the page.

Active Technologies report

It is designed for offline analysis. When using an active report, you can interact with data, using analysis options similar to those found in an Excel workbook. Since no connection to a server is required to view the data or use the analysis options, you can save and use the report anywhere. Analysis options include filtering, sorting, charting, and much more.

ADD

A keyword used in a DEFINE command to add to, rather than erase, existing temporary fields created with a previous DEFINE.

aggregating verb

Verbs that group data (SUM and COUNT). SUM adds the value of data values and COUNT counts the number of those values. WRITE is a synonym for SUM.

aggregation

The process of grouping records to produce summary information, not individual values.

alphanumeric

A term that identifies the format of fields and type of data stored in those fields. The letters of the alphabet, numbers, punctuation marks, and other special symbols can all be stored in an alphanumeric field. Numbers stored in alphanumeric fields cannot be used in calculations.

AND

The logical operator used in conditional statements to screen records. This operator requires that each and every condition connected by it is true in order for a record to be retrieved. The word AND used outside of a WHERE or WHEN condition is optional for clarity.

AS

A keyword that changes the default title of columns in a report. The AS phrase consists of AS followed by a new title enclosed in single quotation marks (').

ASNAMES

A parameter, which is used with the SET command, that controls the naming of fields in HOLD files.

BOTTOM

A keyword that changes the default position of footings from two lines below the last line of output to the bottom of each page when used in conjunction with FOOTING.

BY

A keyword that starts a sort phrase. BY uses the order of values in the highest-order sort field to control the order of records. Each value in the sort field is displayed in a row on the page.

BYDISPLAY

It displays sort field values for every row.

CENTER

A keyword that changes the default position of headings and footings from left-justified to centered. CENTER is used in conjunction with HEADING and FOOTING.

character string

A sequence of characters enclosed in single quotation marks (') or double quotation marks ("), depending on the command with which it is used.

chart

Any type of chart produced by the GRAPH command. A chart presents the same kinds of information as tabular reports, but in a wide variety of two-dimensional and three-dimensional chart types. Charts allow you to present information graphically, using such visual cues as color, size, and position to convey relationships between measures (numeric fields to be aggregated) and dimensions (categories) and to identify trends and outliers.

column

A vertical collection of data.

COLSPAN

It allows heading, subheading, footing, and subfooting items to span multiple columns.

COLUMN-TOTAL

A command used with a verb command to produce totals for all columns that contain numeric values. When used with the ON TABLE phrase, COLUMN-TOTAL produces totals for specified columns that contain numeric values. When used with ROW-TOTAL, it produces a matrix report.

command

Any instruction issued to WebFOCUS, WebFOCUS App Studio, or FOCUS that performs an action.

COMPUTE

A command that creates temporary fields *AFTER* records have been retrieved. These are not real fields. They apply only to the request in which they are created.

concatenation

A process of connecting one alphanumeric field value to another. The two types of concatenation are weak, which maintains trailing blanks in the field to which you are concatenating, and strong concatenation, which eliminates trailing blanks in the field to which you are concatenating.

conditional phrase

A phrase initiated by the WHERE keyword that specifies requirements or conditions in conjunction with logical and relational operators to screen unwanted records and select desired ones.

CONTAINS

A relational operator used in a WHERE phrase to screen alphanumeric records. CONTAINS ensures that records containing the specified literal are retrieved. OMITS is the reverse of CONTAINS.

COUNT

An aggregating verb command that counts the number of non-distinctive values that exist for any field or fields specified by it.

data

The information used to create reports. The data for the EMPLOYEE data source is stored in units called fields.

data source

One or more files used to store and maintain a collection of related records.

DECODE

A command that translates characters stored in a field into a user-supplied value.

default

A predetermined setting that causes automatic action. Many defaults can be changed.

DEFINE

A command that creates temporary fields *BEFORE* a request is written. Treated just like real fields, these last for an entire session and can be used to sort and select records.

dimensions

The fields used for sorting and categorizing data. The fields are usually, but not always, alphanumeric fields.

display commands

These commands present data in the reporting language, commonly called verbs. For example, PRINT and LIST display each record: PRINT displays individual data, LIST displays individual data in a numbered list. SUM and COUNT process multiple records: SUM returns a single value, typically the sum total. COUNT counts and displays the number of data occurrences.

drill-down report

It enables you to create links from report data (including headings and footings) as well as graphic images (such as a company logo or product image), to other reports, procedures, URLs, or JavaScript functions.

drill-through report

It enables you to create a PDF document that contains a summary report plus detail reports, where the detail reports contain all the detail data for designated fields in the summary report.

EDIT

A function that changes the display of alphanumeric fields, extracts part of a field, or changes alphanumeric fields to integer fields or integer fields to alphanumeric fields.

EDUCFILE data source

A source of data for reports in this guide. EDUCFILE contains sample data about company in-house courses.

EMPDATA data source

A source of data for reports in this guide. EMPDATA contains sample data about company employees.

EMPLOYEE data source

A source of data for reports in this guide. EMPLOYEE contains sample data about company employees.

Excel Compound Report

It provides a way to generate multiple worksheet reports using the XLSX output format. By default, each of the component reports from the compound report is placed in a new Excel worksheet.

FINANCE data source

A source of data for the Financial Modeling Language (FML) report in this guide. FINANCE contains sample financial data for balance sheets.

END

A command that terminates and executes a report request and breaks connection to the data source named in the TABLE FILE command.

ENTER key

The key used to transmit WebFOCUS, WebFOCUS App Studio, or FOCUS commands on some systems.

entering commands

The process of transmitting commands to WebFOCUS, WebFOCUS App Studio, or FOCUS. Requires pressing of either the ENTER or RETURN key, depending on the system used. Synonymous with issuing commands.

error message

A message produced and displayed each time a mistake is made. Mistakes can be typos or misuse of commands.

EX

A command used to execute a FOCEXEC.

expression

A calculation or equation provided by the user for use with commands and phrases, such as COMPUTE, DEFINE, WHEN, and WHERE.

field

A unit of a data source that stores data called field values. Each field in a data source has a name and the field names are usually unique.

A n

A name that identifies fields in a data source. Often used synonymously with field. Field names specify which fields contain the data values to include in a report.

field name variable

The field name used as a variable (changes when the field value changes) in headings and footings.

field value

A value contained in a field. For example, the name Banning is a value in the field named LAST_NAME.

Financial Modeling Language (FML)

An extension of the reporting language, which produces reports with interrelated columns and rows.

financial report

It is specifically designed to handle the task of creating, calculating, and presenting financially oriented data, such as balance sheets, consolidations, and budgets. You design the content of the report on a row-by-row basis. This organization provides a number of advantages, including easily defined inter-row and inter-column calculations, formatting on a cell-by-cell basis, and saving individual rows and row titles in extract files.

FML hierarchy

It defines the hierarchical relationship between two fields in the Master File and loads this information into memory. The FML request can then dynamically construct the rows that represent this relationship and display them in the report, starting at any point in the hierarchy.

FOCEXEC

A set of commands that can be edited, saved, and executed at any time. This set of commands is stored as straight text. No formatting codes or codes created by many word processors are allowed.

FOOTING

A command that produces and displays a page footing on each page of a report. The footing contains text supplied by you, and by default, is positioned left-justified and two lines below the last line of output.

format

A term used to identify the length of a field and the type of data it contains. Alphanumeric and numeric are two types of formats often used.

formatting symbols

Symbols such as dollar signs ($) and commas (,) that are not stored in a data source, but are included in the display of records.

free-form report

It presents detailed information in a form-like context that is often used with letters and forms. You can use free-form reports to position headers, footers, free text, and fields precisely on a page, customize your headers and footers by including fields as display variables, and incorporate prefix operators in your headers and footers to perform calculations on the aggregated values of a single field.

GRAPH language

A collection of commands that enables you to produce reports in chart form.

graph request

A group of commands, starting with the GRAPH FILE command and ending with the END command, that produces a chart.

HEADALIGN

It aligns heading, subheading, footing, and subfooting items with columns in the report body.

HEADING

A command that produces and displays a page heading at the top of each page of a report. The heading contains text supplied by you, and by default, is positioned left-justified at the top of each page.

highest-order sort field

The first sort field specified in a report, also called the primary sort field. This produces the first column of a report and is used to control the ordering of records.

HOLD

A command that creates extract files. HOLD files contain output from report requests in a format specified by you, for example, XLSX, PDF, PPTX. A Master File may be created, depending on the format used.

IN-GROUPS-OF

A command that groups records in a report into specified ranges. This command is added to a sort phrase and is used only with numeric sort fields.

internal matrix

An internal area where aggregated values are stored after records are retrieved, selected, sorted, and aggregated.

issuing commands

See "entering commands."

JOBFILE data source

A source of data for reports in this guide. JOBFILE contains sample data about company job positions.

JOIN

A command that links two or more data source so they can be accessed as if they were one, even though they remain physically separate.

keyword

Any single word of syntax.

LIKE

The relational operator used to screen alphanumeric records only. LIKE can be used in conjunction with a mask character, that is, the percent sign (%) and the underscore (_). LIKE ensures that only records matching the specified mask are retrieved.

LINES

A parameter used with the SET command that controls the number of lines of a report that are printed on a page.

LIST

A verb command that displays and numbers data in specified fields.

literal test value

See "test value."

logical operator

A component of a conditional statement that joins more than one condition. Examples of logical operators are AND and OR. The AND operator requires that each and every condition connected by AND be true before a record is retrieved. The OR operator requires that at least one condition connected by OR be true before a record is retrieved.

mask

A string of characters used to act as a filter for data in a field when used with the EDIT function, and used to act as a conditional basis of comparison when used with WHERE. Masking characters for screening records are the dollar sign ($), percent sign (%), and the underscore (_).

Master File

A file that describes the structure and contents of data sources and HOLD files. The Master File consists of statements, called declarations, that name each part of the file and describe its characteristics.

MATCH

It merges two or more data sources. The command creates a new data source (a HOLD file), into which it merges fields from the selected records. You specify which records to merge and which to eliminate.

matrix

A type of report produced using BY and ACROSS together in a single request, or the Financial Modeling Language (FML). A matrix displays values in rows and columns.

measures

The fields used in summations and other calculations. The fields are usually numeric fields.

MORE

It concatenates data from data sources with dissimilar Master Files in a single request.

MULTILINES

A command used with SUBTOTAL, SUB-TOTAL, SUMMARIZE, and RECOMPUTE to display subtotal lines only when the specified sort field contains more than one record.

multi-verb request

A report request that uses more than one verb command at a time. Requires use of LIST or PRINT only once in the report and as the last verb.

NODATA character

A character used in a report to indicate that no data exists for that field. The default NODATA character is the period (.).

NOPRINT

A command that suppresses the printing of a field.

NOTOTAL

A command that suppresses the display of grand totals in a report.

numeric

A term that identifies the format of fields and type of data stored in those fields. Numeric data consists of decimal and integer numbers used in calculations.

OMITS

A relational operator used in a WHERE phrase to screen alphanumeric records. OMITS ensures that only records lacking the specified literal are retrieved. CONTAINS is the reverse of OMITS.

OR

The logical operator used in conditional statements to screen records. Requires that at least one condition connected by OR be true in order for a record to be retrieved.

page footing

The footing produced and displayed by the FOOTING command two lines below the last line of output on each page of a report. The footing contains text supplied by you.

page heading

The heading produced and displayed by the HEADING command at the top of each page of a report. The heading contains text supplied by you.

PAGE-BREAK AND

A command used in conjunction with a sort field that controls when a new page is created. Each time the sort field changes values, a new page is created.

platform

A term that refers to hardware as well as software, that is, the type of machine and operating system used to run WebFOCUS, WebFOCUS App Studio, or FOCUS.

PCHOLD

It creates a data source containing the output of a report request, and downloads the HOLD data source and the optional Master File to a client computer or browser. As with a HOLD file, you can specify a variety of file formats.

PLUS OTHERS

In a sort phrase, you can restrict the number of sort values displayed. With the PLUS OTHERS phrase, you can aggregate all other values to a separate group and display this group as an additional report row.

precision report

It provides an additional set of tools that make it easy to control the precise placement of objects and data in the report output. With a precision report, you can quickly create a layout that is perfectly aligned for a preprinted form, such as a Bill of Sale or a tax form, and that automatically breaks out one record per report page.

prefix operators

They perform calculations directly on the values of aggregated fields.

primary sort field

See "highest-order sort field."

PRINT

A verb command that displays data in specified fields.

query command

A command that starts with a question mark (?) and provides information about aspects of the product and the reporting session, including SET parameter settings, temporary fields created with the DEFINE command, and names of fields stored in a data source.

range

An upper and lower limit used to screen records. A range is created using the relational operators FROM...TO, or a combination of GT and LT, or GE, and LE.

RANKED

It indicates the numeric rank of each row.

RECAP

A command that computes subtotals based on user-supplied calculations. New values are displayed each time the specified BY field value changes.

RECOMPUTE

A command that displays totals for columns containing numeric values, and recalculates temporary fields containing information, such as ratios, using subtotals each time a specified sort field changes values.

record

A collection of fields stored together as a unit.

RECORDLIMIT

A keyword used in a WHERE phrase that retrieves a specified number of records that meet the specified test conditions.

relational operator

A component of a conditional statement that determines the type of comparison made between a field or calculation and another field, a test value, or a calculation. EQ, LT, and LIKE are examples of relational operators.

REPAGE

A command that changes the default page numbering of reports from consecutive to renumbering the page number as 1 each time the specified sort field changes values. Page numbering is consecutive within each section of the report.

report

The result of a report request.

report footing

The footing produced and displayed by the SUBFOOT command two lines below the last line of output on the last page only of a report. The footing contains text supplied by you.

report heading

The heading produced and displayed by the SUBHEAD command at the top of only the first page of a report. The heading contains text supplied by you.

report request

A group of commands, starting with the TABLE FILE command and ending with END, that produces a report.

reporting language

A collection of commands used to create reports, invoked by the TABLE FILE command.

retrieve

A process performed by WebFOCUS, WebFOCUS App Studio, or FOCUS, based on instructions in report requests. The data source specified in the TABLE FILE command is searched for records that satisfy the specified instructions and conditions. Records that satisfy the instructions are included in the report.

RETURN key

A key used to transmit commands to WebFOCUS, WebFOCUS App Studio, or FOCUS on some systems.

row

A horizontal collection of data.

ROW-TOTAL

A command used in a verb phrase to produce totals for all rows in a report containing numeric values. ROW-TOTAL used in an ON TABLE phrase produces totals for specified rows in a report containing numeric values. When used with COLUMN-TOTAL, ROW-TOTAL produces a matrix report.

SALHIST data source

A source of data for reports in this guide. SALHIST contains information about employee salary history.

SAVB

It creates a SAVE file in BINARY format. As with a HOLD file, you can specify a variety of formats suitable for use with other software products.

SAVE

It is identical to a HOLD command, except that it does not create a Master File, and ALPHA is the default format. You can specify a variety of formats suitable for use with other software products.

screening

The process of selecting a subset of records by eliminating those that do not satisfy conditions specified in a WHERE conditional statement.

screening condition

A comparison that starts with WHERE and provides a condition that must be met in order for records to be retrieved.

secondary sort field

A sort field identified after the primary sort field. Also called lower-level sort field.

section footing

It is a footing that is produced and displayed by the SUBFOOT command at the end of each section of a report. A section is produced each time a specified sort field changes values. The footing contains text supplied by you.

section heading

It is a heading that is produced and displayed by the SUBHEAD command at the beginning of each section of a report. A section is produced each time a specified sort field changes values. The heading contains text supplied by you.

SET

It overrides default actions that govern your WebFOCUS, WebFOCUS App Studio, or FOCUS environment.

SKIP-LINE

A command that inserts a blank line between each line of a report when used with a field in a verb phrase. When used with a sort field, SKIP-LINE inserts a blank line between each section of a report. A section is created each time the sort field changes values. Only one SKIP-LINE may be used in a single request.

sort field

A field identified in a BY or ACROSS phrase. The order of values in the sort field is used to reorganize records in a report. The first sort field identified produces the first (left-most) column of a report. Subsequently identified sort fields produce the subsequent columns in the same order they are specified.

sorting

The process of ordering data in default or specified order using BY and/or ACROSS.

sorting keywords

BY and ACROSS are the two sorting keywords that start a sort phrase. BY sorts fields and displays their values down the page in rows. ACROSS sorts fields and displays their values across the page in columns.

statistics

It displays of number of the records and lines included in a report produced by executing a request.

string

See "character string."

strong concatenation

See "concatenation."

style sheet

It enables you to format and produce attractive reports that highlight key information. With StyleSheets, you can specify various characteristics of your report and format report components individually.

SUBFOOT

A command that produces a footing below each section of a report. A section is defined each time a specified sort field changes values, when used in conjunction with a sort field. The footing contains text supplied by you. When used with a non-sort field, SUBFOOT produces a report footing that appears only on the last page of a report.

SUBHEAD

A command that produces a heading above each section of a report. A section is defined each time a specified sort field changes values, when used in conjunction with a sort field. The heading contains text supplied by you. When used with a non-sort field, SUBHEAD produces a report heading which appears only on the first page of a report.

SUBTOTAL

A command that displays a total for columns containing numeric values only when a specified sort field changes values. SUBTOTAL is used in conjunction with a sort field and can be specified in a BY or ON phrase.

SUB-TOTAL

A command that displays a total for columns containing numeric values only when a specified sort field, and any preceding sort fields change values. SUB-TOTAL can be specified in a BY or ON phrase.

SUM

An aggregating verb that acts on multiple records and returns a single value, typically the sum total. If used with an alphanumeric field, SUM displays only the last value retrieved for that field. WRITE is a synonym for SUM.

SUMMARIZE

A command that displays totals for columns containing numeric values and recalculates temporary fields containing information, such as ratios, using subtotals each time a specified sort field, or preceding sort fields (higher level) changes values. SUMMARIZE can be specified in a BY or ON phrase.

synonym

It defines unique names (or aliases) for each table and view that is accessible from the server. Synonyms are useful because they hide the underlying data source location and identity from client applications. They also provide support for extended metadata features of the server, such as virtual fields and additional security mechanisms.

system editor

It is the text editor provided on your system.

system variable

A variable that represents values supplied automatically. An example of a system variable is TABPAGENO.

TABLE environment

See "reporting language."

TABLE FILE

A command that provides two functions. It invokes the reporting language and identifies the source of data for subsequent reports.

Table of Content report

It generates a multiple-worksheet report where a separate worksheet is generated for each value of the first sort field (BY) in the report.

TABLEF

A variation of the TABLE command that provides a fast method of retrieving data that is already stored in the order required for printing and requires no additional sorting. Using TABLEF, records are retrieved in the logical sequence from the data source.

TABPAGENO

A system variable that turns off the default page number location and provides a page number for each page of a report. You incorporate TABPAGENO into the commands that create page, section, and report heading or footings.

tabular report

It displays information in rows and columns. This is the basic report type, incorporating the fundamental reporting concepts. Most of the other report formats build on these concepts.

temporary field

A field created using the DEFINE or COMPUTE command.

temporary field definition

It is an expression used in a COMPUTE or DEFINE command to indicate how to calculate values for the new temporary field.

test value

A user-supplied value in a conditional statement to which records are compared before being retrieved. All literal test values that are dates or alphanumeric must be enclosed in single quotation marks (').

TITLE

A parameter that is used with the SET command that controls the naming of column titles in HOLD files.

TOP

When used in an IN-GROUPS-OF phrase, TOP sets an upper limit within which all records with greater values than that amount are grouped.

trailing blanks

Blanks that occur in a field value when the value is shorter than the field length. The blanks occur at the end of the value.

UNDER-LINE

A command used with a sort field that inserts underlines after each section of a report. A section is defined each time the sort field value changes.

verb command

A reporting language command that indicates how to display data in specified fields. PRINT, LIST, COUNT, and SUM are all verb commands.

weak concatenation

See "concatenation."

WHEN

A keyword that controls when subtotals appear in a report based on user-supplied conditions. WHEN is used in conjunction with the field specified in the preceding SUBTOTAL, SUB-TOTAL, RECOMPUTE, or SUMMARIZE commands.

WHERE

A keyword that starts a WHERE phrase used to select records based on specified conditions. Only records meeting the specified conditions are retrieved and included in a report.

A test that is applied to the rows of the internal matrix after COMPUTE calculations are processed.

WITHIN

A keyword that performs operations on a field value within the scope of a sort field value. These calculations take place regardless of the summarizing commands in a request.

WRITE

An aggregating verb that acts on multiple records and returns a single value, typically the sum total. If used with an alphanumeric field, WRITE displays only the last value retrieved for that field. SUM is a synonym for WRITE.

ibi Documentation and Support Services

For information about this product, you can read the documentation, contact Support, and join Community.

How to Access ibi Documentation

Documentation for ibi products is available on the Product Documentation website, mainly in HTML and PDF formats.

The Product Documentation website is updated frequently and is more current than any other documentation included with the product.

Product-Specific Documentation

The documentation for this product is available on the ibi™ WebFOCUS® Documentation page.

How to Contact Support for ibi Products

You can contact the Support team in the following ways:

- To access the Support Knowledge Base and getting personalized content about products you are interested in, visit our product Support website.
- To create a Support case, you must have a valid maintenance or support contract with a Cloud Software Group entity. You also need a username and password to log in to the product Support website. If you do not have a username, you can request one by clicking **Register** on the website.

How to Join ibi Community

ibi Community is the official channel for ibi customers, partners, and employee subject matter experts to share and access their collective experience. ibi Community offers access to Q&A forums, product wikis, and best practices. It also offers access to extensions, adapters, solution accelerators, and tools that extend and enable customers to gain full value from ibi products. For a free registration, go to ibi Community.

Legal and Third-Party Notices

Cloud SG software may be available on multiple operating systems. However, not all operating system platforms for a specific software version are released at the same time. See the “readme” file for the availability of a specific version of Cloud SG software on a specific operating system platform.