IBM

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iSeries

Query for iSeries Use

Version 5

SC41-5210-04

IBM

@server

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SC41-5210-04

Note

Before using this information and the product it supports, be sure to read the information in "Notices" on page 261.

Fifth Edition (September 2002)

This edition applies only to reduced instruction set computer (RISC) systems.

Contents

About Query for iSeries Use

Query for iSeries is a decision support utility you can use to obtain information from the DB2 UDB for iSeries. This book describes how to use Query for iSeries to select, arrange, and analyze information stored in one or more database files to produce reports and other data files.

You may need to refer to other IBM books for more specific information about a particular topic.

For a list of publications related to this book, see the “Bibliography”.

Who should read the Query for iSeries Use book

This book is intended for people creating query reports and managing data on the iSeries system.

Before you use this book, you must be familiar with the introductory material for using the iSeries system. You do not have to understand how to use a high-level programming language to use Query for iSeries.

Part 1. Introduction to Query for iSeries

Chapter 1. What is Query for iSeries?

Query for iSeries is an IBM® licensed program and a decision support utility that can be used to obtain information from the DB2 Universal Database for iSeries database. It can obtain information from any database files that have been defined on the system using Operating System/400 (OS/400®) data description specifications (DDS), the OS/400 interactive data definition utility (IDDU), or DB2 UDB for iSeries Structured Query Language (SQL).

You use Query to select, arrange, and analyze information (data) stored in one or more database files to produce reports and other data files. You can create your own query definitions and then run them, you can run existing queries that you did not create, or you can even run a default query against a particular database file (using an unnamed query). You determine what data the query is to retrieve, the format of the report, and whether it should be displayed, printed, or sent to another database file.

You can use Query to obtain information from a single file or a combined set of up to 32 files. You can select all the fields, or a few of the fields and organize them as you want them to appear in the type of output chosen. You can have all records in the files included in the output, or you can select only a few to be included, using record selection tests. These and other functions are described in detail later.

This chapter begins by introducing basic information about Query, and then it introduces all the major tasks (such as creating, displaying, or running query) that can be done using Query.

Query for iSeries fundamentals

Several elements on your system organize and store information, or data, so that you and other system users can work with it to get the results that you need. The following topics introduce those elements, tell you about them and how they relate to you and Query, and direct you to other publications where you can find more information.

Files, fields, and record formats in Query for iSeries

Information, or data, is organized and stored on your system in various forms, primarily in objects called **database files** (usually referred to as just **files**). A file contains individual units of information, called **records**, that each contain related pieces of data. Each piece of information in a record is called a **field**, and how the fields are organized is defined in a **record format** (often just called a **format**).

When you run a query to produce a report, Query uses the files, fields, and record formats to get the information you want from the database, in the form of records, and uses those records to produce a query report.

For example, an employee name and address file named `NAMEADDR` might contain a group of records that identify one employee in each record (see Figure 1). Each record has several fields that contain the name and address of an employee. The fields in each record might have names like `NAME`, `STREETADDR`, `CITY`, `STATE`, and `ZIPCODE`. This order of the fields might be specified in a record format also named `NAMEADDR`.

NAME	STREETADDR	CITY	STATE	ZIPCODE
Susan P Gantner	907 Abbey Hwy	Mushroom Manor	OR	67891
Perry C Swenson	19821 Metro Hwy.	St. Paul	OR	67891
Matt F Thomas	961 S 19th Ave	Piney Island	OR	67890

Figure 1. Three Records in NAMEADDR File (Using Record Format NAMEADDR)

Another record format, named ZIPADDRESS, might be defined for a file that might be location-oriented and contain only the ZIPCODE, STATE, CITY, and STREETADDR fields, in that order (see Figure 2).

ZIPCODE	STATE	CITY	STREETADDR
67891	OR	Mushroom Manor	907 Abbey Hwy
67891	OR	St. Paul	19821 Metro Hwy.
67890	OR	Piney Island	961 S 19th Ave

Figure 2. Three Records in NAMEADDR File (Using Record Format ZIPADDRESS)

Query retrieves the data you want from the files you choose. It uses certain fields (and record formats) from those files to select, sort, calculate, and summarize that data in the form you want. It also produces the query reports containing that data.

Double-byte character set (DBCS) fields in Query for iSeries

Some countries use pictographs or symbolic characters in their language. DBCS fields must be used for such data. As a general rule, if your national language uses single-byte character set (SBCS) characters, your files do not contain DBCS data. You can ignore any on-line help information that refers to DBCS data.

Notes:

1. To properly display DBCS data, you need a DBCS-capable display.
2. In Query, the following naming convention is used for DBCS data:
   - *Character data* refers to both SBCS and DBCS character data.
   - *DBCS data* refers to any type of DBCS data, including bracketed-DBCS and DBCS-graphic data types.
   - *Bracketed DBCS* refers to DBCS-open, DBCS-either, or DBCS-only data types.

UCS2 level 1 character set support in Query for iSeries

UCS2 Level 1 is a 16-bit encoding for graphic characters. When doing business in a worldwide environment you need the ability to enter and process data from more than one national language. For example, a list of customer names may contain German, Greek, English, and Thai characters that must be printed or displayed on the same device at the same time.

Query for iSeries™ treats UCS2-graphic data the same as GRAPHIC or VARGRAPHIC data. A UCS2-graphic field is a DBCS-graphic field tagged with a UCS2 CCSID.

The VARCHAR and VARGRAPHIC functions help you write queries that include UCS2 data.

Data definition languages and utilities support in Query for iSeries

Query can query data in files that are created using different data definition languages or products. Although the description given above applies to all the files on your system, the names or concepts that might be used depend on the programming language or product (like IDDU, DDS, and DB2 UDB for iSeries) that is used to define the files.

If you are not a programmer and you want to create a file that you can query from Query, you may want to use IDDU to create the file. If a programmer can create the file for you, he might use IDDU, DDS and control language (CL), or the DB2 UDB for iSeries program to create the file. Consider the following:

- IDDU is a menu-driven utility used to define files, fields, and record formats, to store all those definitions in a data dictionary, and to create the files so they can be used to store data. A file defined using IDDU can have more than one format. For more information about IDDU, see the *IDDU Use* book.
- The **data file utility (DFU)** is used to add, change, and delete data in a database file. You can use DFU directly, or you can use some of its function through the Enter data option of the IDDU Work with Database Files display. For more information about DFU, see the *ADTS/400: Data File Utility* book.

- CL and DDS use the same terms and descriptions as IDDU, but they provide additional support for files. Using DDS and CL commands, you can define and create physical files and logical files to indicate how fields are to be organized in files.

  A **physical file** contains the fields of data, as records, but logical files do not. A physical file contains at least one record format. The field order in a physical file determines the format of the records.

  A **logical file** gives a different view of the data stored in one physical file or in several physical files. A logical file does *not* contain data. That is, a logical file lets you see information in records that are stored in physical files as though the records actually existed that way. This is accomplished without having to duplicate and store that data on the system in that logical view (thus, the name *logical* file). A logical file can use a subset of the fields in one physical file, a composite of all or some of the fields in several physical files, or even a mixture of fields from physical and other logical files. Join logical files can have only one record format, but nonjoin logical files can have more than one record format.

  For more information about physical files, logical files, CL, and DDS, refer to the *CL Programming* book.,

- The DB2 UDB for iSeries program uses a relational model of data; that is, all data is perceived as existing in tables. On the iSeries system, DB2 UDB for iSeries objects are created and maintained as OS/400 objects. The following table shows the relationship between OS/400 terms and DB2 UDB for iSeries relational database terms:

OS/400 Term	DB2 UDB for iSeries Term
Library	Collection. Consists of a library, journal, journal receiver, data dictionary, and DB2 UDB for iSeries catalog. A collection groups related objects and allows the user to find the objects by name.
Physical file	Table. A set of columns and rows.
Record	Row. The horizontal part of a table containing a serial collection of columns.
Field	Column. The vertical part of a table of one data type.
Logical file	View. A subset of columns and rows of one or more tables.

Query for iSeries definitions

You use a query to get information from database files to produce a report. The file or files that a query uses to get the information and what is to be done with that information are defined and stored in a query definition. A **query definition** is an object (with type *QRYDFN) and it contains all the details that Query needs to find and use the files in the way you specify, and to produce the results that you expect.

To create a query definition, you follow a sequence of displays that guide you through the process of defining and saving a query definition. Once you have defined your query (and even *while* you are defining your query), you can run it (as a query) to produce the reports that you need.

Libraries in Query for iSeries

A **library** is a place on the system to store objects, including the query definitions and files that you use in Query for iSeries. Therefore, when you are working with queries and files, you may need to specify the library where a query or file is stored.

Major functions of Query for iSeries

Two primary Query displays, the Query menu and the Work with Queries display, are the starting point for the major tasks that you can do using Query. (See Figure 3 on page 6.) Another important display is the Define the Query display, which starts all the tasks in a query definition.

- The Query menu allows you to start working with queries, run a query, or delete a query. It also allows you to start working with files.
- The Work with Queries display allows you to do specific tasks with one or more queries. You can create, change, display, copy, delete, or run a query, or print a query definition.

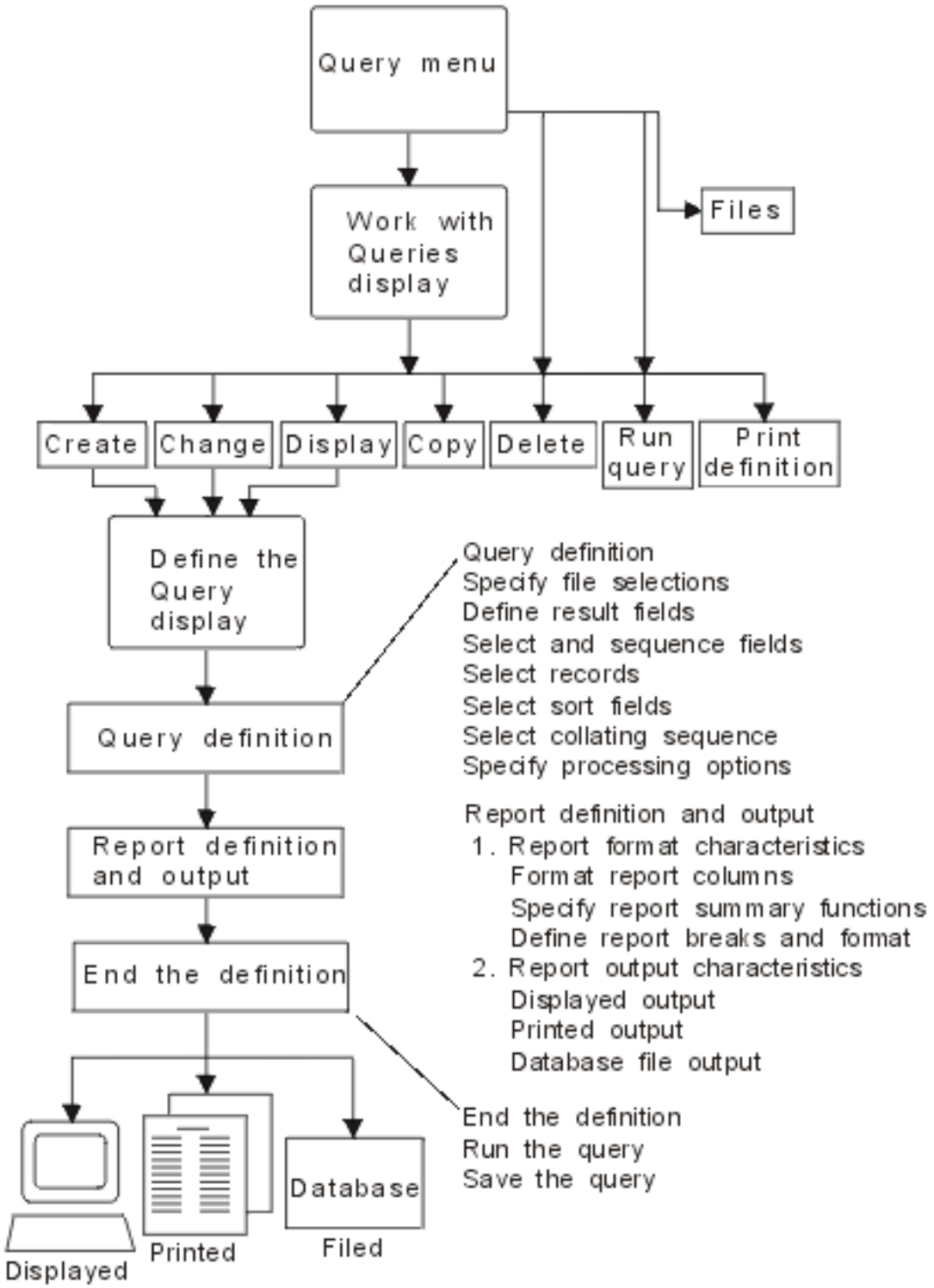


Figure 3. Major Tasks on the Query Menu and the Work with Queries Display

Chapter 2. General operating information for Query for iSeries

This chapter describes the general operating information for Query, such as getting started with Query, using prompts and lists, how you can check your query definition before it is finished, how to use the function keys, and error recovery procedures.

Practicing with Query for iSeries

Appendix B, “Practice exercise for Query for iSeries query”, provides practice examples that you can do in order to quickly become familiar with Query.

Getting started with Query for iSeries

You can access Query in a variety of ways. To use Query, you can do any of the following:

- Use the Work With Query (WRKQRY) command by typing `WRKQRY` and pressing the Enter key. This causes the Work with Queries display to appear.
- Use the Start Query (STRQRY) command by typing `STRQRY` and pressing the Enter key. This causes the Query menu to appear. Typing `GO QUERY` and pressing the Enter key has the same effect.

From the Query menu, you can choose to work with queries, run a query, delete a query, work with files, or do an office-related task.

From the Work with Queries display you can:

- Create, change, copy, delete, display, print, or run a query if you came from the Query menu or the WRKQRY command.
- Create, change, copy, delete, or display a query definition.
- Create, change, copy, delete, or display a query definition.

When you are finished working with Query for iSeries

When you are finished working with Query, you can exit from the Work with Queries display by pressing either F3 (Exit) or F12 (Cancel).

Telling Query for iSeries what you want

When you work with a query, Query shows you a series of displays that ask (or prompt) you for:

- What information you want Query to get from a file or files
- Whether you want the information printed or displayed as a report or output as data in another file
- How you want the report to look

Query gathers all of this information from what you enter on the displays.

Using prompts and default values in Query for iSeries

Prompts are the system’s way of asking you what it needs to know in order to fulfill your request. You need only “fill in the blank.” Often, the prompt even lists the possible correct choices, so you only need to type the choice that fits what you are doing. If you are not sure what information you are supposed to supply at a prompt, you can move the cursor to the prompt and press the Help key.

Also, when a display appears, some of the prompts are already filled in. These values are called **default** values—they are the values assumed by the system if you do not specify anything yourself. You can leave a default value the way it is, or if you want, you can change it to another value by moving the cursor to the prompt and typing over the default value.

Using Query for iSeries function keys

Function keys like Enter, Help, and Print can be used at any time with any query display. However, not all the function keys (such as F3, F4, and F11) apply to all displays. Each display shows, at the bottom of the display, which function keys are *commonly* used with that display (all the available keys may not be shown). If you want to know how all the available keys work on a particular display, move the cursor to the function key section of that display and press the Help key.

Checking the results before printing the Query for iSeries report

Function keys F5 (Report) and F13 (Layout) can be used to check the results of your work at many points in the query definition process. That is, during query definition, you can use these keys to see if you are getting the output results you expected. If so, you can continue on with confidence; if not, you can make whatever changes are necessary to get what you want before you move on to the next definition step. In some situations, looking at the layout may be more useful than looking at the report, and vice versa (for example, F13 can be used when there is no data in a file that is used by the query).

Before printing a query report, remember the following:

- F5 (Report) uses all the information you have defined so far in this and previous definition steps to run the query and display the results. The results are shown on the Display Report display in report form.

  Note: If Query finds errors in numeric fields when your query is run, an error message might be displayed or the field value might be shown in the output as plus signs (++++). Plus signs are also used to indicate division by zero and overflow (when the overflow occurs as data is being taken from the file). You can specify that Query ignore any numeric field errors—see “Ignoring decimal data errors during Query for iSeries processing” on page 164 for more information. Asterisks (*****) are shown if the field length and/or number of decimal positions was changed on the Specify Report Column Formatting display to a size too small for the value to be shown.

  When the query is run, if Query finds conversion errors either in the date, time, or timestamp fields, or in character fields due to the coded character set identifier (CCSID), plus signs (++++) are shown in the output. Plus signs are also shown if the data is not good or overflows.

  Field, break text, minimum, maximum, average, and total values can be null and are represented by a dash (-) on the display.
- F13 (Layout) uses all the information that you have defined so far to show the column heading and field layout without actually running the report.

On the Display Report Layout display, Xs show SBCS character data and 9s show numeric data. The current date, time, or timestamp shows where date, time, or timestamp data is.

If floating-point fields are present:

- 9‘s and 0’s, followed by E +029, represent single-precision data.
- 9‘s and 0’s, followed by E +299, represent double-precision data.
- You may also see 1.00 for a floating-point field if the data is smaller than the size selected by Query (which is a length of four with two decimal positions).

If you are using a DBCS-capable display and if DBCS fields are present, you may see:

- Double-byte J’s, which represent DBCS-only data. DBCS-only fields contain only DBCS data.
- Double-byte O’s, which represent DBCS-open (mixed) data. DBCS-open (mixed) fields contain DBCS data, SBCS data, or a mixture of both types of data.
- Double-byte E’s, which represent DBCS-either data. DBCS-either fields contain either all SBCS data or all DBCS data, but not both in the same field.
- Double-byte G’s, which represent DBCS-graphic data. DBCS-graphic fields contain only DBCS-graphic data.

DBCS characters take twice the amount of space of SBCS characters. In addition, a shift-out character precedes DBCS data, and a shift-in character follows the data. The shift-out and shift-in characters are called DBCS bracket characters. DBCS-graphic data is stored in the database without bracket characters; however, the bracket characters are present when DBCS-graphic data is displayed or printed.

Although you must use a DBCS display to type or read data contained in DBCS fields, you do not need to use a DBCS display to display the layout of a report that uses DBCS fields. However, the layout may not be readable.

You can look at the displayed results and determine whether the spacing between columns, the length of each field, and the column headings produce the results you want.

Note: The displayed report or report layout contains *all* the entries or changes that you have made this far, including those typed just before you pressed F5 or F13.

Printing what you see on your Query for iSeries display

You can use the Print key to print a copy of what you see on any Query display at any time. You may find this useful during query definition, for example, when you type many values in the fields on a display, such as on the Define Result Fields display or on the Select Records display. The printed copy of the displayed information is printed on the printer that is associated with your display station.

You can also use the Print key, when needed, to print the displayed output of the function keys F5 (Report) and F13 (Layout). However, only what is shown on the display is printed. If your report or layout is wider than the display and you have not specified that line wrapping be used, the far right side of the report is cut off and is not printed. In this case, you could use the shift function keys to move text lines to the right and then press the Print key again to obtain a printout of the remainder (or possibly just more) of the report.

Using lists in Query for iSeries

For many displays, Query provides lists of items that can be used to complete the prompts. Those items might include:

- Libraries you are authorized to use
- Queries you are authorized to use
- Files you are authorized to use
- Record formats for a specified file
- Members for a specified file
- Fields available for your query
- Translation tables

The lists eliminate the need to memorize names, and they also reduce the number of potential typing errors.

Displaying a Query for iSeries list

You can obtain a list of an item (for example, a list of files or a list of libraries) by moving the cursor to the prompt and pressing F4 (Prompt) so that the list appears. Note that you cannot display a list for just any item on a display; the items for which lists are available are signified by a comment next to the prompt that you can use F4 to obtain a list.

You could also obtain a particular subset of a list of items by typing a generic name or a special library name in the prompt or prompts before you press F4. (For more information on special library names, see “Special library names in Query for iSeries” on page 10.) Typing a **generic name** (such as `ABC*`) in a prompt that allows generic names limits the items in the list by choosing only the items that *begin* with those characters (`ABC`).

The number of items shown in the list part of the display varies, depending on what form the list is in and the amount of space used by the prompt part of the display. Sometimes a new display will appear that shows the list. If all items in a list do not fit on the display, you can use the page keys to page forward and backward through the list.

Selecting items in a Query for iSeries list

You can select an item from a list by doing one of the following:

- Typing the name and an option number in the first position in the list.
- Selecting an item directly from the list by typing a number next to the name in the list. By selecting an item directly from the list by typing a number next to it, you often can select more than one item and thus save a lot of time and typing.

You may be able to display, from a list, a long comment about a file, a record format, a file member, or a field. Long comments may provide extensive information about their content. If a long comment is defined for a file, a record format, a file member, or a field, you can move the cursor to its name and press F23 to display the long comment.

Note: If the field is a result field, the entire expression defining the result field is shown as a long comment.

Special library names in Query for iSeries

You can specify any of the following special library names to search the associated libraries for query definitions, files, or translation tables:

Special Library Name	Description
***CURLIB**	The current library being used for your job. It is the only library searched. If no current library is found, QGPL is searched.
***LIBL**	All the libraries in the library list for your job. They are searched in the order they are listed.
***USRLIBL**	All the user libraries that are in the user part of the library list for your job. They are searched in the order they are listed.
***ALLUSR**	All the user libraries on the system that you have the authority to use and other libraries that you have authority to use whose names begin with the letter Q. *ALLUSR does not list certain System/36™ libraries that begin with the # character. The libraries are searched in alphabetical order.
***ALL**	All the libraries on the system that you have the authority to use. They are searched in alphabetical order.
GENERIC*	All libraries starting with characters that precede an asterisk that you have authority to use are searched. For example, you can specify `STA*` to search all libraries starting with STA.

If you specify `*CURLIB` in the *Library* prompt, Query changes it to the name of the library currently being used in your job. That library name is displayed in place of `*CURLIB`.

Note: You can use only those libraries for which you have the necessary authority. If you specify a special library name that contains libraries you do not have authority for, you will see queries in only those libraries in that list for which you do have the authority.

Using Query for iSeries commands

A **command** is a statement used to request a function of the system. This means you need only remember a command that is a few characters long instead of remembering all the individual instructions or taking the time to go through a series of menus.

Query has four commands, which can be entered from any command line:

- STRQRY brings up the Query menu.
- WRKQRY brings up the Work with Queries display.
- Run Query (RUNQRY) runs an existing query, or you can use it to run a default query. This command can also be embedded in CL programs so that you could, for example, run several queries overnight.
- Delete Query (DLTQRY) deletes one or several query definitions.

For detailed information about how you can use these commands, see the CL Reference information in the iSeries Information Center.

Using the Query Utilities menu

The Query Utilities menu allows you to select Query tasks for working with queries, running queries that have previously been defined, deleting query definitions, or working with files.

```
QUERY                          Query Utilities

Select one of the following:

  Query for iSeries
     1. Work with queries
     2. Run an existing query
     3. Delete a query

  SQL/400
    10. Start SQL/400 Query Manager

  Query management
    20. Work with query management forms
    21. Work with query management queries
    22. Start a query
    23. Analyze a Query for iSeries definition
                                                                    More...
Selection or command
===>

F3=EXIT   F4=PROMPT   F9=RETRIEVE   F12=CANCEL   F13=USER SUPPORT
F16=OS/400 MAIN MENU
(C) COPYRIGHT IBM CORP. 1980, 1991.
```

If you select option 1 (Work with queries) and press the Enter key, the Work with Queries display is shown. On that display, you can specify which query you want to work with and in what way. The tasks that can be started using that display (including additional ways for running and deleting queries) are introduced in “Using the Work with Queries display” on page 12.

If you select option 2 (Run an existing query) on the Query Utilities menu, you are shown the prompt displays for the Run Query (RUNQRY) command. You can use this command to run a query and produce a query report of the data selected from one or more database files. You can use this command to run an existing query (one that is defined and stored by name on the system) or to run a “default” query (one that is unnamed and that uses mostly system-supplied values). If you do not know the name of a query or library, use option 1 (Work with queries) so that you can get a list of queries and libraries.

If you select option 3 (Delete a query) on the Query Utilities menu, you are shown the prompt display for the Delete Query (DLTQRY) command. You can use this command to delete a query definition. If you do not know the name of a query or library, use option 1 (Work with queries) so that you can get a list of queries and libraries.

There are other tasks that you can do that are not part of Query but may be related to it or may be convenient to get to from the Query Utilities menu:

- If you select option 30 to work with files, the Files (FILE) menu is displayed. From that menu, you can do a file-related task (display, copy, delete, save, restore, or edit) or you can use a different file-related utility such as IDDU or DFU, or a licensed program, such as the DB2 UDB for iSeries program. For example, you can use IDDU to define and create files, and you can use either IDDU or DFU to type data into the files.
- If you select option 31 to do an office-related task, the Office Tasks (OFCTSK) menu is displayed. From that menu, you can choose to work with documents or folders, with office security, or with OfficeVision or Client Access.

Using the Work with Queries display

The Work with Queries display is the major starting point for working with one or more queries at a time. Using this display, you can select (and, therefore, start) one or more of the following primary tasks:

- Create a new query definition.
- Change, copy, display, or delete an existing query definition.
- Print the definition of a query.
- Run a query to select data from files and produce a report using that data.

Part 2 of this book describes these primary Query tasks. Creating query definitions is described in Chapters 3 through 14, running queries is described in Chapter 15, and the remaining tasks (changing, copying, displaying, printing, and deleting query definitions) are described in Chapter 16.

Choosing a single Query for iSeries task

To work with a query, you need to determine which query you want to work with, and you need to select the task you want to do. To select a task, you can type the number of the task you want to do in the *Option* prompt on the Work with Queries display, or if a list of query names is shown, you can type the number of the task in the *Opt* column (as shown in Figure 4 on page 13). These are the tasks that you can choose from:

Query Task	Description of Task
1=Create	Creates (defines) a new query. When this option is processed, the Define the Query display is shown so you can start defining a query.
2=Change	Changes an existing query definition. The Define the Query display is shown for this option also.
3=Copy	Copies an existing query definition. The Copy Queries display is shown.
4=Delete	Deletes an existing query definition. The Confirm Delete of Queries display is shown.
5=Display	Shows the definition of a query without being able to change it. (To change the query, choose option 2.) The Define the Query display is shown.
6=Print definition	Prints a query definition. For more information, see “Printing a Query for iSeries query definition” on page 180.
8=Run in batch	Runs a query in batch, reducing the resource drain caused by running the query interactively.

9=Run Runs a query. Query displays a report, prints a report, or puts the data into a database file, depending on what is specified in the query definition. For information about running queries, see Chapter 15.

Specifying a Query for iSeries query and its library

To identify the query you want to work with, you can type the name of the query (in the *Query* prompt) and the name of the library (in the *Library* prompt) in which it is to be stored (or is already stored). Or you can look at a list of query names or library names and then select the name you want— see "Choosing multiple Query for iSeries tasks".

If you specify the name of a query, Query assumes that it already exists and searches for it in the library specified in the *Library* prompt. If you specified a special library name (such as `*LIBL`) or a generic library name (such as `ABC*`), the first query found with the name you specified is used; libraries are searched in alphabetical order (except for `*LIBL` and `*USRLIBL`).

If you are creating a query, you do not need to name it unless you want to save it for later use. For more information on creating queries, see Chapter 3, "Creating a Query for iSeries query definition".

Choosing multiple Query for iSeries tasks

If you position the cursor on the *Query* prompt and press F4 (Prompt) to show a list, the list contains the names of all the queries that are in the library (or libraries) indicated by the *Library* prompt. Only the queries and libraries for which you have the necessary authority are shown. The following display shows some sample query names.

```
                            Work with Queries

Library . . . . . .   QGPL         Name, *LIBL, F4 for list
Subset  . . . . . .   __________   Name, generic*
Position to . . . . .   __________   Starting character(s)

Type options (and Query), press Enter.
  1=Create   2=Change   3=Copy   4=Delete   5=Display   6=Print
  8=Run in batch   9=Run

Opt  Query          Opt  Query

 _   __________
 _   ACCTPAYFEB      _   PAYROLLMAR
 _   ACCTPAYMAR
 _   ACCTRECFEB
 _   ACCTRECMAR
 _   INTFEB
 _   INTMAR
 _   INVFEB
 _   INVMAR
 _   PAYROLLFEB

F3=Exit         F4=Prompt         F5=Refresh        F11=Display text
F12=Cancel      F19=Next group
```

Figure 4. Work with Queries Display (Multiple-Column List)

You can type any option number (except a 1) beside the name of each query that you want to select from the list. If selecting multiple queries, you can select and mix the options according to the types of work you need to do. For example, if you need to run a query, delete another query, and copy a third query, you can page through the list looking for the query names and select all three options on this display at one time. You can also type an option number (including 1) and a query name in the top position of the list as well.

You can select as many as 30 queries from the list, as well as type a query name and option in the first list position of this display. Query processes the requests in the order that they appear in the list, starting first with the option and query that you typed in the first list position (in the input fields of the *Option* and *Query* columns).

When you select multiple options and the list contains multiple columns of names only (such as in Figure 4 on page 13), the processing order of the columns is top to bottom and left to right. That is, Query processes all the selected queries in the leftmost column first, then the second column, and so on. (However, if the selected options include queries that are to be copied or deleted, Copy Queries or Confirm Delete of Queries displays are shown when the first query with one of those options is found. Then Query groups together all others with the same option, by library, for you to verify what you want done.)

Working with a list of Query for iSeries queries

When you work with a list (in this case, a list of queries), Query provides several functions to help you. Here are some possibilities:

- To see all the queries in a different library or group of libraries, you can press the Enter key after changing the value in the *Library* prompt and typing blanks or an asterisk (*) in the *Subset* prompt. You are shown all the queries that you have the authority to use that exist in that library or group of libraries. (You indicate which libraries are to be checked by specifying a library name, a special library name [such as `*LIBL`], or a generic library name [in the form of `ABC*`] in the *Library* prompt.)
- To see a particular subset (a smaller group) of query names, you can type a generic name (in the form of `ABC*`) in the *Subset* prompt and press the Enter key. If you know at least the starting characters in the name you are looking for, this function can reduce the time needed to locate it.
- To see if more than one library contains a specific query name, you can type that query name in the *Subset* prompt and type `*ALL` in the *Library* prompt before you press the Enter key. You are shown all the queries by that name for which you have the authority to use.
- To position the list to a specific name, type the name (or the starting characters in the name) in the *Position to* prompt and press the Enter key. This function can also reduce the time needed to locate a name.
- You can also use a combination of these things at the same time. For example, you could specify a different library name, generic library name, or special library name in the *Library* prompt, a subset value (of query names) in the *Subset* prompt, a specific query name or the starting characters of a query name in the *Position to* prompt, and then press the Enter key to show the desired subset list of query names.

These functions are described in the following topics.

Selecting a Query for iSeries query name from a list

If you are working with a list of queries, you can select a query by using one of the following methods:

- You can use the top position in the list to type the name of a query (and library name, if the *Library* column is shown) you want to create or use. (To select an existing query, it must be available for use—see “Other considerations when you are trying to locate or use a particular Query for iSeries query” on page 17.)

  If you are creating a query, you can check this list to see what names are already used before you type a new name. Then, type the new name in the first list position (in its input field) and type a 1 next to it.
- You can work with a query (or queries) in the list by typing an option next to the query(s). (To select a query, it must be available for use—see “Other considerations when you are trying to locate or use a particular Query for iSeries query” on page 17.)

Using Query for iSeries list subsets

You can use the *Subset* prompt to see a smaller group (subset) of query names. To do so, type the starting characters (in the form of `ABC*`) that identify the group of queries that you want to display, and press the Enter key. All the queries whose names start with those characters in the specified library or

library group are shown. For example, if you typed IN* in the *Subset* prompt, you might see a list of query names like: INTEREST, INTFEB, INTMARCH, INVENTORY, INVFEB, INVMARCH, and so on. (The queries are shown alphabetically for each library.)

You can also specify a complete name (without an *) in the *Subset* prompt. Continuing the previous example, if you want to see which libraries contain queries named INVENTORY, type that complete query name in the *Subset* prompt.

If you want to return to the full list previously shown, blank out the subset value (or type an * as the subset value) and press the Enter key again.

Positioning a list of Query for iSeries queries

When a list of query names is shown, they are shown in alphabetical order within each library.

You can use the special values *TOP or *BOT to position to the top or bottom of the list. If it is a long list, you may want to move (change the position within) the list so that it starts with a particular query name. You can do this by typing one of the following in the *Position to* prompt:

- All of the characters in an existing query name
- One or more of the starting characters in the name

When you press the Enter key, Query moves the list so that the fully specified name (or, in a list for a specific library, the first name with the specified starting characters) is now shown at the top of the list.

If there is no *Library* column present and if there is no query name in the list that starts with those characters, Query moves the list to the name closest to, and in front of, the position that the name would have been in. However, if there is a *Library* column present and there is no query name that exactly matches the value in the *Position to* prompt, the list is not repositioned.

Two other methods are also available to move through a long list of queries:

- You can use the page up and page down keys to go forward or backward through the list.
- You can use F19 (Next group) to advance to the start of the next library's list of query names.

Using F11 to display additional information about Query for iSeries queries

When a list is displayed, you can use F11 (Display text) to alternate between showing a list of just the item names (such as queries, fields, and so on) and showing a list of both the item's name and the text that describes each item. When you press F11, the text—if any was specified when the item was created or changed—is shown next to each item name in the list. Some additional information may also be shown; for example, when you display the text for a list of queries, the date that each of the queries was created or last changed is also displayed.

Following is an example of how the Work with Queries display might appear when F11 is used.

```
                          Work with Queries

Library . . . . . .   QGPL         Name, *LIBL, F4 for list
Subset  . . . . . .   __________   Name, generic*
Position to . . . . .   __________   Starting character(s)

Type options (and Query), press Enter.
  1=Create   2=Change   3=Copy   4=Delete   5=Display   6=Print
  8=Run in batch   9=Run

Opt  Query           Text                                          Changed

 _   __________
 _   ACCTPAYFEB      Accounts payable for February                 02-29-88
 _   ACCTPAYMAR      Accounts payable for March                    03-31-88
 _   ACCTRECFEB      Accounts receivable for February              02-29-88
 _   ACCTRECMAR      Accounts receivable for March                 03-31-88
 _   INTFEB          Customer acct interest accumulated - Feb.     02-29-88
 _   INTMAR          Customer acct interest accumulated - March    03-31-88
 _   INVFEB          Ending inventory for February                 02-29-88
 _   INVMAR          Ending inventory for March                    03-31-88
 _   PAYROLLFEB      Total payroll, by day, for February           02-29-88
                                                                  More
F3=Exit         F4=Prompt    F5=Refresh        F11=Display names only
F12=Cancel      F19=Next group
```

After you press F11, all lists on all the Query displays that use F11 are shown in the form you chose until you press F11 again.

Selecting a library for your Query for iSeries queries

The library name indicates where you want to store a new query or where an existing query is already stored. (If you are creating a query, you do not need to specify a library name if you do not intend to save the query.) Also, if you decide later during query definition that you do want to save the query, you are given another opportunity to specify (a query name and) a library name at the end of definition time.

If this is the first time you are using Query, your current library is supplied as the library name. If you do not have a current library, QGPL is used. When you specify a different library name, a special library name, or a generic library name, Query supplies that name the next time you use this display. You can use the same value each time, or you can change it to a different library or library group. (See “Query for iSeries profile information” on page 18 for more information.)

To look at or use a different library, or a list of libraries from which you can choose, do either of the following:

- Type the name of the library, a generic library name, or a special library name in the *Library* prompt and press the Enter key. A list of all the *queries* in that library or group of libraries for which you have the authority to use is shown. If there are multiple libraries, the queries are listed in alphabetical order within each library. The libraries themselves are shown in alphabetical order if *ALL, *ALLUSR, or a generic library name is specified. If you specify *LIBL or *USRLIBL, the libraries are shown in the order that they are listed in the library list.

  If you specify a library name or special value that contains no query definitions (or none that you have authority to use), a message is displayed indicating there were no queries.

  If the list of queries is not empty but one of the libraries in the group is being used or is damaged, a message is displayed indicating that the list may be incomplete.
- Move the cursor to the *Library* prompt and either leave the prompt blank or type a generic name or a special library name, then press F4 to list the libraries. A list of the libraries that you are authorized to use is shown.

Other considerations when you are trying to locate or use a particular Query for iSeries query

You should be aware of other considerations when you are trying to locate or use a particular query. To use a query:

- You must have the authority needed to use the query definition. You may need to either ask the owner of the query, the administrator, or security officer to give you the type of authority that is necessary. For more information about the types of authority, see “Giving authority to others to your Query for iSeries query” on page 168.
- You must have the authority needed to use the library containing the query definition.
- The query (or the library) must not be in use in such a way that it cannot be shared. For example, if the owner is making changes to the definition of the query or if the system operator is saving the library that contains the query, you may need to wait a short time before you can use the query. If the *Text* and *Changed* columns are blank in a query list with the text displayed, the query is being used.

Displaying the format of constants in Query for iSeries

If you create or change a query and specify a date or time constant in an OS/400 format or a numeric constant with a decimal separator, that format must match the format description or separator shown on the Display Constants Format display. To check what OS/400 format or separator you must use, press F17 from either the Select Records display or the Define Result Fields display.

Note: If you are sending queries between countries that use the comma for a decimal separator, put a blank after each comma separating arguments in a function, such as SUBSTR or VALUE.

```
                    Display Constants Format

Query . . . . . :   QRY1             Option  . . . . . :   CHANGE
  Library . . . . :     QGPL         CCSID . . . . . :   65535

Use an SAA format to enter a date or time constant, or
use the format described by the following values.

Use the decimal separator shown.

Query definition values
  Date format . . . . :   *MDY
  Date separator  . . :   /
  Time format . . . . :   *HMS
  Time separator  . . :   :
  Decimal separator . :   .




Press Enter to continue.

F12=CANCEL
```

The Display Constants Format display appears when you:

- Change a query from the Work with Queries display and either at least one date or time constant is specified in the query definition in an OS/400 format other than the date or time format specified for your job.
- Display a query from the Work with Queries display and your job format for the date or time is different from an OS/400 date or time format constant that is specified in the query definition.
- Use the run-time `record selection` option of the RUNQRY command and your job format for the date or time is different from an OS/400 date or time format constant specified in the query definition.
- Use the run-time `record selection` option with the QRYRUN procedure and your job format for the date or time is different from an OS/400 date or time format constant specified in the query definition.

- Change or display a query from the Work with Queries display or use the run-time `record selection` option of the RUNQRY command, and the query was defined with a numeric constant and the decimal separator saved with the query does not match your current decimal separator.
- Press F17 from the Select Records display.
- Press F17 from the Define Result Fields display.

OS/400 date formats are *MDY*, *YMD*, *DMY*, and *JUL*. The valid OS/400 time format is *HHMMSS*.

Query for iSeries profile information

Query creates and maintains a query profile for each user. The profile is automatically created the first time you use the Query utility program, and its values are updated automatically whenever you specify certain values or press certain keys. *You do not have to worry about creating or changing this profile.*

You may notice that some prompts on some of the displays are already filled in when the display is first presented to you. These values may have been obtained from your profile, because Query uses it to make your definition tasks easier by providing certain information at the appropriate time.

The values that are stored in your Query profile are:
- The library you last used on the Work with Queries display
- The library you last used to specify your first file selection on the Specify File Selections display
- The library you last used to specify where database file output was to be stored
- Your list column mode (whether displays are to show names and text or just names only)
- Your report/layout display width (80 or 132)
- The current collating sequence option
- Your collating sequence and coded character set identifier (CCSID)
- The collating sequence table and library name

Handling Query for iSeries messages and errors

You should not worry about making errors while working with Query. Query either prompts you for needed input or issues an error message. You can correct your errors by responding to either of these. If you want to obtain help for any message that Query issues to you, move the cursor to the message line and press the Help key or F1.

Some of the things that may go wrong are:
- You specify a value that is not listed as a possible choice.
- You are not authorized to use a query, file, or table that you specified, or a file is currently being used.
- You change your mind after entering something.

Changing your Query for iSeries queries

Whether you change your mind about something you have already entered because it was a mistake or because you thought of a better way to get what you want, you will find it is very easy to change things in Query.

If you are still creating or changing your query, you can go back to previous displays by using F12. If you press F12 on a display, all of the new entries or changes you made on that display are ignored. Pressing F10 on a display keeps all of your new entries or changes and shows you the previous display. You can also return to the Define the Query display and choose the option(s) that you want to change or add.

If you define and save the query before you notice that the results are not what you want, just choose option 2 (Change) on the Work with Queries display and change the query. When changing a query, you

select only the option(s) that need to be changed and then, when you are shown the appropriate display, you need only type the new choices or change the incorrect ones. Everything else you defined earlier remains defined; you do not have to redefine the whole query.

If you just want to quit, press F3 (Exit) to go to the Exit This Query display. On the Exit This Query display, indicate whether you want to save or run the query (or do both), and then press the Enter key. Afterwards, if you have not selected other options, the Work with Queries display appears. Press F3 to exit Query.

Part 2. Defining and using Query for iSeries query definitions

Chapter 3. Creating a Query for iSeries query definition

This chapter describes the process of creating a query (that is, defining a query definition object) that can be used to query one or more files in the DB2® UDB for iSeries. The chapter begins with selecting option 1 (Create) on the Work with Queries display, and then it introduces the Define the Query display and the 11 possible definition steps you can use to define a query or change part of an existing query definition. The details for each of the definition steps are described later, in Chapters 4 through 14. The details for each of the other major tasks then follow in Chapters 15 and 16.

Starting Query for iSeries query definition

You start query definition by selecting option 1 (Create) on the Work with Queries display and, optionally, by specifying the name of the query you want to create.

To specify a query name, you can type the name of the query (*Query* prompt) that you want to define, and you can specify the name of the library (*Library* prompt) in which it is to be stored. Or, you can look at a list of query names or library names to select the query name and the library name you want to use.

For example, you might specify `CUSNAMQRY` as the name of a query definition that you would use to query the `CUSTNAME` file. If you do not specify a library name, the query is stored in the library identified in the *Library* prompt (the QGPL library in this example).

```
                          Work with Queries

Type choices, press Enter.

  Option  . . . . . .   _           1=Create   2=Change   3=Copy   4=Delete
                                    5=Display  6=Print definition
                                    8=Run in batch, 9=Run
  Query   . . . . . .   __________  Name, F4 for list
    Library . . . . .     QGPL      Name, *LIBL, F4 for list

F3=Exit         F4=Prompt        F5=Refresh        F12=Cancel
```

If you are creating a query (definition), you do not need to name it unless you want to save it for later use. (The query does not exist as a definition object on the system until you save it.) If you do name it, use the normal rule for naming objects, which follows:

The query name must begin with an alphabetic character (A through Z, $, #, or @) and can be followed by no more than 9 alphanumeric characters (A through Z, 0 through 9, $, #, @, ., or _).

Note: To use this query in a multilingual environment, use A-Z or 1-9.

Because most system-supplied objects on the iSeries system begin with Q, your query names should not start with a Q.

If you position the cursor on the *Query* prompt and press F4 (Prompt) to show a list, it contains the names of all the queries that are in the library (or libraries) indicated by the *Library* prompt. You can get a smaller list by typing a generic name in the *Query* prompt before you press F4. The generic name shows in the *Subset* prompt when the list is shown.

When you are creating a query, you can check this list to see what names are already used before you choose a new name. Type the new name in the first list position (in its input field) and type a 1 next to it.

For more information on using lists on the Work with Queries display, see "Working with a list of Query for iSeries queries" on page 14.

Selecting definition steps when defining a Query for iSeries query

When you specify option 1 (Create) on the Work with Queries display, you are shown the Define the Query display (another key display) where you select one, several, or all of the 11 definition steps (options) needed to define your query.

The only definition step that you are required to select is *Specify file selections*. You *do not* have to select all of these definition steps—use only those that you need. Most of these steps do not have to be done in a specific order (although the order shown is recommended when you need to use most of them). Each step you select is a separate process that shows you one or more displays as you need them.

```
                          Define the Query

Query . . . . . :                   Option  . . . . . :  Create
  Library . . . . . :  QGPL         CCSID   . . . . . :    37

Type options, press Enter.  Press F21 to select all.
  1=Select

Opt   Query Definition Option
 1    Specify file selections
 _    Define result fields
 _    Select and sequence fields
 _    Select records
 _    Select sort fields
 _    Select collating sequence
 _    Specify report column formatting
 _    Select report summary functions
 _    Define report breaks
 _    Select output type and output form
 _    Specify processing options

F3=Exit             F5=Report           F12=Cancel
F13=Layout          F18=Files           F21=Select all
```

The Define the Query display is the primary display from which you start defining your query.

From this display, you can select options that define, generally speaking, the four major parts of a complete query definition:

- The first six options define **the query itself**, including the *files* you want to query, the *fields* to be used in each file, and the *records* to be selected.
- The next three options define **what the report is to look like**, including which columns are to be summarized and when (using report breaks).
- The second to last option defines **where the report is to go** and what values are to be used when it is sent there.
- The last option defines **how numeric calculation results are processed** and **if substitution characters are allowed during the conversion of character fields**.

Selecting options for a Query for iSeries query definition

To select options that you want to use from those listed in the *Query Definition Option* column, type a 1 in the *Opt* (option) column beside each of those options, then press the Enter key. The displays for the options you select are then shown one after the other so you can create those parts of the query definition.

Following are brief descriptions of each of the definition steps.

Specify file selections
This option is required, and you use it to specify the file or files from which you want your query to obtain information. If you specify more than one file, you are shown the displays on which you specify how you want the files joined.

Define result fields
Use this option to define fields that do not exist in your files but you want to use in your query. For example, your selected file(s) contains a field representing the number of weeks, but it does not contain a field representing the number of days, and you want your report to show days, not weeks. You can define a result field that will hold the results of a calculation that uses the number of weeks to determine the number of days.

Select and sequence fields
Use this option to select the fields (from your selected file(s) and your result fields) that you want to appear on your report. You also specify in what order you want them to appear.

Select records
Use this option to select records, from your selected file or files, if you only want particular records to be included in your report.

Select sort fields
Use this option to specify what fields to sort on so that your output records appear in a particular order (such as alphabetically or in descending or ascending order).

Select collating sequence
Use this option to select a collating sequence for your query. The collating sequence you select can affect many different things in your query, including record selection and the order of records when they are sorted. The collating sequence usually relates to your country's language. You can also specify a different language for a particular query. You can set your collating sequence defaults while defining your first query and thereby never have to change the collating sequence again.

Specify report column formatting
Use this option to change the column headings, column spacing, numeric editing, length, and decimal positions for fields that appear in your report.

Select report summary functions
Use this option to specify one or more (or all) of the types of summary functions for each field in your report: total, average, minimum value, maximum value, and count.

Define report breaks
Use this option to specify how to break your report into groups of records.

Select output type and output form
Use this option to specify if you want your output to be displayed, printed, or sent to a database file. If you want your output printed, you also specify printer attributes. You also use this option to specify whether you want detailed or summary-only output.

Specify processing options
Use this option to specify if you want the results of your query calculations to be truncated or rounded, if you want decimal data errors ignored, or if you want to ignore character substitution warnings during conversion.

You can specify one, several, or all of the options shown. To select *all* of them, press F21.

Moving through the Query for iSeries definition displays

For each option you select, Query shows you the definition displays for that step. (The words shown for each option on the Define the Query display match the title of the first display shown for that definition step.) After you specify your definition values on a display, press the Enter key to have them included in the query definition and to go to the next display in the sequence. Whenever you need to go backward in the sequence, press F10 (Process/previous) to keep what you have entered on a display and then show the previous display, or press F12 (Cancel) to ignore what you have entered on a display and then show the previous display.

After you go forward through all of the options that you need, press the Enter key to return to the Define the Query display. Then, you can select more options, change your selections, or end the definition of this query.

When you return to the Query for iSeries Define the Query display

When you return to this display, Query displays a > symbol beside all those definition steps that currently have definition values that are different from the system-supplied (default) values. This is also true if you are changing or displaying an existing definition.

Also, if you are creating or changing a definition, a message is shown to remind you to press F3 (Exit) to save the query changes and/or run the query at this time. When you press F3, the Exit this Query display is shown so you can specify both choices. (If you want to look at or change more definition steps first, you can type a 1 next to each option as before, and press the Enter key.)

If there are any definition errors in the options you used, they are highlighted in reverse image when you return to this display; you should correct the errors before you use the Exit key.

Considerations for creating Query for iSeries queries

The following are reminders, tips, and techniques for creating queries.

Selecting files, records, and fields for Query for iSeries

Query can use files created using IDDU, DDS, or the DB2 UDB for iSeries program. For a description of file organization, see the *IDDU Use* book.

When you create a query, if you do not select and sequence the fields to be reported by the query, Query selects the following:

- For reports, the first 500 of the following:
  - Fields chosen as sort fields on the Select Sort Fields display, in the sequence they appear on that display
  - Result fields in the order they are defined on the Define Result Fields display
  - Fields that can be used by Query in the record format(s), in the sequence they appear in the record format(s) (those in the first file selection, followed by those from the second, and so on)
- For database output:
  - All data in the record format
  - Result fields defined on the Define Result Fields display

For database output, maximum record length is limited to 32 766 bytes (32 740 bytes if variable-length or null-capable fields are part of the record). In some cases, the maximum record length will be less than these limits.

Suggested sequence of tasks for creating Query for iSeries queries

The following is a suggested sequence of tasks to create queries:

1. Define result fields before selecting and sequencing fields.
2. Specify comparisons used for selecting records before selecting and sequencing fields.
3. Select and sequence fields and specify sort fields before you reformat columns.
4. Select sort fields before you define report breaks.
5. Press F5 to view your query results and F13 to view your report layout before and after you reformat columns.

You can use a query to quickly sort records in a data file. Simply select the sort fields, choose database as the output device, and specify the output database name.

Chapter 4. Specifying and selecting files for a Query for iSeries query

This chapter describes how you select and use one or more database files that are to be queried for information. Specifying file selections (the first option on the Define the Query display) is the first of the 11 steps that you can use to define a query. This step includes specifying (or changing) what files you want to select for your query, seeing what files are already selected, and specifying the join characteristics when more than one file is selected. This step also allows you to select, when necessary, file members and record formats for the files.

Notes:

1. Although this chapter discusses this step primarily for the task of *creating* a query definition, most of the information also applies to the tasks of *changing* or *displaying* an existing definition.
2. If you are creating a query, a 1 is already supplied by the system for the *Specify file selection* option on the Define the Query display, and it cannot be removed. This is the *only* option in the definition process that you *must* select when you are *creating* a query.
3. If you make changes to any of the file selection values in this step, Query attempts to keep whatever parts of the definition that are still valid. For example, if a field in a file being removed from the definition also exists in a file being added (as a replacement), the field's uses in other parts of the definition (such as part of the sort definition) are kept. (However, it is your responsibility to determine whether the field in the replacement file contains the kind of information you want.)

The displays related to the file selection process are:

- File selection displays (for one or more files):
  - Specify File Selections
  - Select Library (optional)
  - Select File (optional)
  - Select Member (optional)
  - Select Record Format (optional)
- File join displays (for multiple files only):
  - Specify Type of Join
  - Specify How to Join Files

Specifying file selections for a Query for iSeries query

The file selection process includes selecting each file from which your query will get data and also specifying the library containing the file, the file member, and the record format (or using the values supplied by Query when the display first appears). If you select multiple files, the process also includes specifying the file join characteristics.

After you have selected your definition steps on the Define the Query display and you press the Enter key or F21 (Select all), the first display that you see is the Specify File Selections display.

```
                        Specify File Selections

Type choices, press Enter.  Press F9 to specify an additional
  file selection.

  File . . . . . .   _________   Name, F4 for list
    Library  . . . . .   QGPL     Name, *LIBL, F4 for list
  Member . . . . . .   *FIRST     Name, *FIRST, F4 for list
  Format . . . . . .   *FIRST     Name, *FIRST, F4 for list

                                                                  BOTTOM
F3=Exit          F4=Prompt        F5=Report        F9=Add file
F12=Cancel       F13=Layout       F24=More keys
```

The Specify File Selections display is used to specify one or more database files that you want to query for the data in your report. You can specify as many as 32 files to be queried, and you can assign unique 3-character identifiers to each one. (You can also specify the same file twice, if you need to join it to itself; if you do, it counts as two files in the query definition. For example, you might specify the same file twice but use two different record formats.)

If you are creating or changing a query definition, you should complete all the information needed for one file selection before you start on the next one. Based on the values you enter and the key you press, Query shows you the displays you need. The order of prompting within each file selection is: file, library, member, and record format. (If you have not completed all the information in a file selection, several of the F keys will not work until you supply the needed information.)

The following special values are shown in the prompts for each file selection group when it is first shown: `*FIRST` (for members and record formats) and `*ID` (for file IDs if shown). These and others that you may specify (like `*LIBL` for libraries) are changed when you press the Enter key; they are changed to the actual values that will be used when the query is run. Special values for member names are not changed.

The initial value shown in the *Library* prompt of the first file selection group is the value that you used in the file selection step in a previous query definition. For the remainder of the file selections, the initial value is the same as is used in the first group.

Choosing a file for a Query for iSeries query

To choose a file, move the cursor to the *File* prompt and type the name of a file.

If you want to choose a file from a list of file names, you can press F4 (with the cursor at the *File* prompt). The Select File display is shown, and on this display you can choose one or more files for your query.

Note: If the *File* prompt is blank before you press F4, you can select multiple files from the Select File display; if it is not blank, you can select only one file.

Choosing a library for a Query for iSeries query

Because the files you want to select may be in different libraries, you can specify a different library name, generic library name, or special library name for each file selection.

- If you type a generic library name (in the form of ABC*) or special library name in this prompt and press the Enter key, that library group is searched for the file named in the *File* prompt. If the file is found in one of the libraries, the name of that library replaces the special library or generic name.
- If you type a generic library name (in the form of ABC*) or a special library name and then press F4 with the cursor in this prompt, the specified list of library names is shown on the Select Library display. When you select the library you want from the list and press the Enter key, you return to this display with the selected name filled in. For an explanation of these special library names, see "Special library names in Query for iSeries" on page 10.

If you specify *CURLIB as the library name for a file selection and you do not have a current library, QGPL replaces the *CURLIB value.

Choosing a member or record format for a Query for iSeries query

Similarly, for each file selection, if you want to choose from a list of members or record formats, move the cursor to that prompt and press F4 to see the associated display, and select the member name (or format name) you want to be used with that file. Then, when you return to the Specify File Selections display, that name is shown in the prompt. If you did not select a member name, Query supplies *FIRST in the *Member* prompt. If you did not select a format name, Query resolves the special default value and supplies the first format name in the *Format* prompt.

Selecting multiple files for a Query for iSeries query

If you want to include additional files for your query, press F9 (Add file) each time you want another file selection. If you have completed the previous file selections for this query, a new group of prompts is shown for you to fill in; the *File* prompt is blank, and the other prompts show default values that you can change. (However, if you have not filled in a file name for one of the file selections, F9 moves the cursor to the blank *File* prompt instead of giving you a new file selection.)

```
                        Specify File Selections

Type choices, press Enter.  Press F9 to specify an additional
  file selection.

  File . . . . . .   EXAMPFILE    Name, F4 for list
    Library  . . . .     QGPL      Name, *LIBL, F4 for list
  Member . . . . . .   *FIRST      Name, *FIRST, F4 for list
  Format . . . . . .   *FIRST      Name, *FIRST, F4 for list
  File ID  . . . . .   T01         A-Z99, *ID

  File . . . . . .   __________    Name, F4 for list
    Library  . . . .     QGPL      Name, *LIBL, F4 for list
  Member . . . . . .   *FIRST      Name, *FIRST, F4 for list
  Format . . . . . .   *FIRST      Name, *FIRST, F4 for list
  File ID  . . . . .   *ID         A-Z99, *ID
                                                        Bottom



F3=Exit          F4=Prompt        F5=Report        F9=Add file
F12=Cancel       F13=Layout       F24=More keys
```

If you are working with multiple files on this display, use the page keys to move forward or backward in the list of file selections. If you press F18 (Files), you can also see this information in a different form. F18 takes you to the Display File Selections display and shows you the names of all the files, libraries, file members, record formats, and file IDs for all the files currently defined in this query definition.

If you try to leave the Specify File Selections display before you specify how multiple files are to be joined, Query assumes that the type of join is a 1 (Matched records) and shows you the Specify How to Join Files display so you can specify the necessary join test specifications.

Using file IDs for a Query for iSeries query

File IDs are used when you select more than one file. Although Query assigns a file ID value to each file selection, you can specify your own identifier.

Note: When you are creating a query, the *File ID* prompt is not shown for your first file selection. However, if you select more than one file, you will see that Query has assigned the value `T01` as the file ID of your first file. You will have to go back and change the file ID if you want to assign your own file ID values.

The file ID allows you to uniquely identify fields that have the same name but are in different files. You can specify from one to three characters; the first character must be alphabetic, $, #, or @, and the last two can be alphabetic, numeric, or $, #, or @. Examples of valid identifiers are: `A`, `B`, `B03`, `AEX`, and `$99`.

Note: If you are creating queries that are distributed to other systems or are used in a multilingual environment, use only A-Z and 1-9.

If you do not specify a file ID (that is, you do not change the value *ID in the *File ID* prompt), Query resolves the value *ID to the number of the file selection, if not already used, or to the lowest possible value that is available in the range of T*nn*, where *nn* is a number from 1 to 32.

Although file IDs are assigned to each file on the Specify File Selections display, you do not have to use them in other parts of the query definition unless you need to use a field that has the same name in more than one of the files in the query. You *must* use file IDs every time for identical field names, to ensure that the correct field is used from the files. For all the other field names, (that is, those that occur in only one file in the query definition), you do *not* need to use the file IDs.

If you decide to change a file ID, Query keeps any definition values already assigned for field selection, sort field selection, and so on. (You must change the ID, if used, for join tests, result field expressions, record selection values, and break text.) However, if you *move* a file ID to a different selection group, all the definition values you specified are lost, even if all of the names in the from and to file selections are the same.

Confirming your options for a Query for iSeries query

When you are *creating* a query definition, you see a message that asks you to verify the values you just defined. This message appears when you press the Enter key after defining file selection values. You should verify your choices made thus far, then either continue selecting files or end the file selection process after confirming your choices. To end file selection, press the Enter key again.

When you are *changing* an existing query definition, you see a different message when you press the Enter key, and the values that you changed are shown in reverse image. Again, you should verify your changes and then press the Enter key a second time to actually have them changed in the definition. You do not have to press the Enter key twice if you make no changes or if you change only member names.

Removing a option for a Query for iSeries query

Whether you are creating or changing a definition, if you decide you do not want to keep one of the files in the definition, you can remove it by blanking out the *File* prompt. When you press the Enter key or F5, F10, or F13, that file selection is removed.

By removing a file selection, you may cause an error elsewhere in your definition. This occurs if the file you removed was used in a join test or a field from a removed file was used to define a result field.

Handling errors on the Query for iSeries Specify File Selections display

An error message is shown when you press the Enter key, F5, F10, or F13.

- If you did not type a file name

- If you typed a file name and left blank any of the *Library*, *Member*, or *Format* prompts for the file
- If there is a problem with one of the values you typed

The cursor is positioned to the blank prompt or the prompt in error, and the message describes the error for that prompt. For example, you may have typed the name of a file that you do not have the authority to use.

If there is more than one error, you will see the next one after you have corrected the first one.

Selecting files on the Query for iSeries Select File display

The Select File display shows you a list of files from which you can select one or more files that your query is to get data from, or you can select one to receive the output from your query. This display appears if you position the cursor on the *File* prompt of a display and then press F4 (Prompt). (This display appears only when you are creating or changing a query definition.) The following is an example of how the Select File display might appear.

```
                              Select File

File ID . . . . :  T01

Library . . . . . .    CUSTINV       Name, *LIBL, F4 for list
Subset  . . . . . .    __________    Name, generic*
Position to . . . . .  __________    Starting character(s)

Type option (and File), press Enter.
  1=Select

Opt  File
 _   FILE1
 _   CUSTMAST_1
 _   CUSTMAST_2
 _   CUSTMAST_3
 _   EXAMPFILE1
 _   EXAMPFILE2
 _   INVMAST
 _   TESTFILE_A
 _   TESTFILE_B

F4=Prompt       F11=Display text       F12=Cancel       F24=More keys
                                                          Bottom
```

At the top of the display, a field named *File ID* may or may not appear. The *File ID* field is shown only if you came from the Specify File Selections display and pressed F4 (Prompt) in a nonblank *File* prompt. If the file ID is shown, it is the file ID of the file selection group that the cursor was positioned to on the previous display.

If the *File* prompt was blank and you pressed F4 on the Specify File Selections display, the *File ID* field is not shown on this display, and you can then select *multiple* files here. If the *File* prompt had a name or a generic name to get a subsetted list and you pressed F4 on the Specify File Selections display, the *File ID* field is shown as T*nn* on this display, and you can select only *one* file.

If you came from the Define Database File Output display or Specify Dependent Value Qualifiers display, you can select only one file on this display.

The list on this display includes all files (for which you have the needed authority) that are in the library shown at the top of the display. If you came from the Specify File Selections display, that library is the one indicated in the *Library* prompt below the *File* prompt in which the cursor was positioned when you pressed F4 for this list. If you specified a generic file name (in the form of ABC*) as a file name on the

Specify File Selections display, it is used as a subset value on this display, and only file names starting with those generic characters are included in the list. (You can specify another subset value on this display to change the subset shown.)

You can use the *Library* prompt to see the files that exist in a different library or group of libraries.

If you want to select a particular library from a list of libraries, press F4 with the cursor positioned in the *Library* prompt. The list that is shown contains only the libraries that you have the authority to use.

- If you press F4 when the prompt contains a library name, *LIBL, or blanks, you see the libraries that are in the *LIBL library list.
- If you press F4 when the prompt contains a generic library name or any of the other special library names, you see the group of libraries represented by that value.

If you do not want or need to see a list of libraries, type the name of a library, a generic library name (in the form of ABC*), or one of the following special library names: *CURLIB, *LIBL, *USRLIBL, *ALLUSR, or *ALL.

Note: If you type *CURLIB and you do not have a current library, QGPL is used.

After you have entered a value in the *Library* prompt at the top of the display, press the Enter key and a list of the files that you are authorized to use from that library appears.

If you typed in a generic library name or special library name, a *Library* column appears on the display so that you are able to determine in which library a particular file resides.

```
                              Select File

Library . . . . . .    CUST*         Name, *LIBL, F4 for list
Subset  . . . . . .    __________    Name, generic*
Position to . . . . .  __________    Starting character(s)

Type option (and File and Library), press Enter.
  1=Select

Opt  File          Library               Opt  File          Library
 _   __________    __________
 _   CUSTMAST_1    CUSTINV                _   CUSTRELFEB    CUSTREL
 _   CUSTMAST_2    CUSTINV                _   CUSTRELJAN    CUSTREL
 _   CUSTMAST_3    CUSTINV                _   CUSTRELMAR    CUSTREL
 _   EXAMPFILE1    CUSTINV
 _   EXAMPFILE2    CUSTINV
 _   INVMAST       CUSTINV
 _   TESTFILE_A    CUSTINV
 _   TESTFILE_B    CUSTINV


                                                                    Bottom
F4=Prompt       F11=Display text           F12=Cancel      F24=More keys
```

If a *Library* column is present, you can specify a library name, generic library name, or special library name in the *Library* prompt in conjunction with a typed-in option number and file name to complete a file selection. If you typed a generic name or special library name in the *Library* prompt, it will be resolved to the name of the first library (in the specified group of libraries) that contains a file with that name.

To see a smaller group of file names, move the cursor to the *Subset* prompt and type the starting characters followed by an asterisk (*) to identify the group you want to see, and press the Enter key. All the files whose names begin with those characters in the specified library or library group are shown. (If no * is used, only the file(s) with the specified name is shown.)

To return to the complete list of file names, blank out this prompt (or put an * in it) and press the Enter key.

To move (position) the list of file names so that it starts with a particular name, move the cursor to the *Position to* prompt and type all of the characters or one or more of the starting characters in the name you want, and press the Enter key. (Do *not* add an * after the starting characters in this prompt.) If a specific library name is used in the *Library* prompt, Query moves the list so that the first position shown contains the first file name that starts with the characters you typed.

If there is no file name in the list that starts with those characters, Query moves the list to the name closest to, and in front of, the position where the name would have appeared. If a special library name or generic library name is used in the *Library* prompt, the list is repositioned only if the *Position to* prompt value exactly matches a complete file name.

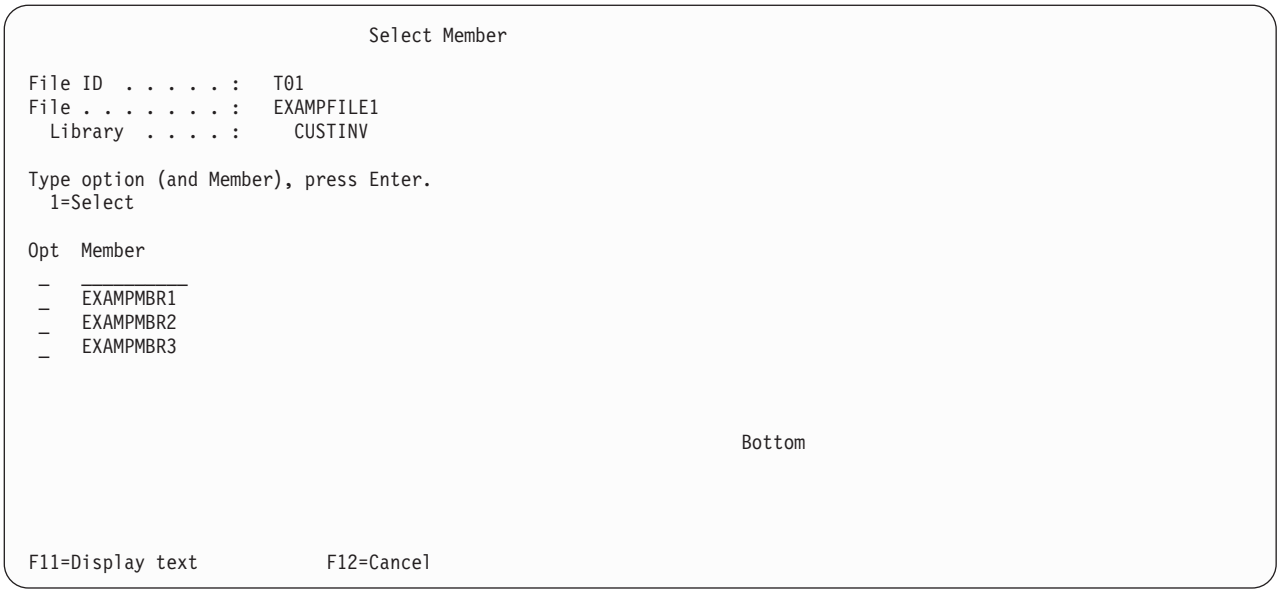
Use F11 to alternate between showing a list of only file names to showing a list of both file names and text describing the files.

Once you have located the files you want, type a 1 beside each file name (if more than one is allowed), including the file name in the top position in the list. If you are selecting multiple files, you can select as many 32 files, *including* those previously selected for this query. Note that if join logical files are used, you are only able to select less than 32 files because each file used in the join logical file is counted as one of the 32 files. For example, if three physical files were joined into one join logical file, this join logical file is counted as three files, not one.

After you have made your file selections, press the Enter key to return to the Specify File Selections display. All the files you selected are added to the file selections, if any, that were there previously. (Any blanked out file selections are filled in first and new ones are added at the end as needed.) The files are added, each with its own group of file selection prompts, in the same order as they existed on the Select File display. They are also assigned file IDs to match the number of the file selection or, if that number is taken, to the lowest possible value that is available in the range of T01 through T32, which you can change if you wish.

Selecting file members on the Query for iSeries Select Member display

The Select Member display appears when you position the cursor on the *Member* prompt of a display and press F4 (Prompt). The Select Member display shows you a list of members and allows you to select the one from which your query can obtain data or the one to which the output from your query is received. This display appears only when you are creating or changing a query definition.



If you came from the Specify File Selections display or Specify Dependent Value Qualifiers display, you can specify which member you want your query to get data from. If you came from the Define Database File Output display, you can specify which member you want the query data to be put into.

At the top of the display, the *File ID* field is shown if you came here from the Specify File Selections display. The file ID is the file identifier of the file that is shown in the *File* field. This file is the one for which you want to choose a member. The *Library* field shows the library in which the file is stored.

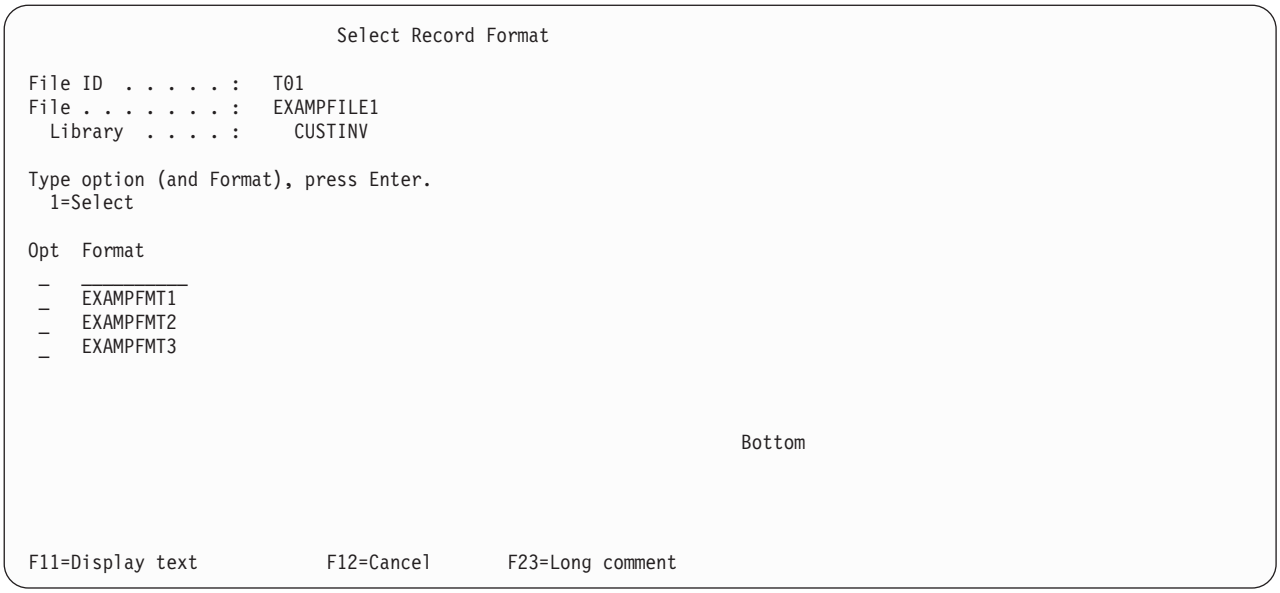
The names of the member that currently exist in the file shown at the top of the display are shown in the *Member* column. You can choose a member by either typing a 1 in the *Opt* column to the left of the member or by typing a member name (and a 1 in the *Opt* column next to it) in the first position in the list. If you specify a member name in the top position, that member must also exist at this time. If you specify `*FIRST` or `*LAST`, the member name on the previous display is changed to that value. Then, either the first or the last member that exists in the file at the time the query is run is the member that is used. If you came from the Define Database File Output display, you can also specify `*FILE` in the first position in the list.

You can use F11 to alternate between showing a list of only member names to showing a list of both member names and text describing the members.

When you press the Enter key on the Select Member display, the member that you specify is then shown in the *Member* prompt on the display that you return to. If you return to the previous display without selecting or specifying a name, the previous member name or value is not changed.

Selecting record formats on the Query for iSeries Select Record Format display

The Select Record Format display appears when you position the cursor on the *Format* prompt of the Specify File Selections display and press F4 (Prompt). The Select Record Format display shows you a list of record formats from which you can select the one you want your query to use with a selected file member. This display appears only when you are creating or changing a definition.



At the top of the display, the *File ID* field shows the file ID of the file that appears in the *File* field. This file is the one for which you want to choose a record format. The *Library* field shows the library in which the file is stored.

The names of the record formats that you can select for the file shown at the top of the display are shown in the *Format* column. You can choose a record format by either typing a 1 in the *Opt* column to the left of the record format or by typing a record format name (and a 1 in the *Opt* column next to it) in the first position in the list.

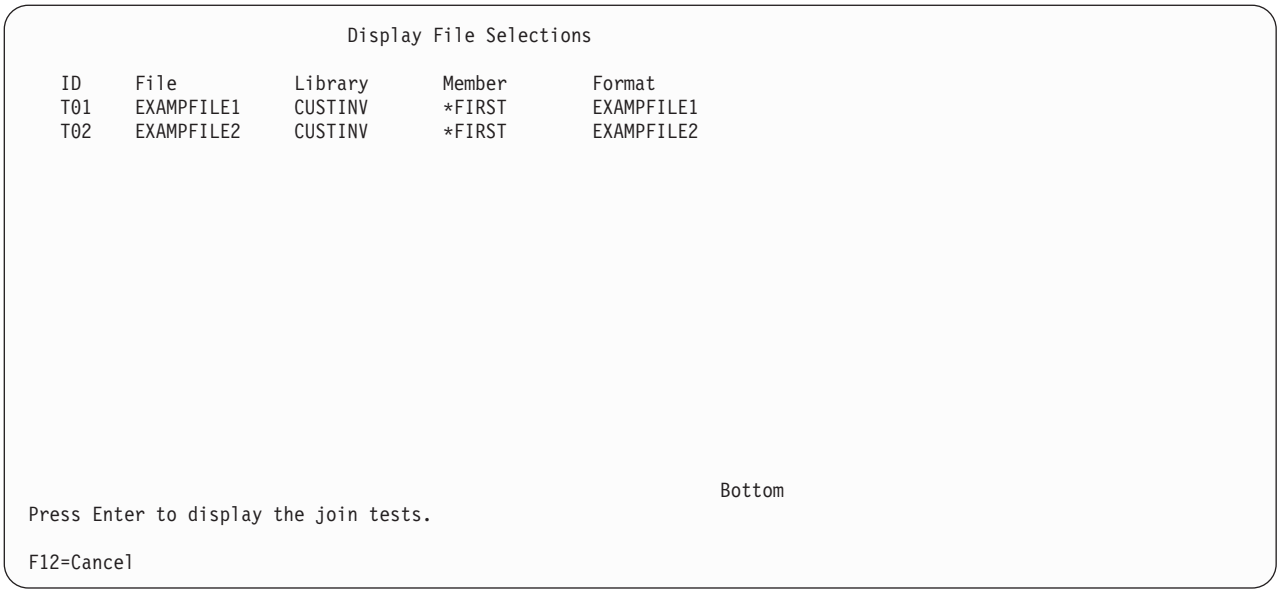
If you specify a record format name in the top position, that record format must also exist at this time. If you specify `*FIRST`, the format name on the previous display is changed to the actual name of the first record format in the file. It is possible that some record formats cannot be used with certain file members, but this is not determined until the Specify File Selections display is processed.

You can use F11 to alternate between showing a list of only record format names to showing a list of both record format names and text describing the record formats.

When you press the Enter key, you return to the Specify File Selections display, and the name of the format that you selected is shown in the *Format* prompt that you came from. If you return to the previous display without selecting or specifying a name, the previous record format name or value is not changed.

Displaying all files selected on the Query for iSeries Display File Selections display

The Display File Selections display appears when you press F18 (Files) from a display where F18 is listed on the bottom of the display. The Display File Selections display shows all the files that you selected for use in the query. For each file, this display shows you the file ID, the library containing the file, and the file member and record format that are to be used. The information on this display is for your information only; it cannot be changed here.



If multiple file selections are shown, you can press the Enter key to show the join type and all the join tests for these same files. However, if you came to this display from the Specify File Selections, Change File Selections, Specify Type of Join, or Specify How to Join Files display, the Enter key returns you to the previous display. F12 and the Enter key (*not* F18) can be used to alternate between the Display Join Tests display and this display.

Joining files in a Query for iSeries query

Once you have used the Specify File Selections display to select all the files that you want used for your query, if more than one file was selected, you must tell Query how you want to join the files when they are used to get data from their fields. You use the following two displays to specify all the join specifications for your query:

- The Specify Type of Join Files display allows you to specify the type of join you want to use. There are three ways that you can join the files for selecting the records you want.
- The Specify How to Join Files display allows you to indicate the fields to be used to join the files. You specify which fields are to be used and how they are to be compared with fields in the other files.

For a record to be selected, the join specifications for *all* the files are used to determine whether a matching record exists in each of the files joined in the query. A match occurs when, for each specified file, the contents of its fields selected for comparison match the test condition(s) given on the Specify How to Join Files display. Depending on whether there is a match and which type of join is specified on this display, the records are then selected and used in the output as determined by the other *join specifications* given on the Specify How to Join Files display and the *record selection specifications* given on the Select Records display.

When Query determines that a record is to be selected from the specified files, it uses the data in all the fields and files selected for the query to produce a single output record. This output record is included in the query report or in an output database file.

Types of joins in a Query for iSeries query

```
                      Specify Type of Join

Type choice, press Enter.

  Type of join . . . . . .   1      1=Matched records
                                     2=Matched records with primary file
                                     3=Unmatched records with primary file

F3=Exit            F5=Report          F10=Process/previous
F12=Cancel         F13=Layout         F18=Files
```

There are three types of joins, or three ways that you can select matched or unmatched records from the specified files. You can:

- Select only records that have matching records in *all* the specified files.
- Select *all* primary records, and include all matching secondary records. Primary records exist in the primary file. The primary file is the first file selected on the Specify File Selections display. Secondary records exist in secondary files. Secondary files are all of the files selected after the primary file on the Specify File Selections display. After the join is done, the record selection tests, if any, are applied to determine which records are selected.
- Select only the primary records that have one or more *unmatched* secondary records, and include all the secondary records that also match.

All three types of joins use the same join fields and join tests specified on the Specify How to Join Files display. They also all use the other specifications in the query definition the same way to select records and produce the output.

Use the second join type (type 2) if you want to use every record in the primary file, whether or not it has a matching record in the secondary file(s).

Use the third join type (type 3) if you want to see which records in the primary file do not have matching records in the secondary file(s).

How to join files in a Query for iSeries query

Use the Specify How to Join Files display to specify the join tests needed when more than one file has been selected for your query. Use this display to tell Query how to join (combine) the files and record formats by specifying pairs of fields with a test value; each test value indicates how those fields must compare before Query can select the record. The result of every test in the join specifications must be true before the matching records in each of the files are joined as one record for the record selection tests that follow.

When comparing character values, all values must be marked with compatible CCSIDs. When comparing SBCS character values, all values and any collating sequence to be applied must be marked with compatible CCSIDs.

Note: See “CCSID and join tests in Query for iSeries” on page 252 for information on how CCSIDs can affect your join selections.

```
                     Specify How to Join Files

Type comparisons to show how file selections related, press Enter.
  Tests:  EQ, NE, LE, GE, LT, GT

Field             Test     Field
_______________   _____    _______________
_______________   _____    _______________
_______________   _____    _______________
_______________   _____    _______________
_______________   _____    _______________
                                                                  Bottom
_____________________________________________________________________

Field              Field
A.NBR              B.NAME
A.NAME             B.PHONE
A.ADDR             B.SERIAL#
A.ZIP
B.NBR
                                                                  Bottom
F3=Exit        F5=Report     F10=Process/previous     F11=Display text
F12=Cancel     F13=Layout    F18=Files                F24=More keys
```

For each test, you specify two fields to be tested and the test value to be used. Look for a field in one file that contains the same (or similar) information that can be found in a field of the other file, such as a name or identification number. Specify the names of the fields (including their file identifiers, if needed) on either side of the test value.

For example, if you specify the EQ (equal) test value between two fields, the test result is true if both fields contain the same value. (The EQ value is almost always used.)

Field	**Test**	**Field**
A.NAME	EQ	B.NAME

In this example, both fields are named NAME, so the file identifiers (A and B) are included with the field names.

Rules for joining files in a Query for iSeries query

Note: To indicate that you do not want to specify join tests, use the *ALL join. All records from one file are joined to all records in the secondary file or files without any kind of selection.

The rules for join tests are:

- For two files to be selectively joined, they must have at least one field in common. (Note that having a field in common does not mean that the field names are the same.) This is also true for logical database files, even though they may be based on fields with different names in the physical file over which the logical file is created.
- If you select option 2 (Matched records with primary file) or option 3 (Unmatched records with primary file) on the Specify Type of Join display, the combined length of fields used in the join test must be less than or equal to 2000 bytes. For DBCS fields, each DBCS character counts as two bytes. If fields contain bracketed-DBCS data, the shift characters are counted in the length.
- You can only use the EQ test value to join any of your selected files to a join logical file.
- Fields in each join test must come from different files.
- You can use more than one test for a given pair of files. If you specify option 2 or 3 (both using a primary file) in the *Type of join* prompt on the Specify Type of Join display, the test values must be the same for all the tests used in that pair of files.

- A field name must be preceded by a 1- to 3-character file identifier if that field name is used in more than one file selected for the query.
- You can specify up to 100 join tests.
- For a matched-record join, if one or both fields in a join test are null, the records are not joined.
- The data in both fields of a join test must be the same type (for example, both character), except that date, time, or timestamp fields can be compared to SBCS character, DBCS-either, or DBCS-open fields that contain a correct representation of a date, time, or timestamp. Dates in character fields must be either in the date format of the query or in an SAA® format— the SAA format is recommended. Date, time, and timestamp fields are identified by an L, T, or Z, respectively, in the *Dec* column of the field list.

  Note: When comparing a date, time, or timestamp field with an SBCS, DBCS-either, or DBCS-open character field, use a character field for which each value can be recognized as an SAA formatted date, time, or timestamp. If the character field contains a correct representation of a date, time, or timestamp but in other than an SAA format, you may get unexpected results. When you run a query that uses a non-SAA format for date, time, or timestamp values in character fields, and query has no setting for a non-SAA literal date value, use the CHGJOB command to make sure your job date format and separator match the format and separator in the character field values.

  If some of the fields contain bracketed double-byte characters, you can use these DBCS fields for both fields, or you can use an SBCS character field for one field and a DBCS-either or DBCS-open field for the other field. Bracketed-DBCS fields are identified by a J, O, or E in the *Dec* column in the list of fields. Press F11 to see the *Dec* column if it is not currently shown.

  A DBCS-graphic field can be compared only to another DBCS-graphic field. DBCS-graphic fields are identified by a G in the *Dec* column. Collating sequence is not applied to DBCS-graphic fields used in join comparisons.

  Valid comparisons for join tests are:
  - Numeric field with numeric field
  - SBCS character field with:
    - SBCS character
    - Date
    - Time
    - Timestamp
    - DBCS-either
    - DBCS-open
  - Date field with:
    - Date
    - SBCS character
    - DBCS-either
    - DBCS-open
  - Time field with:
    - Time
    - SBCS character
    - DBCS-either
    - DBCS-open
  - Timestamp field with:
    - Timestamp
    - SBCS character

    - DBCS-either
    - DBCS-open
  - DBCS-either field with:
    - SBCS character
    - Date
    - Time
    - Timestamp
    - DBCS-either
    - DBCS-open
    - DBCS-only
  - DBCS-open field with:
    - SBCS Character
    - Date
    - Time
    - Timestamp
    - DBCS-either
    - DBCS-open
    - DBCS-only
  - DBCS-only field with:
    - DBCS-either
    - DBCS-open
    - DBCS-only
  - DBCS-graphic field with:
    - DBCS-graphic
  - UCS2-graphic field with:
    - UCS2-graphic
- Only the data fields specified in the join specifications for each file are used to join the files. For the purposes of joining the files, the other fields in the files are ignored.
- Character fields of different lengths can be joined.
- A fixed-length character field can be compared to a variable-length character field. Variable-length fields are identified by a V in the *Dec* column in the list of fields.
- If you specified option 1, matched records, on the Specify Type of Join display, you can type `*ALL` in the first four spaces of the left field, but only in the first field name position, rather than specifying any join test. If *ALL is used, each record in the first file is joined to *every* record in the other files. For example, if a file of 2000 records is joined to a file of 3000 records using *ALL, the result is a joined file of 6000000 records. Using *ALL can significantly degrade the performance of your query. If join tests are not specified between each file, those files without a test are joined using the *ALL method.

Note: The fields you use to join the files do **not** have to be used in selecting the records or included in the query report. You can use those same fields in other ways in the query definition, such as for record selection or as part of the output of the query.

Examples of joining files in a Query for iSeries query

Consider an example where you want to join a master name and address file named `RESIDENTS` to a name and telephone number file name `PHONELIST`.

RESIDENTS File (File A)

NBR	NAME	ADDR
1	Ruth A Anderson	226 W 2nd St
2	Jane L Johnson	123 Park Dr
3	Susan M Jones	Box 333 Rt 1
4	Richard A Klein	978 N 9th Av
5	James A Kryka	421 S 1st Av
6	Sam K Smith	16 N Broadway

PHONELIST File (File B)

NBR	NAME	PHONE
1	Ruth A Anderson	744-1017
3	Susan M Jones	327-1234
4	Richard A Klein	744-9922
4	Richard A Klein	744-9988
5	James A Kryka	327-1547

You can obtain several different results from a file join when you use different combinations of join tests and options on the Specify How to Join Files display.

Following are some examples of how you might use the three different types of joins. All of the examples assume that A.NAME EQ B.NAME was specified on the Specify How to Join Files display.

Example: Selecting matched records from all selected files in a Query for iSeries query

Type a 1 if you want records selected from each file only if they have a match with at least one record in each and every one of the other selected files. That is, for a record to be selected, *all* the files must have a matching record as determined by the join specification(s). A match occurs when, for each file used in the query, the contents of its fields selected for comparison match the test condition(s) given on the Specify How to Join Files display. (This type, option 1, has no primary or secondary files; all files are treated equally.)

In this example, if you join files A and B using option 1 (Matched records), the query report contains the following records. (The report fields and layout are not important here.)

RESIDENTS File (File A)

NBR	NAME	ADDR
1	Ruth A Anderson	226 W 2nd St
2	Jane L Johnson	123 Park Dr
3	Susan M Jones	Box 333 Rt 1
4	Richard A Klein	978 N 9th Av
5	James A Kryka	421 S 1st Av
6	Sam K Smith	16 N Broadway

PHONELIST File (File B)

NBR	NAME	PHONE
1	Ruth A Anderson	744-1017
3	Susan M Jones	327-1234
4	Richard A Klein	744-9922
4	Richard A Klein	744-9988
5	James A Kryka	327-1547

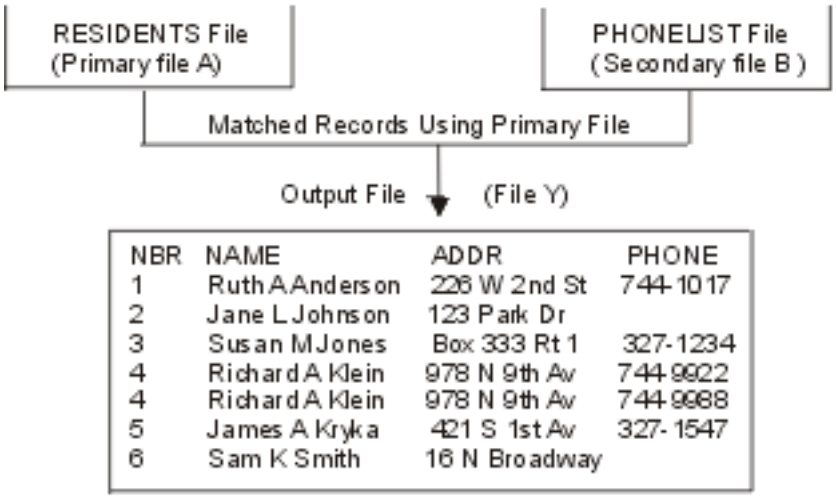
Matched Join

Output File (File X)

NBR	NAME	ADDR	PHONE
1	Ruth A Anderson	226 W 2nd St	744-1017
3	Susan M Jones	Box 333 Rt 1	327-1234
4	Richard A Klein	978 N 9th Av	744-9922
4	Richard A Klein	978 N 9th Av	744-9988
5	James A Kryka	421 S 1st Av	327-1547

Example: Selecting matched records using a primary file in a Query for iSeries query

Type a 2 if you want to include in the query output *every* record in the primary file and all the matching records from all the other (secondary) files, whenever they exist. Every record in the primary file is selected whether or not it has a match. (The primary file is always the one that was selected first in your query definition.) Exception: if a field from the primary file used in a join test is null, the primary record is not selected.



In this example, the RESIDENTS file is the primary file, so all of its records (numbered 1 through 6) are included in the query report, assuming all of the records meet the selection tests on the Select Records display. The PHONELIST file is the only secondary file being used, and it supplies a telephone number for each primary record that it matches; the NAME field is used as the comparison test field in both files. Note also that record 4 is included twice in the report, because Richard A Klein has two records, each with a different telephone number, in the secondary file.

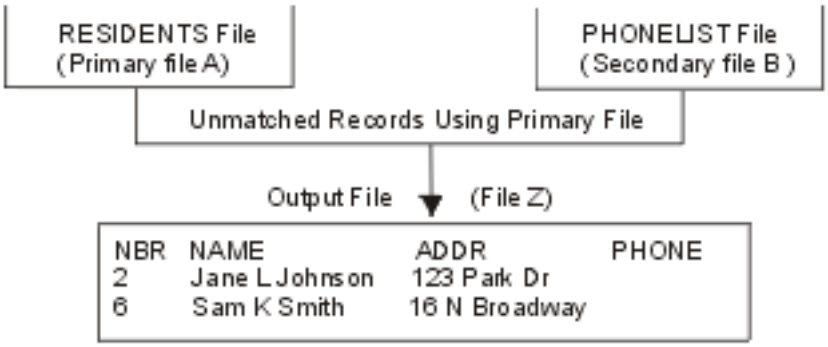
If a secondary file does not have a record that matches the join specifications of the primary file's record, blanks (for character fields), zeros (for numeric fields), or January 1, 0001 (for date fields) are used as data for that secondary file's selected fields. If these fields are included as output fields in the query report, the substituted characters or values are used in the report. In the example, the PHONE field shows blanks because it was coded as a character field. In the case where the fields are null-capable, the specified default values are used as data for that secondary file's selected fields. If a default value is not specified, a null value is shown as a dash (-).

Note: If the secondary file was defined using DDS, values other than blanks zeros, and January 1, 0001 can be used when the DFT keyword defines default values for any of the fields. If the DFT keyword specifies a default value for a field that is used in the query report, the default value is substituted in the report when the secondary file does not have a matching record.

Example: Selecting unmatched primary file records in a Query for iSeries query

Type a 3 if you want to select, in the primary file, only records that lack matches in at least one secondary file. That is, you want to select every primary record that does not have a matching record in *all* the secondary files. For example, if four files were joined and only two of the three secondary files had matching records, then a record containing the selected information in the primary and two matching secondary files (and the default data, if any, from the unmatched secondary file) is included as a single record in the query output.

This type of join is typically used to list records that are missing in one or more secondary files.



In our example, the RESIDENTS file is still the primary file, so only its records that do not have a matching secondary record are included in the query report. The PHONELIST file has two such unmatched records; the residents identified in records 2 and 6 do not have a telephone number, so there are no records for them in the secondary file. (The NAME field is used again as the comparison test field in both files.)

As with the previous type of join, blanks (for character fields) or zeros (for numeric fields) are used as the data for a missing record in a secondary file's selected fields. Or, if the DDS DFT keyword was used to define default values, those default values are used instead. (In our example, the PHONE field shows blanks, since it was coded as a character field and no DFT value was defined for the PHONE field.)

Sequencing secondary files for a primary join in a Query for iSeries query

The order in which you specify secondary files on the Specify File Selections display is important for some joins.

Specifically, the order of secondary files is important if *all* of the following are true:

- The join type is 2 (primary matched) or 3 (primary unmatched). Both types have one primary file, followed by secondary files.
- The query specifies three or more files in all.
- One or more secondary files do not have join tests connecting them to the primary file.

If these points apply to your query, then follow the secondary file sequence rule:

Use join tests to connect each secondary file to a file listed above it on the Specify File Selections display.

For instance, when joining four files, use a join test to connect the second file to the first, and use another test to join the third file to the first or second file. The fourth file can be connected to any of the other files.

Example: Sequencing secondary files in a Query for iSeries query

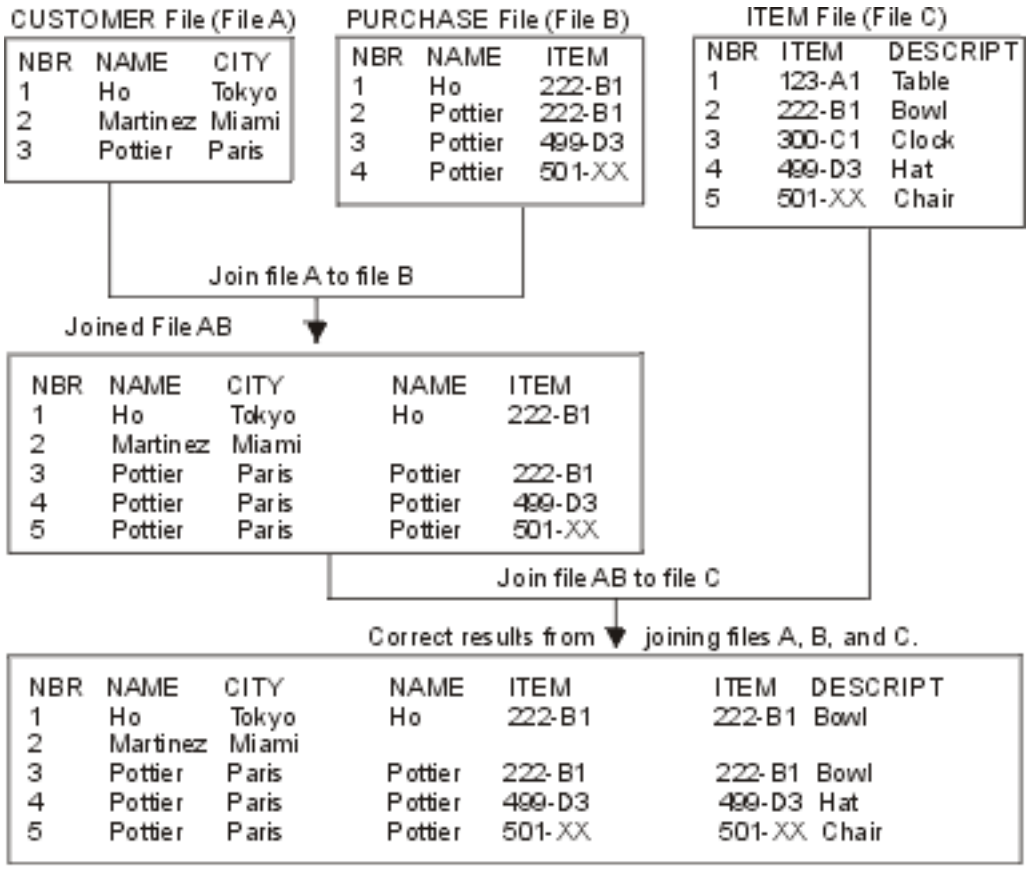
To show how the secondary file sequence rule ensures that you get the desired results when you join more than two files, the following example uses three files in two ways, correctly and incorrectly. The first method, the correct method, produces *five* records when the files are joined. The incorrect method produces 15 records. The only difference between the methods is that the order of the second and third files is changed. For primary joins, Query joins files in the order indicated on the Specify File Selections display, not in the order indicated by the join tests.

Three files named CUSTOMER, PURCHASE, and ITEM are to be joined so that a report can be produced that lists each customer's name and city, the item purchased (one item per line in the report), and a description of the item. (For example, if Monique Pottier bought three items, the report should have three lines for her, with each line listing her name, city, one item, and the item description.) If the customer did not make any purchases, the report should include the customer once in the list with blank item and description fields.

Correct method:

On the Specify File Selections display, type the CUSTOMER file first, the PURCHASE file second, and the ITEM file third. Specify the file IDs A, B, and C, respectively. The join type is 2 (Matched records with primary file). The join tests are:

```
A.NAME    EQ    B.NAME
B.ITEM    EQ    C.ITEM
```



Query performs the file join in two steps:

Step 1: Join the first two files, A and B.

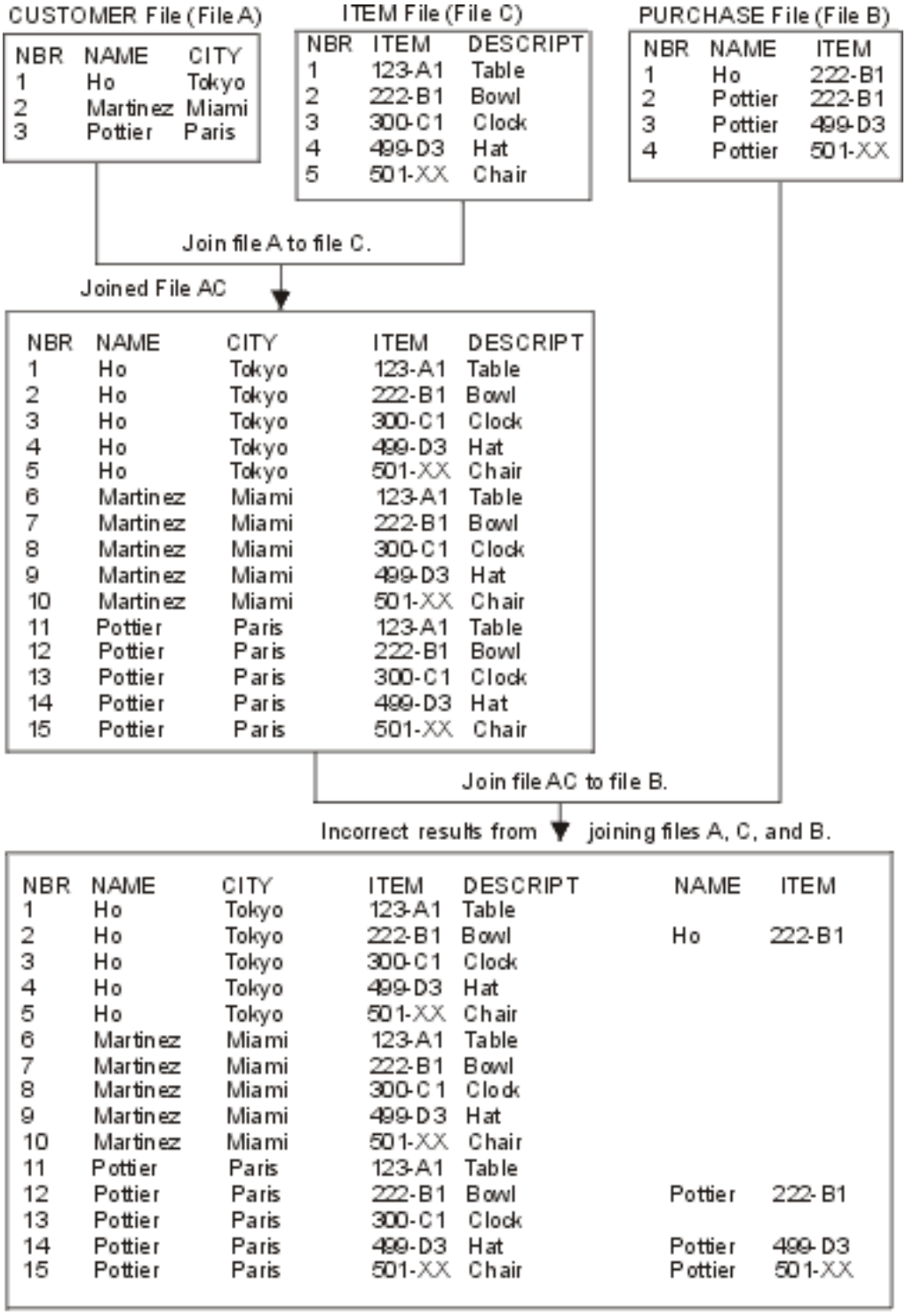
Query joins the files in the order listed, starting with file A (CUSTOMER), and file B (PURCHASE). Query joins each record in file A to any record in file B for which the NAME field in A is equal to the NAME field in B. Because this query is join type 2 (primary matched), every record in the primary file A is included in the join. If a record in file A (such as Martinez) has no match in B, Query joins it to a default record for file B, which has blank values for fields. The result of step 1 in our example is a file called AB. (Note that AB is a working file used to build the joined file that you want in your report. You cannot see file AB.)

Step 2: Join file AB to file C.

Query joins each record in file AB to every record in ITEM file C for which B.ITEM equals C.ITEM. If a record in AB (such as Martinez) has no match in file C, Query joins it to a default record for file C, which is also blank. This completes the join operation. Each record in primary file A is represented one or more times in the five records.

Incorrect method:

On the Specify File Selections display, type the CUSTOMER file first, and specify the file ID as A. Type the ITEM file second (file C), and the PURCHASE file third (file B), which is in the opposite order from the correct method. Note that each file has the same file ID as before. Specify the join type and join tests the same as before. This method does not follow the secondary file sequence rule because file C is not connected by a join test to the file (A) listed above it.



Query performs the file join in two steps:

Step 1: Join the first two files, A and C.

Query joins the files in the order listed, starting with file A (CUSTOMER), and file C (ITEM). But there is no join test that compares a field in A to a field in C. Query joins every record in file A (one record at a time) to

every record in file C. Because there are three records in A and five records in C, the result is 15 records. The join tests are not used in this step. The result of step 1 this time is a working file called AC.

Step 2: Join file AC to file B.

Query joins each record in file AC to every record in PURCHASE file B for which A.NAME equals B.NAME and B.ITEM equals C.ITEM. If a record in AC (such as Martinez) has no match in B, Query joins it to a default record for file B, which is blank. This completes the join operation.

The incorrect method produces 15 records, which is 10 too many. Each customer has five records, one for each item description, even if the customer made no purchases. Note that if the ITEM file has 1000 records instead of five, the correct method still selects five records, but the incorrect method selects 3000 records. Also, the ITEM and DESCRIPT values for Martinez are not blank as they should be.

In summary, this problem does not affect queries with join type 1 (matched), queries with just two files, or queries that use the primary file in each join test. In this example, the logical order to specify files is CUSTOMER, PURCHASE, and ITEM, with PURCHASE in the middle because it is the connection between the CUSTOMER and ITEM files. This logical order is also the correct order.

Displaying all join tests in a Query for iSeries query

When you press the Enter key on the Display File Selections display (see “Displaying all files selected on the Query for iSeries Display File Selections display” on page 41), the Display Join Tests display is shown. The information on this display is for your information only; none of the entries can be changed here. (The following display shows some sample information.)

```
                            Display Join Tests

Type of join . . . . . :   Matched Records

Field             Test     Field
A.NAME            EQ       B.NAME

                                                                  Bottom
Press Enter to continue.

F12=Cancel
```

The Display Join Tests display shows:

- The type of join being used to join all the files in the query. One of three join types can be specified:
  - Matched records
  - Matched records with primary file
  - Unmatched records with primary file

  The primary file, used in the last two types, is the first file listed on the Display File Selections display. For more information, press F11 (Search index), type *joining files* as the index search words, then press the Enter key.
- The join tests being used to join the files.

The *Field* columns show the fields being used to join the files. Each field name can have two parts: the file ID and the actual name of the field, separated by a period. For example, if a field named CUSTNUM exists in files T01 and T02 used in this query, they would be shown as T01.CUSTNUM and T02.CUSTNUM. To find the files associated with the file IDs (such as T01), press F12 to show the Display File Selections display.

The *Test* column shows the test values that determine how the files are to be joined.

Handling missing fields in a Query for iSeries query

The Fields Missing from File Definition display is shown when report fields (that is, fields used in the report) that were in a file selection used by the query are now missing from that file selection. Fields that are missing from files originally selected in a query can cause errors or give you bad results when the query is run. They may have been used, for example, to define result fields or to select or sort records in addition to being selected for output.

```
                    Fields Missing from File Definition

Query  . . . . . :   QRY1              Option . . . . . :   Change
  Library. . . . :   LIB1
File . . . . . :   FILEA
  Library. . . . :   LIBA
Format . . . . . :   FMT1
File ID  . . . . :   T01

The following fields may have been used in the query, and were expected
in this file definition, but were not found.

Field
NAME
ADDR
PHONE
SERIAL#



Press Enter to continue recovery of query definitions.

F12=Cancel
```

This display is shown at least once for each file selection that has missing fields. Once you are aware that fields are missing, you may want to press F12 (Cancel) to bypass seeing any additional displays of missing fields. Or, if you want to see which of the other file selections may have missing fields, use the Enter key to see each display, one after the other. You might also want to return to a previous display and use F5 (Report) to run the query and see how the report is affected by the missing fields.

Either you must remove the fields from wherever they are used in the query definition, or you must select different files or formats that contain those fields. Or, you can leave Query and check the files or formats themselves. If this display appeared when you first started to change or display a query, something may have changed in the files or formats since the query was created or last changed. For example, a record format definition may have had one or more of its fields deleted, or an IDDU-defined file may have been linked to a dictionary definition but is now unlinked or is linked to a different definition.

The situations that can cause this display to appear are:

- When you specify a different file selection. This can occur while you are changing a query or are defining a *new* query that already has file selections specified.
- When you *start* to change or display an existing query definition.

Handling missing fields during file selection process of a Query for iSeries query

While you were changing a query, or were defining a new query that already had file selections specified, you chose the *Specify file selections* option on the Define the Query display. Then, on the Specify File Selections display, you selected a file or format that does not have all of the report fields that your first selection contained. As a result, this display was shown with the missing fields.

For this situation, when you press F12 or the Enter key, you return to the Specify File Selections display without affecting your previous file (and format) selections. Once there: you can still confirm the file selections and continue by pressing the Enter key (even though Query found fields missing in the current file selections); you can specify a different file on the display and then press Enter; or you can press F12 to leave the file selections unchanged and then leave Query to go do something about the file (or format) definitions.

If you choose to press the Enter key as soon as you return to the Specify File Selections display, confirming that you want to use the current file selections, Query uses as much of the file, format, and field information as it can for the file selections now in this query. It removes all the missing fields from the query definition for *some* of the definition steps, such as *Select and sequence fields* and *Select sort fields*. When you select a logical file for use with Query or DB2 UDB for iSeries programs without specifying any sort fields, unpredictable results may occur. For example, you may not receive the logical view of the physical file.

After Query has done all it can, it shows the Specify How to Join Files display if the query uses multiple files and there are errors caused by missing fields; otherwise, it continues with the definition steps selected on the Define the Query display, or it returns you to the Define the Query display. On the Define the Query display, any other field-related definition steps affected by the missing fields are shown in reverse image. You must select each of these definition steps, such as *Define result fields* and *Select records*, and correct the problems caused by the missing fields. On the definition displays for the affected steps, the expressions or selection tests that use fields that are now missing are highlighted.

Handling missing fields when starting to change or display a Query for iSeries query

When you started to *change* or *display* an existing query (by specifying option 2 or 5 on the Work with Queries display), one of the following occurred:

- Query determined that one or more report fields are no longer in a file or format used by the query; the fields have been removed since the query was defined or was last changed.
- Query found a file that was unusable (for example, the query may have been migrated from another system but a file containing the fields was not) and showed the Change File Selections display. On that display, you selected a different file to correct that problem, but its record format does not have all of the fields that your first selection contained.

For these two situations, when the Fields Missing from File Definition display is shown, you can either press F12 or press the Enter key:

- If you choose to press the Enter key, you might see the Fields Missing from File Definition display again if there are additional missing fields to be displayed for this or another file. If not, Query uses as much of the file, format, and field information as it can for the file selections now in this query. It removes all the missing fields from the query definition for *some* of the definition steps, such as the *Select and sequence fields* and *Select sort fields* steps. When you select a logical file for use with Query or DB2 UDB for iSeries programs without specifying any sort fields, unpredictable results may occur. For example, you may not receive the logical view of the physical file.

  After Query has done all it can, it shows the Define the Query display. On it, other field-related definition steps affected by the missing fields are shown in reverse image. You must select each of these definition steps, such as *Specify file selections*, *Define result fields*, and *Select records*, and correct the

problems caused by the missing fields. You must also ensure that none of the fields were used in break test values on the Format Report Break display. On the definition displays for the affected steps, the expressions or selection tests that use fields that are now missing are highlighted.

- If you press F12 (Cancel), you return to the Work with Queries display without affecting your previous file (and field) selections. You can press the Enter key to go again (assuming you were there once) to the Change File Selections display and select another file. Or, you can press F3 (Exit) to stop working with queries, leave Query, and then work with the files or formats.

Chapter 5. Defining result fields in Query for iSeries

This chapter describes how you define result fields. They need to be defined in your query if the information that you want to present in your report does not exist as a field in your selected file(s). For example, you want your report to show the number of days, but your database file only has a field containing the number of weeks. You can define a result field that contains the number of days by creating an expression that performs a calculation on the number of weeks.

After you have defined a result field, you can use it like any other field that exists in your selected file(s). You can include the result field in your output, you can use it to define another result field, you can use it as a sort field, and so on.

While you are defining result fields, a list in the lower part of the display assists you by showing the names of fields in the files selected for your query. If you want to see additional information about each field such as descriptive text, length, and decimal positions, use F11 (Display text) to switch between the multiple-column list and the single-column list. This information is very useful when you are deciding on a result field name and when you are building your expressions. The page keys will present all the fields available, four at a time. For more information on using F11, see “Using F11 to display additional information about Query for iSeries queries” on page 15.

In most cases, the result fields that you define appear in your query output, but selecting them for output is optional since some result fields are only needed as an intermediate step to obtain a final result. For example, you might define a result field only for the purpose of selecting records, and you do not want the result field to appear on the report.

Creating results fields in Query for iSeries

The Define Result Fields display appears if you typed a 1 next to the *Define result fields* option on the Define the Query display. You use the Define Result Fields display to create the result fields that you need for your query. (The following display has some sample fields listed in the bottom part.)

```
                        Define Result Fields

Type definitions using field names or constants and operators, press Enter.
  Operators:  +, -, *, /, SUBSTR, ||, DATE...

Field       Expression                        Column Heading          Len Dec
__________  ________________________________  ____________________  _____  __
            ________________________________  ____________________
            ________________________________  ____________________

__________  ________________________________  ____________________  _____  __
            ________________________________  ____________________
            ________________________________  ____________________
                                                                   Bottom
_____________________________________________________________________________
Field             Field             Field             Field
ACCTNUMBER        STREETADDR        TELENUMBER        DATELASTPD
LASTNAME          CITY              CRLIMIT
INIT              STATE             BALDUE
COMPANY           ZIPCODE           PASTDUE
                                                                   Bottom
F3=Exit         F5=Report          F9=Insert         F11=Display text
F12=Cancel      F13=Layout         F20=Reorganize    F24=More keys
```

To define a result field, you specify a unique name for the result field by entering a name in the *Field* column on the Define Result Fields display. You *cannot* specify the name of a field that exists in your selected file(s)—the list in the lower part of the display shows you these field names. To page through the field list, position the cursor in the list part of the display and use the page keys. (A one-word indicator

always appears below and to the right of the list to tell you where you are in the list. *More...* means that there are more items after, and possibly before, the items currently shown. *Bottom* means that you are at the end of the list, but there may be more items before those currently shown.) Use F19 (Next group) to reposition the list at the beginning of the next logical group of fields (the cursor can be anywhere when you use F19). (The first group is selected fields, if any, and the second group is sort fields, if any. If there are not selected fields, then the fields are grouped by file, and within each file grouping, the fields are listed in the order in which they appear in the file definition.)

You can specify the length and number of decimal positions for a numeric result field by filling in the *Len* and *Dec* prompts on this display, or you can have Query determine the length and decimal positions for you by leaving the prompts blank.

You can specify a column heading for any result field. If you leave the prompt blank, the result field name is used as the column heading for the result-field definition.

Query for iSeries result field name

Since Query result field names are similar to database field names, create them according to the following:

- Start the name with an alphabetic character (A through Z, $, #, or @) and use no more than 9 alphanumeric characters (A through Z, 0 through 9, $, #, @, or _) for the remaining characters. Do not use blanks within the name.

  Note: Use A-Z or 1-9 if this query is sent to other systems or used in a multilingual environment.
- Do not use any names from the list on the lower part of the display or the names of other result fields.

Enter an expression that creates the desired value for your result field.

Query for iSeries expressions

In Query for iSeries, an **expression** is a representation of a value with field names, constants, functions, or keywords appearing alone or in combination with operators. It can be either a numeric, character (SBCS or DBCS), date, time or timestamp expression:

- A **numeric expression** assigns numbers or performs an operation (calculation) on them. Numeric expressions can contain the following operators:

  \+ (Addition)

  – (Subtraction)

  * (Multiplication)

  / (Division)
- A **character expression** assigns characters or performs an operation on them. Character expressions can contain the following operators or functions:

  || (Concatenation operator)

  SUBSTR (Substring function)

  VALUE (Value function)

  DIGITS (Digits function)

  Note: See “CCSID and result field expressions in Query for iSeries” on page 252 to see how CCSIDs are handled for the concatenation symbol.
- A **date expression** performs an operation on a date. Date expressions can contain the following operators or functions:

  \+ (Addition)

  – (Subtraction)

  CHAR

  DATE

DAY
DAYS
MONTH
YEAR

- A **time expression** performs an operation on a time. Time expressions can contain the following operators or functions:

  + (Addition)
  – (Subtraction)
  CHAR
  TIME
  HOUR
  MINUTE
  SECOND
  MICROSECOND

- A **timestamp expression** performs an operation on a timestamp. Timestamp expressions can contain the following operators or functions:

  + (Addition)
  – (Subtraction)
  CHAR
  TIMESTAMP

If any argument can be null, the result field can be null. If any argument is null, the result is null.

Query for iSeries numeric expressions

To define a numeric result field (that is, a result field that contains numbers) for your query, you need to follow the rules for creating numeric expressions. A numeric expression for a result field can contain the following, alone or in combination:

- **Numeric field names** (names of fields that contain numbers). You can use the names of numeric fields listed on the lower part of the display (numeric fields have numbers shown in the *Len* and *Dec* columns) and the names of previously defined numeric result fields. For example, you can multiply two numeric fields and put the total in a result field named AMOUNT:

  ```
  AMOUNT = QUANTITY * PRICE
  ```

- **Numeric constants** (any numbers such as 4 or -12.5). The rules for using numeric constants are:
  - The total length can be no more than 31 digits. (For a single-precision floating-point constant, the total length can be no more than nine digits. For a double-precision floating-point constant, the total length can be no more than 17 digits.) This includes the digits both to the left and right of the decimal point but does not include the decimal point. All the digits can be to the right of the decimal point.
  - Use the correct decimal separator. Press F17 to show the decimal separator that must be used (see “Displaying the format of constants in Query for iSeries” on page 17).
  - Do not use a currency symbol (like $5000), and do not use thousands separators (like 5,000).
- **Numeric functions**. The VALUE function returns the first value that is not null. See “VALUE Query for iSeries function” on page 62.

Other examples of numeric expressions for a field named AMOUNT are:

```
QUANTITY
5
5 + 6
5 + QUANTITY
```

When you do more than one calculation within a numeric expression, use parentheses to tell Query in what order to do the calculations and to make the expression easier to understand. If you use nested parentheses for example, `60 * (A - (B + C))`, the calculations are done for the innermost pair first (in the example, `B + C`), then the next innermost pair, and so on. If you do not use parentheses, Query first does multiplication and division, left to right, and then addition and subtraction, left to right. For example, `(5 + 4) * 2` equals 18, but `5 + 4 * 2` equals 13.

Be aware that the result of a numeric expression, especially one containing division and multiplication operations, is truncated or rounded depending on what you specify on the Specify Processing Options display (see Chapter 14, "Specifying Query for iSeries processing options"). If you divide by zero, your query may not run.

Query for iSeries character expressions

To define a character result field (that is, a result field that contains SBCS or DBCS characters) for your query, you need to follow the rules for creating character expressions. A character expression for a result field can contain the following, alone or in combination:

- **Character field names** (names of fields that contain SBCS or DBCS characters). You can use the names of SBCS- or DBCS-character fields listed on the lower part of the display (in the *Dec* column, SBCS-character fields have blanks or Vs (if variable length), DBCS-only fields have Js, DBCS-open fields have Os, DBCS-either fields have Es, and DBCS-graphic fields have Gs) and the names of previously defined SBCS- or DBCS-character result fields.
- **Character constants** (SBCS or DBCS characters enclosed in apostrophes, such as `'ABCdef123'` or `'This text includes blanks and special characters **$$'`). The rules for using character constants are:
  - The character constant must be enclosed in apostrophes.
  - Any combination of letters, numbers, or special characters (for example, $ or #) can be used.
  - If two apostrophes are used *within* a character string, the two apostrophes become a single apostrophe in the output. For example, `'October's Profits'` becomes `October's Profits`.
  - Words with lowercase and uppercase letters are used exactly as typed.
  - If a character constant represents a valid date, time, or timestamp, and is used with a date, time, or timestamp field, it is considered a date, time, or timestamp constant.
  - A DBCS character constant must include DBCS shift-out and shift-in characters, represented by the characters < and > in the following example: `'<D1D2D3>'`. A DBCS-graphic character constant must be preceded by an uppercase or lowercase G, for example, `G'<D1D2D3>'`.
- **Character operators and functions** (one or more concatenation operations and character functions SUBSTR, DIGITS, and VALUE—see "Query for iSeries character functions" on page 61).

Query for iSeries concatenation operation

Character expressions can include one or more concatenation operations. Concatenation operations must be specified in the form:

- *Value-1* and *Value-2* are the character fields or character constants that are to be concatenated. You can use SBCS- and DBCS-character field names (including character result fields) and character constants (including DBCS-open, DBCS-only, and DBCS-graphic constants). A DBCS-graphic field can be concatenated only with another DBCS-graphic field or constant.
- Two logical OR symbols (||) make up the concatenation operator used to join the two values. (See "CCSID and result field expressions in Query for iSeries" on page 252 to see how CCSIDs are handled for the concatenation symbol.)

For example, if a character constant 'Dr. ' and a character field named LASTNAME containing the value Smith are concatenated, the result is a field containing the value Dr. Smith. Other examples of character expressions are:

```
NAME
'Mr.'
'Mr.' || NAME
FIRSTINIT || MIDINIT
```

If any field is null-capable, the resulting field is null-capable. If any field used in a concatenation is null, the resulting expression is null.

Except for the case of two DBCS-open fields, if all concatenated values are either fixed-length fields or constants, the result is a fixed-length field. The concatenation of two DBCS-open fields results in a DBCS-open field that allows for the varying lengths that can result from concatenating DBCS-open fields. If any field is variable-length, the result is a variable-length field.

A UCS2-graphic field can only be concatenated with another UCS2-graphic field.

The CCSID of the result is as follows:

- CCSID 65535 if any field or constant has CCSID 65535.
- Mixed CCSID if any field has a mixed CCSID.
- CCSID of a file field has precedence over result fields or constants.
- CCSID of result fields has precedence over constants.
- CCSID assigned to the result will be the CCSID of the first of the two values if both concatenated values are fields from the file, or both are result fields.
- CCSID 65535 is assigned to a DBCS-graphic constant if the job CCSID is a single-byte CCSID with no associated DBCS CCSID.

Query for iSeries character functions

Character expressions can include the character functions SUBSTR, DIGITS, and VALUE.

SUBSTR Query for iSeries function

The SUBSTR function returns part of a character value. The form is:

- *Value* is the name of a character field (including result fields that are already defined), a character expression, or a character constant. It can be an SBCS or DBCS field, an SBCS constant, a DBCS-open constant, a DBCS-only constant, or a DBCS-graphic constant. A SUBSTR operation on a DBCS-only or DBCS-either field produces an SBCS character data type. A SUBSTR operation on a DBCS-open field produces a DBCS-open data type. A SUBSTR operation on a DBCS-graphic field produces a DBCS-graphic data type. If *Value* is a field, the CCSID of the result is the CCSID of the field. If *Value* is a constant, the CCSID of the result is the associated CCSID of the job of the user who creates the query (or of the user who changes the query, if the original CCSID was 65535).
- *Offset* is the starting character position within the field or character constant. An expression can also be used for the offset.
- *Length* is the number of characters that make up the substring. An expression may be used for length. You do not need to specify a length. If you do not, the resulting substring is the entire field or character constant from *Offset* to the end.

You must use commas between the substring elements; blanks are allowed after the commas. If you are sending queries between countries that use the comma for a decimal point, put a blank after the comma separating the offset and length.

Example of a character field substring: If a character field named ALPHA containing the value ABCDEFGHI is used in SUBSTR(ALPHA,4,3), the result is a character field containing DEF. If you do not specify a value for *Length*, the result is DEFGHI.

If the *Offset* and *Length* values cause the substring to exceed the right end of the field, you will receive an error message. If any argument can be null, the result field can be null. If any argument is null, the result is null.

If a variable-length field is used for *Value*, the result is a variable-length field. If either *Offset* or *Length* is an expression, the result is a variable-length field.

For SBCS, DBCS-open, DBCS-only, and DBCS-either fields, *Offset* and *Length* refer to bytes, including shift-out and shift-in characters. For example, if FIELD1 contains string <A1B1C1D1E1F1>, the operation SUBSTR(FIELD1,2,3) results in a character field containing A1B.

For DBCS-graphic fields, *Offset* and *Length* refer to the number of double-byte characters. Shift-out and shift-in characters in a graphic constant are ignored. For example, the operation SUBSTR(G'<A1B1C1D1E1F1>',2,3) results in a graphic field containing B1C1D1.

DIGITS Query for iSeries function

The DIGITS function returns a character representation of a number. The form is:

The argument must be an integer or decimal value. The result of the function is a fixed-length character string. The CCSID of the string is the default SBCS CCSID at the application server. If the argument can be null, the result can be null. If the argument is null, the result is a null value.

The result is a string of digits that represents the absolute value of the argument without regard to its scale. The result does not include a sign or a decimal point. The result includes any necessary leading zeros so that the length of the string is:

- 5, if the argument is a small binary value with no decimal positions.
- 10, if the argument is a large binary value with no decimal positions.
- The length of the argument, if the value is a packed, zoned, or binary field with decimal positions.

Example:

```
DIGITS(JOBCODE)
```

VALUE Query for iSeries function

The VALUE function can be used in any type of expression: character, numeric, date, time, or timestamp. The VALUE function, VALUE(x,y), returns the first argument that is not null. The arguments are evaluated in the order in which they are specified. The arguments must be compatible; character string arguments are not compatible with numbers. X is a field and Y can be a field, value, or a list of fields or values. X can be any data type and may be a previously defined result field or any file field.

The result can be null only if all arguments can be null; the result is null only if all arguments are null. The X value is not checked to determine if it is null-capable.

Example:

```
VALUE(commission, 0)
```

If commission is null, the result is 0.

Note: If you are sending queries between countries that use the comma for a decimal point, put a blank after each comma separating values in a list of numeric values.

The selected argument is converted, if necessary, to the attributes of the result. The attributes of the result are determined as follows:

- If the arguments are dates, the result is a date. If the arguments are times, the result is a time. If the arguments are timestamps, the result is a timestamp.
- If the arguments are constants, the CCSID of the result is the CCSID that would result if the arguments were concatenated.
- If all arguments are fixed-length, the result is a fixed length of n, where n is the length of the longest argument.
- If any argument is variable length, the result is variable-length with length attribute n, where n is the length attribute of the argument with the greatest length attribute.
- If the arguments are numbers, the data type of the result is the data type that would result if the arguments were added.
- If all arguments are DBCS-only, the result is DBCS-only.
- If the arguments are any combination of bracketed-DBCS, the result is DBCS-open.
- If the arguments are DBCS-graphic, the result is DBCS-graphic.

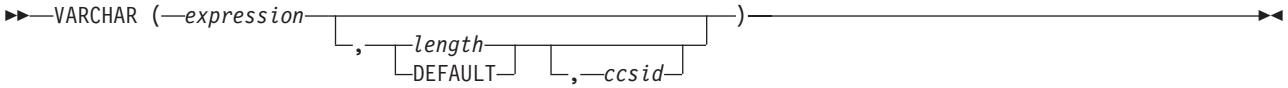
If X is a DBCS-graphic field, Y fields and constants must all be DBCS-graphic. If X is not a DBCS-graphic field, no Y fields or constants may be DBCS-graphic.

The CCSID of the result is as follows:

- CCSID 65535 if any field or constant has CCSID 65535.
- Mixed CCSID if any field has a mixed CCSID.
- CCSID of a file field has precedence over result fields or constants.
- CCSID of result fields has precedence over constants.
- CCSID assigned to the result will be the CCSID of the first of the two values if both concatenated values are fields from the file, or both are result fields.
- CCSID 65535 is assigned to a DBCS-graphic constant if the job CCSID is a single-byte CCSID with no associated DBCS CCSID.

VARCHAR Query for iSeries function

| The VARCHAR function returns a varying-length character string representation of a string. VARCHAR
| supports conversion from CHARACTER to VARCHAR and UCS-2 GRAPHIC to VARCHAR. Conversion of
| numeric type data is not supported. VARCHAR supports conversion from CHARACTER to VARCHAR and
| UCS-2 GRAPHIC to VARCHAR. Conversion of numeric type data is not supported.



The first argument must be a string expression; it must not be DBCS-graphic data.

The second argument, if specified as a *length*, is the length attribute of the resulting varying-length string. The second argument must be an integer constant between 1 and 32740 if the first argument is not nullable or between 1 and 32739 if the first argument is nullable. If the first argument is mixed data, the second argument cannot be less than 4. If the second argument is not specified or DEFAULT is specified, the result length is determined as follows, where n is the length attribute of the first argument.

- If the first argument is SBCS or mixed data, the result length is n.
- If the first argument is UCS2 graphic data and the result is SBCS data, the result length is n.

- If the first argument is UCS2 graphic data and the result is mixed data, the result length is (2.5*(n-1)) + 4.

The third argument, if specified, must be a valid SBCS or mixed CCSID. If it is a SBCS CCSID, the first argument cannot be a DBCS-either or DBCS-only string.

The result of the function is the character string that would result if the character string expression was assigned to a varying-length host variable with a length attribute of *n*, where *n* is the length attribute of the result. If the length attribute of the argument is greater than the length attribute of the result, truncation is performed and no warning is returned.

The result data type is VARCHAR.

If the *ccsid* (third argument) is not specified:

- If the first argument is SBCS character, then the result is SBCS character. The CCSID of the result is the same as the CCSID of the first argument.
- If the first argument is mixed (DBCS-open), DBCS-only, or DBCS-either then the result is mixed. The CCSID of the result is the same as the CCSID of the first argument.
- If the first argument is non-UCS2 graphic, then the result is mixed. The CCSID of the result is the associated mixed CCSID of the DBCS CCSID.
- If the first argument is UCS2 then the CCSID of the result is the job CCSID. If the job CCSID is mixed, then the result type is mixed. If the job CCSID is SBCS, then the result is SBCS character.

If the *ccsid* is specified:

- The result is dependent on the specified CCSID. If *ccsid* is a SBCS CCSID, then the result type is SBCS character. If *ccsid* is a mixed CCSID, then the result type is mixed character.
- The CCSID of the result is the *ccsid*.

If the first argument can be null, the result can be null; if the first argument is null, the result is the null value.

Following are examples of using VARCHAR to convert from CHARACTER to VARCHAR and UCS-2 GRAPHIC to VARCHAR:

```
RESCHAR     varchar(char1,10,37)

where char1 is a character field to be converted
10 is the length of the output variable
37 is the ccsid of the output variable
RESUCS2     varchar(ucs2,8,37)

where ucs2 is a UCS-2 graphic field to be converted
8 is the length of the output variable
37 is the ccsid of the output variable
```

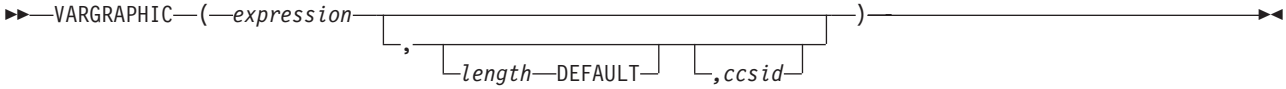
Following are examples of using VARCHAR to convert from CHARACTER to VARCHAR and UCS-2 GRAPHIC to VARCHAR:

RESCHAR	varchar(char1,10,37)	where char1 is a character field to be converted, 10 is the length of the output variable, and 37 is the CCSID of the output variable
RESUCS2	varchar(ucs2,8,37)	where ucs2 is a UCS-2 graphic field to be converted, 8 is the length of the output variable, and 37 is the ccsid of the output variable

VARGRAPHIC Query for iSeries function

The VARGRAPHIC scalar function provides a way to convert:

- character data (SBCS and Mixed) to DBCS graphic.
- character data (SBCS and Mixed) to UCS2 graphic.
- UCS2 graphic to UCS2 graphic.
- DBCS graphic to UCS2 graphic.



The VARGRAPHIC function returns a graphic string representation of a string expression.

The first argument must be a string expression and must not be bit data.

The second argument, if specified as *length*, is the length attribute of the result and must be an integer constant between 1 and 16370 if the first argument is not nullable or between 1 and 16369 if the first argument is nullable.

If the second argument is not specified or DEFAULT is specified, the length attribute of the result is the same as the length attribute of the first argument.

In the following rules, S denotes one of the following:

- If the string expression is a host variable containing data in a foreign encoding scheme, S is the result of the expression after converting the data to a CCSID in a native encoding scheme.
- If the string expression is data in a native encoding scheme, S is that string expression.

If the third argument is specified, the CCSID of the result is the third argument. It must be a DBCS or UCS2 CCSID. The CCSID cannot be 65535.

If the third argument is not specified, the CCSID of the result is determined by a mixed CCSID, let M denote that mixed CCSID. M is determined as follows:

- If the CCSID of S is a mixed CCSID, M is that CCSID.
- If the CCSID of S is an SBCS CCSID:
  - If the CCSID of S has an associated mixed CCSID, M is that CCSID.
  - Otherwise the operation is not allowed.

M	Result CCSID	Description	DBCS Substitution Character
930	300	Japanese EBCDIC	X'FEFE'
933	834	Korean EBCDIC	X'FEFE'
935	837	S-Chinese EBCDIC	X'FEFE'
937	835	T-Chinese EBCDIC	X'FEFE'
939	300	Japanese EBCDIC	X'FEFE'
5026	4396	Japanese EBCDIC	X'FEFE'
5035	4396	Japanese EBCDIC	X'FEFE'

The result of the function is a varying-length graphic string. If the expression can be null, the result can be null. If the expression is null, the result is the null value. If the expression is an empty string or the EBCDIC string X'0E0F', the result is an empty string.

The actual length of the result depends on the number of characters in the argument. Each character of the argument determines a character of the result. Regardless of the CCSID, every double-byte code point in the argument is considered a DBCS character, and every single-byte code point in the argument is considered an SBCS character with the exception of the EBCDIC mixed data shift codes X'0E' and X'0F'.

- If the nth character of the argument is a DBCS character, the nth character of the result is that DBCS character.
- If the nth character of the argument is an SBCS character that has an equivalent DBCS character, the nth character of the result is that equivalent DBCS character.
- If the nth character of the argument is an SBCS character that does not have an equivalent DBCS character, the nth character of the result is the DBCS substitution character.

The equivalence of SBCS and DBCS characters depends on M.

If the result is UCS2 then, each character of the argument determines a character of the result. The nth character of the result is the UCS2 equivalent of the nth character of the argument.

Date, time, and timestamp expressions in Query for iSeries

Date, time, and timestamp data types and values can be assigned to result fields. A date, time, or timestamp expression for a result field can contain the following, alone or in combination:

- **Date, time, or timestamp field names** (names of fields that contain date, time, or timestamp values)
- **Character constants** (SBCS or DBCS characters enclosed in apostrophes— see examples and rules under "Query for iSeries character expressions" on page 60.)
- **Date, time, and timestamp functions and operations** (one or more of the following functions and arithmetic operations):

  + (Addition)
  – (Subtraction)
  CHAR
  CURRENT
  VALUE
  DATE
  DAY
  DAYS
  MONTH
  YEAR
  TIME
  HOUR
  MINUTE
  SECOND
  MICROSECOND
  TIMESTAMP
- **Durations** (a length of time, represented by a labeled duration, date duration, time duration, or timestamp duration— see "Durations in Query for iSeries" on page 73.)

Character constants can represent date, time, or timestamp values when used with date, time, or timestamp fields or functions. They can be used in expressions and treated like a date, time or timestamp. For example, a date constant may be subtracted from a date field.

A date, time, or timestamp expression for a result field can contain the following either alone or in combination:

Query for iSeries date

A **date** expression is a three-part value (year, month, and day) designating a point in time under the Gregorian calendar, which is assumed to have been in effect from the year 1 A.D. [1] The year range is 0001 to 9999. The month range is 1 to 12. The day range is 1 to *x*, where *x* is 28, 29, 30, or 31, depending on the month.

A date starts with a digit and has a length of at least 6 characters. Trailing blanks can be included. Leading zeros can be omitted from the month and day portions. Valid formats allowed for dates are listed in Table 1. Each format is identified by name and includes an associated abbreviation (used by the CHAR function) and an example of its use.

Table 1. Formats for Representations of Date Data Types

Format Name	Abbreviation	Date Format	Example
International Standards Organization	ISO	yyyy-mm-dd	1987-10-12
IBM USA Standard	USA	mm/dd/yyyy	10/12/1987
IBM European Standard	EUR	dd.mm.yyyy	12.10.1987
Japanese Industrial Standard Christian era	JIS	yyyy-mm-dd	1987-10-12
OS/400 format	DMY YMD MDY JUL	DD/MM/YY YY/MM/DD MM/DD/YY YYDDD YYYYDDD	12/10/87 87/12/10 12/10/87 87/344 1987/344 The date separator can be either a period (.), slash (/), comma (,), dash (-), or blank space for the OS/400 date format data types.

Note about using SAA date format: To prevent confusion about the date value, use the Systems Application Architecture® (SAA) date formats (ISO, USA, EUR, or JIS) when specifying date constants in a multilingual environment or when a query is to be displayed or changed by different people.

If the OS/400 two-digit year format is used, the range of dates is from 1940 through 2039. Any year from 40 through 99 is assumed to have a century of 19. Any year from 00 through 39 is assumed to have a century of 20. If a value outside of that range is in a field with a two-digit year format, it will be shown on a report as +'s. Use the CHAR function on that field specifying a SAA date format, and then select the result field for the report.

Query for iSeries time

A **time** expression is a three-part value (hour, minute, and second) that designates the time of day using a 24-hour clock. The hour range is 0 to 24, while the minute and second range is 0 to 59. If the hour is 24, the minute and second specifications are both zero.

A time data type starts with a digit and has a length of at least 4 characters. Trailing blanks can be included; a leading zero can be omitted from the hour part of the time, and seconds can be omitted entirely. If you choose to omit seconds, 0 seconds is assumed. Thus, 13.30 is equivalent to 13.30.00.

1. Historical dates do not always follow the Gregorian calendar. Dates between 1582-10-04 and 1582-10-15 are accepted as valid dates although they never existed in the Gregorian calendar.

Valid formats for times are listed in Table 2. Each format is identified by name and includes an associated abbreviation (for use by the CHAR function) and an example of its use.

Table 2. Formats for Representations of Time Data Types

Format Name	Abbreviation	Time Format	Example
International Standards Organization	ISO	hh.mm.ss	13.30.05
IBM USA Standard	USA	hh:mm am or pm	1:30 pm
IBM European Standard	EUR	hh.mm.ss	13.30.05
Japanese Industrial Standard Christian era	JIS	hh:mm:ss	13:30:05
OS/400 format	-	HMS	13:30:05

Note: Time separators can be either a period (.), slash (/), comma (,), dash (-), or a blank space. Use the CHGJOB command to change the OS/400 date or time format separators.

In the USA time format, the hour must not be greater than 12 and cannot be 0 except for the special case of 00:00 AM. Using the International Standards Organization (ISO) format of the 24-hour clock, the correspondence between the USA format and the 24-hour clock is as follows:

USA Format
24 Hour-Clock

12:01 am through 12:59 am
00.01.00 through 00.59.00

01:00 am through 11:59 am
01.00.00 through 11.59.00

12:00 pm (noon) through 11:59 pm
12.00.00 through 23.59.00

12:00 am (midnight)
24.00.00

00:00 am (midnight)
00.00.00

The system always uses 00.00.00. Only the user can enter 24.00.00.

Query for iSeries timestamp

A **timestamp** expression is a seven-part value (year, month, day, hour, minute, second, and microsecond) that designates a date and time as previously defined. The time part includes a fractional specification of microseconds.

A timestamp data type starts with a digit and has a length of at least 16 characters. The complete representation of a timestamp has the form *yyyy-mm-dd-hh.mm.ss.nnnnnn*. Trailing blanks can be included. Leading zeros can be omitted from the month, day, and hour part of the timestamp. Trailing zeros can be truncated or omitted entirely from microseconds. You do not need to specify microseconds. A timestamp of *yyy-mm-dd-hh.mm.ss* is acceptable. If you choose to omit any digit of the microseconds portion, an implicit specification of 0 is assumed. Thus, *1990-3-2-8.30.00.10* is equivalent to *1990-03-02-08.30.00.100000*.

A timestamp expression with a time of 24.00.00.000000 can be accepted.

Displaying constants format in Query for iSeries

The Display Constants Format display shows you what date or time format you must use if you specify a date or time constant and do not use an SAA format.

```
                    Display Constants Format

Query . . . . . :   QRY1             Option  . . . . . :   CHANGE
  Library . . . . :     QGPL         CCSID . . . . . :   65535

Use an SAA format to enter a date or time constant, or
use the format described by the following values.

Use the decimal separator shown.

Query definition values
  Date format . . . . :   *MDY
  Date separator  . . :   /
  Time format . . . . :   *HMS
  Time separator  . . :   :
  Decimal separator . :   .




Press Enter to continue.

F12=CANCEL
```

The Display Constants Format display appears when you:

- Change a query from the Work with Queries display and at least one date or time constant is specified in the query definition in an OS/400 format other than the date or time format specified for your job.
- Display a query from the Work with Queries display and your job format for the date or time is different from an OS/400 date or time format constant that is specified in the query definition.
- Use the run-time `record selection` option of the RUNQRY command and your job format for the date or time is different from an OS/400 date or time format constant specified in the query definition.
- Use the run-time `record selection` option with the QRYRUN procedure and your job format for the date or time is different from an OS/400 date or time format constant specified in the query definition.
- Press F17 from the Select Records display.
- Press F17 from the Define Result Fields display.

OS/400 date formats are *MDY*, *YMD*, *DMY*, and *JUL*. The valid OS/400 time format is *HHMMSS*.

Date, time, and timestamp arithmetic operations in Query for iSeries

Addition and subtraction operations can be performed on date, time, and timestamp values to determine the result-field value.

Note: If an addition operand is a date, time, or timestamp value, the other operand must be a duration.

The following rules apply to date, time, and timestamp addition:

- If one operand is a date, the other operand must be either a date duration or a labeled duration of years, months, or days.
- If one operand is a time, the other operand must be either a time duration or a labeled duration of hours, minutes, or seconds.
- If one operand is a timestamp, the other operand must be a duration. Any duration type is valid.

Subtraction rules are different from addition rules because a date, time, or timestamp value cannot be subtracted from a duration. Also, subtracting two date, time, or timestamp values is not the same as subtracting a duration from a date, time, or timestamp value.

The following rules apply to date, time, and timestamp subtraction:

- If the first operand is a date, the second operand must either be a:
  - Date
  - Date duration
  - Character representation of a date
  - Labeled duration of years, months, or days
- If the second operand is a date, the first operand must either be a:
  - Date
  - Character representation of a date
- If the first operand is a time, the second operand must either be a:
  - Time
  - Time duration
  - Character representation of a time
  - Labeled duration of hours, minutes, or seconds
- If the second operand is a time, the first operand must either be a:
  - Time
  - Character representation of a time
- If the first operand is a timestamp, the second operand must either be a:
  - Timestamp
  - Character representation of a timestamp
  - Duration
- If the second operand is a timestamp, the first operand must either be a:
  - Timestamp
  - Character representation of a timestamp

Date arithmetic operation in Query for iSeries

Dates can be subtracted, added to (incremented) or subtracted from (decremented).

Subtracting dates in Query for iSeries

The result of subtracting one date (DATE2) from another (DATE1) is a date duration that specifies the number of years, months, and days between the two dates. The data type of the result is a packed-decimal numeric. If DATE1 is greater than or equal to DATE2, DATE2 is subtracted from DATE1. However, if DATE1 is less than DATE2, DATE1 is subtracted from DATE2, and the sign of the result is made negative. The following procedural description clarifies the steps involved in the operation RESULT = DATE1 - DATE2.

```
If DAY(DATE2) < = DAY(DATE1)
    then DAY(RESULT) = DAY(DATE1) - DAY(DATE2).

If DAY(DATE2) > DAY(DATE1)
    then DAY(RESULT) = N + DAY(DATE1) - DAY(DATE2)
      where N = the last day of MONTH(DATE2).
    MONTH(DATE2) is then incremented by 1.

If MONTH(DATE2) < = MONTH(DATE1)
   then MONTH(RESULT) = MONTH(DATE1) - MONTH(DATE2).

If MONTH(DATE2) > MONTH(DATE1)
```

```
      then MONTH(RESULT) = 12 + MONTH(DATE1) - MONTH(DATE2).
      YEAR(DATE2) is then incremented by 1.

   YEAR(RESULT) = YEAR(DATE1) - YEAR(DATE2).
```

For example, the result of DATE('3/15/2000') - '12/31/1999' is 215, or a duration of 0 years, 2 months, and 15 days.

Incrementing and decrementing dates in Query for iSeries

The result of adding a duration to or subtracting a duration from a date is itself a date. It must be between January 1, 0001 and December 31, 9999 inclusive. If a duration of years is added or subtracted, only the year portion of the date is affected.

If a duration of months is added or subtracted, only the months and years are affected. The day portion is unchanged unless the result is not valid (September 31, for example).

Adding or subtracting a duration of days affects the day portion and possibly the month and year.

Date durations, either positive or negative, may be added to and subtracted from dates. The result is a date that has been incremented or decremented by a specified number of years, months, and days.

When adding durations to dates, adding one month to a given date gives the same date one month later *unless* that date does not exist. Then, the date is set to the last day of the later month. For example, January 28 plus one month gives you February 28. But January 29, 30, or 31 plus one month results in February 28 or in a leap year, February 29.

Note: If one or more months is added to a given date and the same number of months is subtracted from the result, the final date is not necessarily the same as the original date.

Converting a numeric field to a date field in Query for iSeries

The following is a way to convert a numeric field that contains a date to a date data-type field.

In this example, the job date format is *YMD* and the job date separator is /. A file contains a numeric date field call NUMDATE, length 6, which contains dates in the format MDY (month day year). The first value in NUMDATE is 011392.

Create the following result fields:

```
CHARDATE     DIGITS(NUMDATE)
CHARDAT2     SUBSTR(CHARDATE,5,2)||'/'||
             SUBSTR(CHARDATE,1,2)||'/'||
             SUBSTR(CHARDATE,3,2)
NEWDATE      DATE(CHARDAT2)
```

NEWDATE contains the internal representation of year 1992 month 01 day 13. If the date is shown on the report, it shows as 92/01/13.

Note: If the date value resulting is outside the range of 1940 through 2039, it will show as +'s on the report. Use the CHAR function to see the correct value.

Working with numeric dates in Query for iSeries

If you are using numeric fields to represent dates, you can use arithmetic operations to manipulate the dates without using the Query date functions. Example 1 shows a method of converting a numeric field containing a date from MMDDYY format to YYMMDD format. Example 2 shows the reverse conversion: YYMMDD format to MMDDYY format.

Example 1: Working with numeric dates in Query for iSeries: The following query defines a MMDDYY numeric field conversion to a YYMMDD numeric field, which is more suitable for sorting and for

selection on specific year, month, and day values. The marked (*) lines are necessary and a sample report follows. If you require rounding for fields in the report (instead of truncation), you can add to each of the intermediate expressions a minus one half, as follows: `MM = (MMDDYY/10000)-0.5`.

```
                        Example 1

5728QU1 R03 M00 900824  IBM OS/400 Query  10/04/90 14:17:45  Page  1
  Query . . . . . . . . . . . . . . . . . YYMMDD02
    Library . . . . . . . . . . . . . . . CRP
  Query text  . . . . . . . . . . . . . . MMDDYY to YYMMDD
  Collating sequence  . . . . . . . . . . Hexadecimal
  Processing options
*   Use rounding  . . . . . . . . . . . . No
    Ignore decimal data errors  . . . . . No  (default)

Selected files
  ID     File           Library       Member        Record Format
  T01    MMDDYY         QTEMP         MMDDYY        MMDDYY
Result fields
  Name    Expression                    Column Heading  Len  Dec
* MM      (mmddyy/10000)                                  2   0
* DD      (mmddyy/100 - (mm * 100))                       2   0
* YY      (mmddyy - (mm*10000 + dd*100))                  2   0
* YYMMDD  (yy*10000)+(mm*100)+dd                          6   0

   * * * * *   E N D   O F   Q U E R Y   P R I N T   * * * * *

  MM  DD   YY   YYMMDD  MMDDYY
  08  31   90   900831  083190
* * *  E N D  O F  R E P O R T  * * *
```

Example 2: Working with numeric dates in Query for iSeries: This example shows the reverse in formatting— converting a numeric YYMMDD to MMDDYY. The marked (*) lines are necessary and a sample report follows.

```
                        Example 2

  Query . . . . . . . . . . . . . . . . . YYMMDD01
    Library . . . . . . . . . . . . . . . CRP
  Query text  . . . . . . . . . . . . . . YYMMDD to MMDDYY
  Collating sequence  . . . . . . . . . . EBCDIC
  Processing options
*   Use rounding  . . . . . . . . . . . . No
    Ignore decimal data errors  . . . . . No  (default)
  Special conditions
    *** All records selected by default ***

Selected files
  ID     File           Library       Member        Record Format
  T01    YYMMDD         QGPL          JUNK          YYMMDD
Result fields
  Name    Expression                    Column Heading   Len  Dec
* YY      (yymmdd/10000)                                  2    0
* MM      (yymmdd/100 - (yy * 100))                       2    0
* DD      (yymmdd - (yy*10000 + mm*100))                  2    0
* MMDDYY  (mm*10000)+(dd*100)+yy                            6    0

    * * * * *   E N D   O F   Q U E R Y   P R I N T   * * * * *

 MM  DD  YY   MMDDYY  YYMMDD
 08  31  90   083190  900831
* * *  E N D  O F  R E P O R T  * * *
```

Time arithmetic operation in Query for iSeries

Times can be subtracted, incremented, or decremented. The result of subtracting one time (TIME2) from another (TIME1) is a time duration that specifies the number of hours, minutes, and seconds between the two times.

For example, the result of TIME('11:02:26') – ('10:32:56') is 2930; a duration of 0 hours, 29 minutes, and 30 seconds.

Incrementing and decrementing times in Query for iSeries

The result of adding or subtracting a duration from time is itself a time. If a duration of hours is added or subtracted, only the hours portion of the time is affected. The minutes and seconds remain unchanged. If a duration of minutes is added or subtracted, only the minutes and hours if necessary are affected. Adding or subtracting a duration of seconds affects the seconds portion and possibly the minutes and hours.

Timestamp arithmetic operation in Query for iSeries

Timestamps can be subtracted, incremented, or decremented. The result of adding or subtracting a duration from a timestamp is a timestamp. Date and time arithmetic is the same as previously defined, except that an overflow or underflow of hours is carried into the date portion of the result.

Durations in Query for iSeries

A **duration** represents a length of time. There are four types: labeled, date, time, and timestamp.

Labeled duration in Query for iSeries

A labeled duration represents a specific unit of time expressed as a number followed by one of the following duration keywords:

YEAR, YEARS
MONTH, MONTHS
DAY, DAYS
HOUR, HOURS
MINUTE, MINUTES
SECOND, SECONDS
MICROSECOND, MICROSECONDS

A labeled duration can only be used as an operand if the other operand is of type date, time or timestamp. For example:

```
HIREDATE + 2 MONTHS + 14 DAYS
```

is a valid expression.

```
HIREDATE + (2 MONTHS + 14 DAYS)
```

is not a valid expression. In both expressions, the labeled durations are 2 MONTHS and 14 DAYS.

Date duration in Query for iSeries

A date duration represents years, months, and days expressed as a DECIMAL (8,0) number. To be properly interpreted, the number must have the format*yyyymmdd* where *yyyy* represents the number of years, *mm* the number of months, and *dd* the number of days. The result of subtracting one date value from another, as in the expression HIREDATE — BIRTHDATE, is a date duration. Example:

```
HIREDATE - BIRTHDATE
```

Time duration in Query for iSeries

A time duration represents hours, minutes and seconds expressed as a DECIMAL (6,0) number. To be properly interpreted , the number must have the format *hhmmss* where *hh* represents the number of hours,*mm* the number of minutes, and *ss* the number of seconds. The result of subtracting one time value from another is a time duration.

Timestamp duration in Query for iSeries

A timestamp duration represents a number of years, months, days, hours, minutes, seconds, and microseconds expressed as a DECIMAL (20, 6) number. To be properly interpreted, the number must have the format *yyyymmddhhMMsszzzzzz* , where *yyyy* , *mm* , *dd* , *hh*, *MM* , *ss* and *zzzzzz* represent, respectively, the number of years, months, days, hours, minutes, seconds and microseconds. The result of subtracting one timestamp value from another is a timestamp duration.

Date, time, and timestamp functions in Query for iSeries

The following functions can be performed on date, time, and timestamp values:

CHAR Query for iSeries function

The CHAR function returns a character representation of a date, time, or timestamp value. An optional second argument dictates the SAA format for the result string. The first argument must be a date, time, or timestamp. The second argument, if used, is the name of a character format. The form is:

The result of the function is a fixed-length character constant. If the first argument can be null, the result can be null. If the first argument is null, the result is null. Other rules depend on the data type of the first argument as follows:

- If the first argument is a date:
  - A format should be specified, especially if:
    - The query is to be used by different users.
    - The query is to be sent to a different machine.
    - A date has a two-digit year format attribute and the values may not be in the range of 1940 through 2039. Use this function to see the date in a four-digit year SAA format.
  - If the second argument is omitted, the string format is the job format.
  - The result is the character string representation of the date in the format specified by the second argument.
  - The result length is 10 if a format is specified, 8 if no format is specified.
- If the first argument is a time:
  - If the second argument is omitted, the string format is the job format.
  - The result is the character string representation of a time in the format specified by the second argument.
  - The result length is 8.
- If the first argument is a timestamp:
  - The second argument is not applicable and *must* not be specified.
  - The result is the character string representation of a timestamp.
  - The result length is 26.

Example:

```
CHAR(HIREDATE,USA)
```

DATE Query for iSeries function

The DATE function returns a date from a value. The form is:

The argument must be either a:

- Timestamp
- Date
- Positive number or expression less than 3 652 059
- Valid character representation of a date
- Character representation with a length of 7

If the argument is a character representation of length 7, it must represent a valid date in the form *yyyynnn* where *yyyy* represents the year digits and *nnn* represents digits between 001 and 366, signifying a day in that year.

The result of this function is a date. If the argument can be null, the result can be null. If the argument is null, the result is null.

- If the argument is a timestamp, the result is the date part of the timestamp.
- If the argument is a date, the result is that date.
- If the argument is a number, the result is the date that is *n*–1 days after January 1, 0001.
- If the argument is a character value, the result is the date represented by the character string.

Note: If the OS/400 two-digit year format is used, the range of dates is 1940 through 2039. Any year from 40 through 99 is assumed to have a century of 19. Any year 00 through 39 is assumed to have a century of 20. If a value outside of that range is in a field with a two-digit year format, it will be shown on a report as +'s. Use the CHAR function on that field specifying a SAA date format, and then select the result field for the report.

Example:

```
DATE(STRDATE)
```

DAY Query for iSeries function

The DAY function returns the day part of a value. The form is:

The argument must be either a:

- Date
- Timestamp
- Date duration
- Timestamp duration

The result of the function is a binary field. If the argument can be null, the result can be null. If the argument is null, the result is null.

If the argument is a date or a timestamp, the result is the day part of the value, which is a binary field with a value between 1 and 31.

If the argument is a date duration or a timestamp duration, the result is the day part of the value, a binary field with a value between –99 and 99. A nonzero result has the same sign as the argument.

Example:

```
RESULT(DAY) = DAY(HIREDATE)
```

RESULT(DAY) would equal a value between 1 and 31.

DAYS Query for iSeries function

The DAYS function returns a numeric representation of a date. The form is:

The argument must be either a:

- Date
- Timestamp
- Valid character representation of a date

The result of the function is a binary field. If the argument can be null, the result can be null. If the argument is null, the result is null.

The result is one more than the number of days from January 1, 0001 to *D*, where *D* is the date that would occur if the DATE function were applied to the argument.

Example:

```
RESULT(DAY) = DAYS(CURRDATE) - DAYS(HIREDATE)
```

`RESULT(DAY)` equals a number representing the number of days between these two dates.

HOUR Query for iSeries function

The HOUR function returns the hour part of a value. The form is:

The argument must be either a:

- Time
- Timestamp
- Time duration
- Timestamp duration

The result of the function is a binary field. If the argument can be null, the result can be null. If the argument is null, the result is null.

If the argument is a time or a timestamp, the result is the hour part of the value, which is a binary field with a value between 0 and 24.

If the argument is a time duration or a timestamp duration, the result is the hour part of the value, which in a binary field with a value between –99 and 99. A nonzero result has the same sign as the argument.

Example:

```
HOUR(TIME) where time = 12:11:22
```

The resulting value of HOUR would equal 12.

MICROSECOND Query for iSeries function

The MICROSECOND function returns the microsecond part of a value. The form is:

The argument must be either a:

- Timestamp
- Timestamp duration
- Valid character representation of a timestamp

The result of the function is a binary field. If the argument can be null, the result can be null. If the argument is null, the result is null.

If the argument is a timestamp, the result is the microsecond part of the timestamp, which is a binary field with a value between 0 and 999999.

If the argument is a timestamp duration, the result is the microsecond part of the timestamp duration, which is a binary field with a value between –999999 and 999999.

Example:

```
MICROSECOND(TIMESTAMP) where TIMESTAMP = 1991-10-22-12.15.23.123456
```

The resulting value of MICROSECOND equals 123456.

MINUTE Query for iSeries function

The MINUTE function returns the minute part of a value. The form is:

The argument must be either a:

- Time
- Timestamp
- Time duration
- Timestamp duration

The result of the function is a binary field. If the argument can be null, the result can be null. If the argument is null, the result is null.

If the argument is a time duration or a timestamp duration, the result is the minute part of the value, which is a binary field with a value between &minus 99 and 99. A nonzero result has the same sign as the argument.

Example:

```
MINUTE(TIMESTAMP) where TIMESTAMP = 1991-10-22-12.15.23.123456
```

The resulting value of MINUTE equals 15.

MONTH Query for iSeries function

The MONTH function returns the month part of a value. The form is:

The argument must be either a:

- Date
- Timestamp
- Date duration
- Timestamp duration

The result of the function is a binary field. If the argument can be null, the result can be null. If the argument is null, the result is null.

If the argument is a date duration or a timestamp duration, the result is the month part of the value, which is a binary field with a value between &minus 99 and 99. A nonzero result has the same sign as the argument.

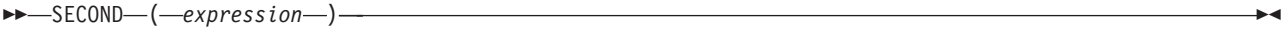
Example:

```
MONTH(TIMESTAMP) where TIMESTAMP = 1991-10-22-12.15.23.123456
```

The resulting value of MONTH equals 10.

SECOND Query for iSeries function

The SECOND function returns the seconds part of a value. The form is:



The argument must be either a:

- Time
- Timestamp
- Time duration
- Timestamp duration

The result of the function is a binary field. If the argument can be null, the result can be null. If the argument is null, the result is null.

If the argument is a time or timestamp, the result is the seconds part of the value, which is a binary field with a value between 0 and 59.

If the argument is a time duration or a timestamp duration, the result is the seconds part of the value, which is a binary field with a value between –99 and 99. A nonzero result has the same sign as the argument.

Example:

```
SECOND(TIMESTAMP) where TIMESTAMP = 1991-10-22-12.15.23.123456
```

The resulting value of SECOND equals 23.

TIME Query for iSeries function

The TIME function returns a time from a value. The form is:

The argument must be either a:

- Time
- Timestamp
- Valid character representation of a time

The result of the function is a time value. If the argument can be null, the result can be null. If the argument is null, the result is null.

- If the argument is a timestamp, the result is the time part of the timestamp.
- If the argument is a time, the result is that time.
- If the argument is a character string, the result is the time represented by the character string.

Example:

```
TIME(TIMESTAMP) where TIMESTAMP = 1991-10-22-12.15.23.123456
```

The resulting value of TIME equals 12.15.23.

TIMESTAMP Query for iSeries function

The TIMESTAMP function returns a timestamp from a value or a pair of values. The form is:

The rules for the arguments depend on whether or not the second argument is specified.

- If only one argument is specified, it must be either a:
  - Timestamp
  - Valid character representation of a timestamp
  - Character string of length 14

  Note: A character string of length 14 must be a string of digits that represents a valid date and time in the form *yyyyMMddhhmmss* where *yyyy* is the year, *MM* is the month, *dd* is the day, *hh* is the hour, *mm* is the minute, and *ss* is the seconds.
- If both arguments are specified, the first argument must be a date or a valid character representation of a date. The second argument must be a time or a valid character representation of a time.

The result of the function is a timestamp. If either argument can be null, the result can be null. If either argument is null, the result is null.

If both arguments are specified, the result is a timestamp with the date specified by the first argument and the time specified by the second argument. The microsecond part of the timestamp is zero.

If only one argument is specified and it is a timestamp, the result is that timestamp. If only one argument is specified and it is a character string, the result is the timestamp represented by that character string. The timestamp represented by a string of length 14 has a microsecond part of zero.

Example:

```
RESULT(x) = TIMESTAMP(DATEFRNK,TIMEFRNK)
```

YEAR Query for iSeries function

The YEAR function returns a numeric representation of the year part of a value. The form is:

The argument must be either a:

- Date
- Timestamp
- Date duration
- Timestamp duration

The result of the function is a binary field. If the argument can be null, the result can be null. If the argument is null, the result is null.

If the argument is a date or a timestamp, the result is the year part of the value, which is a binary field with a value between 1 and 9999.

If the argument is a date duration or a timestamp duration, the result is the year part of the value, which is a binary field with a value between –9999 and 9999. A nonzero result has the same sign as the argument.

Example:

```
YEAR(TIMESTAMP) where TIMESTAMP = 1991-10-22-12.15.23.123456
```

The resulting value of YEAR is the numeric value 1,991.

Additional date, time, and timestamp functions in Query for iSeries

Based on the system clock, the CURRENT function used with DATE, TIME, TIMESTAMP, or TIMEZONE returns the current system value corresponding to the function used. The TIMEZONE function is used to allow an easy conversion to Greenwich Mean Time (GMT) by subtracting CURRENT(TIMEZONE) from a local time value.

Note: If these functions are used more than once within a Query definition, *all* values are based on a single clock reading.

If your job date format is different than the format used in the query, Query for iSeries uses the job date format. If you use CURRENT(DATE) as a break field, you may get unexpected results when the job and query date format are different.

Example:

```
CURDAT = CURRENT(DATE)
CURTSP = CURRENT(TIMESTAMP)
```

Converting date formats in Query for iSeries

You may sometimes encounter circumstances in which you want to generate a report with the date in a format other than the one defined when the file was created.

Converting date for output to a database file in Query for iSeries

To convert a date field to a format different from the input file, you must externally define the output file with DDS specifying the date format for the output date field. This conversion occurs automatically.

Converting date for output to a display or printer in Query for iSeries

You can use the date functions to convert an input date field to a different format. Examples 1 and 2 show two methods of converting a date field from the MMDDYY format to the YYDDD format. Examples 3 and 4 show the reverse conversions, from YYDDD to MMDDYY format.

Note: For ease of reading, multiple panel views are merged into single screen images.

Example 1—Converting from MMDDYY to YYDDD format in Query for iSeries

The following Define Result Fields panel defines an MMDDYY to YYDDD date conversion. The conversion is done completely within the panel.

```
                        Define Result Fields

Type definitions using field names or constants and operators, press Enter.
  Operators:  +, -, *, /, SUBSTR, ||, DATE...

Field       Expression                        Column Heading          Len Dec
YY_______   SUBSTR(CHAR(MMDDYY),7,2)_________ ____________________  _____  __
            _____________________________________ ____________________
            _____________________________________ ____________________

CHARJAN01_  '01/01/' || YY____________________ ____________________  _____  __
            _____________________________________ ____________________
            _____________________________________ ____________________

JAN01_____  DATE(CHARJAN01)___________________ ____________________  _____  __
            _____________________________________ ____________________
            _____________________________________ ____________________

DDD_______  SUBSTR(DIGITS(DAYS(MMDDYY)-DAYS(J ____________________  _____  __
            AN01)+1),10,3)____________________ ____________________
            _____________________________________ ____________________

YYDDD_____  YY_||_'/'_||_DDD__________________ ____________________  _____  __
            _____________________________________ ____________________
            _____________________________________ ____________________
_____________________________________________________________________________
Field           Text                                                Len Dec
MMDDYY          Date field in MMDDYY format                           8   L

                                                                   Bottom
F3=Exit         F5=Report          F9=Insert         F11=Display names only
F12=Cancel      F13=Layout         F20=Reorganize    F24=More keys
```

Example 2—Converting from MMDDYY to YYDDD format in Query for iSeries

This examples shows an alternative method for the same conversion done in example 1. The conversion is done completely within the panel. This method requires that the date format for the current job must be set to YYDDD. When this circumstance exists, the DATE function automatically does the conversion.

```
                        Define Result Fields

Type definitions using field names or constants and operators, press Enter.
  Operators:  +, -, *, /, SUBSTR, ||, DATE...

Field       Expression                        Column Heading          Len Dec
YYDDD_____  DATE(MMDDYY)_____________________ _____________________  _____  __
            _____________________________________ _____________________
            _____________________________________ _____________________

_________   _____________________________________ _____________________  _____  __
            _____________________________________ _____________________
            _____________________________________ _____________________

                                                                  Bottom
_____________________________________________________________________________
Field           Text                                                  Len Dec
MMDDYY          Date field in MMDDYY format                             8   L

                                                                    Bottom
F3=Exit         F5=Report           F9=Insert         F11=Display names only
F12=Cancel      F13=Layout          F20=Reorganize    F24=More keys
```

The commands to run the query in example 3 are:

```
CHGJOB DATFMT(*JUL)
RUNQRY QRY(YYDDD)
```

Example 3—Converting from YYDDD to MMDDYY format in Query for iSeries

The following Define Result Fields panel defines a YYDDD to MMDDYY date conversion. The conversion is done completely within the panel.

```
                        Define Result Fields

Type definitions using field names or constants and operators, press Enter.
  Operators:  +, -, *, /, SUBSTR, ||, DATE...

Field       Expression                        Column Heading          Len Dec
YY________  SUBSTR(DIGITS(YEAR(YYDDD)),9,2)__ _____________________  _____  __
            _____________________________________ _____________________
            _____________________________________ _____________________

MM________  SUBSTR(DIGITS(MONTH(YYDDD)),9,2)_ _____________________  _____  __
            _____________________________________ _____________________
            _____________________________________ _____________________

DD________  SUBSTR(DIGITS(DAY(YYDDD)),9,2)___ _____________________  _____  __
            _____________________________________ _____________________
            _____________________________________ _____________________

MMDDYY____  MM_||_'/'_||_DD_||_'/'_||_YY_____ _____________________  _____  __
_____________________________________________________________________________
Field           Text                                                  Len Dec
YYDDD           Date field in YYDDD format                              6   L

                                                                    Bottom
F3=Exit         F5=Report           F9=Insert         F11=Display names only
F12=Cancel      F13=Layout          F20=Reorganize    F24=More keys
```

Example 4—Converting from MMDDYY to YYDD format in Query for iSeries

This example shows an alternative method for the same conversion done in example 3. The conversion is done completely within the panel. This method requires that the date format for the current job must be set to MMDDYY. When this circumstance exists, the DATE function automatically does the conversion.

```
                        Define Result Fields

Type definitions using field names or constants and operators, press Enter.
  Operators:  +, -, *, /, SUBSTR, ||, DATE...

Field       Expression                        Column Heading          Len Dec
MMYYDD_____  DATE(YYDDD)_____________________  ____________________  _____  __
             _____________________________  ____________________
             _____________________________  ____________________

_________  _____________________________  ____________________  _____  __
             _____________________________  ____________________
             _____________________________  ____________________

                                                                 Bottom
_____________________________________________________________________________
Field           Text                                                  Len Dec
YYDDD           Date field in YYDDD format                              6   L

                                                                     Bottom
F3=Exit         F5=Report          F9=Insert         F11=Display names only
F12=Cancel      F13=Layout         F20=Reorganize    F24=More keys
```

The commands to run the query in example 4 are:

```
CHGJOB DATFMT(*MDY)
RUNQRY QRY(MMDDYY)
```

General considerations when creating an expression in Query for iSeries

Following are some general rules you should use when you are creating expressions:

- Character constants that represent dates are evaluated using the date format stored in the query definition.
- Your expression can have a single value, or it can use as many operands and operators needed to fit in the three lines provided on the Define Result Fields display.
- Do not use a result field in select records tests or as a sort field if it may have a division by zero or overflow result.
- You can avoid dividing by zero by doing one of the following:
  - When you select records, either by means of a select/omit logical file or by means of record selection tests on fields other than the result field, select only records that will not cause a division by zero.
  - If a dividend for the definition of a result field will always be zero, try the following change to the expression:

    ```
    Original expression--> FIELD = P / X

    Revised expression---> S     = .00001

                           FIELD = P / (X + S)
    ```

    Note: In the expression S, the number of zero digits before the 1 digit should be two more than the decimal precision of the original expression.
  - If a dividend for the definition of the result field will not be zero when the divisor is, the following change to the expression prevents an overflow condition.

    ```
    Original expression--> FIELD = P / X

    Revised expression---> S     = .00001

                           FIELD = (P*X) / ((X*X) + S)
    ```

  - If your expression performs a division operation, avoid dividing by zero by defining the denominator as the result field just before the result field with a division. Then, for all logical OR groupings of record selection, add a logical AND test stating the denominator must not equal zero.
- On the three lines provided, you can split a field name, numeric constant, or character string at the end of one line and continue it at the beginning of the next. When you split a field name or a numeric constant, do *not* put spaces at the end of the first line or at the beginning of the next line because Query then treats it as *two* field names or numeric constants. Character constants (that is, characters enclosed in apostrophes) can be split at any point. A DBCS character constant can be split by placing a shift-in character in the last position of the upper line and a shift-out character in the first position of the lower line.
- When using a field to divide, you must also select that field not equal to zero as the first selection before any other result fields are processed, as in the following example:
-

  1. AND/OR Field Test Value
  2. ODQYSD NE 0
  3. AND OMCRMM EQ 0
  4. AND OMSTAT EQ '50'
  5. AND ODSTAT NE '99'
  6. AND PCT LT 90
  7. AND PCT LT 90
  8. AND OMUSOR LIST 'DT' 'ET' 'SR' 'RT'
- To make your expressions easier to read, you can use blanks between field names and operators.
- You can create up to 100 result fields.
- Substring and concatenation operations are not allowed with date, time, timestamp or numeric fields. To circumvent this, use the CHAR function around the date, time, or timestamp field and the DIGITS function for numeric fields.

Query determines the data type of the result field according to the following:

If the first value in the expression is a numeric field name, a numeric constant (like the number `7` or `-3.14`), or a function that returns a numeric value, then the result field is numeric.

If the SUBSTR function is used, the result field is an SBCS character field if the value is SBCS, DBCS-only, or DBCS-either. The result field is a DBCS-open field if the value is DBCS-open. The result field is a DBCS-graphic field if the value is DBCS-graphic. A substring of a fixed-length field can be either a variable- or fixed-length field, depending on how you define the length and offset.

If the expression is a constant, field, or function, the data type of the result field is the data type of the constant, field, or value returned by the function.

If the concatenation operation is used and all of the values being concatenated are DBCS-only, the result field is DBCS-only.

If the concatenation operation is used and all of the values being concatenated are DBCS-graphic, the result field is DBCS-graphic.

If the concatenation operation is used and one of the values being concatenated is DBCS-either, or if the expression contains a mixture of SBCS and bracketed-DBCS fields or constants, the result field is DBCS-open.

If a variable-length field is concatenated to either a fixed or variable-length field, the result is a variable-length field.

If two or more fixed-length fields are concatenated, the result is a fixed-length field.

If two fixed-length DBCS fields are concatenated, the result is a variable-length field.

Column headings in Query for iSeries

If you want to specify a column heading to be used for a result field, type the heading you want on the three lines (up to 20 characters each) of the display that correspond to your result field. The heading will appear in your query output exactly as you enter it on the three lines.

If you do not want any heading for a result field, type *NONE in the first five positions on the first line for that field. (You must use all capital letters, and the remainder of the line and the next two lines must be blank.) If you do not specify either a heading or *NONE, Query uses the result field name as the column heading.

Length and decimal positions in Query for iSeries

For character (SBCS and DBCS), date, time, and timestamp result fields, you must leave the *Len* and *Dec* values blank. If you do not specify anything in the *Len* and *Dec* columns when you define a result field, Query determines the length of the result field. When Query determines these values, you have fewer things to consider when changing expressions. If you want to know the length of the result field, press F13 to see the layout of the report and count the number of 9s (numeric fields) and Xs (SBCS character fields). If you are using a DBCS-capable display and have DBCS data, count the number of:

Double-byte Js, which represent DBCS-only data

Double-byte Os, which represent DBCS-open (mixed) data

Double-byte Es, which represent DBCS-either data

Double-byte Gs, which represent DBCS-graphic data

For date, time, or timestamp fields, look at the length of the current date, time, or timestamp in the result field.

For numeric result fields, length is the total number of digits in the field. It includes the number of digits to the left and right of the decimal point but not the decimal point itself. Decimal is the number of decimal positions to the right of the decimal point. If you want to type your own value for the length, to prevent unexpected results, you should first read “Length and decimal positions in Query for iSeries reports” on page 120 and “Result field length and decimal positions in Query for iSeries” on page 188. Also, observe the following:

- If you specify a value for *Len*, you must also specify a value for *Dec* (decimal positions).
- If you increase or decrease the value in *Dec*, you should increase or decrease the value in *Len* the same amount. Also, you may need to change these values later if you make changes to the numeric expression.
- If you leave *Len* and *Dec* blank, Query changes the value if the expression changes.

If you are creating result fields by using multiplication and division operations, you *may* be able to reduce the length value if the actual data in your files will not require the maximum field size as established by Query. For example, an inventory master file would typically have a PRICE field and a QUANTITY field. Both fields would have to have sufficient length to handle the largest value possible. When these two fields are multiplied to create a result field called AMOUNT, the maximum length would be the sum of the sizes of both fields. Since items with high prices are usually stocked in low quantities, the maximum field size for AMOUNT would probably be too large for practical use (for example, in a report).

Note: If you want to decrease the field length because you only want a certain number of positions shown on a report, you should not change the field length on the Define Result Fields display. Change the field length on the Specify Report Column Formatting display instead. If you specify a field length on the Define Result Fields display, the result of an numeric expression may be truncated or rounded, depending on what you specify on the Specify Processing Options display.

Example of defining a result field in Query for iSeries

An example of how you would create a numeric result field called DAYS using the expression WEEKS * 7 and using the report column heading Total Days is shown on the following display. The second input area shows how you would define a character result field called GREETING with a value of 'Have a nice day' and no column heading.

```
                        Define Result Fields
Type definitions using field names or constants and operators, press Enter.
Operators:  +, -, *, /, SUBSTR, ||, DATE...

Field       Expression                        Column Heading          Len Dec
DAYS        WEEKS * 7                         Total                  _____  __
                                              Days



GREETING    'Have a nice day'                 *NONE                  _____  __

                                                                       Bottom
_____________________________________________________________________________
Field
MONTHS
WEEKS
YEAR

                                                                       Bottom
F3=Exit         F5=Report           F9=Insert         F11=Display text
F12=Cancel      F13=Layout          F20=Reorganize    F24=More keys
```

Note: See “CCSID and result field expressions in Query for iSeries” on page 252 for information on how CCSIDs affect result fields.

Adding or removing result fields in Query for iSeries

Adding a result field to your query definition requires positioning the cursor to the top half of the display and using F9 to insert a blank set of result field definition lines. After you have entered the information necessary to define your new result field or fields, they are inserted after the set where the cursor was positioned when you pressed F9. Note that a result field must be defined before it can be used as part of an expression to create another result field.

Once you have positioned the cursor in the top half of the display, the page down key will continue to show you the next two field definitions until you reach the last nonblank definition in the list. Page up shows you the previous two definitions until you reach the beginning of the list.

To remove a result field, blank out all references to the field and its definition on the Define Result Fields display. You must remove all other occurrences of it from your query, but Query leads you to any occurrence of that result field in other expressions or in other parts of the query definition.

Chapter 6. Selecting and sequencing fields in Query for iSeries

This chapter describes how you select fields that you want to include in your query output and how you indicate in what sequence the fields are to appear. They appear in a query report from left to right based on the sequence number that you enter for each field. Query gives you the opportunity to select fields from all your selected files and from all the result fields defined in your query.

Letting Query for iSeries select and sequence fields

If you did not type a 1 next to the Select and sequence fields option on the Define the Query display, Query selects and sequences up to the first 500 fields available in your query. If the file(s) you have selected contains only a few small fields that would all easily fit in 132 positions (the standard width of printed output) and you do not care about the sequence of the output, letting Query select and sequence fields for you makes good sense and may save you some time. Selecting only the fields you want in your query may, however, improve the performance when the query is run.

The Select and Sequence Fields display is shown during query definition if you typed a 1 next to the *Select and sequence fields* option on the Define the Query display. You can press F12 (Cancel) to return you to the previous display if you have changed your mind and now want Query to select and sequence fields for you. (Anything you typed on the display is ignored.)

Selecting fields and specifying their sequence in Query for iSeries

The Select and Sequence Fields display is shown below with some sample fields from a customer master file shown in the *Field* column.

```
                        Select and Sequence Fields

Type sequence number (0-9999) for the names of up to 500 fields to
  appear in the report, press Enter.

Seq   Field               Seq   Field
____  ACCTNUMBER          ____  PASTDUE
____  COMPANY             ____  DATELASTPD
____  FIRSTNAME           ____  CURRENTDAT
____  MIDDLEINIT          ____  YEAR
____  LASTNAME            ____  MONTH
____  STREETADDR
____  CITY
____  STATE
____  ZIPCODE
____  TELENUMBER
____  CRLIMIT
____  BALDUE
                                                              Bottom


F3=Exit           F5=Report        F11=Display text      F12=Cancel
F13=Layout        F20=Renumber     F21=Select all        F24=More keys
```

You make your selections by specifying a sequence number from 0 through 9999 in front of each field you want to select. Use the numbers in ascending sequence. The lowest numbered field is positioned on the far left of your output (or is the first field in your database file). If you change your mind about the fields you have selected, you can delete a field from the output by removing the number you specified in front of it. To change the sequence of the selected fields, just change the numbers.

After making new selections or changing old ones, press the Enter key to rearrange them on the display in the new sequence. You can then renumber them with new sequence numbers in added amounts of 10 (10, 20, 30, and so on) by pressing F20. Renumbering can make it easier to add a field within the sequence later.

Only those fields that you have selected so far appear in your output. If you want the remaining fields (those with no numbers to the left of them) to appear in your output and you do not particularly care how they are arranged, press F21 (Select all). Query arranges the list beginning with those fields that you already selected, and then it supplies sequence numbers for all of the remaining fields in the order that they appeared in the list. (F21 is available only if you are creating or changing a query definition.)

When you make selections or change the sequence and press the Enter key, Query rearranges the fields to match the sequence you specified and displays the message `Press Enter to confirm.` If you are satisfied with the selections and sequence, press the Enter key again to end field selection. If you make any changes before you press the Enter key, the message is shown again, and you must press the Enter key once more to continue.

The fields are shown on the display in the following order:

1. All fields selected on this display, in the sequence specified. If no fields are selected, the fields chosen as sort fields (if any) for this query are listed first, in the order they were given priority on the Select Sort Fields display. (See Chapter 8, “Selecting sort fields in Query for iSeries”.)
2. Any result fields that have been defined for this query but have not been selected.
3. All other fields, in the order they exist in the record format definitions for the selected files. Fields that are not selected from the first file are listed first, followed by those in the second file, and so on.

Following is an example of how you might select and sequence fields so that a query of the customer master file produces a report that shows `COMPANY`, `ACCTNUMBER`, and `PASTDUE` in that order.

```
                        Select and Sequence Fields

Type sequence number (0-9999) for the names of up to 500 fields to
  appear in the report, press Enter.

Seq   Field               Seq   Field
2     ACCTNUMBER          3     PASTDUE
1     COMPANY             ____  DATELASTPD
____  FIRSTNAME           ____  CURRENTDAT
____  MIDDLEINIT          ____  YEAR
____  LASTNAME            ____  MONTH
____  STREETADDR
____  CITY
____  STATE
____  ZIPCODE
____  TELENUMBER
____  CRLIMIT
____  BALDUE
                                                              Bottom


F3=Exit           F5=Report         F11=Display text      F12=Cancel
F13=Layout        F20=Renumber      F21=Select all        F24=More keys
```

If you then pressed the Enter key, the Query would rearrange the fields so that `COMPANY` is in the first position in the list, `ACCTNUMBER` is in the second position, and `PASTDUE` is in the third position. You could also press F20 so that the selected fields are renumbered in added amounts of 10.

```
                        Select and Sequence Fields

Type sequence number (0-9999) for the names of up to 500 fields to
  appear in the report, press Enter.

Seq   Field               Seq   Field
10    COMPANY             ____  BALDUE
20    ACCTNUMBER          ____  DATELASTPD
30    PASTDUE             ____  CURRENTDAT
____  FIRSTNAME           ____  YEAR
____  MIDDLEINIT          ____  MONTH
____  LASTNAME
____  STREETADDR
____  CITY
____  STATE
____  ZIPCODE
____  TELENUMBER
____  CRLIMIT
                                                              Bottom


F3=Exit            F5=Report         F11=Display text       F12=Cancel
F13=Layout         F20=Renumber      F21=Select all         F24=More keys
```

You could then select the remaining fields for output on the report by pressing F21 (Select all). Query would then select and supply sequence numbers for the remaining fields in the order that they appeared in the list.

```
                        Select and Sequence Fields

Type sequence number (0-9999) for the names of up to 500 fields
  to appear in the report, press Enter.

Seq   Field               Seq   Field
10    COMPANY             130   BALDUE
20    ACCTNUMBER          140   DATELASTPD
30    PASTDUE             150   CURRENTDAT
40    FIRSTNAME           160   YEAR
50    MIDDLEINIT          170   MONTH
60    LASTNAME
70    STREETADDR
80    CITY
90    STATE
100   ZIPCODE
110   TELENUMBER
120   CRLIMIT
                                                              Bottom


F3=Exit            F5=Report         F11=Display text       F12=Cancel
F13=Layout         F20=Renumber      F21=Select all         F24=More keys
```

Another way of making your selections is to first specify the *same* sequence number (a 1, for example) for all of the fields you want to select. Press the Enter key, and Query pulls all of those fields to the top of the list. You can then specify new sequence numbers to arrange the fields in the order you want for your report. This is particularly useful when there are too many fields to appear on a single display.

Query has the ability to show you additional information about the fields in the list area of the display. If only the field names are shown in the list and you press F11, you see the descriptive text, the length, and the decimal positions for the fields. For more information on using F11, see “Using F11 to display additional information about Query for iSeries queries” on page 15. You can also display a long comment (if one exists) for a field (or display the expression defining a result field) by moving the cursor to that field and pressing F23.

After you have confirmed the fields you want by pressing the Enter key a second time without making any changes to your sequence choices, Query completes this step and takes you back to the Define the Query display so that you can continue with other query tasks. If you previously selected more options on the Define the Query display, Query shows you the first display for the next option.

Chapter 7. Selecting records in Query for iSeries

This chapter describes how you can perform record selection tests so that your query output contains only selected records, such as records in which the value of a field is equal to a specified value. For example, you want to obtain information from an employee master file about all employees whose age is equal to or greater than 21. By using certain tests, you can select only these records from your file (and thus exclude those who are less than 21).

This selection process involves creating comparison tests that Query uses to select the desired records. You can specify one test or as many as 100 tests. If the result of the test or the combined result of several tests is true, the record being tested is selected and included in your query output.

Letting Query for iSeries select records

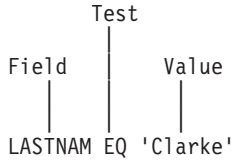
If you did not type a 1 next to the *Select records* option on the Define the Query display, all of the records from your selected files are included in your query output.

The Select Records display is shown during query definition if you typed a 1 next to the *Select records* option on the Define the Query display. Press F12 (Cancel) to return to the previous display if you have changed your mind and now want all records in your output. (Anything you typed on this display is ignored.)

Selecting the records you want in Query for iSeries

Usually your reports are based on records that have something in common, such as a report that lists only those items in an inventory that are in short supply. Selecting records by creating comparison tests gives you the ability to specify that the records must contain (or not contain) particular information—in the case of the inventory items that are in short supply, you would want in your report only those items for which the quantity on hand is below a certain level. This type of report is usually more meaningful and easier to use than a report that contains all of the records from a file.

To select a record, you compare the contents of one or more fields (including result fields) with one or more specified values to see if a condition, or test, is true. For example, you want all persons with the last name (`LASTNAM`) equal to `'Clarke'` to appear in your output.



The Select Records display lists fields you can use (including result fields) and asks you to specify your comparisons. This display is shown below with some sample fields from a customer master file shown in the *Field* column.

```
                              Select Records

Type comparisons, press Enter. Specify OR to start each new group.
  Tests:  EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field             Test   Value (Field, Number, or 'Characters')
        ______________    _____  ______________________________
 ____   ______________    _____  ______________________________
 ____   ______________    _____  ______________________________
 ____   ______________    _____  ______________________________
 ____   ______________    _____  ______________________________
 ____   ______________    _____  ______________________________
                                                          Bottom
_____________________________________________________________________
Field               Field              Field              Field
ACCTNUMBER          STREETADDR         CRLIMIT            YEAR
COMPANY             CITY               BALDUE             MONTH
FIRSTNAME           STATE              PASTDUE
MIDDLEINIT          ZIPCODE            DATEPAID
LASTNAME            TELENUMBER         CURRENTDAT
                                                          Bottom
F3=Exit          F5=Report           F9=Insert          F11=Display text
F12=Cancel       F13=Layout          F20=Reorganize     F24=More keys
```

Note: The value is not limited to the length of the line on the input display. If you need more space, continue on to the next line. You must separate all values with blanks. If one value ends at the end of the line and you continue on to the next line, you must include a blank space before the value on the next line. You can split DBCS character constants by placing a DBCS shift-in character in the last position of the first line and a DBCS shift-out character in the first position of the next line.

A comparison has all of the following:

- A field to be compared
- A test
- One or more values to compare the field with

You can specify up to a maximum of 100 comparisons. Each comparison can use as many lines (up to 30 characters per line) as needed, up to a maximum of 100 lines total for all comparisons.

The Select Records display provides six input lines at a time for you to enter comparisons. If you need more than this, press the Page Down key to get more blank input lines. If the cursor is positioned on any of the input lines (whether you have typed a comparison on it or not), you can use the page keys to view all of the comparisons that you have entered.

Comparison fields in Query for iSeries

In order to be tested, the field must be one of the following:

- A field that exists in your selected file(s). This can be any field, including a field that you have not chosen to include in your output.
- A result field defined for this query.

When you specify a field in a comparison, you must put the file identifier followed by a period in front of any field name that appears in more than one selected file in the list. For example, if the field `ACCTNUMBER` exists in two of your selected files that have file IDs `T01` and `T02`, you would have to specify `T01.ACCTNUMBER` or `T02.ACCTNUMBER`. If you did not include the file identifier, Query would not know from which file to get the account number needed for the comparison test. You can press F18 (Files) to see a list of the files that you selected and the file ID associated with each file.

Comparison values in Query for iSeries

The value you compare the field with can be:

- Another field
- A numeric constant
- A character constant (SBCS or DBCS)
- A date constant
- A time constant
- A timestamp constant

The field and the value you are comparing must be compatible data types. The following are valid comparisons for record selection tests:

- SBCS character field with:
  - SBCS character
  - DBCS-either
  - DBCS-open
- DBCS-either field with:
  - SBCS character
  - DBCS-either
  - DBCS-open
  - DBCS-only
- DBCS-open field with:
  - SBCS character
  - DBCS-either
  - DBCS-open
  - DBCS-only
- DBCS-only field with:
  - DBCS-either
  - DBCS-open
  - DBCS-only
- DBCS-graphic field with:
  - DBCS-graphic
- UCS2-graphic field with:
  - UCS2-graphic
- Numeric field with a numeric field
- Date field with:
  - SBCS character
  - Date
  - DBCS-either
  - DBCS-open
- Time field with:
  - SBCS character
  - Time
  - DBCS-either
  - DBCS-open
- Timestamp field with:

SBCS character

Timestamp

DBCS-either

DBCS-open

- Any field can be compared to the keyword NULL using the IS or ISNOT test to determine if a field value is or is not null.

Note: When comparing a date, time, or timestamp field with an SBCS, DBCS-either, or DBCS-open character field, use a character field for which each value can be recognized as an SAA formatted date, time, or timestamp. If the character field contains a correct representation of a date, time, or timestamp, but in other than an SAA format, you may get unexpected results. When you run a query that uses a non-SAA format for date, time, or timestamp values in character fields, and query has no setting for a non-SAA literal date value, use the CHGJOB command to make sure your job date format and separator match the format and separator in the character field values.

Usually you specify only one value per comparison. The exceptions are discussed in "Comparison tests in Query for iSeries" on page 95.

Fields as values in Query for iSeries

If you use a field as a value (that is, in the *Value* column on the display), the field can be any field from the list in the lower part of the display.

An example of a situation where you might use a field as a value is if you want only the records—from a customer master file—with a balance due (in a field named `BALDUE`) greater than their credit limit (in a field named `CRLIMIT`). In this example, you are comparing a field (`BALDUE`) with a value which is also a field (`CRLIMIT`).

The fields being compared do not have to be the same length, and numeric fields do not have to have the same number of decimal positions.

Character constants as values in Query for iSeries

A character constant is simply characters enclosed in apostrophes (for example, `'xxx'`). The apostrophes are important, because Query assumes that any group of characters not enclosed by apostrophes is a field name. In DBCS character constants, shift-out and shift-in characters must surround DBCS data within the apostrophes. DBCS-graphic character constants must be preceded by an uppercase or lowercase G.

For example, if you want only the records for Jan Alison, you compare the `NAME` field with `'Jan Alison'`. Also, note that if you do not use the apostrophes, Query tells you: `Only one value is allowed for test`.

The characters in the constant can be any combination of letters, numbers, or special characters (such as *, ?, #, $, @) that might be found in the tested field. You must use apostrophes around a character constant, even if it contains only numbers. You must also type uppercase and lowercase letters exactly as you want them. The special characters underscore (_) and percent (%) have certain meanings when used in a LIKE test.

If the character constant you specify contains an apostrophe, you must enter it as two apostrophes, so Query does not think it has reached the end of the constant. For example, if you are looking for records that list the street address as `Granger's Circle`, you type the constant as `'Granger's Circle'`. Query counts two apostrophes within a constant as a single apostrophe.

Numeric constants as values in Query for iSeries

You must not enclose a numeric constant in apostrophes. A numeric constant can be from 1 to 31 digits long.

Do not use a currency sign (to indicate a monetary value) or a thousands separator (to indicate thousands, millions, and so on) within a numeric constant.

Note: If you are sending queries between countries that use the comma for a decimal separator, put a blank after each comma separating the offset and length in the SUBSTR function and between numeric values in a list in the VALUE function. Press F17 to show which decimal separator to use in the query (see “Displaying the format of constants in Query for iSeries” on page 17).

Date, time, timestamp constants as values in Query for iSeries

Date, time, or timestamp constants are the same as the constants used on the Define Result Fields display. See “Date, time, and timestamp expressions in Query for iSeries” on page 66. You can see what is allowed for OS/400 date and time formats and separators by pressing F17 (see “Displaying the format of constants in Query for iSeries” on page 17).

Null values in Query for iSeries

Null is a valid value for all data types on record selection. IS and ISNOT are valid tests for the keyword NULL.

Comparison tests in Query for iSeries

You can specify these tests in comparisons:

Test	Description
EQ	Equal. Use this test to determine if the contents of the field and the value are equal.
NE	Not equal. Use this test to determine if the contents of the field and the value are not equal.
GT	Greater than. Use this test to determine if the contents of the field is greater than the value.
LT	Less than. Use this test to determine if the contents of the field is less than the value.
GE	Greater than or equal. Use this test to determine if the contents of the field is greater than or equal to the value.
LE	Less than or equal. Use this test to determine if the contents of the field is less than or equal to the value.
RANGE	Range. Use this test to determine if the contents of the field is within a range that you have specified for the value.
LIST	List. Use this test to determine if the contents of the field is equal to one of the values in a list.
NLIST	Not List. Use this test to determine if the contents of the field is not equal to any of the values in a list.
LIKE	Like. Use this test to determine if the contents of the field has a pattern similar to the value.
NLIKE	Not Like. Use this test to determine if the contents of the field has a pattern that is not similar to the value.
IS	Is. Use this test to determine if a field is null. The only valid value is NULL or null.
ISNOT	Is not. Use this test to determine if the contents of the field is not null.

Character fields and constants are compared character by character for all tests except LIKE, NLIKE, IS, and ISNOT.

- If two fields or a field and a constant being compared are not the same length, Query treats the shorter field as if it has enough blanks at the end to make both fields the same length.
- The collating sequence determines greater than and less than conditions (for GT, GE, LT, LE, and RANGE comparisons). For more information on collating sequences, see Chapter 9, “Selecting a collating sequence in Query for iSeries”.

Date, time, or timestamp comparisons in Query for iSeries

A date, time, or timestamp value may be compared either with another value of the same data type or with a character representation of that data type. All comparisons are chronological. The farther a point in time is from January 1, 0001, the *greater* the value of that point in time.

Comparisons of time values and character representations of time values always include seconds. If the character representation omits seconds, zero seconds are assumed. A time or timestamp value that includes 24:00:00 is not the same as 00:00:00.

Testing for equal (EQ) and not equal (NE) in Query for iSeries

You use the equal and not equal tests to determine if the contents of a field is equal or not equal to the value you specify.

If the test is EQ, records are selected only if the field contains data that is exactly the same as the specified value. For example, if the only comparison is:

```
INTRAT EQ 18
```

records are selected only if INTRAT, a numeric field, contains a value equal to 18. For example, INTRAT could contain 18., 18.00, 00018, and so on.

If the test is NE, records are selected only if the field contains data that is different than the specified value. For example, if you want to select records that contain anything other than a value of SMITH in the field NAME, you specify:

```
NAME NE 'SMITH'
```

It does not matter to Query if the field called NAME is defined to be longer than five characters. Query looks for all records that do not exactly match SMITH. SMITHSON, Smith, and NEISMITH would all be selected as names that are not equal to SMITH.

Testing for IS Null (IS) and ISNOT Null (ISNOT) in Query for iSeries

You use the IS and ISNOT tests to determine if the contents of any field is or is not null. Any field can be compared to null using the IS or ISNOT test. Some examples of IS and ISNOT are:

```
NAME IS NULL
```

Records are selected if the field NAME contains a null value.

```
NAME ISNOT NULL
```

Records are selected if the field NAME does not contain a null value.

Testing for greater (GT or GE), less (LT or LE), and range (RANGE) in Query for iSeries

You use the greater and less tests to determine if the contents of a field is greater than, greater than or equal to, less than, or less than or equal to the specified value. You use the range test to determine if the contents of a field lies within the specified range of values. In addition to using these to test numeric data, you can also test character data.

Some examples of greater and less tests are:

- `NAME GT 'SMITH'`

  Records are selected if the field NAME contains a value in the collating sequence greater than SMITH.
- `INTRAT GE 18`

  Records are selected if the field INTRAT contains a value that is greater than or equal to 18.
- `BALDUE LT CRLIMIT`

  Records are selected if the data in the field BALDUE is less than the data in the field CRLIMIT.
- `BALDUE LE CRLIMIT`

Records are selected if the data in the field BALDUE is less than or equal to the data in the field CRLIMIT.

When you test for RANGE, the contents of the field must be within the range of two values (greater than or equal to the first value but less than or equal to the second) for the record to be selected. On the Select Records display, you must specify two values in the *Value* column, and you must separate them by a blank. If the first value is greater than the second value for a record, that record will not be selected.

For example, you want to select records only for the months of February through August. The field named MONTH is a numeric field, and it contains a 1 to represent January, a 2 to represent February, a 3 to represent March, and so on. On the Select Records display, you would specify:

```
                              Select Records

Type comparisons, press Enter. Specify OR to start each new group.
  Tests: EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field            Test   Value (Field, Number, or 'Characters')
        MONTH_________   RANGE  2 8_____________________________
 ____   ______________   _____  _____________________________
 ____   ______________   _____  _____________________________
```

To use the GT, GE, LT, LE, and RANGE tests for SBCS character fields and values, you may need to know the collating sequence. The collating sequence determines what characters are greater than or less than others. If you do not select a different one, the hexadecimal collating sequence is used and:

- Most special characters are less than letters.
- Lowercase letters are less than uppercase.
- Letters are less than numbers.

For example, the characters A, 8, &, and b would sort from low to high as follows:

```
&
b
A
8
```

For more information about selecting or defining a collating sequence, see Chapter 9, “Selecting a collating sequence in Query for iSeries”.

Testing for values in a list (LIST NLIST) in Query for iSeries

Use the LIST, NLIST tests to determine if the content of a field is equal or not to one of the values that you list in the *Value* column on the Select Records display.

Note: See “CCSID and record selection tests in Query for iSeries” on page 253 for information on CCSIDs and how they affect the Select Records display.

When you compare a field with a list, the record is selected if the contents of the field exactly match one of the values you specify. The values you specify in the list:

- Must be numeric constants if you are comparing a numeric field with them.
- Must be SBCS character constants if you are comparing an SBCS character field with them.
- Must be SBCS, DBCS-only, or DBCS-open character constants if you are comparing a bracketed-DBCS field with them. (If the field being tested is a DBCS-only field, the constant can only be a DBCS-only constant.)
- Must be DBCS-graphic character constants if you are comparing a DBCS-graphic character field with them.
- Must be separated by blanks.
- Cannot be field names.

- Must be date constants if comparing to a date field. If the list contains correct representations of a date but in other than SAA format, you may get unexpected results. To prevent unexpected results, the list should be in SAA format.
- Must be time constants if comparing to a time field. If the list contains correct representations of a time but in other than SAA format, you may get unexpected results. To prevent unexpected results, the list should be in SAA format.
- Must be timestamp constants if comparing to a timestamp field.

Your list must contain at least two values, and they need not be in any particular order. You must enclose each character constant in apostrophes and use two apostrophes where the character constant itself contains an apostrophe (see the name `O'Grady` in "Example 2: Testing for values in a list (LIST NLIST) in Query for iSeries").

If all of the values in the list do not fit on one line, just continue them on the next line under *Value*. If one value ends in the last position of a line and you continue on the next line, you must put a blank space before the value on the next line. You can split DBCS character constants by placing a DBCS shift-in character in the last position of the first line and a DBCS shift-out character in the first position of the next line.

Example 1: Testing for values in a list (LIST NLIST) in Query for iSeries: If you want to select only records that have `04567`, `00976`, and `85432` in the `ITEMNO` field, you specify:

```
                              Select Records

Type comparisons, press Enter. Specify OR to start each new group.
Tests: EQ, NE, LE, GE, LT, GT, RANGE, LIST, NLIST, LIKE, NLIKE, IS,ISNOT

AND/OR  Field             Test   Value (Field, Number, or 'Characters')
        ITEMNO            LIST   04567 00976 85432
 ____   _______________    _____  ____________________________________
 ____   _______________    _____  ____________________________________
```

Example 2: Testing for values in a list (LIST NLIST) in Query for iSeries: The following tests the field `LASTNAME` for a number of different last names:

```
                              Select Records

Type comparisons, press Enter. Specify OR to start each new group.
  Tests: EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field             Test   Value (Field, Number, or 'Characters')
        LASTNAME          LIST   'Staples' 'Thorson' 'Smith' 'J
 ____   _______________    _____  ones' 'Alison' 'O'Grady'
 ____   _______________    _____  ____________________________________
```

Testing for values that are similar (LIKE NLIKE) in Query for iSeries

You use the LIKE test to determine if a field has a pattern that is similar to the test pattern you specify. You use the NLIKE test to determine if a field is not similar to the test pattern that you specify. You can use LIKE comparisons for SBCS and DBCS character fields, but specifying a LIKE or NLIKE comparison for any other field types causes an error message.

When you use a LIKE test, a record is selected if a certain part of the field has the same characters as the test pattern you specify for the comparison value. For example, you would use the LIKE test if you wanted to select all records that have a last name that begins with an `A`.

You must enclose the test pattern in apostrophes; use two apostrophes where the test pattern itself contains an apostrophe. If the test pattern consists of two apostrophes alone (`''`), it is treated as an empty string.

You can use some special characters to represent the positions in the field that you do not care about:

- An underscore (_) means skip one character at that position and do not test for that character. Each underscore takes the place of one character in the field.
- A percent sign (%) means skip as many characters as necessary to get to the end of the field or to the next specified character. Each % takes the place of zero or more characters in the field. (Thus, you need not write a test pattern that is 32 characters long just because the field is 32 characters long.)

A test pattern must be no longer than, but it can be as long as, the actual field. Query does not count a % as a character and counts two apostrophes within a constant as one character when checking pattern length.

For example, if you are testing for an `A` in the first position of the `LASTNAME` field, and if:

- The field length is 1, you could specify `'A'`
- The field length is 3, you could specify `'A__'`
- The field length is at least 1, you could specify `'A%'`

You would type them on the display as follows:

```
                              Select Records

Type comparisons, press Enter. Specify OR to start each new group.
  Tests: EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field             Test   Value (Field, Number, or 'Characters')
        LASTNAME          LIKE   'A%'
 ____   ______________    _____  ______________________________
 ____   ______________    _____  ______________________________
```

If you are testing for an `A` in the last position of the field, you could specify `'%A'`. But note that if an 8-character field contained `'ANNA    '`, the LIKE test would fail because the last position in the field is a blank.

If you are testing for an `E` followed by an `A` two positions after it, and the field length is at least 3, you could specify:

```
'%E_A%'
```

Note that if an 8-character field contained any of the following, the LIKE test would be true:

```
'ANNE A. '        'EVAN E. '          'ANNE EVA'
```

Note: A LIKE, NLIKE test cannot be used for a date, time, or timestamp field. Only character constants are allowed for LIKE, NLIKE. To circumvent this, create a result field and use the CHAR function on the date, time, or timestamp field. Then use the result field on the Select Records display.

Testing for DBCS LIKE (like) and NLIKE (not like) in Query for iSeries

DBCS LIKE or NLIKE tests can be used in the *Value* column of the Select Records display to select records. The following types of LIKE patterns can be used for DBCS fields that are being tested: standard SBCS character constants, DBCS-only character constants, DBCS-open character constants, and DBCS-graphic character constants.

Non-DBCS character LIKE, NLIKE (not like) pattern in Query for iSeries: This pattern, which contains no DBCS data, can be used to test DBCS-either and DBCS-open fields. Use a % sign to skip any number of characters or none at all. Use an underscore (_) to represent any single SBCS character. Although the LIKE pattern contains only SBCS characters, it can test DBCS-open fields that contain both DBCS data and SBCS data, because a % sign can be used to skip over both kinds of data.

DBCS-only LIKE, NLIKE (not like) pattern in Query for iSeries: This pattern, which contains only double-byte characters, can be used for any bracketed-DBCS field, but not for a DBCS-graphic field. Start the pattern with a shift-out character and end it with a shift-in character. Use the DBCS percent sign (%%) to skip any number of characters or none at all. Use the DBCS underscore (__) to indicate that any double-byte character is accepted for that position. Although the LIKE pattern contains only double-byte characters, it can test DBCS-open fields that contain both double-byte character data and alphanumeric data because a %% sign can skip over both kinds of data.

DBCS-open LIKE, NLIKE (not like) pattern in Query for iSeries: This pattern, which contains both DBCS and SBCS character data, can be used only for DBCS-open fields.

- The percent sign (%) skips any number of SBCS characters or double-byte characters, or none at all. It ignores shift-out and shift-in characters.
- The DBCS percent sign (%%) works the same way as the standard percent sign (%).
- The underscore (_) represents one SBCS character. It does not represent a double-byte, shift-out, or shift-in character.
- The DBCS underscore (__) represents one double-byte character. It cannot be used to represent an alphanumeric, shift-out, or shift-in character.

DBCS-Graphic LIKE, NLIKE (not like) pattern in Query for iSeries: This pattern, which contains only double-byte characters, can be used only for a DBCS-graphic field. A DBCS-graphic test pattern must have an uppercase or lowercase G before the apostrophe. Within the apostrophes, the pattern must start with a shift-out character and end with a shift-in character. Use the DBCS percent sign (%%) to skip any number of characters or none at all. Use the DBCS underscore (__) to indicate that any double-byte character is accepted for that position.

Examples: In the following examples, %% represents the DBCS percent sign, __ represents the DBCS underscore, s/o represents the shift-out character, s/i represents the shift-in character, and a pair of the same SBCS characters, such as DD, represent a single DBCS character.

```
Example 1:       DBCSFLD1   LIKE   's/o__DD__%%HH%%s/i'
```

Example 1 selects only records in which the second character in field DBCSFLD1 is DD, the first and third characters are any double-byte characters, and at least one of the fourth through last characters is HH. This test could be used for any bracketed-DBCS field that is at least ten characters long. This test could also be used for a DBCS-graphic field by putting a G in front of the test pattern:

```
                G's/o__DD__%%HH%%s/i'
```

If DBCSFLD1 is a DBCS-open field, this test could select data that has alphanumeric characters, such as 's/oXXDDMMs/iAnns/oGGHHs/i', for which the DBCS percent sign would skip over both double-byte characters and alphanumeric characters before reaching HH.

```
Example 2:       DBCSFLD2   LIKE   's/o%%__%%s/i'
```

Example 2 selects only records in which field DBCSFLD2 contains at least one double-byte character. The DBCS underscore (__) can stand for a double-byte character, but not for an alphanumeric character. A different value, '%_%', selects records that have at least one alphanumeric character. A value of 's/o__________s/i' selects those that have all double-byte characters for a field that is ten characters long.

```
Example 3:       DBCSFLD3   LIKE   's/oYY%%s/i A_o'
```

Example 3 selects all records in which the field DBCSFLD3 begins with the double-byte character YY and ends with alphanumeric characters, the first of which is blank, the second of which is A, and the fourth of which is o. This test selects fields such as 's/oYYs/i Amo'; 's/oYYZZXXs/iMary Abo'; or 's/oYYs/iABCs/oTTWWs/iM Aro'. It is not important that the percent between the double-byte character and alphanumeric parts of the value is a DBCS percent; the following two values are equivalent to the one used: 's/oYY%s/i A_o' and 's/oYY%%s/i% A_o'.

If the test pattern consists of two apostrophes alone (`'' or G''`) or two apostrophes enclosing only DBCS shift-out and shift-in characters (`'s/os/i' or G's/os/i'`), the test pattern is treated as an empty string. These patterns will select records in which the field contains an empty string.

Using more than one comparison test in Query for iSeries

When you use more than one comparison, you need to tell Query how to connect them by typing a connection in the *AND/OR* column. The two types of connections are:

- AND connections
- OR connections

If you do not specify anything in the *AND/OR* column between comparisons, Query assumes AND. *All* of the comparisons that are connected by ANDs must be true for the record to be selected by that group of comparisons.

For example, to select records for all customers with the last name of `'Clarke'` and who live in Arizona (`'AZ'`) requires an AND connection:

```
                              Select Records

Type comparisons, press Enter. Specify OR to start each new group.
  Tests:  EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field             Test   Value (Field, Number, or 'Characters')
        LASTNAME          EQ     'Clarke'
 AND    STATE             EQ     'AZ'
 ____   ______________    _____  ______________________________
 ____   ______________    _____  ______________________________
 ____   ______________    _____  ______________________________
 ____   ______________    _____  ______________________________
                                                          Bottom
_____________________________________________________________________
ACCTNUMBER          STREETADDR          CRLIMIT             YEAR
COMPANY             CITY                BALDUE              MONTH
FIRSTNAME           STATE               PASTDUE
MIDDLEINIT          ZIPCODE             DATEPAID
LASTNAME            TELENUMBER          CURRENTDAT
                                                          Bottom

F3=Exit          F5=Report           F9=Insert        F11=Display text
F12=Cancel       F13=Layout          F20=Reorganize   F24=More keys
```

Although this example shows the AND typed in the *AND/OR* column, it is not necessary. (If you leave the *AND/OR* column blank, Query assumes an AND connection.) Comparisons connected with one or more ANDs are considered a group of comparisons.

The other kind of connection between comparisons is OR; that is, one or more of the comparisons (or groups of comparisons) must be true for the record to be selected.

Because Query assumes AND connections unless told otherwise, you must specify `OR` in the *AND/OR* column whenever you want an OR connection.

For example, to select records in which the last name is `Kingsbury` or the credit limit is greater than or equal to `$5,000` requires an `OR` connection:

```
                              Select Records

Type comparisons, press Enter. Specify OR to start each new group.
  Tests:  EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field             Test   Value (Field, Number, or 'Characters')
        LASTNAME          EQ     'Kingsbury'
 OR     CRLIMIT           GE     5000
 ____   _____________     _____  ______________________________
 ____   _____________     _____  ______________________________
```

You can use AND and OR connections together to be even more specific about which records to include in your report. The following example selects records for customers who placed orders from November 1986, through January 1987. Note that numeric constants are used for months.

```
                              Select Records

Type comparisons, press Enter. Specify OR to start each new group.
  Tests:  EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field             Test   Value (Field, Number, or 'Characters')
        MONTH             LIST   11 12
 AND    YEAR              EQ     86
 OR     MONTH             EQ     1
 AND    YEAR              EQ     87
```

If written out, the above example looks like this:

```
(MONTH LIST 11,12 AND YEAR EQ 86) OR
(MONTH EQ 1 AND YEAR EQ 87)
```

Because using a combination of AND and OR connections can be confusing, you might want to use F5 to look at your report and make sure your comparisons work the way you expect.

If a combination of AND and OR connections seems particularly complex, you should probably look at the comparisons closely to see if you can use fewer connections to make the same record selection. For example, following are two ways of selecting records for customers from Rhode Island (`'RI'`) who have a balance due from $900 to $1000 during 1986 OR 1987.

The first method uses a combination of AND and OR connections.

```
                              Select Records

Type comparisons, press Enter. Specify OR to start each new group.
  Tests: EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field             Test   Value (Field, Number, or 'Characters')
        BALDUE            RANGE  900 1000
 AND    STATE             EQ     'RI'
 AND    YEAR              EQ     86
 OR     BALDUE            RANGE  900 1000
 AND    STATE             EQ     'RI'
 AND    YEAR              EQ     87
 ____   _____________     _____  ______________________________
```

Written out, this example would look like this:

```
(BALDUE RANGE 900,1000, AND STATE EQ 'RI' AND YEAR EQ 86)
OR
(BALDUE RANGE 900,1000 AND STATE EQ 'RI' AND YEAR EQ 87)
```

The second method, which uses the LIST test and AND connections, selects the same records but needs fewer lines and is easier to read:

```
                              Select Records

Type comparisons, press Enter. Specify OR to start each new group.
  Tests: EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field             Test   Value (Field, Number, or 'Characters')
        BALDUE            RANGE  900 1000
 AND    STATE             EQ     'RI'
 AND    YEAR              LIST   86 87
 ____   ______________    _____  ________________________________
 ____   ______________    _____  ________________________________
                                                          Bottom
```

Written out, the example would look like this:

```
(BALDUE RANGE 900,1000 AND STATE EQ 'RI' AND YEAR LIST 86,87)
```

Note: CCSIDs can affect how records are selected. See “CCSID and record selection tests in Query for iSeries” on page 253 for information on CCSIDs and how they affect record selections.

Adding and removing comparisons in Query for iSeries

The prompt part of the Select Records display only has room to show six comparisons at a time. You can press the Page Down key to get blank input lines after the last line you typed. When you have specified more than six comparisons, you can press the Page Up key to see the previous ones.

If you want to add another comparison between two comparisons that you have already typed, you can press F9 to insert a blank line where you need it so that you do not have to retype everything. The new line is added after the line on which the cursor is positioned when you press F9. You can also press F9 instead of the Page Down key to add lines as you type in comparisons.

If you change your mind about a comparison and want to remove it from the group, just use the spacebar or Field Exit to blank it out. If you change your mind and want to remove all of your comparisons, press F12 (Cancel). Anything that you entered on the Select Records display is then ignored.

If you have blanked out a line or two and are at the last available blank line and need more lines, you can press F20 to reorganize the space. Query moves the blank lines to the end of the comparisons. You see the first six comparison lines on your display and must press the Page Down key to get to the blank lines or to the place where you want to insert a line. If you run out of space but have no blank lines to move, you have to redesign your comparisons so that they fit into the 100-line limit.

Chapter 8. Selecting sort fields in Query for iSeries

This chapter describes how you can select sort fields to control the arrangement of the data in your query output. To Query, a sort field is a field whose contents are used to sort the output records in a particular order. For example, if you wanted to use a customer master file to obtain a list of all your customers, you might want those customers listed in a particular order, such as alphabetically by last name, alphabetically by state, or both alphabetically by state and then by last name. In this case, you would need to specify one or more sort fields to ensure that your output in is the order you want it to be in.

Letting Query for iSeries determine the order of records for you

You can let Query retrieve the data directly from the database and include it in your query without any sorting. If the sequence of the data in your report is not important, you do not need to worry about selecting sort fields. When running a query that does not have a sort field specified, the order in which rows are retrieved is not guaranteed. If the order is important, you should define a sort field in the query. A thorough knowledge of database concepts, including file type and access paths, is needed if you want to predict the sequence of your output.

Note: When you select a logical file for use with Query or DB2 UDB for iSeries programs without specifying any sort fields, unpredictable results may occur. For example, you may not receive the logical view of the physical file.

If you did not type a 1 next to the *Select sort fields* option on the Define the Query display, the Select Sort Fields display is not shown while you work with your query definition, and the data is not sorted when you run the query.

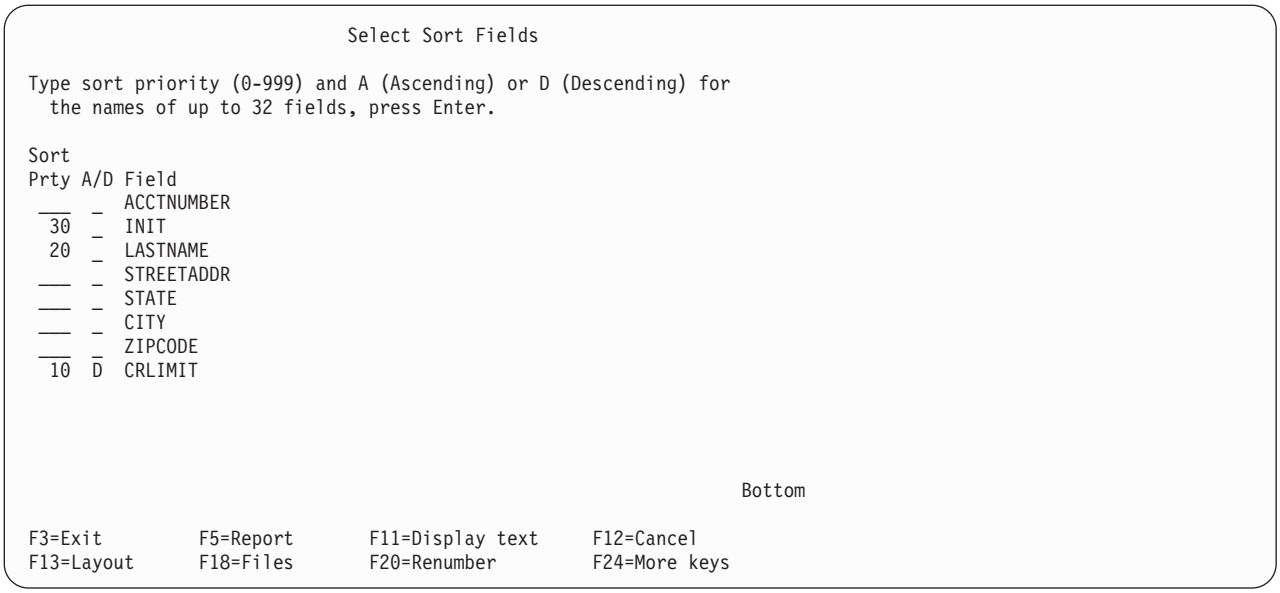
If you typed a 1 next to the *Select sort fields* option on the Define the Query display, the Select Sort Fields display is shown during query definition. Press F12 (Cancel) to return to the previous display if you have changed your mind and do not want to select any sort fields. (Anything you typed on the display is ignored.)

Selecting the sort fields you want to use in Query for iSeries

On the Select Sort Fields display, as shown below, you select the sort fields that you want by entering a sort priority number in the *Sort Prty* column. You can select up to 32 sort fields from the list. (The list on this display shows only those fields that were selected on the Select and Sequence Fields display; if no fields were selected, the list shows all the fields.) The total length of all the sort fields cannot be greater than 10 000 characters (that is, if you add up the lengths of the sort fields, the total cannot exceed 10 000 characters).

Based on the number you type for each field you select as a sort field, Query establishes a sort priority. You can use any numbers from 0 to 999—use the lowest number for your highest priority sort field. If you use numbers like 10, 20, 30, and so on, you can easily add another sort field later.

You can also specify whether you want the sort field sorted in ascending order (from lowest to highest value) or descending order (from highest to lowest value) by typing an A (for ascending) or a D (for descending) in the *A/D* column. (If you leave the *A/D* column blank for a field, the sort for that field is done in ascending order.)



When you press the Enter key after typing your sort priority numbers, Query rearranges the fields on the display in the following order:

- If fields were selected on the Select and Sequence Fields display, they are listed in the following order:
  1. All sort fields (if any) previously selected on this display, in the order specified.
  2. Fields selected for the query, but not selected as a sort field. These fields are listed in the order they were specified on the Select and Sequence Fields display.
- If *no* fields were selected on the Select and Sequence Fields display, the fields on this display are shown in the following order:
  1. All sort fields (if any) previously selected on this display, in the order specified.
  2. Any result fields that have been defined for this query.
  3. All other fields, in the order they exist in the record format definitions for the selected files. Fields from the first file are listed first, followed by those in the second file, and so on.

Query then displays a message `Press Enter to confirm.` so that you have a second chance to review your sort fields and change them if you want.

To remove a sort field from your selections, blank out the number in front of that field name. It is not necessary to renumber the other fields. To change the priorities of the sort fields, just change the numbers.

If you make any changes, press the Enter key again. The list of field names is rearranged and is shown with the sort fields first, in the sort priority you specified followed by the remaining fields that were selected for output. If you want to renumber the fields in added amounts of 10 (10, 20, 30, and so on), press F20.

When you are satisfied that your sort field selections are correct, press the Enter key a final time to end sort field selection.

The following is an example of how to specify sort priorities.

Assume that you are the credit manager for the United States division of an international mail-order company, and you want a report of customer names and addresses organized as follows:

- Customers with the highest credit limit should appear first, then the next highest, and so on.
- If two or more customers from the same state have the same credit limit, these customers should be grouped by state.

- The states, and the customers listed for each state, should appear alphabetically.

In order to obtain the order you want, your first sort field is credit limit (CRLIMIT), in descending order (from highest to lowest); your second sort field is state (STATE); your third sort field is last name (LASTNAME); and your last sort field is first name (INIT).

You would complete the Select Sort Fields display as follows:

```
                            Select Sort Fields

Type sort priority (0-999) and A (Ascending) or D (Descending) for the
  names of up to 32 fields, press Enter.

Sort
Prty A/D  Field           Text                                      Len  Dec
 ___  _   ACCTNUMBER      Account number                              6
  40  _   INIT            Customer first and middle initial           2
  30  _   LASTNAME        Customer last name                         20
 ___  _   STREETADDR      Street address                             20
 ___  _   CITY            City                                       15
  20  _   STATE           State abbreviation                          2
 ___  _   ZIPCODE         Zip code                                    5
  10  D   CRLIMIT         Credit limit amount                         7    2




                                                                  Bottom

F3=Exit         F5=Report        F11=Display names only     F12=Cancel
F13=Layout      F18=Files        F20=Renumber               F24=More keys
```

Notice that a D has been typed in the *A/D* column for the CRLIMIT field. The STATE, LASTNAME, and INIT fields will all be sorted in ascending order (which is the order you want).

Also notice that this display shows additional information including the text, length, and decimal positions for each field. While you are selecting sort fields you can press F11 to alternate between showing only the names of the fields and showing both the names and additional information about the fields. For more information about using F11, see “Using F11 to display additional information about Query for iSeries queries” on page 15.

After pressing the Enter key, the Select Sort Fields display appears again, but this time the fields given priority are listed first in the order specified and the fields not used as sort fields are moved to the bottom of the list:

```
                          Select Sort Fields

Type sort priority (0-999) and A (Ascending) or D (Descending) for the
  names of up to 32 fields, press Enter.

Sort
Prty A/D  Field          Text                                      Len  Dec
  10  D   CRLIMIT        Credit limit amount                         7    2
  20  A   STATE          State abbreviation                          2
  30  A   LASTNAME       Customer last name                         20
  40  A   INIT           Customer first and middle initial           2
 ___  _   ACCTNUMBER     Account number                              6
 ___  _   STREETADDR     Street address                             20
 ___  _   CITY           City                                       15
 ___  _   ZIPCODE        Zip code                                    5




                                                                 Bottom

F3=Exit         F5=Report        F11=Display names only     F12=Cancel
F13=Layout      F18=Files        F20=Renumber
```

Notice that because you left the *A/D* column blank for the STATE, LASTNAME, and INIT fields, Query replaces the blank with an A to show that ascending order is used.

The sort in this example provides a report that looks something like this:

```
Account       Last           Street                          Zip    Credit
Number   Init Name           Address         City        State Code   Limit
------- ---- -------------- -------------- ---------- ----- ----- -------

938485   CA   Johnson        101 2nd St.     Montvale    GA    30545  9999.00
583990   GF   Abraham        20 Vineview     Elk River   MN    55330  9999.00
693829   NO   Thomas         8256 1st Ave.   Twostone    WY    82609  9999.00
846283   JS   Alison         20749 73rd St.  Ottawa      MN    56342  5000.00
938472   EJ   Henning        1 Oil Lane      Oiltown     TX    75217  5000.00
029384   MA   Brown          904 38th St.    New York    NY    12201  1000.00
397267   OS   Tyron          1039 20th Ave.  Falls       NY    14841  1000.00
475938   MA   Doe            P.O. Box 90834  Reading     CA    95685   700.00
930484   BJ   Hubbard        10 Colusa       Junction    CA    91722   700.00
192837   CE   Lee            98 Elm St.      Falls       NY    14841   700.00
392859   LL   Vine           18940 Main St.  Tombstone   VT    05046   700.00
389572   RS   Stevens        38 Yale Blvd.   Deer Falls  CO    80226   400.00
839283   AC   Jones          1984 5th Ave.   New York    NY    13041   400.00
493264   JS   Jones          P.O. Box 8910   New York    NY    13088   400.00
```

The highest credit limits (9999.00) are listed first, followed by the next highest. Within each group of credit limits, the records are listed alphabetically by state. Within each group of states, the customers are listed alphabetically by last name (such as Brown and Tyron in New York, and Doe and Hubbard in California). If two or more customers with the same last name live in the same state and have the same credit rating, the order of the records is determined alphabetically by first and middle initials (such as AC Jones and JS Jones in New York).

Additional sort considerations in Query for iSeries

Numeric fields are sorted by arithmetic value.

SBCS character data in SBCS, DBCS-open, and DBCS-either fields are sorted in the order of the hexadecimal representation of the characters or an order defined by a selected collating sequence. For more information on collating sequences, see Chapter 9, “Selecting a collating sequence in Query for iSeries”.

DBCS data in character fields is sorted by the hexadecimal representation of the data. The collating sequence is not applied to DBCS data in DBCS character fields.

UCS2-graphic data is sorted by the hexidecimal representation of the data. The collating sequence is not applied to UCS2-graphic data in UCS2-graphic fields.

Date, time, and timestamp fields are sorted in chronological order.

For all data types, null values are sorted last if the sort is in ascending order and are represented by a dash (-). For example, for the following data:

```
field1          value
record
   1              B
   3              A
   2              null value
   4              null value
```

The sorted report looks like this:

```
A
B
-
-
```

Chapter 9. Selecting a collating sequence in Query for iSeries

This chapter describes how you select the collating sequence for your query. The collating sequence is used for certain operations (such as sorting, comparing, and evaluating) that involve SBCS character data in SBCS, DBCS-open, and DBCS-either character fields. A collating sequence assigns a weight to each alphanumeric and special character so that Query knows how to perform operations on character fields and constants.

The collating sequence is *only* used for SBCS character data in SBCS, DBCS-open, and DBCS-either fields. It is *not* used for numeric, date, time, timestamp, DBCS-only, DBCS-graphic, or UCS2-graphic data.

Note: To provide the intended effect regardless of the hexadecimal representations of the characters in the data, coded character set identifiers (CCSIDs) are stored with collating sequences when they are saved. For more information about how CCSIDs affect the collating sequence used see "CCSIDs and collating sequences in Query for iSeries" on page 248.

Letting Query for iSeries select a collating sequence

If you did not type a 1 next to the `Select collating sequence` option on the Define the Query display, Query for iSeries uses the default collating sequence. If you have never saved a collating sequence default value, your collating sequence for new queries is the hexadecimal sequence.

Setting your default collating sequence in Query for iSeries

Generally, you will use the same collating sequence for all of your queries. For most users, the *language* collating sequence (provided on most systems) is the only one needed. If you select the Select collating sequence option on the Define the Query display when you are creating or changing a query and save your collating sequence option as a default in your query profile, all your queries can use this same collating sequence option without you having to specify it in each query definition. (This does not mean that you *must* use this same collating sequence for *all* of your query definitions. It just means that, if you save the collating sequence option as a default, you do not have to select the Select collating sequence option for every query that you create; you have to select it only when a query you are creating requires a *different* collating sequence.)

After you have selected the collating sequence option that you want on the Select Collating Sequence display, you can save your option as a default value in your query user profile by pressing F23 (Save as default) while you are still viewing the display.

If you decide to define your own collating sequence (option 3 on the Select Collating Sequence display), you can also save your collating sequence (as a default) on the Define Collating Sequence display by pressing F23 while you are still viewing that display. The coded character set identifier (CCSID) of the sequence, assumed from the CCSID of your job, is saved with the profile.

Purpose of a collating sequence in Query for iSeries

A collating sequence determines what characters come before others when operations are performed on character fields for the purpose of:

- Selecting records
- Joining files
- Sorting records
- Calculating the minimum and maximum values of a field
- Determining when a report break occurs

To collate means to place items in proper sequence or to check that items are in proper sequence. For Query for iSeries purposes, collating sequences apply to SBCS character data in SBCS, DBCS-open, or DBCS-either fields, not numeric, date, time, timestamp, DBCS-only, or DBCS-graphic fields. The collating sequences you can use are:

- The collating sequence provided by Query for iSeries for the language of your country.
- A collating sequence that you define.
- A translation table, created by the CRTTBL (Create Table) command, that exists in one of your libraries.
- One of the sort sequences supplied with the system. For each supported language, the system supplies one table with unique weights for all characters and a second table with shared weights for some characters.

Unless you select a collating sequence, the standard sequence used for collating is the same as the numeric sequence of the hexadecimal values used to represent the characters.

Collating sequence and CCSIDs in Query for iSeries

You can define a collating sequence by assigning a sequence number to each character in a displayed list. After renumbering in increments of 10 starting from 64 ('40'X), the assigned number for each character is saved in the one-byte table entry at the offset that corresponds to the numeric value of the hexadecimal representation of the character. The hexadecimal representation can be used later to retrieve the collating weight for character data comparisons.

A CCSID is saved with a collating sequence so that the collating sequence can be converted for use with data in a different code page. Conversion of a collating sequence is a matter of rearranging the numbers in the table so that the appropriate collating weight is found for each character.

How a collating sequence affects Query for iSeries

Several definition steps in Query for iSeries use the selected collating sequence to determine the final results when your query is run. A collating sequence is used:

- When you join files together by comparing an SBCS, DBCS-open, or DBCS-either character field in one file to a character field in the other file by using the following tests:
  - EQ (equal)
  - NE (not equal)
  - GT (greater than)
  - LT (less than)
  - GE (greater than or equal)
  - LE (less than or equal)
- When you use comparison tests like EQ, NE, GT, LT, GE, LE, LIKE, NLIKE, LIST, NLIST, and RANGE to select records based on SBCS, DBCS-open, or DBCS-either character field values

  Note: Query for iSeries does not use the collating sequence for EQ, NE, LIST, NLIST, LIKE, and NLIKE comparisons, or apply it to SBCS characters in DBCS fields and constants, when the `Use collating sequence for all character comparisons` option is set to NO (the default for a query from a release earlier than Version 2 Release 3) on the Specify Processing Options display.
- When you select an SBCS, DBCS-open, or DBCS-either character field for sorting records
- When you define minimum and maximum summary functions for an SBCS DBCS-open, or DBCS-either character field
- When you define report breaks on an SBCS, DBCS-open, or DBCS-either character field

Selecting a Query for iSeries collating sequence

To select a collating sequence, you have to understand how the data exists in your files. For example, if both uppercase and lowercase SBCS characters exist in your character fields, you have to decide if you want uppercase and lowercase characters treated the same. Once you make this analysis, you can select the collating sequence that produces the desired results, or you can define a collating sequence of your own.

```
                      Select Collating Sequence

The selected collating sequence will be used for character fields when
sorting, selecting records, joining files, finding minimum and maximum
values, and determining when a control break has occurred.

Type choices, press Enter.

  Collating sequence
    option . . . . . .   1          1=Hexadecimal
                                    2=Query for iSeries English
                                    3=Define the sequence
                                    4=Translation table
                                    5=System sort sequence

  For choice 4=Use translation table:
    Table  . . . . . .   __________   Name, F4 for list
      Library  . . . . .   __________  Name, *LIBL, F4 for list


F3=Exit          F4=Prompt           F5=Report            F10=Process/previous
F12=Cancel       F13=Layout          F17=Job sequence     F24=More keys
```

Using the hexadecimal collating sequence in Query for iSeries

The standard collating sequence is the hexadecimal collating sequence. For any given CCSID, all of the character-set characters (alphanumeric and special) are assigned a hexadecimal value. The characters and their related hexadecimal value are called a code page. A code page is shown as a 16 by 16 matrix as shown in Table 3.

Table 3. Example of How a Code Table Works. The value in the left column is the first half of the hexadecimal value. The value at the top of each column is the second half of the hexadecimal value. The lowercase a in this table is at '81'X and the uppercase A is at 'C1'X. This is an example, a real table contains all the alphanumeric and special characters.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0																
1																
2																
3																
4																
5																
6																
7																
8		a														
9																
A																
B																

Table 3. Example of How a Code Table Works (continued). The value in the left column is the first half of the hexadecimal value. The value at the top of each column is the second half of the hexadecimal value. The lowercase a in this table is at '81'X and the uppercase A is at 'C1'X. This is an example, a real table contains all the alphanumeric and special characters.

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
C		A														
D																
E																
F																

When you use the hexadecimal collating sequence, the characters in a code table are ordered by ascending hexadecimal values. An advantage of hexadecimal collating is that it distinguishes between uppercase and lowercase letters.

For CCSID 37, the default for English language systems, the hexadecimal collating sequence is:

blank
miscellaneous characters, such as . + & %)
a through r
(tilde)
s through z
{
A through I
}
J through R
\
S through Z
0 through 9

To see what the hexadecimal collating sequence looks like, select option 3 (Define a collating sequence) on the Select Collating Sequence display and press the Enter key. The Define Collating Sequence display appears. Press F14 (hexadecimal sequence). Query for iSeries shows you the characters and their sequence numbers in the hexadecimal collating sequence.

Each character with a hexadecimal value in the range '40'X to 'FE'X is listed. You can use the page keys to page through the list of characters. Press F11 to show the hexadecimal value of each character under the *Hex* column. Use F12 to return to the Select Collating Sequence display.

If hexadecimal collating is selected, the minimum and maximum values saved in summary-only output to a database file may differ from the corresponding values in a printed or displayed report, even though the same job CCSID is used to run the query. This happens only if values for a minimum or maximum field are converted to the job CCSID in order to be printed or displayed.

Using the language collating sequence for your country in Query for iSeries

You may want to select the collating sequence provided by Query for iSeries for your country so that character data is sorted in a more useful order for your language. In Great Britian and the United States, the collating sequence provided (in addition to hexadecimal) is Query for iSeries English. In this sequence,

as in most Query for iSeries language sequences, each pair of uppercase and lowercase letters (such as A and a) sort together because they share a collating weight that is distinct from the weights of other letters.

The language collating sequence is not saved in the query definition. If you save your query and it is used on a system with a different language, the collating sequence for the other language is used. When you need to save the language used for collating, use option 3 (Define the sequence) on the Select Collating Sequence display and press F15.

Defining your own collating sequence in Query for iSeries

You may want to define your own collating sequence so that character data is sorted according to your particular needs.

For example, you have a two-digit customer account number field that has gone beyond its maximum of 99, and entries in this field after 99 are alphabetic—A1, A2, and so on. You want the alphabetic entries sorted to follow the numeral entries. You can define your own collating sequence so that the alphabetic data follows the numeric data for this particular query.

To define your own collating sequence, type a 3 in the *Collating sequence option* prompt on the Select Collating Sequence display and press the Enter key.

```
                        Select Collating Sequence

The selected collating sequence will be used for character fields when
sorting, selecting records, joining files, finding minimum and maximum
values, and determining when a control break has occurred.

Type choices, press Enter.

  Collating sequence
    option . . . . . .   3          1=Hexadecimal
                                    2=Query for iSeries English
                                    3=Define the sequence
                                    4=Translation table
                                    5=System sort sequence
```

The Define Collating Sequence display is the next display you see.

```
                         Define Collating Sequence

CCSID. . . . . . . . . . . . . :      37

Position to  . . . . . . . . . . _    Char

Type sequence number (0-9999) for each character, press Enter.
  (Use the same sequence number to have characters collate in a group.)

Sequence  Char  Hex     Sequence  Char  Hex     Sequence  Char  Hex
    10          40          90     c    83         140     h    88
    20          41          90     C    C3         140     H    C8
    30          E1         100     d    84         150     i    89
    40     -    60         100     D    C4         150     I    C9
    50     '    7D         110     e    85         160     J    D1
    60     -    CA         110     E    C5         160     j    91
    70     a    81         120     f    86         170     K    D2
    70     A    C1         120     F    C6         170     k    92
    80     b    82         130     g    87         180     L    D3
    80     B    C2         130     G    C7         180     l    93
                                                                More...
F3=Exit                 F11=Chars only    F12=Cancel     F14=Hexadecimal
F15=Language sequence   F16=Use default   F20=Renumber   F24=More keys
Collating sequence initialized from national language sequence
```

The CCSID of the sequence is shown at the top and is always your job CCSID. If the collating sequence CCSID does not match your job CCSID, the previously specified or defaulted sequence is converted before it is shown on the Define Collating Sequence display. See “CCSIDs and collating sequences in Query for iSeries” on page 248 for more information on how CCSIDs affect the collating sequence.

You are shown a list of characters with a sequence number assigned to each character. Characters are assigned sequence numbers beginning with 10 and incremented by 10 in ascending order. A message stating what collating sequence is used is shown on the bottom of the display. You can use the following sequences as a base for defining your own collating sequence:

- Hexadecimal sequence
- Query for iSeries language sequence
- Default sequence saved for your user ID
- System sequence

To do this, press F14 (Hexadecimal sequence), F15 (Language sequence), F16 (Use default), or F17 (System sequence).

Use the page keys to page through the list of characters. Certain characters cannot be displayed on some terminals; therefore, some sequence numbers may not have a character shown beside them. Press F11 and the hexadecimal value of each character is shown even if the character cannot be displayed on your terminal. You can use the *Position to* prompt to find a specific character in the list quickly. (You can enter the hex value of the character, if you know it and if your keyboard has this feature, or the character itself.)

To define your own collating sequence, change the sequence numbers beside those characters whose sequence you want to change. Each character must have a sequence number. You can specify the same sequence number for two or more characters—these characters are treated as equal when operations are performed on them.

After you have renumbered the characters in the sequence you want, press the Enter key. The list of characters is shown in the sequence you specified. Make sure the blank character (’40’X) is still first. To renumber the characters in this new sequence by amounts of 10, press F20. Using F20 to renumber makes it easier to specify a new sequence later. You must press the Enter key again to confirm that this is the sequence you want to use. The characters are renumbered, by amounts of 10, when you leave this display.

You can also save your collating sequence as a default by pressing F23 while you are still viewing this display.

Selecting a translation table in Query for iSeries

If your query needs a sequence that is not provided for with the available collating sequences, and creating a user-defined collating sequence does not produce the desired results, you may find that using a translation table will create the correct sequence for your query. Translation tables (similar to user-defined collating sequences) are created and used to translate data. The CCSID of any translation table created in a release prior to Version 2 Release 3 is 65535.

If you want to use a translation table, select option 4 on the Select Collating Sequence display. Enter the table name and the library that contains the table you want. If you would like Query for iSeries to list the existing tables for you, position the cursor to the *Table* prompt and press F4. An example of the Select Translation Table display follows:

```
                        Select Translation Table

Library  . . . . . .   *LIBL        Name, *LIBL, F4 for list
Subset   . . . . . .   __________    Name, generic*
Position to  . . . . .  __________   Starting character(s)

Type option (and Table and Library), press Enter.
  1=Select

Opt  Table       Library   Text
 _   __________  _________
 _   QASCII      QSYS      EBCDIC TO ASCII TRANSLATE TABLE
 _   QEBCDIC     QSYS      ASCII TO EBCDIC TRANSLATE TABLE
 _   QLA10025S   QSYS      LATIN1 CCSID 37 SHARED WEIGHTED
 _   QLA10025U   QSYS      LATIN1 CCSID 37 UNIQUE WEIGHTED
 _   QRMASCII    QSYS      EBCDIC TO ASCII TRANSLATE TABLE FOR RM/COBOL
 _   QRMEDCDI    QSYS      ASCII TO EBCDIC TRANSLATE TABLE FOR RM/COBOL
 _   QSYSTRNTBL  QSYS      LOWER TO UPPER CASE TRANSLATE TABLE
 _   QA3BA69A3R  QUSRSYS   CHRID(*N 1009) TO CHRID(1150 1025) TRANSLATE


                                                                  More...
F4=Prompt        F11=Display names only  F12=Cancel
F19=Next group
```

For more information on using lists, see “Using lists in Query for iSeries” on page 9.

Selecting a system sort sequence in Query for iSeries

You can specify that the query use a system-provided sort sequence associated with a specific language. There are two sort sequences for each language:

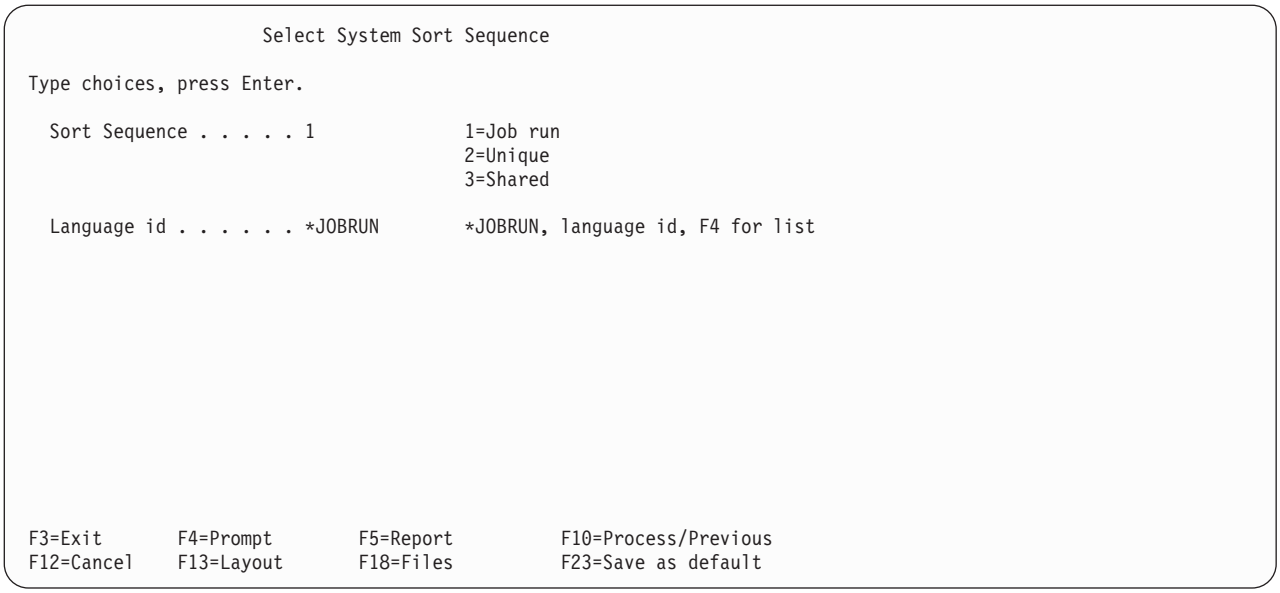
- One with unique weights for each character in the table.
- One with shared weights for various characters.

Note: The system provides the system sort sequences as translation tables in library QSYS. You can also select them by name using option 4 (Translation table) on the Select Collating Sequence display.

The system sort sequences are different than the Query for iSeries language sequences (option 2 on the Select Collating Sequence display). The Query for iSeries language sequences are not externalized objects and can only be used with Query for iSeries definition objects. Also, the Query for iSeries sequence for a language does not produce the same results as either of the system sort sequences for that language. For the differences in your language, check the sequence tables. Often, the difference is where the number characters are sorted.

To display the Select System Sort Sequence display select option 5 on the Select Collating Sequence display and press the Enter key.

Note: In addition to 2(Unique) and 3(Shared) you can specify *HEX or a specific table with the SRTSEQ parameter for your job.



Job run and *JOBRUN are resolved to the sort sequence (SRTSEQ keyword) and language ID (LANGID keyword) from the user's job when the query is run. These are the defaults for collating sequence option 5 if no sort sequence and language ID are saved in the query user profile.

The language ID is not used when:

- You choose Job run as the sort sequence option, and
- The sort sequence of the job at run time is *HEX or a named translation table.

Unique means that each character has a unique weight. Shared means that some characters share the same weight. For example, in the shared sequence for English, uppercase and lowercase pairs of letters share the same weight.

Note: If a translation table or sort sequence you selected via option 4 or 5 changes, the changed version becomes the one used for your query the next time you change or display the query. The changed table is also used if you deferred selection until run time. If you want a specific translation table or sort sequence permanently associated with your query you must use option 3 on the Select Collating Sequence display. Set the SRTSEQ parameter for your job to the desired table then start a Query for iSeries session to create or change your query, use option 3 to set the Define Collating Sequence display, and press F17. You can use F23 to permanently associate the table with all new queries you create.

Chapter 10. Specifying report column formatting in Query for iSeries

The first part of this chapter describes how you control the format of your query output. You can change the spacing before the report columns, the headings above the columns, and the report field lengths.

In the second part of this chapter, the four ways of editing numeric fields are described. Since numeric fields of information are stored in database files without any punctuation, you can edit them so that they are easier to read when they appear in a query report or display.

Formatting the columns of the Query for iSeriesquery report

Note: The first time that you select the Specify Report Column Formatting option, the information that is shown on the display for column headings, field lengths, and decimal positions is taken from the field definitions and result field definitions. If column headings are defined for the fields, they are shown; otherwise, the field names are used as the column headings.

You can specify the following information about how the columns should appear in printed and displayed reports:

- The number of spaces to the left of each column
- The wording of headings above the columns
- The size of the fields in the columns

Query ignores any column formatting you specify when you send detailed output to a database file. However, if you later use that query to produce a report, the column formatting you specify is used.

Query uses the column heading (break fields only), editing, and field size that you specify for a query when you send summary-only output to a database file. Summary-only output is described in Chapter 13, “Selecting output type and output form in Query for iSeries reports”.

Column spacing in Query for iSeries reports

If you want to change the column spacing for a field, type a number from 0 through 99 to indicate the number of spaces you want to appear to the left of that field column.

Unless you change the column spacing for fields, Query puts no spaces in front of the first column and puts two blank spaces in front of all the other columns in the report. Before you specify any values, you should be familiar with the possible effects of any changes. For example, if you ask Query to put several blanks in front of more than one field, the new width of your output might exceed the width of the print line on your printer, and your output may be truncated (that is, part of it may have dropped off). If this happens, you could specify less space between the columns, or you could specify a Y (Yes) for line wrapping on the Select Output Type and Output Form display (see Chapter 13, “Selecting output type and output form in Query for iSeries reports”).

Column headings in Query for iSeries reports

For each field that has a column heading defined in its field definition (such as in IDDU field definitions), that information is used by Query unless you change it. For result fields, any column headings specified on the Define Result Fields display are also used by Query. For fields that have no headings defined, the field names are used as the headings (in heading line 1), unless *NONE is specified in heading line 1. If you specify *NONE, it must begin in the first position of the first heading line and must be all uppercase letters. The remainder of the heading must be blank.

Each column heading appears in the report exactly as you type it. Each heading can be up to three 20-character lines, and you can use any characters you want (see the heading for the INIT field on the following display).

```
                      Specify Report Column Formatting

Type information, press Enter.
  Column headings:  *NONE, aligned text lines

                  Column
Field             Spacing       Column Heading              Len  Dec   Edit
LASTNAME             0          LASTNAME                      30



INIT                 2          First &                        2
                                Middle
                                Initials

STARTTIME            2                                         6          *
                                Start
                                Time



                                                                    Bottom
F3=Exit       F5=Report         F10=Process/previous     F12=Cancel
F13=Layout    F16=Edit          F18=Files                F23=Long comment
```

If you want the headings of all your columns to line up on the lowest heading line, you must type each one on the display that way.

If you change a heading but decide you want to use the original heading, blank out the heading you typed. The original (default) heading is used in the report and appears the next time you return to this display. If you want to change the heading for a result field, you may change it on the Define Result Fields display, as described in Chapter 5, “Defining result fields in Query for iSeries”.

Length and decimal positions in Query for iSeries reports

The length first shown for each field from a file is the length defined in the field definition. The length first shown for each *result field* is the length that Query calculates for you, or is the value that you typed in the *Len* column on the Define Result Fields display. Length has a different meaning for each data type:

- For SBCS character fields, length is the total number of characters in the field.
- For DBCS-only, DBCS-open, or DBCS-either fields, length is the total number of bytes in the field, including shift-out and shift-in characters.
- For DBCS-graphic fields, length is the total number of DBCS characters in the field. Shift-out and shift-in characters used when the field is displayed or printed are not included in the *Len* value.
- For numeric fields, length is the number of digits to the left and right of the decimal point, but does not include the decimal point or any other editing characters (like a currency symbol).
- For date, time, and timestamp fields, the length is the number of characters in the formatted value, including the separators and any other characters required by the format (for example, 12:15 am). Timestamp is always 26 characters long.

Changing the *Len* value on this display affects only how the field appears in this query. The actual length is not changed in the field definition, and the actual length is used for all other field processing done by Query, such as sorting, report breaks, and so on. If you want to change the actual length for a *result* field, you should make the changes on the Define Result Fields display rather than during formatting.

If you specify a length, the valid length values are:

- 0 through 32 766 for SBCS character fields
- 0 through 31 for numeric fields in packed, zoned, or binary form

- 0 through 9 (single-precision) or 0 through 17 (double-precision) for floating-point fields

For date, time, timestamp and DBCS fields, you cannot change the length to anything but 0, which excludes the field from the report.

For numeric fields, if you increase or decrease the value in *Dec*, you should increase or decrease the value in *Len* the same amount. If you change the value in *Len* or *Dec* but decide you want to use the original field definition value, blank out the number you typed. If there is a value in the *Len* or *Dec* column for the same field, you must blank it out also. If you blank out the values, the original length and decimal values are used in the report.

The length and the number of *decimal positions* first shown for each numeric field from a file is the same as defined in the field definition. The length and the number of decimal positions first shown for each *result field* is the number that Query calculates for you, or is the number that you typed in the *Len* and *Dec* columns on the Define Result Fields display.

For numeric fields, the number in the *Dec* column indicates the number of positions to the right of the decimal point.

For non-numeric fields, the type of field is shown in the *Dec* column and cannot be changed:
- An all-blank *Dec* column identifies a fixed-length SBCS character field
- V means variable-length
- J means DBCS-only
- O means DBCS-open (mixed)
- E means DBCS-either
- G means DBCS-graphic
- L means Date
- T means Time
- Z means Timestamp

Changing the *Dec* value affects only how the field appears in your query output. The actual value is not changed in the field definition. If you want to change the actual number of decimal positions for a result field, you should make the changes on the Define Result Fields display rather than at this time.

For numeric fields, you can type your own value (0 through 31) for decimal positions, but you must not enter a value for *Dec* that is greater than the length of the field.

Omitting fields from a Query for iSeries report

You can create different versions of the same basic query output by selecting all of the possible fields you might want to include when you select and sequence fields, and then omit certain fields during the formatting processing by entering a length of zero on the Specify Report Column Formatting display. Each of these versions can be saved and run as separate queries.

You may also want to use a field for sorting or for a report break, but not want it to appear in the query report. If you change the field length (*Len* prompt) to zero on the Specify Report Column Formatting display, the field is not printed, displayed, or used for summary output sent to a database file. The field is still used for sorting, record selection, report breaks, and break text insert (see the appropriate Chapters for details).

If you type a zero in the *Len* column, and there is a number in the *Dec* column for the same field, you must also enter a zero for the *Dec* column.

Note: You cannot change the order of the fields on your report during the formatting process. If you determine that you need to change the order of the fields in your output, you must go back to the Define the Query display and choose the *Select and sequence fields* option (see Chapter 6, “Selecting and sequencing fields in Query for iSeries”).

Editing numeric fields in Query for iSeries reports

The first method you should consider for editing numeric fields is to not enter any edit options and let Query make the decisions for you. However, if this method does not provide the output results you want, you can use one of the four edit options that are discussed in this chapter.

The *Edit* column on the Select Report Column Formatting display is used by Query to indicate whether or not any numeric field editing has been defined for any of the numeric fields in your query. If an asterisk (*) is shown for a field, there are editing override values specified in your query definition for the field; the field values are edited in the report using those values. This column is blank for character fields and for numeric fields that are edited using only default values. (The default or original values can be in the file definition or in system-supplied default values used by Query.)

If you want to edit a numeric field, that is, specify numeric field editing values that will be used as part of your query definition, position the cursor on that field and press F16 (Edit) to go to the Define Numeric Field Editing display. Depending on the choice you make on this display, Query will present the appropriate display to allow you to describe the remainder of your edit definition. When no numeric editing override values are saved for a field in your query definition, the editing actually used for the field comes, first, from the original field definition (in a file definition) or it comes, last, from system-supplied default values.

Note: If you want to *remove* all override editing for a particular field (as defined in the query), press F16 here to go to the Define Numeric Field Editing display, then press F16 again there (F16 is *Remove edit* there). When you press F16 to remove editing, *all* editing definitions for all four editing options defined for that field are removed.

Defining numeric field editing in Query for iSeries reports

The Define Numeric Field Editing display allows you to edit any of your numeric fields, one field at a time. Floating-point fields, however, *cannot* be edited.

```
                        Define Numeric Field Editing

Field . . . . . :
Text  . . . . . :
Heading 1 . . . . . :
Heading 2 . . . . . :
Heading 3 . . . . . :
Length  . . . . . :
Decimal . . . . . :
Sample  . . . . . :   -9,999.99_____________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________

Type choice, press Enter.

  Edit option . . . . .   1      1=Numeric editing choices
                                 2=Date or time editing choice
                                 3=Edit code
                                 4=Edit word

F3=Exit          F5=Report       F10=Process/previous     F11=Change sample
F12=Cancel       F13=Layout      F16=Remove edit          F18=Files
```

The Define Numeric Field Editing display allows you to specify the type of editing you want to use to edit a numeric field. The editing determines how the values for the field are to appear in your query report. This is the first of two displays used to define the editing; the second display to be shown depends on which edit option (1 through 4) you select on this display. For example, if you choose option 2, you go to the display that allows you to specify the type of separator character you want to use in a date field.

Shown on the Define Numeric Field Editing display is the name of the numeric field to be edited, the field's report-related information, and an edited sample value for the field as it would appear in the report with the editing values that are currently defined for it. The field is the one that the cursor was positioned to on the Specify Report Column Formatting display when F16 (Edit) was pressed.

Each of the edit options are described as follows:

1=Numeric editing choices
Shows the Describe Numeric Field Editing display, on which you can describe several editing attributes for the field. You can select the characters to be used for the decimal point, thousands separator, negative sign, and currency symbol, and you can specify how zero values and leading zeros are to be handled.

2=Date or time editing choice
Shows the Describe Date/Time Field Editing display, on which you can select the separator character used for a date or time value.

3=Edit code
Shows the Specify Edit Code display, on which you can select the edit code and modifier (if any) to be used to edit the field.

4=Edit word
Shows the Specify Edit Word display, on which you can define your own edit words (values) to be used on the field.

If an asterisk (*) was shown in the *Edit* column on the Specify Report Column Formatting display, editing override values are already defined in this query for the field. If an asterisk was shown there, then the result of the current editing in effect for the field is shown in the *Sample* field on this display, and the type of editing is indicated by the edit option currently specified in the *Edit option* prompt. If no asterisk was shown there, then the sample field is edited here according to the editing specified in the field definition or in the system-supplied default values assumed by Query.

If you press F11, you can change the value shown in the edited sample. Each time you press F11, you can see either the largest positive number (all 9s), zero (0), or negative 1 (–1). You can change the edit option and press F11 at the same time to see the effect of each set of editing overrides or default values. Also, if you change the edit option number and press the Enter key, you go to the definition display for that option where you can look at or change how the editing for that option is defined. When you press F10 (Process/previous) to return, the edited sample shows the results of the editing values for that option.

If you want to see the editing for summary totals, if any exist, use F5 (Report) or F13 (Layout).

When you first come to the Define Numeric Field Editing display for any numeric field:

- The values shown in the *Text* through *Decimal* fields for that numeric field are the same as shown on the Specify Report Column Formatting display for that same numeric field.
- The sample shows the current editing definition of the field, done with the largest positive value (all 9s) that the field can hold. The sample also shows how the number will appear when it is edited according to the currently selected numeric field definition (option 1 through 4 specified in the *Edit option* prompt).
- If an error occurs while the number in the field is being edited, the sample is edited using the J edit code, and an error message is shown along with the edited sample.

- The *Edit option* value is the value last specified in the query definition, the value associated with the field definition in the file definition (if this is a field from a file), or 1, if neither of the first two indicates its value.

Generally, when you first come to the other four numeric field editing displays (identified on the *Edit option* prompt of the Define Numeric Field Editing display), the displayed values are taken from the previously saved values in your query definition, from the field definition in the file, and from the system-supplied default values (in that order). Query uses edit code J as the default for edit option 3 and blank edit words for edit option 4.

Describing numeric field editing in Query for iSeries reports

If you have determined that letting Query do the editing for you will not give you the results you want, you can specify your own editing attributes. You do this on the Describe Numeric Field Editing display.

```
                      Describe Numeric Field Editing

Field . . . . . :

Type choices, press Enter.

  Decimal point . . . . . .   _         1=.  2=,  3=:  4=$      5=None
  Thousands separator . . . .   _       1=.  2=,  3='  4=Blank  5=None
  Show negative sign  . . . .   _       Y=Yes, N=No
    Left negative sign  . . .   ______
    Right negative sign . . .   ______
  Show currency symbol  . . .   _       Y=Yes, N=No
    Left currency symbol  . .   ______
    Right currency symbol . .   ______
  Print zero value  . . . . .   _       Y=Yes, N=No
  Replace leading zeros . . .   _       Y=Yes, N=No
    Replace with  . . . . . .   _       1=Blanks
                                        2=Asterisks
                                        3=Floating currency symbol
    Single leading zero . . .   _       Y=Yes, N=No

F3=Exit          F5=Report           F10=Process/previous    F12=Cancel
F13=Layout       F16=Remove edit     F18=Files
```

This display allows you to specify the editing characteristics that you want used for a numeric field. The editing determines how the values for the field are to appear in your query report (if the report is run when the edit option for the field is 1). You can select the characters to be used for the: decimal point, thousands separator, a negative sign(s), and a currency symbol(s). You can specify separate negative sign characters and separate currency symbol characters for either side of the field's data values. You can also specify whether zero values are to be printed and how leading zeros are to be handled.

This display shows the name of the numeric field to be edited and the numeric field editing override and default values that will be used in the report. The editing values shown could be from IDDU or a system-supplied edit description.

If you blank out *all* the values in the prompts on this display and press the Enter key, all the values are then set to the system-supplied default values that are assumed by Query. These values are the same default values used for result fields when they are first defined; thus, using this method, you can specify the same type of editing for fields from files as is used for result fields, providing consistent editing in your report.

To remove all editing overrides for this numeric field, press F16 (Remove edit). The asterisk (*) is removed from the *Edit* column on the Specify Report Column Formatting display, and the editing values that will be used for this field in the query report are taken from the field definition or from the system-supplied default values.

Decimal point in Query for iSeries reports

Type the option number of the character that you want used as the decimal point in this field. The option numbers and characters are shown below, along with examples of the edited results for a numeric value of 245.87:

Option	Example	Meaning of Option
1= .	245.87	Decimal point is a period
2= ,	245,87	Decimal point is a comma
3= :	245:87	Decimal point is a colon
4= $	245$87	Decimal point is a dollar sign
5=None	24587	Decimal point not used

Thousands separator in Query for iSeries reports

Type the option number of the character that you want used as the thousands separator in this field. The option numbers and characters are shown below, along with examples of the edited results for a value of 1515109:

Option	Example	Meaning of Option
1= .	1.515.109	Separator is a period
2= ,	1,515,109	Separator is a comma
3= '	1'515'109	Separator is an apostrophe
4=Blank	1 515 109	Separator is a blank space
5=None	1515109	Separator not used

Show negative sign in Query for iSeries reports

Type a Y or N to indicate whether a negative sign is to be used with this field.

Y=Yes

A negative sign is to be shown when the value in the field is negative. The sign can be on the left or right side of the value (or on both sides), and it can be defined differently for each side. All negative signs take space in the report. Use the next two prompts to define from 1 to 6 characters for the negative sign(s). (You can leave one prompt blank. If you do, no sign shows on that side of the field and no space is taken in the report.)

N=No

A negative sign is not to be shown when the value in the field is negative. If the next two prompts contain negative sign definitions, they are saved in this query but not used.

Left negative sign in Query for iSeries reports

Type from 1 to 6 characters that you want used as the negative sign to appear on the left of negative values in this field. Any character that can be printed or displayed can be used. Either the blank or underscore (_) can be used within the character string, but if you want blanks at the *right end* of the string for the negative sign, you must use underscores.

Some examples of left negative signs for the negative value of 27.03 are:

Sign	Edited Negative Value
-	-27.03
CRAMT	CRAMT27.03
CR AMT	CR AMT27.03
CRDT:_	CRDT: 27.03

The coding for the last example must include an underscore because of the blank at the right end of the left negative sign characters.

The position of the left negative sign depends on the value specified in the *Replace with* option when leading zeros are to be replaced.

- If you specify option 1 (Blanks) or option 2 (Asterisks), the negative sign is fixed; it is always shown in the farthest left position of the field, to the left of all the asterisks that replace all leading zeros. For example, in a field with a length of eight digits, the edited value for 27.03 would be -****27.03 or
  - 27.03.

- If you specify option 3 (Floating currency symbol), then the negative sign moves (or floats), depending on how many leading zeros it replaces, so that it is to the immediate left of the first significant digit in the value (such as -27.03), or it is to the immediate left of the left currency symbol (such as -$27.03).

Right negative sign in Query for iSeries reports

Type from 1 to 6 characters that you want used as the negative sign to appear on the right of negative values in this field. Any character that can be printed or displayed can be used. Either the blank or underscore (_) can be used within the character string, but if you want blanks at the *right end* of the string for the negative sign, you must use underscores. Examples of right negative signs are 27.03-, 27.03CR AMT, and 27.03 CRDT.

Show currency symbol in Query for iSeries reports

Type a Y or N to indicate whether a currency symbol is to be used with this field.

Y=Yes

A currency symbol is to be shown with the value in the field. The symbol can be on the left or right side of the value (or on both sides), and it can be defined differently for each side. If option 3 (Floating currency symbol) is not specified below in the *Replace with* prompt (for leading zeros), then the left currency symbol (if used) appears in a fixed position in the field. However, if option 3 is used, then *any* left currency symbol specified will be a floating symbol, depending on how many leading zeros it replaces. Use the next two prompts to define from 1 to 6 characters for the currency symbol.

N=No

A currency symbol is not to be shown with the value in the field. If the next two prompts contain currency symbol definitions, they will be saved in this query but not used.

Left currency symbol in Query for iSeries reports

Type from 1 to 6 characters that you want used as the currency symbol to appear on the left of values in this field. Any character that can be printed or displayed can be used, but you should not use an asterisk (*), zero, or whatever your decimal point is (such as the period). Either the blank or underscore (_) can be used within the character string, but if you want blanks at the *right end* of the string for the symbol, you must use underscores.

Some examples of left currency symbols that might be used with a value of 45.5 are:

Symbol	Edited Result	Possible Use
L.	L.45.5	Italy
Kr	Kr45.5	Norway
$	$45.5	U.S.
THOUS_	THOUS 45.5	U.S.

This string is positioned in the same way as you typed it, unless you choose to replace the leading zeros with the floating currency symbol. In that case, this string is moved (floats) to the immediate left of the first significant digit.

Right currency symbol in Query for iSeries reports

Type from 1 to 6 characters that you want used as the currency symbol to appear on the right of values in this field. Any character that can be printed or displayed can be used, but you should not use an asterisk (*), zero, or whatever your decimal point is (such as the period). Either the blank or underscore (_) can be used within the character string, but if you want blanks at the *right end* of the string for the symbol, you must use underscores.

Some examples of right currency symbols that might be used with a value of 123.45 are:

Symbol	Edited Result	Possible Use
_BF	123,45 BF	Belgium
F	123,45 F	France
$	123.45$	U.S.
THOUS	123.45THOUS	U.S.
>	123.45>	U.S.

The right currency symbol is always in a fixed position.

Print zero value in Query for iSeries reports

When this field contains a numeric value of zero, type a Y or N to indicate whether it is to show a zero or it is to be left blank.

Y=Yes
A numeric value of 0, when it occurs, is to be shown.

N=No
A numeric value of 0 is to be shown as all blanks; no 0 is to be shown in this field.

Replace leading zeros in Query for iSeries reports

When this field contains leading zeros, type a Y or N to indicate whether they are to be replaced by different characters or not. Leading zeros are those zeros that appear to the immediate left of the first significant digit (1 through 9) in the numeric value, or to the immediate left of the decimal point if the numeric value is less than 1. For example, there are four leading zeros in the eight-digit field 000027.03, and there are six in the eight-digit field 000000.03.

Y=Yes
Leading zeros are to be replaced by other characters (blanks or asterisks) or by a floating currency symbol.

N=No
All leading zeros are to be shown. (If the *Replace leading zeros* and *Replace with* prompts contain values, they will be saved in this query but not used.)

Replace with option in Query for iSeries reports

If you typed a Y for the *Replace leading zeros* prompt, type the option number of the character or symbol that you want used to replace any leading zeros in the values for this field.

1=Blanks
Blank spaces are to be used to replace leading zeros (27.03 and .03).

2=Asterisks
Asterisks (*) are to be used to replace leading zeros (****27.03 and ******.03).

3=Floating currency symbol
The currency symbol is to be used to replace leading zeros. The symbol floats so that it appears to the immediate left of the first significant digit in the numeric value (for example, $27.03 and $.03).

Single leading zero in Query for iSeries reports

When the numeric value in this field is less than 1, type a Y or N to indicate whether a single leading zero is to be shown to the left of the decimal point. This prompt value is used only if a Y is specified for the *Replace leading zeros* prompt.

Y=Yes
A single leading zero is to be placed to the left of the decimal point when the value is less than 1, assuming that the length is greater than the number of decimal positions (for example, 0.03 for a result of 3/100).

N=No
No zero is to appear to the left of the decimal point when the value is less than 1 (for example, .03 for a result of 3/100).

Describing date/time field editing display in Query for iSeries reports

If you have selected numeric fields for your query that contain date or time values, Query provides an easy way to specify or change the separator character that is used in the editing process.

The Describe Date/Time Field Editing display allows you to specify the type of separator character that you want used for a numeric field that contains a date or time value. The editing value determines how the values for the date or time field are to appear in your query report (if you use option 2 as the edit option for this field).

```
                        Describe Date/Time Field Editing

Field . . . . . :

Type choice, press Enter.

  Date/time separator . . . . .   _    1=.    2=/    3=:    4=-    5=,









F3=Exit           F5=Report           F10=Process/previous   F12=Cancel
F13=Layout        F16=Remove edit     F18=Files
```

When you first see this display, the edit value shown is the value previously saved in your query, is the value from the field definition in the file description, or is the system-supplied default.

You can either change the edit value shown or you can blank it out. If you blank out the value, the system-supplied default separator value (stored in the QDATSEP system value) is to be used, and it is shown if you return to this display. To use this date/time edit value to edit the field, edit option 2 must be specified on the Define Numeric Field Editing display.

Any number less than six digits long loses one date/time position on the left for each digit that it is short (zero values become blanks). If the leading digit on the left is zero, it is replaced with a blank (for example, if your date/time separator is a slash, the value 000829 becomes 0/08/29). To show dates without having the leading zero truncated, use the edit word option with a leading zero or asterisk.

Only the last six digits of a numeric field are displayed when you use date/time editing (for example, if your date/time separator is a slash, the value. 19631001 becomes 63/10/01). To display a four digit year, use the edit word option.

Date/time separator in Query for iSeries reports

Type the option number of the character that you want used as the date or time separator in this field. The option numbers and characters are shown below, along with examples of the edited results for a value of 100863:

Option	Example	Meaning of Option
1= .	10.08.63	Separator is a period
2= /	10/08/63	Separator is a slash
3= :	10:08:63	Separator is a colon
4= -	10-08-63	Separator is a hyphen
5= ,	10,08,63	Separator is a comma

To remove all the query-defined editing values for this numeric field (for this edit option *and* all others), press F16 (Remove edit).

Specifying an edit code in Query for iSeries reports

The Specify Edit Code display allows you to specify which edit code or user-defined edit description you want used to edit each value in a numeric field. The edit code or edit description that you choose determines how the values for the specified field are to appear in your query report (if the report is run when the edit option for the field is 3). For certain edit codes you can also specify a modifier character to be used as part of the editing.

The codes available are similar to the codes available to RPG/400* programmers.

To remove all the query-defined editing values for this numeric field (for this edit option *and* all the others), press F16 (Remove edit).

```
                           Specify Edit Code

Field . . . . . :

Type choices, press Enter.

  Edit code . . . . . _     1-4, A-D, J-Q, W-Z, user-defined 5-9

  Optional edit code
    modifier  . . . . . _     1=Asterisk fill
                              2=Floating currency symbol









F3=Exit          F5=Report          F10=Process/previous    F12=Cancel
F13=Layout       F16=Remove edit    F18=Files
```

Edit code in Query for iSeries reports

Type the character that identifies the edit code or edit description that you want used to edit the values in this field. You can specify any one of the following numbers or letters for edit *codes*: 1 through 4, A through D, J through Q, or W through Z. Or you can specify any one of the user-defined edit *descriptions:* 5 through 9.

Most of the edit codes are shown in the following table. The other edit codes (W, X, Y, and Z) and the user-defined edit descriptions (5 through 9) are listed after the chart.

			-- Value in QDECFMT System Value: --		
Edit Code	**Print Commas**	**Negative Symbol**	**Blank Value**	**I Value**	**J Value**
1	Yes	None	.00 or 0	,00 or 0	0,00 or 0
2	Yes	None	Blanks	Blanks	Blanks
3	No	None	.00 or 0	,00 or 0	0,00 or 0
4	No	None	Blanks	Blanks	Blanks
A	Yes	CR	.00 or 0	,00 or 0	0,00 or 0
B	Yes	CR	Blanks	Blanks	Blanks
C	No	CR	.00 or 0	,00 or 0	0,00 or 0
D	No	CR	Blanks	Blanks	Blanks
J	Yes	-	.00 or 0	,00 or 0	0,00 or 0
K	Yes	-	Blanks	Blanks	Blanks
L	No	-	.00 or 0	,00 or 0	0,00 or 0
M	No	-	Blanks	Blanks	Blanks
N	Yes	-	.00 or 0	,00 or 0	0,00 or 0
O	Yes	-	Blanks	Blanks	Blanks
P	No	-	.00 or 0	,00 or 0	0,00 or 0
Q	No	-	Blanks	Blanks	Blanks

Note: For all these edit codes, *decimal points* are always shown, and *leading zeros* are always suppressed.

Query uses the J edit code as the default edit code whenever an error occurs during numeric field editing or whenever there are no other editing values to use. If an error occurs, an error message is shown along with the edited result produced using the J code.

For a field that does not have an edit code specified in its definition, edit code J is shown as the default the first time you see this display for that field.

The other edit codes and edit descriptions are:

- **Edit code W** suppresses the three leftmost zeros of a date field that is six to eight digits long, and it suppresses the leftmost zero of a date field that is five digits long. It also inserts slashes (/) between the year, month, and day. The positions of the slashes depend on the number of digits in the field: nn/nnn, nnnn/nn, nnnn/nnn, and nnnn/nn/nn.
- **Edit code X** shows the values in their unedited form. For example, a value of -12 is shown as 1K. You can think of the unedited form as the character presentation of the hexadecimal string that makes up the zoned decimal representation for the numeric value. Table 4 shows the unedited presentation form and internal representation of numbers in zoned, packed, and binary format.

Table 4. Edit Code X Examples

Format	Length/ Dec. Places	Actual Value	Unedited Presentation	Internal Representation (How Stored)
Zoned	7	549134	0549134	X'F0F5F4F9F1F3F4'
Packed	7	549134	0549134	X'0549134F'
Binary	7	549134	0549134	X'008610E'
Zoned	5/2	-319.34	3194N	X'F3F1F9F4D5'
Packed	5/2	-319.34	3194N	X'31945D'
Binary	5/2	-319.34	3194N	X'000F8337'

- **Edit code Y** suppresses the farthest left zero of a date field that is three to six digits long or eight digits long, and it suppresses the two farthest left zeros of a date field that is seven digits long. It also inserts slashes (/) between the month, day, and year. The positions of the slashes depend on the number of digits in the field: nn/n, nn/nn, nn/nn/n, nn/nn/nn, and nnn/nn/nn, and nn/nn/nnnn.
- **Edit code Z** removes any plus or minus sign from a numeric field and suppresses leading zeros.
- **Edit descriptions 5 through 9** are user-defined edit codes. They can be defined to use other characters or combinations of characters to edit a numeric field.

The negative sign is on the left of the value for edit codes N through Q, and on the right of the value for other edit codes and edit descriptions.

You must either specify an edit code here or press F12 to return to the Define Numeric Field Editing display. (You can then specify, for example, option 4 in *Edit option* and then define your own edit words on the Specify Edit Word display.)

- The only currency symbol that can be used with any of these edit codes is the one defined in the system-supplied system value QCURSYM.
- If date/time edit code Y is specified for a field, the field must be three to eight digits long.
- If the definition of an edit code is changed (done outside of Query), the changes are reflected in all query reports that use that edit code.

Optional edit code modifier in Query for iSeries reports

Type the character that you want used as the optional modifier for the specified edit code. If you specified one of the edit codes W through Z or one of the edit descriptions 5 through 9 in the *Edit code* prompt, you cannot specify an optional modifier in this prompt.

1=Asterisk fill

Asterisks (*) are to be used as the fill character to replace leading zeros for this field; for example, `****27.03`.

2=Floating currency symbol

The currency symbol specified in the QCURSYM system value is to be used as the edit code modifier for this field. An example is the dollar sign ($), as in `$27.03`.

Specifying edit words

Specifying or creating an edit word is another way to define numeric editing. It should be considered when the first three methods do not produce the results you want.

The Specify Edit Word display allows you to specify or change the edit word(s) that you want used to edit a numeric field. An edit word determines how all the values for the specified field are to appear in your query report if the report is run when the edit option for this field is 4.

You can use one edit word to edit all the *detailed values* for the field and, if the total summary function was specified for the field, you can use another edit word to edit the *summary total values* for the field.

A blank string enclosed in apostrophes appears as the default for the detailed values edit word for a field that does not have an edit word specified in its definition.

To remove only the edit word used for this field's summary totals, blank out the *Edit word for summary total* prompt. If you want to remove *both* edit words defined for this field, press F16 (Remove edit). Note that F16 removes all editing values defined in *all four* edit options, not just this option.

For the *Edit word* prompt, either you must specify an edit word or you must press F12 to return to the Define Numeric Field Editing display. You *cannot* leave the *Edit Word* prompt blank.

If an error occurs while a field is being edited by Query, the field is edited with the J edit code, and the field value is displayed in its edited form along with an error message.

Edit word in Query for iSeries reports

Type the character string that you want used as the edit word for this field. The character string must be enclosed in quotation marks and the number of blanks the edit word contains must equal the number of digits in the field, as determined by the length field shown on the display. Insert a zero or asterisk as the first character of the edit word to prevent the truncation of leading zeros.

For example, if your edit word is

```
'0  /  /    '
```

the value of 01251960 becomes 01/25/1960. Without a leading zero or asterisk, 01251960 would appear as 1/25/1960. To specify a blank space in the report result, use an ampersand (&).

```
                            Specify Edit Word

Field . . . . . :                  Heading 1 . . . . :
Length  . . . . :                  Heading 2 . . . . :
Decimal . . . . :                  Heading 3 . . . . :

Type information, press Enter.  (Put quotes around edit words.)
  (Each blank replaced by a digit, each '&' with a blank.)

  Edit word . . . . .         '  ,   ,  0.  -'

               (These are SAMPLES only; they are not defaults.)


  Edit word for
    summary total . .      '  ,   ,   ,  0.  -'




F3=Exit           F5=Report           F10=Process/previous    F12=Cancel
F13=Layout        F16=Remove edit     F18=Files
```

For example, if you want to define an edit word containing an eleven-digit field with no decimal positions, and you want commas for thousands separators and CR for negative values, your edit word would be ' , , , &CR' and a value in the report would appear as 27,345,838,789 CR if it were a negative value.

You might define '0( )& - ' as the edit word for a ten-digit telephone number that has been formatted for ten or eleven digits on the Specify Report Column Formatting display.

The ten digit number 5079876543 would be displayed as (507) 987-6543.

The edit word might be ' - - ' for a nine-digit social security number, such as '123-45-6789'.

Consider the following as you define your edit words. Each edit word is marked with the CCSID of the job used to define it so that it can be converted for use in a job with a different CCSID. Refer to “CCSID and column formatting and editing in Query for iSeries” on page 253 for information about how CCSIDs affect edit words.

- If option 1 (Total) was or will be specified on the Select Report Summary Functions display to get summary totals for the field, the J edit code is used to edit the field if you do not define an edit word in the *Edit word for summary total* prompt.
- The edit word for summary function totals, if used, must have three more blank positions than the field length indicates, but its length cannot exceed 31 digit positions. The editing positions containing commas for thousands separators or a period for the decimal point, for example, are in addition to the 31 maximum.
- When an edit word is used, its length is considered by Query in determining the column width used in the report for that field. If the summary total edit word is defined, but no summary total is defined for this field, for example, then the length of the summary total edit word is ignored in determining the column width for detailed output.
- If both edit words are defined and used, both are assumed to be aligned on the right with the last character in each string. If they are not aligned, the ampersand (&) can be used to add blanks to one of the edit word character strings so that they are aligned.
- If the widest edit word to be used is narrower than the column headings, the column headings are centered over it. Otherwise, the farthest right position of the column headings is aligned with the farthest right position of the edit word.
- If you want a single apostrophe to appear in the edited result, use two single apostrophes (') in the edit word.

- An edit word does *not* have to have a decimal digit position (to the right of the decimal point) for each decimal digit in the field; only the total length is significant. Query does not check the two edit words to see that they have the same number of decimal positions.
- Only the system-defined currency symbol (stored in the QCURSYM system value), can be used as a *floating* currency symbol. Any other symbol specified will not float; it stays fixed in one position.
- If the length of the field or its decimal positions value changes, the edit words may no longer be correct. In this case, Query uses the J edit code to edit the field value when necessary.

Edit word for summary total in Query for iSeries reports

If option 1 (Total) was specified on the Select Report Summary Functions display to get summary totals for this field, you must type the character string that you want used as the summary total edit word for this field. The character string must be enclosed in quotation marks and must have a blank position for each digit in the field, plus three more than the length of the field shown at the top of the display, up to a maximum of 31 positions. To specify a blank space in the report result, use an ampersand (&).

For example, if you want to define an edit word long enough for the total values for an 8-digit field with no decimal positions, and you want commas for thousands separators, and CR for negative values, your edit word would be `' , , , &CR'` and a value in the report would appear as `27,345,838,789 CR` if it were a negative value.

If you do not specify an edit word here and you specify on the Select Report Summary Functions display that the field be totaled, the J edit code is used to edit summary totals for the field.

Chapter 11. Specifying report summary functions in Query for iSeries reports

This chapter describes how to specify the summary functions for each of the selected fields in your query output. Depending on the type of field, you can specify one or more (or all) of the types of summary functions for each field in your report: total, average, minimum value, maximum value, and count. All of them can be used for numeric fields, and all *except* total and average can be used for character (SBCS and DBCS), date, time, and timestamp fields.

For each field for which you specify summary functions, Query calculates *summary values* and includes them in the report. Query calculates these summary values at each report break (break levels 1 through 6) defined in this query and at the end of the report (break level 0). Each type of summary is shown on a separate line in the report, with a descriptive abbreviation shown on the left of the summary values (see Chapter 12, “Defining Query for iSeries report breaks”).

For example, assume that your query has a numeric result field named `ITEMTOT` defined using the expression `QUANTITY * ITEMCOST` (two numeric fields being multiplied together). These two fields are used to calculate the cost of each item ordered in the `ITEM` field. You might define the following summary functions for those fields: *count* for the `ITEM` field, *total* and *maximum* for the `QUANTITY` field, *maximum* for the `ITEMCOST` field, and *total* and *maximum* for the `ITEMTOT` field. The following is an example of how part of a report might look for a customer named `Z Z Smith`:

```
      ITEM     QUANTITY  ITEMCOST   ITEMTOT

      Bolt           12       .10      1.20
      Hammer          2      8.50     17.00
      Ruler           1      2.00      2.00
      Screw           6       .05       .30

Totals for: Z Z Smith
TOTAL                21               20.50
MAX                  12      8.50     17.00
COUNT 4
```

Each summary function result for each field (column) is calculated and included as a summary value (similar to a subtotal) at every defined report break and as a final summary (final total) at the end of the report. (However, using the Define Report Break display, you can format a particular break level to suppress the summary information. In this case, when a break occurs, a blank line and possibly break text that includes break values, if defined, is used.)

Summary function results, if defined, can appear in all three types (displayed, printed, and database) and both forms (detailed and summary) of output, with one exception: they cannot be included if the report is to a database file in detailed form.

Types of summary functions in Query for iSeries reports

On the Select Report Summary Functions display, you can enter the number of one or more of the following options to specify the types of summary functions to be used for the fields. You can specify as many options for as many fields as you want, if they are valid for that type of field. If you type more than one option for a field, they can be typed in any order. The order that the summaries appear in the report, however, is the same as listed here, and cannot be changed:

1=Total
Shows the sum of the values in the field for the break level or for the whole column (numeric fields only). Null values are ignored unless all values are null, then the total is null.

2=Average
Shows the average of the values in the field for the break level or for the whole column (numeric fields only). The average is the total divided by the count (number of values that are not null used to determine the total). If the total is null, then the average is null.

3=Minimum
Shows the lowest character or numeric value in the field for the break level or for the whole column. The minimum of date, time, or timestamp values is based on chronological order. Null values are ignored unless all values are null, then the minimum is null.

4=Maximum
Shows the highest character or numeric value in the field for the break level or for the whole column. Maximum of date, time, or timestamp values is based on chronological order. Null values are ignored unless all are null, then the maximum is null.

5=Count
Shows the total number of values that are not null in the field for each break level or for the whole report.

When summary values are being calculated for the total, average, minimum, and maximum summary functions, the original length and decimal position values (in the field definition) are used for the field calculations, not the values specified for the field (if any) in the *Len* and *Dec* column of the Specify Report Column Formatting display. Also, rounding or truncation is done in these calculations, depending on what you specify on the Specify Processing Options display (see Chapter 14, “Specifying Query for iSeries processing options”).

```
                      Select Report Summary Functions

Type options, press Enter.
  1=Total   2=Average   3=Minimum   4=Maximum   5=Count

---Options---    Field
5  _  _  _  _    ITEM
1  4  _  _  _    QUANTITY
4  _  _  _  _    ITEMCOST
1  4  _  _  _    ITEMTOT

                                                                  Bottom

F3=Exit           F5=Report        F10=Process/previous    F11=Display text
F12=Cancel        F13=Layout       F18=Files               F23=Long comment
```

This display shows all the fields (including result fields) that are available to be used in your report. The fields are listed in the order that they will be shown in the report:

- If fields were selected on the Select and Sequence Fields display, they would be listed on this display in the order that they were specified (includes result fields).
- If no fields were selected on the Select and Sequence Fields display, all the fields in the query would be shown in the following order:
  1. All sort fields (if any) in their order of sort priority.
  2. Any result fields not selected as sort fields.
  3. All other fields, in the order they exist in the record format definitions used in the selected files. Fields from the first file are listed first, followed by those in the second file, and so on.

Summary functions can be specified for as many of these fields as you want, as long as that type of function is valid for that type of field.

Summarizing columns in Query for iSeries reports

The collating sequence that you select (see Chapter 9, “Selecting a collating sequence in Query for iSeries”) for your query has an effect on different parts of your query definition. If you choose the *minimum* or *maximum* option for one or more of the SBCS, DBCS-open, and DBCS-either character fields in your query, the selected collating sequence is used to establish the values that appear on your report. In some cases, blanks are the minimum or maximum value (if a record does not contain data but has blanks in that field) and are used for your query output.

A CCSID is associated with a collating sequence. Different CCSIDs can cause different results for MINIMUM and MAXIMUM processing. See “CCSID and summary functions in Query for iSeries” on page 253 for information on how CCSIDs affect summary functions.

Location of column summary values in Query for iSeries reports

In a report that lists the detail information from the query, summary values are shown directly below the column(s) for which they are specified, at the end of the report, and/or after each report break. In a report that lists summary information only, summary values are shown directly below the column headings after any line of break fields for report breaks. Specifying whether you want detail or summary information is described in Chapter 13, “Selecting output type and output form in Query for iSeries reports”.

Each type of summary is shown on a separate line. The descriptive abbreviation (TOTAL, AVG, MIN, MAX, or COUNT) for each summary is placed to the left of the summary value, and is separated from the value by at least one space. (You cannot change the placement of this information or the order in which the summaries are shown.)

For example, if you have a result field of TOTDUE for which you want a total and maximum value to show on the report, and you want a count of all records in the report, your report would look something like this:

```
             Accounts Receivable Summary

           NAME                 TOTAL DUE

           Jones   B D               5.00
           Kagy    R L              25.39
           Vine    S S                .00
           Johnson J A             140.28
           Alison  J S              36.36
           Henning G K           1,900.50
           Stevens K L               6.90
           Wilson  T N              15.00
           Doe     J W                .00

      FINAL TOTALS
      TOTAL                      2,129.43
      MAX                        1,900.50
      COUNT 9
```

Each AVG, MIN, and MAX value is edited in the same way as the column in which it appears.

Chapter 12. Defining Query for iSeries report breaks

This chapter describes how you define the report breaks that you want to occur in your query report. **Report breaks** are used to break the report into groups of records (or lines) each time the value of a report break field changes. The second part of this chapter describes how, for each of your report breaks, you can control report break formatting and define break text messages.

The primary reason for defining report breaks is to provide a basis (along with your selected sort fields) for Query to create a set of subtotals for each logical group of records in your output. An example of a logical group of records would be all of the time records for one employee. Another example would be all of the employee records for an entire department. A third example would be all of the sales activity records for one inventory item.

If daily time records existed for each employee, at the end of a pay period you could have Query process all of the records and create two kinds of groups or subtotals. To accomplish this you would have to define two report break fields (DEPTNO and EMPNO, for example) and select the same two fields as sort fields. If you assigned a sort priority of 10 to DEPTNO and a sort priority of 20 to EMPNO, Query would arrange the records in groups so that they would appear on your report by employee number within department number (starting with the lowest number employee's records in the first or lowest department number, followed by all the remaining in ascending sequence).

If you also defined break level 1 as DEPTNO and break level 2 as EMPNO, Query would create group or level breaks and would print or display subtotals for each group based on what you specified for your Report Summary functions (see Chapter 11, "Specifying report summary functions in Query for iSeries reports" for details). If you only wanted final totals at the end of the report, you would not have to define any report breaks in this example.

When a report break occurs for each group of records selected by the query, break text (if any) is shown following a blank line. The break text is then followed by a separate line for each type of summary function being used in your query. On each summary function line is the name of the function and all the summary values calculated at that report break for all the fields using that function.

Defining a Query for iSeries report break

On the Define Report Breaks display, you select each field that you want used as a break field and you assign to it the break level you want it to control. You can define as many as six break levels (numbered 1 through 6) and you can specify multiple break fields to control any break level, as long as you assign no more than nine break fields for all the break levels used.

For example, you can have: only one break level with all nine fields defined as break fields for it; three break levels with three break fields each; or a maximum of six break levels, with one field each used as break fields for five of the levels and four fields used for one level.

If multiple break fields are defined for the same break level, a change in any one of those break fields causes a break (or group change) level to occur for the specified break level number. This break level change causes Query to include the appropriate summary values in your output.

A break at one level automatically causes a break at all lower break levels (the lowest level has the highest number). For example, if all six break levels were defined, a control break occurring at level 4 would also force breaks at levels 5 and 6, and the break text and summary values for each of those three levels (6 to 4) would be included at that point in the report.

```
                          Define Report Breaks

Type break level (1-6) for up to 9 field names, press Enter.
  (Use as many fields as needed for each break level.)

Break    Sort
Level    Prty    Field
  1         1    COMPANY
  2         2    DIVISION
  3         3    REGION
  4         4    DEPARTMENT
  5         5    EMPLOYEE









                                                                  Bottom

F3=Exit       F5=Report      F10=Process/previous      F11=Display text
F12=Cancel    F13=Layout     F18=Files                 F23=Long comment
```

An example of when you might need to define five report break levels, would be if you sequenced a group of payroll time records by employee within department, within region, within division, and within company. In this case you would assign the following break levels:

- Break level 1 = company
- Break level 2 = division
- Break level 3 = region
- Break level 4 = department
- Break level 5 = employee

You can use any field shown in the list to define a report break; however, in most cases, you should use only sort fields for break fields. Generally, the break levels should be in the same order as the sort priorities assigned to the fields. That is, the highest assignable break level (level 1) should be assigned to a high sort priority number (where 1 is also the highest), break level 2 should be assigned to some lower priority number, and the lowest break level used should be assigned to the lower sort priority numbers.

If you specify a field as a break field that is not also a sort field, you may get extra report breaks in your report because if the field is not part of the sorting step, records that belong in the same group may not be grouped together and will cause the extra breaks.

Break definitions are ignored for detail output to a database file. Refer to “Building a new output file definition in Query for iSeries reports” on page 156 for more information on how break definitions and summary functions are used for summary-only output to a database file.

For summary-only printed or displayed output, a line of break values is shown instead of the detail lines for the break group. For either detail or summary-only printed or display output, one or more of the following appears at each report break:

- A blank line to separate the summary information from the column data.
- Any break text defined for that break level, including any break values that are defined in that text.
- Any summaries (totals, averages, minimum and maximum values, and counts) that you specified on the Select Report Summary Functions display. Columns with no break or summary values to be shown are omitted.
- Another blank line, or if the report is printed, you can specify for any break level that a new page be started after the summary information is printed.

- If no break fields are selected, no summary functions are selected and final summaries are suppressed. Only a count of the records is produced.

In a name and address file, for example, you might specify that two fields named CITY and STATE be specified as break fields. If STATE was defined as the break field for break level 1, CITY was defined as the break field for break level 2, and both fields were specified as break values in break text for their respective levels, then the following sample report breaks and break text might appear in a report for the following records:

```
Records in file:                 |  Lines in report:
                                 |
LNAME     CITY      STATE        | STATE  CITY            LNAME
Brown   Rochester     MN         |   MN   Rochester       Brown
Jones   Rochester     MN         |                        Jones
Smith   Rochester     MN         |                        Smith
  .        .          .         |
  .        .          .         | Users in Rochester MN
  .        .          .         |       Count                3
  .        .          .         |
Adams   St Paul       MN         |        St Paul         Adams
  .        .          .         |
  .        .          .         | Users in St Paul MN
  .        .          .         |       Count                1
  .        .          .         | All Users in MN
  .        .          .         |       Count                4
  .        .          .         |
  .        .          .         |
Calva   Rochester     NY         |   NY   Rochester       Calva
Doe     Rochester     NY         |                        Doe
Smith   Rochester     NY         |                        Smith
  .        .          .         |
  .        .          .         | Users in Rochester NY
  .        .          .         |       Count                3
  .        .          .         | All Users in NY
  .        .          .         |       Count                3
```

If you do not specify report breaks, Query prints or displays all the records in the report, one after the other without any additional spacing or text.

Break level 0 is another level, provided by Query, that you can use. This break level, which occurs only at the end of the report, is used to print the final summary values for all the specified summary functions at the end of the report.

Break level 0 has default break text (FINAL TOTALS), but it can be changed or filled with blanks if you do not want any final total description or values.

For printed output only, Query suppresses the printing of identical field information within a field that is defined as a break field. That is, when the contents of a break field are the same in a group of records, only the first record in the group has that field printed. All the other records in the group do not print the duplicate contents of that field.

See the previous name and address file example. Even though each record contains a value for the STATE field, the value for STATE only appears in its column when the value changes.

However, for the first record at the top of every page, *all* the information in all report fields is printed again for ease of reading.

Query assumes you want a blank line after any summaries, unless you specify a new page. If you display the information rather than print it, Query ignores new page requests.

You can exclude break fields from showing in the report in column format and still use their values in the report's break text. That is, if you specify a 0 in the *Len* column of the Specify Report Column Formatting display for a field, no column of data for the field appears in the report. But you can still specify that the field be used as a break field so that its value, when a report break occurs, is included in the break text defined for that level of report break.

The following are additional considerations regarding the occurrence of report breaks:

- For SBCS data in SBCS, DBCS-open, and DBCS-either character fields, a report break may not occur even though the characters in a field may be different. For example, if the collating sequence treats each uppercase and lowercase letter as having the same value (`Aa`, `Bb`, `Cc`, and so on), then no report break occurs if the only change in a field is from `A` to `a`, for example. (Collating sequences are not used for DBCS character data in DBCS fields.)
- For numeric fields, the actual data in the fields is used for determining report breaks, not the edited form of the data.
- For date, time, and timestamp fields, chronological equivalency determines report breaks.
- For both character and numeric fields, the original definition size of each field is used for determining report breaks, not any changed size that may have been specified on the Specify Report Column Formatting display.
- If null values are found, they are grouped together.

The following are sample report breaks showing null values:

Table 5. Sample File Data

Field 1	**Field 2**
1	AZ
1	AZ
2	XY
2	null value
3	null value
null value	AB

If sort and report breaks are specified on Field 1 and MIN and MAX are specified on Field 2, the following summary only report is shown:

Table 6. Summary Only Report with Null Values

	Field 1	**Field 2**
	1	
MIN		AZ
MAX		AZ
	2	
MIN		XY
MAX		XY
	3	
MIN		–
MAX		–
MIN		AB
MAX		AB
FINAL TOTALS		
MIN		AB
MAX		XY

Defining report break formatting in Query for iSeries reports

The Format Report Break display is used to format each of the break levels (1 through 6) that you defined on the Define Report Break display. This display is shown once for each of the break levels that you defined for your query. You can also specify some formatting characteristics for break level 0, which is the 'Final Totals' break level provided by Query. You can think of break level 0 as the group that includes all of the selected records. Formatting information on this display affects only output to printer and output to display.

For all break levels except break level 0, you can specify whether the report is to skip to a new page after a particular report break occurs. For each break level (1 through 6), you can also specify whether the summary function values are to be suppressed. You can also specify the break text (if any) that you want included with (or instead of) any summary information. The break text appears after the column data, on the line before any summary values.

```
                            Format Report Break

Break level  . . . . . :   1

Type choices, press Enter.
  (Put &field in text to have break values inserted.)

  Skip to new page . . . . .   N           Y=Yes, N=No

  Suppress summaries . . . .   N           Y=Yes, N=No

  Break text . . . . . .   Company



Level  Field                Level  Field
  1    COMPANY                4    DEPARTMENT
  2    DIVISION               5    EMPLOYEE
  3    REGION



F3=Exit           F5=Report           F10=Process/previous          F12=Cancel
F13=Layout        F18=Files           F23=Long comment
```

Skip to new page in Query for iSeries reports

Type a Y or N to specify, for this break level, whether printing is to start on a new page after a report break occurs for this break level. The summary information or break text, if any, for this break level is printed before skipping to the next page occurs.

This prompt applies to printed reports only and is ignored for displayed reports. For break level 0, this prompt is *not shown*.

Y=Yes
Query is to skip to a new page after any summary values are printed on the current page for each report break that occurs for this break level.

N=No
Query is not to skip to a new page when a report break occurs for this break level. Instead, it is to skip the number of lines you specify on the Define Printer Output display plus one additional line (see Chapter 13, "Selecting output type and output form in Query for iSeries reports").

Suppress summaries in Query for iSeries reports

Type a Y or N to specify, for this break level, whether summary values (if any summary functions were selected) are to be suppressed. You may want to exclude summary values for level 0 (Final Totals) if they are not needed.

N=No
Any summary values are not to be suppressed. They are to be included each time that a report break occurs at this break level.

Y=Yes
All summary values are to be suppressed. They are *not* to be included for this break level.

Break text in Query for iSeries reports

Type any text that you want to appear at each report break for this break level. The text can be as long as 40 characters. The text appears ahead of any summary lines for this report break.

If you include `&XXXXXX` (where `XXXXXX` is any one of the selected fields in your query) in the text, the current value of the field appears in place of `&XXXXXX` in the text in the report. For example, if you entered break text of:

```
Totals for &CITY &STATE
```

you might get:

```
Totals for Glendale CA
```

If you entered break text of:

```
&FINIT&MINIT &LNAME
```

you might get:

```
JY Clarke
```

Notice that a blank should follow a field name. An exception is that a second field name can follow a field name. As shown in the second example, the middle initial field, `&MINIT`, follows the first initial field, `&FINIT`, with no blank between them. The characters /, -, or : may also follow a field name. You can also type characters directly in front of a field name.

The field names can be uppercase, lowercase, or a mixture: `&LNAME`, `&lname`, or `&Lname`. Blanks at the end of field values, such as `Glendale`, are dropped. Blanks in front of field values are also dropped.

Note: Any changed lengths (except 0) specified on the Specify Report Column Formatting display are used. However, if 0 was specified for a field (to exclude the field from the report in column form), then the originally defined length and decimal position values are used in the break text.

The inserted value appears as it would in a report column.

- Any editing or formatting specified for numeric fields is applied.
- A null value is shown as a dash (-).
- Replacement characters are used to indicate error conditions.

Query prints only part of the text if the width is not large enough on a printed report. However, field value substitutions in the break text are either wholly included or excluded. If there is not enough room left to print all of a value, none of it is printed.

To suppress summaries for break level 0 and prevent the `FINAL TOTALS` line from appearing in the report, you must answer Y (Yes) to the *Suppress summaries* prompt and you must blank out the text in the prompt for break level 0.

Chapter 13. Selecting output type and output form in Query for iSeries reports

This chapter describes how you select where you want your query output to go, and in what form you want it to be. You can have the output displayed, printed, or put into a database file. You can also specify that the output is to be in detailed form (which includes all of your selected records) or in summary form (which only includes report break data as described in Chapter 12, “Defining Query for iSeries report breaks”).

If you do not use this definition step in defining your query, the output produced by Query is shown on your display and is in detailed form.

If you specify that your output is to be printed or stored in a database file, Query will present additional displays so that you can define printer or database file characteristics.

Selecting the output type and form you want in Query for iSeries reports

You can select the output device for your query by entering one of the following choices:

1=Display
The output of your query is to be shown on your display, and it can be shown in detailed or summary form. The output is the same as that produced by F5 (Report) during query definition. For information on how to use the Display Report display, you can press the Help key while you are displaying your query output.

Note: If a query is run in batch, output is sent to the printer, even though display output type is specified.

2=Printer
The output of your query is to be printed, and it can be printed in detailed or summary form. If you select this option, the Define Printer Output display is shown when you press the Enter key. There, you can specify the printer to be used and other characteristics of the printed output. Other displays related to the printed output are also shown.

Note: If a query is run in batch, output may be sent to a different printer than one you specify, depending on the default printer specifications for batch.

3=Database file
The output of your query is to be put into a database file. If you select this option, the Define Database File Output display is shown when you press the Enter key. There, you can specify the name of the file and member to be used to store the output and whether the output is to be added to the file or member or is to replace existing data in the file or member.

Both the detailed and summary forms of database file output are different from displayed or printed output:

- For *detailed* output to database, report break and summary function output (if defined in the query) is ignored; only the selected records are put in the database file. Also, if you specify that output is to a database file, the values in the line wrapping prompts are ignored; database output records are never wrapped. Report column formatting is ignored.
- For *summary* output to database, Query produces a record for each defined report break, including one for break level zero (0). Editing values on the total fields are used.

Note that database output does not contain certain report characteristics that are used for displayed or printed reports: column headings, column spacing, line wrapping, report break formatting, or printer

output definition information. If no field selections are made, Query produces all fields for a database file. Result fields are ordered last instead of first, as they are for printed or displayed output.

Even though these characteristics may be defined in the query, they are not used unless your *Output type* choice specifies either displayed or printed output. (Because the query definition can contain definitions for all three types of output at the same time, you have the flexibility to use the same query for more than one type of option. All you have to do is change the option and run your query again.)

```
                    Select Output Type and Output Form

Type choices, press Enter.

  Output type  . . . . . .   1        1=Display
                                      2=Printer
                                      3=Database file

  Form of output . . . . .   1        1=Detail
                                      2=Summary only

  Line wrapping  . . . . .   N        Y=Yes, N=No
    Wrapping width . . . .   ___      Blank, 1-378
    Record on one page . .   _        Y=Yes, N=No









F3=Exit           F5=Report           F10=Process/previous
F12=Cancel        F13=Layout          F18=Files
```

Form of output of Query for iSeries reports

Type the number of one of the following choices to select the form of output you want for your query. You can specify that the output for the report is to be produced in detailed form or in summary form. The detailed form includes all the records selected in the query and any summary information that was defined. Summary information consists of report breaks, totals, averages, maximums, minimums, or counts.

1=Detail
For displayed and printed output, the report is to contain both the selected data records and all summary information. For database file output, only the selected records are put into the file; summary information is not.

2=Summary only
The report is to contain only the summary information provided at report breaks and at the end of the report (final totals).

Line wrapping in Query for iSeries reports

Type a `Y` or `N` to indicate whether lines of the report are to be wrapped whenever all the fields in the output record cannot fit on one line in the report. Line wrapping values are used for displayed and printed output; they are *ignored* when output is to a database file.

Y=Yes
The data for each output record is to be wrapped (continued on the next line of the report) whenever the length of the record exceeds the width of the report. If a field cannot fit on the end of a line, all of that field is carried over to the next line along with any other fields that follow it. If the column formatted for the carried-over field would extend past the wrapping width, the field is dropped from the report, unless it is a character field and at least one character of its value (one byte for SBCS or four bytes for DBCS) would be displayed after truncation of the column at the wrapping width.

When line wrapping occurs, Query also wraps the field headings. The results on your report are a line(s) of field headings followed by a line(s) of field data.

N=No
The data for each output record is *not* to be wrapped when the length of the output record exceeds the width of the report line. Instead, any extra fields on the right end of each record are dropped. If `N` is specified, the next two prompts are ignored.

Wrapping width in Query for iSeries reports

For displayed or printed output only, you can specify a value that indicates the maximum width of the lines in the report. Either type a value of 1 through 378 or leave this prompt blank.

Note: For DBCS-graphic fields, Query adds DBCS shift-out and shift-in characters before showing the fields in a displayed or printed report. Variable-length DBCS values are extended to the full field length.

If all of the fields of an output record cannot fit within the specified width of one line of the report, the field that would exceed the specified width is started on the next line. If you leave this prompt blank, wrapping occurs whenever the maximum width of the specified display, or printer is reached.

If you specify too small a width, some column headings, fields, or summary function values may be truncated or dropped from the report. If such a problem occurs, you can either make changes here or to the *Column Spacing* or *Column Heading* prompts on the Specify Report Column Formatting display. To see the fields in which this may occur, press F13 (Layout). Error messages are shown for each field in error.

Record on one page in Query for iSeries reports

When line wrapping can occur, you can specify whether you want to prevent records from being split across pages of your printed report. Type a `Y` or `N` to indicate whether you want all of each record to be on the same page in the report.

Y=Yes
Each record is to have all its fields kept together on the same page. If there is not enough room left on the current page to contain all of its fields, the complete record is displayed or printed on the next page.

N=No
Records that start near the end of one page are split as necessary and continued at the top of the next page. The split occurs after the last complete field that fits on the full page, with the remainder of the fields in the record continued on the next page.

Displaying wrapping widths in Query for iSeries reports

You can use F13 (Layout) to show the effect of various wrapping widths. If you do, you see that wrapping is not a simple matter of continuing each formatted report line on the next line when the wrapping width is reached:

- Page, break, and final text lines are not wrapped, and are truncated without warning if the wrapping width is too small.
- Column headings wrap as a band of aligned lines, not individually.
- The *Column spacing* value specified on the Specify Report Column Formatting display for the first field in the output is used to indent each wrapped line.
- The *Column spacing* value may or may not be carried over to the next line, as shown in the example below. If a field cannot fit on the end of a line, all of that field is carried over to the next line along with any fields that follow it. The Column Spacing value for a wrapped field may show up as blanks after the field on the previous line, as blanks before the wrapped field, or a combination thereof.

  The following example shows the original report and the report showing wrapping that occurs if the wrapping width is set to 15.

```
Original report:

Position to line  . . . . .             Shift to column  . . .
Line   ....+....1....+....2....+....3....+....4....+....5....+..
             INTEGER   CHAR              DECIMAL         NUMERIC
000001 1,000,000,001   aaaaaaaaaa  11,111,111.01   11,111,111.01


Report showing wrapping width 15:

Position to line  . . . . .             Shift to column  . . .
Line   ....+....1....+
             INTEGER
           CHAR
             DECIMAL
              NUMERIC
000001 1,000,000,001
000002  aaaaaaaaaa
000003 11,111,111.01
000004  11,111,111.01
```

Alignment for the wrapped fields is uneven in this example, because, although the Column Spacing value for CHAR is 2, one blank appears after the INTEGER heading and field on the first line, and one blank appears before the CHAR heading and field on the second line. The Column Spacing value for DECIMAL is also 2, but both blanks appear after CHAR on the second line and no blanks before DECIMAL on the third line.

- A summary function caption is used for each wrapped summary line. None of the indent space is available for these captions. Formatting for these captions may cause additional spacing than specified for the columns on the line.
- If the wrapping width is too small, Query may truncate or discard information that would otherwise have appeared in the column (such as a column heading or a count summary), or even drop an entire column from the report. Values from numeric, date, time or timestamp fields are never partially shown. A column is dropped from the report rather than present it with no part of the value showing.

  Note: Messages about truncated and dropped information appear under a displayed report or if you press F13 to display the layout. There are no warnings about truncated or dropped information for a printed report.

Defining output to the printer in Query for iSeries reports

The Define Printer Output display is the first of several printer output definition displays that you can use to define where, and in what manner, your report is to be printed. This display is used to identify the printer and some of the print characteristics of the forms (paper) used in the printer, including the length and width of the forms, the starting and ending print lines on each page, and the line spacing between each printed record.

```
                          Define Printer Output

Type choices, press Enter.

  Printer device . . . .   *PRINT        *PRINT, name

  Form size
    Length . . . . . .     ___           Blank, 1-255
    Width  . . . . . .     132           Blank, 1-378

  Start line . . . . . .   ___           Blank, 1-255

  End line . . . . . .     ___           Blank, 1-255

  Line spacing . . . . .   1             1, 2, 3

  Print definition . . .   N             Y=Yes, N=No




F3=Exit          F5=Report          F10=Process/previous
F12=Cancel       F13=Layout         F18=Files
```

You can also specify whether your query definition is to be printed when the report is printed. If it is, the values specified on this display apply to the printing of both the query report and the query definition.

These values do not apply if you print the definition using option 6 on the Work with Queries display (which prints only the definition) or if you specify both database output and print definition (which puts the report in the file and prints the definition).

Printer device in Query for iSeries reports

Specifies the printer device to be used to print your query report. If you type *PRINT in this prompt, the printer currently assigned to your job is used to print the report. If you want to print your report on a different printer, type the name of that printer device to be used.

Note: If a query is run in batch, output may be sent to a different printer than one you specify, depending on the default printer specifications for batch.

Form size in Query for iSeries reports

This set of prompts specifies the length and width of the printer forms that are to be used to print your query report. If you leave these prompts blank, the length and width values used are those specified in the printer device file named QPQUPRFIL, which is the only printer device file that Query uses. You cannot override this file with another device file.

Form length

Either type a number from 1 through 255 that indicates the number of lines per page that are available on the printer forms to be used, or leave this prompt blank. This length should be the length of the form itself.

Form width

Either type a number from 1 through 378 that indicates the number of print positions (characters) per line that are available on the printer forms to be used, or leave this prompt blank. If you specify a width greater than the width of the form, Query produces the report but truncates any fields on the right end of the report that exceed the width of the form. If the value specified is greater than 132, Query forces the characters per inch (CPI) value to 15 and the printer font value to *CPI in the spooled file that is created.

This does not affect the report width shown on the Display Report display.

If you want to increase the left margin of the report (with the left edge being print position 1), go to the Specify Report Column Formatting display and type a larger value in the *Column Spacing* prompt for the first field to be shown in the report.

Note: For DBCS-graphic fields, Query adds DBCS shift-out and shift-in characters before showing the fields in a displayed or printed report. Variable-length DBCS values are extended to the full field length.

Start line in Query for iSeries reports

Type a number 1 through 255 that indicates the first line to be printed on each page of your report. Depending on what you have defined elsewhere in this query definition, the first line of page headings, column headings, or the next record is printed on this starting line.

If you leave this prompt blank, the starting line is line 6. If you specify a starting line number, it must be no greater than the ending line value and less than or equal to the form length value.

End line in Query for iSeries reports

Type a number 1 through 255 that indicates the last line to be printed on each page of your report. Depending on what you have defined elsewhere in this query definition, the page footing or a record (or part of a record, if it is wrapped) is printed on this ending line. If you specify an ending line number, it must be greater than the starting line value and less than or equal to the form length value. If the ending line is greater than the form length, Query prints the report using an ending value equal to the form length value.

If you leave this prompt blank, the value specified in the printer device file (named QPQUPRFIL) used by Query determines the ending line number.

Line spacing in Query for iSeries reports

Type a number (1, 2, or 3) that indicates the kind of line spacing between records that you want used for your report. This value controls the amount of separation (blank lines) between all but wrapped lines, which are always single spaced. A value of 2 or 3 can make the report easier to read if line wrapping is active and required. A default value of 1 is assumed, and a single-spaced report is printed.

1 Prints with single-spacing (*no* blank lines between)

2 Prints with double-spacing (*one* blank line between)

3 Prints with triple-spacing (*two* blank lines between)

Print definition in Query for iSeries reports

Type a Y or N to indicate whether you want a copy of your query definition to be printed whenever the query report is printed. N (No) is the default.

Y=Yes
A copy of the query definition is to be printed along with the query report. The definition is printed immediately ahead of the report.

N=No
A copy of the query definition is *not* to be printed when the report is printed.

Specifying spooled output overrides in Query for iSeries reports

The Define Spooled Output display is another printer output definition display used to continue defining the print characteristics of your query report. You can specify the type of forms (paper) to be used in the printer and the number of copies of your report to be printed. You can also specify the spooling characteristics: whether the output is to be spooled, and whether it is to be held on the output queue to be printed at a later time.

If you specified that both the query report and query definition are to be printed, the values on this display apply to both of them.

Completing this display does not cause the query to immediately run and print a report. You must still use the Exit This Query display (see Chapter 15, “Exiting and running a Query for iSeries query”).

If you have your query output spooled and if it is necessary to work with your spooled output, you can use the Work with Spooled Files display. (You can get to that display by typing the Work With Spooled Files (WRKSPLF) command on a command line of any menu.) For more information about spooled output files and printer device files, see the *Printer Device Programming* book. For information about the values mentioned here with this display, see the description of the Create Printer File (CRTPRTF) command parameters in the CL Reference information in the iSeries Information Center.

```
                          Define Spooled Output

Type choices, press Enter.

  Spool the output . . .   _            Blank, Y=Yes, N=No

  Form type  . . . . . .   __________   Blank, name, *STD

  Copies . . . . . . . .   1            Blank, 1-255

  Hold . . . . . . . . .   _            Blank, Y=Yes, N=No









F3=Exit            F5=Report           F10=Process/previous
F12=Cancel         F13=Layout          F18=Files
```

Spool the output in Query for iSeries reports: If you want to specify whether your report is to be spooled (as a spooled printer file) to an output queue, type a `Y` or `N`. If the output is spooled, the report can be scheduled for more efficient printing or possibly be delayed until a later time. If you leave this prompt blank, the value specified in the printer device file (named QPQUPRFIL) used by Query determines whether the output is to be spooled.

When your query is run, it creates your report and sends it as a spooled printer file to an output queue. You can specify that either the output be printed as soon as it can be scheduled, or that it be *held* on the output queue until it is released at a later time.

Y=Yes
The output for your report is to be spooled and sent to an output queue. When the report is printed is determined by the scheduling value specified in the printer device file QPQUPRFIL. The scheduling value is specified on the SCHEDULE parameter of, for example, the CRTPRTF (Create Printer File) command.

N=No
The output for your report is not to be spooled; it is sent directly to the printer to be printed as each output record becomes available. This option (N=No) is not recommended; it can result in errors if the printer is not available at run-time.

Form type in Query for iSeries reports: You probably do not need to specify this value to print your query. If you leave this prompt blank, the value specified in the printer device file (named QPQUPRFIL) used by Query determines which forms are to be used to print the report. If you want to print your report on a particular type of form, type the name of the form or type the special value `*STD`.

- If you type the name of a form, it must be a form name that has been defined on the system. After the query runs and the output is ready to be printed, a message appears on the console telling the operator to change the forms in the associated printer to the forms type that you specified by name.

- If you type *STD, the system assumes that the standard forms are already in the printer, and no message is sent to the system operator.

Copies in Query for iSeries reports: Type a number from 1 through 255 to indicate the number of copies of the report that you want printed. If you leave this prompt blank, the value specified in the printer device file (named QPQUPRFIL) used by Query determines the number of copies to be printed.

Hold in Query for iSeries reports: Type a Y or N to indicate whether your report is to be printed now, or is to be held and printed at a later time. The value in this prompt, however, is ignored if the value specified or assumed in the *Spool the output* prompt is N. If you leave this prompt blank, the value specified in the printer device file used by this printer determines whether the report is to be held or not.

If you specified that the output for your query is to be spooled when your query is run, your report is created as a spooled printer file and sent to an output queue. You can specify either that the spooled file be printed as soon as it can be scheduled, or that it be *held* on the output queue until it is released for printing at a later time.

Y=Yes
The output for your report is to be held as a spooled printer file on an output queue. The report is not printed until the spooled file is released for printing at a later time.

N=No
The output for your report is not held; it is printed as soon as it can be scheduled.

Defining the printout cover page of Query for iSeries reports

The Specify Cover Page display is another printer output definition display used to continue defining the print characteristics of your query report. On this display, you can specify whether you want a cover page to be printed for your report, and you can specify as many as four lines of text to be printed on the cover page.

```
                          Specify Cover Page

Type choices, press Enter.

  Print cover page . . .   Y            Y=Yes, N=No

  Cover page title
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________









F3=Exit             F5=Report           F10=Process/previous
F13=Cancel          F13=Layout          F18=Files
```

Print cover page of Query for iSeries reports: Type a Y or N to indicate whether a cover page is to be printed at the beginning of your report.

Y=Yes
A cover page is to be printed. It will contain any text that you specify on the *Cover page title* prompt, the date and time of printing, and information about your query (its name, its library name, the files selected, and text describing the query, if any).

N=No
No cover page is to be printed for your report. If you specify text on the *Cover page title* prompt, it is saved for future use.

Cover page title of Query for iSeries reports: Type the title, or title text, to be printed on your report as a cover page. You can type as many as four full lines of text using all characters (including uppercase and lowercase letters) that can be printed by the printer that you specified on the Define Printer Output display.

If you press F5 (Report) or F13 (Layout) to display the report or its layout, this title is *not* shown.

Defining the page headings and footings in Query for iSeries reports

The Specify Page Headings and Footings display is the last printer output definition display used to define the print characteristics of your query report. On this display, you can specify whether you want page headings and footings to be printed on all the pages of your report (except the cover page). You can also specify whether you want to print the standard version of page heading information used by Query, print only your own headings, or print both types. The standard page heading is used only on heading line 1 of each page; it contains the system date and time, the current page number, and any text that you specify here for the first heading line.

If you specify your own heading text or footing text, you can use three special codes in either one (or in both) that cause the system date, the system time, and the current report page number to be printed exactly where you want them in your text. These codes are provided so you can use them instead of the standard headings and format them however you wish.

&date The system date, printed in the job's standard date format.

&time The system time, printed in the job's standard time format.

&page
The current page number of the report, printed without a caption (you can specify your own). Leading zeros are replaced with blanks, and values of 1 through 9999 are printed (with no thousands separators). However, because the page field is only four positions, the leading zeros *are* shown for all pages after 9999 (to indicate that there is a 1 that is not printed in front of the 4 printed digits; page 10 000 shows as `0000`, page 10 001 shows as `0001`, and so on).

These codes can be used anywhere you want in the heading and footing text, and they can be used more than once.

```
                  Specify Page Headings and Footings

Type choices, press Enter.
  (Type &date, &time, and &page, or choose standard page headings.)


  Print standard
    page headings  . . .   Y            Y=Yes, N=No

  Page heading
_____________________________________________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

  Page footing
_____________________________________________________________________________




F3=Exit             F5=Report          F10=Process/previous
F12=Cancel          F13=Layout         F18=Files
```

Print standard page headings in Query for iSeries reports: Type a `Y` or `N` to indicate whether the system's standard headings are to be printed on each page of your report (except for the cover page). You *must* specify an `N` if you do not want to print the standard headings; your use of the special date, time, and page codes does not control the printing of the standard information.

When the standard heading is used, it automatically formats and shows:

- On the top left, the current system date and time (of printing)
- On the top right, the page caption and page number (of the current page)

If you type a `Y` for this prompt and also specify your own heading text, Query prints the standard information in the same locations on the first line and includes as much of your first line of heading text as it can. Your text is centered between the standard information and is truncated on the right end if it cannot all be used. Your other two heading lines, if any, are also centered and printed below the first line.

Note that your other two heading lines are centered on lines 2 and 3, and not with respect to your heading text on line 1. The longest line of lines 2 and 3 is centered on its own line, then the shorter line starts at the same position as the longest line does. Any text that cannot fit on either line is truncated.

Y=Yes
The standard heading information is to be printed on each page. Your heading text, if any, is also printed.

N=No
The standard heading information is not to be printed. Only your heading text, if any, is printed. If you do not specify any heading text in the *Page heading* prompt, no page heading information is printed.

Page heading in Query for iSeries reports: Type the text, if any, for the heading that you want printed at the top of all the pages of your report, except for the cover page. You can type as many as three full lines of text using all characters (including uppercase and lowercase letters) that can be printed by the printer that you specified on the Define Printer Output display. You can also use the special codes `&date`, `&time`, and `&page` wherever you want in your heading text.

If you press F5 (Report) or F13 (Layout) to display the report or its layout, this page heading is *not* shown.

Page footing in Query for iSeries reports: Type the text, if any, for the footing that you want printed at the bottom of all the pages of your report, except for the cover page. You can type one full line of text using all characters (including uppercase and lowercase letters) that can be printed by the printer that you specified on the Define Printer Output display. You can also use the special codes `&date`, `&time`, and `&page` wherever you want in your footing text.

If you press F5 (Report) or F13 (Layout) to display your report or its layout, this page footing is *not* shown.

Defining output of Query for iSeries reports to a database file

The Define Database File Output display is used to specify which database file is to be used to store your query output. This display is shown because you specified option 3 (Database file) on the Select Output Type and Output Form display. On this display, you specify the name of the file and file member, and you indicate whether the query output is to create a new file or member, be added to an existing member, or replace an existing file or member.

The output to be stored can be the records selected by your query (if the detailed form of output was specified), or the output can be the summary information produced from report breaks and summary function values defined in your query. You can also specify whether your query definition is to be printed when your query output is stored.

For database file output, some report characteristics (although they may be defined in this query definition) are ignored. If you later change the output type or the output form on the Select Output Type and Output Form display, these defined characteristics can be used as specified.

The data from your query is saved in your database file in the order that the fields are specified in your query. If you requested detailed output, but did not select fields for your query, all fields for selected records are placed in your database file, followed by any defined result fields.

```
                        Define Database File Output

Type choices, press Enter.
  (The printed definition shows the output file record layout.)

  File . . . . . .   QQRYOUT       Name, F4 for list
    Library  . . . .     QGPL       Name, F4 for list
  Member . . . . . .   *FILE        Name, *FIRST, *FILE, F4 for list

  Data in file . . . . .   1           1=New file, 2=Replace file
                                       3=New member, 4=Replace member
                                       5=Add to member

  For a new file:
    Authority  . . . . .   *LIBCRTAUT    *LIBCRTAUT, *CHANGE, *ALL
                                         *EXCLUDE, *USE
                                         authorization list name
    Text . . . . . .   ____________________________________________

  Print definition . . .   N             Y=Yes, N=No

F3=Exit           F4=Prompt            F5=Report          F10=Process/previous
F12=Cancel        F13=Layout           F18=Files
```

The following considerations apply when you define your query to put its output in a database file:

- Unless you use lists to select them, the file and library names that you specify on this display are not checked at this time for their existence or for your authority to use them. These items are checked when the query is run. The file is also checked to ensure that it is a database file.
- Query for iSeries cannot put data into a file while running a query that gets data from that file. Although you can specify a file you have already selected as an input file for this query, you cannot run the query without using file selection override.
- If summary-only output is being used and an overflow error occurs in a summary for a numeric field, 9s are put in the summary field instead of the data. If the field contains floating-point data, then 0's are used instead. If the field contains date or timestamp data, then the highest possible chronological value is used. The overflow indicator has an asterisk (*) in it when data has overflowed for any break or summary fields.
- If you change only the value in the *Library* prompt, the information on the Define Database File Output display is not saved when you define your query. If a query is run when no information is defined for this display, the library used for output is the profile value. Changing the default value for the *Library* prompt updates the Query for iSeries user's profile value for that prompt.
- If a database file is being created or replaced, Query for iSeries builds a new file definition matching the attributes of the query data. If a file member is being created, replaced, or added to, the existing output file definition is not changed and the query data may be converted as it is placed in the file.

Using an existing output file definition in Query for iSeries reports

Values from a null-capable field can be placed into a field that is not null-capable. The first null value encountered causes an error that ends output.

Values from a date, time, or timestamp field can be placed into any field of the same data type, regardless of any differences in the format or separator.

Note: This can cause an unwanted result if a date value outside the range 1940 through 2039 is put into a file field that has a two-digit year format. The value will be shown as pluses (++++++) on a report. To avoid this result, either use the CHAR function to see the data in a four-digit year format when you query the data, or change the attributes of the file field to a four-digit year format.

The record format printed at the end of the query definition shows the field characteristics of the existing output file.

Building a new output file definition in Query for iSeries reports

Some format and field definition information from the input file definition is copied unchanged, some is used in algorithms for defining parts of the output definition, and some is ignored.

Even if your query only sorts or selects records from a single file, the output file definition that Query for iSeries creates when creating or replacing a file is likely to differ from that of the input file definition. Query for iSeries creates only physical files, and does not use everything in each input field definition when building the format definition. For example, a long comment is not carried over from the referenced field.

Even if the expression for a result field is a field name from a single file, the output field defined for the result field differs from that of the referenced field. Data type, size, keyboard shift (DBCS subtype), and null capability are considered in the algorithms used to derive the result definition. Column headings, text, editing, null value defaults, and so on, are not carried over.

Specified formatting overrides saved in the query definition are used in summary only output definitions. The column heading, size, and expression specified to define a result field are used for detail output definitions and (when not overridden) for break fields in summary output definitions.

Query for iSeries creates field names to avoid duplication and to reflect the nature of the function applied in summary output.

Text and column headings for summary-function fields are created from input field names and translatable summary function captions. The CCSID assigned depends on where the name originated. The query definition CCSID is used for result fields and the appropriate file format definition CCSID is used for file fields.

For result fields and summary-function fields, assignment of attributes involves more than just copying information from a related input file field, which is what happens for most attributes for detail and break fields.

Some assigned attributes for result fields (type, size, editing) and defined attributes for input file fields can be determined while you are working on the definition because they are shown in field lists or presented as initial defaults.

The layout shown for F13 may be helpful if you keep in mind that it represents characteristics of displayed or printed output, which shows result fields first (not last) when no fields are selected, does not have individual columns for summary function values, and applies formatting overrides to detail as well as summary output.

The record format printed for option 6 (Print definition) shows additional information, such as the coded character set identifier (CCSID), null capability, and the specific data type of numeric fields. For summary output, for example, you can see that certain fields (totals, averages, counts, nonfloating-point numeric breaks, minimums, and maximums) are zoned decimal, even if the underlying field is binary or packed.

One way to see how the file will be created without actually running a long query is to create it using record selections that cause no records to be added. The format definition of the new file can then be displayed to see if it is satisfactory or changed to have the attributes that you want. Displaying the format

definition is the only way to determine some of the assigned attributes, such as the allocated length for variable length fields. Changing the format definition is the only way to specify certain attributes, such as a preferred default for null values.

Specifying an output database file for Query for iSeries reports

File: To specify the database file that is to store your query output, you can type a file name, use the name already shown, or press F4 (Prompt) to see a list of existing file names. If you intend to use an *existing* file, you can select the one you want from the displayed list. If you intend to create a *new* file, the file name you specify should not exist in the library where you want the new file stored. See Appendix A, "Differences between Query for iSeries and Query/36" for more information.

Do one of the following:

- Type the name of the database file that is to contain the output of your query.
- Leave the file name that is shown. However, if the name is QQRYOUT, you might want to change it; QQRYOUT is a file that others can use. They might use it and replace your data, or you might replace theirs.
- With the cursor in the *File* prompt, press F4 (Prompt) to see, on the Select File display, a list of all the files that you have the authority to use in the specified library or library list.

  If you intend to use an *existing* file, you can select the one you want from the list.

  If you want to create a *new* file:

  – You should verify that the name you want to use is *not* in the list. (Note, however, that you see only the files that you have the authority to use, and that even though a file by that name may not exist now, it could be created before the time you actually run this query. At that time, if a file by that name exists in the library you specified, you get an error message and you will have to change this query definition or replace the existing file.)

  – The file name must begin with an alphabetic character (A through Z, $, #, or @), and it can be followed by no more than nine alphanumeric characters (A through Z, 0 through 9, $, #, @, ., or _); for example, NAMEADDR or INVEN_12.

    Because most system-supplied objects on the iSeries system begin with Q, your file names should not start with a Q. Also, if you have systems in countries that use different languages, you might not want to use $, #, or @ because they might not be translatable characters.

Library in Query for iSeries reports: Shows the name of the library that contains or will contain the database file to be used. The initial library value shown in this prompt is: the value last used on this display, the name of your current library (if specified), or QGPL if you have never used this display and you do not have a current library.

If you want to use a different library than the one shown, you can type a different library name or press F4 (Prompt) to see a list of library names. Do one of the following:

- Type the name of the library that contains or will contain the file for the query output.
- If you type a generic library name (in the form of ABC*) or a special library name (*LIBL, *USRLIBL, *ALL, or *ALLUSR), and then press F4 with the cursor in this prompt, the specified list of library names is shown on the Select Library display. When you select the library you want from the list and press Enter, you return to this display with the selected name filled in.

Member in Query for iSeries reports: Type the name of the member in the specified database file that you want your output to be placed in. You can also specify *FILE (the default), *FIRST or *LAST; if one of these is used, the value is changed to the actual member name when your query is run.

Or, with the cursor located in this prompt, you can press F4 to list the members in the file, and select one from the list; however, if you are creating a *new* member, you should use a name not shown in the list.

If you specify *FILE, *FIRST, or *LAST in this prompt, a member is created with the same name as the file if the file is created or replaced or has no members.

If *FIRST or *LAST is used with a request to put the output into a new member of an existing file containing members, Query for iSeries sends an error message. You need to cancel the request or replace the member named in the message.

Data in file in Query for iSeries reports: Type the number of one of the following options to tell Query (at the time it is running your query) how to use the file and member you specified in the *File* and *Member* prompts:

1=New file
Creates a new file with the name specified in the *File* prompt and a member with the name indicated in the *Member* prompt. While running the query, if Query finds a file by that name in the library specified in the *Library* prompt, a message is displayed. You can either type a C (cancel) to cancel running the query or type a G (go) to continue running, thereby indicating that the file is to be replaced by the data from your query.

2=Replace file
Replaces the existing file named in the *File* prompt with the data from your query. The file and all the members of the file are deleted, and your data is put into a new member that is named with the name specified in the *Member* prompt.

3=New member
Creates a new member with the name specified in the *Member* prompt. While running the query, if Query finds a member by that name or a *FIRST or *LAST member in the file specified in the *File* prompt, a message is displayed. You can either type a C (cancel) to cancel running the query or type a G (go) to continue running, thereby indicating that the member is to be replaced by the data from your query.

4=Replace member
Replaces the existing member named in the *Member* prompt with the data from your query. All the data in that member is deleted, and your data is added. If a member by that name did not exist, the member is created and the data is put in it.

5=Add to member
Adds the data from your query at the end of the data in the existing member named in the *Member* prompt. If a member by that name did not exist, the member is created and the data is put in it.

When your query data is put into a file that exists and is not being replaced, the format of the query data must be compatible with the record format definition of the existing database file. To be compatible, the following must be true:

- The formats must have the same number of fields.
- Corresponding fields in sequence in the formats (that is, the first, second, third fields, and so on) must have field definitions of the same data type and, except for date, time, and timestamp data types, must have the same length, scale, precision, and keyboard shift. Date, time, or timestamp fields need only have the same data type — for example, both date fields.

For any of the options that replace data in existing files or members, the following also controls whether you can replace that data. The data cannot be replaced in a file or member if:

- Other files depend on the definition of this file. For example, you cannot replace the data in a physical database file on which other logical database files are based. You can use the Display Database Relations (DSPDBR) command to see the relationships of a file to other files.
- You do not have the needed authority for the file to be replaced.
- The file is not a physical file or it has more than one format definition.
- The output file or member names are the same as any of the selected files or members used in your query.

For all options, if the file does not exist in the specified library, Query tries to create that file.

Authority in Query for iSeries reports: Type the value for the kind of object authority that you want to give to other users for your database file. (This authority value is used *only* if your query creates a new file.) The values that you can specify are:

***LIBCRTAUT**
Library create authority assigns the authority from the create authority (CRTAUT) value in the library the object is being created into. The authority could be *ALL, *CHANGE, *EXCLUDE, *USE, or an authorization list name. Your ability to use the file depends on the authority assigned.

***CHANGE**
Change authority allows other users to perform all operations on the object except those limited to the owner or controlled by object existence authority and object management authority. A user can change or use the file in any way except to: replace or add new members, delete the file, or transfer it to a new owner.

***ALL**
All authority allows other users to perform all operations on the object except those limited to the owner or controlled by authorization list management rights. A user can do anything with the file (including deleting it), except for transferring it to a new owner.

***EXCLUDE**
Exclude authority prevents other users from doing anything with the file. Unless given specific types of authority, no user except its owner can use the file.

***USE**
Use authority allows other users to read records in the file.

authorization list name
If you specify the name of an authorization list, its authority is used to control the ability that users have to use the file. For more information, see the *iSeries Security Reference* book.

The following table shows, for each predefined type of authority, what can be done with the file:

Type of Authority	Create New File	Replace the File	Add New Member	Add to Member	Replace Member
*ALL	Yes	Yes	Yes	Yes	Yes
*CHANGE	Yes	No	No	Yes	No
*USE	Yes	No	No	No	No
*EXCLUDE	Yes	No	No	No	No

Note: If the authority you specify is *LIBCRTAUT, the value assigned when the object was created is used.

Text in Query for iSeries reports: You can type a comment (text) of up to and including 50 characters in this prompt to describe a file that Query for iSeries creates or replaces when this query is run. The comment reminds you what the file is for when it is displayed later in a list of files. The comment is displayed, for example, on the Select File display whenever the *Text* column is shown.

Print definition in Query for iSeries reports: Type a `Y` or `N` to indicate if you want a copy of your query definition to be printed whenever the query output is stored in the database file. `N` (No) is the default.

Y=Yes
A copy of your query definition (and the output database file definition) is to be printed whenever the query output is stored in the file.

N=No
A copy of the query definition is *not* to be printed when the query is run.

Summary-only output of a Query for iSeries report to a database file

The data sent to a database file, when summary-only output is selected, is one of the following:

- If no summary functions or report breaks have been selected, the output is a single record containing a count of the records selected by your query.
- If summary functions but no report breaks have been selected, the output is a single record containing summary function values.
- If report breaks but no summary functions have been selected, the output is a record containing report break values for each report break.
- If both summary functions and report breaks have been selected, the output is a record containing report break values and summary function values for every report break and for the final totals.

For a better understanding of summary-only output to a database file, compare the summary database file output with a printed report from the same query. The data produced is the same (if no summaries have been suppressed), but the layout of the data is different. If you print the query definition for a query with output sent to a database file, the record format layout is included.

The information in each summary-only record that is output to a database file has the following format:

- The first position of each record contains a break level number.
- The second position of each record contains an overflow indicator.
- The third position of each record begins the actual data.

The break level is a number from 0 through 6, which identifies the different report break levels output to a record. A 0 identifies a final total (summary) record. The numbers 1 through 6 identify a report break and correspond to the level number associated with the report break.

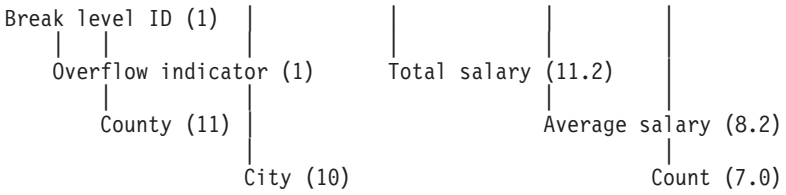
The overflow indicator indicates when data has overflowed in 1 or more fields in this record. The indicator position is blank if overflow has not occurred. An asterisk (*) appears if any calculated field overflows. The field that overflowed is filled with the maximum value for a field of that type and size (a string of asterisks ***** appears for the value in a printed or displayed report).

The output data is grouped together by field with the report break values followed by any summary function values for the field. The data for break fields with priority lower than the current break level is considered null. If the corresponding field in the output file is not null capable, Query for iSeries uses the null-value defaults (like blanks for character data). Summary data is displayed or printed in the following order: total, average, minimum, maximum, and count. If a field is totaled, Query adds 3 digits to the field length to hold the total (up to a maximum of 31 digits). Count summary values are 7 characters long and are zoned decimal. Break and summary values for packed and binary data are converted to zoned decimal format when saved in a database file. Date, time, and timestamp data is saved in internal format. DBCS-graphic data is saved without shift-out and shift-in characters.

As an example, assume you have an input file containing personnel information about all state employees. You set up a query that requests total salary, average salary, and the number of employees in each county and city. The query sorts on two fields: `CITY` within `COUNTY`. Report breaks are defined for these fields and the Salary field for each county is totaled, averaged, and counted.

If you ran this query and selected summary-only output, the following seven records would be sent to a database file:

```
2       Los Angeles Arcadia     00007000000  03500000  0000002
2       Los Angeles Glendale    00009000000  04500000  0000002
1       Los Angeles .........   00016000000  04000000  0000004
2       Orange      Costa Mesa  00006000000  03000000  0000002
2       Orange      Irvine      00008000000  04000000  0000002
1       Orange      .........   00014000000  03500000  0000004
0       .........   .........   00030000000  03750000  0000008
|   |   |           |           |            |         |
```



The number in parentheses, behind the explanation of the field, is the output field length and number of decimal positions. A blank break value is shown as a string of periods. Note that the overflow indicator column is blank, indicating all the data fits.

Note: Truncation or rounding of averages is not considered overflow.

The report breaks for CITY (break level 2) have break values for both COUNTY and CITY. The report breaks for COUNTY (break level 1) have break values for COUNTY only. The last record (break level 0) contains the final totals of the summary functions and has no break values. The blanks shown between the fields are for example purposes only; the actual database file output has no blanks between fields.

In the above example, the query had both summary functions and report breaks specified. If this query had neither summary functions or report breaks specified, the output would be a single record (break level 0) containing a count of the records selected by the query. For example:

```
0     0000008
```

If this query had summary functions but no report breaks specified, the output would be a single record (break level 0) containing summary function values for the records selected by the query. For example:

```
0     00030000000  03750000  0000008
```

If this query had report breaks but no summary functions specified, the output would be a record for each report break specified. In the first example above, this would be the first six records without their summary functions. For example:

```
2     Los Angeles  Arcadia
2     Los Angeles  Glendale
1     Los Angeles  ........
2     Orange       Costa Mesa
2     Orange       Irvine
1     Orange       ........
```

Using an output database file created by Query for iSeries

You can use a file containing the query data the way you do any other file on your system. Therefore, you can select this file on the Specify File Selections display for another query which might possibly increase the speed at which your new query runs because the file may now:

- Contain fewer records and data fields
- Be sorted the way you want
- Not need to be shared with other users

Chapter 14. Specifying Query for iSeries processing options

This chapter describes how you specify processing options for running a query. The processing options you can specify are:

- Whether the results of numeric field calculations or field length changes done for your query are to be rounded or dropped off (truncated).
- Whether errors and bad data found in numeric fields are to be ignored.
- Whether warnings about character substitutions encountered during CCSID conversions are to be ignored.
- Whether to use the collating sequence for all character comparisons or just those that were done in previous releases of Query for iSeries.

Purpose of Query for iSeries processing options

The numeric processing options available on the Specify Processing Options display help you control the precision and accuracy of your query output. Sometimes you might require that your query output be pinpoint precise, such as if you were calculating the interest charged to a customer for credit. Sometimes you may not care if your results are quite so precise, such as if your query calculates the approximate percentage of customers who purchased more than $10,000 worth of your company's products last year.

If you work in an environment in which CCSID conversions are necessary and might involve character substitution, you can choose to either ignore or see the character substitution warnings, depending on the data and reports you need.

You can select whether you want to use the selected collating sequence for all character comparisons. Query for iSeries Version 2 Release 3 makes the collating sequence available for all SBCS character comparisons. In previous releases, the EQ, NE, LIST, NLIST, LIKE, and NLIKE tests used the character value, instead of the collating weight. (GT, GE, LT, and LE tests have always used the collating weight when applicable.) Also in previous releases, the collating sequence was only applied to SBCS characters in SBCS fields and constants.

```
                          Specify Processing Options

Type choices, press Enter.

  Use rounding . . . . . .          Blank, Y=Yes, N=No

  Ignore decimal
    data errors . . . . . .         Blank, Y=Yes, N=No

  Ignore Character
    substitution warnings . . . . .     Y     Y=Yes, N=No

  Use collating sequence for
    all character comparisons . . .     Y     Y=Yes, N=No









F3=Exit            F5=Report               F10=Process/previous
F12=Cancel         F13=Layout              F18=Files
```

Rounding numeric field values during Query for iSeries processing

You can control whether the result of numeric field calculations or field length changes should be rounded or truncated when your query is run. By typing a `Y` in the *Rounding* prompt on the Specify Processing Options display, all of your numeric field calculation results are rounded (if necessary) when your query is run. By typing an `N` in the prompt, all of your numeric field calculation results are truncated (if necessary) when your query is run.

Note: If your query was created on an iSeries system, a `Blank` is shown as the default. If Query determines that your query was migrated from System/36, an `N` is used so that the query can be processed as it was on System/36.

Whether you choose to have numeric field calculations rounded depends on how precise you require your results to be. Initially, you need to determine how rounding or truncation will affect your results. If your query uses several multiplication or division operations, the result of a numeric field calculation may differ significantly whether your results are rounded or truncated. This is because rounding or truncation could occur more than once for the field as the calculations are performed. For example, multiplying a customer's balance due times an interest rate may supply a result with more decimal positions than you need or are allowed to have. If necessary, the result is rounded or truncated thus introducing a *small* error in the result. Suppose that this result is then added to similar calculations for other customers. Then all of the *small* errors begin to add up to a *larger* error. This error may or may not be significant, but it will probably be different depending on whether you have selected rounding or truncation.

Note: If you created a result field for a numeric expression that is too small to hold the integer portion (the numbers to the left of the decimal point) of the result, the result cannot be calculated and a decimal data error occurs. Even if you specify `N` in the *Rounding* prompt and `Y` in the *Ignore decimal data errors* prompt, Query stops processing if it encounters a decimal data error. The rounding option and the ignore decimal data errors option function only for numeric data that can be calculated. See "Specify processing options in Query for iSeries" on page 238 for a more detailed description of the ignore decimal data errors option.

Rounding and truncation are not done just on result fields, they are also done on the average and total summary functions on the Select Report Summary Functions display and when overriding the numeric field length on the Specify Report Column Formatting display (such as changing from five decimal positions to three decimal positions).

You can let Query decide whether the result of numeric field calculations or field length changes will be rounded or truncated when your query is run. If you leave the *Rounding* prompt blank on the Specify Processing Options display, Query decides whether to round or truncate the calculations based on the environment in which the query is run. If the query is run in the OS/400 environment, the results are rounded. If the query is run in the System/36 environment, the results are truncated.

Ignoring decimal data errors during Query for iSeries processing

By typing a `Y` or an `N` after the *Ignore decimal data errors* prompt, you can indicate whether you want Query to ignore any errors it finds in numeric fields when your query is being run. For example, an A (hex C1) in a zoned or packed-decimal numeric field is an error. If you have chosen that errors in numeric fields be ignored, the A is changed to a 1 (hex F1). If you have chosen that errors in numeric fields not be ignored, either an error message is displayed or the field value is shown in the output as plus signs (++++). The error you get depends on how the field is used.

You can let Query decide whether to ignore any errors it finds in numeric fields when your query is run. If you leave the *Ignore decimal data errors* prompt blank on the Specify Processing Options display, Query decides whether to ignore decimal data errors based on the environment in which the query is run. If the query is run in the OS/400 environment, errors are not ignored. If the query is run in the System/36 environment, errors are ignored.

Whether you choose to have decimal data errors ignored depends on whether your data contains values that cause decimal data errors. You may want to define your query to ignore decimal data errors if the files it uses have zoned or packed numeric fields that contain data that is not normally interpreted as zoned or packed data. For example, some applications write `blank` into a zoned field when the user leaves a prompt blank. Also, some direct files set all records to hex 40.

Ignoring decimal data errors can have a significant performance cost and should be avoided if the file does not contain such data. If you define your query to not ignore decimal data errors, it may run faster.

Note: If your query was created on an iSeries system, a `Blank` is shown as the default. If Query determines that your query was migrated from System/36, a `Y` is used so that the query can be processed as it was on System/36. Ignore the character substitution warning.

Ignoring character substitution warnings during Query for iSeries processing

The Ignore Character Substitution prompt lets you specify whether or not character substitution warnings should be ignored when converting data or a collating sequence from one CCSID to another.

Each character field, literal, and collating sequence is associated with a CCSID. This makes it possible to convert field and literal values to a different coding representation, and to convert collating sequences for use with data in a different coding representation. Character conversion, when required, is automatic and transparent to the user. CCSID conversion usually occurs when the user is running in a multilingual environment. A unique character may be substituted during character conversion for any character in the source coding representation that does not have a match in the target coding representation.

Y=Yes
Character substitution is ignored and no error messages are issued. Leave the default Y if your system contains all files with the same CCSID. If you have a primary and secondary language (such as Spanish and English), character conversion may be done. Leave the default Y if no substitution is possible, or if you do not care if this happens. If your files have different CCSIDs and you ignore character substitution, you may:

- See substitution characters in your output.
- Encounter unexpected matching (when differing characters are substituted).

N=No
An error message is issued if a character substitution occurs or could occur when converting from one CCSID to another, and the request being processed is ended with output incomplete.

Using collating sequence for all character comparisons during Query for iSeries processing

The *Use collating sequence for all character comparisons* prompt lets you specify whether use of the selected collating sequence should be unrestricted.

Y=Yes
Use the selected collating sequence for all character comparisons. When you choose this option, `A` equals `a` if they share a collating weight in the sequence regardless of the test or data type.

N=No
Do not use the selected collating sequence for EQ, NE, LIST, NLIST, LIKE, and NLIKE tests or for SBCS data in DBCS fields or constants. This is the default for queries restored from a release prior to Version 2 Release 3 or converted from a System/36.

Chapter 15. Exiting and running a Query for iSeries query

This chapter describes how to exit query definition and the different ways you can run your query.

Ending a Query for iSeries query definition

When you have finished creating a query and have pressed F3 (Exit) on one of the definition displays, the Exit This Query display is shown.

```
                              Exit This Query

Type choices, press Enter.

  Save definition  . . .   Y            Y=Yes, N=No

  Run option . . . . . .   1            1=Run interactively
                                        2=Run in batch
                                        3=Do not run

  For a saved definition:
    Query  . . . . . .     _________    Name
      Library  . . . . .     QGPL       Name, F4 for list

    Text   . . . . . .     ___________________________________________

    Authority  . . . . .   *LIBCRTAUT   *LIBCRTAUT, *CHANGE, *ALL
                                        *EXCLUDE, *USE
                                        authorization list name


F4=Prompt        F5=Report       F12=Cancel         F13=Layout
F14=Define the query
```

You can save a newly created query or changes to a previously saved query from either of these displays.

Saving a Query for iSeries query definition

When you save your query definition, all the values that you defined are saved with it. It is saved in the library that you specify, and it is saved as a query definition object whose type is *QRYDFN. If this is a new object, you are its owner, and you can specify which other users can use your query and in what way. Like other objects, you can display information about it using the Display Object Description (DSPOBJD) command.

Storing the Query for iSeries query definition

Query supplies a `Y` for the *Save definition* prompt on the Exit This Query display, since most of the time you want to save a newly created query or changes to a previously saved query. You do not have to save a query; however, if you do not save it, you lose your new query definition or changes if you choose to run the query now.

To save a newly created query, type a query name (*Query* prompt) and library name (*Library* prompt) if you did not already do this on the Work with Queries display. To display a list of libraries, position the cursor on the *Library* prompt and press F4 (Prompt).

You do not need to supply a query name or library if you are saving changes to a previously saved query; these names should already be filled in on the display. If you change either the query name or the library, you create a new query with that name and library, and the original query remains unchanged.

Describing the Query for iSeries query definition

You can also type some descriptive text about the query. The text reminds you what the query is for when it is displayed in a list of queries or printed on the cover page of a report. The text is displayed, for example, on the Work with Queries display whenever the *Text* column is shown.

Giving authority to others to your Query for iSeries query

| You can specify the type of authority that you want to give to other users for this query definition object.
| What you specify on the Exit This Query display determines how other users can use the query. When
| saving a query after creating it, the default authority on the Exit This Query display is *LIBCRTAUT.

The values that you can specify are:

***LIBCRTAUT**

Library create authority assigns the authority from the CRTAUT value in the library the object is being created into. The authority could be *ALL, *CHANGE, *EXCLUDE, *USE, or an authorization list name. The ability of other users to use the query file depends on the authority assigned.

***CHANGE**

Change authority allows other users to perform all operations on the object except those limited to the owner or controlled by object existence authority and object management authority. A user can change or use the query definition in any way, except that it cannot be copied, deleted, or saved with changes made to it.

***ALL**

All authority allows other users to perform all operations on the object except those limited to the owner or controlled by authorization list management rights. A user can do anything with the query (including deleting it), except for transferring it to a new owner or changing the type of authority.

***EXCLUDE**

Exclude authority prevents other users from doing anything with the query definition. Unless given specific types of authority, no user except its owner can use the query definition.

***USE**

Use authority allows other users to run the query or to display or print the query definition. A user cannot copy the query definition nor save the definition with changes made to it. The query may be selected for change and saved under a different name.

authorization list name

If you specify the name of an authorization list, its authority is used to control the access that users have to the query. Query shows the public authority special value rather than the authorization list name when the query is changed. You can specify an authorization list when you create a query; you cannot put an authorization list on an existing query. For more information, see the *iSeries Security Reference* book.

The following table shows, for each predefined type of authority, what can be done with the query.

Type of Authority	Change Query	Copy Query	Delete Query	Display Query	Print Query Definition	Run Query	Change Authority
*ALL	Yes	Yes	Yes	Yes	Yes	Yes	No
*CHANGE	No	No	No	Yes	Yes	Yes	No
*USE	No	No	No	Yes	Yes	Yes	No
*EXCLUDE	No	No	No	No	No	No	No

Note: If the authority you specify is *LIBCRTAUT, the value assigned when the object was created is used.

Running a Query for iSeries query

Running a query consists of telling Query for iSeries to use the query definition to acquire the data you want from selected files, to organize the data into a report format, and then to either display the report, print it, or store it in a database file.

To run a query, you can:

- Press F5 (Report) while creating, displaying, or changing your query. This runs the query and displays the report.
- Choose option 2 (Run an existing query) on the Query menu.
- Type a 1 (Run interactively) or a 2 (Run in batch) in the *Run option* prompt on the Exit This Query display.
- Type an 8 (Run in batch) or a 9 (Run) in the *Option* prompt on the Work with Queries display.
- Use the Run Query (RUNQRY) command.

Using function key F5 when running a Query for iSeries query

If dependent values are *not* used in record selection tests, you can run a query at any time by pressing F5 (Report) while you are creating, changing, or displaying it. Your query runs immediately, the report is displayed, and you can see what the report looks like and how any changes you make affect it.

Running a Query for iSeries query from the Query for iSeries menu

You can run an existing query by selecting option 2 (Run an existing query) on the Query menu. This causes the RUNQRY (Run Query) command help display to appear. For more information on using the RUNQRY command, see the CL Reference information in the iSeries Information Center and “Running a Query for iSeries query using the RUNQRY command” on page 171 of this book.

Running a Query for iSeries query from the Exit This Query display

When you finish creating or changing a query, the Exit This Query display is shown.

```
                            Exit This Query

Type choices, press Enter.

  Save definition  . . .   Y            Y=Yes, N=No

  Run option . . . . . .   1            1=Run interactively
                                        2=Run in batch
                                        3=Do not run

  For a saved definition:
    Query  . . . . . .     _________    Name
      Library  . . . . .     QGPL       Name, F4 for list

    Text   . . . . . .     ________________________________________

    Authority  . . . . .   *LIBCRTAUT   *LIBCRTAUT, *CHANGE, *ALL
                                        *EXCLUDE, *USE
                                        authorization list name


F4=Prompt        F5=Report       F12=Cancel         F13=Layout
F14=Define the query
```

Query assumes that you want to save your query, so it usually supplies a Y (Yes) in response to the *Save definition* prompt. *Run option* is a profile option, and whatever you selected the last time you exited a query is the default until you select a different value. However, Query supplies a 3 (Do not run) for the *Run option* prompt when your query has an error.

You can run a query and get the report without saving the definition of the query only if you are running interactively. (The query must be saved to run in batch.) However:

- If you are creating a query and choose not to save it, it runs only once and then is lost. To save your query, you need to supply values for the *Library* and *Query* prompts. The query name must be a unique query name in that library. If not, Query issues a message asking whether you want to replace the existing query.
- If you are running a query in batch, you must save it in a library other than QTEMP before running the query.
- If you are changing a query and choose not to save it, it is kept without the changes, and the newly changed or newly entered values are used only if you run the query now. That is, if you changed an existing definition, the report shows the results of the changes only one time. If the report is run again, the results are based on the original definition.

  To save a newly changed query, you do not need to supply a library name and query name; if you do, the original query remains unchanged, and a new query is created with the changes you made. Type the name of the library in which the query is to be saved. Only an actual library name or `*CURLIB` can be specified for the *Library* prompt. However, if you want to first see a list of libraries from which you can select one, do the following: move the cursor to this prompt, type a special library name (such as `*LIBL`) or a generic library name (in the form of `ABC*`), and press F4 (Prompt).

If you choose to run the query interactively, type 1 (Run interactively) in the *Run option* prompt and press the Enter key. Query shows the report on your display, prints the report on a printer, or places the data from the query in a database file. For more information on selecting an output device, see Chapter 13, “Selecting output type and output form in Query for iSeries reports”.

If you choose to submit the query to batch processing, type a 2 (Run in batch) in the *Run option* prompt and press the Enter key. The query is submitted to the job queue specified in the job description for your user profile.

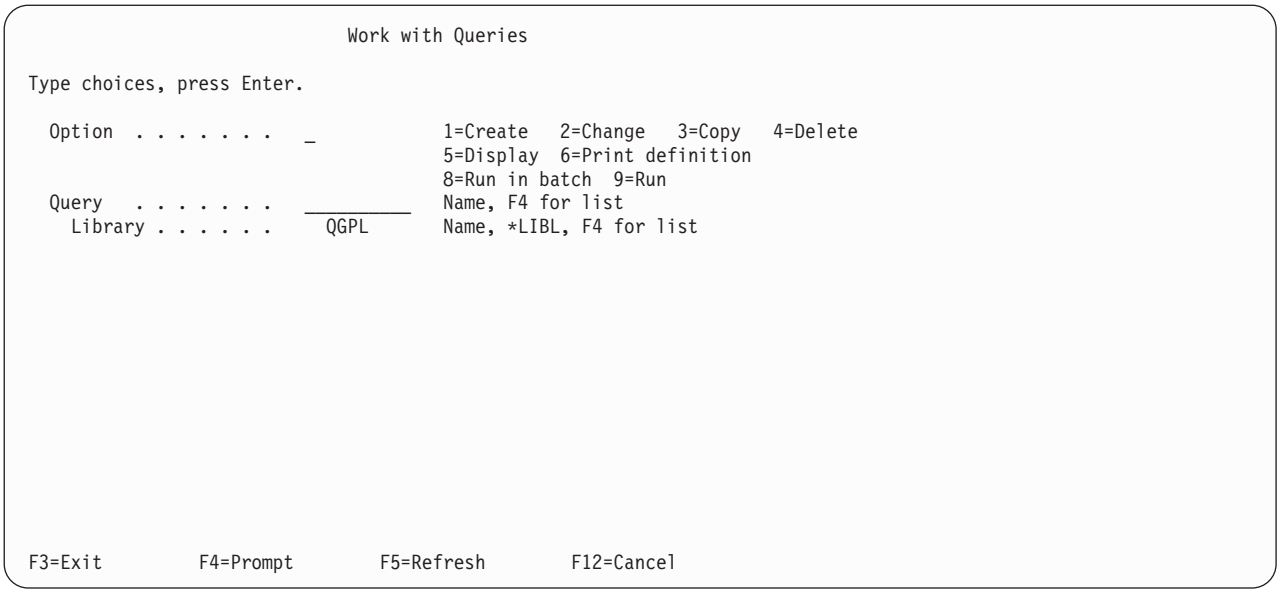
You can create a query for a file member that does not contain any data. If you run the query, no data shows in the report or is placed in a database file. However, you can press F13 (Layout) on the Exit This Query display to check your report layout.

Running a Query for iSeries query from the Work with Queries display

From the Work with Queries display, you can only run a query that has been previously saved. The query runs exactly as it was defined. If you want to change anything about the output device, you must first change the query and then run it.

To run a query from the Work with Queries display:

1. Select option 8 (Run in batch) to submit the query to the job queue specified in the job description for your user profile.
2. Select option 9 (Run) to run the query interactively.
3. Type the name of the query. If you do not know the name of the query, “Selecting a Query for iSeries query name from a list” on page 14 tells you how to see a list of query names.
4. Type the name of the library in which the query is stored. Query assumes it is stored in the library for your last Query work session or in your current library. If you do not have a current library, Query assumes it is stored in QGPL. You can change the assumed library name. If you do not know the name of the library, “Selecting a library for your Query for iSeries queries” on page 16 tells you how to display a list of library names.
5. Press the Enter key.



Query displays a report, prints a report, or puts the data into a database file, depending on what is specified on the Select Output Type and Output Form display. For more information on selecting an output device, see Chapter 13, “Selecting output type and output form in Query for iSeries reports”.

Query uses current data each time a query is run. For example, if a customer’s address changes in the file, the new address appears in the data produced when the query is run. However, if definition of data has changed since the query was created or last changed, the report created by the query may not show these changes. For example, assume you want to run a query that does not have column headings specified. The query then uses column headings defined by IDDU. If the IDDU column headings have been changed since the query was created or last changed, the query may not use the new headings.

When you change a query, Query updates the query with the current IDDU definitions. If you save the query, any IDDU changes are saved with it. Therefore, you can make sure you have the current definitions when you want to run the query from the Work with Queries display by selecting option 2 (Change) instead of option 9 (Run). You can then save the query without actually making any changes by doing the following:

- Press F3 on the Define the Query display.
- Choose to save the definition *and* run the query on the Exit This Query display.

IDDU definitions are explained in the IDDU online information.

Running a Query for iSeries query using the RUNQRY command

You can use the RUNQRY command to run a query. The output can be displayed, printed, or stored in another database file. If the query contains dependent values, you must use the option for specifying run time record selection and supply the values that would ordinarily come from a record in a different file or query.

The RUNQRY command can be used three different ways: to run an existing query (one that has already been created), to run an existing query with some of its definition values changed by values you specify on this command, or to run a default query based only on the parameter values specified on this command. (You supply parameters values to give Query information it needs, such as the query name, the library in which the query is stored, where to send the output, and so on.)

For detailed information on the RUNQRY command, its parameters, how to use it, and some examples, see the CL Reference information in the iSeries Information Center.

Following are some suggestions for using the RUNQRY command:

- If you want to use an existing query without changing the file or files to query, specify only a query and library name (without an input file name). This runs the query exactly as it was defined.
- If you want to run a default query on a file, specify only an input file name. This produces a report showing the information contained in the first 500 fields of each record.
- If you want to run a changed version of an existing query, specify a query name and the appropriate parameters to change the definition to what you want. The parameter values you specify on this command override the corresponding values in the existing query definition, but only when the command is processing (that is, the changes are not permanently made to the query definition).
- If you specify both a query name and an input file name, the files specified by the input file name parameter override the file name(s) specified in the query definition. Therefore, if multiple files (and members) are defined in the query definition and you want to change one or two of them, you must specify *SAME for the file selections that do not change and specify the values for the ones you want to override.

When you run a saved query you might not get the results you expected. The items in the following list can dynamically affect how a query runs or how the data is formatted:

- The language ID or sort sequence of the job (if the query takes them from the current job) is different than when the query was defined.
- The format of the job date.
- The default for numeric editing for the language.
- The system decimal positions processing value.
- The system currency symbol.
- File overrides may be in effect.
- The job CCSID.
- The Query for iSeries language installed (if the query specifies option 2 on the Select Collating Options display.
- The printer file definition.
- The attributes of the workstation you are using to display the report.

Chapter 16. Working with Query for iSeries query definitions

This chapter describes the ways you can work with your query once it has been created and saved in a library. In addition to running your query:

- You can change the results of your query output by making changes to your query definition.
- You can copy your query definition to the same or another library. You might do that so that other users can have their own copy to work with.
- You can delete one or more of your query definitions that are no longer needed.
- You can rename your query by using a new name when you copy it. You then can delete the old query.
- You can display the definition of your query without being able to make any changes to it.
- You can print your query definition. You might do that if you want a printed copy for documentation purposes.

Changing a Query for iSeries query definition

You can change a previously saved query by using option 2 (Change) on the Work with Queries display. You can supply a query and library name on the display, or you can select a query from a list. (For more information about using lists, see “Using lists in Query for iSeries” on page 9.)

Changing a query is almost the same process as creating a query. You choose the definition steps on the Define the Query display for which you want to change query definition values. When the definition step displays appear, the prompts are already filled in. To change the query, all you need to do is change or delete the values in the prompts.

When you have finished changing a query, you can run it, save it, run it and save it, and so on.

Starting changes by copying a Query for iSeries query definition

You may find it helpful to use option 3 (Copy) on the Work with Queries display before you change a query. If you copy the query you want to change, the original is not affected by the changes you make. Then, should you decide that you would rather have your query as it was originally defined, you do not have to change everything back. You can delete the changed query (as explained later in this chapter) and keep the original.

If, however, after running and testing the changed query, you decide you want to keep the changes, you can delete the unchanged original query.

Changes you can make to a Query for iSeries query

In general, you can make two kinds of changes to a query. You can change:

- What data is reported by changing the record and or field selection
- The characteristics of the report (or output) by changing the formatting, the summarizing, or the report breaks

Each type of change may require that you select several definition steps on the Define the Query display by typing a 1 in the *Opt* column next to the definition steps you want to change.

```
                          Define the Query

Query . . . . . :  QRY1              Option  . . . . . :  Change
  Library . . . . . :  QGPL          CCSID   . . . . . :     37

Type options, press Enter.  Press F21 to select all.
  1=Select

Opt    Query Definition Option
     > Specify file selections
 _     Define result fields
 _   > Select and sequence fields
 _     Select records
 _     Select sort fields
 _     Select collating sequence
 _   > Specify report column formatting
 _     Select report summary functions
 _     Define report breaks
 _     Select output type and output form
 _     Specify processing options

F3=Exit             F5=Report           F12=Cancel
F13=Layout          F18=Files           F21=Select all
```

The options currently defined for your query are shown with a > to the left of the option. You can change these and define additional options. You can choose as many options as you want from this display. Each of these options and their associated displays are described in previous chapters.

Each option has its own corresponding display(s), on which you can make specific changes. The displays for the options you select are shown to you in the order they appear on the Define the Query display.

If you decide you do not want an option that has already been defined, do the following:

1. Select that option on the Define the Query display.
2. Blank out any prompts that are completed for that option display.

If you decide not to change anything on an option display once you see it, just press the Enter key without changing anything and continue. If you have changed the display and decide you would rather have it the way it was, press F12 (Cancel).

Pressing F12 does not “undo” the result of pressing F23 (Save as default). Also, changes Query must keep as a result of your pressing the Enter key (or F10 or F3) to get to a different display cannot be canceled later by pressing F12. All other changes you make can be canceled by pressing F12. The following exceptions to this rule let you cancel all changes for your most recent work on an entire definition option by pressing F12 after returning from a secondary prompt display to the primary prompt display on which the secondary display depends:

- Join tests are canceled with file selections.
- Dependent value qualifiers are canceled with record selection tests.
- Editing changes are canceled with column formatting changes.
- Break level formatting changes are canceled with break field selections (level definitions).

If you decide you do not want to keep the changes you have made on previous displays, press F3 to end the revision and type an `N` (No) for the *Save definition* prompt on the Exit This Query display.

When you are working at a display, you can press the Help key to see the on-line help information that briefly describes how to specify the choices for that option. You can also press F5 or F13 to see how the changes affect the report the query produces.

When you finish making changes on all the displays you want to change, Query returns you to the Define the Query display, where the options now defined for your query are shown with a > to the left of the option. You can choose more options to make more changes, or you can press F3 to end the process of changing the query.

From the Exit This Query display, you can do either or both of the following:

- Save the query definition with the changes you have made.
- Run the query with the changes you have made.

```
                            Exit This Query

Type choices, press Enter.

  Save definition  . . .   Y            Y=Yes, N=No

  Run option . . . . . .   1            1=Run interactively
                                        2=Run in batch
                                        3=Do not run
  For a saved definition:
    Query  . . . . . .     __________   Name
      Library  . . . . .     ________   Name, F4 for list

    Text   . . .           ________________________________________
    Authority  . . . . .   *LIBCRTAUT   *LIBCRTAUT, *CHANGE, *ALL
                                        *EXCLUDE, *USE
                                        authorization list name



F4=Prompt       F5=Report       F13=Layout       F14=Define the query
```

You can change any combination of the *Query*, *Library*, and *Text* prompts. If you save the query definition, these changes have the following effects:

Query Name and/or Library Name Changed	**Query Name and Library Name Unchanged**
Existing query is not changed	Existing query is changed
New query created with new name and/or in different library	New query definition replaces existing definition
Text and authority applies to new query	Text and authority applies to new definition of the query

If you are replacing a query, you cannot specify authorization list name authority; you must use one of the special names (*CHANGE, *ALL, *EXCLUDE, or *USE) or blanks (no change).

If you choose *not* to save the query definition, changes to the following prompts have the following effects:

Prompt Changed	**Effect**
Query name	None
Library name	None
Text	Text prints on cover page if you choose to run the query and printer is the selected output device
Authority	None

Considerations for changing Query for iSeries queries

To make changes to your query, choose the correct options on the Define the Query display. Refer to the appropriate chapters or appendixes in this guide for information and considerations on how to enter the definitions that you want. Each query is saved with a CCSID. You cannot change a query if your job CCSID is not compatible with the query CCSID (one of the CCSIDs is 65535 or they are the same).

Note: See "Changing a Query for iSeries query" on page 250 for more information on how CCSIDs affect processing a query.

Changing your collating sequence on Query for iSeries queries

A change in your collating sequence can affect join tests, record selection tests, and sorts involving SBCS data in SBCS, DBCS-open, and DBCS-either character fields. The extent of the effect depends on the test.

Changing the setting of the Use Collating Sequence processing option can change your results. If you set the processing option to Yes, the EQ, NE, LIST, NLIST, LIKE, and NLIKE tests compare character collating values. These tests compare the hexadecimal character codes if you set the option to No.

Note: The Use Collating Sequence option does not affect your output when the collating sequence is set to *HEX.

LT, LE, GT, GE, and RANGE tests compare collating sequence values regardless of how you set the processing option. A change to your collating sequence can change the records that these tests select. A change to the collating sequence can also affect your query's minimum and maximum summary values, the location of report breaks, and the order of selected records (if you use a field containing SBCS character data for sorting).

For example, you have 2 collating sequences. In one, the character `E` has a higher sequence number than `e`, and in the other, the two characters have equal (shared) sequence numbers. In one record, field `NAME1` has a value of `LEE`, and field `NAME2` has a value of `Lee`. Table 7 and Table 8 show the results of comparing the strings (NAME1 and NAME2) using various tests for a collating sequence with:

- Unique weights used in all tests
- Shared weights used in all tests
- Unique weights not used in EQ and NE tests
- Shared weights not used in EQ and NE tests

Table 7 applies when all data is SBCS. Table 8 applies when some or all of the data is DBCS.

Table 7. Effect of Collating Sequence and Processing Option on Selection. Both NAME1 and NAME2 are SBCS data. Yes means the record under test is selected. No means it is not selected.

Test	ColSeq=YES Unique Weights	ColSeq=YES Shared Weights	ColSeq=NO Unique Weights	ColSeq=NO Shared Weights
NAME1 EQ NAME2	No	Yes	No	No
NAME1 GE NAME2	Yes	Yes	Yes	Yes
NAME1 GT NAME2	Yes	No	Yes	No
NAME1 NE NAME2	Yes	No	Yes	Yes
NAME1 LE NAME2	No	Yes	No	Yes
NAME1 LT NAME2	No	No	No	No

Table 8. Effect of Collating Sequence and Processing Option on Selection. Either or both NAME1 and NAME2 are DBCS data. Yes means the record under test is selected. No means it is not selected.

Test	ColSeq=YES Unique Weights	ColSeq=YES Shared Weights	ColSeq=NO Unique Weights	ColSeq=NO Shared Weights
NAME1 EQ NAME2	No	Yes	No	No
NAME1 GE NAME2	Yes	Yes	Yes	Yes
NAME1 GT NAME2	Yes	No	Yes	Yes
NAME1 NE NAME2	Yes	No	Yes	Yes
NAME1 LE NAME2	No	Yes	No	No
NAME1 LT NAME2	No	No	No	No

Copying a Query for iSeries query definition

There are many reasons for copying a query. Following are some of the most common:

- To copy a query from someone else's library into your library.
- To copy a query you keep in a test library for experimenting with different files, record formats, and query features. When you have a query you want to use, you can copy it into your library and keep the original in the test library for further experiments.
- To copy a query so that you can change it without changing the original.
- To rename a query or move a query to another library by copying the query to the other library and then deleting the query from the original library.

You can copy a previously saved query by using option 3 (Copy) on the Work with Queries display. You can type the name of the query (and its library) on the display, or you can, from a list of queries, type a 3 next to the query(s) that you want to copy. (For more information about using lists, see "Using lists in Query for iSeries" on page 9.)

After you press the Enter key, the Copy Queries display appears. (The following display has some sample information typed in.)

```
                              Copy Queries

From library  . . . . . :   TESTLIB

Type choices, press Enter.

  To library  . . . . . .   __________  Name, F4 for list
  Replace query . . . . .   N           Y=Yes, N=No

To rename copied query, change To Query name.
From Query   To Query
ACCTRECFEB   __________
INVENTFEB    __________
MAILADDR     __________
PAYROLLFEB   __________









F3=Exit                  F4=Prompt        F9=Reset         F12=Cancel
F20=Cancel copy in error
```

To place the copy in a library other than the library that contains the original query, type a different library name in the *To library* prompt. If you do not know the name of the library that should receive the copy, you can use F4 (Prompt) to select a library from a list.

To place the copy in the same library as the original, do not type anything in the *To library* prompt.

Then select a choice in the *Replace query* prompt:

- Type a `Y` if you want the copy to replace a query that has the same name in the library.
- Leave the `N` in the prompt if you want to copy the query to the library only if no other query with the same name already exists in the library.

To rename the query(s), type the new name(s) in the *To Query* column. If you place the copy in the same library as the original query, you must type a new name for the copy. If you place the copy in a different library, you can rename it, or you can use the original query name.

When you are finished typing information on the Copy Queries display, press the Enter key. If Query finds no errors while copying the queries, all the queries are copied. If you did not select any other options from the Work with Queries display (such as change, delete, display, and so on), you return to the Work with Queries display. If you selected the queries to be copied from a list of queries in a specific library and did not copy the queries to a different library, the names of both the original and copied queries are included in the list.

If Query finds an error while copying the queries, the list of queries being copied is shown and an error message appears at the bottom of the display. The query that has the error is highlighted and appears at the top of the list. Any queries that were before that query in the list have already been copied. You can do either of the following:

- Press F9 (Reset) without pressing the Enter key. The copy process is canceled for all remaining queries, including the query in error.
- Press F20 (Cancel copy in error) without pressing the Enter key. The query in error is not copied. To continue copying the remaining queries, press the Enter key. If an error is found while copying one of the remaining queries, another error message is shown and the list is shown again with that query listed first and highlighted.

Renaming a Query for iSeries query definition

If you want to rename a query, do the following:

1. Copy the query, giving the copied query a new name.
2. Delete the original query.

These tasks are options on the Work with Queries Display and are described in other sections of this chapter.

Deleting a Query for iSeries query definition

When you no longer need a query, you can delete (remove) it from the library. Once you delete a query, you cannot get it back, so it is a good idea to check a query definition before you delete it. If you delete a query from the Work with Queries display, you can use F11 to display text about the query. If there is no text, or if it does not include enough information to help you, you can display or print the query definition. These tasks are described later in this chapter.

You can delete a previously saved query by:

- Using the Delete Query (DLTQRY) command. For more information on using the DLTQRY command, see the CL Reference information in the iSeries Information Center.
- Selecting option 3 (Delete a query) on the Query menu. This causes the DLTQRY (Delete Query) command help display to appear. For more information on using the DLTQRY command, see the CL Reference information in the iSeries Information Center.
- Using option 4 (Delete) on the Work with Queries display. You can type the name of the query (and its library) on the display, or you can, from a list of queries, type a `4` next to the query(s) that you want to

delete. (For more information about using lists, see “Using lists in Query for iSeries” on page 9.) Then press the Enter key. The Confirm Delete of Queries display appears.

```
                          Confirm Delete of Queries

From library  . . . . :   MYLIB

Press Enter to confirm your choices for 4=Delete.
Press F12 to return to change your choices.

 Query
 ACCTRECJAN
 INVENTJAN
 MAILADDR
 PAYROLLJAN
 TESTQUERY1
 TESTQUERY2









F9=Reset          F12=Cancel          F20=Cancel delete in error
```

This display shows the query name(s) you chose to delete. (The above display shows some sample information.) Carefully check the names.

If you are sure you want to delete the queries listed, press the Enter key. The queries are deleted. If you selected the queries to be deleted from a list of queries, the deleted query name(s) are no longer included when you return to the Work with Queries display.

If you decide you do not want to delete one of the queries shown, press F12 (Cancel) to return to the Work with Queries display without deleting any queries. The list of queries is still displayed and you can change any of your selections.

If Query finds an error while deleting the queries, the list of queries being deleted is shown and an error message appears on the bottom of the display. The query that has the error is highlighted and appears at the top of the list. Any queries that were before that query in the list have already been successfully deleted. You can do either of the following:

- Press F9 (Reset) without pressing the Enter key. The delete process is canceled for all remaining queries, including the query in error.
- Press F20 (Cancel delete in error) without pressing the Enter key. The query in error is not deleted, but the delete process continues for the remaining queries. If an error is found while deleting one of the remaining queries, another error message is shown and the list is shown again with that query listed first and highlighted.

Displaying a Query for iSeries query definition

When you display a query, Query does not allow you to make any changes. Each query is saved with a CCSID. You cannot display a query if your job CCSID is not compatible with the query CCSID. They are compatible if one CCSID is 65535, the job and query CCSIDs are the same, or one can be converted to the other.

Note: See “Displaying a Query for iSeries query” on page 249 for more information on CCSIDs and how they affect processing a query.

If you display a query and decide you want to change it, you have to return to the Work with Queries display and use option 2 (Change). You can print the information you see when you display a query, although the information will be in a different form. See “Printing a Query for iSeries query definition”. You may be able to print the definition of a query that you cannot change or display.

You can display a previously saved query by using option 5 (Display) on the Work with Queries display. You can type the name of the query (and its library) on the display, or you can, from a list of queries, type a 5 next to the query that you want to display. (For more information about using lists, see “Using lists in Query for iSeries” on page 9.)

After you press the Enter key, the Define the Query display appears. All the options that were defined for the query are shown with a > to the left of the option. To look at how the options are defined, you can either:

1. Use F21 to look at displays for all the options (even those that are not defined for this query).
2. Type a 1 in the *Opt* column beside the options you want to look at.

You can press F5 while displaying a query to see how a report would look if you ran the query and displayed or printed a report.

Note: There are circumstances under which the display you see when you press F5 may differ from the display you would see during a normal running of the query. For example, if the collating table selected for option 4 has been changed since the query was saved, the F5 display will show the change, but the RUNQRY display will not.

When you have finished looking at a display for an option and are ready to look at the displays for the next option, press the Enter key. When you have seen displays for all the options you selected, you return to the Define the Query display. You can look at the same options again, or choose to display different options. Whenever you decide you are finished displaying this query definition, you can either:

1. Press F12 as many times as necessary to return to the Work with Queries display.
2. Press F3 to work with any remaining queries, if you selected more than one query from a list on the Work with Queries display. You return to the Work with Queries display if you were finished working with all the queries you selected on that display.

Note: You may not be able to display a query if the file definition has been changed since the query was last used or displayed. Changing the query or the file definition may make it possible to display the query. You also may not be able to use certain command and function keys while you are displaying because they are available only when you create or change a query.

Printing a Query for iSeries query definition

You can print the query definition. The printout tells you what information the query uses to prepare a report or create a file. You can see the same information on your display by selecting option 5 (Display) on the Work with Queries display, but the information will be in a different form.

You can print the query definition using any of the following methods:

- Use option 6 (Print definition) on the Work with Queries display. You can type the name of the query (and its library) on the display, or you can, from a list of queries, type a 6 next to the query name that you want to print the definition for. (For more information about using lists, see “Using lists in Query for iSeries” on page 9.)
- Specify to print the definition on either the Define Printer Output display or the Define Database File Output display and then run the query. These displays are described in Chapter 13.
- Specify to print the definition when you use the Run Query (RUNQRY) command to run the query. For more information on the RUNQRY command, see “Running a Query for iSeries query using the RUNQRY command” on page 171.

When you select option 6 (Print definition) on the Work with Queries display and press the Enter key, the query definition is printed immediately.

Information printed for a Query for iSeries query definition

The printout includes the following information:

- A header at the top of each page. This header lists information about the system you are using and when the definition was printed.
- The query name and CCSID.
- The library name.
- Any text about the query.
- Constants attributes (decimal point separator, date format and separator, time format and separator).
- The processing options.
- Collating sequence information.
- Assorted warnings.
- The file identifier(s). For each file identifier, the printout includes the following:
  - The file name
  - The name of the library
  - The name of file member
  - The record format selected for the file
- The join tests, if more than one file is used, and the type of join used.
- Any result fields, their expressions, length and decimal positions, and column headings.
- Record selection tests.
- Selected fields, their sequence, sort priority and sort type, and any text.
- Column formatting and summarizing.
- Any report breaks.
- The selected output type:
  - If the report is to be printed, printer information is shown.
  - If the output is to be put in a database file, database file information and the field layout are shown.
- The form of output selected, detailed or summary-only, and wrapping specifications.

If you print the definition using option 6 (Print definition) on the Work with Queries display, the printout includes information about any output type selected for the query. For example, if database file output was selected when the query was created and the query was later changed so that the output is to be printed, the printout of the query definition would include both database file and printer information. If you print the definition using any method except option 6, only current information is printed.

If you print the query definition while using the RUNQRY command (by specifying the PRTDFN(YES) parameter), the information in the printed definition reflects any temporary changes that you specify using the RUNQRY parameters or choices that Query for iSeries resolves at run time. For example, you might specify an input file name, make changes to the record selection tests, specify a different type of output, or define your query to use the running job's sort sequence. There might be missing information, when compared to an option 6 listing, because Query for iSeries did not need to use all the selected fields to run the query.

In addition to information about the query definition, if the query produces output to a database file, a description of the record format layout is also printed.

Example of printed record format information for a Query for iSeries query definition

The following is an example of one particular part of the query definition (the record format layout for the database output file) that can be printed when the query is run. The information shown below is printed only if the query is defined for database file output and, in this case, when it sends summary-only output to the database file.

```
                                IBM Query for iSeries                     92-01-15   10:36:31
Output file record format
  Output record length  . . . . . .  .   128
  Output CCSID value  . . . . . .  . .    37
  Field list:
    Field          Begin   Len  Dec   Null  Data Type           Text
    BREAKLVL           1     1              Character           BREAK LEVEL
    OVERFLOW           2     1              Character           OVERFLOW FLAG
    TM1USA             3     8   T          Time                FMT SYS
    DT1EUR             6    10   L          Date                FMT SYSTEM
    TS1               10    26   Z          Timestamp           FMT SYSTEM
    PK2               20     8    2         Zoned decimal
    ZD3               28     8    2         Zoned decimal
    ID1               36     3              Character           ID FIELD
    VC1               39     8   V      Y   Variable character  ' EMPTY STRING DFT
    C1                49    10          Y   Character           CHAR DFT *NULL
    DBCSOPEN          59     8   O          DBCS capable        DBCS OPEN
    DBCSEITH          67     8   E          DBCS capable        DBCS EITHER
    DBCSONLY          75     8   J          DBCS capable        DBCS ONLY
    DBCSGRPH          83     8   G          Graphic             DBCS GRAPHIC
    DBCVOPEN          89     8   OV         Variable DBCS       DBCS OPEN VAR.
    DBCVEITH          99     8   EV         Variable DBCS       DBCS EITHER VAR.
    DBCVONLY         109     8   JV         Variable DBCS       DBCS ONLY VAR.
    DBCVGRPH         119     8   GV         Variable graphic    DBCS GRAPHIC
```

- The *Output CCSID Value* is the CCSID of the entire query. This line is not printed if the CCSID is 65535. If the query contains multiple CCSIDs, a CCSID column shows the CCSID of each field.
- The *Field* column shows the fields that exist in the output records. Each data field in the record output is assigned a name equal to the field name as it exists in the query definition. If two or more fields in the record output have identical field names (this occurs if one or more summary functions are specified for a field or when files are joined), the first six characters of the field name are used plus a two-digit number is added that corresponds to the summary function (01=Total, 02=Average, 03=Minimum, 04=Maximum, and 05=Count).

  For example, if minimum and maximum summary functions were specified in the query definition for the `FMT` field, two fields named `FMT03` and `FMT04` would appear in the record output; they would contain the minimum value for the `FMT` field (`FMT03`) and the maximum value for the `FMT` field (`FMT04`). This naming is true only in this simple case. Actual naming varies with different queries.
- The *Begin* column shows the starting byte of the field within the record. For example, the field named `ZD3` starts at byte 28.
- The *Len* and *Dec* columns show the length and decimal positions for each field. For example, the field named `PK2` has a length of eight with two decimal positions.

  Note: What is shown on the report is the printed output length after formatting, not the internal-database field length. You *cannot* add the length to the begin position and get the beginning position of the next field.
- For nonnumeric fields, the *Dec* column shows the type of data that is contained in the column:

  Blank means fixed-length character

  V means variable-length character (SBCS or DBCS)

  J means DBCS-only

  O means DBCS-open (mixed)

E means DBCS-either

G means DBCS-graphic

L means Date

T means Time

Z means Timestamp

- The *Null* column shows whether the field is null capable (Y) or not (blank).
- The *Data Type* column shows the data type for each field.
- The *Text* column shows the comment (if it exists) for each field. If the field is for a summary function, the text shown is the field name (without any added numbers) followed by the type of summary function.
- The *CCSID* column (if shown) appears when multiple CCSIDs are represented and shows the CCSID for each field.

Part 3. Advanced information about Query for iSeries

Chapter 17. Additional information about Query for iSeries for programmers

This chapter provides additional information which may be of interest to programmers.

Files with different record formats in Query for iSeries

You can use a file that has more than one record format; however, you can use only one record format at a time. If an application you are designing requires processing of different record formats in the same file at the same time, you should consider using the RPG/400 or COBOL/400* programming language.

For example, if customer names are in one record format and the amount each customer owes is in a different record format in the same file, a single query cannot print the names of all customers who owe more than $500. For Query to select records from both record formats, the selection values—customer name and amount owed—must exist in one record format (that is, the physical disk record must reflect both customer name and amount owed fields).

Note: This could be accomplished in a single query by joining the file to itself. However, the record formats must all contain a common field. For more information on joining files, see “Joining files in a Query for iSeries query” on page 42

File sharing considerations in Query for iSeries

Other application programs can read and update a file at the same time Query is creating a report from the file, and two or more Query definitions can refer to the same file at the same time.

Overriding database files in Query for iSeries

Your query run results cannot be predicted if you use the Override with Database File (OVRDBF) command to override a database file. Query allows you to use the OVRDBF command, but problems may occur because record formats and file members selected for the overridden file may not correspond to the new file.

DBCS considerations when defining result fields in Query for iSeries

If you use the SUBSTR function on a DBCS-only or DBCS-either field, the result field is an SBCS character field. If you use the SUBSTR function on a DBCS-graphic field, the result field is a DBCS-graphic field. With a DBCS-open field, the result is a DBCS-open field.

If you concatenate DBCS-only fields or DBCS-only constants (or both), the result field is a variable-length DBCS-only field.

If you concatenate DBCS-open fields, the result field is a variable-length DBCS-open field.

If you concatenate a DBCS-only, DBCS-open, or DBCS-either field or constant (or both) with an SBCS character field or constant, the result field is a variable-length DBCS-open field.

If you use DBCS-graphic fields or constants in a concatenation operation, all fields and constants must be DBCS-graphic.

If you use UCS2-graphic fields in a concatenation operation, all fields must be UCS2-graphic.

Joining files in Query for iSeries

For joining files (type of join):

- Type 1 join is the same as for Query/36 (on System/36).
- Type 2 join selects all the records in a primary file and records in the secondary files that match the primary records. (It selects the matches.)
- Type 3 join selects only the records in a primary file that have no matching records in the secondary files. (It selects the exceptions.)

For a complete description and examples of each type of join, refer to “Joining files in a Query for iSeries query” on page 42.

Using *ALL in Query for iSeries

You should be wary of using an *ALL join because it can return a large number of records. Refer to “Joining files in a Query for iSeries query” on page 42 in this guide for more information. You can use *ALL for your join if you are creating a database file with field extension using a one-record pad file, or there are few records in any of the files being joined and you want all of the formats combined.

Using fields other than sort fields for report breaks in Query for iSeries

The fields you use for sorting may not be meaningful in a report, so you may want to use fields other than sort fields for break fields. For example, a field containing the customer name portion of a mailing label may be used as the break field, while an arbitrarily assigned (also unique) customer ID is used for sorting. Since customer name is a break field, it can be inserted in break text or placed in a summary-only database file.

Result field length and decimal positions in Query for iSeries

Query determines the presentation length and number of decimal positions for result fields when it creates them in the report. These values are satisfactory for most users. The following sections suggest when, and how, the user should specify length and decimal positions. See “Length and decimal positions in Query for iSeries reports” on page 120 and “Length and decimal positions in Query for iSeries” on page 85 for further information.

Tips for dealing with presentation length and decimal positions in Query for iSeries

In certain situations, the length that Query determines for the result field is larger than necessary. For example, for result field RESULT10:

```
Result Field     --- Values and Operands ---       Layout

RESULT10          9  +  9  +  9  +  9  +  9        999999
```

Query assigns length 6 to result field RESULT10. Since the result in RESULT10 is 45, only a length of 2 is needed. You could specify a 2 in *Len* column and a 0 in the *Dec* column on the Define Result Fields display for this result field.

Similarly, for result field RESULT11:

```
Result Field     --- Values and Operands ---       Layout

RESULT11            N1 + N2 + N3 + N5 + N5         99999
```

If fields N1 through N5 each have a length of 1, Query assigns a length of 5 to RESULT11, but a length of 2 is long enough.

In calculations involving many large fields, you can control your results better by breaking the expression into parts, calculating each part as a separate result field. Then you can use these result fields in an expression to calculate the result field you want. You can specify length and decimal positions for the intermediate result fields to minimize the length of the final result field.

For example:

```
X12 = (1.2998 - P - Q)/((R + S) * (T - U)) + 6
```

Instead of defining result field X12 in one step as above, you could do it in three:

```
X12PART1 = 1.2998 - P - Q

X12PART2 = (R + S) * (T - U)

X12 = X12PART1/X12PART2 + 6
```

If the user knows that X12PART1, for example, is always a number between 0 and 1.2998, the user can specify 5 for *Len* and 4 for *Dec* (on the Define Result Fields display) for X12PART1. This decreases the length of X12.

Length and decimal positions used for internal numeric calculations in Query for iSeries

The following formulas define the maximum length and decimal positions used internally by Query for decimal calculations for numeric result fields. The maximum length and decimal positions do not necessarily correspond with the presentation length and decimal positions assigned by Query. The symbols *p* and *d* denote the length and decimal positions of the first operand. The symbols p^1 and d^1 denote the length and decimal positions of the second operand.

Addition and subtraction in Query for iSeries

The maximum length for the result field:

$min(31,max(p-d,p^1-d^1)+max(d,d^1)+1)$.

The maximum decimal positions:

$max(d,d^1)$.

Multiplication in Query for iSeries

The maximum length for the result field:

$min(31,p+p^1)$

The maximum decimal positions:

$min(31,d+d^1)$.

Division in Query for iSeries

The maximum length for the result field:

31

The maximum decimal positions:

$31-p+d-d^1$.

Example: Increasing the decimal precision for result fields in Query for iSeries

Figure 5 has a result field with a current maximum precision of 31 (length) and 2 (decimal positions). The decimal precision was derived from the calculation *31-29+9-9*.

```
                          Define Result Fields

Type definitions using field names or constants and operators, press Enter.
  Operators:  +, -, *, /, SUBSTR, ||, DATE...

Field       Expression                        Column Heading        Len   Dec
RESULTA___  PRN299A/PRN299B_____________      ____________________   __    __
            ____________________________      ____________________
            ____________________________      ____________________

_________   ____________________________      ____________________   __    __
            ____________________________      ____________________
            ____________________________      ____________________

_________   ____________________________      ____________________   __    __
            ____________________________      ____________________
            ____________________________      ____________________
                                                                    Bottom
_____________________________________________________________________________
Field           Text                                                 Len  Dec
PRN299A         Field with precision of 29,9                          29    9
PRN299B         Field with precision of 29,9                          29    9
                                                                      Bottom
F3=Exit          F5=Report         F9=Insert          F11=Display names only
F12=Cancel       F13=Layout        F20=Reorganize     F24=More keys
```

Figure 5. Decimal Precision Using Default

Note: The presentation length for RESULTA a would be 31,9. You can see this by pressing ″F13=Layout″.

To increase the decimal precision for the result field (RESULTA):

1. Assign each input field (PRN299A, PRN299B) directly to a result field.
2. Replace the input fields used in the original result field expression with the new result fields (RESULT269, RESULT295).
3. Change the corresponding length (Len) and decimal positions (Dec) for the new result fields so that the decimal precision sufficiently increases (see the previously listed formulas) for the original result field (RESULTA).

In Figure 6 on page 191the RESULTA decimal precision is changed from 2 to 9. The new decimal precision was derived from the calculation *31-26+9-5*.

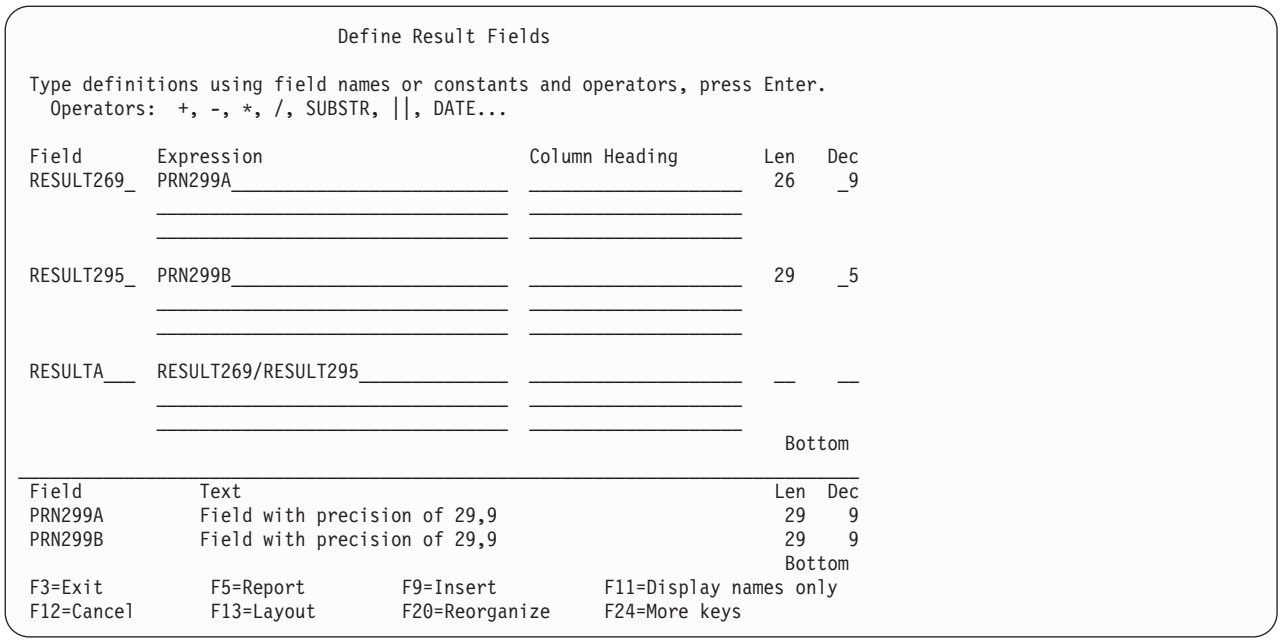


Figure 6. Changing Decimal Precision

Selecting records (ignoring field case) in Query for iSeries

To select records ignoring the case, do one of the following:

- Define your own collating sequence such that uppercase and lowercase letters have the same weight.
- Use a system sort sequence with shared collating weights.

You must also set the `Use collating sequence for all character comparisons` option in the Select Processing Options display to YES. If for some reason you cannot set this option, you will have to use an EQ (equal) test alternative such as RANGE or a combination of LE (less than or equal) and GE (greater than or equal). (This works only if there is no DBCS data involved.)

Note: Changing your collating sequence affects sorting, minimum, maximum, and report breaks. See “CCSID conversions for Query for iSeries options and functions” on page 249 for more information about how CCSIDs affect sorting, minimum, maximum, and report breaks.

Part 4. Appendixes

Appendix A. Differences between Query for iSeries and Query/36

This appendix describes the differences between Query for iSeries and Query/36. The Query for iSeries differences described in this appendix are limited to the differences that may cause you some inconvenience if you did not know about them before working with Query for iSeries. This appendix defines these differences as:

- Conceptual
- Operational
- Command
- Migration

Conceptual Differences

The following list identifies the concepts that are different on the iSeries system along with an explanation of the differences as they apply to the listed concepts:

Subroutines
Queries were subroutine members in a library on System/36. On the iSeries system, queries are a unique object type called a query definition (*QRYDFN) stored within a library. This change is important to understand since some System/36 commands that work with subroutines may not work on the iSeries system.

Files Files are stored in libraries on the iSeries system, so a library name needs to be specified for Query for iSeries in order for a file to be located. System/36 did not store files in libraries.

Operational Differences

The following list identifies the operations that are different on the iSeries system along with an explanation of the differences as they apply to each listed item:

Linked files
If an IDDU-defined file that is migrated from System/36 is not linked, you can still run a query against the file. However, the file will show as a one-field file (that is, if you were to run a default query against the file, the file would appear as though all of the fields were run together).

File IDs
In Query/36, file IDs are one of the letters A through E. If a Query/36 query is migrated to the iSeries system, all file IDs for files selected for that query remain the same. All files selected for a query on Query for iSeries have a 1- to 3-character file ID that you specify, or it defaults to T*nn*, where *nn* is in the range of 01 to 32.

Joining files
In Query/36, you can join up to five files, and only one type of file join (matched records) is allowed. In Query for iSeries, you can join up to 32 files, and three types of file join are allowed:

- Matched records
- Matched records with primary file
- Unmatched records with primary file

In Query/36, the maximum combined length of character fields used to join files is 120; in Query for iSeries, the maximum is 2000.

Report breaks
Report breaks for printed requests may be different in spacing. In Query/36, the report skips one line for report breaks unless it is defined to skip to a new page or defined to use double or triple

spacing. In Query for iSeries, the report skips an extra line for report breaks unless it is defined to skip to a new page. This means the first detail line after a control break has an extra blank line printed between it and the last detail line before the break.

Character fields
In Query/36, character fields that were defined in IDDU with a length greater than 256 bytes were truncated at 256 bytes. Query for iSeries supports character fields up to 32 766 bytes in length. Record selection tests that use these fields will now use the entire field for the comparisons instead of just the first 256 bytes.

Sort sequence
If no sorting was specified in the query, the order in which records are printed in the report may be different than the order they were printed in Query/36. Also, if sorting is specified but the field(s) being sorted contain the same value in multiple records, the order in which these records appear may be different from Query/36.

Result fields
Result fields that use multiplication or division operations in Query for iSeries may have a slightly different result in the farthest right decimal positions as compared to Query/36. This occurs because multiplication and division are carried out to a much greater precision in Query for iSeries.

Calculation results
The results of multiplication and division operations are truncated according to the field length for queries that are migrated from System/36. For queries defined using Query for iSeries, you can specify that the results of multiplication and division operations be either truncated or rounded.

Output to file
When the output of a query is being sent to a file, Query for iSeries builds the file as a database file with a definition. It is no longer necessary to build the IDDU definition and link that definition to the file, as was needed on Query/36, unless the QRY or QRYRUN procedure was used to run the query.

Summary-only output
When sending summary-only output to a file using Query for iSeries, each report break field whose break level number is greater than the break level that this record was created for will contain blanks for character fields and zeros for numeric fields. On System/36, these fields contained binary zeros. The iSeries system operates this way to avoid putting incorrect data into numeric fields.

Library default
The library default for the input file on the Specify File Selections display and the output file on the Define Database File Output display is the library that was set up at configuration time for the System/36 environment files.

Decimal data
In Query/36, decimal data errors were tolerated. When running a query using Query for iSeries, decimal data errors are tolerated depending on the value specified on the Processing Options display. For default queries and queries without the specified processing option value, Query tolerates decimal data errors in the System/36 environment and does not tolerate them in the OS/400 environment. See Chapter 14, “Specifying Query for iSeries processing options”, for more information.

Message response
On System/36, a user could have an automatic response file set up to handle Query/36 messages. An automatic response file of this type does not handle Query for iSeries messages.

Printing
Printing with spooling set to N=NO does not operate the same on the OS/400 as it did on the System/36. For more information see the *Printer Device Programming* book.

Command differences between System/36 and Query for iSeries commands

The following table lists the System/36 Query commands and the equivalent OS/400 system commands (if appropriate) plus some system commands that work with queries:

System/36	OS/400 System
QRY	WRKQRY
QRYRUN	RUNQRY
REMOVE	DLTQRY
FROMLIBR	SAVOBJ
HELP QUERY	STRQRY
LIBRLIBR	CRTDUPOBJ
TOLIBR	RSTOBJ

Migration differences between System/36 and Query for iSeries definitions

Query for iSeries definitions cannot be migrated to System/36.

Appendix B. Practice exercise for Query for iSeries query

To do an exercise using query, you must first have a file set up with some data. This exercise takes you through the following steps before you actually create a query:

- Creating an IDDU definition
- Creating a database file
- Entering data

If you already have a file on the system with data that you can use, you may want to skip directly to the section on creating a query. If you do not care what type of data you are working with, you can create a query that uses data from the QGPL library. This exercise is described in the last section of this appendix, "Query for iSeries query exercise: Creating an advanced query" on page 215.

Query for iSeries query exercise: Creating an IDDU definition

In the following example, you are shown how to create the definitions for a name and address file. The definitions are organized to be used with the work you can do in the data file utility task in the *ADTS/400: Data File Utility* book.

1. You can type `STRIDD` (for the Start IDDU command) on any command line. Or you can go to the IDDU main menu by choosing the IDDU option from either the Files menu or the Decision Support menu. The Decision Support menu appears if you select option 2 (Office tasks) on the OS/400 Main Menu and then option 3 (Decision support) on the Office Tasks menu.
2. Create a data dictionary by choosing option 2 (Work with data dictionaries) on the IDDU menu and pressing the Enter key. (You do not need to do this if one exists in a library you can use. If a data dictionary exists that you can use, go to step 6.)
3. Choose option 1 (Create) on the display, type the name of the library that will contain the dictionary, and press the Enter key.

   If you attempt to create a data dictionary and the named library does not exist, a message is displayed that says `Library not found. Press Enter to create.` If you press the Enter key, you will see the Create Library display. From this display you can create the library that will contain the data dictionary. When you finish creating a library, you will continue to the Create Data Dictionary display.
4. On the Create Data Dictionary display, the name of the library appears as the name of the dictionary. Later in this exercise, we will use a dictionary name of `SYSDIC`; you can replace `SYSDIC` with the name of another dictionary.
5. You can accept the system-supplied values and press the Enter key. You also can type a brief description in the *Text* prompt and choose to enter a long comment. If you type 1 (Select) in the *Long comment* prompt, you are shown the Edit Long Comment display where you can type detailed information about the dictionary. The dictionary is created when you end your work and press the Enter key on that display.

   The iSeries system can take some time to create the dictionary. It shows you a message when the dictionary has been created. Then press F12 (Cancel) on the Work with Data Dictionary display to return to the IDDU main menu.
6. Choose option 1 (Work with data definitions) on the IDDU main menu,

```
IDDU             Interactive Data Definition Utility (IDDU)

Select one of the following:

     1.  Work with data definitions
```

   and press the Enter key.

7. You will name the file definition first, so select option 3 (File). (The name SYSDIC appears in the *Data dictionary* prompt on the following display; what you see on your display is the name of the data dictionary you just created, or the name of the data dictionary you last used. You may change the data dictionary.)

```
                          Select Definition Type

Type choices, press Enter.

  Definition type . . . . . .   3          1=Field
                                           2=Record format
                                           3=File

  Data dictionary . . . . . .   SYSDIC     Name, F4 for list
```

   Then press the Enter key.

8. When you see the Work with File Definitions display, choose option 1 (Create) and name the new file definition. (We have used NAMEADDR as an example of a file definition name.)

```
                          Work with File Definitions

 Dictionary. . . . . . . :  SYSDIC

 Position to . . . . . .  _____________ Starting characters

 Type options (and File Definition), press Enter.
 1=Create   2=Change   3=Copy   4=Delete
 6=Print    7=Rename   8=Display where used

      File
 Opt  Definition
```

   Then press the Enter key.

9. When you see the Create File Definition display, select option 2 (Create single format) and accept the system-supplied record format name (the system uses the file definition name and adds the letter R to the end). You can type brief descriptive information in the *Text* prompt, as we have. Do not specify anything in the *Long comment* prompt.

```
                          Create File Definition

 Definition. . . . . . . :  NAMEADDR       Dictionary. . . . . :  SYSDIC

 Type choices, press Enter.

   Record formats
    option   . . . . . .  2           1=Create and/or select formats
                                      2=Create default format
                                        and select fields

    For choice 2=Create default format:
      Format . . . . . .  default____  Name

   Select key field
     sequence  . . . . .  N           Y=Yes, N=No

   Long comment  . . . . _           1=Select, 4=Remove

   Text  . . . . . . . . .  practice definition for DFU and Query
```

   Then press the Enter key.

10. You are now ready to create the field definitions that will be used by the record format definition you just named. Name the first field definition by typing LASTNAME in the *Field* prompt. Use the sequence number 10 that is already supplied on the display. Do not press the Enter key yet.

```
                    Create and Select Field Definitions

Definition. . . . . :  NAMEADDRR       Dictionary. . . . . :  SYSDIC



Position to . . . . . . _____________ Field, sequence (0-99999)

Type sequence numbers (0-99999), (and Field), press Enter.
Type field, press F6 to create.


Seq    Field          End    Seq    Field         End   Seq  Field    End

 10    LASTNAME
```

Now press F6. You will complete the description of the LASTNAME field definition (as well as naming and describing the remainder of the field definitions) from the next display.

11. Complete the LASTNAME field description with its type, size, and any other descriptors, according to the table shown below. Then name and describe the remainder of the field definitions.

Field Name	Field Type	Size	Text
LASTNAME	Character	15	Last name
FIRSTNAME	Character	10	First name
ADDRESS1	Character	20	Address line 1
ADDRESS2	Character	20	Address line 2
CITY	Character	15	City
STATE	Character	2	State
ZIP	Character	9	Zip code
AMOUNT	Numeric, 2 decimal positions	6	Amount

```
                        Create Field Definitions

Type information, press Enter to create.
  Field type (size) . . :  1=Character (1-32766)
                           2=Numeric (1-31, decimal positions 0-31)
                           3=DBCS (4-32766, mixed; 1-16383, graphic)
                           4=Date/Time (no size)
  More options. . . . . :  Y=Yes

-------Field---------  Dec  More
Name       Type Size   Pos  Opt   Text

LASTNAME    1   15     __    _    Last name
FIRSTNAME   1   10     __    _    First name
ADDRESS1    1   20     __    _    Address line 1
ADDRESS2    1   20     __    _    Address line 2
CITY        1   15     __    _    City
STATE       1   2      __    _    State
ZIP         1   9      __    _    Zip code
AMOUNT      2   6       2    _    Amount
```

12. When you have completed specifying the field characteristics, press the Enter key. The Create Field Definitions display is shown again, and your fields have been created.

```
                        Create Field Definitions

Type information, press Enter to create.
  Field type (size) . . :  1=Character (1-32766)
                           2=Numeric (1-31, decimal positions 0-31)
                           3=DBCS (4-32766, mixed; 1-16383, graphic)
                           4=Date/Time (no size)
  More options. . . . . :  Y=Yes

-------Field---------  Dec  More
Name       Type Size   Pos  Opt   Text

__________  _   _____  __    _    ________________________________________________
__________  _   _____  __    _    ________________________________________________
__________  _   _____  __    _    ________________________________________________
```

Press the Enter key without making any changes to the display.

13. When you see the Create and Select Field Definitions display,

```
                     Create and Select Field Definitions

 Definition.....: NAMEADDRR        Dictionary.....:  SYSDIC

 Position to . . . . . . _________ Field, sequence (0-99999)

 Type sequence numbers (0-99999), (and Field), press Enter.
 Type field, press F6 to create.


 Seq    Field          End    Seq    Field         End   Seq  Field    End


 Seq    Field       End
 10     LASTNAME    15
 10     FIRSTNAME   25
 10     ADDRESS1    45
 10     ADDRESS2    65
 10     CITY        80
 10     STATE       82
 10     ZIP         91
 10     AMOUNT      95
```

verify that the field names are arranged in the proper sequence. (When sequence numbers are the same, the arrangement of the field names on the display determines the sequence of use in the record.) If a field is out of sequence, type the necessary sequence numbers to indicate the correct arrangement, and press the Enter key. When the fields are in the proper sequence, press the Enter key without making any changes to the display.

14. You will then see the Work with File Definitions display where

```
                         Work with File Definitions


 Dictionary. . . . . . . :  SYSDIC

 Position to . . . . . . .  _____________ Starting characters

 Type options (and File Definition), press Enter.
 1=Create   2=Change   3=Copy   4=Delete
 6=Print    7=Rename   8=Display where used

      File
 Opt  Definition
```

you press F3 (Exit) without making any changes to the display.

You are finished creating the definitions *describing* a database file. The instructions to *create* the file and to enter data into the file are described in the following sections.

Query for iSeries query exercise: Creating a database file

After you have completed creating the necessary file definitions, you can create the database file using the Work with Database Files display. You can get to this display either from the main IDDU menu or by entering the Work With DB Files Using IDDU (WRKDBFIDD) command.

You can create as many files as you require by entering a new file name each time you return to the display. These file names might have a level of authority previously assigned to them (authority holder). This affects the authority that you can assign.

To create a database file, do the following:

1. Choose option 3 (Work with database files) from the IDDU menu (or type WRKDBFIDD on a command line).
2. On the Work with Database Files display, choose option 1 (Create), name the new file, and specify the library that will contain the file.

```
                          Work with Database Files

Library . . . . . .     default___  Name,F4 for list
Position to . . . . .   __________  Starting characters

Type options (and Database file), press Enter.
  1=Create   2=Enter data

     Database            Database            Database          Database
 Opt File            Opt File            Opt File          Opt File
```

3. Press the Enter key. The Create Database File display is shown with the names of the new file and its library.

   On this display, specify NAMEADDR for the file definition, SYSDIC for the dictionary (or the name of the dictionary you created in the previous section of this appendix), and *CHANGE for the authority others have to this file.

```
                         Create Database File

File . . . :   NAMEADDR                        Library . . . . :   YOURLIB

Type choices, press Enter.

  Related definition information:

    File definition  . . . . . .   NAMEADDR    Name, F4 for list

    Dictionary . . . . . . . . .   SYSDIC      Name, F4 for list

    Authority  . . . . . . . . .   *CHANGE     *LIBCRTAUT, *ALL, *CHANGE
                                               *USE, *EXCLUDE
                                               Authorization list name
```

4. Press the Enter key to create the file. When the file is created, the system automatically links the file to its file definition.

   Press F3 (Exit) to return to the IDDU menu.

Query for iSeries query exercise: Entering data

To enter data into the file, do the following:

1. Choose option 3 (Work with database files) from the IDDU menu (or type WRKDBFIDD on a command line).
2. On the Work with Database Files display, specify option 2 (Enter data), NAMEADDR for the file name, and your library for the library name.

```
                          Work with Database Files

  Library . . . . . .     default___  Name,F4 for list
  Position to . . . . .   __________  Starting characters

  Type options (and Database file), press Enter.
    1=Create   2=Enter data

       Database            Database            Database          Database
   Opt File            Opt File            Opt File          Opt File
```

3. Press the Enter key. The Work with Data in a File display is shown.

```
WORK WITH DATA IN A FILE                        Mode . . . . :   ENTRY
Format . . . . :   NAMEADDR                     File . . . . :   NAMEADDR


LASTNAME:
FIRSTNAME:
ADDRESS1:
ADDRESS2:
CITY:
STATE:
ZIP:
AMOUNT:









F3=Exit                  F5=Refresh                 F6=Select format
F9=Insert                F10=Entry                  F11=Change
```

4. Type the information shown on the following display, but do not press the Enter key. After you have typed in the amount, press the Field Exit key first and *then* press the Enter key.

```
WORK WITH DATA IN A FILE                        Mode . . . . :   ENTRY
Format . . . . :   NAMEADDR                     File . . . . :   NAMEADDR


LASTNAME:  SIMPSON
FIRSTNAME: FRANK
ADDRESS1:  1722 ORANGE STREET
ADDRESS2:
CITY:      RIDGEWAY
STATE:     CA
ZIP:       72430
AMOUNT:      9998









F3=Exit                  F5=Refresh               F6=Select format
F9=Insert                F10=Entry                F11=Change
```

5. The Work with Data in a File display is shown again, but the fields are blank, ready for you to continue adding more data.
6. Continue adding the following data to the Work with Data in a File display:

LASTNAME	FIRSTNAME	ADDRESS1	ADDRESS2	CITY	STATE	ZIP	AMOUNT
Daye	Ben	1312 Elm Street	Apt C	Marshill	AK	77901	456
Patterson	Tammy	4 Ridgeview Court		Marshill	AK	77901	501
Barker	Rick	1432 Le Grand Blvd		Emmerson	LA	71282	938
Sedgewick	Lillian	200 Park Lane		Emmerson	LA	71282	25
Skoggen	Linda	Circle Court NE		Truman	NC	57432	764
Golinero	Sebastin	7196 Thomas Street		Highpoint	MN	55909	00
Lien	Sue	469 Jackson Street		Ridgeway	CA	72430	00
Sedgewick	Leona	21st Cannery Row	Apt 43	Emmerson	LA	71282	45
Skoggen	Charles	401 Abbey Road		Truman	NC	57432	629

7. After you have added all your data and the Work with Data in a File display is shown with blank fields, press F3 (Exit). The End Data Entry display is shown.

```
                            End Data Entry

  Number of records processed

    Added  . . . . . :          10
    Changed  . . . . :           0
    Deleted  . . . . :           0



Type choice, press Enter.

  End data entry  . . . . . .    Y           Y=Yes,  N=No
```

You do not need to change anything on this display. Press the Enter key.

8. The Work with Database Files display is shown.

```
                          Work with Database Files

  Library . . . . . .     default__   Name,F4 for list
  Position to . . . . .   __________  Starting characters

  Type options (and Database file), press Enter.
    1=Create   2=Enter data

      Database            Database            Database          Database
   Opt File            Opt File            Opt File          Opt File









F3=Exit      F4=Prompt       F5=Refresh      F11=Display text
F12=Cancel   F21=Work with definitions       F22=Work with data dictionaries
Data for file NAMEADDR in YOURLIB was changed.
```

A message on the bottom of the display tells you that data in your file was changed.

9. Press F3 (Exit), and you see the menu that you started from.

   An audit log is automatically printed showing all the data you entered.

Query for iSeries query exercise: Creating and running a query

In the following exercise, you create and change a query that produces a report that lists all the information in the file NAMEADDR or any other file that may already exist on your system. NAMEADDR is a file definition that you created in the previous example using IDDU.

NAMEADDR contains names and addresses and includes the following information:

- Last name
- First name
- Address 1
- Address 2
- City
- State
- Zip code

- Amount

After you create and save the query, you run it as it exists and then change the query and run it again.

Query for iSeries query exercise: Creating a query

In this exercise, you create a query that lists on your display all the information in the file NAMEADDR in the order the information exists in the file.

This exercise asks you to save the query you create in a library. You will probably want to use your own library. If you do not have a library or do not know how to create one, see the person responsible for libraries on your system.

1. Go to the Work with Queries display by typing WRKQRY on any command line.
2. On the Work with Queries display type a 1 (Create) for the *Option* prompt, xxxQRY for the *Query* prompt (using your initials instead of xxx), and the name of your library for the *Library* prompt.

```
                            Work with Queries

Type choices, press Enter.

  Option  . . . . . .   1           1=Create, 2=Change, 3=Copy, 4=Delete
                                    5=Display, 6=Print definition
                                    8=Run in batch, 9=Run
  Query   . . . . . .   KJOQRY      Name, F4 for list
    Library . . . . . .    YOURLIB   Name, *LIBL, F4 for list

F3=Exit         F4=Prompt        F5=Refresh        F12=Cancel
```

3. Press the Enter key. The Define the Query display is shown.

```
                           Define the Query

Query . . . . . :   KJOQRY           Option  . . . . . :   CREATE
  Library . . . . . :   YOURLIB        CCSID . . . . . :     37

Type options, press Enter.  Press F21 to select all.
  1=Select

Opt   Query Definition Option
 1    Specify file selections
 _    Define result fields
 _    Select and sequence fields
 _    Select records
 _    Select sort fields
 _    Select collating sequence
 _    Specify report column formatting
 _    Select report summary functions
 _    Define report breaks
 _    Select output type and output form
 _    Specify processing options

F3=Exit             F5=Report           F12=Cancel
F13=Layout          F18=Files           F21=Select all
```

Notice that Query has already supplied a 1 for the *Specify file selections* option on this display. This is because whenever you create a query, you *must* specify a file, but you do not have to select any other options on this display.

4. Press the Enter key, and the Specify File Selections display is shown.

```
                        Specify File Selections

Type choices, press Enter.  Press F9 to specify an additional
  file selection.

  File . . . . . .   __________   Name, F4 for list
    Library  . . . .     QGPL     Name, *LIBL, F4 for list
  Member . . . . . .   *FIRST     Name, *FIRST, F4 for list
  Format . . . . . .   *FIRST     Name, *FIRST, F4 for list

                                                              BOTTOM
F3=Exit          F4=Prompt        F5=Report        F9=Add file
F12=Cancel       F13=Layout       F24=More keys
```

This display is where you tell Query what database file(s) you want to query for the data in your report.

5. Type `NAMEADDR` for the *File* prompt, the name for the library that contains the file for the *Library* prompt, and leave the *Format* and *Member* prompts as they are shown.

```
                        Specify File Selections

Type choices, press Enter.  Press F9 to specify an additional
 file selection.

  File . . . . . .   NAMEADDR     Name, F4 for list
    Library  . . . .   YOURLIB    Name, *LIBL, F4 for list
  Member . . . . . .   *FIRST     Name, *FIRST, F4 for list
  Format . . . . . .   NAMEADDRR  Name, *FIRST, F4 for list

F3=Exit          F4=Prompt        F5=Report        F9=Add file
F12=Cancel       F13=Layout       F24=More keys
```

6. Press the Enter key. The Specify File Selections display is shown again with the message `Select file(s), or press Enter to confirm.` displayed at the bottom.

```
                        Specify File Selections

Type choices, press Enter.  Press F9 to specify an additional
  file selection.

  File . . . . . .   NAMEADDR     Name, F4 for list
    Library  . . . . .    YOURLIB    Name, *LIBL, F4 for list
  Member . . . . . .   *FIRST      Name, *FIRST, F4 for list
  Format . . . . . .   NAMEADDRR   Name, *FIRST, F4 for list

F3=Exit          F4=Prompt        F5=Report        F9=Add file
F12=Cancel       F13=Layout       F24=More keys
Select file(s), or press Enter to confirm.
```

7. Press the Enter key. The Define the Query display is shown with the message `Select options, or press F3 to save or run the query.` displayed at the bottom.

```
                           Define the Query

Query . . . . . :   KJOQRY           Option  . . . . . :   CREATE
  Library . . . . . :   YOURLIB        CCSID . . . . . :     37

Type options, press Enter.  Press F21 to select all.
  1=Select

Opt    Query Definition Option
 _   > Specify file selections
 _     Define result fields
 _     Select and sequence fields
 _     Select records
 _     Select sort fields
 _     Select collating sequence
 _     Specify report column formatting
 _     Select report summary functions
 _     Define report breaks
 _     Select output type and output form
 _     Specify processing options

F3=Exit            F5=Report          F12=Cancel
F13=Layout         F18=Files          F21=Select all
Select options, or press F3 to save or run the query.
```

   The Specify file selections option has a > shown in the *Opt* column to indicate that it is a previously defined option.

8. Press F3 (Exit). The Exit This Query display is shown.

   Query supplies a `Y` (Yes) in the *Save definition* prompt and a `1` (Run interactively) in the *Run option* prompt because it assumes you want to both save the query definition object and run the query. Leave these defaults in both prompts.

9. Type `Lists customer names and addresses` for the *Text* prompt.
10. Type `*CHANGE` for the *Authority* prompt.

```
                            Exit This Query

Type choices, press Enter.

  Save definition  . . .   Y            Y=Yes, N=No

  Run option . . . . . .   1            1=Run interactively
                                        2=Run in batch
                                        3=Do not run

  For a saved definition:
    Query  . . . . . .   KJOQRY       Name
      Library  . . . . .     YOURLIB    Name, F4 for list

    Text         . . . .   Lists customer names and addresses

    Authority  . . . . .   *CHANGE      *LIBCRTAUT, *ALL, *CHANGE,
                                        *EXCLUDE, *USE
                                        authorization list name



F4=Prompt        F5=Report       F13=Layout       F14=Define the query
```

11. Press the Enter key to save the query definition object and run the query.
    The report produced by the query is shown on your display:

```
                            Display Report
Query . . . :   YOURLIB/KJOQRY              Report width . . . . . :   117
Position to (Line) . . . .   _____      Shift to column  . . . . . .   _____
Line   ....+....1....+....2....+....3....+....4....+....5....+....6....+....7...
       LASTNAME         FIRSTNAME   ADDRESS1              ADDRESS2
000001 SIMPSON          FRANK       1722 ORANGE STREET
000002 DAYE             BEN         1312 ELM STREET       APT C
000003 SEDGEWICK        LILLIAN     200 PARK LANE
000004 LIEN             SUE         469 JACKSON STREET
000005 PATTERSON        TAMMY       4 RIDGEVIEW COURT
000006 SKOGGEN          LINDA       CIRCLE COURT NE
000007 SEDGEWICK        LEONA       21ST CANNERY ROW      APT 43
000008 BARKER           RICK        1432 LE GRAND BLVD
000009 GOLINERO         SEBASTIN    7196 THOMAS STREET
000010 SKOGGEN          CHARLES     401 ABBEY ROAD
****** ********  End of report  ********




                                                                      Bottom
F3=Exit   F12=Cancel   F19=Left   F20=Right   F21=Split   F22=Width
```

    The report lists all the information in the file NAMEADDR. The data, including column headings, was defined to the system using IDDU.

    Press F20 (Right) to see the right side of the report.

12. Press F3 (Exit). The Work with Queries display is shown.

    A message is shown on the bottom of the display confirming that the query was processed successfully.

```
                           Work with Queries

Type choices, press Enter.

  Option  . . . . . .   _           1=Create, 2=Change, 3=Copy, 4=Delete
                                    5=Display, 6=Print definition
                                    8=Run in batch  9=Run
  Query   . . . . . .   KJOQRY      Name, F4 for list
    Library . . . . . .    YOURLIB  Name, *LIBL, F4 for list









F3=Exit         F4=Prompt        F5=Refresh        F12=Cancel
Query option processing completed successfully.
```

Query for iSeries query exercise: Changing a query

If you want a report of only those customers who live in the state of Louisiana, you need to change the query to list customers from that state only.

1. Type a 2 (Change) for the *Option* prompt on the Work with Queries display.
2. Type xxxQRY (where xxx are your initials) for the *Query* prompt if xxxQRY is not shown as the query name.
3. Type the library name you used in the previous exercise for the *Library* prompt, if that is not the library name already shown.

```
                           Work with Queries

Type choices, press Enter.

  Option  . . . . . .   2           1=Create, 2=Change, 3=Copy, 4=Delete
                                    5=Display, 6=Print definition
                                    8=Run in batch  9=Run
  Query   . . . . . .   KJOQRY      Name, F4 for list
    Library . . . . . .    YOURLIB  Name, *LIBL, F4 for list









F3=Exit         F4=Prompt        F5=Refresh        F12=Cancel
Query option processing completed successfully.
```

4. Press the Enter key. The Define the Query display is shown.
5. Type a 1 for the *Select records* prompt.

```
                          Define the Query

Query . . . . . :   KJOQRY           Option  . . . . . :   CHANGE
  Library . . . . :   YOURLIB        CCSID . . . . . :     37

Type options, press Enter.  Press F21 to select all.
  1=Select

Opt    Query Definition Option
     > Specify file selections
 _     Define result fields
 _     Select and sequence fields
 1     Select records
 _     Select sort fields
 _     Select collating sequence
 _     Specify report column formatting
 _     Select report summary functions
 _     Define report breaks
 _     Select output type and output form
 _     Specify processing options

F3=Exit            F5=Report          F12=Cancel
F13=Layout         F18=Files          F21=Select all
```

6. Press the Enter key. The Select Records display is shown.

```
                             Select Records

Type comparisons, press Enter.  Specify OR to start each new group.
  Tests:  EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field            Test   Value (Field, Number, or 'Characters')
        ______________   _____  ______________________________
 ____   ______________   _____  ______________________________
 ____   ______________   _____  ______________________________
 ____   ______________   _____  ______________________________
 ____   ______________   _____  ______________________________
 ____   ______________   _____  ______________________________
                                                          Bottom

Field          Text                                       Len  Dec
LASTNAME       Last name                                   15
FIRSTNAME      First name                                  10
ADDRESS1       Address line 1                              20
ADDRESS2       Address line 2                              20
CITY           City                                        15

F3=Exit        F5=Report          F9=Insert          F11=Display names only
F12=Cancel     F13=Layout         F20=Reorganize     F24=More keys
```

The fields in the file NAMEADDR are listed on the bottom portion of this display. (If your display is not in single-column list format, that is the *Text*, *Len*, and *Dec* prompts are not shown, press F11.) You can move your cursor to any place in the list and press the Page Down key to see more field names.

7. Complete the *Field*, *Test*, and *Value* columns on the display as follows:

```
                              Select Records

Type comparisons, press Enter.  Specify OR to start each new group.
  Tests:  EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field            Test   Value (Field, Number, or 'Characters')
        STATE            EQ     'LA'
 ____   ______________    _____  ______________________________
 ____   ______________    _____  ______________________________
 ____   ______________    _____  ______________________________
 ____   ______________    _____  ______________________________
                                                          Bottom

Field           Text                                      Len  Dec
LASTNAME        Last name                                 15
FIRSTNAME       First name                                10
ADDRESS1        Address line 1                            20
ADDRESS2        Address line 2                            20
CITY            City                                      15
                                                         More...
F3=Exit        F5=Report           F9=Insert          F11=Display names only
F12=Cancel     F13=Layout          F20=Reorganize     F24=More keys
```

This tells Query for iSeries to test the field named STATE in each record for the value LA. Only records with that value will be included in your report. (If you are using a unique weight system sort sequence table or *HEX, make sure you type it as 'LA' because the apostrophes tell the program that LA is what the field contains and not the field name. You must also type this value in all uppercase letters because that is the way it is specified in the field. If you have any doubt about the case of the data in the database, you should use a shared weight table.)

8. Press F5 (Report) to run the query and show the report. F5 lets you see the effect your query changes have on the report before you actually save those changes.

   The report appears listing only customers in Louisiana (only the *left* portion of the report is shown on the following display):

```
                            Display Report
                                        Report width . . . . . :      117
Position to line  . . . . . ______     Shift to column  . . . . . .  _____
Line   ....+....1....+....2....+....3....+....4....+....5....+....6....+....7...
       LASTNAME         FIRSTNAME   ADDRESS1              ADDRESS2
000001 SEDGEWICK        LILLIAN     200 PARK LANE
000002 SEDGEWICK        LEONA       21ST CANNERY ROW      APT 43
000003 BARKER           RICK        1432 LE GRAND BLVD
****** ********  End of Report  ********









                                                                Bottom
F3=Exit   F12=Cancel   F19=Left   F20=Right   F21=Split   F22=Width 80
```

9. Press F20 to display the *right* portion of the report.

```
                              Display Report
                                          Report width . . . . . :      117
Position to line  . . . . .  ______     Shift to column  . . . . . .   _____
Line   ....+....1....+....2....+....3....+....4....+....5....+....6....+....7...
            ADDRESS2             CITY             STATE  ZIP           AMOUNT
000001                           EMMERSON          LA    71282            .25
000002      APT 43               EMMERSON          LA    71282            .45
000003 VD                        EMMERSON          LA    71282           9.38
****** ********  End of Report  ********









                                                                        Bottom
F3=Exit   F12=Cancel   F19=Left   F20=Right   F21=Split    F22=Width 80
Last column of report.
```

10. Press F3 (Exit), F12 (Cancel), or the Enter key to return to the Select Records display. Then press F3 (Exit). The Exit This Query display is shown.

```
                             Exit This Query

Type choices, press Enter.

  Save definition  . . .   Y            Y=Yes, N=No

  Run option . . . . . .   1            1=Run interactively
                                        2=Run in batch
                                        3=Do not run

  For a saved definition:

    Query  . . . . . .   KJOQRY       Name
      Library  . . . . .     YOURLIB    Name, F4 for list

    Text     . . . . . .   Lists customer names and addresses

    Authority  . . . . .   *CHANGE      *LIBCRTAUT, *CHANGE, *ALL
                                        *EXCLUDE, *USE
                                        authorization list name


F4=Prompt       F5=Report        F13=Layout       F14=Define the query
```

You can use this display to run the query with the changes you made. You can also choose to make the query changes either permanent or for this time only. Because you may never again want a report that lists only customers in Louisiana, you may not want to make the changes permanent. And because you have already used F5 to run the query and see the report, you do not want to run the query again.

11. Fill in the Exit This Query display as follows:

```
                            Exit This Query

Type choices, press Enter.

  Save definition  . . .   N            Y=Yes, N=No

  Run option . . . . . .   3            1=Run interactively
                                        2=Run in batch
                                        3=Do not run

  For a saved definition:

    Query  . . . . . .   CEBQRY        Name
      Library  . . . . .     YOURLIB    Name, F4 for list

    Text       . . . . .   Lists customer names and addresses

    Authority  . . . . .   *CHANGE      *LIBCRTAUT, *CHANGE, *ALL
                                        *EXCLUDE, *USE
                                        authorization list name


F4=Prompt      F5=Report       F13=Layout      F14=Define the query
```

12. Press the Enter key. The Work with Queries display is shown.

```
                            Work with Queries

Type choices, press Enter.

  Option  . . . . . .               1=Create, 2=Change, 3=Copy, 4=Delete
                                    5=Display, 6=Print definition
                                    8=Run in batch  9=Run
  Query   . . . . . .   CEBQRY      Name, F4 for list
    Library . . . . . .    YOURLIB  Name, *LIBL, F4 for list









F3=Exit         F4=Prompt        F5=Refresh        F12=Cancel
Query option processing completed successfully.
```

To sign off the system or use it for something other than Query, press F3 (Exit) to return to the menu from which you chose to use Query.

Query for iSeries query exercise: Creating an advanced query

In the following example, you create a file named QRYFILE by using the Display Object Description (DSPOBJD) command. The file contains descriptions of all the objects that currently reside in the QGPL library. Then, using several of Query's definition step options, you create a query definition that obtains information from QRYFILE and creates a report showing that information.

Note: This example does not explain the DSPOBJD command and its parameters. For additional information, see the CL Reference information in the iSeries Information Center.

1. On the command line of the OS/400 Main Menu, type the DSPOBJD command as shown on the following display and press the Enter key. This creates the file named QRYFILE and puts it in the library QGPL.

   Note: When you type *ALL for the OBJTYPE parameter, you must include a space after *ALL or you will receive an error message. You must type in the entire command *exactly* as it appears on the display that follows.

```
 MAIN                          OS/400 Main Menu
                                                          System:   RCH38342
 Select one of the following:

      1. User tasks
      2. Office tasks
      3. General system tasks
      4. Files, libraries, and folders
      5. Programming
      6. Communications
      7. Define or change the system
      8. Problem handling
      9. Display a menu

     90. Sign off



 Selection or command
 ===> DSPOBJD OBJ(QGPL/*ALL) OBJTYPE(*ALL ) OUTPUT(*OUTFILE) OUTFILE(QGPL/QRYFIL
E)
 F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel     F13=User support
 F23=Set initial menu
                                      (C) COPYRIGHT IBM CORP. 1980, 1991.
```

2. Type WRKQRY on the command line and press the Enter key.

```
 MAIN                          OS/400 Main Menu
                                                          System:   RCH38342
 Select one of the following:

      1. User tasks
      2. Office tasks
      3. General system tasks
      4. Files, libraries, and folders
      5. Programming
      6. Communications
      7. Define or change the system
      8. Problem handling
      9. Display a menu

     90. Sign off



 Selection or command
 ===> WRKQRY

 F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel     F13=User support
 F23=Set initial menu
```

3. The Work with Queries display is shown. On this display, choose option 1 (Create). Then name your query by typing a name in the *Query* prompt, and specify the library where your query will be stored by typing a name in the *Library* prompt. Press the Enter key.

```
                          Work with Queries

Type choices, press Enter.

  Option  . . . . . .   1           1=Create, 2=Change, 3=Copy, 4=Delete
                                    5=Display, 6=Print definition
                                    8=Run in batch  9=Run

  Query . . . . . . .   QNAME       Name, F4 for list
    Library . . . . .     YOURLIB   Name, *LIBL, F4 for list









F3=Exit       F4=Prompt      F5=Refresh       F12=Cancel
                                    (C) COPYRIGHT IBM CORP. 1988, 1991
```

4. On the Define the Query display, select definition steps *Select and sequence fields*, *Select records*, *Select sort fields*, *Specify report column formatting*, *Select report summary functions*, and *Define report breaks* by typing a 1 to the left of each of them. (Notice that *Specify file selections* is already selected for you.) Press the Enter key.

```
                            Define the Query

Query . . . . . :   QNAME            Option  . . . . . :   CREATE
  Library . . . . :     YOURLIB      CCSID . . . . . :      37

Type options, press Enter.  Press F21 to select all.
  1=Select

Opt   Query Definition Option
 1    Specify file selections
      Define result fields
 1    Select and sequence fields
 1    Select records
 1    Select sort fields
      Select collating sequence
 1    Specify report column formatting
 1    Select report summary functions
 1    Define report breaks
      Select output type and output form
      Specify processing options

F3=Exit             F5=Report           F12=Cancel
F13=Layout          F18=Files           F21=Select all
```

Query presents the selected definition step displays to you in the order in which they are listed on the Define the Query display.

5. On the Specify File Selections display, which is the first display shown after the Define the Query display, type `QRYFILE` in the *File* prompt and `QGPL` in the *Library* prompt. The *Member* and *Format* prompts already are filled in for you. Press the Enter key.

```
                          Specify File Selections

Type choices, press Enter.  Press F9 to specify an additional
  file selection.

  File . . . . . .   QRYFILE      Name, F4 for list
    Library  . . . . .   QGPL       Name, *LIBL, F4 for list
  Member . . . . . .   *FIRST       Name, *FIRST, F4 for list
  Format . . . . . .   *FIRST       Name, *FIRST, F4 for list









F3=Exit          F4=Prompt        F5=Report              F9=Add file
F12=Cancel       F13=Layout       F24=More keys
```

The message `Select file(s), or press Enter to confirm.` appears.

```
                          Specify File Selections

Type choices, press Enter.  Press F9 to add.


  File . . . . . .   QRYFILE      Name, F4 for list
    Library  . . . . .   QGPL       Name, *LIBL, F4 for list
  Member . . . . . .   *FIRST       Name, *FIRST, F4 for list
  Format . . . . . .   QLIDOBJD     Name, *FIRST, F4 for list









F3=Exit          F4=Prompt        F5=Report              F9=Add file
F12=Cancel       F13=Layout       F24=More keys
Select file(s), or press Enter to confirm.
```

Press the Enter key again.

6. The next display to appear is the Select and Sequence Fields display.

```
                        Select and Sequence Fields

Type sequence number (0-9999) for the names of up to 500 fields to
  appear in the report, press Enter.

Seq   Field               Seq   Field               Seq   Field
      ODDCEN                    ODCCEN                    ODSV02
      ODDDAT                    ODCDAT                    ODSV03
      ODDTIM                    ODCTIM                    ODSV04
      ODLBNM                    ODOBOW                    ODSV05
      ODOBNM                    ODSCEN                    ODSV06
      ODOBTP                    ODSDAT                    ODSV07
      ODOBAT                    ODSTIM                    ODSV08
      ODOBFR                    ODSCMD                    ODSV09
      ODOBSZ                    ODSSZE                    ODSV10
      ODOBTX                    ODSSLT                    ODSVMR
      ODOBLK                    ODSDEV                    ODRCEN
      ODOBDM                    ODSV01                    ODRDAT
                                                                  More...


F3=Exit           F5=Report        F11=Display text      F12=Cancel
F13=Layout        F20=Renumber     F21=Select all        F24=More keys
```

If your display is in multiple-column format (that is, if the *Text*, *Len*, and *Dec* columns are *not* shown), press F11 (Display text) to show some additional information about the fields in the list. Select the fields ODLBNM, ODOBTP, ODOBAT, ODOBSZ, and ODOBTX by typing the numbers 1 through 5 to the left of them as shown below. The fields you select are the fields that will appear in your query report, in the order that you specify (ODLBNM will appear first, followed by ODOBPT, and so on).

Note: You must select fields that you plan to sort on.

```
                        Select and Sequence Fields

Type sequence number (0-9999) for the names of up to 500 fields to
  appear in the report, press Enter.

Seq   Field            Text                                        Len  Dec
      ODDCEN           DISPLAY CENTURY                               1
      ODDDAT           Display date: Format- MMDDYY                  6  x
      ODDTIM           DISPLAY TIME                                  6
1     ODLBNM           LIBRARY                                      10
      ODOBNM           OBJECT                                       10
2     ODOBTP           OBJECT TYPE                                   8
3     ODOBAT           OBJECT ATTRIBUTE                             10
      ODOBFR           Storage freed: 0-Not freed,1-Freed            1
4     ODOBSZ           OBJECT SIZE                                  10    0
5     ODOBTX           TEXT DESCRIPTION                             50
      ODOBLK           Object locked: 0-Not locked,1-Locked          1
      ODOBDM           Object damaged: 0-Not damaged,1-Damaged       1
                                                                   More...


F3=Exit           F5=Report          F11=Display names only   F12=Cancel
F13=Layout        F20=Renumber       F21=Select all           F24=More keys
```

Press the Enter key. Query rearranges the fields on the display so that the fields you selected are shown at the top of the list in the order that you specified. The message Press Enter to confirm. is also shown.

```
                      Select and Sequence Fields

Type sequence number (0-9999) for the names of up to 500 fields to
  appear in the report, press Enter.

Seq   Field            Text                                          Len  Dec
   1  ODLBNM           LIBRARY                                        10
   2  ODOBTP           OBJECT TYPE                                     8
   3  ODOBAT           OBJECT ATTRIBUTE                               10
   4  ODOBSZ           OBJECT SIZE                                    10    0
   5  ODOBTX           TEXT DESCRIPTION                               50
      ODDCEN           DISPLAY CENTURY                                 1
      ODDDAT           Display date: Format- MMDDYY                    6
      ODDTIM           DISPLAY TIME                                    6
      ODOBNM           OBJECT                                         10
      ODOBFR           Storage freed: 0-Not freed,1-Freed              1
      ODOBLK           Object locked: 0-Not locked,1-Locked            1
      ODOBDM           Object damaged: 0-Not damaged,1-Damaged         1
                                                                     More...


F3=Exit            F5=Report          F11=Display names only   F12=Cancel
F13=Layout         F20=Renumber       F21=Select all           F24=More keys
Press Enter to confirm.
```

Press the Enter key again.

7. The next display shown is the Select Records display. Here, you specify which records you want included in your report.

```
                              Select Records

Type comparisons, press Enter.  Specify OR to start each new group.
  Tests:  EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field             Test   Value (Field, Number, or 'Characters')









                                                                  Bottom

Field           Text                                             Len  Dec
ODLBNM          LIBRARY                                           10
ODOBTP          OBJECT TYPE                                        8
ODOBAT          OBJECT ATTRIBUTE                                  10
ODOBSZ          OBJECT SIZE                                       10    0
ODOBTX          TEXT DESCRIPTION                                  50
                                                                 More...
F3=Exit        F5=Report           F9=Insert        F11=Display names only
F12=Cancel     F13=Layout          F20=Reorganize   F24=More keys
```

For your report, you want all records for objects with an object type of either *FILE or *PGM. Type the information in the *Field*, *Test*, and *Value* columns as shown in the following display. Do not press the Enter key just yet.

```
                              Select Records

Type comparisons, press Enter.  Specify OR to start each new group.
  Tests:  EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field             Test   Value (Field, Number, or 'Characters')
        ODOBTP            LIST   '*FILE' '*PGM'









                                                                    Bottom

Field           Text                                               Len  Dec
ODLBNM          LIBRARY                                             10
ODOBTP          OBJECT TYPE                                          8
ODOBAT          OBJECT ATTRIBUTE                                    10
ODOBSZ          OBJECT SIZE                                         10    0
ODOBTX          TEXT DESCRIPTION                                    50
                                                                   More...
F3=Exit          F5=Report           F9=Insert        F11=Display names only
F12=Cancel       F13=Layout          F20=Reorganize   F24=More keys
```

8. Now display your report by pressing F5 (Report). The Display Report display appears showing your query report, which is based on the query you have defined up to this point. (The information you see on your display depends on the objects that are currently in QGPL on your system. What you see may not match what is shown in the display that follows.)

```
                              Display Report
                                        Report width . . . . . :     100
Position to line  . . . . .             Shift to column  . . . . . .
Line   ....+....1....+....2....+....3....+....4....+....5....+....6....+....7...
       LIBRARY     OBJECT    OBJECT             OBJECT   TEXT DESCRIPTION
                   TYPE      ATTRIBUTE          SIZE
000001 QGPL        *PGM      CLP                14,336   B & R Example - Page 2
000002 QGPL        *PGM      CLP                16,384   B & R Example - page 2
000003 QGPL        *FILE     PF                  8,192
000004 QGPL        *FILE     PF                  1,024   Default source data ba
000005 QGPL        *FILE     PF                  1,024   Default source data ba
000006 QGPL        *FILE     PF                 16,384   Default source data ba
000007 QGPL        *FILE     DKTF                2,560   Default diskette data
000008 QGPL        *FILE     DKTF                2,560   Default source diskett
000009 QGPL        *FILE     PF                  1,024   Default source data ba
000010 QGPL        *FILE     PF                140,288   RSTS36FLR COMMAND
000011 QGPL        *FILE     PRTF                2,048   Default spool output p
000012 QGPL        *FILE     PRTF                2,048   Default spool print fi
000013 QGPL        *FILE     PRTF                2,048   Default spool print fi
000014 QGPL        *FILE     PF                 38,912   Outfile for DSPOBJD
000015 QGPL        *FILE     PF                 16,384
                                                                   More...
F3=Exit   F12=Cancel   F19=Left   F20=Right   F21=Split   F22=Width 80
```

On the bottom far right side of the display, the message `More...` appears. This means that all of the report does not fit on the display, so if you want to see all of the report, you can use the page keys or F20 (Right) and F19 (Left) to page through the report (both left to right and top to bottom). When you have finished looking at the report, press F3 (Exit) to return to the Select Records display.

```
                              Select Records

Type comparisons, press Enter.  Specify OR to start each new group.
  Tests:  EQ, NE, LE, GE, LT, GT, RANGE, LIST, LIKE, IS, ISNOT...

AND/OR  Field             Test   Value (Field, Number, or 'Characters')
        ODOBTP            LIST   '*FILE' '*PGM'




                                                                    Bottom

Field           Text                                              Len  Dec
ODLBNM          LIBRARY                                            10
ODOBTP          OBJECT TYPE                                         8
ODOBAT          OBJECT ATTRIBUTE                                   10
ODOBSZ          OBJECT SIZE                                        10    0
ODOBTX          TEXT DESCRIPTION                                   50

                                                                   More...
F3=Exit        F5=Report        F9=Insert           F11=Display names only
F12=Cancel     F13=Layout       F20=Reorganize      F24=More keys
```

On the Select Records display, press the Enter key.

9. The next display to appear is the Select Sort Fields display. Here you specify which fields you want Query to use to sort the selected records for your report. You want the records sorted first by object type and then by object size, so type a `1` next to `ODOBTP` and a `2` next to `ODOBSZ` as shown below.

```
                            Select Sort Fields

Type sort priority (0-999) and A (Ascending) or D (Descending) for
  the names of up to 32 fields, press Enter.

Sort
Prty A/D  Field           Text                                      Len  Dec
          ODLBNM          LIBRARY                                    10
1         ODOBTP          OBJECT TYPE                                 8
          ODOBAT          OBJECT ATTRIBUTE                           10
2         ODOBSZ          OBJECT SIZE                                10    0
          ODOBTX          TEXT DESCRIPTION                           50









                                                                    Bottom

F3=Exit            F5=Report       F11=Display names only   F12=Cancel
F13=Layout         F18=Files       F20=Renumber             F24=More keys
```

Press the Enter key. Query rearranges the fields on the display so that the fields you selected for sorting appear at the top of the list, in the order you specified. The message `Press Enter to confirm.` is also displayed.

```
                            Select Sort Fields

Type sort priority (0-999) and A (Ascending) or D (Descending) for
  the names of up to 32 fields, press Enter.

Sort
Prty A/D  Field          Text                                      Len  Dec
  1   A   ODOBTP         OBJECT TYPE                                 8
  2   A   ODOBSZ         OBJECT SIZE                                10    0
          ODLBNM         LIBRARY                                    10
          ODOBAT         OBJECT ATTRIBUTE                           10
          ODOBTX         TEXT DESCRIPTION                           50









                                                                   Bottom

F3=Exit            F5=Report       F11=Display names only   F12=Cancel
F13=Layout         F18=Files       F20=Renumber             F24=More keys
Press Enter to confirm.
```

Press the Enter key again.

10. The next display is the Specify Report Column Formatting display. It is here that you specify column spacing, column headings, and other report formatting options.

```
                      Specify Report Column Formatting

Type information, press Enter.
  Column headings:  *NONE, aligned text lines

                  Column
Field             Spacing       Column Headings              Len  Dec   Edit
ODLBNM               0          LIBRARY                       10



ODOBTP               2          OBJECT                         8
                                TYPE


ODOBAT               2          OBJECT                        10
                                ATTRIBUTE

                                                                    More...


F3=Exit       F5=Report        F10=Process/previous       F12=Cancel
F13=Layout    F16=Edit         F18=Files                  F23=Long comment
```

Query supplies much of this information for you. Change the column heading for the ODLBNM field so that it reads NAME OF LIBRARY instead of LIBRARY.

```
                    Specify Report Column Formatting

Type information, press Enter.
  Column headings:  *NONE, aligned text lines

                 Column
Field            Spacing       Column Headings             Len  Dec   Edit
ODLBNM              0          NAME OF                      10
                               LIBRARY


ODOBTP              2          OBJECT                        8
                               TYPE


ODOBAT              2          OBJECT                       10
                               ATTRIBUTE

                                                                    More...

F3=Exit       F5=Report       F10=Process/previous       F12=Cancel
F13=Layout    F16=Edit        F18=Files                  F23=Long comment
```

Press the Enter key.

11. The next display you see is the Select Report Summary Functions. By specifying options on this display, you can have selected fields summarized in your report—that is, for a selected field, you can specify that a total, average, minimum, maximum, and (or) count be included in your report.

```
                    Select Report Summary Functions

Type options, press Enter.
  1=Total   2=Average   3=Minimum    4=Maximum   5=Count

---Options---  Field          Text                                Len  Dec
_  _  _  _  _  ODLBNM         LIBRARY                              10
_  _  _  _  _  ODOBTP         OBJECT TYPE                           8
_  _  _  _  _  ODOBAT         OBJECT ATTRIBUTE                     10
_  _  _  _  _  ODOBSZ         OBJECT SIZE                          10    0
_  _  _  _  _  ODOBTX         TEXT DESCRIPTION                     50









                                                                  Bottom

F3=Exit       F5=Report       F10=Process/previous       F11=Display text only
F12=Cancel    F13=Layout      F18=Files                  F23=Long comment
```

Specify that you want *all* the summary functions (total, average, minimum, maximum, and count) for the field ODOBSZ by typing 1 through 5 next to the field as shown in the following display.

```
                    Select Report Summary Functions

Type options, press Enter.
  1=Total   2=Average   3=Minimum    4=Maximum   5=Count

---Options---  Field          Text                                  Len  Dec
               ODLBNM         LIBRARY                                10
               ODOBTP         OBJECT TYPE                             8
               ODOBAT         OBJECT ATTRIBUTE                       10
1  2  3  4  5  ODOBSZ         OBJECT SIZE                            10    0
               ODOBTX         TEXT DESCRIPTION                       50

                                                                    Bottom

F3=Exit        F5=Report       F10=Process/previous        F11=Display text only
F12=Cancel     F13=Layout      F18=Files                   F23=Long comment
```

Press the Enter key.

12. The next display to appear is the Define Report Breaks display. On this display you specify which fields you want used as break fields. Report breaks are used to break the report into groups of records each time the value of the report break field changes.

```
                          Define Report Breaks

Type break level (1-6) for up to 9 field names, press Enter.
  (Use as many fields as needed for each break level.)

Break    Sort
Level    Prty  Field          Text                                  Len  Dec
              ODLBNM         LIBRARY                                10
           10 ODOBTP         OBJECT TYPE                             8
              ODOBAT         OBJECT ATTRIBUTE                       10
           20 ODOBSZ         OBJECT SIZE                            10    0
              ODOBTX         TEXT DESCRIPTION                       50

                                                                    Bottom

F3=Exit       F5=Report      F10=Process/previous      F11=Display names only
F12=Cancel    F13=Layout     F18=Files                 F23=Long comment
```

Specify break level 1 for the field named ODOBTP by typing a 1 to the left of it in the *Break Level* column.

```
                          Define Report Breaks

Type break level (1-6) for up to 9 field names, press Enter.
  (Use as many fields as needed for each break level.)

Break    Sort
Level    Prty  Field          Text                                  Len  Dec
               ODLBNM         LIBRARY                                10
  1         10  ODOBTP         OBJECT TYPE                             8
               ODOBAT         OBJECT ATTRIBUTE                       10
            20  ODOBSZ         OBJECT SIZE                            10    0
               ODOBTX         TEXT DESCRIPTION                       50

                                                                     Bottom

F3=Exit        F5=Report       F10=Process/previous       F11=Display names only
F12=Cancel     F13=Layout      F18=Files                  F23=Long comment
```

Press the Enter key.

13. On the next display, Format Report Break, you specify the formatting you want for the report break you defined. Note that the value in the *Break level* prompt is zero. You can use break level 0 to print the final summary values for all specified summary functions at the end of the report. For this example, do not change anything on this display. Just press the Enter key.

```
                            Format Report Break

Break level  . . . . . :   0

Type choices, press Enter.
  (Type &field in text to have break values inserted.)



  Suppress summaries . . . .   N           Y=Yes, N=No

  Break text . . . . . .   FINAL TOTALS



Level  Field
  1    ODOBTP




F3=Exit       F5=Report       F10=Process/previous        F12=Cancel
F13=Layout    F18=Files       F23=Long comment
```

On the next display you see that the *Break level* prompt has been filled in with a `1`. Here you format the report break for break level 1. In the *Break text* prompt, type in `Break text for object type`. This text will occur in the report every time a report break occurs for this break level.

```
                            Format Report Break

Break level  . . . . . :   1

Type choices, press Enter.
  (Type &field in text to have break values inserted.)

  Skip to new page . . . . .   N           Y=Yes, N=No

  Suppress summaries . . . .   N           Y=Yes, N=No

  Break text . . . . . .   Break text for object type



Level  Field
  1    ODOBTP




F3=Exit           F5=Report       F10=Process/previous        F12=Cancel
F13=Layout        F18=Files       F23=Long comment
```

Press the Enter key.

You are finished with all of the definition steps that you selected earlier, so the Define the Query display appears again. (The definition steps you selected earlier are now indicated with a > symbol to the left of them.)

```
                              Define the Query

Query . . . . . :   QNAME            Option  . . . . . :   CREATE
  Library . . . . :     YOURLIB        CCSID . . . . . :      37

Type options, press Enter.  Press F21 to select all.
  1=Select

Opt    Query Definition Option
     > Specify file selections
       Define result fields
     > Select and sequence fields
     > Select records
     > Select sort fields
       Select collating sequence
     > Specify report column formatting
     > Select report summary functions
     > Define report breaks
       Select output type and output form
       Specify processing options

F3=Exit             F5=Report           F12=Cancel
F13=Layout          F18=Files           F21=Select all
Select options, or press F3 to save or run the query.
```

14. Now display your report by pressing F5 (Report). The Display Report display appears showing your finished query report. (The information you see on your display depends on the objects that are currently in QGPL on your system. What you see may not match what is shown in the display that follows.)

```
                              Display Report
                                          Report width . . . . . :     104
Position to line  . . . . .             Shift to column  . . . . . .
Line   ....+....1....+....2....+....3....+....4....+....5....+....6....+....7...
       NAME OF     OBJECT    OBJECT                 OBJECT   TEXT DESCRIPTION
       OBJECT      TYPE      ATTRIBUTE              SIZE
000001 QGPL        *FILE     PF                      1,024   Default source dat
000002 QGPL        *FILE     PF                      1,024   Default source dat
000003 QGPL        *FILE     PF                      1,024   Default source dat
000004 QGPL        *FILE     PF                      1,024   Default source dat
000005 QGPL        *FILE     PF                      1,024
000006 QGPL        *FILE     DSPF                    1,536
000007 QGPL        *FILE     PRTF                    2,048   Default spool outp
000008 QGPL        *FILE     PRTF                    2,048   Default spool prin
000009 QGPL        *FILE     PRTF                    2,048   Default spool prin
000010 QGPL        *FILE     TAPF                    2,048   Default tape data
000011 QGPL        *FILE     TAPF                    2,048   Default source tap
000012 QGPL        *FILE     DKTF                    2,560   Default diskette d
000013 QGPL        *FILE     DKTF                    2,560   Default source dis
000014 QGPL        *FILE     PF                      8,192
000015 QGPL        *FILE     PF                      8,192
                                                                    More...
F3=Exit   F12=Cancel   F19=Left   F20=Right   F21=Split   F22=Width 80
```

On the bottom far right side of the display, the message `More...` appears. This means that all of the report does not fit on the display. Use the page keys or F20 (Right) and F19 (Left) to page through the report (both left to right and top to bottom) so that you can see the breaks and summaries in the report.

When you have finished looking at the report, press F3 (Exit) to return to the Define the Query display.

```
                              Define the Query

Query . . . . . :   QNAME             Option  . . . . . :   CREATE
  Library . . . . :     QGPL          CCSID . . . . . :      37

Type options, press Enter.  Press F21 to select all.
  1=Select

Opt    Query Definition Option
     > Specify file selections
       Define result fields
     > Select and sequence fields
     > Select records
     > Select sort fields
       Select collating sequence
     > Specify report column formatting
     > Select report summary functions
     > Define report breaks
       Select output type and output form
       Specify processing options

F3=Exit             F5=Report           F12=Cancel
F13=Layout          F18=Files           F21=Select all
Select options, or press F3 to save or run the query.
```

Press F3 (Exit).

15. The Exit This Query display is shown. On this display, change the *Save definition* prompt to `N` (No) and the *Run option* prompt to `3` (Do not run) if you do not want to save the query or run it again.

```
                            Exit This Query

Type choices, press Enter.

  Save definition  . . .   N            Y=Yes, N=No



  Run option . . . . . .   3            1=Run interactively
                                        2=Run in batch
                                        3=Do not run

  For a saved definition:
    Query  . . . . . . .   QNAME        Name
      Library  . . . . .     QGPL       Name, F4 for list

    Text   . . . . . . .

    Authority  . . . . .   *CHANGE      *LIBCRTAUT, *CHANGE, *ALL
                                        *EXCLUDE, *USE
                                        authorization list name

F4=Prompt        F5=Report       F13=Layout       F14=Define the query
```

Press the Enter key.

16. The Work with Queries display appears, showing the message `Query option processing completed successfully`.

```
                            Work with Queries

Type choices, press Enter.

  Option  . . . . . .               1=Create, 2=Change, 3=Copy, 4=Delete
                                    5=Display, 6=Print definition
                                    8=Run in batch  9=Run
  Query . . . . . . . .   QNAME     Name, F4 for list
    Library . . . . . .     QGPL    Name, *LIBL, F4 for list

F3=Exit       F4=Prompt     F5=Refresh       F12=Cancel
Query option processing completed successfully.
```

Now you can return to the OS/400 Main Menu by pressing F3 (Exit) to complete your work with this example.

Appendix C. Query for iSeries performance tips and techniques

This appendix provides guidelines for improving the performance of the Query for iSeries product. These guidelines help you better understand how Query works and which key items to keep in mind for performance when designing or changing a query.

This appendix does not discuss all variations of queries, but instead provides tips and techniques that help with the majority of queries running on the iSeries system. You need to determine which tips and techniques apply to your own particular queries.

The information in this appendix is divided into the following sections:

- Introduction to Query Processing
- File Definitions and Data
- Defining Queries
- Using Join Operations
- Miscellaneous Tips and Techniques
- Query Status Messages

Introduction to Query for iSeries query processing

Query processing involves the following stages:

- Validating the query and evaluating the best method for retrieving the requested data
- Performing the input/output (I/O) for this data
- Presenting the data in the requested format

Query often overlaps these stages to provide the best possible response time.

In the first stage of running a query, called **optimization**, Query determines the fastest way to process a query. An access plan results and is used to perform the actual I/O for the query.

Optimization includes factors such as file size, selection tests, and sort tests. However, the main performance element for both optimization and I/O is the use of keyed sequence access paths for the files selected by the query.

Keyed sequence access paths in Query for iSeries

A **keyed sequence access path** describes the order in which records in a database file are read. Use the Create Logical File (CRTLF) command to create access paths with keys specified in the data description specifications (DDS).

During optimization, Query uses existing keyed sequence access paths to obtain an approximation of the number of records the query will return. This information is needed in the optimization itself. Also, Query uses existing access paths, if possible, to do the required I/O. Depending on the circumstances, Query may choose to build a temporary access path to complete the query request.

Without existing access paths, Query either must read every record in each file to determine if it meets the values in the query or build a temporary access path if Query requires one. These options can be expensive in terms of processing unit, I/O, and storage requirements and can result in longer response times.

Note: Having existing access paths is important because a temporary access path created by Query is not saved. It must be created each time that particular query is run.

Select/omit access paths in Query for iSeries

Use the CRTLF command to create access paths with select/omit tests specified in the DDS.

Specify the select/omit tests in such a way that they match part or all of the selection tests from one or more queries. Specifying an existing access path should improve performance because Query then does not have to find or build a usable access path.

Using a select/omit access path also can save time when defining a query because the selection and sort tests specified in the access path need not be repeated in the query definition.

Note:

Query may use a select/omit access path even if it is not specifically named in the *Specify file selections* portion of the query itself. However, if the select/omit access path is created with the Dynamic Selection (DYNSLT) keyword in the DDS, there is no performance gain over nonselect/omit access paths.

The select/omit access path can be used if it is a superset of the selection criteria. For example, if the selection criteria specifies an action path `'X GT 45'` and a select/omit access path (logical file) exists with a selection of `'X GT 40'`, then the existing logical file may be chosen by the optimizer.

Considerations for creating access paths in Query for iSeries

Not all access paths can be used by all queries, so create access paths that you use often, either by one query that is run a great deal or by several queries that can all share the same access path. To determine which access paths that Query can use and other general tips on how to define your Queries to improve performance, see “Defining queries for Query for iSeries” on page 234.

Creating a minimum number of access paths is important for these reasons:

- Any change to a field in a database results in updating all access paths keyed on that field as well. This can be expensive in terms of performance for a large number of access paths.
- Backup and restore time may increase considerably if a large number of access paths are saved along with the files.

In addition to the tips provided in this section, there are two other general guidelines that may help you determine whether an access path can be used for a particular file:

- If the query selects over 20% of the total number of records in the file, it generally does not use an access path for that file. Instead, it accesses the records sequentially. However, if the query contains sort tests, an existing access path may be used or a temporary access path may be created even if the 20% guideline is true. The optimizer usually chooses to implement the sort using sequentially read records instead of an access path.
- Query does not usually create and use access paths for small files. Although “small” in this case is defined as files with approximately 1000 records, this is not a rule, just a general guideline. However, if sort tests exist in the query, an existing access path may be used, or a temporary access path may be created for the file. The optimizer usually chooses to implement the sort using sequentially read records instead of an access path.

Access plans in Query for iSeries

When you save a query definition (whether it is for a new query or a revised query definition), an access plan reflecting the best method for accessing the data is saved along with it.

Each time you run a saved query, Query validates the access plan by checking that the files and access paths named in the plan still exist.

If it is valid, Query uses that plan to access the data. This can result in a significant performance gain, when compared with running queries without stored access plans, because Query does not have to validate the access path when running a stored query. However, the difference may not be significant for some queries if this validation is only a small part of the processing time.

If the access plan is not valid, Query tries to find the best access plan to use in accessing the data, and performance may be affected.

The saved access plan is not used if you:

- Override the output form when date, time, or timestamp data is included
- Override the output type from display to printer or database file or vice versa
- Use a query from a prior release
- Override an input file (OVRDBF command)
- Override a file selection using the run query (RUNQRY) command
- Run a query with language sequence collating on a system with a different national language. This applies if Use Collating Sequence for all Character Comparisons processing option is set to NO.
- Run a query with a change in weighting values or CCSID of the collating sequence selected at run time. This applies if Use Collating Sequence for all Character Comparisons processing option is set to NO.
- OS/400 forced a rebuild due to system program changes (PTFs).

Note: In some cases, when you press ENTER (to save a query), it may take longer than expected to save the query because the system is defining an access plan for the query. However, once the access plan is defined for the query, the performance advantage can be significant for both the individual query response time and the system in general, especially if the query is run often.

Updating access plans in Query for iSeries

To update an access plan for a saved query, enter the change option for that query and save it again. (You do not need to make any changes.) This allows Query to update the access plan to reflect any changes. If you have a large number of saved queries, it is useful to understand which queries are affected by which access path changes. Then you do not have to change and save all the queries when a change is made to one or more access paths.

Access plans for stored queries are not updated to reflect access paths that were deleted or created since the last time the query was saved. Query notes these kinds of changes when it validates the access plan and reoptimizes. Although the reoptimization may find a better method of accessing the data, this better method is not automatically updated in the access plan. This means that the next time the query is run, reoptimization occurs again because the access plan still reflects the original method chosen at the time the query was saved.

File definitions and data in Query for iSeries

This section lists considerations for defining files and the actual data in the files.

File definitions in Query for iSeries

Note whether numeric field definitions within a database file on the iSeries system are in the zoned or packed decimal format. The iSeries system performs arithmetic operations using the packed decimal format.

In the packed decimal format, two digits are stored in each byte, except the low-order byte. The low-order four digits of the low-order byte contain the sign of the number. For example, the binary representation of +123 in the packed decimal format is 0001 0010 0011 1111. In the zoned decimal format, the digits are

stored in the low-order four bits of each byte. The high-order four bits of the low-order byte contain the sign. The high-order four bits of all other bytes contain all 1s (1111). For example, the binary representation of +123 in zoned decimal format is 1111 0001 1111 0010 1111 0011.

If a file contains numeric fields defined as zoned (which is common on files migrated from a System/36), the iSeries system converts the fields from zoned to packed for the arithmetic operation and then converts them back to zoned when the resulting value is returned to the program.

When the program is Query, this means that running a query involving zoned numeric fields requires additional processing unit time and possibly somewhat longer response times. If you are concerned about this aspect of performance, consider converting your files to use packed fields instead of zoned. However, make this decision carefully, especially if the conversion has a major affect on your operation.

When creating a new file on the iSeries system, define numeric fields as packed, with the length of these fields being an odd number of characters. If the length of the field is declared as an even number, the first four bits of the first byte in the field are not used, but the system still checks these four bits to ensure that no overflow has occurred. If you declared the field as an odd length, this checking does not occur. The system uses additional processing time when numeric fields have even lengths.

File data considerations for Query for iSeries

Decimal data errors may show up with files that have migrated from the System/36. The System/36 applications sometimes place blanks in numeric fields instead of leading zeros (the blanks result in errors when processed on the iSeries system). You should identify and correct decimal data errors to obtain optimal query performance. See “Defining queries for Query for iSeries” on page 234 for more information.

You can identify and correct numeric field errors by using the *Programmer's Tool Kit PRPQ* that is available for the iSeries system. The files you analyze or correct with this tool kit must be externally described database files. Ensure that all applications (especially those migrated from the System/36) are corrected so they do not continue to insert data with these kinds of errors.

Defining queries for Query for iSeries

This section provides tips and techniques for defining or changing queries on a single database file. Operations involving multiple files are covered in “Using join operations in Query for iSeries” on page 238.

The information in this section relates to the Define the Query display. See “Selecting definition steps when defining a Query for iSeries query” on page 28 for details.

Query for iSeries performance when designing or changing queries

When you design or change queries, view the results of the query in one of the following ways:

- Press F5 (Report) on the Define the Query display to run the query and show the results of the report as it is designed up to that point.
- Press F13 (Layout) on the Define the Query display to see an example of the layout, including column headings, a sample detail record, any report break text, and any summary functions defined for the query.

Note: Use F13 instead of F5 as much as possible because since F5 requires more processing unit time, I/O, and generally takes longer than F13. In either case, use output type option 1 (Display) while viewing the results.

To improve performance when going from one display to the next, view the lists without their accompanying text as much as possible. Query uses extra processing unit time and possibly some I/O to

retrieve the text for each field. Also, showing the text for each field results in fewer fields being shown on each display so you have to page through more displays to retrieve the fields you need to view. This is also true for query, file, member, and format lists.

Define result fields in Query for iSeries

Labeled durations are added or subtracted in left to right order. This could make a difference in your results. For example, adding `1 MONTH + 1 DAY` could give a completely different result than adding `1 DAY + 1 MONTH` Jan 28 + 1 DAY + 1 MONTH gives -> Jan 29 then Feb 28. Jan 28 + 1 MONTH + 1 DAY gives-> Feb 28 then Mar 1.

Define numeric result fields with odd lengths instead of even lengths to reduce system processing unit time when using these fields. See “File definitions and data in Query for iSeries” on page 233 for details.

Avoid defining a result field using division by zero. Although the system processes the query with this present, each divide by zero operation causes error handling by the system that is expensive in terms of processing unit and overall response time.

Avoid defining a result field that causes an overflow condition. Overflow occurs when a field is larger than its specified length. When overflow occurs, Query shows these result fields with the ‘+’ character on the report.

Avoid defining variable-length character fields. Use numeric constants for the offset and length of a SUBSTR function.

Select and sequence fields in Query for iSeries

This option allows you to control which fields appear in a report and where they appear within a report record. To prevent unnecessary disk I/O by Query, select only the fields you need. Also, additional unneeded fields make a report less readable. If you want to use most of the fields, use F21 (Select All) to show all fields, then delete the sequence numbers from the fields you do not need.

Note: If you select no fields, Query for iSeries (as a default) picks up to the first 500 fields in the file. Avoid this type of operation because it causes unnecessary disk I/O.

Avoid using variable-length fields and null-capable fields. Both of these attributes require extra processing.

Select records in Query for iSeries

Specify record selection tests using fields that match key fields of existing access paths or to create access paths that match often-used record selection tests. Query attempts to use an existing access path if at least some of the record selection tests match the first key field of that access path.

For example, assume there is a file X with fields A, B, C, and D. An access path exists over this file using the key fields A, B, and D, in that order. For any query with record values using field A, Query considers using this access path. However, if the record selection does not involve field A, the access path is not used. For instance, if the record test is `A EQ 3`, the access path can be used. If the query contains record selection tests involving only fields B or D (for example, `B EQ 5 or D EQ 8`), this access path cannot be used.

Performance improves if more of the selection tests match more key fields in the same access path. This allows the access path to reduce the number of records selected. As an example (using file X again), if the record tests are `A EQ 3 AND B EQ 5 AND D GT 8`, the access path can be used to find records matching all three of these values.

Note: If there is no existing access path matching some of the record selection tests, Query does not build an access path solely for purposes of selection. Query reads each record and selects those that qualify.

If you request a particular query often, consider creating an access path with select/omit tests to match that query. See “Select/omit access paths in Query for iSeries” on page 232 for more information on this subject.

Existing access paths are only used for OR conditions involving the same field specified in the selection tests.

One type of record selection is to use the % symbol with the LIKE operator as a generic search or scan (also known as a wildcard scan). If the generic scan starts in the first position of a field (for example, %ABC), Query cannot use any existing access paths for that portion of the record selection. However, if the generic scan starts after the first position (for example, ABC%), Query can use any qualifying access paths over the field specified in this type of record selection.

Select sort fields in Query for iSeries

Query, in most cases, needs an access path to sequence the selected records when sort fields are specified. If an access path does not exist, Query creates a temporary access path at run time or uses a sort to order the records. A sort routine is used when the optimizer determines that the sort routine provides better performance. If a temporary access path is used, it is deleted after the query has finished running, so each run of the query requires another build of the access path. For this reason, always consider whether you really need sort fields for the query.

Consider creating access paths that match the sort tests for queries that you use often and for queries where the access path build time is excessively long. Query attempts to use an existing access path if all the sort fields from the query match the high order key fields from the access path. This way you can avoid excessive building of access paths for queries with sort tests.

As an example, assume file Z has fields A, B, C, and D. Also assume there are six access paths built over this file that have the following keys specified in this order:

1. Access path #1 has key field A
2. Access path #2 has key fields A and B
3. Access path #3 has key fields A and C
4. Access path #4 has key fields A, B, and C
5. Access path #5 has key fields B, A, and C
6. Access path #6 has key fields A, B, C, and D

Now if you run a query that is defined to sort on key fields A, B, and C, only access paths #4 and #6 are considered by Query during optimization. Access paths #1, #2, and #3 are not used because it is inefficient for Query to read the records again and sort on the additional keys. It is more efficient for Query to build and use an access path containing all the sort and selection tests. Access path #5 is not considered because the sorted keys are not in the correct order.

If a particular query is requested often, consider creating an access path with select/omit tests to match that query. See “Select/omit access paths in Query for iSeries” on page 232 for more information on this subject.

If you have sort tests that you use often, another option (besides creating access paths) is to use Query to sort the records in a database file in the desired order. Query can then be run against this file with no sort tests, if the queries are looking for data sorted as it appears in the file. To perform this function, select the desired sort fields from the file, choose database as the output device (option 3 on the Select Output Type and Output Form display), and specify the output database file name, which must be different from the

input or original file name. This produces a new database file containing the sorted records. The time required to produce the sorted records may vary, depending on whether Query has to build an access path to do the sort.

Consider these items before performing this type of operation:

- Any changes to the original file are not automatically reflected in the sorted file unless you provide for this with some type of additional maintenance. For this reason, you may want to limit the use of this option to those files that are infrequently changed.
- If an access path is built over an unsorted field in the sorted file, use of this access path by Query results in records being returned in an unsorted order. Limit building access paths over a sorted file unless the access paths are built over sorted fields in that file.

If possible, avoid sorting on defined result fields. This can be an expensive operation in terms of performance, since Query must build an access path to satisfy this type of request.

Select collating sequence in Query for iSeries

Use this option to specify an alternative collating sequence. For example, you may want to change a query so that all lowercase letters sort before uppercase letters. If you specify an alternative collating sequence and the query contains character sort keys, Query cannot use existing access paths and must build an access path to do the sort.

Note: Using an alternative collating sequence does not affect numeric, DBCS-only, DBCS-graphic, date, time, or timestamp sort fields.

Using job-run collating sequence choices can cause a query to take longer to run.

Do not use a collating sequence if it is not needed. If your query involves only numeric fields, change a defaulted collating sequence other than hexadecimal to hexadecimal.

A unique-weight sort sequence table might require less processing than a shared-weight table because it can be ignored for comparisons that do not involve evaluating relative order.

Specify report summary functions in Query for iSeries

Access paths do not help performance for summary functions, so you do not need to consider creating access paths solely for this type of function. However, if the query has selection or sort tests specified along with summary functions, an access path matching these values may help improve the overall performance of the query.

If you are familiar with the use of the DB2 UDB for iSeries program on the iSeries system, consider the use of DB2 UDB for iSeries views for Query summary functions. The DB2 UDB for iSeries program allows you to create views based on summary functions against the fields in a file. For example, you can build an DB2 UDB for iSeries view to contain the sum and average for a field in a file. The performance advantage of an DB2 UDB for iSeries view can be significant for Query summary functions, especially in terms of reduced response times. To use a view, specify the name of the view as the file to be selected.

Select output type and output form in Query for iSeries

If you only need to view the summary records, specify this on the Select Output Type and Output Form display. This eliminates the unnecessary time it takes to page through the detail records.

If you are only interested in viewing the first display or two of results from a query, you may choose to view results to a display instead of a printer or database file. Query provides the first display of data as quickly as possible, so viewing one display from the work station is generally much quicker than waiting for the query to generate all results to a printer or a database file.

However, if the data you want to view is at the end of the searched records, it may take longer than anticipated to display those records. This may also be true when paging down to access more data (even if the first display did appear quickly) if the additional data is located much further into the file. If Query has to build a large access path prior to retrieving data it takes longer to reach the first display.

Specify output type 1 (Display) and output form 1 (Detail) for a multi-copy query. Specify output type 2 (Printer) for a column list query.

Specify processing options in Query for iSeries

The key option on the Specify Processing Options display is whether to ignore decimal data errors (see "File definitions and data in Query for iSeries" on page 233 for a description of decimal data errors). If decimal data errors are ignored, Query cannot use any existing access paths for that file and has to build an access path if one is required for the query, and additional processing is required to handle any fields with decimal data errors.

If decimal data errors are not ignored, Query stops processing if it encounters a decimal data error. However, if Query does not encounter any decimal data errors during processing, it can use existing access paths and runs normally.

Note: This handling of decimal data errors only affects queries that use numeric fields. Queries that use only character fields are not affected by this option.

When specifying whether to ignore decimal data errors, you have these choices:

- `Y` (Yes) means ignore decimal data errors.
- `N` (No) means do not ignore decimal data errors.
- Leaving the *Ignore Decimal Data Errors* field blank means Query chooses either `Y` or `N`, depending on the environment in which you are running the query.

  If the query is run in the System/36 environment, Query uses `Y` and decimal data errors are ignored. If the query is run in the System/38 environment or OS/400 environment, Query uses `N` and decimal data errors are not ignored. The System/36 environment uses `Y` because decimal data errors were always ignored on the System/36. Because access paths cannot be used when `Y` (the default) is used in the System/36 environment, there may be substantial performance differences between the environments if the default is used.

You may want to consider eliminating decimal data errors to make sure you can use existing access paths and to eliminate the extra processing needed to handle these errors. Use the *Programmer's Tool Kit PRPQ* that is available for the iSeries system. If you cannot eliminate the decimal errors, you may want to choose `Y` (or use RUNQRY in the System/36 environment to get `Y` to default) to make your query run faster. Even if it is necessary to build a new access path, this may take less time than diagnosing decimal data errors.

Using join operations in Query for iSeries

Queries involving join operations have special considerations relating to performance. Although the performance tips listed prior to this may apply to individual files within a join, Query must consider all the values involving all the files to be joined and then make a decision on how best to proceed with the query.

One of the key concepts of joins is that of primary and secondary files. The **primary file** is the first file used in the join while the **secondary files** are those that are joined to the primary.

You can select one of three types of join operations when defining a join query:

Option 1—Matched records
A record from the primary file is selected only if there is a match with every secondary file specified.

Option 2—Matched records with primary file
A record from the primary file is selected regardless of whether there is a match with any of the secondary files. The selection of primary records is dependent on the select/omit criteria specified on the Select Records display. Only primary records that meet those criteria are selected. Select/omit criteria specified against secondary files may cause a record from the primary file not to be selected.

Option 3—Unmatched records with primary file
A record from the primary file is selected only if there are no-matches with all of the secondary files.

For option 2 and option 3 joins, which file is listed as the primary and which as the secondary is important to the end result produced by the query, since ordering these files differently can produce different results. However, the order is not important for option 1 joins since the same result occurs regardless of the order in which files are placed.

This difference is important when considering how Query performs a join. Since the order of the files in an option 1 join is not important, running this type of query may result in Query choosing a different ordering of the files to gain better performance at run time. For example, if a query defines file A as the primary and file B as the secondary, at run time Query may actually decide to use file B as the primary if it provides better overall performance for the query. In options 2 and 3, however, Query cannot rearrange the order of the files since this can produce different results, so the primary and secondary files always remain as listed in the query definition.

Note: Although Query may choose to rearrange the order of the files at run time for an option 1 join, Query never alters the actual query definition.

Performance tips for join operations in Query for iSeries

For all join operations, Query requires the use of an access path over each of the secondary files in the join. If no usable access paths exist, Query builds them as needed. For this reason, if a particular join query is run often or if several join queries use the same sort or join selection tests, consider building access paths that match these values so Query does not have to build them each time you run the queries.

Note: Query does not require an access path on the primary file unless there are sort fields selected from this file.

It is important to build access paths to match join selection tests you use often. The access path or paths should match the fields selected from the secondary files. For example, if the join selection test is `T01.A EQ T02.A`, an access path is required over `T02.A`. For an option 1 join, Query may decide to switch the order of the files and also internally switch the order of the join selection to match the new order. In this case, the previously created access path may not be used. For an option 2 or 3 join, however, Query does not switch the order of the files, so existing access paths that match the join selection tests on the secondary file should be usable for the join.

Use as many record selection and join selection tests as possible on all files to be joined to narrow down the number of records that will result from the join operation. This significantly reduces the amount of I/O required to run the query.

If possible, limit using *ALL on the Specify How to Join Files display. If *ALL is used, the number of joined records produced could be large. For example, if you use *ALL to join a file containing 2000 records with a file of 3000 records, the end result would be 6000000 joined records. A large amount of I/O would be required, resulting in a long response time and some degradation in overall system performance.

Be careful with using the “NE” comparison between fields from different files on the Specify How to Join Files display. This could result in a large number of records being selected and a large amount of I/O being performed.

Query runs more efficiently when the files are ordered from smallest to largest. In this case, smallest means the file from which the fewest records are selected for the join. Although this can be the file with the least records, in some cases a very large file can be used if only a few records are chosen from that file.

For an option 1 join, Query attempts to order the files from smallest to largest, depending on the number of records selected from each. For an option 2 or 3 join, list the files in this order to achieve more efficient processing.

For an option 2 or 3 join, try to make the files listed first as small as possible by using both join and record selection tests. For example, if the join selection tests is `T01.A EQ T02.A AND T02.A GT 100`, it would be more efficient to change this to `T01.A EQ T02.A AND T01.A GT 100`. For an option 1 join, apply as many selection tests as possible to all the files, since you cannot determine which one Query will choose as the primary.

If sort tests must be specified from multiple files for an option 1 join or a secondary file in an option 2 or 3 join, using both record selection and join selection tests becomes important. The smaller the number of records selected, the fewer that have to be copied into the temporary file for the sort, thus saving on processing unit, I/O, and response times.

If you are experiencing severe performance problems when joining large files, either try to avoid this type of operation, or use selection tests to narrow down the number of records being joined.

If you need to join large files and can use record selection tests, run Query against the file or files requiring the record selection and put the output to a database file (option 3 on the Select Output Type and Output Form display). Use this output file to join with the other files. However, this approach may result in using “old” data, since the output to the database file may be an older version by the time the join query using this file is run. Also, since no access paths exist over this output file (unless you build them), Query must build one at run time if it is required.

Miscellaneous tips and techniques for Query for iSeries

This section lists miscellaneous tips and techniques designed to assist you when using Query.

Batch processing for Query for iSeries

Consider submitting queries to batch processing whose results you do not need immediately. For instance, a query that generates printed reports that will not be used until later is a good candidate to submit to batch. This frees your terminal for other tasks instead of waiting for the query to finish running. Also, a properly tuned system is better at balancing system resources (processing unit time, storage, I/O) between jobs if a query that normally uses a lot of resource is submitted to batch rather than run interactively.

The steps to submit a query to batch vary depending on the environment you operate in. In the System/36 environment, press F6 (Put on job queue) to submit a query to batch from the prompt display for QRYRUN. This key is allowed after you specify printer or disk as the output type and press the Enter key. If you are not in the System/36 environment, use the Submit Job (SBMJOB) command to submit a batch job containing a Run Query (RUNQRY) command. From the iSeries system, use the Work with Queries or Exit this Query display to submit queries to batch. See Appendix D, “Preventing users from running Query for iSeries queries interactively” on page 243. For more information on these commands, see the CL Reference information in the iSeries Information Center.

Query for iSeries performance tuning

A properly tuned system provides much better overall performance than one in which performance tuning has not been used. However, there are many factors to consider when properly tuning the system to meet your needs. See the Work Management topic for details. In addition, the *Performance Tools for iSeries* book explains how to monitor and understand overall system performance. Use these guides together to help improve overall system performance.

If possible, limit the number of ad hoc queries in order to avoid unnecessary access path builds. Determine which queries are used most often, then create access paths for these queries and save the query definitions. Most users can then operate out of this fixed set of queries and experience much better response time and overall system performance than if everyone runs queries in an ad hoc manner.

Limit access to the Query product on the system to those people who have an understanding of Query performance and how to best use it. This eliminates costly ad hoc queries that can severely affect other users. Have new users read through this guide to introduce them to Query before giving them access to the product.

Consider removing unused data from the files that are actively used and placing it in separate saved files. This significantly reduces the amount of time and resources spent by Query searching through the active files or building access paths over them.

Ensure that all available performance PTFs are applied to the system. This not only includes PTFs applying directly to Query, but also others that may apply to overall system performance as well.

Pay attention to the performance optimization messages that are available in debug mode (use STRDBG before running your query). These messages may help you determine how you can change the query definition so it will run faster.

Query for iSeries migration considerations N to N-1

When query creates a database file that includes a date, time, timestamp, variable-length, or null-capable field, a bit is set that states that this file cannot be used with a release prior to Version 2 Release 1 Modification 1. When query creates a database file that includes a DBCS-graphic field, a bit is set that states that this file cannot be used with a release prior to Version 2 Release 2 Modification 0.

Notes:

1. If you run a query that contains date, time, or timestamp data types on a release prior to Version 2 Release 1 Modification 1, one of the following two things may happen:
   - No records are selected
   - Results are in error
2. A query that uses a DBCS-graphic constant will not run on a release prior to Version 2 Release 2 Modification 0.

Query for iSeries status messages

When you run a query interactively, status messages may appear at the bottom of your display to let you know what is happening. For long-running queries, these messages can help determine which stages of the query take the most time to run. Once this is determined, it may be easier to decide which of the previously listed tips and techniques apply. This section lists the status messages that may appear when running a query.

Query running. Building access path for file X in Y.

This message indicates Query has determined an access path is required to run this query, but no existing access path meets the needed values. Query builds an access path and displays this message while the access path is being built. Notice how long this message appears on the

display and also the total amount of time it takes the query to run. If a significant portion of the query run time is spent building an access path, attempt to use the tips and techniques previously listed on using access paths.

Query running. Building access path from file X in Y.
This message indicates Query is building an access path from an existing access path. Generally, the appearance of this message is not an indication of a performance problem, but instead should be viewed as a positive indication because Query is using an existing access path for the operation.

Query running. Creating copy of file X in Y.
This message indicates that Query is copying one of the files in the query to a temporary file. This occurs in the following cases:

- A multi-format logical file is specified
- A join logical file is specified with a join type that does not match the query's join type
- A complex SQL View is specified

If the temporary file is created for a join as described above, try to avoid this type of operation. Refer to "Using join operations in Query for iSeries" on page 238 for more information on this item. If this message occurs because the total length of the sort fields is greater than 2000 bytes, this may be reason for concern. For more information on this, refer to "Select sort fields in Query for iSeries" on page 236.

Query running. Sorting copy of file *N in *N.
This message appears either when the combined length of the sort fields exceeds 2000 bytes or when Query has chosen to use a sort routine rather than create an access path to achieve better performance. This indicates that Query is performing its own sort routine on the temporary file that was just created.

Query for iSeries debug mode messages

Query for iSeries issues performance optimization messages when running in debug mode (STRDBG). When running in debug mode, you also get such things as optimization messages and diagnostic details for mapping errors that do not end the job.

Appendix D. Preventing users from running Query for iSeries queries interactively

The system administrator can restrict users from running queries interactively. When this restriction is applied, users cannot:

- Use option 9 (Run) on the Work With Queries display.
- Press F5 (Report) to display the report on-screen.
- Use option 1 (Run interactively) on the Exit this Query display.
- Run the QRYRUN procedure interactively.
- Run the Run Query (RUNQRY) command interactively.

If a user attempts to run a query interactively, and is restricted from doing so, an error message appears.

A user **cannot** run a query interactively when:

- The authority for the RUNQRY command is changed so the user is no longer authorized to it. This may affect the ability of the user to run in batch (see note below on allowing one or more users to have different run capabilities).
- The RUNQRY command is changed to no longer support being run interactively.

To prevent a user from running a query interactively:

- Use the Change Command (CHGCMD) command to remove *INTERACT from the ALLOW (where allowed to run) parameter. ALLOW(*PGM) is not allowed in RUNQRY.
- Change the authority for the RUNQRY command to state which users have authority to this command.

  Note: To allow one or more users to have different run capabilities than what is specified for the RUNQRY command in QSYS:

  1. Create a duplicate object of the RUNQRY command and place it in a library other than QSYS.
  2. Make the needed changes to restrict the use of the RUNQRY command in QSYS.
  3. Place the library containing the new RUNQRY command, that is, the version that allows users to run interactively, ahead of QSYS in the library list of the users who need to run queries interactively.

Note: If you add a new release of the operating system, you may need to redefine the RUNQRY command parameters.

Appendix E. Coded character set identifiers (CCSIDs) in Query for iSeries

This appendix contains information about coded character set identifiers or CCSIDs. This information will help you understand CCSIDs and why they are important to Query for iSeries.

A **CCSID** is a 2-byte (unsigned) integer that uniquely identifies an encoding scheme and one or more pairs of character sets and code pages. A CCSID can be assigned to each query definition, data field, and collating sequence. A CCSID can also be assigned to individual items in a file record format definition, such as the column heading, text description, edit word, or long comment for a field.

CCSID-marked data can be converted so that it looks the same in languages that use the same character set or superset of the character set (see Figure 7 on page 246). Data will not look the same without conversion if the code pages differ. The hexadecimal value for a graphic character (a character that is displayed or printed) in one language may be different than the value for the equivalent character in another language. The problem does not end with displaying and printing. If data is collated using a sequence prepared from characters in a different code page, or if data in different code pages is compared without being converted, the result will seem incorrect.

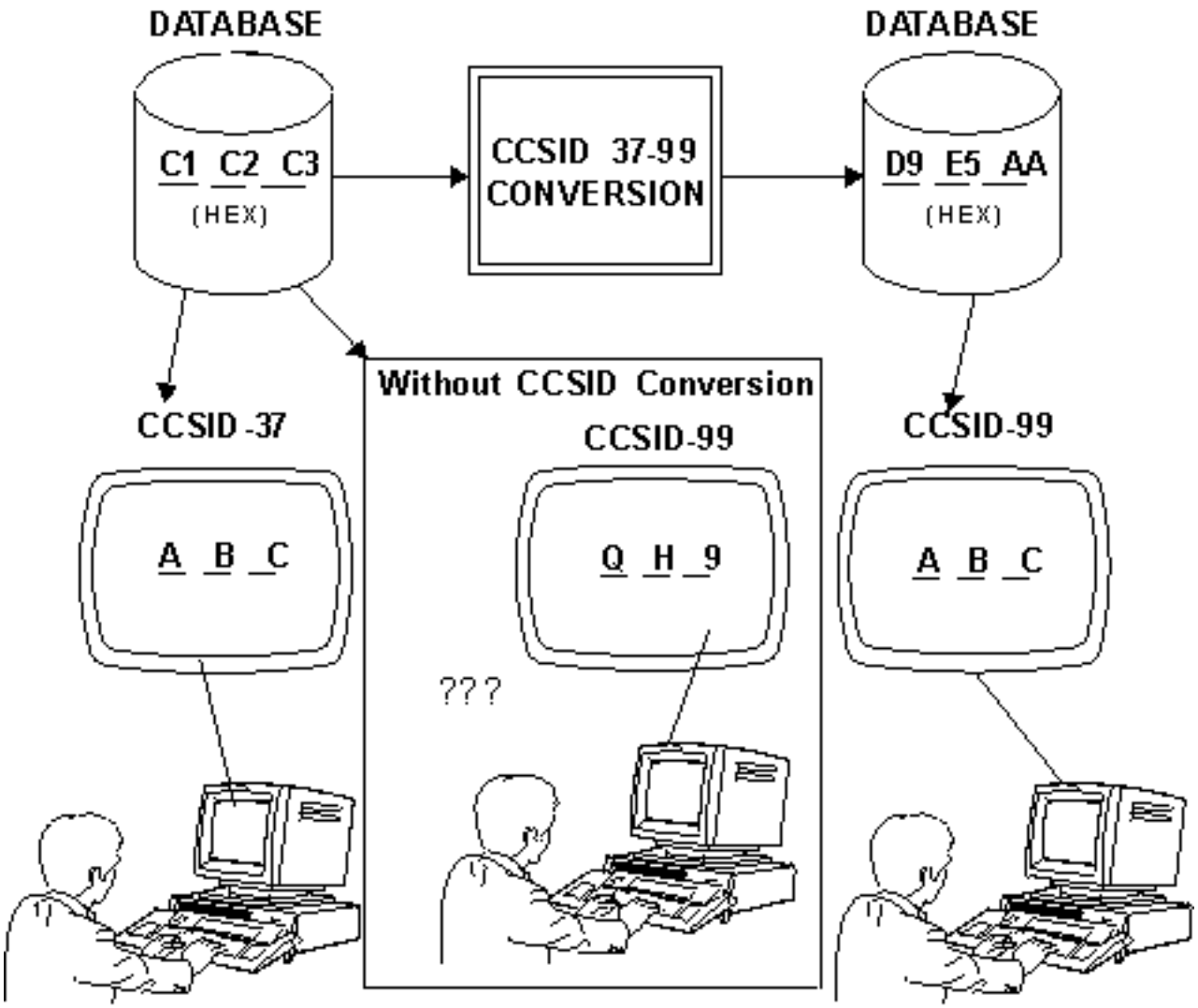


Figure 7. Working with and without CCSID Conversion. Conversion, when necessary and possible, is done automatically by the system.

Query for iSeries recognizes when conversion of data, collating sequences, and text is needed, and performs the conversion. The system notifies you if the conversion fails. You may not be able to work on a query or run a saved query depending on the CCSIDs involved. Four conditions can result from CCSID comparisons:

- They match identically, which means no conversion is necessary.
- They are compatible, which means complete conversion is possible.
- They are compatible with substitution, which means conversion is possible but substitution characters might be used. Substitution characters, depending on where they occur, can give unpredictable results, particularly in sorting and testing character fields.
- They are incompatible, which means conversion is impossible.

This appendix explains how CCSIDs affect what Query for iSeries does in specific circumstances. For more information, see the Query for iSeries section of the National Language Support topic.

CCSID marking in Query for iSeries

The following bulleted objects contain CCSID tags used by query processing. Each item inherits its CCSID from the containing item unless marked with an asterisk. An asterisk indicates that the object has its own CCSID tag. The bulleted items inherit their CCSID from the user profile or job, unless specifically changed. Numbers in parentheses refer to notes explaining how you can determine CCSID values for the item.

- Query definition (1, 6) *
  - Override column heading (5)
  - Override edit word (5)
  - Constant in expression (8)
  - Constant in value for record selection test (8)
  - Result field name (5)
  - Concatenation symbols ||
  - First 50 positions in expression, used as result field text (5)
  - Result field column heading (5)
  - Break text
  - Final totals text (found at break level 0)
  - Cover page text
  - Page heading text
  - Page footing text
  - Collating sequence (user-defined, or snapshot of translation table, or system sort sequence) (2, 7, 8) *
- Translation table and system sort sequence
  - Collating sequence (8 9) *
- Query user profile
  - Collating sequence (user-defined default) (7, 8) *
- Query program object containing preconfigured language sequences. That is, the module that contains the sequences for option 2 on the Select Collating Sequence display.
  - Collating sequence (for language) (7, 8) *
- Job description (8) *
  - Data (in printer or display buffers)
  - Collating sequence (job) *
- File definition *
  - File record format (8) *
    - Text about the format *
    - Data (in members) * (3, 5)
    - Field
      - Name (5)
      - (Original) Column heading (5) *
      - (Original) Edit word (5) *
      - Text about the field (5) *
      - Long comment *
      - Null default
      - Data (in members)
      - Sort sequence for * file (4, 5, 8) *
  - File member

- Text about the member *
- Data (the CCSID tag or tags are in the format definition)

Notes:

1. The CCSID of the query definition is shown on displays that show the query name, like the Define the Query display.
2. The CCSID of the user-defined collating sequence is shown on the Define Collating Sequence display.
3. The CCSID of the character data in an output file is shown on a line above the record format in a printed query definition if all the character-data CCSIDs match (single and mixed-byte versions of a CCSID are considered matching).
4. The CCSIDs of the character fields in an output file are shown in a column of the record format in a printed query definition if individual CCSIDs do not match.
5. When text parts from an input file definition, such as column headings, field text, and file definition text, are used to create an output file definition, the CCSIDs of those parts are carried over to the output file definition. The CCSIDs of fields are also carried over. You can use the Display File Field Description (DSPFFD) command to determine the CCSID of fields. You can dump the file to determine the CCSID of field text or file definition text.
6. The original CCSID of the query definition is shown in an informational message on the Define the Query display. If this CCSID is 65535 and the CCSID shown at the top of the display differs, text and constants in the query definition will start to be treated as though marked with the latter CCSID.
7. The original CCSID of the collating sequence used to initialize the Define Collating Sequence display is shown in the second level text of the informational message about how the sequence was initialized. If this CCSID is 65535 and the CCSID shown at the top of the display differs, the sequence, whether or not you reorder it, will start to be treated as though marked with the latter CCSID.
8. Some diagnostic messages about CCSID conversion problems show the incompatible CCSIDs.
9. The CCSID of the collating sequence resolved for the current collating choices is shown in a message at the bottom of the Select Collating Sequence display.

CCSIDs and collating sequences in Query for iSeries

Within Query for iSeries you can specify hexadecimal (the default), the language sequence, a user-defined sequence, a translation table, or system sort sequence to specify a collating sequence. The collating sequence is used for join tests, record selection, sorting, grouping report-breaks, and determining minimum and maximum values. Collating sequence tables are only used for SBCS characters.

A CCSID is associated with each of the collating sequences supported by Query for iSeries. Query for iSeries assumes that a translation table has a CCSID of 65535. A user-defined sequence has the job CCSID of the defining user.

Note: If you select the hexadecimal sequence or use a collating sequence with a CCSID of 65535 for ordering marked data, the results you get may seem inconsistent. For example:

- The value that sorts to the lowest position may not be the minimum summary value for a displayed or printed column. This can happen because sort comparisons are done before, and minimum comparisons after, any conversion to the job CCSID occurs.
- The minimum and maximum values saved in summary-only output to a database file may differ from the corresponding values in a printed or displayed report, even though the same job CCSID is used to run the query. This happens only if values for a minimum or maximum field are converted to the job CCSID in order to be printed or displayed.

When you save a user-defined collating sequence as the default in your Query profile, the job CCSID is saved with it. If you choose to save the language option as your default, only the option is saved in the profile—*not* the language sequence or its CCSID.

Note: The query profile, user-defined collating sequence default, and CCSID are *only* updated if you press F23 from the Define Collating Sequence display to save the sequence.

Query for iSeries language sequences

Following are the language sequences that are supported by Query for iSeries.

Table 9. Language Code-Page CCSIDs

Country or Version	Code Page	CCSID
Belgian Dutch	00500	500
Belgian French	00500	500
Canadian English	00037	37
Canadian French	00500	500
Danish NLV	00277	277
Dutch NLV	00037	37
Finnish NLV	00278	278
French MNCS	00500	500
French NLV	00297	297
German MNCS	00500	500
German NLV	00273	273
Icelandic	00871	871
Italian MNCS	00500	500
Italian NLV	00280	280
Norwegian NLV	00277	277
Portuguese NLV	00037	0037
Portuguese MNCS	00500	500
Spanish MNCS	00500	500
Spanish NLV	00284	284
Swedish NLV	00278	278
Swiss French MNCS	00500	500
Swiss German MNCS	00500	500
Swiss Italian MNCS	00500	500
United Kingdom	00285	285
United States English	00037	37

Notes:

1. MNCS means multinational character set
2. NLV means national language version

CCSID conversions for Query for iSeries options and functions

You may get a diagnostic message or unexpected result when you select a Query for iSeries option or press a function key that requires a conversion from one CCSID to another. The following may help you understand what conversions may be needed to satisfy various requests and what happens when such a conversion fails.

Displaying a Query for iSeries query

The following table shows how different combinations of job and query CCSIDs affect displaying a query and how constants are treated. You can display the query definition if the process (job) CCSID and the query definition CCSID match, if either is marked with a CCSID of 65535 (do not convert), or if the query definition is not marked. In Table 10 on page 250, 37 is the English CCSID and 65535 is a CCSID that blocks conversion.

Table 10. How CCSIDs Affect Displaying a Query

Job CCSID	Query CCSID	Constants Processed as Marked with CCSID
37	37	37
65535	37	37
37	65535	65535
65535	No tag	65535
37	No tag	65535

Changing a Query for iSeries query

You can change the query definition if the process (job) CCSID and the query definition CCSID match, if either is marked with a CCSID of 65535 (do not convert), or if the query definition is not marked.

Table 11 shows when a query can be changed and how the constants are treated.

Table 11. How CCSIDs Affect Changing a Query

Job CCSID	Query CCSID	Constants Processed as Marked with CCSID
37	37	37
65535	37	37
37	65535	37
65535	No tag	65535
37	No tag	37
37	500	Cannot change

Getting a list of objects with text in Query for iSeries

No conversion is done when query gets text descriptions for queries, translation tables, files, or libraries because these text descriptions cannot be marked with a CCSID.

If the descriptive text is not displayed in a list display, press F11.

Defining a Query for iSeries query

You may see CCSID related diagnostic messages in a definition you are either creating, changing, or displaying. See “CCSIDs and Query for iSeries query definition items” on page 252 for more information.

Defining a collating sequence in Query for iSeries

If a collating sequence CCSID does not match your job CCSID and neither CCSID is 65535, the collating sequence CCSID is converted to your job CCSID before the Define Collating Sequence display is initialized. If a translation table cannot be converted, it is not used, regardless of the choice in the *Ignore character substitution* prompt.

If you are creating or changing a collating sequence and select option 3 on the Select Collating Sequence display, Query for iSeries assumes that you are starting work on a new sequence. Query for iSeries looks at the following list and selects the first existing sequence that either requires no conversion or can be converted (without character substitution) to your job CCSID.

- The previously defined sequence for this query
- The user-defined default sequence from the query-user’s profile
- The language sequence for your system
- The hexadecimal sequence

For example, the language sequence is used to initialize the Define Collating Sequence display if there is no previously defined sequence for the query and the default sequence from the query-user's profile is converted with warnings about the use of substitution characters.

Query for iSeries warns you on the Select Collating Sequence display when the sequence previously defined for this query cannot be converted. You can find out why the language sequence or a user-defined default sequence was not used by pressing F15 (Language sequence) or F16 (Use default) on the Define Collating Sequence display.

Getting a list of formats or members with text in Query for iSeries

If a member or format-text description cannot be converted to the job CCSID, blanks are shown.

If the descriptive text is not displayed in a list display, press F11.

Saving a Query for iSeries query definition

Conversion may be required when an access plan is built to be saved with the query. This can cause previously undetected compatibility problems, and you are asked to confirm saving the query definition with errors.

Running a Query for iSeries query

Each position of every value that cannot be converted to the job or document CCSID is printed or displayed as a plus sign (+). Each position of a text string that cannot be converted is printed or displayed as a dot (.). An edit word that cannot be converted is ignored (edit code J is used instead). This happens regardless of the method used to run the query.

| **Note:** The job CCSID is the CCSID of the job. It can be changed by the command CHGJOB CCSID().

Neither data nor text is converted when the output is directed to an existing file. If a field receiving data has a different CCSID, output processing stops with a diagnostic before any records are added.

If you have done an override to a database file selected for input, Query for iSeries uses the new file information, including the CCSID markings. This can cause the same kind of errors that would be diagnosed at definition time.

If you do nothing to cause the access plan to be rebuilt (see "Access plans in Query for iSeries" on page 232), you can get errors if a file is replaced with a file in a format that requires no level check, but has different CCSID characteristics.

Running a default query in Query for iSeries

When you run the default query for a file, the job or document CCSID and other conversions can fail. For example, the file could be a logical file involving concatenation of fields with different CCSIDs or you may be using a query profile with an incompatible collating sequence default.

Selecting records at run time in Query for iSeries

You can do run-time record selection if the process (job) CCSID and the query definition CCSID are the same, if either is marked with a CCSID of 65535 (do not convert), or if the query definition is not marked.

Table 12 on page 252 shows when record selections can be changed at run time and how the constants are treated.

Table 12. How CCSIDs Affect Run-Time Record Selection

Job CCSID	Query CCSID	Constants Treated as CCSID
37	37	37
65535	37	37
37	65535	37
65535	No tag	65535
37	No tag	37
37	500	Not allowed

CCSIDs and Query for iSeries query definition items

Query for iSeries warns you about some CCSID compatibility problems as you are working on a query definition but some problems are not diagnosed until the query is run. To understand the results, you need to know:

- How CCSIDs are assigned to constants and expressions
- The order in which conversions and comparisons are performed
- Whether the check looks at the data or just the CCSID marking

The following topics present some of this information by query definition item. Refer to "CCSID compatibility considerations in Query for iSeries" on page 254 for information on specific pairs of marked items.

CCSID and file selections in Query for iSeries

If a format that you specify when you are working on a query definition has any text that cannot be converted to the CCSID of your job, you see an error message telling you to select a different file or format.

If you have done an override to a database file, query uses the new file information, including the CCSID markings. This could cause the same kind of errors that would ordinarily be diagnosed at definition time.

CCSID and join tests in Query for iSeries

If fields in a join test have different CCSIDs, a conversion to a compatible CCSID is done. If the two fields do not have the same CCSID and cannot be converted, or if any collating sequence to be used cannot be converted, you see an error message.

CCSID and result field expressions in Query for iSeries

Query for iSeries users in countries other than the United States should type field names and keywords (for example, SUBSTR) in uppercase to ensure correct results. The CCSID of the result field depends on the fields used to define the result. At create time, the system assumes constants are marked with the job CCSID. At change time, the system assumes constants are in the job CCSID of the changing user if the create time CCSID is 65535. If one field is specified, the result field has the CCSID of that field. If values with different CCSIDs are specified, the result field has a CCSID based on the order of the values and type of the expression.

Field and constant values that are not in the CCSID of the expression must be converted. If fields or constants used in expressions have CCSIDs that are not compatible, a message is sent to the user.

For a concatenation symbol you can type:

- Two vertical bars.
- The hexadecimal value of two vertical bars in CCSID 37 ('4F4F'X).
- Two of the characters that have hexadecimal representation 4F in the CCSID of the query.

CCSID and result field column headings in Query for iSeries

A column heading in a result field definition is converted, if necessary, to the job or document CCSID when it is passed back to the document or shown in a report. Dots (...) are shown if the conversion fails.

CCSID and sort fields in Query for iSeries

If the CCSID of the sort field is different from the collating sequence CCSID, the sequence is converted to the field CCSID. If the conversion fails, an error message is sent to the user.

CCSID and record selection tests in Query for iSeries

Query for iSeries users in countries other than the United States should type field names and keywords (for example, NULL) in uppercase to ensure correct results.

At create time, the constants are assumed to be in the job CCSID. At change time, the constants are assumed to be in the job CCSID of the changing user if the create time CCSID is 65535. If the fields or constants used do not have compatible CCSIDs, or if any collating sequence table to be used cannot be converted, you see an error message.

CCSID and summary functions in Query for iSeries

Conversions are performed as needed to evaluate the minimum and maximum functions selected for character fields. For displayed or printed output, evaluation occurs after the data is converted to the job or document CCSID after records are sorted. Minimum and maximum function evaluation is done on unconverted data for summary output to a database file. Any conversion needed to put the results into an existing file is done later.

If a collating sequence is involved, it is converted as needed to the CCSID in which the data is being evaluated. If a conversion error occurs while the collating sequence is being converted, you see an error message. This happens only while a query is running.

CCSID and column formatting and editing in Query for iSeries

Column headings and edit words are converted, if necessary, to the document or job CCSID when passed back to a document or shown in a report. Dots are used if the conversion fails. For an edit word, this forces an error that causes edit code J to be used.

CCSID and report breaks in Query for iSeries

Conversions are performed as needed to evaluate the report break functions selected for character fields. For displayed or printed output, evaluation occurs after the data is converted to the job or document CCSID after records are sorted. Report break evaluation is done on unconverted data for summary output to a database file. Any conversion needed to put the results into an existing file is done later.

If a collating sequence is involved, it is converted as needed to the CCSID in which the data is being evaluated. If a conversion error occurs while the collating sequence is being converted, you see an error message. This happens only while a query is running.

CCSID and break and final text in Query for iSeries

Break text is converted, if necessary, to the document or job CCSID when passed back to a document or shown in a report. Dots are used if the conversion fails.

CCSID and cover page, page headings and footings in Query for iSeries

Page text is converted, if necessary, to the document or job CCSID when passed back to a document or shown in a report. Dots are used if the conversion fails.

CCSID compatibility considerations in Query for iSeries

CCSID marking makes it possible for conversions to be performed before presentation of marked material or use of marked material in comparisons, but can also restrict the use of various combinations of marked items. The following tables show what can occur when pairs of items are marked with different CCSIDs, neither of which is 65535.

Table 13 shows what happens at definition time if item 1 cannot be converted to the CCSID for Item 2.

Table 13. CCSIDs Not Compatible-Definition-Time Consequences

Item 1	Item 2	Consequence
Long comment	Job	Diagnostic shown (not long comment) for F23.
Format text	Job	Format text shown blank on Select Format display.
Format text	Job	Format cannot be specified for file selection. Error diagnosed and displayed on Specify File Selections, Change File Selections, or File Selection Status displays.
Member text	Job	Member text shown blank on Select Member display.
Original column heading	Job	Format cannot be specified for file selection.
Original edit word	Job	Format cannot be specified for file selection.
Collating sequence	Job	Cannot use sequence to initialize Define Collating Sequence display (substitution character involvement is always treated as an error in this case). The consequence depends on the origin of the collating sequence and what you are doing. **(sequence origin)** consequence **(user-defined)** after a warning, prompt bypassed in display mode **(user-defined)** after a warning, prompt initialized from other source for first showing in change mode **(language sequence)** F15 request rejected **(user-defined default)** F16 request rejected. **(job sequence)** F17 request rejected.
Collating sequence	Field	Cannot perform comparison for join. Error diagnosed and displayed on Specify How to Join display or indicated on Define the Query or Exit the Query displays.
Field 2	Field 1	Cannot perform comparison for join. Error diagnosed and displayed on Specify How to Join display or indicated on Define the Query or Exit This Query display.
Field 2/constant	Field 1	Cannot derive expression CCSID. Error diagnosed and displayed on Define Result Fields display or indicated on Define the Query or Exit This Query display. (Can occur when Query definition constant inherits job CCSID of changing user.)[1]
Collating sequence	Constant	Cannot perform comparison for record selection. Error diagnosed and displayed on Select Records display or indicated on the Define the Query or Exit this Query display. (Can occur when Query definition constant inherits job CCSID of changing user.)[1]

Table 13. CCSIDs Not Compatible-Definition-Time Consequences (continued)

Item 1	Item 2	Consequence
Collating sequence	Field	Cannot perform comparison for record selection. Error diagnosed and displayed on Select Records display or indicated on the Define the Query or Exit this Query display. (Can occur when Query definition constant inherits job CCSID of changing user.)
Field 2/constant	Field 1	Cannot perform comparison for record selection. Error diagnosed and displayed on Select Records display or indicated on the Define the Query or Exit this Query display. (Can occur when Query definition constant inherits job CCSID of changing user.)[1]
Field 2/constant	Field 1	Cannot calculate expression for key field when building access plan. Save request rejected; user must submit request again to save with newly discovered error.[1]

1. This can happen when you specify that character substitution warnings not be ignored on the Specify Processing Options display.

Table 14 shows what happens at run time if Item 1 cannot be converted to the CCSID for Item 2.

Table 14. CCSIDs Conversion Problems-Run-Time Consequences

Item 1	Item 2	Consequence
Field 2	Field 1	Cannot perform comparison for join. Run request rejected.
Field 2/constant	Field 1	Cannot perform comparison for record selection. Run request rejected.[1]
Field data	Collating sequence	Cannot perform comparison involving dependent value. Run request fails. No column list results returned.
Field 2/constant	Field 1	Cannot calculate expression for key field when building access plan. Run request fails.[1]
Field 2	Field 1	Cannot convert data to CCSID of receiving record field. Run request fails. (No records added to new file or member.)[1]
Field data	Job	Cannot display or print field values. Run request fails.[1]
Column heading	Job	Column heading line shown as dots in displayed or printed report.
Edit word	Job	J edit code used, not edit word, in displayed or printed report.
Break text	Job	Text line segment shown as dots in displayed or printed report.
Cover page	Job	Cover page shown as dots in displayed or printed report.
Final text	Job	Text line segment shown as dots in displayed or printed report.
Page heading	Job	Page heading text shown as dots in displayed or printed report.
Page footing	Job	Page footing text shown as dots in displayed or printed report.
Collating sequence	Field	Cannot perform break, minimum, or maximum on field for: • Summary-only output to database • A user with job CCSID 65535, to printer or display The run request fails for database or printer output. For displayed output, the run request continues, but all values and summaries are shown as replacement strings (+++).

Table 14. CCSIDs Conversion Problems-Run-Time Consequences (continued)

Item 1	Item 2	Consequence
Collating sequence	Job	Cannot convert table for performing break, minimum, or maximum for field. The run request fails for printer output. For displayed output, the run request continues, but all values and summaries are shown as replacement strings (+++).

Note: For output to display, Query uses a single diagnostic message to warn you to look for unwanted dots and missing edit word text. There is no warning when you print a report.

1. This can happen when you specify that character substitution warnings not be ignored on the Specify Processing Options display.

Table 15 shows what happens at run time when items are marked with compatible substitution CCSIDs, but conversion of Item 1 to the CCSID of Item 2 requires use of a substitution character for some value, and character substitution warnings are not ignored.

Table 15. Compatible with Substitution CCSIDs, Conversion Failure-Run-Time Consequences

Item 1	Item 2	Consequence
Field 2	Field 1	Cannot perform comparison for join. Run ended (output is incomplete).[1]
Field 2/constant	Field 1	Cannot perform comparison for record selection. Run ended (output is incomplete).[1]
Field 2/constant	Field 1	Cannot calculate result field value for sorting. Run ended (no records returned).[1]
Field 2/constant	Field 1	Cannot calculate result field value for use in record selection (the error could occur for the tested field or test value). Run ended (output is incomplete).[1]
Field 2/constant	Field 1	Cannot calculate result field value for output. Replacement string displayed or printed for value and for any subsequent break, minimum, or maximum value for the field. Output to database ended (output is incomplete; possibly some, but not all, records added).[1]
Field data	Job	Cannot convert selected field value to the job CCSID, therefore it cannot be displayed or printed. Replacement string displayed or printed for value and for any subsequent break, minimum, or maximum value for the field.[1]
Collating sequence	Job	Cannot perform break, minimum, or maximum on value converted for display or print. Run request ended for print (output is incomplete). Replacement string displayed for value and for any subsequent break, minimum, or maximum value for the field.[1]
Collating sequence	Field	Cannot perform break, minimum, or maximum for displayed or printed output for a user with job CCSID 65535, or for summary only to database. Output is incomplete for printer or database. Replacement string displayed for value and for any subsequent break, minimum, or maximum value for the field.[1]

1. This can happen when you specify that character substitution warnings not be ignored on the Specify Processing Options display.

Table 16 on page 257 shows the different options allowed for several combinations of process (job) and Query definition CCSIDs. The capital letters A and B represent different CCSIDs neither of which is 65535. The queries with no tags are from a previous release.

Table 16. How CCSIDs Affect Query Use

Job CCSID	Query CCSID	Run Query allowed	Change Query allowed	Run time record selection	Display Query allowed
A	A	Yes	Yes	Yes	Yes
A	65535	Yes	Yes[1]	Yes[1]	Yes[1]
65535	A	Yes	Yes	Yes	Yes
A	B	Yes	No[1]	No[1]	No[1]
65535	No tag	Yes	Yes	Yes	Yes
A	No tag	Yes	Yes[1]	Yes[1]	Yes[1]

1. Either a warning or request ending message is issued.

Bibliography

The following OS/400 books contain information you may need. The books are listed with their full title and base order number.

- *ADTS/400: Data File Utility*, SC09-1773-00, provides the application programmer or programmer with information about using the Application Development Tools data file utility (DFU) to create programs to enter data into files, update files, inquire into files, and run DFU programs.
- *Backup and Recovery*, SC41-5304-06, describes the recovery features of the iSeries system.
- The Backup, Recovery and Availability topic under Systems Management in the Information Center describes the basic backup features of the iSeries system.
- *Printer Device Programming*, SC41-5713-05, provides the application programmer and system operator with information to understand and control printing.
- *IBM Personal Computer Disk Operating System Reference* SC21-8090, provides personal computer users with information on how to use DOS on their personal computer.
- The Globalization Overview topic in the Information Center contains information about the national language support (NLS) function on the iSeries.
- *Programmer's Tool Kit PRPQ*, 5799DAG, contains information programmers can use to correct field and data errors on the iSeries system.
- *CL Programming*, SC41-5721-05, provides an application programmer or programmer with a wide-ranging discussion of OS/400 programming topics, including a general discussion of objects and libraries, control language (CL) programming, controlling flow and communicating between programs, working with objects in CL programs, and creating CL programs.
- The Control Language (CL) Reference information in the **Programming** category of the iSeries Information Center provides the application programmer with a description of the OS/400 control language (CL) and its commands. Each command description includes a syntax diagram, parameters, default values, keywords, and an example. This information should be used to refer to the CL commands to request functions of the OS/400 program and of the various languages and utilities.
- *Performance Tools for iSeries*, SC41-5340-01, provides the programmer with information about what Performance Tools/400 are, gives an overview of the tools, and tells how to manage system performance.
- The Work Management topic in the Information Center provides the programmer with information about how to create and change a work management environment.
- *iSeries Security Reference*, SC41-5302-06, provides the programmer (or someone who is assigned the responsibilities of a security officer) with detailed information for planning a setting up security on the system.
- *IDDU Use*, SC41-5704-00, provides the administrative secretary or business professional with detailed information on how to use OS/400 interactive data definition utility (IDDU) to describe data dictionaries, files, and records to the system. Advanced information about using IDDU to work with files created on other systems and information about error recovery and problem prevention is provided for programmers.

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SC41-5210-04